



TURBOTECH

TurboTech Precision Engineering Pvt Ltd

A-343, 9th Main, 2nd Stage

Peenya Industrial Estate

Bengaluru - 560 058

INDIA

Phone: +91 80 4122 7224 / 4127 7225

Fax: +91 80 4127 2767

www.turbotechindia.com

Presentation on

Energy Conservation Steam Turbine For Micro CoGeneration

Presented by

V. Kanagarajan

Manager - Marketing

About TurboTech

- Incorporated: 1989
- 120 people, 2 work-centers at
 - A) Peenya Industrial Area, Bangalore
 - B) Nelamangala, Bangalore
- Product Design, Manufacturing
- Assembly & Testing



Business Primary Focus:

- Energy Conservation Steam Turbines (ECT™): 30 kW – 3000 kW
 - High Speed Turbines (12000 RPM)
 - 3 Frame Sizes: Frame Mark 3 (30 to 200 kW)
Frame Mark 4 (Between 500 kW to 3000 kW)
Frame Mark 7 (Between 100 kW to 600 kW)
 - Back-Pressure & Condensing-Extraction
 - Designed for a) Saturated Steam (100% dry)
b) Super heated Steam (up to 460 °C)
- Air- Expander Turbine 250 kW
 - Low pressure vent air from process (4 bar, 65 deg C)



Business Primary Focus Ongoing...

- Quick Start Turbine (QST™) for CSP application
 - Quickstart™ Steam Turbine Generator for Concentrated Solar Power Applications (CSP)- 250kW-3000kW

- Projects under R & D for Defence and others
 - Gas Turbine – 500 kW
 - Oil cooling System for Helicopter
 - Micro Gas Turbine – 45 kW
 - Ammonia Turbo Expander
 - Turbo Charger

