Potential of Renewable Energy Sources

Schinko Thomas **KF University Graz**

Pacovsky Libor **UJEP**

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1 Introduction

In the contemporary period an accurate energy policy belongs to the most important things a country should think about, especially the question of a well-balanced energy mix and enhanced share of RES. The importance confirms the level of regulation on EU level. Authors consider that is very important to mention the most important fact influencing energy policy. It is a demonstration of the contemporary political attitudes in the different areas.

On the last summit of European Council 8-9.3 2007 the main topics were Global climate change and the EU RES politics. The participants of the summit agreed on a commitment to a compulsory share of at least 10 % bio-fuels on the whole fuel consumption in the transport sector and the commitment to a 20 % share of RES in the total energy consumption for the whole EU until 2020. This target also follows the target to decrease the energy dependency on Russia and the Middle East. The compulsory target takes into account the different initial conditions of the particular member countries and that the members still can decide how to fulfil the target. The proposal from Czech Republic and France during the conference was to include nuclear energy into the definition of RES. This is probably one of the main gaps between Czech and Austrian energy policies. Austria does not consider nuclear energy as a sustainable potential RES, while on the contrary the Czech attitude is to define nuclear poer as a renewable energy source. This proposal was completely rejected by all other participating countries in the summit, but EU concurred that nuclear energy can contribute to a reduction of green house gas emission and the security of energy supply. Of course, on the first place stays the nuclear security.

In fact, the approaches to the development of RES in the EU member countries are very different, and Czech and Austrian politics contrast in many different ways, not only due to their attitudes on nuclear energy. These countries differ greatly in the case of the utilisation of RES, what should be carefully explored within this work. The target of the work is to give an overview of the state-of-the-art RES use and to explore the potential of RES, mainly in electricity generation, for both countries. On the basis of the results which will be provided in two parts for Austria as well as for CR and the final conclusions to the partial analysis, the reader will be able to understand the different approaches in the two examples and the fact that with the further integration of RES in the energy mix, neither of the two countries will be able to reach overall security of supply.

Part A: Austria

2 Primary Energy Consumption in Austria

The primary energy consumption in Austria has risen steadily over last few decades. The gross domestic primary energy consumption has grown for about 75% during 1970 until 2004 and amounted to 1.395 PJ in 2004. The consumption of every energy source, with the exception of coal, has risen in this period, as Table 2.1 provides.

Table 2.1 Change in gross domestic energy consumption in % from 1970 till 2004; Source: Austrian Energy Agency 2005

	1970–2004 in %
Öl	53,68
Gas	209,83
Kohle	-17,53
Erneuerbare	142,25
Bruttoinlandsverbrauch	75,01

It is likely that this trend will continue in the next few years.

3 Final energy consumption in Austria

Energy consumption in Austria in 2005 saw a further increase compared to 2002. The increase in primary energy consumption during this period was approximately 9.8%. The main causes are the sectors mobility, households and industries, which account for 86% of the total energy consumption in Austria. The total final energy consumption in in Austria accounted for 1105,2 PJ in 2005 (Bundesministerium für Wirtschaft und Arbeit, 2005).
In Figure 1 you can see the share of the total final energy consumption in Austria for the year 2005.

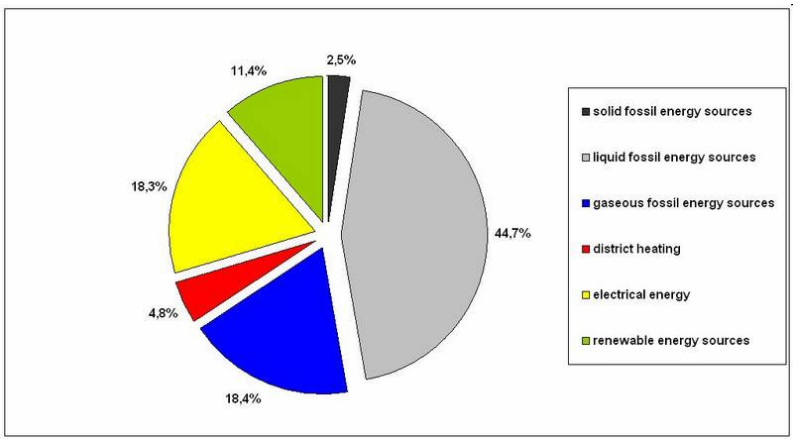


Figure 1 Total final energy consumption in Austria 2005; Source: Umweltbundesamt

Fossil energy sources contributed about 79% of total final energy consumption in 2005. The majority of fossil energy sources were oil products (about 45%) such as heating oil, diesel, gasoline etc. Natural gas (18%) and coal (2%) together contributed about 21% of primary energy consumption. Renewable energy sources contributed about 307.513 TJ (21%) of total final energy consumption in 2005.

4 Renewables in Austria

The share of renewable energy sources in the total energy system has been rising since the mid 70ies and amounted to 22.8 percent of total energy supply in 2003. In fact, the utilization of hydro power varies with the season, but anyways the share of renewable energy sources on

gross domestic energy consumption hasn't fallen under 20 % since beginning of the 80's (Figure 2).

