KeepWarm

Renewing district heating

The use of biomass and smart devices in District Heating in Latvia

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ZREA

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This project receives co-funding from the German Federal Ministry of Economic Cooperation and Development.

Energy and climate targets & district heating in Latvia

Renewable energy and energy efficiency is at the heart of the priorities of the European Union

Energy and climate goals of Latvia: energy consumption reduction and increase of RES share

Annual growth of RES share in DH by 0.55%; current use of RES in DH is almost 55% (2017)

Reduction of GHG emissions outside ETS by 13% till 2030

Increase of RES share in DH by upgrading installed capacities of biomass boilers and heat pumps and by increase of use of non-emission technologies in DH

District heating system in Latvia

Heat plants: ***633***

320 Small heat plants *(0.2 < P ≤ 1 MW)*

311 Medium heat plants *(1 < P ≤ 50 MW)*

2 Large heat plants *(> 50 MW)*

Combined heat and power plants (CHP): ***175***

117 Small CHP *(0.2 < P ≤ 1 MW)*

54 Medium CHP *(1 < P ≤ 20 MW)*

4 Large CHP *(> 20 MW)*

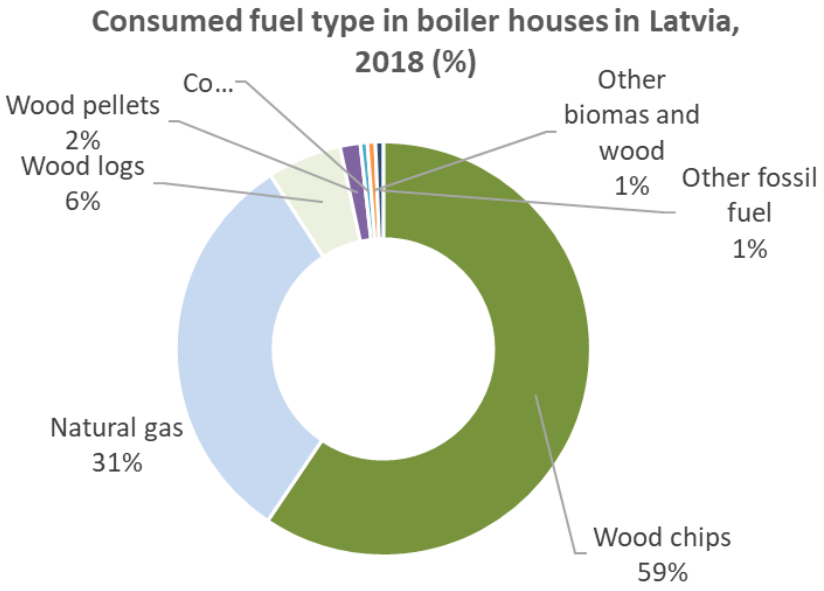
Heat network lenght ***~2000 km***
Relative heat loss ***11.8%***

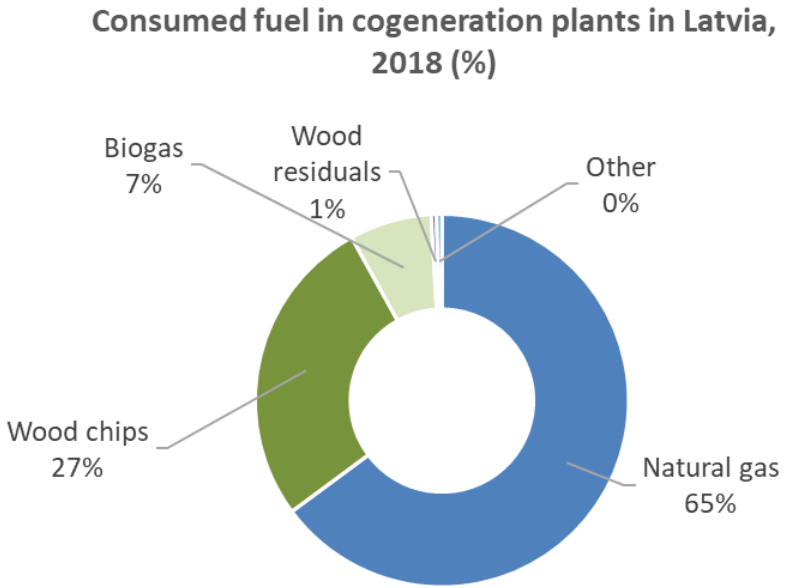
Heat plant installed heat capacity ***2094.9 MW***

Produced heat ***7947,9 GWh***
Heat plants ***2564,9 GWh***
CHP ***5383 GWh***

Source: Central statistical data 2019.

