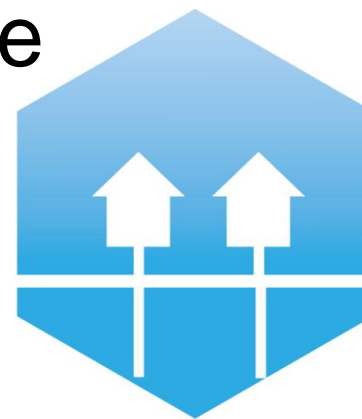
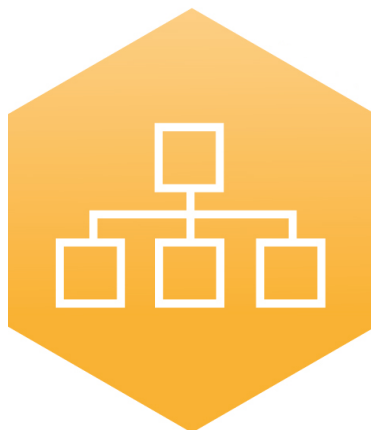


Høring om fjernvarmen i det fremtidige energisystem
Folketingets Klima-, Energi- og Bygningsudvalg, Landstingssalen, Christiansborg, 23. april 2014

Fjernvarmes fremtid - Fremtidens fjernvarme

Professor Henrik Lund, Aalborg Universitet



AALBORG UNIVERSITY
DENMARK

4DH

4th Generation District Heating
Technologies and Systems



Fjernvarme fordi:



- Sikrer udnyttelse af **affalds**-ressourcen til kraft/varme
- Muliggør udnyttelse af **geotermi**
- Muliggør udnyttelse af industriel **overskudsvarme**
- Muliggør **fleksibel kraft/varme** i kombination med varmepumper (bedre indregulering af **vindkraft**)
- Skaber synergi til kollektive **biogas** og **solvarmeanlæg**
- Muliggør effektiv **biomassekonvertering** i fremtiden (spildvarme og behov for damp)



4DH

4th Generation District Heating
Technologies and Systems

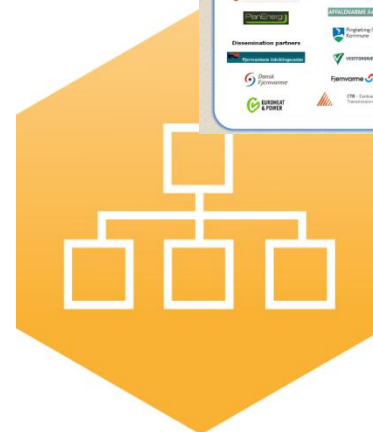
Hvad siger forskningen om:

Fjernvarmes fremtid:

- Har vi brug for fjernvarmen i fremtidens energi system: Fossilt frit år 2050?

Fremtidens fjernvarme:

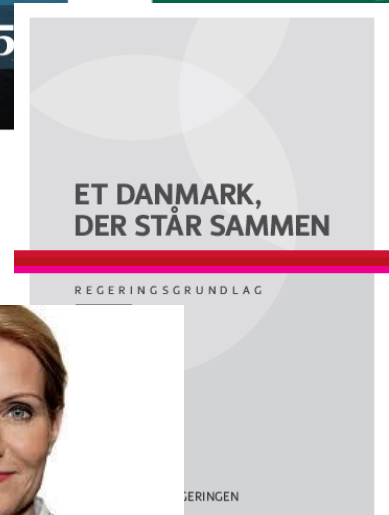
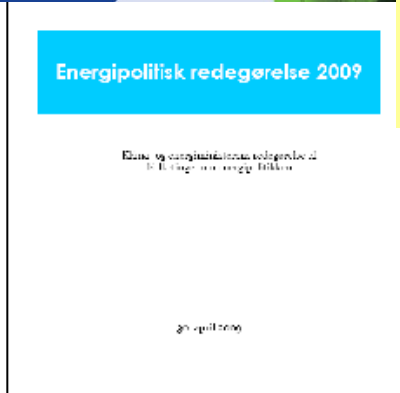
- Hvordan skal fjernvarmeteknologien udvikle sig for at tidssvarende i år 2050?



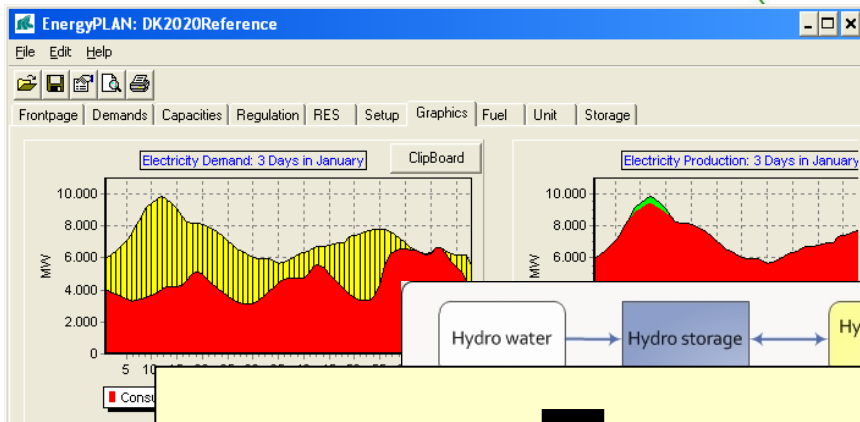
Den langsigtede målsætning



"Vi skal gøre Danmark helt fri af fossile brændsler som olie, kul og gas"



