IEA-DSM Task XVII: Country Report – Austria

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AUSTRIA – Facts and Figures (2005) [1]

Control-area managers:		3
Balance-group coordinators (settlement agencies):		2
Registered balance groups:		60
Distribution-system operators:		133
Nationwide electricity suppliers:	approx.	10
Consumers:	approx.	4 million
Annual demand:	approx.	60 TWh
Installed generating capacity:	approx.	18,000 MW
Peak load:	approx.	9,000 MW

Energy consumption in Austria

Figure 1 depicts the evolution of gross domestic electricity consumption on the basis of the national energy statistics. Consumption grew by 61% over the 1985–2005 period. Gross domestic electricity consumption almost trebled over the entire period covered, 1970–2005.

[Source: E-Control]

Figure 1: Evolution of gross domestic electricity consumption, 1970-2005

[1] Ref.: The electricity market in Austria, e-control, 2005

The breakdown of energy and electricity supply in 2005, on the basis of data from Statistics Austria[2] and E-Control, was as follows:

2005	in petajoules	in TWh
Total energy supply	**1,679**	**0.5**
Imports	1,241	
Exports[1]	207	
Final energy consumption (selected energy sources)	**1,105**	**0.3**
Contributions to total energy supply		
Crude oil and oil derivatives	**702**	
Imports	646	
Domestic production	56	
Natural gas	**403**	
Imports	344	
Domestic production	59	
Coal	**178**	
Imports	167	
Domestic production	11	
Biofuels	**159**	
Electricity[2]		
Domestic electricity consumption[3]	236	65.6
Net electricity imports	11	3.1
Hydro[4]	129	35.7
Thermal	93	25,9
whereof biomass and biogas	4	1.2
Wind	5	1.3

[1] After conversion and conversion losses
[2] Data from E-Control
[3] Excl. pumped storage
[4] Energy capability factor in 2005: 0.98

[June 2007 | Sources: Statistics Austria and E-Control]

Table 1: Total energy and electricity balance

Policies, driving forces for DG, RES, DR/DSM

Legal basis of renewable electricity

The Green Electricity Act, which entered into force on the 1st of January 2003, made way for a uniform country wide regulation of the support schemes for Green Power. E-Control is entrusted with monitoring progress towards achieving the objectives set out in the Green Electricity Act.

Market structures

Renewable electricity support payments system

Figure 2 is a schematic diagram of the settlement system under the renewable electricity support payment scheme as it has been since the formation of "Abwicklungsstelle für Ökostrom AG (OeMAG)". The latter began work on 1 October 2006 having obtained an

[2] Ref. www.statistik.at

operating license in September. It replaces the three former green power balancing group representatives.

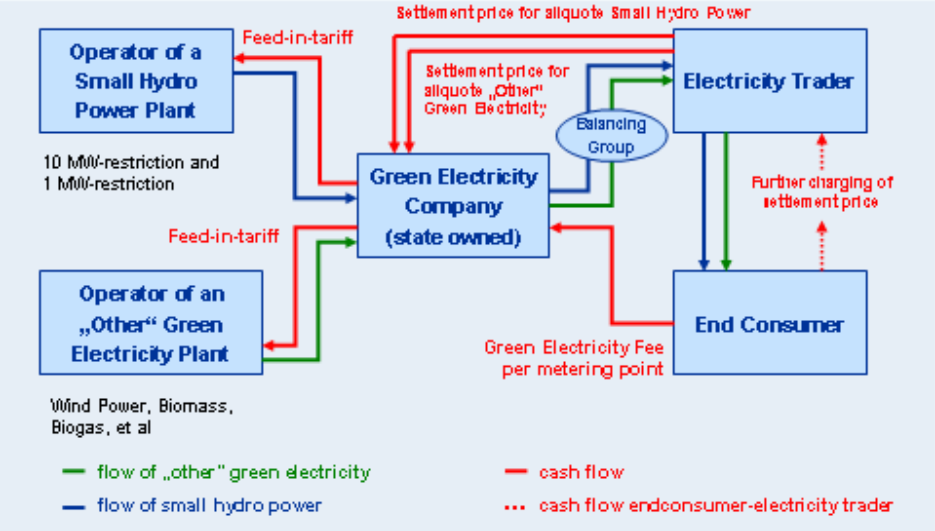

Figure 2: Schematic diagram of the renewable electricity support payments system under the Green Electricity (Amendment) Act 2006

