

**BUSINESS
FINLAND**

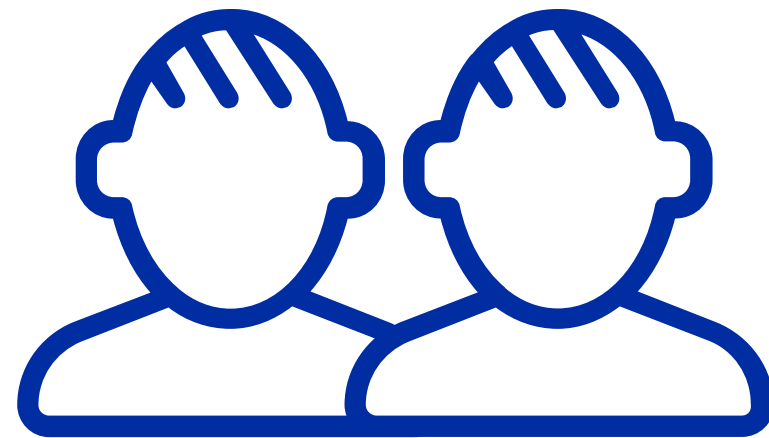
WORLD IDEAS IN ENERGY



FINNISH COMPANIES ENSURE THE BEST AVAILABLE TECHNOLOGY AND SUSTAINABLE & EFFICIENT USE OF RAW MATERIALS

- Decades of experience with woody biomass, agro waste and municipal solid waste (MSW)
- World-class equipment and systems that radically increase the efficiency of supplying raw materials without risking the sustainability aspect
- Best solutions for both large-scale and small-scale decentralized units.

BEST PRACTICES FROM FINLAND



80%

Holistic solutions from raw material collection to energy production

Share of bioenergy in renewable energy production

99%

of Municipal Solid Waste (MSW) is recovered either as energy or by material recycling

WHAT DO WE OFFER

MUNICIPAL SOLID WASTE TO VALUE

- Smart Waste Collection
- Waste pre-treatment & separation
- Waste to Energy (W2E) solutions for landfill reduction

SUSTAINABLE BIOENERGY SOLUTIONS

- Smart & Sustainable Forestry
- Combined Heat & Power (CHP) generation
- Off-grid solutions

ADVANCED BIOFUELS

- 2nd generation liquid biofuels
- Waste based biogas for vehicle fuel
- Circular economy solutions

HIGH EFFICIENCY POWER PLANTS

- Fuel receiving & handling systems
- Boilers, burners, micro turbines
- Turn-key solutions including O&M services

CONSULTING SERVICES

- Feasibility studies
- Forest value chain consulting
- Educational & training services



MUNICIPAL SOLID WASTE TO VALUE

- Only 3% of MSW end up in landfills (2016)
- Valuable end products include recycled materials, energy, biofuels, fertilizers
- Proven results from efficient Public Private Partnership (PPP)

BMH TECHNOLOGY

Company background

BMH Technology specializes in turnkey deliveries of SRF (Solid Recovered Fuel) production plants and solid fuel handling systems for power plants and cement kilns.

Products & services

- Turn solid waste into high-quality, homogeneous fuel, and meanwhile recycle metal and other valuable substances.
- SRF, as a substitute for traditional fossil fuels, such as coal, gas, oil etc. to be used in CFB boiler and cement plant
- Increase electricity efficiency and boiler operation hours
- Low emissions, such as CO₂, NO_x, etc.



CROSS WRAP OY

Leading waste industry solutions from the leading manufacturer

Cross Wrap builds and installs automatic stretch-film bale wrappers to pack various waste materials and recyclables for transport and storage.

A bale is an efficient way to handle, store and transport waste – and if you so choose, to reuse it i.e. as a source of energy. Wrapped bales are environmentally friendly, effective and economical.

CROSS WRAP OY'S unmatched experience, combined with its leading-edge patented technologies, means that it can deliver an effective, economical and environmentally friendly wrapping solution for every waste management challenge.

20 years – 400 machines – 50 countries



ECOMOND

TCOS – Logistics & Field Service Management and Optimization Software

ECOMOND is a software company specialized in Field Service Management and Optimization software TCOS – Logistics Control

TCOS is a modern non-industry specific solution for managing operations in various businesses from waste management to healthcare and from services to logistics. The solution is made for handling the Logistics or Field Service Management chain with large number of transactions and can be integrated to almost any other software like financial, ERP, HR etc.

Benefits

- 10-30% savings in the operational costs
- Improved customer satisfaction and typically over 50% reduction in manual work
- 80-90% less time in planning needed and hugely improved reaction rate into changes
- 100% transparent and optimal operations in any situation
- Typical pay back time 3-6 months



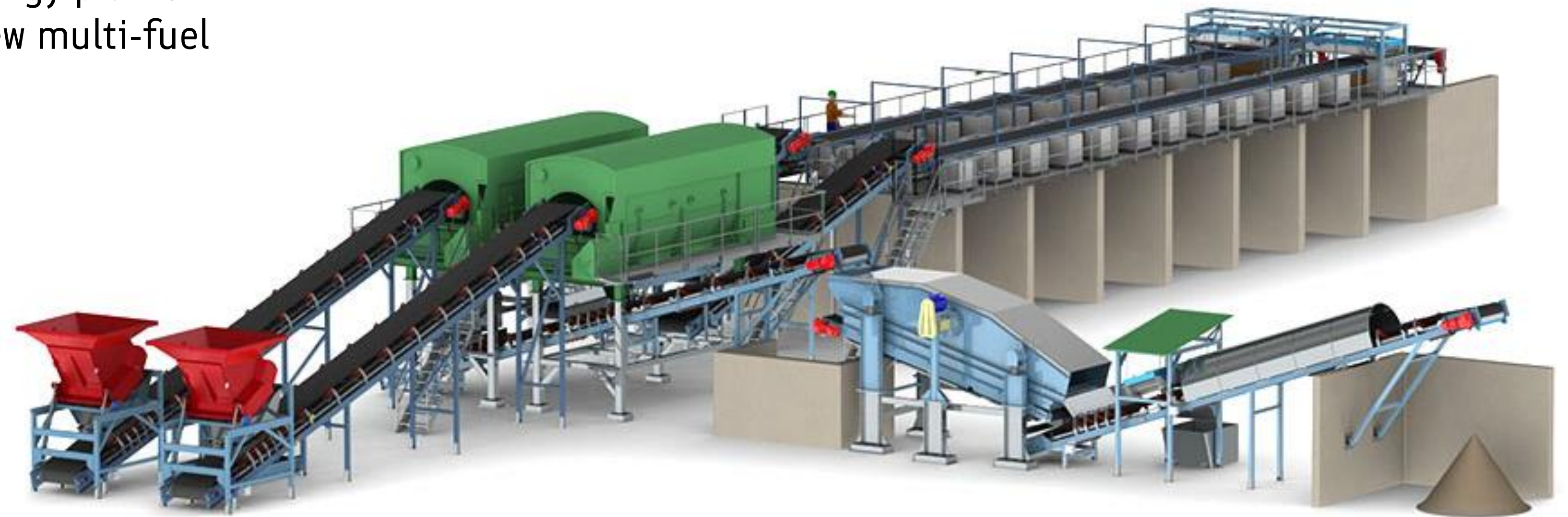
FERROPLAN

Company background

Ferroplan provides the best available technology for sorting and recycling municipal solid waste, fuel producing for biogas and waste-to-energy plants. Ferroplan is proudly presenting it's new multi-fuel energy plant.