Energi System Analyse Model

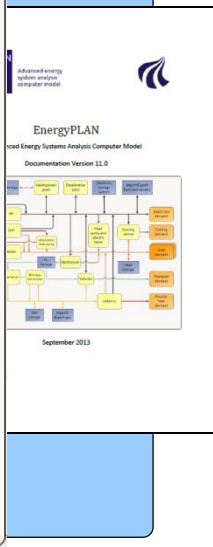
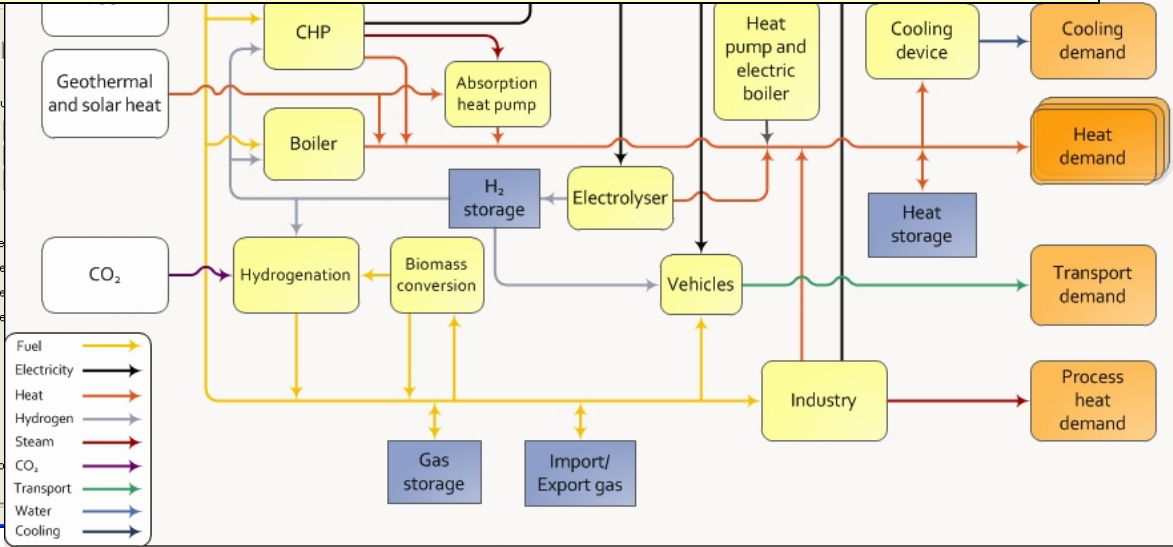
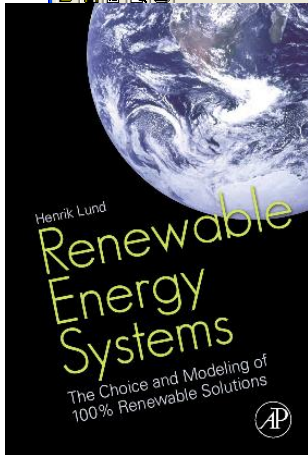


The screenshot shows the EnergyPLAN website homepage. The header includes the logo and navigation links: Home, Download, About, Contact, LinkedIn. The main content area features a large image of a city and the title 'Energy City Frederikshavn - A 100% Renewable Energy Scenario for the Town of Frederikshavn'. Below this is a 'Benefits' section with a list of advantages:

- Free of charge
- Access to a network of global users
- User friendly and very fast for normal PC
- Detailed hourly analyses of a complete energy system
- Easy access to library of hourly data
- Long list of case studies from various countries
- Free online training, guides, and documentation

 A prominent orange button labeled 'Download Model' is visible at the bottom of the page.

