

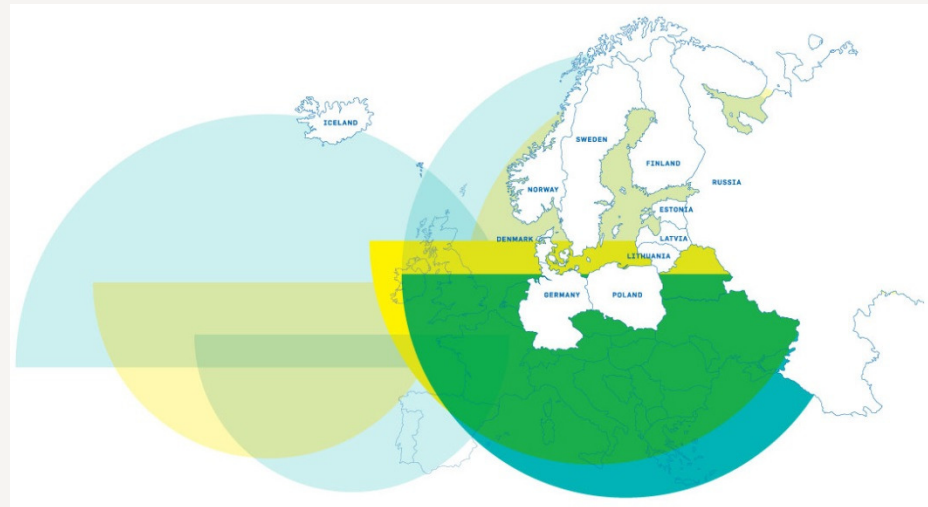
Sustainable and Energy Efficient District Heating and Cooling

BASREC Seminar May 21 2014, Helsinki



Best Practices of DHC and CHP in the Baltic Sea Region

*presented by
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District Heating and Cooling, Combined Heat and Power and Renewable Energy Sources



BASREC- Best Practices Survey Study carried out in 2013 by Nuorkivi Consulting and COWI A/S

- › Study background and objectives
- › Why is DHC in BASREC important
- › Study approach and development process
- › Best practice cases
BASREC Capitals
Other best practices
- › Main findings
- › Conclusions and recommendations



Background



- > Communiqué adopted at the BASREC Meeting of Energy Ministers in Berlin 14–15 May 2012:
The Parties confirmed that their co-operation in the upcoming co-operation period 2012-2015 will concentrate on certain energy topics in order to meet global energy policy challenges.
- > Two of these topics are:
Increased use of renewable resources available in the region, including integration of fluctuating wind power into the electricity system, and Rehabilitation and development of DHC and CHP.
- > On 25 October 2012, the EU adopted the Directive 2012/27/EU on EE:
This Directive establishes a common framework of measures for the promotion of EE within the Union in order to ensure the achievement of the Union's 2020 headline target on 20 % EE.

Objectives

As basis for ensuring a sustainable development the long term targets of the project are to:

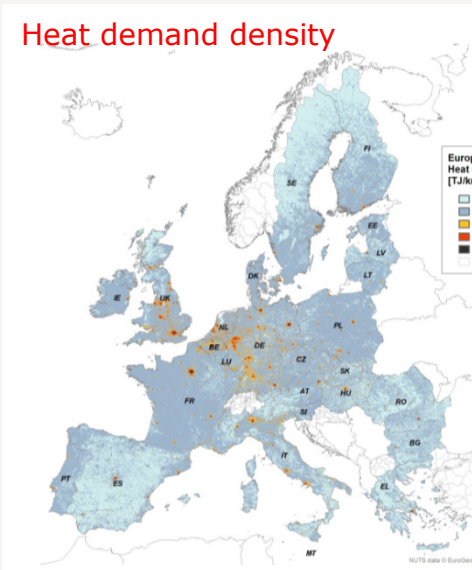
- › *minimize the carbon footprint and PEF; and,*
- › *increase the rates of CHP, DH, DC and RES and improve the overall efficiency of CHP, DH, DC*
- › The immediate goals of the project are:
 - › To make a survey of the state of the art on DH, DC, CHP generation and use of Renewable/Local Energy Sources in BASREC countries; and,
 - › Based on the survey to propose project(s) by which to fulfill the assignments set out in the Communiqué in an efficient way and benefiting the majority of the BASREC countries.