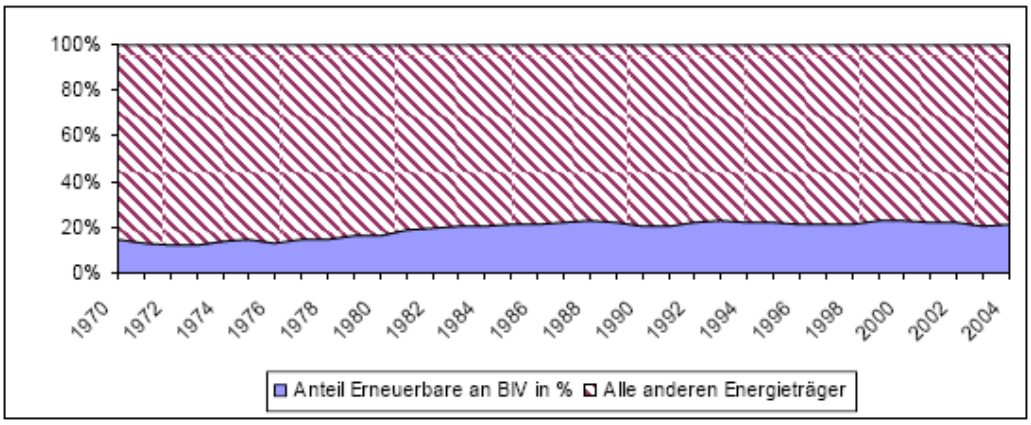


Figure 2 Share of renewables on gross domestic energy consumption, 1970 - 2004; Source: Austrian Energy Agency 2006

Even if the share of renewables has risen over the last decades, there have emerged quite dramatically changes in the mix of renewables. As Figure 3 shows, the share of hydro power has fallen from 63,17 % in 1974 to 43,70 % in 2004. This is based on the fact that the hydro power is almost fully developed in Austria and that therefore no new big hydro power station has been built in Austria since a very long time. So as the amount of energy production through hydropower remains stable but the total energy consumption rises steadily in Austria, the share of hydropower is likely to decrease. This lower share of hydropower is counterbalanced by a rise of other renewable energy sources like biogenic fuels, combustible waste, Heat Pumps, Firewood, windpower and photovoltaics.

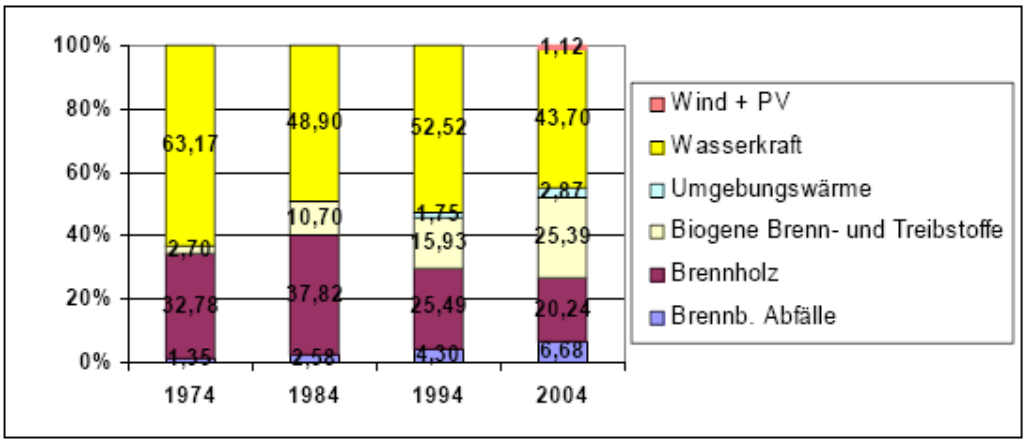


Figure 3 Gross domestic energy consumption - renewables mix 1974 – 2004 in %; Source: Austrian Energy Agency 2006

5 Electricity from renewables

5.1 Hydropower

Hydrowpower is Austria's major electricity source. Of the approx. 18,9 GW bottleneck capacity installed in electricity supply enterprises, about 11.7 GW were accounted for by hydropower plants. Some 5.3 GW thereof came from run-of river power stations and the remaining 6.4 GW from storage power stations (E-Control, 2006). Hydropower covered in

2005 altogether about 60% of electricity generation in Austria which amounted to 66.359 GWh in 2005 (E-Control, 2006), its share in the total gross energy consumption amounts to about 9,4 % in 2005 (Bundesministerium für Wirtschaft und Arbeit, 2006). In addition to a great number of run-of-river power stations the most important of which are situated on the Danube, numerous storage power stations were constructed in the western alpine regions, primarily covering peak loads and the demand for electricity during the winter months. During the summer months the entire demand could theoretically be covered by hydropower stations, in practice, however, peaks generated in storage power stations are partly exported and base loads partly covered by thermal power stations. Figure 4 provides detailed information on the share of hydropower in the Austrian power supply. The shares of hydro power generation range between 58,6 % and 74,5 % for the provided time period.

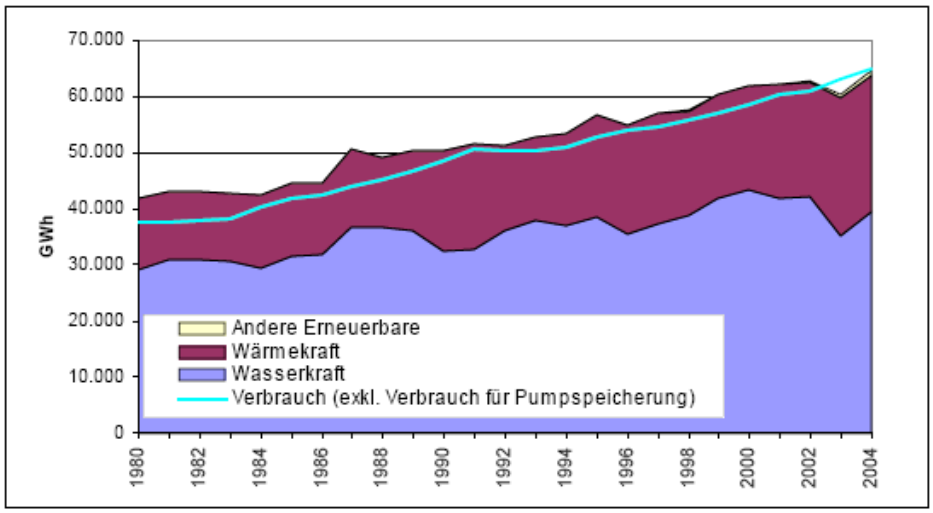


Figure 4 Austrian demand and supply of electric power 1980-2004 in GWh; Source: Austrian Energy Agency 2006

