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Vedat Yorucu
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The Southern Energy Corridor: Turkey's Role in European Energy Security

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Preface

As authors of this monograph, we state up front that we are of Turkish Cypriot origin, both academic economists educated in the British and Canadian tradition of free exchange of ideas. Coming as we do from the divided island of Cyprus, we are fully aware of the strong feelings on ethnic conflict. And, arguably nothing can be more controversial than writing on hydrocarbons and energy security. Cyprus problem, Turkey–EU relations, and conflicts in the Middle East, Cold War and East-West tensions …. these are all part and parcel of what we write.

We hope, indeed pray, that we have been balanced and objective in our presentation of issues and controversies surrounding the theme of the monograph, viz. The Role of Turkey in European Energy Security. If we have erred, it is primarily from our conviction—which lead to the writing of this monograph in the first place—that modern Turkey is grossly under-rated in Europe and the West generally. As the principal successor state to the Ottoman Empire, it is understandable that most European images of anything Turkish are still shaped by the legacies of that Empire. But that is outdated and needs updating.

In our post-Brexit world, with a protectionist US President in the White House, Europe needs new friends and partners. New energy sources are essential to secure its energy future. Turkey itself is an energy-hungry emerging market economy. By geography, it sits on the strategic location linking the Caspian, Middle East and Eastern Mediterranean hydrocarbon fields that provide the vital resource for the Southern Energy Corridor, the principal alternative supply to traditional fossil-fuel supply via the Northern Corridor connecting Russia to European markets via Ukraine.

We believe Turkey and Europe are destined to become energy partners in the near future, with the completion of such pipelines as the TANAP/TAP and the Turkish Stream 2. Turkey is also the logical and rational choice for delivering, at lowest unit cost, Middle East and East Mediterranean hydrocarbons, once wars and conflicts give way to peace. Given peace, energy cooperation regionally as well as between Turkey and European Union will emerge naturally out of market forces, conferring win-win outcomes for producers and consumers as well as for transit countries like Turkey.

This monograph will have been worthwhile if it can promote a better understanding, on the part of potential readers, of the geopolitics and the market forces relating to the development of the Southern Energy Corridor.

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Acknowledgements

Over the last two decades, the authors have collaborated on numerous research projects, writing and publishing several academic papers in scholarly journals. Almost all of these are cited in the monograph along with other related literature. We want to thank the journals and their academic peers who, anonymously, have facilitated our publications. We are grateful to, and acknowledge the kindness, of several publishers and authors who gave us written permission to use copy-righted material. These are appropriately cited in the text. We wish to thank our many colleagues and friends who, in various ways, have contributed to our research and work.

In particular, we thank Prof. Ercan Uygur, the president of the Turkish Economics Association who, not only took a personal interest in our work, but invited us to several academic conferences where we first tested our hypotheses and presented our findings. When Özay was Dean, Faculty of Business and Economics, at the same University, he received much help from Eralp Bektaş, Caner Barın, Bilge Öney, Yılmaz Çolak, Ahmet Yörükoğlu and Serhan Çiftçioğlu. In Canada, he wishes to express his thanks to his academic friends, in particular Dane Rowland, Martin Rudner and Tareq Ismael. Both the authors wish to thank their friends Radar Resat, Ergün Olgun and Rafet Akgünay for their encouragement throughout this project.

Vedat would like to give special thanks to former ambassador of Turkey in Nicosia, Mr. Halil İbrahim Akça for his support to arrange meetings in İstanbul at IGDAŞ (İstanbul Natural Gas Public Company) to precede the research about onshore prefeasibility study of Natural Gas network and distribution systems. The Ph.D. research assistant Mrs. Hatice Imamoğlu at Eastern Mediterranean University also deserves special thanks for conducting such an important and valuable research at IGDAS both for South and the North of Cyprus. The former CEO of IGDAS, Mr Veysel Türkel was very generous with his assistance and technical expertise. The former Rector of College of Europe (Europa College—Brugge Campus) Prof. Dr. Paul Demaret kindly provided hospitality and help in research conducted at the Europa College in 2013 and 2014. Also, it is a pleasure to thank the Coordinator

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A word of thanks is in order for our editors at Springer, in particular Amudha for all the editing and technical work. Last but not least, it is our pleasure to thank our loved ones. Our dear wives, (Karen and Saskia) and all our children (Sean, Erin, Aidan, Stefaan, Suzanne), for their moral support and patience in allowing us to devote unlimited research time, at the expense of family time. Without their understanding, this work would never have been completed.

Needless to say, all errors belong to us as authors.

Vedat Yorucu
Özay Mehmet

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Abbreviations

bcm	Billion cubic metre
BP	British Petroleum Company
EEZ	Exclusive Economic Zone
KRG	Kurdistan Regional Government
KRI	Kurdistan Regional Administration
MBTU	Millions of British Thermal Unit
mcm	Millions of cubic metre
SEC	Southern Energy Corridor
TANAP	Trans Anatolian Pipeline
TAP	Trans Adriatic Pipeline
tcm	Trillions of cubic metre
UNCLOS	UN Convention on the Law of the Sea—1982

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Chapter 1
Introduction

1.1 Europe and Modern Energy Security

Almost four-fifths of EU energy consumption is fossil fuels, almost all oil and natural gas (Eurostat 2013). Moreover, it is import-dependent, possessing reserves supplying less than one-fifth of its consumption. No less than 40% of the EU imports come from OPEC, largely from the turbulent Middle East, and 33% from Russia with which serious security and political problems exist.

Diversification of sources and security of supplies are now seen as the essential ingredients of 'modern energy security' (Biresselioglu 2011). In this context, Turkey is emerging as an indispensable partner to Europe, notwithstanding a troubled relationship in other issues. The country is not itself an energy producer, but it is next-door to more than three-quarters of the global proven hydrocarbon reserves. In a turbulent world, Turkey is rapidly emerging as the most secure and cost-effective route of diversification for European energy requirements. It is already a strategic country, linking Russian, Greater Caspian, Middle East and Eastern Mediterranean hydrocarbon sources. As well, the Turkish economy is rapidly industrializing and Turkey itself is a huge energy consumer.

This monograph is dedicated to the idea that Europe and Turkey are obliged to become energy partners. Cooperation is essential, not only between state actors responsible for enabling legislation and licensing, but as well for promoting a more competitive energy market enabling private-sector investors and corporate actors to undertake the myriad activities involved in monetizing new hydrocarbon reserves, constructing pipelines and linking consumers and producers through dependable network of complementary services.

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1.2 Turkey, The Vital Link

Turkey is already a key transit country on the Southern Energy Corridor, thanks to its unique geographical position at the crossroads of the Caucasus, the Middle East and Europe. Over the next decade, peace replacing conflicts in the neighbouring countries, it is poised to emerge as a regional energy hub. The port of Ceyhan is already the terminal point, connecting several major hydrocarbon (i.e. oil and gas) pipelines for export and further expansion will bring complementary facilities and essential services in energy marketing. Regional geopolitical dynamics are pushing Turkey in this direction. From the north, the Russian–Ukraine conflicts, which not long ago had interrupted gas deliveries, have obliged Europe to seek alternative energy supply routes and have enhanced the Turkish role in European energy security. In Eastern Mediterranean, significant hydrocarbon reserves have been discovered. Israel and Turkey are keen to cooperate, but tension and disputes over territorial boundaries remain. Monetizing East Mediterranean potential wealth requires investment first and foremost in regional peace. Wars and conflicts in Syria and Iraq will, sooner or later, end and reconstruction will commence. Hydrocarbon reserves will no doubt find ready markets in the emerging economies of the region. Beyond regional demand, exporting to western markets will eventually be normalized. Turkey is expected to be a major player in all of these future energy developments.

This monograph, based on original and latest research, explores the geopolitical dynamics of Turkey as an emerging hub on the Southern Energy Corridor.

1.3 Regional Energy Model

The major theme of the monograph is the emergence of a Regional Energy Model. The 'Region' in this context is broad, extending from the Black Sea, the Caucasus and the Greater Caspian Basin, the Eastern Mediterranean and Iraq and the Persian Gulf area. Turkey is the key country in this Model, both strategically and geographically. On the Turkish energy map, several infrastructural facilities are in place: The port of Samsun on the Black Sea coast, connected with undersea pipelines to Russia, Erzurum in eastern Anatolia serving as the interconnector on the Baku–Tbilisi–Ceyhan and TANAP pipeline running west to Europe via the Turkish Straits. In southern Turkey, next to Syrian coast the Turkish energy export terminal at Ceyhan/Iskenderun is already operational and may, in the next decade, emerge as the Rotterdam of Eastern Mediterranean.

Material presented in the monograph demonstrates that the Southern Energy Corridor is capable of contributing to European energy security by monetizing the hydrocarbon wealth of the area, while the countries in the region can derive huge dividends through peace and cooperation within a Regional Energy Model.

1.4 Regional Cooperation: The Old Great Game in a New Setting

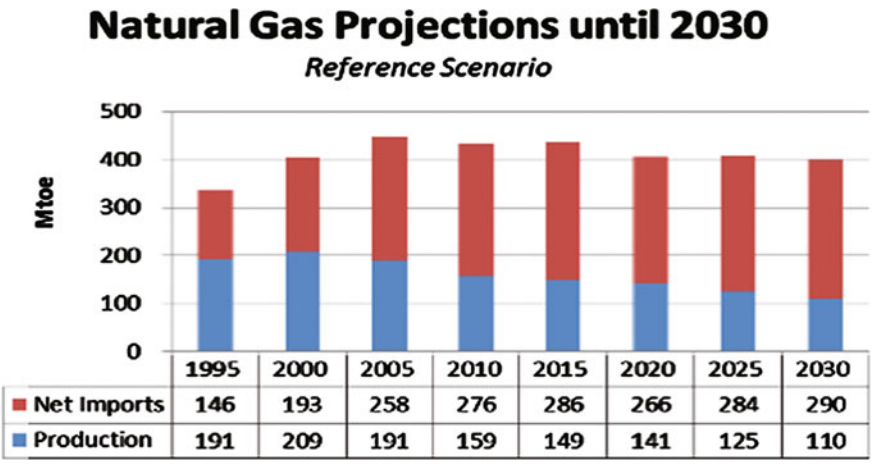
Great challenges, however, must be overcome in sorting out boundary disputes, and peace and cooperation must first replace conflict and animosity before this win–win outcome can be realized. In a historical sense, the same old nineteenth-century imperial games are being re-enacted in the Levant and the Middle East, with Putin's Russia taking on the US-led coalition. Then, it was control of trade routes and warm seas connecting Europe to Kipling's British Raj. Nowadays, a modern version of the Great Game is being played out in Syria. Across the Persian Gulf, energy-rich Shia Iran is competing with even more energy-rich Sunni world of Saudi Arabia and the Gulf States. In the Caucasus, Azeri–Armenian–Turkish hostility has resulted in Baku–Tbilisi–Ceyhan oil pipeline bypassing landlocked Armenia. Russia closely watches and influences competing pipeline projects in the region from its near-abroad perspective to the North, while, of course, being bogged down in conflict with Ukraine. Across the Aegean and in/around Cyprus, Greeks and Turks are in loggerheads in disputes over land and territorial sea boundaries. Likewise, Israel and its neighbours have boundary conflicts in Eastern Mediterranean.

Yet, despite all these rivalries and conflicts, the future must be viewed with optimism. Wars and disputes must ultimately end. Rational choice must sooner or later prevail, and cooperation must replace mistrust. The recent reconciliation agreement between Turkey and Israel, which also incorporates energy cooperation, is a significant example in this direction, as will be shown in the following pages.

By its location and economies of scale, Turkey can become a natural energy hub emerging beyond being a transit country within this Model. It is also a major consuming country with a growing demand for the hydrocarbon wealth in the region to fuel its industrial and economic development.

From a European perspective, evidence shows that EU's net import dependence will continue to rise until 2030 (Table 1.1). For a more efficient energy policy, the EU is aiming at becoming also an Energy Union, promoting and implementing a policy framework of integrated of efficient and coordinated energy system. To become an Energy Union in practice requires solving major internal reforms and making strategic external choices. Internally, national policies amongst members need to be coordinated and integrated. Externally, EU faces a couple of strategic choice problems: on the one hand, it has to opt for more sustainable energy sources, especially Green Energy, it needs tax and subsidy programs to avoid dirty oil, coal and shale gas which have major environmental costs. On the other hand, in regards to imports, it has to choose the most cost-effective source from several competing supply sources from different parts of the world, e.g. Algeria, Libya, Nigeria, Qatar, along with the Southern Energy Corridor, all in the context of reducing its excessively high dependency on Russia (Table 1.2). For its part, Russia will most

Table 1.1 EU natural gas net imports to 2030



Source John Roberts presentation at METU on 6 May 2016 (Eurostat 2013) European Commission data, used with permission of the author (see Roberts 2014)

Table 1.2 Natural gas supplies to Europe

	2010	2011	2012	2013	2014
Supplies by major gas exporters					
OAO Gazprom (long-term contracts)	138.6	15n/a	138.8	161.5	146.6
Algeria (incl. LNG)	57.3	52.4	46.5	36.6	31.7
Libya (including LNG)	10.3	2.5	6.7	5.7	6.5
Qatar	32.9	43.9	31.3	24.4	23.7
Nigeria	13.5	18.1	12.1	7.0	6.0
Total	252.6	266.9	235.4	235.2	214.5
Supplies by major European producers					
Norway	115.4	109.4	121.4	114.7	116.8
Netherlands	76.5	72.9	72.6	77.7	63.1
UK	64.5	51.1	43.8	41.2	41.2
Other	100.8	56.6	73.5	71.5	50.4
Total	357.2	29n/a	311.3	305.1	271.5
Total	609.8	556.9	546.7	540.3	486.0

Source John Roberts, op. cit (Gazprom Annual Report, May 2015), used with author's permission

certainly not remain idle, countering efforts to reduce its market share in energy markets with geopolitical strategy, be it in Syria or elsewhere in the Southern Energy Corridor.

1.5 Global Energy Shift

Globally, there is a significant shift underway in energy sources. During 1994–2014, fossil fuel registered the fastest growth in energy, led by coal, gas and oil. Emerging economies, such as China and India, have relied principally on these fossil fuels to launch their industrialization. In the period ahead, from 2014 to 2035, while gas will keep on growing, coal and oil growth will decelerate, while non-renewable energy sources, as well as hydroelectricity and nuclear, will expand (Fig. 1.1).

Notwithstanding these forecasts, at least for the foreseeable future, fossil fuel dominance of world energy markets will continue. A projection by BP (Box 1.1) shows that fossil fuel share of energy, accounting for 86% of global energy supply, will still account for 80% in 2034. While alternate and renewable sources are being promoted for greater diversification and sustainability, documented in EU's Green Energy publications, fossil fuel derived from hydrocarbons will, for the foreseeable future, remain as the principal source of energy supply.

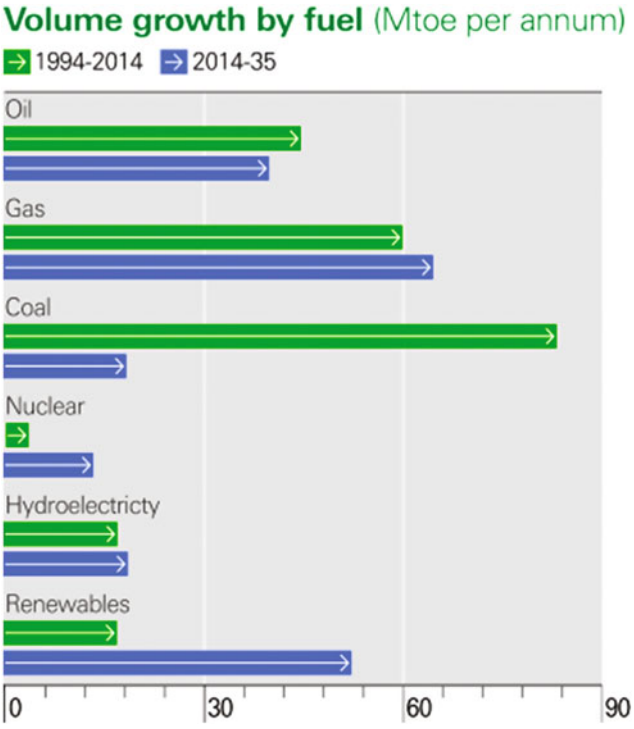


Fig. 1.1 Volume growth by fuel (Mtoe per annum). *Source* http://www.bp.com/en/global/corporate/energy-economics/energy-outlook-2035/energy-outlook-to-2035.html

Box 1.1 From Fossil fuel Dominance to Non-renewable Energy, 2014–2034

Fossil fuels remain the dominant source of energy powering the global economy, providing around 60% of the growth in energy and accounting for almost 80% of total energy supply in 2035 (down from 86% in 2014).

Gas is the fastest growing fossil fuel (1.8% p.a.), with its share in primary energy gradually increasing. Oil grows steadily (0.9% p.a.), although the trend decline in its share continues.

The combined increase of oil and gas over the Outlook is similar to the past 20 years.

In contrast, coal suffers a sharp reversal in its fortunes. After gaining share since 2000, the growth of coal is projected to slow sharply (0.5% p.a.), such that by 2035 the share of coal in primary energy is at an all-time low, with gas replacing it as the second-largest fuel source.

Among non-fossil fuels, renewables (including biofuels) grow rapidly (6.6% p.a.), causing their share in primary energy to rise from around 3% today to 9% by 2035.

Source http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2016/bp-energy-outlook-2016.pdf

1.6 The Emergence of the Southern Energy Corridor

Southern Energy Corridor is a key component of European energy security. Diversification of sources and pipeline routes may ultimately reduce Russian dependency via the Northern supply route. Diversification need not become a cause for rivalry. Increasing cooperation between Ankara and Moscow, for example, via the Turkish Stream via the Black Sea, may prove a win–win outcome, satisfying both Russian and European requirements. In this sense, as well, Turkey may play a constructive role in making the Regional Energy Model a reality, as will be demonstrated in this monograph. In this context, it is a positive step that the European Bank for Reconstruction and Development is expected to become a significant investor in the giant TANAP pipeline to deliver natural gas to European markets from Caspian Basin as early as 2019 (https://www.azernews.az/business/117162.html). However, as will also be amply demonstrated in the following pages, there are serious hurdles and geopolitical obstacles in translating the Southern Energy Corridor into a full-fledged reality.

1.7 Hydrocarbons in the 'Feed Region' of the Turkish Energy Corridor

What is the quantity of hydrocarbons in the feeding region of the Turkish (Southern) energy corridor? The 'feeding region' in this context consists of three areas, viz. (1) The Caspian Basin; (2) Part of the Middle East including Iraq, Iran, Kuwait and Qatar; and (3) The Levant Basin. Table 1.3, summarizing data presented elsewhere in the monograph, gives the latest known reserves in this region. In addition, the Russian sources via the Black Sea region are also becoming an integral part of the feeding region.

1.8 EU Idealism, European Values and National Energy Policy Divergences

European civilization is understandably the envy of much of the world. High culture always goes hand in hand with prosperity and EU, as a bloc, aspires to be a model of Union of Values built on basic human freedoms, including free press,

Table 1.3 Hydrocarbon reserves in the Turkish energy corridor 'Feed Region'

Natural Gas (billion cub. metres, unless otherwise stated)	Crude oil
The Caspian Basin: Azerbaijan (Shah Deniz Ph.I &II) 1.2tcm Azer.: (ACG deep level) 300–500 Azer: (Umid, Babek, Nakchivan, Apsheron, Zafer-Meshel, Araz–Alov, Sharq, Asiman-Shafaq) 2.7 tcm Turkmenistan (Galkynysh) up to 26.2 tcm (Dauledabad) 1 tcm (Offshore Block 1) 180	7.0 billion barrels (CIA Factbook, 1/1/2015)
The Levant Basin: Israel (Leviathan, Tamar, Dolphin, Dalit, Tanin, MariB, Noa) 806 Egypt (ZOHR) 645–730 Cyprus (Aphrodite) 140–220 Gaza Marine 1–2* 28 Lebanon #(Blocks 1,4, 9) 43.1 tcf	865 million barrels
Middle East: Kurdistan Reg. Adm., Iraq 3–6 tcm Iraq (Akkas) 59.4 South Pars–North Dome (Qatar–Iran border) 51 tcm	360 billion barrels

Sources and Notes See Tables 2.1 and 3.1
Notes * yet-to-find basis; # [based on 50% probability est.]

freedom of movement and democracy. These values make Europe great. In particular, it is a magnet for refugees, escaping war and persecution in Africa, Middle East and elsewhere. Understandably, European citizens and their political leaders wish to preserve their civilization, to keep out terrorists and enemies out of their daily lives.

Western civilization rests heavily on adequate supply of affordable energy. Homes, cars and industries cannot run without imports energy, given the fact that Europe is nowhere near energy self-sufficiency. In January 2009 and for a long time subsequently, several European countries froze in −10° arctic conditions, when Russia cut off gas supplies as a result its dispute with Ukraine. This is not the only example of European energy vulnerability. It is sufficient, however, to demonstrate in stark reality how fragile European civilization and EU idealism are without energy security. It behoves EU leaders and citizens to recognize their vital dependency of European values and civilization on regions beyond Europe's borders, to recognize the imperative of diversification and the strategic significance of regions which, while refugee-producing, are also rich in energy resources on which democratic values and high culture depend.

In the summer of 2016, with UK voters choosing to leave EU, prospects for EU policymaking, in energy as well as in other areas, looked extremely challenging. Whether or not Brexit negotiations will lead to a cooperative exit, or whether it will lead to contagion and cause severe damage in energy security and supplies remains to be seen. In the meantime, major policy inconsistencies remain within EU idealism and energy policy priorities at the national level, especially in the Eastern Mediterranean region. On the one hand, European policymakers, in particular at the Commission, have announced in 2015 an Energy Union, 'the biggest energy project since the European Coal and Steel Community', with the overall aim to coordinate the transformation of European energy supply. Poland's Donald Tusk and other East European leaders have taken the lead to strongly react against Russian annexation of Crimea as an outcome of the Ukrainian conflict, and remain committed on reducing European dependency on Russian energy supply. Within the EU, fiscal policy is expected to be harmonized through tax and subsidy reforms to promote energy security, solidarity and trust around a fully integrated energy market. Energy demand will become more efficient and more sustainable by decarbonizing the economy. Germany has gone ahead and introduced subsidies in favour of electronic car.

However, fiscal policy harmonization remains a big challenge for EU, not only in energy but also in macroeconomic policy in general. In regards to Eastern Mediterranean energy geopolitics, major differences exist in national policy divergences. Greece, for example, while adopting a fairly favourable stance on Trans-Adriatic Pipeline, remains closely allied with Greek Cypriot authorities in promoting the uneconomic undersea pipelines from Cyprus to Greece. Likewise, at the present time, with no Cyprus settlement, Greek Cypriot LNG plants are approved, on paper, in disregard of costs and prices prevailing in energy markets. Greeks and Greek Cypriots, who suffered so badly from recent Euro debt crises and who were saved thanks to huge EU bail-out financial aid, are obliged by market forces to cooperate with Turkey in developing cost-efficient routes of delivering

Levant hydrocarbons to the nearby Turkish pipelines. As will be documented extensively in the following pages, at the moment (with unresolved Cyprus problem) Greek Cypriot authorities in Cyprus reject energy cooperation with Turkey, support rival Russian geopolitics and actively seek Israeli and/or Arab countries to join a Greek-Middle East energy consortium. But Greeks (and Greek Cypriots) are effectively bankrupt. They expect Europeans to ignore market forces and finance such high-cost energy pipedreams. At the end of the day, the more rational choice relying on Turkish-Israeli hydrocarbon cooperation may operate as a catalyst.

This, perhaps, is where European decision-makers can make the difference. Taking a cue from the reconciliation of Turkey and Israel, political leaders in the EU can choose the path of peace and cooperation in the development of the Southern Energy Corridor. European actors certainly have very significant tools of leverage, controlling as they do technology and investment resources up front and as final consumers of East Mediterranean hydrocarbons at the end of the monetization process. They can encourage private-sector actors in the selection of the most efficient and cost-effective pipelines, and offer financial incentives to state actors and stakeholders in energy consortia to bring about the most rational decision outcomes. At the end, market forces must determine these outcomes, but political leaders in the EU as well as in states in the Levant Basin must be capable to respond to, and seize those market choices from a myriad of competing alternatives. There are, no doubt, complicating issues which may cause delays or create uncertainty. Brexit negotiations and an unpredictable Donald Trump as president in the White House are two such issues in the Spring of 2017. Yet, for its own greater self-reliance, it is imperative for the EU to safeguard its long-term energy security by means of the Southern Energy Corridor.

1.9 Comparative Cost of Alternative Routes

Delivery of energy supplies to European markets depends crucially on unit cost of alternative supply routes. On this basis of evidence presented in this study, it appears that Turkish pipelines, delivering hydrocarbon energy to European markets has the economic advantage over such alternative as the East Mediterranean Pipeline. According to comparative cost figures (see Chap. 4), TANAP's unit cost may be as much as five times less compared to gas delivered through the East Med pipeline.

1.10 Outline of the Monograph

The monograph consists of ten chapters including this Introduction. The eight substantive chapters are organized in four Parts. Part I on Turkey's role in European Security consists of two chapters. Chapter 2 is focused on the concept of this

particular Corridor, defining and articulating its rationale, emergence and the geopolitical dynamics surrounding it. Chapter 3 is concerned with the central issue of securing future European energy supplies from such alternative sources as in the Caspian Basin and Eastern Mediterranean.

The details of the Turkish role as an energy hub are further discussed in Part II. Chapter 4 highlights that country's dual role, viz. as an energy transit country now extensively networked with pipelines, generally running from sources in the east to markets in the west, and as a consuming country, a growing market itself with a rapidly increasing energy demand. Chapter 5 provides in-depth empirical evidence of the Turkish energy market, utilizing authors' own previous research. At the present time, Turkey is an insignificant producer of hydrocarbons. As a result of the ongoing conflict with the Kurdish terrorist group PKK, there is no investment for exploration in the country's south-east region bordering the hydrocarbon-rich Northern Iraq. Turkey is therefore obliged to import no less than 97% of its energy requirements from imports, especially from Russia, Iran, Iraq and other sources, giving rise to a major problem of dependency and vulnerability. Thus, discovery of hydrocarbons in Eastern Mediterranean in waters facing the Turkish coastline is, naturally, of vital national interest to Turkey.

Part III of the monograph, organized in three chapters, deals with these discoveries. Chapter 6 provides details of the hydrocarbon, covering volume and location and the boundary disputes which these discoveries have generated. Geopolitical factors are then highlighted in Chap. 7 which identifies and evaluates specific national and trans-national pipeline projects. Then Chap. 8 is focused on the economic, engineering and financial details of the infrastructural investments to connect the Turkish pipelines and the further development of the Turkish energy hub in the region. Nevertheless, alternative scenarios are also discussed. This is done on the basis of analysing the related literature. Revealingly, almost totally authorities consulted are agreed that the most rational (i.e. cost-effective) method of monetizing the gas resources in the Eastern Mediterranean region is by connecting to the Turkish energy corridor. Nevertheless, we shall also examine the investment and financial implications of alternative scenarios that have emerged due to political conflicts and rivalries.

Part IV is the conclusion in two brief chapters. Chaps. 9 and 10 discuss EU-Turkey relations, highlighting the importance of the Southern Energy Corridor in securing Europe's future energy requirements.

References

Biresselioglu, M. (2011). *European energy security, Turkey's future role and impact*. Basingstoke: Palgrave Macmillan, UK

BP Statistical Review of World Energy 2011. (2011). Retrieved January 28, 2013, from http://www.bp.com/en/global/corporate/energy-economics/energy-outlook-2035/energy-outlook-to-2035.html. http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2016/bp-energy-outlook-2016.pdf.

Eurostat. (2013). International Energy Agency and BofA Merrill Lynch Global Research, Bloomberg, in Keating, D. (2013) Liberalisation of Europe's energy markets has had mixed results, and the sector is still dominated by a few big firms. *European Voice* (pp. 16–17), July 11, 2013.

Roberts, J. (2014). Gas in the Eastern Mediterranean: Great promise but no early answers. *European Energy Journal, 4*(1), 71–76.

Part I
Definitions, Norms and Models

This Part is concerned with laying the basis of the discussion to follow. It is devoted to defining key terms, such as energy 'security', 'corridor', 'hub' and it examines legal norms and diplomatic methods of conflict resolution in the disputed energy fields and boundaries. Boundary conflicts are best resolved with goodwill and cooperative arrangements sharing hydrocarbon wealth in disputed waters. In this Part, we look at actual experience of success cases as examples of Best Practice, hoping that the countries involved in the Southern Energy Corridor can, over time, develop cooperative modalities of sharing the hydrocarbon wealth of the region, in peace and shared prosperity.

Chapter 2
Europe's Energy Security and the Southern Energy Corridor

2.1 What Is Energy Security?

In this study, we do not see 'energy security' as an absolute, static term. Rather what is considered secure is a variable, a continuum, since a pipeline, route, field or supply is always subject to risk. The risk involved is intricately involved with conditions of peace or conflict prevailing at a particular point in time, taking account of diplomacy or geopolitics. At one point in time, there may be cordial, friendly relations among countries hosting a pipeline on land or undersea, or there may be partners in exploiting and monetizing an energy supply. At a later period, these peaceful relations may become adversarial. Peace may break down into conflict, or vice versa.

Accordingly, in this study, we shall classify hydrocarbon sources of supply by current levels of risk, as we see them. Thus, as our concern is with European 'energy security', we shall define, or approach, different supply routes according to what we believe is more or less secure at the time of writing.

The EU is expected to support a regional cooperation scheme aimed at developing an Eastern Mediterranean gas hub for both energy policy and foreign policy considerations. Regarding energy policy, the EU must initiate the creation of a long-lasting gas supply diversification strategy. However, regarding foreign policy the EU needs to initiate international collaboration in an area of the neighbourhood that currently presents very low profile of cooperation due to political problems among neighbouring countries. This will be explained in more detail in Chap. 3 under Sect. 3.4.

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2.2 What Is Energy Corridor?

Energy Corridor is a route, typically a pipeline on land or undersea for large-scale transport of hydrocarbons, connecting a producing source to a market destination. It is manmade and requires huge upfront investment for infrastructure and other facilities, such as transmission stations, storage and warehouses, refineries and export/import terminals and related infrastructure. Examples of special interest here are Northern Energy Corridor delivering Russian energy supplies to European markets via Ukraine. By contrast, in this monograph we focus on the Southern Energy Corridor through Turkey. It has three major wings: First, the Baku–Tbilisi–Ceyhan Pipeline transporting Caspian Basin oil to the export terminal at the Port of Ceyhan in southern Turkey near the Syrian border.

Second, there is the Russian–Turkish energy link across the Black Sea. Already, there is the Blue Stream linked to the port of Samsun, now in operation, but new ones are being planned to become operational in the near future.

Third, the Trans Anatolian Pipeline (TANAP) runs from Azerbaijan to the Greek–Turkish border in Thrace to link up with the Trans Adriatic Pipeline (TAP) to carry Caspian and Central Asian hydrocarbons to Western markets. There are, as well, other subsidiary pipelines, for example, Kirkuk–Ceyhan carrying oil from northern Iraq, and the Arab Gas Pipeline projected to connect Ceyhan to a network of countries including Syria, Lebanon, Jordan, Israel and Egypt. New and strategic pipelines in Eastern Mediterranean are also in various stages of planning.

Energy corridors are subjects of great geopolitical discourse. For example, the freeze-up in European countries in January 2009 when Gazprom stopped deliveries in the wake of a price dispute with Ukraine, and then again when war broke out between Ukraine and Russia earlier in 2014 has created a new sense of urgency for reducing European dependency on the Northern energy corridor. As a result, several European countries joined in the huge NABUCCO project to develop a Southern supply route. However, euro debt crisis and geopolitical considerations, along with cost, have now replaced this project with a more feasible one, TANAP, to be financed by Azeri and Turkish investors along with Greek and Italian partners for the TAP segment. Russia favours the TANAP-TAP route, wishing to link up with Turkish Stream across the Black Sea, completely avoiding Ukraine. This wider rationale, with Russian involvement along with Azeri and Turkish component (and likely Israeli participation), reinforces the Regional Energy Model endorsed in this study.

The Southern Energy Corridor has received a big boost from yet another source. The discovery of new sources of natural gas in the Levant Basin has given rise to renewed hopes and expectations of a new bonanza. Cypriot explorations to date have been rather disappointing, but, on the other hand, discovery of important gas fields in Israeli, Lebanese and Egyptian territorial waters has strengthened the prospect of regional cooperation. Israel holds the key, at least initially, as it must

find export markets to monetize its hydrocarbon wealth. Turkey, on the other hand, as the nearest big market, with an existing export terminal at Ceyhan and its TANAP/TAP pipeline to Europe, offers the most cost-effective route to monetize Levant Basin hydrocarbon reserves. However, rather than one giant multinational energy consortium, a gradual, step-by-step evolution of the Regional Energy Model seems the most likely scenario. Thus, in the first stage, Israel would transport natural gas from Leviathan and Tamar to its own port, then, when geopolitics permits, it would transfer exportable gas to Egypt. With its own huge discovery at Zohr gas field, Egypt may eventually have capacity for LNG conversion, and exportable surplus to Europe and world markets. At the same time, and again depending on favourable geopolitics, Israel would likely enter into an undersea pipeline project with Turkey to transport its gas to Ceyhan, going via Lebanese and Cypriot territorial waters, raising the attractive incentive to these countries of win-win prospects. Depending on whether there is a Cyprus settlement, Greek and Turkish Cypriot regimes may join in, together or separately, in the Israeli–Turkish project. In all these projects, the Israeli determination to monetize offshore hydrocarbon reserves may be expected to trump problems relating to the exact delimitation of boundaries over territorial waters, now under dispute.

2.3 Law of the Sea and EEZ

Articles 55, 56 and 57 of the UN Convention on Law of the Sea (UNCLOS 1982) define, regulate and empower coastline states to declare and 'exclusive economic zone' (EEZ) for up to 200 nautical miles in their territorial waters, so long as there is no overlapping boundary issue. Turkey is not a signatory to this Convention [over its dispute with Greece in the Aegean] and is therefore not obliged to honour its application affecting Turkish national interest. Israel, too, is not a signatory to UNCLOS, and neither is the USA. In practice, this would mean that neighbouring countries having overlapping territorial waters should resolve these EEZ disputes through diplomacy and cooperation. Put differently, EEZ boundaries affecting Turkey cannot be determined unilaterally.

Most significantly, article 79 of UNCLOS specifies principles relating to submarine cables and pipelines on the continental shelf (Box 2.1). Subject to the provisions of this article, all states are entitled to lay submarine cables and pipelines.

Box 2.1 Article 79 of UNCOLS

1. *All States are entitled to lay submarine cables and pipelines on the continental shelf, in accordance with the provisions of this article.*
2. *Subject to its right to take reasonable measures for the exploration of the continental shelf, the exploitation of its natural resources and the*

prevention, reduction and control of pollution from pipelines, the coastal State may not impede the laying or maintenance of such cables or pipelines.

3. *The delineation of the course for the laying of such pipelines on the continental shelf is subject to the consent of the coastal State.*
4. *Nothing in this Part affects the right of the coastal State to establish conditions for cables or pipelines entering its territory or territorial sea, or its jurisdiction over cables and pipelines constructed or used in connection with the exploration of its continental shelf or exploitation of its resources or the operations of artificial islands, installations and structures under its jurisdiction.*
5. *When laying submarine cables or pipelines, States shall have due regard to cables or pipelines already in position. In particular, possibilities of repairing existing cables or pipelines shall not be prejudiced.*

Source UNCLOS (1982)
http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

These states have the right to lay such submarine facilities and coastal states 'may not impede the laying or maintenance of such cables and pipelines'. However, the consent of coastline states is required in delineating the course. This consent must rest on (1) 'reasonable measures for the exploration of the continental shelf' and (2) 'the prevention, reduction and control of pollution from pipelines'. In short, coastal states do not have an outright veto right to prevent other states wishing to lay undersea pipelines. If a pipeline proposed by other states does not conflict with existing exploration rights of coastline state in the area of the pipelines concerned and safeguards the environment, then consent cannot be reasonably withheld. Once a pipeline is laid, Art 79 (5) kicks in, protecting built pipelines. Accordingly, if for example, the course of the pipeline goes through an area with no hydrocarbons or other submarine wealth at the time when a pipeline is laid, and at the same time the pipeline meets environmental standards, consent should be forthcoming as a matter of reasonable behaviour. Consent cannot be denied as of right under UNCLOS.

Regardless of legality, the case of South Cyprus, Greece and Turkey presents exceptional difficulties in so far as territorial waters are concerned. Greece has refrained from unilateral application of its legal right under the UN Convention in Aegean to extend its territorial waters around Greek islands to 12 miles [from the status quo of 3 miles], no doubt in deference to Turkish declaration that such unilateral action would be '*casus belli*', i.e. declaration of war on Turkey, the strong implication being a military showdown.

The Cypriot case is even more complex because Turkey does not recognize Greek Cypriot regime as the legitimate 'Republic of Cyprus' declared in the 1960 Constitution for which, along with Greece and the United Kingdom, Turkey acts as a 'Guarantor Power'. The 1960 Constitution, giving Cyprus independence from the United Kingdom provided a partnership Republic which, in 1963–1964, was

violently destroyed and replaced by an all-GC regime. The problem was further complicated in 1974 when GC regime at that time in power, staged a coup d'état for ENOSIS (union of the island with Greece) which Turkey prevented by military intervention. As a result, the island has been divided on ethnic lines into all-GC South Cyprus and all-Turkish North Cyprus. The former enjoys international recognition and since 2004 has been an EU member. Turkish Cypriots, for all practical purposes, are isolated politically and diplomatically, their 1960 Constitutional rights remaining in limbo. The UN Secretary General has led a 'good offices' mission since 1964, working to date fruitlessly to resolve the impasse. The latest round of UN-led negotiations in Crans-Montana Switzerland in July 2017 concluded in failure.

GC regime in South Cyprus, in concert with Greece, has taken unilateral action, without the consent of Turkish Cypriots, to declare its own EEZ, ignoring Turkey's overlapping claims. It has also adopted a blind eye to Turkish Cypriot rights as co-owners of the island, claiming exclusive sovereign rights, including licensing, exploration and monetization of hydrocarbons, often undermining ongoing UN-sponsored negotiations. With the discovery of natural gas reserves in the island's territorial waters, these overlapping claims have become even more intense and provocative.

Turkish Cypriots, backed by Turkey, claim co-ownership and an equal say in exploration and monetization of these hydrocarbons, insisting that these offshore gas fields must be exploited and monetized only after settlement of the Cyprus Problem when cooperation and win-win outcome becomes feasible.

The Greek/GC and Turkish/TC cases of disputed territorial waters are not the only ones in Eastern Mediterranean. There are disputes between Lebanon and Israel and in the case of the Arab Gas Project, topics to be discussed in later parts of the monograph. In addition, the East Mediterranean region is bedevilled by civil war, conflict and terrorism. Egypt, which recently discovered huge offshore reserves in the Zohr gas fields, is threatened by Islamic terrorism directed at the military regime as well as the peace deal with Israel. The Jewish state, bogged down with the Palestinian conflict, is surrounded by hostile neighbours. It has a fragile peace with Cairo, and has invested heavily in a network of pipelines over Sinai and undersea with Egypt, but is constantly vulnerable to Islamic terrorism targeting not only the land and population of Israel itself, but also its pipelines to from Leviathan and Tamar gas fields. It needs Turkey, the only Muslim-majority power in the region for normal diplomatic and commercial relations to monetize its Levant hydrocarbons. This has been confirmed in the reconciliation agreement reached between the two countries on 27 June 2016. Lebanon is in much the same situation. Burdened with a complex demographic and domestic political agenda, it lacks capacity to invest in infrastructure and manage its huge offshore hydrocarbon wealth and it has a boundary problem with Israel.

Regional peace and cooperation is clearly the optimal solution for realizing its hydrocarbon wealth potential. Looking to the future, rational choice seems to be most evident in the case of Israel gas fields. In this context, the most pragmatic way forward is through private-sector led development of the Regional Energy Model.

Israel, in particular, can play a vital role in launching such a Model. Utilizing its good relations with Greek Cyprus, for example, Israel can finance an undersea pipeline going through Cyprus EEZ, securing the necessary consent from Nicosia for this, while Turkish partners can undertake responsibility for the northern segment of the pipeline going to Ceyhan.

Private partnership is the key East Mediterranean Energy Model. Oil and gas companies, foreign and local, pursuing commercial self-interest, can provide finance, investment and technical know-how. But, of course, states and political leadership must facilitate with licensing, promotion and protection of a healthy business environment. Existing international law is supportive of an Israel–Turkey undersea gas pipeline. In addition to UNCLOS reviewed above, there is legal support from the Energy Charter Treaty. Under this Treaty, to which both Cyprus and Turkey are signatory powers, EEZs are not considered 'sovereign territory', meaning that Greek Cypriot claims of territorial waters cannot stop an Israel–Turkey undersea pipeline from proceeding as a bilateral project. Of course, the better alternative would be a political settlement in Cyprus and peaceful relations between Cyprus and Turkey. Cyprus has already good relations with Israel, and, as pointed above, there are ways of overcoming Greek Cyprus concerns, even in the event of non-settlement of the Cyprus Problem. Better still would be settlement. Given peace and cooperation, great prosperity can be achieved through partnership for a win-win outcome. For this to happen, perhaps the optimal path is a private-sector development of hydrocarbon wealth and pipeline construction in otherwise troubled waters. Some combination of private and public interest for common good is also a reflection of reasonable behaviour. This is what happened elsewhere, when wiser and cooler heads win the day. A model case if the North Sea Oil, briefly discussed below.

2.4 What Is Reasonable? The Case of North Sea Oil

The North Sea hydrocarbon wealth is an impressive model of international cooperation for a 'win-win' outcome. It can be used as a reference in determining 'reasonable' decision-making under Art. 79 (2). No less than five countries (UK, Norway, Denmark, Germany and the Netherlands) have behaved with rationality and common-sense to divide the North Sea and share its hydrocarbon wealth, peacefully and cooperatively. Even though the North Sea in question contains numerous small islands, each potentially with its own EEZ, the five countries have gone ahead basing their share of division of 290,000 miles^2 (750,000 kms^2) cooperatively, according to agreed median lines, taking cue from a 1958 Continental shelf convention and an enabling court ruling in 1969. Division among the five countries was achieved first, major discovery and monetization followed later.

