

# Optimize the Use of Renewable Water by Energy Saving Wastewater Reclamation System with Membrane Technology

October 2017

Presentation at 5<sup>th</sup> WATER ARABIA

**CHIYODA CORPORATION**  
**KOBELCO ECO-SOLUTIONS**

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# 1. Company Introduction

## CHIYODA CORPORATION

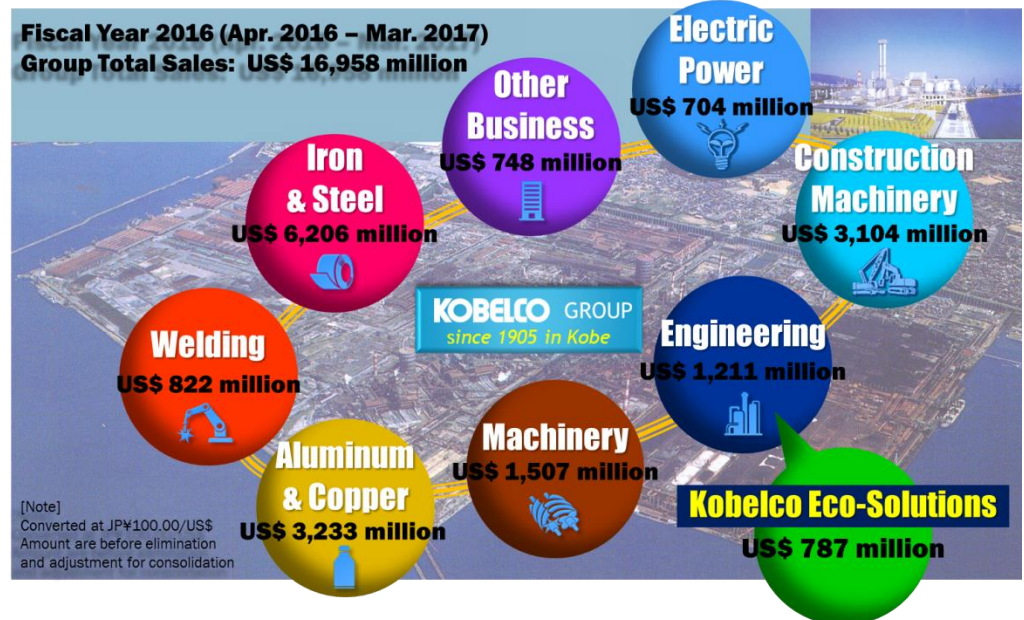
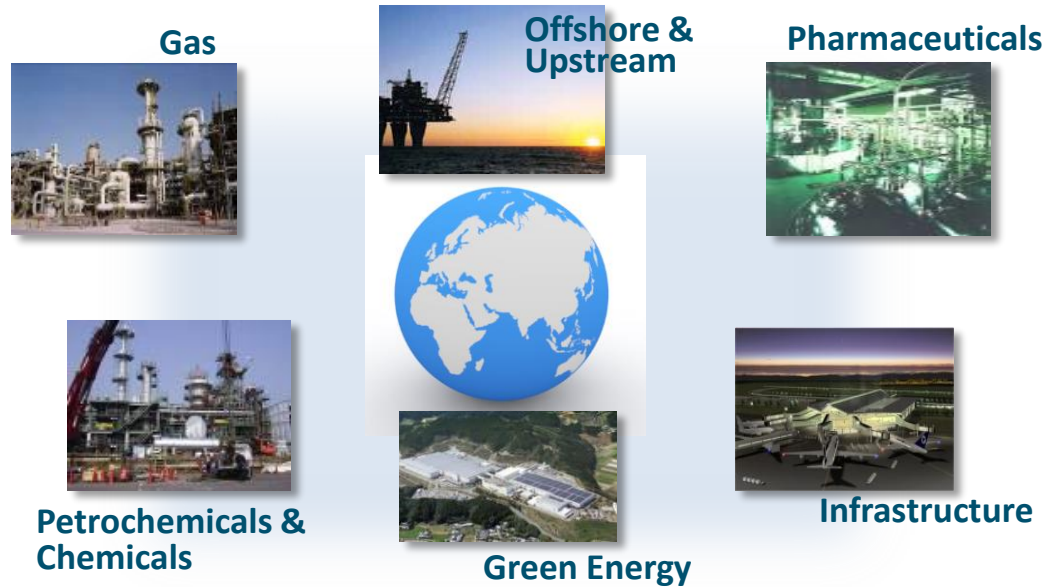
CHIYODA is the Engineering & Construction Company which covers business for oil & gas energy plant and other various kinds of industries / infrastructures worldwide.

