WATER USE IT WISELY

Chennai Petroleum Corporation Limited

(A group company of IndianOil)

CPCL

WATER MANAGEMENT
in
CPCL REFINERIES

23rd October 2009

Chennai Petroleum Corporation Ltd.

- **Refining Capacity (Manali) : 9.5 MMTPA … Going up to 11.2 MMTPA by 2011-12**
  (CBR) : 1.0 MMTPA … Expected to 1.3 MMTPA by 2011-12
- **Average Turnover for last four years : Rs. 31000 Cr. / year.**
- **Average PAT for last four years : Rs. 450 Cr. / year.**
- **Investment Plan up to 2013-14 : Rs.7500 Cr.**

Major Projects ……. 1.0 MMTPA Capacity Expansion by Feb. 2010
0.7 MMTPA Capacity expansion by Dec. 2012
Auto Fuel quality Up-gradation by July 2010
Resid Up-gradation by Dec. 2012
SPM for Crude unloading by Dec 2011
Additional Propylene Recovery

Chennai Petroleum Corporation Ltd.

Pioneering effort :

- Continuous reduction in Specific energy consumption
  - Flare Gas Recovery since 1988
  - Air Preheater for furnaces since 1983
  - Advance Process Control for ENCON
  - Use of VFD, VSD for fan motors & Stepless control for Compressor motors to save Power
  - Use of FRP Blades for Cooling Tower fans

  Through small modifications alone in last 8 years
  Saving 53000 MT/year of CO_2 Emission

- Three Projects selected under CDM
- Refinery Business Optimization

Chennai Petroleum Corporation Ltd.

Water Management Initiatives :

- Sea Water Desalination Plant commissioned recently
- Tapping water through City Sewage since 1991
- Power generation through Wind Mills since 2007 & its use in Desalination Plant

Water Management at CPCL Manali

- Water consumption in Indian Refineries widely vary from 1M^3 per MT of crude processing to 2 M^3 per MT.
- CPCL Manali Refinery in Chennai commissioned in 1969 with water consumption of 2.0 M^3/MT crude processing (3.5 MGD for 2.8 MMTPA crude processing).
- Current consumption 1.02 M^3/MT of crude (6.5 MGD for 9.8 MMTPA processing)

Source	M^3 / MT of crude processed
Fresh Water	0.28
Recycling of Refinery Effluent	0.25
Recycling of City Sewage	0.49
Total	1.02

Driving force for Water Conservation

Chennai City is prone to Water scarcity.

- **Restricted supply from Metro Water sources.**
- **CPCL had to fetch 500 trucks per day of water from 60 KMs radius for sustenance of operation from 2001 and 2004.**
- **Refinery-I Shutdown for 35 days in 2001 due to water scarcity.**

High cost of Metro Water.

Year	Cost of Raw water Rs / m^3	Cost of Sewage water Rs / m^3
1991-92	8.40	0.9
1994-95	25.00	3.00
1998-99	40.00	5.40
2008-09	60.00	9.20

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Water Management Initiatives

City Sewage Reclamation : 5 MGD

- **First Plant 2.5 MGD capacity Tertiary Treatment and Reverse Osmosis commissioned in 1991.**

…. first of its kind in Asia in magnitude and used for the refinery process applications.

- **Second Plant was commissioned in 2006 with a capacity of 2.5 MGD.**
- **To recover the maximum water, the high conductivity Reject Water from RO Plant, is further processed through a chain of Reverse Osmosis Membranes for 50% more recovery (0.25 MGD)**