Status and targets for DG, RES, DR/DSM

Renewable energy sources in Austria and the European Union[3]

In 2005 renewable energy sources met 21.4% of Austrian gross domestic energy consumption and 59% of electricity consumption. The renewable contribution is several times the EU average, mainly because of Austria's large hydro power resources. The EU averages are 6.4% for overall energy consumption and 14% for electricity alone.

2005	Austria*	EU-27**
Gross domestic consumption	1,440 PJ	68,500 PJ
whereof renewables	21.4%	6.6%
Electricity consumption	69 TWh	3,310 TWh
whereof renewables	59%	14%

*Sources: Statistics Austria and E-Control
**Source: Eurostat

Table 2: Energy situation in Austria and the EU as a whole

[3] Ref.: [1] Chapter 4.

The indicative targets of Directive 2001/77/EC[4]

Section 4 Green Electricity Act defines the Act's objectives as follows:

- Attainment of the 78.1% target established by Directive 2001/77/EC;
- Efficient use of support funding;
- Designation of development priorities with a view to advancing technologies to commercialmaturity;
- Creation of a secure investment climate for existing and future generating stations;
- A supply contribution from "other" renewable electricity of at least 10 % by 2010;
- A 9% contribution by small hydro power by 2008.

Section 4 (2) Green Electricity Act also states that the aims of the Act include "efforts to achieve the conclusion of contracts … for the uptake of electricity from renewable energy sources other than hydro power by 2010 that result in a share of 10% of total annual supply to consumers connected to public networks. "This figure is relative to total annual electricity supply by all Austrian system operators to final consumers. Since this is not the same amount as the 56.1 TWh on which the 78.1% target established by Directive 2001/77/EC is based, the targets are based on different reference levels and are thus not fully comparable.