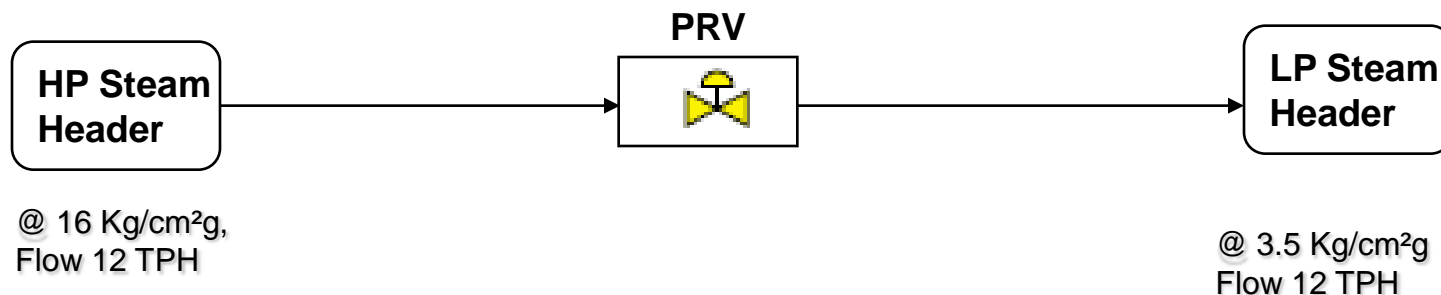


Energy Conservation Solutions

Energy Conservation Steam Turbine (ECT™)
for
Process Industries

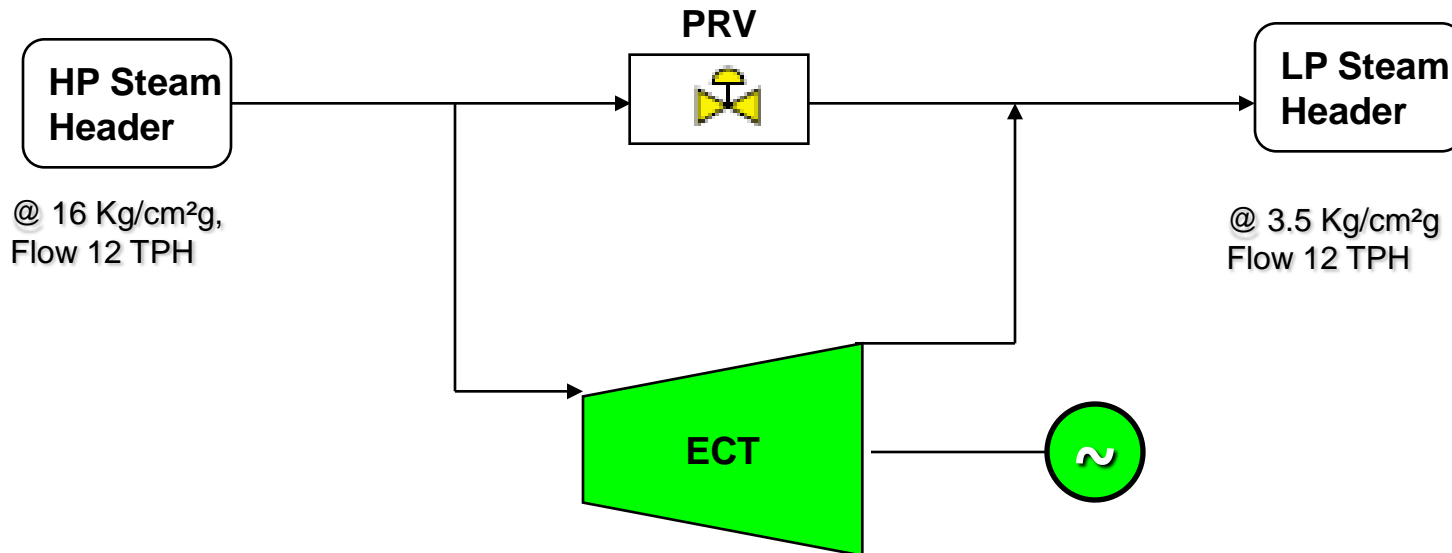
Process Points with No Energy Conservation

EXISTING SITUATION



Process Points with Energy Conservation

TURBOTECH'S SOLUTION



300 kW Incidental Power

Energy Conservation Solutions – The Range

- Specially designed for **Retrofit to Existing Steam Systems:**
 - **ANY** Inlet Pressure from 4 kg/cm² (g) to 45.0 kg/cm²(g)
 - **ANY** Back Pressure up to 14.0 kg/cm²(g)
 - **ANY** Inlet Temperature up to 460 deg C
 - **ANY** Flow Rate up to 50.0 TPH
- **EVERY** P.C.V is a potential **ECT Application Point**

Frame Mark 3 – Built & Ready for Shipping



Rated Power	30-200 kW
Pressure Range a) Inlet b) Exhaust	30 kg/cm ² (g)(Max) 1 kg/cm ² (g) (Min)
Inlet Temperature	250°C (Max)
Steam Flow	Up to 10 TPH
No of Stages	01
Turbine speed (RPM)	12000/14400
Out put (RPM)	3000/3600
Frequency	50 H _z /60 H _z
Voltage	415/380V
Type of Generator	Induction Generator only
Configuration	Back Pressure only
Weight(Approx.)	2000 kgs
Turbine Room size (LxWxH) Dimensions (in mm)	8000x5000x4000

Frame Mark 7 – Built & Ready for Shipping



Rated Power	100-600 kW
Pressure Range a) Inlet b) Exhaust	30 kg/cm ² (g)(Max) 1 ata (Min)
Inlet Temperature	300°C (Max)
Steam Flow	Up to 25 TPH
No of Stages	1,2,&3
Turbine speed (RPM)	12000/14400
Output (RPM)	1500/1800
Frequency	50 Hz/60 Hz
Voltage	415/380V
Type of Generator	Both Induction Generator & Alternator Options
Configuration	Back Pressure, Extraction & Back pressure Extraction cum condensing Full (100%) condensing
Weight(Approx.)	4500kgs
Turbine Room Size (LxWxH) Dimensions (in mm) For Back pressure For Condensing	6500x4000x3000 8500x5500x2500

Frame Mark 4 – Built & Ready for Shipping

Rated Power	500-3000 kW
Pressure Range	
a) Inlet	44 kg/ cm ² (g)(Max)
b) Exhaust	1 ata (Min)
Temperature	440°C (max)
Steam Flow	25 TPH
No of Stages	2&4
Turbine speed	12000/14400
Out put (RPM)	1500/1800
Frequency	50 H _z /60 H _z
Voltage	415/380V
Type of Generator	Both Induction Generator & Alternator Options
Configuration	Back Pressure, Extraction & Back pressure Extraction cum condensing Full (100%) condensing
Weight(Approx.)	15000kgs
Turbine Room size (LxWxH) Dimensions (in mm) For Back Pressure For Condensing	7800x5000x4000 25500x17000x5300



