








# Challenges and Possibilities for DSOs in the Future Smart Grid

Evonet

## Agenda

-  Key figur for Evonet
-  The green transformation
-  The challenges in the future
-  Our possibilities
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## Evonet's supply area

- Supply area in Syd- og Sønderjylland and a part of Nordjylland
- Created through 26 mergers
- Supply of app. 324.000 installations
- A part of SE-koncernen



## Key figur for Evonet

|                            |            |
|----------------------------|------------|
| • Selskabsform             | A.m.b.a.   |
| • Distribueret volumen     | 3,5 TWh    |
| • Antal målere             | 324.236    |
| • Antal stationer          | 12.156     |
| • KM kabel                 | 24.183     |
| • Omsætning (Mio.)         | 1.829      |
| • EBIT (Mio.)              | 287        |
| • Afskrivninger (Mio.)     | 278        |
| • Anlægsværdisværdi (Mio.) | 4.984      |
| • Økonomisk effektivitet   | Nr. 7 / 17 |
| • Teknisk kvalitet         | OK         |
| • Betaling til netselskab* | DKK 1.619  |
| • Cost-to-serve**          | DKK 524    |

\* Tarif og abonnement for almindelig husholdning med forbrug på 4.000 kWh årligt. For Nord er det tilsvarende tal DKK 1.428

\*\* Påvirkelige driftsomkostninger i benchmarking 2016. For Nord er det tilsvarende tal DKK 678 pr. kunde