Oil and gas in the North Sea is produced by five countries. Within each of the five national jurisdictions, national tax and royalty licensing regime prevails.

Peaking in 1999, production of North Sea oil was almost 950,000 m^3 (six million barrels) per day. Natural gas production was nearly 10 trillion cubic feet. As a result of Brexit, Scotland may eventually opt for independence, in part to better control its share of the remaining North Sea energy resource. However, in view of diminishing gas reserves, other considerations will, no doubt, play greater role in such an eventuality.

2.5 What Is an Energy Hub? Can Ceyhan Be a Hub?

There are several competing interests and potential candidates in Eastern Mediterranean to emerge as an energy hub: Syrian port of Latakia (once the Syrian war is over), Limassol in South Cyprus, Tripoli, Lebanon or other locations in the Levant. Economics of scale and efficiency considerations suggest that only one candidate is likely to become an energy hub. In this study we believe the Turkish export terminal at Ceyhan is already on the way to beat the competition. It is acquiring significant comparative advantages over other candidates, but undoubtedly major challenges exist in this case, as well as in others.

An energy hub is a strategically located centre, typically a port, offering a set of energy infrastructure and related services. The Port of Rotterdam is perhaps the best example of an energy hub at its most integrated stage (*Source* www.portrotterdam.com).

It offers integrated array of energy infrastructure, covering arrival, storage, production and distribution of traditional fossil fuels, LNG plants and modern renewable forms of energy. As well, it provides related services ranging from financial and marketing that permit the setting of spot prices to cutting edge research and innovation centres working to reduce fossil fuel dependency and its replacement with renewable and sustainable energy from as solar, wind and water.

As documented in this study, Turkey is rapidly emerging as a pivotal country in the Southern Energy Corridor, connecting final delivery markets in Europe to supply sources in the Caspian basin as well as the other hydrocarbon fields in Iraq, Kurdish Regional Government, Iran and Levant basin of Israel, Egypt, Lebanon and Cyprus. The Port of Ceyhan (Fig. 2.1) is strategically located in the Bay of Iskenderun to become an energy hub serving the Levant region in Eastern Mediterranean. It is already the terminal of the Baku–Tbilisi–Ceyhan and the Kirkuk–Ceyhan pipelines. It began operations in 2006 and by 2014 2390 tankers loaded 1.84 bn barrels of oil have been shipped (*Source* http://www.seanews.com).

Several new pipeline projects are in various stages of planning, augmenting the role of Ceyhan, notably an Israeli–Turkish water and gas pipeline passing through Northern Cyprus, the Samsun–Ceyhan pipeline delivering Russian gas via another pipeline across the Black Sea and the Arab Gas Pipeline involving Egypt, Jordan, Syria and Lebanon. Cypriot gas prospects are also on the horizon, depending on geopolitical considerations. With growth and expansion Ceyhan has the potential to become the Rotterdam of the region.

Fig. 2.1 Boat loading at Ceyhan Terminal. *Source* http://www.botasint.com/Foto/Original/477__BIL9380.jpg (accessed on 05 August 2017)

However, the Eastern Mediterranean region is a zone of conflict, shaken by civil wars and terrorism, unstable regimes, and several boundary disputes. Daunting challenges must first be overcome before any potential hydrocarbon wealth can be realized. We shall now explore some of the principal challenges in the region.

The quantities of hydrocarbons in the East Mediterranean Basin are not exactly known. Cost of exploration in troubled waters is not only risky as investment. Disputes over ownership and monetization make development of hydrocarbon fields exceedingly uncertain. Accordingly, how much gas and oil exists is estimated only speculatively. Proven reserves change constantly with new discoveries. Thus, Table 2.1 figures, updated upwards with the addition of new reserves discovered at Zohr gas fields in Egyptian territorial waters, puts total East Mediterranean gas reserves at 8734 bcm. The Zohr gas field is by far the largest, estimated at between 645 and 730 bcm, enough to justify construction of LNG plant, to meet Egyptian domestic needs as well as providing an exportable surplus. Potential Egyptian energy cooperation would include Israel as well as Greek Cypriots and Greece. Greek Cypriot authorities announced their intention to proceed with exploration and drilling in Parcels 10 and 11 of their EEZ during the month of July 2017, a unilateral action rejected by the Turkish side.

Hafner and Tagliapietra (2016) have accentuated that, after the discovery of the Zohr field, Egypt seems to hold the keys of the Eastern Mediterranean gas future. According to the authors, it might opt to develop its resources in parallel to Israel and Cyprus, by creating a new Eastern Mediterranean gas hub based on its existing

Table 2.1 Volume of offshore gas in Eastern Mediterranean

Israel	
Leviathan	476 bcm
Tamar	250 bcm
Dolphin	2 bcm
Dalit	14 bcm
Tanin	33 bcm
Mari-B	30 bcm
Noa	1 bcm
Cyprus	
Aphrodite	140–220 bcm
Egypt	
Zohr	645–720 bcm
Gaza	
Gaza Marine 1–2	28 bcm (yet-to-find)
Lebanon	
Phase 1	672 bcm (yet-to-find)
Total East Med	Up to 8734 bcm

East Mediterranean Hydrocarbon Fields: Partners or Enemies forever? (discovered and yet-to-find)
Source Hafner and Tagliapietra (2013) … with updating by the authors

exporting infrastructure. Albeit commercially soundly, the realization of such a development will ultimately depend on geopolitical factors. In particular, this will depend on the political willingness of Egypt and Israel to cooperate in such a highly strategic sector.

We believe that the new explorations in Cyprus offshores at Parcel 10 and 11, which are very close to Egyptian Zohr field, may change the whole scenario. New discoveries of a considerable volume of gas in either of these fields may bring new potential and challenges to pipe Leviathan gas with Egyptian Zohr and Cyprus' Aphrodite gas to Turkey. Eastern Mediterranean gas can then be a new hub with competing prices to the European market, only if political disputes in the region are resolved.

Even with the updated quantities, summarized in Table 2.1, the Levant Basin reserves are not by huge, by global standards, compared to Russian, Iranian/Qatari gas fields or in terms of rising demand in terms of Chinese or India. But in regional terms they are impressive. Just for comparison, total Turkish consumption annually at the present time is about 50 bcm, making the estimated total East Med natural gas reserves to date, enough to meet Turkish requirement for the next 150 years at least.

The vital question which arises is this: Will countries and people of the Levant Basin behave rationally, like the five nations in the case of the North Sea Oil, and divide and share their hydrocarbon wealth cooperatively? Or will they remain forever enemies trapped in war and conflict?

In this monograph, we acknowledge conflict and rivalries, yet we deliberately opt for cooperation, if not in the near future, then in the longer term. We believe that, in the final analysis, market forces will prevail and that disputes and conflicts will ultimately yield to cooperation. More specifically we consider the Turkish–Israeli energy cooperation as the catalyst in the development of regional cooperation in hydrocarbons. Most significantly, we believe European consuming countries, acting out of self-interest, can be expected to behave as rational actors guided primarily by market forces.

References

Hafner, M., & Tagliapietra, S. (2013). *Globalization of natural gas markets: New challenges and opportunities for europe*. Leuven: Claeys and Casteels Publishing.

Hafner, M., & Tagliapietra, S. (2016). *The future of european gas markets: Balancing act between decarbonisation and security of supply*. Leuven: Claeys and Casteels Publishing.

http://www.botasint.com/Foto/Original/477__BIL9380.jpg.

UNCOLS (1982). http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf (Extracted on 14 06 2017).

Chapter 3
Diversifying European Energy: Challenges of Securing Supply

3.1 Introduction

A strategic aim of the European Union's energy policy is to achieve long-term security of supply. The key for such supply security is long-term agreement achieved in solidarity with partners, particularly new partners who are able to promote both security and diversification of supply. The aim of this chapter is to highlight the role of Turkey in this strategic EU energy security, especially in terms of development of the Southern Energy Corridor.

Turkey' status is an observer within the EU energy community. Laursen (2013) has pointed out that Turkey was offered to become a conditional member as she still needs to recognize the South Cyprus Administration and complete the requirements outlined in Maastricht and Copenhagen Criteria. However, the high-level political commitment between Turkey and the EU, if positively translated into facts, could change the course of EU–Turkey energy cooperation which can serve as a stimulus for the overall Turkey–EU relations. Hafner and Tagliapietra (2013, p. 138) have accentuated that the new large-scale renewable projects such as the Mediterranean Solar Plan and Desertec, offer a great opportunity for energy cooperation both between the EU and Turkey and within the overall Mediterranean Region. Such large-scale renewable energy projects could greatly contribute to the economic development of overall Mediterranean region and also to its social and political stability. In the meantime, pipeline geopolitics and new hydrocarbon gas fields from the Caspian Basin to the Persian Gulf and in eastern Mediterranean, and EU-Russian/Ukraine relations, have strengthened the strategic importance of the Southern Energy Corridor and the key Turkish role in this Corridor.

From EU's long-term energy security, the imperative for long-range planning can hardly be overestimated. Hilbrecht (2010) has accentuated that the new road-map for 2050 must be considered, with clearer and shared understanding of possible development paths of the EU energy system and the related policy context, both globally and within the EU. He noted, in particular, the crucial global requirement

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for clean air and the ultimate aim of Europe to achieve a low-carbon, high-efficiency energy systems, probably with near-zero net emission power generation system, certainly with large increases in energy efficiency throughout energy uses and possibly with near-zero emission road passenger transport. From this perspective, Europe vitally needs secure and affordable natural gas, mostly in transformation sector, transportation and manufacturing industry. However, the security of long-term supply of natural gas to Europe is fraught with risk and uncertainty due to lack of infrastructure that necessitates costly investment or political problems in gas exporting nations.

3.2 Risk Levels of Alternative Supply Sources

We explicitly classify Caspian Basin energy sources, particularly via TANAP, as the lowest risk supply route. TANAP and TAP are already operational. Turkey and Azerbaijan are secure, stable partners. Even if Trans Caspian energy sources are less secure, we believe Caspian energy will, within the next decade, be delivering increasing quantities of natural gas to European markets. This component of the Southern Energy Corridor is therefore as good as an accomplished fact. It will be analysed later in this chapter on this basis, further elaborated subsequently.

In subsequent chapters, we analyse higher risk supply sources. Thus, somewhat higher risk-level supply sources on the Southern Energy Corridor are the Russian–Turkey pipelines. The geopolitics of these pipelines is intricately dependent on East-West relations. While a return to a renewed cold war confrontation is possible, on balance we believe rational behaviour on Russian and Turkish actors to prevail in line with market forces.

The same cannot be said about energy sources in the eastern Mediterranean basin. The geopolitics of these otherwise impressive hydrocarbon fields are too deeply involved in disputes over territorial seas and highly emotional political issues. Whether it is the politics of ethnic division in Cyprus, or the Arab–Israeli conflicts, or the return to peace in Syria and Iraq, we believe these may take years, or even decades to resolve. Accordingly, the monetization of these energy sources lies in the uncertain distant in future.

Likewise, for similar reasons, we consider the highest risk-level supply sources to be those sources from Iran, Iraq and the Persian Gulf.

One additional point should be noted: The diversification potential of given supply sources vitally depends on corporate/investor strategy, no less than the politics of producing or transit countries. Therefore, corporate actors as well as energy producers and supply routes through transit countries going to Europe require good relations. One cannot overemphasize the importance of fostering long-term relationships with major suppliers, transit countries such as Turkey, Georgia, etc., and other key partners of the EU in promoting and sustaining energy

security. Multilateral organizations and frameworks need to recognize that it is primarily private-sector actors' responsibility to conduct commercial relations with producing and transit countries.

3.3 Three Pillars of EU Energy Policy

According to Vionis (2010), the three pillars of EU energy policy are: (1) security of gas supply, (2) diversification of deliveries and (3) pricing. These pillars translate into: Availability, Acceptability and Affordability to be pursued within a long-term goal of Energy Union. In the recent past, the Union has faced daunting challenges. The Euro crisis and Greek debt have exposed serious internal problems. Most recently and severely, Brexit has pushed structural issues to the foreground. Populism, especially Islamism and the refugee crisis have tested relations with Turkey. It seems, energy security has been pushed to the backseat, but this is only a temporary perception.

The European Commission declared in its strategic energy review that Union energy security is not a question of dependency, but rather a state of interdependence. That means that security of supply should also be linked with security of demand. A level of uncertainty in EU's potential demand has an impact on their investment in exploration and production. In this study, the approach to security of supply is primarily derived from levels of risk associated with given hydrocarbon fields feeding the Southern Energy Corridor via Turkey, as summarized in 3.2 above.

3.4 Future Gas Supply Potential to EU-27

After the Arab Spring and recent gas findings in the eastern Mediterranean offshore, the EU has focussed on the Southern Gas Corridor and on the Eastern Mediterranean. The Southern Gas Corridor has now become one of EU's highest energy security priorities, outlying the need of a joint work between the Commission, EU member states and the countries with the objective of rapidly securing firm commitments for the supply of gas and the construction of the pipelines necessary for all stages of its development. Devlin et al. (2012) pointed out that the Southern Energy Corridor provides an opportunity to reduce dependency to Russia and North Africa and also to reduce the dominant position of Russian gas supplies and to introduce price competition on regional markets, which eventually will benefit local consumers. Devlin also stated that the Commission is aware that opening a new gas corridor is a complex task which requires a strong commitment, as well as extraordinary efforts and coordination. To this end, the development of the Southern Corridor has been defined as a strategic objective of the EU's external energy policy. It is crucial to note in this context that the

European external energy policy, in general, and the Southern Corridor Strategy, in particular, are closely linked to the European neighbourhood policy and are intended to deepen cooperation with all partner countries. They also highlighted that it is of primary interest to the European Union that the development of Southern Corridor and the respective gas deals are built upon a clear and enforceable regulatory framework—a framework that has a clear basis in international law and respects de jure and de facto the EU energy acquis. Since South Cyprus Administration has vetoed Turkey to join the Energy Community Treaty, it seems unlikely that Turkey will agree to adopt the energy acquis as a whole before the official opening of the energy chapter.

European Commission has adopted the Communication 'European Energy Security Strategy' proposing a series of measures to tackle the EU's security of energy supply challenges. Among all these challenges, increasing energy efficiency, increasing energy production and diversifying suppliers countries and routes, completing the internal energy market, having common voice in external energy policy and strengthening emergency and solidarity mechanisms as well as protecting critical infrastructure (for details see Hafner and Tagliapietra 2016: p. 97).

In March 2015, the Commission under Juncker's administration formally launched the Energy Union initiative with the Communication 'A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy'. This document includes energy security, solidarity and trust; a fully integrated European energy market; energy efficiency contributing to moderation of demand; decarbonization of the economy; and research, innovation and competitiveness in which energy security is always ranked first. According to this document, energy security should be safeguarded by reducing energy consumption, strengthening the internal exchange of energy and diversifying energy supplies. It is also believed that diversification measures are seen as the core of energy security. For partnership, the Communication clearly mentions traditional suppliers such as Algeria and Norway, but also perspective transit countries such as Turkey. The reference to Turkey is in relation to the Southern Gas Corridor, the importance of which is outlined in the Communication in a very clear way (for details see Hafner and Tagliapietra 2016: p. 100). Over the last two decades, the Southern Gas Corridor has represented a key topic of any discussion concerning the EU gas security of supply. However, the 10 bcm per year by 2019 of Azerbaijanian gas is the only tangible input that this initiative will provide to EU gas markets in the foreseeable future. In fact, none of the other potential suppliers in the region (Turkmenistan, Iraq, Iran and KRI) are likely to join Azerbaijan in this initiative anytime soon (Hafner and Tagliapietra 2016: p. 105).

After the collapse of Nabucco which was a project greatly supported by the EU and further Russian occupation of Crimea and Donetsk region in Ukraine, the relationship between Russia and the EU has become awkward. All attention then turn into a new crucial deal of Azerbaijan and Turkey on TANAP pipeline network which guarantees an annual 16 bcm per year and extendable up to 32 bcm per year of natural gas delivery to Europe from Shah Deniz Phase II basin of the Caspian

sea. Energy could therefore be a catalyst to improve relations between Turkey and the EU. As stated by Hafner and Tagliapietra (2013), the Southern Gas Corridor has been considered as a modern Silk Road, interconnecting countries and people from different regions and establishing the adequate framework, necessary for encouraging trade, multidirectional exchange of know-how, technologies and experience. The amount of estimated gas reserves in the Southern Gas Corridor can be summarized as follows (Table 3.1).

3.5 Caspian Sea Basin

The Caspian Sea has an enormous amount of proven gas reserves. The gas pipeline system in that region however had been created under the Soviet period to supply gas mainly to Russia. Being largely dependent on Russian gas system, these countries can export gas to Europe either via Russian network system or have to

Table 3.1 Caspian Basin/Iraq Gas Corridor source fields

Field	Country	Estimated reserves	Timing
Shah Deniz Phase I and II	Azerbaijan	1.2 tcm	25 bcm/y by 2018–2019
ACG deep level	Azerbaijan	300–500 bcm	10 bcm/y by 2023
Umid, Babek, Nakhchivan, Apsheron, Zafer-Meshel, Araz-Alov-Sharq, Asiman-Shafaq	Azerbaijan	2.7 tcm	Unspecified timing
Kurdistan regional adm.	Iraq	3–6 tcm	5–10 + bcm/y
Akkas		(2.1 tcm)	near to medium term
	Iraq	59.4 bcm (GOI)	5–10 + bcm/y
			medium to long term
Fourth bid round	Iraq	?	
Galkynysh	Turkmenistan	Up to 26.2 tcm (gas in place)	10–30 bcm/y by 2015–2025
Dauledabad	Turkmenistan	1 tcm	30 bcm/y with
			E-W pipeline
Offshore block 1	Turkmenistan	180 bcm	10 bcm/y by 2015

Source Platts (2012). The table is adopted from Hafner and Tagliapietra (2013, p. 127)

develop alternative routes such as a pipeline across the Caspian Sea, which has many technical and legal problems and till now they could not manage to reach a compromise on its investment feasibility. As the two biggest supplier of natural gas from the Southern Energy Corridor, the EU has initiated regular meetings with Turkmenistan and Azerbaijan to build a Trans Caspian Pipeline System adjacent to Trans Anatolian Pipeline (TANAP) which could play a pivotal role in natural gas delivery to Europe. Dialogue between the EU and these two Turkic republics was a new and important move to strengthen relations with the EU and hence to underpin the notion of Southern Energy Corridor. This dialogue is especially significant because there are major boundary issues in the division of the Caspian Sea and it is unlikely that any Turkmen gas can be transported to Europe before these disputes are resolved (Source: http://www.pipeline-journal.net/news/south-stream-20-tap-tanap-southern-corridor-na. Accessed on 04.05.2016). Ultimately, the political decision of linking Azerbaijan to Europe will safeguard the supply security of natural gas to Europe, in particular, from Shah Deniz Phase II which is endowed with more than 1 tcm of proven gas. Hafner and Tagliapietra (2014) have emphasized that Turkmenistan could well be in the position to supply natural gas to Turkey and to the EU—in addition of the major volumes targeting the Chinese market—but two major barriers will likely make such a development unfeasible, at least in the medium term. First, Turkmen administration has lack of interest to the European gas market because of its stagnant gas demand and second, there is lack of infrastructure related to the divergence existing between Russia, Iran and Turkmenistan on the legal status of the Caspian Sea and therefore on the construction of Trans Caspian Pipeline. Therefore, Chinese market is more feasible and easy for Turkmenistan gas exports.

In October 2011, Turkey and Azerbaijan have signed an agreement on prices for exports from Shah Deniz 1 to Turkey until 2018. The deal was made between Turkish State Gas Importing Company BOTAS and Azerbaijan SOCAR. The president of Azerbaijan Mr. Ilham Aliyev and the president of Turkey Mr. Recep Tayyip Erdogan have signed this bilateral agreement. Shah Deniz 2 has now been approved by both the presidents, and the deal to build TANAP pipeline has been ratified in June 2014. The share of Turkish Petroleum Public Company has increased from 9 to 19% and this project will include an additional offshore gas platform, subsea wells and expansion of the gas plant at Sangachal Terminal. This project will add 16 bcm per year to the current gas production, to be exported mainly to Turkey (10 bcm per year) and to the EU (6 bcm per year). It is however expandable up to 32 bcm per year, in which Turkey has guaranteed to buy 16 bcm of gas annually and the remaining 16 bcm can be exported to Europe with TAP (Trans Adriatic Pipeline) via Greece to Italy. There is a further pipeline infrastructure project to connect TANAP into IONIC pipeline via Albania to up north of Adriatic coast of Montenegro and Croatia.

3.6 Constructing the Southern Corridor: From NABUCCO to TANAP/TAP

The most ambitious and well-known Southern Corridor project was the NABUCCO project (Glachant et al. 2012). This was a mega pipeline project running from Azeri gas fields to Turkey, then through the Balkans to Austria. It was intended to deliver gas from the Caspian Sea and the Middle East regions to Europe with a maximum through put capacity of 31 bcm per year. The shareholders of this scheme were a large group of state actors: The Austrian OMV, Hungarian MOL, Bulgarian BULGARGAZ, Romanian TRANSGAS, Turkish BOTAS and German RWE. However, this mega project became a casualty of the Euro crisis. Financing and guarantees by the banks proved especially difficult in precarious financial environment. As well, the unstable geopolitical situation in the Caspian and conflicts in Middle East region raised new doubts, while new constraints emerged for the planned capacity of this pipeline. The final blow was friction between the Russian Gazprom and downstream gas marketers (ENI, EDF, Wingas). So, the project ended before it started.

In December 2011, the governments of Azerbaijan and Turkey took an even bolder new initiative. They signed a Memorandum of Understanding to begin the construction of a new pipeline, Trans Anatolian-Azerbaijan Pipeline (TANAP), delivering a death blow to NABUCCO. TANAP has a carrying capacity of 16 bcm per year. Of this supply, 10 bcm per year will be sold to Europe and the remaining 6 bcm will be used by Turkey domestically. TANAP would carry gas from the eastern border of Turkey to the western border to link with TAP, the Trans Adriatic Pipeline via Greece. The first phase of TANAP would rely on existing underutilized pipeline sections in Turkey, thus minimizing the sections to be fully newly built (Glachant et al. 2012: 63). The project equity is currently shared by the State Oil Company of Azerbaijan (SOCAR), which holds an 80% stake in the project and the Turkish state company BOTAS owning the balance. Initial cost estimates for the pipeline are USD 5 billion. Total cost of this mega project is estimated to be USD 25–40 billion and is planned for completion by 2018.

TANAP is going ahead. It is considered the most likely pipeline project for the first section of the Southern Energy Corridor (from Azerbaijan to the Turkish—EU border). The Balkan section of the Southern Energy Corridor was the Interconnector Turkey–Greece–Italy (ITGI) project. Owing to financial troubles in Greece, the ITGI project was subsequently abandoned. The Greek part of ITGI was owned by the Greek state gas transmission company DESFA. It connected to the Italian DEPA as well as Italian Edison (Glachant et al. 2012: 64–65). DESPA had a Greek onshore section and an offshore leg linking the Greek Ionian cost to Southern Italy. As the Greek Euro debt crisis deepened, the viability of ITGI fell into serious doubt. On 20 February 2012, the Shah Deniz II Consortium announced that the ITGI has been eliminated from the group of proposals. In particular, DESFA lacked the required finance of 1 billion Euro for onshore component of the project while also missing the technical know-how regarding operation of the project. As well,

the Greek government, reeling from financial meltdown and facing stiff privatization requirement under the terms of its EU bailout terms, put DESFA on sale. The Russian Gazprom and the Azeri SOCAR initially bid for a controlling equity share in DESFA, but, after the Russian interests withdrew, SOCAR purchased 66% of the equity of DESFA in December 2013.

This recent development has thus reinforced the Trans Adriatic Pipeline (TAP), a project to construct a new gas route (initially with 10 bcm capacity, later possibly 20 bcm per annum) across the territory of Greece from Komotini (near the Turkish-Greek border) to the Albanian border, then across Albania and the Adriatic Sea to Italy. TAP is promoted by Statoil (a member of the Shah Deniz II consortium), EON (who has a gas market in Italy) and the Swiss energy utility EGL. With such credible shareholders, TAP has a good financial base to move forward.

Gardner (2013) has reported that the EU Commission and some east European countries viewed the demise of NABUCCO with concern. The decision to abandon NABUCCO may be painful for Bulgaria, Romania and Hungary, through which NABUCCO West was to run. In the end, however, realism has prevailed and the TANAP-TAP route has emerged as the favoured route. Latest estimates indicate that this route will go on-stream in 2019, and is designed to carry 10–20 bcm of gas per year. Eventually, Azerbaijan could send 50 bcm a year westward (though a large share of that might go to Turkish customers). It is evident that TANAP-TAP will boost energy security in EU-27 inclusive of countries of Eastern Europe from 2020. A positive side effect of TAP is that it will run through Albania and will link up with the Ionian pipeline, which runs up to the Adriatic coast. This in turn will provide Bosnia with a supply not controlled by Serbia or Russia, and help Montenegro and Croatia.

3.7 Infrastructural Investment in the Southern Energy Corridor

Undoubtedly, diversifying Europe's energy needs via the Southern Energy Corridor necessitates massive infrastructure investments (Tagliapietra 2014). One Commission estimate, quoted by Tagliapietra (ibid), regarding the infrastructure investment requirements is as much as 2 trillion Euro investment expenditures, spread in the sectors of energy, transport, as well as information and communication technology by 2020 (European Commission 2010). He noted that energy sector alone is set to require Euro 1.1 trillion, of which Euro 400 billion for distribution networks, and smart grids; Euro 200 billion for transmission networks and storage; Euro 500 billion for generation capacity. The EU's existing ageing energy infrastructure and also the decarbonization path managed to allocate such an enormous amount of budget for energy expenditures. Furthermore, the European Commission (2011) has prepared a comprehensive package including a legislative proposal for new guidelines for Trans-European priority corridors and areas (9 priority corridors

and 3 priority thematic areas). Other than electricity and carbon dioxide networks, 4 of other priority corridors are related with natural gas. These are North-South gas interconnections in Western Europe, North-South gas interconnections in Central Eastern and South Eastern Europe, Southern Gas Corridor and BEMIOP gas.

As a consequence of the Euro financial crisis, all European transmission system operators face serious financing problems. There are some financial difficulties in the private sector after the Euro zone sovereign debt crisis. They cannot self-finance such a massive project anymore. Nevertheless, there is a clear fact that energy infrastructure projects in the EU can no longer be financed solely from public resources, in particular by high public debt countries like Greece, Italy, Ireland, Spain and Portugal. Since government budgets are not in good shape in some of the European countries, who is going to finance such a massive projects then? This question still remains unanswered by many European politicians. The banks who can deliver such a big capital are not willing anymore to participate in such a kind of huge public infrastructure projects due to collateral problems and also the obligations to meet a variety of prudential regulations, such as rules for insurance undertakings in case of possibility of solvency.

What are the available financing options? Tagliapietra (2014) proposed that a practical financing method is to encourage institutional investors such as pension funds, insurance companies, mutual funds and sovereign wealth funds as a pivotal element of the new EU infrastructure funding model. The EU infrastructure funding model is urgently needed in order to undermine the recovery of the EU economy and its future prospects of growth. Creating jobs in the EU and enhancing its competitiveness in the global market place would be facilitated with such a massive infrastructural investment. Tagliapietra (2014) believed that this goal can only be achieved with a composition of significantly higher shares of direct capital market financing and greater involvement of institutional investors.

In the meantime, several infrastructural mega projects are being proposed by diverse stakeholders, each pursuing their own commercial gain, often expecting others to pick up the tab. Hafner and Tagliapietra (2013) have pointed out that TANAP-TAP has numerous potential competitors. The list includes Nabucco West (1300 km long pipeline from Bulgaria to Central European hub), SEEP (South East Europe Pipeline, 3800 km long pipeline from Turkey to Austria), IONIC (Ionic Adriatic Pipeline, running from Albania to Slovenia), AGRI (using existing pipeline from Azerbaijan to Georgia which will then connect to LNG chain across the Black sea, aiming to carry LNG to Romania and Hungary) and White Stream [1100 km (of whom 700 km is offshore submarine in the Black Sea) long pipeline connecting Georgia and Romania] which have been heavily discussed over the last years with regards to the gas exports from the Caspian region to Europe. All these projects, except the White Stream and AGRI, rely on Turkey as a key transit country. Another notable exception, avoiding Turkey, is the ambitious Greek Cypriot proposal, the Eastern Mediterranean undersea pipeline project, 2500 km long via Crete and Greece, intended to carry natural gas from Leviathan and Aphrodite gas fields to Europe. Intricately linked to the complexity of the Cyprus problem, this project will be discussed in greater detail in Chap. 6 of this study.

3.8 Pricing of Internationally Traded Natural Gas

Kjensjord (2013) emphasized that the ability of gas supply to respond to consumer demand is relatively limited, at least in the short term. First, supply depends on the quantity of gas in reserves and on the amount of production facilities available. In order to increase the quantity of gas produced, natural gas companies must acquire leases, secure required government permits, do exploratory seismic work, drill wells and connect wells to pipelines, which can take 6 months to 10 years (NGSA 2011). Second, gas supply depends on the availability of pipelines and storage capacity in the transmission network. The transmission pipelines can only transport a certain amount of gas at all times, its capacity is therefore limited. Despite an increase in demand, supply can only respond to the extent that the pipelines can accommodate. Gas flows at approximately 15 mph through a pipeline, delivery of new supply at a certain destination may take several hours or even days. Storage facilities therefore become crucial in order to be able to respond to changes in demand. Having storage located close to end consumers massively reduces the lead time of delivery and increases the value of owing storage capacities (FERC 2012). Pipeline infrastructure and storage facilities are therefore essential components in the development of a secure supply of European natural gas.

The demand for natural gas is highly inelastic. Consumers do not have any storage possibilities enabling them to buy natural gas when prices are low and use later when prices are higher, changes in price will therefore not measurably affect demand in the short term. Furthermore, as emphasized by FERC (2012), end consumers do not have the possibility to switch to alternative substitutes if prices become too high. For the nearest future, gas is a necessity for the functioning of today's society. An interruption in natural gas supply would leave people without heat, useless appliances and industrial companies without power generation possibilities. The demand for gas must therefore always, at all times, be matched by supply. This requires the transmission system to be able accommodate the highest possible demand and to make variable deliveries continuously according to changes in consumption.

Stern (2012) has pointed out that gas is relatively young fuel with extremely high investment and infrastructure costs. Markets for gas needed to be developed with prices low enough, relative to alternatives, to stimulate demand, but high enough to justify the often considerable infrastructure expenditure. He emphasized that much internationally traded gas is still transacted on the basis of long-term contracts. But as infrastructure develops, the contractual issues and the appropriate market structure also change. The ways in which gas prices are formed appear to be endogenous to the way the overall market develops, and as markets develop one might expect price formation mechanisms to evolve in response. According to the IEA/OECD (1992), the European gas industry has traditionally been based on long-term contracts (up to 25 years) that involve a large amount of 'take-or-pay' (TOP). Take-or-pay clauses guarantee that the buyer will take a specific minimum

volume each year, or pay for it anyway with the flexibility for the buyers to take delivery of the balance later in the contract period.

3.9 Gas Pricing

Gas prices now are mainly determined on regional basis. For example, in the US and the UK, prices are determined at hubs, usually spot markets. In Asia, LNG contracts are indexed to crude oil prices. Much of continental European gas has traditionally been transacted on the basis of the long-term contracts indexed to oil product prices. Transport costs, lack of infrastructure or government policy may sometimes be conceived as the barriers in determining the gas prices. Most countries and regions in the world are facing increasing tensions between the domestic and the international pricing of gas.

Stern (1984) stated that natural gas pricing in international trade has become an extremely controversial subject in the past 3 decades, from the standpoint of both exporters and importers. The arena of domestic pricing in West European countries became a highly political issue. The price that a given importer is prepared to pay for internationally traded gas is related to the perception of what the end user is willing and able to pay, both in the short and long term. It is also accentuated by Stern (2012, p. 148) that in different world gas markets, there are major differences in the price levels that end users are willing to pay, both as regards absolute levels and relativities with other fuels. Despite such differences, events in one of these markets (Western Europe, US and Japan) certainly influence conditions in another and it is rather artificial to discuss one market in isolation.

Mattucci (2008) stated that the gas price setting at wholesale level takes place under three main branches of the wholesale market, which are over the counter (OTC) or bilateral trading, hubs (trading and clearing points) and LNG spot markets. The bulk of trade is held at bilateral level and long-term contracts are usually for 15–20 years. The long-term contracts mainly link gas price to the crude oil prices because both products are substitutes and are in direct competition. The transport modes (physical point-to-point) create more difficulties in pricing gas on global level. It is worth to note here that the long-term contract average prices are more stable than the prices formed continuously in hubs, which result more volatile. Mattucci (ibid) reported that the wholesale price does not incorporate the signals coming from the seasonality of the gas demand. However, the lack of transparency may represent a barrier entry for those operators forced to buy their gas at a more volatile market. Mattucci (ibid) also identified that the prices on spot markets (e.g. NBP, Zeebrugge and TTF) appear to be more liberalized that the prices set at bilateral level, through long-term contracts.

The netback market value concept remained the dominant form of pricing in European long-term contracts in the 2000s, although by the end of the decade it was coming under increasing stress. One of the characteristics of non-liberalized markets is a captive customer basis: the end user cannot easily shift from one source to

another, in the short run. Therefore, their short-run demand is price inelastic. There are two prevailing price setting mechanisms in use: cost-plus and the netback market value. The cost-plus is simply defined as the price of acquisition from upstream, plus markup to assure the cost recovery and the return of capital. This assures the vertical integrated TSO (transmission system operator) a monopolist rent and the possibility to cross-subsidize charging differently the several customers categories. According to Honoré (2012), the basic principles of gas pricing in Europe are based on formula that incorporates two main factors. The first factor is the base price of gas, which divides the risk between the two parties (seller and buyer), and the second factor is the indexation formula, which ensures the gas competitiveness and helps to integrate the changes occurring in the energy market, without having to renegotiate the contract. This methodology generates a maximum price (netback value) and an indexing principle. Honoré (2010) also has stated that in long-term traditional contracts, price formulae are structured in various ways, but in general, the actual gas price evolves around two main elements which are the base price and the index. The gas price traditionally equals the base price of gas plus or minus the development of gas oil prices and plus or minus the development of fuel oil prices. The traditional long-term contracts with integrated gas price indexation to oil products have been widely used since the 1970s as an instrument to deal with the specificity of investment—which is especially high for gas pipelines although they have also been used for the LNG market. It is also worth to note here that in liberalized markets, gas, coal and electricity are increasingly interacting as gas is in competition with coal, nuclear and hydropower. Therefore, high or oil-indexed gas prices are a disadvantage to power companies. Honoré (2010) also highlighted that the pricing issue of gas is complicated when gas is sold for power generation, where competition occurs ultimately at the bus bar and coal is often the competing fuel both on a short- and a long-term basis. In the short term, gas has to compete on a marginal cost basis against the use of coal, which could result in a very low gas price (even by taking into account the different efficiency of the power plants and the price of carbon emissions). This is used to make it unattractive for the exporting countries to expand volumes of gas sold by selling into the power sector as there was a risk of undermining the price level for the inelastic segments of the market (i.e. residential and commercial, and to a lesser extent, the industrial sector). Despite all the advantages, gas-fired technology can offer to investors, especially in open and environmentally sensitive electricity markets, oil indexation hindered investments compared with gas prices based on gas-to-gas competition. Most sellers in the early 2000s had accepted a (small) share of about 10% of the indexation to coal prices in order to reflect the competition for gas in power generation. Honoré (2012) emphasized that in Europe, LNG has to be priced to compete with pipeline gas, which is generally linked to oil products or crude oil. A similar approach has been used in the pricing formulae in most of the existing LNG contracts. However, there are variations in the formulae used. European LNG prices are linked directly to Brent crude oil in the contracts with Algeria, Middle East and Egypt. This formulae facilitate hedging/risk management. According to Honoré (2010), the role of price (and income) in determining energy

demand is well researched. However, there is no rule-of-thumb to know what impact a change in natural gas prices will have on the fuel demand in any sector in relation to volume or time. A cursory examination of the literature (Bernstein and Griffin 2006; Liu 2004; Dahl 2004; Bentzen and Engsted 1993) on price elasticity of natural gas consumption shows that this is a complex and still rather poorly understood issue. Even oil price elasticity—a far better researched fuel than natural gas—is relatively unknown.

According to the Matalucci (2014), the growth in LNG trade is forging linkages between the key regional gas hotspots, paving the way for the globalization of world's gas markets. Hafner and Tagliapietra (2013) pointed out that a key feature is represented by the share of gas traded internationally via LNG, which has surged from 30% in 2008 to 42% in 2012. This expansion of LNG trade has encouraged greater integration of regional gas markets, and trade has been accompanied by increased spot trade and by greater flexibility in the terms and conditions of long-term gas contracts. They also noted that such a trend is likely to continue over the near future, considering that 13 LNG projects are currently under construction worldwide, representing a total capacity of 138.2 bcm per year.

3.10 Shale Gas Revolution and LNG Trade

The shale gas revolution in the United States has reshaped the world energy outlook and rapid expansion of LNG trade has redesigned the global natural gas dynamics Grigoryev et al. (2013). As far as the EU security of gas supply architecture and the EU gas pricing mechanism are concerned, the new dynamics will determine the future of the European gas industry. They also underlined that the regional structure has led to the creation of three key gas markets in the world: the US, Asia Pacific and Europe. These markets differ mainly on two factors: supply–demand balance and pricing.

The most advantageous is the US. It is a self-reliant market with its domestic shale gas production. Indeed, it may be ready for export to the rest of the world. The Asia Pacific countries are mainly supplied via LNG from Malaysia, Australia and Qatar and the EU's gas imports are mainly from Russia, Norway, Algeria, Qatar and Libya. Minor volumes are also provided from Nigeria, Trinidad and Tobago and Egypt.

The EU dependency on external suppliers, represented by the imports/consumption ratio, stood at 70% in 2012. The different endowment of gas resources and, consequently, the different gas supply architecture of the three markets considered have led to a second structural difference, which is the gas pricing mechanism as stated by Grigoryev et al. (2013). According to the IEA (2013a) natural gas report, the US gas prices are increasingly decoupled from the international gas market, with Henry Hub prices stabilized at a level of USD 2.5/Mbtu to USD 4.0/Mbtu during 2012. The recent gas findings by the US origin gas companies in Mozambique will keep the existing US gas prices record low

levels comparing with other markets. The Asia Pacific gas prices continue to be oil-linked, since price formation in their contracts continues to be dominated by oil indexation. The gap between Japanese LNG prices (at a level about USD 15–17/Mbtu) and Henry Hub prices has widened enormously since 2011, because of the increase in LNG demand to accommodate for the unavailability of a significant part of Japanese nuclear generation capacity following the Fukushima accident. Levoyannis and Labreche (2013) also noted that the EU's dependence on energy imports is expected to grow as indigenous production of oil and gas in the North Sea declines. They highlighted that oil imports will reportedly increase to 95% of EU demand by 2030 and gas imports from 63% of demand in 2010 to 80% by 2030.

As reliance on non-nuclear energy increases post-Fukushima and following Germany's decision to phase out nuclear power by 2022, the EU needs to find new sources of energy. The most recent findings of Yorucu and Katircioglu (2014) also validate anti-nuclear arguments. In Europe, gas prices are market based in the UK while on the continent they continue to be influenced by oil price movements (at a level about USD 8–12/Mbtu), although oil and gas prices are no longer as correlated as before 2009. One of the most important destination in Northern Europe is Zeebrugge Hub which sells both LNG and pipeline gas on the spot prices. The regional character of the global gas industry is therefore becoming less pronounced in recent years with the emergence of a sizeable interregional LNG business. This trade, which is projected to continue to grow (IEA 2013b) strongly over the next decades, is increasing the price links between the main regional markets through the potential for arbitrage. Recently, the markets have entered a tighter LNG in particular due to the strong LNG demand in Japan after the Fukushima triple tragic events (earthquake, tsunami and nuclear meltdown) and the subsequent closure of almost all nuclear plants (50 nuclear power plants between March 2011 and May 2012) in the country as well as the strong LNG demand in other East Asian countries, mainly China, South Korea, Taiwan and Japan. Over the last decade, the IEA (2013a) reported that LNG trade has risen from 137 bcm in 2000 to 328 bcm in 2012, mainly because of the demand from Asia Pacific (227 bcm in 2012).

In light of new discoveries in the eastern Mediterranean, natural gas remains the perfect partner for renewable energy in Europe's total energy mix. Levoyannis and Labreche (2013) stated that building an LNG terminal in Vassiliko would reportedly have the capacity for three trains and could accommodate up to four or five in the future. It has also been suggested that one of the most economical solutions for East Mediterranean gas to arrive to markets would be through the construction a Cyprus-Turkey pipeline infrastructure. Technical experts from International Crisis Group (www.crisisgroup.org) have estimated that gas by Cyprus-Turkey pipeline would cost about US $7–8/Mbtu. However, this option remains impossible as long as Cyprus stays divided. According to Levoyannis and Labreche (2013), the option of LNG in Cyprus appears to be the best option as it provides the most flexibility and development opportunities.

We do not agree with their approach that LNG is being a best option. Considering US unconventional gas prices and the enormous potential of shale

discovery in Mozambique, Cyprus cannot be as competitive in LNG trade as the US and other countries like Mozambique, Qatar, Algeria and Libya. The deep seabed (3.9 km deep) in Aphrodite surely increases the cost of extraction up to US 8–10/Mbtu with today's available technology. The other option regarding East Mediterranean gas pipeline linking Israel–Cyprus–Greece presents an interesting option, however, expert opinion remains divided over that project's technical feasibility. Considering all these obstacles, the option of piping East Mediterranean gas to Turkey and then on to Europe could be seen as the easiest option. There are some criticisms by several academic scholars (Tagliapietra 2014; Levoyannis and Labreche 2013) that this would go against the very concept of diversification, and instead it would potentially create another transit monopoly. With TANAP and TAP pipelines, SOCAR and TPAO consortium with DEPA will pipe Shah Deniz Phase II gas to Europe by 2019 and total amount of export will reach up to 32 bcm per year. Such an option as a new energy corridor in the East Mediterranean will provide more energy diversity and energy security to Europe and will eventually set its own gas prices according to spot markets and hub-based pricing. Besides that, accepting Turkey as a full member in the EU shall eradicate all fears concerning natural monopoly.