ECT – Features Vs Benefits



- Custom designed
- Fully Automated System
- Runs on Saturated Steam Process Conditions
- Low Maintenance Cost



Demonstrated Unique Installations of ECT

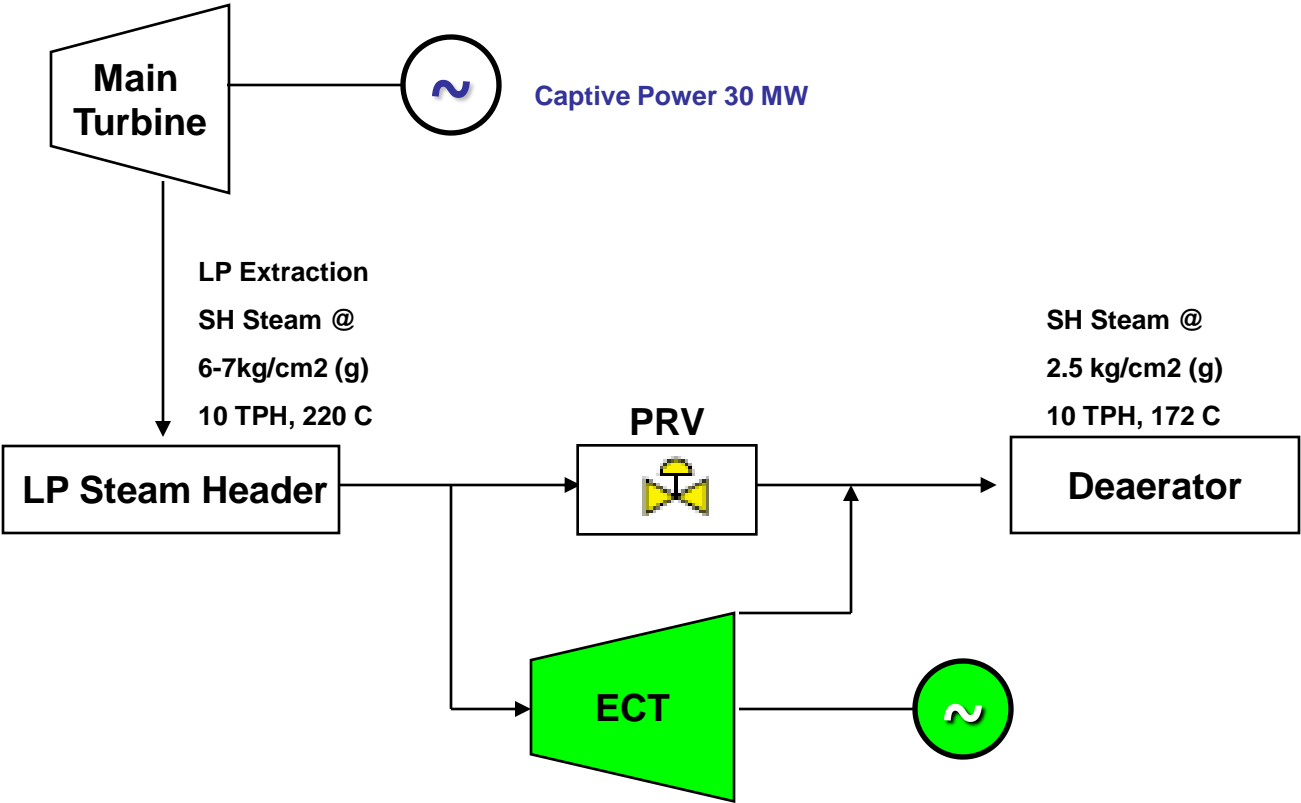
(Location of ECT in the Power/Process Island – Chemical Industries)

