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Snapshots of renewable energy developments in the European Union.

Status in 2010 and progress in comparison with National Renewable Energy Action Plans.





Nicolae Scarlat, Manjola Banja
Jean-François Dallemand, Fabio Monforti-Ferrario

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Institute for Energy and Transport - IET

Contact information
Nicolae Scarlat
Address: Joint Research Centre, Via Enrico Fermi 2749, TP 450, 21027 Ispra (VA), Italy
E-mail: Nicolae.Scarlat@ec.europa.eu
Tel.: +39 0332 786551
Fax: +39 0332 78 9992

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Table of Contents

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Preface

The *Renewable Energy Directive* 2009/28/EC (RED) on the promotion of renewable energy sources, requires the EU Member States to increase the share of renewable energy to 20% of gross final energy consumption and 10% renewable energy in the transport sector by 2020. The RED specifies legally binding objectives rather than indicative national targets for the share of renewable energy by 2020.

Each Member State has a mandatory target for the share of energy from renewable sources in its gross final consumption for 2020. Moreover, the share of energy from renewable sources in the transport sector must amount to at least 10% of final energy consumption in the sector by 2020 in each Member State. In addition, the *Fuel Quality Directive* 2009/30/EC set a target of a 6% greenhouse gas reduction for fuels used in the transport sector in 2020 (EC, 2009b) and both the Renewable Energy Directive and the Fuel Quality Directive include criteria for sustainable biofuel production and procedures for verifying that these criteria are met.

The Renewable Energy Directive also required Member States to prepare *National Renewable Energy Action Plans* (NREAPs) including detailed roadmaps to reach the RES targets for the share of renewable energy consumed in electricity, heating and cooling and in transport, and detailing the measures in place or planned for achieving the national overall renewable energy targets.

The European Commission has prepared *harmonised templates* for the NREAPs to ensure comprehensive planning and comparability of the Member State data.
In the NREAPs, the EU Member States had also to propose two scenarios for energy consumption until 2020:

- the Reference Scenario, only taking into account the energy efficiency and saving measures adopted before 2009;
- the Additional Energy Efficiency Scenario, including all energy efficiency and saving measures adopted and expected to be adopted after 2009.

The contribution of different RES technologies and their targets in electricity, heating & cooling and transport in the NREAPs are based on this Additional Energy Efficiency scenario.

The European Union Member States have to prepare, according to Article 22 of Directive 2009/28/EC, *Progress Reports* (PRs) on the developments in the RES against the *interim targets* established in their NREAPs. The European Commission has established a template for the PRs too (C(2009) 5174-1) to ensure that the MS reports are complete, cover all the requirements of Article 22 of Directive and are comparable with each other and with National Renewable Energy Action Plans.

The Progress Reports had to include the contribution expected from energy efficiency and energy saving measures and the total contribution expected of each renewable energy technology to meet the binding 2020 targets and the *indicative interim trajecto*ry for the shares of energy from renewable resources in electricity, heating and cooling and transport. Member States had to report on the policies and measures taken to promote the use of energy from renewable resources in electricity, heating and cooling and in transport. Progress Reports contain also a section on sustainability scheme for biofuels and bioliquids consumed in the EU and on the economic, social, and environmental impacts of this consumption.

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Executive Summary

The European Union Member States prepared and submitted in 2010 National Renewable Energy Action Plans (NREAPs), as required by the Renewable Energy Directive, setting out their national targets for the share of renewable energy consumed in electricity, heating and cooling and in transport, and measures for achieving the national overall renewable energy targets.

The European Union Member States prepared in 2011 their first Progress Reports on the progress in the promotion and use of renewable energy. Progress reports will be submitted to the European Commission every two years thereafter. The first Progress Reports provide official data about the development of renewable energy in years 2009 and 2010 and contain data on the contribution of each renewable energy technology and the shares of energy from renewable resources in electricity, heating and cooling and transport, in comparison with the *indicative interim trajecto*ry formulated in the NREAPs. All Member States, except Czech Republic, have submitted Progress Reports, describing the overall renewable energy technology, policy developments and their compliance with the measures set out in the Directive and in their National Renewable Energy Action Plans.

Based on the data contained in National Renewable Energy Action Plans and in the Progress Reports, this report presents a snapshot of the use of renewable energy in the European Union, the status in 2010 and the progress and the deviations from the targets set in the National Renewable Energy Action Plans. The report describes also the developments in the overall contribution of renewable energy in each Member State since 2005 according to their first Progress reports, the progress made in the use of each renewable energy source and their share in heating and cooling, electricity and in transport sector.

This report provides also an analysis of the progress made until 2010 in comparison with the 2005 reference year, as well as the progress expected to be made until 2020, as projected in the NREAPs. In addition, this document presents an assessment of the actual achievements reached until 2010 as reported in Renewable Energy Progress Reports in comparison with the planned targets expected in the National Renewable Energy Action Plans. This report includes the updated version of the National Renewable Energy Action Plan of Czech Republic as resubmitted in May 2013.

This overview presents the evolution of several indicators, including:

- total renewable energy use and renewable energy contribution in each sector - heating and cooling, electricity and transport;
- the deployment of each renewable energy technology – hydro energy; geothermal (for electricity, heating and cooling), solar thermal and solar electricity; marine energy; wind; heat pumps; biomass (for electricity, heating and cooling); and biofuels for transport, in each Member States.
- overall share of renewable energy, as well as the share of renewables in heating and cooling and in transport;
- renewable energy contribution to electricity – the contribution of renewables – hydropower; geothermal; solar; marine; wind; biomass to electricity;
- renewable energy use in heating & cooling - the contribution of renewables –geothermal; solar; biomass; heat pumps to the heat;
- the use of renewable energy in transport - bioethanol/bio-ETBE; biodiesel; other biofuels (biogas and vegetable oils); biofuels from wastes, residues, ligno-cellulosic material grew (art. 21.2 biofuels); the use of biofuels from import; renewable electricity.

Reports highlights related renewable energy developments in EU 27 are summarized as following:

The share of renewables

- Overall RES share in gross final energy consumption increased from 8.1% in 2005 to 12.6% in 2010, in comparison with 11.5% planned;
- The share of renewables in heating/cooling sector increased from 9.3% in 2005 to 14.4% in 2010, in comparison with 12.5% planned;
- The share of renewables in electricity sector increased from 14.7% in 2005 to 19.7% in 2010, in comparison with 19.6% planned;
- The share of renewables in transport sector increased from 0.3% in 2005 to 5.0% in 2010, in comparison with 4.9% planned.

Renewable energy progress and expected additional contribution

- The increase of the RES use between 2005-2010 reached 2104 PJ (50.8%) while the additional use of renewable energy in 2010-2020 is expected to be 3946 PJ (63.2%);
- The increase of the RES use in heating and cooling between 2005-2010 reached 1096.6 PJ (48.0%) while the additional use of renewable energy in 2010-2020 is expected to be 1275.6 PJ (37.7%);
- The increase of the RES use in electricity between 2005-2010 reached 575.4 PJ (33.2%) while the additional use of renewable energy in 2010-2020 is expected to be 2017.7 PJ (87.3%);
- The increase of the RES use in transport between 2005-2010 reached 433.8 PJ (254.0%) while the additional use of renewable energy in 2010-2020 is expected to be 741.0 PJ (122.6%).