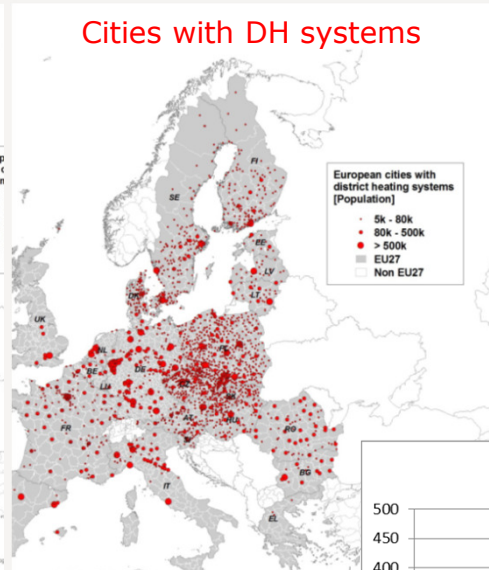
Why is DHC in BASREC important?



Heat demand density

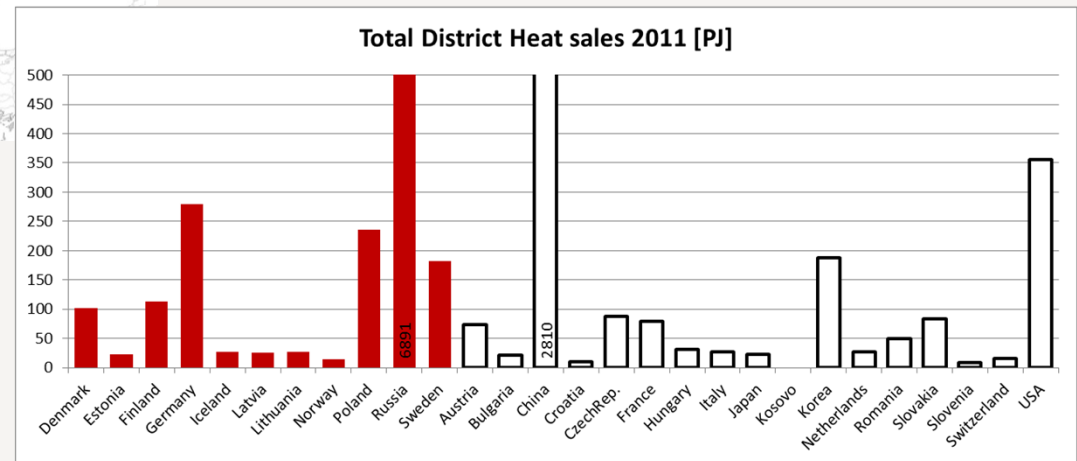


Cities with DH systems



- ▶ Without Russia, the DH sales of BASREC countries amount to 1034 TJ of 1475 TJ in Europe in total (70%)
- ▶ If we assume some 50% of the DH sales in Russia come from the European part, then with Russia, the DH sales of BASREC are 4500 of 4900 TJ in total (92%).

