

AXENS' IRAN SEMINAR  
TEHRAN - 28 TIR 1396 (19 JULY 2017)

# Make a Step Forward with Axens for Water Conservation



**Payam HEIDARARABI**

# Agenda

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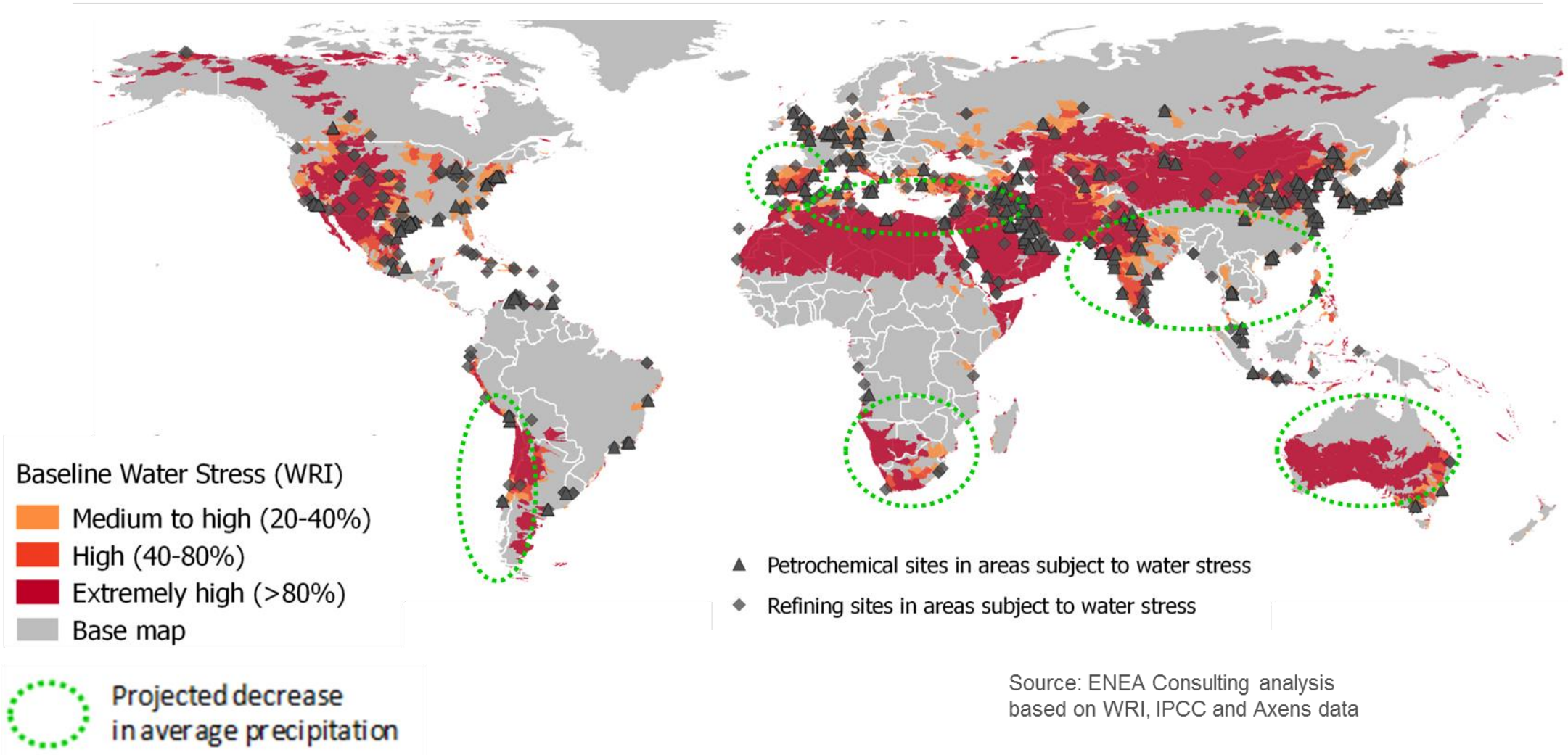
- **Water Conservation: a Must!**
- **How Axens Addresses Water Conservation**
- **Water Conservation in Feasibility Studies**
- **Water Conservation during Basic Design**
- **Refinery Water Audit**
- **Case Studies**

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# Water Conservation: A Must!

