

BOSON ENERGY develops and delivers
future-proof impact technology for energy,
waste, water, and (e)mobility solutions

Affordable distributed co-generation
solutions based on solid fuels – with system
design criteria for high availability

True **In My Back Yard** solutions that build
local **resilience** and prosperity in both
developed and developing markets

Re-sil-i-ence / rɪˈzɪliəns /

1. The capacity of a system to cope with and quickly recover from difficulties and change – be it sudden or shifting conditions over time. In Energy, specifically in the context of local/regional energy security challenges, climate change, changing market conditions, etc. Examples are 'Island solutions'
2. The ability of a substance or object to spring back into shape, elasticity

In My Back-yard / ɪn maɪ bækˈjɑːd /

1. Used to express welcoming by local citizens to the locating in their neighborhood of a project that adds value to the community; providing local positive economic impact (e.g. energy security, local jobs and prosperity) while respecting or improving environment, health and habitat.



BOSON ENERGY

THE IMBY COMPANY

BOSON ENERGY is at the forefront of the global energy system transformation towards distributed generation and integrated utility solutions

The global growth in population and energy demand, combined with increasing pressure for energy supply to meet resilience conditions; drive the current energy system transformation.

In developed markets; intermittent power, subsidies, and network costs put pressure on the energy business and energy systems and the central generation business model is stagnating. As a consequence, the demand for final energy contracting inside-the-fence is growing rapidly, driven by industrial and commercial clients' ambitions to increase control, independence and energy security. Considerable efforts are also made to develop smart grids, micro/macro-clusters, and island solutions.

Developing and emerging markets need highly resilient energy systems to sustain growth, create prosperity and build climate resilience. The global middle class will increase by 3 billion people until 2030, which will drive non-OECD energy consumption up 61% from 2011 to 2030 (OECD, BP). Energy efficiency initiatives (LED lighting etc.) mitigate power demand growth, but also increase the share of the final energy consumed from thermal applications like cooling to 70% and growing – building peak loads and stressing weak infrastructure even more.

Primary Applications

BOSON ENERGY's primary applications are **Power and Heat or Cooling**. Storage has been added to improve the flexibility of Boson's solutions: storage of power, as well as thermal storage; both short-term and seasonal geothermal. Other derived applications include absorption cooling, district cooling, and cold-grid district heating.

Predictions of more than 100 GW of distributed power capacity additions per year 2020-2030

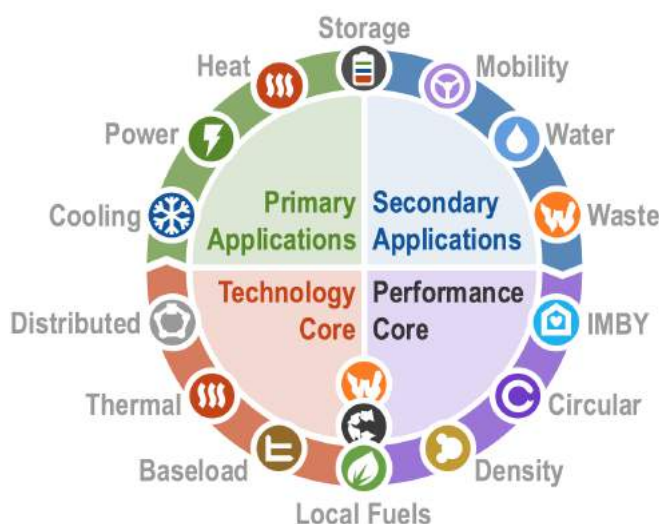
Technology Core

BOSON ENERGY was started in 2009 to develop high-temperature gasification technology for solid fuels to deliver resilient future-proof solutions meeting the Performance Core requirements. **Distributed** solutions for Cost, Speed, Flexibility, and Redundancy – on-grid and off-grid, and as a key component of island solutions and micro-clusters.

