STATISTICS AUSTRIA
The Information Manager

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Model based calculation of Renewable Energy Sources

Solar heat and Biofuels

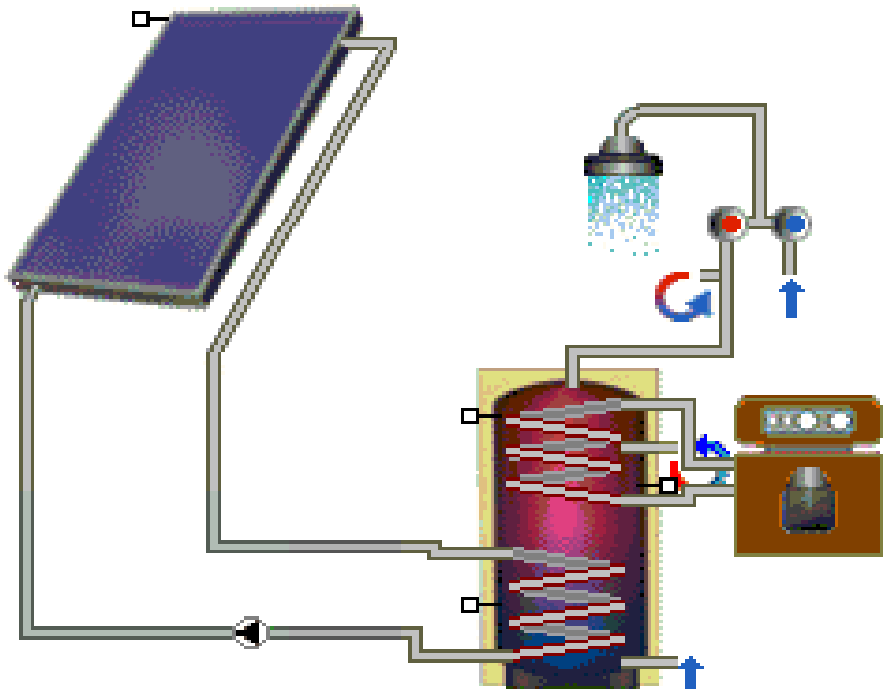
Content

- Modelling: Strengths and weaknesses
- Solar heat
  - Modelling of Supply
  - Modelling of Consumption
- Non Standardized Solid Biofuels
  - Fuel wood specific problems and potential solutions

Modelling: Strengths and Weaknesses

Advantages	Disadvantages
• Save resources (money and staff) • Reduce respondents burden • Quick results • Can be used to adapt or improve survey results • Can be used to reduce survey frequency • **Can be used to estimate information that can't be metered or surveyed directly**	• Worse data quality compared to surveys • No Stand alone methodology -cannot be calculated without input data

Solar Heat



IEA/ESTIF (European Solar Thermal Industry Federation) method for calculating SH supply

- Simple to calculate
- Takes into account all systems relevant, for the time being
- Only sales data needed for solar panels needed
- Follows the IRES/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

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

Pnom : Nominal thermal power output of collector in kW

Calculation example Austria 1

Solar heat supply (IEA/ESTIF methodology):

1. Annual survey on panels installed
2. Model 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

Calculation example Austria 2

Solar heat consumption in private households:

1. Biannual survey on household energy consumption:
    1. Solar heat for hot water only (DHW)
    2. Solar heat for hot water and space heating (combi)
2. Model 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

CALCULATION EXAMPLE AUSTRIA 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

The results for 2010

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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.

Biofuels

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

Biofuels non standardised

General data problems….

- No specific surveys exist for non standardized biofuel supply like they normally do for fossil fuels.
- Production data as well as foreign trade data for such biofuels are fragmentarily, missing or are not differentiated into products for energy and non energy use.
- No satisfying stock information exists
- 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

Fuelwood

Data problems…..

- Production data as well as trade data are fragmentarily or missing
- No satisfying stock information exists

That results in consumption only based fuel wood implementation into the Austrian energy balances. Domestic production is calculated from consumption and foreign trade information.

Fuelwood

..and a lot of fuelwood specific problems..

1. Diversity of wood
2. Inhomogeneous
3. Diversity of units (m^3 [scu], m^3 [bv], sm^3, t)
4. Conversion factors
5. Wide range of water content – calorific values
6. Unclear boundaries between fuelwood and hazardous waste (=chemically treated wood e.g. wooden sleepers)

Fuelwood

…creates (potentially) some more problems!