Deviation from the targets

- The total RES contribution in gross final energy consumption was 6248.3 PJ in 2010, which is 490.8 PJ or 8.5% above the planned NREAPs value;
- Renewable energy contribution in heating/cooling sector in 2010 was 3379.8 PJ, which is 528.2 PJ (12.6 Mtoe) or 18.5% higher than NREAPs value;
- The contribution of renewable energy in electricity sector in 2010 was 2310.5PJ (641.5 TWh), which is 19.5PJ (5.6 TWh) or 0.8% below the planned 2010 NREAPs value of 2330PJ (647.1 TWh);
- RES consumption in transport in 2010 reached 604.6 PJ (14.4 Mtoe), being 25.6 PJ (0.6 Mtoe) or 4.1% below the planned value of 630.2 PJ (15 Mtoe);

Contribution of renewable energy sources

- The use of hydro energy reached 1201.4 PJ in 2010, which is 1.8% below the 1223.3 PJ expected hydro energy use;
- The use of geothermal energy for heating & cooling and electricity reached 42.2 PJ in 2010, which is 16.1% below the 50.3 PJ expected geothermal energy use;
- The use of solar thermal and solar electricity reached 146.2 PJ in 2010, which is 7.2% above the 136.4 PJ expected solar energy use;
- The use of marine energy reached 1.7 PJ in 2010, which is 4.6% below the 1.8 PJ expected marine energy use;
- The use of wind energy reached 558.3 PJ in 2010, which is 6.5% below the 596.9 PJ expected wind energy use;
- The use of heat pumps reached 183.0 PJ in 2010, which is 8.7% above the 168.0 PJ expected heat pumps energy use;
- The use of biomass for heating & cooling and electricity reached 3557.4 PJ in 2010, which is 18.4% above the 3005.0 PJ expected biomass use;
- Biofuel contribution in transport reached 558 PJ in 2010 which is 3.1% below the planned value (575.9 PJ or 13.8 (Mtoe).

Abbreviations

ETBE – Ethyl Tertiary Butyl Ether
EU – European Union
GW – Gigawatt
GWh – Gigawatt-hour
H/C – Heating /Cooling sector
ktoe – kilo-tonnes oil equivalent
Mtoe – Mega-tonnes oil equivalent
MS – Member States
NREAPs – National Renewable Energy Action Plans
PR – Renewable Energy Progress Reports
PV – Solar photovoltaic
PJ – Petajoule
RES – Renewable Energy Sources
RES-H/C- Renewable Energy Sources in Heating/Cooling sector
RES-E – Renewable Energy Sources in Electricity sector
RES-T – Renewable Energy Sources in Transport sector
TWh- Terrawatt-hour

Units

General conversion factors for energy
1 Mtoe = 41.868 PJ = 11.63 TWh
1 ktoe = 41.868 TJ = 11.63 GWh
1 PJ = 0.278 TWh = 0.024 Mtoe
1 TWh = 3.6 PJ = 0.086 Mtoe
1 TJ = 277.8 MWh

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List of Figures

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List of tables

1. Renewable energy in the European Union

1.1. Deployment of renewable energy

The analysis of the Progress Reports for the EU shows that the renewable energy deployment increased from 4144.3 PJ in 2005 to 6248.3 PJ in 2010, an increase of 2104 PJ (50.8%). The renewable use in the EU was 8.5% above the NREAP projections of 5757.5 PJ for 2010. This RES use is expected to further increase to 10194.2 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 3948.1 PJ, i.e., +63.2% in comparison with renewable energy use reached in 2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 1096.0 PJ, followed by renewable electricity with 575.4 PJ and renewable energy in transport with 432.3 PJ. In relative terms, the highest increase was made by the use of renewable energy in transport (345%) followed by heating and cooling sector (48.1%) and electricity (+33.2%). The use of renewable energy in heating & cooling increased from 2283.8 PJ in 2005 to 3379.8 PJ in 2010, 18.5% above the projected level of 2851.6 PJ. The renewable electricity increased from 1735.1 PJ in 2005 to 2310.5 PJ in 2010, 0.8% below the target of 2329.4 PJ. The use of renewable energy in transport grew from 170.8 PJ in 2005 to 604.6 PJ in 2010, which is however 4.1% below the target of 630.2 PJ.

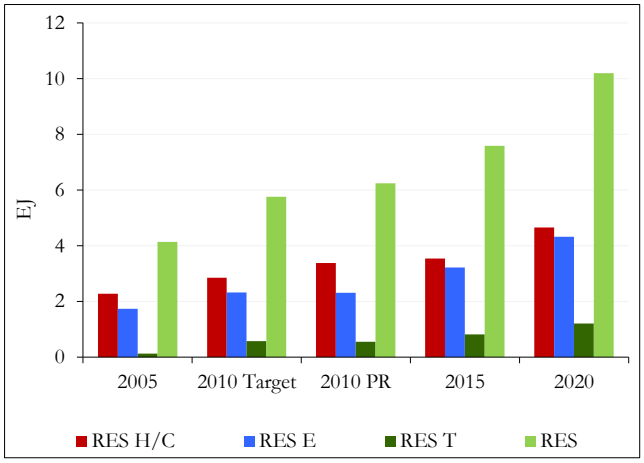

Figure 1-1. RES deployment in the European Union: projected growth and actual progress

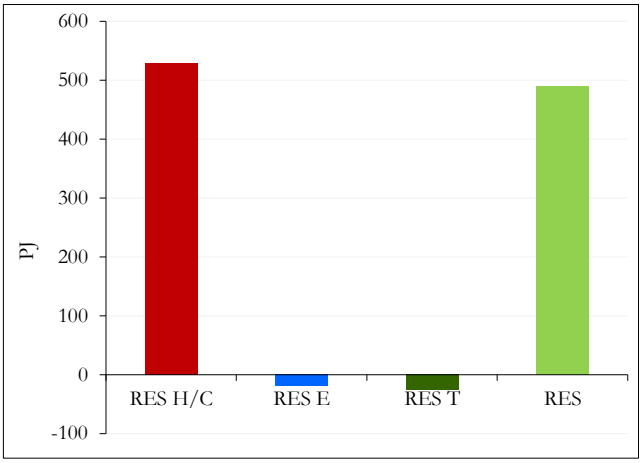

Figure 1-2. Deviation from NREAP in the RES production in the European Union in 2010.

Table 1-1. RES use in the European Union, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAPs
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	3379.8	528.2	18.5	1096.0	48.0	1275.6	37.7	4655.5
RES-E	2310.5	-19.5	-0.8	575.4	33.2	2017.7	87.3	4328.2
RES-T	604.6	-25.6	-4.1	433.8	254.0	741.0	122.6	1345.6
RES	6248.3	490.8	8.5	2104.0	50.8	3946.0	63.2	10194.2

1.2. Renewable energy share

The aggregate data from the Progress Reports show that the overall share of RES for the European Union increased from 8.1% in 2005 to 12.6% in 2010 and this should reach 20.6% in 2020, just above the RES target of 20% required by the RES Directive. The highest increase was made in the renewable heating and cooling (from 9.3% to 14.4%), followed by electricity (from 14.7% to 19.7%) and in transport (from 1.3% to 4.96%). Major increase is expected to be achieved until 2020 in electricity (from 19.7% to 33.9%), followed by heating (from 14.4% to 21.4%) and transport (from 4.96% to 11.4%).

The overall share of RES for the EU was above the 2010 target with 1.1% points, reaching 12.6%, in

comparison with the expected share of 11.5% in the NREAPs. The renewable energy share made significant progress in all sectors, which are all above their expected levels for 2010. The share of renewable heating was above the projected value with 1.9% points, reaching 14.4% in comparison with expected share of 12.5% in 2010. The share of renewable electricity was above the target by only 0.1% points, reaching 19.7% in comparison with 19.6% projected value. The share of renewables in transport was 0.01% points above the target reaching 4.96% in comparison with 4.95% expected share.

Table 1-2. Projected growth in RES share in the European Union and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	9.3	12.5	14.4	1.9	15.9	21.4
RES-E	14.7	19.6	19.7	0.1	26.2	33.9
RES-T	1.3	4.95	4.96	0.01	7.2	11.4
Overall RES	8.1	11.5	12.6	1.1	15.1	20.6

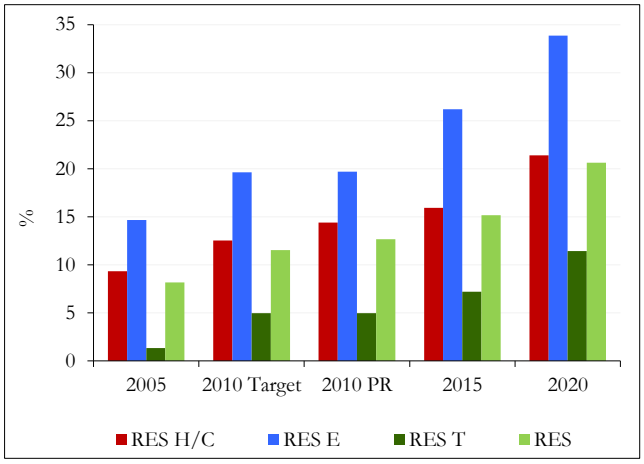

Figure 1-3. RES share in the EU: projected growth and actual progress.

