Finnish Energy Club 2017

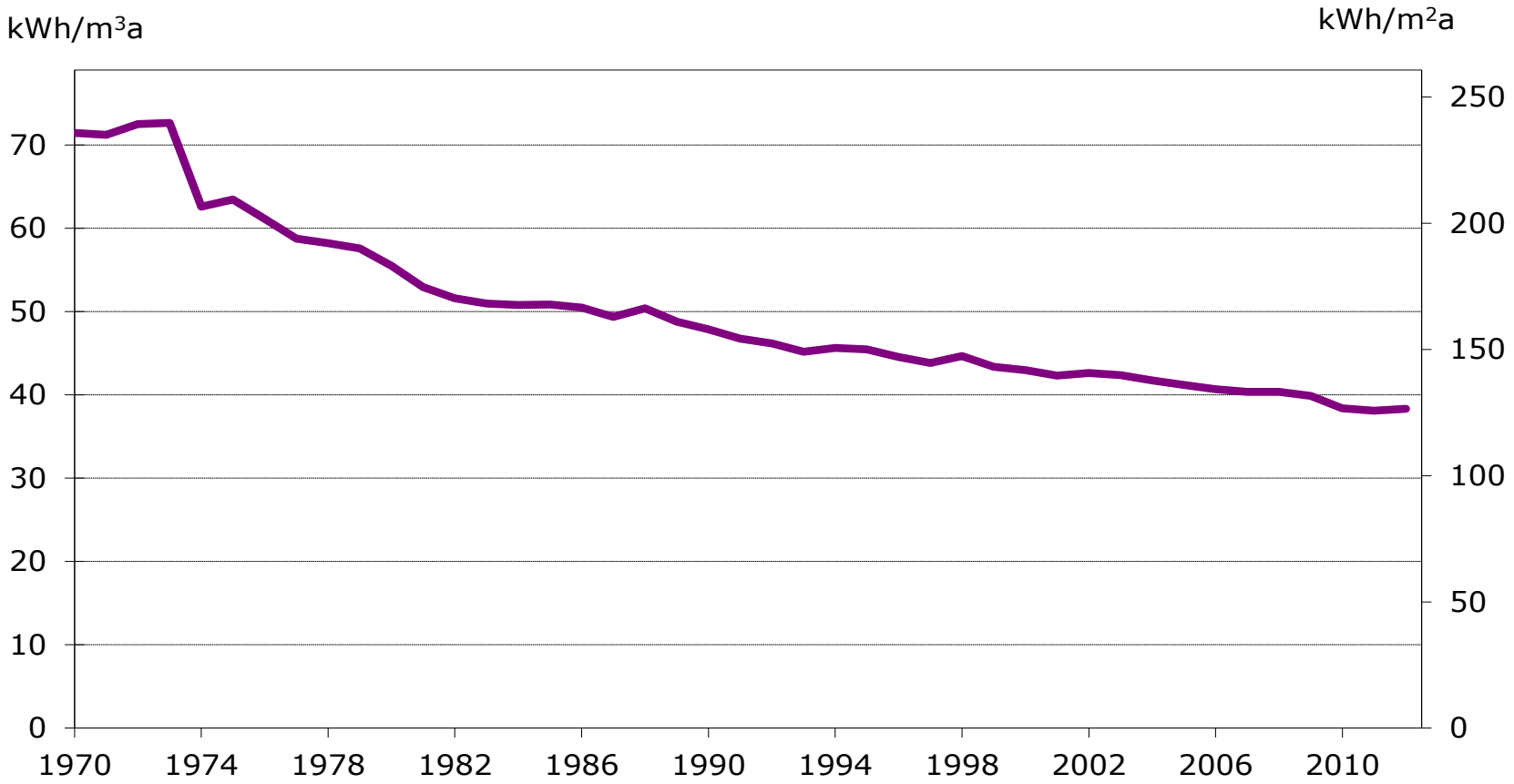
www.svek.fi

Finnish Energy Model by Helen

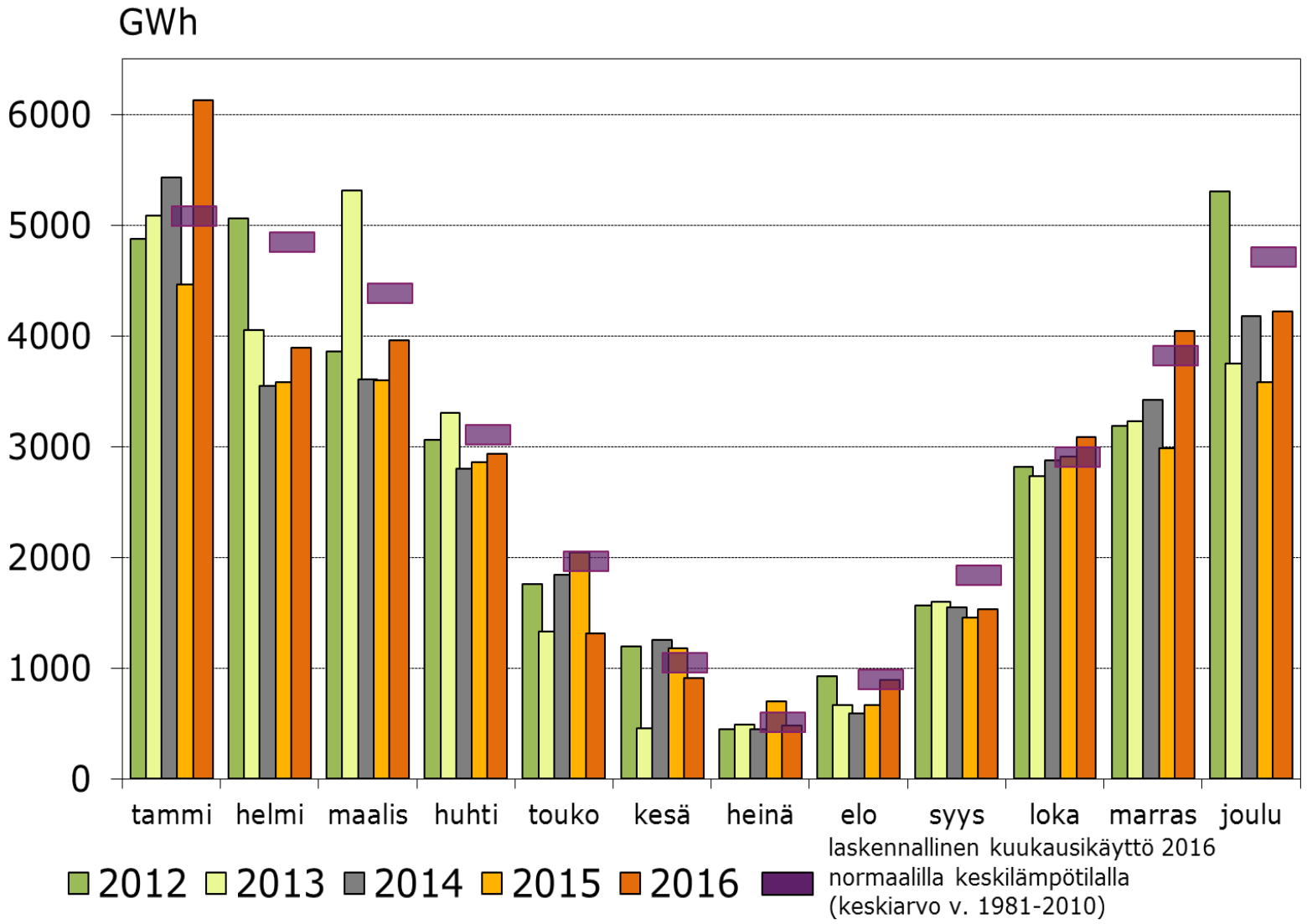
What is the Finnish Energy Club

- **Introduction of the Club**
  - **Was established in 2010**
  - **Club members are energy sector companies and different organisations**
  - **Club wants to increase cooperation between countries and companies**
  - **Share experiences between companies and countries**
  - **Promote utilisation of best practises in the energy sector**
  - **Offer turn key projects and promote sales of member companies**

Specific heat consumption in district heated buildings incl. energy for heating and hot tap water