Thermal for Combined Thermal and Power Solutions with high final energy efficiency. **Baseload & Commercial** for low system cost and high energy security; at industrial/commercial capacity (1-5 MWe + 2-9 MWth) to support local growth and prosperity building. Key requirements on technology and systems include commercially competitive performance on both CAPEX and OPEX over life cycle.

Modular Utility Solutions by BOSON ENERGY

BOSON ENERGY is built on a dual foundation – split in **Performance and Technology**. From that foundation a number of Primary and Secondary Applications have been developed. Based on those applications BOSON ENERGY and its partners develop, build, and integrate complete modular, resilient, smart, and circular solutions for supply of utilities delivering true impact, and prosperity building in local communities. The solutions are fully enabled with IoT infrastructure; smart sensing, connectivity, data analytics, and deep learning.



Secondary Applications

Water and Waste solutions are essential for Utility Solutions that aspire to meet Performance Core requirements. To respond to the existential challenge posed by scarce water supply for communities across the planet, BOSON ENERGY has added **management of wastewater** and production of freshwater to the island solutions portfolio. BOSON ENERGY's substantial experience in **Plasma Assisted Gasification** handling Light Industrial Waste, Municipal Solid Waste, Refuse-Derived Fuel; offers Waste-to-Energy and Waste management solutions that are critical to the sustainability of cities and communities. Secondary Applications also include (e)**Mobility** as a natural part of storage infrastructure, and to reduce emissions and reliance on imported and fossil fuels.

Performance Core

BOSON ENERGY has defined requirements on solutions to meet the energy system challenges of the future: **High Final Energy Density** – for acceptable final energy output per footprint, per CAPEX, etc. Highly **Circular** – for sustainability, cradle-to-cradle energy efficiency, and performance-over-lifetime technology and business models – including water footprint and emissions. **IMBY** (In My Back Yard) meaning municipality and metropolitan compliant for positive impact to communities and environment. Run on **Local (Solid) Fuels** such as biomass, zero-emission coal, or zero-emission waste for local long term skilled jobs and revenues, high energy security; less need for transportation in the energy system, and improved local/regional/national trade balance.

BOSON ENERGY is your provider of modular utility solutions and island solutions

The struggle of centralized generation

Low final energy efficiency where thermal energy is a cost rather than a source of revenue

Low resilience with grid dependence and impact of intermittent generation

High financial, environmental, and political uncertainty stalls high CAPEX investments

Generation plus transmission is expensive CAPEX on CAPEX infrastructure that struggle with profitability at wholesale prices

