



PETRO BIO AB
INNOVATIVE BURNER
TECHNOLOGY

**UTILIZING PRESENT
EQUIPMENT FOR
SUSTAINABLE FUEL
CONVERSIONS**

EXAMPLES FROM FOUR
DIFFERENT USER'S VIEW

Johanna Lindén, CEO
2021 04 19

VISION

PetroBio contribute globally and locally to a better environment and better climate for future generations



FUTURE ENERGY SOLUTIONS

Business:

- Energy solution provider
- Expertise within flame combustion

Deliveries:

- Burners with control systems
- Fuel-, fluegas- and ash handling systems
- Full turn key deliveries for energy plants, including fuel systems, boilers, flue gas treatment etc

The deliveries are tailor made and match the customer needs

Revenue:	100 MSEK/y
Employees:	~25
Founded:	1964

Location:

- Gothenburg and Floda, Sweden
- Harelbeke, Belgium
- Service engineers located close to customers in Sweden

SOLUTION PROVIDER

Fuels:

Solid Fuels: Pulverised wood, waste and agro fuels

Liquid fuels: Bio oil, heavy and light fuel oils, solvents, pine tar etc

- ***Gaseous fuels:*** Bio gas, Natural gas, LPG, waste gas etc

Customers:

District heating: heat / steam systems, turn key and rebuilds

Waste to Energy: start- and load burner systems

Industries: heat / steam systems, turn key and rebuilds

Marine installations: burner systems for heating

Asphalt plants: burner systems and conversions of drying drums



Substantial track record and know how:

Accumulated experience from 4000 installations within many industries and fuels in Scandinavia and globally

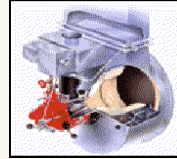
PETROBIO PRESENCE

- Nordic countries
- Several installations in Europe
- Few installations in Asia and US



COMBUSTION SOLUTIONS – PETROBIO DESIGNED BURNER PRODUCTS

- **PETRO Low-pressure Air Atomising**
- **PETRO Rotary Cup**
- **PETRO Lance**
- **PETRO Pulverised Bio Fuel**
- **PETRO Multi Energy System**