Monthly demand of District Heating in Finland



Heat losses/year in DH system in Finland

Energy needed by Customers/year

38 kWh/m³

Fuel needed in boiler plants

45,5 kWh/m³

Losses in heating network 8 %

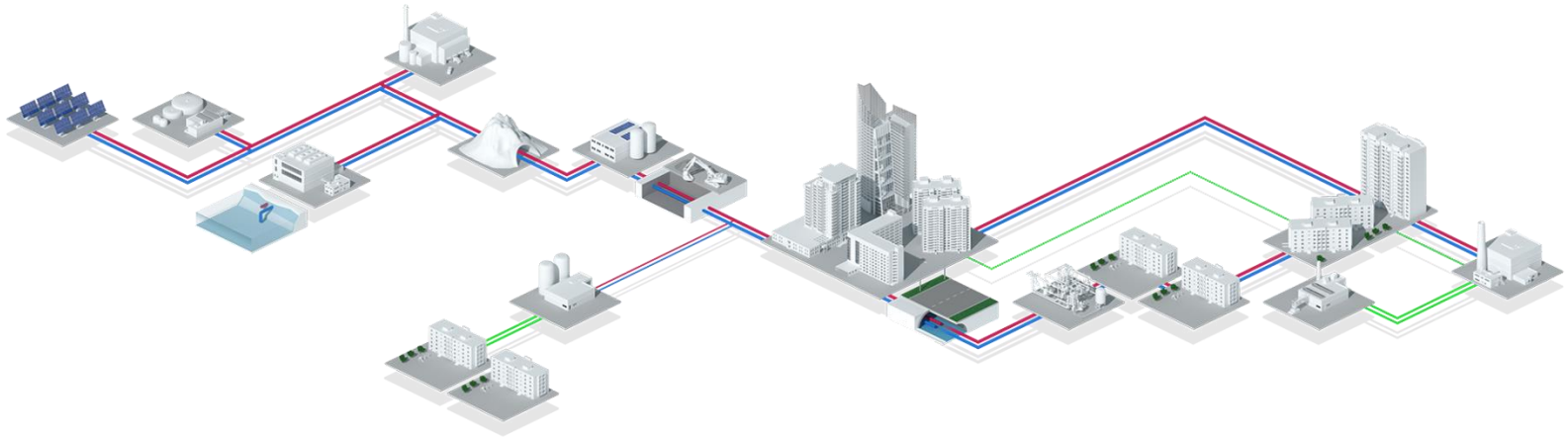
+3,5 kWh/m³

Losses in production 9 %

+4.0 kWh/m³

Total Losses 16 %

7.5 kWh/m³



Key Performance Indicators in the district heating system in Finland

Key Performance Indicators	Finland (200 companies on average)
Network **heat losses** of production	**6-9%**
Make-up **water replenishment** need per year	**1**
Reliability	**99,98%**
CHP share of DH production	**76%**
DH generation **efficiency**	**93%**
RES share of DH production	**38%**
Staff **productivity** (GWh / employee)	**20**
Profitability % of turnover	**10-20%**

Finnish Energy Story and Finnish Energy Model (FEM) by Helen

It is the Story and Model of Winners, which are

Consumers

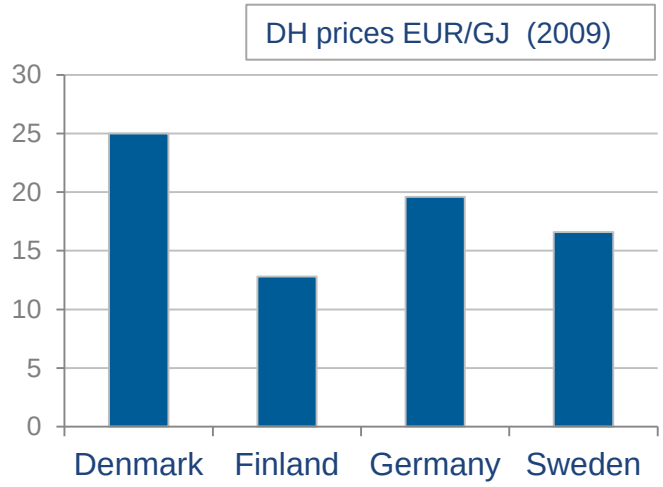
Energy companies

State

Environment

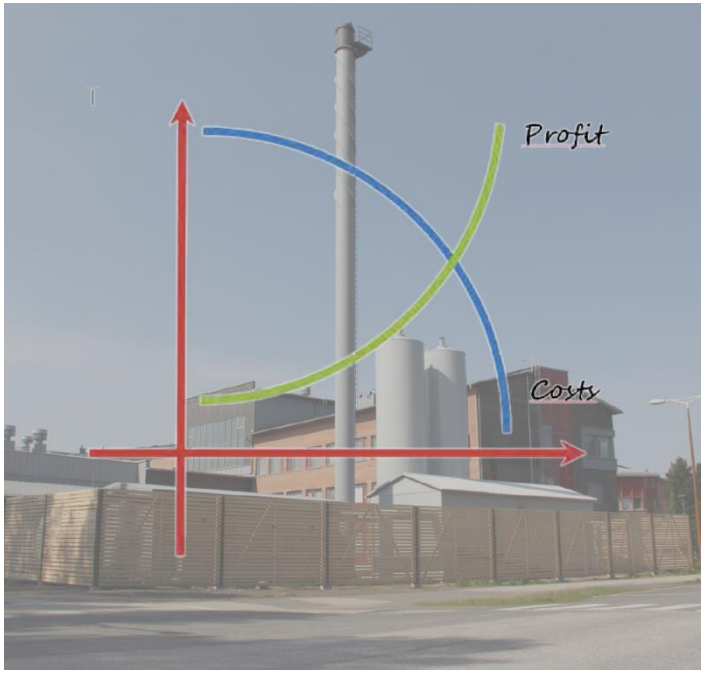
Why to utilize Finnish Energy Model? Because