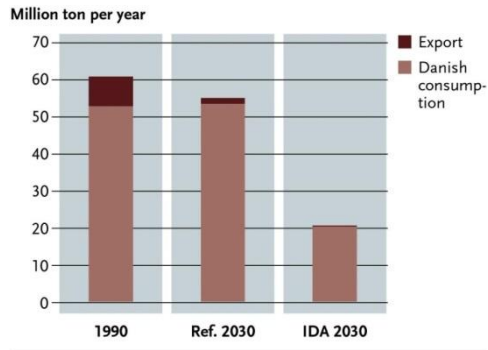
www.EnergyPLAN.eu



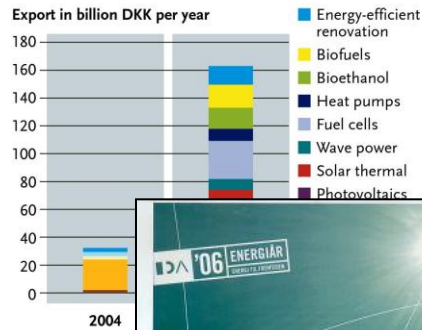


IDA Energiplan 2006

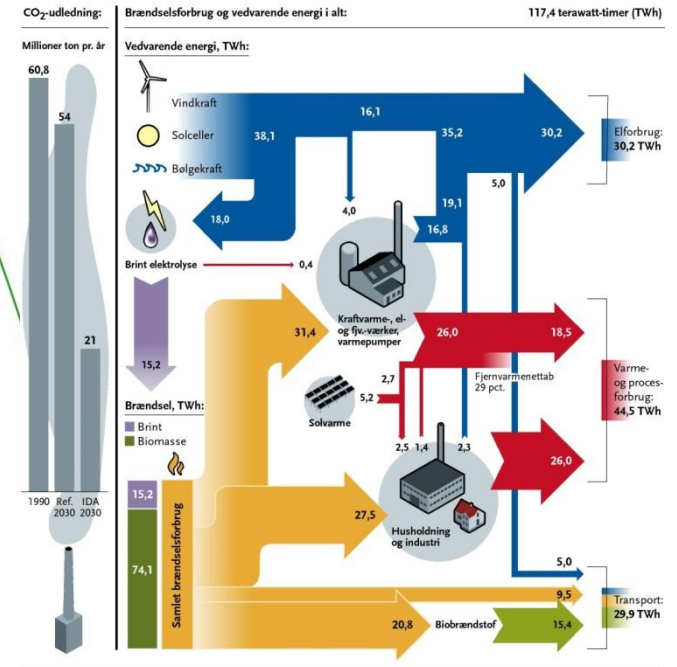
CO₂ emissions



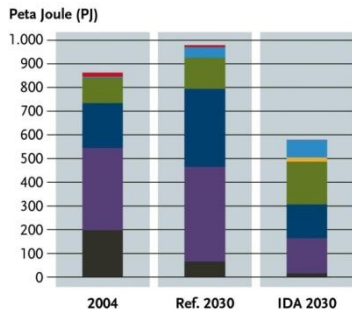
Business potential



100 PROCENT VEDVARENDE ENERGI



Primary energy supply



Varmeplan DK I (2008)

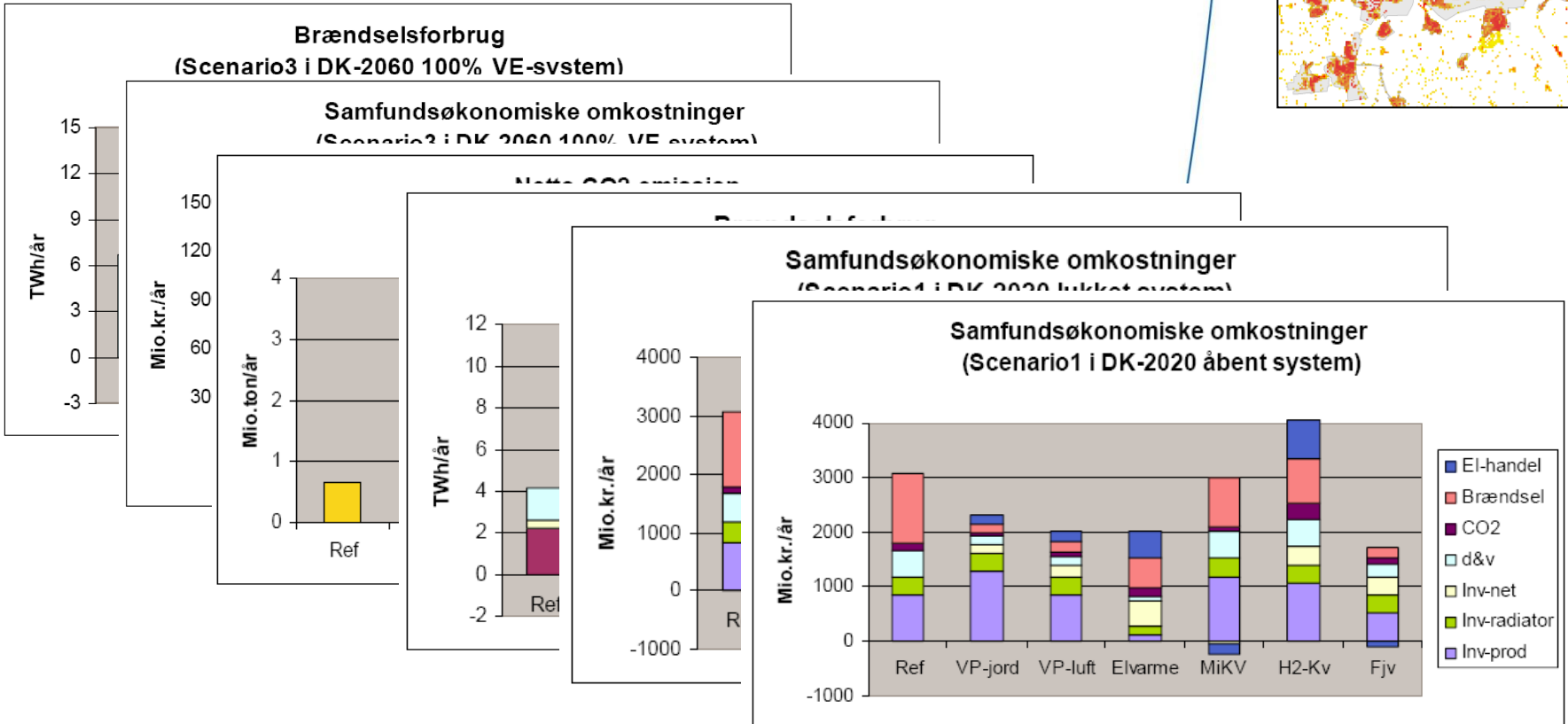
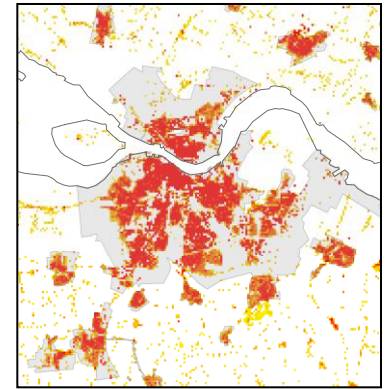


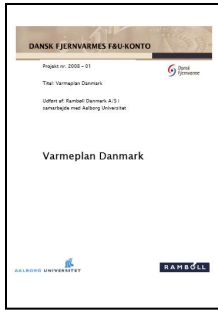
Hvordan skal vi opvarme boligerne i Danmark ??

