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Capacity building training courses
on financing & business models

Key success factors of a DHC project – Guidelines, National framework/ contractual issues

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CONTENT

- Overview of relevant policies and strategies
- Key info about District heating systems in BiH
- Analysis of introducing metering and consumption based billing system in BiH
- Related measures and resulting effects
- Energy/heat price trends
- Key success factors

Overview of relevant policies and strategies

- Law on Production, Distribution and Supply of Thermal Energy/Heat

The Law should regulate the production, distribution and supply of thermal energy, the rights and obligations of service providers, and the rights and obligations of thermal energy consumers

Proposed by a number of relevant strategies:

- ESSBiH Module 9, 2008
- Energy Sector Strategic Plan and Development Programme of FBiH, 2009
- Climate Change Adaptation and Low-Emission Development Strategy, 2013

Overview of relevant RS/FBiH legal framework

Republika Srpska	**Law on Spatial Planning and Construction**, transposing the provisions of Directive 2010/31/EC – Energy Performance of Buildings Directive
	Law on Energy Efficiency, transposing the provisions of Directives 2006/32/EC – Energy End Use Efficiency and Energy Services Directive and 2010/30/EC – Energy Labelling Directive
	Law on Renewable Energy Sources and Efficient Cogeneration, transposing the provisions of Directives 2009/28/EC – Directive on the Promotion of the Use of Energy from Renewable Sources and 2004/08/EC – Directive on the Promotion of Cogeneration
Federation of BiH	**Law on physical planning and land utilization** ("Official Gazette of FBiH", No. 2/06, 72/07 and 32/08)
	Law on Use of Renewable Energy Sources and Efficient Cogeneration, transposing the provisions of Directives 2009/28/EC – Directive on the Promotion of the Use of Energy from Renewable Sources and 2004/08/EC – Directive on the Promotion of Cogeneration
	Law on Energy Efficiency, transposing the provisions Directives 2006/32/EC – the Energy End-Use Efficiency and Energy Services Directive, 2010/30/EC – Energy Labelling Directive, and 2010/31/EC – the Energy Performance of Buildings Directive

EU legal framework – DHS based

Directive 2012/27/EC – Energy Efficiency Directive (EED)

all EU member countries are obliged to regulate consumption-based billing with appropriate legislation by **5 June 2014.**

- heat, cooling and hot water must be billed according to actual consumption ***at least once a year.***
- installation of appropriate measuring devices is mandatory by 31 December 2016 (Article 9)
- consumption-based billing must be carried out at the latest by 31st of December 2014, in case the meters are already installed (Article 10).

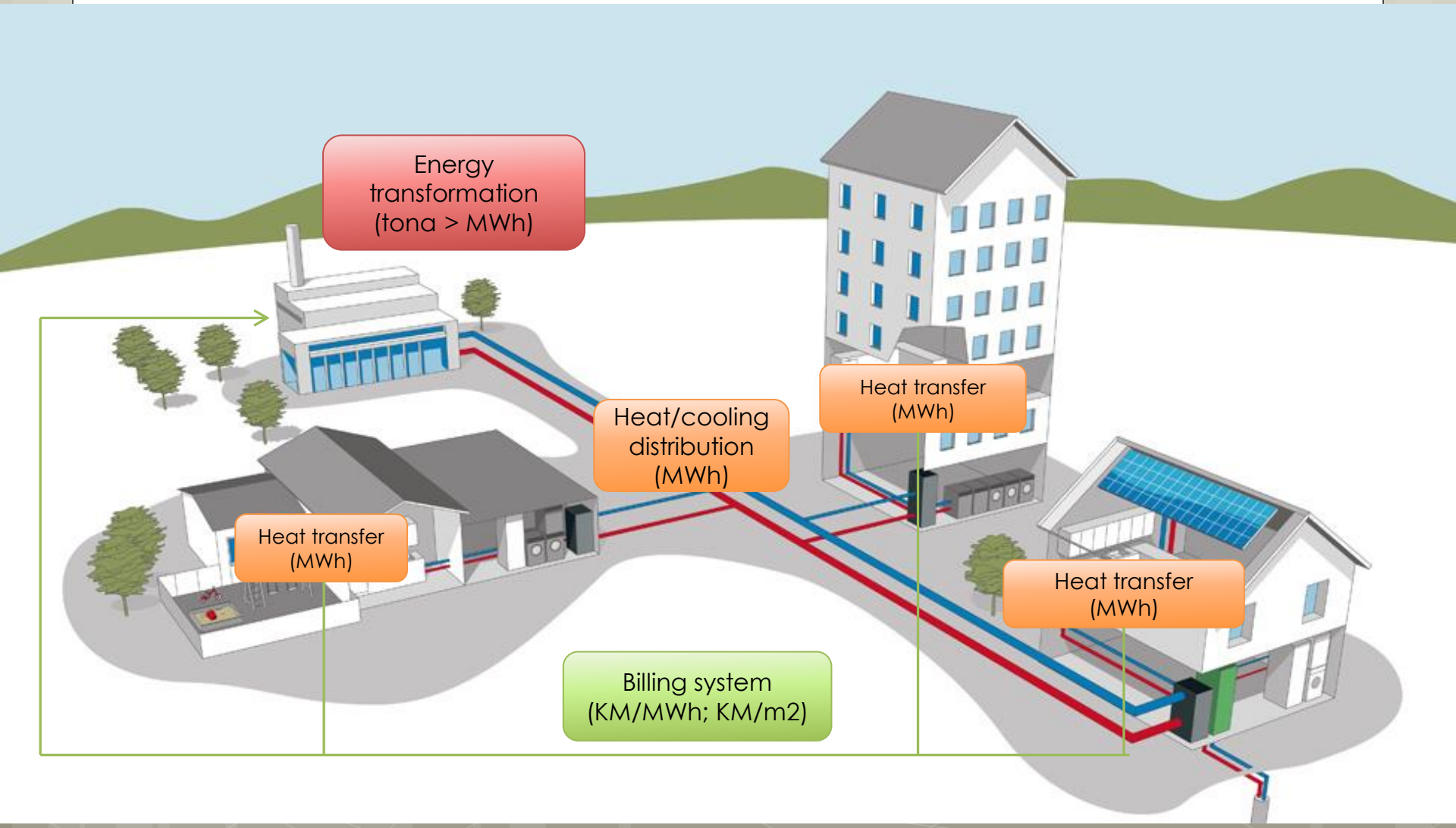
EU legal framework – DHS based

Directive 2012/27/EC – Energy Efficiency Directive (EED)

- All of these laws will have a significant impact on the future implementation of the consumption based billing model in BiH, as well as customers demand/desire to pay only for what they use.

