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The Information Manager

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Abu Dhabi
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Data Collection and Modelling on Renewables

Oslo Group Meeting

What are Renewables 1

- **Solar radiation**
  - **Solar thermal**
  - PV
- Geothermal heat
- **Ambieant heat** (Renewable heat from heat pumps)
  - **Air**
  - **Water**
  - **Ground**

What are Renewables 2

- **Solid Biomass**
  - ➢ Standardised
    - – Biomass pellets
    - – Biomass briquettes
  - ➢ Non Standardised
    - – **Fuel wood**
    - – **Wood chips**, bark, …..
    - – Agricultural residues (straw, corn cob, …..)
- Liquid biofuels and biogases

The sources – Supply I

- **Statistics Austria**
  - **Intrastat & Extrastat (m):** Pellets, Woodchips, Fuelwood, Woodbriquettes, Charcoal
  - **Short Term Statistics (m)**: Heat for District Heating from RES
  - **Survey on Biomass lighted District Heating Plants (5y)**: District heat from Biofuels
- **Fed. Ministry of Economic Affairs**
  - **MOS Oil (m):** Bioethanol, Biodiesel blended
- **E-Control**
  - **CHP & Electricity Survey (a):** Electricity and CHP Heat sold from RES
  - **MOS-Gas (m):** Bio-methane injected

The sources – Supply II

- **Technical University of Vienna**
  - Ambient heat (a)
  - Solar heat (a)
  - Electricity from PV not grid connected (a)

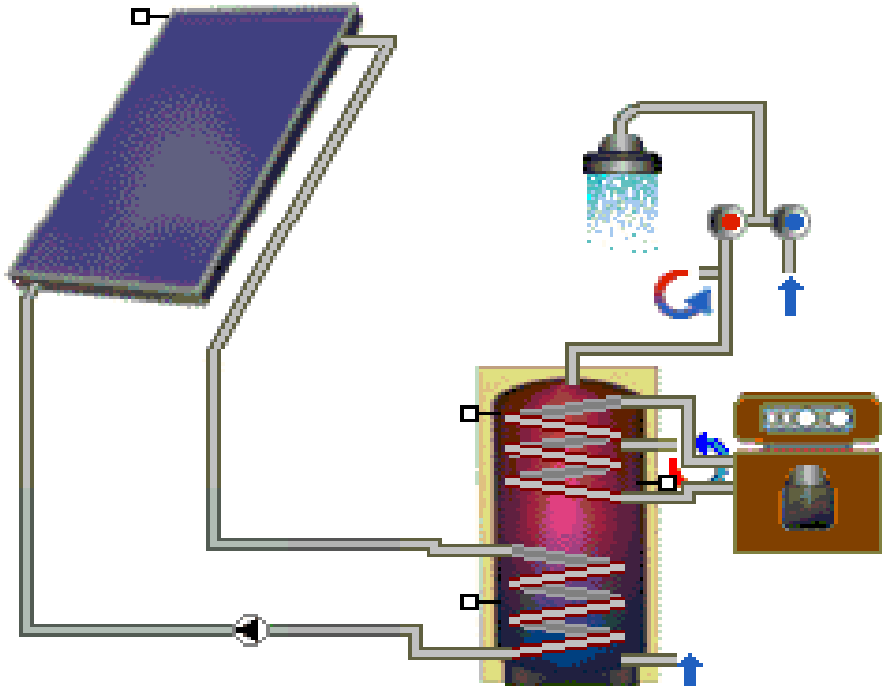
The sources – Consumption I

- **Statistics Austria**
  - **Household Energy Consumption Survey (2y):** Fuelwood, Pellets, Wood briquettes, Wood chips, Ambient & Solar Heat
  - **Input Survey (a)** – Biofuels, Ambient & Solar Heat
  - **Energy Consumption Survey - Services (a)**: Biofuels, Ambient & Solar Heat
  - **Energy Consumption Survey Small and medium sized Industries (5y)**: Biofuels (h), Ambient & Solar Heat
- **E-Control**
  - **CHP & Electricity Survey (a):** Biofuels used for unsold heat production

The sources – Consumption II

- **UBA (Environment Agency)**
  - **Biofuels for transport (a)**: Bioethanol, Biodiesel, Veg. Oil pur
  - **ETS (a):** Biofuels

Solar heat



IEA/ESTIF Methodology

- Simple to calculate
- Data needed are available for all MSs
- Takes into account all systems relevant, for the time being
- Follows the EUROSTAT/IEA fuel definitions

