







SOPA
INTERNATIONAL
SOY CONCLAVE

SOYABEAN PROCESSING: SUSTAINABILITY

www.dvcprocesstech.com

Mr. D. V. Chame
FOUNDER & CEO
DVC PROCESS TECHNOLOGIST

ABOUT US..

- **DVC Process Technologists** headquartered at Pune is a Technology & Innovation driven company that offers comprehensive processing solution for Edible Oil & Fats, Oleo Chemicals and Biodiesel industries.
- Serving the industry with dedicated team of technocrats and engineers with vast experience in Oils & Fats and allied industries
- Own **ISO Certified manufacturing facilities** near Pune at Supe & Jejuri.



CONSERVE ENERGY SAVE ENVIRONMENT

CONTENTS OF PRESENTATION

SOYABEAN PROCESSING: SUSTAINABILITY

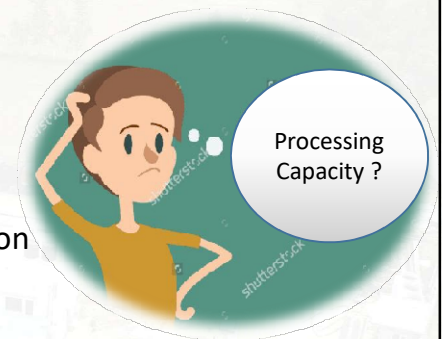
- ❖ Selection of Processing Capacity
- ❖ Selection of Utilities
- ❖ Selection of Layout
- ❖ Technology Selection
- ❖ Instrumentation
- ❖ Automation
- ❖ Maintaining Consistency in Utilities Supply
- ❖ Effluent Treatment : Zero Liquid Discharge (ZLD)
- ❖ Go Green with Conventional and Non- Conventional Fuel Sources
- ❖ Green Fuel : Hydrogen Gas



CONSERVE ENERGY SAVE ENVIRONMENT

SELECTION OF PROCESSING CAPACITY

- Seed processing : Solvent Extraction
- Extracted Oil Refining
- By-products Processing : Lecithin Drying & Soap-stock Acidulation



CONSERVE ENERGY SAVE ENVIRONMENT

UTILITIES

- **Steam:**
 - Selection of steam boiler capacity, rating & fuel
- **Power:**
 - HT Source rating for consistent supply
 - Selection of step down transformer with provision for consistent voltage with Servo Tapping Change Arrangement.
- **Water:**
 - Raw-water quality & quantity
 - Requirement



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LAYOUT

- **Available Land**
- **Optimized Site Key Plan**
 - Arrangement of various sections:
Weighbridge, Seed off-loading point, Pre cleaning, Seed dryer (optional), Inter-mediate storage & Main storage (silos)
 - Daybin silo, Seed preparation
 - Oil extraction areas (Hazard area)
 - Meal conditioning & bagging (DOC godown & storage)
 - Crude oil storage
 - Crude oil processing : Refinery with by-products processing & water cooling towers
 - Refined oil & by-products storage



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LAYOUT

- Utilities:
Steam boiler & high temperature boiler (For Refinery oil heating)
- Electrical Utilities:
LTDB, Transformer, Backup power source (DG)
- Raw water storage, Water treatment plant, RO/DM/Softener for boiler feed, Process water in refinery & input to cooling tower (SEP & Refinery)
- Effluent Treatment Plant (ETP)
- Oil filling & packing Section
- Stores: Chemicals, spares, packing material & miscellaneous



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LAYOUT

- Supporting machine shop & maintenance department
- Quality & Process control laboratory
- Administrative building & canteen
- Security department
- Assembly & fire fighting department
- Gardening as per statutory requirements
- Parking area for incoming & outgoing goods vehicles



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TECHNOLOGY SELECTION

Preparation & Extraction

➤ Seed Processing:

- Seed pre-cleaning, Drying, Cleaning, De-stoning, Seed grading, Cracking, Dehulling, Cooking, Flaking, Expanding, Drying & Cooling

➤ Solvent Extraction:

- Oil extractor

➤ De-Solventization & Toasting:

- Conventional De-solventization & Toasting
- Flash De-solventization to produce high PDI meal

➤ Distillation & Solvent Recovery:

- Effective heat economization
- Low temperature distillation
- Effective solvent recovery using low temperature recuperation system



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TECHNOLOGY SELECTION

Advantages of Flash De-solventization:

High PDI value based products for human consumption like

- Soya Flour
- Soya Protein Concentrates (SPC)
- Soya Protein Isolates (SPI)



Soya Flour



Soya Protein Concentrates (SPC)



Soya Protein Isolates (SPI)



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TECHNOLOGY SELECTION

Oil Refining

- Degumming:
 - Water Degumming to produce wet gums for edible / pharma grade Soya-Lecithin production
 - Modified Degumming – Total or Enzymatic (In case of physical refining process)
- Alkali Neutralization
 - Long-mix Neutralization for optimum removal of phosphatides & bleachability
- Water washing/Soap adsorption
- Pre-Treatment & Bleaching
- De-acidification (In case of physical refining) & Deodorization
- Distillates Scrubbing : Two stage for separating Toco-rich fraction & FFA



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TECHNOLOGY SELECTION

By-Product Processing

- Gums Drying (Lecithin)
 - Rising Film
 - Falling Film for light color product – Latest Development
- Soap-stock Acidulation (Acid Oil)
 - Preparation of soap-stock for saponification of phosphatides
 - Efficient mixing of acid & soap-stock
 - Acidic vapors scrubbing system
 - Recycling of acidic water to minimize the acid consumption, low acidity of effluent generated



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INSTRUMENTATION

Instrumentation helps us to monitor and control the process, utilities parameters, material handling and storages :

- Flow Indicator & Controller
- Temperature Indicator & Controller
- Pressure Indicator & Controller
- Level Indicator & Controller
- Electrical Load Indicator & Controller
- Speed Indicator & Controller (VFD)
- Online pH Indicator & Controller
- Online weighing by load cell
- Storages Level & Humidity Indicator to know the stock (For bulk storages)



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AUTOMATION

- Automation helps us to operate & control the process plant and utilities section operations in a systematic manner as programmed.
- Control loops used are preferably closed type for taking feedback with recording for further processing.
- Sections to be integrated with automation system :
 - Process plant
 - Utilities Sections - Boiler, electrical section
 - Material handling
 - Tank Farm Automation



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AUTOMATION

Automation system comprising of :

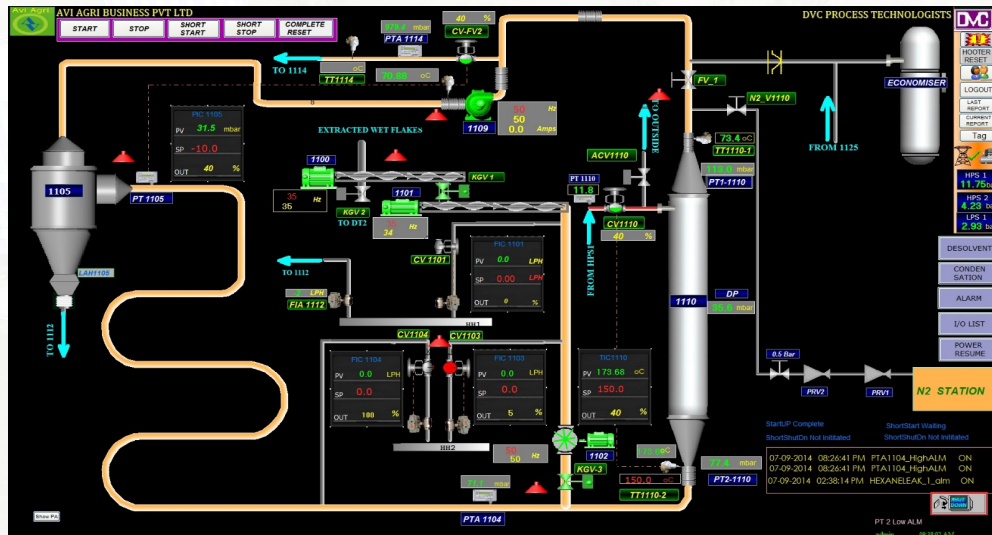
- PLC / DCS
- SCADA Software
- Stations
- Report: Process & utilities data, chemical consumption, material movement / handling data helps in providing the processing cost at given point of time.