- ✓ Finnish consumers pay the lowest energy price in Western Europe. And compared to the purchasing power, the lowest in the whole world.



Comparison of energy prices in Northern Europe

- ✓ Finnish energy companies make good profit



Why to utilize Finnish Energy Model? Because

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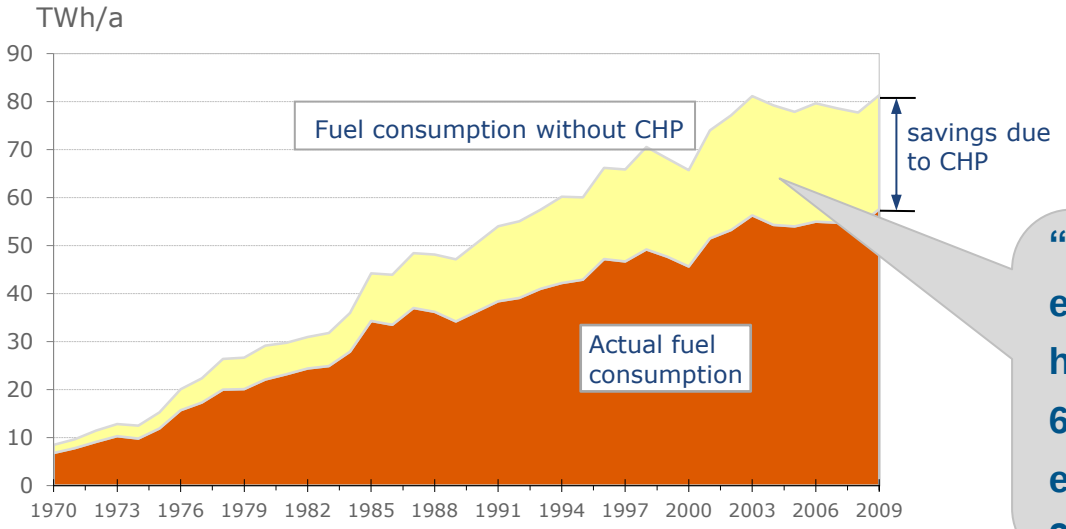
✓ State

State gets good tax revenue from the energy sector

✓ Environment

Losses in energy production and networks are the lowest in the world

Due to CHP-solutions savings in fuel are huge and CO2-emissions are low.



"The fuel savings of about 22 TWh are equal to 3 million metric tonnes of hard coal. Such savings resulted in 600 kg of coal and 1400 kg of CO2 equivalent saved per inhabitant in 2009."