5.2 Other Green electricity[1]

On the basis of the 2002 Eco-Power Act a federally uniform purchasing and payment obligation for "eco-electricity plants" (plants run on solar energy, wind, biomass, biogas, landfill gas, sewage gas, or geothermal energy, and certain kinds of waste, but excluding big hydropower) had been introduced. By 2008 a share of 4 % – assessed in relation to the total supply of electricity to the end consumer – must gradually have been reached with these energy sources. The Eco-Power Act simultaneously aims at reaching the target value of 78.1 % electricity from renewable energy sources (including big hydro power) in the total of Austria's gross electricity consumption by 2010.
Because of this eco-power act there has emerged a significant growth of eco power plants. In 2005 there have been fed into the grid 5.759 GWh electric power in terms of the eco power act. This accounted for a rise of eco power of about 45% in contrast to the year 2003. Figure 5 provides data, that during this period not only the total amount of eco power has risen, but also the mix of eco power (excluding big hydro power) has changed.

[1] Energy Agency (2006)

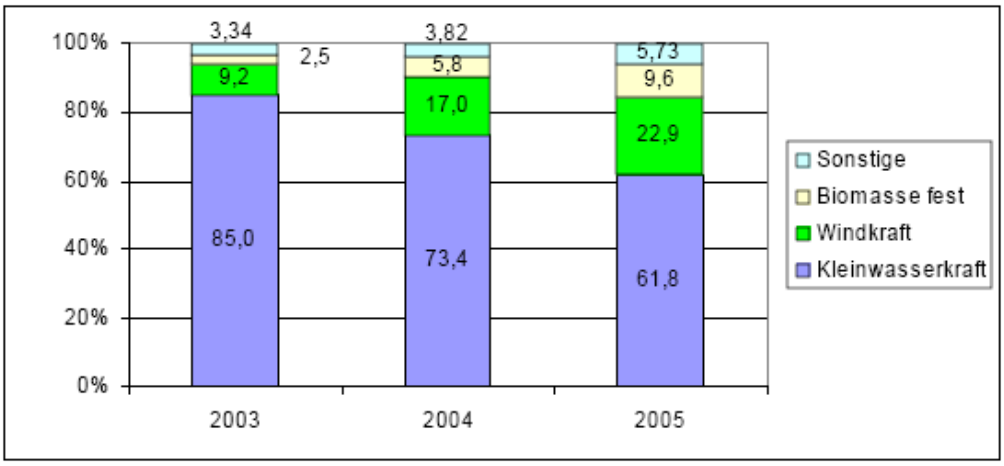


Figure 5 Distribution of feeding volume 2003-2005; Source: Energy Agency (2006)

While the share of small hydro power has fallen over this period, the shares of other eco power sources have grown, especially those of wind power and solid biomass. In the following it will be given an overview of the different eco power sources available in Austria. It should be mentioned that the number of plants in terms of the eco power act is exceeded by the real amount of acknowledged eco-power plants, but the approved plants only represent a trend, because not all of them are already operating or feeding into the grid, while the plants according to the eco-power act are already fully operating.

5.2.1 Small-scale hydro power

A power station is referred to as small-scale if its bottleneck capacity amounts up to 10 MW. Altogether 1.689 hydropower stations feeding the network of the primary supply enterprises were statistically recorded in 2005, representing a bottleneck capacity of 1.146 MW and a gross electricity generation of 3.561 GWh. A promotion system for electricity from smallscale hydropower plants was adopted in 2002 on the basis of the Eco-Power Act in the form of purchasing and payment obligations with a view to having the share in the total energy generation raised to 9 % by 2008 and ensuring a significant contribution towards reaching the target value of 78.1 % as stipulated in the EU-Directive on renewable energy sources.

5.2.2 Solid Biomass

In 2005 there existed 68 plants in terms of the eco power act, representing a bottleneck capacity of 126 MW and and a feeding volume of 544 GWh in that year. The amount of approved plants is 164 with a bottleneck capacity 398 MW, but like mentioned earlier not all of them are operating or feeding into the grid.

5.2.3 Biogas

In terms of the eco power act there existed 231 Biogas power plants in Austria by the end of 2005. Altogether these plants amounted for a bottleneck capacity of 50,68 MW and a feeding volume of 217,14 GWh in 2005.

5.2.4 Landfill Gas & Sewage Gas

From the eco power plants which run with landfill gas or sewage gas, 46 plants had a contractual relationship to the Öko-BGV with a bottleneck capacity of 21 MW and an electric power output of 66 GWh in 2005.

5.2.5 Windpower

Although Austria is a landlocked country with a distinguished hilly topography, meteorological preconditions permit the utilisation of wind energy. From the potential of wind energy in Austria only a small, but steadily rising amount is utilized, this is partly due to the light of landscape protection concerns and environmental aspects. Since the construction of the first windmills in Austria in 1990, the wind power sector in Austria developed very dynamically, as Figure 6 provides. In 2006 the total capacity of wind energy in Austria amounted to 965 MW, which rests on 607 aggregates. The build up of windmills in 2006 accounted for 146 MW and the feeding volumes in 2006 add up to 1738 GWh. Therefore wind power is Austria's third biggest renewable energy source behind big and small scale hydro power.