Products & services

- Waste sorting and treatment
- Waste to energy solutions



ICVF LTD

Designing waste-to-energy epcm projects

ICVF Waste to Energy plant deliveries enable environmentally friendly and economically feasible electricity production turning Municipal Waste to electricity and other side products.

- Technologies and processes developed for solid waste incineration in Finland have been tested in variety of harsh climates.
- Applying these proven methods to municipal waste, an average of 20 MWh of electricity can be produced from the volume of each 1 million people waste.



MOLOK OY

Your partner in waste collection

MOLOK Oy is a company manufacturing, marketing and selling Molok® semi-underground DEEP COLLECTION® waste containers.




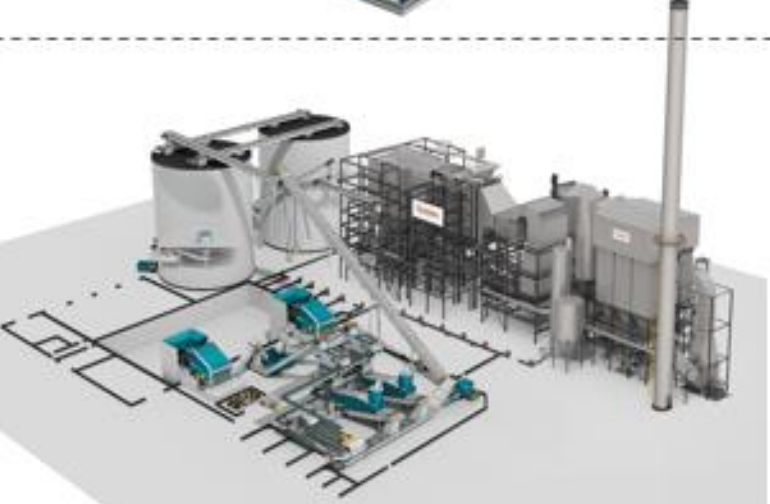
- Leading manufacturer in the world 140 000 installed waste containers in more than 40 countries.
- Benefits of the innovative Molok Deep Collection System
 - Huge underground collection capacity
 - Vertical design compacts waste
 - Long emptying intervals
 - High collecting efficiency
 - Low emissions



OUTOTEC

Outotec's strong market position and technology leadership are based on the knowledge and experience derived from the past 150 years of operations.

- Minerals Processing
- Metals, Energy & Water, including:
 - Innovative waste-to-energy solutions for biomass, sludge, agricultural and industrial by-products as well as sorted waste
 - Solutions for oil winning from oil shale and phosphorus recycling from sewage sludge ashes
- Services, covering full plant lifecycle from supplying an individual spare part to comprehensive maintenance and operations solutions

	Technology package, (EPS)	Plant package, (EPC)
Sludge Incineration (SIP)		
Waste-to-Energy (WtE)		
	Sludge Incineration (SIP) <ul style="list-style-type: none"> • Municipal sludge at >20% solids • Self-sustained combustion (>95% FB) • Incineration to generate low energy steam & recover phosphorous from ash 	Waste-to-Energy (WtE) <ul style="list-style-type: none"> • Solid waste & biomass at 60 - 80% solids • Material & output efficient combustion • Incineration to generate GREEN steam, heat and electricity at high availability

VALMET

Valmet's energy solutions

- Valmet is a **reliable technology partner** in changing energy markets. We know how to combine energy solutions based on biomass, waste and fossil fuels. We enable you to make the most out of them for energy generation.
- Together we can develop **innovative solutions** based on our decades of experience and wide technology, services and automation offering.
- Our offering covers process technologies – combustion and gasification - for biomass, waste (RDF, SRF) and multifuel solutions
- **A multifuel boiler** gives the flexibility to choose the most economic fuel based on availability and price. Valmet's HYBEX and CYMIC boilers, CFB gasifiers and air emission control systems ensure high efficiency and reliability with low emissions – even with the most challenging fuel combinations. Our advanced services and automation solutions improve the reliability and performance of your processes.



