RELIABLE | ROBUST | INTELLIGENT

TURTLE TURBINES PRIVATE LIMITED
STEAM TURBINE GENERATORS

We believe, a dependable
Smart Power Source
opens up radical business
avenues for our Customers.

Our Customers benefit immensely
by generating their own
Onsite Distributed Power
which also keeps our planet Clean.

We craft our Products from
First Principles, challenging
the old dogmas.

We build Great Products.
Reliable | Robust | Intelligent.

Introduction

20 years ago an idea was born and a question was asked, how to generate Green Power that is commercially viable? We founded Biogreen Energy Systems to find an answer to this question. Since 1999 we have come a long way in finding an answer, taking time to hone it to the precision required and to deliver working solutions on a consistent basis.

During 2005 we joined hands with Skinner Power Systems of USA in taking our dream forward of delivering reliable cogeneration solutions at sub-MW power levels. Skinner's Steam Turbine technology is time-tested and matured to perfection over the last 150 years since its inception.

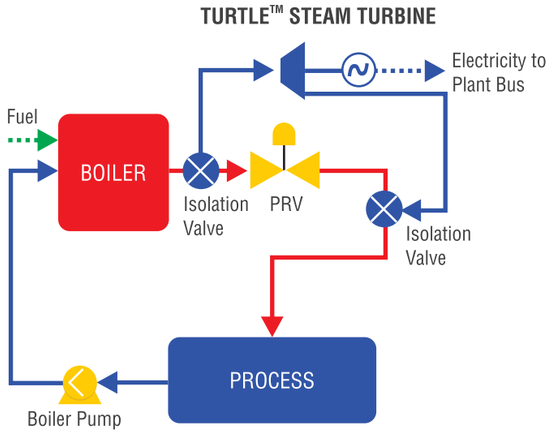
In retrospection, during 2015 we realised our business revolves around providing reliable, robust and intelligent solutions. To symbolise these core qualities, we changed our company's name to Turtle Turbines.

Our pioneering work in integrating Steam Turbines into steam and electrical systems of the process plants has been well appreciated by our demanding customers. With the experience of working in more than 10 countries in different industry segments, Turtle Turbines today is considered as the front runner in the area of cogeneration for small and medium power ranges.

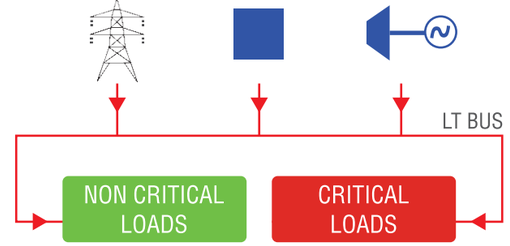
We work closely with all Boiler Manufacturers, Process Plant OEMs and Engineering Consultants to deliver seamless Cogeneration Solutions. PLC based Automated Turbine Controls accommodate varying steam flows and power demands. This also ensures automatic synchronisation with electrical grid and Diesel Generators (DG). Unique Power Protect* schemes can retain your critical loads on turbine power even when the grid fails, avoiding black outs and associated production losses.

We craft great products to the highest technical standards. Every Steam Turbine is factory tested on live steam before dispatch to ensure 100% defect free product delivery. The Turbines are installed at site by trained and experienced technicians. 24 x 7 After Sales Service support is provided by a network of in-house Expert Technicians, backed by a centralised ERP based information management system.

Applications



Process and Manufacturing Industries using Steam for process heating have potential to generate Captive Power by using **Cogeneration Technology**. Steam is generated at high or medium pressure and usually a Pressure Reducing Valve (PRV) is used to drop the pressure to process pressure. A Steam Turbine can be installed to drop the Steam Pressure to Process Pressure and Generate Power. Power is generated at low cost compared to the grid power since only the pressure difference is used to generate power. Thus the investment in **Steam Turbine Generators Gets Paid Back.**



Power generated depends on quantity of steam flow to the process plant. Grid Power or Diesel Generator Power is used to meet difference between the total power demand and the power generated from Steam Turbine Generator. Automated PLC based control system synchronises the turbine power with the grid power.

TURTLE™ Steam Turbine Generators
Truly! Cogeneration, Simplified!!