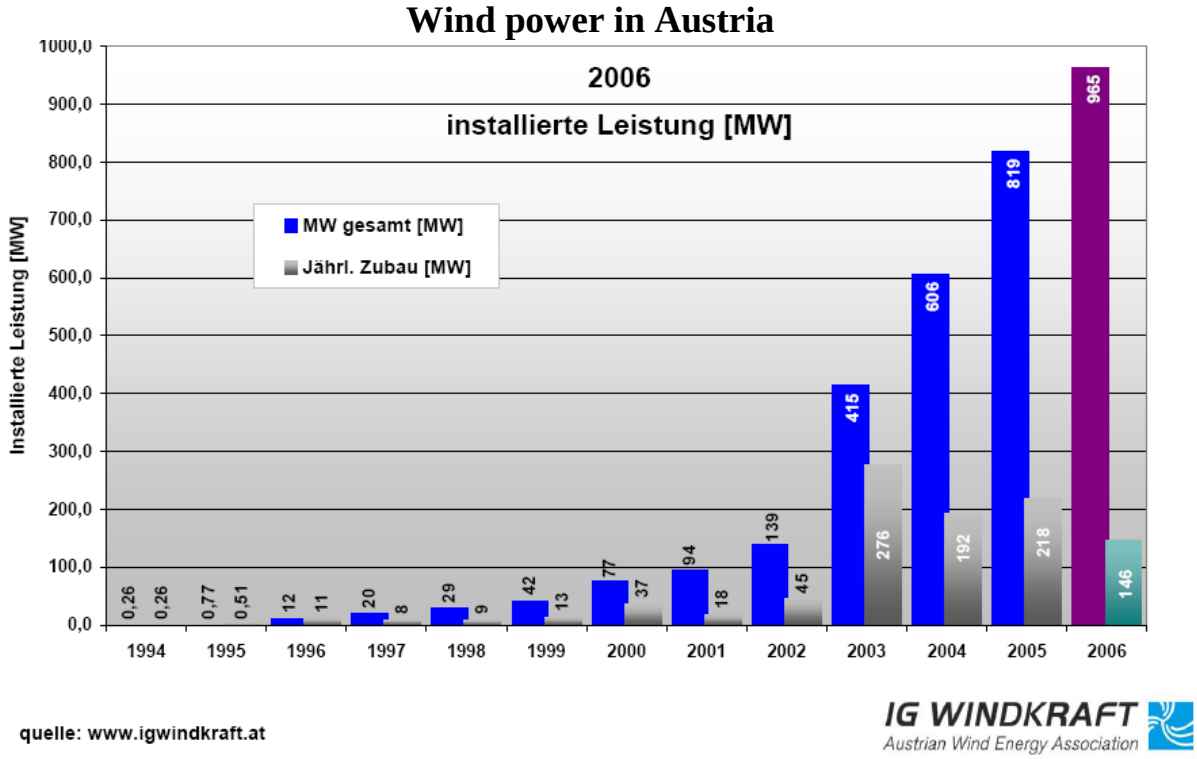
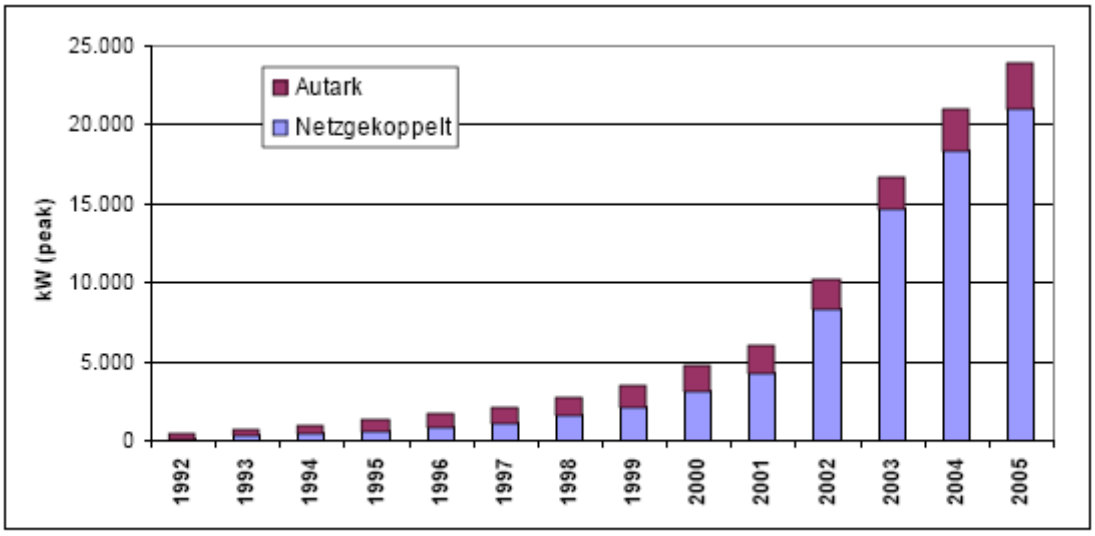


Figure 6 Wind power in Austria - Installed Capacity and new capacity, 1994 - 2006

5.2.6 Photovoltaics

As previously shown in the case of wind power, also the photovoltaics sector underlies a very dynamically development. This fact is shown in Figure 7. The picture divides the whole stock of photovoltaic panels in two categories: the bigger share belongs to the panels which are integrated into the grid, while the smaller amount of the bar are the photovoltaic cells which operate autarkic. According to e-control the installed capacity of photovoltaics in Austria amounted for 15 MW in 2005, with a feeding volume of 13 GWh.