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## Agenda



Key figur for Evonet



The green transformation



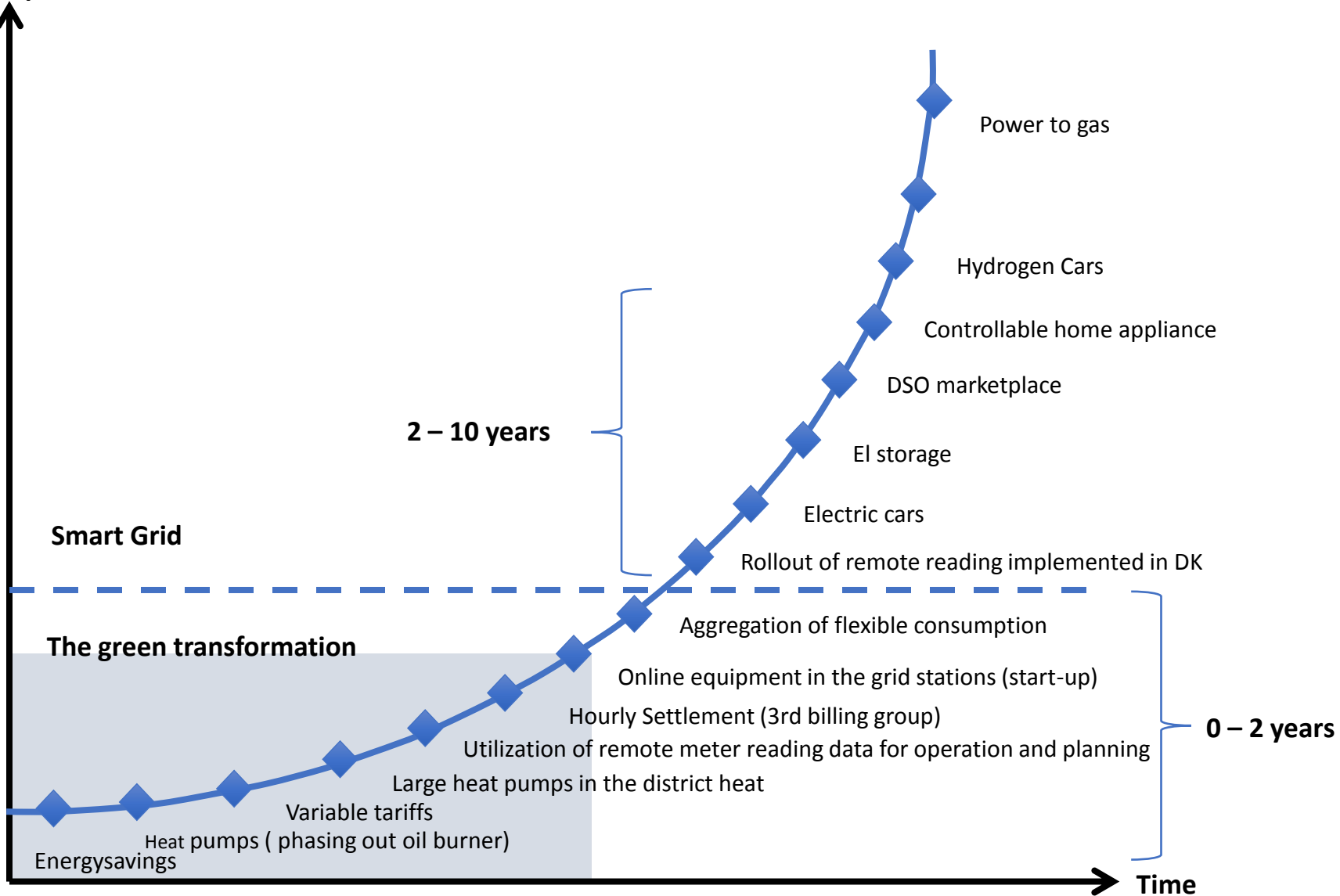
The challenges in the future



Our possibilities



Development



# Challenges

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## EV is here



- By 2030, up to 80 % of the new cars will be electric cars (EV).
- All major car manufacturers participate in the race to deliver EV's.
- Volvo will only sell hybrid cars and EV's from 2019.
- Volkswagen has marked 255 billion DKK to become the world's leading manufacturer of EV in 2025. At the same time, the plan is to electrify the entire fleet by 2030

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## PV and heatpump in all new home



- Integrated PV in building
- The price of solar cells has fallen by 73 % since 2010 and further price falls of 40 % are expected.
- Individual heat pumps and large central heat pumps can increase the need for electricity with 30 % in our supply area.



# Challenges

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## Batteries and other storage methods in combination with price signals



- Batteries can be necessary to maintain the security of supply in the future
- Battery for a housing block for balance the load of the grid. Has capacity for 60 households for up to 24 hours and is connected to the 10 kV grid
- Blockchain technology and price signals important in the balancing of the distribution grid

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## Self-supply can be a trend - also in Denmark



- The distribution grid will act as the local energy system, which is “off grid”

<https://www.youtube.com/watch?v=hmflyT53-hU>

## Example from Germany on the transition from central to decentralized production

Figure 3: Evolution of distributed power generation in Germany

Unbundling of power systems and increasing shares of decentralised generation are major drivers of grid code development.



c. 30,000  
power installations

2000



c. 220,000  
power installations

2006



c. 1.5 million  
power installations

2014



Source: 50 Hertz

## Agenda



Key figur for Evonet



The green transformation



The challenges in the future



Our possibilities



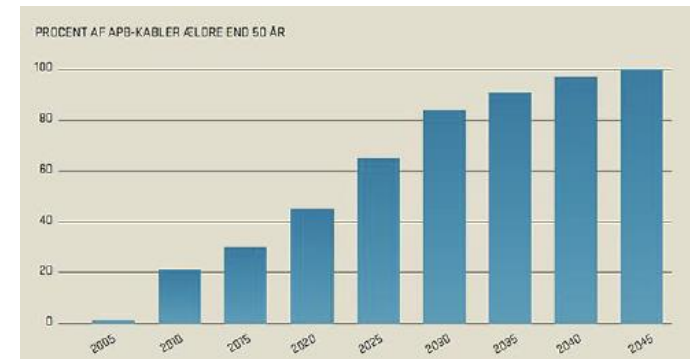
# The future needs higher investments and a higher level of activity in the grid

## Several factors point to rising investment and maintenance costs in the future

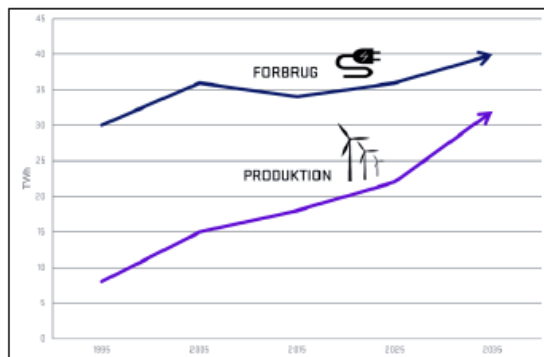
The distribution grid might be reinforced to handle increasing electrification through new decentralized technologies such as EV's, PV's, wind turbines, large heat pumps and storage technologies in district heating

- Change of load conditions in the electricity grid in both Peak and Baseload can stress the grid locally
- Asset Management and increased data analysis will be the cornerstone of balancing local production capacity and ensuring optimal investment in the short and long term

## The grid are getting older

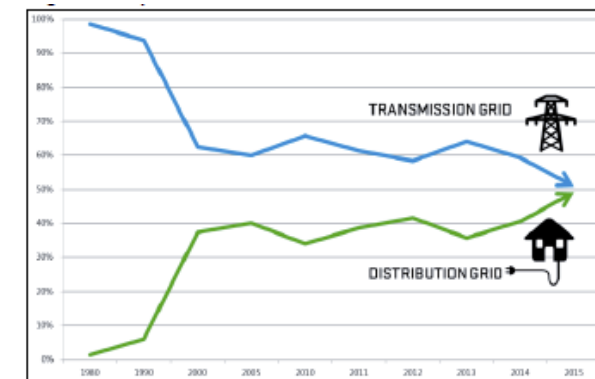


## Increased production and consumption in the distribution network



Kilde: Energinet.dk og egne beregninger.