Hafner and Tagliapietra (2013) warn of possible risks stemming from the EU decarbonization targets. As also stated by Matalucci (2014) the EU energy regulation plays an important role in the shift of gas prices towards hub-based pricing, especially in North-West Europe. Despite the additional flexibility of transporting gas as LNG rather than through pipelines, the long-term contracts remain central. The industry tends to look at price levels, but hub prices can be lower or higher than oil-indexed gas prices. The new gas supply emerging globally due to increasing international LNG trade and the US shale revolution besides new findings in Mozambique is causing an unprecedented shift in supply–demand balances, creating new dynamics in the European gas industry, with particular regard to the gas pricing mechanism. As also specified by Grigoryev et al. (2013) these dynamics are leading the development of a new model for European gas markets, namely hybrid pricing. According to Stern and Rogers (2013), this model refers to the situation where long-term oil-indexed contracts coexist with traded gas hubs; the latter performing a role of short-term balancing. And also Grigoryev et al. (2013) added that this model could be considered as a transition phase towards a fully spot and hub-based market. In fact, the European gas markets seem to be inexorably going in this direction, as the empirical evidence suggests. The most recent empirical study by Yorucu and Bahramian (2015) regarding price modelling of natural gas traded within the EU-12 also supports this evidence. Their empirical tests considering the long-run panel Dynamic Ordinary Least Squares estimation for the EU-12 countries reveal that taxation which has an impact on natural gas prices is found to be inelastic for heterogeneous and elastic for the homogeneous estimations at the 1% confidence interval. However, the crude oil price variable with both the heterogeneous and homogeneous model is found to be inelastic with a 1 and 5% confidence interval, respectively.

Bros (2012) also highlighted that by end of 2014, oil indexation pricing should represent the minority stake in European gas supply. In Europe, the rationale for oil indexation disappeared many years ago, so hub pricing makes more sense today. He argued that in the horizon 2015, it is possible to expect the European gas pricing to be increasingly based on trading at the spot level, even if some long-term take-or-pay contracts will remain indexed to oil. The European gas markets will thus maintain some elements of flexibility. The various market players, such as Asia Pacific and the US, should carefully measure this element, as it could cause a further drop in gas demand due to the fact that gas will not be competitive against coal. After the Russian invasion of Crimea, EU–Russia relations nosedived.

As global energy dynamics continue to evolve, the European Union needs to diversify its sources and routes. Because of its large dependency on Russian gas supplies, EU countries face future uncertainties in their energy needs and future economic prospects. Over the last decade, the large dependency on Russian gas delivery has increased energy prices in Europe and made it impossible to stimulate growth, especially after the 2008 global financial crisis. Most recently, Russian armed forces invaded Ukrainian sovereign land in Donetsk and its surrounding region. This has increased the uncertainties of future gas supply to Europe. The EU as well as the USA have called on Russia to stop Russian occupation of Ukrainian land, and imposed sanctions in renewed East-West tensions reminiscent of the cold war.

3.11 The Dynamics of the Northern Supplies

According to Noreng (2014), the Crimea crisis highlights Europe's dependence on Russian natural gas, by the need to transit Ukraine and by the export revenues to Russia. The crisis and the annexation of Crimea vs Russia have prompted calls for scaling down Russia's gas exports as an act of punishment for political and military aggression. Norway has therefore been singled out as an alternative supplier. However, for several reasons, the calls for substituting Norwegian gas for Russian gas seem futile, in particular given the diminishing reserves in the North Sea.

Total gas export from Russia to EU market was 124.5 bcm in 2012, whereas from Norway was only 108 bcm in the same period. There is no way Norway would be able to replace Russian supplies for the long run, since Norway has only limited amount of gas reserves. The other reason why Norway should not have been able to replace substantial volumes of Russian natural gas, it might have second thoughts about challenging Russia because of an acute crisis over Crimea. Good relations with Russia over the Barent sea, delimitation agreement over Barent exclusive economic zone, huge potential of supply and services industry by Norwegian oil companies to close neighbour Russia also keep Norway out of Ukraine–Russia disputes. Noreng (2014) also noted that any Norwegian attempt to drive out Russian natural gas from the markets of continental Europe could easily trigger retaliation aiming at Norwegian firms, in addition to compromising

long-term political relations. Besides that, there is a long historical relation between Russia and Norway in sharing North-West European natural gas market, with Norway being the major supplier to France, Russia leading in the German market. Not only there is hardly any evidence of price competition between Norwegian and Russian natural gas, as the buyers have been alternating contracts in order to balance supplies, but also a kind of agreed duopoly among them dominating the north-west gas market shares. It seems that most unlikely the major buyer, especially Germany, would welcome a Norwegian move to push Russian natural gas out of the market. Noreng (2014) also pointed out that against this backdrop, natural gas trade between Germany and Russia is a most natural occurrence, based on mutual needs and for the common economic benefit. He added that in German business as among German politicians there is no interest in deteriorating relations with Russia.

3.12 Domestic Market or Export?

Russia is an energy producer, but it is also a huge consumer with a growing domestic consumption. Grigoryev et al. (2013) emphasized that projected domestic demand in Russia is expected to grow strongly, putting pressure on exportable quantities. Russian price elasticity of the domestic gas demand is rather low as alternatives to replace gas are limited. Accordingly, the Russian domestic price increase is the most important source of additional revenues. Increasing domestic gas prices is making domestic market more attractive and profitable for Gazprom, which is the main supplier of Russian gas, as well as the other independent gas producers. Nonetheless, Grigoryev et al. (ibid) have argued that Russia's strategy is presently based on maximization of gas export volumes as well as on expected high gas prices based on oil indexation.

High Russian gas prices compared to spot markets run the risk of reducing Russian market share. Considering the fact that Russian export volumes are falling to Europe, they made a few policy recommendations that first, Russia should rather aim for the long-term profit maximization, as it is impossible to maximize both volumes and prices and second, the restructuring of the Russian gas industry should be left to the market and not to DG Competition. According to their recommendations, Gazprom will have to follow Statoil's lead and adjust to new supply realities and pricing formula.

Do Russian energy decision-makers really listen to what academic scholars and politicians in Brussels propose? We believe the answer of this question is decidedly negative. We tend to believe that Russia will opt for a generally neutral position, one that serves neither security of supply nor security of demand in Europe. At the same time, Russia can be expected to utilize its eastern territories including Siberia, and become increasingly interested in selling gas to Far Eastern markets in China, Japan, South Korea and perhaps to India. Closer to European requirements and choices, Russia seems to follow, for the foreseeable future, a generally rational

energy policy in support of diversification of supply routes, avoiding Ukraine, reducing dependence on the Northern Corridor and developing cooperation with Turkey across the Black Sea.

References

Bentzen, J., & Engsted, T. (1993). Short- and long run elasticities in energy demand: A cointegration approach. *Energy Economics, 15*(1), 9–16.

Bernstein, M. A. & Griffin, J. (2006). *Regional differences in the price-elasticity of demand for energy*, National Renewable Energy Laboratory Report, no. NREL/SR-620-39512, http://www.nrel.gov/docs/fy06osti/39512.pdf.

Bros, T. (2012). European gas: On the verge of being spot indexed. Oxford energy forum, No:89 (pp. 3–4). Oxford, UK: Oxford Institute for Energy Studies, Oxford University.

Dahl, C. (2004). *International energy markets, understanding pricing, policies and profits*. Tulsa: Penn Well.

Devlin, B., Momot, M., & Tourbach, L. (2012). The southern corridor—Strategic aspects for the EU. Policy officers, DG energy, European commission. In J. A. Vionis (Ed.), *EU energy law: The security of energy supply in the European union* (Vol VI). Leuven: Claeys and Casteels Law Publishers.

European Commission. (2010). *Energy infrastructure package,* COM (2010) 677 final.

European Commission. (2011). *Guidelines for tans-European energy infrastructure and repealing Decision No 1364/2006/EC*, COM (2011) 658 final.

FERC. (2012). Energy primer. A handbook of energy market basics. Washington: Federal Energy Regulatory Commission. In Kjensjord, H. K. (2013) Liberalizing the European gas market: The role of network codes. Unpublished Master Thesis, 08.11.06.23 (3) KJEN, European Economic Studies, European integration and business, College of Europe, Brugge, Belgium.

Gardner, A. (2013, July 4) Problems in the pipeline. *European Voice*, 11.

Glachant, J. M., Hafner, M., De Jong, J., Ahner, N., & Tagliapietra, S. (2012). *A new architecture for EU gas security of supply*. European Energy Studies (Vol. 1), Leuven: Claeys and Casteels.

Grigoryev, L., Tagliapietra, S., & Hafner, M. (2013). The role of the Russian federation in a globalizing gas market. *European Energy Journal, 3*(4), 53–64.

Hafner, M., & Tagliapietra, S. (2013). *Globalization of natural gas markets: New challenges and opportunities for Europe*. Leuven: Claeys and Casteels Publishing.

Hafner, M., & Tagliapietra, S. (2014). Turkey as a regional natural gas hub: Myth or reality? *European Energy Journal, 4*(1), 60–66.

Hafner, M., & Tagliapietra, S. (2016). *The future of european gas markets: Balancing act between decarbonisation and security of supply*. Leuven: Claeys and Casteels Publishing.

Hilbrecht, H. (2010). Europe's new energy policy: Achievements and perspectives. In J. M. Glachant, N. Ahner, & A. De Hauteclocque (Eds.), *(edn) EU Energy Law* (Vol. V). EU Energy Law and Policy Yearbook, Leuven: Claeys and Casteels.

Honoré, A. (2010). *European natural gas demand, supply, and pricing: Cycles, seasons, and the impact of LNG price arbitrage*. Oxford Institute for Energy Studies. NY: Oxford University Press Inc.

Honoré, A. (2012). The gas exporting countries forum—Global or regional cartelization? In J. Stern (Ed.), *The pricing of internationally traded gas*. Oxford: Oxford University Press.

IEA. (2013a). *Medium term gas market report 2013*. Market trends and projections to 2018. France: International Energy Agency.

IEA. (2013b). *Resource to Reserves: Oil, Gas and Coal Technologies for the Energy Markets of the Future*. OECD/IEA Publications 61 2012 08 1 P1, Paris.

IEA/OECD. (1992). Politiquez et perspectives du gas naturel, Paris. Jonathan Stern, *Third party access in European gas industries*; and Peter Cameroon, *gas regulation in Europe* (Vols. I and II), London: Financial Times Energy Publishing.

Kjensjord, H. K. (2013). Liberalizing the European gas market: The role of network codes. Unpublished Master Thesis, 08.11.06.23 (3) KJEN, European economic studies, European integration and business, College of Europe, Department of Economics, Brugge Campus, Belgium.

Laursen, F. (2013). *EU enlargement: Current challenges and strategic choices*. Brussels: P.I.E. Peter Lang Publishing.

Levoyannis, C., & Labreche, M. (2013). The geopolitics of energy in the Eastern Mediterranean. *European Energy Journal, 3*(4), 46–52.

Liu, G. (2004). *Estimating energy demand elasticities for OECD countries: A dynamic panel data approach.* Statistics Norway, Research Department Discussion papers no 373, http://www.ssb.no/publikasjoner/DP/pdf/dp373.pdf.

Matalucci, S. (2014). The globalization of natural gas markets: New challenges and opportunities for Europe. *Book Review, European Energy Journal, 4*(2), 11–12.

Mattucci, A. (2008). *The internal market for gas: Proposals, economic evaluation and a possible scenario.* Unpublished Mater Thesis, European Studies, College of Europe, Brugge, Belgium.

NGSA. (2011). Industry and market structure. Natural Gas Supply Association. http://www.naturalgas.org/business/industry.asp%23overview. In Kjensjord, H. K. (2013). Liberalizing the European gas market: The role of network codes. Unpublished Master Thesis, 08.11.06.23 (3) KJEN, European economic studies, European integration and business, College of Europe, Brugge, Belgium.

Noreng, O. (2014). Norwegian oil and natural gas: The outlook for production and exports. *European Energy Journal, 4*(2), 28–33.

Platts. (2012). http://www.platts.com.

Stern, J. P. (1984). *International gas trade in Europe: The policies of exporting and importing countries*. Hants: Gower Publishing Company Limited, UK.

Stern, J. P. (2012). *The pricing of internationally traded gas*. Oxford Institute For Energy Studies, Oxford: Oxford University Press.

Stern, J. P., & Rogers, H. (2013). *The transition to hub based pricing in continental Europe—A response to Sergei Komlev of Gazprom Export*. Oxford Institute for Energy Studies: Oxford Universtity, Oxford, UK.

Tagliapietra, S. (2014). Energy infrastructure investments in Europe: The way forward. *European Energy Journal, 4*(2), 43–48.

Vionis, J. A. (2010). The new rules and EU approach on energy security. In J. M. Glachant, N. Ahner, & A. De Hauteclocque (Eds.), *(edn) EU energy law* (Vol. V). EU Energy Law and Policy Yearbook, Leuven: Claeys and Casteels.

Yorucu, V., & Bahramian, P. (2015). Price modelling of natural gas for the EU-12 countries: Evidence from panel cointegration. *Journal of Natural Gas Science and Engineering*, 24, 464–472. http://www.pipeline-journal.net/news/south-stream-20-tap-tanap-southern-corridor-na. Accessed on 04-05, 2016).

Yorucu, V., & Katircioglu, S. T. (2014). Radioactive convergence of nuclear leakage in fukushima: Economic impact analysis of triple tragic events. *Renewable and Sustainable Energy Reviews, 35,* 400–409.

Part II
Turkish Dual Role in Energy

Turkey is not a major energy producer. It imports no less than 97% of its national energy requirements. It nevertheless plays a significant dual role in energy markets. First, it is a major transit country in European energy supply and security, linking energy sources in the Caspian and Levant Basins, as well as in Russia across the Black Sea with Western markets. Second, it itself is a significant and rapidly expanding energy-consuming country. This Part is devoted to a close examination of this dual role. Chapter 4 examines the Turkish role as an emerging hub in the Southern Energy Corridor, while Chap. 5 evaluates the Turkish domestic energy market.

Given rational behaviour on the part of countries in the Southern Energy Corridor, we believe within the next decade, Turkey is poised to emerge as a gas energy hub, delivering to Europe energy from any combination of such sources as Russia, the Caucasus, Central Asia, the Middle East, including the Levant Basin. But Turkey is more than a transit country in energy supply. Equally significantly, the Turkish economy is emerging rapidly and the demand for energy is growing. It is evident that in the foreseeable future Turkey will play an increasingly important role in the regional and global energy picture.

Chapter 4
Turkey as a Hub in the Southern Energy Corridor

4.1 Introduction

Turkey is not an energy producer, but it sits next door to the world's greatest proven energy reserves. By location, it dominates access to hydrocarbon fields. It links energy sources to consuming markets. As a geographic bridge connecting Europe to the Middle East and Asia, will suffice to demonstrate that country as the natural key on the Southern Energy Corridor. Market forces strongly favour Turkey as the corner-stone of a Regional Energy Model, proposed in this study.

This Chapter explores the emerging dynamics affecting Turkey as an energy hub on the Southern Corridor. The next one will explore the Turkish energy market.

4.2 How Much Gas?

Assuming satisfactory completion of plans and pipelines, Turkish gas corridor may deliver at least 12% of EU-27's annual gas consumption, i.e. between a third to half of what now the EU imports from Russia via the Northern gas corridor. Given the energy security concerns that emerged in Europe after the first Russian-Ukrainian-European natural gas crisis, the EU launched a new diversification policy in 2008. This aimed at the construction of LNG receiving terminals in Central and South-East Europe and the pursuit of the Southern Gas Corridor, in order to bring natural gas from the Caspian and Middle Eastern sources without crossing Russia. The implementation of this strategy was given further boost after a second natural gas crisis between Russia and Ukraine in January 2009.

A conservative estimate, tabulated in Table 4.1, indicates that projected deliveries of gas through TANAP and TAP by 2020, may provide 12% of the annual EU-27 consumption. This is a conservative estimate on the low side, as it excludes Russian deliveries through the Turkish Stream across the Black Sea.

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Table 4.1 Projected gas deliveries through major Turkish Pipelines By 2020 (bcm)

Total EU-27 annual gas consumption	400
(1) Annual projected from Eastern Mediterranean gas fields by 2020	19.9
(2) Annual projected from Caspian Basin	10.0
(3) Annual projected from the Kurdistan Regional Government/Iraq	20.0
Percent of total EU-27 annual gas consumption (%)	12.0

Source Tagliapietra (Turkish Policy Quarterly 2014 and Gurel et al. 2013)

The TANAP/TAP pipeline is projected to deliver 10 bcm/year of Shah Deniz Phase II gas to the European market and a further 6 bcm/year to the Turkish market. Besides Azerbaijan, this source will also carry natural gas to the EU from Turkmenistan, Iraq, and, in the longer term, Iran. However, Turkmenistan is also courted by China. The potential to supply natural gas to Turkey and the EU faces major political and infrastructural barriers, at least in the medium-term.

Far more feasible is the gas source available in the Kurdistan Regional Government (KRG) of Iraq. This is rapidly emerging as a world-class natural gas province. The Kurdistan Region of Iraq (KRI) may become a new gas supplier within a few years. KRI has approximately 3–6 tcm of natural gas resources which have the potential to satisfy both its domestic demand and to export volumes to Turkey and possibly to Europe via the TANAP/TAP pipeline. The Anglo-Turkish Energy Company Genel Energy has reached an agreement with the Kurdistan Regional Government for the development of two natural gas fields, Miran and Bina Bawi in November 2014 with a capacity of 240 bcm of gas per annum. The company, on behalf of Turkey, has signed a deal in 2013 at Erbil to export 4 bcm per year by 2017, 10 bcm per year by 2020 and 20 bcm per year thereafter (for details see Hafner and Tagliapietra 2016: p. 89). A new gas pipeline is promised to be built from Erbil to the Turkish city of Bismil. Yet, this project is suspended due to disagreements between Genel Energy and KRI administration regarding the capex investments as well as for reasons of internal regulatory stability, regional geopolitics and security situation in Iraq. However, an internal dispute between Erbil and Baghdad on the federal hydrocarbon law and the revenue sharing regime needs to be settled to allow gas exports from the KRG to Turkey and eventually to Europe. As well, the war against ISIS in Iraq is ongoing with the Iraqi army and the US-led coalition attempting to retake Mosul.

In the longer term, Iran has the potential to become a major player in international gas markets. But, in the shorter term, considering geopolitical factors and the geographical location of its gas reserves, it seems less likely that Iran would fit into the Southern Gas Corridor framework. More likely, its gas exports will first target the global LNG market and Asian markets via pipeline to the east than west via Turkey. In the longer term, however, this potential should not be ignored.

Another significant potential gas source is the Eastern Mediterranean region. Recent discoveries of natural gas off the shores of Israel and Cyprus could soon become commercialized. The Israeli gas field at Leviathan has 622 bcm gas reserves and is expected to become operational in 2019, delivering in the first

instance to the domestic Israeli market. In addition, private companies, Zorlu Group of Turkey and Delek Drilling and Avner of Israel, are making plans for a $3.75 billion investment in an underwater pipeline from Leviathan to Ceyhan, Turkey. Such a pipeline would supply not only the Turkish market, but as well link up with TANAP-TAP delivering East Mediterranean gas to Europe.

Similarly, there are gas field in Cypriot territorial waters. If and when the Cyprus issue is resolved, the island, which is only 50 kms from the Turkish mainland and the Ceyhan-Iskenderun energy hub, would become a natural link to Turkish pipelines. At the moment, in view of disputes over territorial seas and the unresolved Cyprus problem, it is uncertain if Cyprus will ever become a gas exporter. For one thing, there are financing problems due to the after-effects of the Euro/Banking Crisis of 2014 which, effectively, has bankrupted Greek authorities. Nevertheless, Greek interests are promoting the prohibitively costly 2000-km-long Eastern Mediterranean Pipeline from Israel-Cyprus-Crete-Greece and finally Italy. Likewise, they are also pushing for an LNG plant at Vassiliko, Limassol in South Cyprus.

At this time, the above scenario highlights no more than the potential of securing Europe's energy supply via the Southern Gas Corridor. Given the prevailing geopolitical realities, especially the ongoing conflicts in Syria and Iran, as well as the numerous boundary disputes, significant steps, in specific projects to develop supply infrastructure will most likely materialize after 2020. With this prospect in mind, we will now explore some of the major projects.

4.3 From NABUCCO to TANAP/TAP

Gardner (2013) has added that Azerbaijan now became a significant player in European geopolitics, and Azerbaijan may have succeeded in maximizing its influence. He reminded that, with TANAP project Azerbaijan has effectively ended the NABUCCO project, while increasing Azerbaijan's influence over Turkey. Indeed, Azerbaijan has gone beyond and increased its presence in the Balkans as a result of TAP, specifically with Greece and Albania, and then to Italy. Days before the choice of TAP was announced, the State Oil Company of Azerbaijan (SOCAR) has purchased a controlling stake in DESFA, the company which operates Greece's gas network. By doing so, Azerbaijan will have a geopolitical power now over Greece and is expected to change Greece's traditional support for Armenia over the Nagorno-Karabakh dispute. Last but not least, Azerbaijan may also yet complicate Greek support for Cyprus in the dispute with Turkey over Northern Cyprus. It is almost certain that Europe's future supply of gas will be more diverse and its energy security greater as more and more supplies are delivered through the Southern Corridors.

In order to enhance the security of supply and reduce the gas prices in Europe, regulators and utility companies have been looking for diversification of transit routes. As Mrazkova (2006) stated, there are two main options of infrastructure

diversification: the geographical diversification of gas and oil pipelines and the diversification of transit mode. The construction project of Nabucco pipeline over Turkey to Europe has been declined, and therefore, the diversification policy of Europe has gained more strength within the European gas debate. The main idea to implement such a policy was to offer a solution to Russia's refusal to permitting access to the third countries to its pipelines and a solution to Ukraine's and Belarus' dominant position as transit countries. A new gas pipeline—TANAP (Fig. 4.1) from Caspian Sea (Shah Deniz II) to the oil pipeline over the Black Sea through the Turkish Straits also called Samsun–Ceyhan oil pipeline project (TAPCO), the Trans-Anatolian Pipeline Company) aiming to make Ceyhan as a centre of new energy hub in the Eastern Mediterranean are the main projects currently on the table in order to create more alternatives to be able to transport energy over Turkey. A comprehensive information regarding TAPCO is available in Luciani's (2013) newly extracted book (see pp. 108–9). For natural gas, the pipeline called Blue stream, connecting Russia to Turkey under the Black Sea is already in use carrying Russian Gas to Samsun. There are two projects underway for transportation of natural gas from the Caspian Central Asian, South Mediterranean and Middle East region to Europe through Turkey. The initial project of the South European Gas Ring, the Turkey–Greece Interconnector has been operational since November 2007. A feasibility study for linking the Interconnector with Italy via a pipeline crossing the Adriatic Sea was completed by the end of 2004 (see OECD/IEA (2012), IEA Natural Gas Information 2012). The studies on the Italy extension are conducted by respective companies of Greece and Italy. The second project TANAP, after the decline of NABUCCO is going to carry Azerbaijani natural gas to Italy and other European countries.

Diversification of transit mode means that oil is delivered by pipeline or ship and gas is delivered by pipeline or LNG. Mrazkova (2006) also reminded that, oil transit is fairly developed; gas transit mode relies currently on pipelines. LNG has been only recently made accessible to private sector thanks to cost reductions in recent years. Basically, once liquefied, the gas is shipped or transported by rail, to the destined re-gasification terminal. It can be used, if it is too expensive to build pipelines, or as an alternative to them. It can serve simultaneously as the storage capacity of the gas. The main strength of LNG is that it promotes flexibility. Moreover, the transit risks are far smaller than in case of a pipeline and not dependent on ratified agreements with transit states. However, it is not universally applicable and can be very expensive. Russia's gas supplies from NIS cannot be shipped easily because of the frozen coast of Russia for a long period of the year and the Istanbul Bosporus Straights are even now already overcrowded. It is worth note here that the transport by rail is expensive due to a different system of tracks and need unbundling for the existing rail tracks.

Fig. 4.1 Trans anatolian natural gas transmission network (TANAP). *Source* http://www.botas.gov.tr/images/maps/Tanap_full.png (accessed on 5 August 2017)

4.4 Greater Caspian Gas Reserves

As we mentioned before the Caspian Sea has an enormous amount of proven gas reserves potentially available to enhance European energy security. The gas pipeline system in that region, however, had been created under the Soviet period to supply gas mainly to Russia. As being largely dependent on Russian gas system, these countries can export gas to Europe either via Russian network system or have to develop alternative routes such as a pipeline across the Caspian Sea, which has many technical and legal problems and till now they could not manage to reach a compromise on its investment feasibility. As the two biggest supplier of natural gas from the Southern Energy Corridor, the EU has started regular meetings with Turkmenistan and Azerbaijan to build a Trans Caspian Pipeline System adjacent to Trans Anatolian Pipeline (TANAP) which could play a pivotal role in natural gas delivery to Europe. Dialogue between the EU and these two Turkic republics was a new and important move to strengthen relations with the EU and hence to underpin the notion of Southern Energy Corridor.

The political decision of linking Azerbaijan to Europe will safeguard the supply security of natural gas to Europe, in particular from Shah Deniz Phase II which is endowed with more than 1 tcm of proven gas. Hafner and Tagliapietra (2014) have emphasized that Turkmenistan could well be in the position to supply natural gas to Turkey and to the EU—in addition to the major volumes targeting the Chinese market—but two major barriers will likely make such a development unfeasible, at least in the medium-term. First, Turkmen administration has lack of interest to the European gas market because of its stagnant gas demand and secondly, there is lack of infrastructure related to the divergence existing between Russia, Iran and Turkmenistan on the legal status of the Caspian Sea and, therefore, on the construction of Trans-Caspian pipeline. Therefore, the Chinese market is more feasible and easy for Turkmenistan gas exports.

4.5 Cost Advantage of TANAP

Cost-effectiveness is a key determinant of delivering natural gas to the European market. On this basis, it appears that TANAP is far more economic relative to such alternative as the East Mediterranean pipeline. The details are summarized in Table 4.2. At steady-state capacity in 2026, the unit cost of TANAP gas would be up to one-fifth of East Med pipeline. Moreover, the Greater Caspian Basin, including the gas fields of Turkmenistan, have much longer economic life-frames than those in Eastern Mediterranean. On the other hand, a distant prospect is that the Eastern Mediterranean pipeline might be extended to include recent Egyptian gas discoveries in Zohr. Even if the additional costs of such extension were acceptable on a marginal cost basis, we believe the East Mediterranean pipeline would remain uneconomic because of the unpredictable volume of eventual exportable gas, over

Table 4.2 TANAP versus East med pipeline

Route	Length (kms)	Est. tot. cost US$	Annual capacity (bcm)	Unit cost, US$ [tot.cost/ann.cap.]
TANAP: land via Azerb., to Turkey—Greek border	1850	9.5	In 2021: 10 In 2023: 23 In 2026: 31	0.96 0.41 0.31
East Med: undersea, Cyprus, Crete, Greece to Italy	2000	5.7–19.5	12	0.47 1.63

Sources Based on data from
http://www.naturalgasworld.com/tanap-costs-decrease-by-20-25-26270 (accessed on 2 April 2017)
http://pennyforyourthoughts2.blogspot.com.tr/2017/01/greece=israel-stars-aligned-ital (accessed on 2 April 2017)
Gurel et al. (2013), p. 84

and above Egyptian domestic requirements. The cost of meeting domestic market requirement would, owing to shorter distance, justify domestic over export options. In any event, financing investment in East Med pipeline is clearly beyond the capability of two effectively bankrupt countries (Greece and S. Cyprus). Ultimately, the choice would be made according to market forces. On these criteria, private investors and consuming markets in Europe can be expected to prefer TANAP-TAP with the more attractive lower unit cost of energy supply.

4.6 Iran Gas

Iran has the largest gas reserves with 34 tcm which may make it the game changer in international gas trade. However, Iran is still under the influence of the international sanctions regime and the country's legal framework in relation to petroleum stands as the key barrier for gas trade. Besides international sanctions, the legal framework which is introduced by the government includes the buy-back service contract, which has become a key constraint to international investment in Iranian oil and gas sector. For Iran, a new legal framework has to be prepared to let the country to enter into global energy markets. Yet, this may not be sufficient if Iranian gas is not piped to Europe via Turkey. There are 15 projects under discussions to export gas via pipelines to Bahrain, Kuwait, United Arab Emirates, Syria, Iraq, Pakistan, India and to Europe as well as 7 LNG projects (for details see Hafner and Tagliapietra 2016: p. 93).

Closer home, since 1996 Turkey has moved closer to Iran, developing an important energy relationship, notwithstanding its NATO membership and the trade embargo on Tehran by the USA and European powers. Unlike these western powers, Turkey sits next door to energy-rich Iran and needs to import natural gas, at affordable prices, from diverse sources. Its own energy consumption, both for

household needs as well as to power industry, obliges Turkey to maintain good relations with Iran (Kalesar 2013). Accordingly, Ankara has signed an agreement with Iran to buy minimum 8 bcm of gas each year.

Iran-Turkey gas deal did not please Turkey's NATO partners. In addition, there have been political and technical obstacles in gas deliveries from Iran. The US continuously put pressure on Ankara to avoid dealing gas with Iran, as they believe it will undermine the diplomatic efforts to halt Iran's nuclear program. The supply agreement between Iran and Turkey is currently being blocked by ongoing negotiations over gas pricing. The agreement was to sell gas on 15 years contracts where the price is fixed on net back pricing principles. Turkish state owned natural gas Company BOTAS has stopped the negotiations with Iran gas Supply Company, TIBRIS, since the Iranian Administration insisting to sell their gas at a price indexed to world crude oil prices with 20 years contracts, with take or pay (TOP) principles. However, BOTAS refuses to have long-term contracts and offering on the hub pricing, where Iran has not yet accepted BOTAS's offer.

Besides technical and diplomatic problems, the terrorist attacks by Kurdish PKK rebellions have blown up the pipelines on several occasions. Hafner and Tagliapietra (2014) highlighted that the first international pipeline that Iran will likely develop will not target the European market, but the Asian market. Hafner and Tagliapietra (2016) pointed out that over the last years, among 15 projects, Iran has focused on the pipeline to Pakistan running from Assaluyeh in Iran to Nawabshah in Southern Pakistan with a capacity of 22 bcm of gas per year serving Iran's domestic market itself and 8 bcm per year supposed to be exported to Pakistan, and also to India in the long-run. Iran has already completed most of the 1050 km leg from Assaluyeh to its border with Pakistan. Due to financial problems, Pakistan cannot fulfil its requirement and therefore the Iran-Pakistan pipeline has been delayed. Hafner and Tagliapietra (ibid) also highlighted that in March 2014, Iran has signed a 25-year agreement to supply 10 bcm of natural gas per year to Oman, starting by 2017. As mentioned by the authors, the deal will require the construction of a 260-km-long subsea pipeline from Iran's Hormozgan Province to Oman's Sohar port on the other side of the Persian Gulf. In this plan, it is aimed at exporting about 30% of natural gas as LNG within global LNG markets.

Moreover, the Chinese interest on Iran's natural gas reserves is also very strong and Iranian natural gas exports to China will likely take place in the future as well. For these reasons Hafner and Tagliapietra (2014) think that Iran in the medium term will not fit into Southern Gas Corridor concept, as it will first target the global LNG market and Asian markets via pipeline. They also outlined that a full resolution of the nuclear issue will not automatically change the Iranian natural gas outlook in a short period of time, as a number of commercial barriers will likely remain on the table.

With the collapse of the NABUCCO and its replacement by TANAP/TAP, the Southern Energy Corridor has emerged as an increasingly realistic route. The new deal between Azerbaijan and Turkey on TANAP pipeline network guarantees an annual natural gas flow to Europe of 16 bcm, with a capacity, extendable up to 32 bcm from Shah Deniz Phase II basin of the Caspian sea. Energy could,

Table 4.3 Southern gas corridor: estimates of reserves and fields

Field	Country	Estimated reserves	Timing
Shah Deniz phase I and II	Azerbaijan	1.2 tcm	25 bcm per year by 2018–2019
ACG deep level	Azerbaijan	300–500 bcm	10 bcm per year by 2023
Umid, Babek, Nakhchivan, Apsheron, Zafer-Meshel, Araz-Alov-Sharq, Asiman-Shafaq	Azerbaijan	2.7 tcm	Unspecified timing
Kurdistan Regional Adm.	Iraq	3–6 tcm (2.1 tcm)	5–10+ bcm per year near to medium term
Akkas	Iraq	59.4 bcm (GOI)	5–10+ bcm per year medium to long term
Fourth bid round	Iraq	?	
Galkynysh	Turkmenistan	Up to 26.2 tcm (gas in place)	10–30 bcm per year by 2015–2025
Dauledabad	Turkmenistan	1 tcm	30 bcm per year with E–W pipeline
Offshore block 1	Turkmenistan	180 bcm	10 bcm per year by 2015

Source The table is adopted from Hafner and Tagliapietra (2013, p. 127)

therefore, be a catalyst to improve relations between Turkey and the EU. As stated by Hafner and Tagliapietra (2013), the Southern Gas Corridor has been considered as a modern Silk Road, interconnecting countries and people from different regions and establishing the adequate framework, necessary for encouraging trade, multi-directional exchange of know-how, technologies and experience. The amount of estimated gas reserves in the Southern Gas Corridor can be summarized as follows (Table 4.3).

In October 2011, Turkey and Azerbaijan have signed an agreement on prices for exports from Shah Deniz 1 to Turkey until 2018. The deal was made between Turkish State Gas Importing Company BOTAS and Azerbaijan SOCAR. The president of Azerbaijan Ilham Aliyev and the president of Turkey Recep Tayyip Erdogan have signed this bilateral agreement. Shah Deniz 2 has now been approved by both Presidents and the deal to build TANAP pipeline have been ratified in June 2014. The share of Turkish Petroleum Public Company has increased from 9 to 19% and this project will include an additional offshore gas platform, subsea wells and expansion of the gas plant at Sangachal Terminal. This project will add 16 bcm per year to the current gas production, to be exported mainly to Turkey (10 bcm per year) and to the EU (6 bcm per year). It is however expandable up to 32 bcm per

year, in which Turkey has guaranteed to buy 16 bcm of gas annually and the remaining 16 bcm can be exported to Europe with TAP (Trans Adriatic Pipeline) via Greece to Italy. There is a further pipeline infrastructure project to connect TANAP into IONIC pipeline via Albania to up north of the Adriatic coast of Montenegro and Croatia (Fig. 4.2).

4.7 Turkish–Russian Pipelines

Although a key NATO member and an ally of the West, in energy matters Turkey, like Europe, is heavily dependent on Russia. Just over half of Turkish gas imports come from Russia (compared with over a third in EU's case). This high dependency is clearly a source of worry in Ankara and in NATO (Iseri and Oguz 2013), but what short-term choice does Turkey have? In the longer term, diversification of supply and development of alternative energy sources are available, but in the meantime, Turkish-Russian energy cooperation is unavoidable. The same is valid in Europe's case. Indeed, as will be seen elsewhere in this study, there are solid rational reasons in support of Turkish-Russian energy cooperation.

The natural gas pipeline called Blue stream, connecting Russia to Turkey under the Black Sea is already in use carrying Russian Gas to Samsun. Blue Stream-2, also running under the Black Sea (see Fig. 4.3) called Turkish Stream, is projected to become operational by 2020.

Göetz (2008) has stated that there are strategic considerations behind Blue Stream 2 (capacity of 16 bcm/annum in 2020 increasing in stages to 32 bcm/annum in 2030): Gazprom is seeking to 'cordon off' the Turkish gas market against competitors from the Caspian region, notably Turkmenistan.

Another big ambition of Russia goes well for a major pipeline from Iran to Europe and to build South Stream from Southern Russia to the Bulgarian Black Sea coast attempting to keep competitors out of the Turkish as well as the main European markets. Not only that, Russian's ultimate aim is to continue to pump gas over the Yamal line to Europe through Belarus and Poland to Germany. Russian Gazprom also planned Nord Stream (28 bcm per year in 2010 and 55 bcm per year in 2020) in the Baltic Sea as a different strategic approach as an alternative of the Ukrainian transit pipeline system. Through this strategic approach, Gazprom aims to diminish bargaining power of Azerbaijan over TANAP and aims to strengthen its negotiating position via-a-vis transit countries and obtain a larger share of the profits from gas exports.

Following the normalization of Turkish–Russian relations, the Minister of Economy Nihat Zeybekçi has visited Russian Energy Minister Aleksandr Novak in July 2016 in Moscow to discuss the possibilities of new projects, such as the construction of Blue Stream 2 natural gas pipelines under Black Sea to Edirne and nuclear power plant at Mersin Akkuyu. The CEO of Gazprom Aleksey Miller and his Vice President Alexandr Medvedev have visited Ankara on 31 August 2016 to have meetings on Blue Stream 2 gas pipelines as well as reducing import price of

Fig. 4.2 The projected route of TAP linked to TANAP. *Source* By Pechristener File:Nabucco West Route.jpg: PowerPerson File:BTC-Pipeline.png: Devil_m25, Antemister [CC BY-SA 2.0 (http://creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons https://en.wikipedia.org/wiki/Trans-Anatolian_gas_pipeline#/media/File:TAP_TANAP_SCP_Schah_Denis.png (accessed on 5 August 2017)

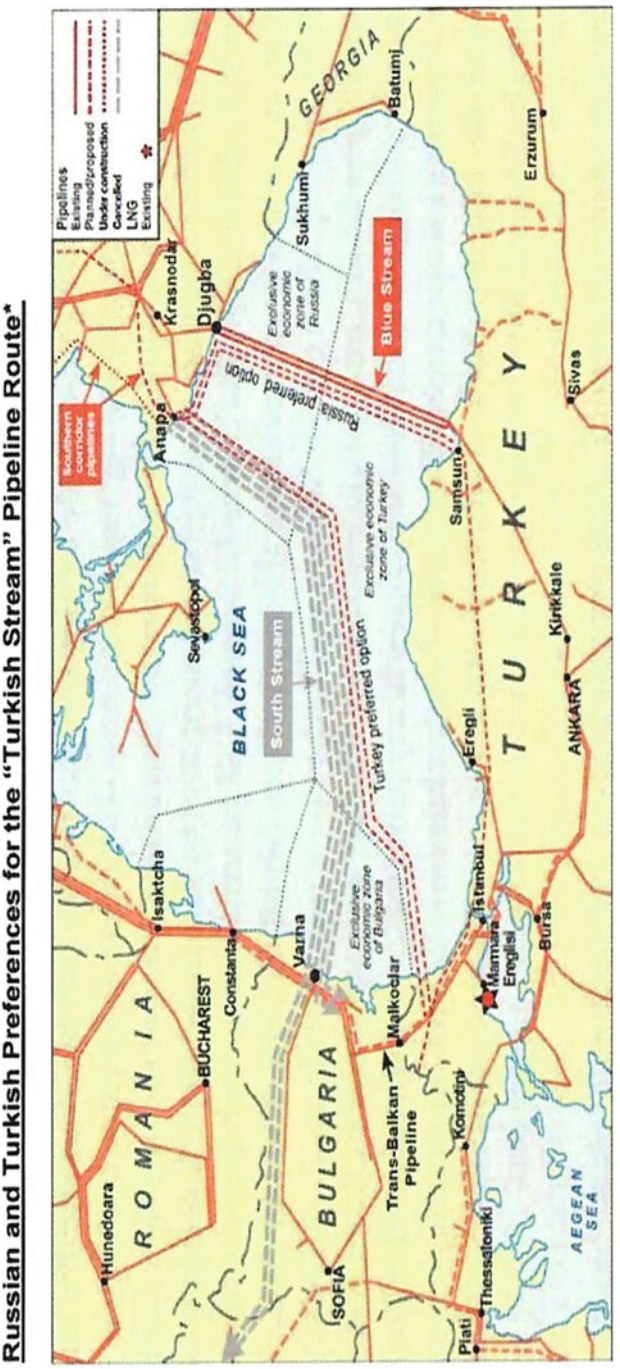

Fig. 4.3 Turk stream and the abandoned South stream projects. *Source* The Figure above was extracted with permission. Leal-Arcas (2016)

natural gas to Turkey. These meetings were arranged just a week earlier to create a platform for two presidents, Putin–Erdoğan which met on 3–4 September 2016 in Moscow. On 10 October 2016, two leaders have signed the intergovernmental agreement to build the pipeline. The law enabling the pipeline was approved by the Turkish Parliament and was signed by President Recep Tayyip Erdoğan. Turk Stream was originally slated to comprise four lines to carry a total 63 bcm/year gas from Russia through the Black Sea to Turkey Thrace region (Fig. 4.3).

Turkish Stream is to have two lines at an estimated cost 12 billion dollars. One line, 900-km-long with 15.75 bcm per year capacity, is expected to supply the Turkish market, while a second line is intended to carry gas to Europe. As also emphasized by Ellinas (Cyprus Weekly, December 16, 2016), construction of the first line to Turkey will now restart from where it left off. The second line is proposed to deliver 15.75 bcm per year. The pipelines will enter the water near Anapa, on the Russian coast, and come ashore on the Turkish coast some 100 km west of Istanbul, near the village of Kıyıköy. From Kıyıköy, an underground pipeline will be developed connecting Turk Stream to the existing network at Luleburgaz. The route will continue from there to its end point at the Turkish town of Ipsala, near the Greek border. The ultimate aim is to export 15.75 bcm of gas per year to southeast Europe, via DESFA through Greece. The national gas transmission system operator company DESFA (a subsidiary of DEPA), which is largely owned by Azerbaijani oil company SOCAR will carry the Russian gas to Italy through TAP. In December 2016, South Stream Transport B.V. which is wholly owned subsidiary of Gazprom and Allseas Group S.A. from the Netherlands signed the contract to build the first string of the Turk Stream gas pipeline's offshore section with an option for laying the second string. Construction of the first line is definite and is progressing, scheduled to come into operation in 2019.