Quelle: Fanninger Gerhard, IFF-Universität Klagenfurt

Figure 7 Installed capacity of the photovoltaics sector, 1992 – 2005

5.2.7 Power from CHP

As regards attaining the Austrian target values for eco-power significant importance is accorded to the expansion of medium and large biomass CHP-plants. Most recent investigations of the most promising generation potentials show that in addition to the present production capacities the generation of

• 500 GWh each in the wood working and the paper industries,
• 150 GWh in the chemical industry, and
• 50 to max. 100 GWh in other branches or by converting biomass heating plants to CHP-operation

During the last few years the importance of biomass CHP plants in the production of electric power has risen, besides a few ups and downs. Altogether the share of renewables on total power from CHP plants adds up to 13,9 % in 2004, as provided in Figure 8.

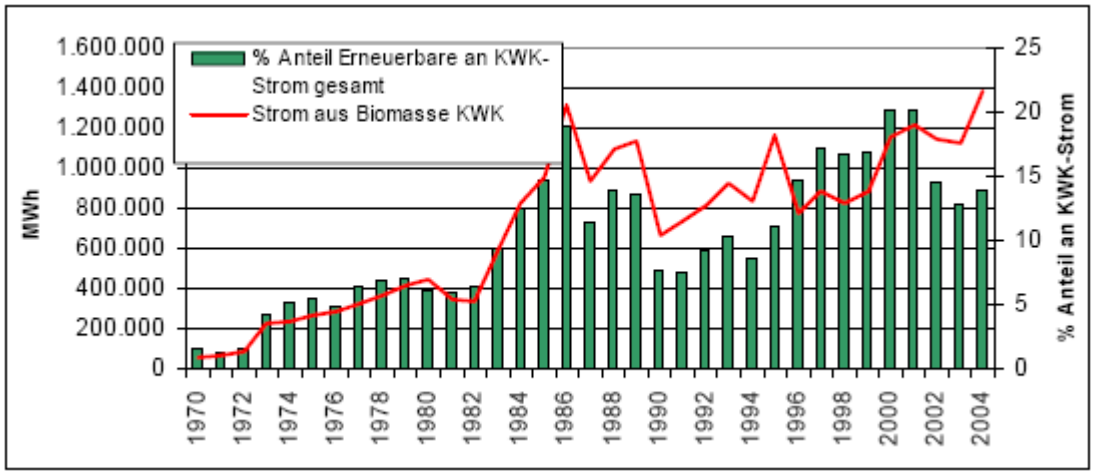


Figure 8 Electric power from biomass CHP, % renewables in CHP sector; Source: Energy Agency 2006

6 Potentials of renewables

According to a research of the Austrian Institute of Economic Research, WIFO (WIFO, 2005), the total final energy consumption will go up to 1,1 % /p.a. in the period from 2005 and 2020. The final electricity consumption in Austria will even rise for more then 2%/p.a. in the same period.
So the total final energy consumption will go up from 1.080 PJ in 2004 to 1.350 PJ in 2020. Even if this calculation underlies an “efficiency – scenario” the total final energy consumption will rise to at least 1.250 PJ. So efficiency activities may reduce the growth in final energy consumption in Austria, until 2020, for about 100 PJ.

It is worth mentioning that the potentials of renewables are often estimated very differently, depending on the sources, but the Austrian electricity regulatory authority (e-control, 2006), derived credible estimates by looking at many different sources. The findings predict additional 68 PJ from renewables to total final energy demand in Austria. As Figure 9 points out, these additional 68 PJ would only satisfy a small part of the rising final energy consumption, even concentrating on the efficiency scenario developed by the WIFO. The first bar (from left) depicts the total primary energy consumption in 2004 for Austria. The second bar gives information about final energy consumption in 2004, while the 3rd bar refers to Austria’s final energy consumption in 2020, underlying the WIFO Baseline scenario as upper bound and the efficiency scenario as lower bound. On the rightmost bar, you can read off the fragmentation by which source the additional 68 PJ final energy out of renewables will be provided.

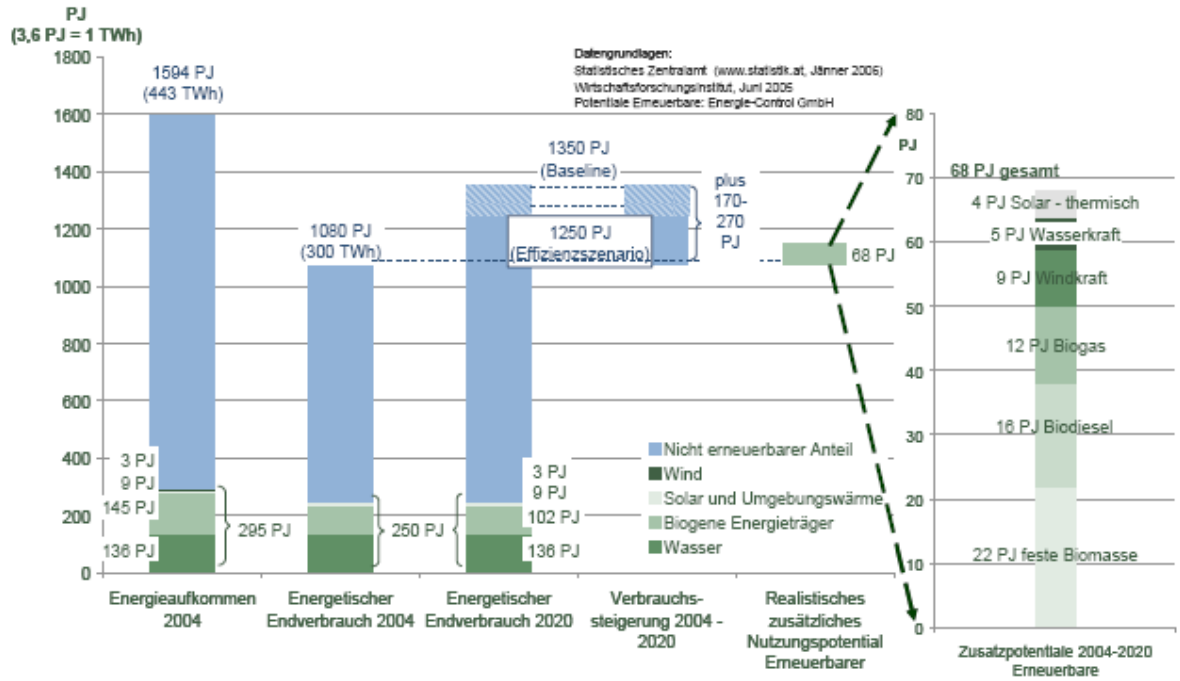


Figure 9 Total primary energy consumption and potentials of renewables; Source: e-control (2006)

