

Water Reuse and ZLD Technologies

Gasification Technologies Conference
2011

HPD

 **VEOLIA**
WATER
Solutions & Technologies



Presentation

- Traditional Wastewater Management Strategy
- Water Recycle and Re-use
- Conventional Industrial Wastewater Treatment
- Zero Liquid Discharge
- New ZLD Technology – The CoLD™ Process
- CoLD ZLD Systems in Gasification Plants



Water and Carbon Footprint Reduction

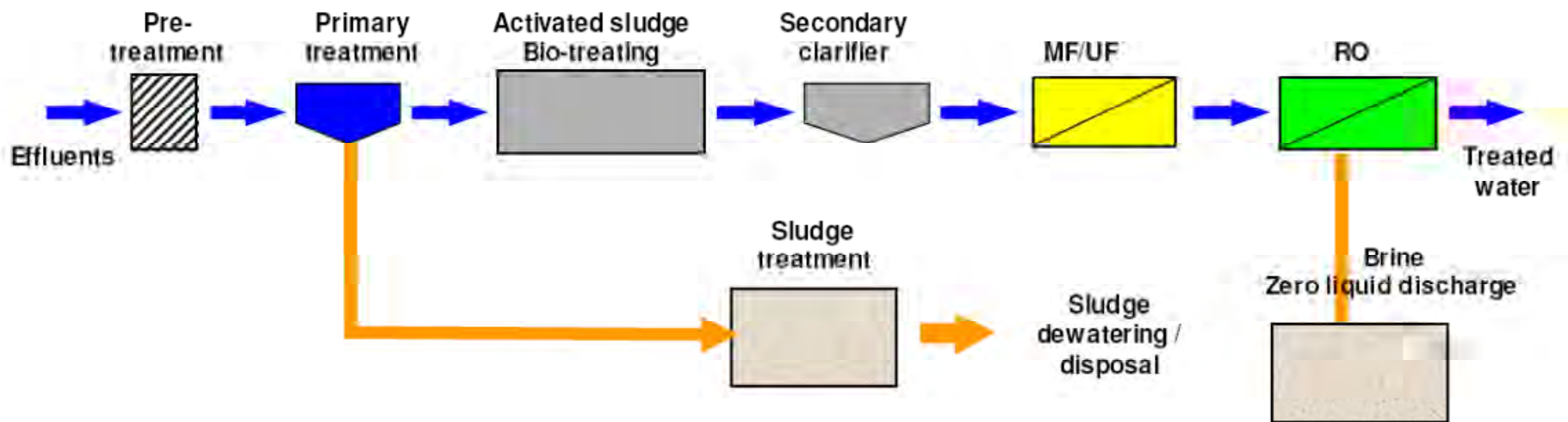
Veolia Water is Committed to Supporting our Customers to Achieve Their Sustainable Visions

Our Focus is on Delivering:

- Improved operations
- Reduced costs
- Neutral or positive energy solutions
- Solutions which utilize green chemicals or zero chemical consumption
- Water-footprint-efficient technologies with high recovery rates