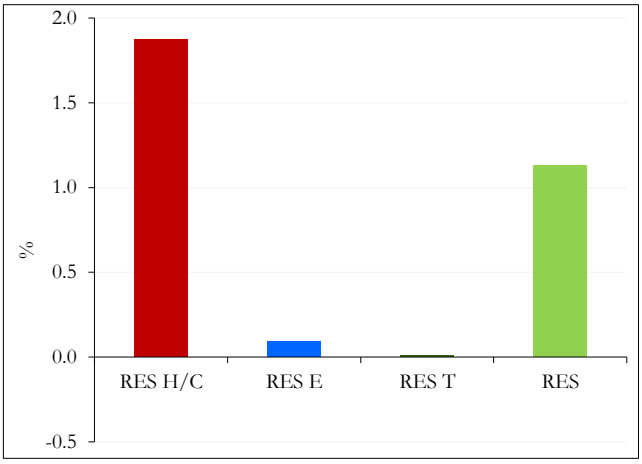

Figure 1-4. Deviation from NREAP in the share of RES in the EU in 2010.

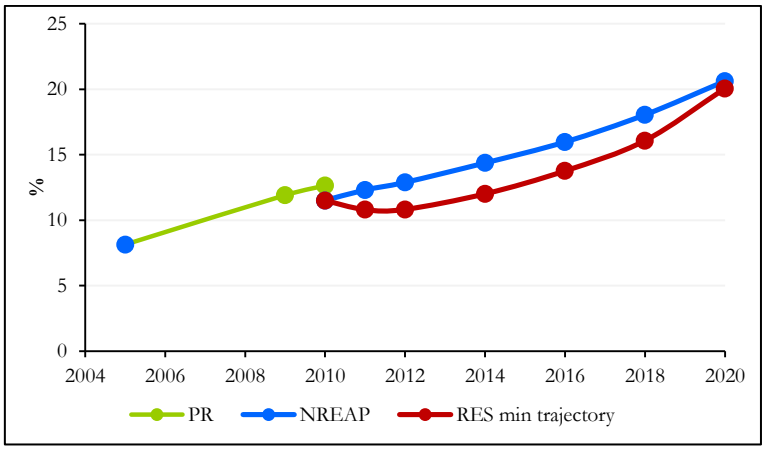

Figure 1-5. Progress of the overall RES share in the EU

The development of renewable energy in the EU led to an overall share above the planned share for 2010 and also above the indicative target for 2011/2012. The trajectory expected for the RES share, according to the aggregated NREAPs, is above the minimum indicative trajectory share defined in RED Directive. The progress made between 2005-2010 shows that the EU is well on track for achieving the 2020 RES share target.

1.3. Sources of renewable energy

A significant increase of the use of almost all various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (1099.0 PJ), followed by biofuels (432.6 PJ), wind (305.0 PJ), heat pumps (158.0 PJ), solar thermal and solar electricity (112.1 PJ) and geothermal, while the use of other sources decreased: hydro energy by 4.7 PJ and marine energy by 0.2 PJ). More progress is expected for the 2010-2020 period, especially by wind (1198.8 PJ) followed by the use of biomass (1048.3 PJ), biofuels (654.6 PJ), solar (483.8 PJ), heat pumps (327.8 PJ), geothermal (107.1 PJ), hydropower (105.4 PJ) and marine energy (21.7 PJ).

Table 1-3. The contribution of different sources of renewable energy in the European Union

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydro	1206.1	1223.3	1201.4	1256.0	1306.8
Geothermal	38.2	50.3	42.2	82.9	149.3
Solar	34.2	136.4	146.2	346.1	630.1
Marine	1.9	1.8	1.72	3.1	23.4
Wind	253.3	596.9	558.3	1106.2	1757.1
Heat pumps	25.0	168.0	183.0	303.7	510.4
Biomass	2458.3	3004.9	3557.4	3669.8	4605.7
Biofuels	125.4	575.9	558	819.7	1210.6

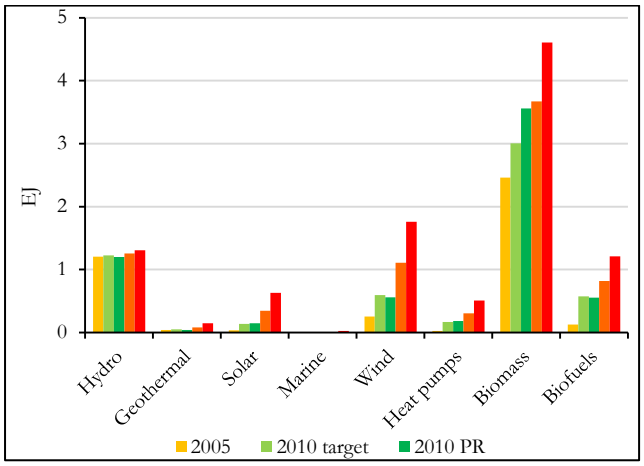

Figure 1-6. Contribution of renewable sources in the EU: projected growth and actual progress

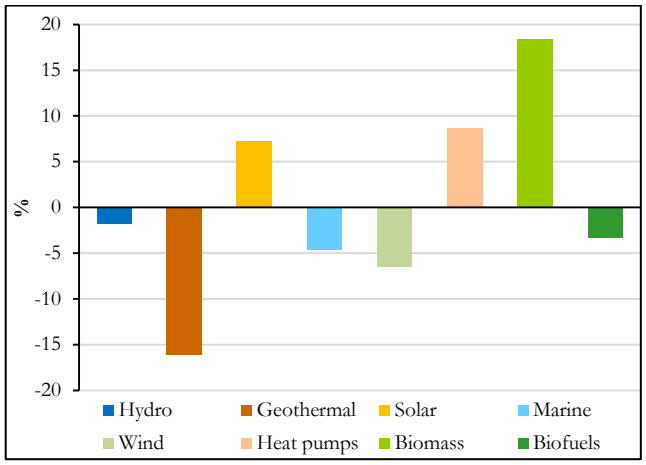

Figure 1-7. Deviation from NREAP in the contribution of renewable sources in EU in 2010

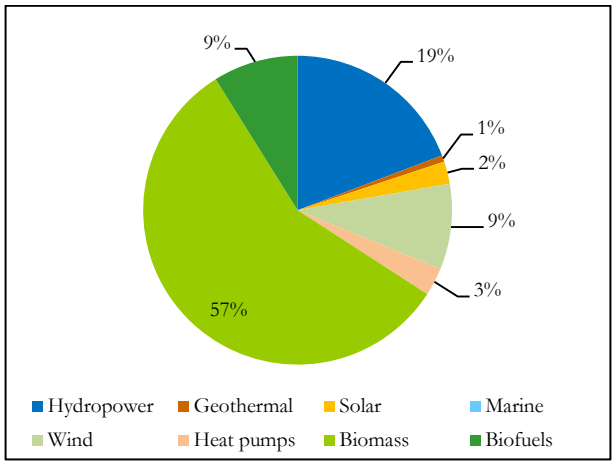

Figure 1-8. Share of renewable sources for electricity, heating & cooling in the EU in 2010

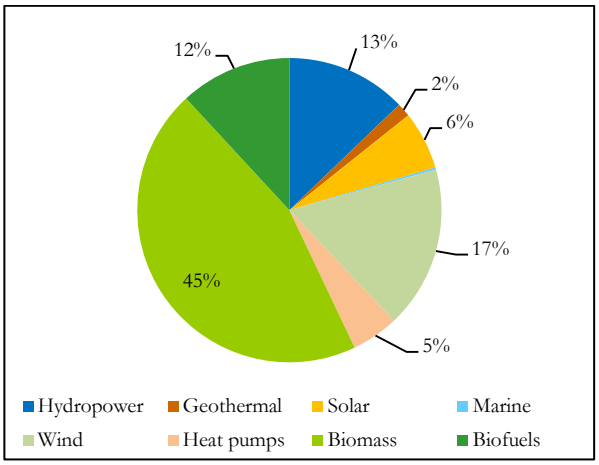

Figure 1-9. Share of renewable sources for electricity, heating & cooling in the EU in 2020

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: biomass by +18.4%, heat pumps by +8.7% and solar by +7.2%, while the use of other renewable sources was below the planned target: geothermal energy by -16.1%, wind by -6.5%, marine energy by -4.6%, biofuels by -3.4% and hydro energy by -1.8%.

