Collecting district heating data: the French experience

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NBS Workshop - Beijing, 23rd – 25th May 2018

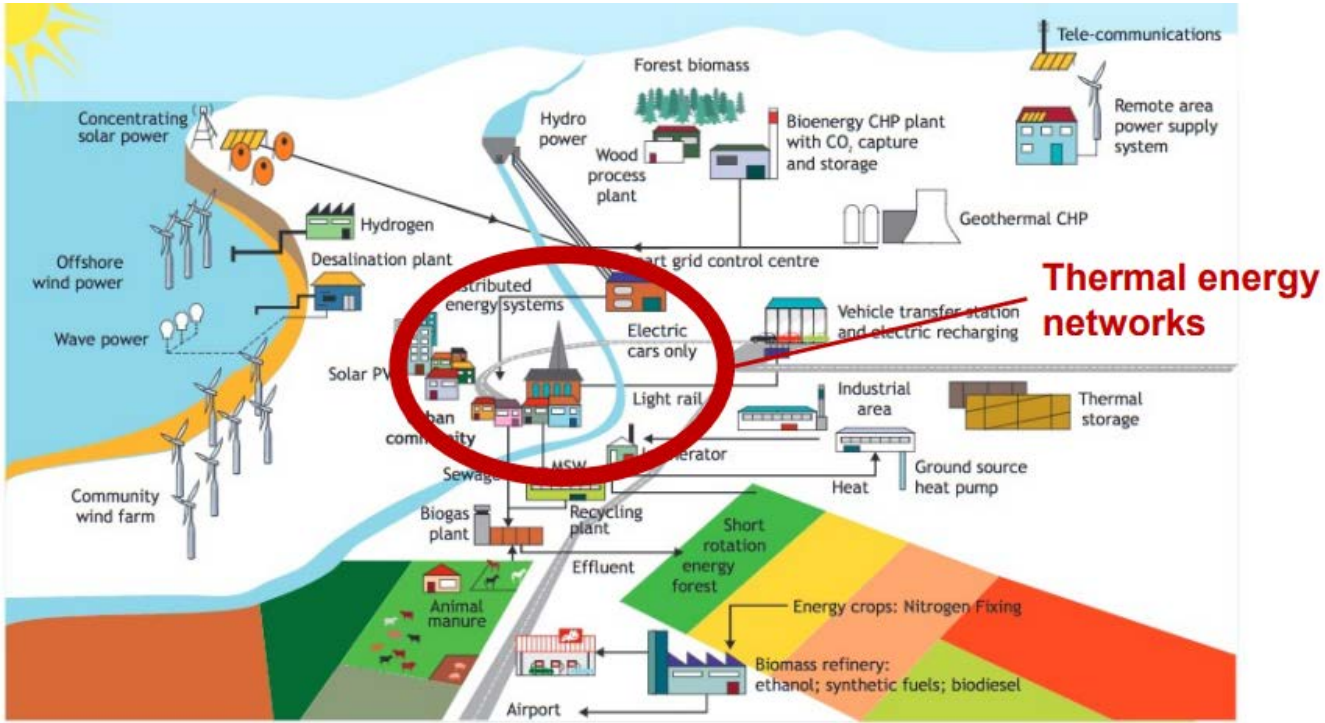
IEA

Presentation overview

- Introduction to district heating
- The French experience on data collection
- Reporting district heating