WOIMA

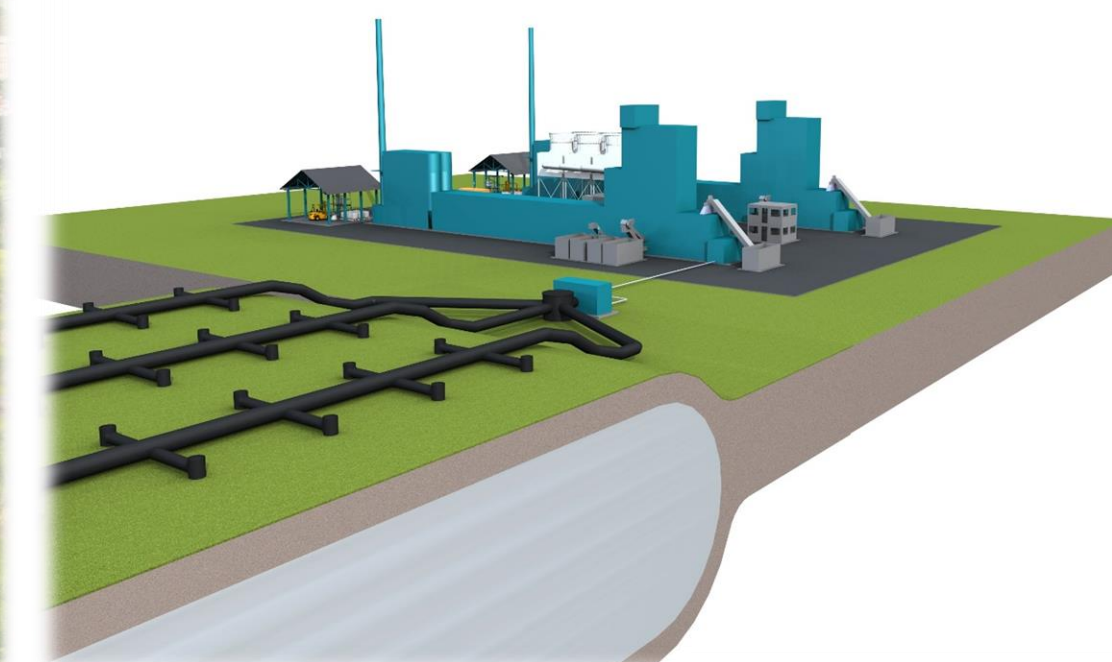
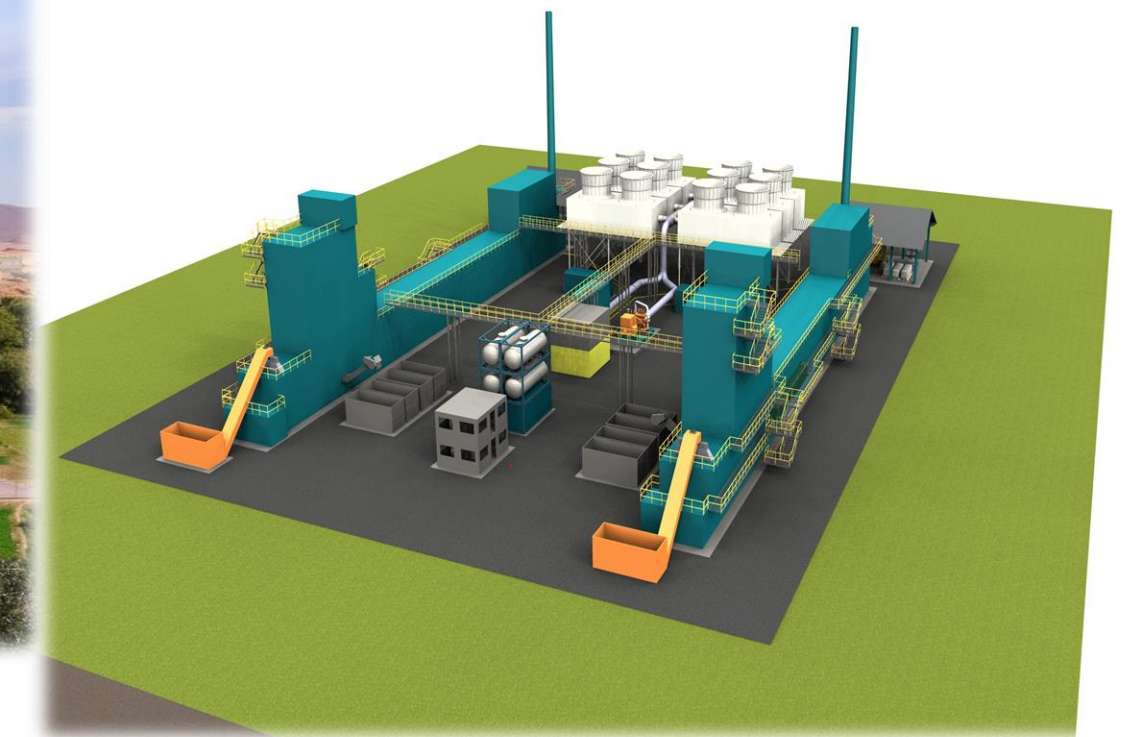
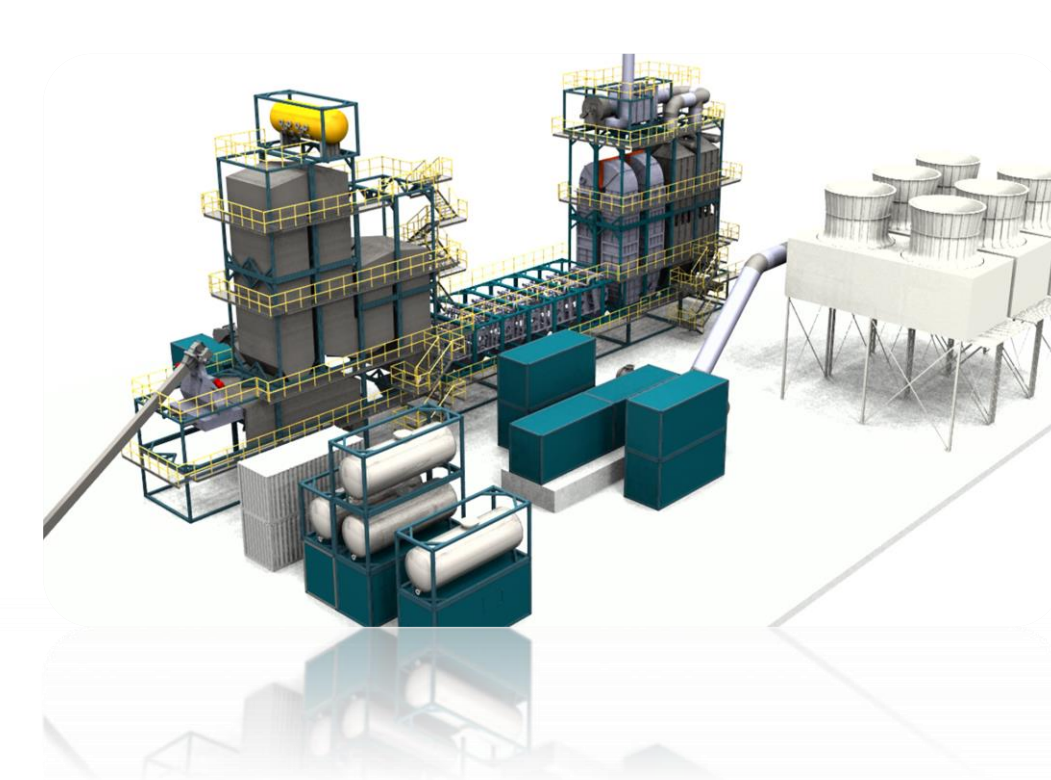
Turning your waste into wellbeing

WOIMA is a Finnish modular waste-to-energy power plant supplier with the aim to mitigate waste-related problems in developing countries. We offer a turn-key solution that simultaneously

- Significantly reduces waste landfilling
- Delivers a variety of energy commodities
- Cuts down waste logistics costs

Our modular wasteWOIMA® power plant

- Can handle a wide variety of fuels (*MSW, RDF, bio, gas, etc.*)
- Offers excellent energy efficiency
- Supports distributed power generation scheme
- Fits perfectly in off-grid solutions and fits to small space
- Has a quick roll-out time
- Is easily scalable and easy to relocate
- Has excellent ROI
- Matches perfectly with future environmental regulations



SUSTAINABLE BIOENERGY SOLUTIONS

- Finland is #1 in combined heat and power (CHP) technology
- World class DHC systems for cities
- Off-grid solutions for remote communities

ARITERM OY

For a sustainable future

Ariterm is a Finnish manufacturer of bioheating systems. Our main products are bio boilers used for heat production, bio burners and bio heating system solutions.

Modern bio heating is an easy and affordable way to take care of heating. The bio heating solutions developed and manufactured by Ariterm Oy provide an efficient and reliable way of benefiting from different kind of bio fuels.

Recycling solutions

- Ariterm is specializing on recycled wood combustion systems, and technology is feasible to combust recycled wood with metallic impurities and biofuels with low ash melting temperature with Multijet – combustion technology.



BIOFIRE OY

Inexpensive, emission free energy efficiently from solid biomass

Biofire Oy manufactures and supplies highly robust and long-lasting heating systems and heating plants which use solid biomass as fuel. Its Palokärki –products are designed for demanding North European conditions.

- More than 30 years of experience in biomass burning and heating plant business. This ensures the best technical know-how is used to Biofire Oy products and services supplied.
- Fully automated heating systems and heating plants in categories from 60 kW up to 5 MW.