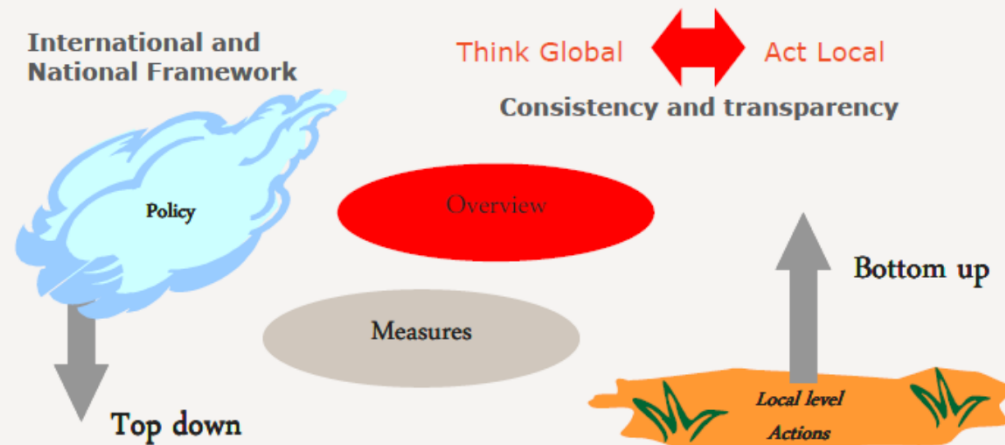
EHP Heat Roadmap



Study approach



- > A comparable and consistent overview of the present **policy and structure** of DH, CHP, DC and use of RES has been established for the 11 BASREC countries.
- > The **capital cities** in the countries are all active players in establishing and implementing sustainable energy development schemes. Therefore it has been chosen to "tell the energy story" of the capital cities for each country along with other selected best practices in the individual countries.
- > A short summary of ongoing both **national and international research and development programs** on DHC and CHP with RES is included to set the framework for decisions related to new needs and activities.

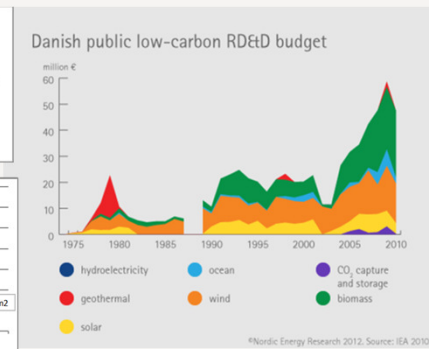
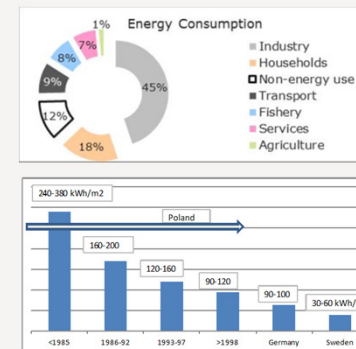


Country Surveys (5 – 10 pages each country)



- > National Energy Policy – main goals
- > Current Energy System – Total Energy balance
Specific chapters on: District Heating, District Cooling, Electricity, RES
- > Planning – Tradition and responsibilities
- > Legal and Regulatory Framework
Building Regulation, Price Regulation, Competition on heat and Power sector, Feed- in tariffs for CHP and RES, Emission Trading Scheme, Carbon tax, Investment Grants, R&D
- > Heat Customers – Regulation
Rights and protection
- > Ownership
Public/private/combined
- > Best Practice Cases – DHC/RES Schemes
BASREC Capitals
Other Best Practices

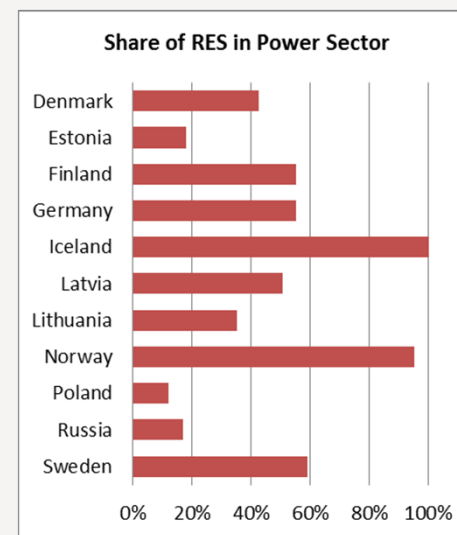
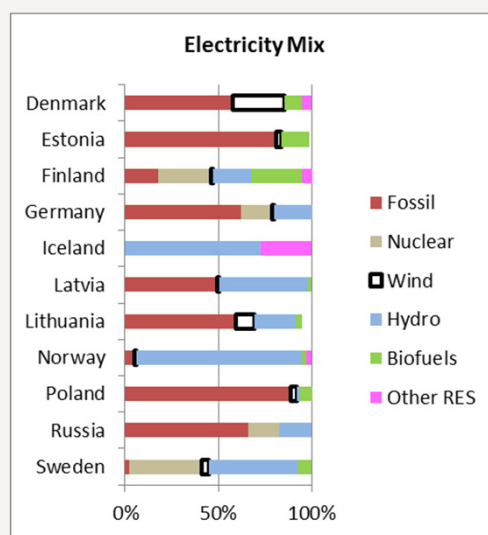
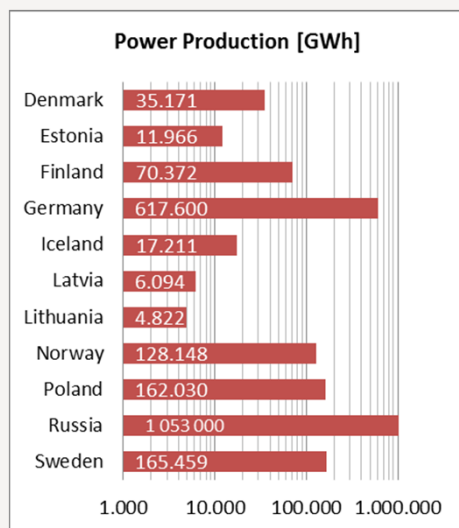
	Fossils	Nuclear	Wind	Hydro	Biomass	Other RES	Total
TPES	62,895	-	475	477	11,281	512	84,690
Power	-	-	475	477	-	477	7,699*
CHP	11,142	-	-	-	744	-	11,886
Heat	2,977	-	-	-	2,082	35	5,094