Calculation methodology 1

As a function of the installed solar collector area:

Un-glazed collectors:	*0.29 * H0 * Aa*
Glazed collectors in DHW systems:	*0.44 * H0 * Aa*
Glazed collectors in combi-systems:	*0.33 * H0 * Aa*

Being:

H0: Annual global solar irradiation in kWh/m²

Aa : Collector aperture area in m²

Pnom : Nominal thermal power output of collector in kW

Calculation methodology 2

As a function of the installed collector nominal thermal power:

Un-glazed collectors:	*0.42 * H0 * Pnom*
Glazed collectors in DHW systems:	*0.63 * H0 * Pnom*
Glazed collectors in combi-systems:	*0.47 * H0 * Pnom*

Being:

H0: Annual global solar irradiation in kWh/m²

Aa : Collector aperture area in m²

Pnom : Nominal thermal power output of collector in kW

Data Implementation Example: Solar heat 1

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1. **Solar heat supply (IEA/ESTIF methodology):**
    1. Annual survey on panels installed last year
    2. Calculation assumptions:
        1. A durability of 25 years
        2. National yield factors calculated with the IEA/ESTIF methodology and the global irradiation of Graz (1126 kWh/m²):

unglazed: 327 kWh/m²*year
glazed (DHW): 495 kWh/m²*year
glazed combi: 372 kWh/m²*year

Data Implementation Example: Solar heat 2

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2. Solar heat consumption of households:

1. Biannual survey on household energy consumption:
    1. Solar heat for hot water only
    2. Solar heat for hot water and space heating
2. Calculation assumptions:
    1. Energy demand for water heating is 1199 kWh by person living in that household and year.
    2. If solar is used 65% of hot water used is coming from solar heat

Data Implementation Example: Solar heat 3

3. If solar is used as main heating system 70% of heat is coming from solar
4. If solar is used as auxiliary heating system 30%, 15% or 10%, depending on the number of auxiliary systems used, come from solar
5. Energy consumption for space heating by m² depending on dwelling type and construction period

	Detached / Semidetached Houses			Appartement Houses		
	Construction Period			Construction Period		
	till 1960	1961 to 1990	since 1991	till 1960	1961 to 1990	since 1991
kWh/m²*a	232,0	166,0	97,0	182,0	132,0	96,0

Data Implementation Example: Solar heat 4

Supply calculation:

1716 GWh from glazed panels of which at least 93% of the installed panel area are attributed to households

That means 1596 GWh are produced by households.

Consumption calculation:

Households consumed 1287 GWh for water and space heating

Conlcusion:

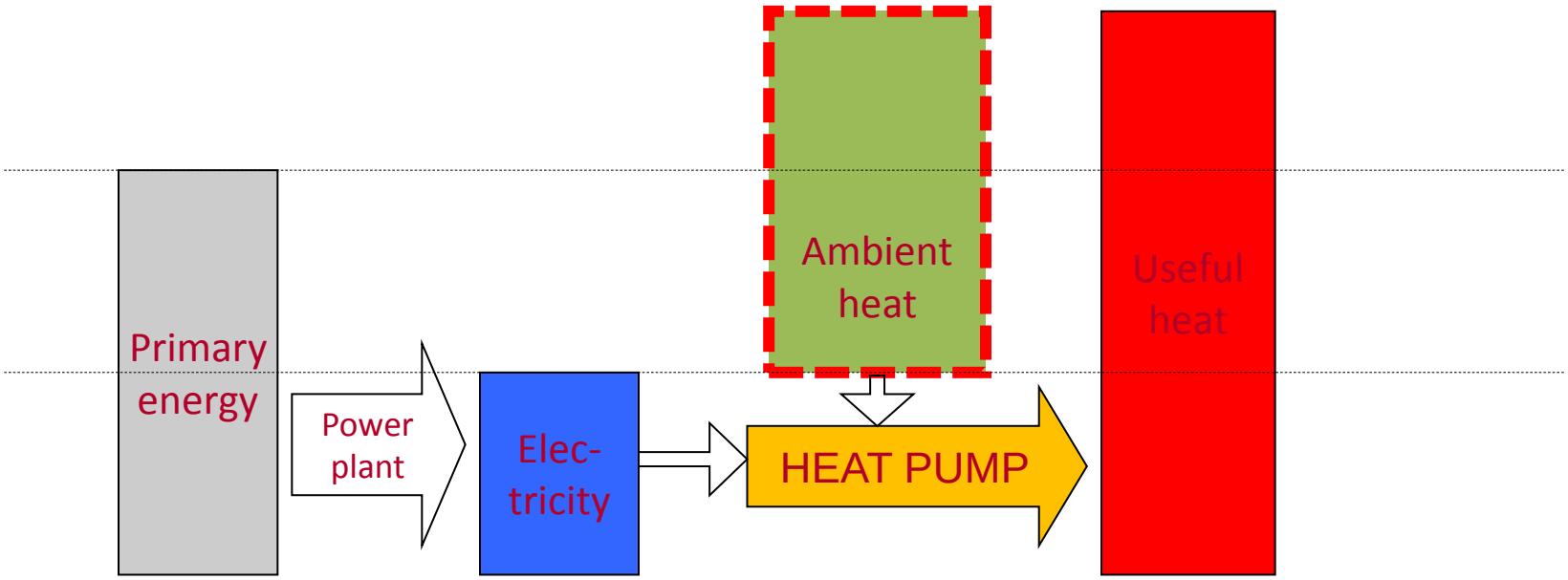
Taking into account the production is measured at the panel exit and given transport losses of 10% (160 GWh) than 91% of the 1436 GWh available are really consumed.

