SUSTAINABLE OIL PROCESSING

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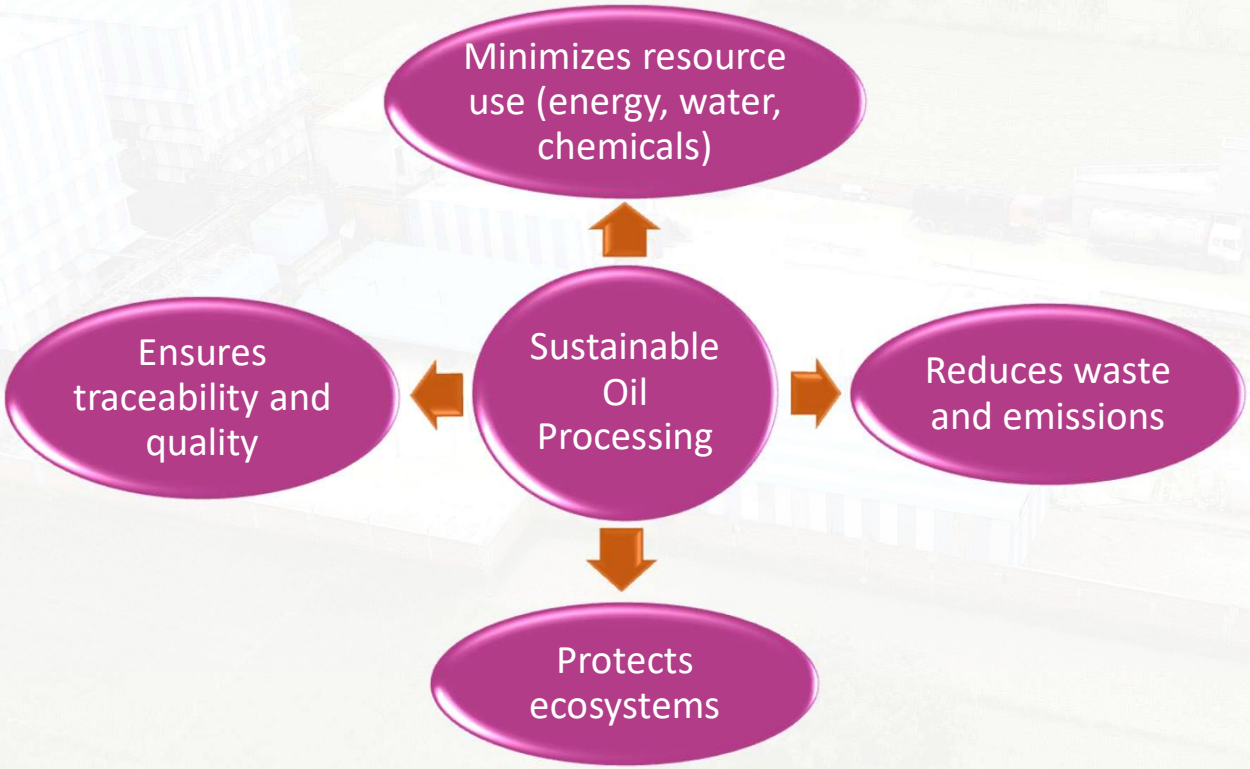
DVC PROCESS TECHNOLOGISTS