Turk Stream will be the first 32-in. sized system to be laid at depths of over 2200 m. The pipes are technologically designed for maximum safety and each of the two offshore pipelines is made up of thousands of individual pipe joints of 12 m in length. As highlighted by Gazprom, the pipes are produced in special mills and shipped to construction yards on the coast. The walls of the pipeline are made from 39 mm of high-quality carbon manganese steel and each joint to improve the mechanical characteristics of the pipe so that it can withstand the huge pressure. Each pipe has internal epoxy coating against friction, steel pipe wall is 3.9 cm thick and has an external coating of three-layer polypropylene against corrosion. The outer layers have a concrete coating. Pipes laid in shallow waters are coated with 5–8 cm of concrete for additional stability. According to Ellinas (2016, ibid) calculation, 12 billion dollars of investment for pipe laying for two times 900-km distance under Black Sea, implies a cost of 6600 dollars per m. This includes manufacturing cost of pipes, pipe materials and pipe lying. The Nord Stream pipeline that is 1224-km-long was completed in 2012, and laid under 210 m deep water with a cost of 7.2 billion dollars (Mullen, 27 January 2017, p. 23, Cyprus Weekly). According to Mullen's calculation, Nord Stream has cost of investment in pipeline construction only about 4100 dollars per m. It seems like the Turk Stream will relatively be cheaper than the Nord Stream due to the efficiency gained in new

technology comparing the one in 2012, as well as the weaken oil prices which have led to a massive reduction in costs.

Gazprom has undertaken to reduce the price of gas it supplies to Turkey. Reduced price of gas delivered to Turkey will surely have wider implications for the East Med region, but also to Europe. Turk Stream will replace the western route pipeline currently delivering 14 bcm per year gas to Turkey through Ukraine. And may be completely phase out from 2019 onwards. As Ellinas (2016a, b, 23 December) also noted, Turk Stream will reduce any uncertainties about the security of gas supplies. With such uncertainties removed, the reduced gas demand in Turkey and the low price of Russian gas, have, in the short term, taken the steam out of a pipeline from Leviathan to Turkey, which, until recently appeared to be a high priority. As Karbuz (2016) noted, in the first quarter of 2016, the average gas sales price to the customers in Israeli was $5.2/MMBTU, which is higher than the current LNG import price, which is likely to remain rather stable and low over the next 5 years. Mullen (2017, ibid) highlighted that, based on Sapienta Economics' gas model, the break-even price is estimated to be $7/MMBTU for the East Med gas to become commercially viable.

4.8 Eastern Mediterranean Sources

Conflict in Ukraine and recent hydrocarbon findings in the territorial waters of Cyprus and Israel have focused attention on the Southern Energy Corridor and on the Eastern Mediterranean. The Southern Gas Corridor has now become one of the EU's highest energy security priorities, reinforcing the need of joint work between the Commission, EU member states and the countries with the objective of rapidly securing firm commitments for the supply of gas and the construction of the pipelines necessary for all stages of its development.

Devlin et al. (2012) pointed out that the Southern Energy Corridor provides an opportunity to reduce dependency to Russia and North Africa and also to reduce the dominant position of Russian gas supplies and to introduce price competition on regional markets, which eventually will benefit local consumers. Devlin (ibid) also stated that the Commission is aware that opening a new gas corridor is a complex task which requires a strong commitment, as well as extraordinary efforts and coordination. To this end, the development of the Southern Corridor has been defined as a strategic objective of the EU's external energy policy. It is crucial to note in this context that the European external energy policy, in general, and the Southern Corridor Strategy, in particular, are closely linked to the European neighbourhood policy and are intended to deepen cooperation with all partner countries. They also highlighted that it is of primary interest to the European Union that the development of Southern Corridor and the respective gas deals are built upon a clear and enforceable regulatory framework—a framework that has a clear basis in international law and respects de jure and de facto the EU energy acquis.

The EU has actively promoted energy cooperation in Southeast Europe through the Energy Community Treaty established in 2005. Greek-Cypriot Cyprus has vetoed Turkey's membership and for this reason, it seems unlikely, for now at least, that Turkey will agree to adopt the energy acquis as a whole before opening and closing of the energy chapter in its own EU accession process. Further geopolitical complications have emerged as well.

In addition to the Caspian Basin gas, Turkey has the potential to connect to the reportedly vast hydrocarbon deposits in the eastern Mediterranean. The US Geological Survey assessment of the resources in the Levant basin which estimates the mean gas resources to be 3450 bcm, have raised expectations about future hydrocarbon discoveries (see IEA 2013a). Israel has already started extracting gas from Leviathan and Tamar basins and expecting to export it to other countries.

However, conflicts abound over boundaries amongst neighbouring countries, while there are risks and uncertainty over quantities of reserves as well as cost and finance. Levoyannis and Labreche (2013) also accentuated that natural gas discovered in the east Mediterranean Sea has divided foreign policy and energy analysts over what transport routes would be most productive and efficient, and how countries can work together to extract resources and create new energy corridor in Europe's southeast. They added that the region remains plagued by instability and tensions, with recent developments in Egypt and Syria contributing to further increase in global oil and natural gas prices.

A short-term deal to deliver a limited quantity of Israeli natural gas to Cyprus has been agreed, but it is uncertain how to deliver the eastern Mediterranean gas to Cyprus. There are several options which is under discussion, by pipeline, LNG or may be as compressed gas. Israel's export policy and export options are going to determine how this gas be exported and priced. Israel is planning to build a new LNG terminal in Eilat, and the existing LNG infrastructure in Egypt sounds the first option among many companies as well as the government officials. However, the vast amount of gas could be utilized at a faster and a cheaper rate by pipeline. The pipeline infrastructure of Egypt and already existing Arab Gas Pipeline diverse the exports to Jordan and other Middle East countries. In the meantime, a much bigger project to lay an undersea pipeline from Leviathan to Ceyhan is under discussion between Israeli private firms and Turcas and Zorlu Groups, a project also supported by the two governments. However, it too faces challenges since the pipeline must pass through Lebanon, Cypriot and Syrian economic exclusive zones.

Roberts (2014) examined the option to construct a pipeline from Cyprus to Europe via Greece. Although prompted by the European Commission as a project of common European interest, is only likely to secure serious consideration if sufficient gas should be found in indisputably Greek waters between Crete and Cyprus, a prospect not yet proven. As yet another option, Cyprus is planning to construct a new LNG terminal in Vassilikos but the amount of gas reserves discovered by Nobel energy in Aphrodite basin (parcel 12) is not large enough (estimated recoverable resources of 142–227 bcm to 5–8 tcf) to build a new LNG terminal. Constructing a single train LNG terminal (one 5 million tonne per annum (mtpa) LNG plant over 20 years) is not feasible and needs approximately

$10 billion start-up capital investment. Cyprus, bogged down in financial difficulty since 2011 and heavily indebted to Russia as well as the Troika, is practically unable to carry such an investment. The US Nobel Energy company, discouraged with exploration results to date, has decided not to continue with any more drilling in Cypriot waters. New exploration deals, signed with ENI and KOGAS consortium, in new parcels are tied up in the geopolitics of disputed waters. So far, drilling licenses for block 12 (license awarded to Nobel-Delek group), plus nine other blocks have been awarded by Cyprus Administration to international oil companies such as Total, ENI, Gazprom, and Woodside to smaller companies Winevia Holdings and RX-Drill Energy Cyprus. So far, six blocks have been awarded, three to ENI/KOGAS (Blocks 2, 3 and 9), two to TOTAL (Blocks 10 and 11) and the last one to TOTAL/NOVOTEK and GPB Global resources from Russia. According to natural gas report (NG Report by MIT 2013), with the existing capacity of gas, the construction of new LNG terminal at this stage is not feasible, yet new potential discovery of gas or adding Israel's gas shall make it possible to construct a 5 mtpa or could be further extended to 15 mtpa liquefaction plant at Vassilikos but not earlier than 2019–20. The other option proposed by Cyprus is to build a pipeline to Crete and then to Greece, which is said to be more costly than the LNG option (for cost details see Paltsev et al. (2013). Levoyannis and Labreche (2013), emphasize the fact that Cyprus remains committed to reviving economic growth, creating jobs and increasing productivity, especially after an EU bank bailout in March 2013 exposed cracks in its economy. As Roberts (2014) also stated, with economic recovery, Cyprus might be in a position to raise the cash required at some future date. However, at present and for the foreseeable period, access to finance remains an obstacle. Although pipelines and LNG constitute the backbone of current international gas delivery systems, there is intriguing possibility that both could lose out to a third option, maritime transport in the form of compressed natural gas (CNG), which is an untried technology for that moment. Indeed, extracting and exporting natural gas could be real game-changer for Cyprus. Similarly, prospects for Israel and Turkey finally concluding a deal for an undersea pipeline would depend, vitally, on how regional conflicts are resolved.

Another challenging option to monetize gas is via floating LNG technology. Since floating LNG technology is not mature, the Leviathan basin will not come on stream until the export infrastructure is completed, that is not earlier than 2017. It is said that (Blomberg news, 2013-07-12) the European Investment Bank (EIB) promised to consider investing in the proposed LNG terminal in Cyprus. The Cyprus Hydrocarbons Co. estimates the first phase of the LNG facility, including infrastructure and as many as five production lines, or trains, will cost more than EUR 9 billion. The similar cost calculations were also quoted both by MIT (Paltsev et al. 2013) and PRIO Reports (Gurel et al. 2013). The floating LNG is also another option to be investigated. Nonetheless, Levoyannis and Labreche (2013) have reminded that the construction of onshore LNG facility and production lines is expected to start in early 2016, with international exports reported to begin as early as 2020. They repeatedly prompted that if all goes according to plan, this could help

Cyprus meet its bailout commitments, spark economic growth and generate returns worth having, both financial and political.

It is worth to note here that the region remains politically unstable and a floating LNG could be under risk of sabotage or terrorist attacks, which increases its vulnerability in terms of security. Considering the economic vulnerability of Cyprus and similar political disputes among neighbouring countries in the region, (especially with Turkey) perhaps the pipeline option signals the utmost importance. Although not directly linked to Turkey's EU ambitions, the recent positive developments between Israel and Cyprus are also significant factors to regional instability (Nicolaides 2013). While traditional Cypriot foreign policy has generally followed a policy on non-alignment and solidarity with its Arab neighbours (Lindsay-Ker 2008, 2010; Mallinson 2011), the discovery of over 7 tcf of natural gas of the south coast of the island (Aphrodite basin, parcel 12) has significantly changed Cypriot foreign policy objectives. The violations of Israeli fighter jets over Turkish research vessel, the Piri Reis and the Turkey scrambled its own aircraft in response had increased the tensions between Israel and Turkey as well as Cyprus. As also mentioned by Levoyannis and Labreche (2013), in recent years, Israel relations with Turkey have been strained as a result of Israel's decision to delimit its EEZ together with Cyprus, as well as the Mavi Marmara incident in May 2010, which set fire to bilateral relations. Mavi Marmara was the aid vessel carrying food and medicine to West Gaza was attacked by Israeli commandoes and 10 Turkish citizens were killed. After 6 years of bitterness, the issue was finally settled in the reconciliation agreement of 27 June 2016.

During the 6 years, from 2010 to 2016, taking advantage of soured Turkish–Israeli relations, Greek Cyprus enhanced its relations with Israel. Thus, a joint oil and natural gas venture between the two nations was announced, and also a bilateral common defence agreement reached. Prime Minister Benjamin Netanyahu's visit to Cyprus in February 2012, and Israel's demand for the possibility of accessing and stationing military jets at the Andreas Papandreou airbase, near Paphos, worsened the relations between Turkey and Israel. Now, however, this period may come to a sudden end. In June 2016, Turkey and Israel have signed a reconciliation agreement. Earlier, with the urging of US President Obama, in March 2013 Israeli Prime Minister Netanyahu has phoned his Turkish counterpart to tender apology. Clearly, there are bigger geopolitical factors at play, cantered on the convergence of American, Turkish and Israeli interests, promoting regional energy cooperation in eastern Mediterranean. Greek-Cypriot leadership would be well-advised to heed these larger interests and settle with the Turks in order to join the emerging Regional Energy Model.

National interest largely is determined by market forces. Despite boundary disputes and geopolitical obstacles, pipeline infrastructure in the eastern Mediterranean is an on-going investment. There are several pipelines already built in the region since 2000 such as, Medgaz, Green stream, Arab Gas, Blue Stream, South Caucasus and Egypt–Israel Pipelines with a 55 bcm capacity of gas delivery in total. Medgaz offshore pipeline with a capacity of 8 bcm natural gas runs from Algeria to Spain, Green stream with 11 bcm capacity runs between Libya and Italy,

Arab Gas with 6 bcm onshore pipeline passes through Egypt-Jordan-Lebanon-Syria route, Blue Stream is a direct submarine running from Russia towards Turkey in the Black Sea with a capacity of 16 bcm, the South Caucasus pipeline is an onshore passing through Azerbaijan Shah Deniz to Erzurum-Turkey via Georgia with a capacity of 7 bcm and Egypt-Israel submarine pipeline connects Arish with Ashkelon with a capacity of 7 bcm per year. As also stated by Hafner and Tagliapietra (2013), seven LNG plants have been constructed in Southern and Eastern Mediterranean countries, for a total capacity of more than 44 bcm annually. Four LNG plants are located in Algeria, another two in Egypt and one in Libya. With a plan to construct a new LNG plant in Eilat (Israel's coastal region), total capacity of LNG exports is expected to exceed 44 bcm per year. Considering, however, that the gas demand of Europe (EU-27 demand is around 506 bcm in 2014 and expected to grow up to 525 bcm by 2018, IEA (2013b)), the existing infrastructure is not enough to deliver enough gas to Europe from the Leviathan region. The European market is therefore significantly dependent on mainly Russian gas, since Norwegian, Dutch and UK's gas capacity is limited.

4.9 Middle East and Arab Sources and Pipelines

Hafner and Tagliapietra (2013) also reported that the northern region of Iraq is actually paving the way to Iraq's emergence as world-class gas province. Between 3 and 6 tcm of gas resources are estimated to be located in the semi-autonomous territory at the confluence of Iraq, Iran and Turkey. They stressed that once established, Kurdistan's Regional Government (KRG) which is represented by Erbil Administration, has already more than tripled its 2015 target for installed gas-fired generating capacity. However, the region's gas potential capacity seems to be so large that the only way to monetize it fully will be to develop export capacity. From this perspective, Turkey has been directed as a key transit nation for gas export to Europe and may be the new gas hub in the region. Hafner and Tagliapietra (2014) reported that it is possible to expect the KRG to export about 10 bcm per year of natural gas to Turkey by 2020–2025. It is worth mentioning here that the new ISIS dispute in Northern Iraq, makes the whole plans totally nullified. As an overall trend, Iraq's plans to export natural gas remain controversial due to the amount of idle and suboptimally fired electricity generation capacity in the country.

Iraq is another energy-rich neighbour of Turkey. Accordingly, Iraq has the potential in any long-range European energy security planning on the Southern Corridor, even though at the present time it is embroiled in terrorism and civil war conflicts. Significantly, despite turmoil, the Kerkuk–Ceyhan oil pipeline has been operational, and a new plan exists to build a new gas pipeline parallel to Kerkuk–Ceyhan oil pipeline. This, if and when done, would connect Iraqi's gas to eastern Anatolia, to the centre of Turkish national gas network, namely Erzurum, and from there to Europe.

Additional mega-projects are also being planned. Energy Minister of Turkey Mr. Yildiz has declared that Turkey plans to build a gas turbines power plant on the Iraqi's border to exchange electricity with gas, which makes a significant move to import gas from Iraq. But, the ISIS crisis in Northern Kurdistan has frozen this plan for an unknown period. Considering the most recent exploration activities in Mosul-Erbil-Aleppo triangle, amounting 2.8–5.6 tcm confirmed gas reserve, which is a substantial quantity, not only Turkey, but also the other international community. As already mentioned, such a massive amount of gas can only be fully monetized if an export capacity is developed. The recent power sharing problems between Erbil administration (Kurdish Regional Administration) and Iraqi's Federal government reflect the political challenges that lie ahead, once war and conflict are over. The Turkish government has made a lot of efforts to strengthen its alliance with KRG, pushing the Kurdish leaders to compromise with Baghdad and to bring peace to the region, bringing the PKK rebellion to an end, and embarking on a cooperation path that could be greatly beneficial for all parties.

Implications for energy security and policy are severe and serious. As emphasized by Hafner and Taglipietra (2013), in the recent past an ambitious project to expand the Arab Gas Pipeline has always been far below the design capacity of 10 bcm per year, and since March 2012 the pipeline is in operable due to several attacks that have taken place since the beginning of the Egyptian revolution, mainly carried out by Bedoin Islamists and Jihadist activists in the Sinai Peninsula. According to Hafner and Tagliapietra (2013), in January 2008, Turkey and Syria signed an agreement to construct a 63 km onshore pipeline between Aleppo and Kilis (at the Turkish border) as the first segment of a Syrian–Turkey connection with the Arab Gas Pipeline. In 2008, the EU, Turkey, Iraq, Egypt, Jordan, Lebanon and Syria reached a consensus to extend the Arab Gas Pipeline to Turkey and Europe with a connection to Iraq. This cooperation effort is presently dormant.

Syria and Turkey started talks in 2010 concerning gas imports through Turkey that could be supplied by Iran and Azerbaijan. This deal was a first step towards integration with the EU gas market as well as the integration of gas markets of Egypt, Jordan, Lebanon and Syria. The political unrest after 2012 in Syria, exploding into a popular revolt against the Esad regime, then turning into a bloody civil war, has completely upset this project. The ISIS terrorist group in Northern Kurdistan Administration and in Syria Has worsened the situation. All in all, the political turmoil in Egypt leading to the military replacement of the Mursi regime by Sisi, the civil war in Syria and the new conflicts between Israel and Palestinians have undermined the existing geopolitical equilibrium of the region, making for the time being extremely difficult any form of comprehensive regional cooperation in the gas market.

4.10 Iraq and Iran Gas

Turkey's pivotal role in the emerging Southern gas infrastructure extends, as well, to Iran and Iraq gas fields. The gas infrastructure is expanding in part to respond to the growth of the Turkish energy market. But, as well, the growth reflects Turkish role in safeguarding European energy security.

In 1996, Turkey has signed an agreement with Iran to buy minimum 8 bcm of gas annually. The US continuously put pressure on Ankara to avoid dealing gas with Iran, as they believe it will undermine the diplomatic efforts to halt Iran's nuclear program. The supply agreement between Iran and Turkey is not a smooth deal as it sometimes encounters disputes over gas pricing. The original agreement was to sell gas on 15 years contracts where the price is fixed on net 'back pricing' principles. Subsequently, the Turkish state natural gas company BOTAS has suspended negotiations with Iran gas supply company, TIBRIS, which insisted to sell their gas at a price indexed to world crude oil prices with 20 years contracts and a 'take or pay' (TOP) basis.

Besides technical and diplomatic problems, deliveries of Iranian gas are subject to the terrorist attacks by the Kurdish PKK operating on the Turkey–Iran border. Terrorists have blown up the pipelines on several occasions. Hafner and Tagliapietra (2014) highlighted that the first international pipeline that Iran will likely develop will not target the European market, but the Asian market. In fact, Iran is already working on a pipeline to Pakistan, in order to export its natural gas not only to Pakistan, but also to India. Moreover, the Chinese interest on the country's natural gas reserves is also very strong and Iranian natural gas exports to China will likely take place in the future as well. For these reasons Hafner and Tagliapietra (2014) think that Iran in the medium term will not fit into Southern Gas Corridor concept, as it will first target the global LNG market and Asian markets via pipeline. They also outlined that a full resolution of the nuclear issue will not automatically change the Iranian natural gas outlook in a short period of time, as a number of commercial barriers will likely remain on the table.

Iraq is another gas source hit by conflict and terrorism. In theory, as Hafner and Tagliapietra (2013) have reported, the energy-rich northern region of Iraq can actually pave the way to Iraq's emergence as a world-class gas province. Between 3 and 6 tcm of gas resources are estimated to be located in the semi-autonomous territory at the confluence of Iraq, Iran and Turkey. However, the war against ISIS nullifies, or at least puts on hold, plans for export of Northern Iraq hydrocarbons. As an overall trend, Iraq's plans to export natural gas remain controversial due to the amount of idle and suboptimally fired electricity generation capacity in the country. Turkey as being the closest neighbour to Iraq has become vital transit location for any gas export from Iraq to Europe. The plan was to build a new gas pipeline parallel to Kerkuk-Ceyhan oil pipeline and connecting Iraqi's gas to eastern Anatolia, to the centre of Turkish national gas network, namely Erzurum. Energy Minister of Turkey Mr. Yildiz has declared that Turkey plans to build a gas turbines power plant on the Iraqi's border to exchange electricity with gas, which makes a

significant move to import gas from Iraq. Yet, the ISIS crisis in Northern Kurdistan has frozen this plan for un unknown period. Considering the most recent exploration activities in Mosul-Erbil-Aleppo triangle, amounting 2.8–5.6 tcm confirmed gas reserve, not only Turkey, but also the other international community. As already mentioned, such a massive amount of gas can only be fully monetized if an export capacity is developed. And such capacity can only be realized through massive investment. Restoration of peace is a first pre-condition. Equally significantly, political cooperation, within Iraq as well in the region, needs to be achieved.

The recent power sharing problems between Erbil administration (Kurdish Regional Administration) and Iraqi's Federal government eventually disturbed the gas export efforts of Iraq. Over the last years the Turkish government has made a lot of efforts to strengthen its alliance with KRG and the former Deputy Prime Minister Mr. Besir Atalay paid several meetings with the Kurdish leaders to bring peace to the region, and thereafter PKK rebellion forces have announced ceasefire, embarking on a cooperation path that could be greatly beneficial for both parties. However, closer relations between Ankara and Erbil have upset the national Iraqi government in Baghdad which claims sovereignty rights over Northern Iraq hydrocarbons. All these rivalries have been nullified by the takeover of Mosul by ISIS and, more recently, the US-led war, with Iraqi and Kurdish support, to retake Mosul.

References

Blomberg, http://www.blomberg.com/news/2013-07-12/cyprus-studies-lng-export-expansion-beyond-12-billion-terminal.html. Accessed on July 14, 2013.

By Pechristener File:Nabucco West Route.jpg: PowerPerson File:BTC-Pipeline.png: Devil_m25, Antemister [CC BY-SA 2.0 (http://creativecommons.org/licenses/by-sa/2.0)], via Wikimedia Commons…. Accessed on August 5, 2017.

Devlin, B., Momot, M., & Tourbach, L. (2012). The Southern Corridor—Strategic aspects for the EU. Policy officers, DG energy, European Commission. In J.A. Vionis (Edn.), *EU energy law: The security of energy supply in the European Union* (Vol. 6). Leuven: Claeys and Casteels Law Publishers.

Ellinas, C. (2016, December 16). A beneficial relationship: Russia-Turkey ties will boost energy cooperation. *Cyprus Weekly*, 18.

Ellinas, C. (2016, December 23). Still no gas sales: Optimism was high in 2016, but progress on energy was slow. *Cyprus Weekly*, 19.

Gardner, A. (2013, July 4). Problems in the pipeline. *European Voice*, 11.

Gazprom: (http://www.gazprom.com/f/posts/55/359415/map-turkish-stream-en.jpg).

Goetz, M. R. (2008). A pipeline race between the EU and Russia? In K. Barysch (Ed.), *Pipelines, politics and power. The future of EU-Russia energy relations*. London: Centre for European Reform, pp. 93–102.

Gurel, A., Mullen, F., & Tzimitras, H. (2013). *The cyprus hydrocarbons issue: Context, positions and future scenarios*. PCC Report 1/2013, PRIO (Peace Research Institute Oslo) Cyprus Centre.

Hafner, M., & Tagliapietra, S. (2013). *Globalization of natural gas markets: New challenges and opportunities for Europe*. Leuven: Claeys and Casteels Publishing.

Hafner, M., & Tagliapietra, S. (2014). Turkey as a regional natural gas hub: Myth or reality? *European Energy Journal, 4*(1), 60–66.
Hafner, M., & Tagliapietra, S. (2016). *The future of European gas markets: Balancing act between decarbonisation and security of supply*. Leuven: Claeys and Casteels Publishing.
http://www.botas.gov.tr/images/maps/Tanap_full.png. Accessed on August 5, 2017.
http://www.naturalgasworld.com/tanap-costs-decrease-by-20-25-26270. Accessed April 2, 2017.
https://en.wikipedia.org/wiki/Trans-Anatolian_gas_pipeline#/media/File:TAP_TANAP_SCP_Schah_Denis.png.
http://pennyforyourthoughts2.blogspot.com.tr/2017/01/greece=israel-stars-aligned-ital. Accessed on April 2, 2017.
IEA. (2012). *World energy outlook 2012*. Paris: OECD/IEA.
IEA. (2013a). *Medium term gas market report 2013. Market trends and projections to 2018*. France: International Energy Agency.
IEA. (2013b). *Resource to reserves: Oil, gas and coal technologies for the energy markets of the future*. Paris: OECD/IEA Publications 61, January 8, 2012, p. 1.
Iseri, E., & Oguz, D. (2013). *NATO's new energy role and Turkey: Possibilities and restraints.* NATO Science for Peace and Security Series, E: Human and Societal Dynamics, Vol. 110, Energy Security in the Wider Black Sea Area—National and Allied Approaches.
Kalesar, M. I. (2013). An insider's account. In V. Arun & N. Rajaram (Edn.), *Troubling Tehran: Reflections on geopolitics*. Iran: Iran Review, Pentagon Press, April 30, 2013.
Karbuz, S. (2016). *The geopolitics of Eastern Mediterranean gas: An overview gas*. http://caspiandc.org/energy/the-geopolitics-of-eastern-mediterranean-gas-an-overview/. Accessed from the blog of Sohbet Karbuz, https://karbuz.blogspot.com, June 24, 2016.
Leal-Arcas, R. (2016). *The European energy union: The quest for secure, affordable and sustainable energy* (p. 74). Leuven: Claeys and Casteels Law Publishers.
Levoyannis, C., & Labreche, M. (2013). The geopolitics of energy in the Eastern Mediterranean. *European Energy Journal, 3*(4), 46–52.
Lindsay-Ker, J. (2008). Europe's Eastern outpost: The "republic of cyprus" and the Middle East. *The Round Table: The Commonwealth Journal of International Affairs, 97*(397), 535–545.
Lindsay-Ker, J. (2010). Shifting alignments: The external orientations of cyprus since independence. *Cyprus Review, 22*(2), 67–74.
Luciani, G. (2013). *Security of oil supplies: Issues and remedies*. *European energy studies* (Vol. 4). Leuven: Claeys and Casteels Publishing.
Mallinson, W. (2011). Foreign policy issues of a part-occupied EU states. *Cyprus Review, 23*(1), 155–160.
Mrazkova, M. (2006). *Impact assessment: European security of gas and oil supply*. Unpublished Master Thesis, European Political and Administrative Studies, College of Europe, Brugge, Belgium.
Mullen, F. (2017, January 27). Is the EastMed gas pipeline an option for Cyprus? *Cyprus Weekly*, 23.
Nicolaides, D. (2013). The non-accession of Turkey to the European union: Implications for cyprus reunification, Eastern Mediterranean natural gas exploration and regional stability. In F. Laursen (Ed.), *EU enlargement: Current challenges and strategic choices*. Brussels: P.I.E. Peter Lang.
OECD/IEA. (2012). *IEA natural gas information 2012, Turkey* (p. 6, 68). France: International Energy Agency.
Paltsev, S., O'Sullivan, F., Lee, N., Agarwal, A., Li, M., Li, X., et al. (2013). *Natural gas monetization pathways for cyprus: Interim report—Economics of project development options*. Cambridge, MA: MIT Energy Initiative, Massachusetts Institute of Technology.
Roberts, J. (2014). Gas in the Eastern Mediterranean: Great promise but no early answers. *European Energy Journal, 4*(1), 71–76.
Tagliapietra, S. (2014). Energy infrastructure investments in Europe: The way forward. *European Energy Journal, 4*(2), 43–48.

Chapter 5
Turkish Energy Market: Transformation, Privatization and Diversification

5.1 Introduction

Turkish economy is highly dependent on fossil energy imports. With limited domestic production of energy and rapid industrialization, urbanization and population growth, Turkish vulnerability to costly energy imports poses a serious threat to the country's comparative advantage while generating rising current account deficit in the short-term. To date, Turkey has managed to obtain its imported natural gas through long-term contracts, typically 15–20 years, with relatively favourable import prices.

This fact implies that Turkey has options in the shorter-term to develop alternative energy sources as a means of reducing its imported gas dependency and vulnerability to sudden or unexpected supply shocks. To diversify its energy sources Turkey has liberalized and expanded search by domestic and external firms for discovering oil and gas reserves. It has also initiated development of two nuclear power stations, and incentives have been offered to alternative energy such as solar, water and wind.

Thus, it can be argued that Turkey has managed to buy itself a bit of a breathing space. During this breathing space, transformation sector (electricity production by power stations) has emerged as the single largest consumer of natural gas. By 2011, electricity production sector accounted for 48% of country's natural gas consumption. The shares of residential and the industrial sectors were 20–22% respectively.

V. Yorucu and Ö. Mehmet, *The Southern Energy Corridor: Turkey's Role in European Energy Security*, Lecture Notes in Energy 60,
https://doi.org/10.1007/978-3-319-63636-8_5

5.2 Electricity Consumption and Output

Rapid industrialization is the key factor behind demand for electricity. Turkish electricity demand is estimated to increase by 7.5% annually until 2020 (IEA 2013a). However, due to slow-down in economic growth, recent trend in electricity production and consumption have been significantly lower. During 2015 and 2016, gross national electricity consumption increased by 3.3%, rising from 265.7 to 278.3 billion kWh, while electricity output fell by 4.9% (Ministry of Energy and Natural Resources: http://www.enerji.gov.tr/en-US/Pages/Electricity. Accessed on 13.04.2017).

Most of the electricity generation is private sector. At the end of 2016, the State Electricity Generating Company had a share of 27.8% of installed generating capacity, while 59% was in the private sector, the rest accounted by build-operate and build-operate-transfer plants. At the same time, the electricity infrastructure is being harmonized with the European electricity system. The investment environment is also being improved with a more transparent and competitive market.

However, the most notable aspect of the Turkish electricity market has been the shift to natural gas as well as to alternate sources, such as solar and wind. At the end of 2016, only 39 coal-using production plants existed. By comparison, there were 260 natural gas-using plants and 597 hydraulic.

5.3 A Brief Historical Background: Shifting from Oil to Gas

Demand for natural gas is expected to undergo significant technological shift due to obligations to convert old fossil fuel power plants to natural gas in conformity with commitments made under the Kyoto Protocol. This shift is continuation of trends that have been taking place over the past several decades, reflecting in steady increase in energy investment.

Turkish investment in energy development and diversification began in 1980s. The then Prime Minister Turgut Ozal transformed the economy from state-control toward neoliberal economics. A more competitive energy sector began to emerge. Turkish Electricity Association, a public monopoly, was privatized and government share in the energy sector has declined. Further liberalization of the energy sector followed after Ozal.

Up to 1990s, the Turkish economy was dependent on imported oil. The country suffered from external shocks such as the Gulf Crisis, Bosnian war and the economic recession in the OECD countries, the major trading market of Turkey. An overvalued Turkish Lira, along with relatively low customs duties, caused a boom in imports, which resulted in high trade deficits. Inflationary pressures and rising demand for oil exposed the vulnerability of the economy and pushed the country to the brink. On 5 April 1994, the government introduced an Economic Stabilization

and Structural Adjustment program. This program aimed at reducing the rate of inflation, maintaining the balance of foreign trade and restoring stability in the foreign exchange market. The GDP in 1995 grew 8% in 1995 (DIE 1999), driven by healthy export trade with Russia. Oil-based growth was suddenly unsustainable. Asian financial crises in 1997 hurt the Russian economy directly and Turkey indirectly. The result was a negative impact on Turkish exports. A further setback followed from a devastating earthquake in Izmit on the Sea of Marmara in August 1999. Further setbacks followed. The Turkish economy suffered badly from chronic inflation and weak external imbalance. In December 1999, the fragile banking system created liquidity problems which resulted in a record loss in dollar reserves of the Turkish Central Bank. In early 2001, there was a speculative attack in the foreign exchange market, forcing the government to float the TL. The crisis forced major reforms in banking and economic restructuring, under the direction of the economics minister, Kemal Dervis, from the World Bank, who was specially invited by the government for the task of stabilizing the Turkish economy. In addition to drastic banking and financial austerity, Dervis initiated a program of privatization of key public sectors, including telecommunications and the energy sector. In the energy sector, Turkey began to shift from oil imports to natural gas.

In 2002, Justice and Development Party (Adalet ve Kalkınma Partisi-AKP) government came to power and Recep Tayyib Erdogan emerged as the new leader of the country. Kemal Dervis was gone, but his reforms were maintained, indeed reinforced with a currency reform, austerity program and TL convertibility. As a result of stronger Turkish banking, the US sub-prime mortgage crisis had relatively limited impact on Turkish economy. Turkish exports declined to Europe, now badly hit by the mortgage crisis. However, diversification of Turkish exports to Russia and other markets continued. In the Turkish energy market, the major transformation has been from high-cost oil to cheaper natural gas. We will return to this subject after a discussion of the principal characteristics of the Turkish natural gas market.

5.4 Principal Characteristics of the Turkish Natural Gas Market

Turkey's industrialization to date has made the country dependent on energy, initially on fossil fuel, but more recently on imported natural gas. This energy dependency put in question the country's comparative advantage and competitiveness since the cost of Turkish exports, especially manufacturing goods is, in effect, determined by the cost of electricity production. At the same time, key Turkish sectors, notably transportation, agriculture, construction, and services all depend on pricing of imported energy. In macro-economic terms, this energy dependency increases the vulnerability of the Turkish balance of payments

accounts, generating perennial current account deficit problem and exchange shocks resulting from fluctuations in prices of oil and natural gas.

Turkish natural gas consumption is also subject to great seasonal variation. Gas demand peaks in winter, with a monthly average of 5.2 bcm per month during the cold season. The IEA (2013b) report stated that daily peak demand in January is around 186 million cubic meters per day (mcm/d). In 2011, natural gas accounted for some 45% of total electricity generation, while coal and hydro represent 28–23%, respectively (IEA 2016a).

Turkish high dependence on imports is also a cause of concern. In 1999, according to data in Table 5.1, import dependency was 99%, up from 0.0% in 1985. Although, the country is Western-oriented, a member of NATO, in recent decades it has relied on Russia and Iran for its energy imports. In 2011, Russia was the largest supplier of gas with 58% of total imports of Turkey. Iran is the second largest supplier of natural gas with 19% of the total. Algeria and Azerbaijan are the other key gas suppliers with 9.5–8.7% imports, respectively. The Russian and Iranian gas is delivered through international pipelines [called the Blue Stream in the case of Russia, and the Southeast pipeline in the case of Iran and Azerbaijan]. Natural gas from Algeria and Nigeria are imported in the form of LNG with long-term contracts which is usually 10 years (see Luciani 2013 for details).

5.5 Privatization and Natural Gas Infrastructure in Turkey

Over the past decade, Turkey been rapidly modernizing and reforming its energy markets, first by updating and harmonizing its regulatory framework in line with the EU (Atiyas et al. 2012). Thus, electricity and gas markets have been restructured and placed under an independent regulatory agency, EMRA, and new legislation has been passed to promote renewable and nuclear energy. The country has completed the privatization of the gas distribution sector and connected its population to natural gas in most cities of the country by a world-wide unique tender process. According to the IEA (2016b) report, there are 42 wholesale companies which are obliged to hold storage capacity to respond to their customer's peak gas demand. These companies are not allowed to engage in transmissions and distribution.

The Turkish petroleum company (TPAO) is the largest natural gas producing company, which operates natural gas fields in the Thrace Basin and in the West Black Sea offshore. Natural gas produced in the Thrace Basin has been sold directly to local consumers, as there is no access to the national transmission network. Turkey is a key country on the cross-road of national transmission systems from East to West, with 12,812 km of pipelines and nine entry points within the country. Among all entry points, 4 international pipeline import points, 2 LNG entry points,

Table 5.1 Key natural gas data for Turkey

Variables	1985	1990	1995	2000	2005	2010	2011	2012	2014	2015[a]
Production (mcm/y)	67	212	182	639	897	682	761	632	393	400
Demand (mcm/y)	67	3468	7029	14,835	27,375	38,127	44,686	45,254	47,600	48,700
Transformation	18	2585	3600	8845	15,157	20,708	21,570	22,300	23,370	23,900
İndustry	49	814	1984	2098	3839	7901	9878	8260	10,470	10,700
Residential	–	49	1364	3218	5747	5888	8779	–	9090	9300
Others	–	20	81	674	2632	3630	4459	–	2999	3068
Net imports (mcm/y)	–	3256	6847	14,196	26,478	37,445	43,925	44,622	47,600	47,600
İmport dependency (%)	0.0	93.9	97.4	95.7	96.7	98.2	98.3	98.6	99	99
Natural gas in TPES (%)	0.1	5.4	9.4	16.6	27.0	29.8	32.3	32.1	33.1	30.2

[a]Based on monthly data submissions to the IEA

Source IEA (2016b) oil and gas security: emergency response of IEA Countries-Turkey

2 entries from production fields and 1 from the storage facility. According to IEA Turkey Report (IEA 2016b), the bulk of daily supply comes from long-term gas pipeline imports; gas from storage is used when needed and spot LNG contracts and long-term LNG contracts are mainly used for peak shaving. Seven compressor stations were also installed with a compressor capacity of 250 MW and 200 pressure reducing and metering stations were established throughout the country. As there is not enough capacity to compress gas from East to West, 2 new compressor stations with a capacity of 98 MW are expected to be integrated to the transmission system in 2013. Turkey has 290 primary exit points of which 53 points are operated by BOTAS transmission division, while 237 entry points are operated by other distribution companies.

For the retail market, 69 private distribution companies are licensed in 2015 and they are obliged to purchase natural gas at least from 2 different sources. By 2015, the gas distribution tenders were finalized for 76 out of Turkey's 81 cities, 71 of are currently using natural gas in their regions, while the tender processes for 5 cities are still ongoing. At the time of writing this book (2016), all of the remaining tender process was approaching completion. The report of IEA (2016b) also reveals that there were some 9.1 million contracts at the end of 2011 when residential gas consumption had reached to 11.3 bcm.

5.6 Gas Marketing and Distribution

Marketing and distribution within Turkey is a mixture of state control and private sector ownership, but in recent years serious efforts have been undertaken toward liberalization. As noted by IEA (2013a), the gas import company is the state-owned BOTAS, yet the gas market was liberalized in May 2001 with the natural gas market Law No. 4646, which obliged BOTAS to reduce its market share in import, wholesale and distribution in order to unbundle and harmonize Turkish energy legislation with the EU's *acquis communitaire.* Still, BOTAS is the dominant gas market player with import contracts representing 20% of annual consumption. The IEA (2013a) also reported that Russian natural gas has been transferred to four private companies with a combined capacity of 4 bcm annually, namely by EnercoEnerji (2.5 bcm), BosphorusGaz (0.5 bcm), AvrasyaGaz (0.5 bcm) and Shell Enerji (0.25 bcm).

Along with natural gas imports through pipelines, some 39 bcm of natural gas was imported by BOTAS in 2011, while a further 5–6 bcm was imported by private gas importers. The capacity of gas import by BOTAS was 43.1 bcm in 2012, 48.7 bcm in 2014 and 47.6 bcm in 2015, which is 2.4% lower than 2014 (IEA 2016b).

5.7 The LNG Market

A new LNG market has also developed. In 2011, no less than 86% of total LNG imports were handled by BOTAS, with the remaining share imported by Ege Gas. Turkey has already 2 LNG re-gasification terminals with a total maximum annual capacity of around 14 bcm, namely Marmara Ereglisi LNG Terminal and Aliaga LNG Terminal. A construction project of a third LNG terminal is currently under evaluation. The pricing of natural gas in Turkey is based on long-term contracts. The supplier requires minimum purchase guarantee for at least 10 years which causes higher risks and undoubtedly higher prices.

BOTAS has three LNG storage tanks at Marmara Ereglisi/Tekirdag with 0.15 bcm storage capacity and all are operational. EgeGaz A. Ş. has two LNG storage tanks at Aliaga/izmir with 0,17 bcm storage capacity also operational. TPAO has two depleted gas fields with underground storage at Silivri/İstanbul with 2.84–4.3 bcm storage capacities. These storage facilities are operational and they have an expansion plan by 2020. BOTAS also has underground storage with 12 salt cavens at Sultanhabı/Aksaray with Salt Lake (TuzGölü) area with 0.15 and 1.0 storage capacities. The facility is located 150 km south-east of Ankara and planned to be commissioned by 2017. Both of them are still under construction and expected to be operational by 2017 (Phase I with total capacity of 1 bcm) and 2019 (Phase II with a maximum of 30 mcm/d injection capacity and 40 mcm/d withdrawal capacity), respectively.

BOTAS also has expansion plan for Marmara Ereglisi LNG Terminal to 415,000 m^3 by installing a fourth LNG storage tank and additional sent-out equipment. According to EIA Turkey Report 2016b, basic design engineering works for this project have been completed. Ministry of Economy granted an investment stimulus package to develop a new underground storage projects in the Tarsus region (Mediterranean) for an additional 4 bcm by 2019. Ministry of Energy and Natural Resources (MENR 2015) strategic plan 2015–2020 includes targets to raise storage capacity to cover 10% of annual consumption by 2019 (5 bcm) and up to 20% thereafter.

5.8 A Pricing Model of Turkish Gas Demand

The price of imported natural gas is a key determinant of Turkish economic competitiveness. It is, therefore, illuminating to explore gas pricing in a more systematic manner. We shall now do so with the aid of an econometric model. Such an empirical study was undertaken by Yorucu (2016) and the details of the econometric model with quarterly time series analysis covering the period of 1988Q1–2012Q4 is constructed with the following equation:

$$\ln(P_{(t-4)}) = \beta_0 + \ln\beta_1 \left(\mathrm{COP}_{(t-4)}\right) + \ln\beta_2 \left(T_{(t-4)}\right) + \ln\beta_3 \left(\mathrm{EXR}_{(t-4)}\right) + \varepsilon_{(t-4)} \quad (5.1)$$

where: $P_{(t-4)}$ is the prices indices of imported gas to Turkey in t period of time, where t = 1988–2012 on quarterly basis (t−4). β_0 is constant variable, β_1 is an unknown elasticity coefficient of crude oil prices (COP), β_2 is an unknown elasticity coefficient of taxes over natural gas (including excise tax and vat), β_3 is an unknown elasticity coefficient of real exchange rates, and $\varepsilon_{(t-4)}$ is the random disturbance error term. All parameters are included in the model with natural logarithms (ln) and the estimated elasticity coefficients are all in percentages.