Guidelines for calculating renewable energy from heat pumps

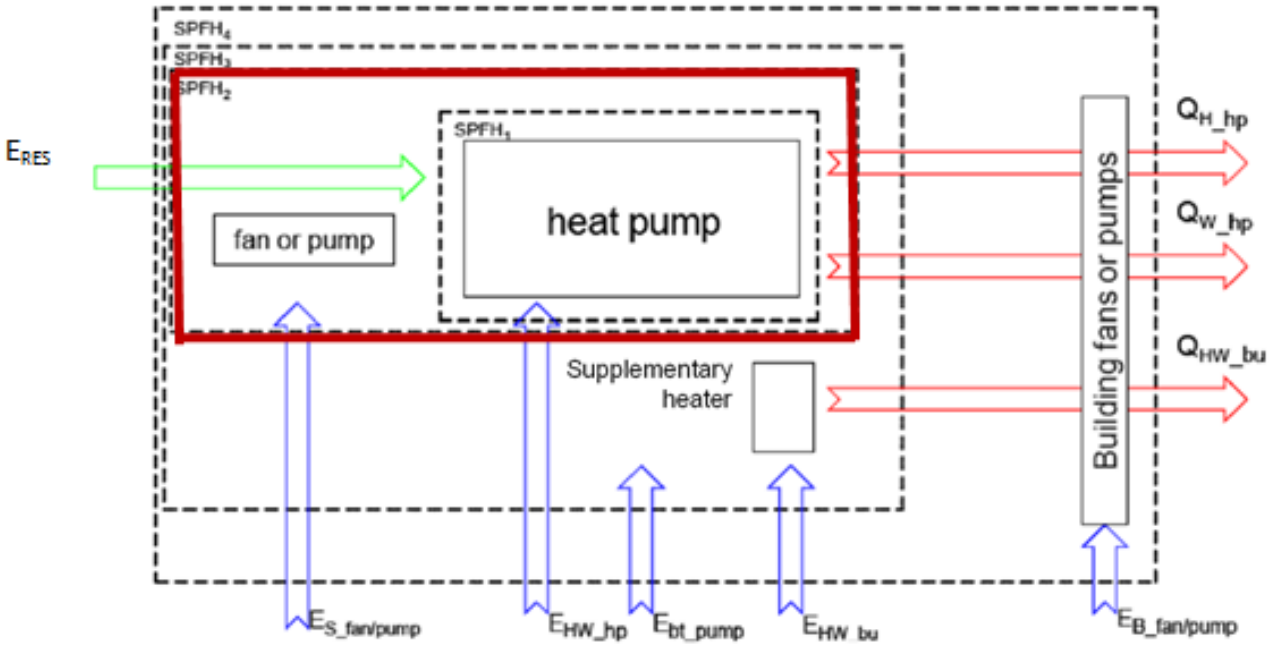
- Reference to the Commission Decision: C(2013) 1082 final
- http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:062:0027:0035:EN:PDF

Electrically driven Heat pumps – what counts as RES?