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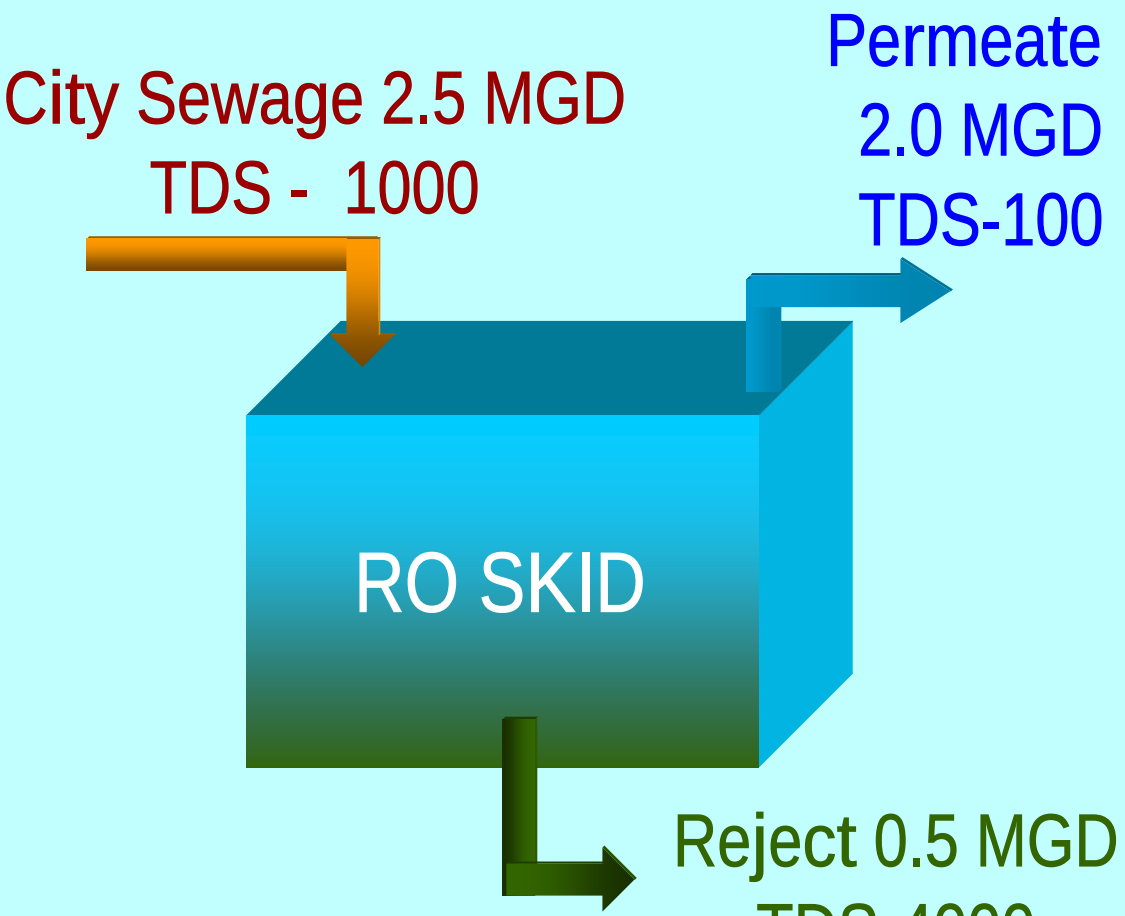
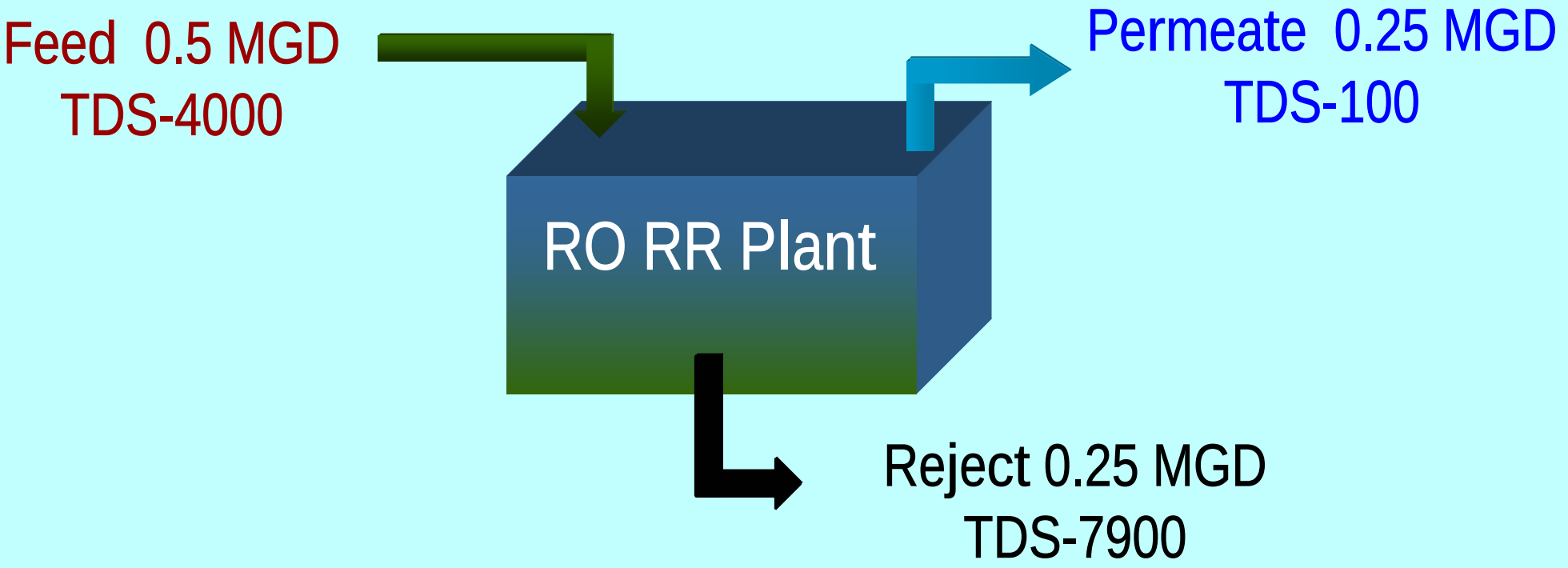
Sewage Reclamation Plant