Hvad skal vi gøre på **kort sigt** hvor vi gerne vil reducere CO₂-emissionen og energiforbruget.

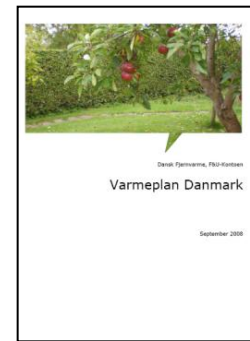
Og hvad skal vi gøre på **langt sigt**, hvor målet er at gå over til 100% Vedvarende energi.

Alternativer og 100% VE



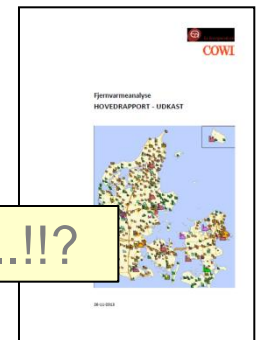


Konklusion i 2008



Der tegner sig et billede af at den fornuftige løsning vil være at kombinere:

- En gradvis udbygning med fjernvarme fra nu 46% til et sted mellem 53% og 70%
- Individuelle varmepumper i de øvrige boliger
- Fokus på synergi ift. en gradvis forbedring af fjernvarmenettets effektivitet (afgørende)



Enig...!!?

Varmeplan DK 2010



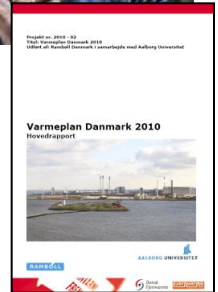
Handlingsplan for gennemførelse af varmeplan Danmark:

Konsekvenser af fjv-udbygning:

- Mindre energiforbrug
 - Mindre CO2 emission
 - Lavere omkostninger (samfund)
 - Flere jobs
 - Positivt bidrag til statsfinanser
- Men der er barrierer*

n til 2020 (inkl.

rkemidler









Heat Roadmap Europe

Heat Roadmap Europe 2050

GIS Mapping: Many Heat Sources

- Urban areas (Heating Demands)
- Power and Heat Generation
- Waste Management
- Industrial waste heat potential
- Geothermal heat
- Solar Thermal
- the study indicates that the **market shares for district heating for buildings can be increased to 30% in 2030 and 50% in 2050.**

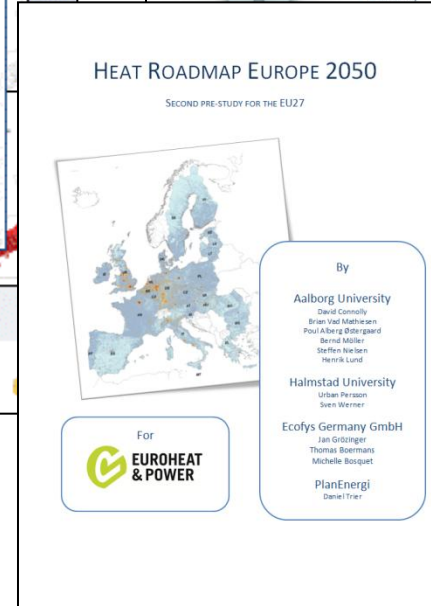




HEAT ROADMAP EUROPE 2050
FIRST PRE-STUDY FOR THE EU27

By
Aalborg University
David Connolly




HEAT ROADMAP EUROPE 2050
SECOND PRE-STUDY FOR THE EU27

By
Aalborg University
David Connolly
Brian Vind Mathiesen
Poul Alberg Børggaard
Berni Möller
Steffen Nielsen
Henrik Lund

Halmstad University
Urban Persson
Sven Werner

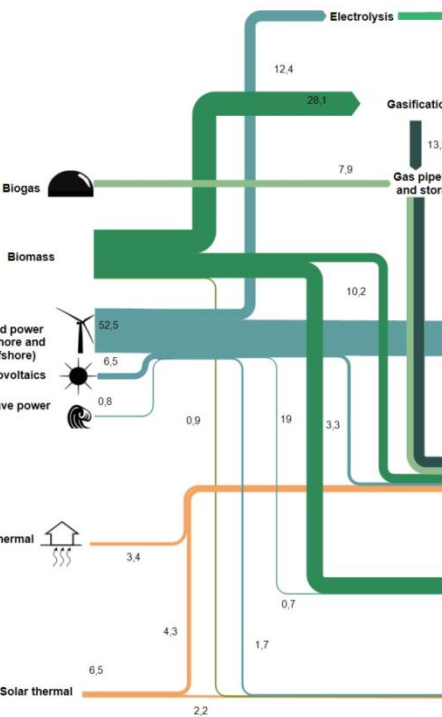
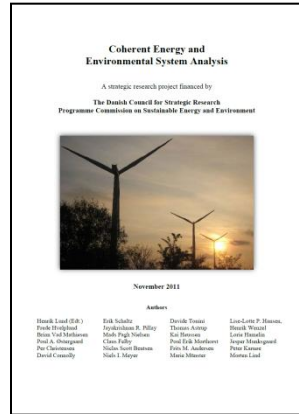
Ecofys Germany GmbH
Jan Gröninger
Thomas Boermans
Michelle Bosquet