Biomass was the major contributor to renewables in 2010 with 57%, followed by hydro with 19%, wind with 9%, biofuels with 9%, heat pumps with 3%, solar with 2% and geothermal with 1%. In 2020, the major input is expected from biomass with 45%, followed by wind with 17%, hydro with 13%, biofuels with 12%, solar with 6%, heat pumps with 5%, geothermal with 2% and marine energy with 0.2%.

1.4. Renewable electricity

The use of renewable electricity in the European Union increased by 159.8 TWh (+33.2%), from 481.9 TWh (1735.1 PJ) in 2005, reaching 641.7 TWh (2310.5 PJ) in 2010, which is 0.8% below the NREAP projections of 647.1 TWh (2330 PJ). Significant progress was made between 2005-2010 in all sectors, especially in wind power (84.7 TWh), followed by biomass (54.5 TWh) and solar (21.7 TWh). In relative terms, the most significant increase was registered in solar power (+1478.6%), followed by wind (+120.4%) and biomass (+79.0%).

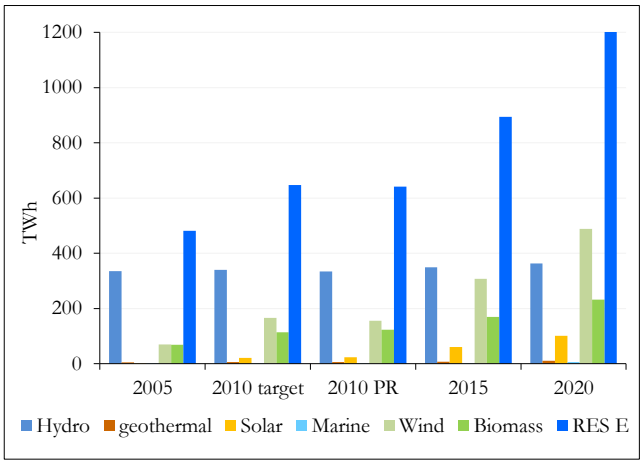

Figure 1-10. RES electricity projected growth and progress until 2010 in the EU.

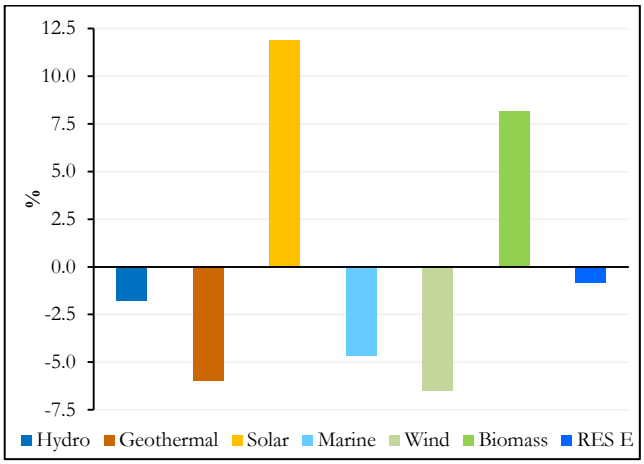

Figure 1-11. Deviation from NREAP in the RES electricity generation in the EU in 2010.

Hydro power generation slightly decreased in comparison with 335.0 TWh produced in 2005, reaching 333.7 TWh in 2010, 1.8% below the projected value of 339.8 TWh. Geothermal electricity production raised from 5.5 TWh to 5.6 TWh in 2010, 6.0% below the expected geothermal power generation of 6.0 TWh. Solar electricity generation grew from 1.5 TWh to 23.2 TWh in 2010, 11.9% above the expected solar power generation of 20.7 TWh in 2010. Marine power production decreased from 535 GWh in 2005 to 478 GWh in 2010, 4.6% below the expected power generation of 501 GWh in 2010. Wind power grew from 70.4 TWh in 2005 to 155.1 TWh in 2010, 6.5% below the expected wind power generation of 165.8 TWh in 2010. Biomass electricity generation also was above the 114.3 TWh projected production for 2010 by 8.2%, reaching 123.6 TWh, in comparison with 69.0 TWh in 2005.

1.5. Renewable energy in heating & cooling

The use of renewable heating and cooling increased in the European Union by 1096 PJ (+48.0%), from 2283.8 PJ in 2005, reaching 3379.8 PJ in 2010, which is 18.5% above the projected value of 2852 PJ. Significant progress was made in all sectors, especially in biomass (+902.7 PJ), heat pumps (+158.0 PJ) and solar thermal (+33.8 PJ). In relative terms, the most significant increase was registered in heat pumps (+630%), followed by solar thermal (+117%) and biomass (+40.8%). The use of heat from geothermal sources increased from 18.5 PJ in 2005, reaching 22.0 PJ in 2010, 23.6% below the projected value of 28.8 PJ. Solar heat use increased from 28.9 PJ in 2005, reaching 62.7 PJ in 2010,

1.6% above the projected value of 61.7 PJ. Biomass heat grew from 2209.8 PJ in 2005 to 3112.5 PJ in 2010, 20.0% above the expected heat use of 2593.6 PJ in 2010. The heat use from heat pumps increased to 182.6 PJ in 2010, 8.7% above the expected generation of 168.0 PJ in 2010.

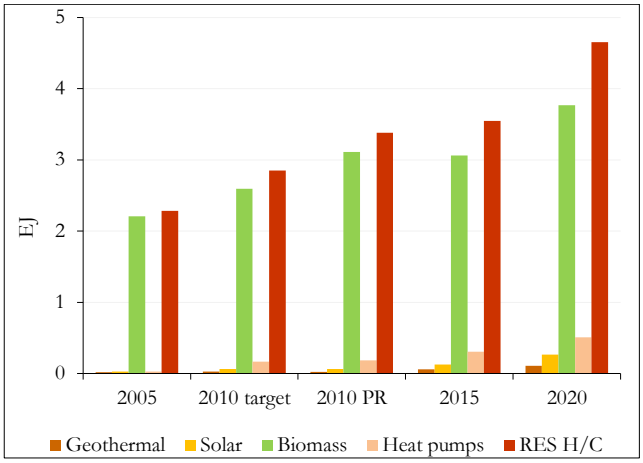

Figure 1-12. RES heat projected growth and progress until 2010 in the European Union.

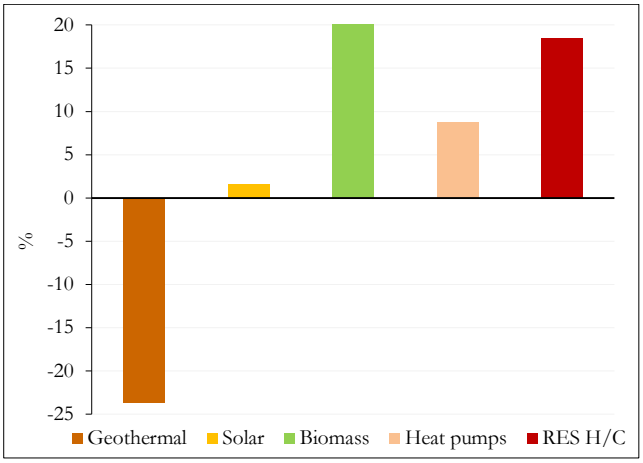

Figure 1-13. Deviation from NREAP in the RES heat generation in the European Union in 2010.

1.6. Renewable energy in transport

The use of renewable energy in transport increased in the EU by 433.8 PJ (260.5%) from 170.8 PJ in 2005 to 604.6 PJ in 2010, 4.1% below the projected value of 630.6 PJ. The use of biofuels reached 558 PJ in 2010 from 125.4 PJ in 2005, 3.5% below the NREAPs planned value of 575.9 PJ.