District heating in Latvia





Source: Ministry of Economics of Latvia

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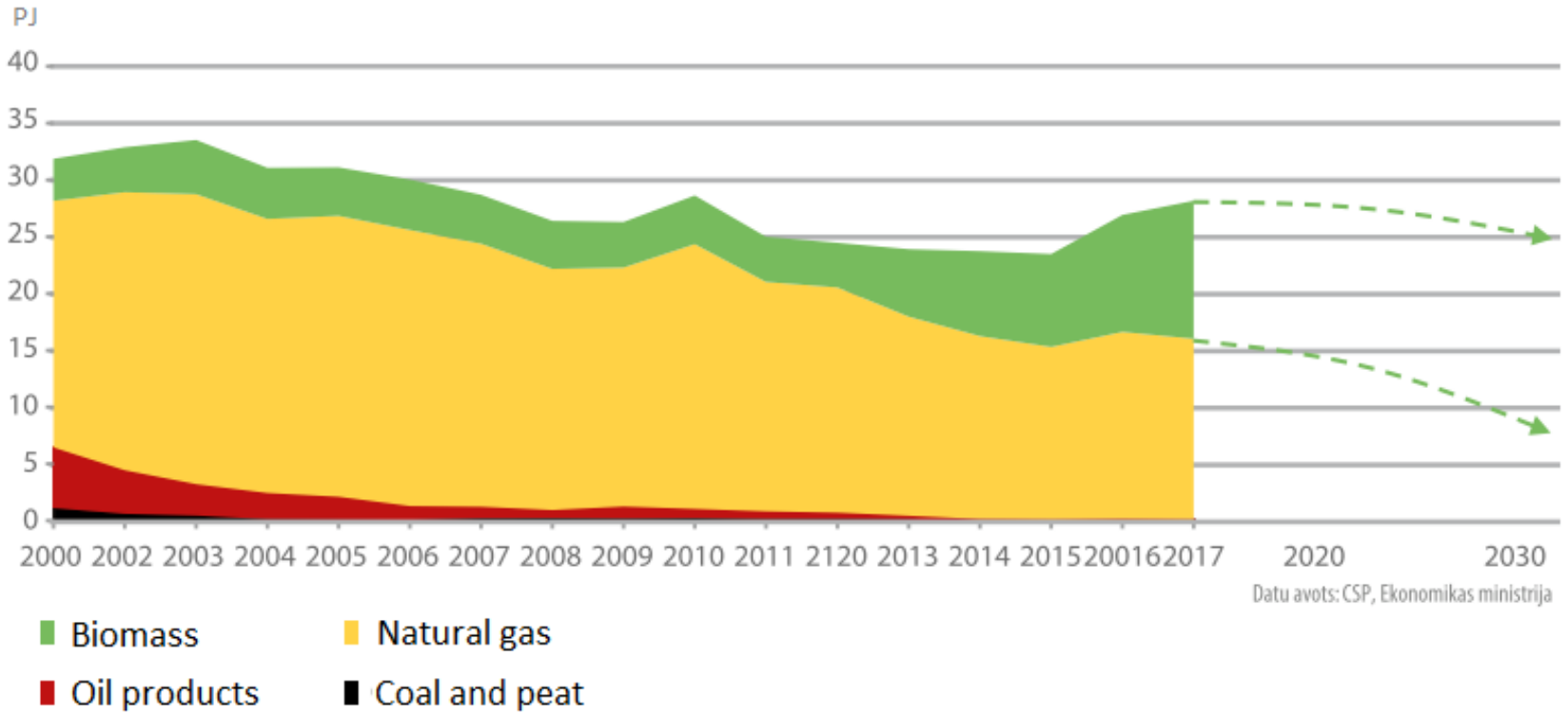
District heating system in Latvia



Source: Enerģija un Pasaule, 2018/6, 34.p.

