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CHP in Chemical Manufacturing Plants – India

By
K.N.Naik
Centre for Fuel Studies and Research

Introduction

- Indian Energy Challenge
- Indian Energy Scenario
- Natural Gas Industry Structure
- Need to use gas efficiently
- Electricity Industry Structure
- Electricity Scenario
- Heubach Colour Ltd.- A CHP Experience
- Summary and Conclusions

Indian Energy Challenge- Controllable Vs. Non-Controllable Factors

- Energy Security
  - Energy Conservation
  - Energy Efficiency
  - Augmenting Supply resources
- Competitiveness of Industry and Service Sector
  - Energy supply Reliability and Quality
  - Energy Cost

Indian Energy Challenge- Controllable Vs. Non-Controllable Factors

- Environment preservation
  - Energy efficiency
  - Clean Fuel Technologies
- Huge Investment required for Capacity Building
  - Energy Efficiency can bring down need for Capacity Building
  - DG will bring down Incremental T&D capital cost

Indian Energy Scenario

- India's import-dependent economy
  - O&G production stagnated in recent years (oil imports 65%–70%)
  - Demand growing by 6% annually
- Why NG is preferred Fuel
  - shortage of hydrocarbons (gas in particular)
  - the high ash content of Indian coal & Limitation in Production Increase
  - the transportation bottlenecks for coal

Indian Energy Scenario

- Indian planners have declared NG " Fuel of the 21st century",
  - low polluting qualities
  - possibility of its utilization in a highly efficient manner

NATURAL GAS INDUSTRY STRUCTURE

- Supply sources will be multi-directional, multi-locational and of multiple ownership
  - LNG terminals
  - Onshore and Offshore Domestic fields
  - cross-border pipelines
- Gas consumers may be in the heavily industrialized states
- Recent discoveries in KG basin, LNG import, CBM blocks and possible UCG projects could augment supply significantly

NATURAL GAS INDUSTRY STRUCTURE

- **Unlike in the past, gas could flow in many directions across the country**
- **government has declared its intent to create a market-based pricing mechanism**
- **Need for a Countrywide T&D Network**

Need to Use Gas More Efficiently- DG+CCHP

"Energy is the prerequisite for all other commodities, so if we "run out" of energy, we will "run out" of everything else too." Jay Hanson very aptly said.

This applies all the more for an import dependent economy like India

ELECTRICITY INDUSTRY STRUCTURE

- **The SEBs handled generation and T&D until the government permitted independent power producers (IPPs) and captive power plants.**
- **Following the Electricity Act 2003, the electricity industry is evolving towards a competitive market framework**
- **It emphasized the role of traders in serving the power needs of the country. Distribution, trading and transmission have now become licensed activities, while thermal generation has been de-licensed.**

ELECTRICITY INDUSTRY STRUCTURE

- **Twelve states have unbundled or corporatized their power utilities, and 10 others are expected to follow suit shortly.**
- **Orissa and Delhi have seen the privatization of distribution**
- **On a national basis, T&D losses fell from 34% in 2001–2002 to 32.5% in 2002–2003. T&D losses consist of technical losses and unauthorised use of power**

ELECTRICITY SCENARIO

- current generation capacity is close to 100 GW
- Coal-based plants continue to dominate, followed by hydro
- aim to add another 100 GW in the 10th and 11th Plan periods, i.e. by 2011–2012
- Natural gas is expected to have a substantial share in the new generation capacity.

