Thermal Biomass Gasification for CHP

Danish Success Stories

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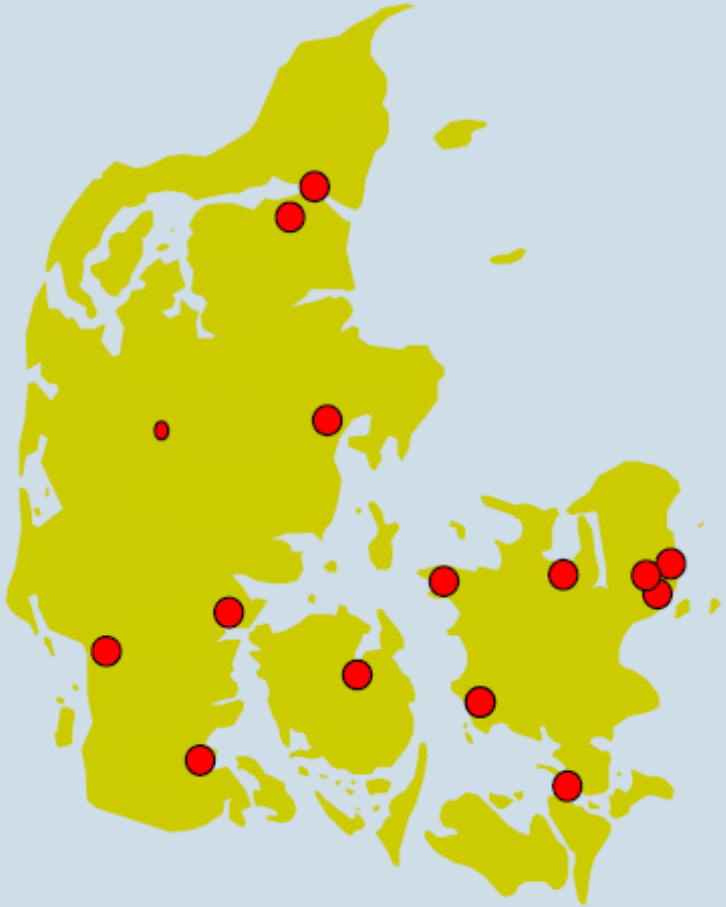
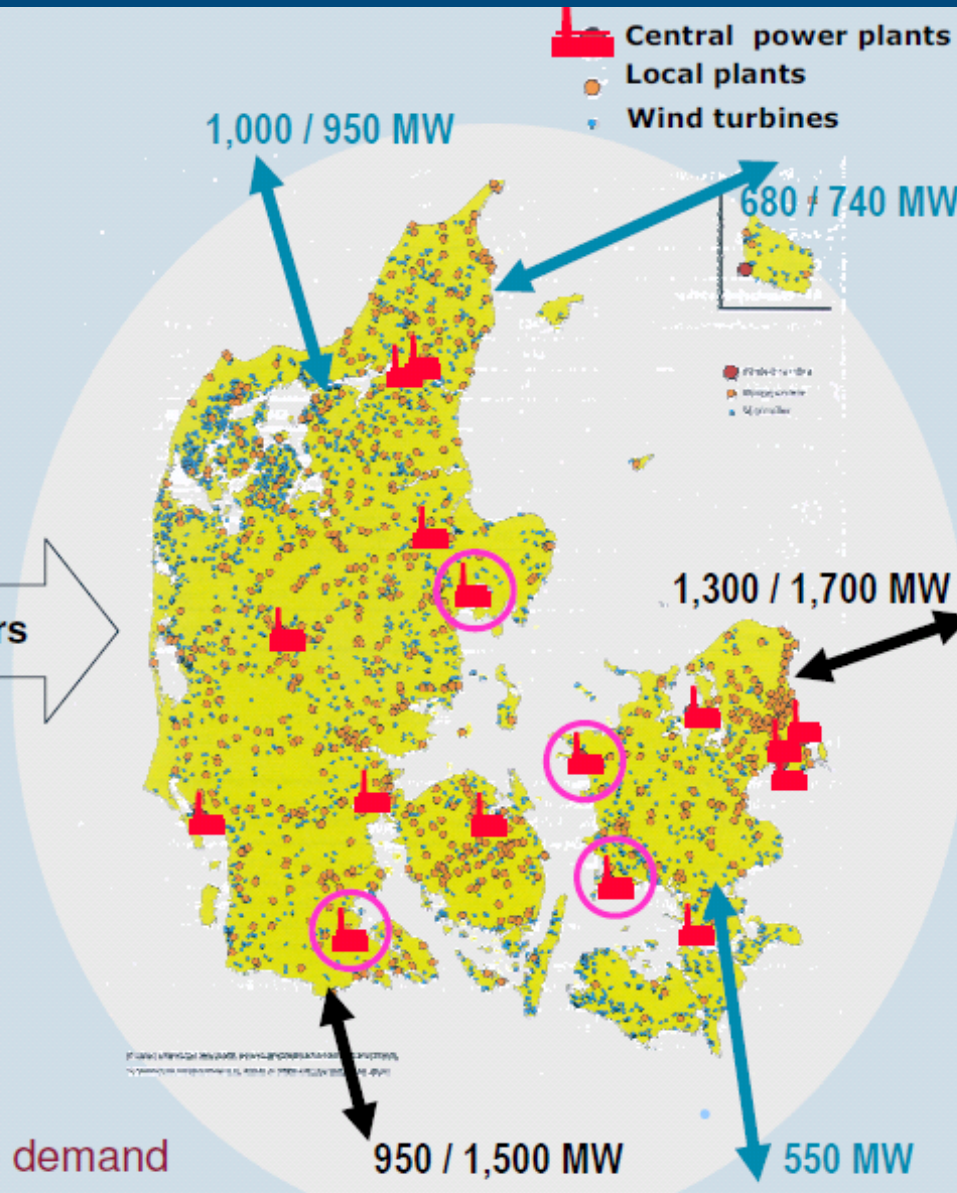
Biomass for energy in Denmark

