

# Policies and Barriers for DHC outside EU Countries

Funded by IEA DHC Annex IX

Bernd Kalkum

**REDUCE, RECYCLE, REPLACE: DOUBLING DHC NOW!**

35th Euroheat & Power Congress, Paris May 9th and 10th 2011



# Objectives

Identify and review barriers and best practices for sustainable development of DHC in order to:

Facilitate an expansion of DHC systems outside the EU countries in order to:

- increase global energy efficiency,
- mitigate climate change through reduced carbon dioxide emissions, and
- increase national security of supply.

# Country specific issues

## **Features and extent of DHC/CHP**

- *DHC and CHP market shares,*
- *Types of consumption: DHW, SH, water/steam*
- *Selected technologies with customer connections,*
- *Heat metering rate,*
- *Market expanding/shrinking*

## **Development Strategy and Policies**

- *National strategy and policy regarding DHC and CHP*
- *Market competition and alternative heating modes*
- *Market drivers/barriers*
- *Energy pricing policy (DH vs. other energy media, differences in price regulations and subsidies, price distortions, restrictions of usage)*

# Country specific issues (continued)

## **Control, supervision and regulation of DH sector**

- ▶ *Analysis of the role of the various governmental entities and the municipalities*
- ▶ *Tariff setting (Regulated or not regulated, regulator on municipal/regional/centralised level, only residential/all consumer groups, only DHC)*
- ▶ *Heat planning (does it exist, is it part of urban planning, indicative or mandatory planning, covers mainly the technical development but also some financial aspects)*
- ▶ *Subsidy systems*
- ▶ *Investment support*
- ▶ *Operation and management of DH*
- ▶ *Customer protection/motivation*

# Country specific issues (continued)

## **DH Legislation and Regulations**

- ▶ *Identification of laws and regulations, basic features of stipulation*
- ▶ *Organisation and role of the regulator*
- ▶ *Status, rights and responsibilities of customers regarding DHC*
- ▶ *Status, rights and responsibilities of DHC and CHP utilities/companies*
- ▶ *Status of third party access in power (and heat) production*

## **Tariffs**

- ▶ *Tariff setting process*
- ▶ *Cost allocation of CHP including emission fees*
- ▶ *Availability of lump sum/one-tier/two-tier tariffs*
- ▶ *Tariff development policy*
- ▶ *Connection/disconnection fees*

# Country specific issues (continued)

## **Taxes and Subsidies**

- ▶ *Fuel, heat and electricity taxes*
- ▶ *Subsidies to customers*
- ▶ *Investment subsidies to DHC /CHP*

## **Social Considerations**

- ▶ *Social assistance programs to allow low-income households to pay for heating*
- ▶ *Other fuel related poverty problems in market and transition economies*
- ▶ *Satisfaction regarding heating quality*

## **Investment Climate**

- ▶ *Governmental support/barriers*
- ▶ *Municipal support/barriers*
- ▶ *Rights of investors*
- ▶ *Financing sources*
- ▶ *Tariff components and cost coverage*

# Countries selected

- ▶ Bosnia & Herzegovina (BiH)
- ▶ Canada (CAN)
- ▶ China (CHI)
- ▶ Croatia (CRO)
- ▶ Kazakhstan (KAZ)
- ▶ Kosovo (KOS)
- ▶ Macedonia FYR (MAC)
- ▶ Russia (RUS)
- ▶ Serbia (SER)
- ▶ South Korea (KOR)
- ▶ Ukraine (UKR)
- ▶ USA (USA)
- ▶ Uzbekistan (UZB)

These countries cover more than 70% of all DH in the world and 95% of DH outside the EU.

# Summary of findings

	BiH	CAN	CHI	CRO	KAZ	KOS	KOR	MAC	RUS	SER	UKR	USA	UZB
Building regulations with EE	y	y	y	y	y	y	y	y	y	y	y	y	n
DH prices regulated	y	n	y	y	y	y	y	y	y	y	y	n	y
Main competitor	Gas	Gas	none	Gas	El/gas	El	LNG	EL	none	El	Gas	Gas	none
Feed-in tariff scheme for RES and/or CHP	y	n	y	y	n	n	n	n	n	y	y	n	n
Emission trading scheme	n	n	n	n	n	n	n	n	n	y	n	n	n
Carbon tax in use	n	n	n	n	n	n	n	n	n	n	n	n	n
Investment grants for DH/CHP	n	n	n	n	n	n	n	n	n	n	n	n	n
DH customer rights (Weak/Strong)	W	S	W	S	W	W	S	W	W	W	W	S	W
DH service quality (Good/Poor)	P	G	P	G	P	P	G	G	P	P	P	G	P
Billing based on consumption	n	y	n	y	n	y	y	y	n	n	n	y	n
Municipal role (Weak/Strong)	W	W	W	W		W		W	W	S	W	W	W
Private sector involvement	n	y	y	n	y	n	n	y	n	n	n	y	y
Synergy allocations: CHP/Res													
Integrated resource planning	n	n	y	y	n	n	y	y	n	n	n	n	n
Heat planning and zoning	n	n	y	n	n	n	y	y	y	n	n	n	y
Technical standards	New	New	New	New	Old	New	New	New	Old	New	Old	New	Old
Refurbishing strategy in use	y	n.a.	y	y	y	y	n.a.	y	n	y	n	n.a.	n
DHW supplied with DH	n	y	n	n	y	n	y	n	y	n	y	y	y