- Energy distributors and/or retail energy sales companies should achieve a cumulative end-use energy savings target of 1,5 % of the annual energy sales to final customers

DHS operation



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DHS in BiH

- DHS in urban places
- DHS in energy utilities
- Local DHS from local factory

Heat plant

TPP/HP

Non operate

Introduction of metering and consumption based billing system in district heating systems of BiH

CASE STUDY

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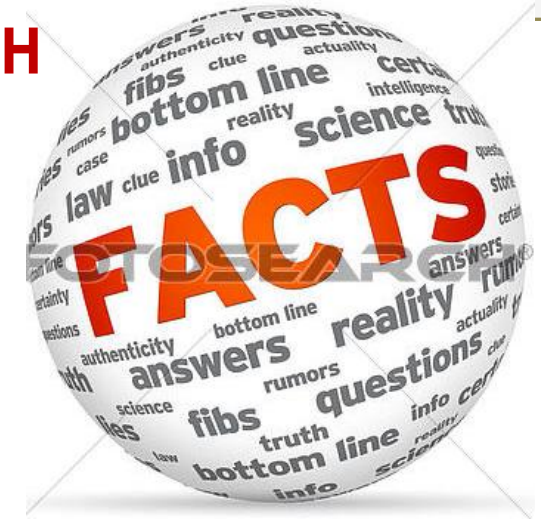
Overview of analyzed district heating systems in BiH based on available data in BiH

	Unit	Residential /dwelings	Public	Commercial	Multi apartment building	Housing
Sarajevo	pcs	50.215	2.498		50.215	
	m^2	2.871.890	445.292		2.871.890	
Zenica	pcs	22.200		600	22.200	
	m^2	1.000.000		372.000	1.000.000	
Tuzla	pcs	19.075	142	2.066	17.168	1.908
	m^2	1.564.140			1.407.726	156.414
Grijanje Kakanj	pcs	3.035		290	1972,75	1.062
	m^2	156.070		47.731	101445,5	54.624
"RAD" Lukavac	pcs	2.700			2.160	540
	m^2	135.000	22.000	12.000	108.000	27.000
„Toplana" Banja Luka	pcs	20.000		650	19.000	1.000
	m^2	1.078.000			1.024.100	53.900
Toplana ODJP „Doboj"	pcs	7.130		493	5704	1426
	m^2	350.000		98.000	280.000	70.000
„Toplana" Prijedor	pcs	3.500		1.500	2.800	700
	m^2	201.999		75.041	161.599	40.400
„Gradske toplane" Pale	pcs	647	4	68	453	194
	m^2	37.030	8.054	3.182	25.921	11.109
JP Toplana Tešanj	pcs	572	72		400	172
	m^2	46.000	27.000		32.200	13.800
Toplane Banovici	pcs	1.200	118		1.200	0
	m^2	62.000	26.000		62.000	0
Eko Toplane Gračanica	pcs	303	18	51	212	91
	m^2	56.000			39.200	16.800
Total	pcs	**130.274**	**2.834**	**5.667**	**123.273**	**7.001**
Total	m^2	**7.502.129**	**528.346**	**607.954**	**7.074.881**	**427.247**