PlanEnergi
Daniel Trier

For




CEESA Projekt 2011/2012

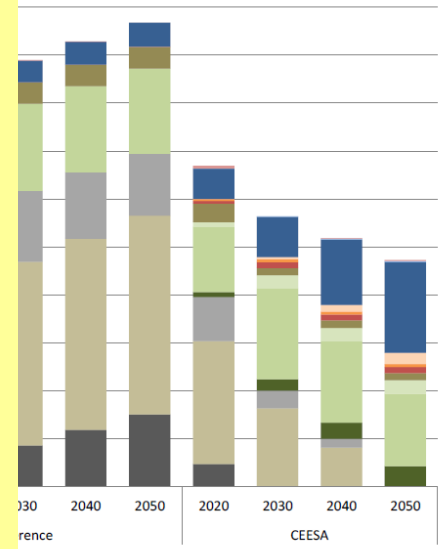


Transport:
El biler er bedst set fra et energi system synspunkt. Men gas og flydende brændsler behøves for at håndtere hele transport sektoren.

Biomasse:
.. er en begrænset ressource og der er ikke nok til at tilfredsstille hele transportsektoren...

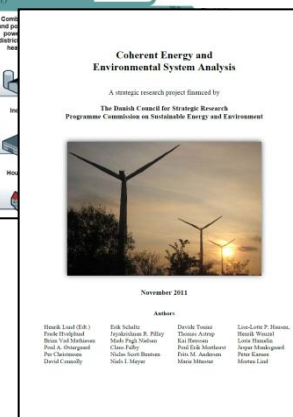
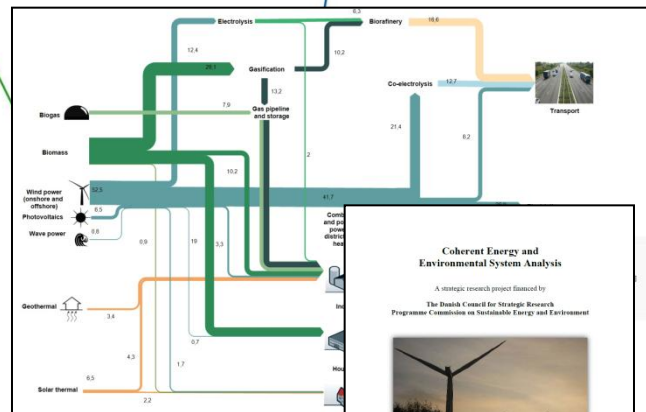
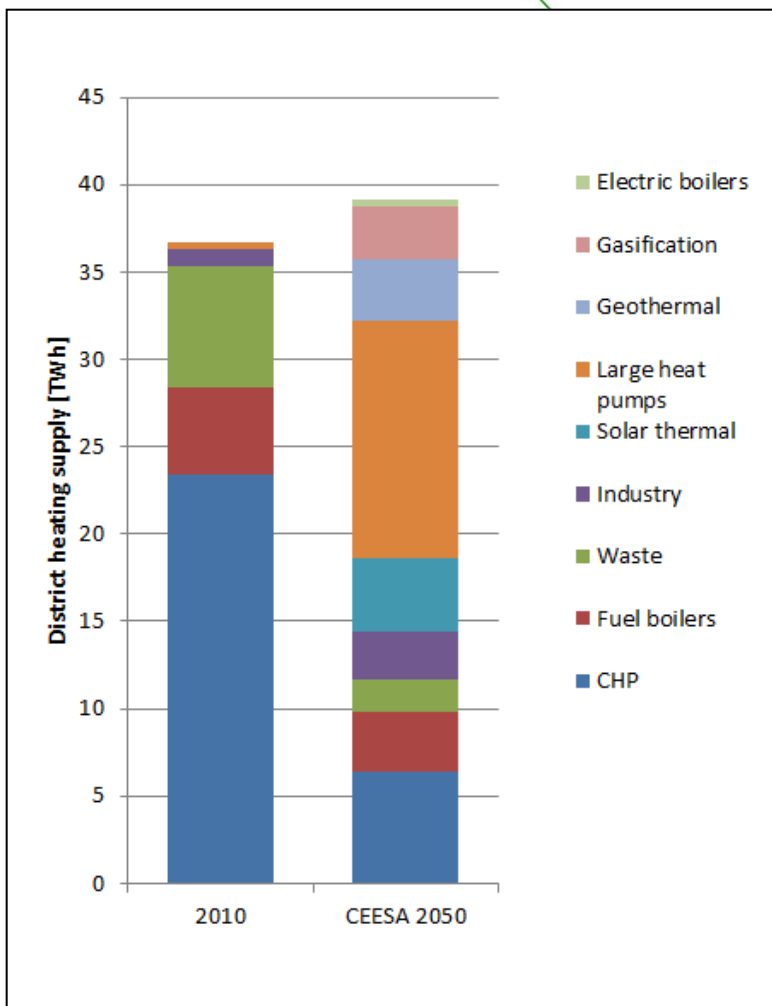
Konsekvensen...
... el fra vindkraft (og tilsvarende) skal konverteres til VE-gasser og flydende brændsler på langt sigt...