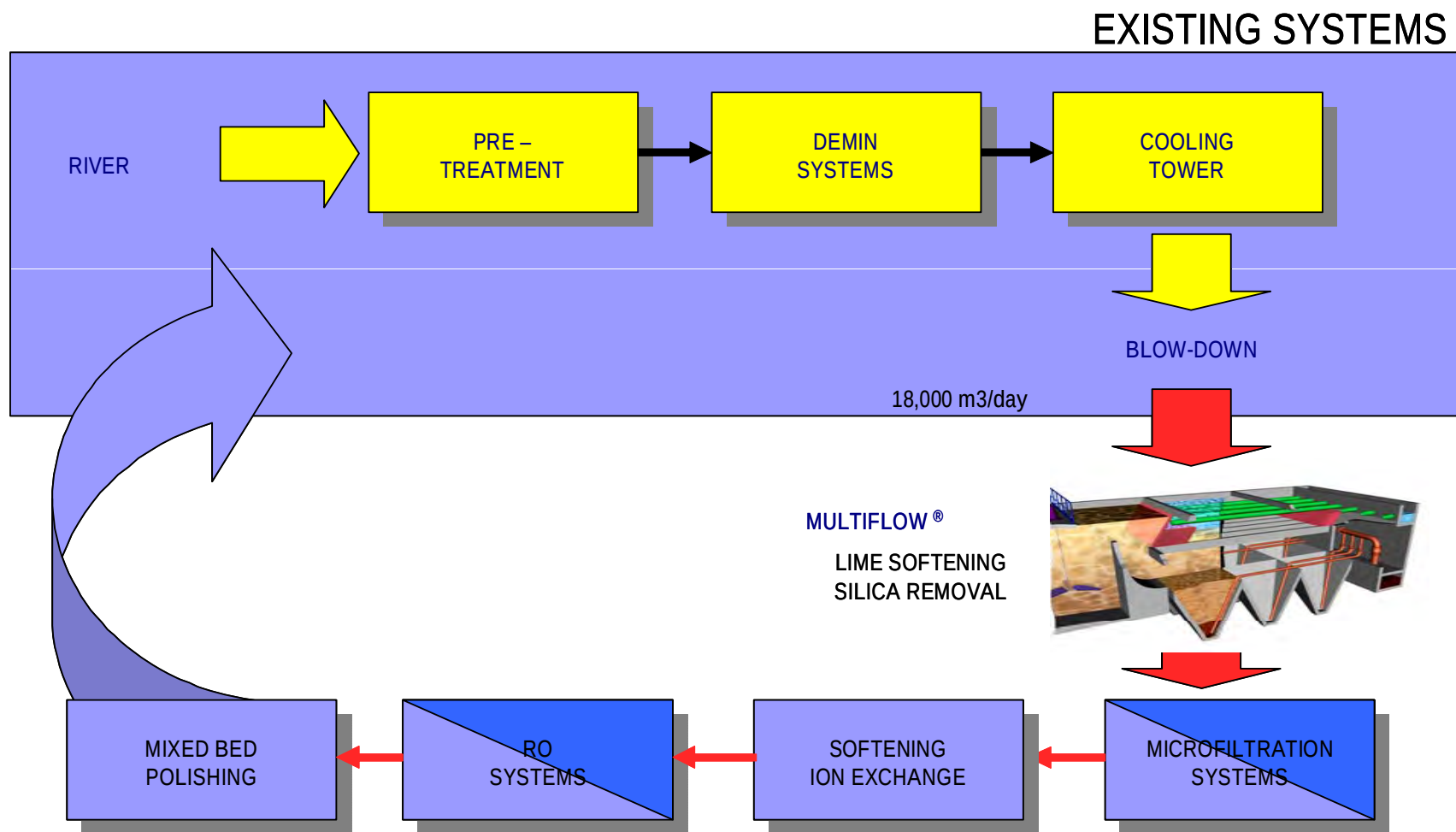


Traditional Wastewater Effluent Strategy



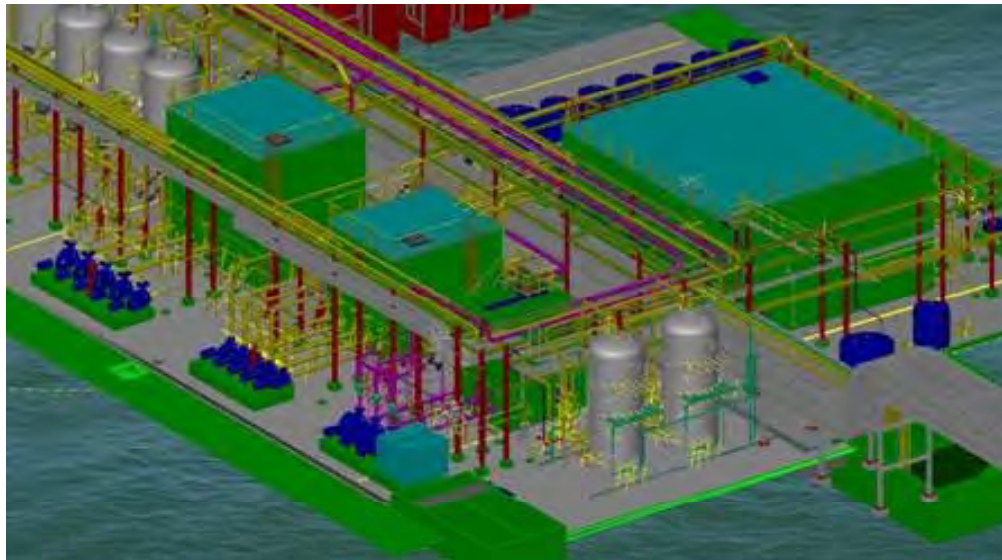
- ▶ Reduce volume through segregation and re-use.
- ▶ Staged treatment is a function of outlet quality required
 - Primary treatment: solids separation
 - Secondary treatment: bio-treating
 - Tertiary treatment: membrane filtration / RO
 - Effluent recovery: evaporation / crystallization

Water Re-use from Cooling Tower Blowdown to HP Boiler Make-up Water, South Africa CTL Plant, (delivered 2006)



Water Re-use from Cooling Tower Blowdown to HP Boiler Make-up Water, South Africa CTL Plant, (delivered 2006)

- Scope of Supply: EPC Contract



- General Project description

- Cooling Water reclaim to feed CTL plant

- Technology

- Multiflo (TSS removal)
- Multiflo (lime softening)
- MF/UF
- Reverse Osmosis
- Polishing on MB exchangers

- Capacity

- Flow-rate: 3 x 250 m³/hr (12.000 m³/d)

