



AUSTRIAN ENERGY AGENCY

Austrian Energy Agency

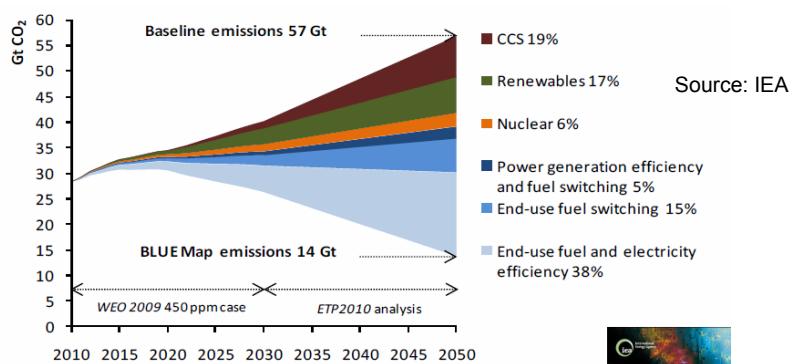
Innovative Energy Technologies – Where do we stand?

Herbert Lechner

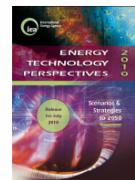
Austrian Energy Agency | 02/05/11 | Seite 1



A fundamental change of our energy system is necessary

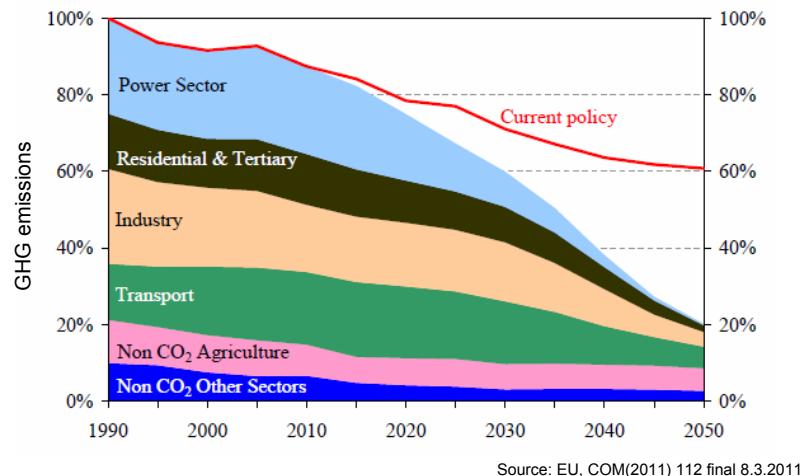


Energy efficiency is the main catalyst!



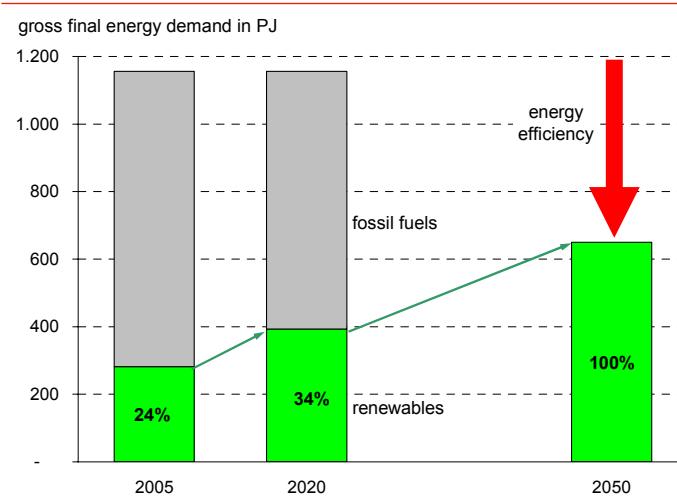
Austrian Energy Agency | 02/05/11 | Seite 2

EU: Moving to a competitive low carbon economy in 2050



Austrian Energy Agency | 02/05/11 | Seite 3

Austria's energy system 2050: high efficiency, renewable based supply



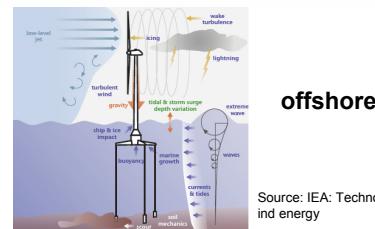
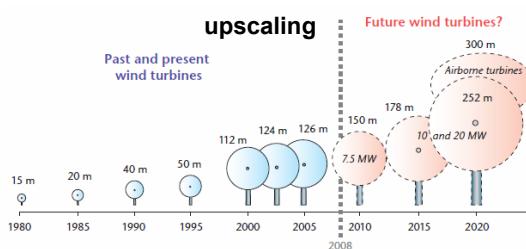
Austrian Energy Agency | 02/05/11 | Seite 4