Few Best Practices on Energy Conservation

Customer Site Location	Type of Plant	Location of ECT
State of Maharashtra	Captive Power Plant	In Parallel to the PRV upstream of the Deaerator
State of Gujarat	Sulphuric Acid Mfg Plant	Partial Back Pressure Steam from the Turbo Blower
South Korea	Incinerator Plant	Downstream of the Heat Recovery Boiler of the Incinerator
State of Karnataka	Aluminium Mfg Plant	As Turbo Drive to their Boiler Feed Pump.
State of Gujarat	Gas Turbine Power Island	Downstream of the Heat Recovery Boiler of the Gas Turbine
Thailand	H ₂ O ₂ Mfg Plant	Utilizing excess air vented out of the manufacturing process (Air Expansion Turbine)

ECT Installed at a Captive Power Plant

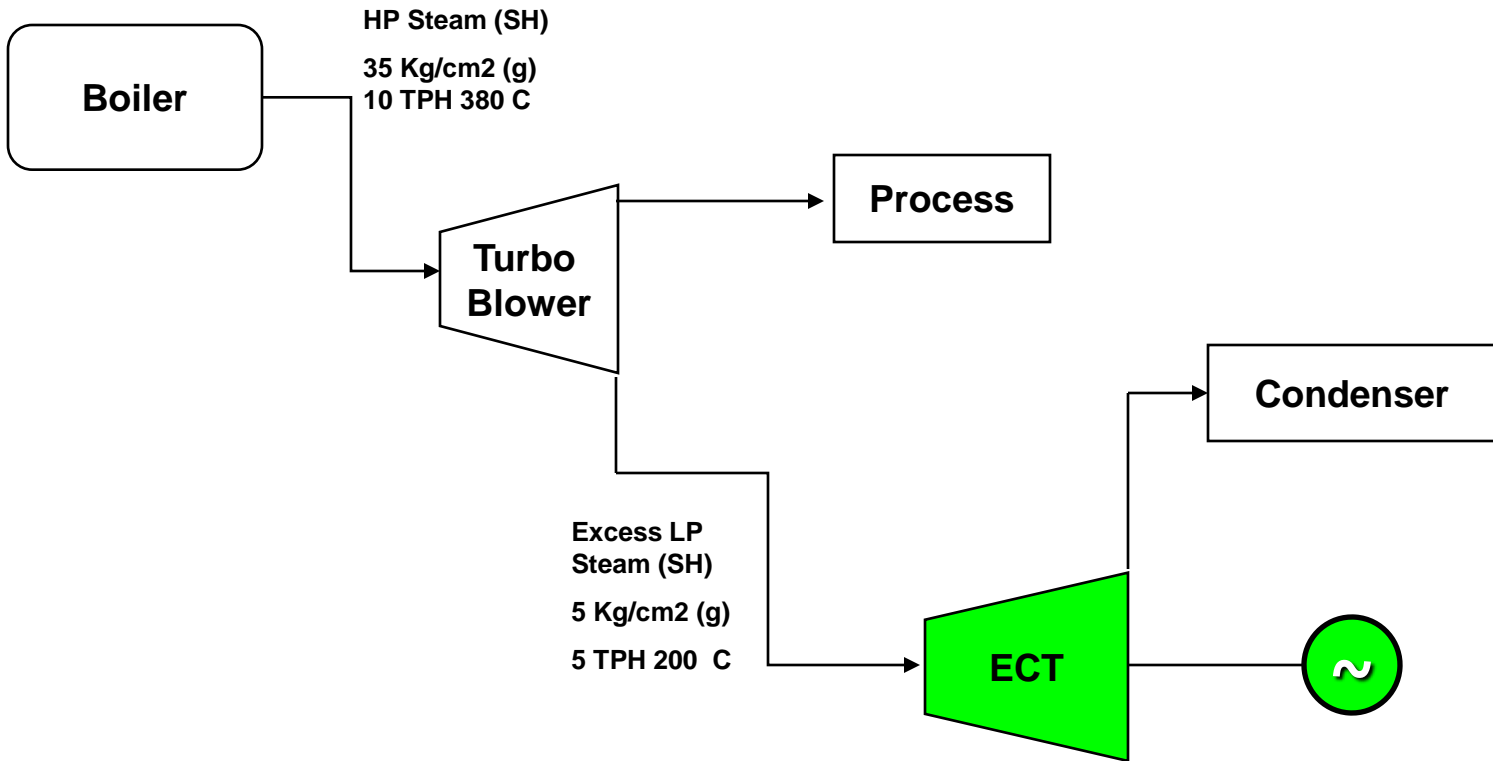
(Schematic Representation – As Installed at a site in State of Maharashtra)



220 kW Incidental Power!