CHIYODA  
 Total Sales :US\$ 3,141 million  
 FY 2016 (Apr 2016 – Mar 2017)

## KOBELCO ECO-SOLUTIONS

KOBELCO ECO-SOLUTIONS is the environment business unit of KOBE STEEL GROUP (KOBELCO).

KOBELCO GROUP  
 Total Sales :US\$ 16,958 million  
 FY 2016 (Apr 2016 – Mar 2017)



## 2. What is Energy Saving Wastewater Reclamation System with Membrane Technology ?

- Conventional System (Currently used) :

Sea Water Desalination + Waste Water Treatment

⇒ High energy cost, Treated waste water discharged to the environment

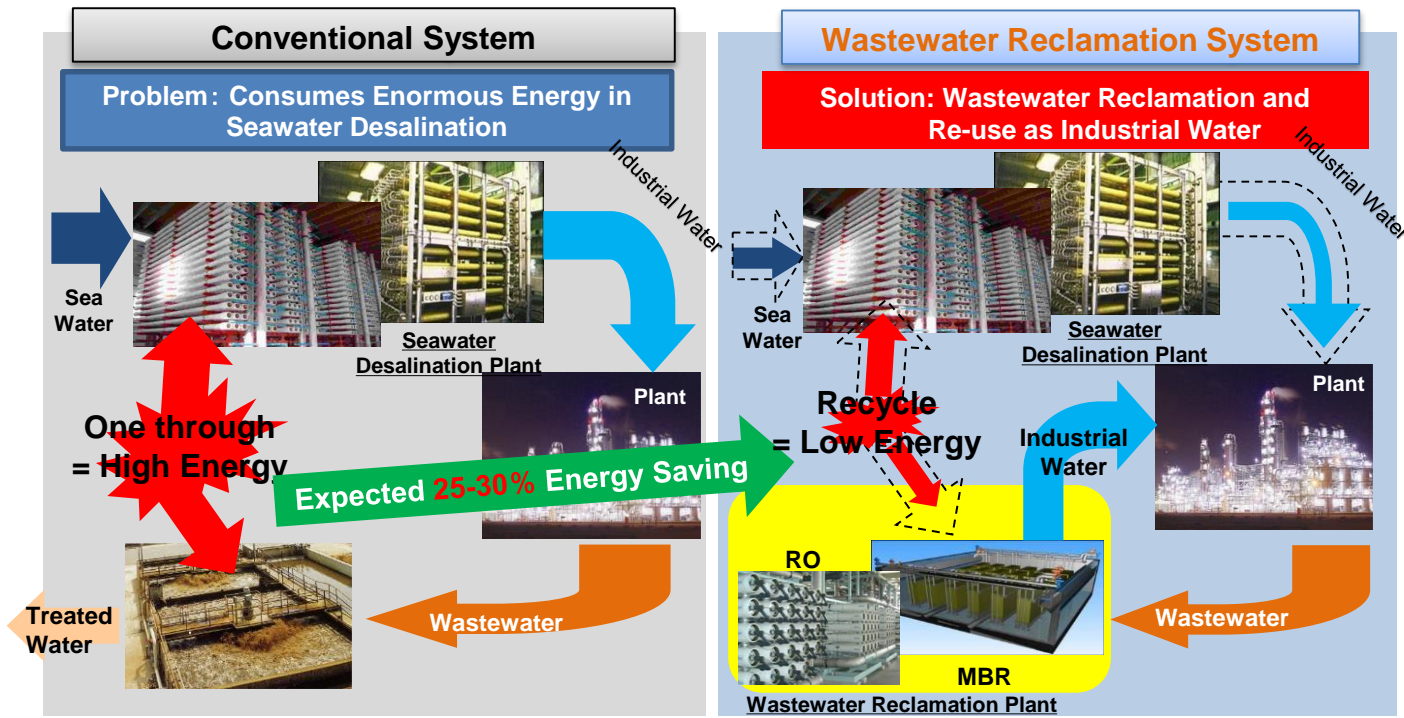
- Wastewater Reclamation System (Proposed):

- Recycles wastewater to pure industrial water by Membrane Bio Reactor (MBR) and Reverse Osmosis (RO) membrane.

⇒ Energy saving by 25 to 30% compared with energy consuming “desalination”.

- Produces industrial water by wastewater recycling

⇒ Expensive desalinated water currently used for industrial purpose can be diverted to drinking use.