Technologies for 2020 targets are available: Example wind energy



Austrian Energy Agency | 02/05/11 | Seite 5

... but more efforts in RD&D are needed to reach decarbonisation of the power sector



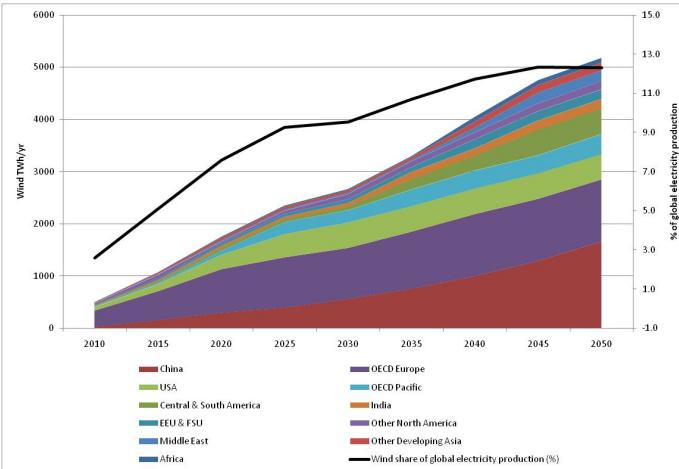
Source: IEA: Technology Roadmap, in energy



Transmission &
balancing/storage

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IEA wind roadmap -> 12% of global electricity production in 2050



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Technologies are available: Example new buildings: S-House

Straw house in passive house standard,
Böheimkirchen, Lower Austria



- Office & exhibition building of the University
- Energy efficiency factor 20
- Wall system: wood construction, straw bale as insulation material
- Development of a solar cooling system

Source: The Research and Technology Programme Building of Tomorrow (PLUS)
Ministry for transport, innovation and technology

Austrian Energy Agency | 02/05/11 | Seite 8

Example new buildings: social housing

**social housing in passive house standard
Utendorfgasse, Vienna**



- construction costs less than 1055 €/m²
- passive house standard ($\leq 15 \text{ kWh/m}^2\text{a}$, $\leq 10 \text{ W/m}^2$)
- primary energy consumption $\leq 120 \text{ kWh/m}^2\text{a}$
- high user comfort

Austrian Energy Agency | 02/05/11 | Seite 9

Source: Ministry for transport, innovation and technology

Example renovation of old buildings

**Passive house renovation Makartstraße
Linz, Upper Austria**



- renovation of a multi-storey-building from the 1950s
- use of prefabricated wall units
- central element of the façade system is a special solar comb, which is mounted on the outside wall in form of a panel (gapsolar)
- controlled ventilation with single room ventilators

Austrian Energy Agency | 02/05/11 | Seite 10

Source: Ministry for transport, innovation and technology

Example renovation of single family house

renovation in passive house standard
Pettenbach, Upper Austria



- first renovation of a single family house in Austria to passive house standard, reduction of energy consumption by 95 %
- use of prefabricated timber wall elements
- thermal bridges of the existing rising brickwalls were compensated by a circumferential umbrella-shaped insulation
- insulation of the floor by using vacuum insulation

Austrian Energy Agency | 02/05/11 | Seite 11

Source: Ministry for transport, innovation and technology

Example new technologies Space and water heating

Facade-integrated solar collector



(Source: AEE INTEC, Fa. Doma, GREENoneTEC)

Austrian Energy Agency | 02/05/11 | Seite 12

Source: Ministry for transport, innovation and technology

Example new technologies Space heating with pellets



Austrian Energy Agency | 02/05/11 | Seite 13

Roadmaps show the path for technological transition

Technology Roadmaps of IEA

- Supply side
 - ◆ CCS power generation
 - ◆ Coal – IGCC
 - ◆ Coal – USCSC
 - ◆ Nuclear III + IV
 - ◆ Solar – PV
 - ◆ Solar – CSP
 - ◆ Wind
 - ◆ Biomass – IGCC & co-combustion
 - ◆ Electricity networks
 - ◆ 2nd generation biofuels
- Demand side
 - ◆ Energy efficiency in buildings
 - ◆ Energy efficient motor systems
 - ◆ Efficient ICEs
 - ◆ Heat pumps
 - ◆ Plug-ins and electric vehicles
 - ◆ Fuel cell vehicles
 - ◆ Industrial CCS
 - ◆ Solar heating
 - ◆ Efficient industry processes (starting with Cement)