- Questionnaires filled in by forest statisticians and energy statisticians - even with theoretically the same figures – (most probably) look completely different
- Using different conversion factors or even a different number of decimal places give totally different amounts

An example for the dilemma

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
12 785 000	0.641	8 195 185	0.530	15 462 613	2 677 613
12 785 000	0.641	8 195 185	0.6414	12 777 027	-7 973

0.641(4)…factor actually used in energy statistcs (50% hw 50% sw)

0.730 …….factor for hard wood (hw)

0.530……..factor for soft wood (sw)

The (simple?) way out

- A joint working party on conversion factors with experts from
  - Forestry
  - University
  - Panel industry
  - Paper industry
  - Energy Agency
  - Environmental statistics
  - Energy statistics

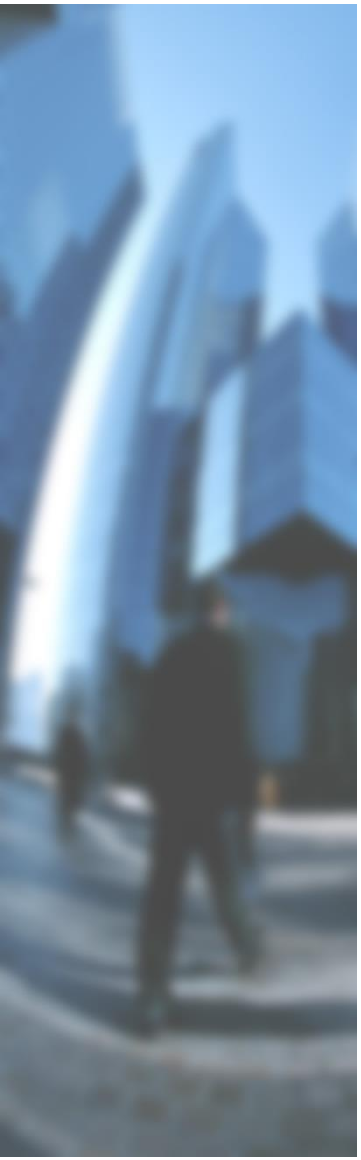
  to identify default CFs to be used for statistical calculations

- A detailed table including conversion factors for the main ranges of wood and primary wood based fuels

The solutions part 1 – default CF for statistical purposes

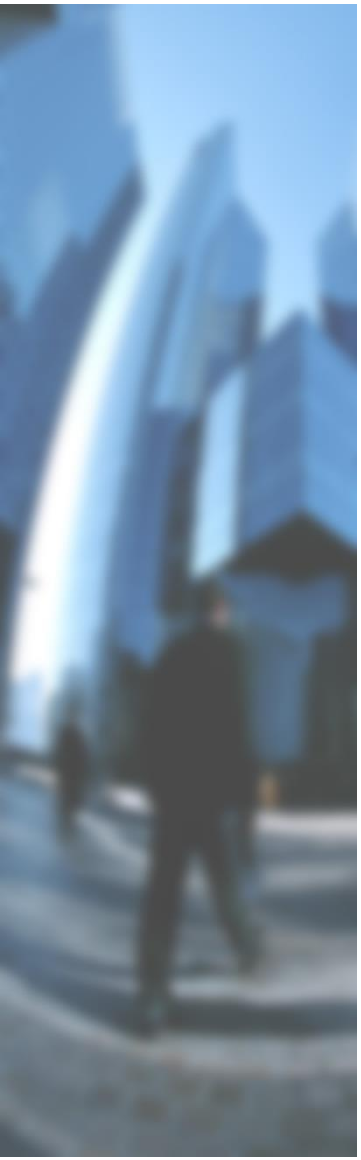
Product line	Water-content %	m³ fill volume	stere	scm	t-air dry matter	t-abs. dry matter	CV (GJ)	CV (MWh)	by
Chippings G30 (SW & HW mixture)	35	**1,000**	-	0,400	0,256	0,167	**2,921**	0,811	m³ fill volume
		2,500	-	**1,000**	0,641	0,417	**7,302**	2,028	scm
		3,906	-	1,560	**1,000**	0,650	**11,393**	3,165	t-air dry
Chippings G50 (SW & HW mixture)	35	**1,000**	-	0,330	0,211	0,137	**2,410**	0,669	m³ fill volume
		3,030	-	**1,000**	0,641	0,417	**7,302**	2,028	scm
			-		**1,000**	0,650	**11,393**	3,165	t-air dry
Bark (SW)	50	**1,000**	-	0,300	0,250	0,125	**2,073**	0,576	m³ fill volume
		3,333	-	**1,000**	0,835	0,417	**6,909**	1,919	scm
		-	-	-	**1,000**	0,500	**8,276**	2,299	t-air dry
Wood pellets	8	-	-	-	**1,000**	0,920	**17,284**	4,801	t-lutro
Wood briquetts	10	-	-	-	**1,000**	0,900	**16,855**	4,682	t-lutro
Fuel wood (hardwood, split logs 25 - 33 cm)	20	**1,000**	-	0,500	0,365	0,292	**5,079**	1,411	m³ fill volume
		-	**1,000**	0,850	0,621	0,497	**8,634**	2,398	Stere
		-	-	**1,000**	0,730	0,584	**10,158**	2,822	scm
		-	-	-	**1,000**	0,800	**13,911**	3,864	t-air dry
Fuel wood (SW & HW Mixture, split logs 1 m)	20	-	**1,000**	0,700	0,371	0,297	**5,414**	1,504	m³ fill volume
		-	-	**1,000**	0,530	0,424	**7,735**	2,149	scm
		-	-		**1,000**	0,800	**14,587**	4,052	t-air dry
SCM-equivalent (SW & Hw mixture)	35	-	-	**1,000**	0,641	0,417	**7,302**	2,028	scm