18 INDUSTRY SEGMENTS
SPREAD OVER 10 COUNTRIES

- Distillery
- Organic Chemicals
- Paper Mills
- Edible Oil
- Dyes & Pigments
- Rice Mills
- Metals & Minerals
- Milk & Dairy Products
- Tea Factory
- Fragrances & Cosmetics
- Starch
- Food Processing
- Biomass Power
- Solar Thermal
- Sulphuric Acid
- Oil & Gas
- Soaps & Detergents
- Food Antioxidants

- India
- Myanmar
- Thailand
- Vietnam
- Kenya
- Uganda
- Nepal
- Philippines
- Indonesia
- South Korea

Case Study

Vegetable Oil Refinery

Power Demand	: 970 kW
Steam Demand	: 12 TPH @ 3.5 barg
Boiler Parameters	: 35 barg 350 °C
Grid Power Cost	: 7.50 Rs/kWh | 0.1 $/kWh
Operating Hours/Annum	: 7200 hrs
Power Generated by Turbine	: 700 kW
Power Drawn from the Grid	: 270 kW

Cost of Power

Before Turbine	: Rs. 523.80 Lakhs | $ 770,295.00
After Turbine	: Rs. 145.80 Lakhs | $ 214,411.00

Gross Savings / Annum	:	Rs. 378.00 Lakhs $ 555,882.00
Less, Maintenance Cost / Annum	:	Rs. 7.50 Lakhs $ 11,030.00
Less, Cost of Additional Fuel	:	Rs. 90.50 Lakhs $ 133,088.00
Net Savings / Annum	:	Rs. 280.00 Lakhs $ 411,764.00
% Of Power Cost Saved / Annum	:	53.50%

The total investment gets paid back within less than a year.

Reduction in the cost of production continues year after year, for 15 years. Also, the TURTLE Turbine Generator maintains a near constant back pressure, improving process efficiency of the Vegetable Oil Plants further.

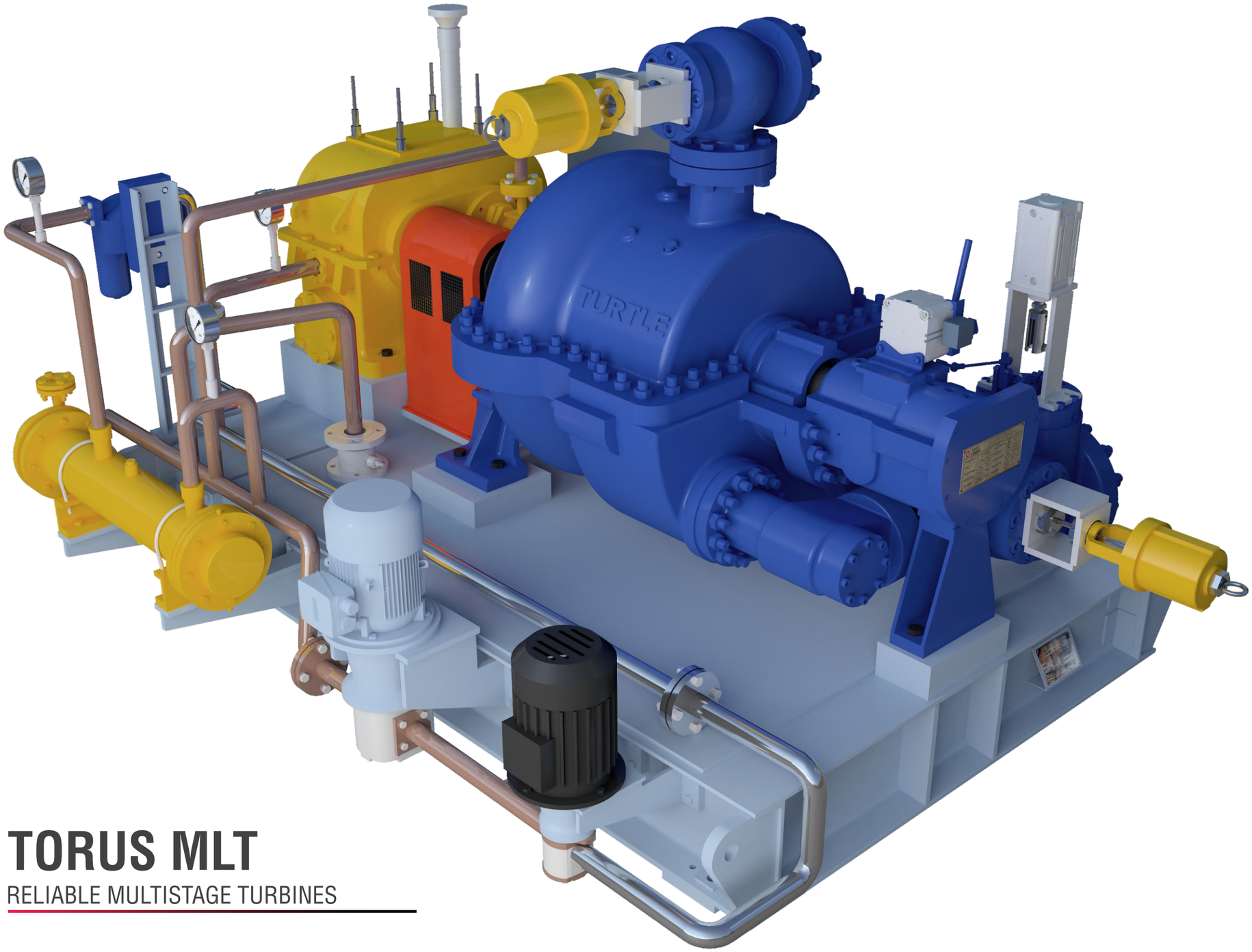
TURTLE Turbine Generators can also work on existing medium and low pressure Saturated Steam Boilers.