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AUTOMATION

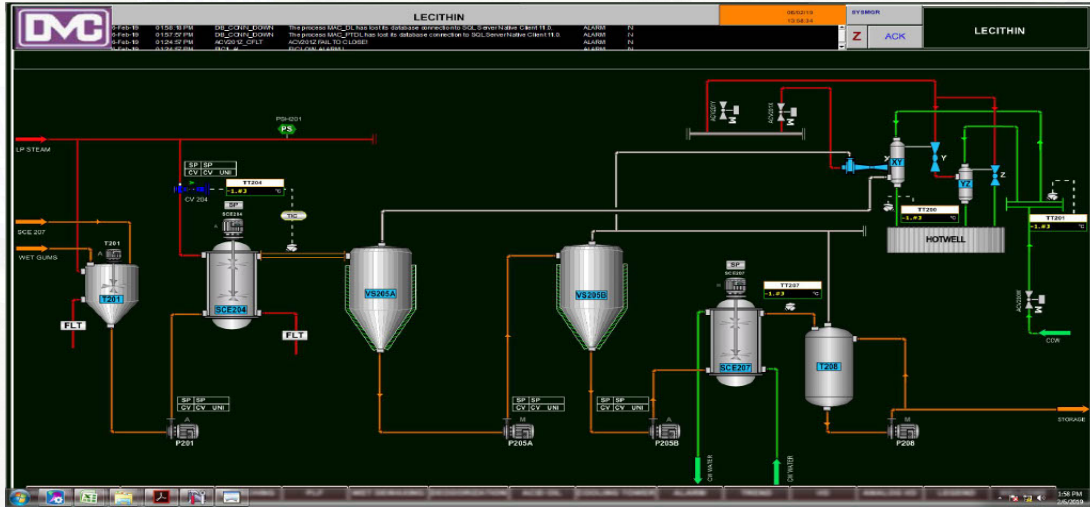
FLASH DE-SOLVENTIZATION (FDS)



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AUTOMATION

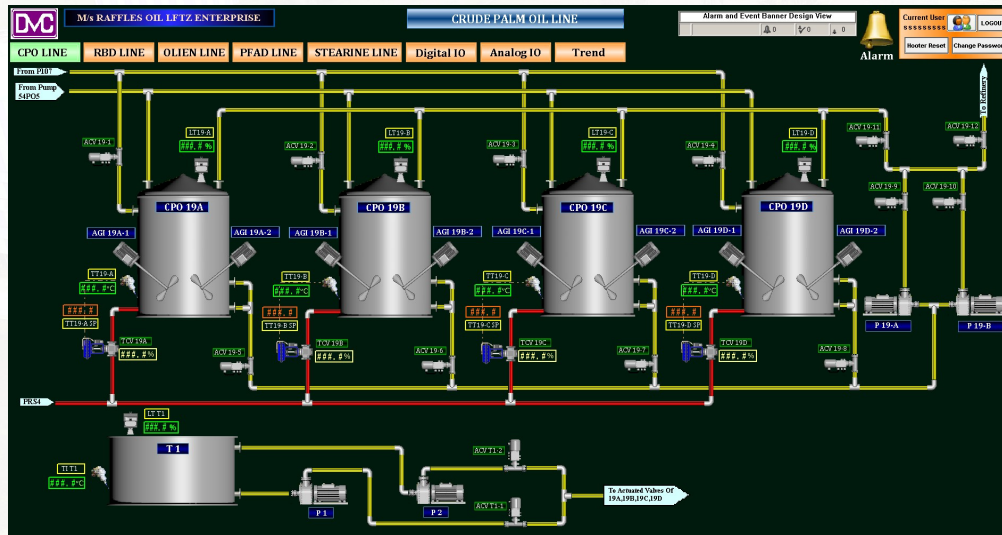
GUMS DRYING PLANT (LECITHIN)



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AUTOMATION

TANK FARM AUTOMATION



CONSERVE ENERGY SAVE ENVIRONMENT

REFINED OIL QUALITY ENHANCEMENT

LOWTRANS™ Deodorization

Salient Features:

- Dual temperature deodorization (High & low)
- Ideal for high FFA feedstock (like RBO)
- Low Trans fatty acid isomer content
- Low operating pressure
- Optimum deodorization temperature and retention time combination
- Efficient stripping in dual temperature zones
- Keeps a check on 3 MCPD and GE esters too
- No splash oil generation

Stripping in packed column @ high temp
240 - 245°C

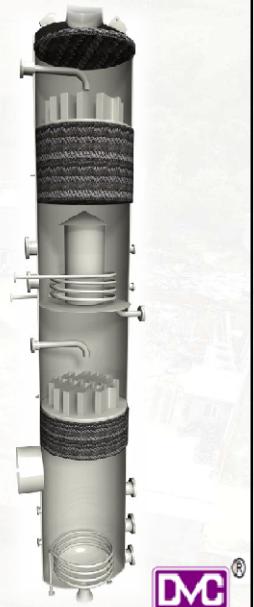
Cooling to
210 - 220°C



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Two Stage Scrubbing to produce Toco-rich content

- Maximum separation between FFA and tocopherol streams
- No extra processing cost
- Higher tocopherol yield in refined oils
- Due to separation of two products, adding value to both
- DUALSCRUB™ can be installed in existing systems too.

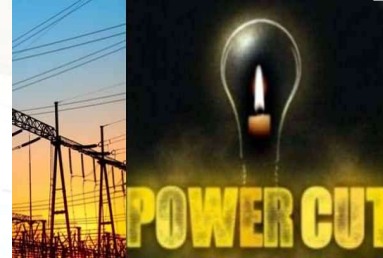


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MAINTAINING CONSISTENCY IN UTILITIES SUPPLY



- Interrupted Power Supply affects the running plant production capacity.
- 5 to 6 times small interruptions cause loss of 3 Hrs of effective working time



How to Cope-up with interrupted power supply?
Solution is Power Bank.

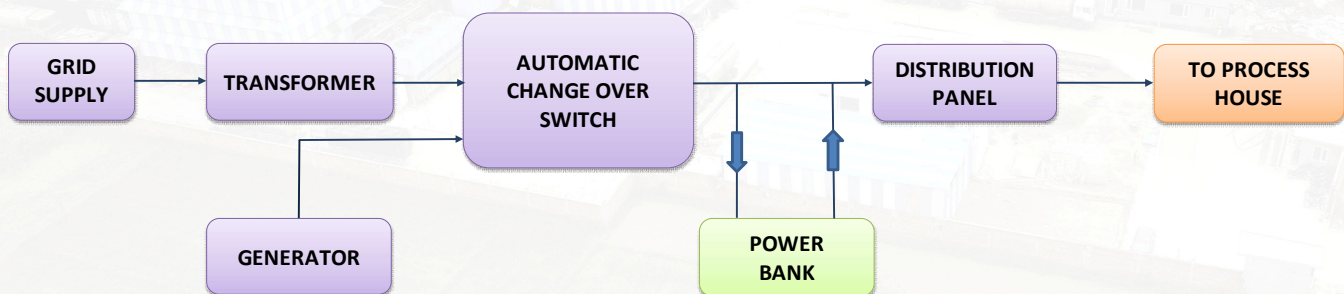


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MAINTAINING CONSISTENCY IN UTILITIES SUPPLY

Power Bank

When incoming utility power fluctuates or fails, the **Power Bank** ensures continuous plant operations. It helps to maintain the production efficiency.