Pilot DHS in Latvia –boiler house of «Jekabpils Siltums», Ltd.

Location: Jekabpils city, Latvia

Operating since: 2003

Ownership: municipality

Grid: 1362 m (owned by the DHS)

Customers: 15 multi-residential buildings

Connected load: 3649 kW

Boiler output: 3360 kW (2 boilers), provides 6% of total heat supply

Type of DHS: production and distribution of heat and hot water supply all year

Current fuel: wood chips (93%) / gas (7%)

Challenges: old inefficient boilers, high staff costs

Pilot DHS in Latvia –boiler house of «Jekabpils Siltums», Ltd.

Reconstruction and automatization of boiler house:

- Change of wood-chips boiler to new, automated wood-chips boiler (1MW);
- Change of gas boiler to new (1,4 MW)
- Installation of additional new automated 0,4 MW gas boiler (for summer load);

Results:

- ES/fossil heat production ratio: 78%/22%;
- Diversification of heat source,
- Increase of boiler house efficiency by reducing primary energy input: 6736 MWh/year to 4907 MWh per year
- Yearly savings of staff costs (64000 EUR/year)
- CO2 emissions: 205,698 t/year
- Internal Rate of Return (IRR): 14%
- Discounted repayment period: 8 years
- Estimated costs: 510 000 EUR

Source: Jekabpils Siltums

Used smart devices:

- New boilers monitored in automatic regime,
- Heat exchanger meter can be read remotely,
- Video surveillance.

Pilot DHS in Latvia – boiler house at **Lielauce** parish of «Auces komunalie pakalpojumi», Ltd.

Location: Lielauce parish, Auce county, Latvia
Operating since: 2004
Ownership: municipality
Grid: 300 m (owned by the DHS)
Customers: 5 buildings (3 multi-residential, 2 publ
Connected load: 540 kW
Boiler output: 0,6 kW
Type of DHS: production and distribution of hot water for heating
Current fuel: wood chips
Challenges: old heat networks, there is no frequency changer for network pump, fuel supply is not automated (work of 4 operators is needed).

Pilot DHS in Latvia – boiler house at **Lielauce** parish of «Auces komunalie pakalpojumi», Ltd.

Modernisation of the heat source without replacing the existing boiler:

- Installation of frequency changer for network pumps;
- Change of grid: installation of industrially isolated single channel pipes with less diameter;
- Automation of fuel supply with a sliding floor and a fitted conveyor;

Results:

- RES heat production:100%;
- Reduction of heat losses: from 27% to 10%;
- Increase of boiler house efficiency by reducing primary energy input: 1423 MWh/year to 1178 MWh per year.
- Yearly staff costs saving 22 181 EUR/year
- Internal Rate of Return(IRR): 29%
- Discounted repayment period: 4 years
- Estimated costs: 65 000 EUR

Source: Auces komunālie pakalpojumi

Pilot DHS in Latvia – heat supply grid in **Bene** parish of «Auces komunalie pakalpojumi», Ltd.

Location: Lielauce parish, Auce county, Latvia
Operating since: 1994
Ownership: municipality
Grid: 900 m (owned by the DHS)
Customers: 12 Buildings (10 multi-residential, 1 public, 1 industrial)
Connected load: 2310 kW
Type of DHS: Heat energy is purchased according to meter from biological gas station and delivered to customers
Current fuel: Biogas
Challenges: monopoly of produced heat energy price, change of cogeneration station owner from where heat is purchased, unclear national policy regarding subsidizing electricity producers (cogeneration plants), company does not own boiler house in Bene.

Auces komunālie PAKALPOJUMI

Pilot DHS in Latvia – heat supply grid in **Bene** parish of «Auces komunalie pakalpojumi», Ltd.