Oil and gas
2 - 25 MW



Oil and gas
9 - 50 MW



Oil and gas
2 - 50MW

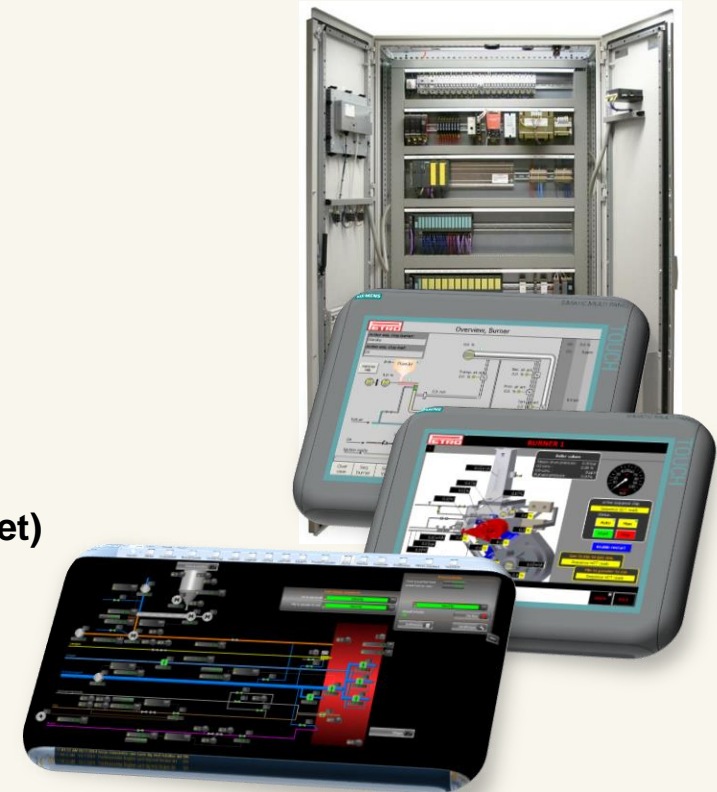


Pulverised wood fuels
2 - 40 MW



Oil and gas (for CIS market)
5 - 10MW

**Burner Management System
SCADA**



PETRO BIO SERVICE

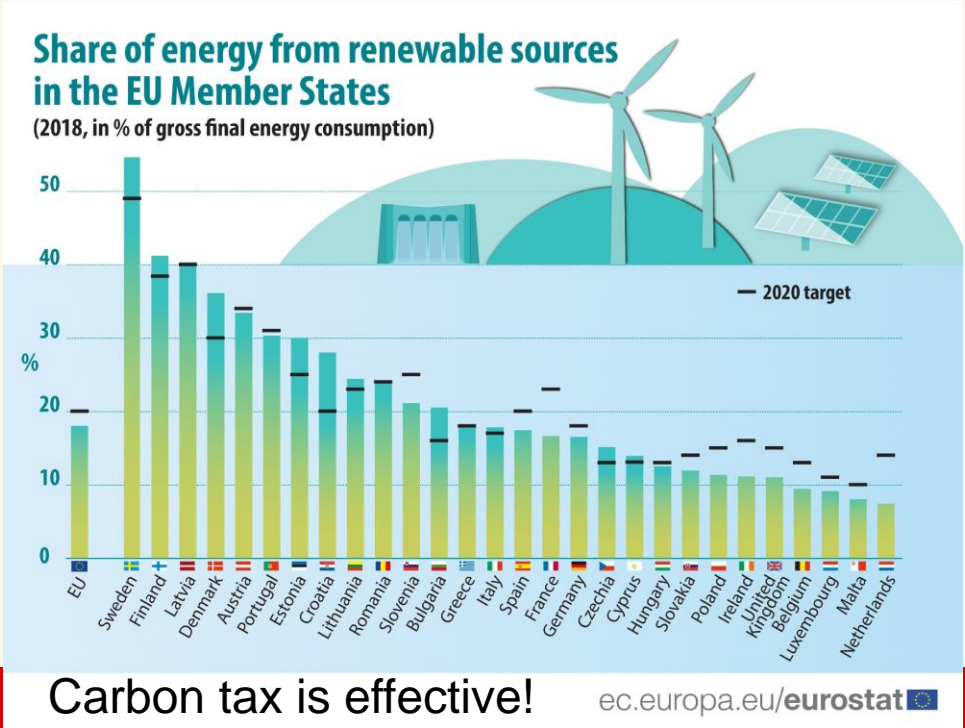
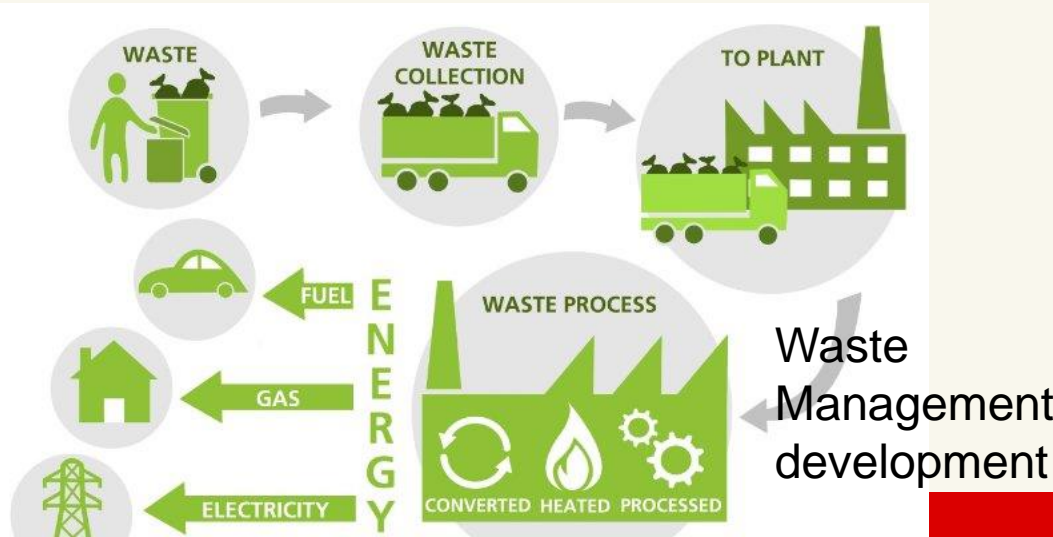
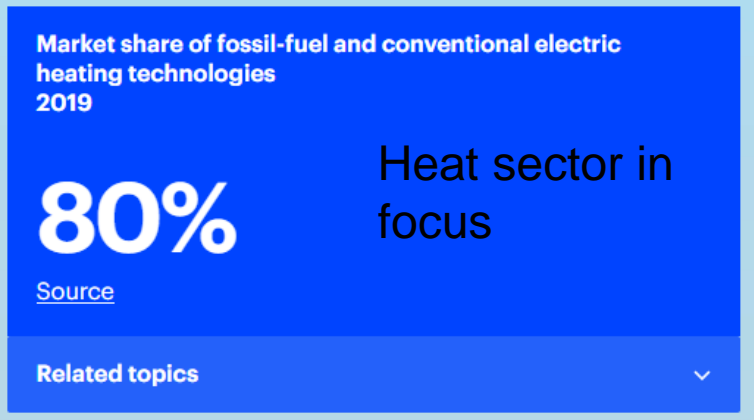
