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Policy instrument design to reduce financing costs in renewable energy technology projects ANNEXES

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with contributions from
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Annex 1: Country sheets

The information in this annex was collected in order to prepare a broad overview of policies and measures that have been in place to promote renewable energy in IEA countries (at least up to 2006). Based on this overview a selection was made for a more detailed elaboration on particular country/technology combinations (see the main study report). Note that this overview is not necessarily comprehensive and most certainly outdated due to changes in policies since 2006.

- Overview table: Overview of main support schemes for (notably large-scale) applications of renewable electricity and heat in selected countries

- Canada (generic overview and details of selected instruments (Québec))
- Denmark
- France (generic overview and details of selected instruments)
- Germany (generic overview and details of selected instruments)
- Ireland
- Italy
- Japan
- Netherlands (generic overview and details of selected instruments)
- Norway
- Portugal
- Spain
- United Kingdom (generic overview and details of selected instruments)
- United States of America (generic overview and details of selected instruments (California))

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Overview of main support schemes for (notably large-scale) applications of renewable electricity and heat in selected countries

Country	Renewable energy support scheme elements (situation 2006)	Contribution of scheme[1]				Market[2]	Characterisation
		Won	Wof	Bio	PV		
Canada	Direct production incentive (10 year time period): 8/7 €/MWhe (WPPI/ecoENERGY)						
	Low interest loans for municipalities (Green Municipal Fund)	•	•	•	•	••	**Production incentive**
	Investment subsidies for electricity retailers producing RES-E (up to 40%)						
	Investment subsidies (25%, with maximum of 53 k€)						
Provinces, e.g.	Feed-in tariff (20 year time period):						
Ontario	73 €/MWhe for wind (<10 MW); 277 €/MWhe for PV, for 20 yr)	•••			••	••	**Feed-in tariff / Tax measures**
	Sales tax exemptions and income tax credits						
	Tender rounds for wind projects (>10 MW)						
Québec	Tender scheme for wind projects. Resulting in a contract price for a period of 15 to 25 year, with inflation correction (bid results equal a fixed feed-in tariff of about 50 €/MWhe).	•••				••	**Tender (contract price)**
Denmark	Feed-in premium (20 year time period): 13 €/MWhe (+3 €/MWhe for wind energy balancing costs)						
	Feed-in tariff for biogas and future high potential RES-E options (wave, tidal, etc.): 80 €/MWhe for year 1-10; 54 €/MWhe for year 11-20	•	•••	•••	•	•••	**Feed-in premium / Feed-in tariff**
	Tendering scheme for offshore wind energy (2002-2005)						
	Obligation for utilisation of 1 Mt/yr of straw by utilities.						

[1] Rough indication of the contribution of the main support scheme in reducing the costs of the RES. Won: wind onshore; Wof: wind offshore; Bio: CHP biomass combustion plant, PV: solar photovoltaic. Insignificant: • to Significant: •••

[2] Indication of market maturity (mix of technologies, excluding hydropower). Emerging: • to Mature: •••

Country	Renewable energy support scheme elements (situation 2006)	Contribution of scheme[1]				Market[2]	Characterisation
		Won	Wof	Bio	PV		
France (mainland)	Feed-in tariff (15 year time period): Wind onshore: 82 €/MWhe year 1-10, the next 5 years tariffs ranging from 28 to 82 €/MWhe, depending on wind resource) Wind offshore: 130 €/MWhe year 1-10, the next 5 years tariffs ranging from 30 to 130 €/MWhe, depending on wind resource) Biomass (< 12 MW): 49 €/MWhe (+ correction) including premium for high efficiency installations (up to 12 €/MWhe) Solar PV (<12 MW): 300 €/MWhe + 250 €/MWhe (premium for building frame integration) for first 1500 full load hours, then 50 €/MWhe Tendering scheme for RES-E > 12 MW (excluding wind) Flexible depreciation	•••	•••	•••	•••	•	**Feed-in tariff / Tax measures**
Germany	Feed-in tariff (20 year time period (hydro 30 year)): Wind onshore: Year 1-T: 83.6 €/MWhe initial tariff Year T-20: 52.8 €/MWhe basic tariff The first 5 years have a guaranteed initial tariff (T≥5). The determination of year T is based on the actual wind resource (during year 1-5). Wind offshore: Year 1-T: 91 €/MWhe initial tariff Year T-20: 61.9 €/MWhe basic tariff The first 12 years have a guaranteed initial tariff (T≥12). The determination of year T is based on the actual wind resource (during year 1-12) Biomass (>5 and ≤20 MWe): 81.5 €/MWhe (plus bonus for co-generation, innovative concepts, and utilisation of energy crops)	•••	•••	•••	•••	•••	**Feed-in tariff**

Country	Renewable energy support scheme elements (situation 2006)	Contribution of scheme[1]				Market[2]	Characterisation
		Won	Wof	Bio	PV		
	Solar PV: 406 €/MWhe for open space installations 487.4 €/MWhe (>100 kW) for rooftop systems (with bonus of 50 €/MWhe for facades) The tariffs will decrease over time with technology specific degression rates.						
Ireland	Feed-in tariff (REFIT, 15 year time period): Wind <5 MW: 59 €/MWhe ; >5 MW: 57 €/MWhe Biomass: 70 €/MWhe (landfill gas); 72 €/MWhe (other)	••	••	••		•	**Feed-in tariff**
Italy	Quota obligation system for RES-E except PV (green certificate of about 126 €/MWhe (reference price) plus electricity purchase price of about 65 €/MWhe) Feed-in tariff for PV (>50 kW and <1 MW): 490 €/MWhe without and 539 €/MWhe with architectural integration	•••	•••	•••	•••	•	**Quota obligation / Feed-in tariff (PV)**
Japan	Quota obligation (Renewable Portfolio Standard: 1.35% of electricity sales by RES-E in 2010 (12.2 TWhe)) Voluntary purchase agreements Capital grants	•		•	•	••	**Quota obligation**
Netherlands	Feed-in premium (MEP, 10 year time period): 1st half of 2006: wind onshore 65 €/MWhe; wind offshore 97 €/MWhe; biomass (>10 and < 50 MW): 97 €/MWhe for pure biomass, 60 €/MWhe for fats/oils, and 25 €/MWhe for mixed biomass, 97 €/MWhe for solar PV. >2nd half of 2006: all tariffs are set to 0 €/MWhe Energy investment deduction Low interest loans	•••	•••	••	•	••	**Feed-in premium**
Norway	Investment subsidy for wind energy and bioenergy (heat/CHP), based on cash flow analyses, on average 25%. For 2008 a differentiated feed-in premium system is proposed (November 2006) for a	••	•	••		•	**Investment subsidy**

<table>
<tr><th>Country</th><th>Renewable energy support scheme elements (situation 2006)</th><th colspan="4">Contribution of scheme[1]</th><th>Market[2]</th><th>Characterisation</th></tr>
<tr><th></th><th></th><th>Won</th><th>Wof</th><th>Bio</th><th>PV</th><th></th><th></th></tr>
<tr><td></td><td>15 year time period (5 €/MWhe for hydropower (<3 MW), 12.5 €/MWhe for other RES-E). If electricity market prices exceed 55.5 €/MWhe, the premium will be reduced (0.6 €/MWhe for every €/MWhe increase in market price)</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Portugal</td><td>Feed-in tariff (15 year time period)
Wind energy: 88 €/MWhe (before February 2007); Bio-energy: 108 €/MWhe;
Solar-PV: 320 €/MWhe (>5 kW)</td><td>•••</td><td>•</td><td>•••</td><td>•••</td><td>•</td><td>Feed-in tariff</td></tr>
<tr><td>Spain</td><td>Choice of feed-in tariff or feed-in premium

<table><tr><th rowspan="2">Technology</th><th colspan="2">Duration</th><th colspan="2">2006</th></tr><tr><td>both</td><td>fixed</td><td>premium</td></tr><tr><td>(years)</td><td>(€/MWh)</td><td>(€/MWh)</td></tr><tr><td>PV < 100 kWp</td><td rowspan="6">No limit, but fixed tariffs are reduced after either 15, 20 or 25 years depending on technology</td><td>440.4</td><td>x</td></tr><tr><td>PV > 100 kWp</td><td>229.8</td><td>199.1</td></tr><tr><td>Wind < 5 MW</td><td>68.9</td><td>38.3</td></tr><tr><td>Wind > 5 MW</td><td>68.9</td><td>38.3</td></tr><tr><td>Biomass (biocrops, biogas)</td><td>68.9</td><td>38.3</td></tr><tr><td>Agriculture + forest residues</td><td>61.3</td><td>30.6</td></tr></table>
Tax deduction schemes
Low interest loan</td><td>•••</td><td>•</td><td>••</td><td>•••</td><td>•••</td><td>Feed-in tariff / Feed-in premium</td></tr>
<tr><td>United Kingdom</td><td>Obligation system (with Renewable Obligation Certificates values in the order of 60 €/MWhe (July 2006))
Climate change levy exemption for RES-E (6 €/MWhe)
Investment subsidy for offshore wind energy, wave and tidal energy.</td><td>•••</td><td>••</td><td>••</td><td>•</td><td>••</td><td>Quota obligation</td></tr>
</table>

Country	Renewable energy support scheme elements (situation 2006)	Contribution of scheme[1]				Market[2]	Characterisation
		Won	Wof	Bio	PV		
United States of America	Production Tax Credit (10 year time period, 15 €/MWhe,)	•		•	•	•••	**PTC**
California	Quota obligation: Renewable Portfolio Standard (towards a share of 20% RES by 2010 and 33% by 2020)						**Quota obligation/ (Production incentive)**
	Production incentives (for above market costs to meet RPS)	•••		•••	•••	•••	
	Investment subsidy for small-scale wind (<50 kW) and fuel cell projects using renewable fuels (<30 kW)						
Minnesota	Quota obligation:						
	Mandatory target for state-owned utility for wind and biomass projects	••		••	••	••	**Quota obligation**
	Renewable Energy Objective (REO): 10% RES-E by 2015						

Canada

Summary

Besides a very large share of hydropower and some biomass there is only little development of RES in Canada so far. Since the late 90s a range of support policies exist both on federal and province level, but these were insufficient to stimulate significant RE development. Recently wind power production started to increase faster in some provinces.

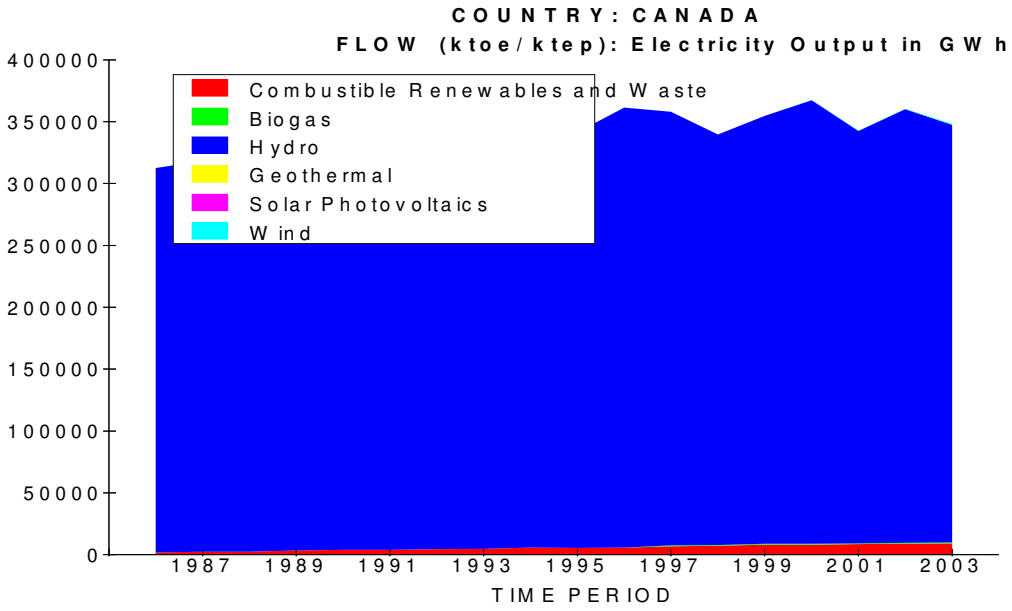


Figure A-1 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

Some targets are set at provincial level.

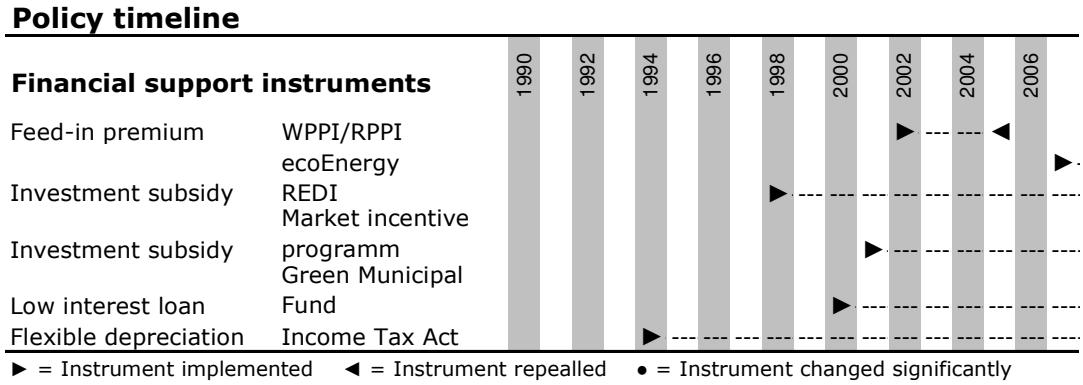


Figure A-2 RES-policies 1990-2006

Table A-1 Key policies and measures – Canada

Financial support instruments for RES (1CAN$=0.7 €)

Production incentive 2002 – 2005	**Wind power production incentive (WPPI) &** **Renewable power production incentive (RPPI)** Targeted to increase wind power capacity by 1000 MW in 5 years. It covers only about half of the additional cost of wind power (1.2 CAN$ct/kWh for 10 years) in order to spur complementary action in the provinces. RPPI applied to other RE technologies.
2007 - 2011	**ecoEnergy for renewable power** Direct production incentive announced in January 2007, aiming to stimulate 4,000 MW of additional RES-E capacity. 1 CAN$ct/kWh for 10 years for almost all RES-E technologies.
Feed-in tariff 2006 - present	**Ontario: Standard Offer Program (SOP)** Ontario has a feed-in tariff for RES-E from wind, biomass or hydro up to 10 MW of 11 CAN$ct/kWh. The tariff for photovoltaic is 42 CAN$ct/kWh. The feed-in tariff is paid for 20 years and 20% of the tariff is indexed for inflation according to the consumer price index. Projects that can reliably operate during On-Peak Hours (11 am to 7 pm EST) will be eligible for an additional 3.52 CAN$ct/kWh for Electricity actually delivered during those On-Peak Hours. Intermittent generation Projects are not eligible for this additional payment. WPPI and RPPI payments are not fully paid on top, but shared equally between the generator and the Ontario Power Authority who administers the SOP. In the past Ontario had used a tendering scheme.
Tendering scheme 2004 - 2005	**Ontario: Request for proposal (RFP)** So far 3 rounds of tendering have been conducted in 2004 and 2005. "Renewables I" contracted 395 MW, "Renewables II" 1000 MW between 20 and 200 MW capacity, while "Renewables III" aimed for 200 MW of projects below 20 MW. **Québec: Tendering scheme for wind energy** (http://www.hydroquebec.com/distribution/en/marchequebecois/index.html) Hydro-Québec has organised two tender rounds for onshore wind (1000 and 2000 MW respectively). See main report.
Investment subsidy 2007 -	**ecoEnergy for renewable heat** Support for solar thermal and heat pumps (Details not yet known)
1998 – 2007	**Renewable Energy Deployment Initiative (REDI)** Investment subsidies of 25% up to a maximum of 80,000CAN$ for amongst others biomass projects.
2001 - present	**Market Incentive Program** Investment subsidies of up to 40% for electricity retailers producing RES-E
Low interest loan 2000 - present	**Green Municipal Fund** Low interest loans for RE projects conducted by Municipal governments
Flexible depreciation 1994 – present Government purchase 1997 - present	**Income Tax Act** Allows accelerated depreciation of investment cost. The province Ontario also has sales tax exemptions and income tax credits for purchasing for certain RE technologies.