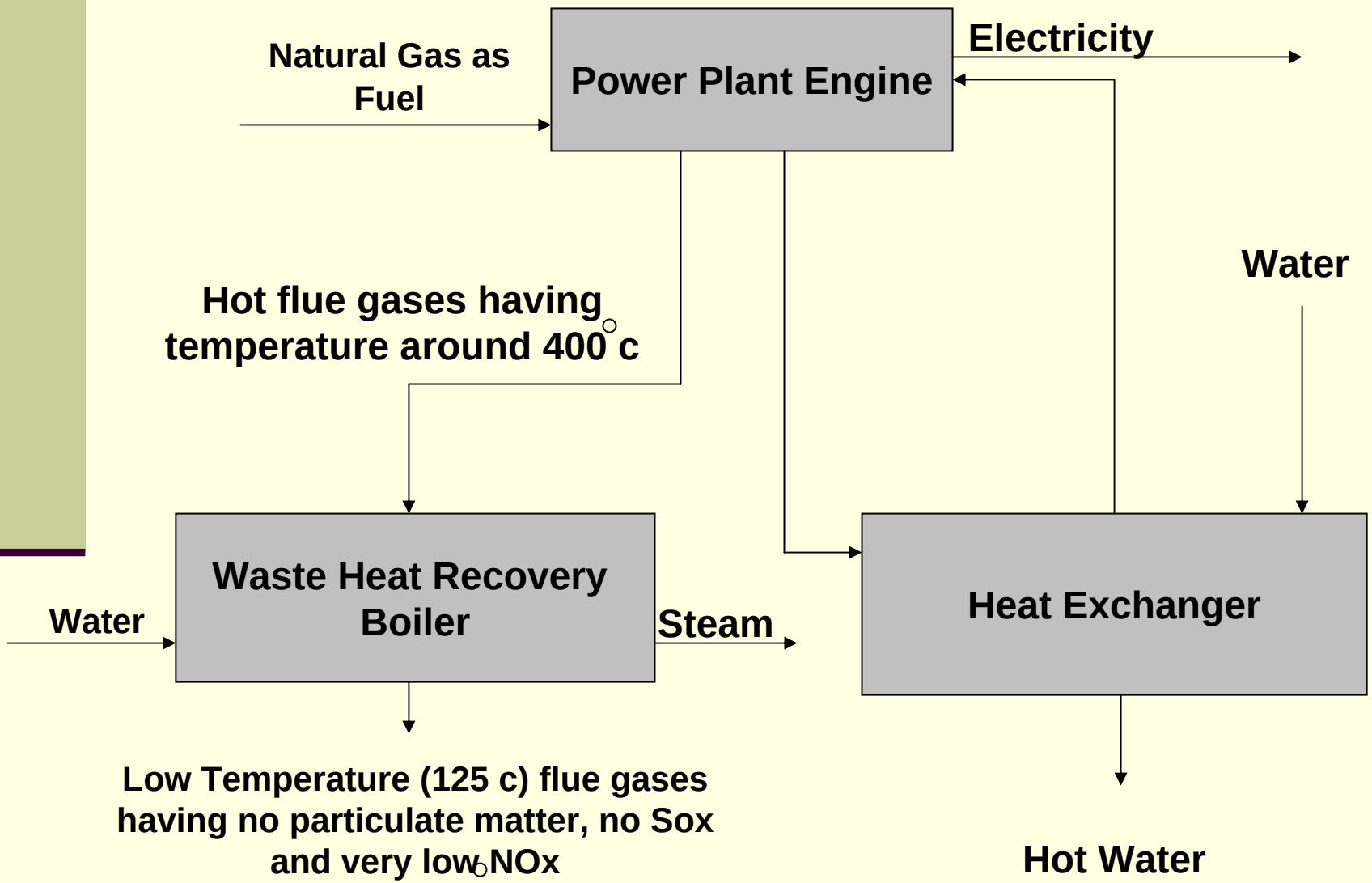
ELECTRICITY SCENARIO

- **T&D network is fully stretched, an investment of at least another $89 billion would be required if the country resorts to central generation alone.**
- **India's aim has been to reform the electricity sector by throwing it open to private-sector investment. But there is still a large gap between intention and action.**
- **Awareness regarding the virtues of DG+CHP/CCHP increasing but there is a need for National level Consensus**

Factors Driving Customer Choice

- High Energy Bills
- Reliability and Power Quality Problems
- Need to Control Operating Costs
- Early Adopters of Technology
- Dissatisfaction with Current Equipment
- Need for HVAC/Infrastructure Upgrade
- Thermal Process Needs

Huebach Colour Ltd.- CHP Experience



Huebach Colour Ltd.- CHP Experience

Form of Energy	EFFICIENCY ON FUEL
Electrical Power	36%
Steam Generation from Exhaust Gases	26%
Hot Water from Jacket/Lube oil Cooling	22%

Capacity: 3 MW
Capital Cost: Rs. 7.91 crores
Payback Period: < 3 Years

Huebach Colour Ltd.- CHP Experience

Benefits:

- Pollution Reduction- NG is Cleaner Fuel and Total Energy Consumption is lower
- Uninterrupted, high quality power leading to smoother operation
- Waste Heat Utilisation leads to lower energy cost

Financial Gains:

- Delivered Power Cost Rs. 3.10 versus Rs. 5.55 of SEB
- Savings of Rs. 20 Lakhs/ Month

Other Initiatives

Like Heubach, many other gas users have already implemented or plan to implement CHP/CCHP to make the most of valuable energy resource:

- **Garden Vareli Group**
- **Colour Synth**
- **Diamond Industry in Surat**
- **Zee Telefilm Studio in Delhi**
- **Some Hotels**

Existence of Captive Power Plants

More for Power Reliability than for Energy Efficiency

- **Central Electricity Authority putting the figure at about 11600 MW while industry experts feel that it is much higher, close to 20000 MW.**
- **industries increasingly relying on their own generation (captive and cogeneration) rather than on grid supply, primarily for the following reasons:**
  - **Non-availability of adequate grid supply**
  - **Poor quality and reliability of grid supply**
  - **High tariff as a result of heavy cross subsidisation**

Opportunity for increase in efficiency by Retrofitting CCHP Technology

Barriers to Captive Power Plants

Concern of the owners of captive and cogen plants stems from:

- **Non-remunerative tariff structure for surplus power**
- **Inadequacies in wheeling and banking facilities**
- **High contract demand charges.**
- **High level of duties and taxes on sale of power**
- **High wheeling losses assumed for power to be sold to grid**
- **Charges for back-up or standby power from the grid are twice the normal rate for captive plants**
- **No formal policy for purchase of cogenerated power (in most of the states)**

Specific changes in policies required to Promote Distributed Generation with CCHP

- Grant nondiscriminatory access to the grid ,cost-based interconnection fees
- Establish clear, explicit rates for standby electricity service to meet infrequent demand
- Purchase excess power from operators of distributed generators at prices consistent with SEBs/Distribution Zone operators -operators could sell their power at prices consistent with the savings to the T&D agencies;

This alone would Ensure that **the customer decides the power generation capacity based on his heat/cooling load requirements to maximise the utilisation of waste heat and hence Total Energy Efficiency**. For example, an Industrial captive plant has captive generators whose capacity was decided on the basis of need for power rather than need for heat. As a result they have HRSGs also and stand alone boilers also.

Reasons why opt for Distributed Generation

- Save Money
  - reduced investment in T&D
  - capacity savings
  - higher energy efficiency
  - enhanced system reliability
- Reduce Pollution
  - improved heat rates result in reduction of total fossil fuels used

The Myth of Economy of Scale- Focus on Delivered Energy

Large central power plants cost less to build than smaller local power plants, but:

- **One new KW delivered from central power plants requires 1.5 kW new plant (55,500 Rupees) and 1.5 KW new T&D, (87,000 Rupees); total of 142,000 Rupees**

- **One new kW delivered from DG requires 1 kW new generation (50,000 Rupees) plus 0.1 kW new T&D (3,700 Rupees); total of 53,700 Rupees per delivered kW.**

What is at Stake!

Business as usual scenario

Capacity Addition by 2012:	**100,000 MW**
Cost	
Power Plants	**Rs.400,000 Crs.**
T&D	**Rs.400,000 Crs.**
Total	**Rs.800,000 Crs.**

Distributed Generation

Capacity Addition by 2012:	**80,000 MW**
Cost	
Power Plants	**Rs.400,000 Crs.**
T&D	**Rs.100,000 Crs.**
Total	**Rs.500,000 Crs.**

What is at Stake!

Savings with Distributed Generation

Fuel Cost (NG Price Rs.10/SCM)	**Rs. 84,000 Crs.**
Capital Cost (Generation+T&D)	**Rs. 300,000 Crs.**

Summary

✓India Plans to double its Generation Capacity in next Decade

✓Coal will remain a dominant fuel for Power generation

✓However Natural gas is emerging as a fuel for Power generation

✓If natural gas has to be used for power generation, we need to extract maximum efficiency out of it

✓We need to learn to think about heat and power Together

✓Enabling factors for Growth of DG are Availability of Gas, Availability of Widespread T&D network, Policy Framework which promotes DG, technologies and last but not the least AWARENESS

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Thank You