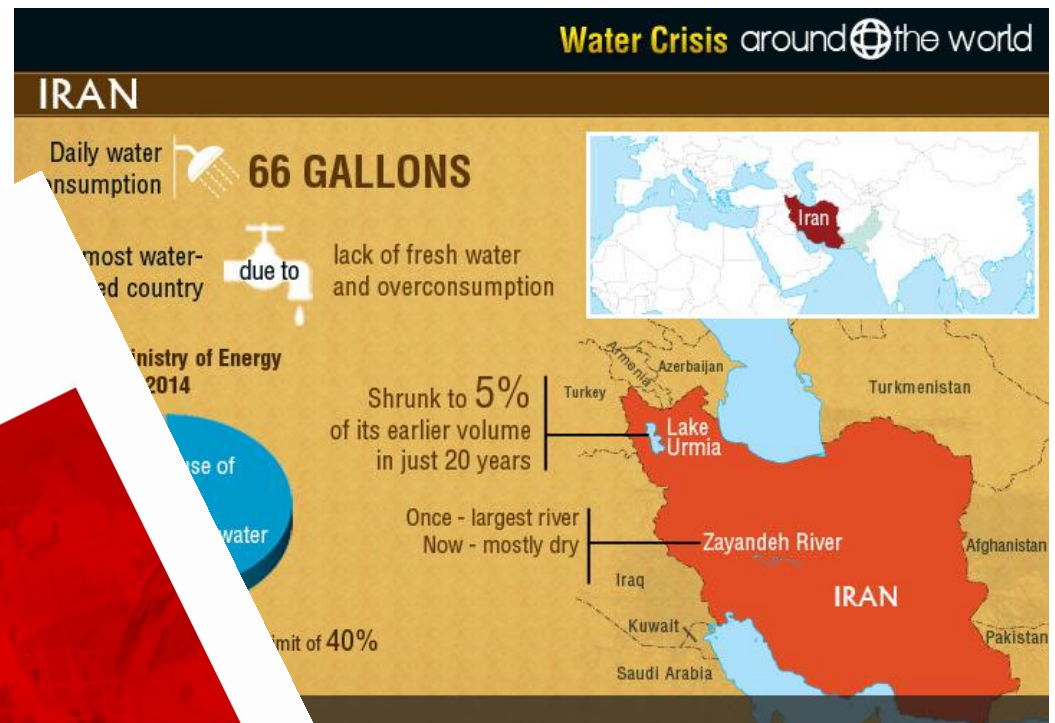


➔ **58% of refining and petrochemical sites are in areas subject to medium to extreme water stress**

# Situation in Iran

*“...At least 90% of Iran's natural water resources have already been used to meet the country's needs and relying on natural reserves is no longer viable...”*

According to an official at the Energy Ministry, Financial Tribune- October 2016





# Water Conservation: A must!

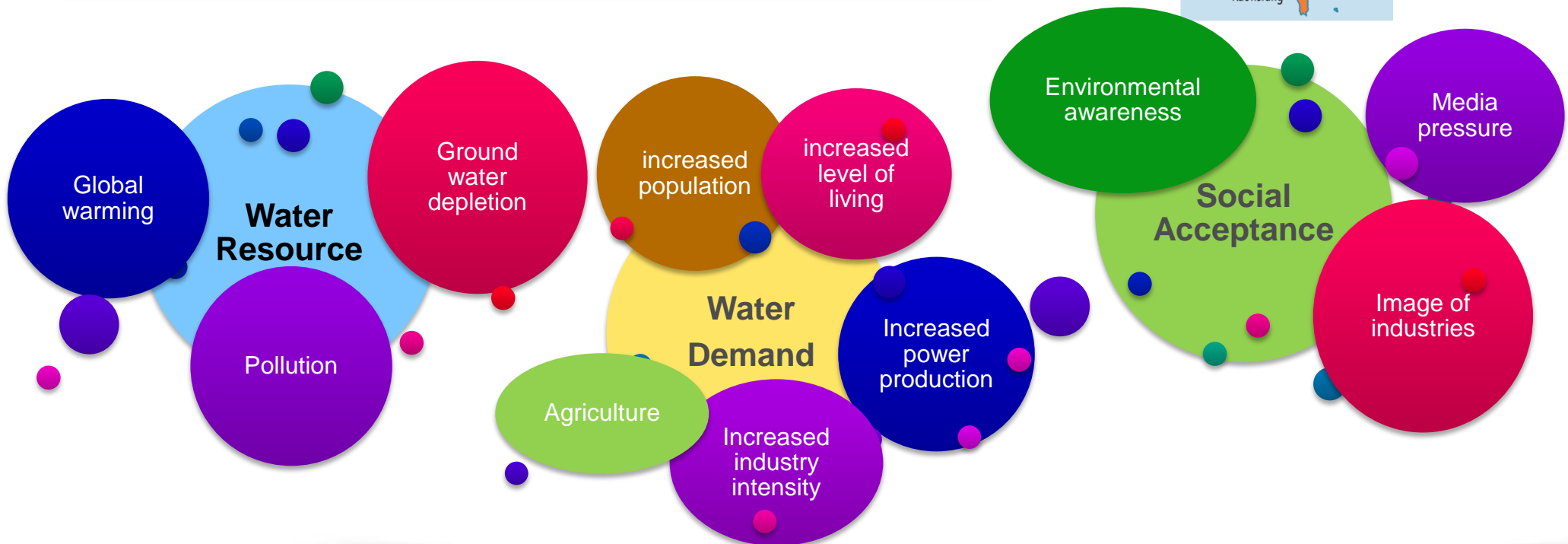
*“Water shortage hits Taiwan petrochemical production”*