ECT Installed at Sulphuric Acid Mfg Plant

(Schematic Representation – As Installed at a site in State of Gujarat)

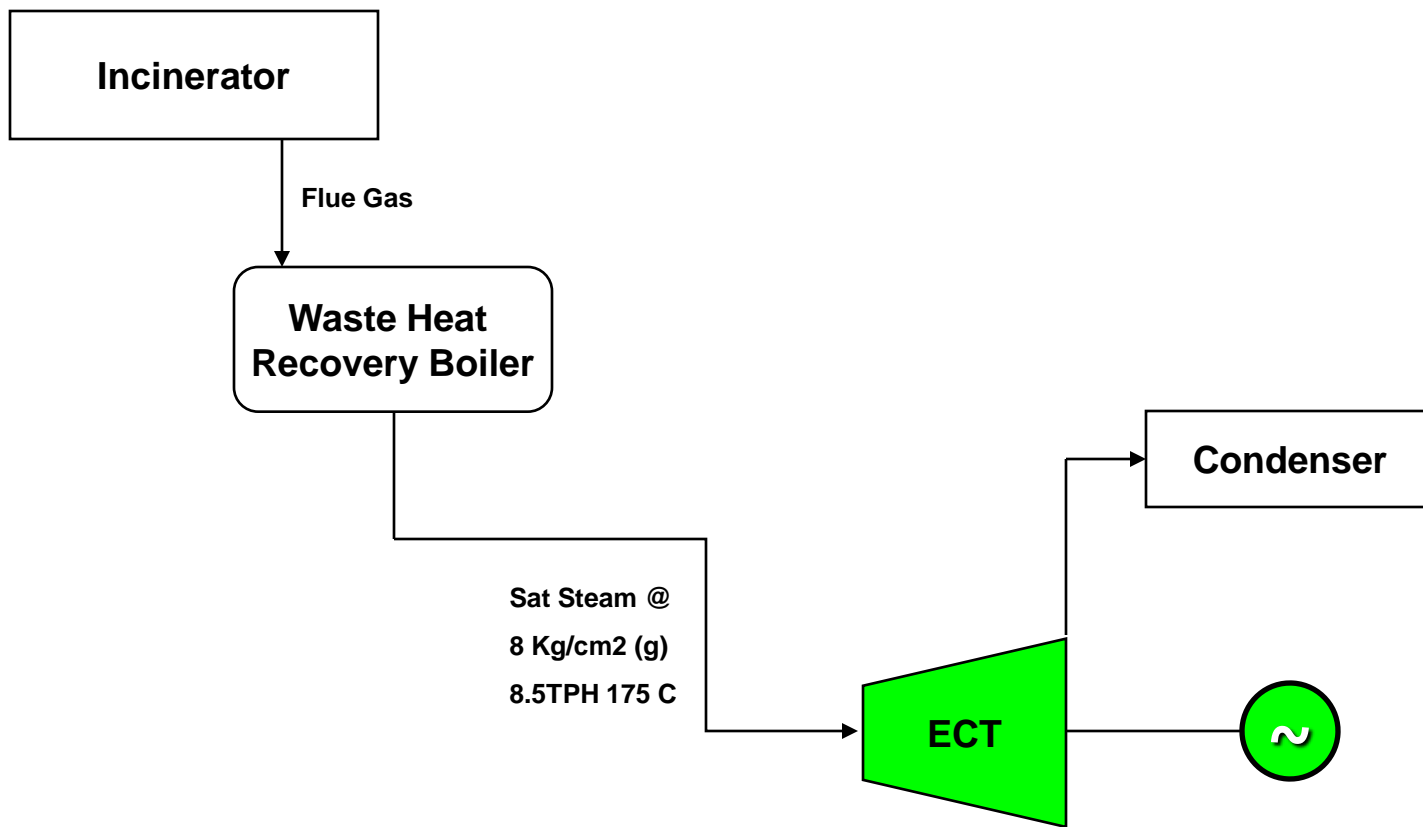


500 kW Incidental Power!