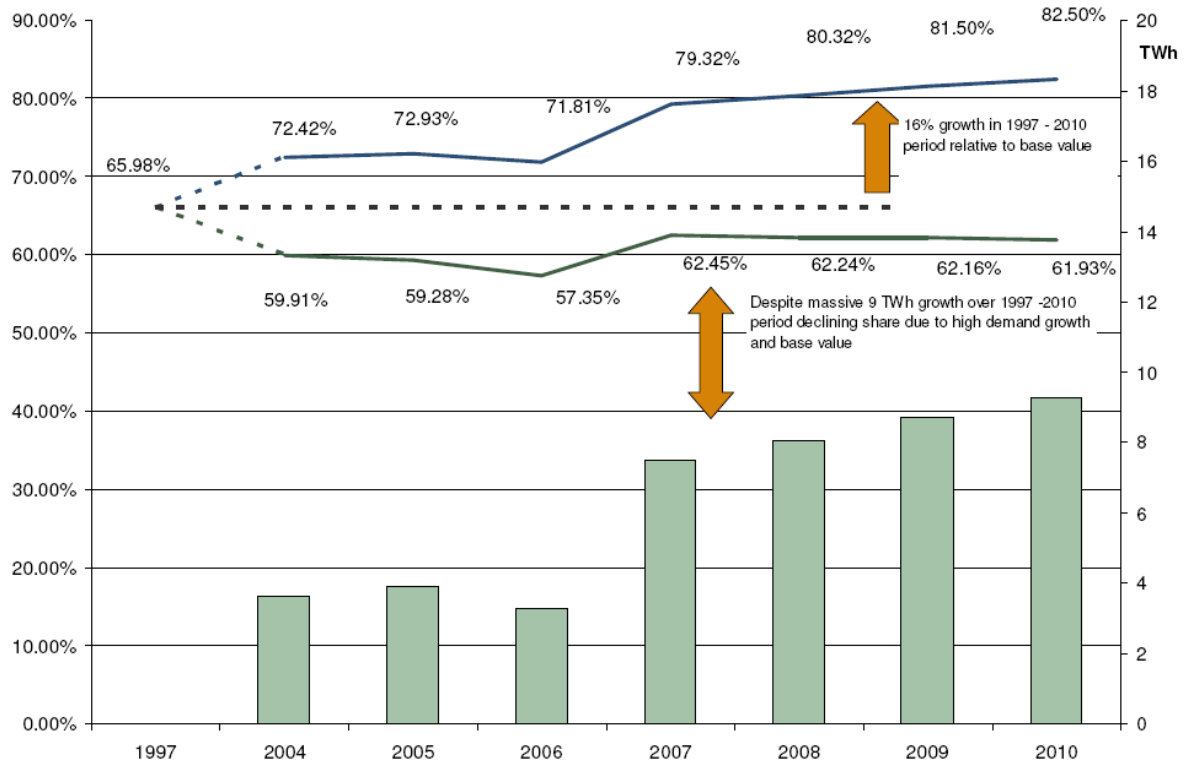

Figure 3: Renewable energy sources as a proportion of gross national electricity consumption, 1997-2010

[4] Ref.: [2] Chapter 91

In an average year Austrian hydro power output is about 37 TWh. This corresponds to some 66.5% of electricity consumption in 1997 (56.1 TWh). If hydro power output remains roughly constant in absolute terms its share of total consumption declines by at least 1.2% per annum as a result of demand growth. In other words, a 1.2% annual growth rate for other RES is required merely to make good the fall in hydro power's percentage contribution. The cumulative growth required between 1997 and 2010 would be about 15%. After 2010 implementation of the Water Framework Directive is likely to present an additional obstacle to renewable electricity generation. Water supply in 2006 was below average, with an energy capability factor of 0.96. Consequently, hydro power provided only around 35 TWh of electricity, meaning that its share of total consumption fell to 57% (based on reference figure of 56.1 TWh)

Evaluation of the green power quota developments in % of the overall electricity generation from 2003 to 2007

Target of the green electricity act is a minimum share of 4% annual end consumer electricity delivery of renewable energy. The overall energy delivery in the year 2008, based on 47.848 GWh in the year 2001 and an annual increase by 2%, will reach 55.000 GWh. Therefore a target of 2.200 GWh energy injections from renewable energy will be set.

The following Figure 4 demonstrates the forecast developments in green power expansion on the sole basis of the Injection Tariff Order (Federal Law Gazette II No. 508/2002 from December 2002 (including old facilities)).