NOTE: The Energy powering the heat pumps (electricity, thermal) is not to be included



System boundaries



- Fans and pumps included, but NO supplementary heater

Solid Biofuels (not standardised)

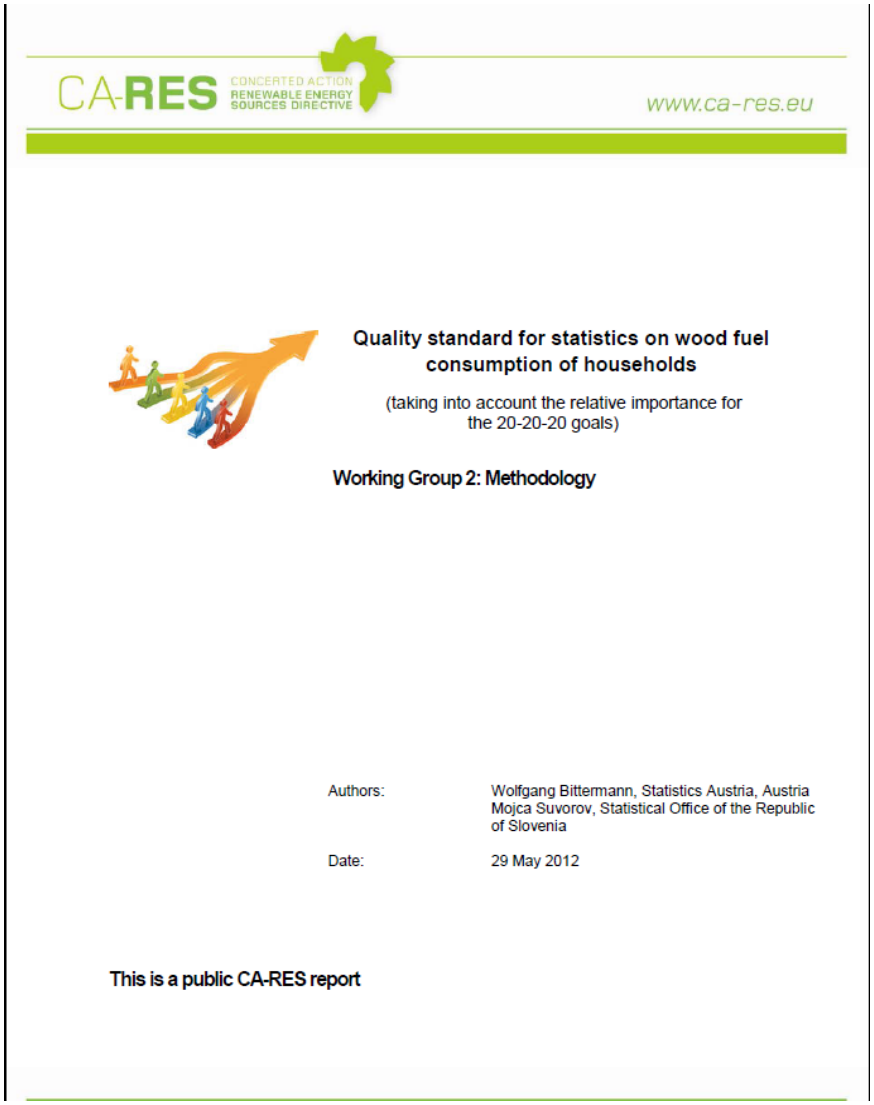
General data problems….

- No specific surveys exist for biofuel supply like they normally do for fossil fuels (oil, gas, coal).
- Production data as well as foreign trade data for biofuels are fragmentarily, missing or are not differentiated into products for energy and non energy use.
- No exact information on non energy use of wood products e.g. for the manufacture of plywood, laminboard, particle board, fiber board and other boards and panels
- No satisfying stock information exists

..and a lot of biomass specific problems

1. Diversity of fuels
2. Inhomogeneous fuels
3. Diversity of units (m^3 [scu], m^3 [bv], t)
4. Conversion factors
5. Wide range of water content – calorific values
6. Unclear boundaries between biofuels and (non renewable/hazardous) wastes

..but there is some assistance!



CA-RES CONCERTED ACTION RENEWABLE ENERGY SOURCES DIRECTIVE www.ca-res.eu

Quality standard for statistics on wood fuel consumption of households

(taking into account the relative importance for the 20-20-20 goals)

Working Group 2: Methodology

Authors: Wolfgang Bittermann, Statistics Austria, Austria
Mojca Suvorov, Statistical Office of the Republic of Slovenia

Date: 29 May 2012

This is a public CA-RES report

..like definitions....

Demolition wood (in energy statistics normally counted as recovered wood): used wood arising from demolition of buildings (roofs and floors, etc.) or civil engineering installations (EN 14588:2010).