Several government purchase programs

Impacts on conventional production affecting RES
Due to the feed-in premium, RES-E is largely affected by the conventional power market (prices).
Regulation relevant for RES
Grid connection procedures were/are a barrier to the development of RES-E.

RES policies

Only after the Kyoto protocol in 1997 support policies for RE were introduced in Canada. Before only competitive technologies like large hydropower and biomass in the paper and forest product industries were deployed to a larger extent. The main support instrument on federal level is a very low feed-in premium for almost all RES-E technologies and flexible depreciation of investment cost. Federal policies have been interrupted in the past. Depending on the specific project additional instruments apply, like investment subsidies and low interest loans. Some provinces have additional instruments in place which are necessary to make projects financially viable.

Denmark

Summary

Since the beginning of the 1980s Denmark has experienced an extraordinary development of renewable energy technologies, especially wind power and both biomass heat and power production, often in CHP installations connected to district heating. Frequent policy changes in the last years have slowed down especially the growth of onshore wind power.

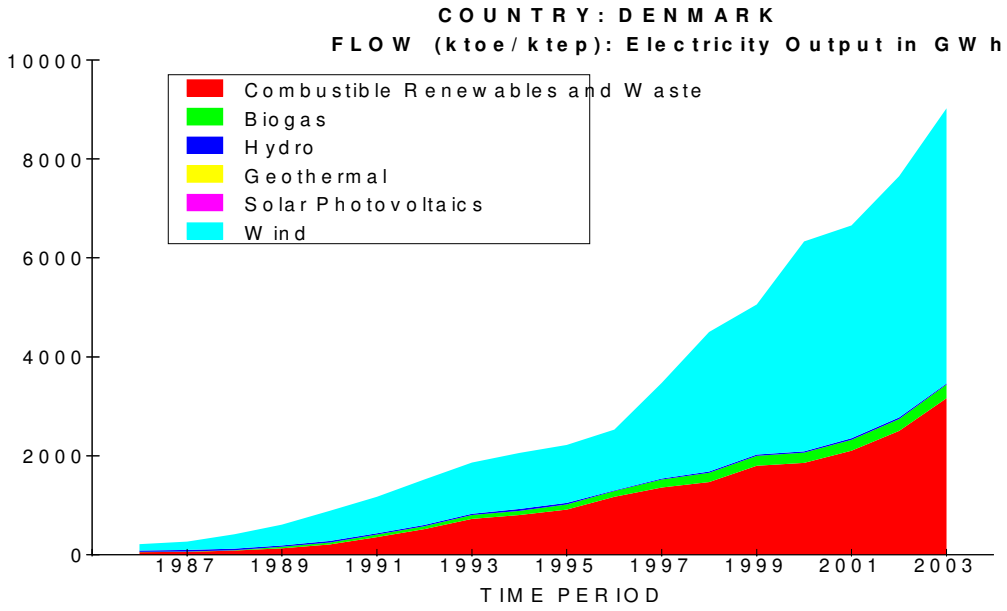


Figure A-3 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

The RES-E target to be achieved by Denmark in 2010 is 29% of gross electricity consumption. According to the governments new energy strategy the share of RE in primary energy shall be doubled to 30% up to 2025.

Policy timeline

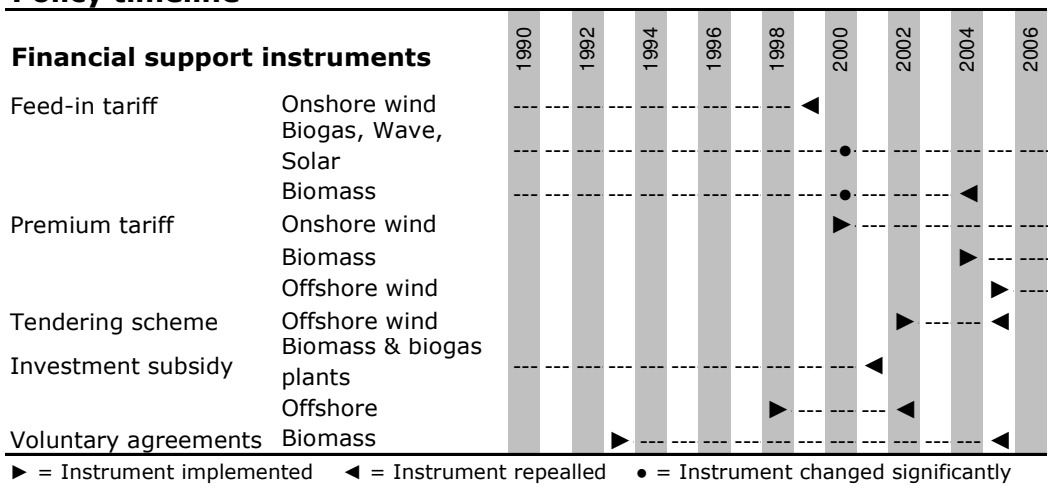


Figure A-4 RES-policies 1990-2006

Table A-2 Key policies and measures – Denmark

Financial support instruments for RES

Feed-in tariff 1981 - present	**Electricity Supply Act / Act on support for utilization of renewable energy** Over the years feed-in tariffs have been applicable for several technologies, starting with wind power in the 1980s. Currently it merely applies to biogas, solar, wave and tidal. For new installations a feed-in tariff of 80 €/MWh is guaranteed for a period of ten years, followed by 54 €/MWh for the next ten years.
1993 - 2005	**Biomass Agreement 1993 & 2000** Agreement with the major utilities to set an objective for wood and straw use in power plants. In 2000 the agreement was amended with a feed-in tariff for this power.
Feed-in premium 2000 - present	**Environmental premium** New onshore installations receive the spot market price plus an environmental premium (13 €/MWh) plus a compensation for balancing costs (3 €/MWh) for 20 years. Turbine owners are responsible for selling and balancing the power. This premium will also apply for future offshore projects. The environmental premium corresponds to the minimum price of a not yet implemented green certificate system. At present the producers receive in total approximately 57 €/MWh in the Western part of Denmark and approximately 58 €/MWh in the Eastern part.
Quota obligation 2005 - present	**Biomass agreement heat** Utilities are obliged to buy at least 1 million tonnes of straw per year starting in 2005.
Tendering scheme 2002 - 2005	**Offshore wind power tendering scheme** An agreement with the major utilities to install 750 MW of offshore wind by 2006 was in 2002 replaced by a tendering scheme. The tendering procedure is now finalised for two large offshore wind farms of 200 MW each. The settling price for the first of these (Horns Reef II) is negotiated to 70 €/MWh for 50,000 full load hours. Following this period the operators will only receive the spot market price. Balancing costs are to be covered by the owners. For future offshore projects the feed-in premium applies (see above).
Investment subsidy 1979-1989 1981 - 2001	**Act on support for utilization of renewable energy** Capital grants for wind power (15-30% of investment cost) Capital grants for biomass and biogas plants (15-30% of investment cost)

Impacts on conventional production affecting RES

Both electricity and gas markets are fully opened. The wholesale markets suffer from the dominant positions of market players. The retail market for households has a price cap. Denmark has two separate electricity grids (east and west) without interconnection.

Denmark has a long tradition of energy taxes. There are taxes on fossil fuels used for heat production, but no taxes on fuel used for electricity. In return for that electricity is subject to consumer taxes while heat is exempt. Hence RES competes with taxed fossil fuels in heat production, but with untaxed fossil fuels when used for electricity production.

RES policies

Since the beginning of the 1980s Denmark has experienced a rapid growth in the development of renewable energy technologies, especially wind power and biomass, supported by a feed-in tariff and investment subsidies. Owing to a change from the favourable feed-in tariff in the late 1990s to a less favourable premium tariff, the development of onshore wind power has slowed down the last 5 years. Though due to Governmental agreements and tendering procedures the development of Danish offshore wind power is still the strongest in Europe with the highest capacity installed per capita in the EU, but for future projects the premium tariff will also apply.

The use of straw in district heating plants began in the 1980s and in the 1990s utilities started using straw in combined heat and power (CHP) plants. The use of straw in CHP plants is expected to increase in coming years due to the objectives set out in the Biomass Agreement.

France

Summary

Renewable energy development in France has been rather moderate over the last years. The dominating RES-E technology is hydropower, despite vast potentials for wind and bioenergy. The high incentive of the French feed-in law has been hampered by complicated planning procedures and other administrative barriers. However, wind energy development speeded up significantly in 2006.
In the heating sector, solid biomass is the most important RE source, contributing at a relatively constant level. The French biofuel market is the second largest in the EU in terms of production.

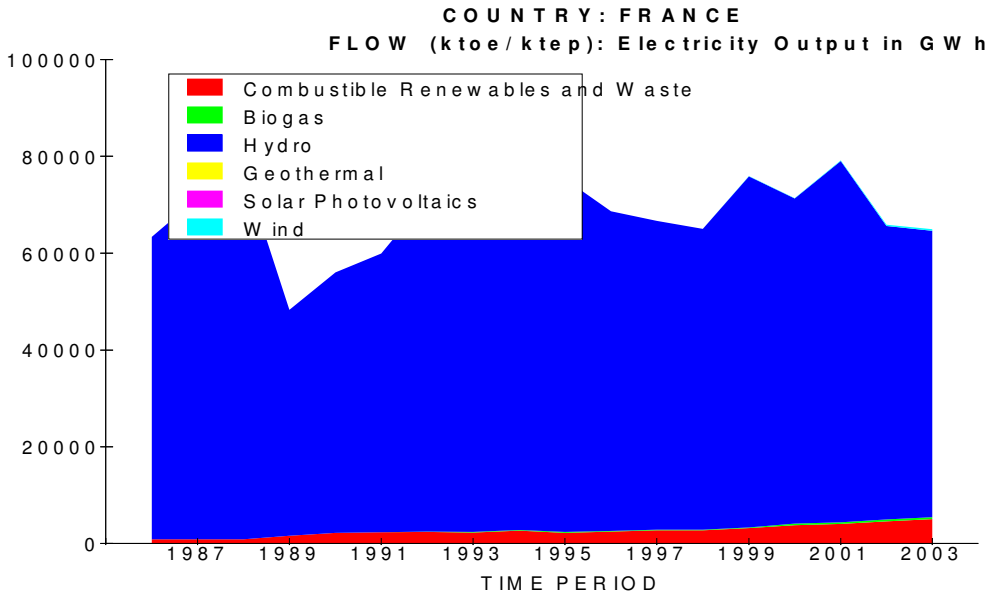


Figure A-5 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

The RES-E target of France is 21% of gross electricity consumption in 2010. The target for biofuels is 5.75% until 2008, 7% until 2010 and 10% in 2015. For renewable heat, no target exists.

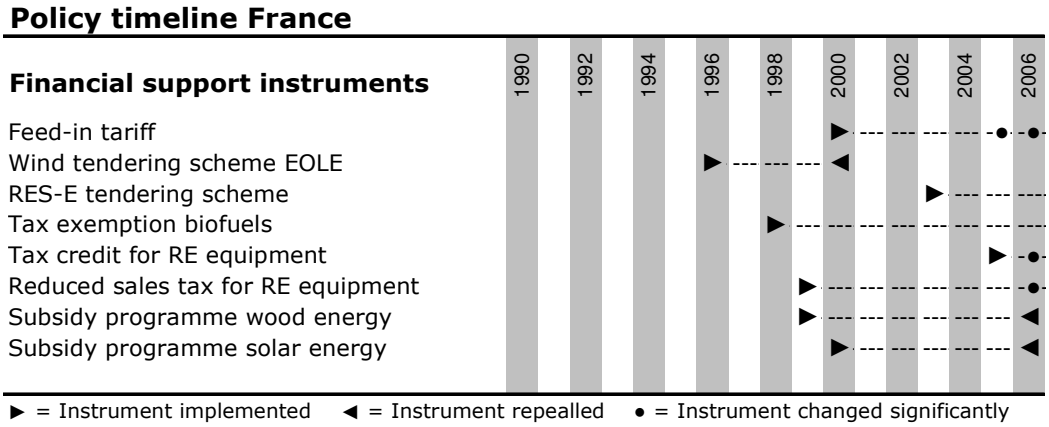


Figure A-6 RES-policies 1990-2006

RES policies

RES support in France is dominated by three types of instruments: the feed-in tariff for RES-E, multiple tax reductions for RES in all sectors, and different subsidy programmes run by ADEME.
The number of support programmes is high. Their conditions vary among regions and are subject to frequent changes. There are special incentives for RES in the French overseas departments DOM/TOM (not mentioned in the table).

Despite the relatively high feed-in tariffs, RES-E and especially wind energy development has been hampered by administrative barriers, mainly bureaucratic planning regulations. The change of regulation in 2005 improved the situation. After years of slow growth, the French wind energy market picked up speed in 2006: With a newly installed capacity of 810 MW, France more than doubled its market and became third in Europe (regarding new installations).

Table A-3 Key policies and measures – France

Financial support instruments for RES

Feed-in tariff 2000 – present	**Law 2000-108 on the modernisation and development of public services in the energy sector, modified by 2005-781 (Programme on the orientation of energy policy)** The law guarantees fixed feed-in tariffs to all renewable energy installations up to 12 MW (except for wind which has no longer this maximum limit but depends on the location of the installations within a certain reserved area, Law 2005-781). Tariffs depend on renewable energy source and may include a premium for certain technologies (e.g. for 70% heat valorization of biomass electricity or building integrated PV). Rates are corrected for inflation. PV-Systems: 300 €/MWh (20 years) + 250 €/MWh bonus if roof integrated; Biomass: 49 €/MWh, including premium up to 12 €/MWh (15 years) Wind onshore: 82 €/MWh for the first 10 years after installation, then between 28 and 82 €/MWh for the following 5 years depending on the local wind conditions (15 years). Wind offshore: 130 €/MWh for the first 10 after installation, then between 30 and 130 €/MWh for the following 10 years depending on the local wind conditions (20 years). Combined Heat and Power: 61 – 91.5 €/MWh
2006 – present	**Increase of feed-in tariffs (Plan Climat 2004 – Actualisation 2006)** Increasing the feed-in tariffs for PV and biogas from waste storage centres and agricultural installations.
Tendering scheme 2003 – present	**Tender for renewable electricity** A tender system is in place for RES installations > 12 MW (except wind). Tenders follow an open bidding process, where the winner gets a guaranteed price contract. The tariff contracted depends on the bid.
1996-2000	**Wind Energy Programme EOLE** Before the feed-in system was introduced, a tendering system was in place. Target of the annual tender was the installation of 250-500 MW wind energy capacity until 2005.
Investment subsidy 2000-2006	1 **Wood Energy Programme (Plan du bois)** For district and industrial heating, the programme foresees the installation of 1,000 new wood-based heating systems by 2006. It offers assistance in the form of advice/decision tools and investment subsidies.
2000-2006	**Solar Energy Programme (Plan Soleil)** This investment support programme for solar water heaters with an annual budget of 7 million € was managed by ADEME. The objective was to install a collector surface of 330,000 m^2 between 2000 and 2006, to promote equipments labels and increase installers' qualifications.
1996 - present	**Isolated sites electrification programme** Public funds dedicated to off-grid RE supply, to avoid creation of regular electric lines. The public financing can only occur if the costs are at least 15% inferior to costs of the extension of the electric line; and this financing can be up to 95% of the costs (5% remaining at the charge of the consumer).