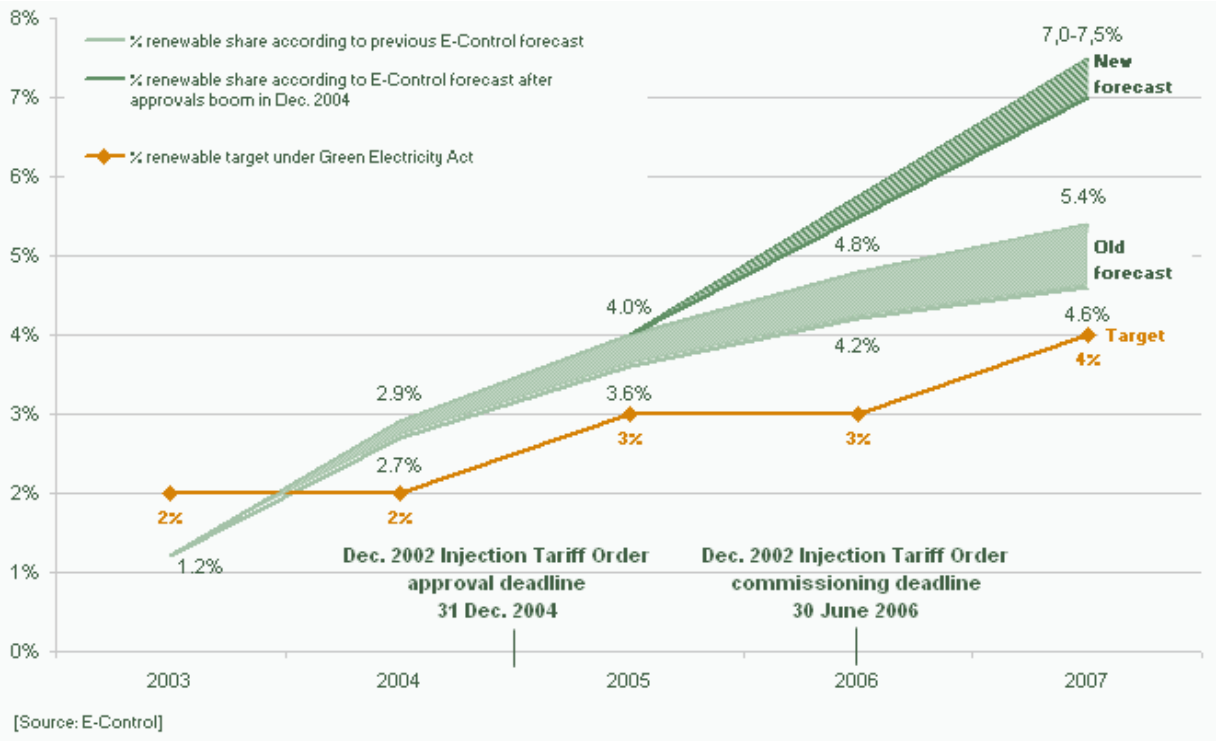

Figure 4: Forecast developments in green power expansion.

Network access of DER

The Green Electricity (Amendment) Act 2006 provides for the following flat metering point charges, graduated by grid levels, to finance renewable electricity:

Flat metering point charge to end users under section 22a(1) Green Electricity (Amendment) Act 2006	**2007-2009 €/year/metering point**
Grid Levels 1-4	15,000
Grid Level 5	3,300
Grid Level 6	300
Grid Level 7	15

[01-03-2007 | Source: E-Control]

Table 3: Flat metering point charges per calendar year for the 2007–2009 periods under the Green Electricity (Amendment) Act 2006

Power quality issues

In Austria the TOR (Technical and organisational rules for system operators and users) mainly relate to the technical requirements for network operations. They correspond to the bodies of rules known as "grid codes" or "distribution code" in other countries.

Study on renewable energy and power quality [5]

The analyses of the framework for distributed generation showed that rules are not transparent and not harmonised and they provide poor incentives for distributed generation. The measurement campaign at sites with distributed generation showed that apart from the voltage rise effect there is generally no significant influence of the distributed generation units on the parameters of power quality. Within the project it was illustrated that technologies for improvement of power quality are available and that they are working. Due to the current organisational and economic framework these technologies still do not play any relevant role, concerning the delivery of ancillary services.

The active integration of distributed generation units could contribute to the improvement of power quality. In addition to the necessary framework which is currently missing, the confidence of network operators in this concept of integrated distributed generation providing ancillary services is lacking. Therefore it is necessary to address this lack of confidence and demonstrate the feasibility within a broad implementation of such concepts in real networks.

[5] Ref. [2] Distributed generation and renewables – Power Quality

Market access of DER

Detailed analysis of renewable electricity feed-in

The charts below present detailed analyses of renewable electricity feed-in in the first quarter of 2007. The most marked increase between the first quarter of 2003 and the same period in 2005 was in wind power capacity. As most of the wind power capacity was already in place by the end of 2004, the largest increases in the subsequent quarters were recorded in biomass.

