The shift from the usage of natural gas to renewable biofuel – a true revolution in district heating sector

AB Kauno Energija
Kaunas, Lithuania

Reykjavik, 2019
AB Kauno Energija Overview

The second largest (by number of customers, amount of heat supplied and by turnover) heat production and supplies company in Lithuania. The Company shares approx. 20% of Lithuanian heat supplies market.

The only district heating company in Lithuania listed in „Nasdaq Vilnius“ stock exchange.
AB Kauno Energija Overview
Ownership structure

The biggest shareholders of the Company as at 31 December 2018 were as follows:

- Kaunas city municipality - 92.84% share in the authorised capital;
- Kaunas district municipality - 3.75% share in the authorised capital;
- Jurbarkas district municipality - 1.74% share in the authorised capital;
- Others shareholder – 1.67% share in the authorised capital.

Number of employees as at 31 May 2019 was 422.
More than 452,6 km of up to 900 mm diameter DH pipelines.

Company’s generation capacities consist of:
• Petrašiūnai power plant (capacity – 314,6 MW),
• 4 boiler-houses in Kaunas integrated network (total capacity – 185 MW),
• 1 boiler-house in Jurbarkas city (capacity – 34,8 MW),
• 7 district boiler-houses in Kaunas district,
• 13 boiler-houses of isolated networks,
• 28 local gas burning boiler-houses (27 burned with gas and 1 with wooden pellets) in Kaunas city,
• 8 local water heating boiler-houses in Sargėnai neighbourhood.

Total installed heat generation capacity consist of 607 MW (including 41 MW capacities of flue gas condensers).
The Company generates and supplies heat to consumers in the cities of Kaunas, Jurbarkas and in Kaunas district.

As at 31 May 2019, the Company supplied heat to 3,529 businesses and organizations as well as to 116,055 households, in total – to 119,584 consumers (objects by addresses).
In 2003 the main heat and electricity production facility of AB Kauno Energija – Kaunas CHP was sold to Russian gas company Gazprom, so from that time up to 2012 AB Kauno Energija was likely a heat distribution company.

**Up to 2012**

...mostly natural gas was used for heat and electricity production in Kaunas, Kaunas district and Jurbarkas city. *Emissions of CO₂ were 29055 tones in 2012. The heat price for customers due to the price for natural gas reached its peak – 9,1 ct/kWh without VAT in 2012. The costs for heat and hot water for households exceeded 20% of average salary.***
Installation of 2 biofuel-based boilers with total capacity of 30 MW (incl. 6 MW flue gas condenser) instead of old steam boiler BKZ-75, construction of biofuel storage in Petrašiūnai CHP plant. Investment – 6,218 million Euros, incl. 1,74 million Euros of EU support.
Major investments during last five years

Inkaras boiler house

Installation of 2 biofuel combustion boilers with total capacity of 20 MW (incl. 4 MW flue gas condenser) in Inkaras boiler-house and reconstruction of the building.

Investment – 5,792 million Euros, incl. 1,74 million Euros of EU support.
Installation of 2 biofuel burned boilers with total capacity of 21 MW (incl. 4 MW of flue gas condenser) in Šilkas boiler-house and reconstruction of the building. Investment – 3,006 million Euros, incl. 1,31 million Euros of EU and Lithuanian Environmental Investments Fund support.
Major investments during last five years

**Jurbarkas boiler house**

Installation of 1 biofuel burned boiler with total capacity of 5 MW in Jurbarkas boiler-house and reconstruction of the building. Investment – 1,0 million Euros.
Major investments during last five years

Noreikiškės boiler house

Installation of 1 biofuel burned boiler with total capacity of 5 MW (incl. 1 MW of flue gas condenser) in Noreikiškės boiler-house and reconstruction of the building. Investment – 1,8 million Euros, incl. 0,67 million Euros of Lithuanian Environmental Investments Fund support.
Major investments during last five years

Ežerėlis boiler house

Installation of 1 biofuel burned boiler with total capacity of 4,3 MW (incl. 0,8 MW of flue gas condenser) in Ežerėlis boiler-house and reconstruction of the building. Investment – 1,32 million Euros, incl. 0,52 million Euros of Lithuanian Environmental Investments Fund support.
Major investments during last five years

Reconstruction of DH networks

The Company implemented **16 trunk pipeline building and reconstruction projects** in 2012 - 2018 with the total value of more than **14,4 million Euros**, including 7,2 million Euros of EU support.