Energy consumption in CEESA



2: Primary Energy Supply in CEESA.

Hvor skal fjernvarmen kommer fra?

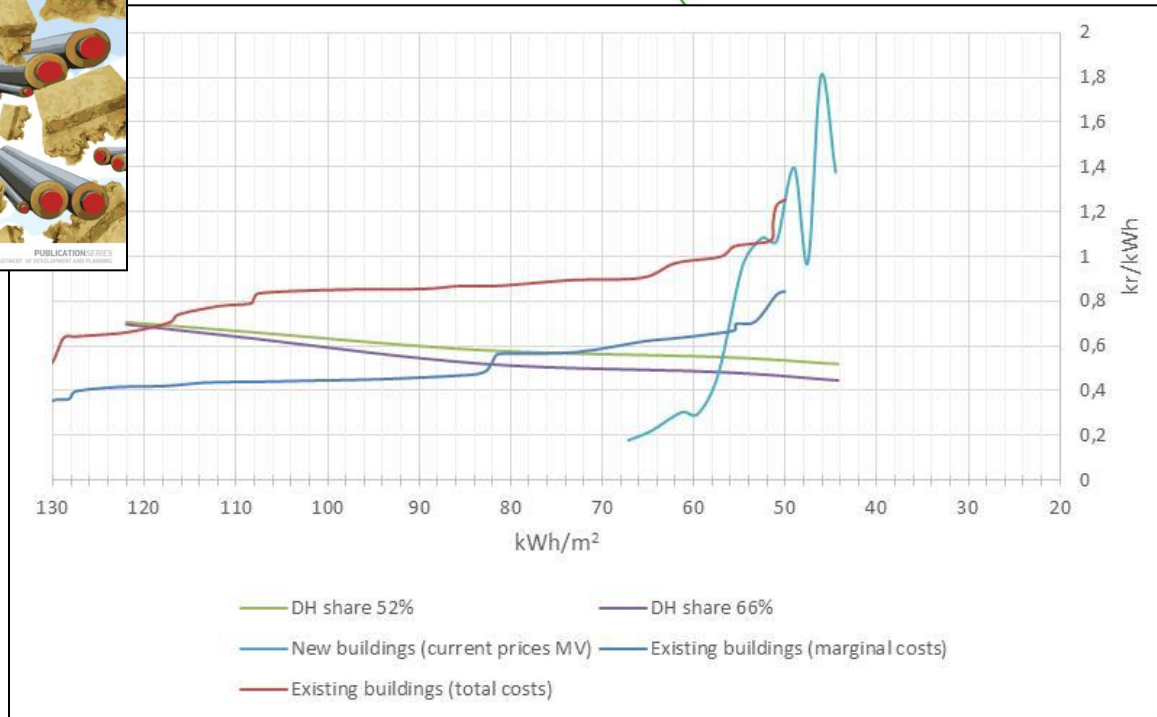
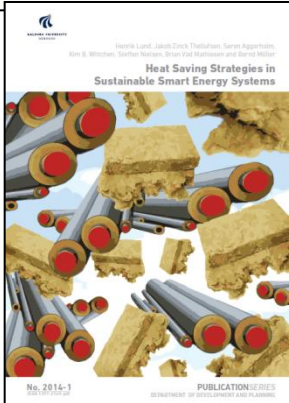


Enig..!?





strategic research centre for **ZERO ENERGY BUILDINGS**



○ Industry

- Danfoss A/S
- Saint Gobain Isover A/S
- VKR Holding A/S
- AffaldVarme Århus
- Velux A/S
- Alufacadesektionen, Dansk Byggeri

○ Research

Aalborg University

- Department of Architecture and Design
- Department of Civil Engineering
- Department of Energy
- Department of Electronic Systems
- Department of Planning and Development
- Danish Building Research Institute, Department of Energy and Environment

Technical University of Denmark

- Department of Civil Engineering

Danish Technological Institute

- Department of Energy Efficiency and Ventilation
- Department of Cooling and Heat Pump Technology
- Department of Renewable Energy



4DH

4th Generation District Heating Technologies and Systems

www.4DH.dk



HOME NEWS EVENTS PUBLICATIONS & REPORTS PROJECTS UNIVERSITY COURSES ABOUT 4DH LOGIN FLYER- 4DH 3RD A



WELCOME TO 4DH

4DH is an international research centre which develops 4th generation district heating technologies and systems. This development is fundamental to the implementation of the Danish objective of being fossil fuel-free by 2050 and the European 2020 goals.

With lower and more flexible distribution temperatures, 4th generation district heating (4GDH) can utilize renewable energy sources, while meeting the requirements of low-energy buildings and energy conservation measures in the existing building stock.