Main Findings – Power production and RES

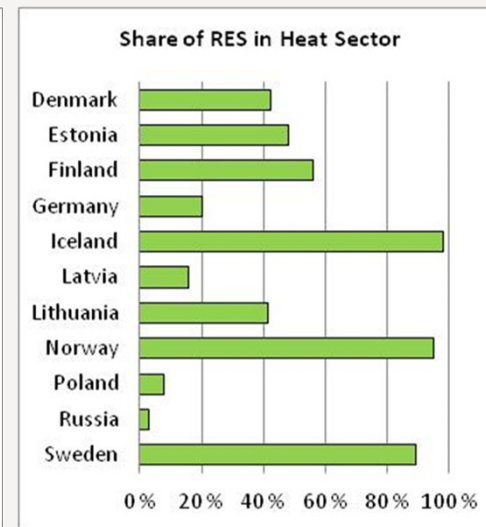
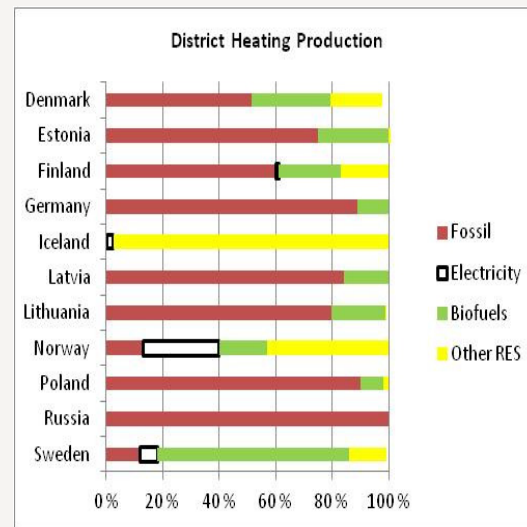
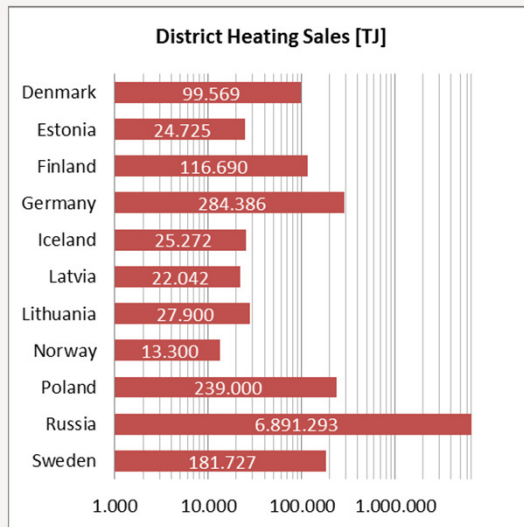
Big differences – between 10 and 100% RES

The BASREC countries however represent a unique mix



Room for more biomass/biofuels to replace fossil fuels?
Further system integration?