ECT Installed at an Incinerator Plant

(Schematic Representation – As Installed at a Site in South Korea)

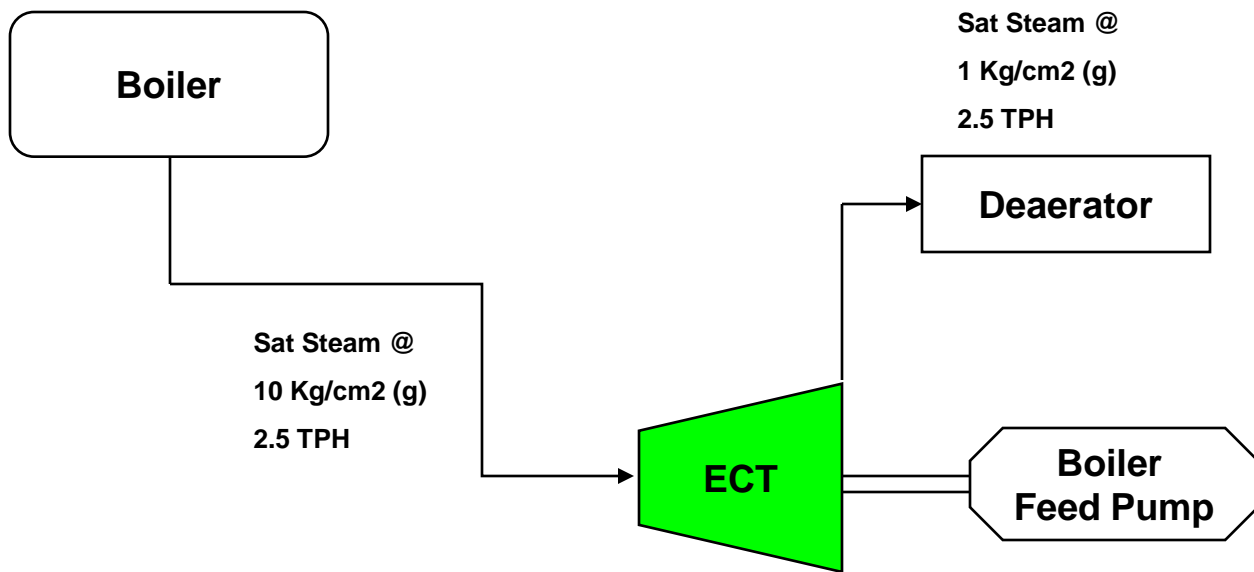


900 kW Incidental Power!