Note: Values above are based on certain fuel and other costs which can be different for every case. The savings may thus get affected. Please contact us for specific feasibility calculations for your specific case.

TORUS SGL

API COMPLIANT SINGLE STAGE TURBINES

- **High Efficiency**
  Most efficient Single Stage Turbine for maximum power generation at given Steam Parameters.
- **Low Operating Cost**
  API & NEMA compliant robust design with least number of parts for lowest Operating Cost.
- **Long Life**
  Time tested flawless design for Long Life, created by Skinner's 150 years of legacy with steam.
- **Automated Operation & Grid Sync**
  No additional specialised manpower required, virtually unmanned operation. Auto Turbine Health Monitoring with Automatic Grid Synchronisation at push of a button.
- **Factory Assembled & Live Steam Tested**
  Completely assembled in factory within controlled environment for world class quality and tested on Live Steam before dispatch.
- **Quick Startup and Shutdown**
  Turbine starts and shuts down within the shortest time from Cold Condition and virtually instantly from Hot Condition.
- **Piping & Electrical Engineering Support**
  Engineering support for Electrical, Piping and Room Layouts as part of scope to ensure seamless and successful installation.



TORUS MLT

RELIABLE MULTISTAGE TURBINES

- **High Efficiency**
  Optimised Multistage Turbine designed for highest in its class efficiency delivering maximum power at given Steam Parameters.
- **Extraction - cum - Back pressure**
  Modular design to meet wide industry requirements. Back Pressure Turbine with a built in option for Extraction.
- **Lowest Operating Cost and Long Life**
  Based on time tested design principles, with Reliability as the basic design parameter, leading to lowest Operating Cost and Long Life.
- **Automated PLC based Controls and Grid Sync**
  Automated Turbine Controls and Health Monitoring based on modern PLC based Controls. Seamless Grid Synchronisation at a push of button.
- **Industry Standard Controls and Grid Sync**
  Turbine Controls are also available in Industry standard configuration with Woodward / Voith Governors, Annunciators etc and Industry Standard Grid Synchronisation.
- **Factory Assembled & Live Steam Tested**
  Completely assembled in factory within controlled environment for best quality and tested on Live Steam before dispatch.
- **Quick Startup and Shutdown**
  Turbine starts and shuts down within the shortest time from Cold Condition and virtually instantly from Hot Condition.

VAPORPOWER

ENERGY RECOVERY TURBINES

Energy Recovery Turbine
Practical Energy Conservation Product with quick payback. Recovers PRV pressure drop into useful Electrical Energy.

Quantifiable Reduction in Carbon Emission
Easily measure and report reduction in carbon emission. Potential to earn Carbon Credits, Energy Saving Certificates or mitigate Carbon Tax.