Building of own new combined boiler house (biomass):

- Installation of new pellet boiler with an automated pellets delivery system (0,8-1MW);

Results:

- Independence,
- RES heat production: 100%;
- Planned energy input: 1760 MWh per year
- CO2 emissions: 0 t/year
- Internal Rate of Return(IRR): 44%
- Discounted repayment period: 2,5 years
- Estimated costs: 165 000 EUR

Source: Auces komunālie pakalpojumi

Used smart devices in «Auces komunalie pakalpojumi», Ltd.:

- Currently boiler houses are equipped with smart notification system – manager of boiler house receives notification in case of problems.
- It is planned to set remote reading of meters in heat exchanger and for possible regulation of heat units.

For a cleaner World

Global tendencies

Climate change and efficiency of resources
Urbanization
More active customers
Digitalization, new technologies

Mission

We involve customers and society to make cleaner World. Our task is to foster these changes, by transforming energy supply, by improving efficiency of resources and by offering smart solutions. So we provide excellent value of stocks.

Vision

Strategy

- To drive a change in a sector and to increase productivity
- To develop sun and wind energy
- To create solutions for sustainable cities
- To create new cooperation forms in energy

Fortum Jelgava in 2019 – biomass cogeneration station

- Ownership: 100% Finnish energy company «Fortum», in Jelgava city since 2008
- Installed heat capacity in cogeneration: 45 MW
- Installed electricity capacity: 23 MW
- Produced heat per year: 230 GWh
- Produced electricity per year: 110 GWh
- Sold electricity per year: 150 GWh to Nord Pool Spot & large industrial clients (13 MEUR)
- Sold heat energy per year: 200 GWh to 16 000 households (420 buildings), 400 juridical clients (11 MEUR)
- Fuel: 90% biomass, 10% natural gas
- Heat accumulation tank: 5000 m3/160 MWh
- Employees: 75