Source: IEA

Austrian Energy Agency | 02/05/11 | Seite 14

Example solar PV roadmap: technology performance milestones

Crystalline Silicon Technologies	2010 - 2015	2015 - 2020	2020 - 2030 / 2050
<i>Efficiency targets in %</i>	<ul style="list-style-type: none"> Single-crystalline: 21% Multi-crystalline: 16% 	<ul style="list-style-type: none"> Single-crystalline: 23% Multi-crystalline: 18% 	<ul style="list-style-type: none"> Single-crystalline: 27% Multi-crystalline: 21%
<i>Industry manufacturing aspects</i>	Si consumption <5g/Wp	Si consumption <3g/Wp	Si consumption <2g/Wp
<i>R&D aspects</i>	<ul style="list-style-type: none"> New silicon materials and processing Cell contacts, emitters and passivation 	<ul style="list-style-type: none"> Low defect silicon wafers Improved device structures 	<ul style="list-style-type: none"> Wafer equivalent technologies New device structures with novel concepts
Thin Film Technologies	2010 - 2015	2015 - 2020	2020 - 2030
<i>Efficiency targets in %</i>	<ul style="list-style-type: none"> Thin film Si: 10% CIGS: 14% CdTe: 12% 	<ul style="list-style-type: none"> Thin film Si: 12% CIGS: 15% CdTe: 15% 	<ul style="list-style-type: none"> Thin film Si: 15% CIGS: 18% CdTe: 18%
<i>Industry manufacturing aspects</i>	<ul style="list-style-type: none"> High rate deposition Roll-to-roll manufacturing Packaging 	<ul style="list-style-type: none"> Simplified production processes Low cost packaging 	Large high-efficiency production units
<i>R&D aspects</i>	<ul style="list-style-type: none"> Large area deposition processes Improved substrates and transparent conductive oxides 	<ul style="list-style-type: none"> Improved cell structures Improved deposition techniques 	Advances materials and concepts

Source: IEA

Austrian Energy Agency | 02/05/11 | Seite 15

The European Strategic Energy Technology Plan (SET-Plan)

- published 10/2009
- „technology pillar“ of the energy&climate package 20/20/20
- defines seven technology core areas and sectoral targets
- is to result in a reduction of fossil fuels in electricity generation from 55% in 2007 to about 20% in 2020
- requires RD&D of 60 bill. Euros until 2020
- RD&D public & private in 2007: 2,23 bill. Euro
- means increasing RD&D by factor 3
- strong PPP approach, especially in demonstration and market replication

Austrian Energy Agency | 02/05/11 | Seite 16

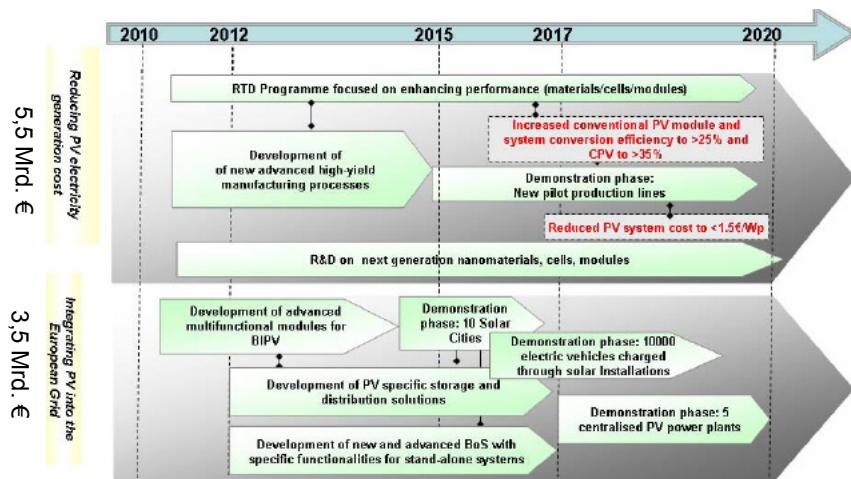
Seven roadmaps for a low-carbon Europe (2010-2020)

European Industrial Initiatives	Total (b€)	market share 2020
Wind Energy	6	20%
Solar Energy (PV & CSP)	9 + 7 Mrd. €	12% + 3%
Bioenergy	9	14%
Carbon Capture and Storage (CCS)	10.5 - 16.5	
Electricity grid	2	
Sustainable Nuclear Energy	5 - 10	
Smart Cities	10 - 12	
Total	58.5 - 71.5	