Introduction to district heating

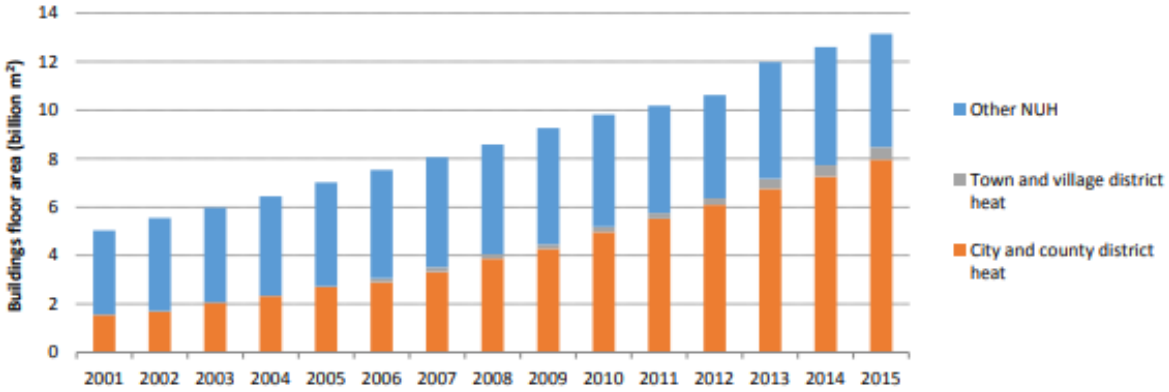
District heating



System that connects multiple thermal energy users through a network of insulated pipes to efficient or renewable energy sources

District heating in China

Space heating floor area coverage by district heat networks in northern urban China



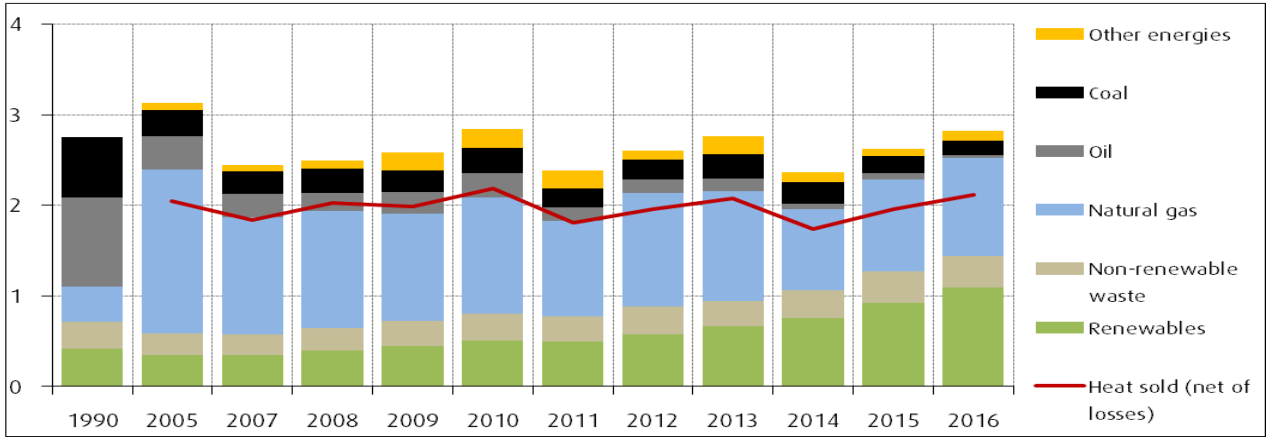
District heating plays a critical role in many parts of China

Source: "District Energy Systems in China", IEA, Tsinghua University

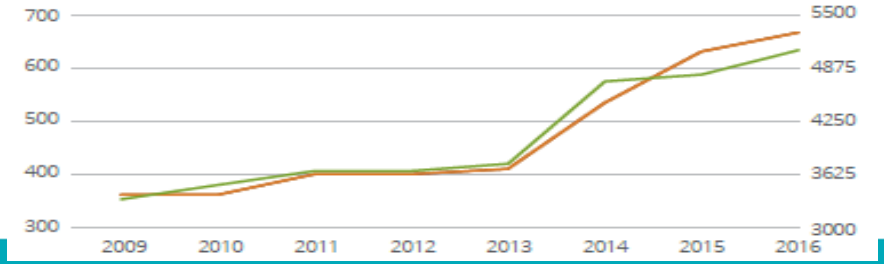
The French experience on data collection

District heating networks (DHN) in France

Consumption of combustibles and heat sold (Mtoe) (Source : SDES)



Number of DHN (orange, left scale), Length of DHN (km, green, right scale) (Source : SNCU)