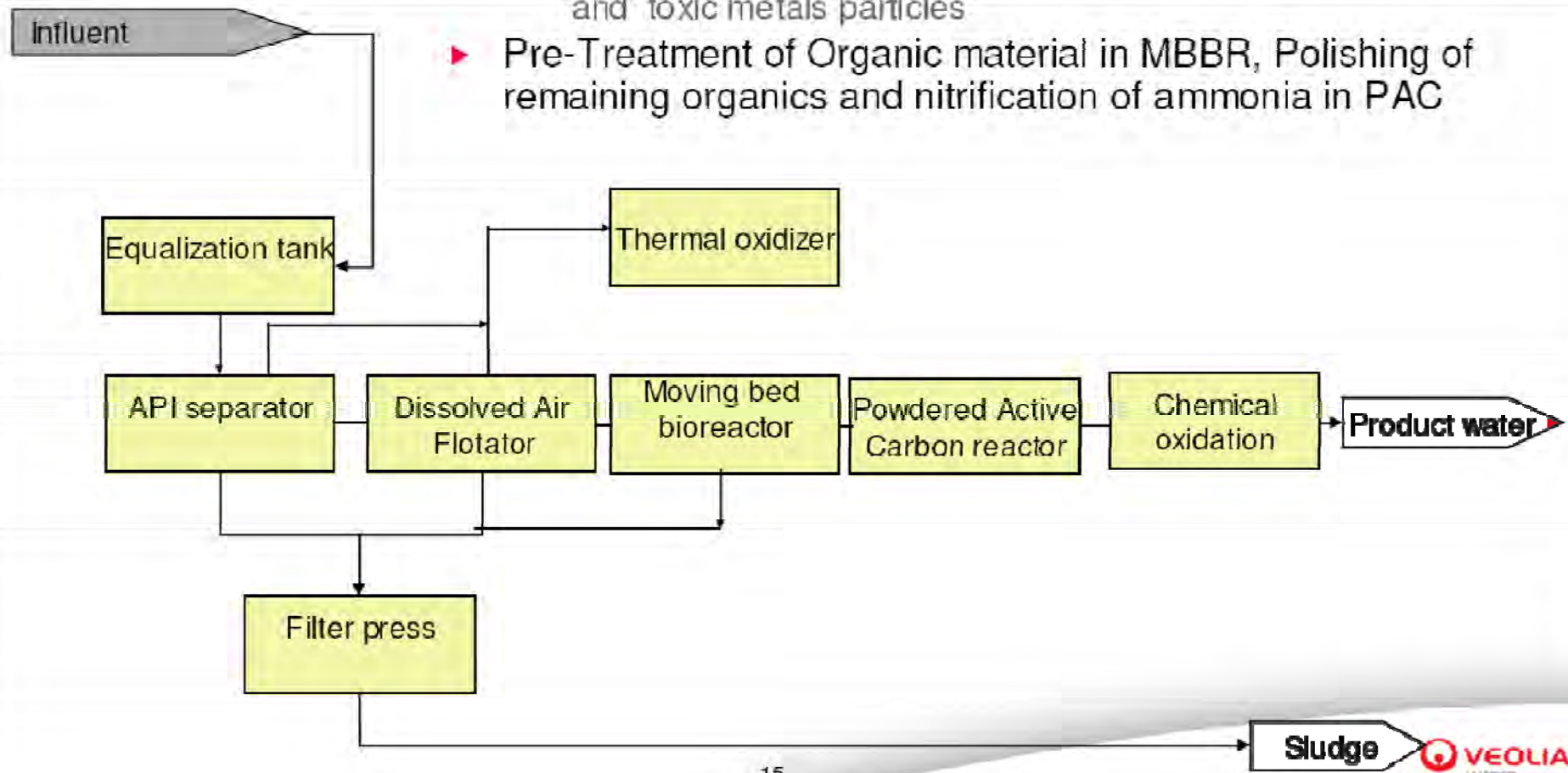
- Year: 2006



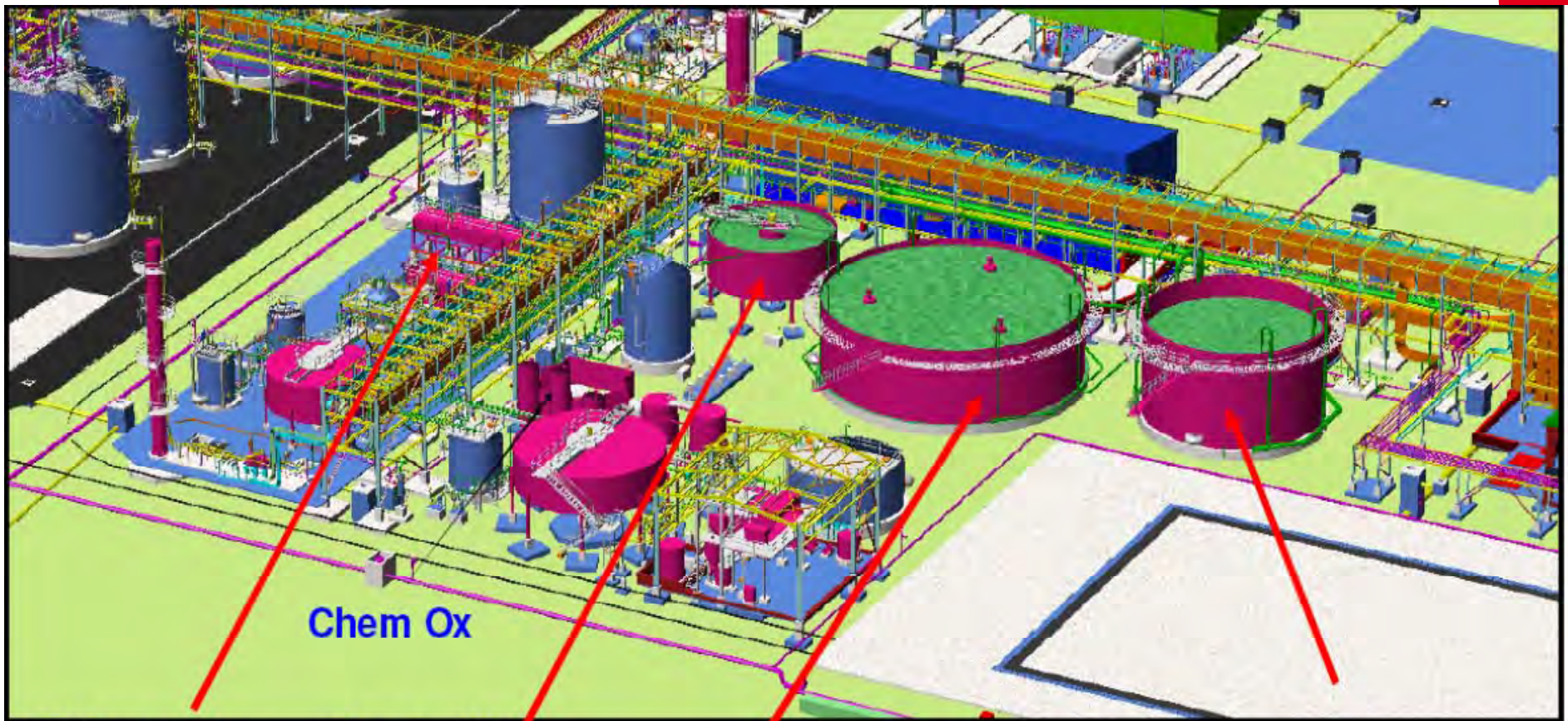
Wastewater Treatment, CTC Plant, South Africa (delivered 2005)