According to Honore (2010) the inclusion of crude oil prices in the model is based on three reasons. The oil indexation mechanism in the determination of internationally traded gas prices is based on gas contracts which were developed with a linkage with oil products-usually heavy fuel oil and gas oil.

The first reason is that the gas prices could not deviate too much from these competing energies, such as, household fuel for heating, fuel oil, alternative industrial fuel for heating and steam, which offered a possible replacement with gas.

The second reason is that the oil market had been a liquid commodity market for several decades when netback market pricing with oil product indexation was created in the 1960s. This causes three consequences, such as the producers accepting the price risk related to changes in gas prices aligned with movements of oil prices; second, the banks seemed to be comfortable with the idea of lending money based on revenues linked to oil products; and third, oil indexation also prevented the few gas suppliers to Europe from being able to influence prices.

The third reason is that in the case of associated gas production, oil-indexed gas prices were to motivate economic gas versus oil production, as gas had long been seen as an unwanted complication during oil production. Considering the transportation cost oil generates higher revenues than gas.

The resulting estimates of level relationships under the autoregressive distributed lag modelling (ARDL) specification in model (1) with distributed lags (4, 0, 3, 4) and in model (2) with lags (2, 1, 0, 3) has been estimated as:

Model (1):

$$\begin{aligned}(\ln\mathrm{TIHGPTRN}_{t-4}) = {} & -0.0007 - \underset{(-0.183)}{0.0006}(\ln\mathrm{COPTRN}_{t-0}) \\ & + \underset{(-1.440)}{0.082}\,(\ln\mathrm{EXRTRN}_{t-3}) + \underset{(16.675)}{0.698}\,(\ln\mathrm{TRHGPTRN}_{t-4}) \\ & - \underset{(-0.021)}{0.001}\,(\mathrm{DUM91}) - \underset{(-9.104)}{1.027}\,(\mathrm{DUM01}) + \underset{(0.057)}{0.003}(\mathrm{DUM08}) \\ & - \underset{(-6.816)}{0.661}\,(\hat{u}_t)\end{aligned}$$

Model (2):

$$
\begin{aligned}
(\ln\mathrm{TIHGPTRN}_{t-4}) = {} & -0.0007 - \underset{(-0.183)}{0.0006}(\ln\mathrm{COPTRN}_{t-0}) \\
& + \underset{(-1.440)}{0.082}\,(\ln\mathrm{EXRTRN}_{t-3}) + \underset{(16.675)}{0.698}\,(\ln\mathrm{TRHGPTRN}_{t-4}) \\
& - \underset{(-0.021)}{0.001}\,(\mathrm{DUM91}) - \underset{(-9.104)}{1.027}\,(\mathrm{DUM01}) + \underset{(0.057)}{0.003}(\mathrm{DUM08}) \\
& - \underset{(-6.816)}{0.661}\,(\widehat{u}_t)
\end{aligned}
$$

where $\hat{u}_t$ is error correction term and t-statistics are given in parenthesis in all models. The crude oil (COPTRN) parameter has been found statistically significant only in equation model (2) but economically not meaningful since the estimated coefficient is very low (0.006). Therefore, we can draw a conclusion here that the crude oil price in Turkey does not have any impact on natural gas prices. Eventually, we can say that crude oil in Turkey cannot be substituted for either household consumption or industry needs.

Real exchange rate variables in model (2) have been found significant and consistent with theory and t-statistics in parenthesis shows that exchange rate (EXRTRN) variable in Turkey is very significant at one percent confidence interval. When there is one percent increase in real exchange rate of Turkey, it causes 0.144% increase in industry gas prices in Turkey. Exchange rate variable was not found to be significant in the estimation model (1) when household gas price is concerned.

Tax variables for Turkish household gas price (TRHGP) and Turkish Industry gas price (TRIGP) have been found statistically significant in both models and have high elasticity coefficients, (0.698), and (0.776) in model (1) and (2) respectively. The estimated results for household demand reveal that when there is a 1% increase in taxes, the household prices increases by more than 0.65%. When industry demand is concerned, a 1% increase in taxes, cause more than 0.77% increases on industry gas prices in Turkey. We can reach a conclusion that the fiscal decisions of government in Turkey may have a great impact on natural gas prices in Turkey. This is consistent with theory since Turkey is highly energy dependent country, especially to natural gas.

In the next stage, conditional ECM regressions associated with the above level relationships have been estimated. Results reveal that the error correction terms in model (1) and (2) are reasonably high, statistically significant (−0.661) and (−0.523) have expected coefficient signs in both models which is consistent with theory. This shows that the dependent variables (TIHGP and TIIGP) in both equation models converge reasonably high to its long-run equilibrium level.

Under the ARDL mechanism, as a long-run context, the conditional Granger causality test results estimated from model 1 and model 2 reveal that there are unidirectional relationships from real exchange rates and tax revenues towards the

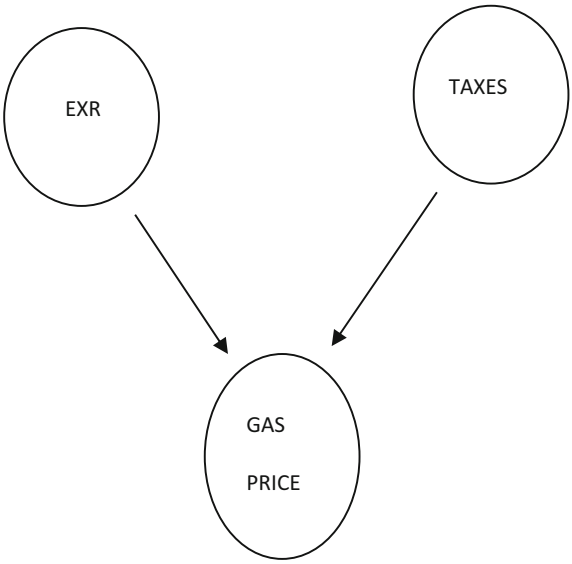

Fig. 5.1 Real exchange rates and taxes cause changes in household gas prices in Turkey. *Source* Yorucu (2016)

household gas prices as well as from tax revenues towards industry gas prices (Fig. 5.1).

The *t*-statistics for error correction terms in all equations, where household or industry gas price is the dependent variable, are statistically significant. The *F*-statistics for short-term causations are statistically significant (For details see Yorucu 2016); thus, short-run causations were also confirmed between real household gas price growth and tax revenues, and exchange rate growth. This is also valid between real industry gas price growth and tax revenues growth. In another word, changes in real exchange rates and taxes, preceded a change in real household gas prices of Turkey. The changes in taxes over the industry demand, also changes the real industry gas prices in Turkey. Therefore, these major findings support the hypotheses of 'gas price growth' in the case of Turkey. It is also possible to say that growth in real exchange rates and taxes expands the gas prices in Turkey.

In summary, the model of 'gas-price-growth' in Turkey validates the hypothesis that the manufacturing sector has become the dynamo of Turkish economy in which energy demand has been the driver. Turkey, with high dependency on gas imports, has experienced an expanding current account deficit during the last decade.

Results of the empirical estimations reveal that a long-run equilibrium relationship exists between each pair of variables such as, natural gas prices, crude oil prices, taxes on gas and real exchange rates. Furthermore, the empirical findings confirm unidirectional causalities running from: (1) real exchange rates and taxes towards real gas prices for households, and (2) from taxes towards real gas prices for industry in Turkey. This empirical work also identifies macroeconomic policy instruments that play significant role in determining the pricing of natural gas in

Turkey. Over and above policy instruments, movements in capital markets and possible risks associated with high inflation will also impact future prices of gas in Turkey.

5.9 Gas Deliveries in the Pipeline

The mega project named, Trans Anatolian Natural Gas Pipeline (TANAP) has started in 2013 to transport Shah Deniz phase-two gas from Azerbaijan to Europe through Turkey with a capacity of 16 bcm, among that 8 bcm is expected to be imported by Turkey for domestic use, and the remaining will be exported to Europe via Trans Adriatic Pipeline over Greece. The project has already started and is expected to be completed in 2018.

TANAP has changed the energy scenario in the region. With this deal, Turkey will have a big relief with TANAP by 2018 in meeting its rising domestic demand. Karbuz (2014) pointed out that natural gas has become the fuel of choice in Turkish industrial and household consumption as well as in power generation. Nearly 48% of total imports of natural gas is needed for transformation industry in Turkey (Yorucu 2016). With 45.2 bcm of gas demand in 2012, Turkey has become one of the biggest gas markets in Europe, consuming no less than approximately 10% of total Europe's annual gas consumption.

Karbuz (2014) has estimated that the Turkish gas demand will reach 48 bcm in 2013 and 80 bcm in 2030. With this level of natural gas consumption and strong economic growth, Hafner and Tagliapietra (2014) believed that Turkey is the most dynamic natural gas market in the OECD region. They also mentioned that in addition to its rapidly expanding domestic market, Turkey has become a hot topic of world—and notably European—natural; gas markets for another reason: the European quest for new "Silk Road" aimed at diversify its natural gas imports away from Russia. From this perspective, Turkey is like a hamburger, on the upper ban Russia gas, on the lower ban east Mediterranean and Caucasian gas and in the middle Southern Gas Corridor acting as a transit together with BOTAS, TANAP and TAP.

Besides TANAP, Turkey also has an interest in a variety of other sources and pipeline projects in the region. These include the following, with varying degrees of risk: the Turkmenistan-TANAP-Europe Natural Gas Pipeline, Iraq-Turkey Natural Gas Pipeline, the Arab Gas Pipeline, and the existing Kirkuk-Ceyhan Pipeline delivering crude oil to the port of Ceyhan (IEA 2013b).

Of special interest to Turkey are the potential gas fields in the Eastern Mediterranean. At the time of writing, these include the Leviathan in Israeli territorial waters and Aphrodite in the case of Cyprus. The development of Israeli gas field, with Turkish-Israel cooperation is likely, while the Cypriot reserves are contingent upon resolution of the Cyprus Problem and therefore more likely in the longer rather than shorter term. These and other cases will be further analysed in the next chapter. However, one additional topic may be mentioned at this stage. This is

the case of least-cost mode of transporting natural gas. Transporting natural gas by pipeline from these sources is far cheaper than shipping via LNG tankers. Certainly, liquefaction of Cyprus offshore gas will certainly be more expensive, considering extra cost of construction of LNG storage terminal and shipping costs.

5.10 Hydrocarbon Exploration

Turkey itself lacks major hydrocarbon deposits, producing less than 700,000 barrels of oil equivalent per day and with proven reserves of 270 m barrels of oil and 218 cu.ft of natural gas. Paradoxically, the country is surrounded by rich oil and gas reserves all around, Azerbaijan to the east and on the Iraqi border, where Zogros hydrocarbon field, running up all the way from the Arabian Peninsula up through Mesopotamia, stops short of the Turkish frontier. Similarly, the rich Kirkuk oil field is south of the Turkish border. Besides, the on-going conflict with the Kurdish Workers Party, aiming to dismember Turkey, prevents any significant exploration in the region.

Exploration to date has had minimal results, but promising reserves do exist offshore in the Black Sea. Domestic interests, principally the Turkish Petroleum Corporation, as well as ExxonMobil, Chevron and others are interested parties, which are involved in negotiations with the government. Elsewhere, in the Aegean and the Mediterranean offshore deposits and exploration activities are constrained by disputes over territorial waters, as discussed in other chapter in this study.

One limited choice on the Turkish energy scene is shale gas. Economic shale gas deposits have recently been discovered in the north-west Turkish Thrace and in the southeast regions of the country. At the end of 2013, the Royal Dutch Shell and Turkish Petroleum exploited their first shale gas well at Sanbuğday-1, near Diyarbakir, estimated to contain up to 6 bcm of gas. Together with other shale gas discoveries in the country, Turkey may realize up to 14 years of domestic gas production to help offset the nation's massive gas import bill. This breathing-space, however, guarantees no long-term sustainability in terms of energy from hydrocarbons.

At the present time, alternative energy sources to hydrocarbons are the better longer-term options for Turkey. In terms of long-term sustainability, these alternatives offer a far better choice for the Turkish economy than hydrocarbons and fossil energy. In the final section of this chapter we shall briefly examine some of the principal alternative choices.

5.11 Alternative Energy

Development of alternative energy sources, to reduce import dependency and achieve greater long, is a major Turkish policy objective. Below is a brief summary of these alternatives, using latest information from the Ministry of Energy and Natural Resources and related sources.

5.12 Wind Energy

A Potential Wind Energy Map of Turkey has been prepared. In heights of 50 m with a wind speed of 7.5 m/s, it is estimated that the country has potential of up to 48,000 MW from potential wind energy-producing areas equivalent to 1.3% of the Turkish surface. Wind turbines are the principal structural elements of wind energy plants which convert kinetic energy of wind, first to mechanic energy and then to electricity. Selling license to private investors for establishing wind power plants is a preferred policy approach adopted by the Energy Ministry.

5.13 Solar Energy

Turkey has a high solar energy potential due to its geographic location. A Solar Energy Map has been prepared identifying the most efficient solar power plants. In 2015, total solar heat production amounted to almost 811,000 tonnes equivalent to petrol, two-thirds for consumption in homes, and one-third in industrial establishments. Solar power plants, governed by a licensing system, are rapidly increasing. At the end of 2016, total installed capacity of solar energy power generation amounted to 832.5 MW. In 2017, a tendering process was completed for the Konya-Karapinar renewable energy area project with a capacity of 1000-MW solar power.

5.14 Geothermal Energy

Turkey is one of the top potential geothermal heat energy producers in the world. This is energy obtained from hot water, steam and hot dry rocks formed around active fault systems and volcanic and magmatic units. Situated on the Alps-Himalayas belt, the country has a theoretical capability of 31,500 MW of geothermal heat energy, especially in western Anatolia. Since 2002, there has been a huge expansion in electricity production from geothermal energy. In 2002, geothermal energy output was 15 MWe, increasing to 820 MWe by 2016.

5.15 Biofuel Energy

This is energy obtained from biomass which range from herbal, animal, forestry components to organic wastes, including urban and industrial wastes. It is estimated that Turkey's biomass potential is about 8.5 million tonnes of equivalent petrol, with a target of installed capacity of 1000 MW by 2023.

5.16 Nuclear Energy

By far the most controversial alternative energy source is nuclear. Security and environmental impact of nuclear power plants have been heightened by major accidents, old and new, including those at the Three Mile Island in the USA (1979), Chernobyl in today's Ukraine and more recently in Japan at Fukushima (Yorucu and Katircioglu 2014). Turkey has two nuclear plant projects in development: (1) Akkuyu plant based on a Russian partnership expected to start construction in 2017 with a completion date of 2023, and (2) Sinop plant involving a Japanese partnership. Currently, some 600 Turkish students are in Russia in a variety of nuclear energy education as a vital step in human resource development for nuclear energy management.

References

Atiyas, I., Cetin, T., & Gulen, G. (2012). *Reforming Turkish energy markets: Political economy*. Regulation and Competition in the Search for Energy Policy: Springer.

DIE. (1999). Devlet İstatistik Enstitüsü. İstatistik Yıllığı. Ankara. (http://www.tuik.gov.tr/UstMenu.do?metod=temelist).

Hafner, M., & Tagliapietra, S. (2014). Turkey as a regional natural gas hub: Myth or reality? *European Energy Journal, 4*(1), 60–66.

Honoré, A. (2010). *European natural gas demand, supply, and pricing: Cycles, seasons, and the impact of LNG price arbitrage*. Oxford Institute for Energy Studies. NY: Oxford University Press Inc.

IEA. (2013a). *Medium term gas market report 2013*. Market trends and projections to 2018. France: International Energy Agency.

IEA. (2013b). *Resource to reserves: Oil, gas and coal technologies for the energy markets of the future*. OECD/IEA Publications 61 2012 08 1 P1, Paris.

IEA. (2016a). *Natural gas information 2016*. http://www.iea.org/statistics/.

IEA. (2016b). *Energy policies of IEA countries: Turkey, 2016 review*. Paris: International Energy agency.

Karbuz, S. (2014). Turkey's energy future: A quantitative assessment. *European Energy Journal, 4*(1), 67–70.

Luciani, G. (2013). *Security of oil Supplies: Issues and remedies*. European Energy Studies, vol. 4, Leuven: Claeys and Casteels Publishing.

MENR. (2015). *Ministry of energy and natural resources statistics 2015*. Turkey: Ankara.

Yorucu, V. (2016). Price modelling of natural gas: The case of Turkey. *AIP-Journal of Renewable and Sustainable Energy, 8,* 1–12.
Yorucu, V., & Katircioglu, S. T. (2014). Radioactive convergence of nuclear leakage in Fukushima: Economic impact analysis of triple tragic events. *Renewable and Sustainable Energy Reviews, 35,* 400–409.

Internet Sources

http://www.enerji.gov.tr/en-US/Pages/Electricity. Accessed on April 13, 2017.
http://www.tuik.gov.tr/UstMenu.do?metod=temelist.
http://www.iea.org/statistics/.

Part III
New Hydrocarbon Reserves in the Levant and the Greater Caspian Basin: Curse or Blessing?

Hydrocarbon wealth, underground or offshore, is expensive to monetize. Heavy investment upfront is required for exploration, transport and refining to produce the energy that heats homes and drives economies. Typically, hydrocarbon wealth lies in gas or oil fields crossing national boundaries, or it has to be transported via long pipelines going through national borders. In one way or another, hydrocarbon wealth can best be realized through cooperative arrangements between countries involved in exploration, development or monetization of this potential.

If such cooperation is achieved, then hydrocarbon reserves can be a blessing, a bonanza of wealth is created to be shared amongst cooperating countries, e.g. in North Sea Oil. If, on the other hand, boundary disputes turn into never-ending conflict, or if domestic stakeholders turn on one another, then the result is a curse, actually making things worse.

This part is devoted to an analysis of new discoveries of hydrocarbons in the Levant and the Great Caspian Basin. Consistent with our 'levels of risk' classification, we rate the prospects of monetizing the Caspian reserves more likely than the Levant discoveries (save for the Israeli finds). We believe Turkish-Azeri cooperation is most likely, while Turkish Israeli cooperation is similarly more likely. To the extent that these reserves and their related pipelines are realized, a Regional Energy Model will slowly emerge which, over time with positive geopolitics, may become even stronger and larger with additional actors joining in. For example, in due course, the Cyprus Problem may be solved allowing cooperation between Turkey, Israel and Cyprus. Arab and Gulf hydrocarbon sources may join our Regional Energy Model in the more distant future. All these prospects, of course, depend primarily on private-sector actors in the energy market as well as geopolitics, discussed elsewhere in this book.

Chapter 6
Hydrocarbon Discoveries in the Eastern Mediterranean

6.1 Introduction

New hydrocarbon reserves are being developed in the region next to Turkey. This chapter will explore the prospects of monetizing new reserves in the Eastern Mediterranean hydrocarbon fields. Monetizing these reserves will be private-sector driven, since the huge financing required will have to come from private investors. But, state policy and decision-making are no less significant to overcome numerous conflicts and disputes involving hydrocarbons. In the interplay of geopolitics and private-sector rationality (i.e. market-driven self-interest), market forces will ultimately prevail. We believe, in the end peace will be restored and a Regional Energy Model, prompted by market forces, will begin to take shape.

The Eastern Mediterranean region remains one of the world's most unexplored areas. To date three new sources of natural gas have been confirmed (Karbuz 2016), with other prospects in the horizon. They are: (1) Israel's Tamar and Leviathan offshore fields, (2) Aphrodite field off the coast of South Cyprus, and (3) the largest gas field yet in the Zohr region in Egyptian territorial waters, just 10 km away from parcel 10 of Cyprus EEZ. Beyond these, good prospects exist of potentially rich gas and oil reserves. The US Geological Survey in 2010 confirmed 9800 bcm of technically recoverable undiscovered gas potential in the region (Nile Delta and East Med Sea sectors of Egypt). This is about 50% of Algeria's current proven gas reserves. Including Israeli's, Cyprus', Lebanon's and Syrian's gas reserves, amount of technically recoverable gas is at significant level. The extensive seismic surveys within Lebanon EEZ show promising prospects, gas ranging 700–2800 bcm. Due to the absence of a functioning government and political instability in Lebanon, the first licensing round for offshore gas exploration in May 2012 was suspended. Also, the Lebanese parliament could not ratify two constitutional decrees related to the number of blocks for exploration and production agreement.

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6.2 Israel's Gas Developments

The Leviathan gas field holds 622 bcm reserves and is expected to become operational in 2019 (http://www.businessinsider.com/r-israel-turkey-gas-pipeline-could-be-ready-in-four-y, accessed 24.04.2017). In the first stage, it is planned to deliver this gas to the Israeli market, possibly with exports to neighbouring Arab countries such as Jordan, Egypt and Palestine. Delek Drilling and Avner, subsidiaries of the Israeli conglomerate Delek Group are partnered with the American Texas-based Noble Energy in this venture which also includes future supplies from the Tamar gas fields. According to Karbuz (2016), the first phase of the Leviathan field development involves an initial investment of up to $4 billion to produce 12 bcm of gas per year. The second phase would expand production and delivery to other market, with two competing options to export gas to Europe via pipelines: (1) Turkey, or (2) the Eastern Mediterranean Pipeline. The private sector partners have stated that an undersea pipeline from the Leviathan field to Turkey's Ceyhan, through a new undersea pipeline 500 km, could have gas flowing by the end of 2020. A more costly alternative route is the 2500 km Leviathan-Cyprus-Crete-Greece–Italy pipeline. The preliminary cost estimates for this range from a low $5 to $19.5 bn.

The shorter and more economic Turkish option is the clear favourite. Once the pipeline ever reaches Turkey, then gas can either be sold to Turkish domestic market or be sent to Europe by the BOTAS pipeline or TANAP. Constructing the Israeli–Turkey pipeline would require long-term commitments and guarantees. It appears that there are some legal challenges within Israel as well with rival business interests claiming that the backers of the Leviathan and Tamar gas fields possess monopoly interests, contrary to competitive laws in Israel. Additionally, there seems to be further competitive risk from far away Russia. Under current market conditions, Russian gas prices are so low that even the relatively short Israel–Turkey pipeline project would be hard-pressed to compete with Russian gas in the Turkish and European markets. The long, high-cost East Mediterranean pipeline project would have trouble getting beyond the planning stage. With all these risks, no private company or a consortium of private companies would be willing to invest a significant amount of capital anytime soon to ensure commercially viable outcome is realized.

6.3 Israel—Russia Possible Cooperation

Israel has always long-term plans to attract new investors to its natural gas sector. As stated by Karbuz (2014), an energy-oriented cooperation between Russia and Israel, especially in upstream operations, is possible in the eastern Mediterranean. According to Karbuz (2014), some gas fields such as the Tanin and Karish fields might be sold to Russian companies, or Russia's Gazprom can become a new

partner in the Leviathan field. The Leviathan field partners, consisting of US Noble and Israel's Delek and Ratio Oil, may make a final investment decision to sell some of its shares to a new partner to finance the development of the natural gas field because they alone are unable to finance it since the companies made huge losses during the past few years as a result of law gas prices. Karbuz (2016) also noted that the increasing presence of Russia in the East Mediterranean is strengthening, while there is a strong possibility that the country will also participate in the Greek Cypriot administration's unilateral offshore natural gas licensing bid in 2016–2017. Egypt and Lebanon will also hold new licensing tenders in the future in which Russia will avail of the opportunity to participate.

Russian Rosneft started to sell LNG to Egypt. Besides that, Tunisia has strong energy-based cooperation in the eastern Mediterranean with Israel, Egypt, Cyprus and Lebanon, and perhaps in the near future, Russia may become the sole power with its dominant position in deciding the amount, direction and timing of natural gas supply from the region to the other markets, such as Middle East, Turkey or Europe.

6.4 The Egyptian Zohr Gas Field

Zohr is a carbonate reservoir lying at a total depth of about 4150 m, with over 600 m of continuous hydrocarbon columns. Ellinas noted (Cyprus Weekly, 10 March 2017, p. 18) that the Zohr field is unlike Tamar, Leviathan and Aphrodite, which were discovered in sandstone formations. It is believed that the Zohr field was formed 5–7 million years ago in lagoons south of Cyprus and investigations since the Zohr's discovery have led to strong indications that other similar reservoirs may exist around this area, with Cyprus Blocks 10 and 11 being strong candidates.

Exxon Mobil's interest in Cyprus is twofold. First, it has been attracted by prospects of making a significant gas discovery in a region within the EU, with established regulatory, taxation and fiscal systems. A discovery of a Zohr-size gas field could add over 20% to ExxonMobil's proved reserves, which is very important for the profitability of the company. Second, a sizeable discovery can be used to develop LNG exports, particularly, if gas prices recover in the mid-2020s. ExxonMobil and Qatar Petroleum have successful partnership in developing and exporting LNG to global markets. Companies need to carry out 3-D seismic surveys and depending on the availability of data; such complete geological models enabling the identification of drilling targets may become available between 2018 and 2019. ExxonMobil might start drilling in Block 10 in 2017 or more optimistically beginning of 2018 if 3-D seismic surveys are completed. It is certain that if everything goes as being planned, the drilling companies for all three blocks may not be completed before 2020.

New technologies are also being developed, in particular, floating LNG. Thus, if TOTAL is successful with drilling in Block 11, starting in June 2017, and a

significant find is discovered, then floating LNG (FLNG) may become a serious option for gas exports to European and Asian Markets. TOTAL is the fourth richest energy major in the world, has experience, knowledge and financing to invest in LNG trading with its own FLNG technology.

Considering the low gas price in the current markets, TOTAL's LNG and FLNG expertise may come in handy. Total's drilling attempt in Block 11 will be critical for the region, but also its FLNG expertise may open up new avenues and export markets for East Med gas. ENI was equally reluctant, but the government feels the Italian major is very close to also transfer its land operations to Limassol. The company's board has informed the Greek Cypriot Energy Ministry that they are scheduling their remaining (Block 9) drills within 2017. ENI had dry wells in the Onasagoras and Amathousa wells in Block 9 of Cyprus's EEZ in 2014 and 2015, respectively. Both ENI and Total renewed their interest in Cyprus's prospects after the discovery of the huge Zohr gas field in the EEZ of Egypt using a new geological model. All the major energy companies will negotiate year contracts which put the prospect of exploiting any findings well into the mid-2020s. Exploratory drilling are expected to start after 2018 at the earliest, if everything goes as planned. If a first drilling is successful, it will be followed by the appraisal well, a second drill to confirm the finding. Soon after then, the search for potential buyers may begin the presentation of a development plan, and finally, the process of extracting the gas and transporting it to the buyer.

In the meantime, trading over the Zohr reserves has already begun for corporate financing. ENI sold up to 50% of the lucrative Zohr gas-field in Egypt to BP (10–15%) and Rosneft (30–35%). The proceeds will help ENI funding the development of Zohr gas field. Zohr has 850 bcm proven gas reserves and discovered in 2015 with start-up expected before the end of 2017. ENI is now focusing on near-term and low-cost exploration options, with time-to-market being the key driver. It has set a target to discover 1.6 billion boe between 2016 and 2019 at a cost of $2.30/boe, which may help Cyprus. ENI is well placed to make new discoveries when it re-starts exploration in Blocks 2, 3 and 9 towards the end of 2017. Even though ENI's drilling in Block 9 in 2015 was unsuccessful, new geological models based on the Zohr discovery make this block, as well as the adjacent Block 8, more promising. As stated by Ellinas (Cyprus Weekly, 13 Jan 2017, p. 15) ENI expects the development cost to be around $12 billion. Gas sales are expected to reach a plateau of 28 bcm/year by 2019 and are mostly destined for the domestic Egyptian market, but some of it may be exported as LNG from Demietta.

6.5 The Cypriot Gas Quandary

With the discovery, much below original expectations, of gas reserves in the Aphrodite field by Nobel Energy on 28 December 2011, the Greek Cyprus government quickly considered alternative scenarios. One has been the diplomatic option of considering cooperative deals between Greek Cyprus, Greece together

with Egypt and Israel (Source: http://www.newenglishreview.org/blog_direct_link.cfm/blog_id/63503/The-Triple-All, accessed 24.04.2017).

Perceived as an alternative to the Turkish pipeline connection, this triple or quadruple alliance, cantered on the East Mediterranean Pipeline, is more diplomatic than economic. Neither is the construction of an LNG Terminal (at Vassilikos, near Cyprus), feasible on the basis of hydrocarbon discoveries to date.

The Cypriot hydrocarbon picture can suddenly change with the discovery of future reserves. At the time of writing (Spring 2017), there were early indications that in Cypriot Block 11 there may be reserves of gas, large enough to rival Egypt's Zohr (http://www.ihsmarkit.com/press-release/catherine-gifford/totals-offshore-cyprus-block, accessed on 25.04.2027). Block 11 is situated just north of Zohr which, according to ENI statements, has recoverable reserves of up to 20 tcf. ENI has so far drilled five wells in the Zohr area, confirming the high-quality gas accumulation. If the Cypriot Block 11 drilling by TOTAL leads to an equal bonanza, it would still be far from sure that all that hydrocarbon wealth could be monetized, unless there is first a political settlement between the Turks and Greeks. Potentially, a win–win scenario is achievable, including the prospect of gas exports from Cypriot and/or Egyptian sources. For that to happen, however, politics must yield to economic rationality. Zohr and potential new reserves in Block 11 and elsewhere in Eastern Mediterranean, may even propel Egypt into a regional commercialization hub. It is to be hoped that rationality, on all sides, would prevail and a Regional Energy Model would emerge, inclusive of Egyptians and Cypriots as well as Turks, Arabs and Israelis.

The key factor in the case of Cypriot hydrocarbons is that monetization should follow a political settlement on the island. No diplomatic relations have existed between Turkey and Greek Cyprus since 1963 when the Cyprus Problem emerged. Since then, Turkish Cypriots have been excluded in the All Greek-Cypriot Cyprus government. For their part, Greek Cypriots refuse to join any project involving a pipeline to Turkey. Unless the Cyprus Problem is resolved, it is unlikely the Cypriot hydrocarbon reserves can be exploited and monetized, at least in any economic manner.

The alternative option of building a 2000 km undersea pipeline from Cyprus to Crete and then to the Greek mainland, and from there to Italy, appears to be highly uneconomic. Even if its feasibility study might be supported by the EU, such a long pipeline is very expensive (ranging from a low of $5.5 to $19.5 billion) and also technically very difficult. Energy Minister Yiorgos Lakkotrypis (see Adilinis (2017) Cyprus Weekly, 6 Jan 2017) stated that the East Med pipeline is one alternative together with a floating platform to liquefy gas (floating LNG) and an onshore LNG plant. The Minister Lakkotrypis said that all depends on the prices one sells the gas. He also added that Cyprus could only sell its gas in the European energy market if the price is competitive. The cost of the East Mediterranean Pipeline cannot ignore the ultimate unit price in Europe. This is the big question which has not yet been answered. According to one feasibility study Ellinas (2017, Cyprus weekly, 23 Dec 2016, p. 19) the East Med pipeline will only be commercially feasible if gas prices in Europe are in the range of $7–$9/MMBtu or over, almost twice the prevailing gas

prices in Europe averaging $4.5/MBtu in 2016. Furthermore, at the European Gas Summit in Sept 2016 at Dusseldorf, the mood was pessimistic, with gas prices in Europe expected to stay around $4/MMBtu for the longer term. And if the expected influx of US liquefied natural gas (LNG) gains a foothold gas prices may go down even further. World energy investments on renewable are also threatening gas prices not to rise.

As well, with the new Turk Stream project going ahead with the prospect of cheaper Russian gas deliveries, the East Med project seems to be dead as a premature baby before it was born. In 2012, Cyprus opened a second round of exploration and production bidding round for 12 offshore blocks. In early 2013, five of them was awarded three major oil companies from France, Italy and Korea. ENI/Kogas consortium drilled two wells but found out to be dry. TOTAL has announced that it had not found any targets in Blocks 10 and 11 to justify drilling. Total relinquished Block 10, as highlighted by Karbuz (2016) the TOTAL Company has agreed to extend its presence in the country to conduct geological and geo-chemical surveys in and around Block 11, which is 6 km away from Egyptian Zohr basin. Mega reserve Zohr is resembled with Cyprus' Block 11, where in the third round licensing; there were a lot of competition to get drilling licenses for Blocks 6, 8, 10 and 11. Bidding Companies who joined in Cyprus 2016 Bid Round are as follows: Total (50%) and ENI (50%) were for Block 6, Cairn (50%) and Delek (50%) for Block 8, Total (50%) and ENI (50%) for Block 10, Exxon Mobil (50%) and Qatar Petroleum (50%) for Block 10 and Statoil for Block 10. ENI was successful in the third licensing round in Cyprus, having been selected for award of Block 8 outright and Block 6 in partnership with TOTAL. These are in addition to Blocks 2, 3 and 9 of which is the operator in partnership with KOGAS. With ENI's dominant involvement in 5 out of 8 licensed Blocks, the company is very important to Cyprus future hydrocarbon exploration and production.

6.6 Geopolitics of New Drilling in Disputed Waters

Greek Cypriot authorities have announced plans to commence drilling in May 2017, but, in view of Turkey's rejection of these plans, it is likely to end up in new round of geopolitical feuding. Shell already bought 35% stake in the field in January 2016. As Ellinas stated (2017, Cyprus Weekly, 6 Jan 2017, p. 18) Exxon Mobil plans to stay focused on investments based on a longer term view. This favours its venture into Cyprus. Having reduced operating and production costs, Exxon Mobil stands to benefit as oil prices rise towards $60/b in 2017, following OPEC's production cuts. Exxon Mobil and Qatar Petroleum have been working together since 2000 to develop Qatar's North Field, the world's largest natural gas field. Qatar is the world's leading LNG exporter. Qatar has LNG tankers with 266,000 tons of LNG carrying capacity. On December 21, the Exxon Mobil/Qatar Petroleum partnership was chosen to negotiate license terms for Block 10 of Cyprus EEZ. According to Ellinas (2017, Cyprus Weekly, 6 Jan 2017, p. 18), this

contains carbonate formations similar to those that led to the discovery of Zohr by ENI.

Based on the information provided by Ellinas (2017, Cyprus Weekly, 20 Jan 2017, p. 16), Block 11 share in Cyprus EEZ has a boundary in the South with Zohr, and HIS Market analysts said that Total's well will be one of the most critical wells drilled globally in 2017. HIS said ENI has drilled five wells in Zohr. Drilling in Block 2 in onshore Egypt, a 50/50 partnership with BP, will start as soon as a rig currently being used by BP on another block is available, as emphasized by Stephanie Michel (Total's President for Exploration and Production in the Middle East and North Africa—MENA: Ellinas, (2017, Cyprus Weekly, 20 Jan 2017, p. 16). Michel (2017) also added that Total's oil and gas production for the region will grow in 2017. To sum up, third licensing round awards was made on Tuesday, 7 March 2017, as expected awards were given ENI-TOTAL consortium for Block 6, ENI alone for Block 8 and Exxon Mobil and Qatar Petroleum for Block 10.

The signature bonus to be paid to the Greek Cypriot Administration of Cyprus totals to be $110 million dollars. The awards were ratified by the Councils of Minister of Greek Cypriot government on the 17 March 2017. ENI and TOTAL have agreed to extend their cooperation in Block 11 on a 55 basis, with TOTAL as the operator. ENI further reinforces its own position in Cyprus exploration, acquiring the right of exploring an area of 2215 km^2 nearby the super-giant Zohr discovery in the Egyptian offshore (Cyprus Weekly, 10 March 2017, p. 5). ENI has been present in Cyprus since 2013 and holds exploration rights on Blocks 9, 3 and 2 (ENI 80% operator, Kogas 20%) awarded in the second licensing round. In the third round, as a selected bidder for Block 6 (ENI 50% operator and Total 50%) and Block 8 (ENI 100 operator), ENI will develop the natural gas with its extensive knowledge and money. Turkish Energy Minister Berat Albayrak said that Barbaros Turkish seismic vessel will be launching seismological research and drilling activities in the Mediterranean, possibly at Block 6, which Turkey has also claimed that Block 6 is within Turkey's EEZ. The situation seems very vulgar and nobody knows what will happen in the next months or years. Currently, Turkish seismic vessel Barbaros Hayrettin has completed 3D survey at Bay of İskele (Famagusta) and new explorations are expected to be undertaken in July 2017.

The exploration and extraction of gas are not, at this stage, sufficient to monetize Cyprus' gas alone. In the meantime, political dispute with Turkey over the delimitation and EEZ of Cyprus, and the unresolved Cyprus problem between Greek and Turkish Cypriots, affecting ownership of Cypriot sovereignty, has put major obstacles in the way of commercializing off-shore gas development. Additionally, with effective bankruptcy in Greece and South Cyprus, in the aftermath of the euro zone crisis, there are huge financial impediments to undertake the required infrastructural investments in production and delivering gas from Cyprus off-shore reserves.

6.7 Marketing and Russian Competition

Marketing, especially in view of prevailing low gas prices, is another major problem. Cyprus and East Med need to find buyers for their gas, but low oil and gas prices on top of expensive production from deep sea waters, and also low Russian gas prices are making this increasingly difficult to find export markets. The Russian gas is cheap, at $4/MMBtu in 2016 and Gazprom can reduce the price even further. Russia has over 100 bcm/year spare production capacity at marginal cost. Plentiful energy renewables, energy efficiency and climate change have driven oil and gas prices low and they are expected to stay low.

Turkey may be the catalyst to finding export routes for East Med gas. With the implementation of the Turk Stream pipeline project, which is explained in more detail in Chap. 4, the future of both East-Med and Israel–Turkey pipeline has become more doubtful on the basis of cost-effectiveness. Turkish and/or Russia participation in Cypriot and Israeli hydrocarbon potential is one way of reducing uncertainty in the development of Eastern Mediterranean reserves. Put differently, a Regional Energy Model, including not only Turkey but possibly Russia along with countries in the Levant is a rational way forward.

Meanwhile, selling Cyprus gas to Egypt is not commercially challenging anymore. After Zohr discovery, Egypt is no longer an export opportunity for Cyprus gas. On the other hand, the Leviathan gas is considered to be monetized and perhaps Aphrodite gas may be combined with Leviathan and sold to Turkey, which is the main and preferred market. After Turkish Stream is back on track, Russian gas and Gazprom has become a game-changer for the region. With a second string, which needs European buying guarantee to be realized, Turkey may not need East Med gas anymore, or it may no longer be an urgent priority, especially if this source is not high cost.

As stated by the Adilinis (2017, Cyprus Weekly, 30 December 2017, p. 4), TOTAL is planning to drill in Block 11 in May 2017. According to Ellinas (2017, Cyprus Weekly, 20 Jan 2017, p. 18), TOTAL's exploration well in Block 11 as one of the most critical wells to be drilled globally in 2017, matching the Zohr gas discovery in Egypt. Such drilling, however, would torpedo the Cyprus peace negotiation talks, under UN auspices. Turkish Cypriots may claim the same right to intervene exploration activities with Turkish vessel Barbaros Hayrettin, in particular with Block 6 which is overlapping with Turkey's EEZ. Ankara claims that part of the Block 6 falls within its own continental shelf.

Already Ankara gave notes to the UN and officially declared that Cyprus EEZ map is not legitimate. Turkey is not a signatory to the UN Convention on the Law of the Sea (UNCLOS), where median line principle was completely and perhaps deliberately neglected by the Greek Cypriot Administration. Turkey has complained officially to the UN about Greek Cypriot violation of its sovereign right over territorial waters (for detail see Baseren 2010).

The dispute between Turkey and Cyprus is not unique. A similar overlapping problem took place between Romania and Ukraine for the blocks in the Black Sea,

surrounding Serpent Island, and the European Court of Justice has made a decision based on the principle of 'median line' to resolve the diplomatic dispute among two nations. Using the 'median line' ruling, Turkey has a right to object again when TOTAL and ENI start drilling in May 2017, and the UN peace talks are suspended. Military confrontation cannot be ruled out again in the area in dispute, since no confidence building steps were taken any further by two communities of Cyprus for the possible EEZ disputes.

Further afield, the EU is interested in the East Med through Cyprus, whose sovereign rights it supports. The EU looks at the East Med for its own security, for diversification and as a bridge for greater cooperation. Pipeline projects such as the Trans Anatolian (TANAP) pipeline from Azerbaijan and Turkish Stream from Russia are adding Turkey's prominent position and importance in the wider region as a gas transit route and potentially as a hub. We know that a key requirement for a gas hub is a transparent and cost-based pricing mechanism. Turkey still needs to liberalize its gas networks and make more regulatory changes, which are explained in the previous chapter. Considering security of future gas supplies, Turkey is in more advantageous position compared to Europe. Relations with Russia are now normalized, and the Turkish Stream and TANAP are progressing, bringing more gas to Turkey, Russian gas is particularly cheap, in the range of $4–$4.50/MMBtu, and even if it gets more expensive, it will still be considerably cheaper than the East Med gas.

Some corporate actors are revising their hydrocarbon strategy in Cypriot waters. Noble Energy for one had dropped Cyprus from its Long-Term Outlook to 2020. As stated by Ellinas (2017, Cyprus Weekly, 27 Jan 2017, p. 18) Noble Energy has made extensive references to the Leviathan and Tamar gas fields, but none to Cyprus. According to Ellinas (ibid), this reflects the company's shifting priorities and the lack of visible progress in the development of Aphrodite field. Noble started operations in Israel in 1998, but it was not until 2010 that it made its first major discovery Tamar with 10 tcf, fooled by Leviathan in 2011, with 22 tcf gross recoverable natural gas. Based on Noble's long-term outlook to 2020, total production is expected to reach between 600,000 and 700,000 boe/d in 2020, assuming Leviathan start-up in January 2020. It is worth to note over here that Noble Energy has proposed mid-2013 to bring a spar-rig from the Gulf of Mexico to Block 12, to develop Aphrodite gas for domestic power generation. This was not taken up, with one of the stated reasons being that Aphrodite gas was reserved for the LNG plant. By December 2013, the offer lapsed. In December 2013, Noble was proposing exports, using marine compressed natural gas (CNG).