Tax relief 2006 – present	**Tax credit (crédit d'impôt)** Private household installing renewable energy technologies can claim a tax credit of 50% of the capital costs (increased from 40% to 50% in 2006)
1999 – present	**Reduced sales tax** Sales tax for residential renewable energy equipment (e.g. PV and solar thermal plants) is lowered to 5.5% in mainland France and 2.1% in DOM/TOM (compared to 19.6% general sales tax)
2006-present	Sales tax lowered (5.5%) also for heat production networks which are supplied with at least 60% renewable energy/taken over energy/ energy derived from waste energetic enhancement.
1998 - present	**Tax relief for biofuels** A partial tax exemption for biofuels exists. Under the 'Custom Code' (Code des douanes), an additive to a fuel is submitted to the same tax than the fuel it is incorporated to (Tax on imported petrol products -TIPP), but biofuels are partially exempted from this TIPP.
Low interest loan 2006 - present	**Sustainable development savings account** (Plan Climat 2004 – Actualisation 2006) Funds collected on these savings accounts will allow banks to finance loans with attractive rates for energetic renovation of buildings, compensated by a tax exemption of these funds.
Flexible depreciation	**Flexible depreciation for enterprises** Enterprises can depreciate renewable energy investments within one year.

Impacts on conventional production affecting RES

Because of the fixed feed-in tariff scheme and the guaranteed price in the tendering scheme, renewable electricity is not directly affected by market prices.

Since 1998, there is a general tax (TIPP) on petroleum fuels (diesel, petrol, LPG; heavy and light oil) that provides funds to ADEME to support programmes for energy conservation and renewable energy deployment.

Regulation relevant for RES

Strong administrative barriers regarding planning procedures (site permissions etc.) have hampered the French RES-E market. There have been changes in administrative procedures (regional planning) for wind energy with regard to planning regulations (Law 2005-781), which have a positive impact on wind power development.

Germany

Summary

Germany shows a strong and continuous growth of RE in the electricity, heat and biofuel sector. Main drivers for the strong development of RE have been the German Renewable Energy Law in case of RES-E, the market incentive programme for renewable heat production and the tax exemption for the biofuel sector. The strongest growth in terms of total installed MW has been achieved by wind energy (total capacity in 2006: 20.6 GW), even though the market has slowed down due to a lack of good wind sites. Bioenergy growth (especially biofuels and biogas) has speeded up during the last three years.

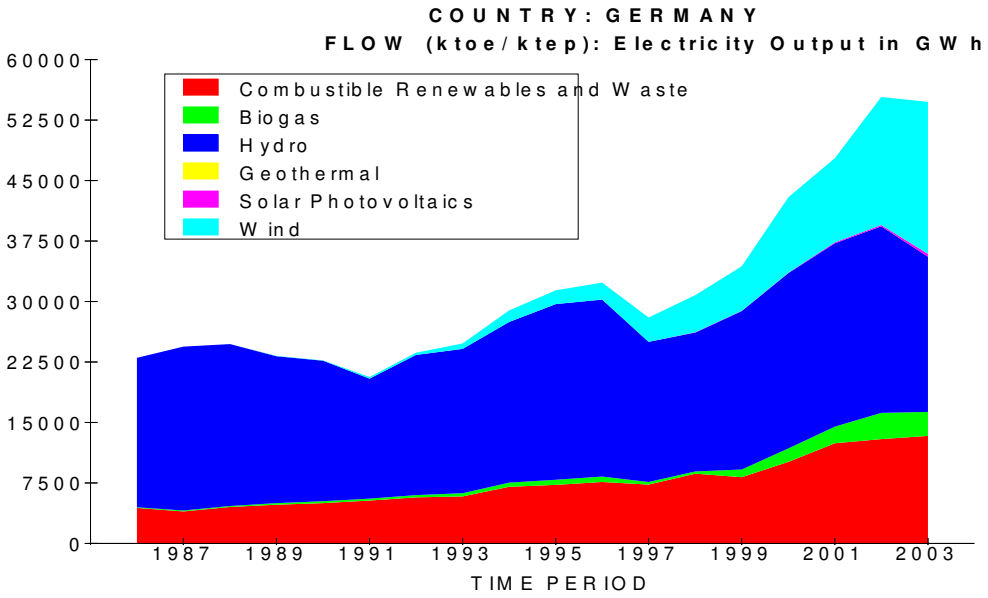


Figure A-7 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

Germany's RES-E target for 2010 within the EU is 12.5% of gross electricity consumption. This target will already be achieved in 2007 (12% were achieved in 2006). Additionally, Germany has set a national target for RE in 2020: 10% of total

energy consumption and 20% of electricity consumption. National indicative targets for biofuels amount to 2% in 2005 (already exceeded earlier) and 5.75% in 2010.

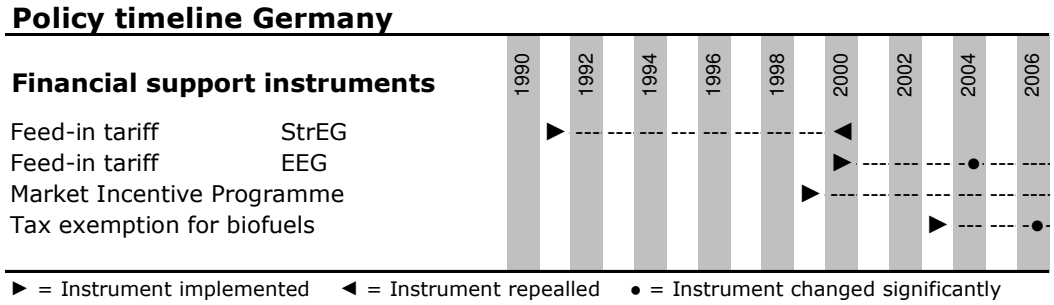


Figure A-8 RES-policies 1990-2006

Table A-4 Key policies and measures – Germany

Financial support instruments for RES

Feed-in tariff 2000 - present	**EEG: Renewable Energy Law** The EEG is the prominent support instrument for RES-E. It grants priority grid access and fixed technology-specific feed-in tariffs for a period of 20 years. The tariffs for new installations decrease every year by a certain percentage. In 2004, new tariffs have been adapted (lower for wind onshore, higher for bio-energies, geothermal and PV). The next review will take place in 2007. Wind (Onshore): up to 83.6 €/MWh for at least five years after installation. Reduction of tariff depending on yield of system to 52.8 €/MWh. Annual reduction of tariff by 2%. Wind (Offshore): up to 91 €/MWh for at least twelve years after installation. Reduction of tariff depending on yield of system to 61.9 €/MWh. Annual reduction of tariff by 2% starting in 2008. PV: 406 - 568 €/MWh, depending on size and whether plant is building integrated. Annual reduction of tariff by 5% in 2005 and by 6.5% from 2006 on. Biomass and biogas: Basis tariff level (up to 20 MW): 81.5 - 111.6 €/MWh; annual reduction of tariff by 1.5%. Reduced tariff for waste wood: 37.8 €/MWh Reduced tariff for landfill gas, sewage gas: 64.5 – 74.4 €/MWh Additional payments are available for: The use of untreated biomass: 40 – 60 €/MWh CHP-applications: 20 €/MWh Innovative technologies: 20 €/MWh Use of wood combustion[1]: 25 €/MWh
1990-2000	**StrEG: Electricity feed-in law** The StrEG provided one single fixed feed-in tariff for all RES-E technologies.
Quota obligation 2007 - present	**Biofuel quota** Obligation for a biofuel share of 2 to 4.5% biofuels (depending on fuel) in the conventional transport fuel supply.
Investment subsidy 1999 – present	**Market Incentive Programme** The programme grants investment subsidies for solar thermal and biomass heaters. In 2006, rates have been lowered due to high demand and rising energy prices. The total budget for 2007 is 213 Mio. €.
2000* – present	**CO_2 Building Rehabilitation Programme* and other KfW programmes** The State owned KfW bank runs several subsidy programmes for energy efficient building modernisation. These programmes also support investments in solar thermal, PV and biomass heating installations.
Tax relief 2003 – 2006	**Tax exemption for biofuels** Biofuels have been exempt from the fuel tax until the end of 2006. From 2007 to 2009, taxes will increase to normal level.
- 2005	Favourable income tax regulations for wind energy investments. Expired in 2005.

[1] However, the premium for untreated biomass is not applicable together with the premium for use of wood combustion.

Low interest loan	**KfW, DtA and regional programmes** KfW and DtA bank, as well as some programmes on regional (Bundesländer) level, give low interest loans for energy efficient and renewable energy investments.

Impacts on conventional production affecting RES
The German electricity market is characterized by a high degree of vertical and horizontal integration dominated by very few large companies. This structure in combination with congestion at interconnectors as well as some specific problems related to network access is thought to prevent effective competition from developing and to increase barriers for new entrants and independent investments in new power plants.
Regulation relevant for RES
Especially in Northern Germany limited grid capacity affects wind power production. At times of extraordinary high wind power production and low local consumption wind power has to reduce its production.

RES policies

Main drivers for the strong development of RES have been the German Renewable Energy Law (EEG) in case of RES-E, the market incentive programme for renewable heat production and the tax exemption for the biofuel sector. Success factors of the EEG have been stable investment conditions, priority grid access and sufficiently high tariffs. The market incentive programme also managed to stimulate the RES-H market, but has produced some stop & go due to budget restrictions. It is not clear yet if the change of policy in the biofuel sector will slow down the market growth.

Ireland

Summary

Traditionally hydropower is by far the most important RES-E source in Ireland, though in recent years production from other RES-E has been moderately increasing, especially wind (first onshore but increasingly offshore) and biogas. The new feed-in tariff is expected to provide more positive investment conditions than the previous tendering scheme.

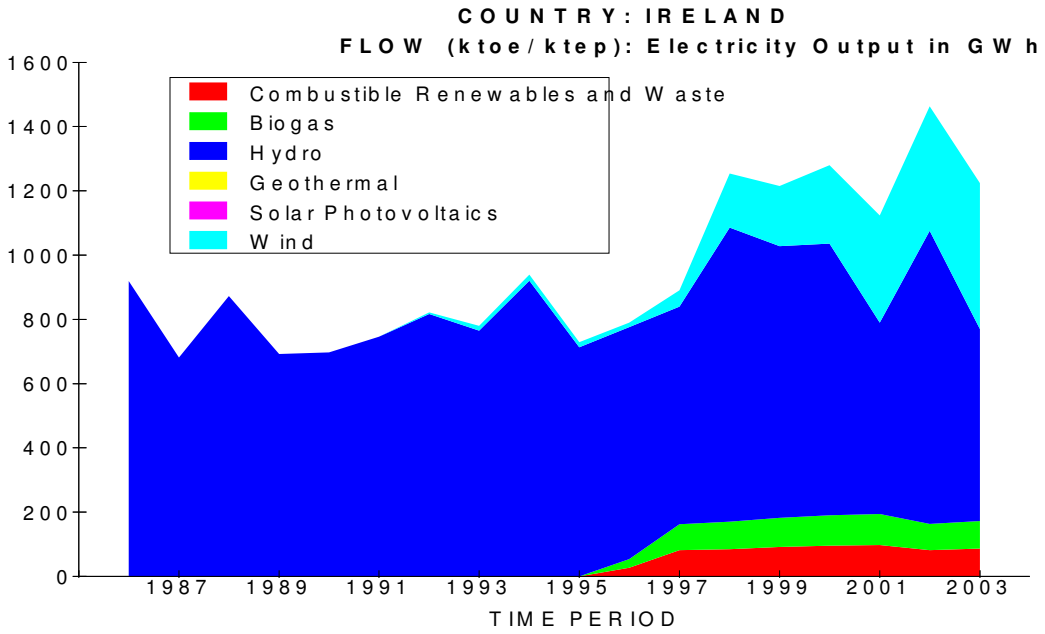


Figure A-9 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

The RES-E target to be achieved by Ireland in 2010 from the EU Directive is 13.2% of gross electricity consumption. Nationally Ireland has set a target of 15% RES-E by 2010. The Energy Green Paper published in October 2006 calls for 30% RES-E in 2020.

Policy timeline

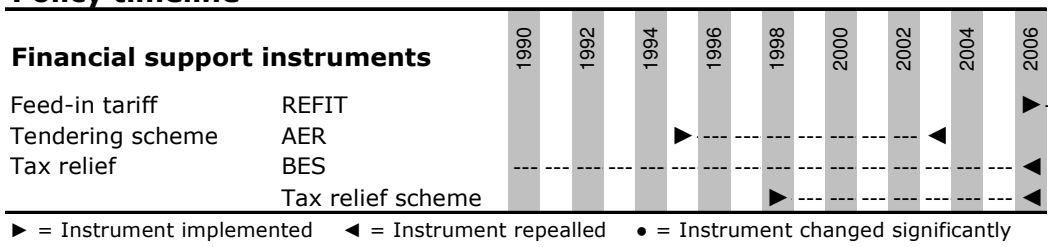


Figure A-10 RES-policies 1990-2006

Table A-5 Key policies and measures Ireland

Financial support instruments for RES

Feed-in tariff 2006 – present	**REFIT: Renewable Energy Feed-In Tariff** From early 2006 new RES-E projects and any projects that were approved but not built in AER Round VI will be eligible to apply for the new feed-in tariff system. The REFIT offers differentiated tariffs for Wind, Biomass and Hydropower which will be guaranteed for up to 15 years. However support has not been confirmed beyond 2024, meaning that guaranteed REFIT payments should start no later than 2009. REFIT was launched with an initial target of at least 400 MW capacity of RES-E by 2010. A precondition for support is to have consent for grid connection and projects with more than 1000 MW have already applied. Thus the targeted capacity will already be overachieved with the currently planned projects, which reduces incentives for further project development. In September 2006 the Irish Government announced the allocation of REFIT support to 55 new renewable electricity plants with a combined capacity of over 600 MW. Wind power so far accounts for 98% of all the new REFIT support. Tariffs for wind are 57 €/MWh (<5 MW) and 59 €/MWh (>5 MWh, for landfill gas 70 €/MWh and for other biomass 72 €/MWh.
Tendering scheme 1995 - 2003	**AER: Alternative Energy Requirement Programme** The Alternative Energy Requirement (AER) was a competition for investors in which the lowest bidders were offered a Power Purchase Agreement of up to 15 years. The AER had six rounds held between 1995 and 2003.
Tax relief 1984 – 2006	**BES: Business Expansion Scheme** The BES was an incentive to private investors to invest equity in amongst others the RE sector. Individual investors holding a BES equity investment for a minimum period of five years could benefit from tax relief at their marginal tax rate for investments of up to € 31,750 per year. The aggregate amount that a company could raise under the BES was € 1,000,000.
1998 - 2006	**Tax relief scheme** The tax relief scheme applied to wind, hydro, solar and biomass energy projects approved by the Department of Public Enterprise. A company could invest up to €38 million (M€12.69 p/a over three years) in a number of renewable energy projects for which it could recoup tax relief at whatever rate the company paid from its own profits.

Impacts on conventional production affecting RES

The incumbents (ESB and NIE) dominate the electricity markets in Ireland. Electricity prices are affected by the EU Emission Trading System, but this does not affect RES-E producers due to the feed-in tariff.

Regulation relevant for RES

Administrative planning procedures are no longer a barrier for RE development, but grid integration still is.

RES policies

Ireland was the last EU country using a tendering scheme as the main instrument to support renewable energy. The AER tended to lead to relatively poor quality of equipment as the lower-price bids won the competition. A lack of co-operation did exist in the Irish RE industry, as a direct result of the tendering scheme. In April 2005, it was announced that the support scheme for renewable electricity would be changed to a feed-in tariff system. The 15 year feed-in tariff should increase investor certainty and end the stop-and-go nature of the renewable market, but a low deployment target and grid integration barriers limit the development.

Italy

Summary

Italy showed some growth in the production of RES-E from wind and biogas, but insufficient to keep pace with electricity consumption growth. Support policies are instable, authorisation procedures long and complex, and grid connection costs high. Currently the main support instrument is a quota obligation for most technologies and a feed-in tariff for PV. A change back towards a feed-in tariff for all technologies like in the 1990s is under discussion. Italy is the only European country with a substantial amount of geothermal electricity production.