Processing Steps

- ***Bio-Treatment for removal of BOD, COD***
- ***Pressure Sand Filtration for removal of TSS.***
- ***Ultra filtration for removal of Colloidal Particles.***
- ***Reverse Osmosis.***

Reject Recovery Plant



Water recycle & Zero Discharge

- Total Recycle and Zero discharge since 2002
- Refinery treated effluent is consumed as :
  - 65% fed to Ultra Filtration and Reverse Osmosis Membrane and product used in DM Plant.
  - Balance Fire Water and Green belt
- Processing Steps in ZDP
  - »Suspended Particle Removal by Pressure Sand Filter
  - »Ultra- Filteration
  - »RO

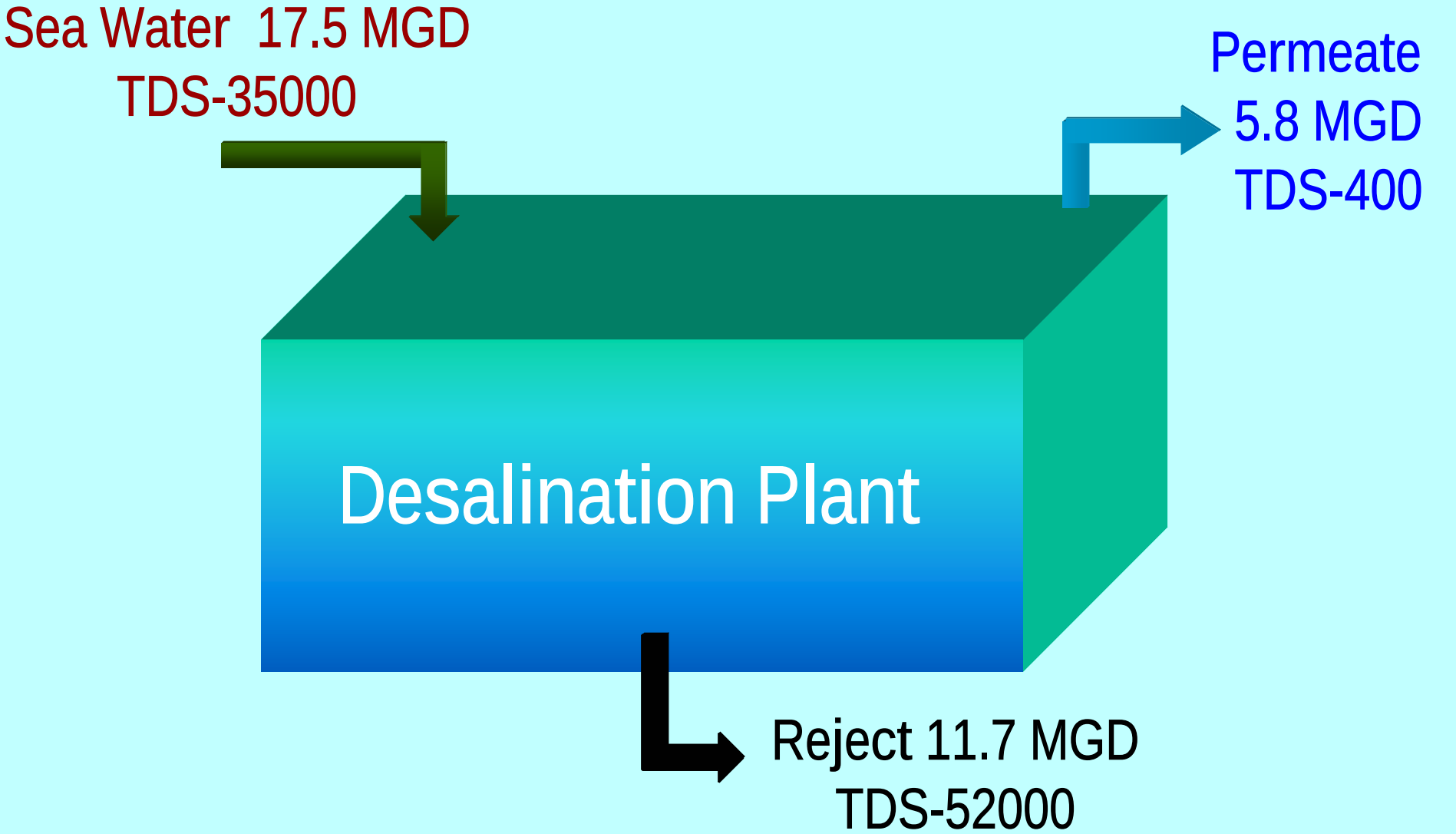
Self Sufficiency in Water Management

- ***To overcome dependency on high cost metro water, CPCL has commissioned Sea Water Desalination Plant of 5.8 MGD capacity.***

- ***The plant is based on Reverse Osmosis technology***

- ***Expandable to 10 MGD for catering to water requirement of future projects.***

Sea Water Desalination



Water conservation efforts

- Condensate recovery maximized from 23 M^3 / Hr to 80 M^3 / hr.
- Air Fin coolers in place of Water Condensers in all new designs since 1982 .
- Co-gen Boiler blow down routed to cooling towers.
- Continuous up-gradation of RO membranes for quality improvement in the product water

Renewable Energy & Carbon Footprint

WINDMILL