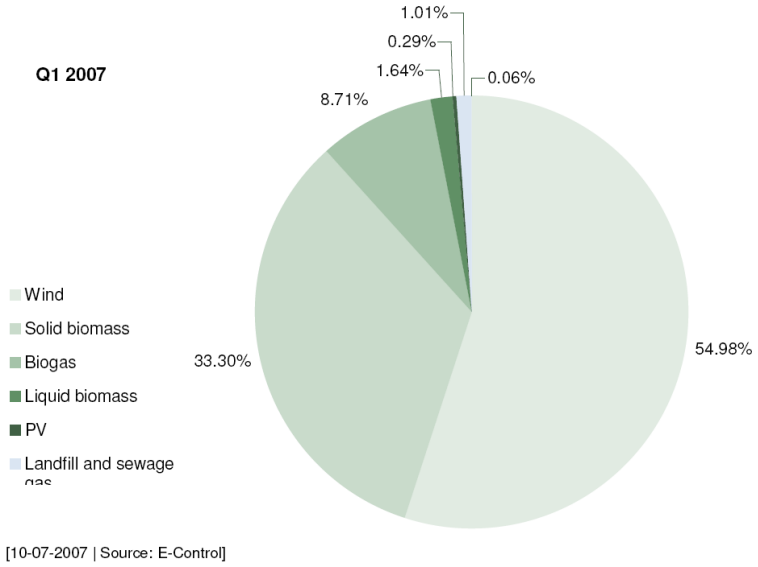

Figure 5: Supported renewable power (excl. hydro power) as a proportion of total power feed-in in the first quarter of 2007

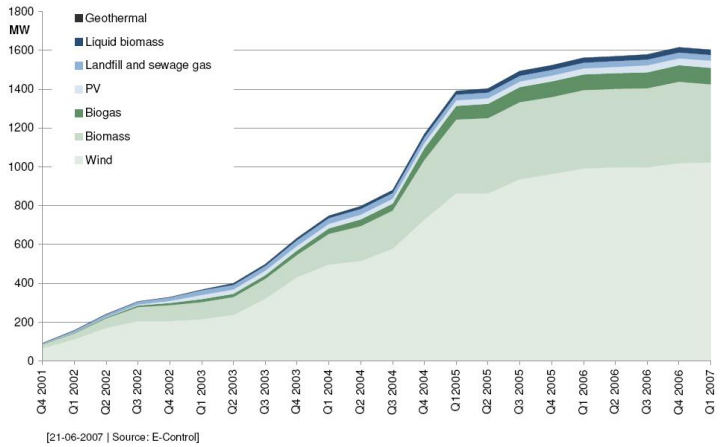

Figure 6: Evolution of accredited renewable generating capacity from Dec. 2001 to March 2007

A comparison of the absolute amounts of “other” renewable electricity fed in over time shows an increase from 128.87 GWh in the first quarter of 2003 to 1,179.77 GWh in the like period of 2007.