LATEST NEWS FROM 4DH

- 18 MAR** 4DH 3rd Annual C Flyer
- 21 NOV** 3rd annual Confer
- 04 OCT** 2nd annual confer energy faces a ch

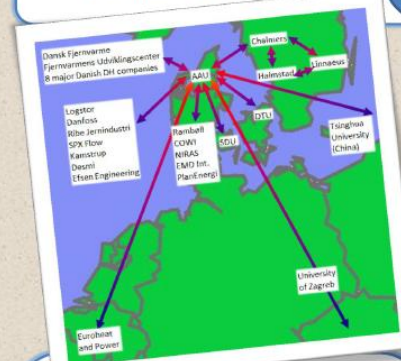


AALBORG UNIVERSITY
DENMARK

Appendix B: Project description

Strategic Research Centre for

4th Generation District Heating Technologies and Systems (4DH)



Private partners



Dissemination partners



District heating companies



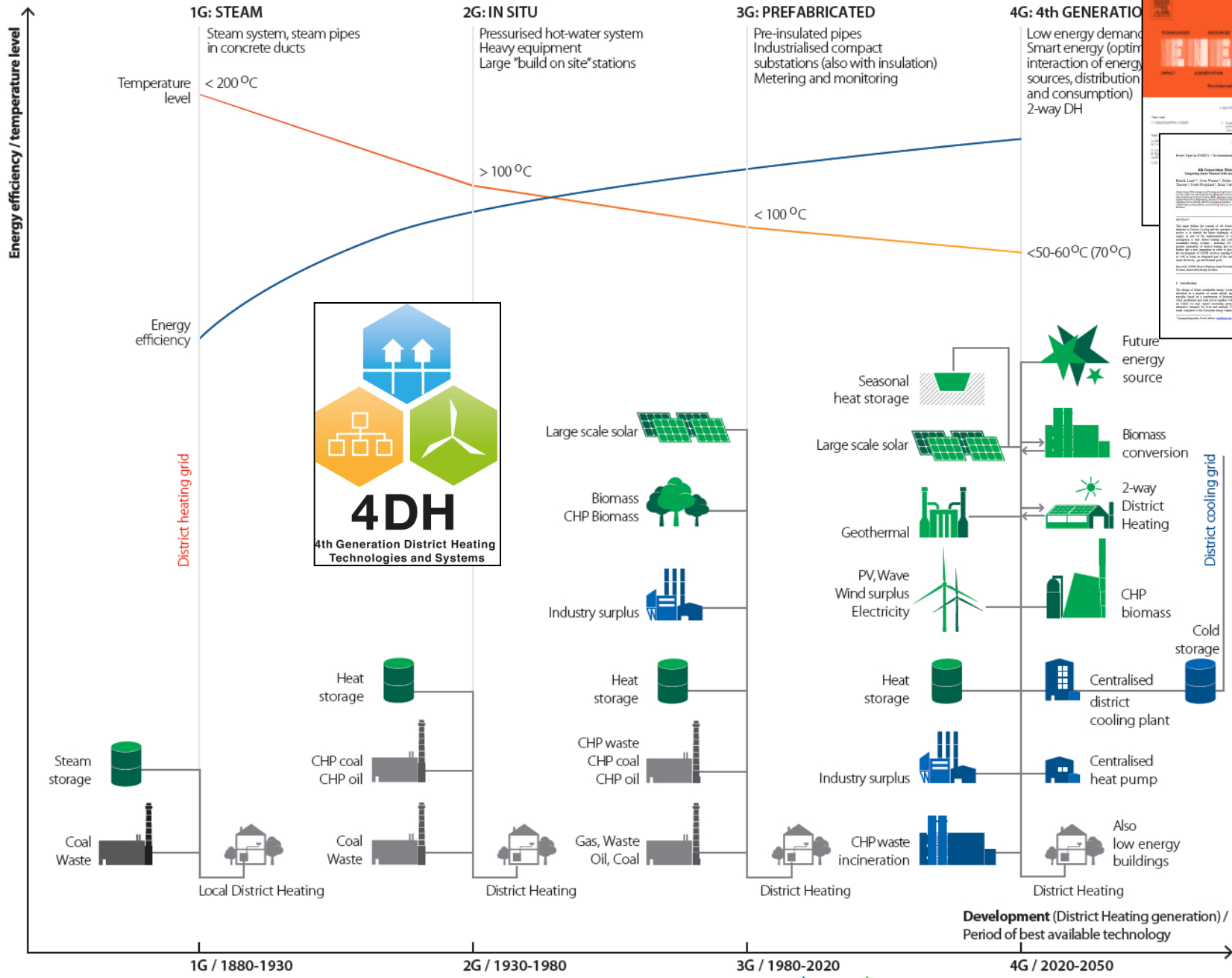
CTR - Centralkommunernes Transmissionselskab I/S

University partners



Industrial partners

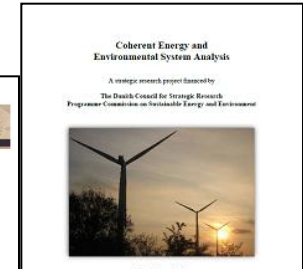
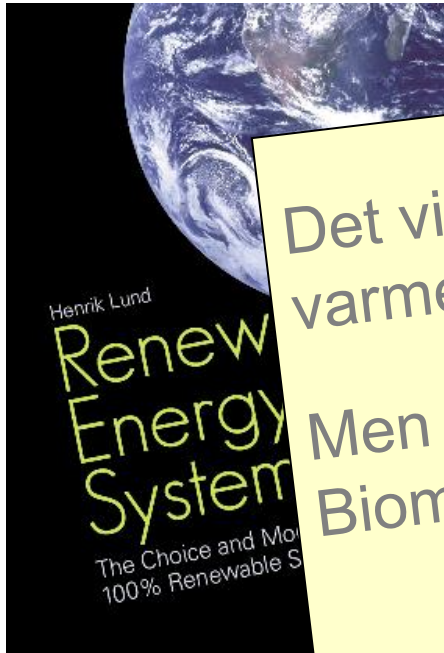