- Residential buildings
  Heating: Log wood, pellets, wood chips, straw
- Public and private service
  Heating: Pellets, wood chips
- Industry
  Heating & CHP: Pellets, wood waste & chips
- District heating plants
  Heating & CHP: Wood chips, straw, pellets
- Central CHP plants
  Electricity & district heating: Pellets, straw, wood chips

The Danish electricity system



25 years



Many annual hours, where RES covers the entire demand

Danish biomass gasification technologies

Technology name	Stakeholders	Technology	Purpose	State	Plants	Hours	T to c.
Alternating Gasifier	Ammongas, Vølund	Twin Bed Filter	Fuel (gas)	Pilot	1	50	1-2
Vølund Updraft Gasifier	B&W Vølund	Updraft	CHP	Commercial	4	130000	0
CHP System of BioSynergi	BioSynergi	Open core dd	CHP	Pilot	1	6000	2-3
Staged Down Draft Gasification	Weiss, DTU, Cowi	Multiple steps dd	CHP	Demonstration	2	4000	1
Pyroneer	DONG, DFBT, DTU	LTCFB	CHP	Pilot	4	700	>4
Close Coupled Gasification	EP Engineering	Vibrating grate FB	CHP	Pilot	1	1000	2
Sublimator	Frichs	CDP	CHP	Commercial	0	?	0
Catalytic Low Temp. Pyrolysis	Organic Fuel Tech.	Catalytic LT Pyrol.	Fuel	Pilot	1	300	1-2
Up Draft Gasifier & Stirling	Stirling DK	Updraft	CHP	Commercial	6	12000	0
BlackCarbon	Stirling DK	Pyrolysis	CHP	Demonstration	1	2400	2
Biomass Gasification Gas Engine	Carbona, Aaen	CFB	CHP, fuel	Demonstration	1	6500	2-3
?	TK Energi	?	?	?	?	?	?

New framework conditions

- New government increased green targets
  - 2020: Half of electricity demand covered by wind
  - 2030: No coal at power plants, no oil heating
  - 2035: Electricity and heating fully covered by RE
  - 2050: Complete energy supply fossil free
- Agreement in Spring 2012
- Focus on electricity, wind and gas, less on combustion of biomass
- Feed-in tarif: 15 €c/kWh

Who is FORCE Technology?

- Independent non-profit company
  - Advanced Technology Group
  - Testing, consultancy and technology development
  - 1000 employees, 133 M€ turnover
  - Present in DK, SE, NO, RU, US, CN, SG

- Unique combination of competences, biomass examples
  - Ultrasound & biomass combustion
  - Corrosion from combustion of special biomass
  - CFD modelling of combustion chambers and flue gas systems
  - Simulators of MSW-plants – training of operations managers
  - Monitoring of biogenic carbon (C14) – to be elevated for ISO
  - GrateVision – video based grate combustion control

Department of Biomass & Waste

- Consultancy on fuels and conversion technology
  - Fuel market analyses and resource studies
  - Plant feasibility studies
  - Project- and system planning and engineering
  - Emission monitoring and fuel laboratory analyses
  - Call for tenders and evaluation
  - Construction supervision and management
  - Training of staff for operation and maintenance
  - Connecting manufacturers, consumers, investors

- Large experience and special competences, e.g.
  - Centre for Biomass Technology
  - Strategies anf action plan on biomass CHP & gasification
  - Feasibility studies for pellet plants, CHP and gasifiers
  - Fuel market analyses - Denmark and abroad
  - Public and commercial projects - market and RD&D

Thank you!

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