Firewood: spitted wood pieces from whole trees without roots or chemically untreated wood residues, either deciduous (hard) or coniferous (soft) wood with different length, depending on the type of firewood burning appliance (1 m, 50 cm, 33 cm, 25 cm).

Non-standardized wood fuels: segregated wood fuels from gardens, parks, roadside maintenance, vineyards, fruit orchards, hedges, used wood and demolition wood, etc.

Standardized wood fuels: wood pellets (EN 14961-2:2011), wood briquettes (EN 14961-3:2011), wood chips (EN 14961-4:2011), firewood (EN 14961-5:2011), all for non-industrial use, e.g. in households and small commercial and public sector buildings.

Used wood (in energy statistics normally counted as recovered wood): mechanically treated wood from wooden packaging like pallets, etc.

Wood fuels: includes all fuels consisting of wood matter.

Wood residues: by-products and residues from the wood processing industry, also compressed to pellets, briquettes, logs, etc., with the exception of sawdust, which is mainly used for wood pellets.

.. average conversion factors, and….

Assortment	Water content (%)	bulk volume m³	stere (30 cm pieces)	stere (1 m pieces)	scm	t-air dry matter	t-abs. dry matter	CV (MWh)	CV (GJ)	by
Hardwood mixture (Deciduous wood)	20%	1.000	0.588	0.714	0.500	0.365	0.292	1.410	5.078	m³ bulk volume
		1.700	1.000	1.214	0.850	0.621	0.497	2.400	8.639	stere (25-30 cm)
		1.400	0.824	1.000	0.700	0.511	0.409	1.975	7.109	stere (1m)
		2.000	1.176	1.429	1.000	0.730	0.584	2.821	10.155	scm
		2.740	1.610	1.957	1.370	1.000	0.800	3.864	13.911	t-air dry
		3.425	2.012	2.445	1.712	1.250	1.000	5.000	18.000	t-abs. dry
		0.685	0.402	0.489	0.342	0.250	0.200	1.000	3.600	MWh
		0.190	0.112	0.136	0.095	0.069	0.056	0.278	1.000	GJ
Softwood mixture (Coniferous wood)	20%	1.000	0.588	0.714	0.500	0.250	0.200	1.022	3.678	m³ bulk volume
		1.700	1.000	1.214	0.850	0.425	0.340	1.737	6.252	stere (25-30 cm)
		1.400	0.824	1.000	0.700	0.350	0.280	1.430	5.149	stere (1m)
		2.000	1.176	1.429	1.000	0.500	0.400	2.043	7.356	scm
		4.000	2.353	2.857	2.000	1.000	0.800	4.086	14.711	t-air dry
		5.000	2.941	3.571	2.500	1.250	1.000	5.278	19.000	t-abs. dry
		0.947	0.557	0.677	0.474	0.237	0.189	1.000	3.600	MWh
		0.263	0.155	0.188	0.132	0.066	0.053	0.278	1.000	GJ

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.. specification of minimum requirements

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5. Specification of level specific minimum requirements

5.1 Level 1

Survey frequency

Every 2 years.

Sample size

It should be determined by the methodology department of the National Statistical Institutions to meet the statistical requirements for the appropriate statistical error. A stratified sampling plan could improve the representativeness of the sample and the quality of the results.

E.g. Austria: total number of private households: 3.6 million; sub-sample size for the 'Labour Force Survey' (LFS): 22 500; desired sample size for the survey "Energy consumption of households": about 40% of the LFS sub-sample: ~9 000.

E.g. Slovenia: total number of population 2 million; sample size: 6 000 households. The sampling plan is stratified by location of the building (rural/urban), by the main heating system in the building, age of the building and the number of dwellings in the building.

Alternatively, an adequate panel could be established.

Conclusions

- Renewables are a tricky field, because their consumption often is not metered and produce no expenditures.
- In case of biomass the fuels often are very inhomogeneous and due to the high variety of units used difficult to record correctly.
- Therefore a comprehensive data validation as well as a comprehensive documentation is extremely important.

A negative example at the end

SCM	Con. Fact. 1	t	Con. Fact. 2	SCM	Difference	
12.785.000	0,641	8.195.185	0,730	11.226.281	-1.558.719	-12,2%
12.785.000	0,641	8.195.185	0,530	15.462.613	2.677.613	20,9%
12.785.000	0,641	8.195.185	0,6414	12.777.027	-7.973	-0,1%

0,641(4) soft/hard wood mixture 35% moisture

0,730 hard wood 20% moisture

0,530 soft/hard wood mixture 20% moisture

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Thank you for your attention