Modelling Smart Energy Systems in Different Energy System Analysis Tools

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The Smart Energy System

Towards 100 % Renewable Energy

Integration of the energy sectors

www.energyplan.eu
Modelling Smart Energy Systems

Simulations required to test the benefits.

Requirements for simulations

• Model on hourly level
• Model all sectors in the energy system
• Being able to include the necessary technologies

EnergyPLAN and Sifre
EnergyPLAN and Sifre

EnergyPLAN

• Analytically programmed
• Used before for Smart Energy Systems

Sifre

• Linear optimisation
• Currently mostly used internally in Energinet.dk
Comparing the two tools

Fuel consumption

Production of electricity and district heating

VRES and Demands must be equal
Case: A simplified IDA 2050 plan

The IDA 2050 Energy Vision for Denmark
Removed the Gasification and Synthetic Fuels
Removed the Industrial Part
Simplified IDA 2050 Plan
Fuel Consumption

EnergyPLAN

Sifre

Variable Renewables
Gas
Biomass

TWh

0
10
20
30
40
50
60
70
80
90
100
Electricity

![EnergyPLAN vs Sifre](chart.png)

- Extraction plants
- Variable renewables
- Demand

TWh

District Heating

Conclusion

Equal renewable production
CHP power plants operate differently
More storage on electric vehicles in Sifre

Not yet a full Smart Energy System; needs to be elaborated
Thank you!