Quelle: SEC(2009) 1295

Austrian Energy Agency | 02/05/11 | Seite 17

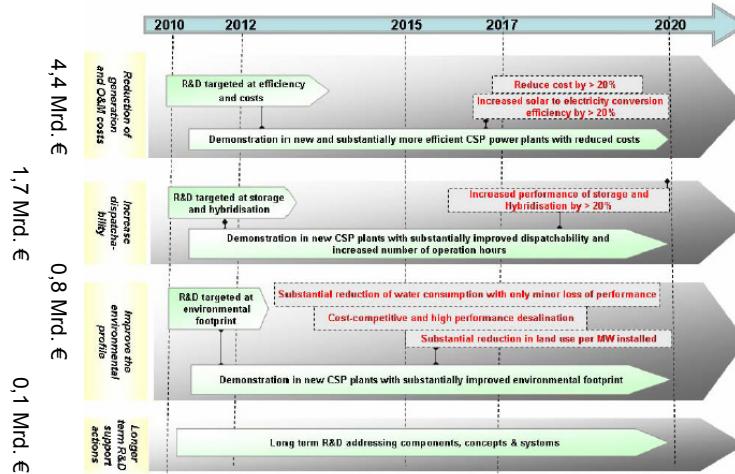
Example roadmap photovoltaics



Austrian Energy Agency | 02/05/11 | Seite 18

Quelle: SEC(2009) 1295

Example roadmap concentrating solar power (CSP)



Austrian Energy Agency | 02/05/11 | Seite 19

Quelle: SEC(2009) 1295

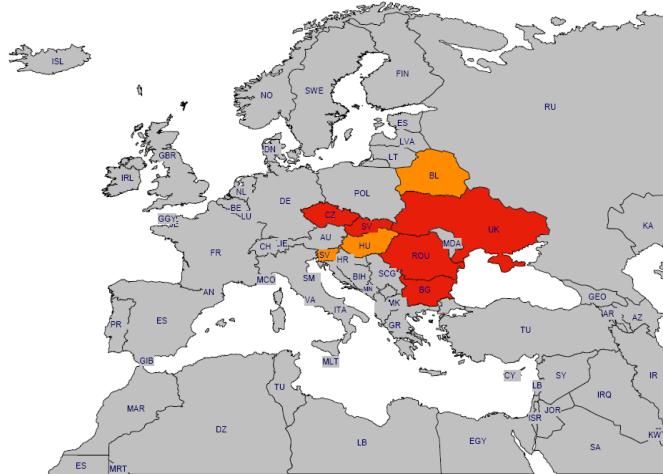
Austrian Energy Partnerships with Central and Eastern European Countries

- initiated and financed by the Federal Ministry of Agriculture, Forestry, Environment and Water Management
- basis is "Memorandum of Understanding"
- managed by Austrian Energy Agency and a selected partner in the respective country
- promotion of renewable energy and energy efficiency
- platform for identifying and deploying innovative energy technologies



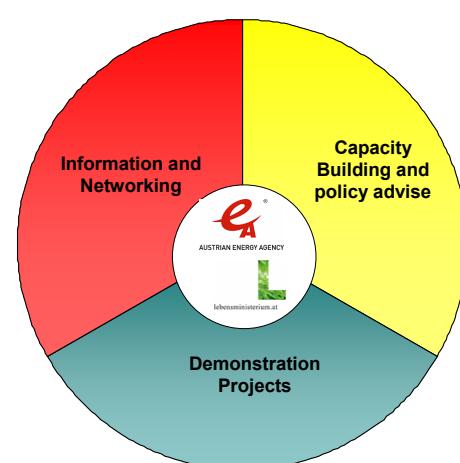
Austrian Energy Agency | 02/05/11 | Seite 20

Existing energy partnerships



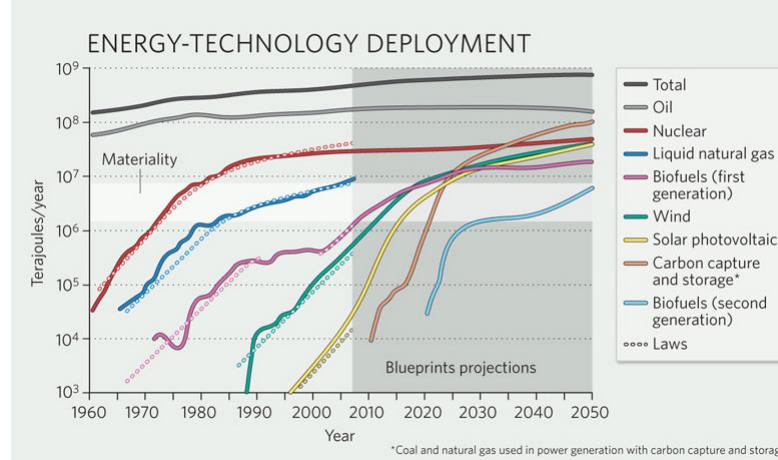
Austrian Energy Agency | 02/05/11 | Seite 21

Austrian Energy Partnerships – Cooperation on 3 Levels



Austrian Energy Agency | 02/05/11 | Seite 22

No time to lose: Change must happen fast



Austrian Energy Agency | 02/05/11 | Seite 23

Thank you for your attention!

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Austrian Energy Agency | 02/05/11 | Seite 24