DHS in BiH



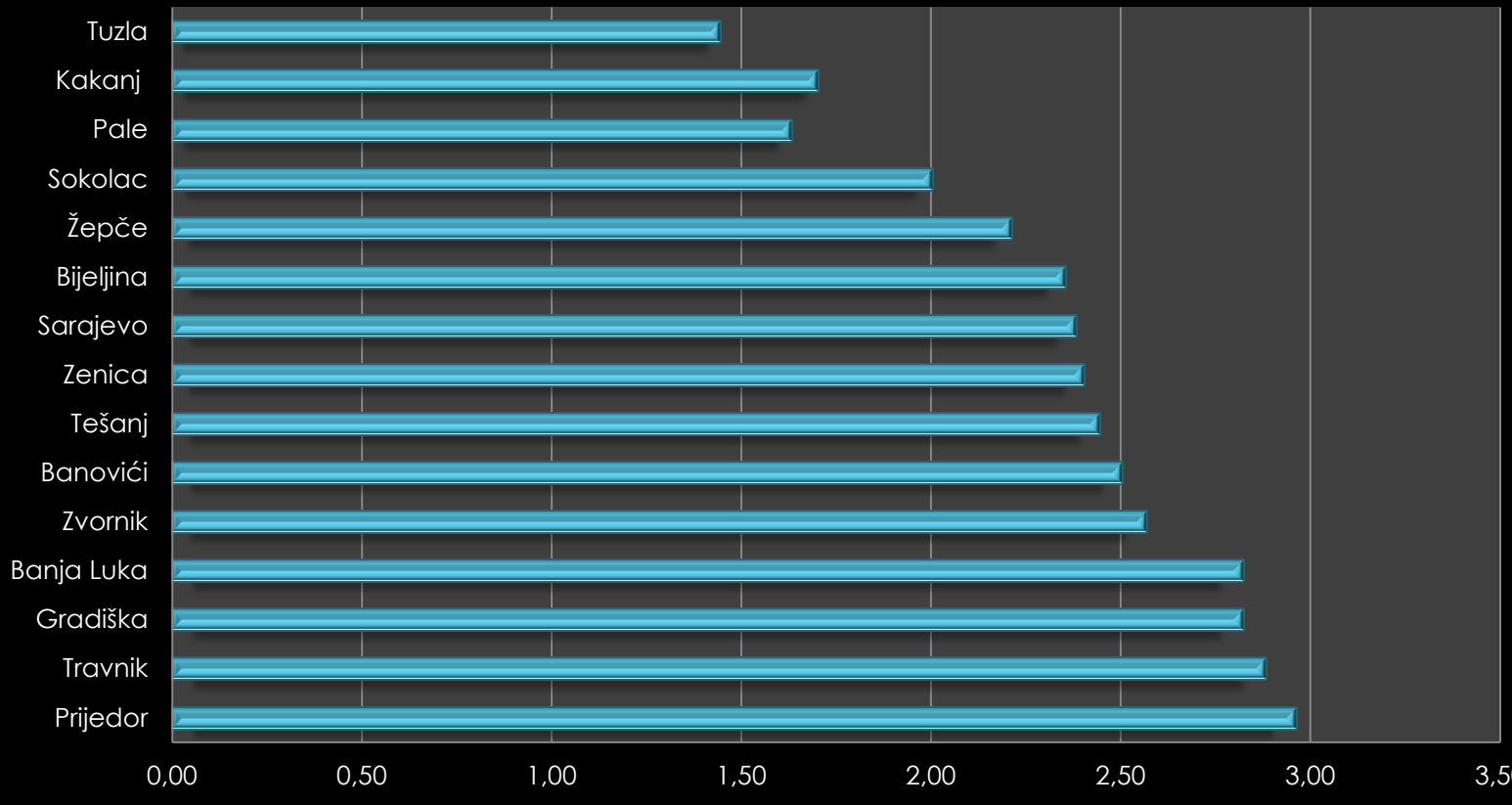
1) Most of the district heating systems in BIH don't have metering systems installed within the final consumer.

2) There is no heat energy/consumption metering system at all within the entire network system.

3) Based on the findings and available data it is assumed that in the DHS's the consumption-based billing is already represented in approx. **20%** of the total residential sector

DHS in BiH – Prices

Heat price in DHS of BiH based od heated area (KM/m2) - *year 2014*



	Prijedor	Travnik	Gradiška	Banja Luka	Zvornik	Banovići	Tešanj	Zenica	Sarajevo	Bijeljina	Žepče	Sokolac	Pale	Kakanj	Tuzla
KM/m2 (6 mjeseci)	2,96	2,88	2,82	2,82	2,56	2,50	2,44	2,40	2,38	2,35	2,21	2,00	1,63	1,70	1,44

Consumption based billing

- **heat cost allocators** (approx. 80% of the total residential sector)

- **heat meters** - one-pipe heating systems (***calorimeters***) - (approx. 20% of the total residential sector)

Investment costs

	Investment costs excl. VAT		Investment costs per dwelling in multi apartment building excl. VAT	Investment costs per family house excl. VAT
	[KM/pcs]	pcs	[KM/pcs]	[KM/pcs]
Thermostatic valves	90	4	360	360
Heat cost allocators - vertical system	80	4	320	0
Calorimeters - horizontal systems and where technically feasible	550	1	0	550
Allocator system (including general calorimeter)	5,000	1	250	0
Total investment costs per dwelling			**930**	**910**

Financial indicators for heat measuring systems investment per dwelling

	Allocator system (including general calorimeter)	Calorimeter system
Investment [KM]	930	910
Expected savings due to consumption based billing [KM]	188	188
Discount rate [%]	7%	7%
Payback period [years]	5.0	4.8
NPV [KM]	1,332 KM	1,352 KM
IRR [%]	19.66%	20.13%

CO2 emission reduction per dwelling: 0,5 tCO_2/a

Preconditions for heat consumption based billing

Legal framework

- LAW
- Decree on conditions of heat supply
- **Tariff system**
- Rules on the operation of the distribution system
- Regulation on Determination of End-Users Supply Tarrifs for thermal energy

Tariff system (example City of Sabac)

Варијабилни трошкови:
-трошкови енергената
-трошкови електричне енергије
-трошкови воде и хп воде

дин/KWh

60-75%

Фиксни трошкови:
-трошкови материјала
-трошкови услуга
-трошкови зарада
-трошкови текућег и инвестиц. одржавања
-трошкови исправке вредности потраживања
-издаци финансирања
-амортизација
-трошкови капитала

дин/m2 (din/KW)

25-40%

Source: ЈКП"ТОПЛАНА-ШАБАЦ" Шабац; Milan Stosic, Tolana Sabac, director

Heat consumption based billing (example City of Sabac)