- Annual power generation : 36 Million units.
- 22 Nos of machines (800KW each-total 17.6MW)
- Project cost 90 crores
- Location: Coimbatore

Saved Green House Gases emission of 34000 MT of CO_2 per annum

THANK YOU

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Energy saving since 2000

Reduction in steam leaks and better steam management	2000	40	3250 SRFT/ yr	Optimisation of operation
Improvement in heat recovery Crude - I , Crude II preheat improvement	2000	257	2550	Optimisation of operation
Interconnection of acid gas line between two sulphur units / routing of Plant 18 Acid gas to Plant 75 SRU	2002	71	609	Optimisation of operation
Installation of secondary seals in 16 floating roof tanks	2001	188.8	1000	New technology
Flare / Other gases recovery	2000	168.02	1929	New technology
Recovery of Condensate from steam coil air pre-heater in NCPP	2002		312	New technology
Increasing effectiveness of existing heaters to 90% - Provision of online O2 analysers	2002	50	687	Optimisation of operation
Steam trap for 1/4" copper tubing	2003	2.5	173	New technology
Replacement of 1F1A APH from regeneration to recuperative type	2003	284	3000	New technology
Variable Frequency Drives for ID and FD fans	2006	25	365	New technology
Replacement of 2000 nos. of steam traps as per Forbes Marshall study	2007	100	100	Optimisation of operation
Total			**13975**	