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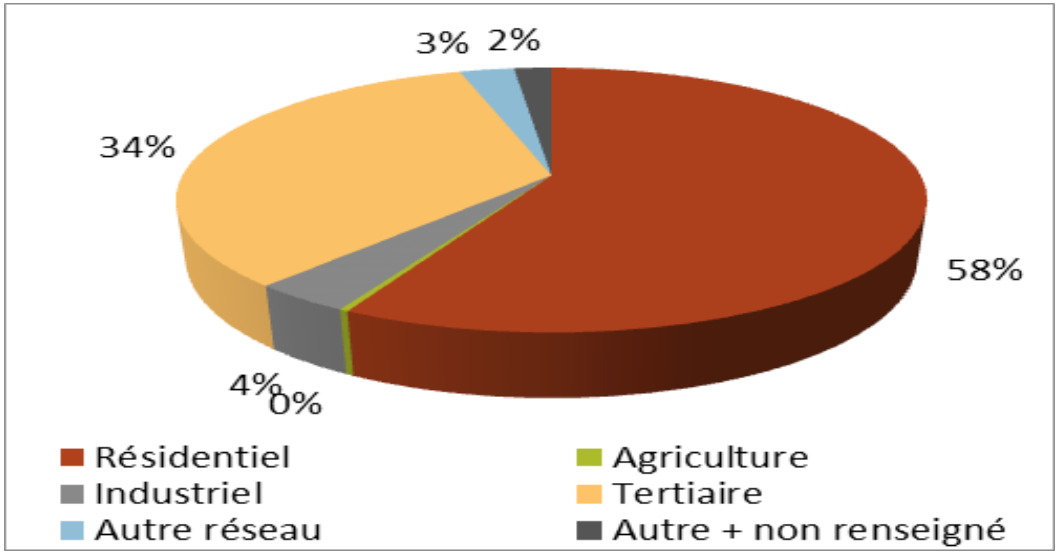
District heating networks in France

Heat deliveries of DHN by kind of customer in 2015 (Source : SNCU) :



Tertiaire : Commercial and public services

Autre réseau : Other DHN

Autre + Non renseigné : Other and non-specified

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Survey of district heating networks

- Statistical annual survey on district heating networks. Mandatory
- Concerns also district cooling networks (about 20)
- Carried out by SNCU (district heating and cooling trade union) with the Ministry (SDES) and an association (Amorce, managing waste, energy and DHN)
- Sampling frame regularly updated to take into account new networks, improvements with gradual integration of small DHN (< 3.5 MW). List updated by SNCU, notably through its adherents.
- Web-questionnaire updated every year by SNCU
- Formal contacts (postal letters) signed by the Ministry (SDES) ; Operational contact (reminder e-mails, feedbacks to DHN for confirmation or correction) essentially by SNCU and Amorce.
- Data collection on year N in Q2 and beginning of Q3 N+1
- Analysis, control and editing microdata (cold deck imputation,…). Final data available in Sept. N+1

Main variables collected

- For each combustible fuel: fuel consumption, heat delivered to the network, thermal capacity ; if relevant cogenerated heat (delivered to the network) and electricity, thermal and electrical capacity
- In case of other equiments (boilers, heat pumps, geothermal) or heat recovered (from other DHN, from waste incineration plants, from industrial sites) : thermal capacity, heat produced and , if relevant, electricity consumption
- Main characteristics of the DHN: number of customers, length of pipes, number of delivery points
- Heat deliveries by kind of customers (residential, commercial and public services, industry, other)
- Economic variables: prices, VAT rates, receipts

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Heat production in France

- Main source: heat plants. Secondary source: CHP plants (behind our survey on electricity producers, including CHP units)

  Cogeneration :

  28 % of DHN concerned,

  17 % of heat delivered to customers by DHN

- Heat sold in French energy balance = heat delivered to customers by DHN + heat cogenerated by CHP units (othr than DHN) and sold, allocated to industry.