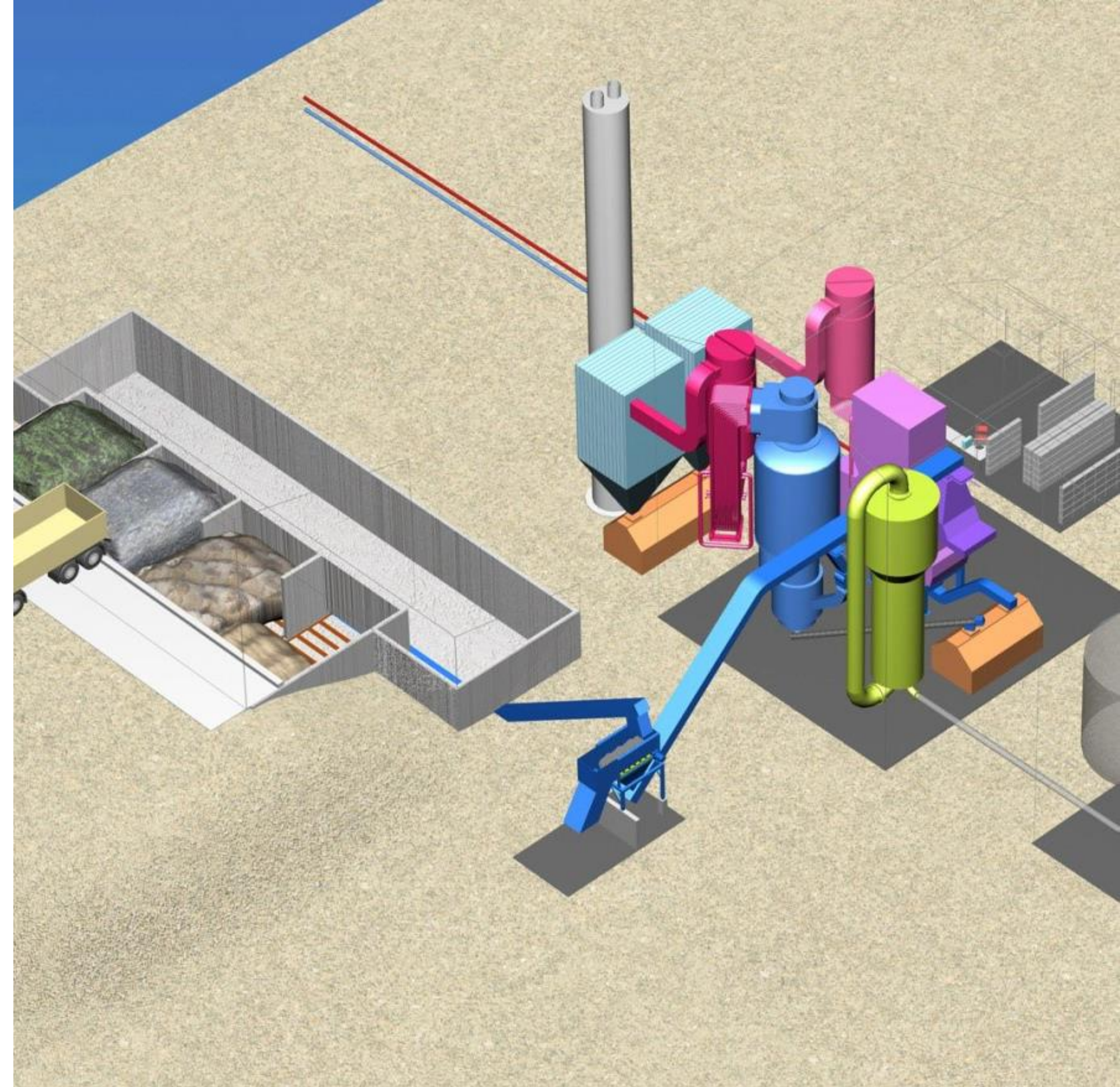
EFIREC OY

Efficient renewable energy services and solutions

We provide renewable energy and energy efficiency services and solutions.

Our solutions provide economic and ecological energy from a local source, district heating (300 kW - 10 000 kW) as well as electrical energy for larger buildings and industry.

- We have also waste heat energy and district cooling solutions and waste treatment in our portfolio.
- We have been one of the pioneers in waste treatment plants as a builder, so we have a comprehensive know-how in this industry.



FARMI FOREST

FARMI FOREST, a global pioneer since 1962 in developing value adding innovative forestry machinery and biomass processing solutions and services. We drive for quality, productivity, safety and customer orientation.

- FARMI Profi and Smart product lines provide productive and sustainable full forestry management solutions around farming tractor both for semi commercial and professional customers.
- Our partners in over 40 countries support our customers finding the right solutions whether you are working on energy wood harvesting or producing biomass wood chip.
- Farmi Forest, part of Normet Group is located in the heart of woodlands of Iisalmi, Finland.



KARELIA UAS

University of applied sciences

Karelia University of Applied Sciences offers expertise in

Decentralized, sustainable energy solutions

- Raw materials and refining
- Heat and power production
- Energy business

Forest based bioenergy

- Heat and power
- Biofuels

Wood construction

- Industrial wood construction
- Demanding household wood construction
- Wood and fibre product and material development



HLAD Engineering Oy



Company background

HLAD Engineering Oy is an engineering company specialized on biogas technology and waste to energy solutions.

HLAD Engineering Oy offers effective solutions in a wide range of business opportunities based on the experience in waste to energy and biogas industries.

The company personnel has over 30 decades of designing experience and a wealth of technical and business knowledge in many industrial and energy projects around the world.

Products & services

The company's services include project management, process & plant design and consulting services to suit the customers' needs.

HLAD® process is a proven solution for biodegradable waste management for municipalities, industry and agriculture. BioThermal treatment is unique and comprehensive concept for the treatment of mixed municipal solid waste (MSW).



MIKSEI LTD

Cleantech Finland Bioenergy – CFB

We offer green, forest based energy solutions for heat and power supply for every customer need.

Customer benefits

- Replace coal as raw material for energy supply!
- Reduction of CO₂
- Cost efficient

World class solution

- We offer full range of services and technologies in bioenergy sector

Secure supplier

- Our technology is in use in hard weather conditions (yearly variation 50-70 C degrees)

Market leader

- Finland is known for its strong know-how in bioenergy technology



VOLTER

Producing own energy from wood

Company background

Volter is a Finnish manufacturer of small-scale wood fuelled combined heat and power plants, CHPs. With Volter 40 CHP our customers can increase their energy independence and develop new business from renewable energy sales. Our solution supports local economy by using local biomass for fuel and bringing jobs to the communities. Volter power plants provide renewable heat and electricity all-year-around, regardless of weather conditions.

Products & services

Volter 40 CHP provides an easy way to produce energy independently, in a cost-effective way. High quality, modern technology and local support system guarantee long running hours and energy security. Compact design, simple installation and advanced automation give extra comfort for producing own, renewable energy. Volter 40 CHP is modularly scalable. For example, 10 CHPs form an energy park with 400 kW electricity and 1 MW thermal output.