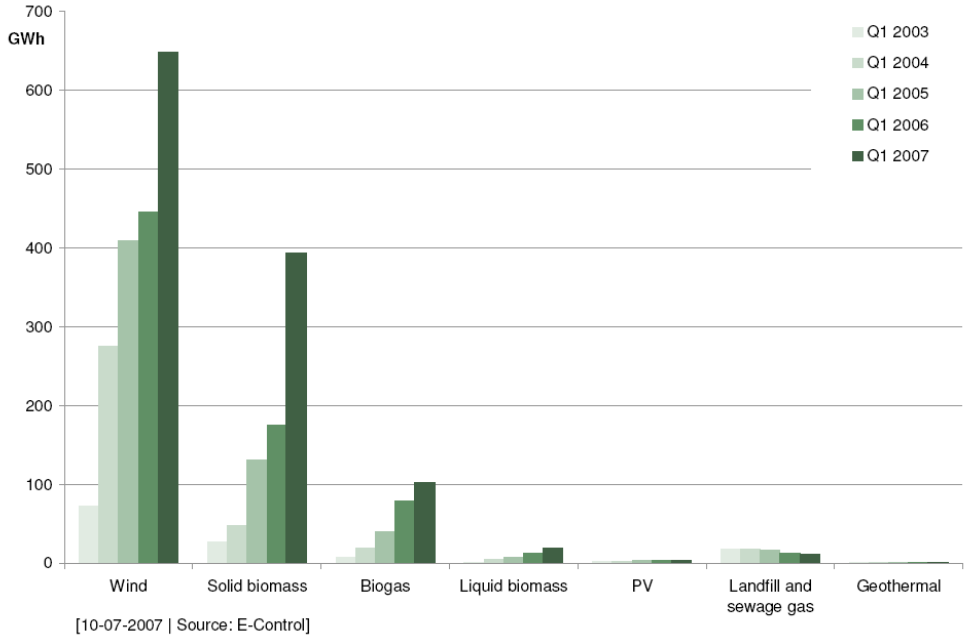

Figure 7: Comparison of renewable electricity feed-in Q1 2003 to Q1 2007 (absolute)

The small hydro category saw a fall from 684.28 GWh in the first quarter of 2003 to 220.53 GWh in the like period of 2007. This sharp decline in recent years chiefly reflects withdrawals from the green power energy balancing group due to high market prices.

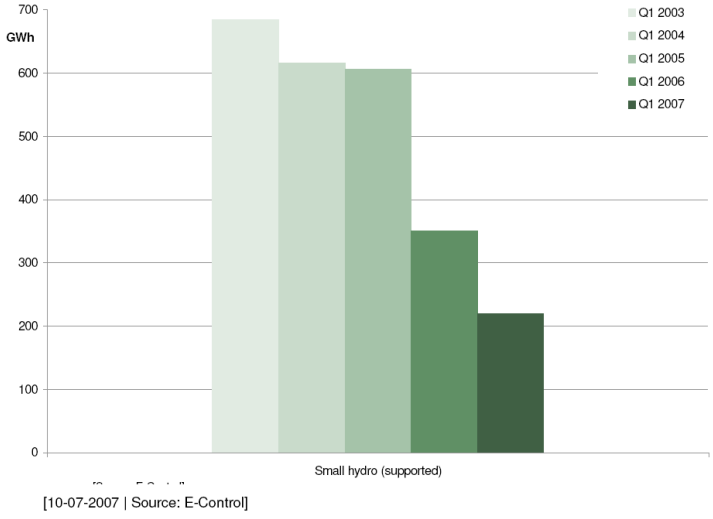

Figure 8: Feed-in by small hydro generating plants from Q1 2003 to Q1 2007 (absolute)

Supported payments (output trends)[6]

As at 30 June 2007, some 955.38 MW of wind power capacity, 270.42 MW of biomass capacity and 64.23 MW of biogas capacity were in operation. A total of 1,032.62 MW of wind power capacity (176 wind farms), 402.03 MW of solid biomass capacity (174 plants) and 86.18 MW of biogas capacity (335 plants) had been approved as of 31 March 2007. In addition, 2,485 small hydro power plants (maximum capacity of 10 MW) with a combined capacity of 1,161 MW had been accredited. Since many of these small hydro stations can realise higher revenues by selling their power at market prices than at the regulated feed-in tariffs, a considerable number no longer come under the support payment regime administered by the green power balancing groups.

The table below shows the evolution of supported Austrian renewable electricity output from 2003 to 2007 (2003–2006 actual, 2007–2008 estimated).