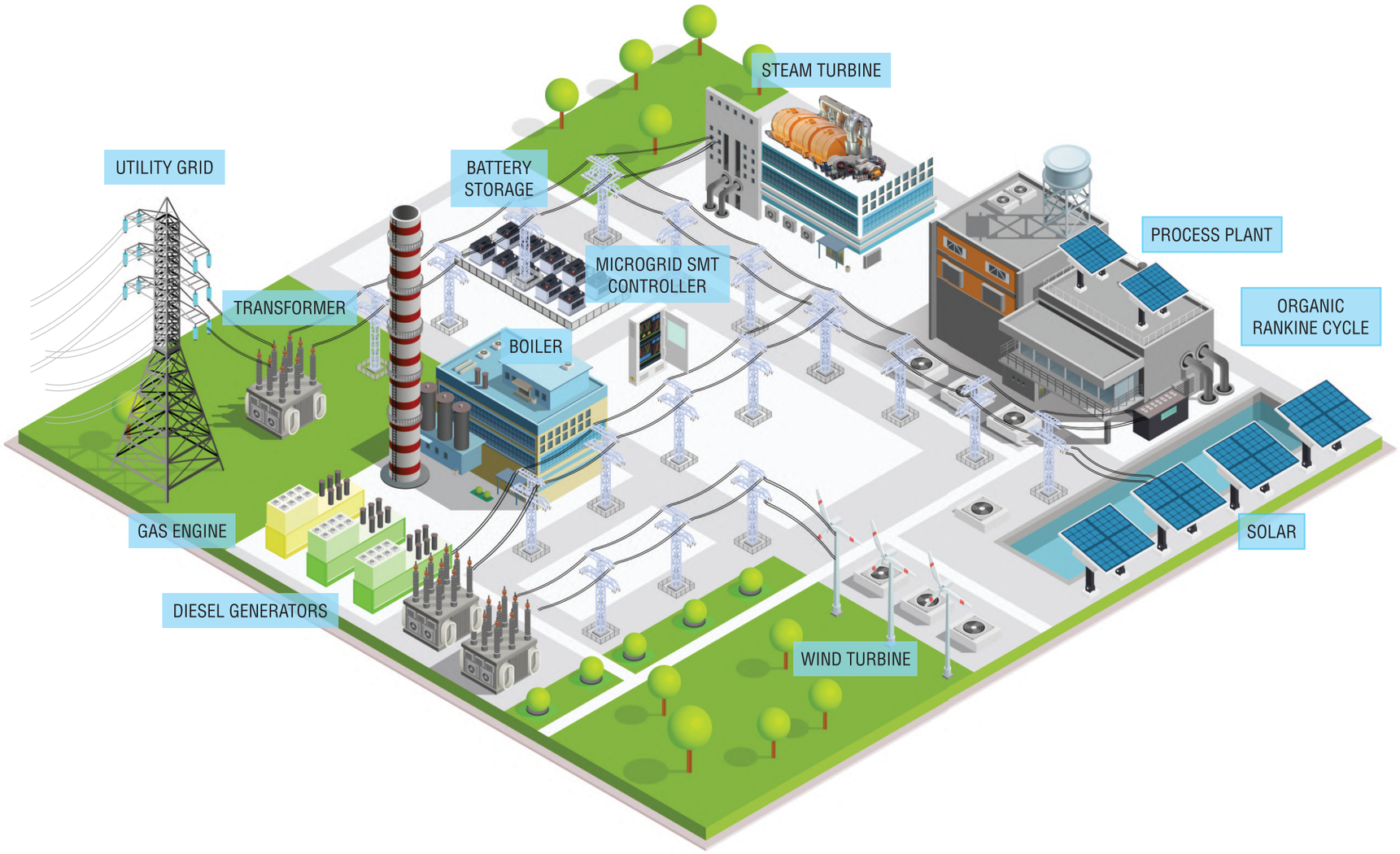
Designed for Saturated Steam
Designed and Time Tested to work on challenging Dry Saturated Steam.

Weather and Sound Proof Compact Product
Packaged in a Weather Proof and Sound Proof compact enclosure. Factory Assembled and ready to install. Live Steam Tested before dispatch.

Accurate Process Pressure Control
Maintains more accurate Process Pressure than a PRV leading to improvement in product quality of the process plant.

Automated Operation & Auto Grid Sync
No additional specialised manpower required, virtually unmanned operation. Auto Turbine Health Monitoring with Automatic Grid Synchronisation at push of a button.

Piping & Electrical Engineering Support
Engineering support for Electrical, Piping and Room Layouts as part of scope to ensure seamless and successful installation.