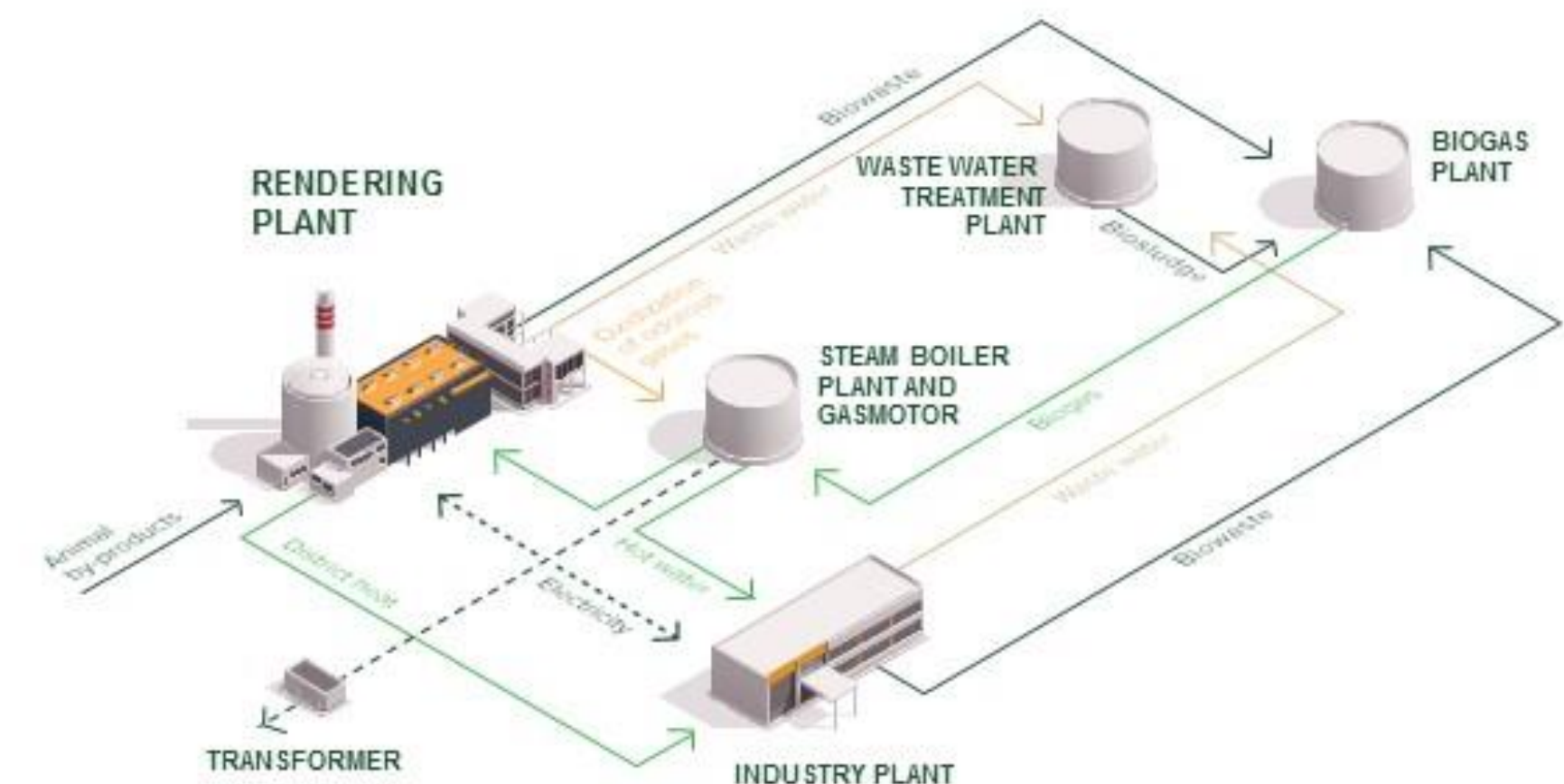
ADVANCED BIOFUELS

The background image shows an industrial facility under a blue sky with scattered clouds. On the right, a tall, cylindrical metal distillation column stands on a concrete base, with a red flag flying from its top. To the left of the column is a large, dark, dome-shaped structure, likely a biogas digester. In the foreground, there are various pipes, valves, and a smaller building with a curved roof. The overall scene depicts a modern biofuel production plant.

- Outstanding technology for refining demanding waste materials into alternative fuels
- New waste refinery and biorefinery concepts in operation in Finland
- Open access pilots and demonstration platforms

HONKAJOKI

- In the meat industry, only approx. 60% of an animal is utilized as meat and the remaining by-products are considered as waste. Animal waste is a massive burden for the environment and a huge economic loss.
- Animal by-products can be processed into biofuels, cosmetics, fertilizers etc. and there is a great demand for end products worldwide. Meat production continues to grow and the need for new innovative solutions for by-product utilization are needed.
- Growing amount of animal waste is a massive burden for our environment. Ineffective recycling of animal waste contaminates soil and ground water, creates greenhouse gases and causes diseases. Recycling animal by-products helps the environment and creates a healthier and more sustainable future for both people and animals.
- Honkajoki offers a way to turn your animal by-products into profits in a sustainable way. Honkajoki Oy recycling plants process animal by products into re-usable raw materials for different industries. The produced raw materials are quality-certified and produced under strict regulations.



DORANOVA

Company background

Doranova is environmental engineering company transforming waste to profitable business in two main business areas :

- Renewable Energy
- Remediation of Contaminated Soil

Products & services

- We help our clients in transforming what has previously been considered as environmental problems, to rational, profitable and sustainable business.
- Our experts design and deliver solutions for renewable energy and soil remediation:
 - Biogas plants
 - Landfill gas recovery and utilization
 - Remediation of contaminated soil with in-situ and on site technologies



DUCTOR

Company background

- The patented Ductor fermentation technology removes a controlled amount of nitrogen from the substrate prior to the anaerobic digestion process.
- This technology prevents ammonia inhibition in biogas production thus turning problem waste into renewable energy and fertilizers.

Organic waste management

- Biogas plants with Ductor fermentation technology
- Ductor fermentation technology installed to existing biogas plant
- Production of renewable energy and nutrient recycling



ENVOR PROTECH

Turning biowaste to biogas and valuable fertilizers

ENVOR PROTECH offers high-class specialist services in technology, design, project management and industrial economics. The services also include equipment and plant deliveries.

Services

- Project management and engineering services in the fields of process and environmental technology
- Process and plan design services
- Waste management: Focus is especially on anaerobic digestion of organic matter (biogasification).
The biogasification technology is based on the HLAD (High Loaded Anaerobic Digestion).
- Process technology
- Waste water treatment: Envor Protech designs waste water pumping stations and equipment buildings. The scope of design includes general arrangement plans, detail design of pump tanks, equipment buildings and other equipment. The company also designs waste water unit processes and other waste water solutions for the process industry and industrial plants.
- Equipment and plant deliveries



RECOMILL

Profitable and ecological animal by-product recycling

Honkajoki and WOIMA have established RECOMILL, a joint venture delivering complete circular economy solutions. We offer all the services from feasibility study to equipment and EPC project delivery, including all the life cycle services.