- ▶ Wastewater treatment system required for very toxic influent
 - 15 000 mg/L COD/2 000 mg/l phenols/ 1 000 mg/L ammonia/CN and toxic metals particles
- ▶ Pre-Treatment of Organic material in MBBR, Polishing of remaining organics and nitrification of ammonia in PAC



Wastewater Treatment, CTC Plant, South Africa, 2005



API Separator
& DAF

Bioclarifier –

PAC

Fixed Film Bio-Reactor
(MBBR)

Typical Zero Liquid Discharge (ZLD) Objectives

● System Objectives

- Eliminate liquid waste
- Generate landfillable solids
- Generate high-quality water for reuse in upstream processes

● Design Objectives

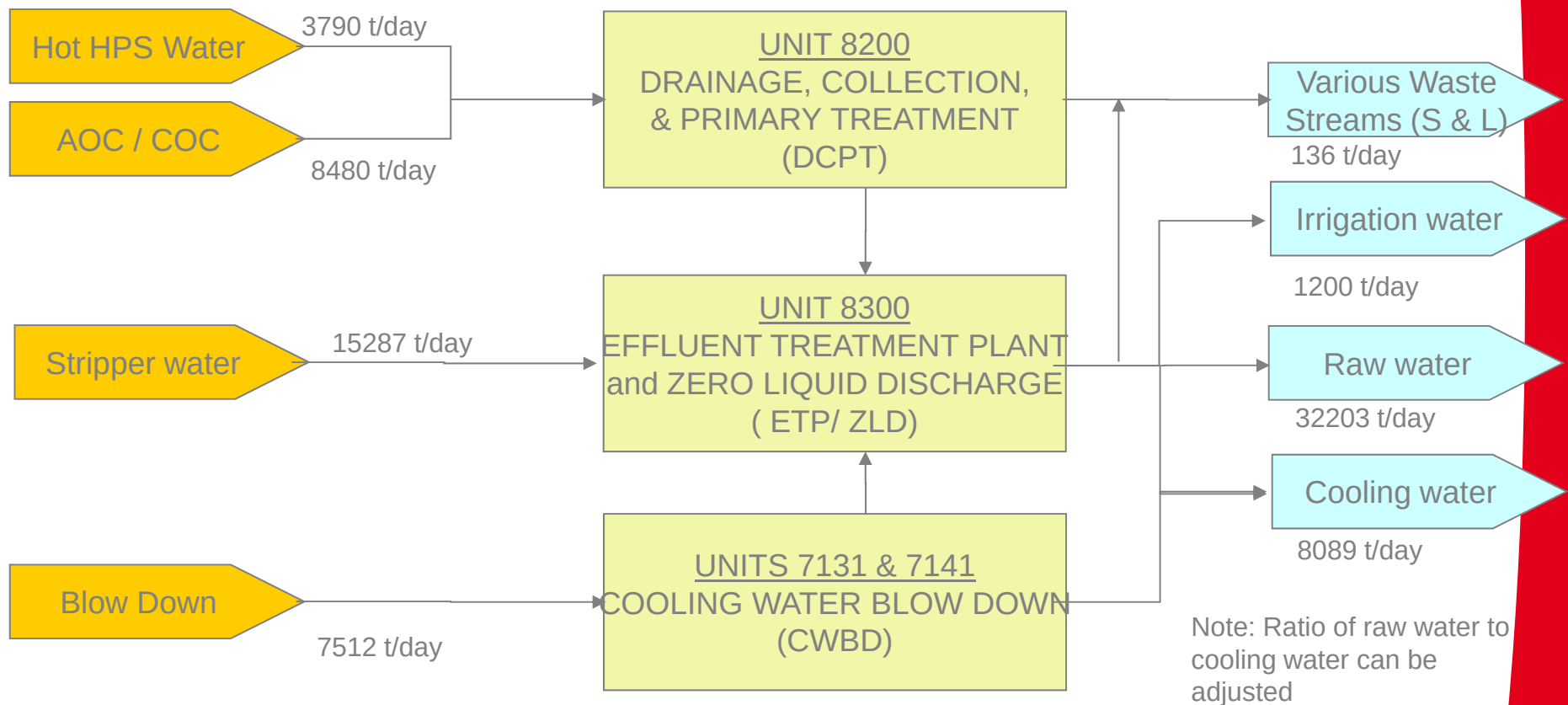
- Minimize capital and operating costs
- Minimize manpower requirements
- Safe, simple, and reliable system operation
- Maximum flexibility (turndown capability)
- Accommodate frequent start-ups, shut-downs, and periods of stand-by operation