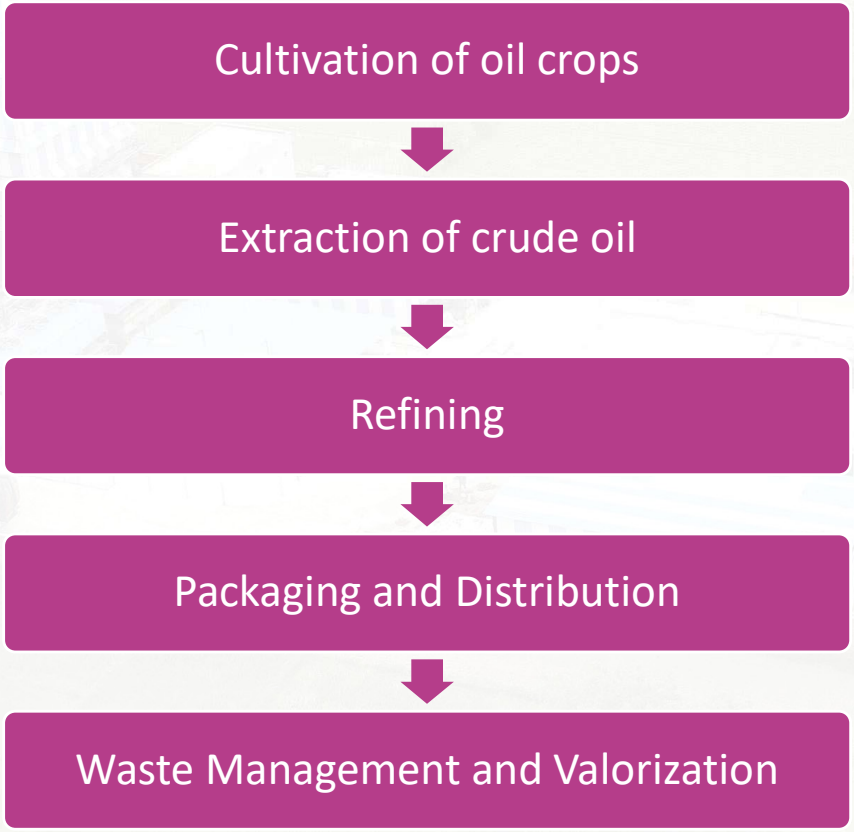
About DVC

- **DVC Process Technologists** headquartered at Pune is a Technology & Innovation driven company that offers comprehensive sustainable processing solution for Edible Oil and Fats, Oleo chemicals & Biodiesel industries.
- Company established with the drive to update the inefficient processing plants on Technological & energy efficiency front. Own **ISO Certified manufacturing facility with CE and ASME certification.**
- Provides turnkey solutions for establishing new green field projects as well as upgradation of existing processing facilities
- Competent team for handling the tasks related to new projects as well as upgradation and services.
- 250+ references world over including 60 green field projects with byproducts processing lecithin & soap stock acidulation.
- Successfully executed and running multi-feed stock Biodiesel plant

What is Sustainable Oil Processing?



Stages in Oil Processing

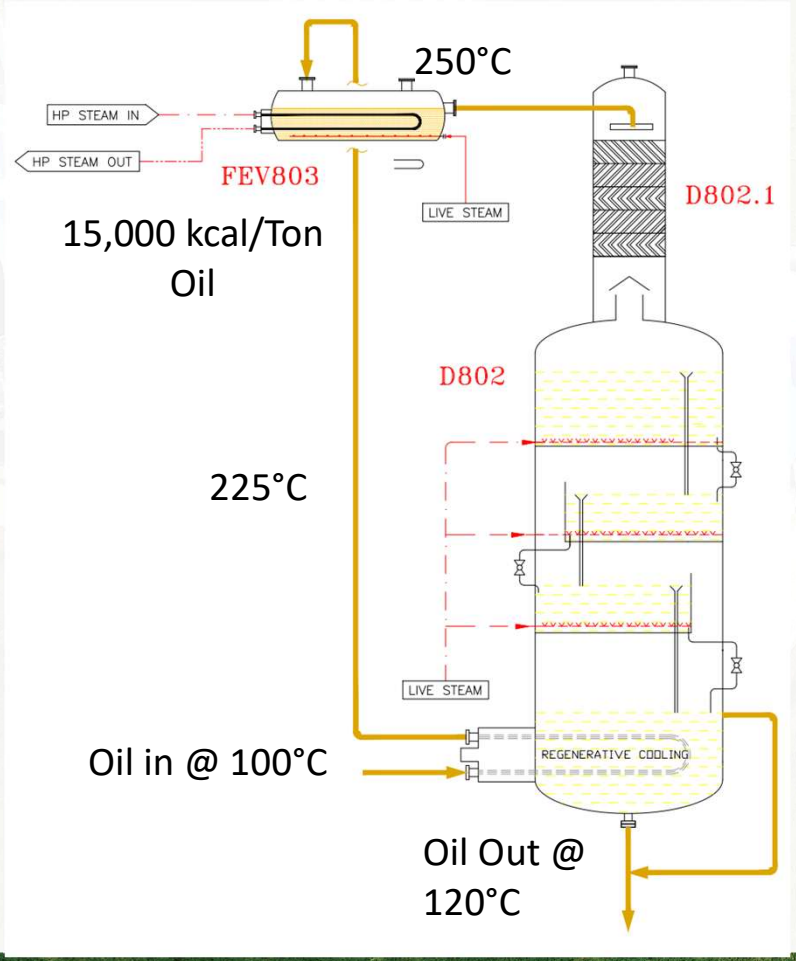


What can be done?