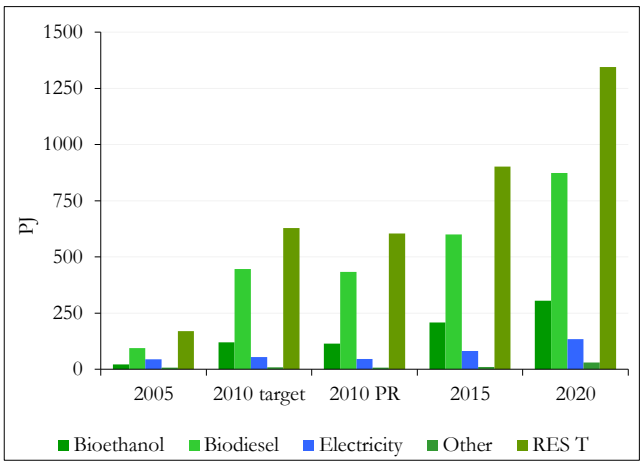

Figure 1-14. RES in transport projected growth and progress until 2010 in the European Union.

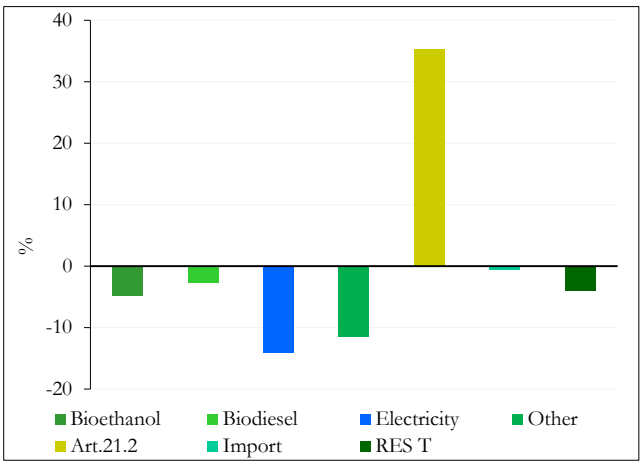

Figure 1-15. RES in transport projected growth and progress until 2010 in the European Union.

The highest increase was achieved by biodiesel (339.0 PJ) followed by bioethanol/bio-ETBE (92 PJ) and biofuels from wastes, residues, ligno-cellulosic material (art 21.2 biofuels) (22.4 PJ). In relative terms, the most significant increase was registered by art 21.2 biofuels (1600%), followed by bioethanol/bio-ETBE (+408%) and biodiesel (359%). The use of biofuels from import increased by 178.4 PJ (+2610%). The use of bioethanol/bio-ETBE grew from 22.5 PJ in 2005 to 114.5 PJ in 2010, 4.9% below the expected use of 120.4 PJ. Biodiesel is the major contributor, increasing from 94.5 PJ in 2005 to 433.5 PJ in 2010, 2.8% below the 2010 expected value of 445.9 PJ. The use of other biofuels (biogas and vegetable oils) provided 8.3 PJ in 2005 and 7.8 PJ in 2010, 11.5% below the target of 8.8 PJ. The use of biofuels from wastes, residues, ligno-cellulosic material grew from 1.4 PJ in 2005 to 23.8 PJ in 2010, 35.3% above the target of 17.6 PJ. The use of imported biofuels increased notably from 7.1 PJ in 2005 to 185.5 PJ in 2010, 0.6% below the expected 186.6 PJ. The use of renewable electricity increased from 45.5 PJ in 2005 to 46.7 PJ in 2010, but this is 14.1% below the target of 54.3 PJ expected for 2010.

2. Renewable energy in Belgium

2.1. Deployment of renewable energy

The deployment of renewable energy in Belgium increased from 29.4 PJ in 2005 to 82.5 PJ in 2010, an increase of 53.1 PJ (180.7%). The use of renewable energy was 31.7% above the NREAP projected use of 62.7 PJ for 2010. Renewable energy use is expected to further increase to 224.7 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 142.1 PJ with a growth of 172.2%.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 22.7 PJ, followed by renewable electricity with 16.1 PJ and renewable energy in transport with 14.1 PJ. The highest relative increase was made by the use of renewable energy in transport (2004.9%) followed by electricity (181.6%) and heating and cooling (110.4%).

The use of renewable energy in heating and cooling increased from 20.5 PJ in 2005 to 43.2 PJ in 2010, 34.7% above the projected level of 32.1 PJ. The RES electricity consumption rose from 8.9 PJ in 2005 to 25.0 PJ in 2010, 48.7% above the target of 16.8 PJ. The use of renewable energy in transport grew from 0.7 PJ in 2005 to 14.5 PJ in 2010, 0.3% below the target of 14.8 PJ in 2010.

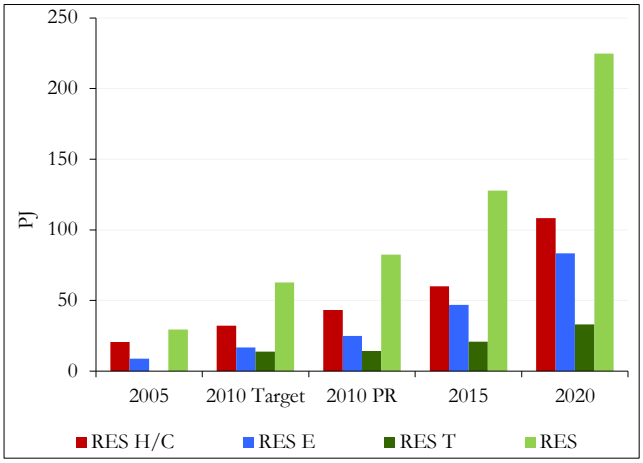

Figure 2-1. RES deployment in Belgium: projected growth and actual progress

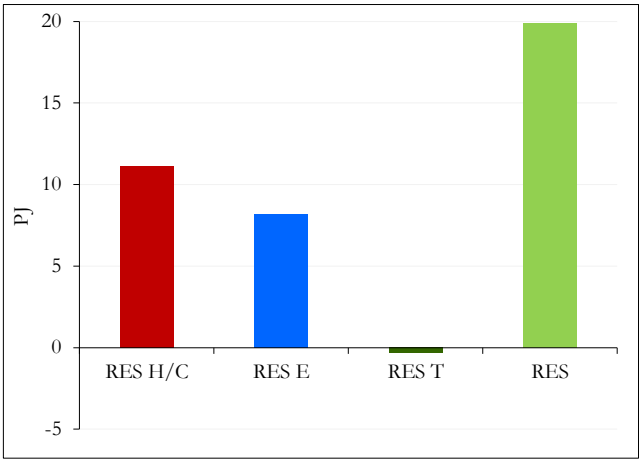

Figure 2-2. Deviation from NREAP in the RES production in Belgium in 2010

Table 2-1. RES use in Belgium, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	43.2	11.1	34.7	22.7	110.4	65.1	150.7	108.4
RES-E	25.0	8.2	48.7	16.1	181.6	58.3	233.5	83.3
RES-T	14.5	-0.3	-2.2	13.8	2004.9	22.7	156.8	37.1
RES	82.5	19.9	31.7	53.1	180.7	142.1	172.2	224.7

2.2. Renewable energy share

The analysis of the Progress Report for Belgium shows that the overall share of RES increased from 1.8% in 2005 to 5.1% in 2010 and this should reach 13.0% in 2020. The highest increase in the share of renewable energy was made in electricity (from 4.3% to 13.9%), followed by heating and cooling (from 2.3% to 7.4%) and in transport (from 4.3% to 7.0%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 7.0% to 20.9%), followed by heating & cooling (from 7.5% to 11.9%) and transport (from 7.1% to 11.6%).

The overall share of RES in 2010 was above the target by 1.3% points, reaching 5.1% in 2010, in comparison with 3.8% expected. The RES share in heating and cooling was above the projected value by 1.0% points, reaching 4.5% in comparison with expected share of 3.5% in 2010. The share of renewable electricity is above the target by 2.2% points, reaching 7.0% in comparison with 4.8% projected value. The share of RES consumption in transport is above the target by 0.7% points, reaching 4.5% in comparison with 3.8% NREAP planned share.