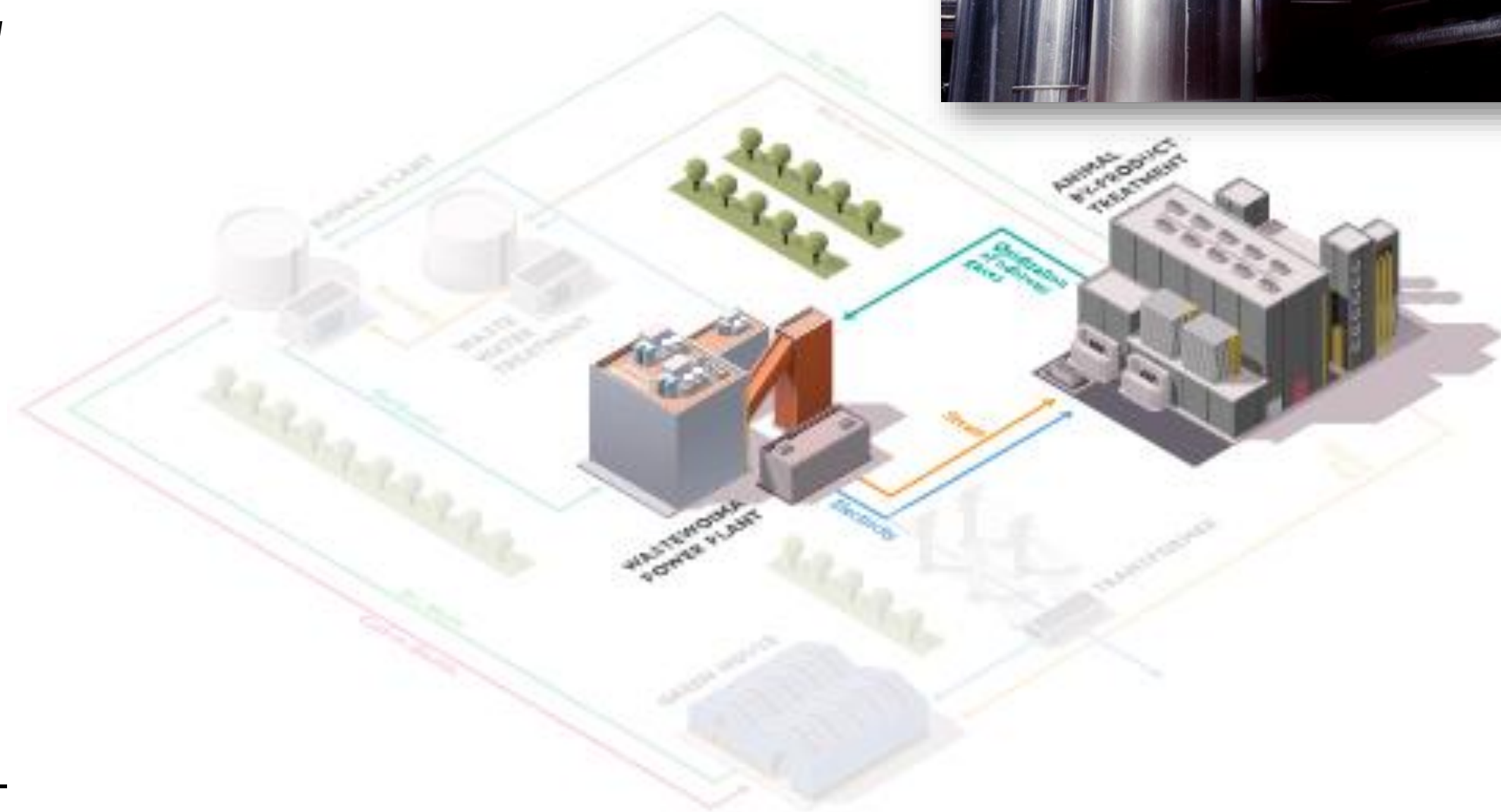
RECOMILL brings together decades of know-how in

- rendering technology
- international project deliveries (EPC or EEQ) world-w

Products & services

RECOMILL renders animal by-products into valuable commodities with world market prices and demand in

- fertilizer industry
- animal feed industry
- biofuel industry
- cosmetics industry



ST1 Renewable Energy

A pioneer in waste-based bioethanol production

St1 is a Finnish energy company operating in the Nordics, implementing our vision to be the leading producer and seller of CO₂-aware energy. We research and develop economically viable, environmentally sustainable energy solutions to replace fossil fuels.

- St1 has a network of 1450 St1 and Shell service stations. Our oil refinery is one of the world's most energy-efficient refineries and our goal is to transform it into a biorefinery. An advanced ethanol plant is already integrated into it.
- One of St1's associated companies is the largest producer of wind power in Finland. We also have an industrial-scale geothermal pilot heat plant project.
- Our advanced ethanol production plants are based on our own technology and use feedstock outside the food chain: industry residues and waste. We develop waste-to-ethanol business and make strong R&D investments in advanced biofuels.

Etanolix®

plants refine waste and residues which are rich in starch and sugar into advanced ethanol and valuable side products



Bionolix®

plant enables the production of advanced ethanol and biogas from municipal and commercial biowaste



Cellunolix®

enables the use of sawmill side products like saw dust and chips in ethanol production



WATREC LTD

Watrec is providing complete solutions for Waste-to-Energy projects – Biogas plants and total solutions for MSW

Watrec biogas plants are

- **Flexible.** Various feed material from liquid to solid. Solution for multiple feed materials or single feed material.
- **Scalable.** Watrec designs each biogas plant to fit perfectly in each project, optimum size in each project.
- **Feasible.** Low CAPEX and OPEX. All projects established have been feasible and efficient. Localization.
- **Reliable.** Extremely low down-time. No interruptions in operation.
- **Effective.** Construction time in Finland: 9 months.
- Biogas plant capacity: Scalable and optimized in each project.
- 100 % nutrient recovery for fertilizer products



HIGH EFFICIENCY POWER PLANTS

- Finland has a long experience in forest industry and a strong machinery cluster
- World class equipment and solutions that radically increase the efficiency of supplying biomass without risking the sustainability aspects
- Scalable energy efficient boiler plants including Circulating Fluidized Bed Boilers (CFB) and Bubbling Fluidized Bed Boilers (BFB)