6.1 Potentials of renewables in power generation

The data from above leads to an additional electric power production (keeping in mind the transformation losses) of 19 PJ (5,7 TWh) until 2020. The interpretation of Figure 10 follows

the one of Figure 9 in the previous section. The main conclusion of this picture is, that the additional 5,7 TWh ouf green electricity might only satisfy a very small amount of the final energy consumption in 2020, especially with the predicted very high power consumption growth rates.

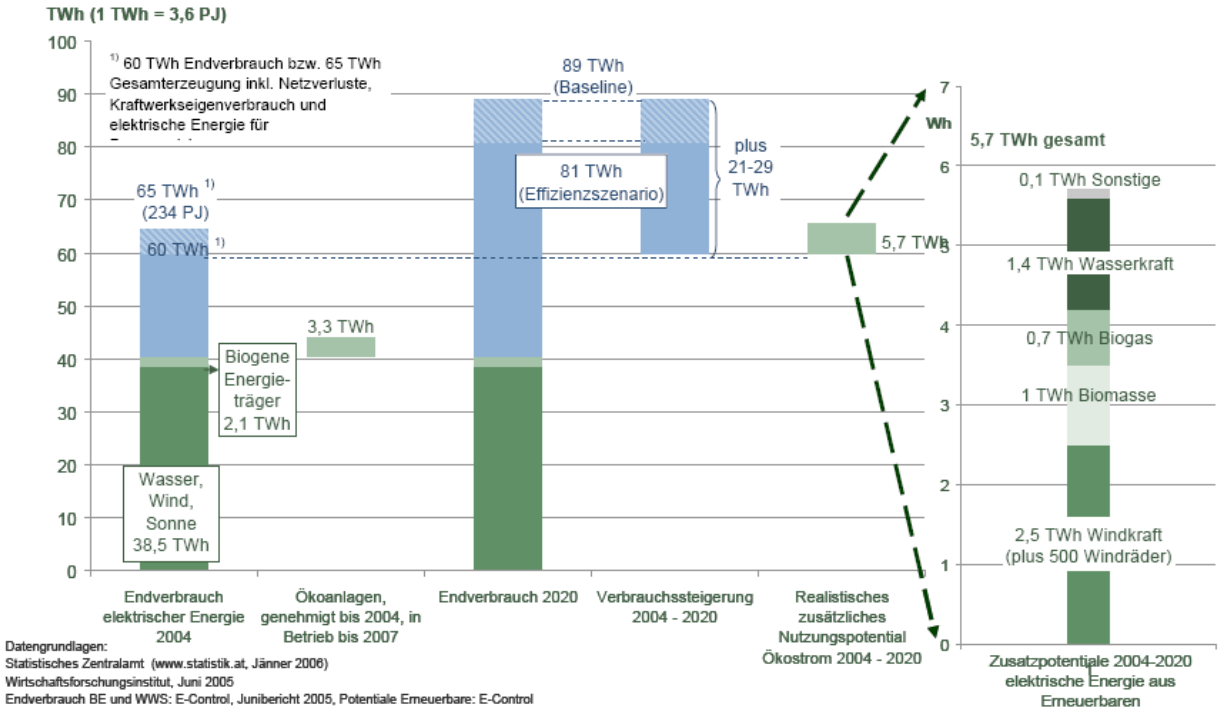


Figure 10 Total final power consumption and potentials; Source: E-Controll 2006

7 Conclusion for Austria

As this paper points out, it won`t be enough to just trust in the future potentials of renewables to guarantee a secure provision of energy for Austria in the future. To release ourselves from the dependency and arbitrariness of the natural gas monopolist Russia and unstable regions like the middle east, there have to be set more radical and concrete actions. The most important challenge in the next few years is going to be the cutting of the total final energy demand in all sectors, because we won`t be able to satisfy the growing energy demand on our owns. This ambitious target might be reached with actions regarding energy efficiency on the supply side (CHP, new technologies) and as well on the consumer side (information campaigns).

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List of figures

Part B: Analysis of RES in Czech Republic

8 Renewables in CR

RES are understood as the instrument to decrease drain of living environment but also RES have increasing role in energy balance. RES have mutual feature „inexhaustibility“. For RES are general considered hydro, wind, and solar energy, energy from biomass, landfill gas and geothermal energy. But dominant role in CR energy system performs PES. In 2005 the share of renewable energy on PES was 4% what is quite low. The national indicative target of electricity generation from RES share is settled up 8 % on gross domestic consumption 2010. This target is settle up by EU via direction 2001/77/EC. It is incomparable number with 78,1 % for Austria. Furthermore in CR the electricity generation share on gross domestic consumption was 4,5 % in 2005. The ratio of electricity generation from RES on the whole gross electricity generation was 3,8 %.