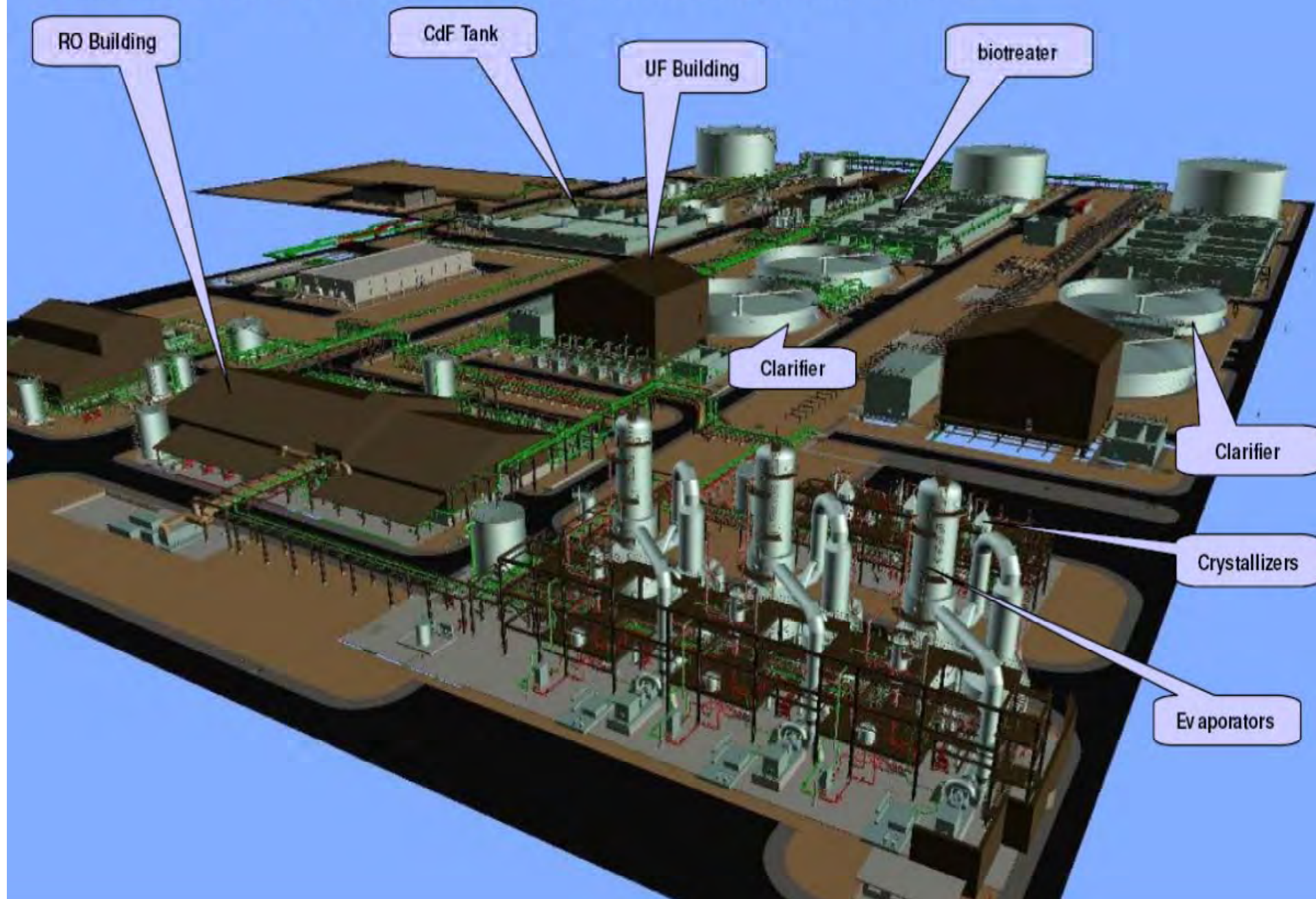
Water Re-use with Zero Liquid Discharge – Gas to Liquids Plant, Qatar



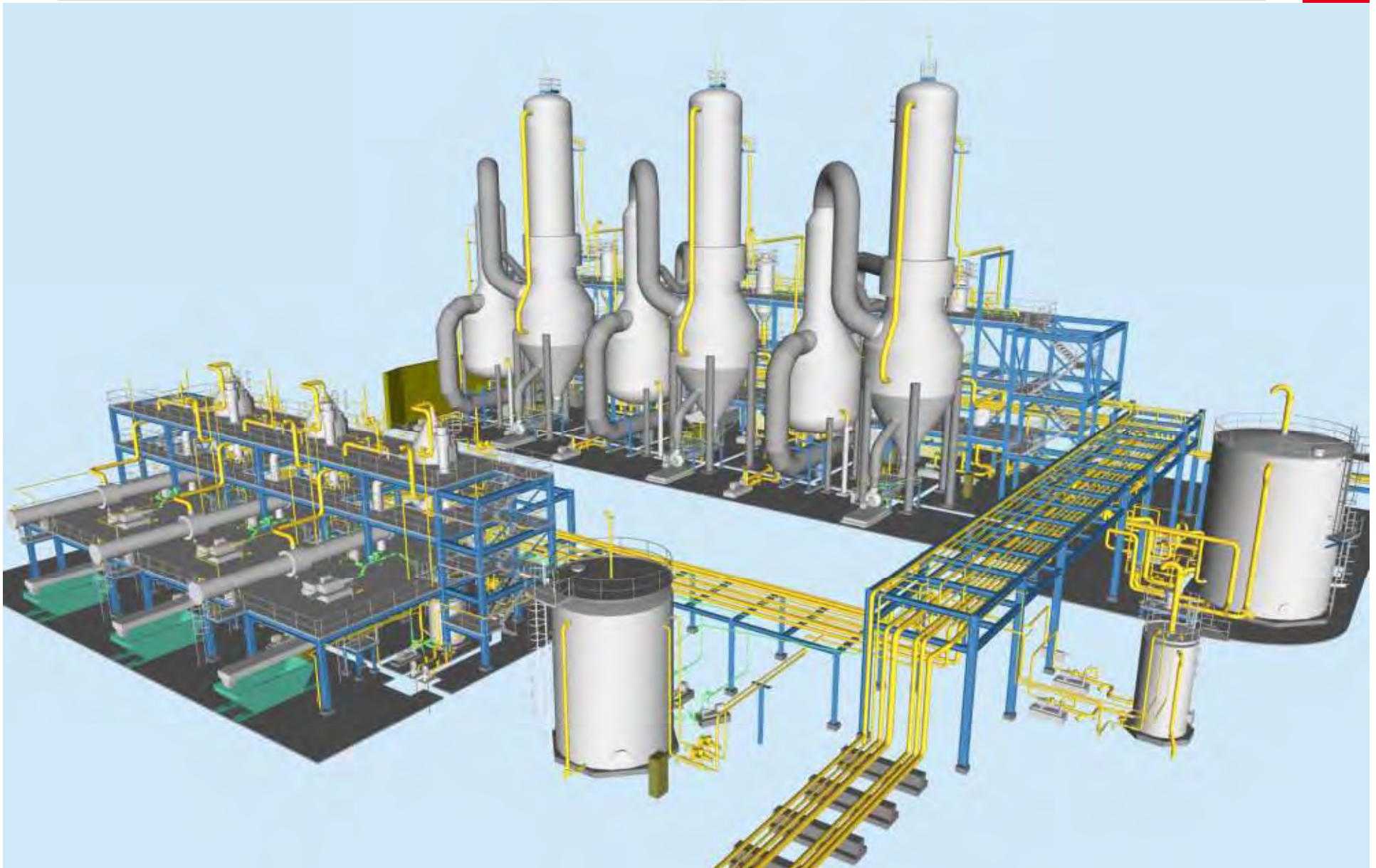
Overall Scheme of Main Units and Flows:



3D Model Overview of GTL Effluent Water Treating Plant-Qatar- EPC



3D Model – Overview (ZLD AREA)



Evaporators A/B/C



Pretreatment

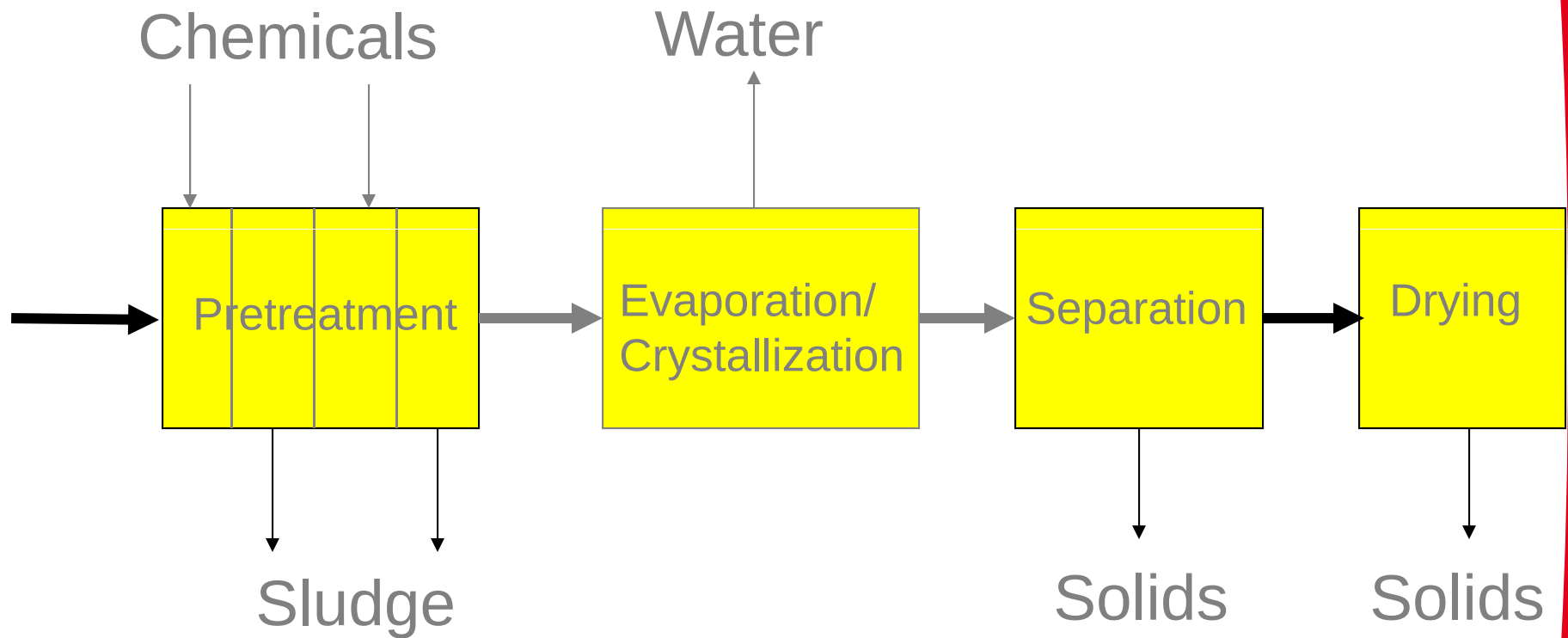
Evaporation



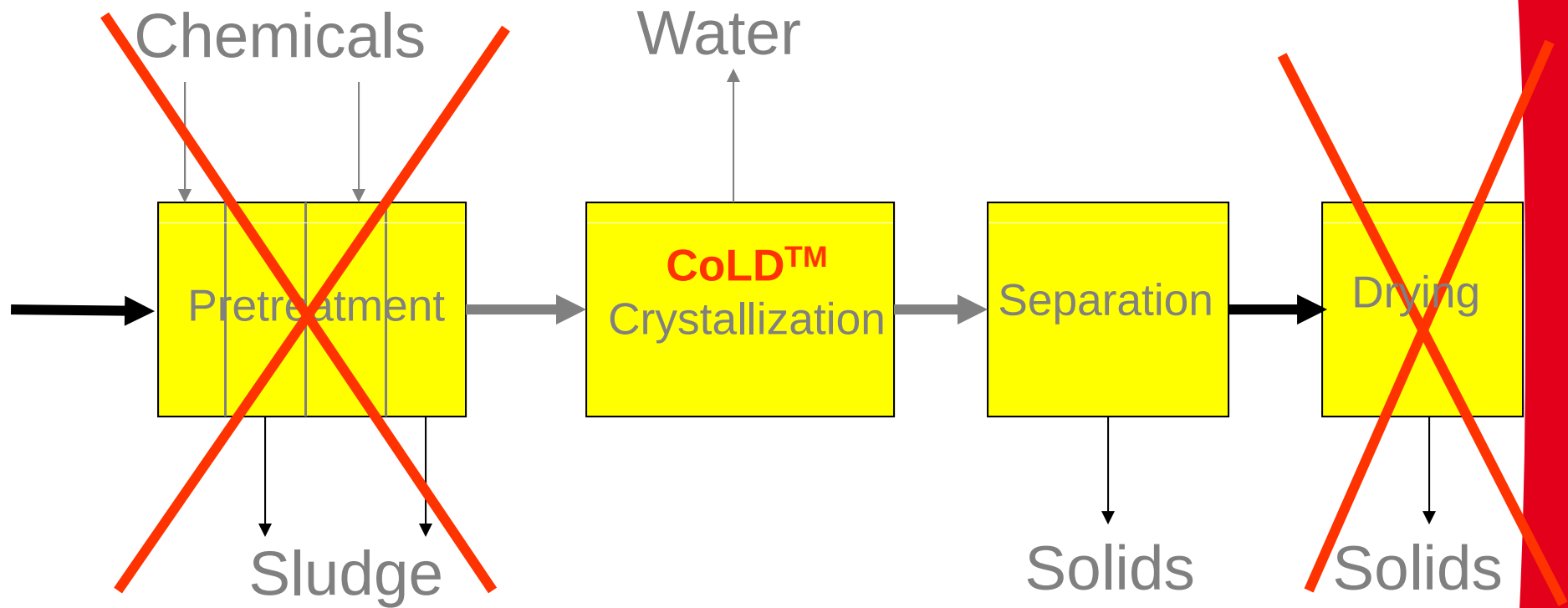
Crystallization
of high solubility salts at