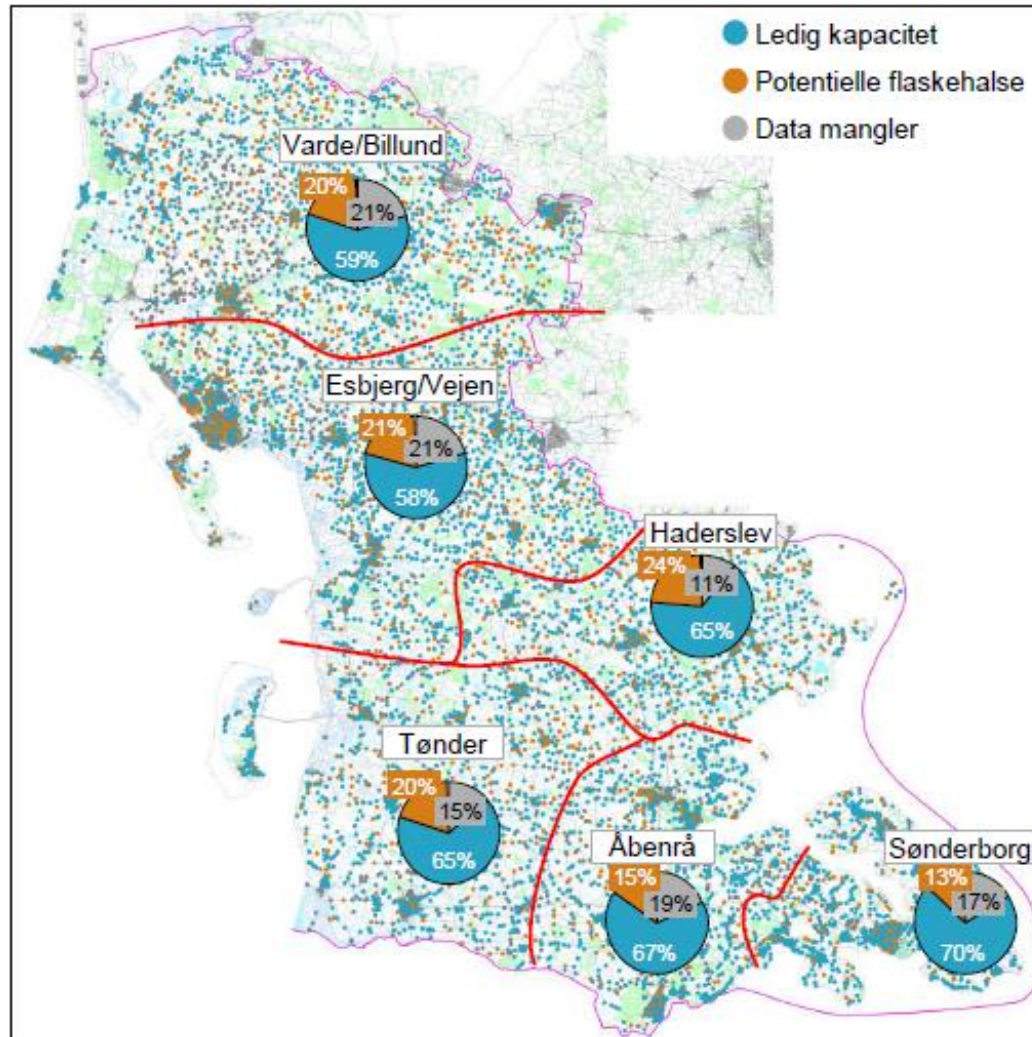
## The production is moved from transmission \*\* to distribution