Supported renewable electricity output [in GWh]							
Energy sources	*2002*	*2003*	*2004*	*2005*	*2006*	*2007e (Nov. 2006)*	*2008e (Aug. 2007)*
Wind	203	366	924	1,328	1,738	2,077	2,100
Solid biomass	95	99	313	553	1,086	2,003	2,000
Biogas	20	42	102	220	358	522	500
Liquid biomass	3	2	18	33	54	120	90
PV	3	11	12	13	13	13	14
Other supported renewable electricity	88	78	76	65	55 [1]	88 [1]	51 [1]
Total "other" renewable electricity	**412**	**598**	**1,445**	**2,212**	**3,304**	**4,823**	**4,755**
Small hydro (supported)	4,243	3,386	3,995	3,561	1,806 [1]	2,000 [1]	1,600 [1]
Total supported renewable electricity	**4,655**	**3,984**	**5,440**	**5,773**	**5,110**	**6,823**	**6,355**

[1] A considerable proportion of the small hydro (and landfill and sewage gas) capacity has been withdrawn from the support system because of higher price realisations on the free market

[29-08-2007 | Sources: E-Control and OeMAG]

Table 4: Supported renewable electricity output, 2002-2008 (2007 and 2008 est.)

At 6,323–7,823 GWh, forecast supported renewable electricity output in 2007 represents between 11.4–14.1% of the projected total power supply to final consumers from the public grid (55,468 GWh).

This includes an estimated 2.7–5.4% of total supply (1,500–3,000 GWh) contributed by small hydro generating stations and 8.7 % (4,823 GWh) by “other” supported renewable sources.

Support requirements[7]

The table below shows the evolution of total support payments for all three forms of power generation supported under the Green Electricity Act, namely, small hydro, “other” renewable electricity and fossil fuel fired CHP.

[6] Ref. [1] Chapter 6.4
[7] Ref. [1] Chapter 6.5

Support payments [in Mio Euro]						
Technology	*2003*	*2004*	*2005*	*2006*	*2007e*	*2008e*
"Other" renewable electricity	69	104	149	219	286	321
Small hydro	65	67	57	15	20	9
Fossil CHP *(subject to reductions due to higher market prices or changes as a result of pending litigation)*	76	78	68	32	55	55
Total	**210**	**249**	**274**	**266**	**360**	**384**

[29-08-2007 | Sources: E-Control and GPBGRs]

Table 5: Evolution of support payments, 2003-2008 (2007 and 2008 estimated)

The actual support payments to be extended for fossil CHP generating stations are the subject of pending litigation, and a redesign of the system as provided for by the Green Electricity (Amendment) Act 2006 is also possible. Table 7 shows the total support payments for “other” renewable generating stations, broken down by energy sources.

Payments from technology promotion funds are also included in this presentation, being assigned to the energy sources for which they were primarily used namely biomass and biogas.

Support payments [in Mio Euro]						
Technology	*2003* (markrt price 2.699 cent/kWh)	*2004* (market price 3.309 cent/kWh)	*2005* (market price 4.073 cent/kWh)	*2006* (market price 4.8 cent/kWh)	*2007* (market price 5.5 cent/kWh)	*2008* (markrt price 5.0 cent/kWh)
Wind	24	48	71	78	66	86
Solid biomass	16	25	41	92	150	171
Biogas	17	18	24	34	49	46
Liquid biomass	1	2	3	5	10	8
PV	8	8	8	8	8	8
Other supported renewable electricity (excl. hydro)	3	3	2	2	3	2
Total	**69**	**104**	**149**	**219**	**286**	**321**

[29-08-2007 | Sources: E-Control and GPBGRs]

Table 6: Detailed presentation fo support payments for "other" renewable electricity, 2003-2008 (2007 and 2008 estimated)

Large renewables integration

Wind Systems Interconnection	
Actors	Industry Utilities, Wind producers State and federal government (policy) Local government (siting)
Key issues	Generation concentrated in north / east Austria (~1400-1700MW) Bottleneck in transmission network

	Forecasting error results in high allocation of reserve energy, reserve standby of conventional plants
Projects	- Integration of wind energy by load management

Hydro Systems Interconnection	
Actors	Industry Utilities, Hydro producers State and federal government (policy) Local government (siting) Environmental Organizations Citizens' initiative
Key issues	Few potential left, Environmental issues concerning protected areas
Projects	- Hydro power with 'hydraulic coupling' - Virtual Green Power Plant - Innovative Concepts for Pumped Storage in Liberalized Grids