The results of utilizing the Model of FEM by Helen

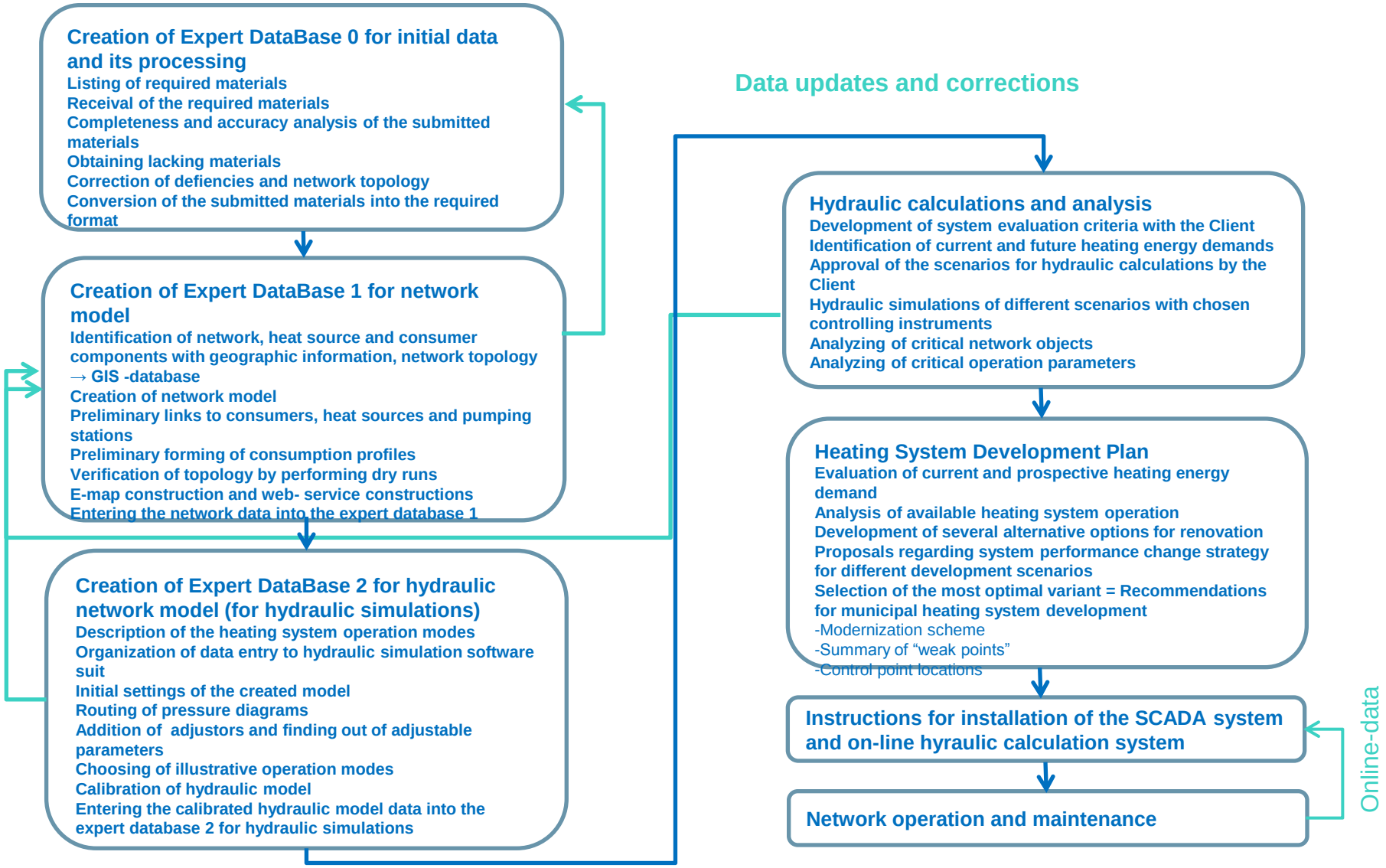
Happy Consumers

Happy Energy companies

Happy State

Happy Environment

Create the EDB, the backbone of the Finnish Energy Model (FEM) (the steps below)



Steps to become a winner and reach the Finnish key performance figures

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Step 1. Establish Expert Database (EDB)

EDB 0

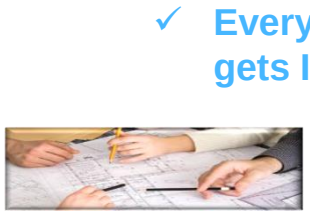
- ✓ Network information feeded into database for next phases
- ✓ Every object gets ID

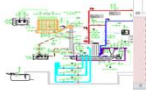
EDB 1

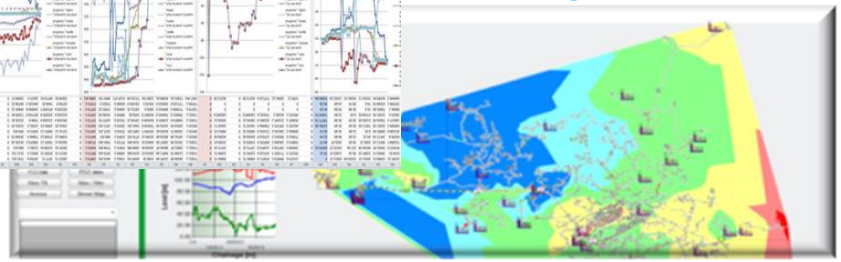
- ✓ Network model with corrected topology

EDB 2

- ✓ Calibrated hydraulic network model for optimization of operation of the utility



