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"A View From Baltic States"
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A Lithuanian Experience in Modernization of District Heating Systems ...

**... How to meet current customer
expectations in the Heating Market?**

Lithuania; a specific situation technically adressed

- In a Lithuanian city, almost all buildings (multi-flat, administration, commercial , ...) are connected to centralized system. Operators of these systems deliver an “universal service” under strict tariff regulation
- After collapse of Soviet Union the main target has been to maintain and refurbish systems in order to make them sustainable and more efficient, keeping existing architecture
- In the last 15 years all system has been modernized and is able to deliver competitive heat and produce cogenerated electricity; heat and electricity being produced from fossil and renewable sources
- The ways that has been developed are:
 - Increasing efficiency both for plants and networks
 - Optimizing the link between production and distribution
 - Inverting the energy management scheme from a production side oriented one to a demand side management (elimination of group heat substations replaced by automatic individual substations
 - Diversifying fuels by eliminating HFO, decreasing gas and switching to a biomass policy

That strategy has led to successful results

“Evolution for KPIs between 2002 and 2014”

23%

15%

Heat Losses (Vilnius)

76%

62%

**Global efficiency (Vilnius)
- 20% in Primary Energy**

7,5

1,7

Refill rate/year (Vilnius)

33%

4%

% Biomass (Country)

120 h

35 h

Stop for Testing (Vilnius)

85%

Connected to
Group Substations

97%

1%

With individual Regulation

1%

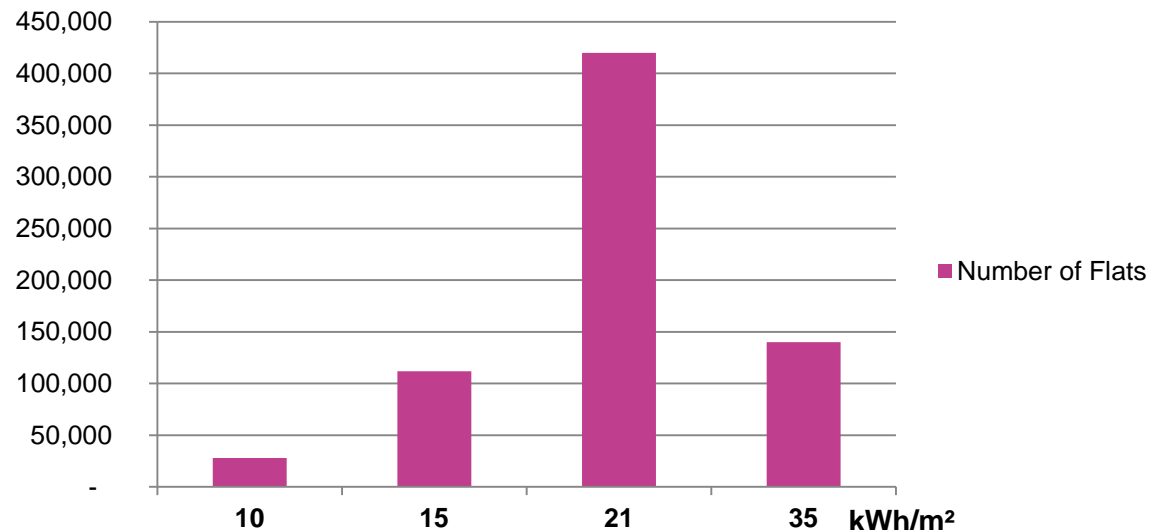
**Change from District Substations to
Aut. Building Substations (Vilnius)**

Current issues for the customers: wasting energy and energy cost

- Despite improvements un-satisfaction towards Central Heating has increased during the last years for two reasons:
 - After January 2006 gas price jumped from 145 €/toe to 595 € in 2012 (today price: 423€/toe) which has provoked increase in tariffs by more than two times. That has erased all technical savings and benefits from partial fuel switch and doubled the pressure on heating cost for households
 - For many reasons the energy efficiency measures to improve specific consumption of buildings has not been done in Lithuania. Biggest majority of buildings have not been refurbished and they suffer a huge lack of insulation

Today 78% of multi-flat buildings are in a poor shape. They consume as an average **-21 -35 kWh/m²** for on month during heating season and only 5% are new constructed or have been renovated (consumption dropped to **8-9 kWh/m²** /month during heating season).

Repartition of Flats in Lithuania following Heating Consumption in kWh/m²/Month (base one heating season)



Expectations from Consumers: A Commodity?