- Optimum process and equipment design for low energy consumption
- Efficient energy insulation systems
- Installing energy efficient systems
- Installing Heat recovery systems that will lower the overall energy consumption
- Optimum use of Instrumentation, Automation and AI to keep a check on energy consumption at every processing stage
- Integrating with renewable energy resources like solar, wind, hydrogen, biofuels to cover their energy needs
- Doing plantations and reducing their own carbon footprints

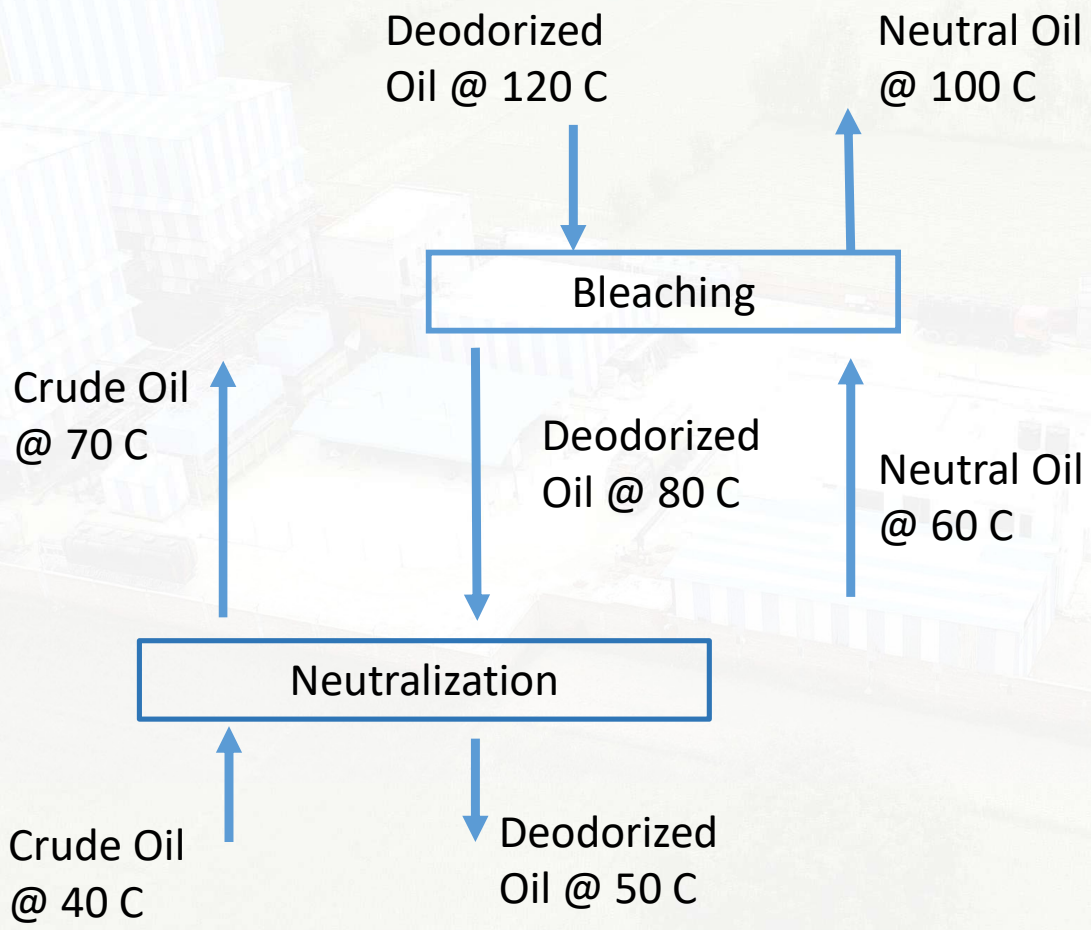
Energy Efficient Processes in Fats & Oils Processing