Microgrid SMT

A SMART MICROGRID

Smart Power Grid within your Factory

With an intelligent choice in your hands on when to use grid power and when to operate completely independent of Grid or in a combination of these, you have complete control over your power cost.

Independence from Grid Failures - 24X7 Power

Your own Grid. Easy to maintain as per predefined maintenance schedule targeted at 99.99% uptime, which means continuous power. No production losses.

Constant Frequency & Voltage - Higher Production

Grid frequency and voltage vary based on the load on the Grid. All your equipment and machinery underperform at lower grid frequency and voltage. Smart Microgrid, when working in island mode, can ensure near constant and optimum frequency and voltage.

No Transmission & Distribution Losses

Transmission losses range from around 3.5% in Europe to 20% in India and more. With Microgrid SMT, the transmission losses are near zero offering straight savings upto 20%.

Highest System Efficiency - Heat & Power + RE

Opportunity to generate Heat, Power and Chilling from a single source of fuel. Renewable Energy sources such as Solar and Wind can be seamlessly integrated. System Efficiency can be as high as 80%.

Onsite Distributed Power - Green Energy Credits

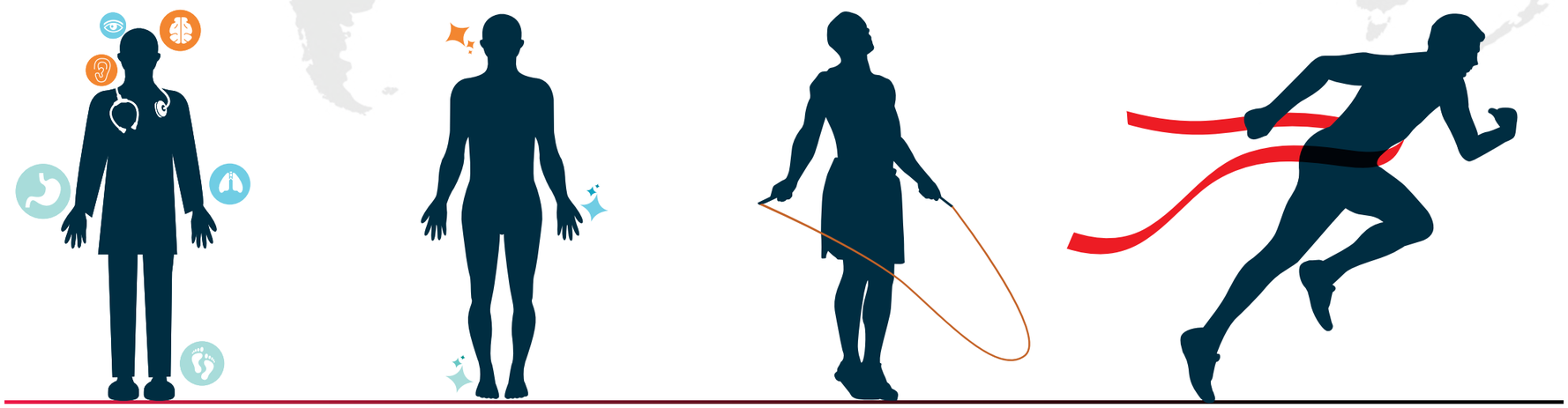
Distributed Energy Leads to reduced CO2 emissions. Validated systems may lead to Carbon Credits, Energy Saving Certificates and mitigation of Carbon Tax.

Freedom to Decide Most Economical Location for the Industry

With Microgird SMT you have the ultimate freedom to decide where your industry should be located - near the Raw Materials, near the Market or near the source of suitable manpower.

TurboVision

REMOTE MONITORING - HYGIENE | HEALTH | PERFORMANCE



Advanced Remote Monitoring System

Most advanced Remote Monitoring System, seamlessly integrated into Turbine Operation and Health Monitoring. Critical operating parameters are mapped and uploaded to Server.

24 X 7 Health and Performance Monitoring

While the Turbine runs unmanned, all critical Hygiene, Health and Performance Parameters are monitored remotely.

Unique Hygiene > Health > Performance Concept *

Based on unique concept of Hygiene leads to Health and Health to Performance. Turbine's Health is continuously monitored to ensure Performance is delivered.

Critical Notifications via SMS to Operator and Manager

Alarms and Trips are communicated by way of SMS to Operator and the Manager to ensure they are attended while Turbine runs unmanned.