*“Water rationing to industrial users has been implemented since the start of the year”*

*“More than 1,000 industrial water users, including petrochemical, textile, electronics, basic metals and paper producers, will be hit by the measures.”*

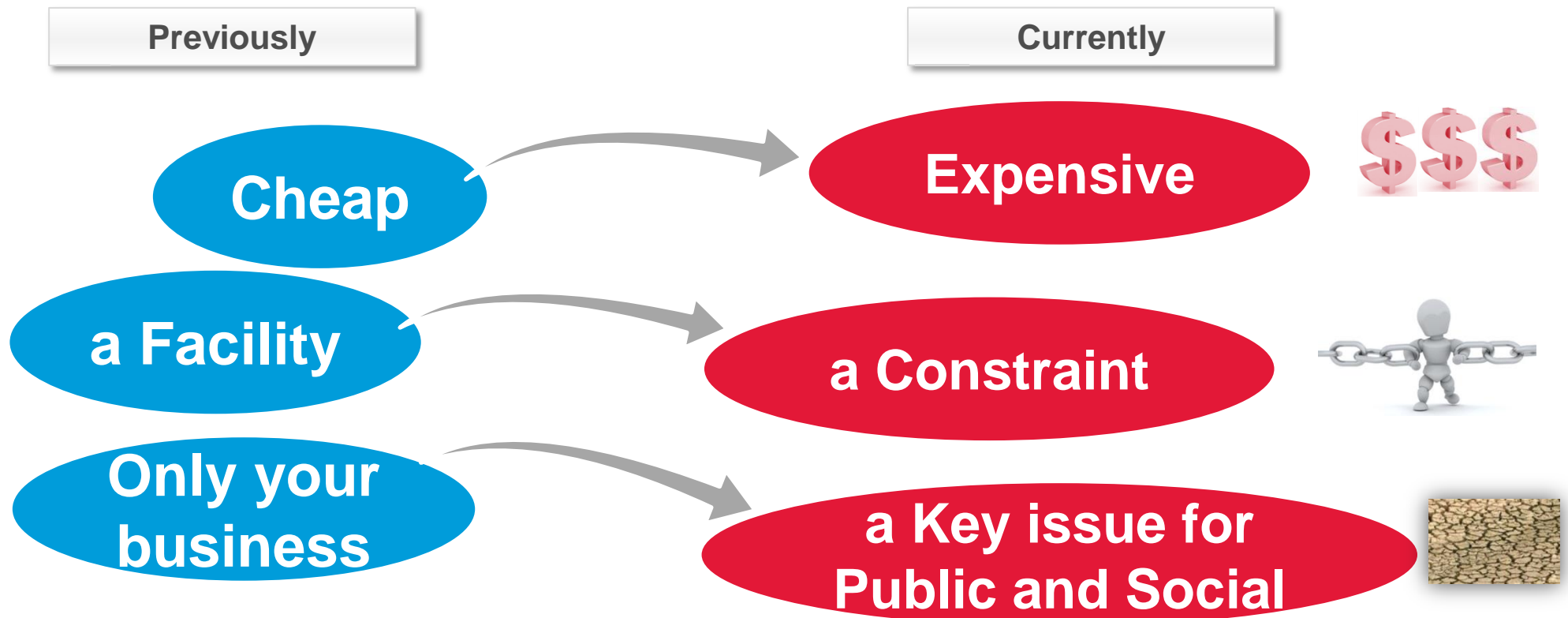
*“Water shortage is worse in the southern parts, particularly Kaohsiung, since it has no local reservoirs”*