Heat Recovery from Deodorized Oil

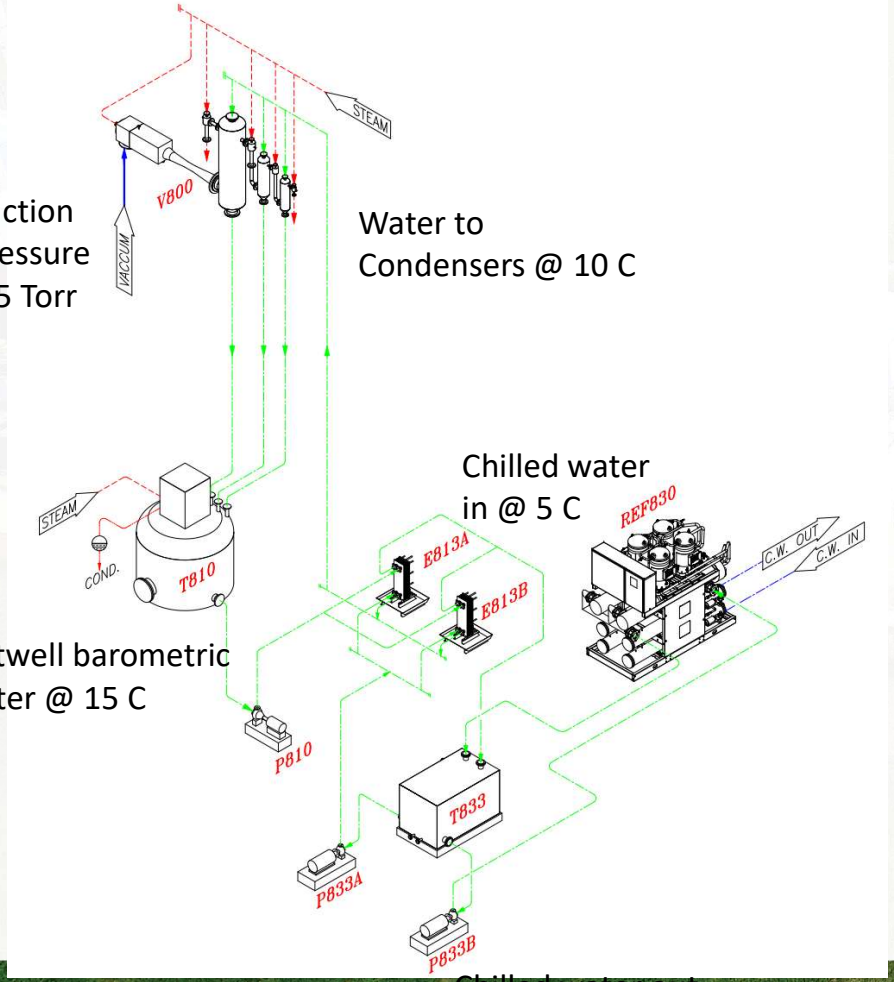


- Typical heat regeneration heats oil up to 200-205 deg C. Required energy to reach 250 deg C – 25,000 kcal/Ton of oil
- With upgraded regeneration systems or by adding additional heat recovery system – 225 deg C can be achieved
- Required energy to reach 250 deg C – 15,000 kcal/Ton of oil.
- Reduction of about 10,000 kcal/Ton of oil – i.e. 40%.