The Canadian Sea NG company introduced its new technology CNG tankers (floating CNG with the Coselle system) at the Eastern Mediterranean Gas Conference in Nicosia that was held in 17–18 March 2015, yet this project was not realized and another opportunity for Cyprus was missed. Based on Nobel's long-term outlook 2020 plan, neither Nobel Energy, nor Delek and Shell have any interests to make any progress in the region due to the prevailing low global gas prices. Ellinas (2017, Cyprus Weekly, 3 March 2017, p. 18) has pointed out that Leviathan partners announced that they have taken the final investment decision on

Leviathan to fund the development of Phase 1A, estimated at $3.75 billion. Phase 1 appears to be progressing, based on domestic sales—and to Jordan to be monetized. During May 2016, a deal was signed in May with Israeli company IPM to supply 13 bcm gas over an 18 year period worth $3 billion. Another deal was signed last November with or Power Energy for 8.8 bcm gas over 20 year at $2 billion.

A deal was also signed in January 2017 with Israeli company Edeltech, and its Turkish partner Zorlu Enerji, to supply gas with 14.8 bcm gas for 17 years. If all the deals were to become firm, the total volume of gas would come to about 5.4 bcm/year, still less than the Phase IA capacity of 12 bcm/year. Phase 1A involves the development of 4 subsea wells producing 3 bcm/year each. The gas will be exported through two 117 km subsea pipelines to a gas treatment and production facility, located 10 km from the shore, from where it will be piped to the shore and connected to Israel's National Gas Transmission System. Noble confirmed that gas sales secured to-date total 5.4 bcm/year, with combined gross revenues estimated to be about $15 billion over 15 years. Sales prices are quite attractive, even in global terms, estimated to be in the range of $5.50–$6.00/MMBtu based on the current Brent oil pricing. at such prices, the full Phase 1A development cost can be recovered in about 4–5 years. Phase 2 will involve the development of an additional 9 bcm/year and Delek has no intention to proceed until firm gas sales agreements are signed.

Ellinas (2017, Cyprus weekly, 17 Feb 2017, p. 15) has emphasized that the Greek Company, Energian has signed a deal to acquire Tanin and Karish, which is part of the Israeli government's Gas Framework, which was ratified in 2016. The fields are about 40 km apart and 100 km offshore Haifa and close to Tamar and Leviathan, at about 1600 m deep water. They were discovered in 2011 and 2013, respectively, and are estimated to hold 2.4 tcf natural gas and 14–18 million barrels of condensate (a form of light oil). Energian, through a fully owned subsidiary in Cyprus, brought these from Delek Group in August 2016 at $148 million plus royalties, with 100% ownership. The development of Leviathan is tied to Tanin and Karish coming on stream first, the project has the full support of the government and a key client could be state owned Israel Electricity Corporation. All gas is expected to be sold to the domestic Israeli market. Based on this information, Energian is targeting to achieve gas sales agreement for a total of 3 bcm/year to make the development commercially viable. Ellinas (ibid) has also added that successful development of Tanin and Karish is also a big milestone for Israel in developing its gas strategy, by bringing international investors and competition in the local market.

6.8 Feasibility Study of Cyprus Onshore Gas Transmission Network and Distribution System

Although it is not certain whether the Cyprus' Aphrodite gas will be developed or not, 240 bcm of gas are expected to be monetized when the market conditions will be suitable. According to our research on Natural Gas pipelines, if in future Cyprus Aphrodite gas is being delivered to the island, the estimated cost to construct the pipeline transmission network and distribution system is a subject to be investigated. Available existing reserve in Block 12 is sufficient for Cyprus' domestic consumption for at least a century. Cyprus population is around 1.1 million (0.8 million lives in the South and 0.3 million lives in the North) and it is less than 10-thousand-kilometre square as the geographical surface. Cyprus has main cities: Nicosia (which is a divided city-the last divided capital of the EU), Kyrenia, and Famagusta in the North, and Paphos, Larnaca and Limassol in the South. Whole Island has 467 km long motorways, 1900 km long main carriage ways, 979 km long village roads, 2120 km long side streets and 2123 km long stabilized roads. Among these, 181 km long of motorways, 343 km long main carriage ways, 225 km long village roads, 1150 km divided two-way roads, 1512 km long side streets and 601 km long stabilized roads are available in the Northern part of Cyprus, which is named as Turkish Republic of Northern Cyprus and the Greek Cypriot Administration has no authority over the administration of the North side. These statistics may change slightly by the day this book is published.

The pre-feasibility study has been undertaken by the authors with a research assistant and Ph.D. candidate Ms. Hatice İmamoğlu at Eastern Mediterranean University. IGDAS (İstanbul Gas Dağıtım, Ananonim Şirketi-İstanbul Gas Distribution Public Company), which is the State Owned Enterprises that has done Istanbul's gas distribution network, has provided us all technical engineering knowledge with its expertise to calculate the overall cost of infrastructural investment for natural gas onshore transmission network, distribution of pipelines and gas compressor stations throughout the Island. There is not any decision to work out on onshore gas infrastructure investment yet, but in the near future if there is any need, and then such a useful research study will give a brief idea about the overall cost of such a kind of investment.

The overall cost for constructing onshore natural gas transmission network (70 Bar), distribution systems (20 Bar) in main six big cities (Nicosia, Paphos, Larnaca, Limassol, Famagusta and Kyrenia), RMS-A and RMS-B pressure stations, SCADA, as well as administration fees is estimated to be $411,206,346 for the whole Island. The overall cost for the South only will be $324,132,183, whereas for the North it is estimated to be $87,074,163. The overall labour cost is estimated to be $307,162,825 and the materials to be $101,960,439.

6.9 Diversification Options: Political Disputes in Natural Gas Rich Regions off-Shore Natural Gas in Israel and Cyprus

Levoyannis and Labreche (2013) noted that as policy makers, industry participants and various analysts search for ways to overcome challenges precipitated by rising global energy prices, the reportedly vast hydrocarbon deposits in the eastern Mediterranean continue to command significant attention. The US Geological Survey assessment of the resources in the Levant basin which estimates the mean gas resources to be 3450 bcm, have raised expectations about future hydrocarbon discoveries (see IEA 2013a). Israel has already started extracting gas from Leviathan and Tamar basins and expecting to export it to other countries. Cyprus, as being dependent to natural gas in electricity production has a short-term deal with Israel for 0.6–0.7 bcm annually up to 2018 or 2020.

Levoyannis and Labreche (2013) also accentuated that natural gas discovered in the East Mediterranean Sea has divided foreign policy and energy analysts over what transport routes would be most productive and efficient, and how countries can work together to extract resources and create new energy corridor in Europe's southeast. They added that the region remains plagued by instability and tensions, with recent developments in Egypt and Syria contributing to further increase in global oil and natural gas prices.

Although the deal was signed by Israel and Cyprus, nobody yet knows how to deliver the eastern Mediterranean gas to Cyprus. There are several options which are under discussion, by pipeline, LNG or may be as compressed gas. Israel's export policy and export options are going to determine how this gas be exported and priced. Israel is planning to build a new LNG terminal in Eilat, and the existing LNG infrastructure in Egypt sounds the first option among many companies as well as the government officials. However, the vast amount of gas could be utilized at a faster and a cheaper rate by pipeline. The pipeline infrastructure of Egypt and already existing Arab Gas Pipeline diverse the exports to Jordan and other Middle East countries. There is another proposal under discussion by Zorlu Group to construct a new interconnector pipeline to Turkey, which sounds more challenging and yet the transit must pass through Lebanon and Syrian economic exclusive zones. There is a political dispute among these countries and therefore a new pipeline infrastructure still pending. At the moment two Turkish companies, Turcas and Zorlu, are seriously considering how Leviathan might be connected by pipeline to Turkey. Roberts (2014) also agree that this would appear to be the most economic export option for Israel and would ensure connection to a major import market seeking both to increase its gas supplies significantly and to diversify its sources of supply. The pipeline route is not precise yet since it should pass either within Cyprus EEZ (Turkey and Cyprus have a dispute in Cyprus' EEZ, see Baseren (2010) for details) or from another disputed zone such as between Greece and Turkey, which anyhow requires a comprehensive solution in long lasting Cyprus problem. The other option to construct a pipeline to Europe via Greece,

although prompted by the European Commission as a project of common European interest, is only likely to secure serious consideration if gas should be found in indisputably Greek waters between Crete and Cyprus (see Roberts 2014).

As a new option, Cyprus is planning to construct a new LNG terminal in Vassilikos but the amount of gas reserves discovered by Nobel energy in Aphrodite basin (parcel 12) is not large enough (estimated recoverable resources of 142 to 227 bcm–5 to 8 tcf) to build a new LNG terminal. Constructing a single train LNG terminal (one 5 million tonne per annum (mtpa) LNG plant over 20 years) is not feasible and needs approximately 10 billion US dollars capital investment. Cyprus is in financial difficulty since 2011 and international loans borrowed from Russia and the EU have not been paid yet. They called for international tender and Nobel energy already decided not to continue with such a limited amount. Another deal for new exploration was signed with ENI and KOGAS consortium with new parcels and all hope is based on these new exploration activities to precede the construction of two 5 trains LNG terminal. Other than bloc 12 (license awarded to Nobel-Delek group), nine other blocks have also been awarded by Cyprus Administration to international oil companies such as Total, ENI, Gazprom, and Woodside to smaller companies Winevia Holdings and RX-Drill Energy Cyprus. So far, six blocks have been awarded, three to ENI/KOGAS (Blocks 2, 3 and 9), two to TOTAL (Blocks 10 and 11) and the last one to TOTAL/NOVOTEK and GPB Global resources from Russia. According to natural gas report (NG Report by MIT 2013), with the existing capacity of gas, the construction of new LNG terminal at this stage is not feasible, yet new potential discovery of gas or adding Israel's gas shall make it possible to construct a 5 mtpa or could be further extended to 15 mtpa liquefaction plant at Vassilikos but not earlier than 2019–20. The other option proposed by Cyprus is to build a pipeline to Creete and then to Greece, which is said to be more costly than the LNG option (for cost details see Paltsev et al. (2013). As also underlined by Levoyannis and Labreche (2013), Cyprus remains committed to sparking economic growth, creating jobs and increasing productivity, especially after an EU bank bailout in March 2013 exposed cracks in its economy. As Roberts (2014) also stated, at that point it might, with luck, be in a position to raise the cash required: at present, it cannot do so. Although pipelines and LNG constitute the backbone of current international gas delivery systems, there is intriguing possibility that both could lose out to a third option, maritime transport in the form of compressed natural gas (CNG), which is an untried technology for that moment. Indeed, extracting and exporting natural gas could be real game-changer for Cyprus, yet this is also a big dream for Israel and Turkey.

Another challenging option to monetize gas is via floating LNG technology. Since floating LNG technology is not mature, the Leviathan basin will not come on stream until the export infrastructure is completed, that is not earlier than 2017. It is said that (Blomberg news, 2013) the European Investment Bank (EIB) promised to consider investing in the proposed LNG terminal in Cyprus. The Cyprus Hydrocarbons Co. estimates the first phase of the LNG facility, including infrastructure and as many as five production lines, or trains, will cost more than EUR 9 billion. The similar cost calculations were also quoted both by MIT (Paltsev et al.

2013) and PRIO Reports (Gurel et al. 2013). The floating LNG is also another option to be investigated. Nonetheless, Levoyannis and Labreche (2013) have reminded that the construction of onshore LNG facility and production lines is expected to start in early 2016, with international exports reported to begin as early as 2020. They repeatedly prompted that if all goes according to plan, this could help Cyprus meet its bailout commitments, spark economic growth and generate returns worth having, both financial and political.

6.10 Other Hydrocarbon Prospects of the Levant

Before ending this chapter, it is useful to consider other prospects, even though they are marginal and dependent upon restoration of peace in Syria and Middle East.

A report by the IEA for 2013 (IEA 2013b) reported that the recent gas discoveries in the Eastern Mediterranean region have the potential to dramatically change not only the future fuel mix in the countries that found natural gas resources, but also that of the whole region. Going beyond Israel, Egypt and Cyprus, there are some other fields available such as Myra, Sara, Dalit, Noa, Mari, Mari-B and Gaza Marine which in total represent more than 1 trillion cubic meter (tcm hereafter) of recoverable gas resources. This quantity is almost equivalent 200 times of Israel's current gas consumption. Apart from Cyprus and Israel, Lebanon could also hold offshore gas resources. Norway's Spectrum Company has undertaken a 3D seismic survey in Lebanon EEZ and suggested that the reserves in the area could amount larger than the initial estimate which was 25 tcf (708 bcm). Roberts (2014) stated that considering offshore prospects for Israel, Cyprus and Lebanon, together with a lack of consensus about export systems and routes, demonstrates that while the Eastern Mediterranean may constitute a new hydrocarbon province, its development will be uneven. Roberts (2014) has also emphasized that with decreasing hopes of Cyprus due to reduced reserve estimates for its only discovery to date, the attentions are directed towards Lebanon, which has high hopes for major gas discoveries offshore, but its lack of political government—a caretaker administration has been in place since 2013—is contributing to major delays in the most basic stage of all licensee awards. According to Roberts' (2014) study, some 52 companies from 25 countries applied for prequalification, 14 of them as prospective operators, such as Shell, TOTAL, Exxon Mobil and Chevron. The bids for Block 10 have been delayed from November 2013 to January 2014 and caretaker administration already eliminated some of the companies from prequalification. Lebanon's viciously divided political forces (supporters of Syria and against of Syria) are still fighting over who should have control of the energy portfolio in whatever government is eventually formed. The civil war is still continuing with no end in sight (as at April 2017).

Although Lebanon is commonly discussed as third major area (after Israel and Cyprus) of prospective significance in the eastern Mediterranean, it is, in fact, the Palestinian Territories, specifically the Gaza Strip, that actually possess a further

proven gas reserve. Moreover, other gas reserves are likely to be discovered in offshore Gaza, Iskenderun and Kas-Mugla. However, the political problems between Israel and Palestinian authorities have closed every little glimmer of cooperation, in which 28 bcm of total estimated reserves found out by the British Petroleum company (BP) in Gaza Marine-1 and Marine-2 fields at the shallow depth waters of west of the coastal town Ashqelon and the Gaza Strip and a recommended subsea pipeline construction to the shore since then declined. As noted by Hafner and Tagliapietra (2013), the Gaza Marine has a field that could supply the Gaza Power Station (140 MW) which was already bombed by Israel's long missiles attack in August 2014, and in the West bank (200 MW each two plants in Jenin) almost 1 bcm/year.

Lebanese territorial waters hold major hydrocarbon reserves, but the country's fragmented politics make monetization of these resources in the foreseeable future extremely unlikely. According to the UK based Spectrum ASA, a detailed 3D seismic survey estimates around 700 bcm gas reserves in Lebanon's offshore at Phase 1 (Middle East Economic Survey 2013). No information has yet been delivered regarding Phase 2.

Syria is one of the considered future gas partners for Turkey. Till now, Syria has not drilled any wells in its off shores. In March 2011, Syria announced an offshore exploration licensing round for three blocks with a closing date of December 2011. As a result of an ongoing crisis in Syria, no bids were submitted and in December 2013, the Syrian government has signed a 25 year agreement with SoyuzNefteGaz, assigning Russian company an exploration license for Block 2. Till now, no progress has been noticed.

Syria and Turkey started talks in 2010, before the civil war, concerning gas politics and cooperation. The war put a stop to these efforts. Until peace is restored in Syria and Iraq, these Arab countries' participation in the Regional Energy Model is bound to stay off limits. Once peace is restored, gradually normal relations, including energy cooperation, will resume.

References

Adilinis, L. (2017, January 6). Aphrodite flirts with Cairo: Egypt the only viable option for Cyprus gas sales, but high oil prices delaying project. *Cyprus Weekly*, 4.

Baseren, H. S. (2010). *Dispute over Eastern Mediterranean Maritime Jurisdiction Areas*. Publication of Turkish Marine Research Foundation (TUDAV), Publication No: 31, Emrah Offset (Emrah Publishing): Istanbul.

Blomberg, (2013). http://www.blomberg.com/news/2013-07-12/cyprus-studies-lng-export-expansion-beyond-12-billion-terminal.html. Accessed on: July 14, 2013.

Ellinas, C. (2017, January 13). Dynamic energy growth: Italian powerhouse ENI has challenge ahead. *Cyprus Weekly*, 15.

Ellinas, C. (2017, February 17). Energian—a Greek success: A road map to becoming a regional oil and gas player. *Cyprus Weekly*, 15.

Ellinas, C. (2017, January 6). Exxon Mobil-a private empire. *Cyprus Weekly*, 18.

Ellinas, C. (2017, March 3). Leviathan off the starting blocks. *Cyprus Weekly*, 18.

Ellinas, C. (2017, January 27). Nobel energy-shifting priorities: Missed opportunities reduce Noble's interest in Aphrodite. *Cyprus Weekly*, 18.
Ellinas, C. (2017, March 10). Good news but realism should prevail: Latest gas developments will take years to bear fruit. *Cyprus Weekly*, 18.
Ellinas, C. (2017, January 20). Total SA: solid performance. Analysing the French energy giants's might and its Cyprus impact. *Cyprus Weekly*, 18.
Ellinas, C. (2017, February 17). Energean—a Greek success: A road map to becoming a regional oil and gas player. *The Cyprus Weekly*.
Ellinas, C. (2017, January 6). Total-Eni forgoe alliance: Italian and French energy giants share rights to block 11. *Cyprus Weekly*, 18.
Gurel, A., Mullen, F. & Tzimitras, H. (2013). *The Cyprus hydrocarbons issue: Context, positions and future scenarios*. PCC Report 1/2013, (Peace Research Institute Oslo) PRIO Cyprus Centre.
Hafner, M., & Tagliapietra, S. (2013). *Globalization of natural gas markets: New challenges and opportunities for Europe*. Leuven: Claeys and Casteels Publishing.
IEA. (2013a). Medium term gas market report 2013. *Market trends and projections to 2018*. France: International Energy Agency.
IEA. (2013b). *Resource to reserves: Oil, gas and coal technologies for the energy markets of the future* (OECD/IEA Publications 61 2012 08 1 P1). Paris: International Energy Agency.
Karbuz, S. (2014). Turkey's energy future: A quantitative assessment. *European Energy Journal, 4*(1), 67–70.
Karbuz, S. (2016). The geopolitics of Eastern Mediterranean gas: An overview gas. http://caspiandc.org/energy/the-geopolitics-of-eastern-mediterranean-gas-an-overview/ (Accessed from the blog of Sohbet Karbuz, https://karbuz.blogspot.com. June 24, 2016).
Lakkotrypis, Y. (2017, January 6). Aphrodite flirts with Cairo. *Cyprus Weekly*.
Levoyannis, C., & Labreche, M. (2013). The geopolitics of energy in the Eastern Mediterranean. *European Energy Journal, 3*(4), 46–52.
Michel, S. (2017, January 20). Drilling ahead: Total prepares to explore offshore block 11. *Cyprus Weekly*, 16.
Middle East Economic Survey. (2013). http://www.mees.com.
Paltsev, S., O'Sullivan, F., Lee, N., Agarwal, A., Li, M., Li, X., et al. (2013). *Natural gas monetization pathways for Cyprus: Interim report—economics of project development options*. Massachusetts Institute of Technology, Cambridge, MA: MIT Energy Initiative.
Roberts, J. (2014). Gas in the Eastern Mediterranean: great promise but no early answers. *European Energy Journal, 4*(1), 71–76.

Internet Sources

http://www.blomberg.com/news/2013-07-12/cyprus-studies-lng-export-expansion-beyond-12-billion-terminal.html.
http://www.businessinsider.com/r-israel-turkey-gas-pipeline-could-be-ready-in-four-y. Accessed April 24, 2017.
http://www.newenglishreview.org/blog_direct_link.cfm/blog_id/63503/The-Triple-All. Accessed April 24, 2017).
http://www.ihsmarkit.com/press-release/catherine-gifford/totals-offshore-cyprus-block. Accessed on April 25, 2027.
http://www.mees.com.
https://karbuz.blogspot.com.

Chapter 7
Energy Actors in the Eastern Mediterranean: Maps and Rivalries

7.1 Introduction

A great hydrocarbon wealth may lie in the Eastern Mediterranean Sea, but these are troubled waters and unless cooperation and rational behaviour on the part of key actors prevail, this wealth may remain unrealized, or worse, it may become a curse, spinning into violent conflict. Sadly, politics especially in the Eastern Mediterranean spill into energy and pipelines. Energy politics determine, to a large extent, domestic agendas, regional conflicts, rivalries and alliances. This chapter examines the key energy actors, their maps and claims, and in particular current rivalries. The next chapter is devoted to what is actually taking shape, slowly but surely, towards a Regional Energy Model based on a Turkish energy hub centred in Ceyhan/Iskenderun.

The Eastern Mediterranean region, including territorial waters, also known as the Levant Basin, stretches from Egypt to Israel and Lebanon, through Syria to Southern Turkey is potentially rich in hydrocarbons. According to Hafner and Tagliapietra (2013) in 2010, the US Geological Survey estimated that in the Mediterranean–Nile offshore there is a potential for resources to be discovered which amounts at 6321 bcm of natural gas, 1763 Gb of oil and 5.9 Gb of NGL. In relative terms, these quantities are small, but not insignificant. Compared to Iran, a top producer with proven natural gas reserves of 33,600 bcm, the Mediterranean gas fields are not major. Yet, they nevertheless exceed Algerian reserves of 4502 bcm. Algeria is a critical supplier to Europe.

Should these figures be confirmed, the East Mediterranean/Levant Basin would become a world-class energy-producing area, especially in natural gas. If we add to this Basin, its hinterland extending to the Persian Gulf in the east and the Caspian Basin in the north, the landmass in question contains as much 75% of the world's proven energy reserves. Monetizing this reserve would require cooperation and rational behaviour of politicians in the region, justifying a Regional Energy Model, necessitating first a significant reversal in prices of oil and gas in world energy

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markets, but equally significantly on a healthier and sustainable geopolitical order, i.e. promoting and securing peace and cooperation between the various countries in the region.

7.2 Energy Actors in the Eastern Mediterranean

Arabs, Jews, Turks and Greeks, along with other people in the region, are for the most part, rational decision-makers responding positively to market incentives. High energy prices stimulate exploration and discovery of new reserves of natural gas and oil fields. Hydrocarbons create wealth, but equally rivalries and conflicts. If rational behaviour prevails, neighbours can cooperate and share hydrocarbon wealth in a win–win scenario. Disputes over boundaries and maps, however, may easily spill into conflict then hydrocarbons become a curse.

Even when rationality and cooperative solutions are implemented, the path to hydrocarbon wealth is not easy or smooth. Once discovered, new energy sources need to be monetized, i.e. delivered from points of production to markets where consumers are located. Shipment of gas and crude by tankers involves transport through sea lanes, canals and territorial waters. Alternatively, delivery is via pipelines which cross national boundaries. As a result, there are transit countries connecting producing and consuming countries. All these actors in the energy markets may, acting out of self-interest, cooperate, sharing finance and investment costs, shipment, marketing a myriad of other activities and services, or they may, for political reasons, choose not to cooperate. In that case, energy development is, at best, postponed to a future when cooperation is feasible.

7.3 The Cyprus Conundrum: Conflicting Maps and Claims Galore!

By its location, as shown in the map (Fig. 7.1), Cyprus could potentially be a significant player in the emerging Regional Energy Market, lying as it does at the front door of the Ceyhan Export Terminal. To add to this role, recently some quantity of natural gas has been discovered in the island's territorial waters.

By itself, Cyprus would be a relatively small natural gas producer, but this small island of less than 1.5 million Greek and Turkish Cypriots could well achieve huge prosperity within a Regional Energy Market if only it were to solve its decades-old Cyprus Problem (CyProb). Failure to solve this problem has caused a de facto division of the island into a Turkish–Cypriot North and Greek–Cypriot South. At its core, the CyProb is whether Cyprus is a Greek island with a Turkish Cypriot minority, or whether it is a land co-owned by two people with political equality. The UN in 2004 proposed a Bi-zonal and Bi-Communal Federation which was

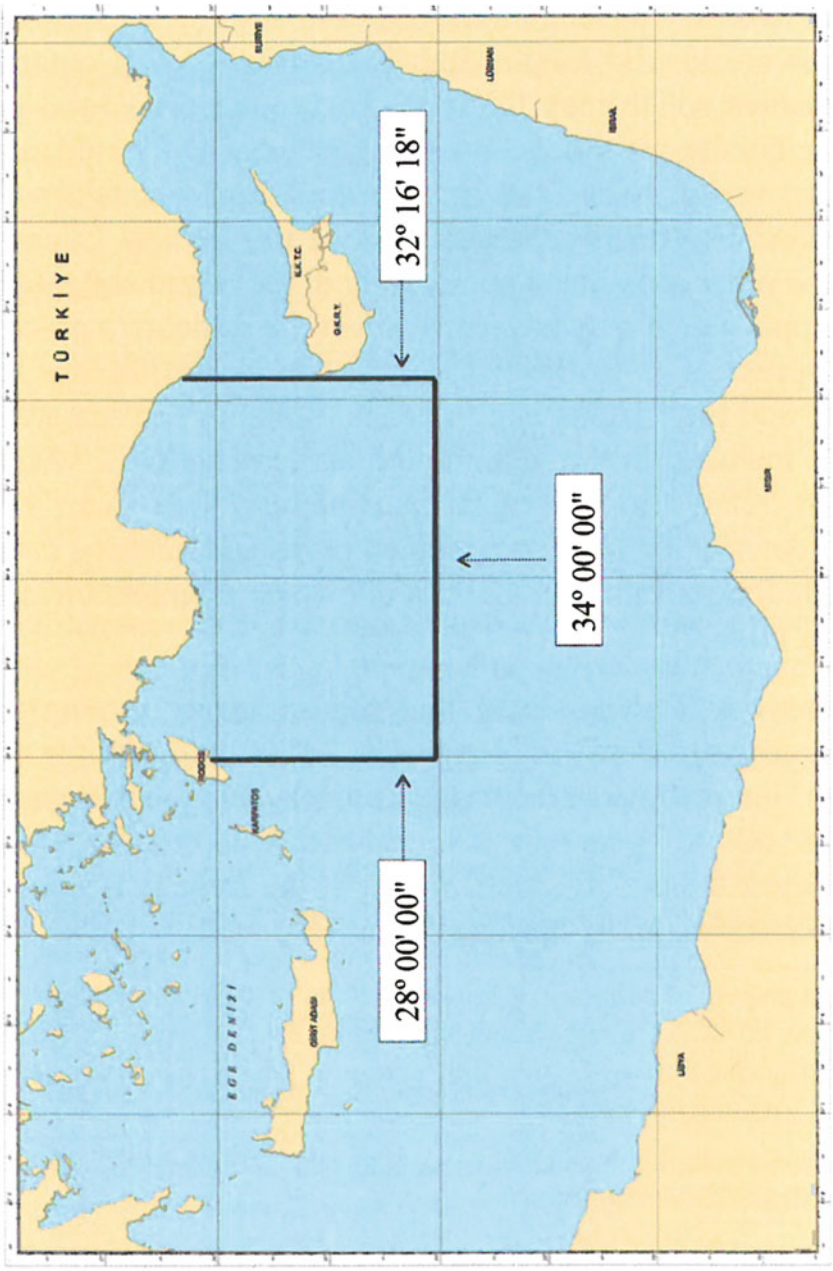

Fig. 7.1 Map of Cyprus and its disputed waters. *Source* the figure was extracted with permission of TUDAV (Turk Deniz Araştırmaları Vakfı). http://www.tudav.org/index.php/en/exlusive-economic-zone/229-potential-maps-of-eastern-mediterranean-exclusive-economic-zone. Also see, Baseren (2010)

submitted to separate referenda. The Turkish Cypriots overwhelmingly approved the UN plan, while the Greek Cypriots voted 76% against. Yet, the GC government was able to become the EU member owing to intricate politics of EU enlargement into Eastern Europe. In the meantime, UN-brokered negotiations have gone on ever since, always ending in deadlock, the most recent being the UN-led international conference in Crans-Montana in Switzerland which ended in failure.

With the discovery of potential hydrocarbon reserves in the island's territorial waters, geopolitics has assumed a predominant position over the exploration, ownership and monetization of Cypriot hydrocarbon wealth. This wealth is located undersea in territorial waters of the island, the boundaries of which are in dispute as well as rights over its exploration and exploitation (Fig. 7.1). The Greek Cypriot authorities take the view that they, alone, have sovereign rights, whereas the Turkish side vehemently rejects this claim.

According to Gurel et al. (2013), in 2006, Cyprus began prospecting for hydrocarbons in an exploration area of 51,000 km^2 offshore Cyprus. The exploration area, divided into 13 blocks, is only part of the total Exclusive Economic Zone (EEZ) proclaimed by the Greek Cypriot government, which is representing only the Greek Cypriot South of the island. The Turkish Cypriot North, created after the 1974 military intervention of Turkey on the island, claims a share of the hydrocarbons. Additionally, Turkey, along with the USA, Israel and Venezuela, is not a signatory to the Law of the Sea Conference, and does not recognize the Greek Cypriot Administration in the South, and has steadfastly rejected its claim over EEZ as its 'exclusive' area of jurisdiction in violation of the rights of Turkish Cypriots (Baseren 2010). The Greek Cypriot authorities have nevertheless moved ahead, defined their own EEZ, and very provocatively from Turkish perspective, granted exploration rights to the American Noble Oil Corporation, and also entered into cooperation agreements with such neighbouring countries as Egypt, Lebanon and Israel. Turkey has registered its disapproval of these actions by sending its navy and exploration ships into disputed waters. The Turkish EEZ claim is shown in Fig. 7.2, specifically the heavy red line. It will be observed that it extends well below the southern boundary of the island, equidistant between Anatolia and Egypt. So long as the Cyprus Problem remains unresolved, hydrocarbon exploration and development in the territorial waters of the island will pose as a potential source of conflict rather than as a potential source of prosperity.

Notwithstanding these claims and counterclaims pertaining to the territorial waters between Turkey and Cyprus, it is evident that certain provisions of the Convention have generally come to be regarded as part of customary international law. In the case of a dispute between Libya and Malta over their continental shelf, the International Court of Justice made a decision based on the EEZ customary law (Baseren 2010). Another decision was also made referencing the UN Convention customary international law by the International Court of Justice, related to the dispute of EEZ in the Black Sea between Ukraine and Romania, including the Serpents Islands (see Baseren 2010, pp. 135–136).

Nobel Energy Inc. which started drilling in the late 2010 has announced, optimistically, that up to 7 tcf of gas reserve could exist in an area called Block 12

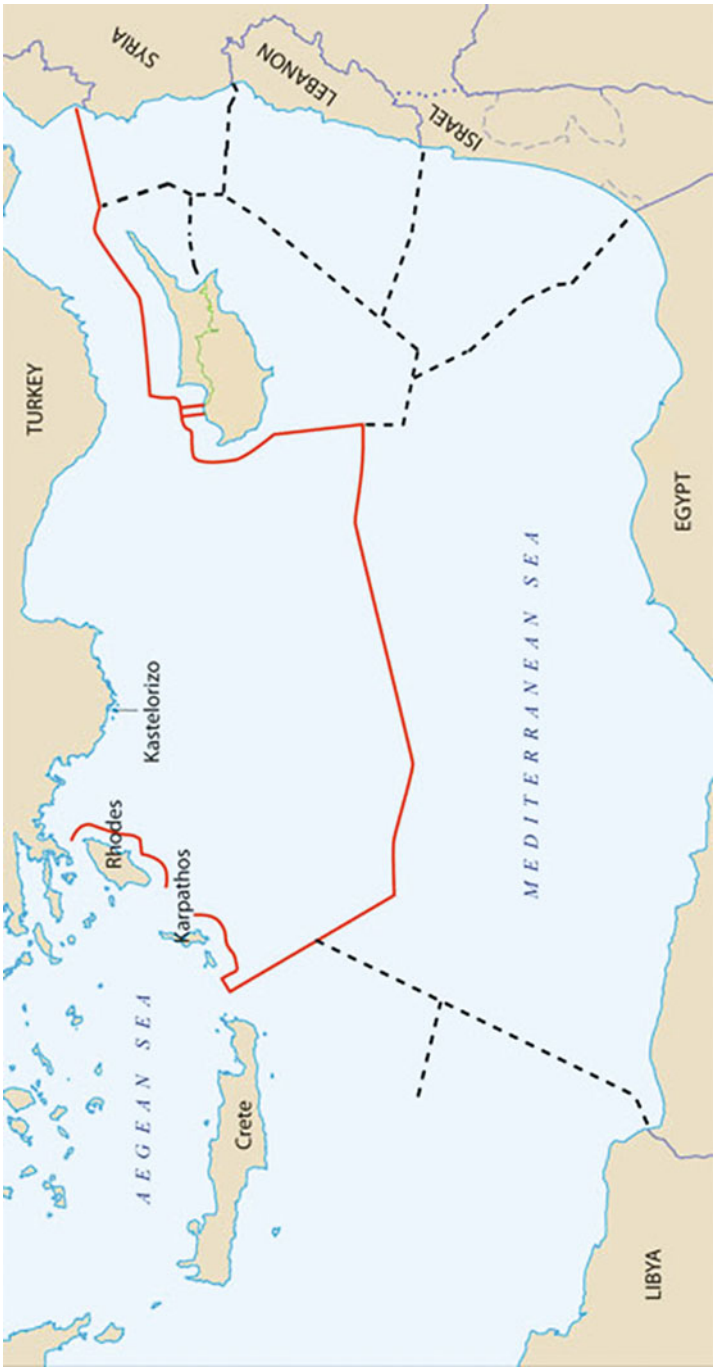

Fig. 7.2 EEZ and continental shelf borders in eastern Mediterranean (claimed by Turkey based on median line principle of the UNCLOS, 1982). *Source* the figure was extracted with permission of TUDAV (Turk Deniz Araşturmaları Vakfı). http://www.tudav.org/index.php/en/exlusive-economic-zone/229-potential-maps-of-eastern-mediterranean-exclusive-economic-zone. Also see, Baseren (2010, p. 96)

(named Aphrodite) on the border of the EEZ between Israel and Cyprus. As of mid-2013, in the midst of a financial crisis in South Cyprus, bad news was released, indicating that much less reserves were found in Cypriot gas fields. As a result, exploration and drilling have virtually ceased, and the Turkish–Greek Cypriot dispute over hydrocarbons has been pushed to the backburner, for the time being at least. In the meantime, UN-brokered talks between Turkish Cypriot and Greek–Cypriots leaders have gone on to resolve the Cyprus Problem to the mutual benefit of all Cypriots.

Ignoring these talks, South Cyprus has moved aggressively ahead, signing bilateral agreements with Israel, Egypt and Lebanon. Greece has also joined these deals, but these are rather unrealistic efforts more significant for diplomatic reasons than sound financial or technical options involving Turkey. So far, Egypt and Lebanon have not ratified this agreement in their national legislature. Lebanon, mindful of its boundary dispute with Israel, is reluctant to ratify this agreement and jeopardize its relations with Turkey. It is well aware of its larger stake in a bigger regional potential cooperation involving Turkey, Israel and other neighbouring countries.

While the EEZ give rights to a country to develop the economic resources in the sea, including surface and under the sea beds, international law, per se, cannot settle boundary disputes. Only political cooperation can do so. Since all the EEZs in the region are overlapping, boundaries remain unclear. Indeed, in some cases, these boundary conflicts may spill into military confrontation. Such a case is the ongoing dispute over the Aegean Sea between Greece and Turkey. Turkey repeatedly warned that extension by Greece of its territorial waters to 12 nautical miles would constitute declaration of war (*casus belli)* and, thankfully, Greece has avoided any provocative action. Turkish policy in the Aegean boundary issue was endorsed by a declaration of the Turkish Parliament adopted in June 1995. It was timed shortly before Greece's ratification of United Nations Convention to the Law of the Sea. The resolution authorized the Turkish government to take all necessary measures, including military steps, deemed necessary to protect the vital interests of Turkey.

A similar Turkish policy exists in the case of disputed territorial seas around Cyprus. Turkey has made it clear that the unilateral bilateral agreement with Israel and cooperation over Leviathan gas reserves cannot proceed in disregard of Turkish interest. Turkey is clearly uneasy over additional licenses tendered by Cyprus Administration in the beginning of 2012 for the Blocks 2, 3, 9 and 11, adjacent to Block 12. The Italian ENI signed exploration and production sharing contracts with the Ministry of Commerce, Industry and Tourism of Cyprus Administration on 24 January 2013, for the Blocks 2, 3 and 9 of the Levantine Basin, which encompass an area of around 12,530 km^2. ENI was awarded the three blocks while leading a consortium formed by ENI (80%, as operator) and the South Korean company Kogas (20%) in an international competitive tender (Cyprus 2nd Offshore Licensing Round) completed in May 2012 (ENI Press Release, 2013). To date, Lebanon and Egypt have not ratified the bilateral agreements in their own parliaments' in deference to Turkish unease.

To push its interest further, Turkey has purchased a new seismic surveying boat called '*Polarcus Samur*' (Barbaros Hayrettin Paşa) from Norway, a state-of-the-art vessel replacing the old Piri Reis. 2D and 3D seismic surveys in offshore Antalya, Mersin (Iskele–Famagusta Bay) and Iskenderun are already completed. TPAO also signed an agreement with Royal Dutch of Shell for the Mediterranean offshore explorations. To date, all TPOA explorations were carried out under the authority of North Cyprus, signifying its strategic importance in the Southern Energy Corridor.

Turkey is an energy-hungry economy, with only marginal domestic production of natural gas and oil in relation to its annual requirement. The proven gas reserves in Turkey are 6.2 bcm which is equivalent of 218 tcf. When these numbers are compared with the unproven gas reserves of South Cyprus (196 bcm), it is clear that they are strategically more important to Turkey than the distant EU market. The annual export of natural gas from Aphrodite would only cover 2% of the EU27's yearly consumption. Even if we add Israel's gas reserves on top, the proportion reaches up to 5% of total annual gas consumption of EU 27 (Table 7.1).

Turkey is more than a transit country in the Southern Energy Corridor. It is also a significant consuming market for the Eastern Mediterranean natural gas reserves. As shown by the data in Table 7.1, potential export of gas from Aphrodite and Leviathan fields would represent 43% of Turkish annual consumption. In other words, Eastern Mediterranean gas is far more significant to Turkey than the EU. North Cyprus is the critical link for Turkey both as facilitator of gas deliveries to the Turkish market and providing access to Turkish pipelines.

The prospect of significant offshore reserves of hydrocarbons in disputed territorial waters between Cyprus and Israel is significant beyond that divided island. It represents an opportunity to secure up to 5% of Europe's natural gas consumption per annum for the next 25 years. By itself, this would be marginal. However, combined with other gas fields in the region, especially from the Caspian Basin, along with rapidly changing geopolitical dynamics from Ukraine to the Middle East, enhances the role of Cyprus as a hydrocarbon producer relative to European energy security.

That prospect, however, depends critically upon reunifying a divided island that has been *de facto* split into a Greek Cypriot South and a Turkish Cypriot North in

Table 7.1 Eastern Mediterranean natural gas reserves as a proportion of EU annual demand

Annual EU-27 primary gas consumption in 2011 (bcm)	400
Est. Gas reserves in Block 12: Aphrodite, (bcm)	198
Est. Block 12 Max. Annual production over 25 years	7.9
As a % of EU annual consumption	2%
Israel's proven gas reserves, (bcm)	300
Israel's Max. Annual production over 25 years, (bcm)	12.0
As a % of EU annual consumption	3%
Memorandum item	
Turkey's annual gas consumption in 2011, (bcm)	46

Source Gurel et al. (2013: 8)

1974. Put differently, hydrocarbons in Eastern Mediterranean can be catalyst in finally settling the long-standing division of Cyprus (Hanney 2005; Ertekun 1981). The Ukraine–Crimean crisis which erupted suddenly in spring 2014 has put in doubt the reliability of Russian gas exports via the Northern Energy Corridor, shifting the geopolitical factors in favour of the Southern option. These geopolitical factors have now created a sense of urgency for settling the prolonged Cyprus conflict so as to monetize the potential offshore wealth as a huge 'Peace Dividend'. Domestic factors may at last act as an incentive for a settlement as well. The Greek Cypriot economy in the South of the island is financially bankrupt and desperately needs a new business model for recovery. Turkish Cypriot North is isolated and heavily dependent on Turkish aid.

Regardless of what happens in Cyprus, one thing is clear: The discovery of hydrocarbons in Eastern Mediterranean has dramatically enhanced the status of North Cyprus, preferably within a reunited Cyprus or, alternatively, as a separate country as in a Two-State Solution. Favouring reunification of the island is a range of geopolitical factors in the region, Europe, and most recently the Ukraine–Crimea–Russia conflict, which have added impetus to the resolution of the Cyprus Problem under a UN Peace Plan based on a new bi-zonal and bi-communal Federation of Cyprus (FOC). Currently, negotiations are ongoing between leaders of the South and North Cyprus for FOC, with endorsement from the international community, in particular the USA and EU that have major interests at stake in terms of energy security as well as the political stability in Eastern Mediterranean. Should, however, these negotiations fail, whether due to ultra-nationalism or other reasons, and Cyprus remains permanently divided, the hydrocarbon resources in the region are bound to ensure that North Cyprus will remain a key territory facing the Turkish energy hub at Ceyhan and, further afield, in terms of energy security for Europe via the Southern Turkish Corridor.

7.4 Israel–Turkey

Further south from Cyprus, right on the boundary of Cypriot and Israeli EEZs, there are significant gas fields (Fig. 7.3). Effectively, it is shared resource best developed through regional cooperation, meaning Israel must get involved in Cypriot politics. Similarly, the Israeli–Lebanon EEZ is also in dispute and almost certainly requires peace and cooperation between Israel and its Arab neighbours.