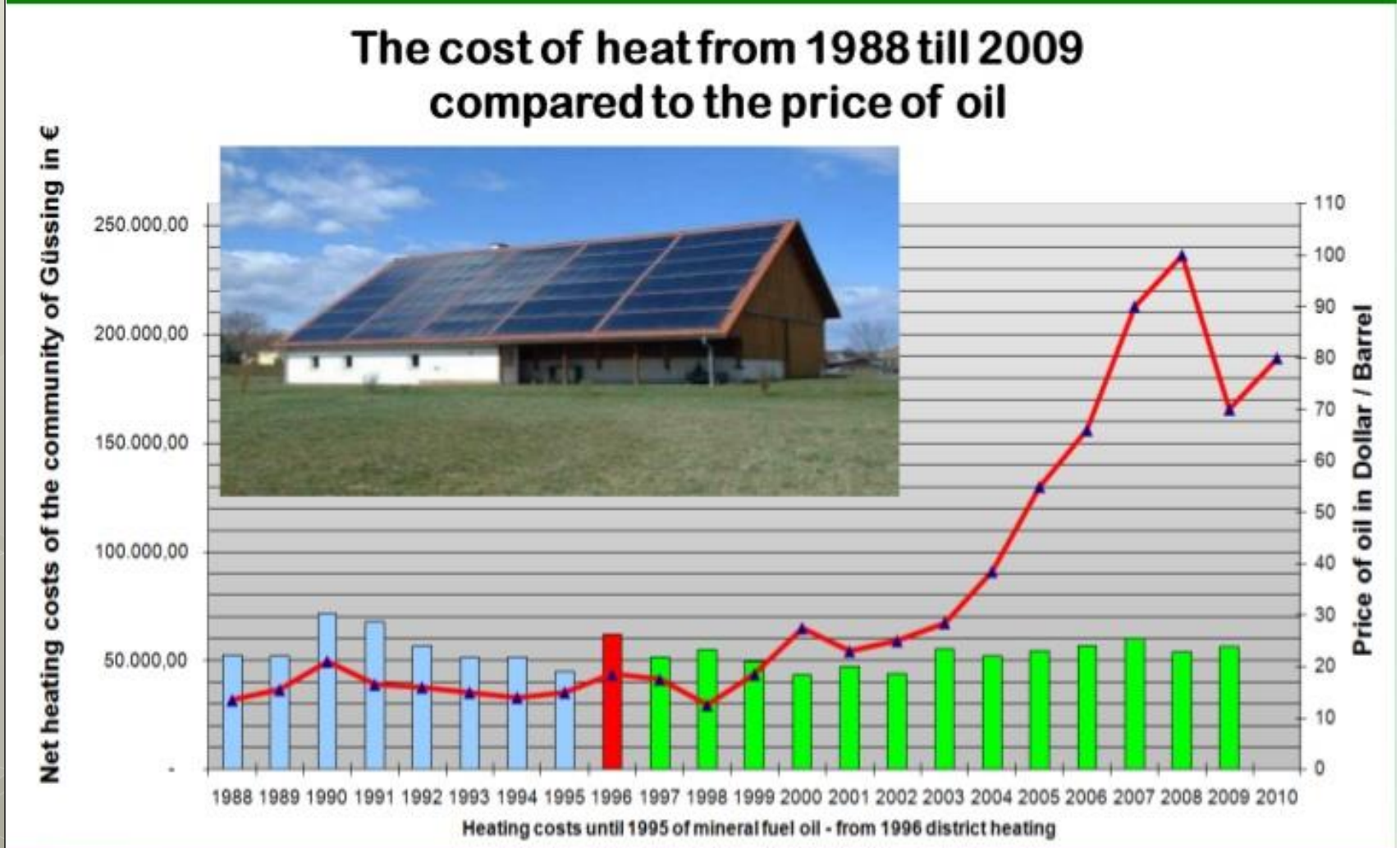
Adresa	Površina (trenutna.)	2014/2015 t_{sr} = 6.13^{0}C Potrošnja	2014/2015 Specifična potrošnja 119,7kWh/m^2	2015/2016 (Аутомат.) t_{sr} = 7.17^{0}C Potrošnja	2015/2016 (Аутомат.) Specifična potrošnja 114,7kWh/m^2	2016/2017 (Аутомат.) t_{sr} = 4.75^{0}C Potrošnja	2016/2017 (Аутомат.) Specifična potrošnja 126,9kWh/m^2
	m^2	MWh	kWh/m^2	MWh	kWh/m^2	MWh	kWh/m^2
I PRIMER : Zgrade istih građevinskih karakteristika i oblika sa i bez izolacije.							
Dr.Andre Jovanovića 1 - izolovana	4533,00	473,70	104,50**(-12,6%)**	439,30	96,91**(-15,5%)**	415,70	91,71**(-27,73%)**
Kneza Lazara 2 - neizolovana	4358,00	577,44	129,24**(7,56%)**	502,91	115,40**(0,61%)**	585,78	134,41**(5,91%)**
II PRIMER : Zgrade istih građevinskih karakeristika sa i bez delitelja.							
Cara Dušana 44 - bez delitelja	1597,55	202,84	117,88**(1,52%)**	191,49	119,86**(4,49%)**	225,77	141,32**(11,36%)**
Cara Dušana 46 - sa deliteljima	1650,66	126,90	76,53**(-36,06%)**	113,40	68,70**(-40,10%)**	130,70	79,18**(-37,60%)**
III PRIMER: Zgrada na kojoj je urađena izolacija 2014.g.							
Kralja Petra I 3	2927,93	258,61	85,62**(-28,47%)**	251,86	86,02**(-25,00%)**	311,95	106,55**(-16,03%)**
IV PRIMER: Neizolovane zgrade starijeg datuma gradnje.							
Norveška 6,8	4301,47	670,43	160,72**(+34,26%)**	609,52	142,70**(+24,41%)**	668,27	155,35**(+22,41%)**
Leonarda da Vinčija 41-49	2881,50	360,83	120,80**(+0,91%)**	353,07	119,58**(+4,25%)**	392,05	136,06**(+7,21%)**
Kralja Petra I 9,11	2771,22	385,25	139,02**(+16,14%)**	355,98	128,46**(+11,99%)**	410,26	148,05**(+16,66%)**
V PRIMER: Izolovane zgrade novijeg datuma izgradnje, sa pojedinačnim merilima utroška toplotne energije za svaku stambenu jedinicu.							
Jovana Cvijića 8	2521,80	168,06	67,44**(-43,65%)**	165,42	60,80**(-46,99%)**	186,80	74,07**(-41,63%)**
Žike Popovića 36	1158,31	77,57	73,85**(-38,30%)**	71,59	59,29**(-48,30%)**	84,36	72,83**(-42,60%)**
Drinska 2	1059,00	96,58	73,75**(-38,38%)**	87,97	76,10**(-33,65%)**	82,41	77,82**(-38,67%)**