The advantages of distributed solutions

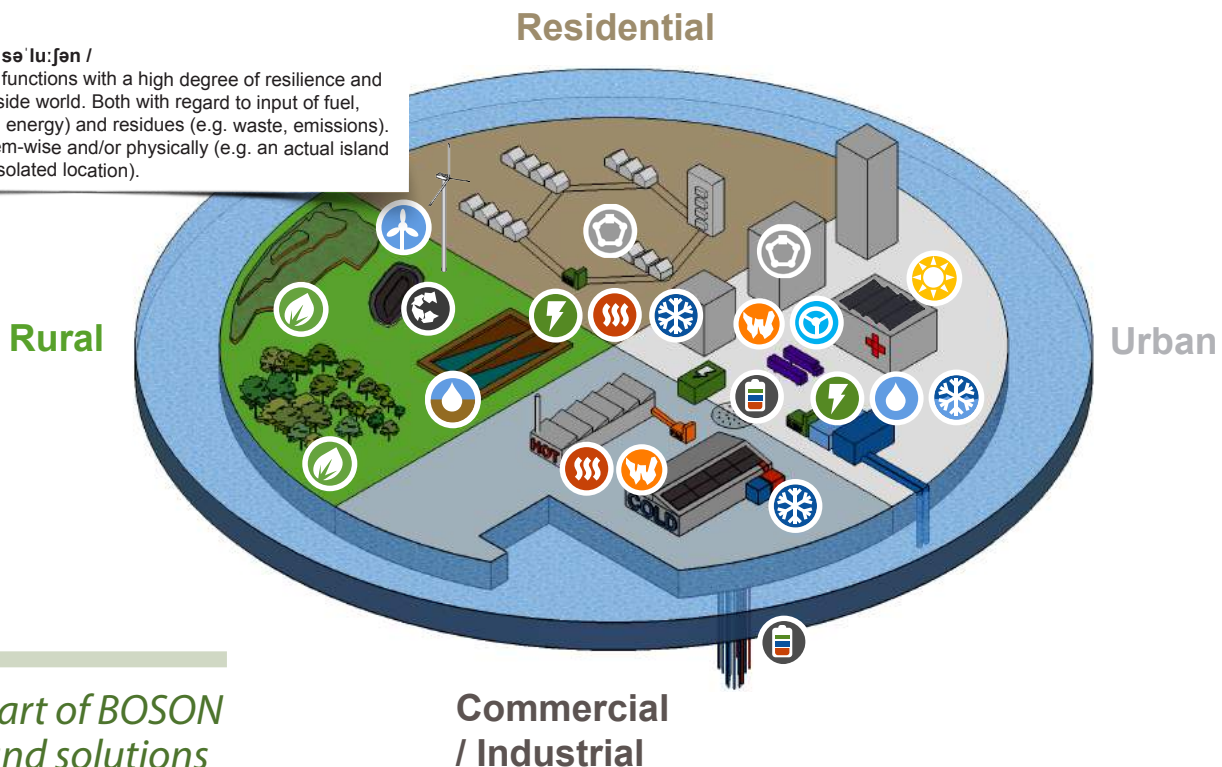
Local Generation: efficient use of thermal energy; and possibility for inside-the-fence generation as a service

(Off-grid) hybrid systems can offer high resilience, high final energy efficiency, high cost- and capital efficiency, high energy profile flexibility; and a future-proof energy system based on solid fuels.

Suitable for urban sprawl and greenfield urbanisation; by minimising costly infrastructure, building social license, and cutting time for permitting and construction

Is-land So-lu-tion / 'aɪlənd sə'luːʃən /

1. A solution or system that functions with a high degree of resilience and independence from the outside world. Both with regard to input of fuel, output/use of products (e.g. energy) and residues (e.g. waste, emissions). Can be delimited only system-wise and/or physically (e.g. an actual island in the sea or an otherwise isolated location).



CHP at the heart of BOSON ENERGY's island solutions

The Boson Energy Unit CHP is powered by H3TAG technology: high temperature gasification technology designed to achieve 100% stability, 100% repeatability; and 90% availability. BOSON's solid fuel gasification is unmatched on low environmental impact (GHG, NOx and SOx, particulates, water, carbon capture ready); while maintaining high final energy efficiency (80%) and high capital efficiency.



BOSON ENERGY is offering 'SIRIUS' solutions to the future energy system challenges (Smart, Resilient, Integrated, Impact Utility Solutions). SIRIUS integrates Power, Heat, Cooling, Storage, Water, Waste, and (e)Mobility solutions to build smart and truly resilient utility systems. The SIRIUS concept provides solutions suitable for urban, industrial, residential, and rural areas.

BOSON ENERGY & Partners

BOSON ENERGY's founders and core team have substantial technical, commercial, and execution experience in thermal systems, combustion efficiency, high temperature gasification, coal-to-biomass conversion, and pollution control by primary methods. BOSON ENERGY is a developer and owner of proprietary technology, but also an integrator of solutions. BOSON ENERGY has built up an extensive network of partners; global brands as well as global niche leaders – both on the technology side and the execution side.

BOSON ENERGY's key partner is **Paul Wurth S.A.** (SMS group); shareholder and global leader in high temperature engineering, development, and execution. BOSON ENERGY's engineering team is fully integrated with Paul Wurth. BOSON ENERGY also benefits from Paul Wurth's global market foot print and 145 year history as a credible and highly competent execution partner.



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