April 2015



# Water Conservation: A must!

Water is no more what it used to be for many industrial players



***And in many places, the transition is brutal !!!***

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# How Axens Addresses Water Conservation

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- At individual **Process unit level**
  - Axens is a Technology licensor and develops Basic Design Packages
- At **Refinery wide level**
  - Axens performs configuration studies which include all the utility integration and water routing optimization all through project developments
- During Refinery **Operation**
  - We follow the units from start-up to operation and optimization (Technical services)
  - We perform Refinery audits for cost reduction and optimization (energy, APC, ...)
  - We provide chemicals used in water treatment packages

# How Axens Addresses Water Conservation

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- During **Feasibility studies**

- Optimize water routing
- Select technologies for Utilities that are intensive consumers (cooling water, BFW...)
- Establish water balance and supply

- During **Process Design**

- Optimize design / select options to reduce consumption
- Validate options with client in a structured way (CEED)

- During **Refinery Water Audit**

- Determine consumption point with potential reduction
- Propose alternative routing / equipment to reduce consumption
- Application of new technologies

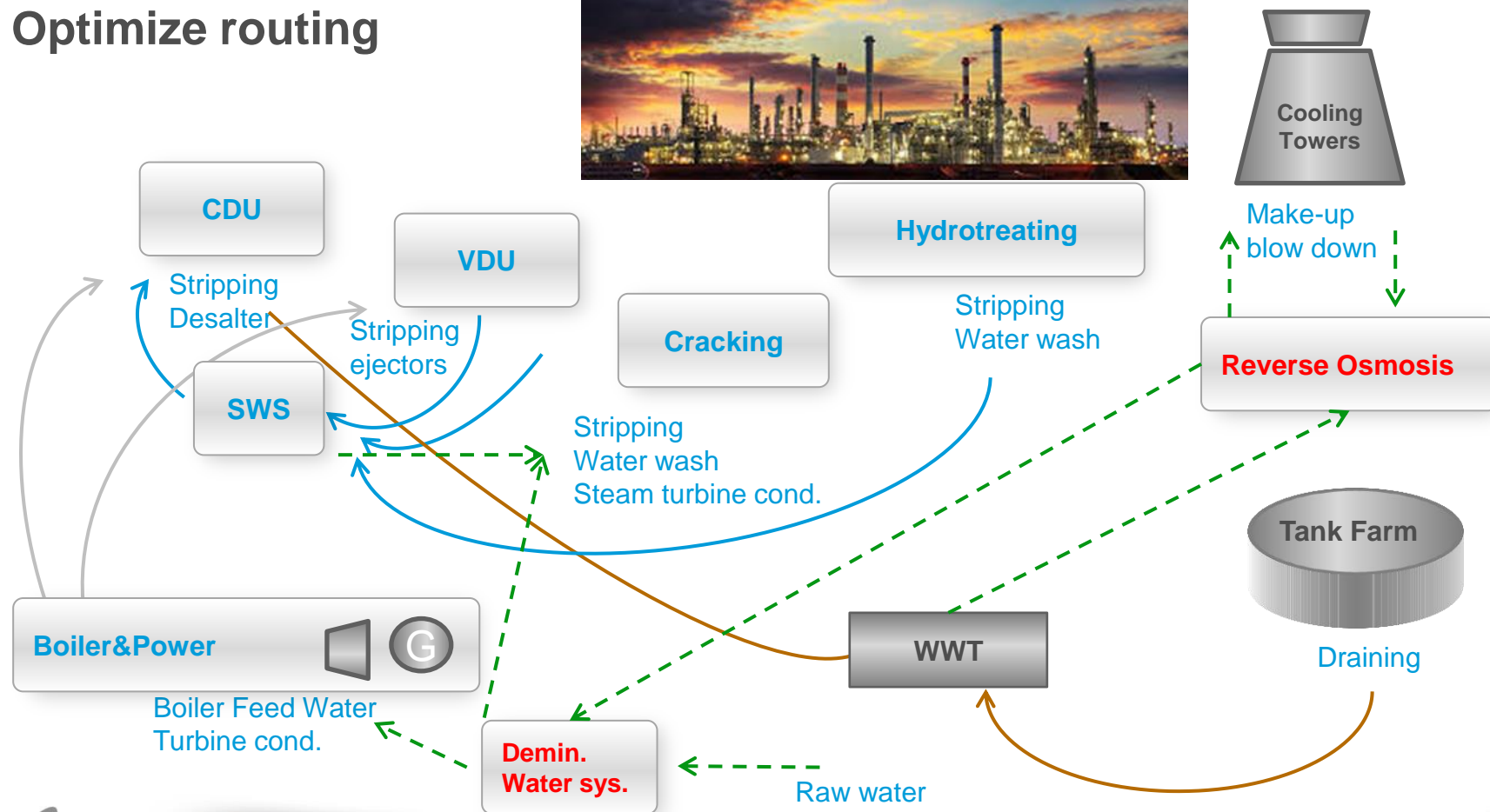
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# Water Conservation in Feasibility Studies