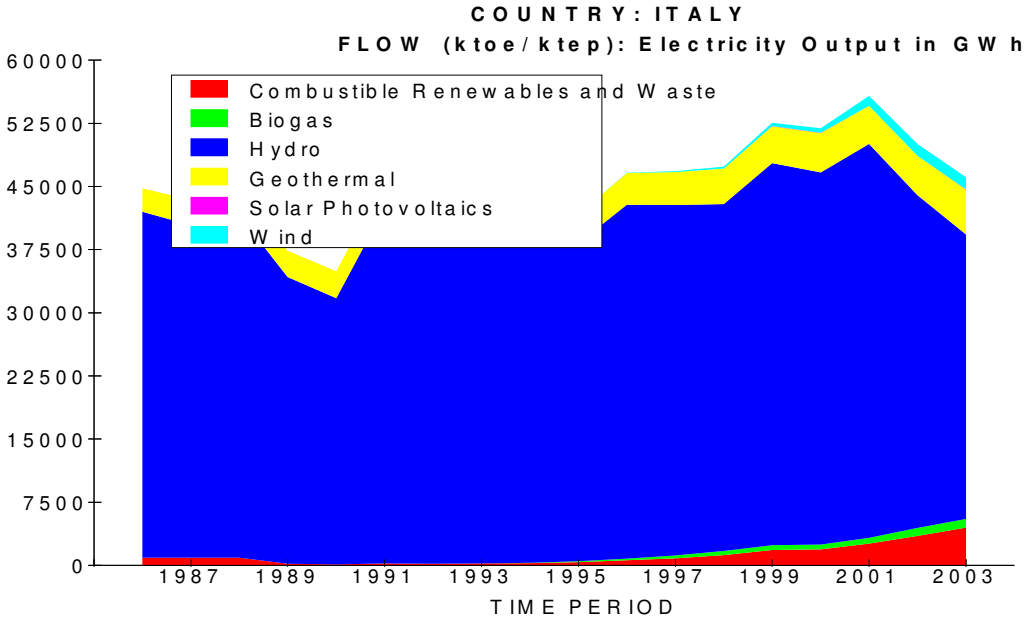


Figure A-11 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

The RES-E target to be achieved by Italy in 2010 is 25% of gross electricity consumption

Policy timeline

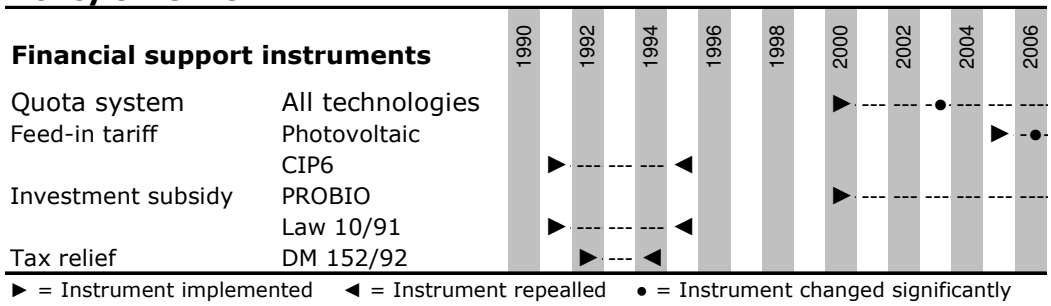


Figure A-12 RES-policies 1990-2006

Table A-6 Key policies and measures – Italy

Financial support instruments for RES

Quota obligation 2001 - present	**For RES-E despite photovoltaic** Obligation for producers and importers of electricity to feed in a given share of RES-E into the power system. Target percentage has so far been increasing by 0.35% per year. Tradable green certificates exist. Quotas for 2007-2009 not yet set. Legislation is currently vague and weak in terms of non compliance and consequent sanctions. A draft law for a change towards a feed-in tariff is currently under discussion. The average price for green certificates has been 109 €/MWh in 2005.
Feed-in tariff 2005 – present	**For photovoltaic** Feed-in tariffs are paid for 20 years. Tariffs are differentiated according to size, year of commissioning, and whether installations are building integrated or not.
1991 - 1995	**CIP6** Feed-in tariff for several technologies; mainly used for CHP. Stopped due to lack of resources.
Investment subsidy 2000 – present	**PROBIO** Investment subsidies for biomass projects, included in the Biomass Fuels National Plan (PROBIO) (CIPE resolution of February 2000).
1991 – 1995	**Law 10/91** Investment subsidies for several technologies.
Tax relief 1992 - 1994	**DM 152/92** 50% income tax relief for individuals and private companies for investment cost.

Impacts on conventional production affecting RES

Production of RES-E under the quota obligation is affected by conventional electricity prices. The latter are subject to the EU Emission Trading System and an excise and carbon tax for fossil fuels.

Regulation relevant for RES

The major problems of developing new production capacity are complex authorisation procedure at local level and high grid connection costs.

RES policies

During the 1990s the main support instrument was a feed-in tariff. Since 2001 a quota obligation with tradable green certificates has been used. In 2005 a separate feed-in tariff for photovoltaic was implemented. Currently a draft law is under discussion which proposes to replace the quota obligation with a feed-in tariff. Although support levels seemed to be sufficient in the past, the development of RES-E is disappointing. This is mainly due to the policy instability, the complex and long authorisation procedures at local level and the high grid connection costs. The use of geothermal energy is historically at this level and not related to one of the recent support instruments. No specific national support instruments exist for RES-H.

Japan

Summary

The Renewables Portfolio Standard (RPS) is currently the main support instrument for electricity generation from renewable energy sources in Japan. The target formulated within scope of the RPS is 1.35% of electricity sales coming from renewables by the year 2010 (excluding large hydrpower, i.e. hydropower > 1 MW).

PV plays a very strong role in Japan, with the country having the highest installed PV capacity in the world after global leader Germany. Past and current financial support for PV in Japan has mainly been aimed at RD&D. Under the RPS, introduced in 2003, PV is one of the eligible technologies.

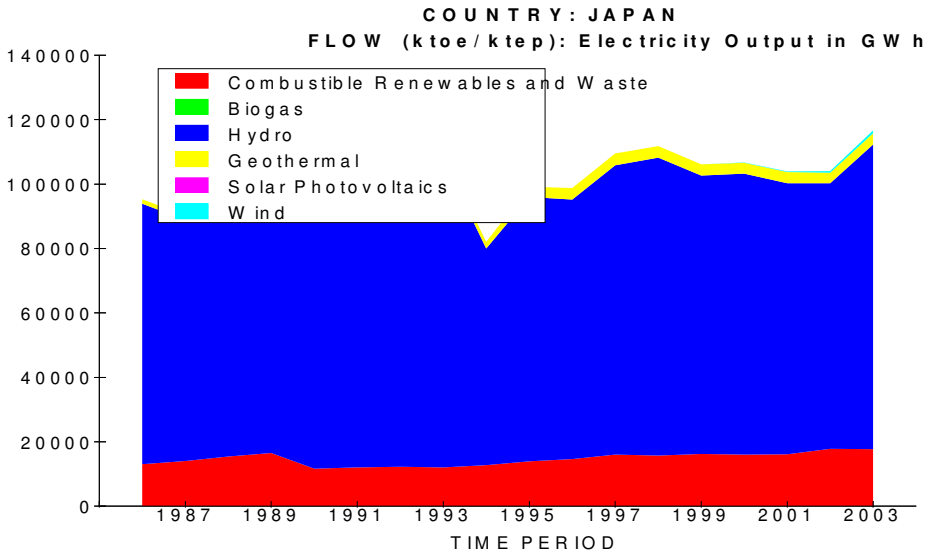


Figure A-13 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

The New Energy Law (1997) introduced a target of 3.1% of Japan's primary energy supply to come from renewables by 2010 (excluding hydroelectric and geothermal energy).

In 2000 the corresponding figure was approximately 1.2%.

The 2010 targets for each type of renewable energy are:
- PV: 4820 MW (from 452 MW in 2001).
- Solar thermal use: 4 390 000 kl (from 820 000 kl in 2001).
- Wind: 3000 MW (from 312 MW in 2001).
- Waste power generation: 4 170 MW (from 1 108 MW in 2001).
- Waste thermal use: 140 000 kl (from 45 000 kl in 2001).
- Biomass generation: 330 MW (from 71 MW in 2001).
- Biomass thermal use: 670 000 kl.
- Others (black liquor, waste wood, etc) 4 940 000 kl (from 4 460 000 kl)

Source: IEA, 2004

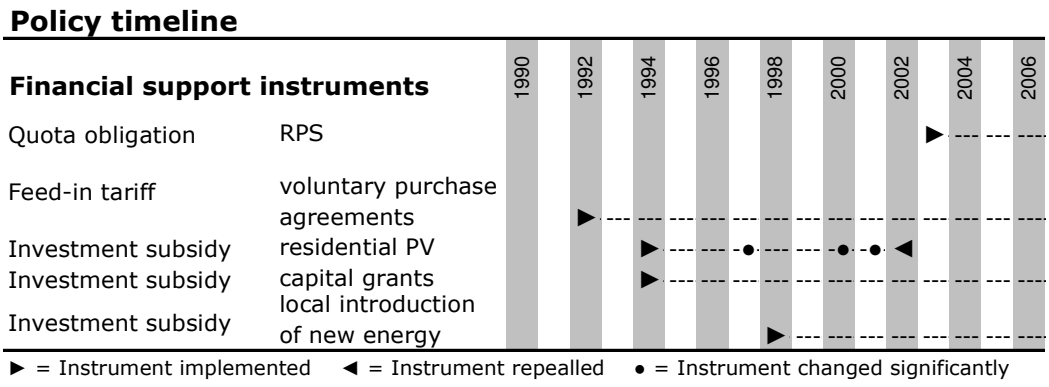


Figure A-14 RES-deployment and RES-policies 1990-2006

Table A-7 Key policies and measures – Japan

Financial support instruments for RES

Feed-in tariff	
1992 – present	**Voluntary purchase agreements** Voluntary agreement between government and energy suppliers to buy electricity generated from renewables at the household retail price. The voluntary purchase agreements focused on solar and wind. The contract period is from 15 to 17 years.
Quota obligation 2003 - 2010	**Renewables Portfolio Standard** Obligation on electricity suppliers, including a certificate system. Eligible technologies are offshore wind, onshore wind, PV, solar thermal electric, CSP, biomass, hydropower (<1 MW) and geothermal. For 2010 a target of 1.35% of electricity sales coming from renewables is set.
Investment subsidy 1994 - 2002	**Subsidy programme for residential PV systems** Subsidy for individuals and owners/developers of houses. The subsidy program is funded by electricity surcharges. The subsidy covers part of the cost of PV modules, its peripheral equipment, distribution lines and installation work. The subsidy covered 50% of the cost from 1994 to 1996 and one third of the cost from 1997 to 1999. In 2000 the subsidy rate was JP¥ 270 000/kW in the first half of the year, up to 10 kW and JP¥ 180 000/kW, up to 4kW in the second half of the year. It was further reduced to JP¥ 150 000/kW, (up to 4kW) before the end of the fiscal year. In 2001 the subsidy was reduced to JP¥ 120 000/kW. In 2002 the subsidy was further reduced to JP¥ 100 000/kW.
1994 - present 1998 - present	**Capital grants to end-users and industry** Grants are mainly aimed at development of PV and wind **Promotion for the local introduction of new energy** Subsidy from NEDO for renewable energy projects at the local level. Public entities and NGOs are eligible for a subsidy to promote PV, biomass, waste and wind power generation, fuel cells, solar thermal, natural gas co-generation, waste thermal, waste fuel production, biomass thermal use, clean energy vehicles and water-source heat pumps. The subsidy rate is up to 50% of the cost for installation, deployment, promotion of public awareness and related activities.

Impacts on conventional production affecting RES

Under the RPS, electricity suppliers need to meet an obligation. The additional costs for electricity generation from renewable energy sources, needed to meet this obligation, depend on the level of the conventional electricity price.

Regulation relevant for RES

In order to facilitate a stronger development of wind energy, rules should be established regarding how the costs of grid reinforcement should be borne, and how the transmission network should be improved and maintained[2].

RES policies

The main support instrument for electricity generation from renewable energy sources is the Renewables Portfolio Standard (RPS), which was introduced in 2003. Eligible technologies are offshore wind, onshore wind, PV, solar thermal electric, CSP, biomass, small hydropower and geothermal. The target formulated within scope of the RPS of 1.35% of electricity sales coming from renewables by 2010 is modest. Wind power and the organic fraction from municipal solid waste are expected to contribute most to the realisation of the target.

The voluntary agreements between government and energy suppliers to buy electricity generated from renewables at the household retail price, introduced in 1992, were the most important drivers for electricity generation from renewable energy sources in the period up to 2002.

Financial support for PV in Japan has mainly been aimed at RD&D. Financial support for PV cell technology has been significant in Japan, starting with the Moonlight and Sunshine Projects in the 1970s and 1980s. Support for RD&D was continued with the New Sunshine Program, which ended in 2000. The aim of the subsidy program for residential PV systems was to promote the development of PV systems. The program ran from 1994 up to 2002. Since 2003 PV is one of the eligible technologies under the RPS.

[2] Discussion Points in Japan's Renewable Energy Promotion Policy - Effect, Impact and Issues of the Japanese RPS, S. Nakakuki, H. Kudo, 2003

Netherlands

Summary

The most important RE technologies in the Netherlands in terms of deployment and growth are wind power and biomass co-firing. Other technologies show only little progress compared to their potential. The most important support instruments are a feed-in premium for RES-E and a tax relief scheme for both RES-E and RES-H. Investments in RE are heavily affected due to the political uncertainty about renewable energy support and the frequent policy changes in the past.

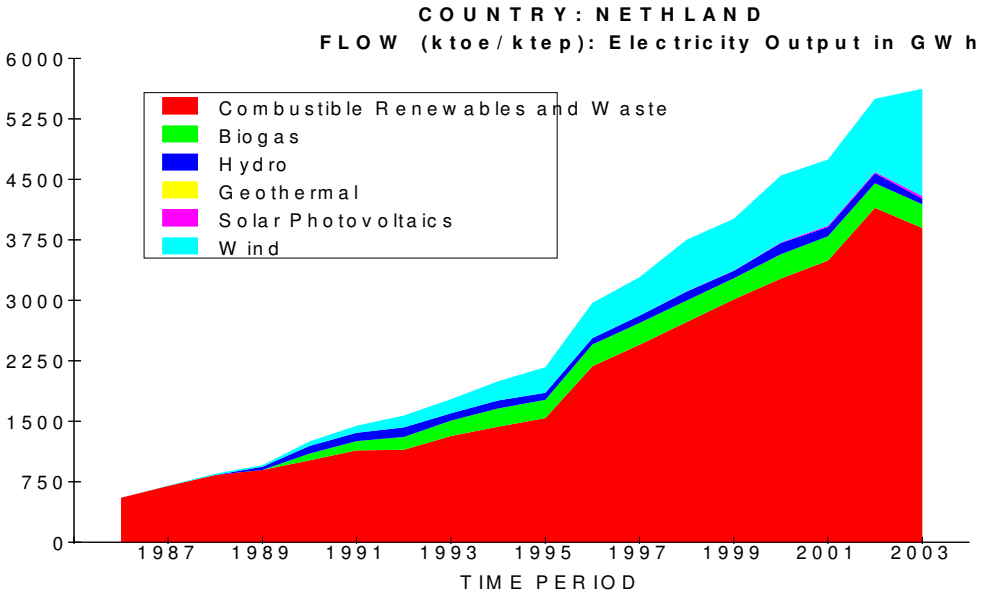


Figure A-15 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

The Dutch climate policy contains an overall target of 10% renewable energy contribution to primary energy demand by 2020 with an interim indicative target of 5% by 2010. The RES-E target to be achieved by the Netherlands in 2010 is 9% of gross electricity consumption.