Low Temperature and
DEEP Vacuum



Past Practice



CoLD™ Process



Advantages of CoLD™ Process

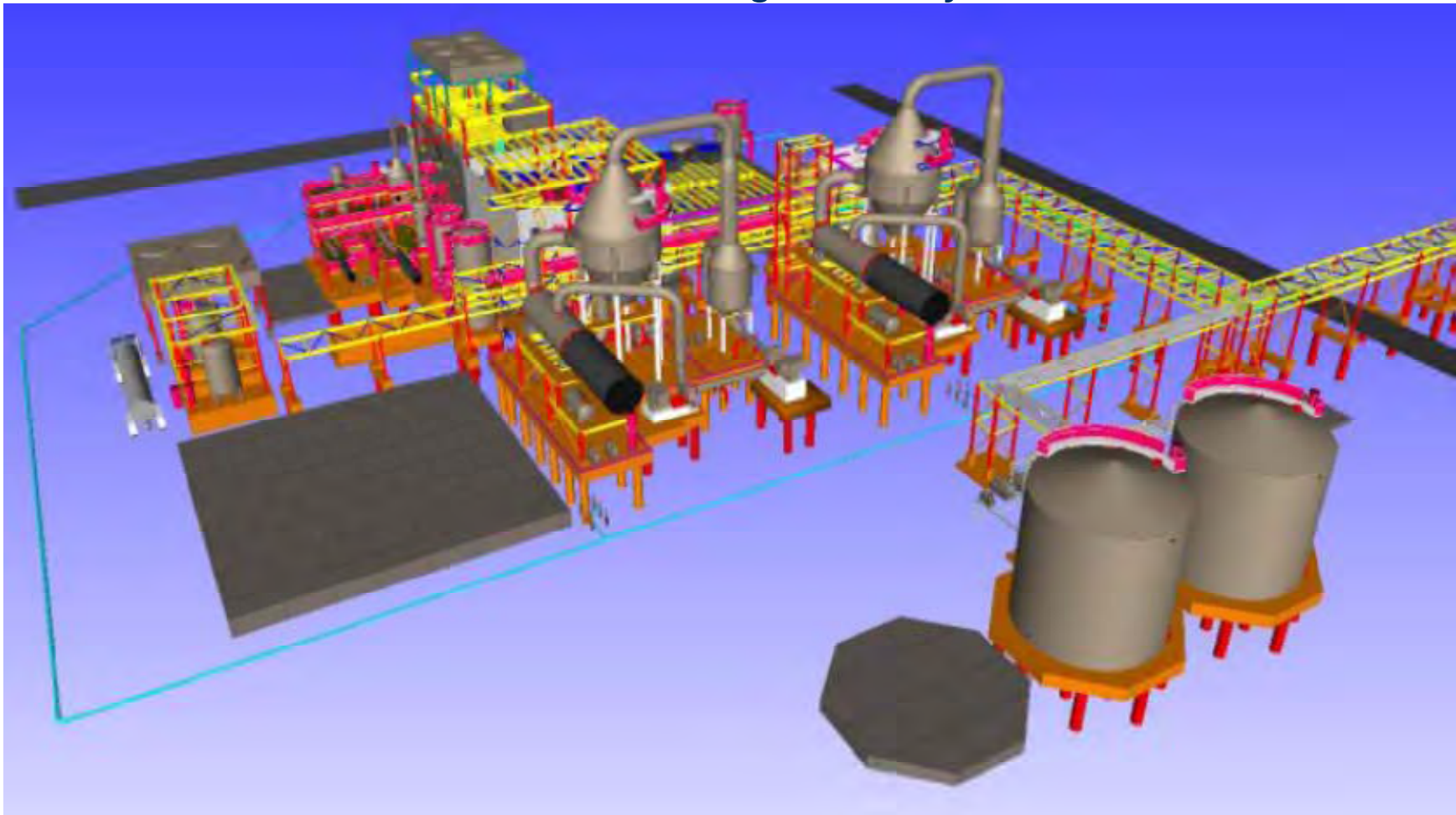
- ▶ No Chemicals, Less Sludge
- ▶ Lower Energy Requirement
- ▶ Simple System, Less Operator Attention
- ▶ Robust System
- ▶ Lower Capital Cost