- From Individual water requirement to global picture
  - List all the water/steam requirements
  - Identify possible routing
  - Optimize routing



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# Water Conservation during Basic Design

- Axens proposes a **customized** adaptation to client specificity through a dedicated stepwise approach during Basic Design



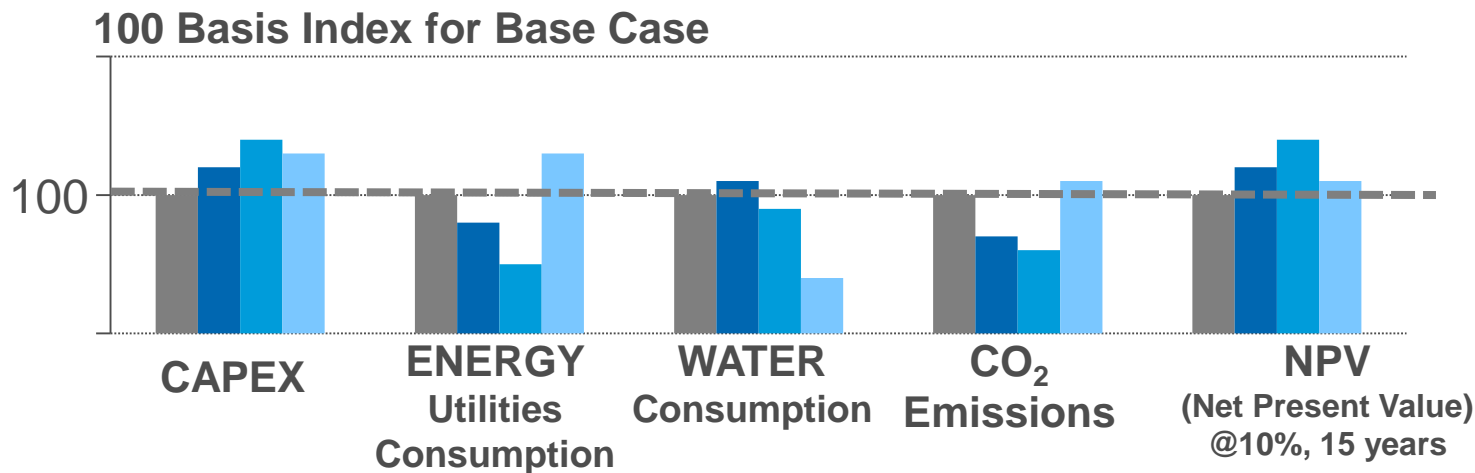
- ✓ Review options with client
  - ✓ Quantify gains on water/energy/CO<sub>2</sub>...
  - ✓ Quantify impact on utilities cost
  - ✓ Quantify impact on investment
- => Right timing before EPC bidding phase**



# CEED : Collaborative Phase & Powerful Decision-Support Tool



... To propose various options evaluated using several criteria selected by the customer ⇒ A powerful decision-support tool



