Protarget AG

Solar Process Heat and Waste Water Treatment
protarget AG Germany was founded in 2009 to develop, produce and sell turn-key parabolic trough power plants and solar steam boilers.

German based CSP plant and research centre for industrial process heat in operation since 2012.

Commercial solar plants in Cyprus, India and Brazil successfully realised. Further projects in Chile, South Africa and India at financing stage.

Key technologies and IP patented and approved by the German Aerospace Centre DLR and TÜV Germany.

Established Indian supplier base for the production CSP components for domestic use and export.

The key business objectives of protarget are:

- Solar boiler systems to supply process heat or steam for industrial applications.
- Solar waste water treatment for industrial applications.
- Solar power plant engineering and project management for CSP projects world-wide.
Steam Technology

Solar Boiler for Process Steam Generation

- A concentrating solar power (CSP) plant employs rows of large mirrors called parabolic troughs that move about one axis in order to track the sun throughout the day.
- The solar energy is concentrated by the mirrors and heats a working fluid that is then used to generate steam or process heat in a conventional heat exchanger.
Industrial Design

Solar Module CF 100

- Special solar module, designed for process heat and steam supply
- Modular concept with industrially produced components
- Developed in cooperation with the German Aerospace Centre DLR and industrial partners
- Robust design for harsh climatic conditions of India with low O&M cost
- Collector technology empanelled by MNRE and eligible for Indian subsidies
- Optimised solar tracking system
- Length 12m, aperture 3.m, weight 1.6t
Solar Waste Water Treatment
For the process industry

• In various stages of the industrial production, industrial waste water treatment is required

• Protarget offers a solar waste water treatment system using a solar thermal system combined with a Membrane Distillation Unit MD

• A MD system is highly corrosion resistant against chlorides, acids and alkalis

• MD systems are also resistant against scaling which results in minimum maintenance cost

• The solar system provides the thermal energy required for the distillation process

• By integrating a thermal storage, the water treatment system can be operated 24/7

• The technology may be employed, to fully recover the acid that is used in the process

• A solar waste water treatment system can also be equipped with a spray drying unit to achieve Zero Liquid Discharge ZLD

• With a ZLD unit, the system is able to produce and recover the containments from the effluent
Ideal Applications
For Solar Process Heat Generation

Product industry:

- **Pharmaceutical and chemical industry** - Process specific applications, distillation
- **Mining and oil industry** – Ore leaching, galvanic processes, oil recovery, cleaning
- **Plastics and rubber industry** - Heating, cooling, vulcanisation
- **Textile and leather industry** - Dying, shaping, ironing, tanning
- **Cement and ceramic industry** – Drying, burning, calcination
- **Paper industry** – Bleaching, thermo-mechanical pulping, drying

Food and beverage industry:

- **Dairy's and bakeries** - Drying, cleaning, cooking, deep frying, baking, pasteurisation
- **Slaughter houses** – Rendering process, steam cooking, cooling and refrigeration
- **Winery's, breweries, distilleries** – Steam juicing, sterilisation, distillation

**Hotel and tourism industry** - Laundry, heating, cooling, water treatment and desalination
Competitive Advantages
With protarget’s Solar Power Systems

System Design
• Faster construction and assembly of solar systems
• Key components made in Germany
• Boilers and heat exchanger manufactured in India according to IBR
• Robust design for climatic condition of India
• Technology empanelled by MNRE – eligible for subsidies

Receiver tube
• Patented vacuum receiver tube
• 20% lower component cost, 10% higher performance

Heat transfer fluid
• Patented thermal oil for wider temperature range -30°C to 430°C
• Qualified for the food- and pharmaceutical industry (non-toxic)

Control system
• IP on solar field control system and power plant operational strategy
• 10% higher power plant availability

Summary
• With protarget’s Solar Boiler Technology, thermal energy is generated at cost of < 1 INR/kg of Steam, which is equivalent 15 INR/litre of diesel or fuel oil
• Compared to current world market fuel prices of 75-85 INR/litre, protarget Solar Boiler System can generate thermal energy 80% cheaper compared to conventional fuels
protarget AG
Company Presentation

October 2018
CSP – Plants and Projects Worldwide
CSP Projects World-Wide
Technology & Engineering made in Germany

Cyprus

India

Germany

Brazil
protarget built a solar boiler system for the “HATSUN Dairy” in Salem, Tamil Nadu, India. Hatsun is the largest private sector dairy company in India,

- protarget is building a 320kW solar boiler system for Hatsun, feeding steam at 215°C, 20 bar, directly into the main steam system of the dairy.
- The steam is used to dry milk powder and for the production of ice cream.
- The company is currently producing its steam with coal and coal dust, which is still a relatively cheap fuel.
- The Indian government has put a system in place, where companies can deduct investments in renewable energies from their corporate taxes.
- The project started in 2016 was successfully accomplished in November 2017, and successfully operated since then.
- India is World's largest producer of milk, producing 117 million tons of milk annually, with an average growth rate of 4%.
- This project is supported by United Nations Industrial Development Organisation UNIDO, for solar thermal projects in India.
- protarget and Hatsun have signed an agreement to extend the plant to a total capacity of 10 MW
Project in Cyprus

Solar Boiler for Juice Company

protarget has built solar steam boiler system with storage on the island of Cyprus

- The system is supplying solar process steam at 200°C directly into the production process of the Cypriot Juice company Kean in Limassol
- This project in Cyprus combines two technological innovations:
  - Operating the solar field at 430°C (protarget system) instead of 400°C (benchmark) using a newly developed an environmentally friendly silicone oil.
  - The system is also equipped with an new and innovative storage system that is capable to supply thermal energy 24/7.
- Both features are unique and have never been achieved before in a commercial CSP plant world wide
- Due to its innovative character, this project has be supported by the European Union
- The plant was commissioned in Mai 2018 and has been successfully operated since then.
Project in Brazil

Owners Engineering & Supervision

Protarget is responsible for the engineering and construction supervision of the first CSP plant which will be constructed in Brazil.

- The Brazilian electricity regulatory agency (ANEEL) encourages electric companies to invest in research and development (R&D) projects that employ innovative technologies for the energy sector.

- CESP – Companhia Energética de São Paulo, a São Paulo state-run utility company – joined his initiative. It invested in an R&D project on the installation of a CSP parabolic trough pilot plant for joint electricity generation.

- The CSP system will have an electric capacity of 0.5 MW and is equipped with a steam turbine and a thermal storage system.

- The project will be realized on the premises of an existing hydro electric plant in Porto Primavera, located in the west of São Paulo State.

- Protarget is responsible for carrying out the owner’s engineering for the entire power plant project and for supporting the construction firm in the management and execution of the project.
Project in Germany
Solar boiler & CSP technology centre

The solar steam boiler technology, developed at protarget’s technology centre in Munich Germany, is in operation since 2012. This centre is used for the optimisation of new CSP components as well as a training centre for protarget’s customer and technology partners.

- Modular units of two rows of parabolic trough modules, 96m in length, each made up of 8 CF100 collectors
- Nominal thermal power – 250 kW, Peak power – 320 kW
- Generating process heat in the range of 80 – 400°C
- Nominal steam yield – 300 kg per hour - replacing 50 tons of fuel oil per year!
- Fully automatic operation, remote monitoring and control system, to reduce supervision to a minimum
- Only routine maintenance required, largely limited to mirror cleaning of circa 20 times per year
- Available as hybrid with oil or gas fired boiler for full operational flexibility.
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