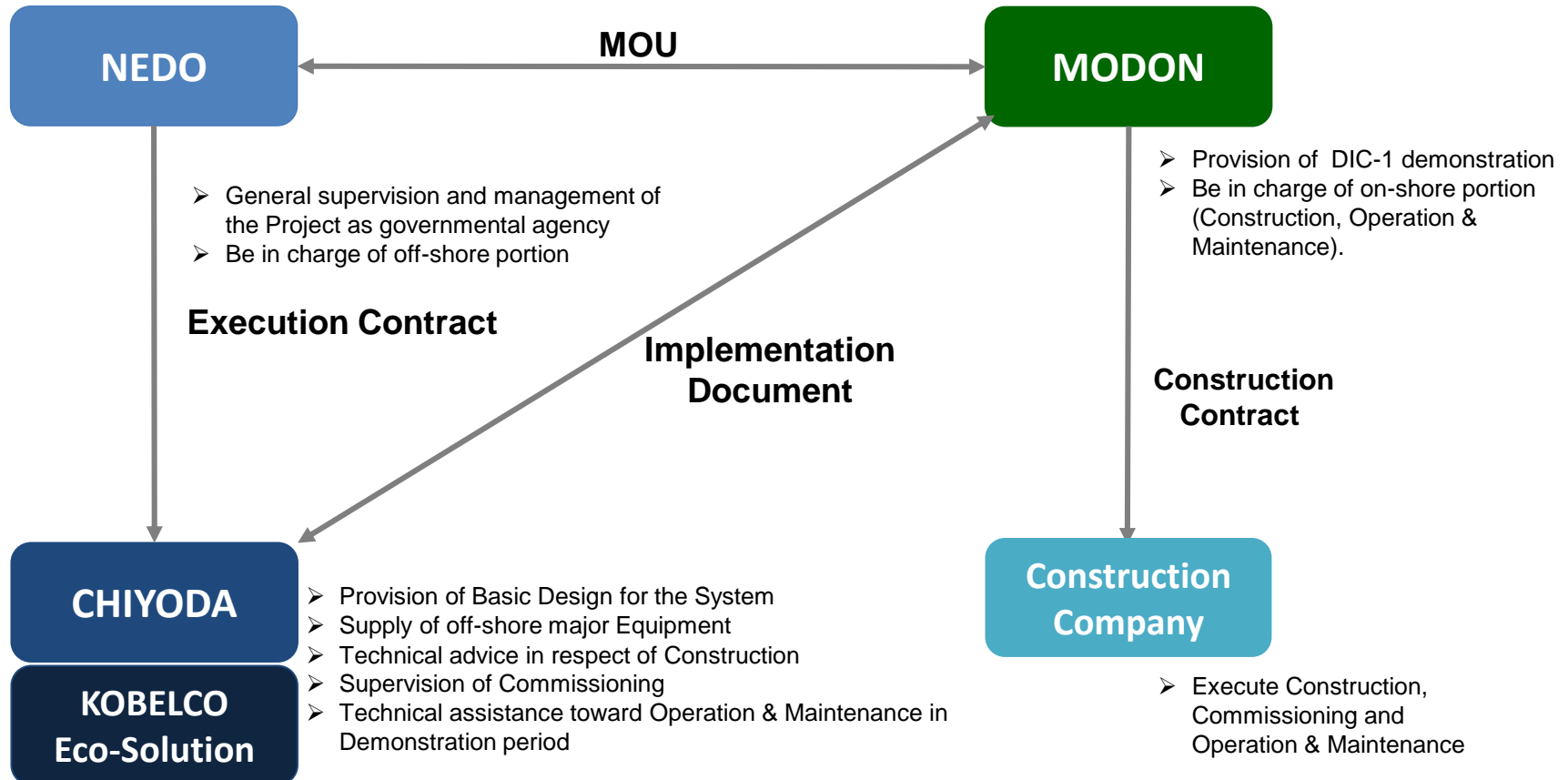


### 3. Demonstration Project in MODON Dammam 1<sup>st</sup> Industrial City



#### 3.1 NEDO Demonstration Project - Scheme

The demonstration project of Wastewater Reclamation System has been underway in MODON Dammam 1<sup>st</sup> Industrial City (DIC-1). The project is sponsored by Japan's New Energy and Industrial Technology Development Organization (NEDO) and jointly executed with Saudi, MODON.