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Reporting district heating

Reporting district heating in IEA electricity and heat questionnaire

Menu		MAIN ACTIVITY PRODUCER PLANTS			AUTOPRODUCER PLANTS			TOTAL	
		ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	ELECTRICITY (ONLY)	CHP	HEAT (ONLY)	MAIN ACTIVITY PRODUCER	AUTOPRODUCER
ELECTRICITY UNIT: GWh (10^6 kWh)		A	B	C	D	E	F	G(=A+B+C)	H(=D+E+F)
Electricity	1	55 394	226		1 227	2 857		55 620	4 084
Nuclear	2							0	0
Hydro	3	23 772			421			23 772	421
Pumped Hydro	4							0	0
Geothermal	5							0	0
Solar	6								0
Tide, Wave and Ocean	7								0
Wind	8	38						38	0
Combustible Fuels	9	31 584	226		806	2 857		31 810	3 663
Heat from Chemical Sources	10								0
Other Sources	11							0	0

Type of Plant

Type of Producer

HEAT Unit: TJ

Heat	12						0	0	0
Nuclear	13							0	0
Geothermal	14							0	0
Solar	15							0	0
Combustible Fuels	16							0	0
Heat Pumps	17							0	0
Electric Boilers	18							0	0
Heat from Chemical Sources	19								0
Other Sources	20							0	0

Sources of heat

Details on the type of combustible fuel are also collected.