The low share of RES is generally promoted by the cause that CR has quite unfavourable conditions for RES. For example, in comparison with Austria do not so much possibilities in hydro energy production (in 2002 CR only 0,5% opposite Austria 11,3%). Obviously, it is the main reason but not the one. Another reason is quite unilateral orientation on domestic coal utilization which it is coming from past development. The limitation implicates from the fact that coal fired power stations were innovated during the1990s to meet emission limits and smaller fire heating stations were reconstructed for natural gas or partly oil. All of this means the stations are relatively new and investment costs are still not covered. The problem of financial difficulties signifies across the innovations and new projects supporting RES.

The promotion to using RES (but only in electricity generation) is via a system of feed-in tariffs. It is arrange by Law n. 180/2005 Sb. The Energy Regulatory Office defines these tariffs in its Price decision. Details of feed-in tariffs are published on http://www.eru.cz/pdf/cen_roz_aj_2006_8.pdf. Although using these arrangements the barriers of using RES in CR are still promoted by higher producing costs of RES what it is significantly participated on less utilisation of biomass, solar energy etc.

9 Potential RES in Czech Republic

The structure of RES utilisation is presented in annexes. The following part will deal with particular potential RES in CR.

9.1 Hydro energy

It is the source relying on natural conditions. In case of CR the most important role in hydro potential is concerned to smaller streams because for large hydro plants (above 10 MWh) are not favourable conditions. Presented theoretical hydro potential is still 1500 GWh. But it is necessary to say that it is maximum potential of all cover streams which it is involved significantly worse hydrologic conditions. It means very slow economical rate of return. Sometimes the significant role plays ecological aspects. The pragmatic view presents that is only 30 % of potential utilisation of current production left. The current hydro production is

2 380 GWh. This is 76 % share on green electricity. The share on overall RES is 11,5 %. The 60 % of small hydro plants are characterised by old technique with efficiency 15 % lesser than new. This performs certain other potential in hydro energy.

9.2 Wind energy

The utilisation of the source in electricity supplies is on initiative base. But due to meteorically conditions CR is indicated especially in small wind power plants (under 60 kW) as uneconomic. Presently CR has 30 large wind plants about 40 MW installed output (in comparison Austria 819, Germany 18000 plants). The enhanced construction of new plants is begun after 2004 as reaction to increased price 3000CZK/1MWh in 2003. But essential change brings Law n. 180/2005 (9 new plants in 2006). The Law includes the commitment for operator electricity distribution the to connect and buy this energy in preference. Forecast potential of wind energy is targeted on 900 MW which it is obviously divided along localities. The forecast expects 400 MW with production 650 GWh in 2010.

9.3 Biomass

Current biomass production of RES energy creates 66 % but still it is only 1,5% on PES. Experts estimates 40 % biomass share (2200 MWh) on RES in 2010. In CR conditions performs biomass especially wood chips (in processing wood create 50 % waste), energy crops, agriculture residues, industry and communal waste from vegetal origin, products from animal production, disposal bottoms, landfill gas and biogas. According to government provision biomass in CR is divided to three groups waste from industry, waste from agriculture and forestry production and energy crops. Along this diving is set up bonuses for electricity from these sources. In local content the biomass is getting important source for heat generation. The most widespread way of energetic biomass utilisation is burning in kettles producing heat - hot water or stream. But this way does not facilitate full energetic potential of biomass.

Wide utilisation of biomass is presented as the cheapest way and the most promising to increase RES share on electricity generation because potential of other RES is significantly limited. The biomass (energy crops) means new opportunity for agriculture. The potential land reaches almost 1 million ha (0,465 urban land and 0,523 pastures).

The price of biomass differs widely between the regions and localities. Usually the cheapest biomass is from agricultural residues, following by biomass from wood-processing and forestry and with the most expensive biomass from the energy crops. Only in four regions, the energy crops are cheaper than the biomass from forestry.
Presently, also a small part of the forestry biomass is combusted, however still the largest part of the estimated potential is available for additional combustion. The largest potential is available from the energy crops (161PJ), although in most cases for much higher price than the other sources. Therefore it is necessary to take into account agriculture subsidies for RES.

9.4 Liquid oils

Liquid oils are getting very important in fuelling. Liquid oils are produced from biomass. The focus is localized on bio ethanol (produced from sugar cane, corn etc.) and bio petroleum (from rape). The minimal share on member markets is settled up by EU direction n. 2003/30/ES. The reference value of liquid oils content in fuelling is 2 % in 2005. The indicative target is determined to 5,75 % in 2010. According to published data about corn surplus it could be produced 2 millions hl. But the situation in CR is slightly upset because still does not exist huge distillery.

9.5 Photovoltaic energy

This source is the most refined energy and the most provident way of its production to environment. In comparison with other current sources is this type of energy still very expensive due to investment costs. Energetic efficiency of current solar panels is about 14 - 17 %, laboratory samples reach 28 %. The durability is minimal 30 years. The rate of return of investment energy to production solar panel is 5 years. It is influenced by available sun light. In CR, the utilisation of photovoltaic energy is more sporadic. In 2006 it was installed photovoltaic systems in overall output 0,5 MW. The state environment fund of environment supports the program “Sun to schools” - familiarization of young generation with possibility of using solar energy. For proceeding solar energy the government benefits 30 % of investment costs for natural person to output 2 kW and for corporate to 20 kW. Have to be connected electricity to distribution. Also the electricity purchase price is the highest. Experts estimate high development and utilisation of these systems.
Indicative target for CR is 84 MW in 2010 and 541MW in 2020. This target is appeared as very unrealistic (in 2002 was 0,3 MW). The higher potential of utilisation performs family houses. Theoretical potential of overall installed output in inclusion of suitable areas is 24,3 GW.