The conclusions

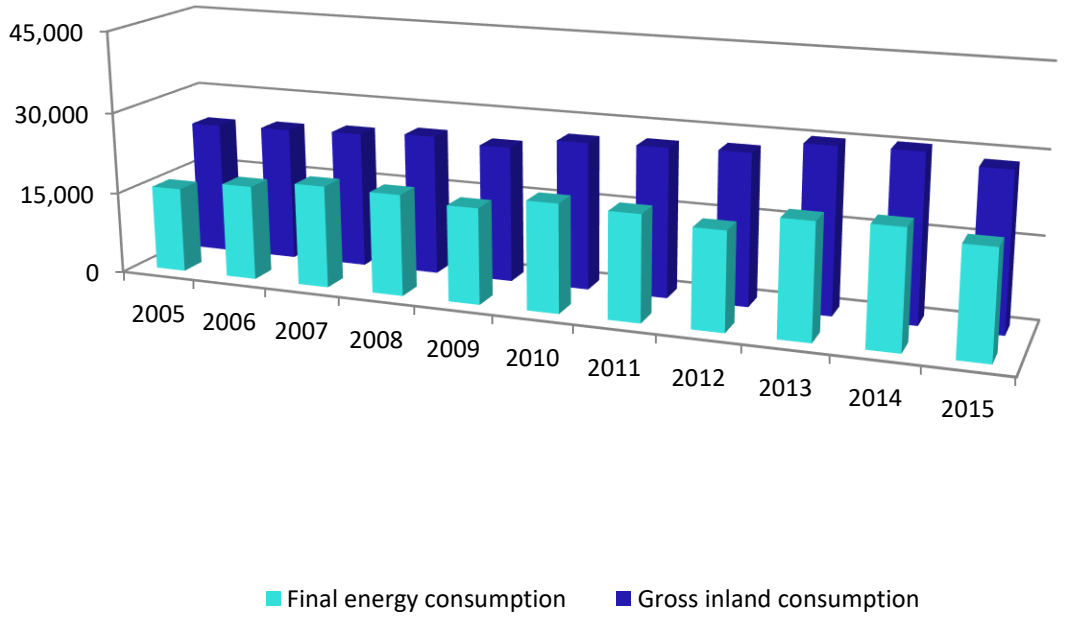


- Fuelwood statistics base mainly on consumption data and model based calculations.
- Because wood often is not purchased, data quality is not the best and it is impossible to adjust the data with monetary information.
- Therefore these data are of less quality than information about fossil fuels which base on supply and consumption data as well as on physical and monetary information.