District heating in the IEA energy balance

People's Republic of China

2015

Million tonnes of oil equivalent

SUPPLY AND CONSUMPTION	Coal	Crude oil[1]	Oil products	Natural gas	Nuclear	Hydro	Geotherm./ Solar/ etc.	Biofuels/ Waste	Electricity	Heat	Total
Production	1868.16	214.76	-	112.62	44.51	95.84	46.24	113.51	-	-	2495.63
Imports	108.75	335.48	53.57	48.64	-	-	-	-	0.53	-	546.98
Exports	-9.60	-2.67	-41.22	-2.71	-	-	-	-	-1.60	-	-58.01
Intl. marine bunkers	-	-	-9.23	-	-	-	-	-	-	-	-9.23
Intl. aviation bunkers	-	-	-7.80	-	-	-	-	-	-	-	-7.80
Stock changes	14.64	-6.24	-2.73	-	-	-	-	-	-	-	5.67
TPES	**1981.95**	**541.14**	**-7.41**	**158.54**	**44.51**	**95.84**	**46.24**	**113.51**	**-1.07**	**-**	**2973.25**
Transfers	-0.97	-1.09	2.49	-	-	-	-	-	-	-	0.43
Statistical differences	-9.24	-0.05	2.20	0.69	-	-	0.00	0.02	-0.01	-	-6.41
Electricity plants	-920.05	-0.13	-2.25	-26.07	-44.51	-95.84	-19.98	-21.92	502.60	-	-628.15
Heat plants	-121.45	-0.07	-4.63	-5.26	-	-	-	-1.47	-	95.90	-36.98
Gas works	-4.78	-	-	1.08	-	-	-	-	-	-	-3.70
Coke/pat. fuel/BKB/PB plants	-61.14	-	-	-	-	-	-	-	-	-	-61.14
Oil refineries	-	-533.29	517.38	-	-	-	-	-	-	-	-15.91
Petrochemical plants	-	-	-	-	-	-	-	-	-	-	-
Liquefaction plants	-3.64	2.19	-	-	-	-	-	-	-	-	-1.46
Other transformation	-	-	-	-	-	-	-	-	-	-	-
Energy industry own use	-56.07	-4.40	-30.77	-21.72	-	-	-	-	-56.42	-11.47	-180.86
Losses	-	-0.87	-0.00	-1.84	-	-	-	-	-25.70	-1.15	-29.56
TFC	**700.75**	**3.42**	**477.01**	**105.42**	**-**	**-**	**26.26**	**90.14**	**419.40**	**83.28**	**1905.68**
INDUSTRY	**538.62**	**2.07**	**54.76**	**38.51**	**-**	**-**	**0.21**	**-**	**276.25**	**55.72**	**966.13**
Iron and steel	191.78	-	0.96	3.59	-	-	-	-	45.86	5.66	247.85
Chemical and petrochemical	90.58	-	12.45	11.51	-	-	-	-	46.71	26.89	188.14
Non-ferrous metals	16.57	-	1.04	3.33	-	-	-	-	47.35	3.50	71.79
Non-metallic minerals	161.98	-	6.13	6.66	-	-	-	-	26.71	0.26	201.73
Transport equipment	2.90	-	0.75	2.54	-	-	-	-	8.19	1.10	15.48
Machinery	12.78	-	2.09	3.82	-	-	-	-	35.38	1.05	55.13
Mining and quarrying	7.17	-	2.87	0.87	-	-	-	-	8.90	0.89	20.69
Food and tobacco	23.48	-	0.89	1.89	-	-	-	-	9.42	3.62	39.31
Paper, pulp and printing	8.76	-	0.33	0.85	-	-	-	-	6.42	4.88	21.25
Wood and wood products	2.76	-	0.27	0.18	-	-	-	-	2.99	0.16	6.35
Construction	4.51	-	7.25	0.18	-	-	-	-	6.01	0.22	18.16
Textile and leather	9.89	-	0.49	0.66	-	-	-	-	16.66	6.89	34.59
Non-specified	5.45	2.07	19.24	2.42	-	-	0.21	-	15.66	0.60	45.65
TRANSPORT	**2.44**	**-**	**262.06**	**16.60**	**-**	**-**	**-**	**2.05**	**15.45**	**-**	**298.60**
Domestic aviation	-	-	18.00	-	-	-	-	-	-	-	18.00
Road	-	-	215.03	16.29	-	-	-	2.05	10.10	-	246.47
Rail	2.44	-	3.23	-	-	-	-	-	5.35	-	11.01
Pipeline transport	-	-	0.00	0.31	-	-	-	-	-	-	0.31
Domestic navigation	-	-	20.94	-	-	-	-	-	-	-	20.94
Non-specified	0.00	-	1.86	-	-	-	-	-	-	-	1.87
OTHER	**104.10**	**-**	**69.39**	**40.33**	**-**	**-**	**26.05**	**88.09**	**127.71**	**27.56**	**483.22**
Residential	49.18	-	35.94	30.10	-	-	21.81	88.09	65.06	22.41	312.60
Comm. and public services	20.18	-	15.73	10.15	-	-	3.56	-	26.20	2.16	78.00
Agriculture/forestry	13.64	-	17.72	0.08	-	-	0.64	-	8.94	0.03	41.04
Fishing	-	-	-	-	-	-	-	-	-	-	-
Non-specified	21.09	-	-	-	-	-	0.04	-	27.50	2.96	51.59
NON-ENERGY USE	**55.59**	**1.36**	**90.80**	**9.98**	**-**	**-**	**-**	**-**	**-**	**-**	**157.73**
In industry/transf./energy	55.59	1.36	66.74	9.98	-	-	-	-	-	-	133.67
of which: chem./petrochem.	-	*1.36*	*55.38*	*9.98*	-	-	-	-	-	-	*66.72*
In transport	-	-	1.23	-	-	-	-	-	-	-	1.23
In other	-	-	22.83	-	-	-	-	-	-	-	22.83
Electricity and Heat Output											
Electr. generated - TWh	**4108.99**	**-**	**9.68**	**145.35**	**170.79**	**1114.47**	**231.15**	**63.73**	**-**	**-**	**5844.16**
Electricity plants	4108.99	-	9.68	145.35	170.79	1114.47	231.15	63.73	-	-	5844.16
CHP plants	-	-	-	-	-	-	-	-	-	-	-
Heat generated - PJ	**3605.29**	**-**	**166.98**	**198.37**	**-**	**-**	**-**	**45.40**	**-**	**-**	**4016.05**
CHP plants	-	-	-	-	-	-	-	-	-	-	-
Heat plants	3605.29	-	166.98	198.37	-	-	-	45.40	-	-	4016.05

1. Includes crude oil, NGL, refinery feedstocks, additives and other hydrocarbons.

Source: IEA World Energy Balances 2017
Based on NBS data processed with IEA methodology

www.iea.org/statistics

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