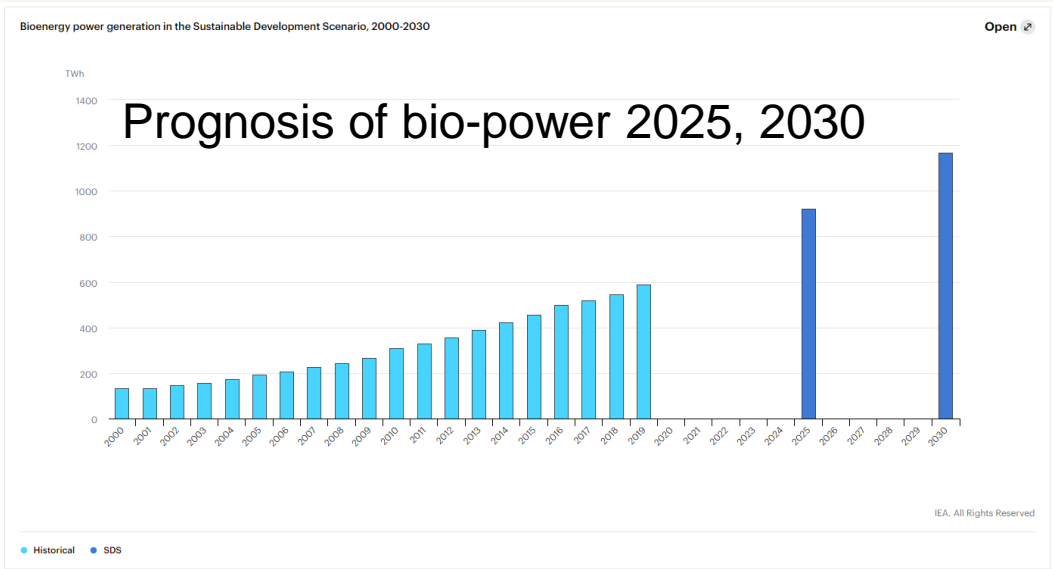
- Burner system lifetime service
 - Start up
 - Operational optimisation and tuning
 - Mech maintenance
 - Spare parts
- Flame combustion knowledge, fuel supply and boiler knowledge
- Well developed service/commissioning organisation, 24/7 hot line
- Remote Service - quick support from experienced service crew