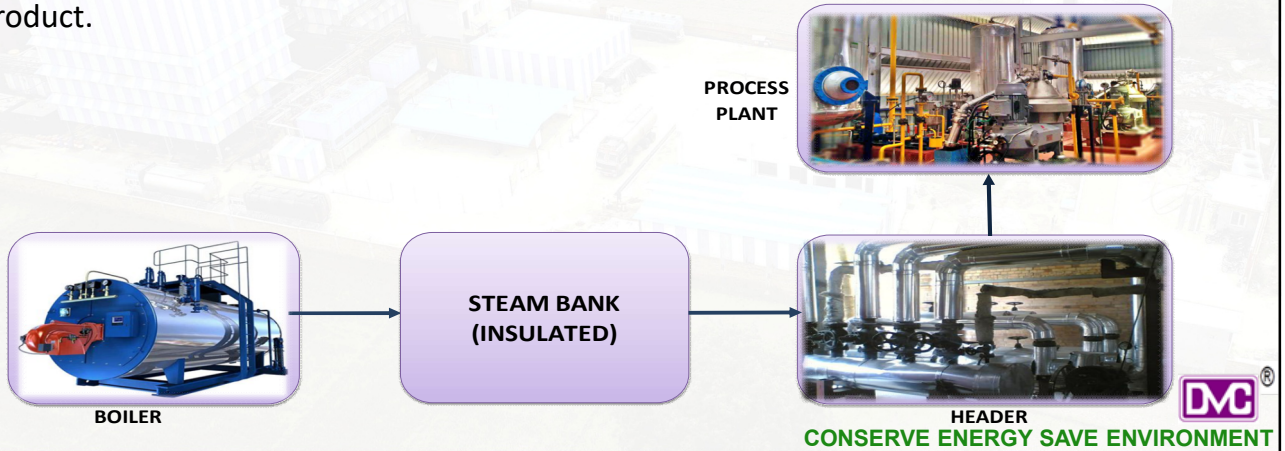


CONSERVE ENERGY SAVE ENVIRONMENT

MAINTAINING CONSISTENCY IN UTILITIES SUPPLY

Steam Bank

- Interrupted / Fluctuated Steam supply causes the stoppage of the process plant.
- Continuous steam supply helps to maintain the cost of production and delivering the quality product.

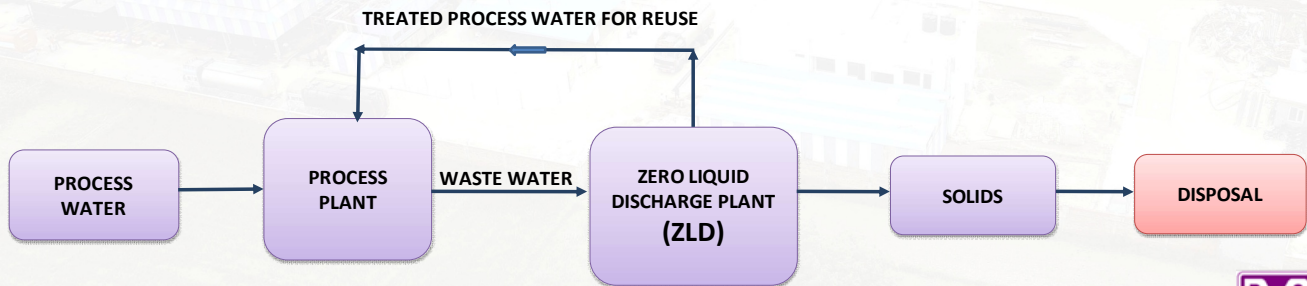


SELECTION OF BOILER

- Pressure rating & capacity
- Fuel & Efficiency
- Type of Boiler

EFFLUENT TREATMENT : ZERO LIQUID DISCHARGE (ZLD)

- Zero liquid discharge (ZLD) is a strategic wastewater management system that ensures zero discharge of effluents.
- DVC's ZLD plants are tailor-made solutions as per wastewater quality from SEP and Oil refinery. The treated water is recycled to the plant.



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MISSION GO GREEN

Present Scenario & Issues

- Limited Supply of Fossil Fuels
- Global warming due to emission of Green-house gases

Way Forward

- Bio-fuels & Non-conventional resources
- Net zero emission
- Value & Abundance
- Cogeneration system by use of Biofuel