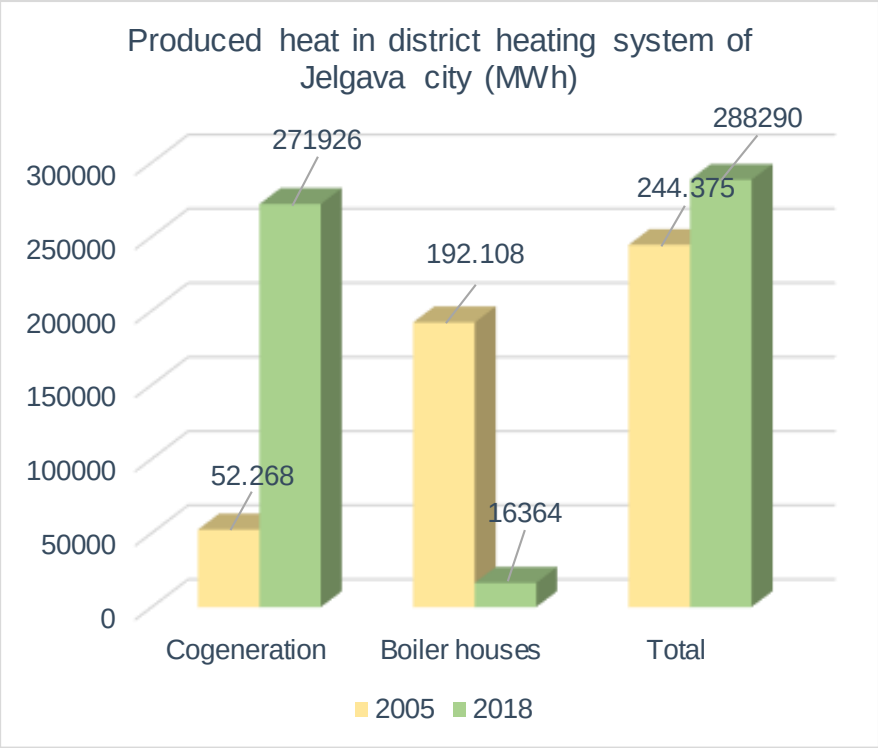
Source: Fortum

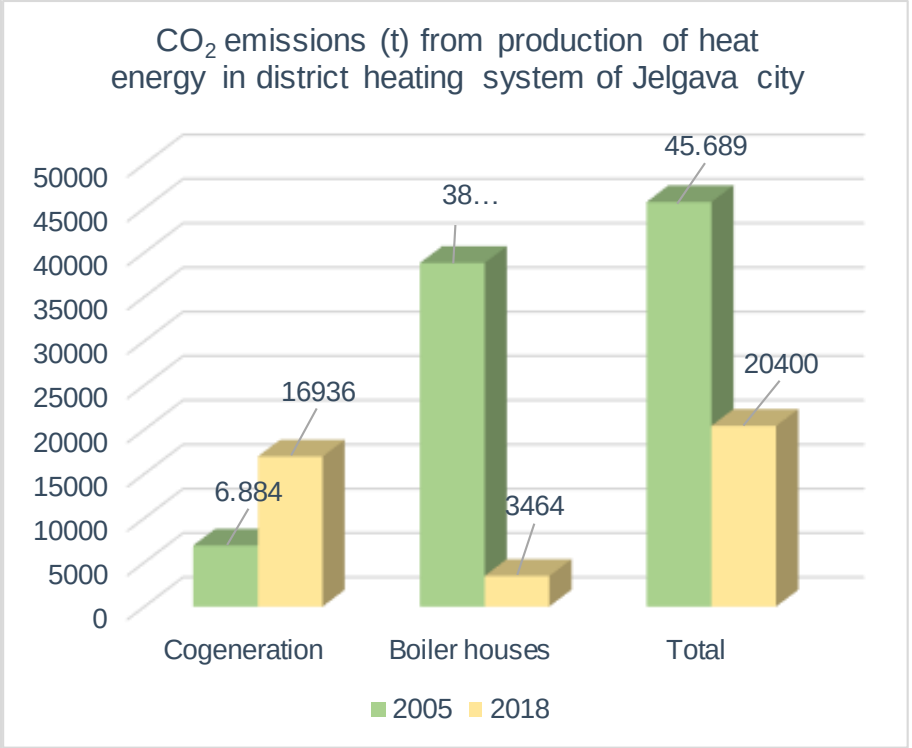
New solution for city heat supply

- The first large capacity biomass cogeneration station in Latvia operates since 2013.
- The first heat supply systems' binding pipe under river in Latvia.
- Provides up to 85% of district heating load of Jelgava city.
- Switch from imported fossil fuel to local renewable energy source – wood chips.
- Since November 2019 accumulation tank in DHS included.
- ~ 300 jobs created in fuel production and supply chain.