Petro Bio still service
and maintain burners
supplied 50 years ago



LOOKING FORWARD

DRIVING FORCES CONNECTED TO INCENTIVES AND POLITICS



Source: IEA, Eurostat

PETROBIO CASE STUDIES

1. WOOD POWDER SOLUTIONS

- Söderhamn Nära DH
- Artic Paper Mill
- Alingsås Laundry

2. BIO OIL SOLUTIONS

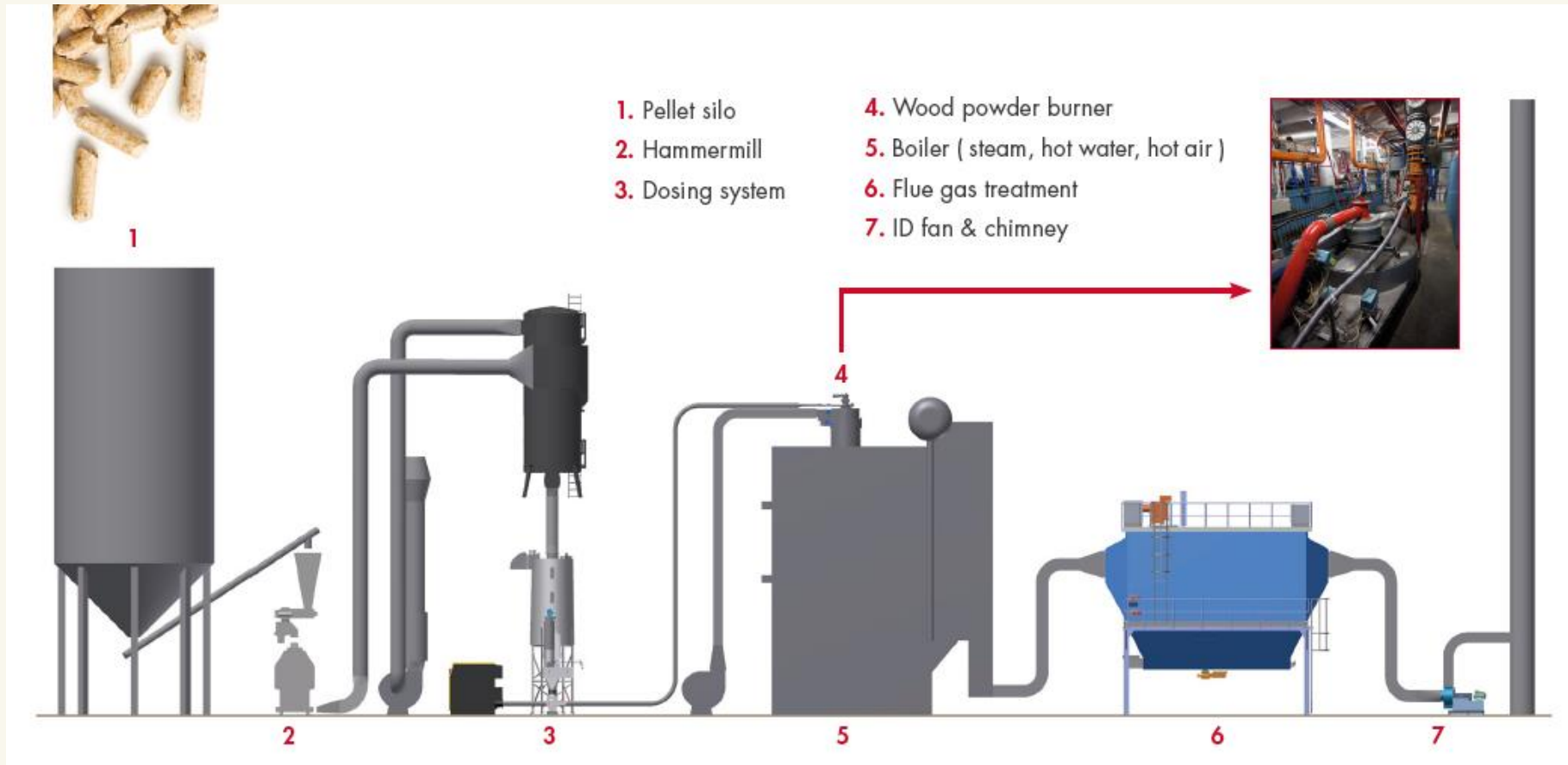
- Renova WtE

INCENTIVES, examples

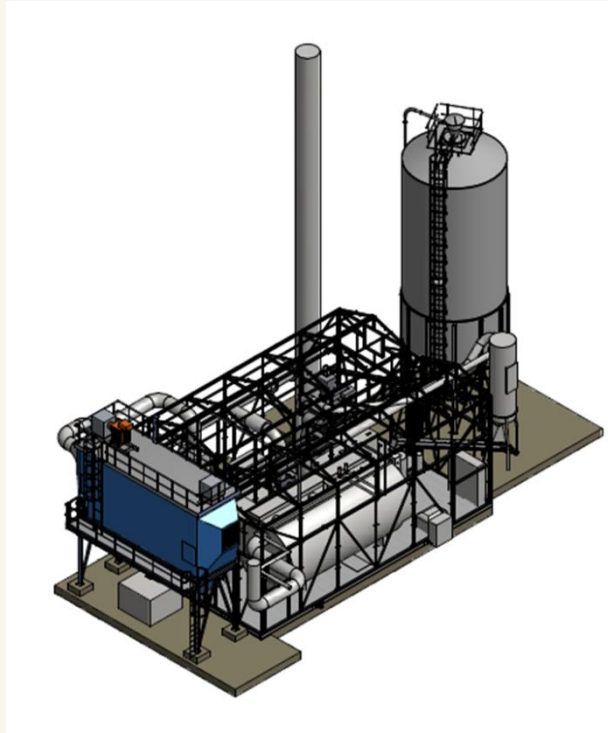
- ROI: 1-4 years
- Adaption to operational situations: fuel and technology

PETROBIO COMBUSTION SOLUTION PROVIDER

WOOD POWDER SYSTEM



PETROBIO WOOD POWDER CONVERSIONS AND GREENFIELD



Petro Conversions:

- Utilize present equipment (boiler)
- Cost effective solution for existing sites



Petro Greenfield solutions:

- Effective footprint
- Suitable for variable energy needs
- Pellets is a commodity, and easy to transport

SPENDRUPS 187



TURKU
ENERGIA

Göteborg Energi

STEP

SKANSKA



VEOLIA

Hafslund

Söderhamn
NÄRA

e-on

VEIDEKKE

Luleå
Energi

AKADEMISKA HUS

ATRIA
Good food – better mood.

CASE STUDY WOOD POWDER, ARTIC PAPER, GRYCKSBO

Paper mill steam plant, Sweden



Dual Block version, horizontally mounted



ARCTIC PAPER

Type: Steam boiler, base load, 8500 h/y
Fuel: Wood Pellets
Secondary fuel: Pine tar oil

Project;

2008: Conversion of a 53 MW industrial steam plant from heavy fuel oil to pulverised wood firing.