Preventive Maintenance

Maximum uptime since TurboVision enables Preventive Maintenance like never before. The data is logged online and analysed to mitigate breakdowns.

24 X 7 Service Support Backup

TurboVision is backed by Customer centric service support with experienced and dedicated Service Technicians and availability of Critical Spares.

Multilevel Responsibilities & Escalation

Intuitive Screens for Operator, Manager and Owner / Plant Head, presenting the exact data needed to take decisions. Unattended Notifications get automatically escalated to the next level.

OEM Screens for Turtle Turbines

Critical issues can be understood and resolved by Turtle Turbines remotely to ensure uninterrupted operation of Turbines even in remote areas.

Online Instant Messaging for Support and Advise.

Operators and Managers can directly chat with Turtle Turbines Service Experts via Online Instant Messaging.

Testimonials

Hugo Douglas-Dufresne
Technical Director
James Finlay, Kenya

We purchased 1000 kVA Back Pressure Steam Turbine Generator from Turtle Turbines during 2008. Complete system engineering was carried out by Turtle Turbines along with supply of equipment and supervision of commissioning.

The system did encounter certain unforeseen issues during the commissioning; however Turtle Turbines put its best efforts and finally sorted out the problems.

I appreciate the dedicated service of Turtle Turbines. The system has been running satisfactorily since then.

Turtle Turbines is technically sound company which believes in customer specific solutions. For our unique first of its kind Vegetable Oil Refinery which runs at low pressure, we purchased a 350 kVA Steam Turbine Generator (STG) form Turtle Turbines in 2005.

The Turbine has unique virtually unmanned TurboSmart™ Turbine Control System developed by Turtle Turbines. For small power users like us, it has proven to be very beneficial as we do not need to hire expensive, trained and skilled turbine operators.

This STG works in load sharing with our local power source flawlessly and all the controls are automatic.

Impressed with performance of this machine, we purchased another 600 kVA steam turbine during 2009 and another two steam turbines of 500 kVA and 1250 kVA during 2017 from Turtle Turbines. All these STGs are working satisfactorily and we wish Turtle Turbines a very bright future.

Bajrang Saboo
Managing Director
Shiv Edibles Ltd., Kota, India

We have installed 350KW Steam Turbine Generator from Turtle Turbines (P) Ltd. Pune, at our factory in Tarapur, Maharashtra. It has been installed and commissioned successfully and has been running continuously since commissioning.

We appreciate the support received for Steam Piping & Electrical related details. The STG was delivered as per committed time frame & installed in our existing setup within limited space and running satisfactorily with local electricity grid. We are pleased with overall performance of STG unit. We wish Turtle Turbines all the best for bright future.

A.S.Dukane
Global Sr. Vice President
Camlin Fine Sciences

References

Some of our reputed customers

- Godrej
- Roquette
- Deepak Nitrite
- Jacobi Carbons
- Camlin Fine Sciences
- James Finlays
- 3F Industries
- Shiv Edibles
- Alkyl Amines & Chem.
- Vedanta
- Thermax
- Hindustan Unilever
- Betul Oil
- Privi Organics
- Sudarshan Chemicals
- Schreiber Dynamix
- Premier
- Embio
- Utopian
- Mirash

Spares and Services

Information Management
Maintenance Schedules are organised and maintained in computerised advanced ERP system. Every Turbine in the field gets undivided attention on preventive maintenance based on these schedules and system generated alerts.

Spares Management
Critical spares are maintained in stock. Spares advisory system ensures general spares are also maintained in inventory at Customer's premises for seamless service delivery.

Expert Technicians Management
Qualified, Trained and Experienced Technicians carry out services based on predefined Standard Operating Procedures (SOPs). Work to be carried out, Spares and Resources required are mapped and monitored using Service Tickets under direct supervision of Services Head

- Pre-Installation Site Visit and Supervision
- Installation & Commissioning
- Hand Holding and Operator training
- Scheduled Preventive Maintenance
- Health Check up & Predictive Maintenance
- Quick Emergency Maintenance

Our Robust Turbines need little maintenance. The intelligence we build in them, tell us if and when maintenance is needed. And we are available 24 x 7 to keep your turbine up and running, 365 days.

Because we care !
We are Team Turbocare !!

TURBOCARE technoservices

Cogeneration, Simplified!

Corporate Office :

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(Formerly: Biogreen Energy Systems (P) Ltd.)

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