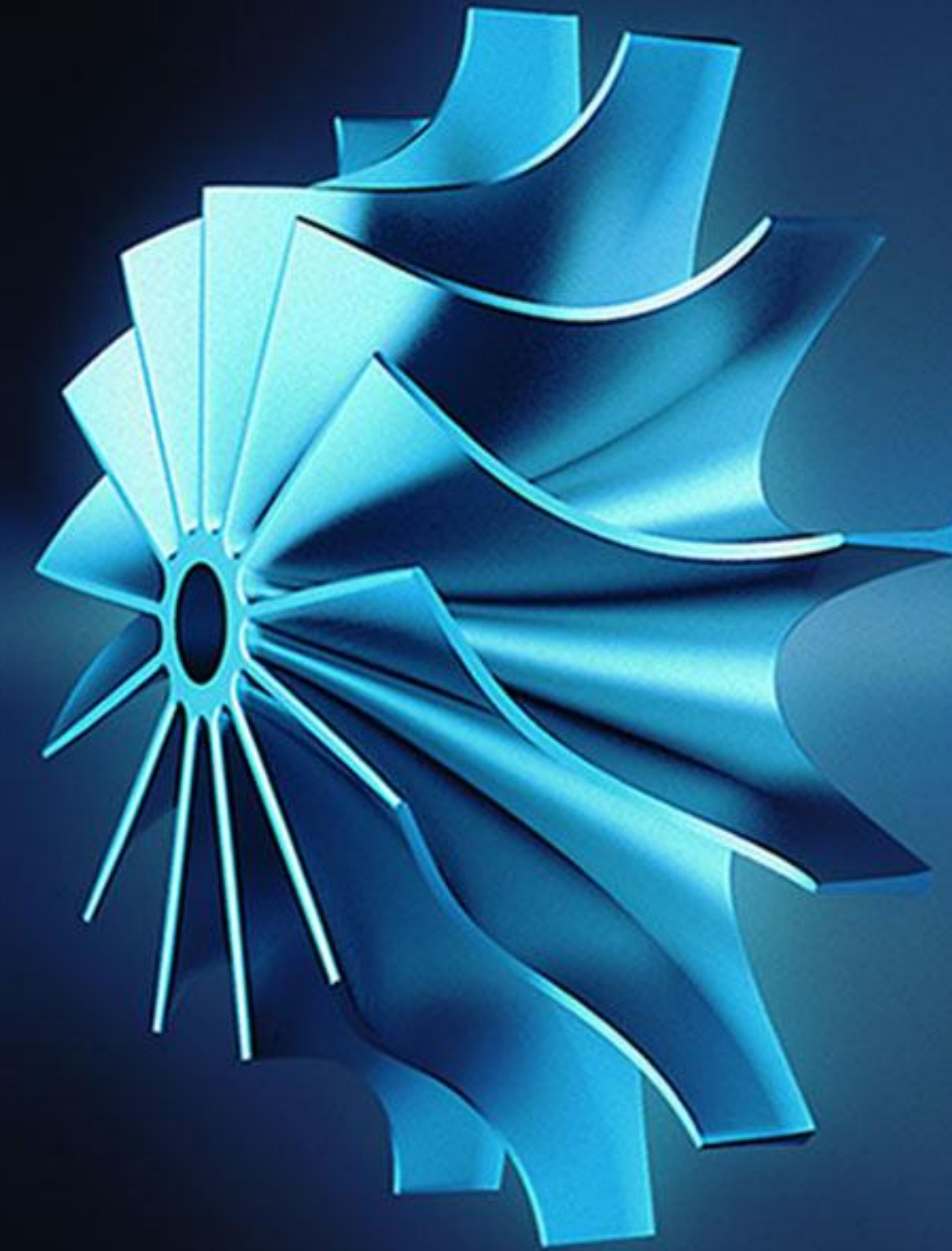
AURELIA TURBINES

Company background

Aurelia Turbines is a manufacturer of highly efficient small gas turbines for distributed power generation in industrial and commercial CHP (combined heat and power) applications.

Products

Aurelia™ A400 is a 2-stage, 2-shaft, intercooled and recuperated gas turbine with nominal output of 400 kW_e. The turbine can utilise a wide variety of fuels, including non-standard and biofuels.



ENVIROBURNERS

Company background

Enviroburners designs and manufactures advanced industrial burner systems for energy production and environment protection.

Products & services

- Our products utilize most of the traditional fuels such as fuel oils and combustible gases or waste streams that need to be oxidized in order to comply with emission standards.
- Start-up and load burners, waste fuel burners, burners for metallurgical processes, wood dust burners, biofuel burners, special burners



KPA UNICON

Business idea

KPA Unicon provides responsible energy solutions. We work together with our customers in energy, process and mineral industry. Our modular solutions utilize efficiently biomass, recycled fuel as well as conventional fuels. We take care of the energy production from financing to the operation and maintenance.

Vision

We are forerunners in the energy industry and work closely as a part of our customers production.

Solutions

- Bio Boiler Plants
- Bio Power Plant
- Oil & Gas Boiler Plants
- Service
- O&M
- PlantSys
- Financing



ECOHEL

Heat and power with multi-biofuel technology

- Ecohel specializes in manufacturing small-to-medium size **Waste to energy and bioenergy power plants** (under 500-600 ton/day).
- We offer our customers comprehensive technological solutions from sorting, treating, processing solid municipal waste and biomass residues to produce clean energy, as heat and electricity for both residential and industrial usage

Bioenergy standard solution power plant

- Our innovative and patented technology enable us to treat **solid waste and all kind of biomass.**
- Unique **rotating grateless incinerator** technology - complete burning, non-clogging
- **Outstanding efficiency**
- Fully automated
- **Uninterrupted** operation, despite the change of waste or biofuel type
- **Solid operation** even at low power of 10 %



RAUMASTER

Raumaster is a global leader in material handling systems

Solid fuel and biomass handling

- Fuel receiving, screening, crushing, storage, reclaiming & conveying systems
- Fuel feeding and ash handling systems
- Recovery boiler, lime kiln and smelting plant conveyor systems

Service

- Retrofits, service audits, field services, maintenance, repairs, overhauls



SAALASTI

Manufacturer of innovative heavy-duty bioenergy machinery

- Machines are used mostly in big power plants and wood rooms
- Main products are different types of stationary forest-based biomass chippers, crushers, cutters and bark dewatering presses. The company delivers entire biomass processing stations.
- SAALASTI CHIPPER H (horizontal feed) is suitable for power plants, biomass terminals and other high-volume applications where correct particle size and reliable operation are a necessity



CONSULTING SERVICES

- Feasibility studies
- Tailored educational packages
- Heat entrepreneurship and biomass value chain consulting



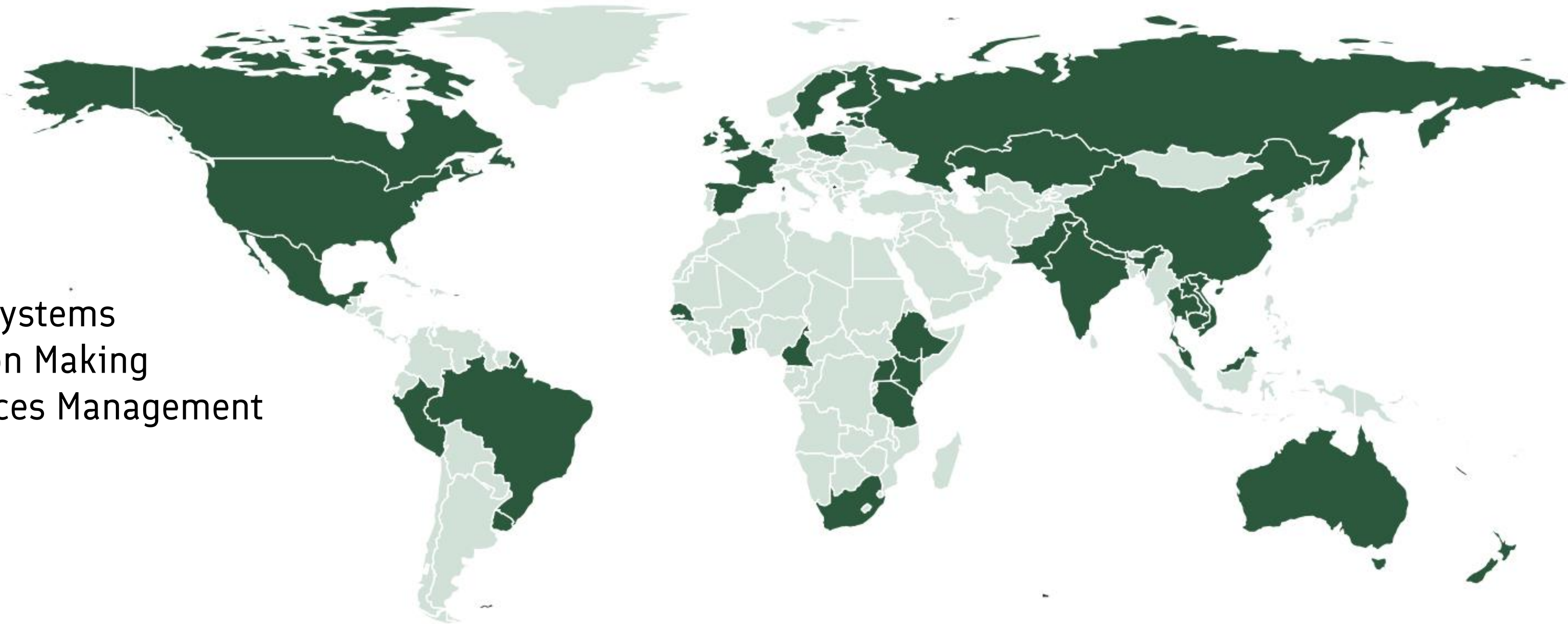
ARBONAUT

**Technology Innovation & Advanced Resource
Management Technologies**

Offering:

- Forest Inventories
- REDD+ and Climate Change
- Tailored Geographic Information Systems
- Spatial Analysis to Support Decision Making
- Expert Services for Natural Resources Management

Our footprint



DataPartner

Company background

We help creating profitability calculations and making **better investment decisions!** For over 30 years, we have delivered know-how, best practices and guidance on financial modelling, investment feasibility studies, business planning, company valuations and more. Our Customers are from all around the world and across all industries, including over 150 energy companies internationally.