9.6 Geothermal systems

It is the source usually used for heat energy generation. There is for types of geothermal systems in nature: hydrothermal, HDR - hot dry rock, geothermal and magmatic. Presently, in world it is used for production of electricity mostly the hydrothermal systems. CR does not have very favourable conditions to utilisations it. On some places there are geothermal streams. But the potential of geothermal systems in CR counts with utilisation of HDR. Advantages are promoted by high potential due to possibility of utilisation on many places Earth surface, not dependency on climate and without any negative impact on environment. The first utilisation in CR will be in Litoměřice due to suitable locality between tectonic breaks. The HDR project here has already started. It should produce heat energy output 50 MW and electricity 5 MW. From experts studies implies that in CR is at least 60 localities suitable for electricity generation with overall outcome 250 MW and 2000MW heat energy outcome.

9.7 Conclusions for CR

In CR the expected share of RES in electricity generation is 13, 63% in to 2020 what is quite different with the EU obligation the 20%. In CR the potential of RES is estimated at 78 TWh and 54 % from it is the potential of biomass (Source: Forbiom). The potential share on consumption PES is 16 % (in nowadays it is only 1,5%). Certain risk of burning biomass and bio fuelling brings increasing risk of creation of persistence organic emissions (toxic features).

10 Annexes

Production of electricity from RES in ČEZ, a.s. (MWh)

Manufacturing devices	**2003**	**2004**	**2005**
Hydro power plants - Overall	773 342	1 251 828	1 541 642
ČEZ, a. s.	606 847	1 065 040	1 333 384
CEZ small hydro plants	47 083	53 917	58 153
Other subjects of CEZ group	166 495	186 788	208 258
Other subjects small hydro plants	105 486	122 416	139 341
Wind power plants - Overall	235	536	474
ČEZ, a. s.	235	478	458
Other subjects of CEZ group ČEZ	0	58	16
Photovoltaic power plant ČEZ	1	8	7
Burning biomass - overall ČEZ	8 638	149 163	115 337
Devices usable RES - overall	**782 216**	**1 401 535**	**1 657 460**

Source: RES and possibilities of utilisations, ČEZ, a. s.

Czech Republic production of electricity from RES in 2005

	Gross electricity production	The supply	Share on green electricity	Share on gross domestic consumption	Share on gross production
	MWh	MWh	%	%	%
Hydro power plants	**2 379 910**	**2 370 300**	**75,95%**	**3,40%**	**2,88%**
Small hydro plants to 1 MW	342 980	340 900	**10,95%**	0,49%	0,42%
Small hydro plants from 1 to 10 MW	727 730	725 800	**23,23%**	1,04%	0,88%
Large hydro plants above 10 MW	1 309 200	1 303 600	**41,78%**	1,87%	1,59%
Biomass overall	**560 251,9**	**210 379,2**	**17,88%**	**0,80%**	**0,68%**
Wood chips etc	222 497,2	153 793,8	**7,10%**	0,32%	0,27%
Cellulose leach	279 582,3	0	**8,92%**	0,40%	0,34%
Vegetal materials	53 735,4	52 382,4	**1,71%**	0,08%	0,07%
Pellets	4 437	4 203	**0,14%**	0,01%	0,01%
Biogas overall	**160 856,9**	**93 413,4**	**5,13%**	**0,23%**	**0,19%**
Communal hydro clean stations	71 446,5	14 857,9	**2,28%**	0,10%	0,09%
Industry hydro clean stations	2 869,1	501,3	**0,09%**	0,00%	0,00%
Agriculture biogas	8 242,5	5 613,5	**0,26%**	0,01%	0,01%
Landfill gas	78 298,8	72 440,7	**2,50%**	0,11%	0,09%
Biological communal waste	**10 612,3**	**3 825,6**	**0,34%**	**0,02%**	**0,01%**
Wind plants (above100 kW)	**21 441,6**	**21 262,8**	**0,68%**	**0,03%**	**0,03%**

Photovoltaic (guess)	**390**	**54**	**0,01%**	**0,00%**	**0,00%**
Overall	**3 133 462,7**	**2 699 235**	**100%**	**4,48%**	**3,79%**

Source: The bulletin of RES in 2005, CR Ministry of Industry

If we compare these numbers with producing of heat energy from RES after the conversion to MWh the produced heat energy from RES was 12 644127 MWh. It is for times higher than in electricity generation. Overall energy from RES is in following tab in GJ (1MWh - 3,6 GJ) .

Overall energy from RES in 2005 (GJ)

	Energy for generation heat energy	Energy for generation electricity	Primary energy	Overall Renewable energy	Share on PES	Share on RES
Biomass (household)	37 078 678	–	–	37 078 678	1,94%	48,66%
Biomass (except households)	20 111 701	3 928 665	–	24 040 367	1,26%	31,55%
Hydro plants	–	–	8 567 676	8 567 676	0,45%	11,24%
Biologic communal waste	2 289 855	56 525	–	2 346 380	0,12%	3,08%
Biogas	1 357 912	977 475	–	2 335 387	0,12%	3,06%
Biologic part PRO and ATP	990 106	–	–	990 106	0,05%	1,30%
Geothermal systems	–	–	545 000	545 000	0,03%	0,72%
Bio fuelling	–	–	117 570	117 570	0,01%	0,15%
Solar thermal connectors	–	–	103 000	103 000	0,01%	0,14%
Wind plants	–	–	77 191	77 191	0 %	0,10%
Photovoltaic systems	–	–	1 418	1 418	0 %	0 %
Overall	61 828 254	4 962 665	9 411 855	76 202 775	3,99%	100%

Source: The bulletin of RES in 2005, CR Ministry of Industry

The Best locations for the biomass utilisation in the district heating are expected to have most of the following success factors:

- long-term availability of biomass fuel
- price of fuel in the lower cost – range
- existing demand for cost-effective utilisation of biomass for heat production
- current price of heat above the national average
- possibility to replace existing obsolete or environmentally harming technology

Source: International Project Forbiom, SEVEn,o.s.