Israel's Natural Gas Authority estimates that offshore gas reserves in these waters could reach 1.3 tcm within next few years. To date, 453 bcm of natural gas has been discovered in the late 2010 and is expected to be operated in 2017. Glachant et al. (2012) stated that the Cyprus Energy Department has already submitted to the Cypriot government a proposal to cooperate with Israel for the construction of an LNG plant near Vassilikos, on the island's southern coast. Noble Energy and Israel's Delek Group have proposed the construction of a 15-mn-tonne per year LNG facility that would process gas from the Leviathan field together with

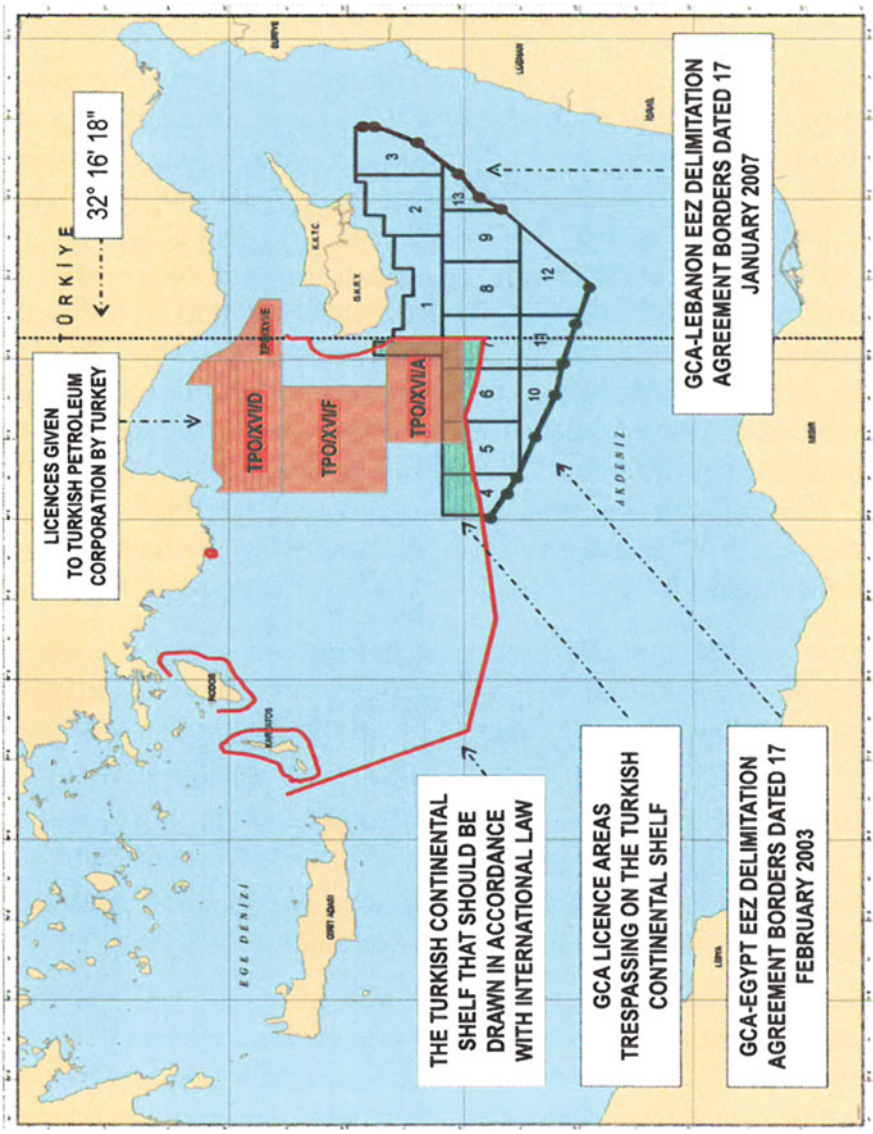

Fig. 7.3 Hydrocarbons in troubled waters: Cypriot and Israeli gas fields. *Source* The figure was extracted with permission of TUDAV (Türk Deniz Araştırmaları Vakfi). http://www.tudav.org/index.php/en/exlusive-economic-zone/229-potential-maps-of-eastern-mediterranean-exclusive-economic-zone. Baseren (2010)

any gas from offshore Cyprus. However, every neighbouring state claims a share from offshore gas in Eastern Mediterranean: Turkey, Lebanon, Syria, Israel, Egypt, Palestine and North Cyprus.

Monetizing hydrocarbons in the Israeli territorial waters will occur with or without a settlement in Cyprus.

As a result of the conflict with Palestinians, Israel has no normal relations with its Arab neighbours, although it has an uneasy peace treaty with Egypt. Yet, owing to regional geopolitical dynamics, it is probably a kingmaker in the development of Levantine energy development. This is due less to its own gas reserves and more due to its close relations with the US government and as well with private-sector actors in the energy market. Thanks to these relations, it may be in the most critical position in determining the shape and evolution of the Regional Energy Model discussed in this monograph.

The Israeli natural gas reserves in the Leviathan, Tamar and Dali fields are bigger than Cyprus discoveries to date, and Israel has adequate access to sources of required capital to finance exploration and development. Situated in an area of virtually permanent conflict in the Middle East, monetizing Israel's hydrocarbon wealth depends more on others than on the country's political, financial and commercial actors. Specifically, Israel needs first and foremost peace with its Arab neighbours, most notably an agreed settlement of the Palestinian conflict. Further afield, Israel's hydrocarbon wealth can best be realized through a rational choice amongst several competing alternatives. After meeting its own domestic requirement, Israel will certainly have a big exportable quantity of natural gas. What are its choices?

In the first place, it can connect to the south with Egypt, building on the peace treaty in place. An LNG plant for re-export would clearly be viable utilizing ZOHR gas field most rationally in an Egyptian–Israeli joint venture. But pipelines and Egypt–Israeli cooperation will always be vulnerable to Islamic terrorism linked to domestic politics or the Palestinian conflict. Jordan offers a small market and export through Aqaba would also be vulnerable to terrorism. Another Israeli option is a westward undersea pipeline to a future LNG terminal in Limassol, Cyprus and then to Greece, a thousand miles away, something which would present daunting financial and technical challenges of building and maintaining such a long undersea pipeline. Such an Israeli–Greek/GC project would be uneconomic; however, desirably, it might be for the Greek Cypriots. At the end of the day, market forces win out and shape national interest. Regionally, the most rational choice for Israel is to link up with the Turkish Energy Corridor, as has been confirmed in the recent reconciliation agreement between Ankara and Tel Avis. Article 8 of this agreement provides official support for undersea pipeline from Israeli gas fields to Ceyhan terminal. Hopefully, by the time this project is completed, there will be a settlement in Cyprus to enable Cypriot cooperation and participation in this project.

But, the Israeli–Turkish energy cooperation will proceed, if need be on a bilateral basis, at least at the beginning. That would clearly not be a 'Best-Case' Scenario. At the outset, owing to the geopolitics of the region, perhaps what is achievable is only 'Second-Best', i.e. the least-cost options rather than optimal. In

this sense, some choices might be combined, e.g. Egyptian–Israeli LNG joint venture might be a component of a feasible Regional Energy Model, with a Turkish hub at Ceyhan, complemented with an Egyptian export terminal in the south.

One further option is worthy of mention as part of such a Regional Energy Model. North Cyprus will almost certainly be a critical territory in such a Turkish–Israel link. And as discussed above, so long as the Cyprus issue remains unresolved, Israel, like other regional actors, will be constrained in maximizing its revenues from its hydrocarbon wealth. Israel's gas fields are on, or close to, the boundary of the territorial waters of Cyprus. For that reason, as well as Israel's own energy security, it is in Israel's best interest to promote settlement of the Cyprus issue, while seeking peace and accommodation at home with Palestinians. In the event, however, problems in Cyprus and Palestine remain unresolved, Second-Best Choices would have to be implemented, i.e. cutting a deal with Turks/TCs, and Egyptians to the south towards the goal of the most feasible and cost-effective Regional Energy Model.

7.5 The Fragile Arab Gas Pipeline

This is a network of pipelines originally designed to deliver Egyptian natural gas to Jordan, Syria and Lebanon. It contains several segments, shown in Fig. 7.4, Arish–Aqaba cutting across Sinai, then Aqaba–Amman through Jordan, finally extending to Damascus and Homs in Syria with a short section to the port cities of Tripoli and Al Rayan.

(https://en.wikipedia.org/wiki/Arab_Gas_Pipeline, accessed August 5, 2017)

There are future plans to extend the Arab Gas Pipeline all the way to the Turkish border town of Kilis, but almost certainly this will be determined by restoration of peace and order in Syria. The Arab Gas Pipeline (Fig. 7.4) also has an Egyptian–Israeli segment, the Arish–Ashkelon pipeline which initially delivered Egyptian gas to Israel, but since March 2015 faced with shortages in Egypt, a reserve flow agreement has been put into effect. In November 2015, a preliminary agreement was reached whereby Israel would export up to 4 bcm annually from the Leviathan gas field. The reverse flow agreement is significant in highlighting the insecurity of Egyptian energy market. In the space of a few years, from being an exporter, Egypt has become an importer. It appears that domestic politics of regime change in Egypt, in the aftermath of the downfall of Mubarak to the short-lived rule of Muslim Brotherhood, followed by the military regime of El Sisi, had much to do behind the scenes of Israel–Egypt gas dealing.

Rather surprisingly, however, Egyptian shortages have not affected exports of natural gas to Arab countries. However, the Sinai segment of the pipeline has been the target of numerous terrorist attacks. Between 2011 and 2014 alone, there were no less than 26 cases of sabotage by local tribesmen revolting against the Egyptian regime.

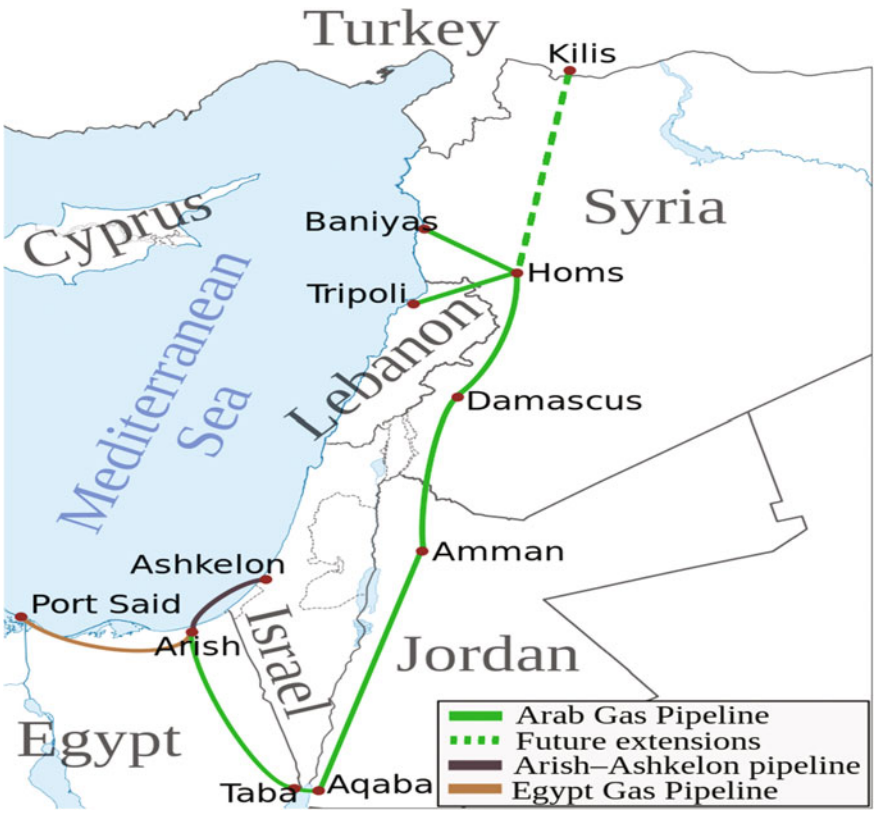

Fig. 7.4 Map of Arab gas pipeline. *Source* by all the location_maps: NordNordWest derivative work: Amirki [CC BY-SA 3.0 de (http://creativecommons.org/licenses/by-sa/3.0/de/deed.en)], via Wikimedia Commons https://commons.wikimedia.org/wiki/File:Arab_Gas_Pipeline.svg, https://en.wikipedia.org/wiki/Arab_Gas_Pipeline, accessed 5/08/2017

As regards, Greek Cypriot–Greek–Egypt natural gas deals that would transport Egyptian natural gas through costly undersea pipeline to Cyprus and then to Crete and Greece, one can be forgiven for categorizing this as a case of pipe dream. On conventional cost analysis, it is simply too uneconomic to warrant serious consideration, certainly in comparison with cost-effective alternatives discussed elsewhere in this study.

7.6 The Lebanese Dilemma

Lebanon is the most heavily indebted country in the region. It also has huge offshore potential hydrocarbon wealth which can solve the country's economic woes and open the door to prosperity. With a fragmented political system, Lebanese

authorities cannot even get onto the first base to issue exploration licenses for a great number of foreign oil and gas companies to search and discover the country's offshore hydrocarbon wealth. While the country has entered into a preliminary agreement with Greek Cypriot regime over boundary delimitation, this has not been ratified, and it is unlikely to become reality without a peace deal on the island.

Additionally, Lebanon is technically at war with Israel and the two neighbours are involved in the shared gas field Darish. A signatory to UNCLOS, Lebanon has appealed to the UN, but as Israel is not a signatory to this convention, it is unlikely to yield any satisfactory outcome.

In the meantime, the USA has offered to mediate, offering two-third of the Darish reserves to Lebanon, one-third to Israel, but this award has been rejected by the Lebanese parliamentary speaker who has taken a personal interest in the country's hydrocarbon reserves. Apparently, he demanded three-fourth of the disputed reserves. However, with continued infighting amongst Lebanon's ethnically fragmented political scene, it is doubtful that a negotiated settlement is feasible. (http://country.eiu.com/article.aspx?articleid=523386036&Country=Lebanon&topic=E, accessed 14/05/2016). Lacking executive authority, the Lebanese Petroleum Agency is powerless to proceed further with licensing, even though numerous American, European and even Chinese companies are ready to invest in exploration.

In this fractured decision-making environment, what may ultimately break the logjam is a bigger incentive to monetize the Lebanese hydrocarbon reserves. Such an incentive is best offered by market forces led by private-sector investment, such as a purely commercial undersea pipeline project linking Israel and Ceyhan terminal in Turkey with neighbouring countries as actively involved in such a Regional Energy Model.

7.7 The Syrian Civil War: A Conspiracy of Competing Pipelines?

Competing hydrocarbon geopolitics has been an integral part of the Syrian conflict. The rise of ISIL and other terrorist organizations has been fuelled by illegal oil sales following their capture of oil fields in Iraq and eastern Syria. But what is incredible is that there is some evidence, of uncertain reliability, suggesting that far deeper hydrocarbon and competing pipeline conflicts lie at the root of the Syrian civil war.

In 2009, at the time of friendly relations between Ankara and its Arab neighbours, including Syria, and well before the popular uprising against Asad, Qatar and Iran were keen on transporting to Turkey and there connecting with the Nabucco pipeline their massive, but shared, gas reserves in South Pars–North Dome field in the Gulf right on the boundary between the two countries (see Fig. 7.6). The quantities of oil and gas in South Pars–North Field are huge (Table 7.2). According to the International Energy Agency, the reserves qualify this field as the biggest in

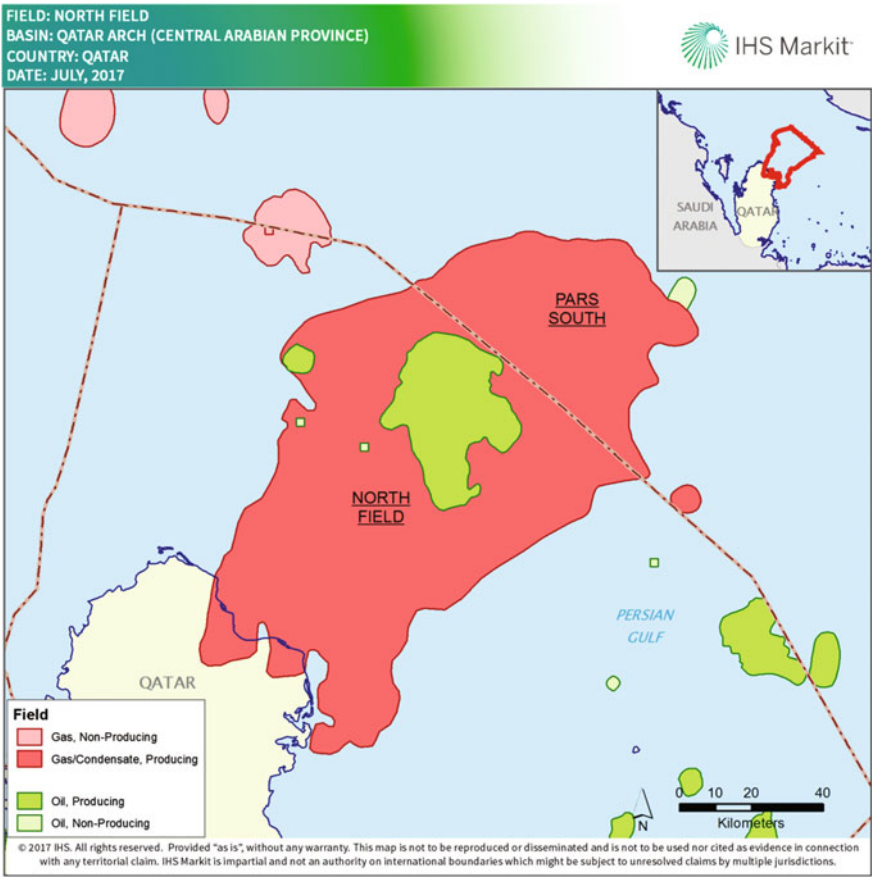

Fig. 7.5 Northern gas fields of Qatar. *Source* IHS Markit (2017). https://outlook.live.com/owa/?path=/attachmentlightbox

Table 7.2 Hydrocarbon reserves in the South Pars–North Dome field

Natural gas	51 (tcm)
Oil	360 billion barrels

Source (https://en.wikipedia.org/wiki/South_Pars_/_North_Dome_Gas-Condensate_field, accessed 16/05/2016)

the world. At a 70% recovery factor, the gas field represents 19% total global recoverable gas reserves.

Marketing such a huge hydrocarbon field has split into major geopolitics. Initially, the ambitious Nabucco pipeline, backed by a European consortium, running through Turkey, was to supply European customers as well as energy-hungry Turkey. Subsequently, relations soured between Ankara and Damascus, not only due to Asad's refusal to heed Turkish President of Recep Tayyip Erdogan's call for

democratic reforms, but also because of the opposition of ally Russia to the Nabucco connection. As a result, Assad rejected the Qatar–Turkey pipeline proposal, backed by the USA, signing instead on a rival $10 billion Iranian–Syrian pipeline, backed by Russia, bypassing Turkey. Subsequently, with the intensification of the civil war, Qatar, Saudi Arabia and Turkey joined the US-led coalition, funding and supporting anti-Asad forces, and calling for Asad's removal. In response, Asad relied increasingly on Russia's Putin and Shia Iran. The civil war took on increasingly an intra-Islamic Shia-Sunni sectarian appearance. In energy markets, Saudi Arabia continued to pump more oil to protect its market share, and prices in world markets plummeted against a background of increasingly bloody civil war in Syria and a terrifying ISIL brutality. Putin's decision to directly get involved in the civil war on the side of Assad has been a game-changer, effectively neutralizing not only the efforts of neighbours like Turkey, Qatar and Saudi Arabia, but also of the US Administration.

7.8 Underground Energy Market

In June 2014, the price of oil climaxed at $110 per barrel, thanks to OPEC ability to set prices by controlling production. Since then, the oil price has fallen reaching $26 in early 2016. There are many reasons for this dramatic decline, foremost being an overproduction, especially by non-OPEC producers. Accumulation of stocks, especially in high-consuming countries like the USA, is also a contributing factor. Overproduction has been largely the outcome of intense competition amongst producers, each one trying to protect its market share against new and old competitors.

As well, the dramatic rise of the jihadist ISIL and other terrorist groups created an illegal oil market. These extremist groups, using terror as a weapon, seized control of oil fields in eastern Syria and such cities as Mosul in Northern Iraq which gave rise to major flow of smuggled oil into neighbouring countries and beyond. Illegal in these transactions, meaning sales by terrorist groups, are clear violations of standard international trade rules, but, in other parts of the world (http://www.al-monitor.com/pulse/originals/2016/03/reza-zarrab-arrest-iran-turkey-us-erdogan-rouhani.html, accessed 28/05/2016).

There are also extraterritorial cases of underground oil sales in the aftermath of USA and European trade sanctions, imposed for political considerations. These extraterritorial extensions of super power laws have contributed to the emergence of underground oil transactions, notably in the case of Iran. 'Gold for Oil' deals, involving Turkish syndicates, and their counterparts in the Gulf States have created domestic and international cases of political corruption. Similar transactions have occurred involving Russia, China, Kazakhstan, India and elsewhere (http://www.gold-eagle.com/article/grandmaster-putin%E2%80%99s-gold-trap-russia-selling-oil-and-gas-exchange-physical-gold, accessed 28/05/2016).

How significant the volume of underground oil trading is and how long such trading will last will depend primarily on how long the ISIL threat and Syrian conflict

will last. One thing, however, is quite certain. That is, the power of OPEC is seriously undermined. Thus, for the foreseeable future, prices will almost certainly be set by market forces of supply, Saudi Arabia, the single biggest producer breaking ranks and opting for its own production policy in order to keep its market share. Other producers are following the Saudi lead and increasing supply in order to sustain market shares. Supply has outstripped demand, and, if current trends hold, over-supply will remain for the future. On the demand-side, higher emission standards in cars and a more conserving behaviour amongst consumers must rank major determinants.

There are several significant supply-side factors behind the low-price scenario. But primary supply factors include increased USA production and accumulation of reserves, discovery of major shale reserves in several parts of the world.

References

Baseren, S. H. (2010). *Dispute over eastern Mediterranean Maritime jurisdiction areas*. Istanbul: Publication of Turkish Marine Research Foundation (TUDAV), Publication No:31, Emrah Offset (Emrah Publishing).

Ertekun, N. (1981). The Cyprus dispute. Oxford: K. Rustem & Brother.

Glachant, J. M., Hafner, M., De Jong, J., Ahner, N., & Tagliapietra, S. (2012). *A new architecture for eu gas security of supply*. European Energy Studies. (Vol. 1.) Leuven: Claeys and Casteels.

Gurel, A., Mullen, F. & Tzimitras, H. (2013). *The Cyprus hydrocarbons issue: Context, positions and future scenarios.* PCC Report 1/2013, PRIO (Peace Research Institute Oslo), Cyprus Centre.

Hafner, M., & Tagliapietra, S. (2013). *Globalization of natural gas markets: New challenges and opportunities for Europe.* Leuven: Claeys and Casteels Publishing.

Hanney, D. (2005). *Cyprus: The search for a solution* (1st ed.). New York: I. B. Tauris.

Internet Sources

http://country.eiu.com/article.aspx?articleid=523386036&Country=Lebanon&topic=E, accessed May 14, 2016.

http://www.al-monitor.com/pulse/originals/2016/03/reza-zarrab-arrest-iran-turkey-us-erdogan-rouhani.html, accessed May 28, 2016.

http://www.gold-eagle.com/article/grandmaster-putin%E2%80%99s-gold-trap-russia-selling-oil-and-gas-exchange-physical-gold, accessed May 28, 2016.

IHS Markit (2017) http://www.ihsmarkit.com.

https://outlook.live.com/owa/?path=/attachmentlightbox.

https://commons.wikimedia.org/wiki/File:Arab_Gas_Pipeline.svg.

https://en.wikipedia.org/wiki/Arab_Gas_Pipeline, accessed August 5, 2017.

https://en.wikipedia.org/wiki/South_Pars_/_North_Dome_Gas-Condensate_field, accessed May 16, 2016.

http://www.tudav.org/index.php/en/exlusive-economic-zone/229-potential-maps-of-eastern-mediterranean-exclusive-economic-zone.

http://oil-price.net/en/articles/oil-prices-and-syrian-civil-war.php.

http://oil-price.net/cartoons/iran-iraq-syria-pipeline.jpg.

Chapter 8
Towards a Regional Energy Model

8.1 Introduction

This Chapter is more optimistic than the previous one: It details infrastructural investments, in particular, the Turkish pipelines in the Southern Energy Corridor. Existing pipelines are examined along with future developments within a Regional Energy Model. Region in this chapter is wider than in Chap. 6 covering the East Mediterranean, the Middle East as well as the Black Sea and the Caspian Basin.

8.2 Towards a Regional Energy Model

Whether Turkey will emerge as an energy hub will depend on economics shaped by geopolitics. As with any other, a hub must evolve from market forces and rational choice of investors and market actors. Construction of pipelines is by consortia of oil and gas companies seeking profitable return on their investment. Likewise building storage facilities, LNG plants and other infrastructure must be profit-driven or else they will not be realized. Political leaders and government officials may issue licenses and grant permits, but venture capital in monetizing hydrocarbons requires hard choices based on feasibility studies and commercial viability. As such, rational choice represents the most cost-effective way of developing the hydrocarbons of the area while also securing Europe's future energy requirements. However, as we have seen purely, economic factors are never sufficient. They always need to be counterbalanced by geopolitical factors. Accordingly, as will be observed in the pages following, every case of pipeline project considered is unique with its own set of problems, challenges and operational constraints. Pipeline economics are always trumped by geopolitics, but, ultimately market forces prevail.

V. Yorucu and Ö. Mehmet, *The Southern Energy Corridor: Turkey's Role in European Energy Security*, Lecture Notes in Energy 60,
https://doi.org/10.1007/978-3-319-63636-8_8

8.3 The Turkish Energy Export Terminal at Ceyhan

This chapter is focussed on a Regional Energy Model in the Eastern Mediterranean, centered on the Port of Ceyhan. Ceyhan is already an export terminal at the end of the Baku–Tbilisi–Ceyhan and the Kirkuk–Ceyhan pipelines. It is the target of normalized Israeli–Turkish hydrocarbon cooperation as well as a post-conflict Syria involving Arab pipeline network. Likewise, it will be the rational choice, the focal point of monetizing Cypriot hydrocarbons, if and when a settlement is reached. If this optimism holds, Ceyhan is set to become a Turkish Rotterdam, the hub of Turkish Southern energy corridor, not only an export terminal, the confluence of several pipelines, but also with expanding warehousing and storage facilities and related technical services.

However, the geopolitics agenda is constantly changing and Ceyhan has other competitors. In addition to policies and priorities of the Turkish authorities, much will depend on discovery of hydrocarbons, dynamics of regional peace and cooperation, and, of course, on the role of actors, local and foreign, private sector as well as political leaders. Thus, earlier on, when major hydrocarbon reserves were anticipated in Cypriot territorial waters, a potential rival to Ceyhan was the Greek Cypriot port of Limassol in Southern Cyprus. At the height of hydrocarbon optimism, before Euro financial meltdown in 2011, the Greek Cypriot authorities announced plans to build a costly LNG plant in Vassiliko near Limassol. When, however, the Cypriot gas reserves to date proved far less than original expectations, and South Cyprus went effectively bankrupt in 2012, Limassol's claim to emerge as the regional hub has rapidly diminished. Other potential candidates including the Port of Haifa in Israel or Latakia in Syria or Tripoli in Lebanon may emerge as subsidiary export terminals depending on how regional political rivalries and alliances in future shape up, especially in a post-conflict Syria. In the meantime, Ceyhan, as the first in the field, is acquiring economies of scale and is emerging as the pre-eminent energy hub (see Fig. 8.1) within a Regional Energy Model in the Levant Basin.

With many conflicts and wars in the area, this Model is no more than a potential. Great geopolitical challenges bedevil its realization, even though the dividends of peace and cooperation are huge. We shall now explore some of the major geopolitical factors at play.

8.4 Existing Pipelines to Ceyhan

At the present, two pipelines are connected to the Port of Ceyhan: (1) The Baku–Tbilisi–Ceyhan delivering Azeri oil, and (2) Kirkuk–Ceyhan carrying oil from Northern Iraq Kurdistan. The former is far longer and passes through territory, politically stable, and is, therefore, less prone to terrorist attacks causing frequent interruptions. By contrast, Ceyhan–Kirkuk pipeline goes through a war zone at the

Fig. 8.1 Port of Ceyhan, the emerging regional energy hub. *Source* http://www.botasint.com/Foto/iletisim/krokib.jpg

present time. As such, it illustrates most vividly the risks and vulnerability of pipelines, while also demonstrating how energy determines regional alliances. Turkey and the Kurdish Regional Government in Northern Iraq have good relations, both viewing PKK and ISIL as a common enemy. This relationship stems from mutually beneficial economic cooperation centred on energy economics. The Iraqi Kurdistan Region Government (KRG), landlocked, is almost totally reliant on oil sales to the international markets via the Kirkuk–Ceyhan pipeline.

8.5 The BTC Pipeline: A Private–Public Sector Success

The BTC pipeline is a success story led by a private-sector consortium in which British Petroleum is the largest equity owner. It is a completed and operational network of 1768 km long delivering crude oil from the Azeri–Chirag–Güneşli oil field in the Caspian Sea to the Turkish port of Ceyhan on the Mediterranean Sea (see Fig. 8.2). The route passes through three countries, Turkey and two (Azerbaijan, Georgia) that were in the former Soviet Union. It skirts Armenia, at the cost of a longer route as a result of unresolved issues between Armenia and Azerbaijan. The pipeline started operations in 2005 when first oil was pumped from the Baku end of the pipeline on 10 May 2005, reaching Ceyhan on 28 May 2006.

The pipeline costs US$3.9 billion and it is a public–private-sector success story. Of total cost, 70% are funded by third parties, such as the International Finance Corporation of the World Bank, The European Bank for Reconstruction and Development and credit agencies of seven countries and a syndicate of 15 commercial banks. Pipeline is owned and operated by BTC Co, a consortium of 11 energy companies. The consortium is managed by British Petroleum (BP), which holds 30.1% of the equity. State Oil Company of Azerbaijan holds 25%, Chevron of USA 8.9%, Statoil of Norway 8.1%, Turk Petrolleri Anonim Ortaklığı 6.53%, ENI of Italy and Total of France 5.0% each, Itochi and Inpex of Japan 3.4 and 2.5%, respectively, while ConocoPhillips and Hess Corporation of USA hold 2.5 and 2.36% each. Hess sold its stake in 2012 for $1 billion to India's Oil and Natural Gas Corporation.

The BTC pipeline has an expected lifespan of 40 years, and at normal capacity can carry one million barrels per day (160×10^3 m^3/d). It needs 10 million barrels (1.6×10^6 m^3) of oil to fill the pipeline. There are eight pump stations, two in Azerbaijan, two in Georgia and four in Turkey. The project includes also the Ceyhan Marine Terminal, three intermediate pigging stations, one pressure reduction station and 101 small block valves. The pipeline is 1070 mm (42 in.) diameter for most of its length, narrowing to 865 mm (34.1 in.) diameter as it nears Ceyhan.

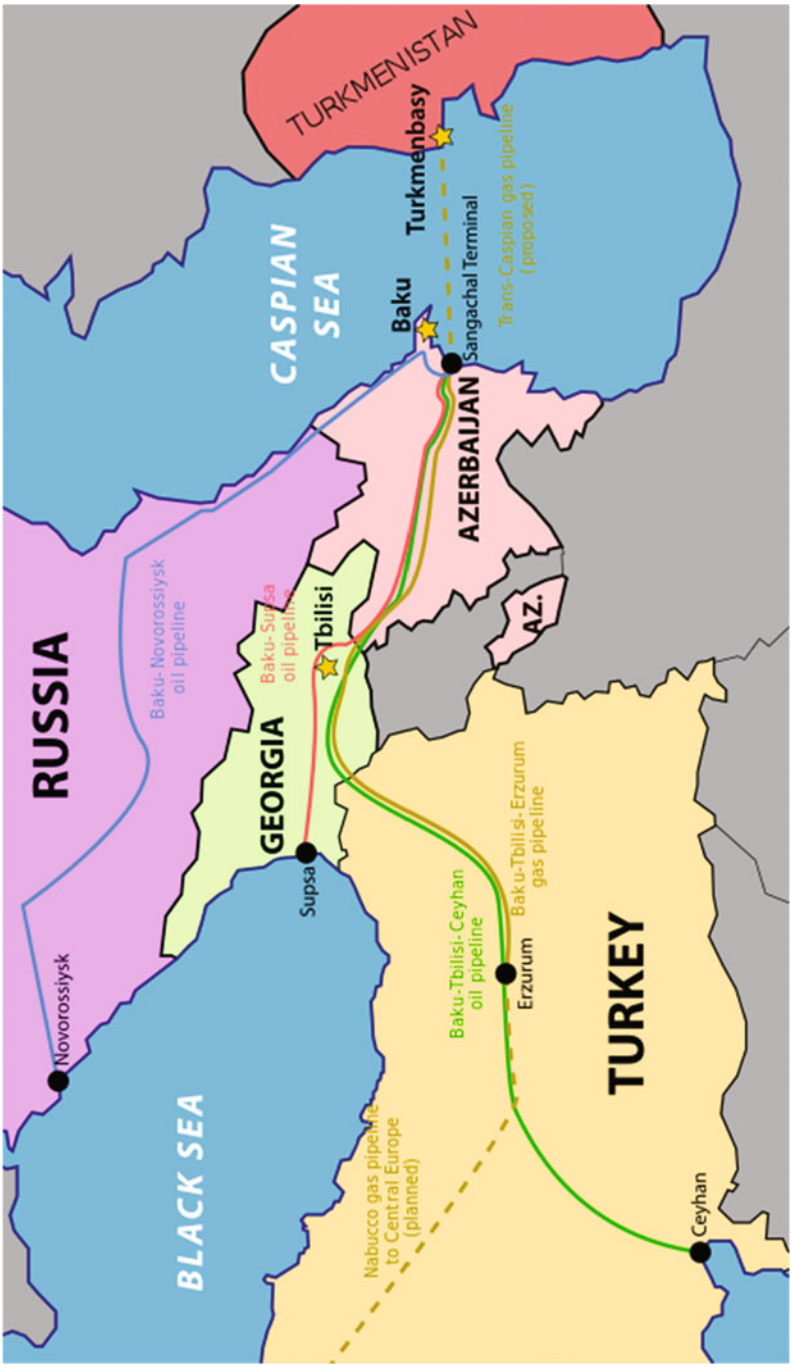

Fig. 8.2 Map of Baku–Tbilisi–Ceyhan pipeline. *Source* By Thomas Blomberg (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0) or GFDL (http://www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons https://commons.wikimedia.org/wiki/File:Baku_pipelines.svg

8.6 Kirkuk–Ceyhan (KC) Pipeline: The Kurdish Quest for a Place in the Sun

Owned and operated by BOTAS, a wholly state-owned oil and gas pipeline company in Turkey, this project owes its origin to a Turkey–Iraq agreement in 1973. It is a 600-mile-long double pipeline, which has become the economic lifeline of the Kurdish Regional Government (KRG) within federal Iraq. KRG, created by American policy in the aftermath of the first American intervention in Iraq, is but one component of the Kurdish quest for statehood, the other actors being the terrorist group PKK fighting the Turkish Republic and Syrian Kurds.

At the outset, KC pipeline was the principal oil revenue source for the Iraqi regime of Saddam Hussein during the Iran–Iraq war. But much has changed since, including Turkish–Iraqi relations and the emergence of KRG. The KC pipeline (Fig. 8.3) has a maximum carrying capacity of 1 million barrels a day, but in actual fact, a third to half of that amount would be a more realistic flow capacity owing to frequent acts of terrorist sabotage and constant disagreements between politicians in KRG and Baghdad.

More recently, the KC pipeline has been a constant source of dispute between KRG and the federal government in Baghdad over the division of oil revenue. KRG is often feels deprived of its fair share, and has adopted an independent policy on raising its fiscal requirement from the Kirkuk–Ceyhan pipeline. Additionally, this landlocked regional government has been hit hard by two separate, though interrelated terrorist campaigns in the area: (1) PKK terrorism directed at the Turkish state, and (2) the rise of ISIL. The KC pipeline running inside Turkey to Ceyhan has been the target of often and repeated acts of sabotage, causing costly interruption to the oil flow, and, as a result, has made normal budgeting virtually impossible for the KRG. When Mosul fell into ISIL hands, KRG opted for increasing US protection, but its survival has become precarious. Oil exports from the region have also been spilt into underground, with smuggling and illegal sales in the climate of breakdown of law and order. KRG's relations with its neighbours are exceedingly challenging. Erbil maintains, on the whole, good relations with Ankara, not only because of the unique importance of KC pipeline, which runs on Turkish soil, but also because its economy depends on trade with Turkey. Thus, KRG is opposed to PKK terrorism, especially when such terrorism uses bases within its territory. A complicating factor is that the Kobani Kurds in Syria are allies of PKK, and KRGs relations with the federal regime in Baghdad are complicated by sectarian (Shia versus Sunni) bias between Baghdad and Tehran. Iran, like Russia, has strongly supported the Asad regime in Syria. Iran makes no secret of its plans to build alternative pipelines to the KC pipeline running through Iraq and Syria, completely avoiding Turkish pipelines, for transporting Iranian oil and natural gas to Europe and global markets through ports in Lebanon.

The complicating factor in the Kirkuk–Ceyhan pipeline is the PYD, the Syrian or Kobani Kurdish extension of PKK. With US backing, PYD has been a significant force in the Coalition fight against ISIL. But Ankara regards PYD as much a

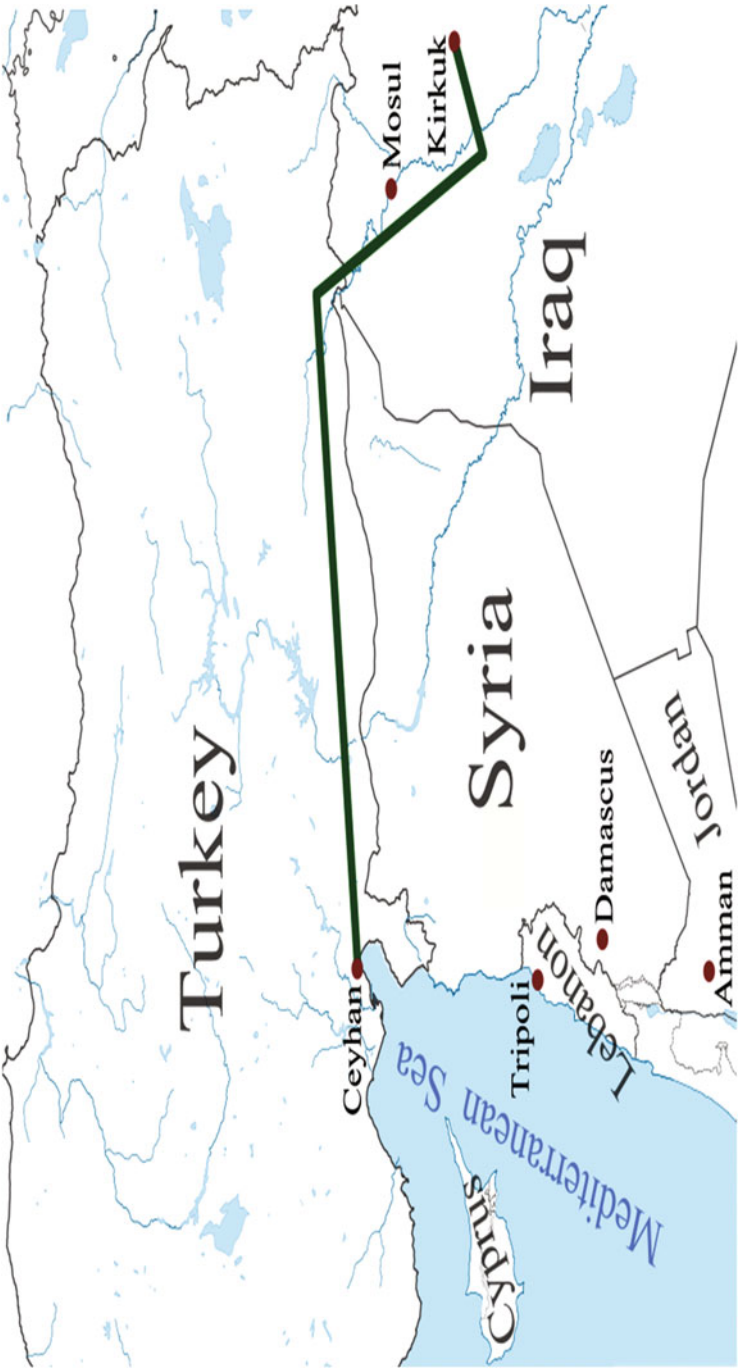

Fig. 8.3 Kirkuk–Ceyhan (KC) oil pipeline. *Source* By Kirkuk–Ceyhan_oil_pipeline-HE.svg: *Mosul-Haifa_oil_pipeline.svg: Amirki (talk) derivative work: Amirki derivative work: Amirki [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0) or GFDL (http://www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons https://upload.wikimedia.org/wikipedia/commons/7/76/Kirkuk%E2%80%93Ceyhan_oil_pipeline.svg

terrorist group as PKK or ISIL and has steadfastly opposed to any cooperation within the US-led Coalition. To prevent PKK/PYD take-over of the Turkish–Syrian border region, so vital for pipelines linking to Ceyhan, Turkey has intervened militarily, establishing control over the strategic town of Al-Bab, the meeting point of pipelines.

In the past, the ISIL conflict and the PKK/PYD terrorism against the Turkish Republic have often resulted in bombings and acts of sabotage along the Kirkuk–Ceyhan pipeline, causing costly interruptions of oil deliveries. However, the relations between Erbil and Ankara have remained cordial throughout. In fact, these two partners have had closer relations than with the national Iraqi government in Baghdad where sectarian and pro-Iranian politics have prevailed. In future, especially after the Turkish incursion in El-Bab, the security of pipelines linked to Ceyhan may be more secure. However, geopolitical factors remain complex.

Recently, an alternative pipeline to Kirkuk–Ceyhan has emerged. There is a preliminary agreement between Baghdad and Tehran on the export of Kirkuk oil to world markets via Iran. It would deliver crude oil from Kirkuk via Iran. If the pipeline is built, it will have to pass through KRG territory. Iran wants to pass the pipeline through northern Iraq via the Sinjar region, where Shiite militias in the country are mostly deployed. KRG is currently exporting its oil through Ceyhan. It has a long-standing dispute with the Baghdad administration as well as among Kurdish parties in Iraq over the control of the region's oil resources. Meanwhile, the Trump Administration in Washington has recently put increased pressure on Iran, threatening new sanctions.