Main Findings – District Heating

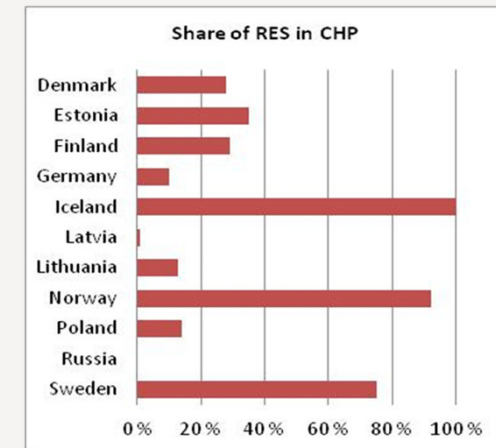
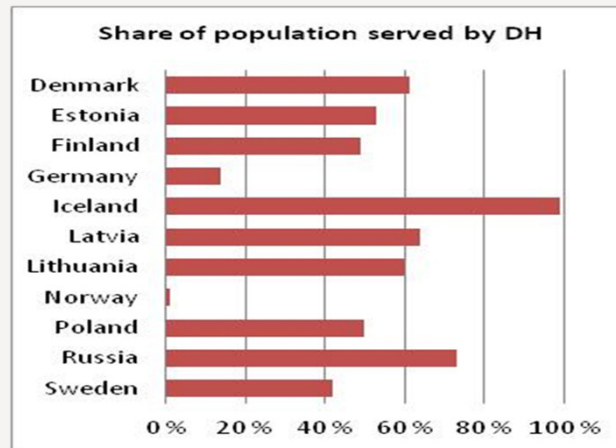
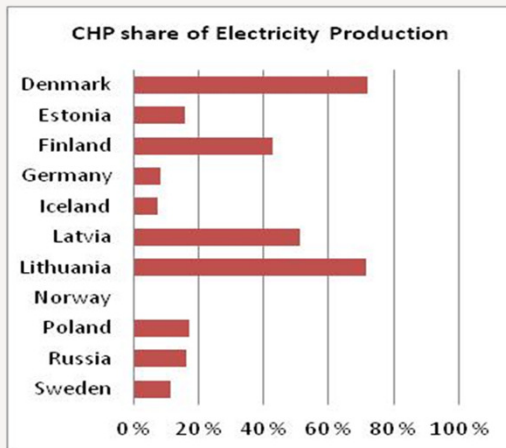
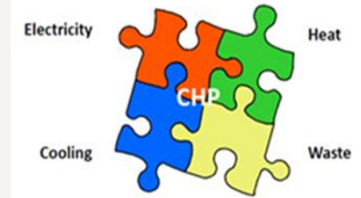


District heating future! – Industrial waste heat – different temperatures
 Waste heat from biofuel production, Cooling, Geothermal heat,
 Heat pumps as well as long, medium and short term storage

The CHP puzzle!

End use competitors!

CHP in the electricity, the heat and the fuel market market



Consistent statistics?

How to define/measure

CHP electricity and CHP heat!

A common language would help development

What are the key drivers?

Policy, regulation & financing ?

Structure & resources?



	DE	DK	ES	FI	IS	LV	LT	NO	PL	RU	SE
1 Building regulations with EE	Y	Y	Y	Y	Y	Y	Y	Y	Y	n	Y
2 DH prices regulated	N	Y	Y	N	N	Y	Y	Y	Y	Y	N
DH market stable/expanding/shrinking	E	S	S	S	S	S	S	E	S	S	S
3 Heat market competition	Y	N	Y	Y	N	Y	Y	Y	Y	N	Y
4 Main competitor	Gas		Gas	HP	El	Gas	Gas	El	Gas		HP
5 FIT/Premium scheme for CHP	Y	N	N	N	N	N	N	N	N	N	N
6 FIT/Premium for Biomass	Y	Y	Y	Y	N	Y	N	N	N	N	N
7 Emission trading scheme	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
8 Carbon tax in use	N	Y	Y	Y	Y	N	*	Y	N	N	Y
9 Investment grants for DH/CHP	Y	N	Y	N	N	N	N	N	N	N	N
12 DH customer rights (Weak/Strong)	S	S	S	S	S	S	S	S	S	W	S
13 DH service quality (Good/Poor)	G	G	G	G	G	G	G	G	G	P	G
14 Billing based on metered consumption	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
15 Municipal role (Weak/Strong)	S	S	S	S	S	S	S	S	S	W	S
16 Private sector involvement in DH/CHP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y/N	Y
17 Integrated resource planning	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
18 Heat planning and zoning	N	Y	N	N	N	Y	Y	N	Y	Y	N
19 Technical standards up-to-date	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
20 Refurbishing strategy in use	n.a.	n.a.	Y	n.a.	n.a.	Y	Y	n.a.	Y	N	n.a.
21 DHW supplied with DH	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Clarifications: N=no, Y=yes, EL=Electricity, W=Weak, S=Strong, HP= Heat pump