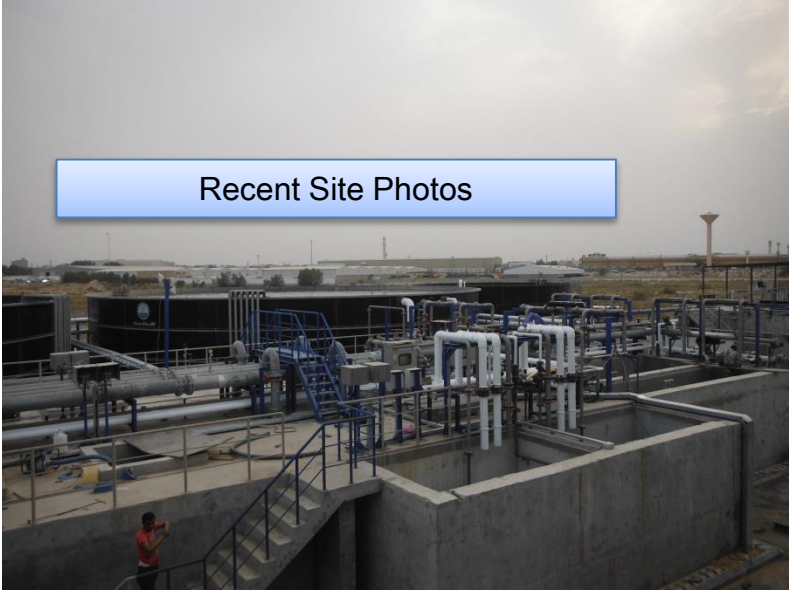


# 3. Demonstration Project in MODON Dammam 1<sup>st</sup> Industrial City

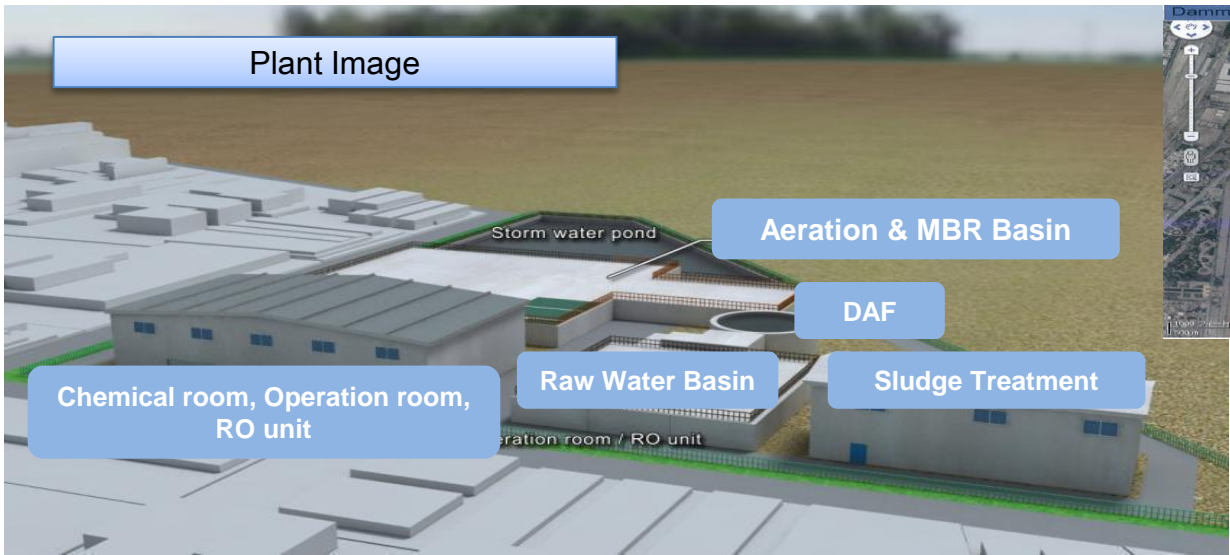


## 3-2 Site Photos and Plant Image

Recent Site Photos



Plant Image



### 3. Demonstration Project in MODON Dammam 1<sup>st</sup> Industrial City



#### 3-3 Project Information & Specification.

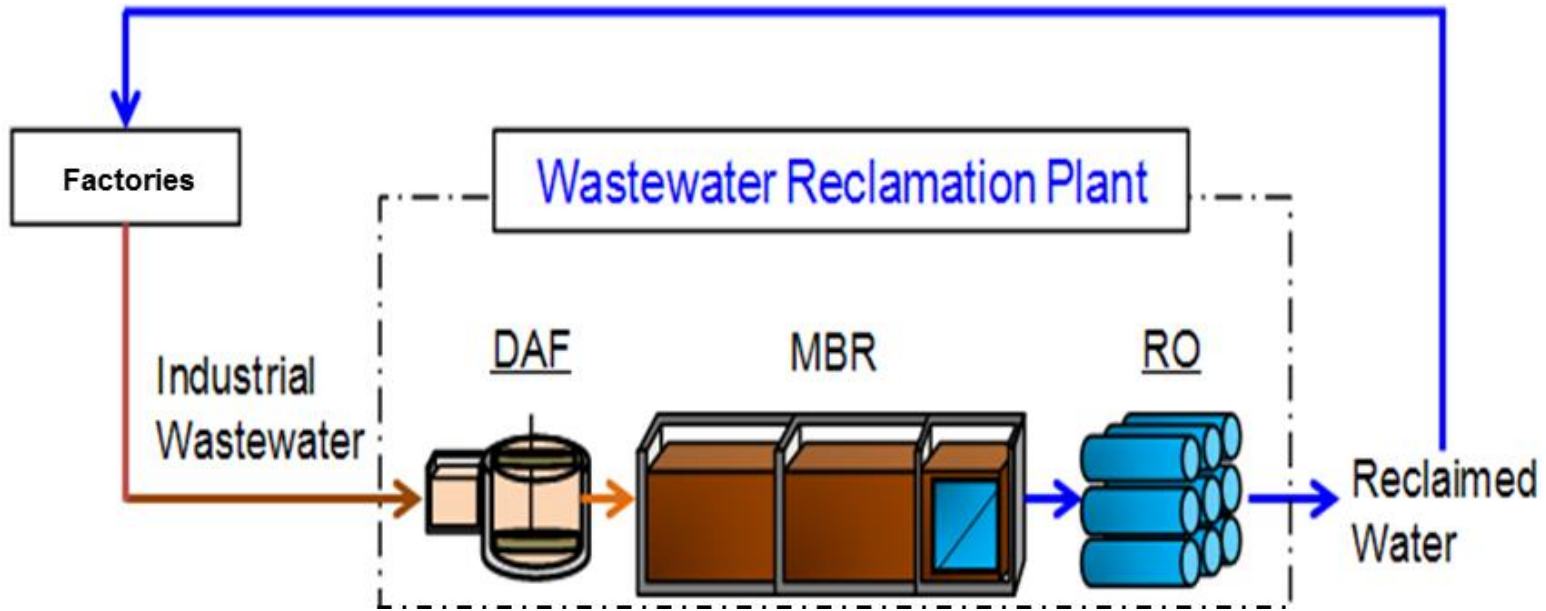
Location	Dammam 1 <sup>st</sup> Industrial City (DIC-1)
Status	Demonstration Operation will start in October 2017
Capacity	5,000 m <sup>3</sup> /day Wastewater 3,500 m <sup>3</sup> /day Claimed Water
Technology	1) DAF (Dissolved Air Flotation) 2) MBR (Membrane Bio Reactor) 3) RO (Reverse Osmosis)

This plant treats industrial wastewater from 120 factories and supplies reclaimed water as industrial water in DIC-1.

### 3. Demonstration Project in MODON Dammam 1<sup>st</sup> Industrial City



#### 3-4 Process Flow





### 3. Demonstration Project in MODON Dammam 1<sup>st</sup> Industrial City



#### 3.5 Water Quality

Item		Wastewater
TSS	(mg/L)	1,500
TDS	(mg/L)	8,000
COD <sub>cr</sub>	(mg/L)	2,500
BOD <sub>5</sub>	(mg/L)	1,000
T-N	(mg/L)	70
Oil & Grease	(mg/L)	100



Expected Treated Water	
	0
	< 200
	< 30
	< 10
	< 1
	0

## 4. Other Applications

### Use for Agriculture

Considering quality of treated water, this reclamation system can be applied for producing Agricultural Water.

⇒ Contribute to Vision's 3.1.2 "Protecting Our Vital Resources"  
by supplying water to agriculture by this system.

### Application to Sewage Water

Application of recycling technology is not limited to Industrial Waste Water. Sewage can also be treated and recycled to industrial water, as is being done in Japan with our technology.

Water Recycling Center (Osaka, Japan)  
Built and Operated by KOBELCO



## 5. Summary and Conclusion

1. The Wastewater Reclamation System with membrane (MBR + RO) enables energy-saving wastewater recycling, and therefore it will contribute to the optimal use of water resources, which is targeted in the Saudi Vision's 1.2.4 "Achieving Environmental Sustainability".
2. The recycled water can be used for both industrial and agricultural purposes.
3. The System can be applied not only to industrial waste water but to sewage water, as being done in Japan.
4. The demonstration plant in Dammam will show its effectiveness, and feasibility study will be conducted for dissemination of the technology.