Source: Fortum

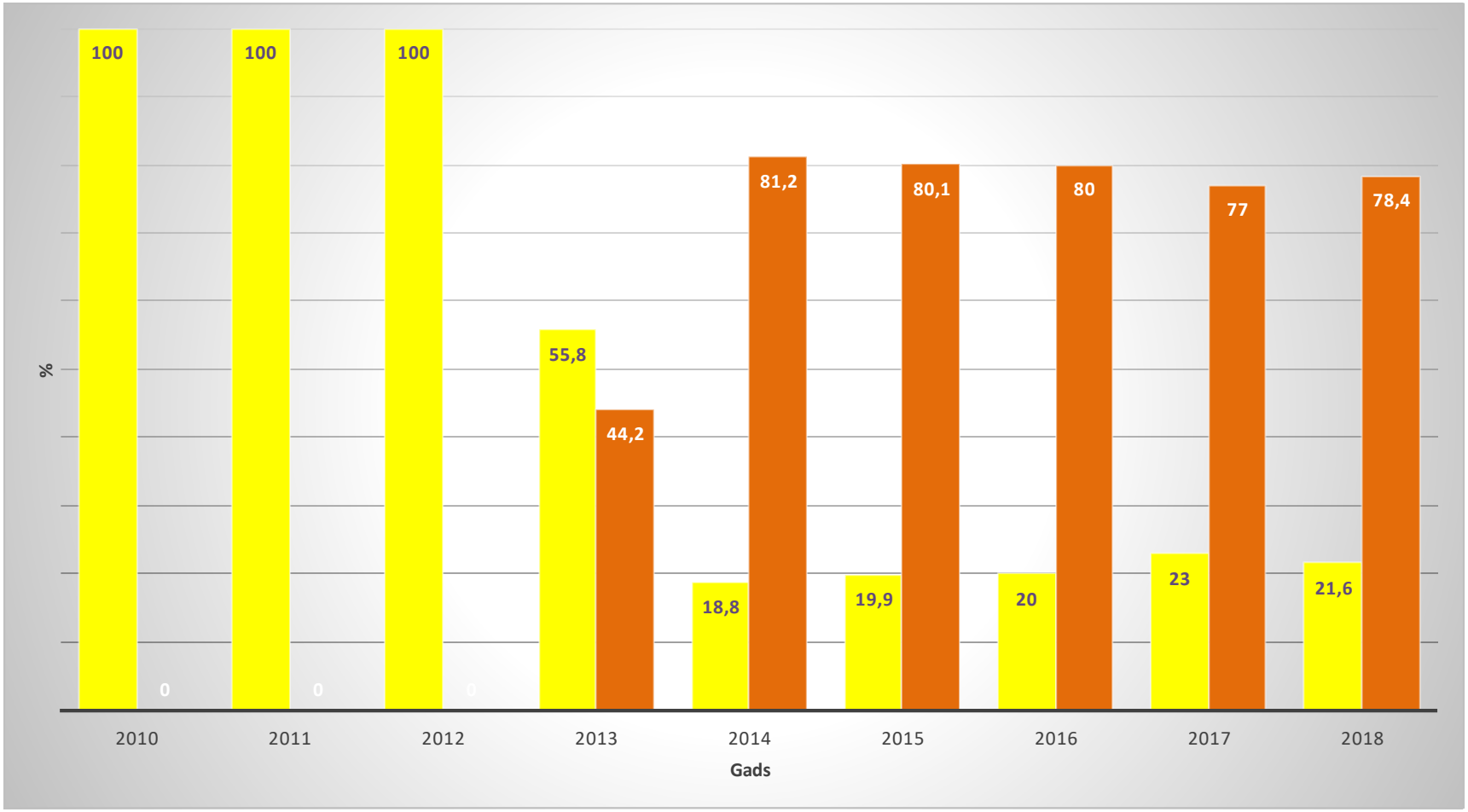
2013


Produced heat in district heating system of Jelgava city (MWh)
300000
250000
200000
150000
100000
50000
0
271926
52.268
192.108
16364
244.375
288290
Cogeneration
Boiler houses
Total
2005
2018


CO_2 emissions (t) from production of heat energy in district heating system of Jelgava city
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
16936
6.884
38…
3464
45.689
20400
Cogeneration
Boiler houses
Total
2005
2018

Source: ZREA

Structure of fuel



Source: Fortum

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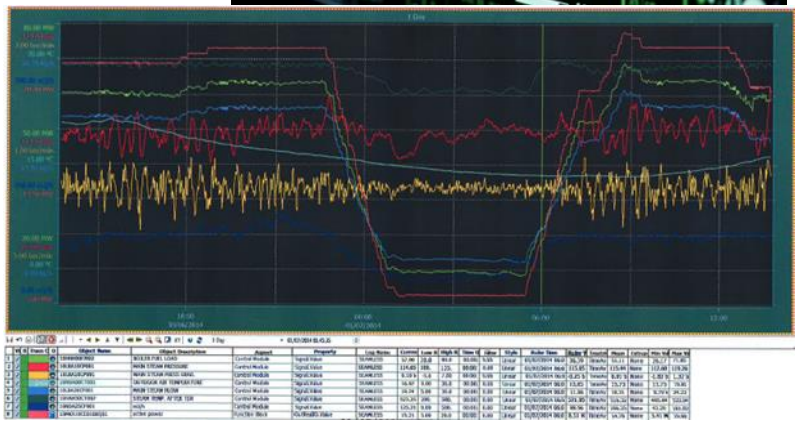
Future artificial intellect smart tools

- Drone systems for monitoring and guarding objects in nature, information.
- GPS.
- Area control with GO online camera.
- Area control with head visor and thermo camera.
- Start/stop equipment - training simulator for different situations.
- Remote equipment management on spot
- mobile tablet, etc.