Source: ЈКП"ТОПЛАНА-ШАБАЦ" Шабац; Milan Stosic, Tolana Sabac, director

Energy/heat price trends

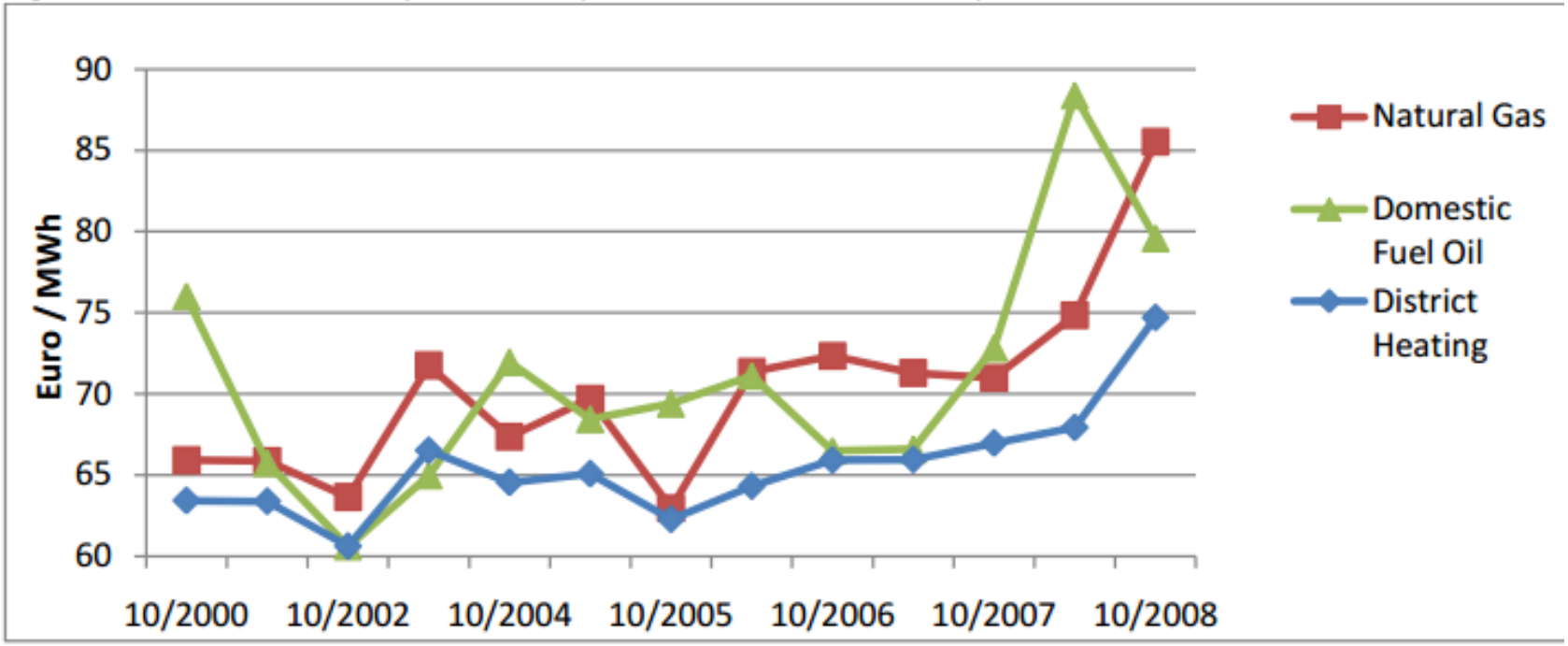
EXAMPLES

Energy/heat price trends - Examples



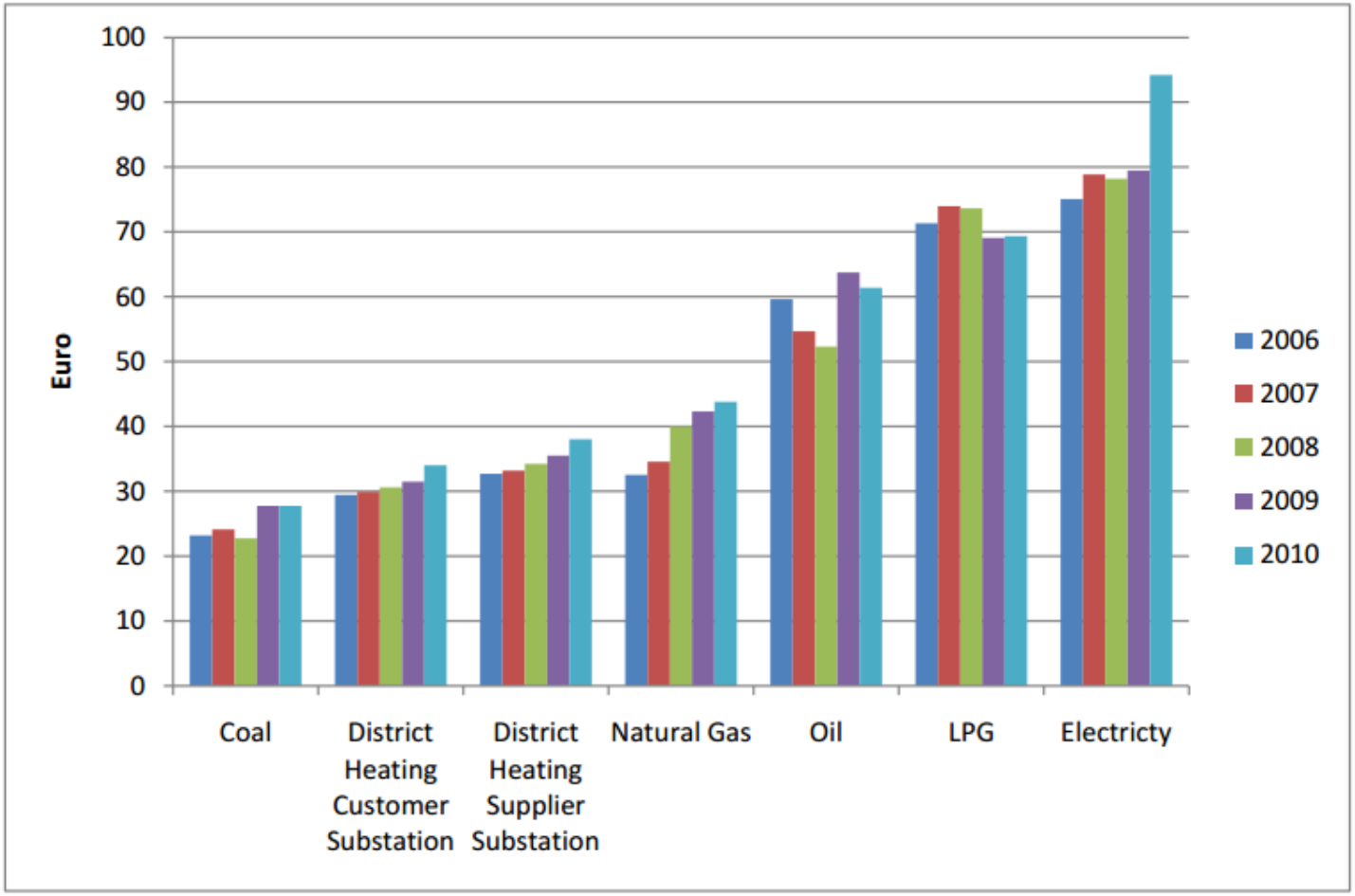
Energy/heat price trends - Examples

Figure 3: German development of specific full costs in Euro per MWh[1]