\*Evonet

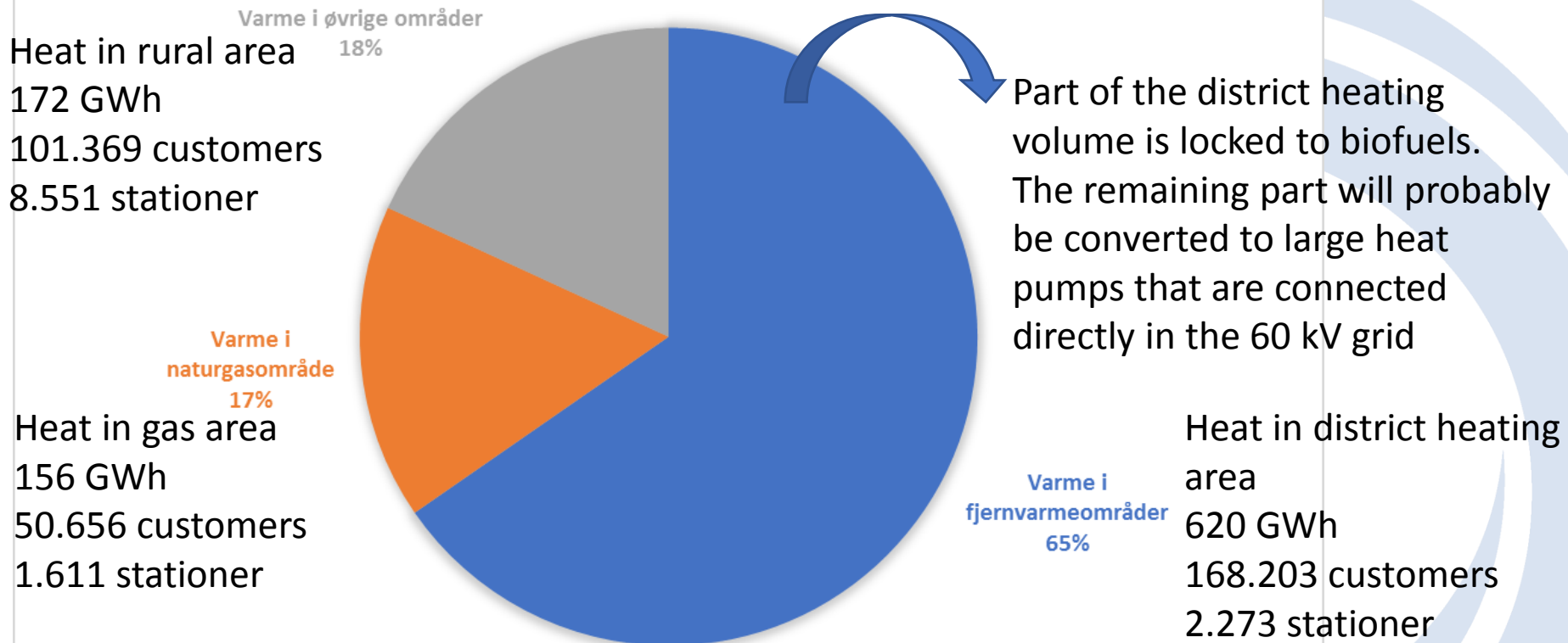
\*\*Energinet.dk

# The load rate of the grid

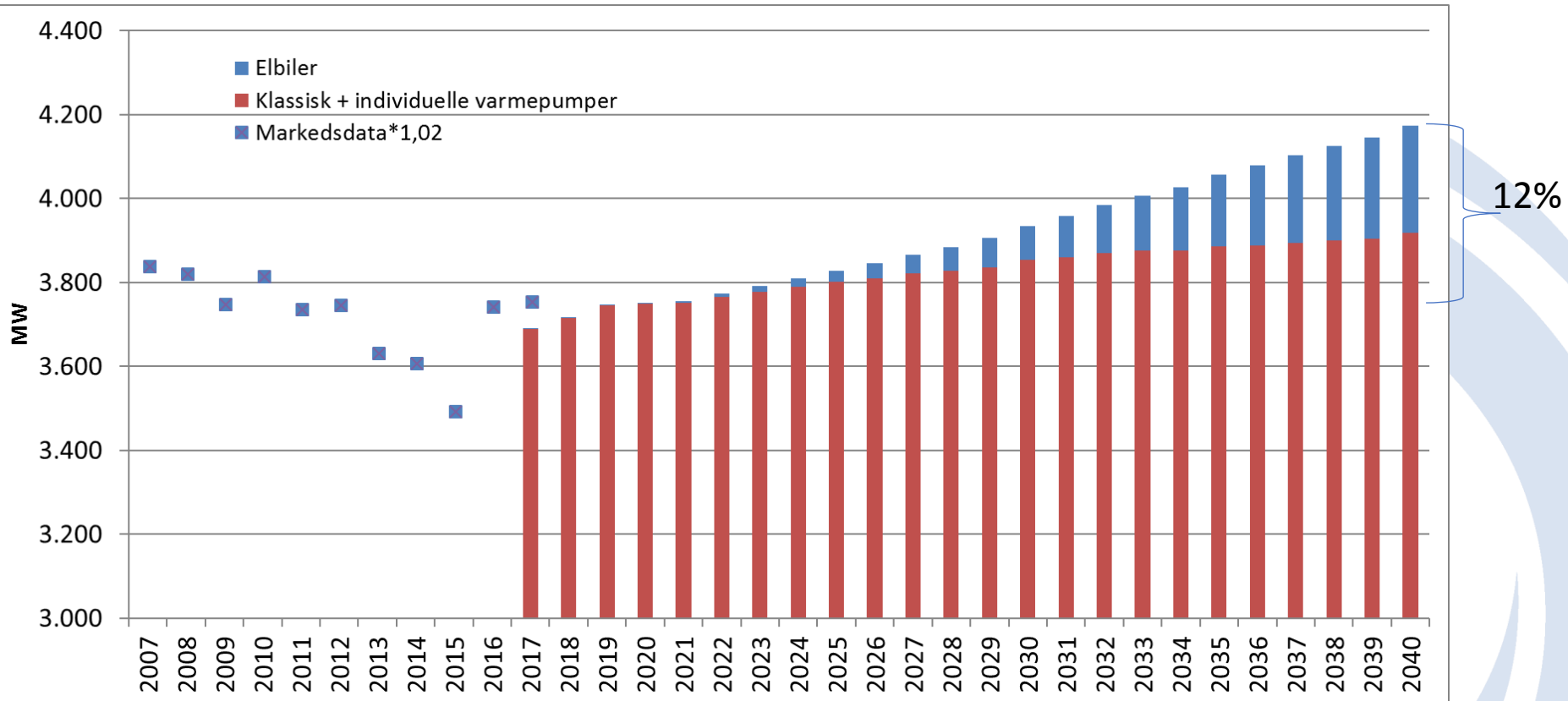