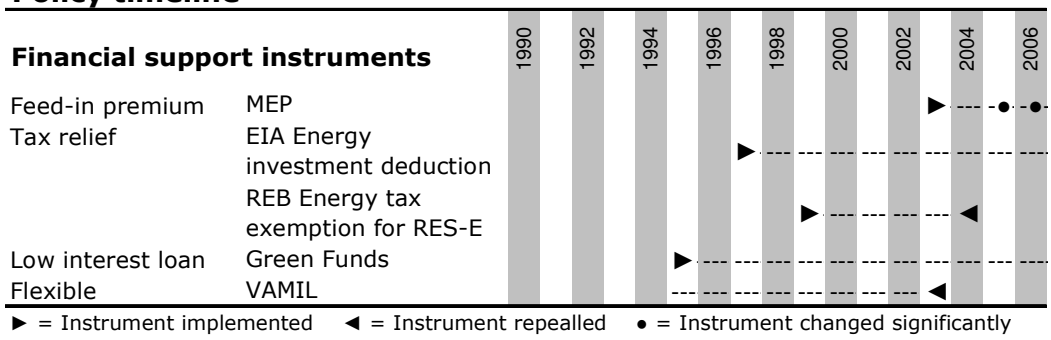


Figure A-16 RES-policies 1990-2006

Table A-8 Key policies and measures – Netherlands

Financial support instruments for RES

Feed-in premium 2003 – present	**MEP: Environmental quality of electricity production** MEP is a feed-in premium which is paid on top of the market price for electricity. In May 2005 feed-in premiums for large scale pure biomass (>50 MWe) and offshore wind were temporarily set at zero. The reason was a lack of budget due to strong development of especially offshore wind farms (available budget is financed through a fee for every electricity consumer, which is always defined one year ahead). The premium tariffs of the MEP scheme were put at zero in August 2006 for all newly applying projects, as the government expected that the RES-E target for the Netherlands (9% in 2010) would be reached if all projects that already applied for the MEP would be realised. The future of the instrument has to be decided by the new government. Before the MEP was discontinued, the premium for offshore wind, PV, tidal and wave, and biomass < 50 MW was 97 €/MWh, for onshore wind 77 €/MWh and for biomass > 50 MW 70 €/MWh. The premium was paid for 10 years.
Tax relief 1997 - present	**EIA: Energy investment deduction** Allows companies to deduct investments from their taxable profit. Applies to several RE technologies. Occasionally stopped due to budget restrictions.
1999 - 2004	**REB: Energy tax (exemption for RES-E)** The REB is an energy tax for small and medium-size customers which still exists. Between 1999 and 2004 RES-E was exempted from the tax and parts of the proceeds could on voluntary basis be used by suppliers as a premium tariff for RES-E. As the tax exemption was also applicable to RES-E imports it stimulated a massive increase in their consumption. The REB exemption for RES-E was phased out and replaced by the feed-in premium MEP.
Low interest loan 1995 - Present	**Green Funds** Interest or dividends derived from funds investing in RE are exempt from income tax. This should result in loans at lower interest rates.
Flexible depreciation 1990's - 2003	**VAMIL (Willekeurige afschrijving milieu-investering)** Allowed companies to decide when they want to depcreciate their investment. Applied to several technologies, but currently only to biogas and co-firing of biomass powder.

Impacts on conventional production affecting RES

As the main support scheme is a premium tariff, RES-E production is also depending on conventional power prices. The power market is rather liberalised with the TSO owned by the state. Power and heat prices are influenced by an energy tax (REB) as mentioned above, power prices and district heating additionally by the EU Emission Trading Scheme.

Regulation relevant for RES

Administrative procedures for RES projects can result in very long lead times. Administrative procedures for large wind and biomass projects (>50 MW) can be simplified and shortened through the new National Project Procedure (RPP, Rijks Projecten Procedure).

RES policies

Up to 2003 the Dutch market for renewable electricity was characterised by high support and market openness, which resulted in a large increase of green power consumption. As the Dutch support scheme (tax exemption for RES-E) was also open for RES-E produced abroad, it led to high imports of already existing RES production as well (e.g. hydro power from Norway). As it did not give sufficient incentives for an increase of domestic RES-E production the policy support scheme was heavily criticised and accordingly revised. A new support scheme (MEP - feed-in premium) has been in operation since July 2003, which led to increasing investments and deployment of RE, but the premium tariffs were put at zero in August 2006. The feed-in premium also applied to CHP. The other main support instrument, the tax relief EIA, applies to both RE heat and power production, but is at times stopped due to budget constraints.

Remarkable is the strong growth of solid biomass as RES-E source since 1999, mainly due to co-firing. A strong increase can also be seen in wind power production. With 2,731 GWh in 2005 the Netherlands are number 4 in Europe in terms of wind power production. The first offshore wind park are currently erected. The PV market decreased in 2005 with 2.1 GWp installed capacity compared to 5.6 GWp in 2004 due to a stop of the highly favourable support schemes.

The political instability in the past and resulting uncertainty on future energy support programmes resulted in withholding new renewable energy investments.

Norway

Summary

Virtually all electricity in Norway is currently produced in hydropower plants. Increased deployment of wind power and use of biomass for central heating is envisaged and some development can be observed. The main support instrument is an investment subsidy.

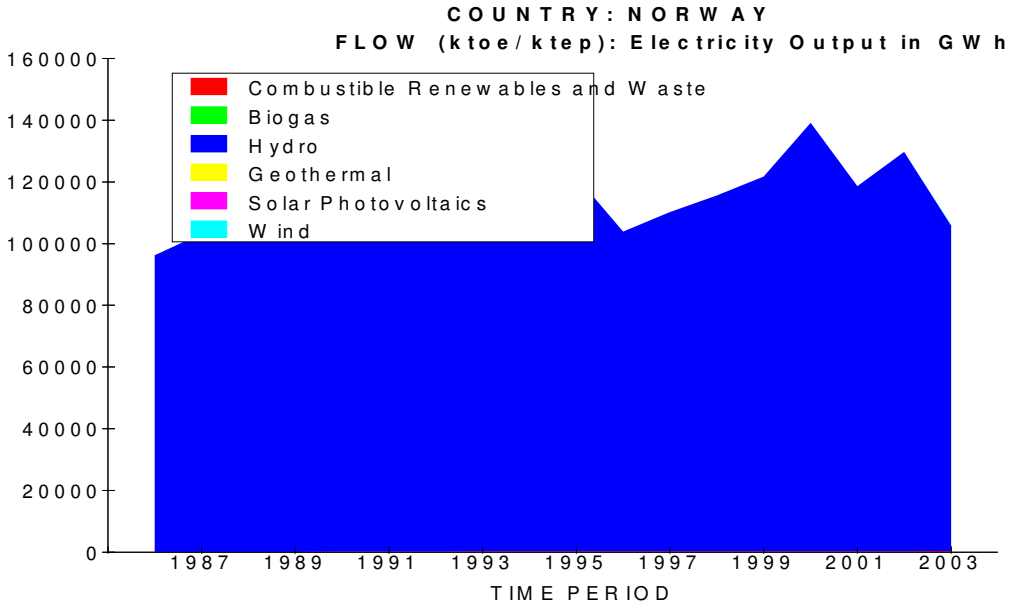


Figure A-17 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

As all of Norway's electricity is already generated from RE, its national targets focus on the introduction of specific technologies: Wind power production of 3 TWh/a and additional use of RE in central heating of 4 TWh/a in 2010.

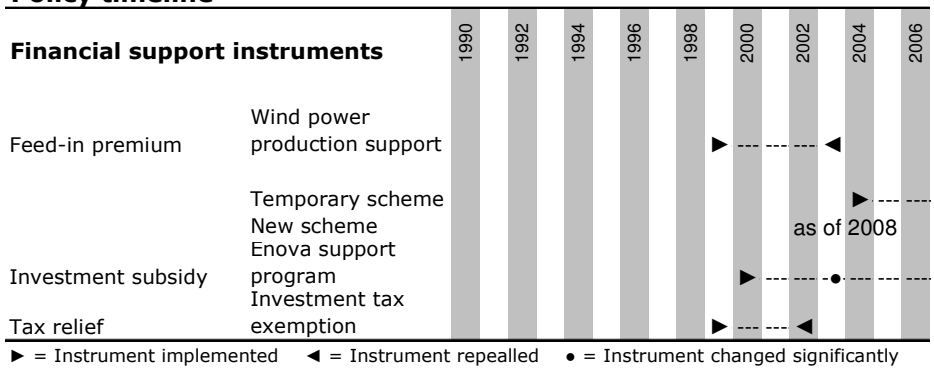


Figure A-18 RES-policies 1990-2006

Table A-9 Key policies and measures – Norway

Financial support instruments for RES

Feed-in premium 1999 – 2003	**Wind power production support** The support level for wind corresponded to half of the consumer electricity tax.
2008 -	**Announced new premium** The premium will be available as of 2008. The premium for wind is about 10 €/MWh for 15 years, 5 €/MWh for small hydro (<3 MW) and 12.5 €/MWh for other renewable technologies. If wholesale electricity prices are rising above 56 €/MWh the premium is gradually reduced by 60% of the additional wholesale price.
Investment subsidy 2000 – present	**Enova support program** Investment subsidy for wind power, bio energy, waste heat, solar and heat pump projects. The support is based on cash flow analyses and project profitability, and provides on average investment support in the region of 25%,.Sources come from a fund fed from electricity tax revenues and is administered by Enova. It also covers efficiency programs.
Tax relief 1999 - 2002	**Investment tax exemption** Norway offered an exemption from its 7% investment tax to investments in new renewable energy, heat pumps, district heating, natural gas grids, small-scale hydro-power plants and refurbishment of all hydro power plants. The investment tax was abolished in 2002.

Impacts on conventional production affecting RES

In 1999 a consumer electricity tax was implemented. In the same year a comparably high CO_2 tax was introduced which has no impact on electricity prices due to the absence of power production based on fossil fuels.

Regulation relevant for RES

Long permitting procedures especially for wind power.

RES policies

In 1999 a feed-in premium and a tax relief were introduced which were both abolished in 2002 and 2003 respectively. Since 2002 the main support instrument is an investment subsidy. The installed capacity of wind turbines increased from 13 MW in 2001 to 325 MW in 2006. The use of biomass also increased, mainly in district heating and the pulp and paper industry. A new feed-in premium will be applicable as of 2008.

Portugal

Summary

RES development in Portugal was modest until 2004. Since 2005 a stronger support framework for renewable energy is in place, due to an improved system of feed-in tariffs and reduced administrative barriers. The stronger support framework is expected to lead to a stronger development of renewables. The vast majority of new generation capacity is expected to come from wind.

The main policy instrument is a feed-in tariff. Over time the system of feed-in tariffs has been adapted to give more investor confidence. Particularly the guaranteed period of time of feed-in tariffs has been gradually increased from 8 years (up to 2001) to 15 years (since 2005)

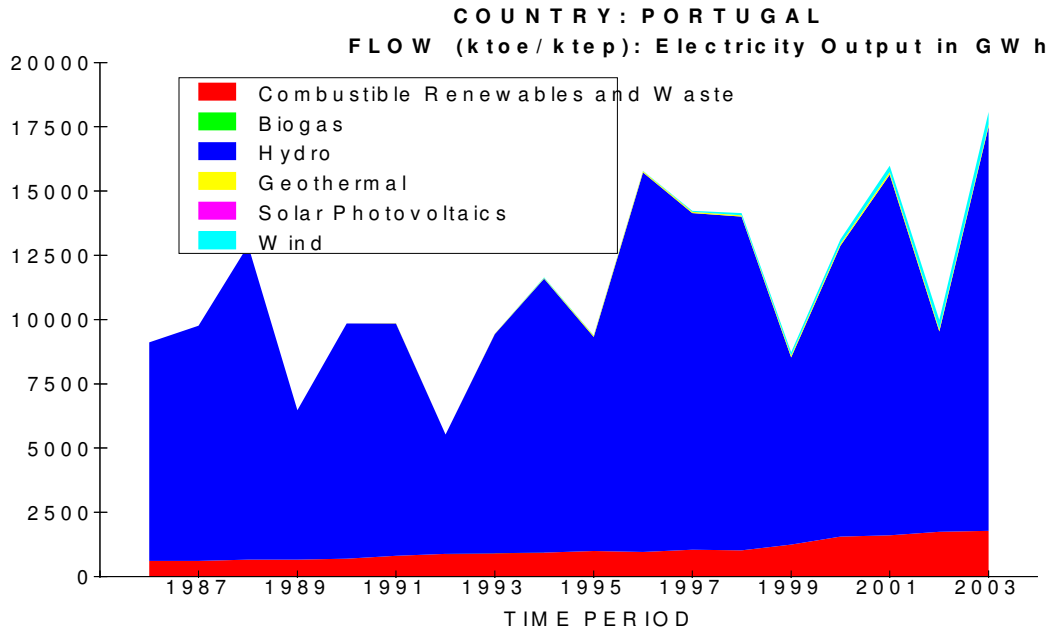


Figure A-19 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

Resolution of the Council of Ministries (RCM 63) of 2003 introduces 2010 targets for electricity produced from renewable energy sources:

Table 2. Targets for Renewables Generating Capacity in 2010

	Installed Capacity (MW) 2001	Installed Capacity (MW) 2010
Wind	101	3 750
Small hydro	215	400
Biomass	10	150
Biogas	1	50
Solid waste	66	130
Wave	0	50
Solar photovoltaics	1	150
Large hydro	4 209	5 000
Total	**4 603**	**9 680**

Source: *Departamento de Energias Renováveis.*

Source: IEA, 2004

The targeted contribution of the increase of installed capacity in 2010 for wind is very high: 74%.

Policy timeline

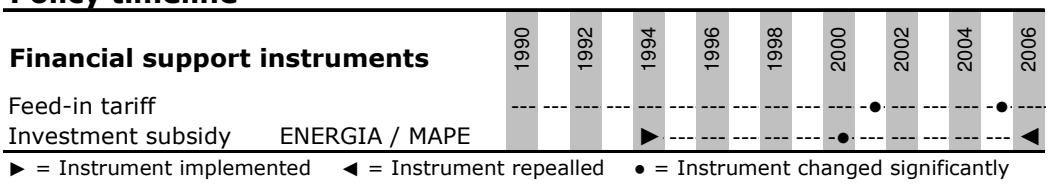


Figure A-20 RES-policies 1990-2006

Table A-10 Key policies and measures – Portugal

Financial support instruments for RES

Feed-in tariff 1988 – present	**Decree-law 189/1988: Independent Power Production law (IPP)** Establishment of feed-in tariffs
2001 - 2003	**Decree-law 339-C/2001 / E4 (Energy Efficiency and Endogenous Energies) programme** Revision of feed-in tariffs. Revision includes introduction of tariff differentation according to renewable energy technology. Increase of guaranteed period from 8 to 12 years.
2005 - present	**Decree Law 33-A/2005** Revision of feed-in tariffs. Feed-in tariffs are guaranteed for 15 years.
Investment subsidy 1994 - 2000	**ENERGIA Programme** Investment incentives
2000 - 2006	**Measure for Supporting the Use of Energy Potential and Rational Use of Energy Programme (MAPE/POE)** Investment incentives (up to 40% of the project investment costs) and loans with no interest. Eligible sources: wind, biomass, PV, geothermal and small hydro (<10 MW). Support is available for the construction, modernization or expansion of power plants using these sources. The incentive consists of two parts: a grant of 40% of the eligible cost of the project, limited to 300 k€, and a zero-interest loan based on 40% of the remaining eligible cost of the project. The incentive cannot be accumulated with other financial support measures. As of 1 January 2007 the MAPE programme is on hold. It is uncertain whether it will be available in the future again[3].

Impacts on conventional production affecting RES

The feed-in tariff is a fixed tariff, thus being independent of the prices on the power spot market. The level of the feed-in tariff depends however on time of supply, i.e. peak or off-peak. During peak times the level of feed-in tariff is higher than during off-peak times.

Regulation relevant for RES

Grid connection has for long been a strong barrier to the development of electricity generation from new renewable energy sources, due to complicated and lengthy grid licensing procedures. Recently efforts were taken to reduce this barrier. In 2005 a tender for grid licensing for 1500 MW wind was launched. In 2006 several tenders for the grid connection of biomass power plants were launched.