Explanations: n=no, y=yes, EL=Electricity, W=Weak, S=Strong

# Focus of the presentation:

- DH Regulation
- DH pricing and billing
- CHP

# DH Regulation

- Special DH regulation is typically not applied in competitive heat markets (most old EU member countries, USA, CAN).
- In countries of the former Soviet Union and China, DH regulation has emerged from the former centralised systems.
- In former Yugoslavia different systems have been developed
- In most of these countries, centralised regulatory bodies address DH (exemptions , e.g., China, Serbia).
- DH regulation copies typically essential elements of Electricity Regulation, despite the obvious differences.

# Current status

	<b>KAZ</b>	<b>RUS</b>	<b>UKR</b>	<b>UZB</b>	
Central national DH regulator	yes	yes	yes	yes	
Central governmental	yes		yes	yes	
Municipal					
Central-regional-municipal		yes			
Private					
	<b>BiH</b>	<b>CRO</b>	<b>KOS</b>	<b>MAC</b>	<b>SER</b>
Central national DH regulator	no	no	yes	yes	no
Central governmental	no	no	yes	yes	
Municipal	yes	yes			yes
Central-regional-municipal					
Private					
	<b>CAN</b>	<b>CHI</b>	<b>KOR</b>	<b>USA</b>	
Central national DH regulator	no	no	yes	no	
Central governmental			yes		
Municipal					
Central-regional-municipal		yes			
Private	yes			yes	

# Findings and conclusions

- Centralised regulations are characterised by:

- Uniform rules should apply to all DH Companies.
- Tariffs are determined on the same cost base
- Trained staff in regulatory bodies is available

Decentralised (municipal) regulations are characterised by:

- Lacking uniform rules
- Large tariff discrepancies and price distortions
- Municipalities are often overcharged with regulatory
- Lacking/few trained staff in regulatory bodies
- Danger that DH becomes the playing field for local politics

# Conclusions and recommendations

- DH regulation is needed in absence of competitive heating alternatives
- Apply uniform rules for all DHC
- Supervisions (i.e., proper application of rules) can be exercised either by central or local entities
- Regulation should cover at least:
  - Determination of cost base
  - Tariff setting
  - Licenses
  - Rules for operation and management (stipulated in licenses)

# DH pricing and billing – current status

	<b>KAZ</b>	<b>RUS</b>	<b>UKR</b>	<b>UZB</b>	
Billing based on consumption					
DH prices regulated	yes	yes	yes	yes	
	<b>BiH</b>	<b>CRO</b>	<b>KOS</b>	<b>MAC</b>	<b>SER</b>
Billing based on consumption		yes	yes*	yes	
DH prices regulated	yes	yes	yes	yes	yes
<i>* mandatory by law, but not yet enforced</i>					
	<b>CAN</b>	<b>CHI</b>	<b>KOR</b>	<b>USA</b>	
Billing based on consumption	yes		yes	yes	
DH prices regulated		yes	yes		

# Consumption-based billing

In most countries of this group, billing used to be done based on lump-sum tariffs (usually, Curr. Unit/m<sup>2</sup>),

- Advantage: simplicity both for DH operators and customers
- Disadvantage: Lacking incentive to save energy and reduce costs.

Converting this system to consumption-based billing in China subject of the so-called „Heat reform“.

In other countries, the initiative has typically come from the DH Companies, when facing increasing competition from other heating options.

# Consumption-based billing

There is a clear tendency to implement consumption-based billing.

- In China the central government pushes consumption-based billing, but implementation at the local level is slow.
- In the countries of the former SU, consumption-based billing is allowed, but typically neither enforced nor actively supported by local authorities.
- In MAC and CRO it is applied, in KOS legally requested but not yet applied. In SR, most DH Companies want it, but local authorities are still resisting.
- Consumption-based billing is typically applied in CAN, KOR, and USA.

