Waste-to-Energy Plant as Part of Combined Heat and Power Strategy
– Using the Example of the Klaipeda Case –

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Fortum is a mid-sized European power generation player and a major producer in global heat (Figure 1).

Figure 1: Largest power producers in Europe and Russia, 2012

Source: Company information, Fortum analyses, 2012 figures pro forma, heat production of Beijing DH not available.
Its operations focus on the Nordic and Baltic countries, Russia and Poland (Figure 2).

![Map of Fortum's geographical presence](image)

Fortum's heat investment focus on combined heat and power (CHP) generation. Figure 3 shows current projects.

![CHP investment portfolio](image)

**Figure 2:** Fortum's geographical presence

Fortum's heat investment focus on combined heat and power (CHP) generation. Figure 3 shows current projects.

**Figure 3:** Fortum's CHP investment portfolio

### 1. Trends having impact on waste to energy

#### 1.1. Importance of circular economy is growing

According to current plans EU will in future strongly promote the circular economy. Aim is to use resources more efficiently with ambitious target to increase resource productivity by thirty percent by 2030. This means less waste sent to landfills and new requirements for more sustainable waste treatment.
- Reuse and recycling of material will increase.
- Energy recovery of non-recyclable waste will have its place in circular economy.
- Low public acceptance of direct municipal solid waste incineration.

![Circular economy illustration](image)

**Figure 4:**
Circular economy illustration

### 1.2. Multi fuel approach

Waste has an important role in fuel portfolio by replacing other more expensive fuels in heat and electricity production. Due to growing interest in the circular economy demand on more sustainable waste management including efficient reuse and recycling of waste will increase. This will have impact on the portfolio of waste derived fuels in energy production.

- Less recyclable waste for energy production,
- MSW, RDF, pre-RDF from MBTs,
- sorted industrial and commercial waste,
- biomass, local fuels.

More multi fuel CHP plants and less direct MSW WtE installations:

- Flexibility important,
- versatile technical requirements.
2. Klaipeda waste to energy plant

Investor was UAB Fortum Klaipeda, which is a joint company owned by Fortum Corporation (95 percent) and Klaipedos Energija (five percent). Klaipeda city (75 percent) and Fortum (twenty percent) are main owners of Klaipedos Energija, which provides district heat to the city of Klaipeda.

Existing production capacity consists of two CHP plants and several hot water boilers. Fuels are natural gas and heavy fuel oil.

New UAB Fortum Klaipeda combined heat and power plant (CHP Plant) improves the existing district heat production capacity to cover the base district heat load of the Klaipeda city.

The size of the CHP Plant is 20 MWe/50 MWth + 15 MWth from flue gas condenser. seventy percent heat load can be achieved also by using reduction heat exchanger DHE3. Plant has auxiliary coolers of thirty megawatt to enable waste firing and power generation also during the lowest heat load period in summer season.

Main fuel of the CHP Plant is municipal solid waste. Optional solid fuels are industrial waste (max. fifty percent), biofuel (max. forty percent), car fluff (max. ten percent) and WWTP sludge (max. seven percent). Natural gas is a start-up fuel.

- 250,000 t per year municipal solid waste and industrial waste,
- up to 80,000 t per year biomass.

Klaipeda CHP Plant consists of the following main equipment:

- Grate firing boiler was delivered by Fisia Babcock Environment GmbH. Boiler is equipped with two natural gas start-up/support burners, each thirty megawatt.
- Semi-dry flue gas treatment plant with flue gas condenser was delivered by Alstom Power Sweden AB.
- Extraction back-pressure turbine SST - 300 was delivered by Siemens Industrial Turbomachinery s.r.o.

Key milestones of the project

- Investment decision 8.12.2009,
- main equipment contracts 11.01.2010,
- start of construction at site 01.03.2011,
- first firing with waste 15.05.2013.
3. Brista waste to energy plant

Investor is a joint company owned by Fortum Värme (85 percent) and City of Sollentuna (15 percent). Fortum Värme is co-owned by Fortum and City of Stockholm. Fortum Värme provides district heating and cooling to Stockholm area.

Existing production capacity of North Stockholm district consists of several combined heat and power plants, several hot water boilers and heat pumps. Fuels used in energy production are biomass, bio oil and conventional oil.

New WtE CHP plant improves the existing district heat production capacity to cover the base district heat load with waste based production. (Figure 7)

The size of the new plant is 20 MWe/48 MWth and 12 MWth from flue gas condenser.

Main fuels are municipal solid waste (70,000 t per year) and RDF/industrial waste (170,000 t per year).

Brista WtE main equipment:
- Grate firing boiler delivered by Martin GmbH,
- flue gas treatment plant with flue gas condenser delivered by Alstom,
- extraction back-pressure turbine delivered by Siemens.

Key milestones of the project
- Investment decision September 2010,
- start of construction at site October 2011,
- commercial operation 28.02.2014.
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