ZLD System for IGCC Power Plant - USA (Start-up 2012)



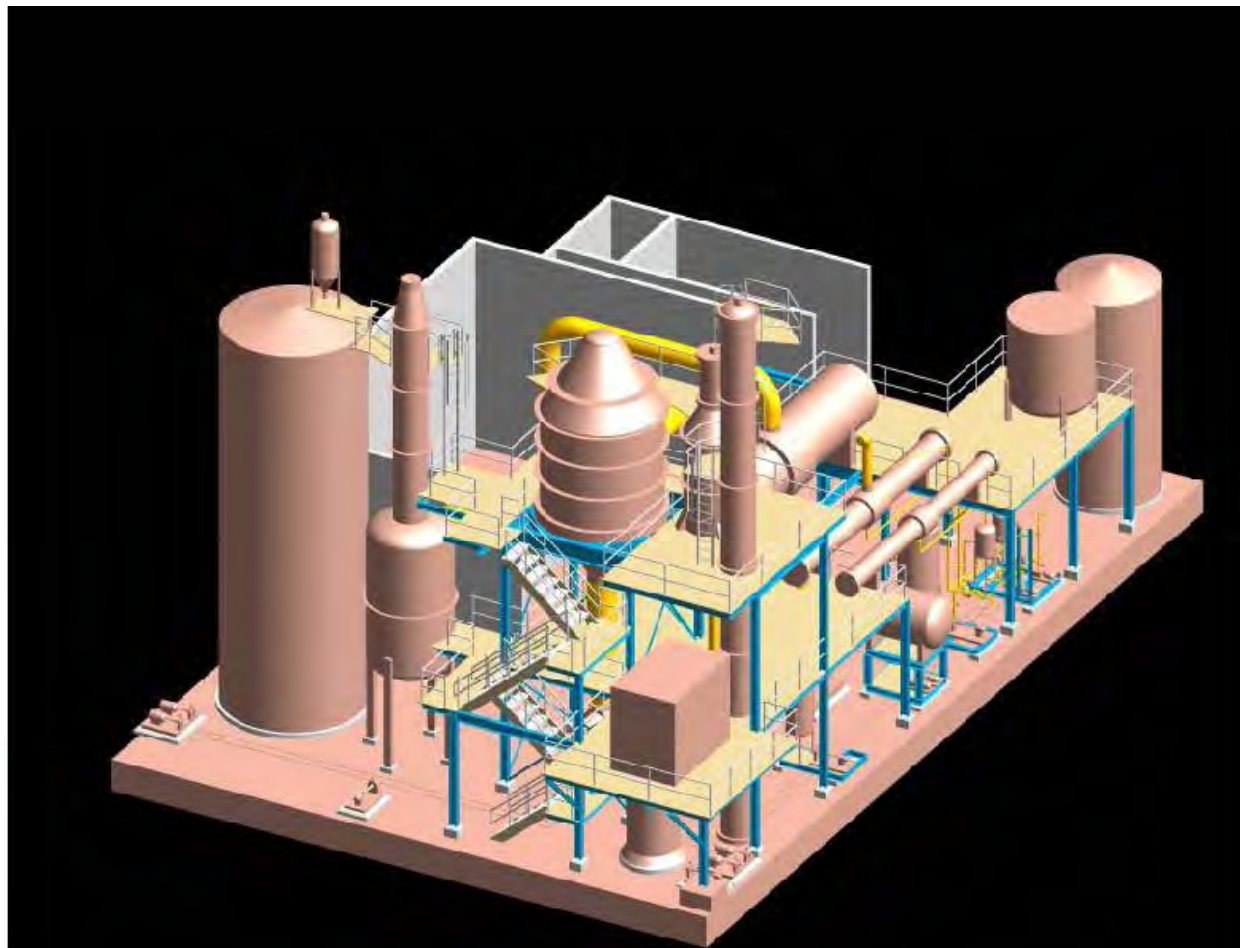
- ▶ 630 MW IGCC Power Facility
- ▶ Zero Liquid Discharge System by HPD Includes two CoLD™ Crystallizers
- ▶ Produces Clean Water for Discharge and Dry Salt for Landfill



ZLD System for IGCC Power Plant – Spain (Start-up 2012)



- ▶ 335 MW IGCC Power Facility
- ▶ Zero Liquid Discharge System by HPD Includes CoLD™ Crystallizer
- ▶ Produces Clean Water for Re-use and Dry Salt for Landfill Disposal



CONCLUSION

- Water management systems may be designed
 - To comply with highest environmental standards
 - To minimize water impact on environment
 - To allow sustainable development



Thank you!