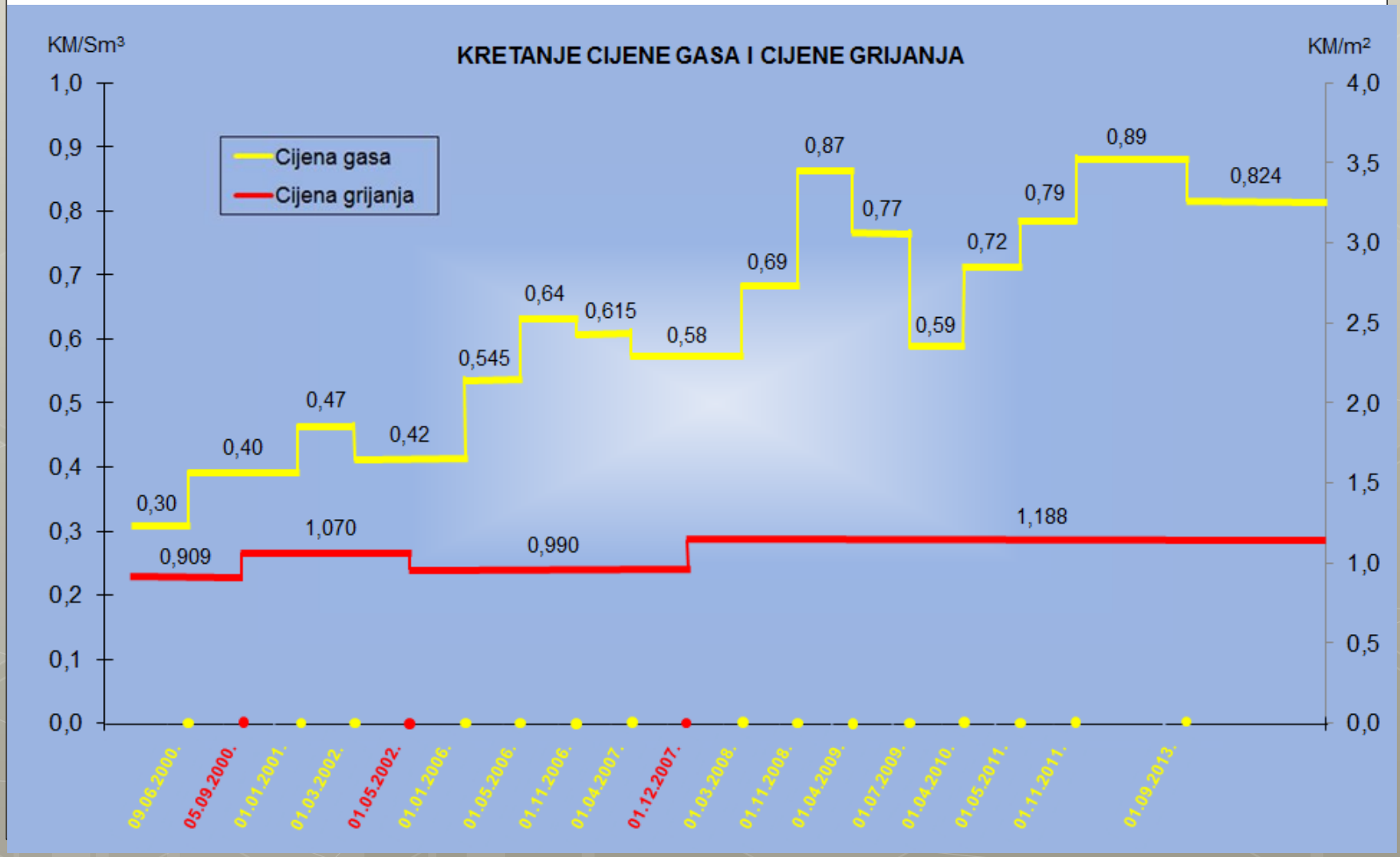


Energy/heat price trends - Examples

Figure 5: Polish Heat Prices according to heat source



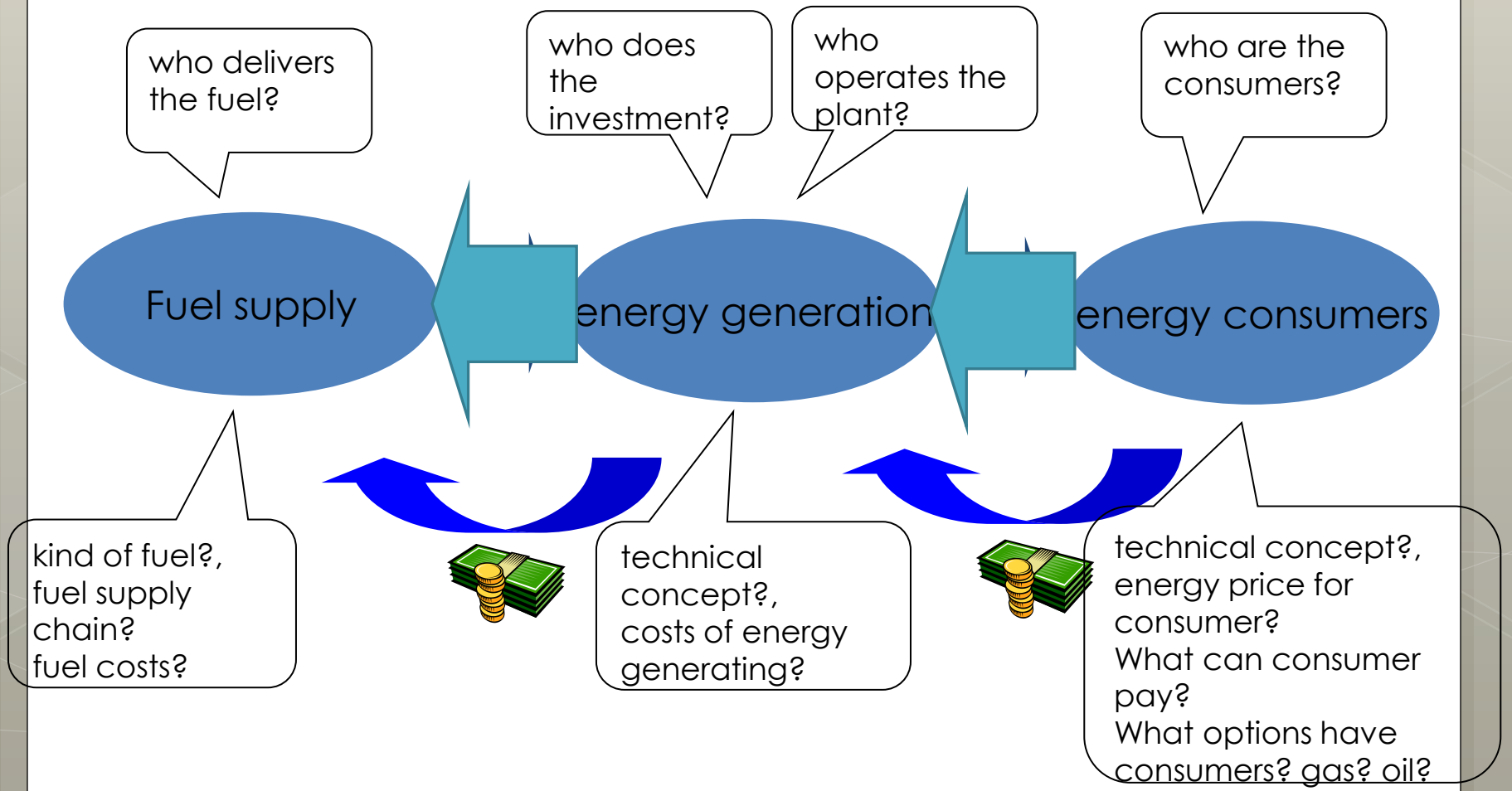
Energy/heat price trends – Examples



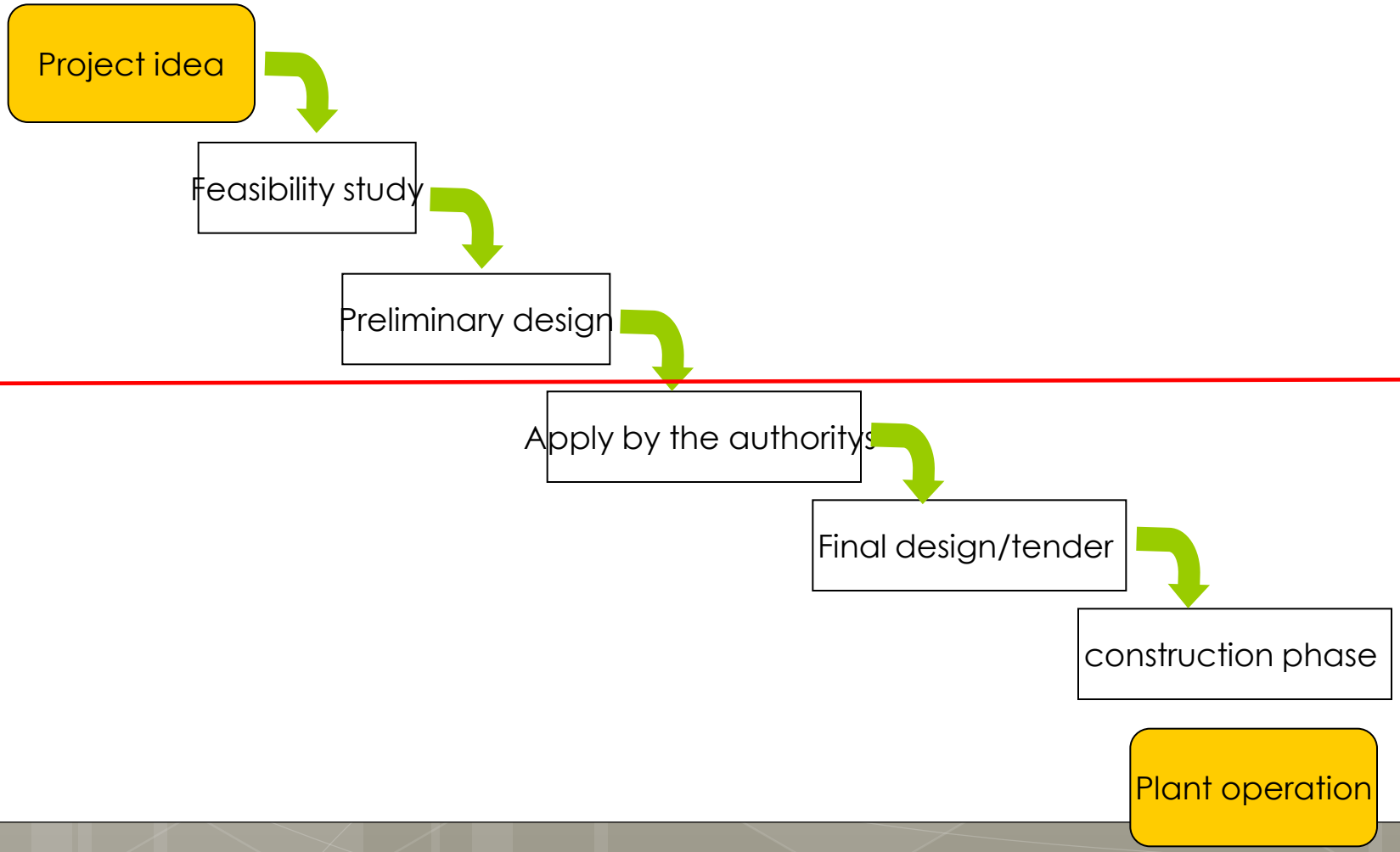
Key success factors of a DHC project

Identifying, planning, implementation, supervision, operation etc.

Identifying a potential project – First questions



Identifying a potential project – Project steps