ECT Installed at Aluminium Mfg Plant

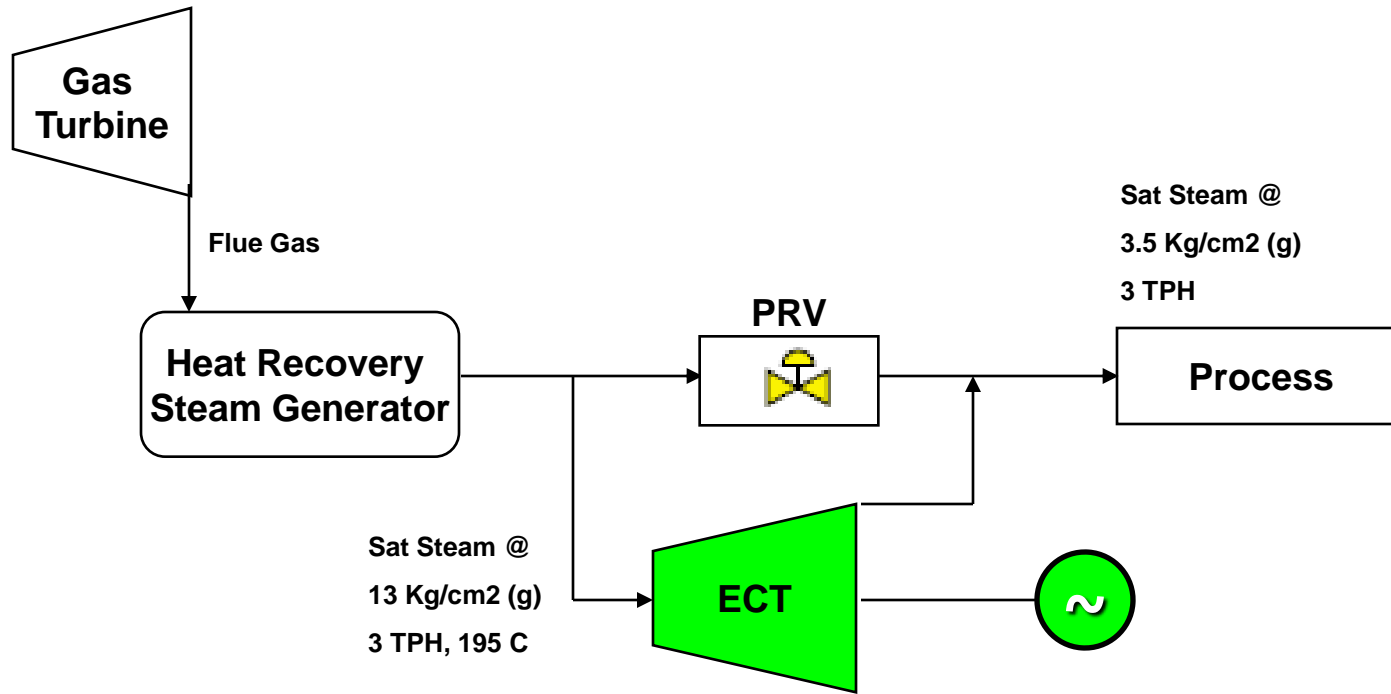
(Schematic Representation – As Installed at a Site in the State of Karnataka)



ECT as Turbo drive 110kWe!

ECT Installed at Gas Turbine Power Island

(Schematic Representation – As Installed at a Site in the State of Gujarat)

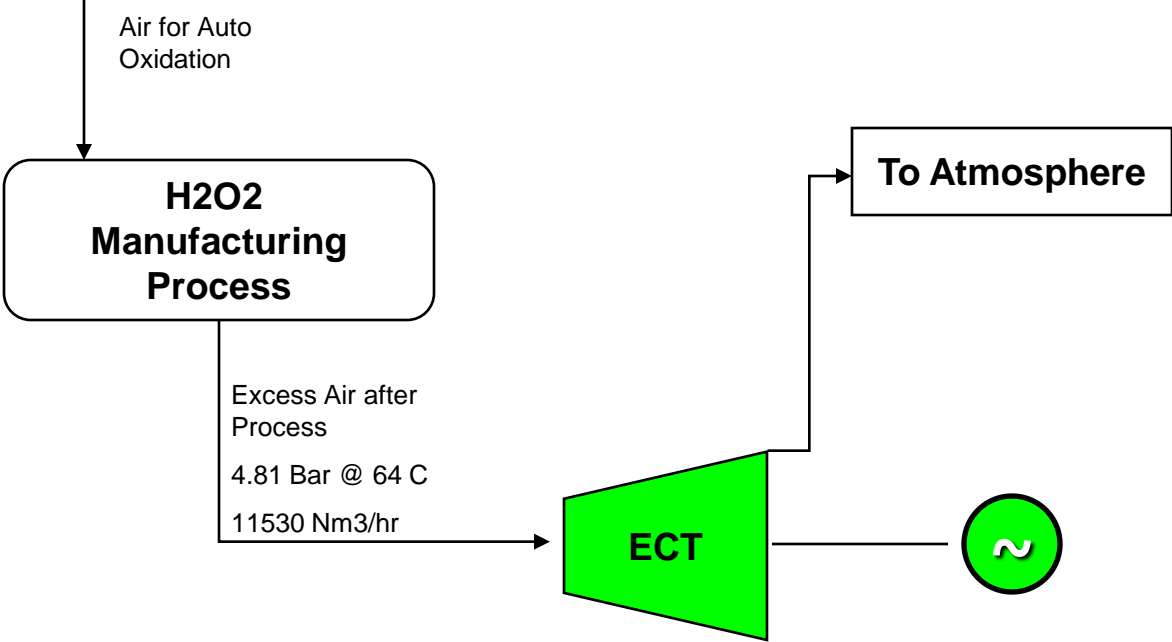


90 kW Incidental Power!