Heat Recovery from Deodorized Oil

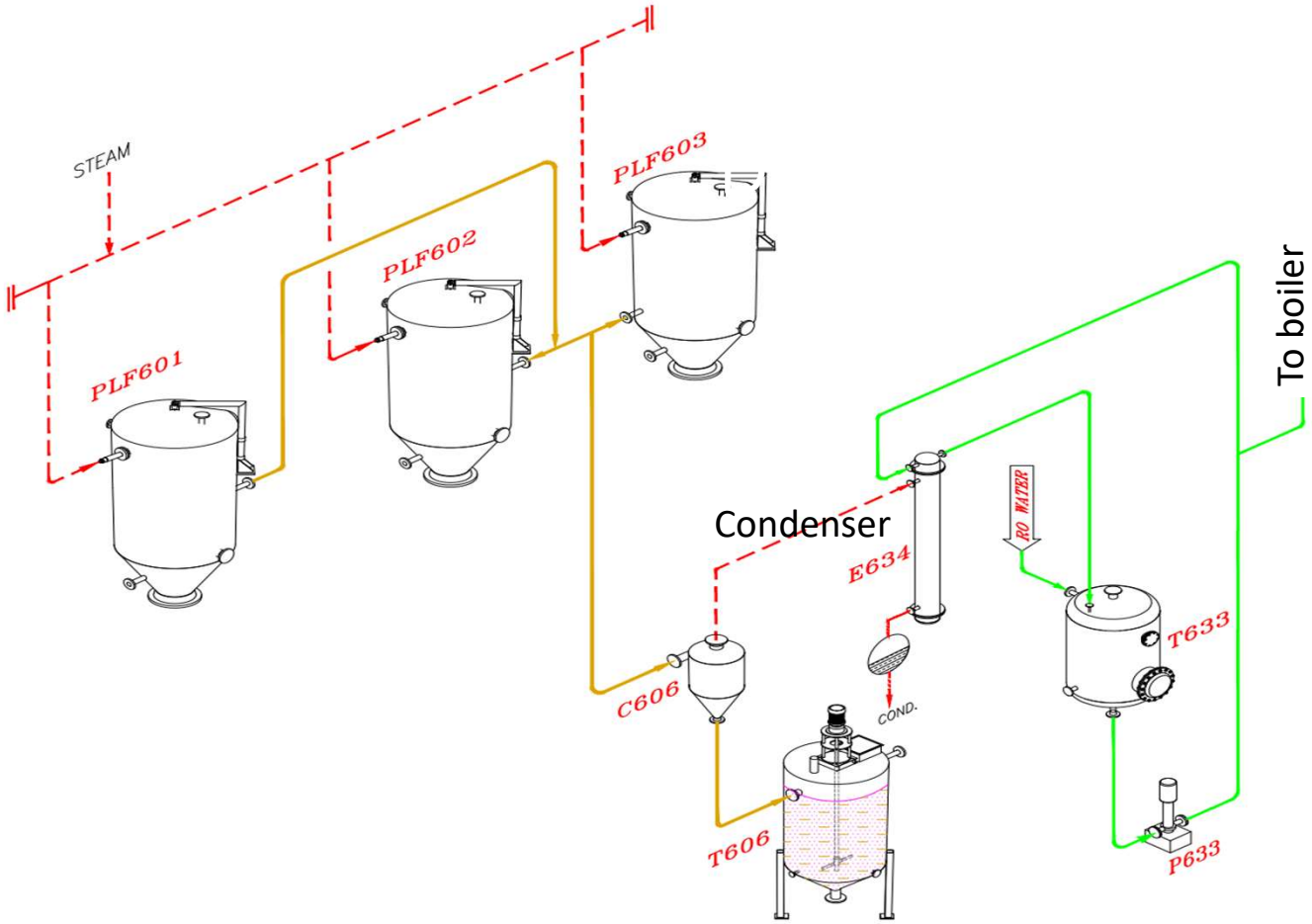


Deodorization Vacuum System



- Closed loop Chilled water Vacuum system, uses less energy as compared to traditional normal temperature systems.