[3] Personal communication, DGE, March 2007

RES policies

Feed-in tariffs are the main support instrument for the promotion of electricity generation from renewable energy sources in Portugal. Feed-in tariffs are in place since 1988. In the beginning the level of tariffs was not sufficient to unlock Portugal's renewable energy potential. Over time the system of feed-in tariffs has been adapted to give more investor confidence. Particularly the guaranteed period of time of feed-in tariffs has been gradually increased from 8 years (up to 2001) to 15 years (since 2005). This has led to increased development of renewable energy over the past few years.

The MAPE programme was in place until 31 December 2006. In the period 2001/2004, 84 investment projects were approved, with a total capacity of 726 MW. The financial incentive given was EUR 172 million, corresponding to a total investment of EUR 867 million. Support from the MAPE programme was limited to 300,000 €, which made it unattractive for large-scale renewable energy deployment.

Grid capacity problems hamper a larger uptake of renewable electricity in some Portuguese regions. Complex and slow licensing procedures have resulted in long lead times for new small-scale hydropower production.

Spain

Summary

A strong development of RES-E technologies, especially wind and PV can be observed. A stable system of feed-in tariffs and premiums combined with low interest loans provides high transparency and certainty in the market. Financial support for biomass has been relatively low up to now, leading to modest development of the biomass sector. In a draft law published 29 November 2006 reduced support for new wind and hydro plants is foreseen, but rising tariffs for biomass, biogas and solar thermal electricity. It also includes a cap and floor mechanism for the premium. Wind power in Spain has developed impressively. Wind farms are mainly developed and owned by consortia formed by utilities, regional institutions involved in local development, private investors and sometimes manufacturers. Potential barriers to further growth in wind capacity are dispatchability and grid connection.

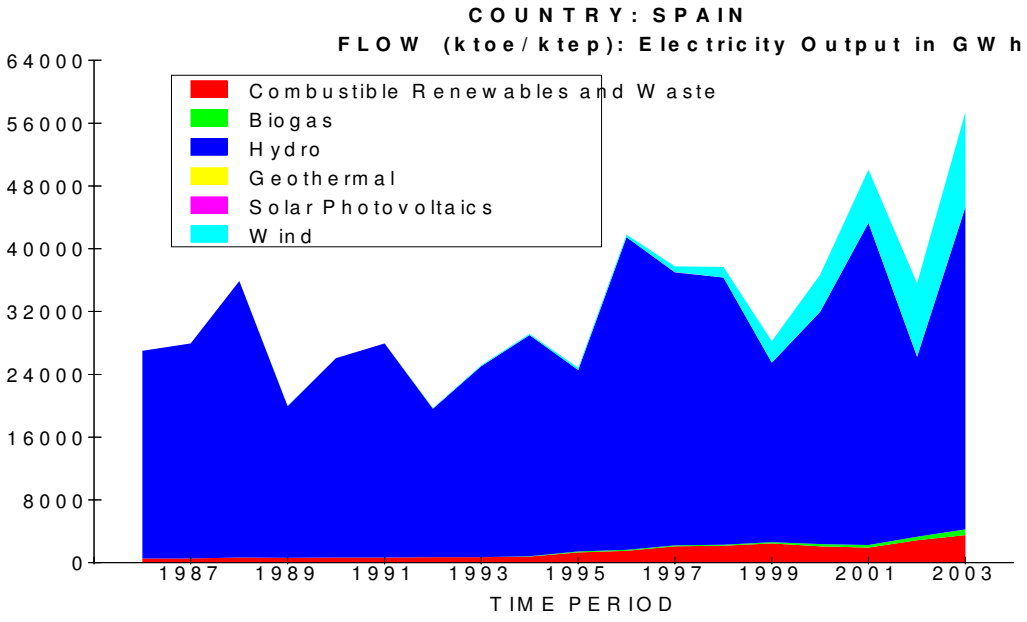


Figure A-21 Development of major RES electricity technologies 1986-2003 (IEA 2005)

RES targets

OBJECTIVES OF THE 2005-2010 SPANISH RENEWABLE ENERGY PLAN
REP scenario

	Situation in 2004 [average year (1)]			Target increase 2005-2010 (2)			Status of objective for 2010		
	Capacity (MW)	Production (GWh)	Primary energy production (ktep)	Capacity (MW)	Production (GWh)	Primary energy production (ktep)	Capacity (MW)	Production (GWh)	Primary energy production (ktoe)
Generation of electricity									
Hydro (> 50 MW) (3)	13.521	25.014	1.979	0	0	0	13.521	25.014	1.979
Hydro (from 10 to 50 MW)	2.897	5.794	498	360	687	59	3.257	6.480	557
Hydro (< 10 MW)	1.749	5.421	466	450	1.271	109	2.199	6.692	575
Biomass	344	2.193	680	1.695	11.823	4.458	2.039	14.015	5.138
Biomass power stations	344	2.193	680	973	6.787	2.905	1.317	8.980	3.586
Co-combustion	0	0	0	722	5.036	1.552	722	5.036	1.552
RUW	189	1.223	395	0	0	0	189	1.223	395
Wind	8.155	19.571	1.683	12.000	25.940	2.231	20.155	45.511	3.914
Solar photovoltaic	37	56	5	363	553	48	400	609	52
Biogas	141	825	267	94	592	188	235	1.417	455
Solar thermoelectric	-	-	-	500	1.298	509	500	1.298	509
TOTAL ELECTRICAL AREAS	27.032	60.096	5.973	15.462	42.163	7.602	42.494	102.259	13.574
Thermal uses	m² I-t solar thermal		(ktoe)	m² I-t solar thermal		(ktoe)	m² I-t solar thermal		(ktoe)
Biomass			3.487			583			4.070
Low-temperature solar thermal	700.805		51	4.200.000		325	4.900.805		376
TOTAL THERMAL AREAS			3.538			907			4.445
Biofuels (Transport)									
TOTAL BIOFUELS			228			1.972			2.200
TOTAL RENEWABLE ENERGY			9.739			10.481			20.220
PRIMARY ENERGY CONSUMPTION (ktoe) (Energy scenario: Trend/REP)			141.567						167.100
Renewable energy/primary energy (%)			6,9%						12,1%

(1): Provisional data for 2004. Hydro, wind, solar photovoltaic and solar thermal energy include production for an average year, based on the capacity and area in service on 31 December and on the nature of the existing facilities, rather than the actual data for 2004. Thermal biogas and geothermal, which in 2004 accounted for 28 and 8 ktoe, are not included.
(2): In the target increases for 2005-2010, production corresponds to an average year based on the capacity and nature of existing facilities.
For hydro-electric and wind energy, only half of the capacity installed in the final year (2010) is shown as production in the corresponding columns.
(3): Includes pure pumped production.

Source: MS report Spain, 2005

Policy timeline

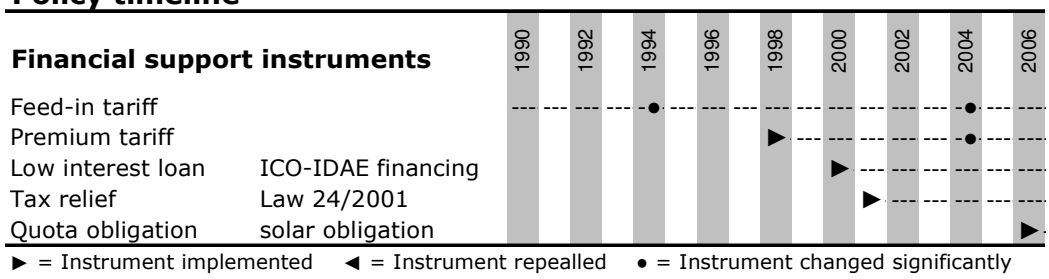


Figure A-22 RES-policies 1990-2006

Table A-11 Key policies and measures – Spain

Financial support instruments for RES

Feed-in tariff 1980 – present	**Law 82/1980: Energy Conservation Law** Introduction of guaranteed prices for electricity generation from hydropower installations. The prices were set annually by an order from the Ministry of Energy and Industry.
1994 - 2004	**1994 Royal Decree** Guaranteed minimum prices for five years.
2004 - present	**Royal Decree 436/2004** Revision of feed-in tariffs and feed-in premiums. Introduction of possibility for generator to choose between feed-in tariff or feed-in premium. Period of feed-in tariff is unlimited, but the tariffs are reduced after either 15, 20 or 25 years depending on type of technology.
Feed-in premium 1998 - 2004	**Royal Decree 2818/1998** Introduction of premium tariff.
Quota obligation 2006 - present	**Royal Decree 314/2006: Solar obligation** Obligation to cover 30-70% of the domestic hot water demand from solar thermal energy. The obligation applies to all new buildings and renovations. The variation of the solar fraction between 30 and 70% depends on the assumed volume of hot water demand and the geographical location of the building. Large buildings in the tertiary sector (for instance office buildings > 4,000 m2) will also be obliged to install PV systems. There are some exceptions for buildings that either satisfy their domestic hot water demand from other RES or CHP or for very shaded buildings.
Investment subsidy 1991 - 2000	**Plan for Energy Saving and Efficiency: Renewable Energy Programme** The Renewable Energy Programme was set up under the Plan, resulting in an investment of € 2 billion and public aid of € 420 million for renewable energy projects over the ten year period.
Tax relief 2001 - present	**Law 24/2001 on Fiscal, Administrative and Social Measures** Corporate tax deductions for investments in renewable energy. Eligible investments entitle firms to a 10% tax deduction on installations or equipment using solar power, biomass from agricultural or forestry waste, solid municipal waste and biofuels. The tax deductions do not apply to wind power.
Low interest loan 1991 - 2000 2000 - 2010	**Plan for Energy Saving and Efficiency** **Renewable Energy Plan** ICO-IDAE financing line for investments in renewable energy. The maximum that can be financed is 70% of investment costs. The line of financing is open to both public and private organisations. The maximum loan size per project is € 6.3 million. In 2000, € 9.98 million was provided, in 2001 nearly € 13.5 million. An estimated € 150.2 million was available in 2002.

Impacts on conventional production affecting RES

Producers can -on a yearly basis- choose between a fixed feed-in tariff or a premium tariff.

Regulation relevant for RES

Grid connection procedures are sometimes time consuming. In general, grid barriers are not strong yet, but might become a barrier to further growth of wind capacity in Spain.

Premium and Feed-in tariffs 2006

Technology	Duration	2006	
	both	fixed	premium
	(years)	(€/MWh)	(€/MWh)
PV < 100 kWp	No limit, but fixed tariffs are reduced after either 15, 20 or 25 years depending on technology	440.4	x
PV > 100 kWp		229.8	199.1
Wind < 5 MW		68.9	38.3
Wind > 5 MW		68.9	38.3
Biomass (biocrops, biogas)		68.9	38.3
Agriculture + forest residues		61.3	30.6

RES policies

The system of feed-in tariffs and premiums combined with low interest loans provides high transparency and certainty in the market. Especially the revision of the system of feed-in tariffs and premium tariffs in 2004 resulted in a strong development of electricity generation from renewable energy sources during past few years.

United Kingdom

Summary

The share of RE in UK is still low compared to its potential and growth is only modest so far. Hydropower has traditionally been the most important source of RES-E in the UK, but is now equalled by RES-E from biogas, mainly landfill gas. Solid biomass co-firing and wind power are also increasing now. The main support instrument in the 1990s was a tendering scheme called the Non-Fossil Fuel Obligation which failed to deliver the envisaged new production capacity. Since 2002 a Quota obligation with tradable certificates has been implemented, with certificate prices being high in the first years. Grid connection procedures are hampering the development of RES-E.

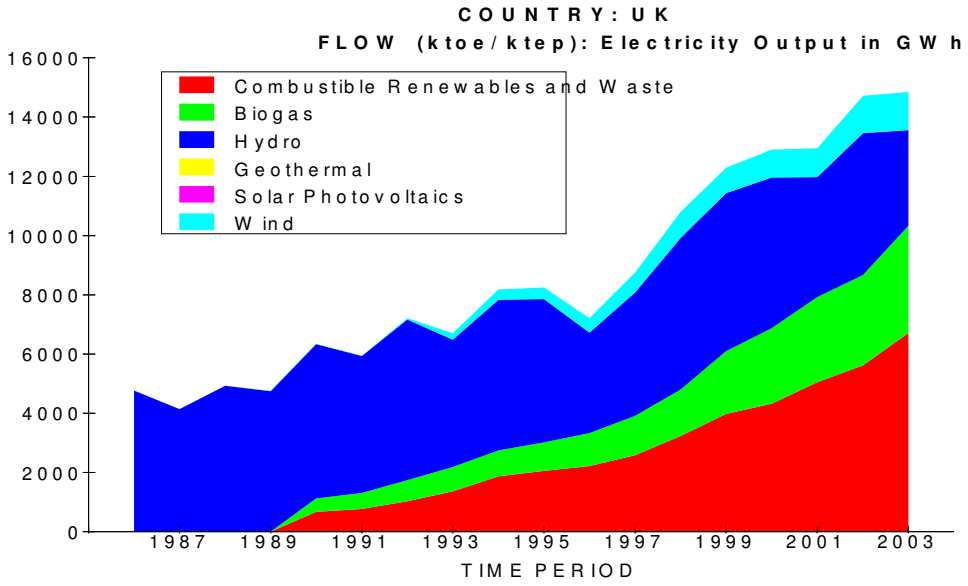


Figure A-23 Development of major RES electricity technologies 1986-2003 (IEA 2005)

Note: For Combustible Renewables and Waste (and probably Biogas) data not available before 1989.

RES targets

The RES-E target to be achieved by the UK in 2010 is 10.0% of gross electricity consumption. The government communicated an aspiration of 20% by 2020. Under the Renewables Obligation (RO) targets have been set out to 2015 (excluding large hydro): 10.4% in 2010, increasing by 1% per year to 15.4% in 2015. No formal targets exist currently in the UK for renewable heat.

Policy timeline

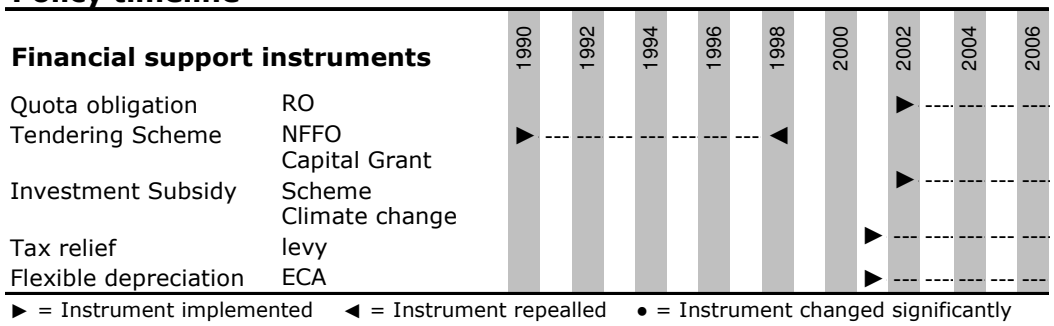


Figure A-24 RES-policies 1990-2006

Table A-12 Key policies and measures – United Kingdom

Financial support instruments for RES

Quota obligation 2002 - present	**RO: Renewables Obligation** The RO requires electricity suppliers to supply an increasing percentage of RES-E (excluding large hydro). Targets are set until 2016-17, and the obligation will remain in place at least until 2027, guaranteeing investment security. The RO is currently technology neutral, but biomass co-firing is going to be phased out. However the UK Government is planning to differentiate the scheme to give differing levels of support to electricity from different renewable sources. This so-called "banding" of the RO, if introduced, is anticipated to be implemented from 2009 or 2010. The total value of the RO certificates (buyout + recycle) was 77 €/MWh in 2003/4 and 65 €/MWh in 2004/5.
Tendering scheme 1990 - 1998	**NFFO: Non-Fossil Fuel Obligation** Revenues from the Non-fossil Fuel Levy on electricity consumption were used to subsidise nuclear power and for a premium paid for RES-E. It was the main support instrument for RES-E at that time. Which projects were going to be supported was decided by means of a competitive bidding procedure. The principal support mechanism for winning projects was a guaranteed price, with the rate set as a function of the power pool wholesale price plus a technology-specific premium that came from the Non-Fossil Fuel Levy funds. Under the five rounds of the NFFO, renewable technologies were separated into different technology categories. Specific cost of the winning projects was low, but the large majority of these projects have never been realised.
Investment subsidy 2002 - present	**Capital grant scheme** Various capital grants available for offshore wind, wave & tidal, biomass**.**
Tax relief 2001 – present	**Climate change levy** Tax on primary energy use from which RE is exempt.
Flexible depreciation 2001 - present	**ECA: 100% Enhanced Capital Allowances for energy-saving investments** Enhanced Capital Allowances (ECA) enable a business to claim 100% first year capital allowances on their investments in eligible energy technologies. Applies to heat pumps, CHP and solar thermal.

