Waste and Balmorel

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WP 1
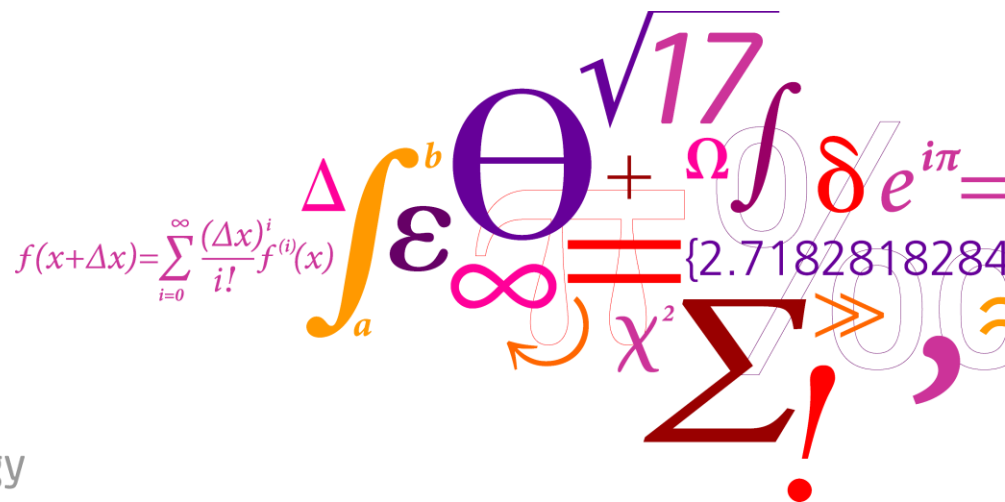CEESA meeting
26th January 2010

Waste amounts

Scenarios
- Business as usual
- High sorting degree (as Sweden today)
- Waste minimization

Waste fractions (households and industry)
- Wet organic
- RDF (dry, organic and fossil)
- Mixed waste

Waste technologies

- Incineration with seasonal heat storage
- Thermal gasification (CHP/ transport fuel)
- Biogas (CHP/ transport fuel)

EnergyPLAN

Exogenous input:

Heat and electricity demand
Fuel prices and emissions
Efficiencies and costs of plants
Hourly distribution of demands
and production from RE sources
Regulation strategies
Capacities of all plants
Electricity price

Results:

Energy production
Fuel consumption
Electricity import/export
Emissions

Balmorel

Exogenous input:
Heat and electricity demand
Fuel prices and emissions
Efficiencies and costs of plants
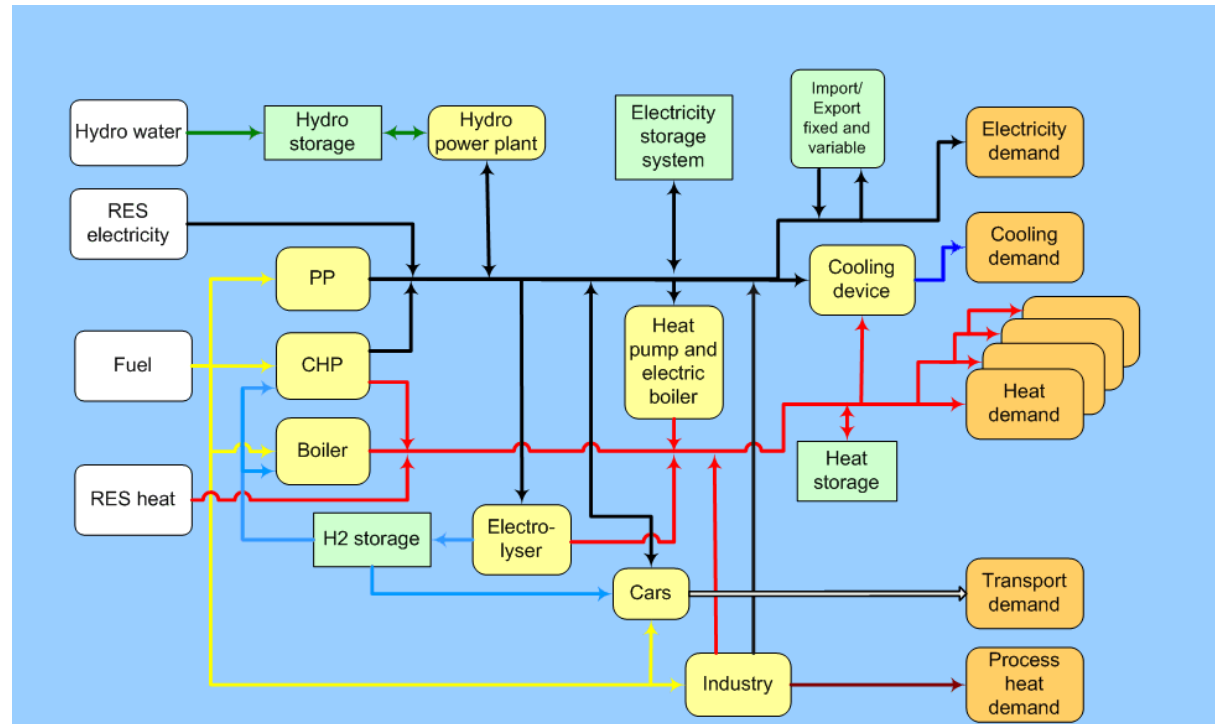Hourly distribution of demands
and production from RE sources
Capacities of existing plants
Time aggregation

Results:
Energy production
Fuel consumption
Electricity import/export
Emissions
Investments in power plants
and transmission lines
Prices on traded energy

Model characteristics

	EnergyPLAN	Balmorel
System aggregation	3 DH groups, 1 region (e.g. a country)	Flexible at three levels (e.g. 21 DH areas and 2 regions in DK)
Optimization type	Analytical/ strategy-based (market or technical)	Linear programming (market)
Optimization focus	Minimizing fuel consumption or marginal production costs	Minimizing annualized costs of energy system
Optimization object	Operation	Operation and investment
Model run-time	Seconds	Depending on size of problem, varying from minutes to days
Access	Free, windows-based interface	Open source, direct access to code (GAMS and LP software)

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Input regarding electricity trade with surrounding countries and least cost investment optimisation

1. Input to EnergyPLAN

2. Validation of EnergyPLAN analyses

Input to EnergyPLAN

Assumptions
- Same data on technologies, fuel costs and demands
- Same capacities in Denmark

- "Perspective scenario" from DH project in surrounding countries
- Scenario with 100% renewable energy in DK and the surrounding countries

Output
- Electricity prices
- CO_2 quota price (with CO_2 cap)
- Biomass price (with limited ressource potential)
- CO_2 emissions from surrounding countries

Deadline Summer 2010

Validation of EnergyPLAN analyses

Operation and trade
- Same data on technologies, fuel costs and demands
- Same capacities
- Energy system open and closed for electricity trade

Scenario, operation and trade
- Same data on technologies, fuel costs and demands
- Combined operation and investment optimisation
- Request for 100% renewable energy in Denmark
- Energy system open and closed for electricity trade

Deadline Winter 2010