Table 2-2. Projected growth in RES share in Belgium and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	2.3	3.5	4.5	1.0	6.6	11.9
RES-E	2.7	4.8	7.0	2.2	12.7	20.9
RES-T	0.2	3.8	4.5	0.7	5.9	11.6
Overall RES	2.2	3.8	5.1	1.3	7.5	13.0

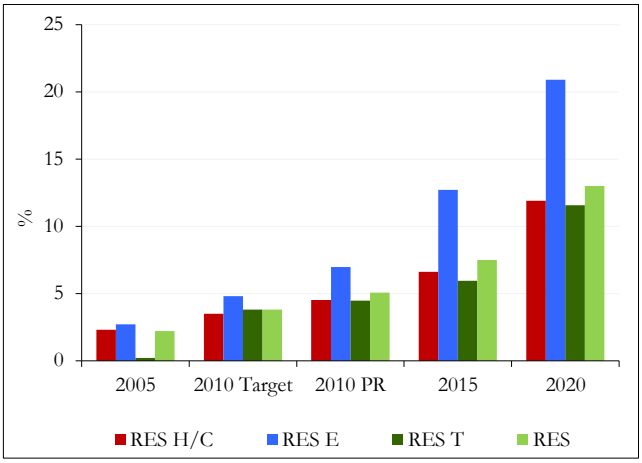

Figure 2-3. RES share in Belgium: projected growth and actual progress

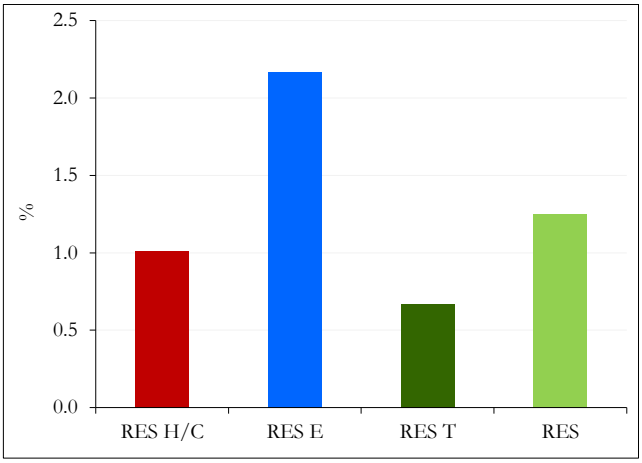

Figure 2-4. Deviation from NREAP in the share of RES in Belgium in 2010

The development of renewable energy in Belgium led to an overall share well above the NREAP planned overall share for 2010 and also above the indicative target for 2011/2012. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory of the share defined in RED Directive. If Belgium will follow the trajectory of period 2009-2010 it will be able to reach the 2020 RES share target.

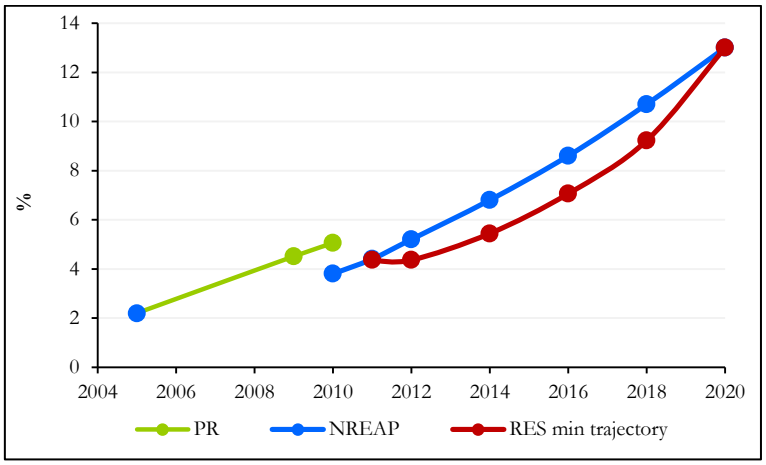

Figure 2-5. Progress of the overall RES share in the Belgium

2.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered in the period 2005-2010, especially by biomass for electricity, heating & cooling (29.6 PJ), followed by biofuels (14.4 PJ), wind (4.6 PJ) and solar thermal and solar electricity (2.4 PJ). More progress is expected during 2010-2020, especially by the use of biomass (68.9 PJ), followed by wind (32.0 PJ), biofuels (18.7 PJ), heat pumps (12.1 PJ), and solar (9.9 PJ), and little growth in geothermal (0.3 PJ) and hydropower (0.2 PJ). In comparison with the expected contribution, the use of several renewable sources was above the 2010 target: wind power by +60.5%, biomass by +42.2%, heat pumps by +15.5%, solar by +8.7%, hydropower by +2.8%, while the use of geothermal energy was below the expectations by -40.6%.

Table 2-3. The contribution of different sources of renewable energy in Belgium

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	1.3	1.3	1.3	1.4	1.6
Geothermal	0.1	0.1	0.1	0.2	0.3
Solar	0.1	2.3	2.5	6.0	12.4
Marine	0.0	0.0	0.0	0.0	0.0
Wind	1.2	3.6	5.7	21.9	37.7
Heat pumps	0.3	2.2	2.5	6.8	14.7
Biomass	26.4	39.4	56.0	70.7	124.9
Biofuels	0.0	13.8	14.4	20.8	33.0

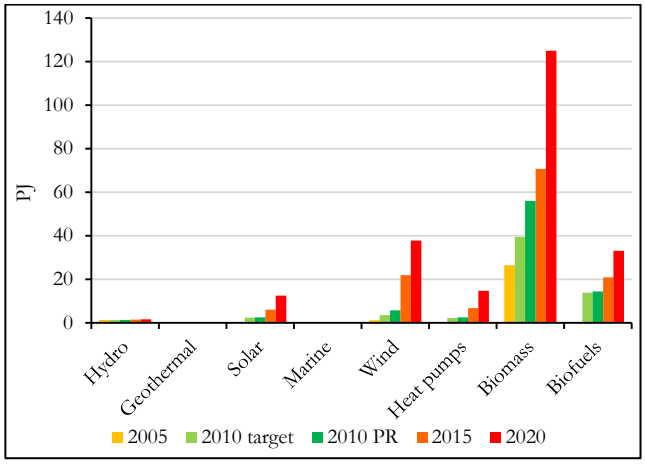

Figure 2-6. Contribution of renewable sources in Belgium: projected growth and actual progress

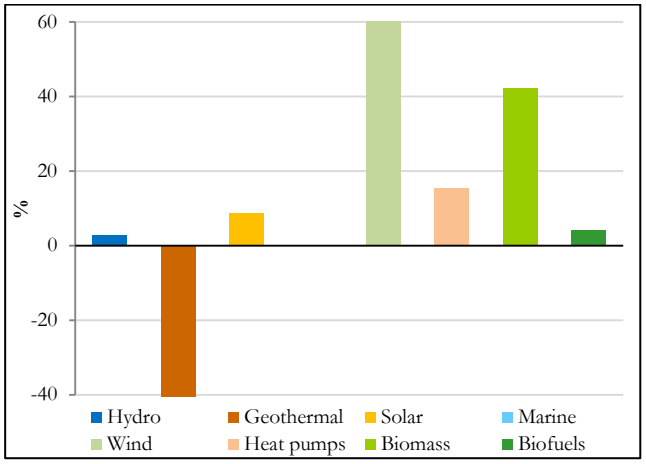

Figure 2-7. Deviation from NREAP in the contribution of renewable sources in Belgium in 2010

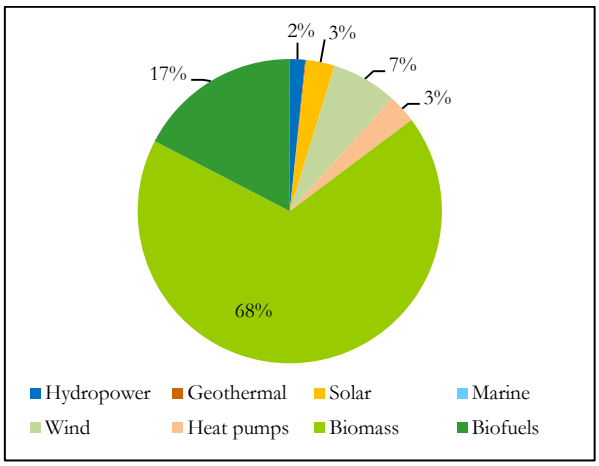

Figure 2-8. Share of renewable sources for electricity, heating & cooling in Belgium in 2010