Impacts on conventional production affecting RES
Electricity and gas markets in the UK are completely liberalised. UK pursues an active climate change policy. The Power sector and thus power prices are influenced by the EU Emission Trading System, the Climate change levy and the Renewables Obligation.
Regulation relevant for RES
Grid connection procedures are hampering the development of RES-E.

RES policies

The main support instrument for RES-E in the 1990s was the Non-Fossil Fuel Obligation. It led to an increase of especially RES-E from landfill gas. But it failed to achieve the envisaged RES-E production due to many projects not being realised. Therefore it was replaced by the Renewables Obligation, which is currently the most important instrument. Certificate prices under the Renewables Obligation

have been rather high in the past years. RES-E production from solid biomass increased rapidly in the last years and equals the amount of electricity produced from wind, which has shown rather low growth rates compared to its potential.

Biomass is the key source for providing RES-H in the UK with a large potential, but it currently contributes just 1% to heat energy without any growth in the past years.

USA

Summary

RES penetration in the USA grew significantly in the period from 1975 to 1985. Since then growth of RES slowed down. Hydropower is by far the most important RES-E source in the USA, followed by biomass. Wind power plays still a modest role, although in 2005 installed wind power capacity grew strongly with 2.4 GW new capacity added.

The Production Tax Credit is the most important federal financial support instrument. It contributes to the development of RES-E, but is marked by an 'on and off' nature, which frustrates a steady development of the renewable energy market.

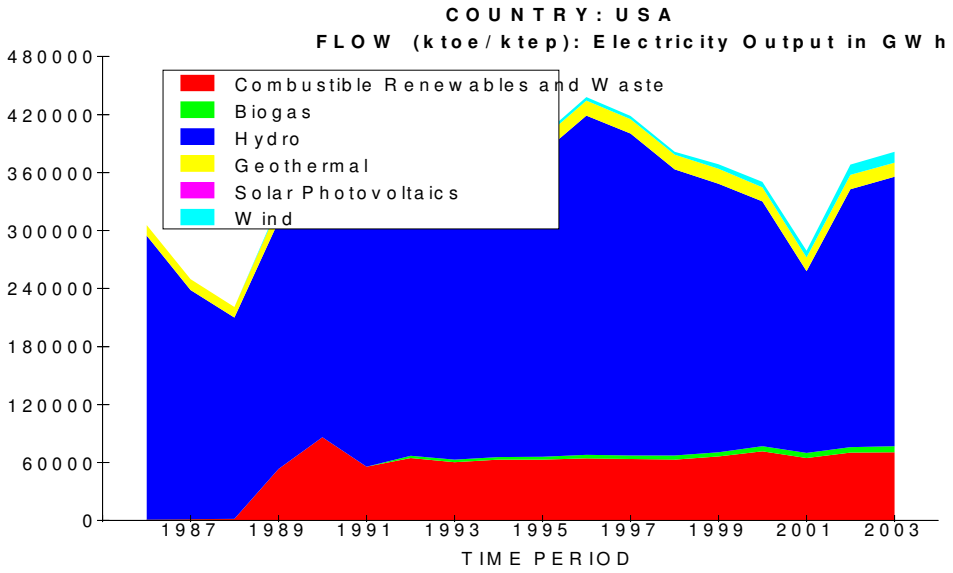


Figure A-25 Development of major RES electricity technologies 1986-2003 (IEA 2005)

FEDERAL POLICY

Policy timeline

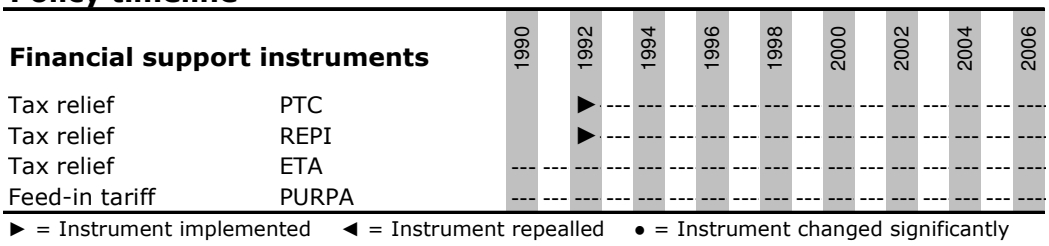


Figure A-26 RES-policies 1990-2006

RES policies

Main federal instruments at the moment are the Renewables Production Tax Credit (for private utilities) and the Renewable Energy Production Incentive (for publicly-owned utilities). The federal tax credits are especially important for the development of wind power projects. The tax credits have applied to more than 5,400 MW of wind power installed from 1995 to 2004. The production tax credit has helped to make wind power a "mainstream" investment in the U.S. in recent years, capturing financier interest in the sector.[4]

The Public Utility Regulatory Policies Act (PURPA), enacted in 1978, led to an increase of renewable energy deployment in the first decade, but gradually lost its effectiveness in supporting renewable energy developments due to low level of financial support. States sharpened the definition of avoided costs, while other States replaced the instrument by other support measures. As a result of PURPA, more than 12 000 MW of renewable energy projects were interconnected to the electricity grid by the end of 1998. However, the biggest result of PURPA has been its contribution to the development of co-generation plants. Although the law remains in effect, the guaranteed prices currently offered by utilities are generally too low to support new project development.

[4] REN21, Global status report

Table A-13 Key policies and measures – United States of America (Federal)

Financial support instruments for RES

Feed-in tariff 1978 – present	**Public Utility Regulatory Policies Act (PURPA)** Federal law comprising a system of guaranteed pricing for qualifying renewable energy facilities. PURPA requires utilities to purchase power from certain "qualifying" non-utility producers, especially small (below 80 MW) renewables-based electricity production at avoided cost rates. In the early years of implementation, the prices paid for the renewable power were pegged to high oil prices, which stimulated new renewables development. Although a federal law, implementation was left to the States resulting into the development of a variety of regulatory regimes, while at the same time in many States virtually nothing was done. The impact of PURPA waned over time as states sharpened the definition of avoided costs and turned to competitive bidding to meet resource needs.
Tax relief 1978 - present	**Energy Tax Act (ETA)** Tax credits available for households and businesses purchasing alternative energy equipment. Residential energy income tax credits for the purchase of solar and wind energy equipment were set at 30% for the first $2 000 invested and 20% for the next $8 000. For businesses, the tax credit was 10% business energy tax credit for investments in solar, wind and geothermal. This credit was in addition to the standard 10% investment tax credit, available for all types of equipment. The tax credit for wind energy expired in 1985. The 10% business energy tax credit for solar and biomass was eventually made permanent in the Energy Policy Act of 1992.
1992 - 2008	**Federal Renewables Production Tax Credit (PTC)** Production tax credit for private utilities and non-utility generators for wind and closed-loop biomass (energy crop). The PTC was created in the Energy Policy Act of 1992 and provides an inflation-adjusted tax credit of 1.5 UScents/kWh (1993 US$ and indexed for inflation) for electricity generated from qualifying projects during the first 10 years of operation. Indexed to inflation, the credit started at 1.5 UScents/kWh in 1994 and increased over time, through several expirations and renewals, to 1.9 cents/kWh by 2005.
1992 - 2026	**Renewable Energy Production Incentive (REPI)** Production incentive available to publicly-owned utilities which were not eligible for the PTC. Incentive payments of 1.5 UScents per kWh (1993 US$ and indexed for inflation) for the first ten year period of operation, subject to the availability of annual appropriations in each Federal fiscal year of operation. Eligible technologies are solar, wind, geothermal (with certain restrictions as contained in the rulemaking), or biomass (except for municipal solid waste combustion), landfill gas, livestock methane, and ocean (including tidal, wave, current, and thermal) generation technologies. Fuel cells using hydrogen derived from eligible biomass facilities are also considered an eligible technology.

USA - CALIFORNIA

Summary

California has an abundant supply of renewable energy resources, especially wind and geothermal. Wind power is, apart from hydropower, the most significant renewable energy source in California. California has the most wind energy capacity in the United States, with 1910 MW installed wind power capacity by the end of 2003. The Geysers geothermal power plant, in the northern part of California, is the largest geothermal facility in the world.

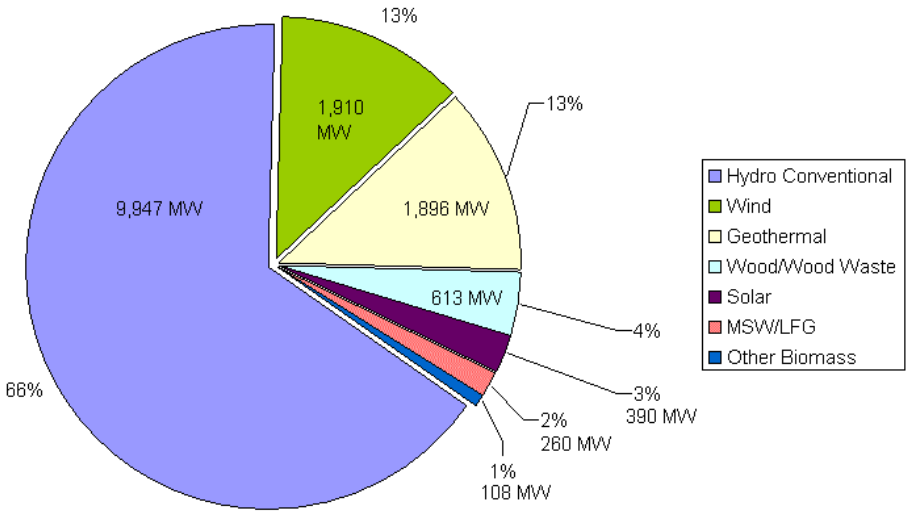
The main support instrument to promote electricity generation from renewable energy sources in California is the Renewables Portfolio Standard (RPS), which was implemented in 2002. The RPS is complemented with production incentives (Supplemental Energy Payments - SEPs) to cover above-market costs of meeting the RPS.

RES targets

Targets adopted for electricity generation from renewable energy sources in California are:
20% electricity from renewable energy sources by 2010 (excl. large hydro)
33% electricity from renewable energy sources by 2020 (excl. large hydro)

Penetration

Figure 1. CA Renewable Capacity (MW), by Energy Source and Percentage, 2003



Source: Table 2

Source: Energy Information Administration, Department of Energy

Policy timeline

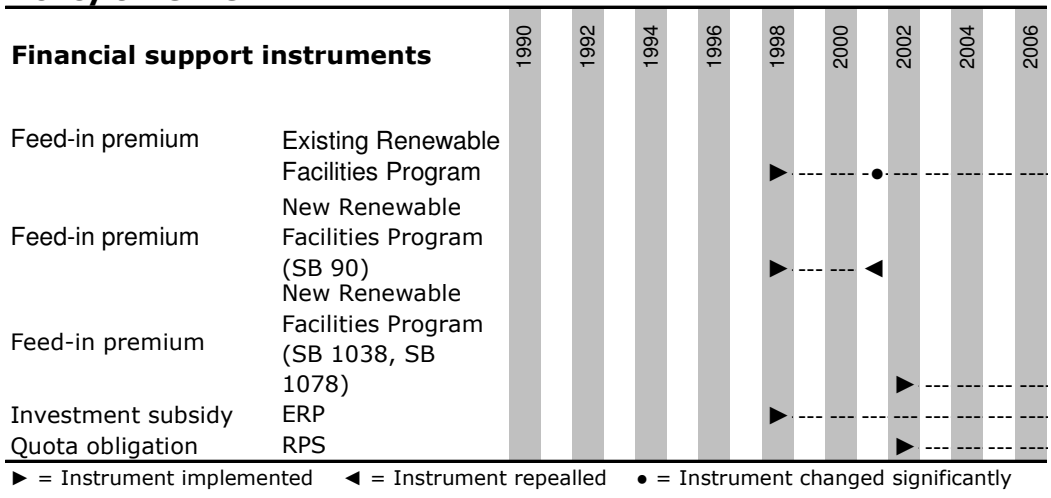


Figure A-27 RES-policies 1990-2006

Table A-14 Key policies and measures – California

Financial support instruments for RES

Feed-in premium
1998 - present

Existing Renewable Facilities Program
Production incentive for the development and maintenance of existing renewable energy projects (i.e., renewable projects that began operating before 26 September 1996). The Existing Renewable Facilities Program is divided into two tiers: (1) biomass and solar-thermal projects, which receive $20.25 million in annual funding, and (2) wind projects, which receive $6.75 million in annual funding.
The Existing Renewable Facilities Program is financed from the Public Benefits Fund which raises money by a surcharge on all electricity sold.

1998 - 2001

New Renewable Facilities Program under SB 90
Production incentives (c/kWh) on top of the grey electricity price awarded through competitive auctions. Three auctions were held by the California Energy Commission in the period between March 1998 and June 2001. Production incentives are granted for a maximum of 5 years.

Table 5. New Renewable Facilities Program Summary of Auction Winning Facilities

Technology	# of Projects	Capacity (MW)	Average Incentive (¢/kWh)	Total Funds Committed[1]
Biomass	2	11.30	1.35	$3,787,902.00
Digester Gas	1	2.05	1.39	$1,148,209.50
Geothermal	4	156.90	1.28	$75,563,854.80
Landfill Gas	17	50.57	1.11	$18,042,206.52
Small Hydro	5	33.24	1.19	$4,208,466.82
Wind	39	982.67	0.74	$79,098,474.83
Total	**68**	**1,236.73**	**0.86**	**$181,849,114.46**

[1] The total funds committed for winning bidders in the second and third auctions reflect both the loss of potential bonuses for early on-line dates and 50% penalties for later on-line dates for those projects not yet on-line. The original conditional funding awards for winning bidders in the second and third auctions included potential bonuses for early on-line dates and did not reflect potential penalties for later on-line dates.

Source: Renewable Energy Program, 2006 annual report to the legislature, California Energy Commission, November 2006

2002 - present

New Renewable Facilities Program under SB 1038 and SB 1078
Production incentives (Supplemental Energy Payments - SEPs) to cover above-market costs of meeting the RPS. As of 30 June 2006, no complete applications for SEPs had been received yet.
The New Renewable Facilities Program is financed from the Public Benefits Fund which raises money by a surcharge on all electricity sold.

Quota obligation
2002 - present

Renewable Portfolio Standard
Under the RPS, retail sellers of electricity are required to increase their procurement of eligible renewable energy resources by at least 2% per year, so that 20% of their retail sales are procured from eligible renewable energy resources by 2010 and 33% in 2020. Eligible renewable resources include biomass, solar thermal, photovoltaics, wind, geothermal, fuel cells using renewable fuels, small hydropower (<30 MW), digester gas, landfill gas, ocean

	wave, ocean thermal and tidal current.
Investment subsidy 1998 - present	**Emerging renewables rebate program (ERP)** Incentive for grid-connected small wind and fuel cells using renewable energy fuels. Effective January 1, 2007, funding levels for the ERP are: • Small Wind Turbines (up to 50 kW): $2.50/W for first 7.5 kW and $1.50/W for increments > 7.5 kW and < 30 kW • Fuel cells (<30 kW) using renewable fuels: $3.00/W for systems less than 30 kW Rebates for eligible renewable energy systems installed on affordable housing projects are available at 25% above the standard rebate level up to 75% of the system's installed cost.[5,6]

RES policies

PURPA was replaced in California by competitive biding in 1993.

