



# Desalination – Solution for a Thirsty World (Made in San Diego)

Presented by:  
Doug Eisberg  
Business Development Director  
Avista Technologies

At the 1<sup>st</sup> Annual Maritime Collaboration Summit  
November 16<sup>th</sup>, 2010





# History of Desalination

- Reverse Osmosis (RO) was only a theory until the 1950's and 1960's
- General Atomic in San Diego, CA was a pioneer of the technology
- Growth trends in desalination
- Cost trends in desalination
- Business cluster in San Diego







# Desalination Growth (RO)

- Seawater (SWRO) membrane sales history:

<u>Year</u>	<u>Global membrane sales \$</u>
1969	\$0.1 million
1978 (Jeddah RO)	\$10 million
1990	\$25 million
2000	\$65 million
2010	\$200 million
2020	\$500 million





# Cost Trends in Desalination (RO)

- Seawater (SWRO) cost reduction history

Year	Global RO membrane cost/1000 gallons
1969	\$12.00
1978 (Jeddah RO)	\$15.00
1990	\$6.00
2000	\$4.60
2010	\$3.00 (\$1100/acre-foot)
2020	~\$2.15





# Energy Consumption Trends in RO

- Seawater (SWRO) energy reduction history
  - Early SWRO plants were built without energy recovery systems
  - In the 1980's Pelton Wheels were used to capture unused energy from the concentrate streams
  - In 2000 isobaric energy recovery devices came into wide usage with 95% efficiency





# Energy Consumption Trends in RO

- Year

	Global RO membrane energy usage (kWhr/1000 gal.)
1969	40
1978 (Jeddah RO)	30
1990	25
2000	17
2010	11
2020	~8





# Desalination – Environmentally Friendly

- SWRO systems are environmentally friendly and global experience has shown no negative effects on flora and fauna near installations
  - Seawater is not heated like older thermal systems
  - Concentrate is returned to sea via dispersion headers to facilitate mixing
  - No (minimal) chemical usage
  - Plant buildings are low-profile and have pleasant visual impact
  - Intakes are designed to be non-lethal to fish and other sea life





# Future for Desalination in North America

- **San Diego County Water Authority**
- **Metropolitan Water District**
  - Carlsbad
  - Huntington Beach
  - Santa Cruz
  - Marin
  - Catalina
  - Cambria
  - Lompoc
  - Ensenada
  - Hermosillo
  - Texas
  - Florida
  - Mexico





# Cluster of Desal Companies in San Diego

- There are an estimated 2500 people employed by desalination-related companies in San Diego
  - **Membrane manufacturers:**
    - General Electric – Vista
    - Koch Membrane Systems – Scripps Ranch
    - Nitto/Hydranautics – Oceanside
    - Toray Membrane USA – Poway
    - SEPRO – Oceanside
  - **Chemical manufacturers:**
    - Avista Technologies – San Marcos
    - King Lee – Kearny Mesa
    - Professional Water Technologies – Vista
  - **Engineers/Developers:**
    - Poseidon – Carlsbad
    - SPI – San Marcos
    - H2O Innovations – Vista
    - Siemens – El Cajon
  - **Pressure vessel manufacturers:**
    - Protec/Bekaert - Vista





# Desalination Trade Organizations

- American Membrane Technology Association (AMTA) – [www.membranes-amta.org](http://www.membranes-amta.org)
- International Desalination Association (IDA) – [www.idadesal.org](http://www.idadesal.org)
- Affordable Desalination Collaboration (ADC) – [www.affordabledesal.com](http://www.affordabledesal.com)
- Others:
  - European Desalination Society (EDS)
  - American Water Works Association (AWWA)
  - Water Reuse Foundation





# Desalination

- Seawater covers over 75% of the Earth's surface
- As global population grows to over 6 billion by 2050, the ultimate source of sustainable potable water is *DESALINATION*