# The volumen of energy to be converted.

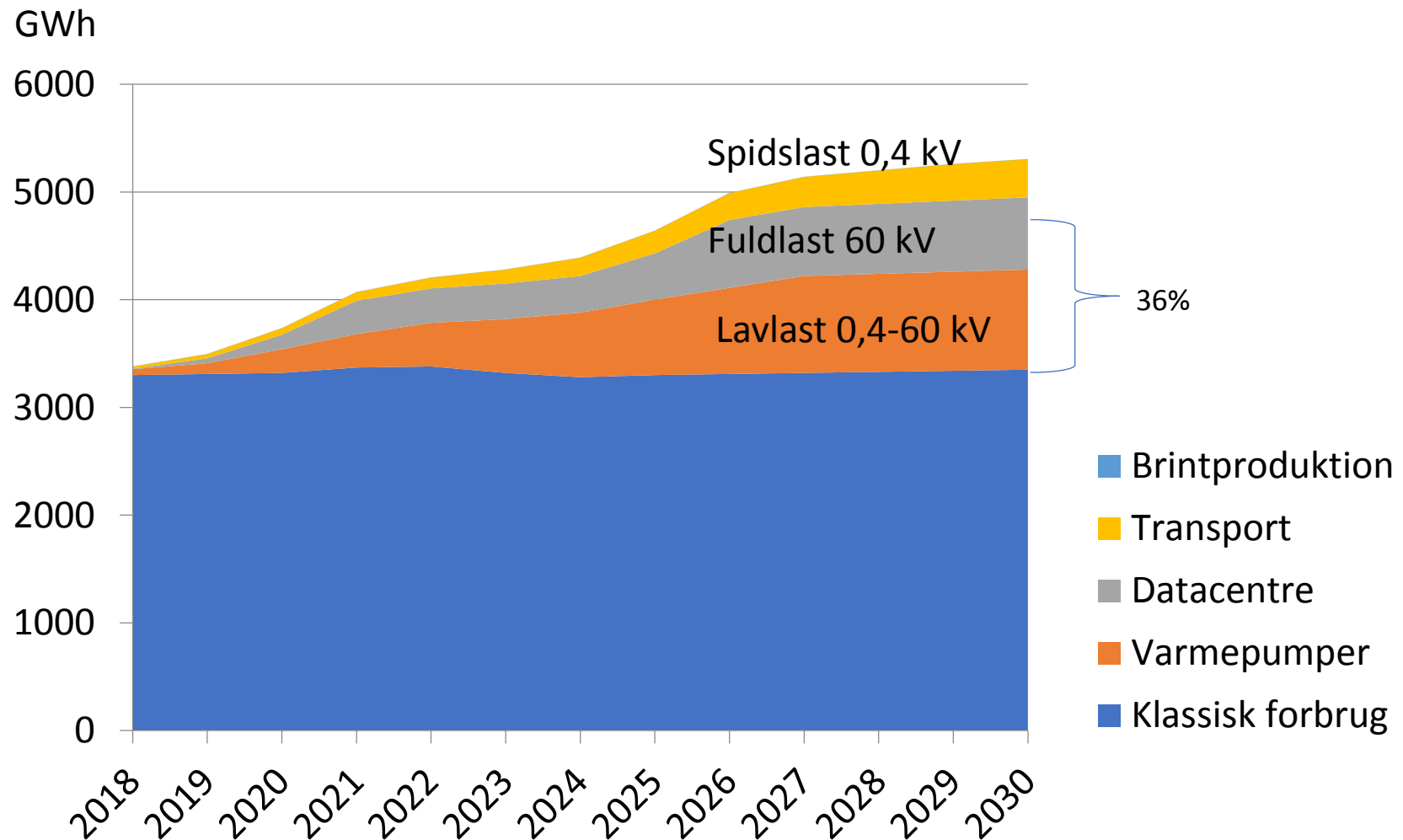
KONVERTERINGSVOLUMEN