*only for transport sector

Large variety:

In structure – CHP share of power production
Denmark 70%, Norway close to zero

In use of resources – share of RES in power production:
Tiny Iceland with 100%
huge Russia with 16%
Poland with 12%

No simple explanations – to be copied

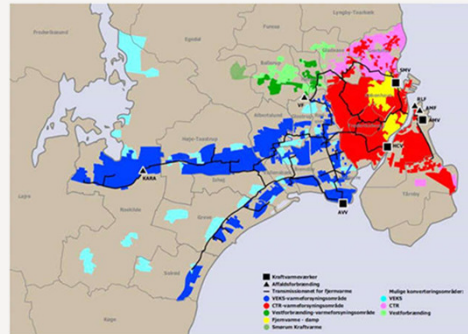
BUT

Lessons from the BASREC group are valuable for development

BASREC Capitals present well developed examples

Large integrated CHP/DH /RES systems

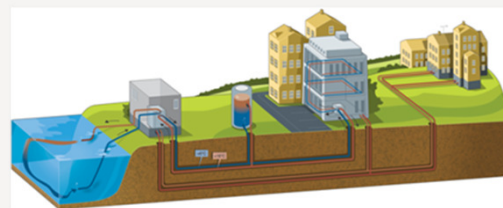
Berlin, Copenhagen, Helsinki, Reykjavik, Riga, Stockholm, St.Petersburg, Tallinn, Vilnius



Integrated CHP/DH systems using different resources

Integrated DC systems

Berlin, Copenhagen, Helsinki, Stockholm



District cooling systems combining different sources

System Development

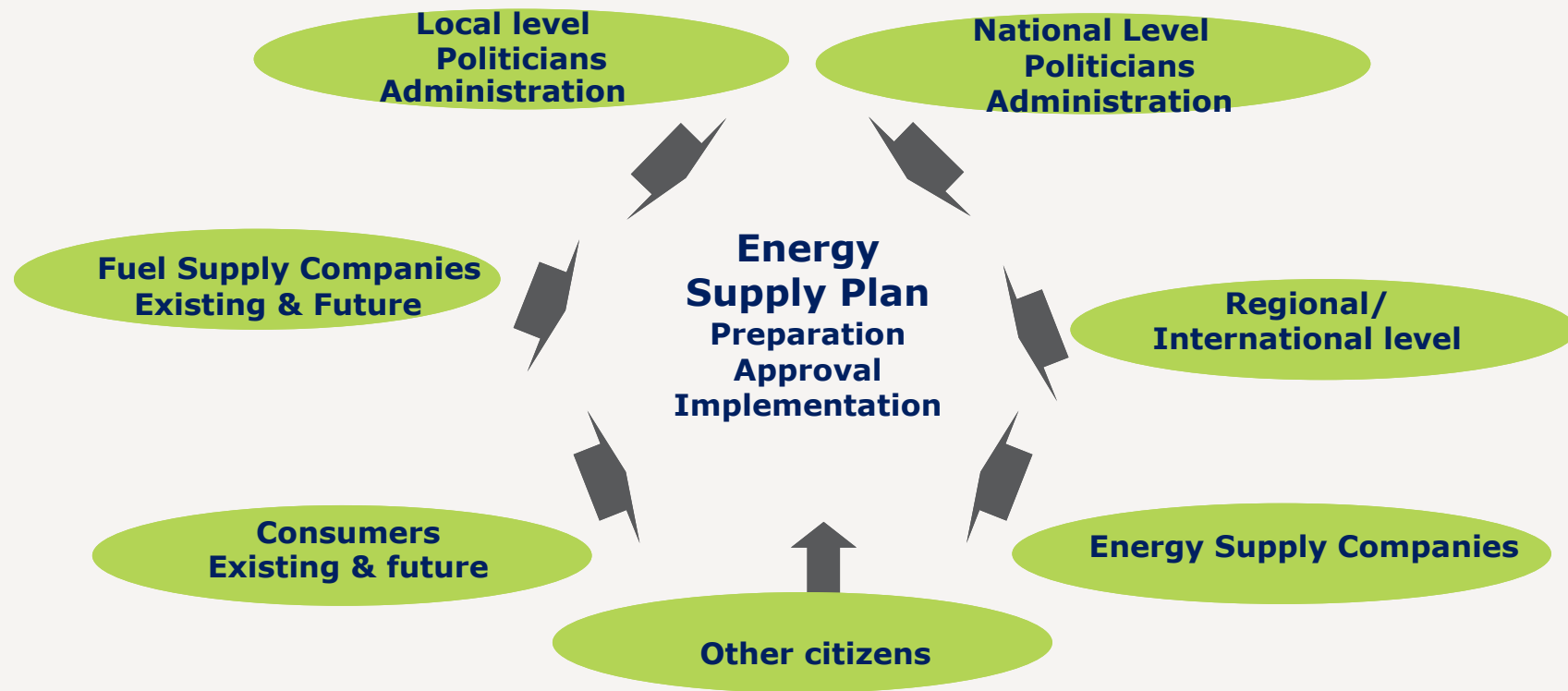
Oslo (and most others)