2020: Air system upgrade

Time schedule, conversion; 12 months from contract signing to take over

Supply; Fuel reception, fuel storage, fuel milling, burners, boiler modifications, soot cleaning, dust cleaning, electrics and controls, mechanical erection

CASE STUDY WOOD POWDER, SÖDERHAMN NÄRA

District heating plant, Sweden



Dual Block version, vertically mounted

Söderhamn
NÄRA

Type: Hot Water boiler, summer base load, winter peak load

Fuel: Wood Pellets

Secondary fuel: Light fuel oil

Project;

1993: Conversion of P2 oil fired boiler to wood powder firing, 17 MW. Supply: milling and dosing, burner, control system

1997: Conversion of P3 oil fired boiler to wood powder firing, 15 MW. Supply: milling and dosing, burner, control system

2016: Refurbish of P3 – burner upgrade

2016: Upgrade P2. Supply: new burner, dosing, Flue gas cleaning, electrics and control system, mechanical erection

CASE STUDY WOOD POWDER, VGR ALINGSÅS TVÄTTERI

Laundry, Sweden



Fuel storage and
milling house



Mono Block version, horizontally mounted

Type: Steam boiler, base load,
fluctuating energy need
Fuel: Wood Pellets
Secondary fuel: Gas (LPG)

Project;

2013: Conversion of a 6,5 MW industrial
steam plant from heavy fuel oil to pulverised
wood firing.

Time schedule, conversion; 6 months
from contract signing to take over

Supply; Fuel reception, fuel storage, fuel
milling, burner, boiler modifications, flue gas
cleaning, electrics and controls, mechanical
erection

BIO OIL

BOOMING TREND FOR RETROFITS – FAST AND CHEAP WAY FOR SUSTAINABILITY

LOW OPEX

- With small adjustments existing equipment can be reused

BIO OIL IS A COMMODITY

- Fuel is available for trading

USAGE OF THE PRESENT FUEL AS BACK UP FUEL

- Multi fuel burners



BIO OILS

FOREST RESIDUES

- Pine oil
- Pyrolysis oil

MFA MIXED FATTY ACIDS

- VEG 25
- BIO 10, BIO 25

INDUSTRY RESIDUES

- Waste streams

LIGHT OILS

- RME
- HVO

PETROBIO CONVERSIONS BIO OIL

Customers are found both in district heating, waste to energy and within industry



One of our commissioning engineers ready for start up of converted burners in a Waste to Energy boiler

CASE STUDY BIO OIL, RENOVA WASTE TO ENERGY PLANT



Renova AB: Waste handling company, owned by 10 Municipalities in Western Sweden

- Waste collection and transportation
- Waste management:
 - 1 500 000 MWh district heating (1/3 of the DH in the area)
 - 280 000 MWh electricity (5%)

Sävenäs Waste to Energy Plant, Renova:

- 4 Waste to Energy Boilers (40-60 MW), combusting 550 000 tonnes / y
- 8 start and load burners



CASE STUDY BIO OIL, RENOVA WASTE TO ENERGY PLANT



Bioenergy International

492 followers

1mo •

+ Follow ...

In an effort to further reduce climate-impacting emissions, the Swedish waste-to-energy (#WtE) operator [#Renova](#) has decided to upgrade its eight start-up- and support burners to be able to operate with bio-oil instead of fossil oil at ...see more



Petro Bio helps Renova replace fossil fuels with renewables

bioenergyinternational.com



Type: Waste to Energy boilers, district heating, 4pcs

Boiler fuel: Municipal waste

Burner fuel: RME (2020), LFO (-2020)

Project;

2016: New burners installed in 2 boilers, adapted for bio oil specification.

Renova starts the preparation for fossil free start up and load burner system

2018: First agreement signed for step wise exchange of old burner parts and fuel preparation parts for the 4 boilers

2019-2020: Conversion to RME, for all 4 boilers. Upgraded control systems

THEY TRUST US



Summary:

- Most processes are feasible for fuel conversions
- Driving forces might be:
 - Economical
 - Sustainability reasons
 - Process adaption for load variations
 - Need of mechanical refurbishment
 - Fuel access



Thank you for your attention

Johanna Lindén

johanna.linden@petrobio.se

+46 705 909517