Small renewables integration

PV	
Actors	Utilities Vendors Regulator Governmental policy / Green Electricity Act Consumers Operators Research & development and Certification & test facilities
Key issues	Investment costs high, governmental incentives too low, Fluctuation – variable generation
Projects	Mitigation of variable power injection through battery (Vandium Redox Flow)

Nonrenewable distributed generation and storage

Biomass, Biogas / CHP	
Actors	Utilities, Vendors – Environmental Technology Regulator Governmental policy Agriculture
Key issues	Efficiency,
Projects	Technological as well as economical optimized Biomass CHP systems with regard to state-of-the-art technologies.

Energy efficiency and DSM

Smart Meters [8]	
Actors	Industry, Government Regulator Research, Utility
Key issues	Costs Replace of existing working meters Recalibration and replacing of old meters Communication infrastructure – access, storage of data and privacy
Projects	Rollout: - Energie AG - Salzburg AG - Feldkirch

Electricity metering is the responsibility of system operators. The E-Control Commission sets maximum charges for metering services which depend on the type of device used.

About 5.3m of the 5.5m electricity meters in place in Austria are domestic electromechanical single or multi-tariff devices which are read manually by system operators' staff — mostly on an annual basis, but in some cases only every three years. There are some 120,000 maximum demand meters, mostly installed at small and medium-sized businesses, and farms, which are also generally read manually. There are also about 30,000 load profile meters used by large consumers and generators (consumption of over 100,000 kWh/50 kW). These are remotely read; the data is transmitted via GSM networks or telephone lines.

Some 600,000 meters form part of customer installations with interruptible load and/or switchable tariff (day/night) periods centrally managed by system operators via ripple control systems.

Better consumer information

One of the main thrusts of the Energy Efficiency Directive is better consumer information. Measures such as individual meters that accurately reflect the final customer's actual energy consumption and informative billing are intended to make consumers aware of how they can control their energy consumption and improve its efficiency in the long term.

[8] Task XVII – Pilots-case studies - SmartMetering.doc

Smart grid

Smart grid technology platform in Austria

Smart grids	
Actors	Research and Development, Universities Vendors, Industry Operators, Utilities Federal Ministry for Transport, Innovation and Technology
Key issues	Interoperability Integration of RES, DG Communication infrastructure Lack of storage technologies, Mitigation of fluctuation Microgrids / Islanding issues of reconnection
Projects	- DG/RES/DSM Laboratory – SimTech Lab - National Platform in Austria: launch on may 13-16 at "smart.grids week vienna"[9]. - Active operation of electrical distribution networks with a high share of distributed power generation – Conceptual design of demonstration networks.

Integration of DSM with DG/RES/storage

Integration of DSM, DR	
Actors	Utilities, Electricity providers, Vendors, industry Research Institutes and Universities
Key issues	Tariff models, Energy market Communication infrastructure
Projects	Studies on Potentials: - end customers: refrigerators, boilers - wind integration and load management, - supermarkets (electrical cooling and heating potential) Research project: - Simulation: Virtual power plant and DSM - Communication device – IRON Concept

[9] www.arsenal.ac.at/smartgridsweek

Problems, barriers and research/policy needs

Currently there is no equitable break down of fix costs of the electricity production in the tariff system. A consideration of fix costs within the power system usage and balance energy market is established, but not in the electrical power market. A break down due to the origins of the costs of capacity would increase the overall efficiency and would be of advantage for the generators and consumers.

References

[1] *Green Electricity in Austria* with proposals for improvements in energy efficiency, Report by Energie-Control GmbH. pursuant to section 25(1) Green Electricity Act, Aug. 2007

[2] R. Bründlinger, H. Brunner; Distributed generation and renewables – Power Quality, Report from Research on Energy and Environment, bmvit, 48 - 2006