System renovation

Warsaw (important to all)



Good and efficient co-operation between involved stakeholder
Establish a common platform

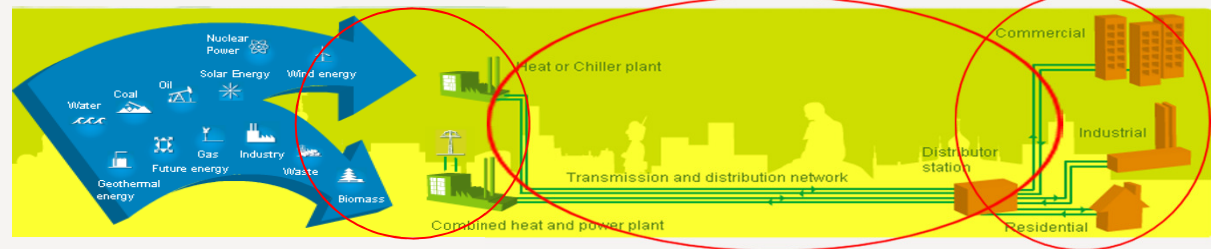


Whether small or large systems
Sustainable Energy Development
Understanding the total chain from resources to requirements
and
An integrated approach to the demand and supply options



R & D Topics

- > Uniform CHP statistics
- > CHP and RES in the electricity market
- > CHP coordination with RES
- > Materialized benefits of CHP
- > DC expansion
- > Hiding heating with electricity



Conclusions and recommendations

- › District cooling shall be developed as a complementary product to CHP and DH in locations where sea or lake water can be used as a natural cooling source.
- › "Planning and pooled operation of several energy production plants in integrated urban CHP/DH systems based on RES (biomass/geothermal/solar) is important to optimise the use of different types of renewable sources in different heat and electricity markets. Flexibility and links between the electricity systems and the heat market are required to ensure that valuable energy is not wasted.
- › Integral urban and energy planning is an important issue while planning urban structures to favour EE and RES development, and with DHC and CHP in particular.
- › The present study has revealed a strong background for BASREC to exchange experiences within all 3 issues and in this way enforce the position of Baltic Sea Region as a frontrunner in developing and implementing sustainable energy- and resource strategies as the European best practice.
- › The story should be told and the cooperation at different levels should be promoted to ensure a continuous development process in the frontrunner field
- › Local CHP/DHC schemes should be linked to the national and cross border development of the electricity systems