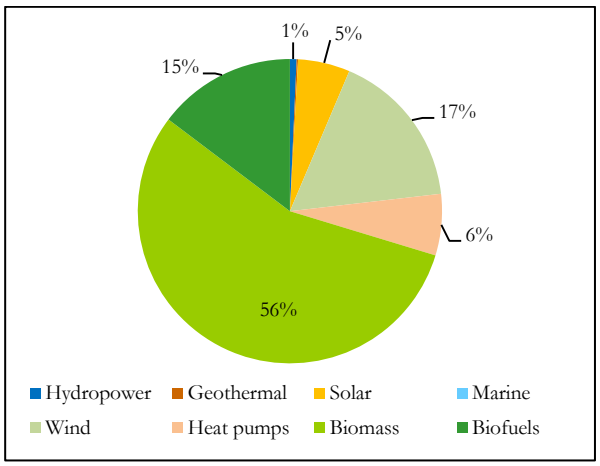

Figure 2-9. Share of renewable sources for electricity, heating & cooling in Belgium in 2020

Biomass was the major contributor to RES use in 2010 with 68%, followed by biofuels with 17%, wind with 7%, heat pumps with 3%, solar with 3% and hydro with 2%. In 2020, the major contribution is expected to come from the use of biomass with 56%, followed by wind with 17%, biofuels with 15%, heat pumps with 6%, solar with 6%, hydro with 0.7% and geothermal with 0.2%.

2.4. Renewable electricity

The renewable electricity generation increased in Belgium from 2462 GWh (8.9 PJ) in 2005 to reach 6933 GWh (25.0 PJ) in 2010, which is 48.7% above the NREAP projected value of 4664 GWh (16.1 PJ). Significant progress was made during 2005-2010 in most sectors, with an increase of 4471 GWh (16.1 PJ) (+181.6%), especially in biomass (2623 GWh or 9.4 PJ), followed by wind power (1270 GWh or 4.2 PJ), and solar (557 GWh or 2 PJ). In relative terms, the most significant increase was registered by far in solar power (+55505.8%), followed by wind (+397.3%) and biomass (+146.4%).

Hydro power generation increased from 350 GWh produced in 2005 to 372 GWh in 2010, 2.8% above the projected value of 362 GWh. Solar electricity generation grew from 1 GWh to 558 GWh in 2010, 83.4% above the expected solar power generation of 304 GWh in 2010. Wind power grew significantly from 320 GWh in 2005 to 1589 GWh in 2010, 60.5% above the expected wind power generation of 991 GWh in 2010. Biomass electricity generation also increased from 1791 GWh to 4414 GWh in 2020, 46.8% above the projected production of 3007 GWh.

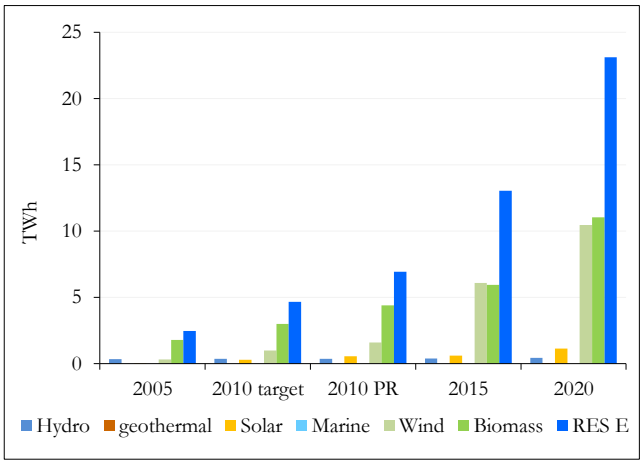

Figure 2-10. RES electricity projected growth and progress until 2010 in Belgium

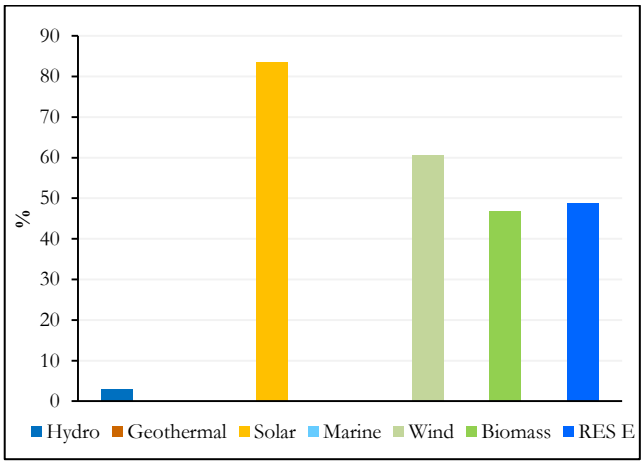

Figure 2-11. Deviation from NREAP in the RES electricity generation in Belgium in 2010

2.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Belgium from 20.5 PJ in 2005 to 43.2 PJ in 2010, which is 34.7% above the NREAP projected value of 32.1 PJ. Significant progress was made, with an increase of 22.7 PJ (+110.4%), especially in biomass (20.1 PJ), followed by heat pumps (20.1 PJ) and solar (0.4 PJ). In relative terms, the most significant increase was registered in heat pumps (+750.5%), followed by solar thermal (+260.4%) and biomass (+100.4%).

The use of geothermal heat decreased from 0.12 PJ in 2005, reaching 0.08 PJ in 2010, 40.6% below the expected use of 0.13 PJ. Solar heat generation increased from 0.14 PJ in 2005 to reach 0.5 PJ in 2010, 58.6% below the projected value of 1.2 PJ in 2010. Biomass heat use grew from 20.0 PJ in 2005 to 40.1 PJ in 2010, 40.5% above the expected biomass heat generation of 28.6 PJ in 2010. The heat production from heat pumps increased to from 0.3 PJ in 2005 to 2.5 PJ in 2010, which is 15.5% above the expected heat pumps generation of 2.2 PJ in 2010.

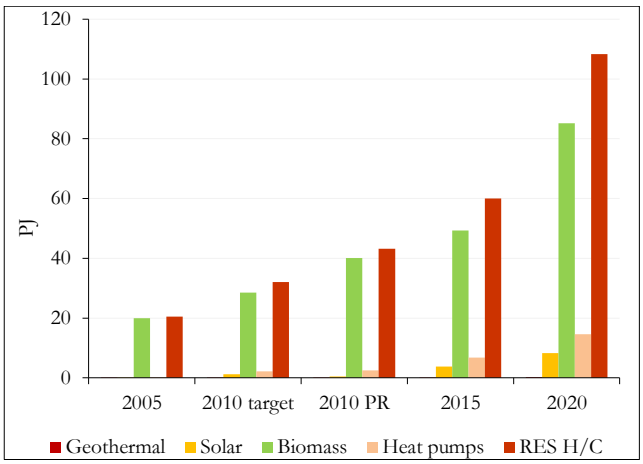

Figure 2-12. RES heat projected growth and progress until 2010 in Belgium

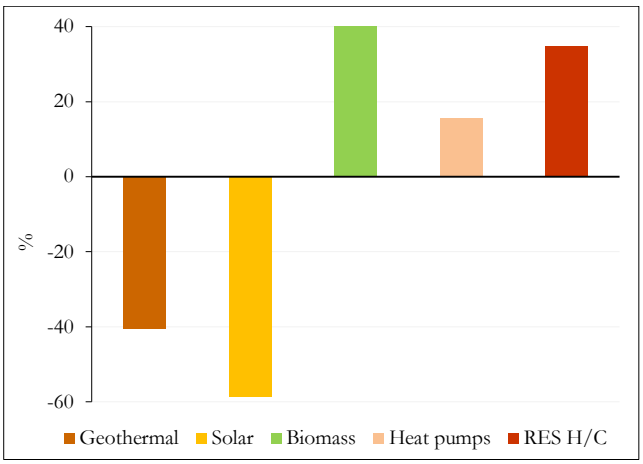

Figure 2-13. Deviation from NREAP in the RES heat generation in Belgium in 2010

2.6. Renewable energy in transport

The use of renewable energy in transport increased in Belgium from 0.7 PJ in 2005 to reach 14.5 PJ in 2010, 0.3% below the NREAP projected value of 14.8 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 13.8 PJ. The highest increase in the transport sector was achieved by biodiesel (12.8 PJ) followed by bioethanol/bio-ETBE (1.6 PJ). Biodiesel was the major contributor to RES use in transport in 2010, increasing to 12.8 PJ, 4.4% above the 2010 projected value of 12.2 PJ. The use of bioethanol/ bio-ETBE reached 1.6 PJ in 2010, 2.7% above the expected bioethanol use. Neither other biofuels (biogas and vegetable oils) nor biofuels from wastes, residues, ligno-cellulosic material were used in 2010. The use of biofuels from import increased significantly to 13.0 PJ in 2010, while no biofuels were expected to be imported. The use of renewable electricity in transport decreased from 0.7 PJ in 2005 to only 0.1 PJ in 2010, 89.9% below the expected use of 1.0 PJ.