# Energinet's forecast



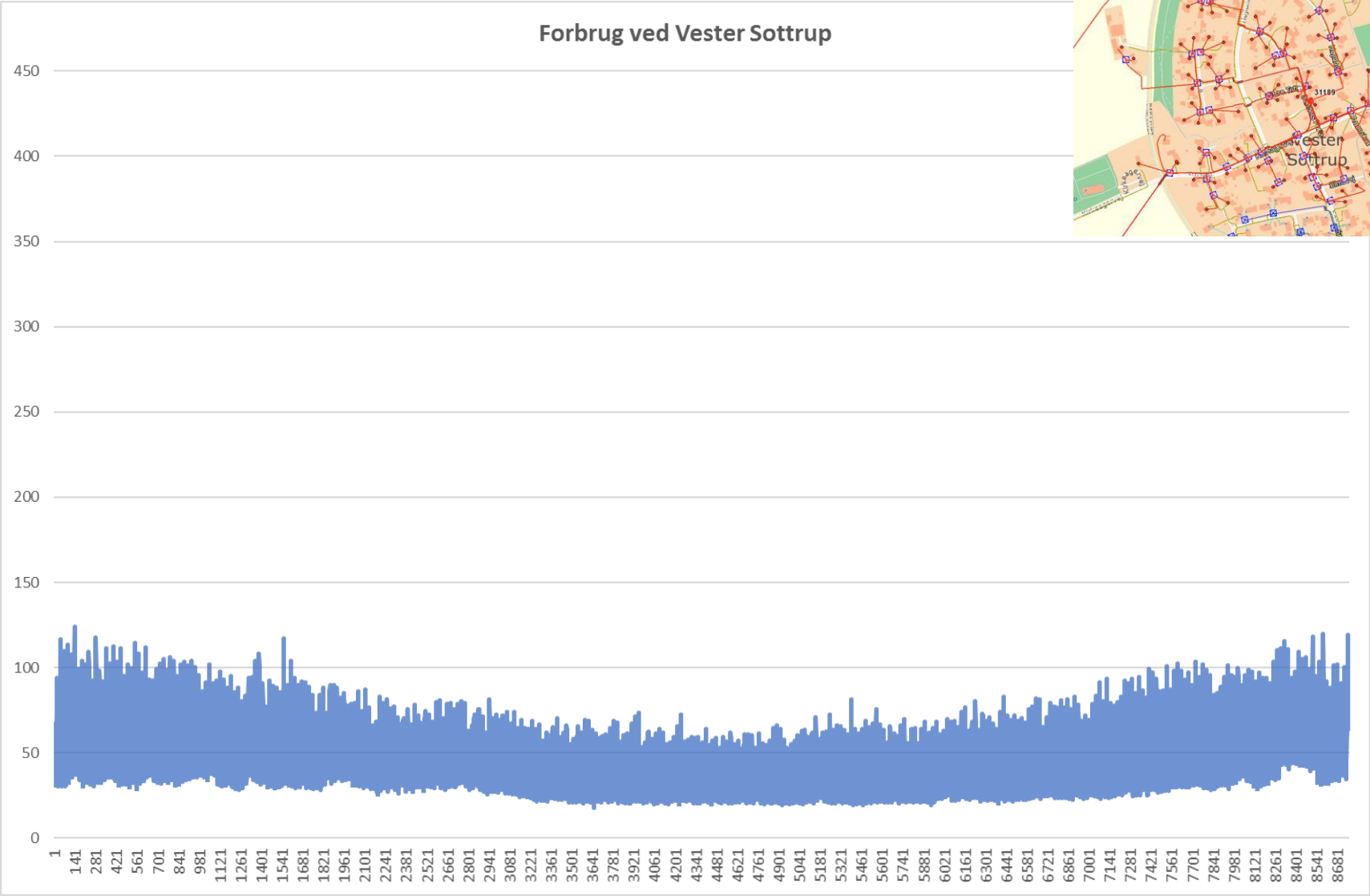
# Volumen of the future consumption - Evonet Evonet