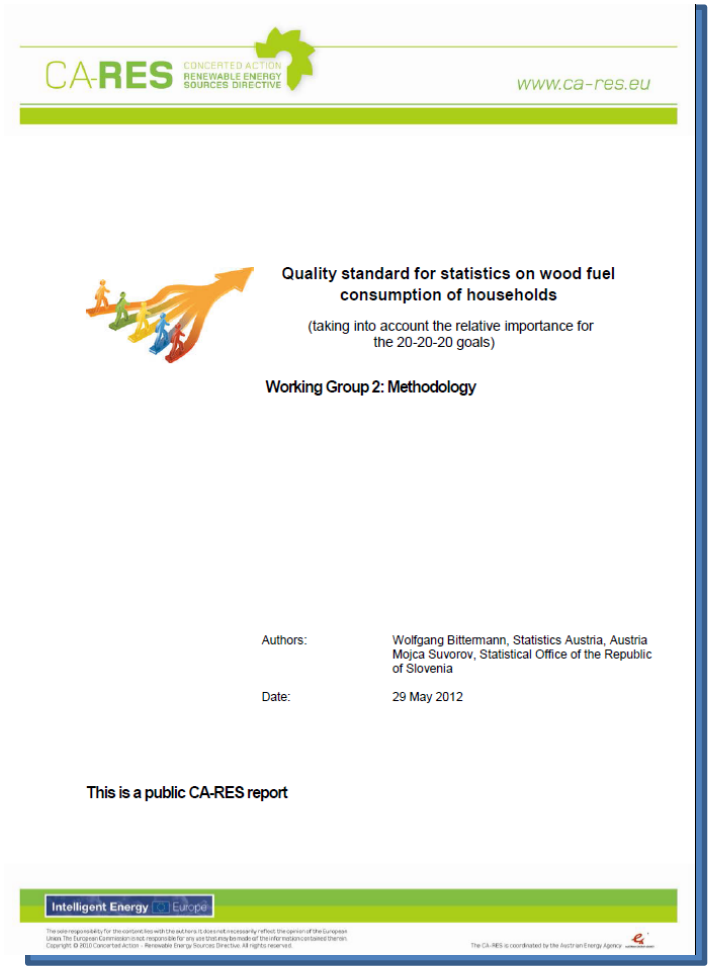
The conclusions

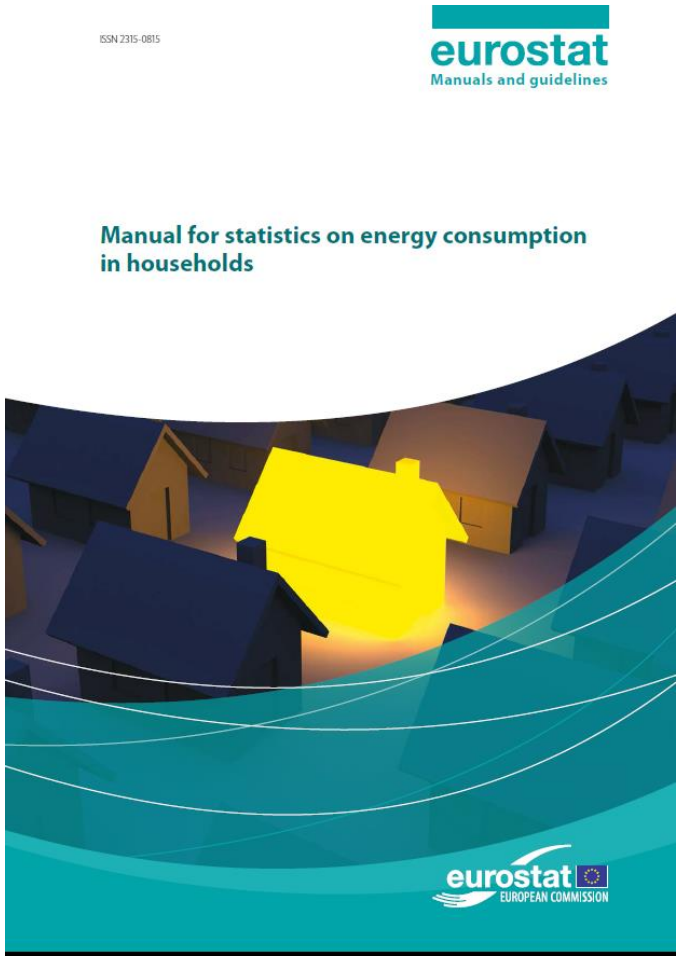


- But on the other hand the consistency of time series based on surveys tells us that these statistics give good information on the development although the absolute amount cannot be verified in all cases.



For more information.....





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Thank you for your attention