- Less smelly as water circulating in closed loop and fatty matter overflows continuously and is much easier to manage

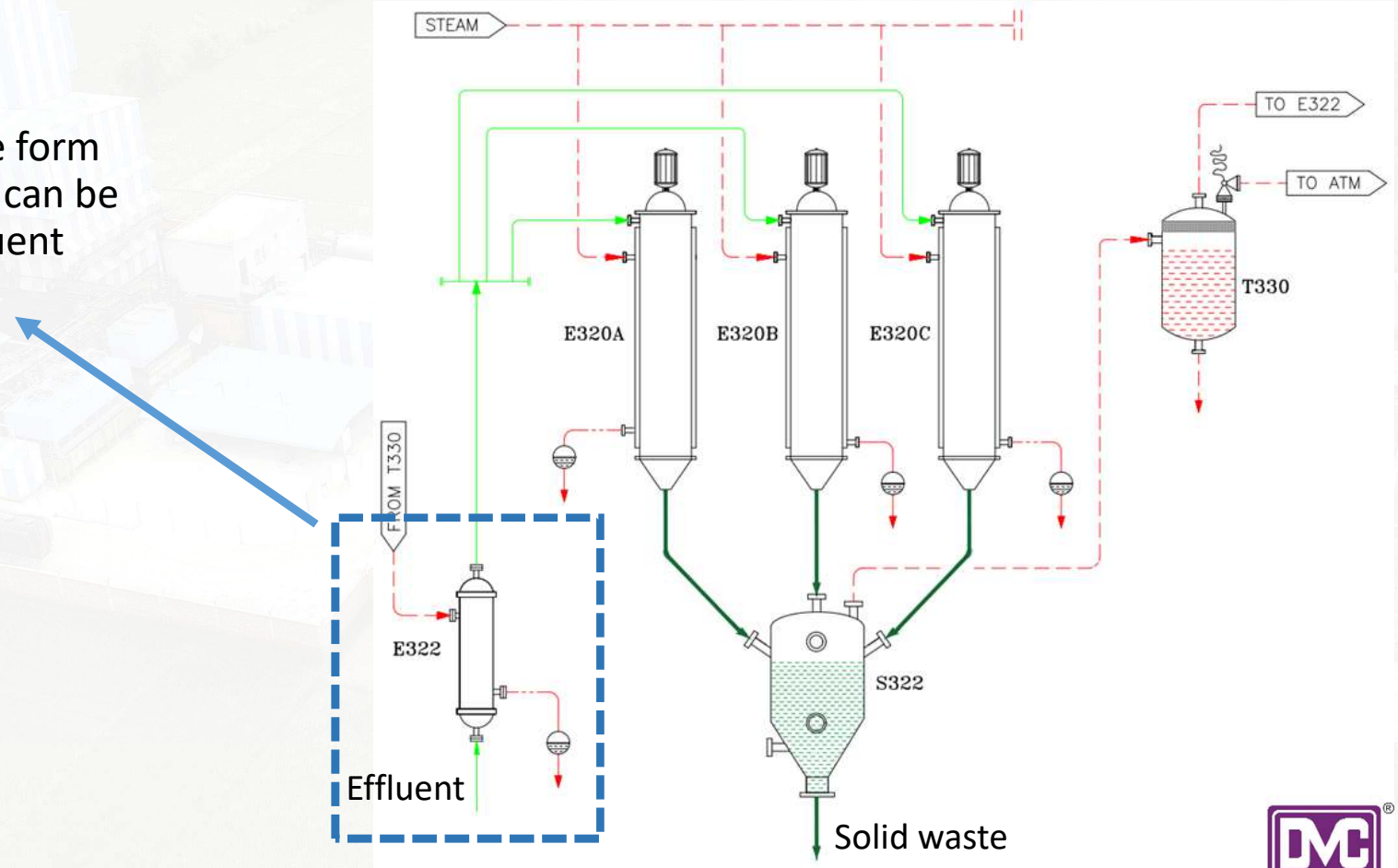
PLF spent steam recovery – to heat boiler feed water