A

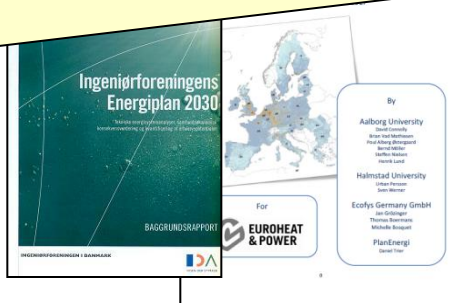
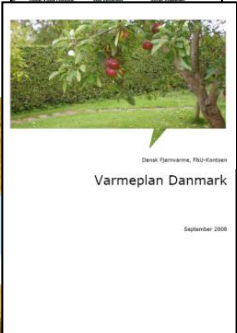
Problem 1....her og nu!!!

Biomasse kontra varmepumpe



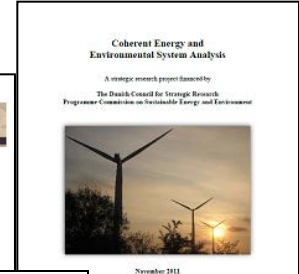
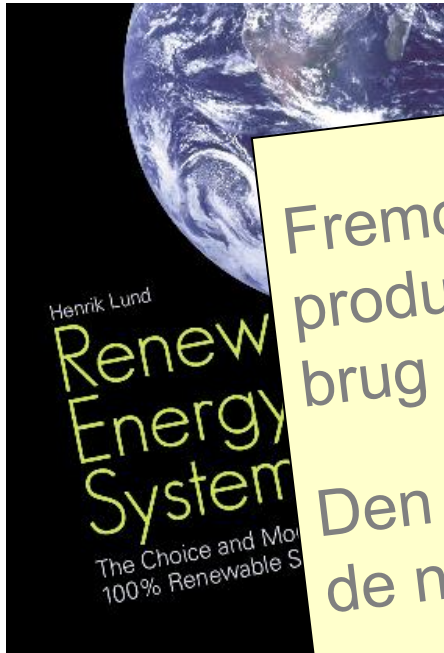
Det vi har brug for er (vind) og store varmepumper på fjv-værkerne.

Men det afgifterne tilskynder til er Biomasse....!



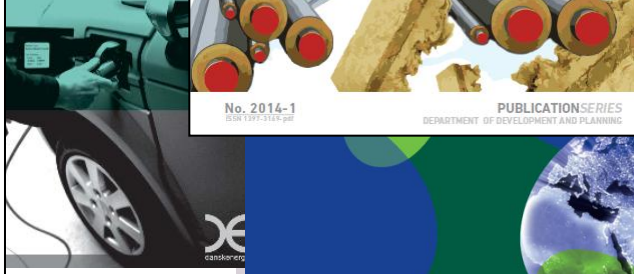
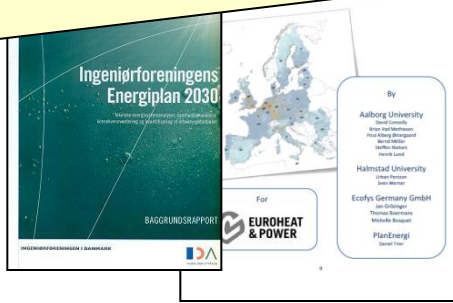
Problem 2....her og nu!!!

Kraft/varme-kapaciteten



Fremover skal kraft/varme-
produktionen mindskes MEN vi har
brug for kapaciteten!

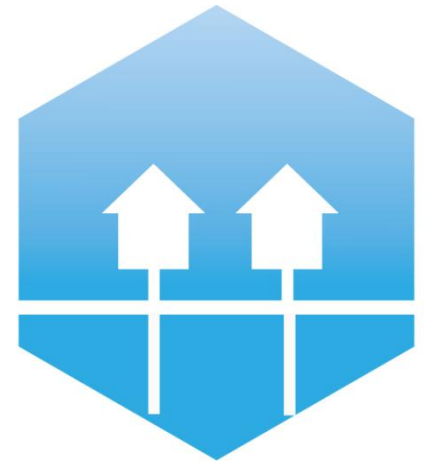
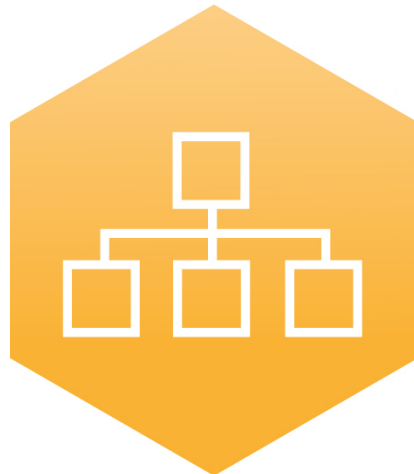
Den billigste kapacitet er at bevare
de nuværende decentrale værker....!



Høring om fjernvarmen i det fremtidige energisystem

Folketingets Klima-, Energi- og Bygningsudvalg, Landstingsalen, Christiansborg, 23. april 2014

Mange tak



AALBORG UNIVERSITY
DENMARK

4DH

4th Generation District Heating
Technologies and Systems