- When level of services has been reached, **the main expectation stays to be the cost of the service.**
- In Vilnius an ambitious plan for individualization of heating at flat level has been set up during the period 2002 – 2007:
 - 75% subsidized (100% for low income owners)
 - Transformation of internal distribution from "serial" system to "quasi parallel" one
 - Installation of heat allocators
 - Remote reading and individualized billing
- Technically it has been a success demonstrating possibility to save 20-25% of energy when system is used to compare to non-individualized buildings. Today 214 buildings have been equipped (about 4% of the housing buildings)
- Commercially it has failed. Very few old multi-flat buildings have decided to join the program. Only new modern buildings have definitively adopted it as a standard solution (85 old buildings for 129 new)
- Why?

... Because Coherence Issue

Qualitative study about Individualization of Heating (AL DSM)

- Purpose – to understand attitudes towards AL DSM and potential barriers
- Qualitative field research (4 focus groups, 40 respondents):
 - *FG 1 – users of AL DSM system and satisfied with it*
 - *FG 2 – users of AL DSM and unsatisfied with it*
 - *FG 3 – not users, but are aware of AL DSM system, positive attitude*
 - *FG 4 – not users, but are aware of AL DSM system, negative attitude*



Research conducted by TNS Gallup in May, 2005

Pros:

- ↑ **Independence** – individual regulation of heat temperature in flats
- ↑ **Transparency** – less possibilities to “steal heat” from neighbors
- ↑ **Economy** – savings and payment based on individual heat consumption (FGs positive towards AL DSM)
- ↑ **Social responsibility of customers** - stimulation to save energy resources (*3rd FG: not users, but positive*)
- ↑ **AL DSM equipment indicate heat consumption (metering)** – “you know for what you pay” (*FGs not using AL DSM*)

Cons:

- ↓ **Additional investment** – refurbishment of buildings
- ↓ **Common agreement – HOAs and necessity to take common decision** regarding installation of AL DSM
- ↓ **Serious responsibility**– customers have to control demand side management
- ↓ **Unclear billing methodology** (calculation of heat consumption is difficult to understand (*users of AL DSM*))
- ↓ **AL DSM equipment doesn't indicate heat consumption (as meters)** – impossible to follow heat consumption in flats, lack of information in Internet (*1st and 2nd FGs*)

Economy is the main goal and expected advantage. If savings/economy is less than expected or not achieved, customers (esp. 2nd FG) turns to opponents of the system

Qualitative study about Individualization of Heating (AL DSM) - II

	POSITIVE	NEGATIVE
USERS of AL DSM SYSTEM	Satisfied with improved temperature control and possibility to save energy. ECONOMY AND INDEPENDENCE are keys	Real effect of SAVINGS not achieved; they consider that BUILDING REFURBISHMENT should come first
NOT USING AL DSM SYSTEM	Would like to have such a system, but it requires TIME and ADDITIONAL INVESTMENTS	Satisfied with the CURRENT HEATING SYSTEM. Majority of them are not organized into Homeowner Association

Deteriorating status of the building is one of serious barriers to AL DSM. This puts the average customer in the “vicious circle”



Conclusion

From our Lithuanian experience, we can draw some simple statements for heating in order to meet customer expectations; the key word being “coherence in the actions”:

- To keep a Demand Side driving process and promote energy control by end users. To promote innovation in heating management for buildings (remote metering, easiness in change of thermal regimes inside buildings for heating and hot water, education of customers for making them responsible of the whole building performance, etc..) They should “own” energy efficiency because at the end of the day it is at their cost
- Production should match heat demand and not electricity output. That simple change allows to decrease temperature in the pipes, decrease the losses and increase lifecycle duration. Do not waste heating to produce electricity in CHP mode but optimize the link between the two outputs;
- To consider the global system as one to take advantage from synergies. That does not mean that it should not be competition (for the sources for example) but that means that competition must be organized in order to bring value to consumers by reducing global cost for an optimal level of services with security of supply;
- To be coherent and balanced in the actions. Decreasing the energy demand by organizing energy efficiency in buildings (e.g. through refurbishment of building envelop) could save not only energy but also investment for new plants by decreasing the capacity needed. It would mechanically increase the share of renewable sources and decrease import of fossil fuels.

District energy stays the only way for optimally meeting expectations of the different stakeholders (customers, cities, environmental challenges, efficient electricity and heat production, safety, security of supply, flexibility and adaptability to energy changes, ...) at minimum global cost. Apparently complex, such infrastructure allows to face the dramatic changes we anticipate in the energy market and should be kept as a must. Alliance between a modernized strong infrastructure, new technologies and control of processes transferred to end users is the recipe for a sustainable success in heating market.