Products & services

Training, Consultancy and Software Solutions for capital budgeting available in several languages.

- Apply best practices and ensure excellence in capital budgeting including profitability and risk analysis;
- Be innovative - help your Customers understand the big picture and life-cycle value of your offering;
- Enhance quality of your decisions on capital allocation regarding competing investment alternatives.

**Be the expert in capital budgeting!
Welcome to contacting us!**



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VP

INDUFOR OY

Consulting for the forest industry value chain

INDUFOR GROUP is one of the world's leading forest consulting service providers. It provides high-quality knowledge and services for its clients over the forest and forest industry value chains.

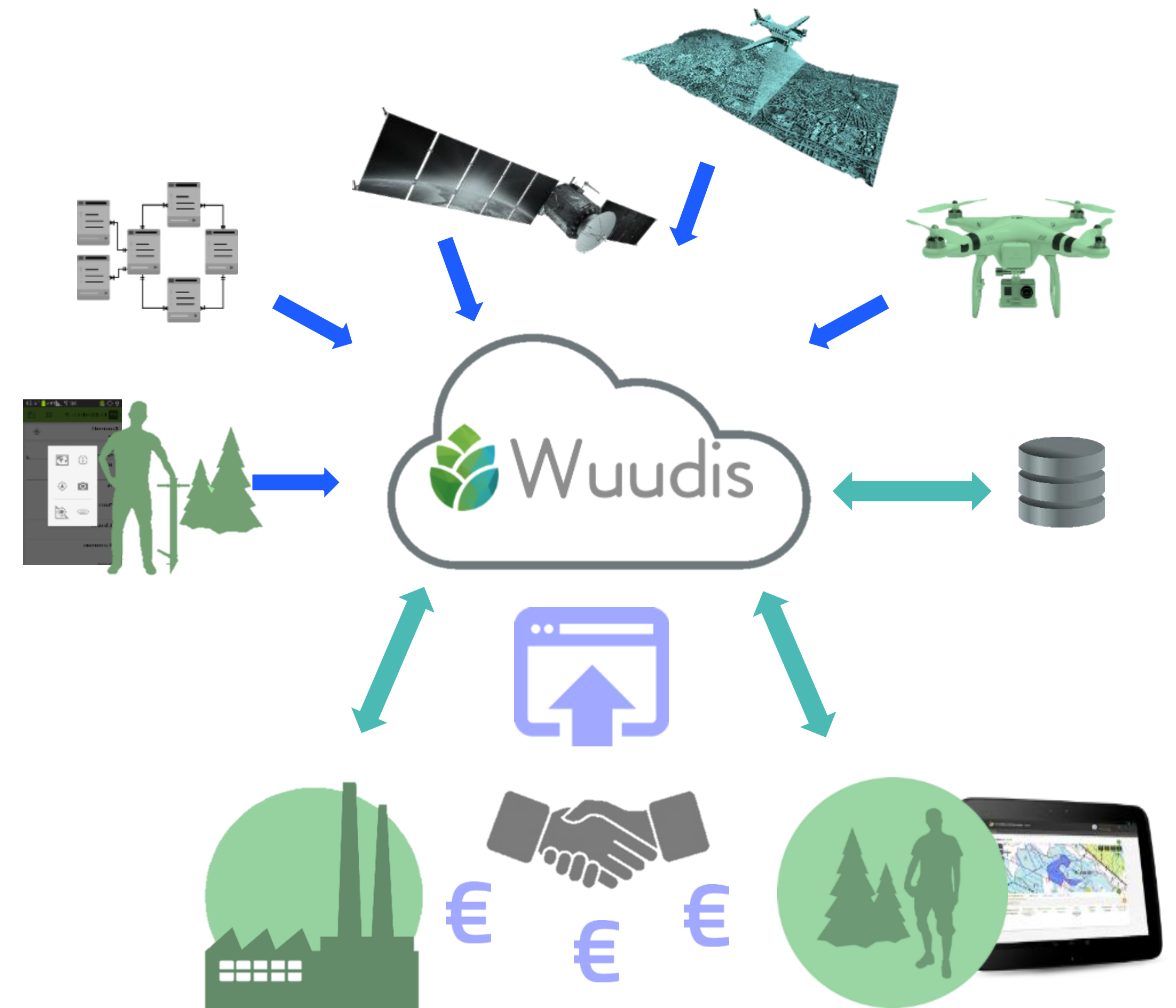
Related to W2E and bioenergy Indufor offers services considering biomass sourcing, investment feasibility as well as new solutions and markets



MHG SYSTEMS

Wuudis – a forest platform ecosystem

- Wuudis is a novel forest platform ecosystem with all forest data in standardized form and custom services and apps.
- Real-time accurate data, updates and observations from the forest on Wuudis platform apps based on data collected by drones and satellites.
- On Wuudis market place easy purchase and sales of timber and biomass, and tendering of care works at best market price.



PROTACON

Company background

Protacon's services encompass consulting, design and engineering, implementation, turn-key deliveries maintenance & upkeep

Product and Services

- ONCE: No 1 digitization of material supply chain and asset management e.g for power-, pellet-, waste to energy- and biogas plants
- INRAY: Real-time material quality measurement and control solution improves plant's efficiency and reduces operating and maintenance costs
- Over the years Protacon has completed varied projects to power plants and to different bioenergy industries in many countries around the world
- Protacon Grid Stabilization ensures grid frequency and an uninterruptible power supply to critical places



SIMOSOL

Raw material sourcing analysis for bioenergy & forest industry investments

- Raw material sourcing analysis for bioenergy & forest industry investments
- Full pre-feasibility analysis of bioenergy plant investments with partners
- Feedstock supply chain and forest management optimization software
- Valuation of forest assets

Customer benefits

- Better investment decisions based on quantitative analysis
- Maximized profit through minimized operational costs and optimization



VTT TECHNICAL RESEARCH CENTRE OF FINLAND LTD.

VTT provides technological background for business related to new solutions and existing assets

- Small scale CHP+C for industry, off-grid and rural areas
- High efficiency Waste-to-Energy and metals recovery
- Optimized boiler operation, lifespan extension and plant economy

Customer benefits

Efficient use of available, sustainable resources for heat power and cooling secure the profitable energy supply in changing policy environment and challenging grid conditions

- Double your income in W-t-E
- World class piloting facilities available for your testing
- Top class technology know how with 50 years experience of boiler development



ÅF-CONSULT LTD

State-of-the-art consulting and engineering services

ÅF Consult Ltd. is an independent consulting and engineering company. We have been involved in design and implementation over 3 Mt/a WtE and 700 MWe biomass based power plants during the last 10 years.

We are leading provider of consultancy, engineering and project management services for WtE and Biomass based power plant projects in Scandinavia.

We operate globally and with a one stop shop approach with our extensive partner network.



WHAT DO WE OFFER?

SMART
INVESTMENTS

ADDED VALUE TO THE
ENERGY CONSUMERS
AND PRODUCERS

EASE OF USE



RELIABILITY
OF GRID AND
COLLECTED DATA

DATA ACCURACY
AND SECURITY

LONG TERM
BUSINESS
DEVELOPMENT
POSSIBILITIES

PROVEN CONCEPTS

SUSTAINABILITY