Identifying a potential project – Local key factors

Fuel supply from the region (quantity, quality, size, price)

Plot for a fuel plant (plot available near to the consumers)

Owner of the plant (investment), operator of the plant, local partners

Consumers with a high heat demand near to the plant

Authorities, municipality, consumers, energy supply companies, other important local actors → acceptance of all actors

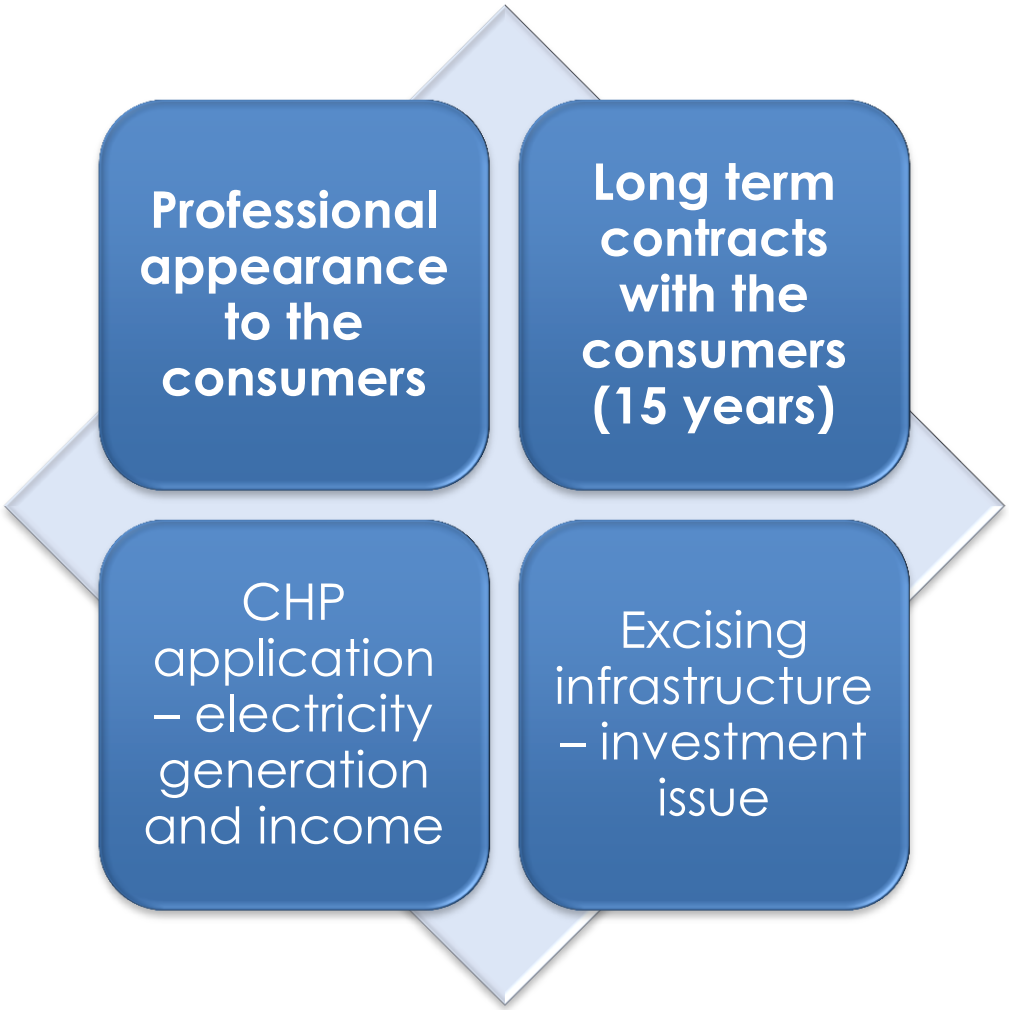
Ability of the consumers to pay for the energy service

Identifying a potential project – Local key factors

Most important are a high potential of heat consumers with a high amount of heat

- Tourism, hotels, companies
- Schools
- Residential buildings
- Hospital
- Old people's home
- Restaurants
- Swimming pools

Identifying a potential project – Other key factors



THANK YOU FOR YOUR ATTENTION!

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