Chilled water out
@ 10 C

Effluent - low pressure steam recovery

Water separated in the form of low-pressure steam can be used pre-heat the effluent feed.



Boiler Flue gas heat recovery

Economizer can be installed to pre-heat feed water by flue gases

Saves 5-7% of the fuel

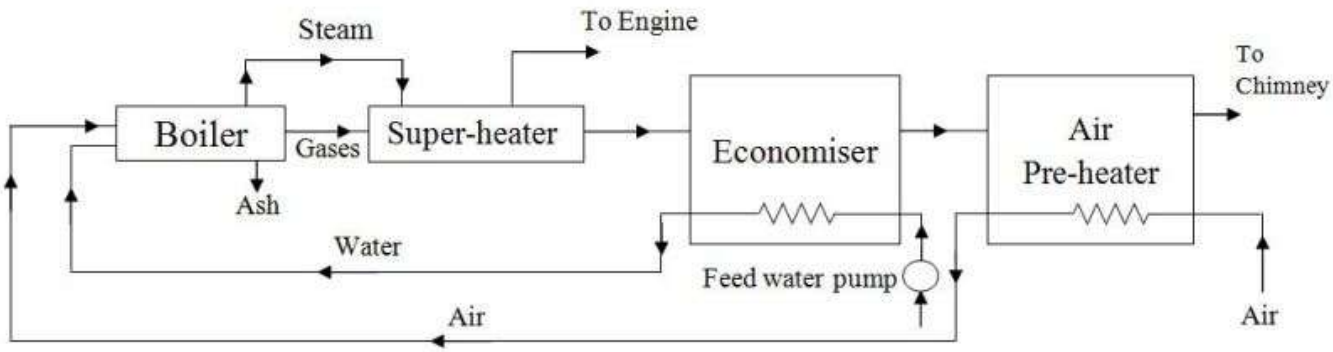
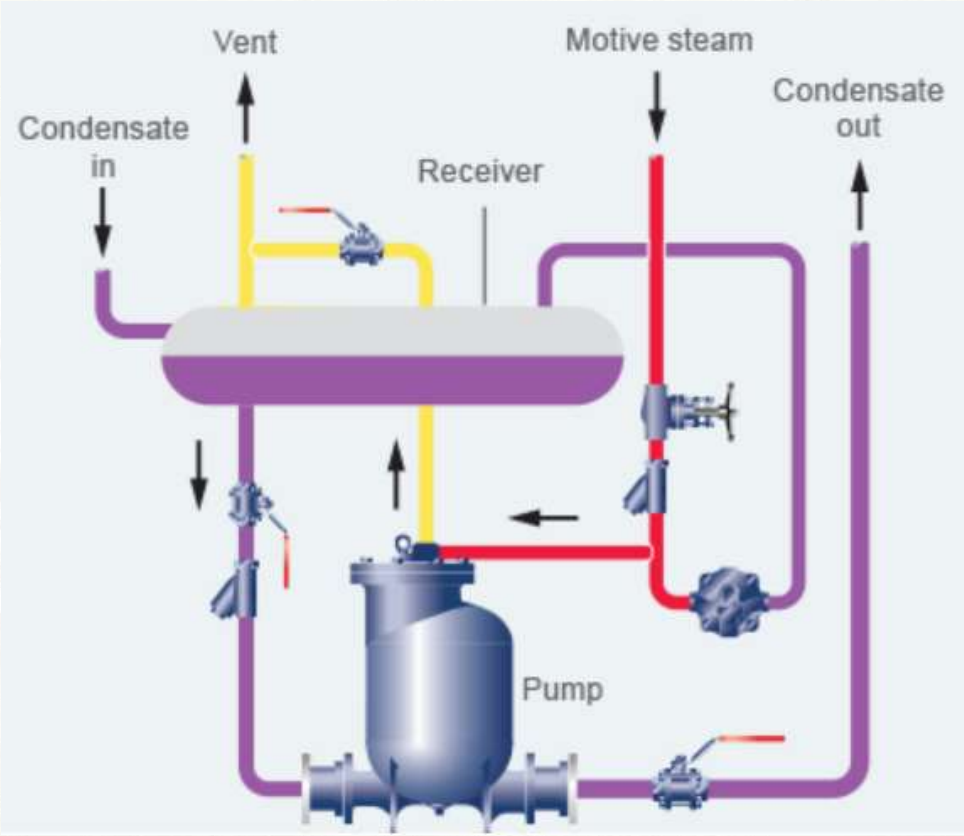