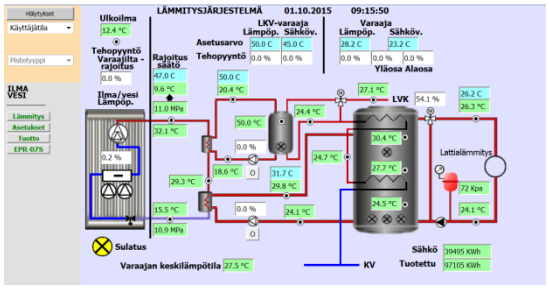


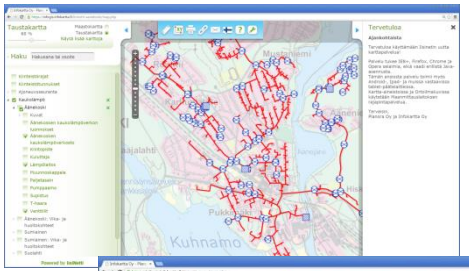


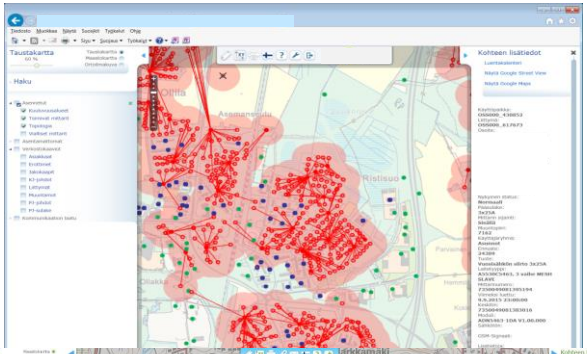
Steps to become a winner and reach the Finnish key performance figures

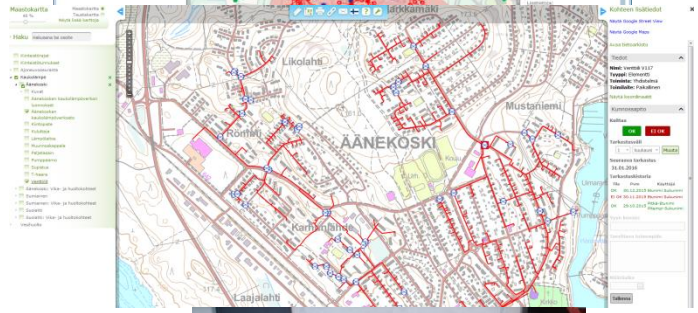
Step 2. Utilize Expert Database (EDB 0 and 1) in different applications