**Options**

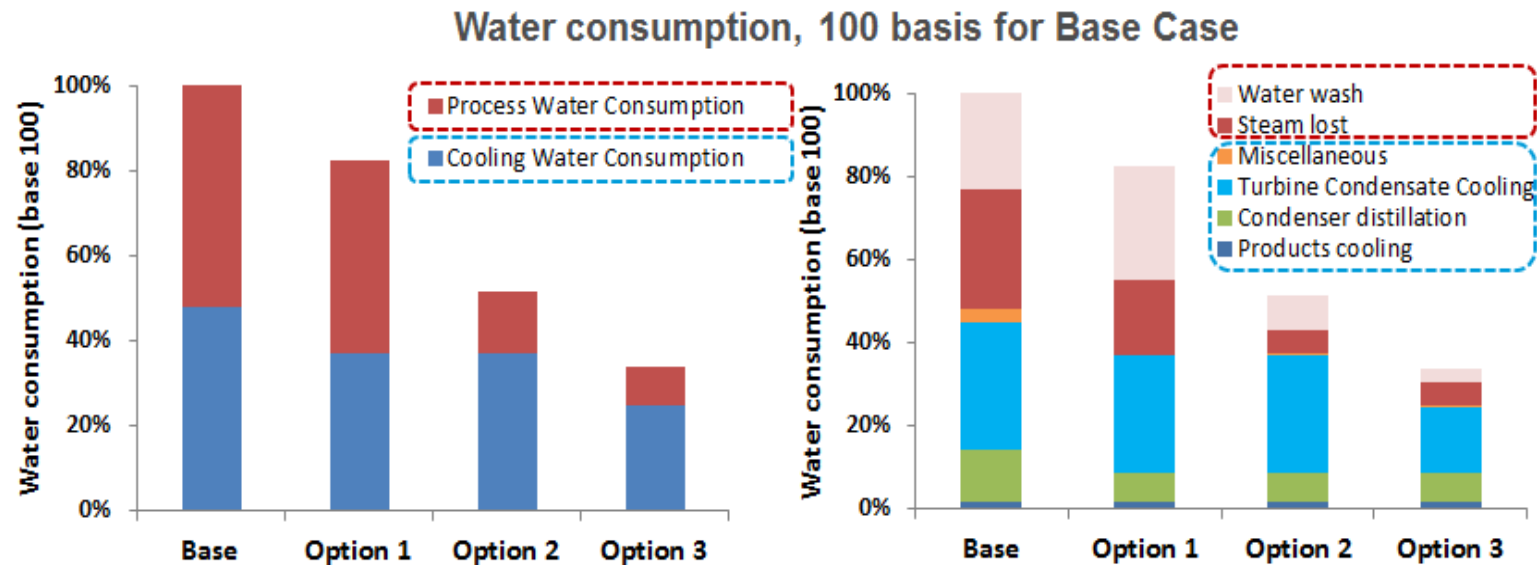
- A** Base Case
- B** Low Energy
- C** Very Low Energy
- D** Low Water



+ Dedicated operability report for each option

# Water Conservation during Basic Design

- Axens is permanently improving its process portfolio
  - Options to reduce water consumption
    - example: Hydrocracker unit



- Addressing water consumption at unit level and at site level
  - to unload water flow to other facilities
  - to reduce global consumption

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# What You Can Get from a Refinery Water Audit

## Review of water management

- Consumption points understanding
- Monitoring of Water Balance
- Water Qualities around the refinery
- Utility operation and performance review (cooling water, WWT, ...)

## Potential Solutions and Ranking

- Direct reduction of consumption (Units operation)
- Potential re-use / routing
- New technologies, consulting vendors
- Ranking of solutions

## Gains and Execution

- Concept & Technology
- Cost / Benefit
- Execution strategy
- Chemical supply
- Modularization

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# Modularization of Treatment Units

- For fast implementation, Axens propose the modularization of water treatment units.
- Modularization is a widely used service within Axens Group in refining projects





# Conclusion

- Water scarcity has a direct impact on industries, especially on hydrocarbon industries
- Potential in refineries to decrease water consumption

**55%**

Oil & Gas  
Waste water  
treated

**15%**

is formally  
reused

**\$3Bn**

on desalination  
yearly

**70%**

Waste water  
reused in many  
GCC countries

- Axens proposes its support for reduction of water consumption

# Thank you! And see you on Axens' Blog axens.net/blog