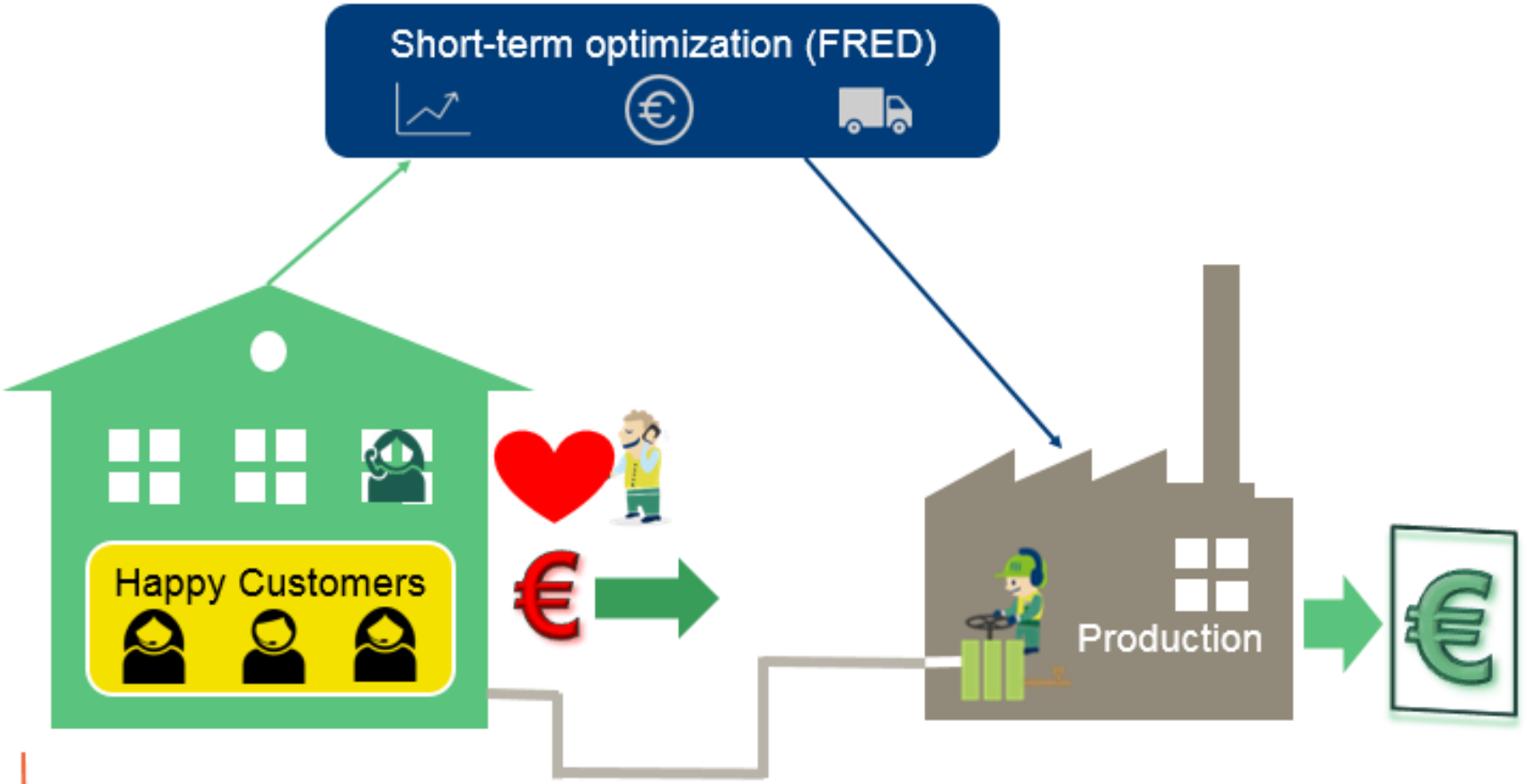
Source: Fortum

Automatic equipment– optimization of human resources

- Automatic extinguishing system.
- Smoke detection system.
- Ash conveyor systems.
- Flue-gas cleaning system.
- Monitoring of silos levels.
- Boiler start/stop system.
- Turbine start/stop system.
- Pump system start/stop systems – sequences.