Currently, the main support instrument to promote electricity generation from renewable energy sources in California is the Renewables Portfolio Standard (RPS). Since the implementation of the RPS in 2002 however, the RPS is plagued by a lack of transparency, overly complex rules, and inconsistent application among retail sellers. As a result, only a small number of contracts have been signed for renewable projects, many of which will not even begin operation until the end of 2006.[7]

In addition, production incentives (Supplemental Energy Payments - SEPs) to cover above-market costs of meeting the RPS are available. As of 30 June 2006, no complete applications for SEPs had been received yet

The most important challenges for increasing the percentage of electricity derived from renewable energy sources which should be addressed are[8]:
The lack of progress in the Renewable Portfolio Standard (RPS) program.
The need for new and/or upgraded transmission to access renewable resources in several areas of the state.
The impact of integrating large amounts of intermittent renewable resources into the electricity grid.
The need to repower aging wind facilities and reduce the number of bird deaths associated with the operation of wind turbines

[5] http://www.dsireusa.org/
6 http://www.consumerenergycenter.org/erprebate/index.html
[7] Integrated Energy Policy Report, California Energy Commission, November 2005
[8] Integrated Energy Policy Report, California Energy Commission, November 2005

USA- MINNESOTA

Summary

The mandates ordering the State's largest utility, Excel Energy, to realise minimum installed capacities of wind and biomass has contributed most to the development of renewable capacity in Minnesota up to now.

RES targets

In 1994, the Minnesota legislature ordered Xcel Energy to acquire 425 MW of wind energy by the end of 2002. In 1999 the PUC (Public Utilities Commission) ordered Xcel Energy to acquire an additional 400 MW of wind energy by 2011
The 1994, the Minnesota legislature ordered Xcel Energy to acquire 125 MW of biomass generated electricity by the end of 2002, which was lowered to 110 MW in 2003
1% of electricity supply to retail customers should come from renewable energy sources in 2005, increasing by 1% per year to reach at least 10% in 2015. At least 0.5% of the electricity generated should come from biomass by 2005, and 1% from biomass by 2010 (Renewable Energy Objective)

Penetration

Wind: 895 MW operational (December 2006)
Biomass 110 MW operational (2007 - estimated)
the vast majority of additional renewable electricity capacity realised between 2006-2015 is estimated to be wind energy[9]

Policy timeline

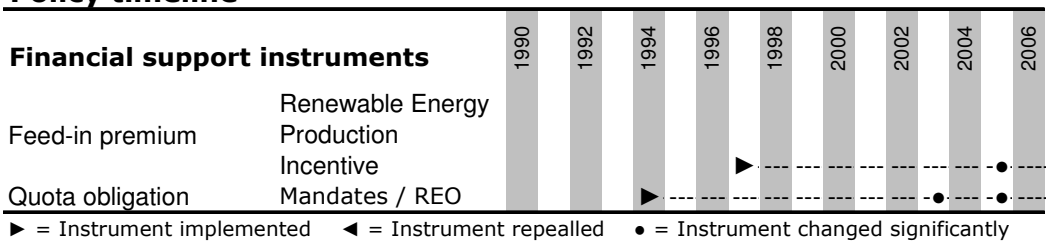


Figure A-28 RES-policies 1990-2006

[9] Renewable Electricity Mandates in Minnesota: status and impact, Institute for Local Self-Reliance, February 2006

Table A-15 Key policies and measures – Minnesota

Financial support instruments for RES

Feed-in premium 1997 - 2005	**State of Minnesota Renewable Energy Production Incentive** Premium of 1.0-1.5 ¢/kWh guaranteed for 10 years. Eligible technologies: • hydropower and on-farm anaerobic manure methane digesters • new wind-energy projects less than 2 MW The Renewable Energy Production Incentive is financed by the Minnesota's Renewable Development Fund. The instrument is one of the few state-level, performance-based incentives offered in the United States[10] The program was closed to new applicants on January 1, 2005.
2005 - present	**Community Based Energy Development (C-BED)** In 2005 the Community Based Energy Development (C-BED)was introduced for small-scale electricity generation from renewable energy sources. It consists of a built-in incentive as part of power purchase contracts that wind developers sign with utilities.
Quota obligation 1994 - 2011	**Wind and biomass mandates** Mandates for Xcel Energy (State's largest utility) In 1994, the Minnesota legislature ordered Xcel Energy to acquire 425 MW of wind energy and 125 MW of biomass generated electricity by the end of 2002. The biomass objective was lowered to 110 MW in 2003. In 1999 the PUC (Public Utilities Commission) ordered Xcel Energy to acquire an additional 400 MW of wind energy by 2011.
2003 - 2015	**Renewable Energy Objective (REO)** Goal: 1% of electricity supply to retail customers should come from renewable energy sources in 2005, increasing by 1% per year to reach at least 10% in 2015. At least 0.5% of the electricity generated should come from biomass by 2005, and 1% from biomass by 2010. Eligible technologies: Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Municipal Solid Waste, Hydrogen <u>Non-mandated REO: electric utilities other than Xcel Energy</u>: Requirement to electric utilities other than Xcel Energy to make a good faith effort to generate or procure a percentage of the electricity that they generate from eligible renewable-energy technologies: solar, wind, hydroelectric (less than 60 MW), hydrogen and biomass -- including municipal solid waste and refuse-derived fuels -- that was not mandated by state law or Minnesota Public Utilities Commission (PUC) order. Amendments made to the mandate in 2003 authorize the PUC to establish a credit-trading program to facilitate compliance. Utilities are required every two years to file formal plans detailing how they will meet the 10% renewables objective through their integrated resource plans, including plans for transmission. The PUC has ruled that electricity generated under green-power programs does not count toward the objective. However, existing renewables potentially could count toward the objective.

[10] http://www.dsireusa.org/

Utilities must do everything they "reasonably" can to meet the renewable-energy objective, and the PUC has established specific criteria and standards on which to judge utility compliance. Under the 2005 revisions, compliance with the renewable-energy objective was included as a provision in the "Certificate of Need" process for receiving approval for new transmission or generation in Minnesota.

Mandated REO: Xcel Energy:
The REO is a mandate for Xcel Energy since 2005. Xcel Energy has the obligation to develop or purchase prescribed minimum electricity generation capacities of specified renewable energy technologies. Mandated additions for Xcel Energy to realise are[11,12]:

- 1000 MW new wind capacity between 2006 and 2010
- 766 MW new wind capacity between 2010 and 2015
- 110 MW new biomass electricity capacity by 2011 (already fulfilled)

Investment subsidy 2002 - 2007	**State of Minnesota Solar-Electric (PV) Rebate Program** Incentive of $2/watt DC for PV systems[13]

RES policies

The mandates ordering Excel Energy to realise minimum installed capacities of wind and biomass has contributed most to the development of renewable capacity in Minnesota up to now. As of December 2006, about 895 MW of wind energy was operational in Minnesota[14]. About 730 MW of the 895 MW of wind energy operational or planned is a result of Xcel Energy's 1994 and 1999 mandates. Electricity from these Xcel Energy wind projects cannot be counted toward the renewable energy totals required under the 2003 REO mandate[15].

As of May 2006, 211 MW of wind power was operating and receiving incentive payments under the State of Minnesota Renewable Energy Production Incentive. An additional 13 MW are eligible to receive payments when operational. The program was closed to new applicants on January 1, 2005.

[11] Renewable Electricity Mandates in Minnesota: status and impact, Institute for Local Self-Reliance, February 2006
[12] http://www.dsireusa.org/
[13] http://www.dsireusa.org/
14 American Wind Energy Association. http://www.awea.org/projects/minnesota.html
[15] Renewable Electricity Mandates in Minnesota: status and impact, Institute for Local Self-Reliance, February 2006

Annex 2: Ecofys cash flow model

The comparative assessment in this report is performed with the Excel-based Ecofys cash flow model, which has been developed since 1996. In essence it is a straightforward cash flow model, incorporating relevant technical, economic and fiscal variables, and enabling a sophisticated analysis of different policy instruments for renewable energy technologies within and amongst different countries.

The model calculates the nominal levelised cost of electricity, which is the minimum price of the generated electricity that would be required to make the project viable from the equity perspective (net present value of free cash flow larger than zero over the economic lifetime of the project) and bankable from the lenders perspective (a debt service coverage ratio larger than a given threshold level, over the debt period). This levelised cost of electricity (including annual electricity price increases) is assumed to be paid for the electricity over the full economic lifetime of the project (or in case of negative values: is a measure for the over-support of a given set of policy instruments). Because of the debt service requirements, there is a direct relation with the debt/equity ratio. The model calculates the debt/equity ratio for which the levelised cost of electricity is minimal. At higher equity shares, the levelised cost increases as the cost of equity is higher than that of debt. At lower rates, the minimum debt service requirement demands higher operating income and hence shows higher levelised cost. The model has the following options:

- Incorporation of multiple country- and/or technology-specific debt schemes (e.g. senior and subordinate debt; low-interest schemes)
- Incorporation of both federal/national and state/regional tax systems
- Selection of various fiscal depreciation schemes
- In- or exclusion of debt reserve (e.g. cumulative vs. annually constrained debt service coverage ratios)
- In- or exclusion of tax loss carry-forward
- Breakdown of effect of different type of policy instruments:
    - Fiscal measures
    - Debt measures
    - Investment grants
    - Production support (feed-in tariff, feed-in premium, value of electricity in obligation schemes)

Examples of graphical output is given in the figures on the next pages.

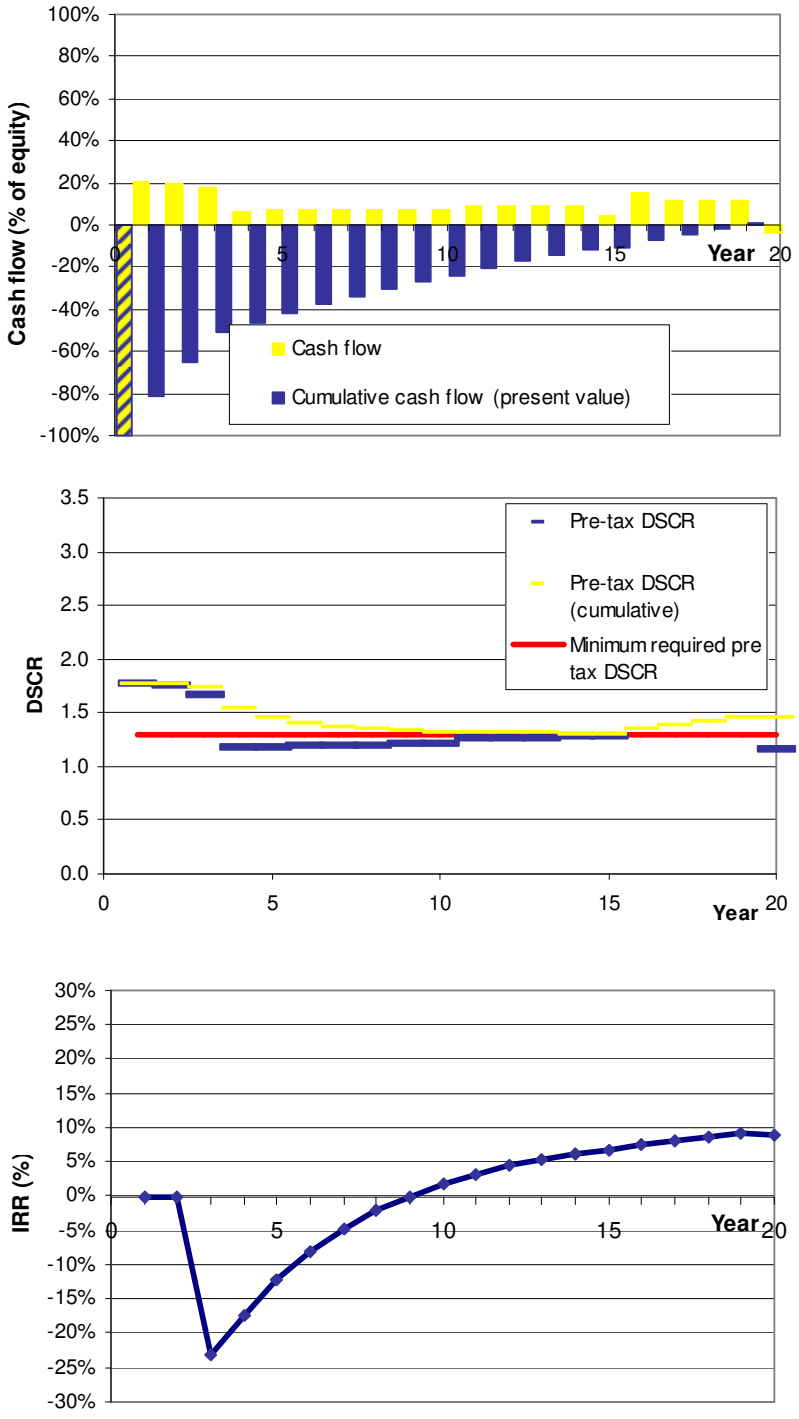


Figure A-29 Free cash flow (*top*), debt service coverage ratio (*middle*), and internal rate of return (*bottom*) for the 2000 FLH onshore wind energy case of Germany (Alte Bundesländer)

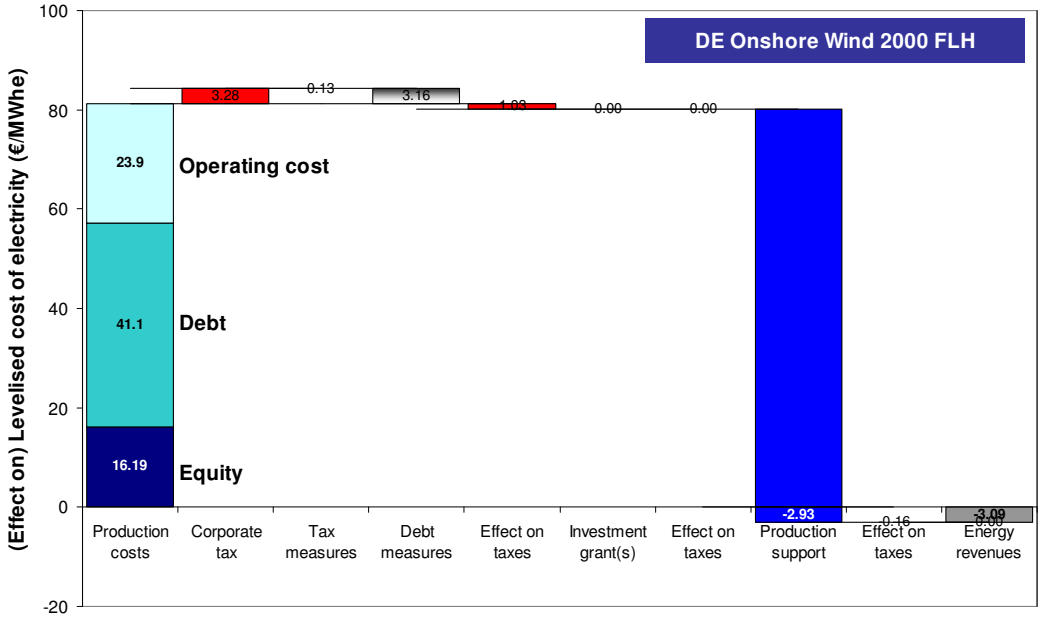


Figure A-30 Effect of policy instruments on the levelised cost of electricity for the 2000 FLH onshore wind energy case of Germany (Alte Bundesländer).

Tax measures involve the use of the triple declining balance depreciation (as compared to straight-line depreciation).

Debt measures concern low-interest loans from the KfW Umwelt and ERP Program.

Production support concerns the feed-in tariff (19.5 year initial tariff of 83.60 €/MWh, followed by 0.5 year basic tariff of 52.80 €/MWh).

The graph shows that the German support scheme results in a small over-support for this particular case.