![Total length of reconstructed and installed trunk pipelines](chart.png)

- **2012**: 6770 m
- **2013**: 4507 m
- **2014**: 5068 m
- **2015**: 3949 m
- **2016**: 4298 m
- **2017**: 8784 m
- **2018**: 4714 m
Fuel balance for heat production in AB Kauno Energija, %

Usage of natural gas became less than 30%
Heat loss in Kaunas DHN

Absolut heat loss, thous. MWh
Comparative heat loss, %
Comparative average heat loss in Lithuania, %
Fuel usage in AB Kauno Energija in 2007–2017, kg<sub>oe</sub>/MWh
The heat is purchased every month from 11 IHP

„If at least one IHP operates in the district heating system, predicted amount of heat, required for the needs of consumers, must be produced and (or) purchased in a way of auction. <...>“

*The Law on Heat Sector of the Republic of Lithuania*

- UAB „Danpower Baltic Taika“ (20 MW, biomass),
- UAB „Danpower Baltic Taika elektrinė“ (CHP, 20 MW_h + 5 MW_e, biomass),
- UAB „Danpower Baltic Biruliškių“ (48,5 MW, biomass),
- UAB „Lorizon energy“ (10 MW, biomass),
- UAB „Petrašiūnų katilinė“ (19,2 MW, biomass),
- UAB „Alde General“ (20 MW, biomass),
- UAB „ENG“ (6,5 MW, biomass),
- UAB „Ekopartneris“ (17,5 MW biomass),
- UAB „Foksita“ (CHP, 30 MWh + 5 MWe, biomass).
- UAB „Ekoresursai“ (2,9 MW, biogas),
- UAB Kauno termofikacijos elektrinė (CHP, 1200 MW_h + 160 MW_e, natural gas).
Locations of AB Kauno Energija and IHP heat production facilities
Heat purchase and production in own facilities in 2012–2018, thousand MWh:

<table>
<thead>
<tr>
<th>Year</th>
<th>Heat production in own facilities</th>
<th>Heat purchase from IHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>293.0</td>
<td>1,038.3</td>
</tr>
<tr>
<td>2013</td>
<td>524.91</td>
<td>1,174.4</td>
</tr>
<tr>
<td>2014</td>
<td>589.38</td>
<td>1,069.7</td>
</tr>
<tr>
<td>2015</td>
<td>564.47</td>
<td>800.72</td>
</tr>
<tr>
<td>2016</td>
<td>571.7</td>
<td>844.30</td>
</tr>
<tr>
<td>2017</td>
<td>564.47</td>
<td>890.40</td>
</tr>
<tr>
<td>2018</td>
<td>571.7</td>
<td>872.9</td>
</tr>
</tbody>
</table>
According to the new Technical regulations for construction, that became valid on 1 February 2019, the heat supplied by AB Kauno Energija and some other heat supply companies in Lithuania is recognized to be largely produced from renewable energy sources and conforms to the new requirements for A++ energy performance class buildings.
Amounts of „green“ energy in 2018 in Kaunas and Lithuania

**Kaunas**
- KE biofuel: 2%
- IHP biofuel: 7%
- KE natural gas: 31%
- IHP natural gas: 60%

**Lithuania**
- Natural gas: 29%
- Biofuel and municipal waste: 69%
- Other fuels: 2%
- Fuel oil: 0%

*(LDHA information)*
The replacement of natural gas with renewable biofuels reduced CO₂ emissions from 29055 tons in 2012 to 21008 tons in 2018.
Average annual price for heat for consumers in Kaunas in 2012 – 2018, ct/kWh excl. VAT

<table>
<thead>
<tr>
<th>Year</th>
<th>Price (ct/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>8.49</td>
</tr>
<tr>
<td>2013</td>
<td>7.82</td>
</tr>
<tr>
<td>2014</td>
<td>6.69</td>
</tr>
<tr>
<td>2015</td>
<td>5.40</td>
</tr>
<tr>
<td>2016</td>
<td>5.02</td>
</tr>
<tr>
<td>2017</td>
<td>4.83</td>
</tr>
<tr>
<td>2018</td>
<td>4.99</td>
</tr>
</tbody>
</table>

Such a quick shift of a big city from the usage of natural gas to renewable biofuel was a true revolution in district heating sector.
Thank you!