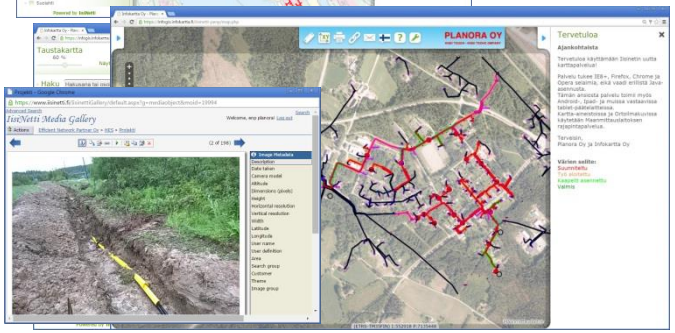
EDB 0 and 1

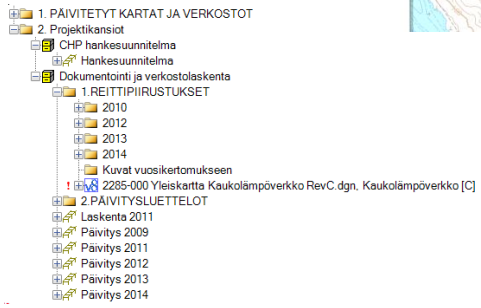












Steps to become a winner and reach the Finnish key performance figures

Step 3. Utilize Expert DataBase in hydraulic calculation for optimization

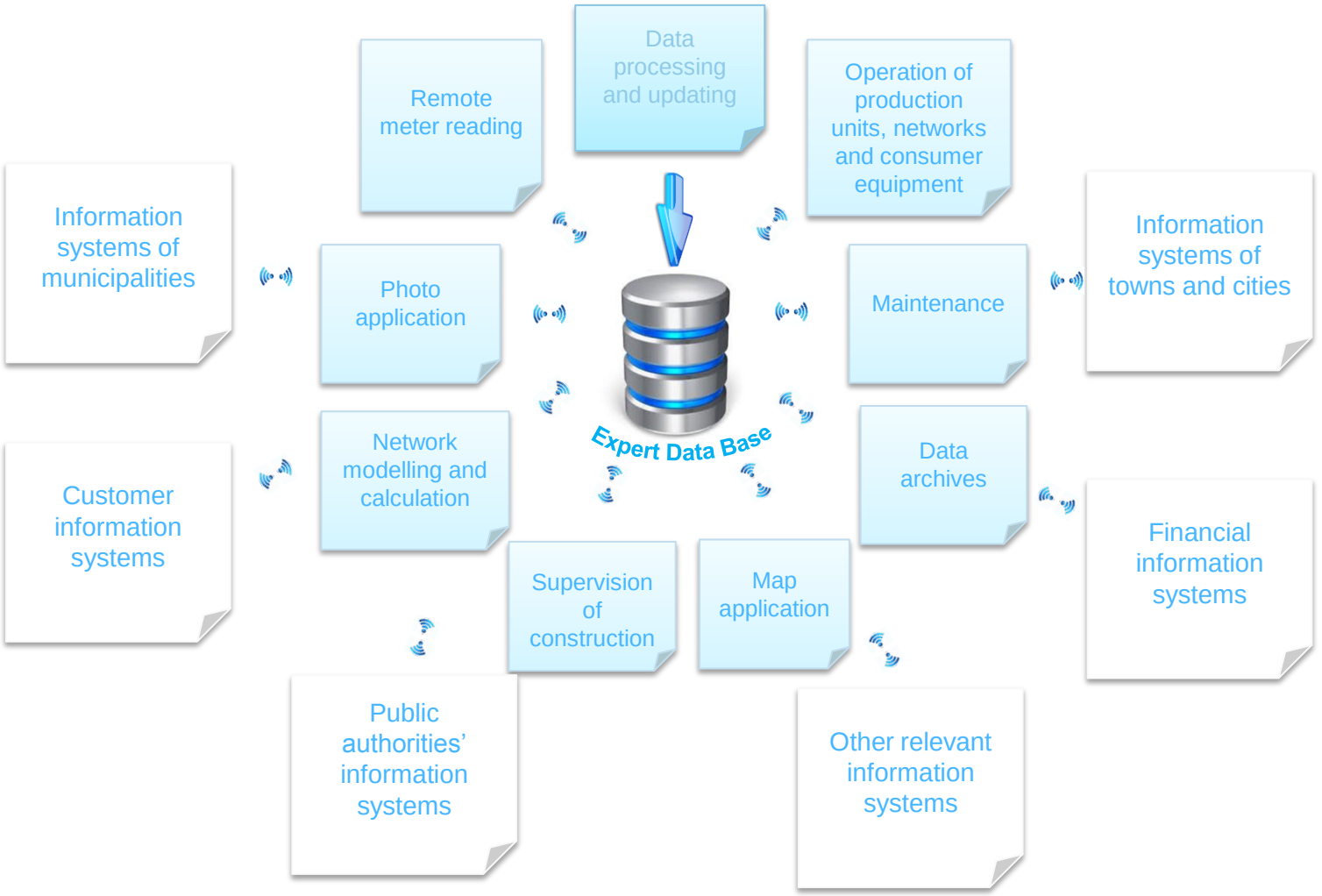
EDB 2

- ✓ **Calibrated hydraulic network model for optimization of the utility**

Optimization of the system

- to optimize investments
- to work out a development plan
- to determine control points and give instructions for SCADA system
- to optimize operation

Share the information with other Data Bases



Utilize the created Expert Data Base in different applications (f.ex Iisi-Netti Service)

The Finnish Energy Model provides

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- A very effective energy system
- Tax revenues for State and Areas
- Profitable Operation for Energy Utilities
- Savings in State and Areas budgets
- Savings in Investments
- Savings in Operation
- Foundation for Smart Energy Utilities and Cities
- EffectiveTraining program
- Positive environmental impacts

Why they are happy;
Because of savings on investment costs

Phase	Type of Cost Affected	Expected Savings	Environmental Impacts	Remarks
Establishment of Expert DataBase (EDB 0 and 1)	Data Management Investments	10-40 %	Neutral	Consolidated data management, easy access through one interface, enables integration of different data sources vs. Fragmented software and disintegrated systems
Hydraulic calculations and optimization (EDB 2)	Investments in: • Production plants, • Network • Devices & Accessories • Construction	10-50 %	Highly positive	Right dimensoning of the system, corresponded to the needs of the customers, improved energy efficiency, reduced losses, emissions, investment costs vs. Production oriented supply system. This means normally overdimensioned plants and networks

Why they are happy;
Because of savings on operation costs

Step	Type of Cost Affected	Expected Savings / Year	Environmental Impacts	Remarks
Data Management	Data management costs	10-40 %	Neutral	Consolidated data management, easy access through one interface, enables integration of different data sources vs. Fragmented software and disintegrated systems
Operation	Operational costs	10-35 %	Highly positive	Operation according to instructions based on calculations and optimization vs. Production oriented system. This means big energy losses and inefficient operation
Maintenance	Maintenance costs	10-35 %	Highly positive	Controlled system with online information features, more reliable operation vs. High maintenance costs due to wrong operation methods and oversized system

Together to Sustainable District Heating, Case Helen, Helsinki, Finland

In the city of Helsinki, DHC and electricity are produced in CHP processes on a large scale. The emissions have decreased and the air quality in Helsinki has improved considerably since 1990s – despite the fact that energy production has increased by more than 60%!