# Good practice - Kosovo

- Consumption-based billing is legally requested (but not yet enforced due to lack of meters)
- A two-part tariff is applied (even without metering)
- Tariff calculated based on cost and demand forecast
- Clear rules for cost-base
- Profit included (return of regulated assets base)
- **ERC** explains in detail reasons for not accepting specific costs
- Losses and profits of the previous year affect the approved cost base of the current year.
- But: Bad debts are not accepted as costs

# DH Pricing and billing- Recommendations

- In regulated DH markets, uniform pricing rules need to be applied (good example: Kosovo)
- Decentralised pricing responsibilities lead to price mismatch and price distortions (such as in Serbia)
- A decentralised variant would comprise (recommended option for China):
  - Definition of uniform rules for cost base, tariff setting and billing,
  - Local/regional supervision of proper application of the rules
- Application of a two-part tariff reflecting variable and fixed costs (particularly important for economies in transition)

# CHP – Current status

	KAZ	RUS	UKR	UZB	
Feed-in tariff scheme for CHP with fossil fuels					
Feed-in tariff scheme for CHP with RES					
Investment grants for CHP					
DHW supplied with DH	yes	yes	yes	yes	
	BiH	CRO	KOS	MAC	SER
Feed-in tariff scheme for CHP with fossil fuels		yes			yes
Feed-in tariff scheme for CHP with RES	yes	yes			yes
Investment grants for CHP					
DHW supplied with DH					
	CAN	CHI	KOR	USA	
Feed-in tariff scheme for CHP with fossil fuels					
Feed-in tariff scheme for CHP with RES		yes			
Investment grants for CHP					
DHW supplied with DH	yes		yes	yes	

# Status of CHP

Shares of CHP in total heat generation capacity is different, but in general sub-optimal.

The biggest markets are:

- China (2006): 2,600 CHP units with over 80 GW of capacity, providing about 18% of the thermal generation capacity
- Russia: Heat supplied by CHP amounts to some 30%
- In CEE, conditions for CHP are difficult:
  - Ukraine: Many old CHP plants have shrunk to heat only boiler plants due to technical problems
  - Serbia: Most CHP plants have stopped production

# Problems of CHP utilisation

- Nation-wide average numbers say nothing about the rationale of CHP utilisation.
- In some cases, practically all heat may come from CHP (e.g., Ulan Bator/Mongolia), i.e., the share of CHP in total capacity may be far above economic optimum.
- In China, there can be hundreds of DH Companies in one city, while only a few are served by CHP.
- In Russia, there is little incentive to develop any CHP. Therefore, the outdated CHP performance is close to modern pure power (condensing) plants.
- In general, there are no clear opinions and guidelines regarding the optimal sizing of CHP.
- Steam is usually extracted at relative high pressures resulting in unnecessary electricity losses.
- Typically low overall efficiencies
- There are only a few examples of reasonable heat planning for cities.

# Good practice – Skopje/MA

- Ownership and regulatory functions clearly separated
- DH is owned by a private investor
- Network is owned by Municipality and leased to DHC
- Licenses for generation, distribution, and supply
- Rehabilitation without funds from IFIs
- High collection rate of 95%
- New CHP CCP plant; more are planned to supply the whole system.
- Heat from CHP cheaper than from HoB (but no feed-in tariff system)

# CHP – Promotion

- Promotion of CHP is mostly limited to small plants (typically up to 10 MWe) using RES and, sometimes, natural gas.
- This has obviously been promoted by the corresponding EU policies and is applied by potential EU members.
- China has adopted a **less vigorous** approach, which actually does not promote small scale CHP with RES.
- There are no particular promotion programmes to support larger CHP plants.
- Clear policies and transparent rules for operating larger CHP plants are mostly lacking.

# CHP - Recommendations

- DH Companies and government are mostly looking for private investors, but transparent and clear legal frameworks are missing; rules are fixed case by case
- Clear and transparent feed-in tariff systems for CHP (including larger facilities) required
- Sizing the plants needs to be based on reasonable heat planning (instead of outdated norms)
- Heat planning is mostly not applied or became a forgotten art (FY).

# Additional information

The report will be publically available by summer 2011 at <http://www.iea-dhc.org/>

Contact:

Arto Nuorkivi, Email: [energy@nuorkivi.fi](mailto:energy@nuorkivi.fi)

Bernd Kalkum, Email: [bk@euc-kalkum.com](mailto:bk@euc-kalkum.com)