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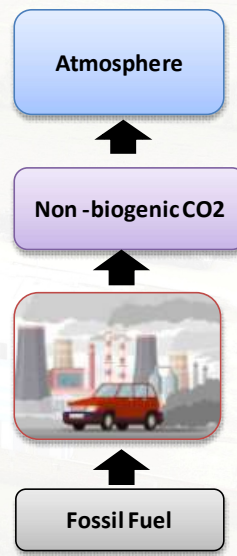
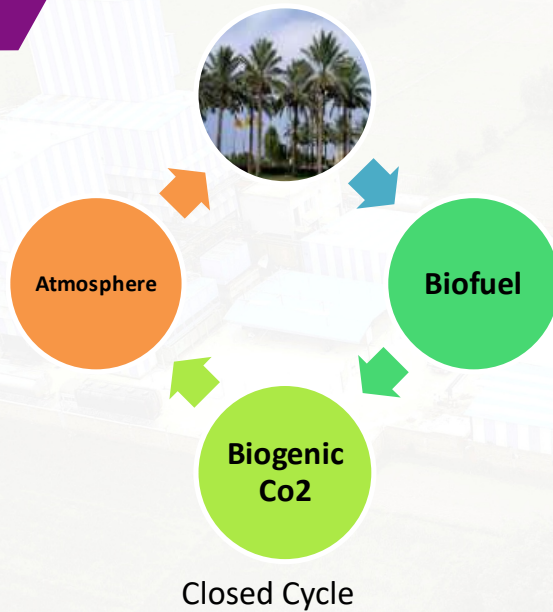
USAGE OF BIO-MASS

- Sustainable and eco-friendly energy resources
- Bio-mass is better choice for replacement of fossil fuels.
- These fuels are available locally.



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CO2 CYCLE



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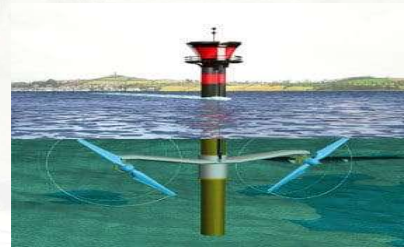
NON CONVENTIONAL SOURCES OF ENERGY



Solar Energy

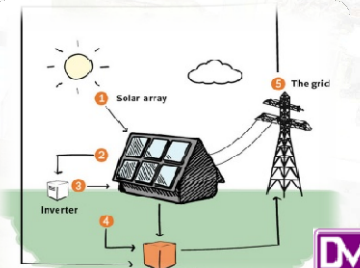


Wind Energy



Tidal Energy

- Renewable & Environment-friendly energy resources
- Zero emission
- Available in abundance at no cost



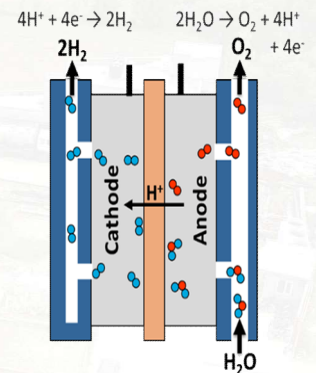
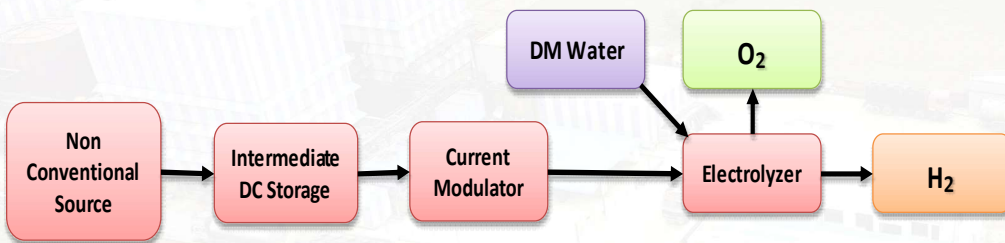
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GREEN FUEL : HYDROGEN GAS



Hydrogen Gas generation by electrolysis of water.



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GREEN FUEL : HYDROGEN GAS

- Power required for generating 1 NM3 of Hydrogen : 3.8 kWh
- Power generated from hydrogen fuel cell is ~ 2.8 to 3 kWh per NM3
- Differential pressure required between hydrogen source/storage and fuel cell is 0.5 barg.
- Net cost for power generated from hydrogen fuel -
 Solar Power Cost : Considering Rs. 2.5/kWh
 Operational Cost for generating H₂ gas & conversion back to electricity : Rs. 1.5/kWh
 Hydrogen Power Cost : $(2.5 * 1.357) + 1.5 = \text{Rs. } 4.8/\text{kWh}$
 (This excludes capital investment of hydrogen generation plant and converters)



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THANK YOU!



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Technology with Innovation

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