- **District heating** covers **93%** of the total heating energy demand in Helsinki
- **More than 90% of DH** energy is produced by **CHP**
- The energy efficiency of CHP exceeds 90%, which is one of highest in the world
- Despite of **low prices of DH**, Helsinki Energy is highly profitable.
- Helsinki is the third biggest and fastest growing district cooling operation in Europe.
- Data server centers are connected to DHC system to create world's most eco-efficient computer halls.

Awards:

- The EU has ranked DHC and CHP in Helsinki as **Best Available Technology** in 2008.
- International Energy Agency IEA has awarded Helsinki for **superior solutions for climate change mitigation** in 2009.
- Euroheat&Power and IEA has awarded Helsinki the **Best District Cooling System** in 2011.

Source: www.helen.fi

Cold, remote and small population - Finnish Energy Story is a success Story in the most difficult conditions

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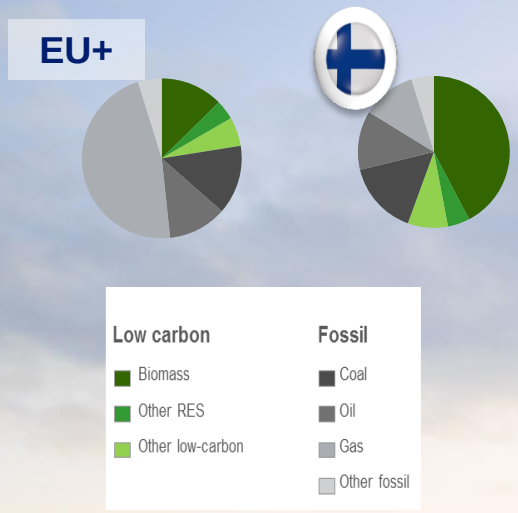
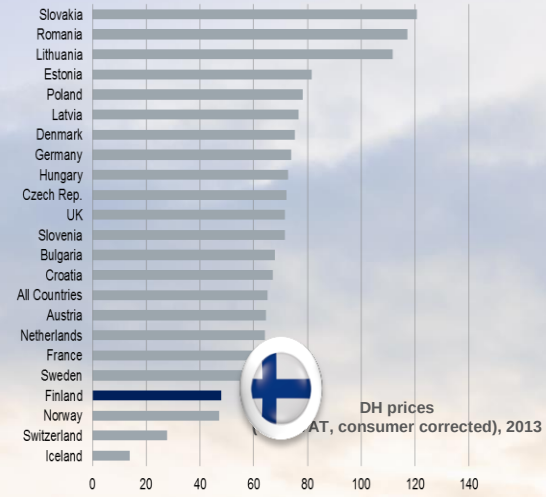
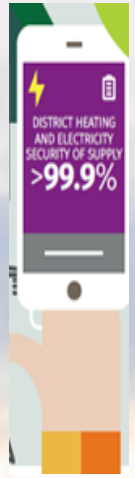
Sustainable



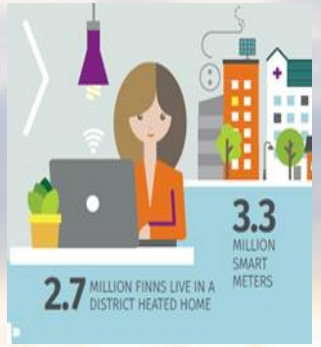
Affordable



Smart & Customer friendly



NPS x %



Finnish Energy Club offers the best practices and services (FEM By Helen)

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Finnish Energy Club with its members is pleased to offer:

- ❑ Establishment of Expert Data Base (EDB)
  - ✓ The foundation and prerequisite for smart cities and smart grids
- ❑ Optimization
- ❑ Design
- ❑ Deliveries:
  - ✓ Heat Substations
  - ✓ Network, accessories and devices
  - ✓ Heating, Power Plants and different accessories and devices
- ❑ Construction
- ❑ O&M (Operation&Maintenance)
- ❑ Management and business models
- ❑ Effective Training program
- ❑ Lifetime partnership

Your partners in Finland: Finnish Energy Club and

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