8.7 The Black Sea Pipelines: The Russian Shift Towards Turkey

The Turkish–Russian energy cooperation is a significant factor in favour of the Turkey-based Regional Energy Model. Several aspects of the Turkish–Russian energy cooperation are worthy of comment. These factors tend to reinforce market forces, including in particular price-setting, which ultimately will determine the realization of this Model.

First, by its relative size as a producer, Russia is able to influence significantly energy prices. This dominant factor is a key element of the Black Sea pipeline in Turkish–Russian energy cooperation. To the extent that cheaper Russian gas flows to Western and European markets via Turkish Stream, the commercial viability of the Eastern Mediterranean gas fields is set not by corporate actors in that Basin, but rather elsewhere by actors further north in the Black Sea region, that is, Russia and, to a lesser extent, Turkey (Fig. 8.4).

Second, the Russian–Turkish energy cooperation illustrates how specific countries play their role in geopolitics. Countries may win or lose, depending on geopolitics is managed. In this context, the wider Russian–Western relations must

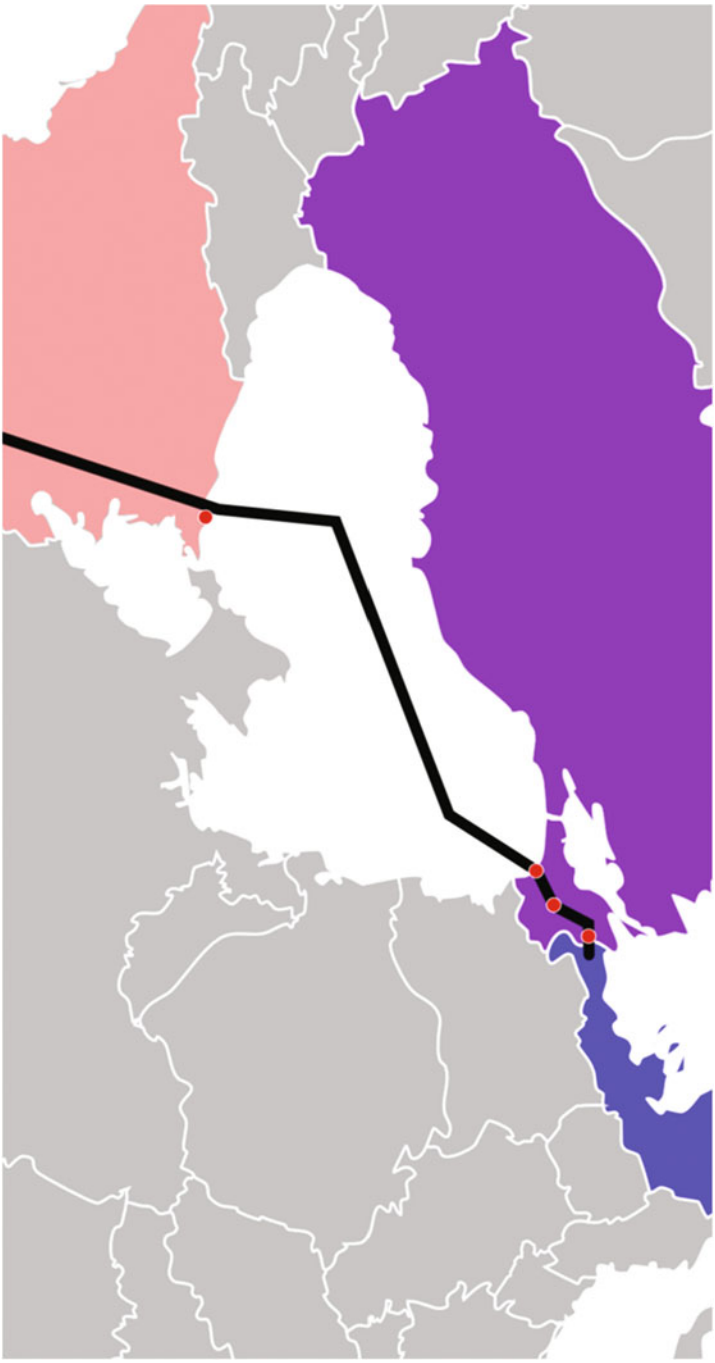

Fig. 8.4 Turk stream connection points in Russian and Turkish Borders of Black Sea. *Source* By Consiglieri88 (Own work) [CC BY-SA 4.0 (http://creativecommons.org/licenses/by-sa/4.0)], via Wikimedia Commons https://commons.wikimedia.org/wiki/File:Turkish_Stream.png

be considered. Moscow, unhappy over Western sanctions and ongoing conflict in Ukraine, has abandoned the earlier Bulgarian transit options and has shifted its strategic preference in energy politics towards Ankara. For its part, Turkey has amply demonstrated its goodwill to Moscow. It has been a reliable and significant buyer of Russian gas, and this remained in force even in the critical period after the shooting down of the Russian jet on the Turkish–Syrian border in November 2015. Moreover, the undersea pipeline to Samsun is operational and the Akkuyu nuclear project, based on Russian technical support, is ongoing.

Third, the revival of the Turkish Stream project means that Bulgaria is now almost guaranteed to lose its transit role to Turkey, and maybe even Greece. From a Russian perspective, Sofia has been hardly a reliable partner capable of securing EU approval and legal guarantees. With a weak influence within the EU, this is unlikely to change anytime soon. As can be seen in Fig. 8.4, Russia has now opted for the Turkish Stream.

The Russian shift towards Turkey is not the first, not the last, case of losers and winners in energy politics. Armenia, excluded in the case of BTC, was earlier in the same situation as what seems to be happening in Bulgaria and the Black Sea pipelines. Similar future outcomes may also be realized in the Eastern Mediterranean basin. As noted elsewhere in this study, discovering a significant hydrocarbon field is one thing, commercializing it quite differently. Much depends on how countries cooperate as well as to what extent public and private actors manage market forces on the one hand, and geopolitics on the other.

8.8 Caspian Basin: TANAP/TAP Replaces NABUCCO

NABUCCO was an ambitious 3500-km pipeline connecting gas fields in Shah Deniz in South Caucasia to consuming markets near and far, including Georgia, Turkey, Greece, Bulgaria, Italy, Austria and further west (see Fig. 8.5). TANAP, which replaced NABUCCO is one of the largest gas development projects in the world. TANAP will increase gas supply and energy security to European markets through the opening of the new Southern Gas Corridor. According to BP (2011), a principal investor, the total cost of the project, including expansion of the South Caucasus Pipeline, will be around $28 billion (http://www.bp.com/content/dam/bp/pdf/sustainability/countryreports/BP_Azerbaijan_sustainability.pdf, accessed on 1 May 2016).

Initially, 16 billion cubic metres (bcm) of gas produced from the Shah Deniz field will be carried in 2018; first deliveries to Europe will follow approximately a year later. The Stage 2 development of the Shah Deniz field includes two new bridge-linked production plat forms: 26 subsea wells drilled with two semi-submersible rigs and 500 km of subsea pipelines built at up to 550 m of water depth and expansion of the Sangachal terminal. As a result of expanding existing facilities, Shah Deniz Stage 1 capacity has been increased to around 970 mcu.ft/d and approximately 55,000 barrels per day of condensate. The Shah Deniz partners

Fig. 8.5 TANAP/TAP has replaced NABUCCO, the megaproject that was earlier the preferred route for Southern gas pipeline. *Source* By Nabucco_Gas_Pipeline-fr.svg: Sémhur (Nabucco_Gas_Pipeline-fr.svg) [FAL or CC BY-SA 4.0-3.0-2.5-2.0-1.0 (http://creativecommons.org/licenses/by-sa/4.0-3.0-2.5-2.0-1.0)], via Wikimedia Commons https://commons.wikimedia.org/wiki/File:Nabucco_Gas_Pipeline-en.svg

have recently agreed terms with SOCAR for further expansion of production capacity to around 1040 mcu.ft/d by the end of 2014.

8.9 The Cypriot Gas Fields: Pipedreams or Pipelines?

In the case of Cyprus, there are several key questions that must be resolved before any natural gas reserves can be monetized. Politics aside, the key challenge is how to export what is discovered under the sea. To date what has been discovered is far less than what would justify economic exploitation, especially on a go-it-alone basis. However, within a Regional Energy Model, Cyprus may indeed become a hydrocarbon producer, if only political determinants are managed efficiently.

Efficiency requires a rational approach to monetizing Cypriot hydrocarbons, specifically choosing connection to Turkish pipelines and rejecting costlier alternatives. A recent study (Gurel et al. 2013) has answered the question of alternatives on the basis of gas reserves in Block 12, Aphrodite, adjacent to the Israeli Leviathan field. On the basis of the drilling results by the American Noble Corporation, Greek Cypriot (GC) authorities estimate that Block 12 may have 173 bcm of gas available for export. The Gurel et al. (ibid) study has examined three alternative options for monetizing this quantity of exportable gas, taking into account political preferences and engineering/economic choices:

(A) By means of a liquefied natural gas (LNG) which would require construction of an LNG plant, something the GC authorities have proposed at Vassiliko, Limassol, i.e. a purely GC option;
(B) Through a 1038-km-long undersea pipeline to Greece via Crete, i.e. a Greek–GC partnership;
(C) By linking to the Turkish export terminal at Ceyhan, only 265 km long.

The summary results of the Gurel et al. (op. cit.) study for the three alternative choices are shown in Table 8.1.

Table 8.1 Investment cost and net revenue of three alternative export options for Cypriot gas

Alternative option	$ million	Net revenue/investment ratio
Investment cost		
(A) LNG option	12,600	
(B) Pipeline from Cyprus to Greece	19,510	
(C) Pipeline to Ceyhan, Turkey	4780	
Net revenue		
(A) LNG option	50,148	3.98
(B) Pipeline from Cyprus to Greece	54,541	2.80
(C) Pipeline from Cyprus to Ceyhan, Turkey	69,122	14.47

Source Gurel et al. (2013, op. cit., p. 86)

In option C), the pipeline from Cyprus to Ceyhan, Turkey has a ratio of net revenue to investment cost of 14.47, a figure that is 4–5 times higher than the other two alternatives. Joining the Southern Energy Corridor by linking exportable Cypriot gas to Ceyhan is by far the most rational, cost-effective method of monetizing it.

The rational and objective result above must, nevertheless, be considered unrealistic unless and until the Cyprus Problem is resolved so that GC/Greek and Turkish relations are normalized. For this to happen outside stakeholders, in particular, the EU, the British and American governments must adopt a win–win stance rather than a win–lose approach. A potential example of the former outcome would be to accelerate Turkey's accession to the EU membership and then settle the Cyprus dispute when there is a level-playing field. To attempt to force concessions on Turkey, while it kept outside the EU, in order to reward one party in the Cyprus dispute, as the Greek side has been demanding since 2004, is unproductive as it amounts to a zero-sum game.

On the other hand, a win–win outcome would enrich everyone involved. Thus, Cypriot natural gas could go to Turkey, either to meet growing Turkish demand or for export to ultimate European markets or, of course, a combination of these two possibilities. A further example of cooperative benefits would be an exchange of Turkish water for Cypriot gas. In 2015, 75 million tonnes of water started flowing, via undersea pipeline, from Anamur in Turkey to Geçitköy in Northern Cyprus, both for household consumption and industrial and agricultural use. This water import will be available to overcome existing water shortage on the entire island, if only political will in the South was to opt for a cooperative solution of the Cyprus Problem. The Turkish government has already built the water pipelines to deliver imported Turkish water right to the boundary of the GC state in the island. Political will is what is required.

8.10 The Arab Gas Pipeline

This network consists of 1200 km of pipelines, delivering natural gas, running from El Arish on the Israeli–Egyptian border to destinations in Jordan, Israel, Egypt, Lebanon, Syria and in future to Turkey. The first section is 250 km from El Arish in Egypt to Aqaba in Jordan. It was completed in 2003 at a cost of $220 million. It is operated by a consortium led by the Egyptian Natural Gas Company and it includes EGAS, ENPPI and PETROGET. It supplies gas to the Jordanian Thermal Power Station, Aqaba.

A Jordanian section of the Arab Gas Pipeline, 390 km, runs from Aqaba to El Rehab on the Syrian border. It was completed in 2005 at a cost of $300 million. The third section, 319 km, delivers gas to Syrian power stations and a gas compressor station near Homs. Completed in 2008, it was built by the Syrian Petroleum Company and Stroytransgaz, a subsidiary of Gazprom. Another section, which

became operational in 2009, runs from Homs to Tripoli, Lebanon, delivering gas to the Deir Ammar power station.

A further section, not officially part of the Arab Gas Pipeline, is from Arish, Egypt to Ashkelon, Israel. It is a 100-km submarine as pipeline, cost not exactly known but estimated to be in the range of $180–$550 million. It became operational in 2008 when Egypt was under the rule of President Mubarak. It was originally intended to supply Egyptian gas to Israel, but owing to shortages in Egypt it started in 2015 to deliver in the reverse direction as a result of a new Israeli–Egyptian agreement. As well, this pipeline has been frequently targeted by Islamic terrorists unhappy with the new regime in Egypt as well as with the Arab Israeli peace accord (http://en.wikipedia.org/wiki/Arab_Gas_Pipeline, accessed on 20 April 2016).

As regards the future development of the Arab Gas Pipeline, there are plans to extend it from Syria to Kilis, Turkey to link up with the Turkish pipelines for the delivery of gas to Europe. In 2008, at a time of cordial Syrian–Turkey relations, an agreement was signed with this aim in mind, but it was subsequently annulled owing to changed geopolitics. In future, developments will depend on the outcome of the Syrian civil war and new regional alliances.

8.11 The Israel–Turkey Pipeline: Another Potential of Private-Sector Success

This is a private-sector-led development in the Southern Energy Corridor. According to Israeli newspaper reports, early in 2014, tenders were invited for the construction of an undersea pipeline to deliver natural gas from the Leviathan field to Turkey. More than ten bids were submitted, including Zorlu Group, Turcas Petrol AS and German electricity utility RWE. Noble Energy Inc owns 39.66% of Leviathan, a further 22.67% is owned by the Delek Group of Israel and a further 15% is owned by Ratio Oil Exploration. (Source: http://en.caspiantv.net/contentJx.aspx?cID=1111).

A noteworthy significance of this tendering lies in demonstrating that, even if no deal is reached in Cyprus Problem, regional energy dynamics will unfold regardless. In other words, larger interests will push the Cyprus conflict aside and move on to develop a regional energy corridor. With or without United Federal Cyprus, however, North Cyprus, already in the Turkish sphere of influence, will emerge as a player in this regional energy corridor. Most likely the Israeli–Turkey undersea pipeline will pass through the territory of North Cyprus. Under the provisions of UNCLOS, as previously discussed, Greek Cyprus may have a say in determining the exact route of this pipeline, but it does not have a veto power to block it.

8.12 EU's Role in the Southern Energy Corridor (SEC)

The EU has a major stake in the development of the SEC. While, in the immediate aftermath of the Russian suspension of gas flow to Europe in 2009, NABUCCO megaproject was favoured and Turkish participation in it was secured with a major 17% equity participation by the state-owned BOTAS, more recently TANAP/TAP project has emerged to the forefront. Now EU must change gears and move more aggressively, in financing and supporting otherwise this alternate route. As noted above, BTC and Israel–Turkish pipeline projects are significantly private-investor-led. Perhaps, the EU decision-makers need to take note of this fact and encourage development, including financing, with explicit private-sector cooperation.

Official encouragement of these megaprojects, cutting across national boundaries, is essential. For example, TANAP/TAP network must, with explicit EU support, be linked with Levant Basin pipelines connecting Cypriot, Israeli and other gas fields to Ceyhan. This may best be facilitated through government–private-sector collaboration. One clear outcome of such collaboration is the avoidance of the far costlier alternatives (e.g. undersea pipeline to Crete and Greece). No private investor would take such a venture, and public funding of it would be foolhardy. Specifically, avoiding Turkey should be explicitly discouraged, while other technical alternatives, as secondary and subsidiary options, considered more favorably are available on merit and net profitability basis, a key objective of private investors.

One alternative which requires careful evaluation is transporting gas in the form of liquefied natural gas (LNG) technology. It is still very expensive and needs investments both in producing and consuming countries to provide for technology and LNG re-gasification terminals. The same problem as in spare producing capacity appears—politically motivated limited foreign direct investments in producing countries and reluctance of private sector to engage in projects which may not be profitable. Nonetheless, Israel has recently constructed an LNG plant (also called liquefaction plant) in order to produce and supply Tamar gas of Eastern Mediterranean within its Economic Exclusive Zone. Neighbouring countries may find it too costly to do the same.

8.13 Some Conclusions: How Feasible Is a Regional Energy Model?

The most recent critical catalyst for a Regional Energy Model in the Eastern Mediterranean Basin may be the Russian–Turkey energy cooperation. This cooperation, as shown above, has enhanced the strategic importance of alternative energy sources and routes for EU. Specifically, thanks to this cooperation, Russian energy will be complementing Caspian, or even Greater Caspian sources flowing through TANAP/TAP. Further, south, a United Federal Cyprus, created by an agreed solution to the Cyprus Problem has the potential to transform the island into

a sub-energy hub, connecting Israel–Cyprus pipelines to Ceyhan/Iskenderun in Turkey, making it a crucial link in the development and operation of the SEC via Turkey.

American and European firms are actively involved in hydrocarbon exploration and development in the Eastern Mediterranean. Beyond these private-sector interests, the American government has far-reaching strategic interest in promoting peace and stability in the region. For these reasons, the USA has now become an active actor in the settlement of the Cyprus Problem as well. The same goes for the EU, for self-evident reasons.

This chapter has demonstrated the vital role of Cyprus in a potential Regional Energy Model. A United Federal Cyprus, based on power-sharing between the island's two main ethnic groups, Turkish and Greek Cypriots, would be able to sell hydrocarbons in the energy-hungry Turkish market while also linking deliveries to the far more cost-efficient Turkish pipelines delivering gas to Western Europe. Evidently, United Federal Cyprus, or an agreed solution, would be able to monetize its recently discovered natural gas reserves in its territorial waters, whereas unresolved Cyprus Problem would create a dispute over Cypriot hydrocarbons, delaying or even preventing totally their full exploitation and monetization.

References

BP Statistical Review of World Energy 2011. (2011). Retrieved January 28, 2013, from http://www.bp.com.

Gurel, A., Mullen, F., & Tzimitras, H. (2013). *The Cyprus hydrocarbons issue: Context, positions and future scenarios*. PCC Report 1/2013, PRIO (Peace Research Institute Oslo), Cyprus Centre.

Internet Sources

http://en.caspiantv.net/contentJx.aspx?cID=1111.

http://en.wikipedia.org/wiki/Arab_Gas_Pipeline. Accessed April 20, 2016.

http://www.botasint.com/Foto/iletisim/krokib.jpg.

http://creativecommons.org/licenses/by-sa/3.0 or GFDL (http://www.gnu.org/copyleft/fdl.html), via Wikimedia Commons.

https://commons.wikimedia.org/wiki/File:Baku_pipelines.svg.

http://creativecommons.org/licenses/by-sa/4.0, via Wikimedia Commons.

https://commons.wikimedia.org/wiki/File:Turkish_Stream.png.

http://creativecommons.org/licenses/by-sa/4.0-3.0-2.5-2.0-1.0, via Wikimedia Commons.

https://commons.wikimedia.org/wiki/File:Nabucco_Gas_Pipeline-en.svg.

http://www.bp.com/content/dam/bp/pdf/sustainability/countryreports/BP_Azerbaijan_sustainability.pdf. Accessed May 1, 2016.

http://creativecommons.org/licenses/by-sa/3.0 or GFDL.

http://www.gnu.org/copyleft/fdl.html, via Wikimedia Commons.

https://upload.wikimedia.org/wikipedia/commons/7/76/Kirkuk%E2%80%93Ceyhan_oil_pipeline.svg.

Part IV
Prospects and Conclusion

This study has emphasized the increasing role of Turkey in securing Europe's future energy security. We have put together the latest information, documenting the importance of the SEC and Turkey's crucial role in this Corridor. Its realization requires closer cooperation between EU and Turkey, which, at this point in time, is far from optimal. In the near future, however, we believe both parties will arrive, in due course, at a more rational point of self-interest, forging energy cooperation in a win-win scenario.

This final part of our study consists of two chapters. Chapter 9 will highlight the Turkish–EU relations in broad terms, examining the troubled relations of the past, and calling for a more rational energy partnership in future. Chapter 10 will summarize the principal findings of this study in relation to the potential Regional Energy Model. We believe the greatest merit of this Model stems from market forces, which will gradually determine how exactly it will emerge.

Chapter 9
Turkey–EU: Energy Partners or Enemies Forever?

9.1 Introduction

Relations between Turkey and the EU (at the time of writing in Spring, 2017) are anything but cordial. For one thing, Turkish patience, waiting for over half a century of positive accession to membership, seems to have run out. On the European side of the equation, radical populism, in the wake of Islamic terrorism and refugee influx from war-torn countries of the Middle East, via Turkey, have adversely affected relations, although in 2013, for a short time, it looked like a cooperative approach to refugee crisis might save the day. In the meantime, Islamophobia and anti-Muslim sentiment in European politics, in Holland, Germany, Austria and elsewhere, have hurt relations between Brussels and Ankara.

As a result, in this Chapter we propose to discuss the following question: Will Turkey–EU stay as enemies forever, or can they overcome the present negativity and move to a higher plane of energy partnership?

9.2 A Troubled Relationship

There is a long relationship between Ankara and Brussels, dating from the 1960 Ankara Protocol, but the relationship has been marked more by discord than cooperation. The Ankara Protocol was a promising start, targeting Turkish membership after a long (30 year-long) institutional reform and economic and political development (Yeşilada 2013, esp. Chap. 2). However, military coup and political instability in Turkey in the seventies, along with changed geopolitics, the nature of European–Turkey relations underwent fundamental re-evaluation. Especially the end of the Cold War in late eighties reduced Turkey's role in European security. The admission of Greece as a member of EEC in 1984 radically transformed the regional balance in Eastern Mediterranean. From this point onwards, decision-making in

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Brussels became pro-Greek. By then, the Cyprus problem had emerged as a complex Greek–Turkish dispute, poisoning Turkey–EEC relations, Greece using its membership as conditionality for future evolution of relations between Brussels and Ankara. A Custom Union was finally negotiated in 1993, and went into force two years later, in return for Ankara's reluctant consent to go along with EU's decision to endorse Cypriot application for membership without first settling the Cyprus problem.

Earlier in 1987, the then President Ozal, suddenly had applied for EU membership for Turkey, if only to redress the regional balance across the Aegean between Turkey and Greece. Exactly 30 years on in 2017, Turkey is still waiting. Although accession talks began in 2004, only a single chapter out of some three-dozen, deemed necessary for membership, has been completed. In effect, membership talks have been effectively suspended for years. Besides rational reasons, such as the economic and social underdevelopment of large parts of Turkey and fears of excessive economic migration, Turkey has been subjected to double standards. Being a Muslim-majority country is perceived as inconsistent with 'Christian heritage' of Europe.

9.3 The Cyprus Impasse and European Extreme Populism

The EU accepted a divided Cyprus as full member in 2004. Some European politicians at the time were critical, but there was general misconception about the Cypriot conflict. Few European politicians knew of the UN mediation since 1964 to restore constitutional breakdown between the Turkish Cypriots and Greek Cypriots as co-owners of the sovereignty vested in the 'Republic of Cyprus', 1960. Germans, still mindful of their own East–West German division, saw itself as 'vulnerable' to Greek veto of the EU's eastward enlargement (Cusack 1999). In the end, the EU leadership, however reluctantly, endorsed Greek Cypriot admission. EU membership came as a 'reward' immediately after the commanding 75.83% rejection by Greek Cypriot of the UN peace plan, known as the Annan Plan in separate referenda on the island. At the same time, perhaps as a consolation price, Turkey was offered Candidate Country status. Open-ended accession negotiations started. An angry British diplomat, David Hanney, who had invested much effort mediating the Cyprus problem, wrote: 'Let down by their leadership, they (Greek Cypriots) chose, just when they were on the point of entering the European Union, to demonstrate that they had not understood the first thing about the fundamental objectives of that Union'. (Hanney 2005: pp. 245–6).

Since 2004, several European actors, including leading political figures, have utilized Cyprus as a 'wild card' indirectly to oppose Turkish membership. Thus, most of the 35 chapters of Acquis Communautaire, essential pre-accession reform, were 'suspended'. For their part, the Greeks prior to 2004, joined by Greek Cypriot since 2004, have sought to use Turkish accession negotiations as a tool of wresting concessions from Ankara. Athens pursues claims in the Aegean, whilst Greek

Cypriots wish to win back full control and ownership of Cyprus. Ankara has remained steadfast in its support of the Turkish Cypriots, always acknowledging their sovereign rights enshrined in the 1960 accords which established the 'Republic of Cyprus'.

Many Europeans oppose Turkish admission for a variety of reasons. Some, such as Austria, even remember the Ottoman Siege of Vienna in 1683. The Dutch anti-Islam populist, Geertz, speaks for many Europeans who wish to preserve the Christian heritage of Europe. Others have objected to the large Turkish population, the risk of large in-migration, and relatively underdeveloped state of Anatolia.

9.4 Crisis Management

From the Euro financial crisis after 2008, through Greek and Greek Cypriot bankruptcy in 2011–13, and finally the dramatic Brexit vote in 2016, EU itself has encountered a series of setbacks. Austerity macroeconomic policies have generated recession and unemployment, especially amongst the younger segments. But the critical challenge in EU–Turkish relations have been the refugee crisis in 2014 when millions of Syrian, Iraqi and other economic migrants crossed the Aegean trying to force their way into EU countries. This uncontrolled inflow has resulted in the EU–Turkey Agreement on Refugees. In return for financial aid, visa liberalization and accelerated accession talks, Ankara agreed to control the outflow of migrants.

Relations, however, did not prosper, as originally expected, largely owing to the personality of president Recep Tayyip Erdogan. Under the former PM Davutoglu, negotiations over refugees, visa liberalization and accession talks progressed reasonably well. But Erdogan took a strong position on terrorism and differences between EU and Ankara widened over curtailment of press freedom and PKK. After Davutoglu's removal, the Brussels–Ankara relations deteriorated, climaxing in the aftermath of the coup of 15 July 2016. Erdogan has been especially angered by the lukewarm support of his defeat of the Coupists. His anti-Gulenist purges, at the expense of basic freedoms, have poisoned the atmosphere. To add insult to injury, Erdogan's attempt to become an 'executive' president, through a Constitutional Referendum, finally held on 16 April 2017, has generally been viewed in Europe as a power-grab. Many opponents have called for suspension of EU negotiations on the ground that Erdogan's attempt to become an authoritarian ruler is incompatible with EU norms and values.

In the meantime, in Spring 2017 (at the time of writing) the Cyprus hydrocarbon dispute has, once more, erupted as a threat. UN-led talks on a power-sharing peace plan, known as the Bi-zonal, Bi-communal Federation, backed also by the EU, have effectively ended. They were already at an impasse over the Greek Cypriot declaration of an ENOSIS motion in parliament, right at the moment when in Geneva, these talks were at the crucial stage of exchanging maps, defining a mutually acceptable border in a potential Cyprus Federation and 5-power conference was

underway to update the Guarantee and Security system. At this stage, the Greek Cypriot side announced drilling activities in territorial waters claimed by Turkey. Turkish government, in retaliation, sent its own drilling ship, Barbaros for exploration in Cyprus waters.

Understandably, with no progress and talks in impasse, the UN mediator has expressed unusually harsh diplomatic warnings. He stated that 'if (the current) talks fail, maybe other options have to come to the table' (http://cyprus-mail.com/2017/05/05/eide-raises-possibility-options-no-cyprus-deal-soon/. Accessed on 6 May 2017). What those 'other options' might be are not specified, but the UN mediation and patience seem to be coming to end, including possible termination of the UN peace-peaking force in Cyprus, On the island since March 1964, the UN force, is the original architect of what has become the 'Green Line' border between the Turkish North and Greek Cypriot South. If the UN pulls out of Cyprus, it will not only amount to a diplomatic failure, after some half a century of futile peace-making effort, it will as well create an extremely dangerous political conflict, including possibly hot conflict in Eastern Mediterranean. This, coming at a time of strained Turkey–EU relations does not bode well for normal exploration and development hydrocarbon wealth in the region. Still, there are also signs, especially on the Turkish–Israeli energy cooperation, that market forces, rational decision-making by private sectors backed by supportive government policy, are operating. They may yet save the day.

9.5 Permanent Enemies?

On 24 April 2017, the Council of Europe took a decision to downgrade Turkey's accession status. It placed the country's standing back to where it had been in 1996. At that time, Turkey was placed on 'political monitoring' (which was not removed until 2004 when Candidate status was granted). In April 2017, President Erdogan's constitutional referendum, opponents claimed, featured serious irregularities, giving him an unjustified slim majority.

Regardless of Recep Tayyip Erdogan's politics and personality, in the foreseeable future cooler heads will, almost certainly prevail, as the war in Syria and Iraq will eventually end. It is even possible that peace and settlement may be achieved on the island of Cyprus. In the meantime, several pipeline projects are moving ahead, principally TANAP and the Turkish Stream in the Black Sea. Additionally, the Israeli and Turkish corporations may be expected to push for undersea pipeline from Leviathan gas fields to Ceyhan. All of these projects, driven by market forces, bode well for future EU–Turkey energy cooperation.

9.6 Turkey–EU as Energy Partners

As documented in this study, there are strong, rational reasons for EU–Turkey energy cooperation. Hopefully rationality will overcome political and historical obstacles, and in particular ethnic rivalries between Greeks and Turks. The EU values and principles should, in theory, help resolve differences through give-and-take negotiations in bilateral relations. On the thorny Cyprus issue, the EU, as originally anticipated, should play a 'catalyst' role. Sadly, however, hidden (e.g. racist or religious) motives have damaged Brussels–Ankara relations, in particular the rise of Islamophobia and anti-Turkey populism in Europe coinciding with radical terrorism. One hopes these are temporary and sooner or later, they will disappear.

In the longer term, deeper mutual interest and rational factors should prevail. Turkey is a founding member country of the International Energy Charter signed in 1994 which went into force in 1998. The EU, as well as the European Atomic Energy Community, along with 52 countries are also members. The overall aim of the Charter is promotion of energy cooperation through adoption of modern rules and regulations within a multilateral framework. In a recent energy conference, the Charter Secretary General Rusnik endorsed the view that Turkey is indeed emerging as an energy hub, in particular with the creation of sufficient gas storage facilities. 'If it can achieve this, then (Turkey) will be able to become a genuine hub for southeast Europe' (http://www.hurriyetdailynews.com/with-enough-gas-storage-turkey-can-turn-into-energy-hub-says-top-energy-official.aspx?pageID=238&nID=113997&NewsC. Accessed on 6 June 2017).

Energy cooperation appears as the most rational choice forward. Despite the fact that Chapter 15 of Acquis Communautaire remains closed, much progress has been made in respect of EU–Turkey energy cooperation. In May 2015, a declaration was signed between the Turkish energy minister and the European Commission for Energy Union both sides recognizing that 'Turkey is a natural energy bridge and an emerging energy hub between energy sources in the Middle Eastern and Caspian Regions and the EU energy markets' (http://www.platts.com/latest-news/natural-gas/istanbul/turkey-eu-sign-joint-declaration. Accessed 27 April 2017). The declaration was signed on the occasion of the ground-breaking ceremony for their 31 bcm per year TANAP due to start supplying 10 bcm per year gas to EU markets in 2020.

In January 2016, EU and Turkey took further steps to strengthen energy ties within the context of a High-Level Energy Dialogue aimed at accelerating energy cooperation. A high-level EU delegation, headed by the EU Commissioner for Climate Change, declared that 'Turkey is a key partner for Europe's energy security and diversification… When the (TANAP pipeline) opens in 2019/2020, it will allow around 10 bcm of gas to flow, possibly rising to 80–100 bcm in the long term. In this way, the Southern Gas Corridor has the potential to meet up to 20% of the EU's gas needs' (http://www.ec.europa.eu/energy/en/news/eu-and-turkey-strengthen-energy-ties. Accessed 27 April 2017).

The EU–Turkey relations worsened in the weeks ahead of the 16 April 2017 Turkish constitutional referendum. Key European countries, including Germany and Holland in particular, prevented Turkish ministers attending pro-Erdogan rallies. This infuriated Erdogan and a battle of strong accusations were traded. Erdogan won a slim victory, thanks in part to his support by Diaspora Turkish voters. But the legality of Erdogan's win has been questioned and the European Court of Human Rights may pass a judgment on the issue. In the Malta meeting of EU Foreign Ministers at the end of April 2017, some positive steps were taken to find a middle ground and keep EU–Turkey relations on the steady course. The EU leaders, however, grudgingly 'respected' the referendum result, and pledged to keep open the accession talks.

As part of a revitalized European energy and climate diplomacy, the EU will use all its foreign policy instruments to establish strategic energy partnerships with increasingly important producing and transit countries or regions such as Algeria and Turkey; Azerbaijan and Turkmenistan; the Middle East; Africa and other potential suppliers (Hafner and Tagliapietra 2016: p. 119).

Energy cooperation may turn out to be a catalyst in preserving, indeed strengthening the EU–Turkey relations. As we have argued in this monograph, there are huge dividends to be realized for both parties from energy cooperation. As one observer has correctly argued: '… the best way to reach the full potential of such cooperation is for the two actors to open the energy chapter in Turkey's EU accession negotiations' (Karbuz 2014). At the time of writing (Spring 2017) that prospect looked unlikely except in the longer term.

References

Cusack, T. (1999). The shaping of popular satisfaction with government and regime performance in Germany. *British Journal of Political Science, 29*(4), 641–672.

Hafner, M., & Tagliapietra, S. (2016). *The future of european gas markets: Balancing act between decarbonisation and security of supply*. Leuven: Claeys and Casteels Publishing.

Hanney, D. (2005). *Cyprus: The search for a solution* (1st ed.). New York: I. B. Tauris.

Karbuz, S. (2014). Turkey's energy future: A quantitative assessment. *European Energy Journal, 4*(1), 67–70.

Yeşilada, B. (2013). *EU-Turkey relations in the 21st century*. New York: Routlege.

Internet Sources

http://cyprus-mail.com/2017/05/05/eide-raises-possibility-options-no-cyprus-deal-soon/. Accessed on May 6, 2017.

http://www.hurriyetdailynews.com/with-enough-gas-storage-turkey-can-turn-into-energy-hub-says-top-energy-official.aspx?pageID=238&nID=113997&NewsC. Accessed on June 6, 2017.

http://www.platts.com/latest-news/natural-gas/istanbul/turkey-eu-sign-joint-declaration. Accessed April 27, 2017.

http://www.ec.europa.eu/energy/en/news/eu-and-turkey-strengthen-energy-ties. Accessed April 27, 2017.

Chapter 10
A Summing up

10.1 Brief Summary

This study has used a 'level of risk' analysis to examine a Turkey-centric Regional Energy Model in order to secure European energy supplies along the SEC. In this Model, Turkey is seen as an emerging energy hub, and Caspian Basin sources and pipelines, especially TANAP/TAP, have been accorded the lowest risk level in terms of supply security and diversification options. Next, in terms of risk level, we have selected the Black Sea pipelines delivering relatively cheap Russian gas to the Turkish energy hub. Israeli gas field, connected to the Turkish hydrocarbon export terminal at Ceyhan/Iskenderun is considered as a third-level risk, in part because of emerging alternatives in Egypt or Eastern Mediterranean that exclude Turkey. Arab energy sources via Turkey are considered even riskier, as are Cypriot fields owing to ongoing conflicts and disputes.

Turkey is not itself an energy producer and is a significant consumer in its own right. This study has examined the Turkish market as well. However, the study's main focus is beyond the Turkish domestic market, in Turkey's intermediary role in ensuring European energy security. As global energy dynamics continue to evolve, the Europe needs to diversify its sources and routes. Algerian and North Africa sources are significant and may remain so, while the North Sea sources diminish in the foreseeable future. The huge dependency on Russian gas via Northern routes has become a hostage of East–West relations. The EU as well as the USA have called on Russia to stop Russian occupation of Ukrainian land and imposed sanctions in renewed East–West tensions reminiscent of the Cold War.

The Ukraine war and the annexation of Crimea by Russia have prompted calls for scaling down Russia's gas exports as an act of punishment for political and military aggression. Norway has been singled out as an alternative supplier, but substituting Norwegian gas for Russia is too inadequate. Indeed, the North Sea sources are diminishing and offer no long-term energy security.

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Russia's own energy requirements must also be considered. With its own demand expected to grow strongly, Russian gas prices will, in future, be more attractive and profitable for Gazprom. As well, Russian Siberia, rich in hydrocarbons, will be increasingly hard put to develop export markets in the Far East. All of these factors suggest longer term reduction in Russian sources for European energy requirements. Significantly, Russian interest in diversifying its export capacity through the Black Sea to Turkey is a major strategic advantage to European energy security through the SEC.

10.2 European Energy via the SEC: A Regional Energy Model

Clearly, the EU countries face future uncertainties in their energy needs and future economic prospects. These uncertainties have increased with the Trump presidency in the USA and Brexit. Securing Europe's energy requires diversification of routes and sources. This study has documented the emergence of the SEC and Turkey's vital role in it. Although this route is by no means free from geopolitical hurdles, it is gradually in the process of taking shape. Within the next few years, major components of the SEC will be completed and operational in 2019–2020, such as the Caspian Basin and the Russian–Turkish Stream, while the Israeli–Turkish pipeline may follow soon thereafter.

Looking further ahead, it is necessary to assume rational behaviour on the part of energy actors involved in the SEC. This is the path of future prosperity for all in Corridor, especially the East Mediterranean. In this study, we have assumed that hydrocarbon wealth can be shared within a Regional Energy Model in which Arabs, Turks, Greeks and Israelis all gain. In such a Model, there could be a division of related energy activities: The Turkish port of Ceyhan could be the principal export terminal, becoming the convergence terminal for pipelines from Egyptian, Cypriot, Lebanese and Israeli gas fields. Limassol in Cyprus could be the shipping hub, Alexandria, Egypt might be the production hub. Tel Aviv in Israel might be the investment and financial hub.

Turkey is a big energy market, a huge consumer as well as being a transit country. Likewise, Egypt and every other country in the region have its own energy-hungry domestic market. Each and every country in the region stands to gain from exploitation and monetization of undersea hydrocarbons. These resources buried in the ground or undersea, are expensive to monetize. It requires heavy investment upfront for exploration, transport and refining to produce the energy that heats homes and drives economies. Typically, hydrocarbon wealth lies in gas or oil fields crossing national boundaries, or it has to be transported via long pipelines going through national borders. In one way or another, hydrocarbon wealth can best be realized through cooperative arrangements between countries involved in exploration, development or monetization of this potential.

If such cooperation is achieved, then hydrocarbon reserves can be a blessing, a bonanza of wealth is created to be shared amongst cooperating countries, e.g. in North Sea Oil. If, on the other hand, boundary disputes turn into never-ending conflict, or if domestic stakeholders turn on one another, then the result is a curse, actually making things worse.

10.3 Geopolitics of Energy Sources

Optimism, however, is never sufficient. Realistically, risk and uncertainty must be regarded as the most likely scenario along the SEC. Consistent with our 'levels of risk' classification, we are more optimistic about the Caspian and Black Sea Basins than the Middle East reserves in general. We believe Turkish–Azeri cooperation is most likely, while Turkish–Israeli cooperation is similarly pretty likely. To the extent that these reserves and their related pipelines are realized, a Regional Energy Model will slowly emerge which, over time with positive geopolitics, may become even stronger and larger with additional actors joining in. For example, in due course, the Cyprus Problem may be solved allowing cooperation between Turkey, Israel and Cyprus. Arab and Gulf hydrocarbon sources may join our Regional Energy Model in the more distant future. In the meantime, the Caspian Basin and Russian supplies across the Black Sea appear most feasible in the near future. Likewise, private-sector actors are likewise likely to prevail in forging energy cooperation between Israel and Turkey. Further ahead in future, market as well as geopolitics, discussed in this book, will determine the extent to which Eastern Mediterranean hydrocarbons may be monetized and delivered to European markets. In all of these scenarios, Turkey's role, we believe is critical. Equally, we believe rational self-interest will promote increase in energy cooperation between Europe and Turkey.

10.4 The Ball is in European Court

This is our final word: We believe the future of energy partnership between Turkey and Ankara rests primarily in European hands. Europe is the final consuming market on the SEC, rich in technology and investible resources. It also sits in a commanding position in terms of alternative routes, from North Africa, North Sea and, in particular in having a big role in the further development of SEC. It can opt for the cost-effective, rational choice, selecting the TANAP-TAP pipeline as its major supply route. Or, alternatively, it can go for the costlier Greek/GC route via the East Mediterranean pipeline excluding Turkey. The former choice would be in line with European competitiveness, the latter would clearly harm it.

Exclusion politics is bad economics. Should European politicians choose bad economics, it will not be the first time that nations or actors go against market

forces. Brexit may be only the latest such example. When exclusion politics (e.g. to freeze accession process and to refuse to open the energy chapter 15), not rational choice determine European interest, Europe's ability to compete in the global market price is damaged. Consumers may end up paying higher per unit of energy, while export prices rise due to higher production costs. Populist politicians may even attempt to justify their choice on the basis of non-economic arguments viewing Turkey as a historical, permanent enemy.

As against religious or populist declarations, we believe European energy security is too important to be decided by exclusion politics guided by outmoded historical or emotional factors. We conclude by summarizing our key market-determined variables, essential for sustaining European global competitiveness. At the present time, oil is about US$50 per barrel; natural gas about US $4–4.50 per cm. Russian gas from Turkish Stream will flow at these competitive rates, while the Caspian Basin energy supplies will be equally competitive. Israeli–Turkish sources, as well as Iraqi and Arab sources, can be expected to match these figures. By contrast, the latest cost analysis of the Eastern Mediterranean pipeline, going via Crete, Greece is 3–5 times higher. Of course, cost analysis, indeed economics, are but one of the many considerations that go into final approval of any pipeline. In the end, the selection of any pipeline will be determined by a set of complex interplay of market forces and geopolitics.