

## Clean Air

Chemical Engineers work on:

- Burner systems that improve clean combustion
- Scrubbers for removal of  $\text{SO}_2$
- Selective Catalytic Reduction (SCR) of  $\text{NO}_x$  – Reduces  $\text{NO}_x$  to  $\text{N}_2$  and  $\text{H}_2\text{O}$
- Monitoring of Flue Gases (CEMs)

## Clean Water

Chemical Engineers work on:

- Systems to reduce temperature of discharge waters
- Systems to remove impurities from discharge waters
- Instrumentation to monitor temperature and purity of discharge waters

## Chemical Engineering is Fun Because:

- There are opportunities to experiment in the Lab and in the Pilot Plant (Pilot plants are used for larger scale testing.)
- You work with large scale equipment
- You play a key role in bringing crucial products to market like water, fuels, electricity, polymers and medicines
- You work with many technologies
- You work with people from many trades and specialties
- You are always learning

## Learn More at:

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[www.che.com](http://www.che.com)

[www.cheresources.com](http://www.cheresources.com)

[www.engineeryourlife.org](http://www.engineeryourlife.org)

[www.worldwidelearn.com/online-education-guide/engineering/chemical-engineering-major.htm](http://www.worldwidelearn.com/online-education-guide/engineering/chemical-engineering-major.htm)

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## Chemical Engineering In the Electric Power Industry

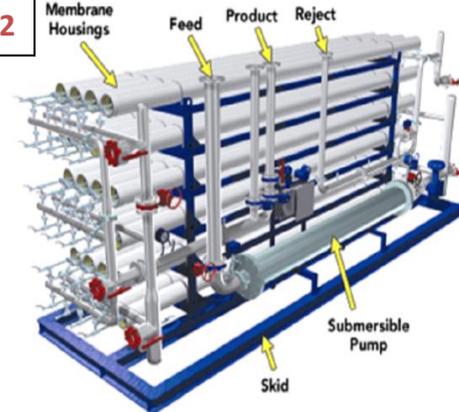


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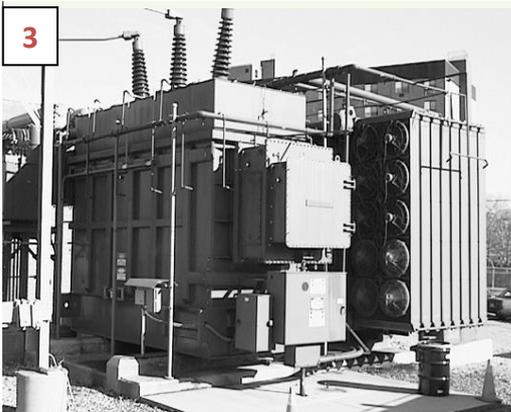
1



2



3



## What it Is

1

Boilers require water that is very pure. Ion exchange vessels contain resin beads that are saturated with mobile ions,  $H^+$  and  $OH^-$ . These ions are exchanged for dissolved solids in water producing pure water as the effluent. When the resin is saturated with dissolved ions, the vessel is removed from service and regenerated with a strong acid to replace the  $H^+$  mobile ions or strong base to replace the  $OH^-$  mobile ions.

2

Reverse Osmosis units also remove dissolved solids from water. The unit shown has several tubes each containing multiple spiral wound membranes. Pumps push pure water through the membrane. Dissolved solids remain in the water that doesn't pass through the membrane called reject water.

3

Step-up Transformer raises electric voltage from generation voltage to transmission voltage. Current passing through one coil induces a higher voltage in another coil with more windings. The induction process generates heat. The transformer is cooled with synthetic oil that is pumped through the electrical equipment.

## Uses these Engineering Principles

1

Engineers need an understanding of hydraulics, regenerant chemicals, coatings, and steel alloys to design the ion exchange (IX) equipment. They need an understanding of the ion exchange processes and of instrumentation to design the IX systems and to operate them

2

Engineers need familiarity with high performance plastics, of semi-permeable membranes, electro chemistry and hydraulics. They also need an understanding of pumps and chemical instrumentation.

3

Chemical engineers and chemists monitor dissolved gas levels in the cooling fluids to detect dangerous conditions at the incipient stage. They use knowledge of heat and mass transfer, organic chemistry, and gas chromatography as well as knowledge of transformer equipment to make maintenance recommendations.