ECT Installed at H2O2 Mfg Plant

(Schematic Representation – As Installed at a Site in Thailand)

TurboTech - First Indian Manufacturer of Air Expansion Turbine



250 kW Incidental Power!



Partial Reference List of Existing Customers (Chemical Industries - Domestic)

IN INDIA

- SHREE SULPHURICS, Ankleshwar, GJ – 500 kW Straight Condensing
- GACL, Bharuch, GJ – 140 kW Back Pressure
- BODAL CHEMICALS, Vadodara, GJ - 260 kW Back Pressure
- ELIOKEM, Ankleshwar, GJ – 90 kW Back Pressure
- GEPIL, Surat, GJ – 421kW- Back Pressure for Waste Heat Recovery System

- HINDALCO, Belgaum, KA – 110 kW Turbo Drive
- SYNGENTA CHEMICALS, Goa – 135 kW Back Pressure
- FINOLEX INDUSTRIES, Ratnagiri, MH – 220 kW Back Pressure
- BILT POWER LIMITED, Bhigwan, Pune – 220 kW Back Pressure

Partial Reference List of Existing Customers (Chemical Industries - EXPORT)

SOUTH KOREA

- EXERGY – PYANGTEK – CHEMICAL INDUSTRY – 535 kW Back Pressure
- EXERGY – KKPC (KUMHO) – PETROCHEMICAL – 640 kW Back Pressure
- EXERGY – ANGANG – INCINERATOR BASED – 900 kW Straight Condensing
- EXERGY – TECHWIN – INCINERATOR BASED – 1275 kW Straight Condensing

THAILAND

- THAI PEROXIDE (ADITYA BIRLA GROUP)– CHEMICAL INDUSTRY
 - 250 kW Air Expansion
- THAI RAYON (ADITYA BIRLA GROUP)– TEXTILE INDUSTRY
 - 450 kW Straight Condensing

PEOPLE REPUBLIC OF CHINA

- ADITYA BIRLA GRASUN – CHEMICAL INDUSTRY
 - 560 kW Straight Condensing



Reference - Performance Certificate from our ECT Customer from INDIA





Reference - Performance Certificate from our ECT Customer from South Korea



August 17th, 2009

Turbotech Precision Engineering Pvt. Ltd.,
A - 343, 9th Main, 2nd Stage,
Peenya Industrial Estate,
Bengaluru - 560 058,
Karnataka, India

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the Turbo generator unit , MK IV, 900 Kwe, straight condensing turbine, supplied by Turbo Tech Precision Engineering Pvt Ltd Bangalore, has been commissioned and running satisfactorily as per the designed conditions and parameters available. The performance of the turbo generator unit at full power found satisfactory.

This turbo generator is installed and running at our Municipal waste Incineration plant ONEARC, situated at Argang, Korea.

(Signature) **ENERGYSOLUTIONS CO., LTD.**

(Seal) **B. Y. LEE / PRESIDENT**

Usage : This certificate can be used to submit for Columbia business activities only if It is usable



Process Industries benefited through ECT

Every Industry using Power and Process Heat can benefit from Energy Conservation through Cogeneration.

We have listed a few below:

CHEMICALS	PAPER	POWER
DISTILLERIES	EDIBLE OIL	RICE MILLS
PHARMA	TEXTILE	METALLURGY

Green Power is the Need of the Hour

Energy Conservation Steps requested from Customer End:

1. Study of HMBD of their Steam Process Plant
2. Identification of Potential Energy Conservation Points
3. Presenting the data for TurboTech's Study

Energy Conservation Support offered by TurboTech:

1. Technical Feasibility Study, Analysis and Recommendation
2. Techno Commercial Offer.
3. Turbines as a Packaged Solution.



Please Contact us at

M/s Turbotech Precision Engineering (P) Ltd

A-343, 9th Main , 2nd Stage, Peenya Industrial Area, Bangalore 560058

Kind Attn: Mr. P.A.Srivatsa, Head - Marketing

Landline: 0091-80-41227224 FAX: 0091-80-41227224 Mobile: 0091-9448992610

Email: marketing@turbotechindia.com, shivatsa@turbotechindia.com

www.turbotechindia.com