Fig- Schematic diagram of a boiler plant

Efficient Condensate Recovery

- Condensate and flash steam contributes a considerable amount in total energy of fuel.
- Collection of condensate from all the sources in Receiver
- Pumping condensate to Boiler
- Flash steam from Condensate and boiler blow down can be used to heat make up water
- Every 6 deg rise in feed water reduces fuel consumption by 1%.



Renewable Power Integration

Integration with Renewable Energy resources

SOLAR

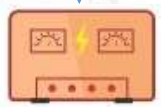
HYDROGEN

WIND

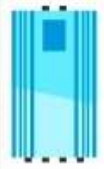
BIOFUELS

Solar Integration with Processing Industry

Solar Panels



Charge Controller



DC-AC Inverter

LT Panel

Net Meter

Industry

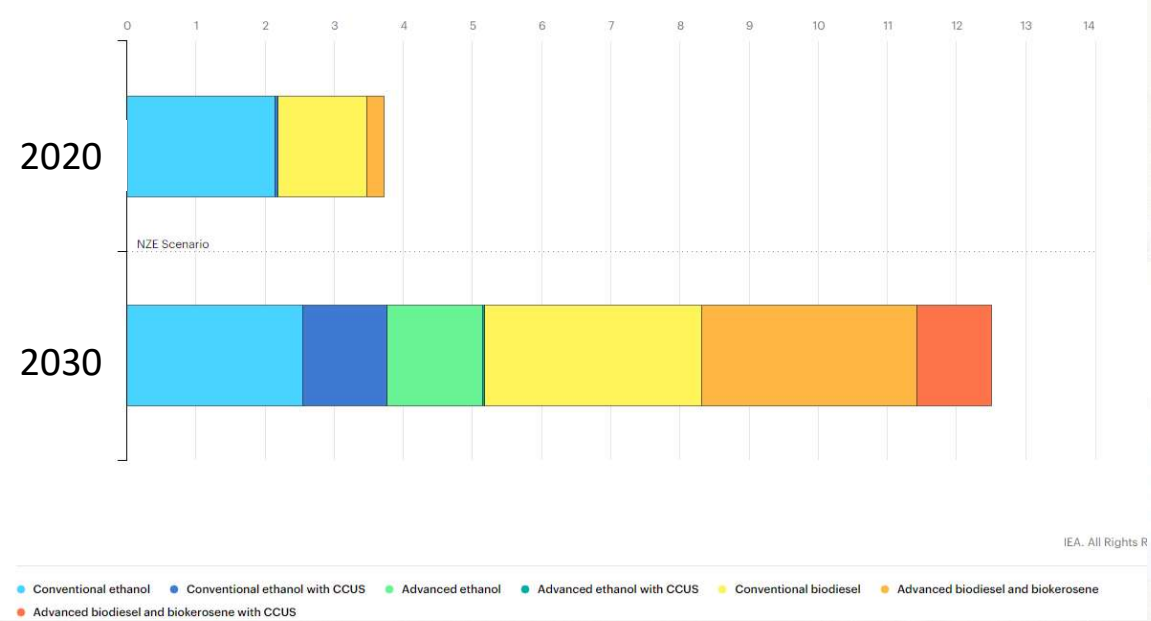
Grid

Solar Integration with Processing Industry

For a Sanctioned Load of 380 kW

Proposed Solar System	Option 1	Option 2
Plant Capacity	216 kW	285 kW
No. of Solar Modules	646x	850x
Modules details : Mono PERC	335 Wp	335 Wp
Reduction in Energy Bill	**81.30%**	**83.90%**
Units Generated per year	277586	364686
Payback Period	**4 years**	**4 years**
ROI	**24%**	**24%**

Biofuels



- As of 2020, Biofuels account for only 3% of transport fuel globally.
- To achieve Net Zero by 2050, there should Annual growth of consumption of atleast by 14% every year.
- Europe, America and Asian countries are implementing policies on this path to increase biofuel demand.
- In biofuels, there are two major sources- Biodiesel and Bio-ethanol.
- Indian government is targeting 20% ethanol blending by 2025.
- Mandatory for all auto makers to offer vehicles that will run on 100% Biodiesel.

Biofuels

- Biodiesel – raw materials – Palm Oil, Stearin, PFAD, crop based oils like soya, corn etc.
- Concerns remain about using crops for fuel instead of food production.
- Limitation of resources like land for having additional crops for biofuel production – can lead to deforestation that will ultimately lead to a bigger deficit in Net Zero emissions.
- More focus on biofuels produced from waste and residue resources to meet 45% of total biofuel demand by 2030 like Used Cooking oil, animal fat, Acid Oil etc.
- Biodiesel manufacturing can be easily integrated in existing oil processing houses. This will make processors self sustainable for their energy needs.

Automation and AI

Role of Automation

- Automated Process Control: Temperature, pressure, flow regulation, pH in refining units
- PLC/DCS and SCADA Systems:
  Real-time monitoring and control across the plant
- Robotics & Material Handling:
  Automated loading, unloading, packing, and palletizing
- Safety & Reliability:
  Reduced human error, consistent operations

Role of Automation

- Applicable for both continuous and batch processes of any sizes of plant operations
- It can be integrated at any stage of plant installation or operations –
  beginning or mid or already running plants

- Phases of Automation:

  Phase 1 – Data Acquisition by various instruments and local / independent control systems.

  Phase 2 – Starting the operations, running in steady state, and shut down operations by the logical programs fed in to the PLC / DCS.

Success of Automation

- Proper selection and installation of field instruments
- Appropriate processes as per feed stock to be processed to achieve desired product quality and optimum chemical and utilities consumption
- Designing of Control Philosophy to include all operational possibilities and built in safety features
- Selection of the processors and other hardware
- Covering the entire range of operations – Oil processing, Utilities, Storages, product filling and packaging, etc. to have complete control of the plant.

Role of Artificial Intelligence

- Predictive Maintenance: AI algorithms forecast equipment failures → less downtime
- Process Optimization: Machine learning tunes refining parameters like temperature, pressure, flow for higher yield & energy efficiency – monitor performance of heat regeneration process.
- Quality Control with Vision Systems: AI detects impurities, color, clarity of oil
- Supply Chain Optimization: Demand forecasting, inventory planning, distribution efficiency
- It can only work if Automation is in place

Benefits of Automation & AI

- Higher Yield: Optimized extraction and refining
- Consistent Quality: Automated precision + AI inspection
- Reduced Costs: Lower energy & raw material waste
- Faster Operations: 24/7 automated systems
- Sustainability: Less energy and water use, reduced emissions
- Only Drawback - High Costs for AI integration – but as compared to the benefits this can have good ROI.

Summary

- Sustainability – cornerstone for selection of technologies and designing processes
- Efficient energy systems is a must
- Integration of Renewable energy resources in processing houses
- Role of Automation and AI

Thank you.

Please visit us for more information.

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Technology with Innovation

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