# Consumption in Vester Sottrup

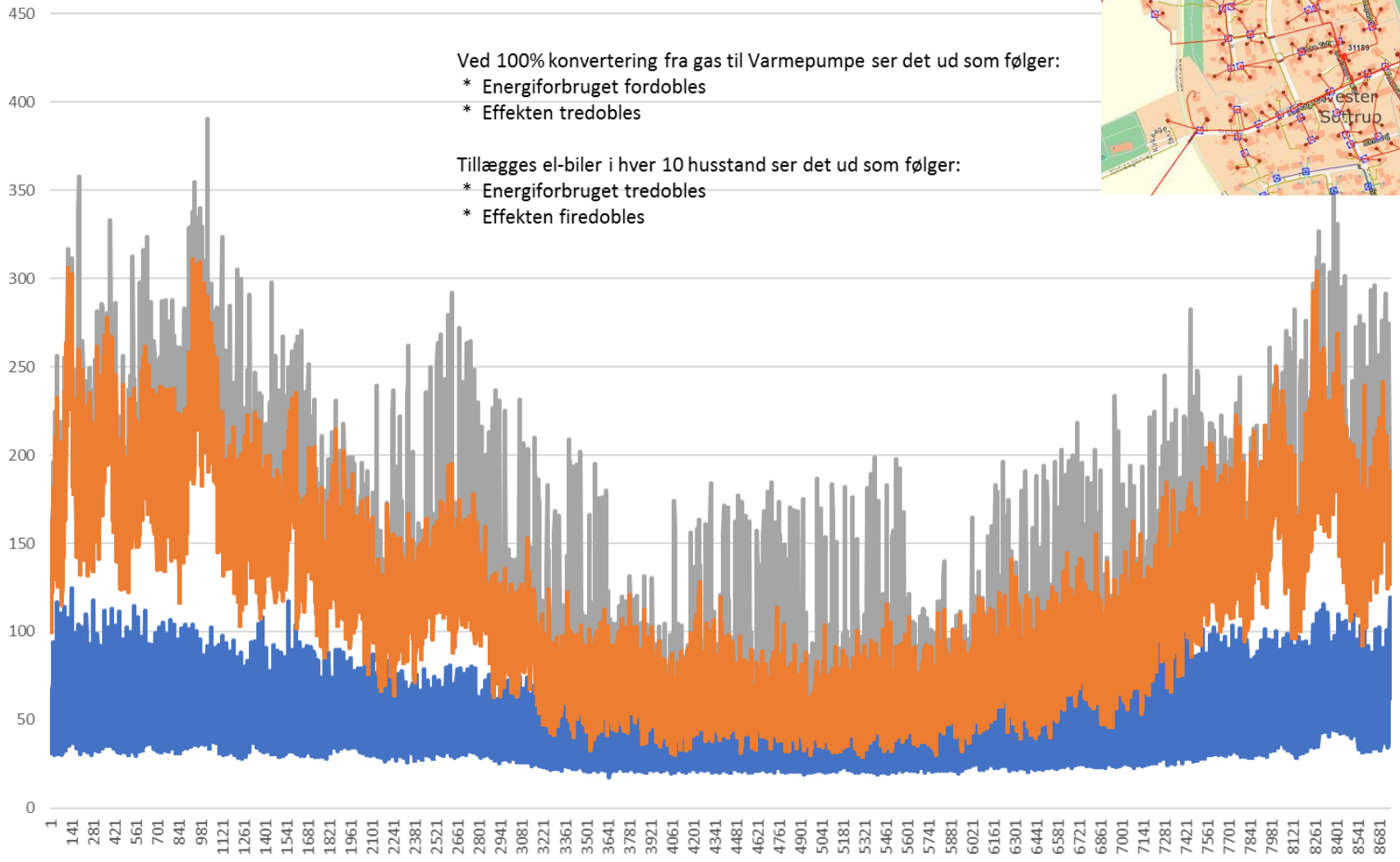
Evonet



# Future consumption in Vester Sottrup

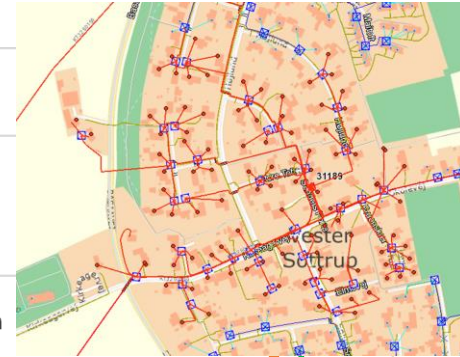
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Fremtidig forbrug ved Vester Sottrup - VP konvertering