Source: Fortum

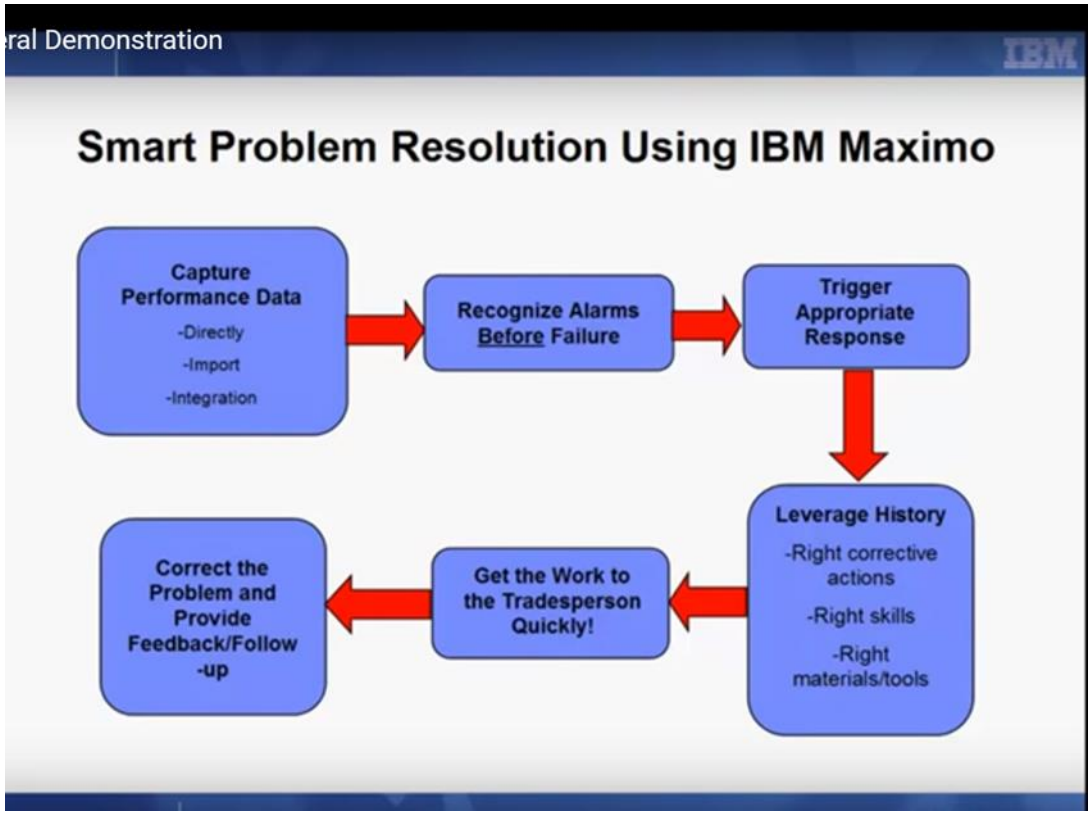
MONA – modelling of production



Source: Fortum

Use of Maximo system in production processes

- Logbook – diary, information, tasks.
- Operation of equipment by engine hours.
- Area incidents.
- Safety control and observations.
- Availability/unavailability of equipment, boiler houses.
- Tasks/Requests - Planned, Urgent Repair Jobs.
- Invoice Processing.
- Reports on produced capacity.



Source: Fortum

Logistics and weight automation system

- Movement of vehicles (in/out) into the territory
- Register and document entry
- Fixation of operations from entry, unloading / loading to departure

Source: Fortum

Flying ash collection system

- Ash automatic collection systems from boiler
- Lifting conveyor
- Pneumatic ash shipping tanks
- Ash filter
- Flying ash tank
- Wet/dry unloading system

Source: Fortum

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Thank you!

For more information,
visit our websites:
www.KeepWarmEurope.eu / www.zrea.lv

or follow us on Twitter:
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giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

FSB University of Zagreb Faculty of Mechanical Engineering and Naval Architecture

lk Landwirtschaftskammer Steiermark

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SJEVEROZAPADNE HRVATSKE
REGIONAL ENERGY AGENCY

Jožef Stefan Institute, Ljubljana, Slovenia
Energy Efficiency Centre

ICLEI Local Governments for Sustainability

ASSOCIATION FOR DISTRICT HEATING of the Czech Republic

ZREA

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University of Belgrade
NATIONAL INSTITUTE OF THE REPUBLIC OF SERBIA

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