# Future consumption in Vester Sottrup with flexible charge of EV's

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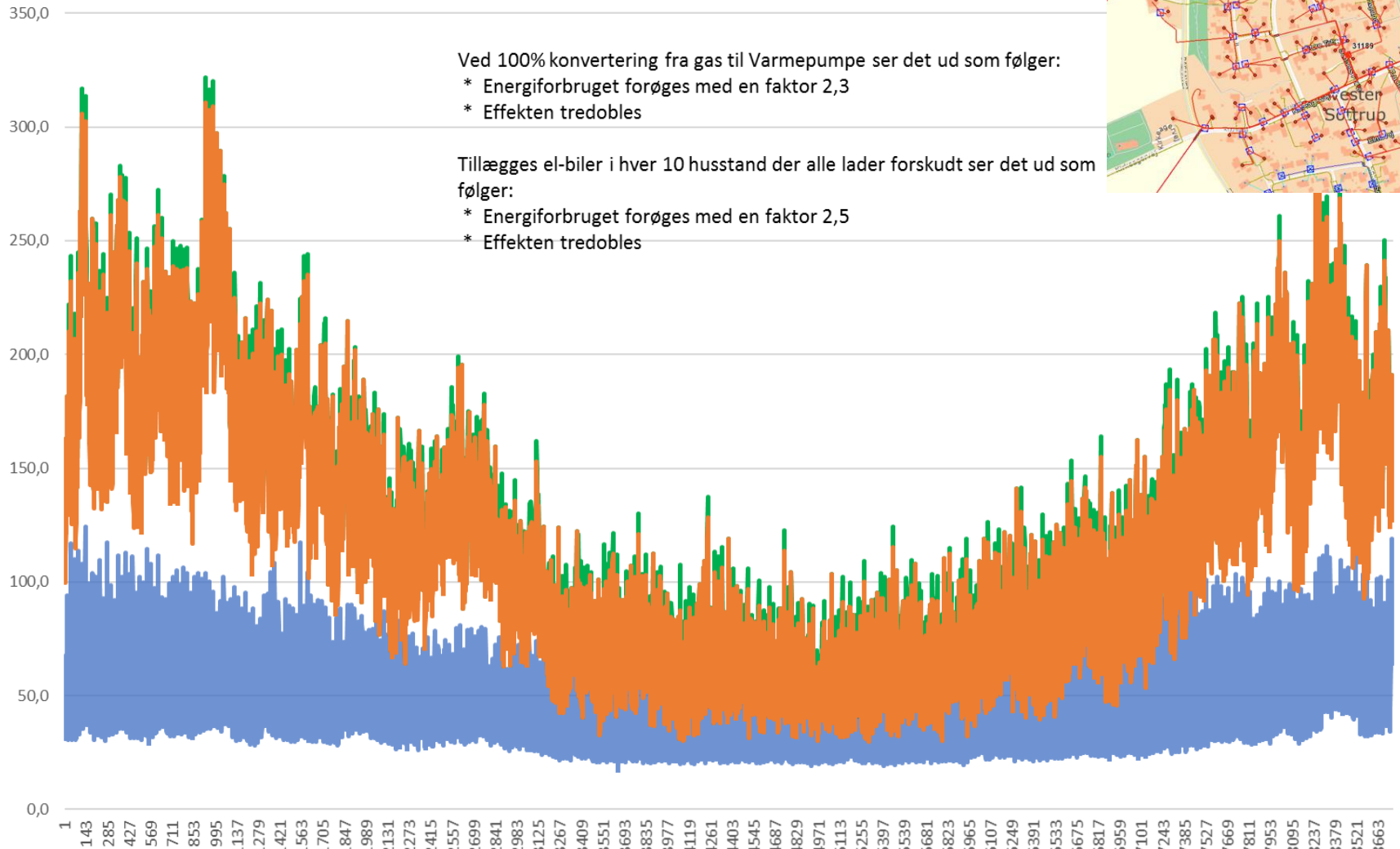
## Fremtidig forbrug ved Vester Sottrup - VP konvertering

Ved 100% konvertering fra gas til Varmepumpe ser det ud som følger:

- \* Energiforbruget forøges med en faktor 2,3
- \* Effekten tredobles

Tillægges el-biler i hver 10 husstand der alle lader forskudt ser det ud som følger:

- \* Energiforbruget forøges med en faktor 2,5
- \* Effekten tredobles



## Agenda



Key figur for Evonet



The green transformation



The challenges in the future



Our possibilities



# Possibilities in the future

- **Good price signals important in the balancing of the distribution grid.**
- **New tariff to support price signals.**
- **Maybe local tariff is necessary.**
- **New tariff that can take care of local energy system, which is “off grid”.**
- **New ways to integrate battery systems into the power grid.**
- **Use the inverters as voltage stabilizing devices in the grid.**
- **Etc.**



**Thanks for listening**

**Evonet**