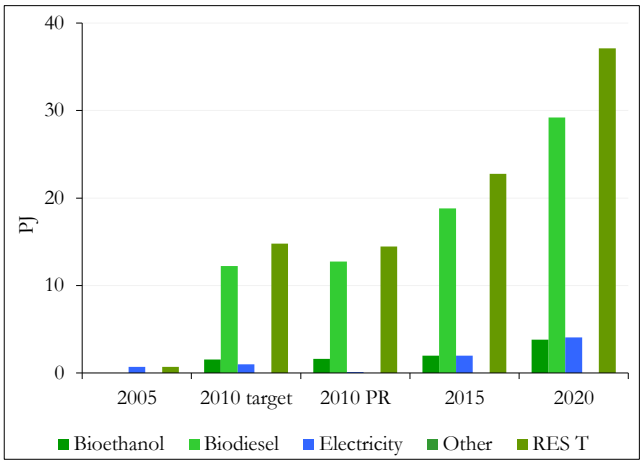

Figure 2-14. RES in transport projected growth and progress until 2010 in Belgium

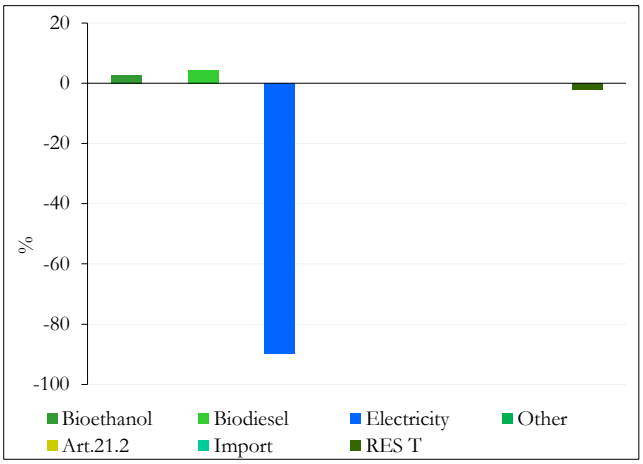

Figure 2-15. Deviation from NREAP in the RES use in transport in Belgium in 2010

3. Renewable energy in Bulgaria

3.1. Deployment of renewable energy

The renewable energy deployment in Bulgaria increased from 41.4 PJ in 2005 to 58.2 PJ in 2010 (an increase of 16.8 PJ or 40.7%). The renewable use in Bulgaria was 25.9% above the NREAP projected RES use of 46.2 PJ for 2010. This is expected to further increase to 85.6 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 27.4 PJ (47%), in comparison with the increase of 16.8 PJ (40.7%) in 2005-2010. About 13.3 PJ is expected to be transferred to other EU Member States within the cooperation mechanism.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 9.1 PJ, followed by renewable electricity with 7.2 PJ and renewable energy in transport with only 0.5 PJ. The highest relative increase involved the use of renewable energy in transport (366.7%) followed by the electricity (65.6%) and heating and cooling (30.1%). The use of renewable energy in heating and cooling increased from 30.3 PJ in 2005 to 39.4 PJ in 2010, well above the projected level of 31.0 PJ. The renewable electricity increased from 11.1 PJ in 2005 to 18.3 PJ in 2010, above the target of 13.8 PJ. The use of renewable energy in transport grew from 0.1 PJ in 2005 to 0.6 PJ in 2010, well below the target of 1.5 PJ in 2010.

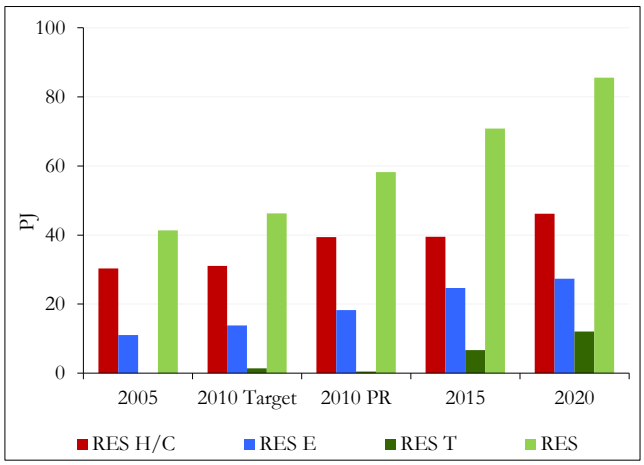

Figure 3-1. RES deployment in Bulgaria: projected growth and actual progress.

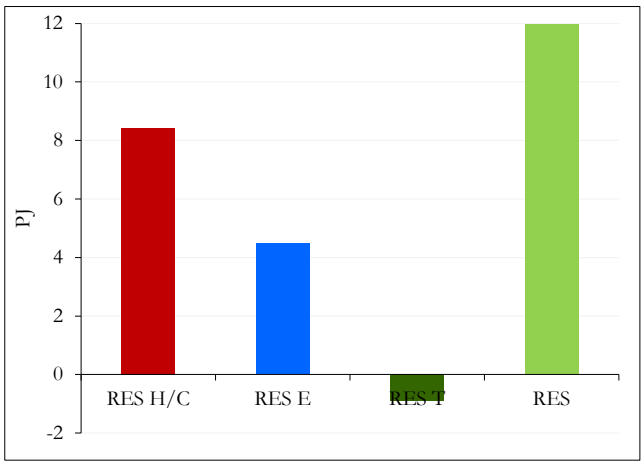

Figure 3-2. Deviation from NREAP in the RES production in Bulgaria in 2010.

Table 3-1. RES use in Bulgaria, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	39.4	8.4	27.1	9.1	30.1	6.7	17.1	46.2
RES-E	18.3	4.5	32.5	7.2	65.6	9.1	49.6	27.4
RES-T	0.6	-0.9	-61.1	0.5	366.7	12.1	2057.1	12.6
RES	58.2	12.0	25.9	16.8	40.7	27.4	47.0	85.6

3.1. Renewable energy share

The analysis of the Progress Report for Bulgaria shows that the overall share of RES increased from 9.6% in 2005 to 10.6% in 2010 and should reach 16.0% in 2020. The highest increase in the share of renewable energy was made in electricity (from 15.9% to 20.1%), followed by heating and cooling (from 8.4% to 12.0%) and in transport (from 0.1% to 0.6%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in transport (from 0.6% to 10.8%), followed by electricity (from 12.0% to 20.8%) and heating & cooling (from 20.1% to 23.8%).

The overall share of RES was above the target in 2010 by 2.5% points, reaching 12.6% in comparison with 10.1% projected in the NREAP. The RES share in heating and cooling is above the projected value by 3.6% points, reaching 20.1% in comparison with expected share of 16.5% in 2010. The share of renewable electricity is above the target by 1.4% points, reaching 12.0% in comparison with 10.6% projected value. On the contrary, the share of RES in transport is below the target by 0.7% points, reaching 0.6% in comparison with 1.3% expected RES share.

Table 3-2. Projected growth in RES share in Bulgaria and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES -H/C	15.9	16.5	20.1	3.6	20.8	23.8
RES -E	8.4	10.6	12.0	1.4	18.6	20.8
RES-T	0.1	1.3	0.6	-0.7	5.8	10.8
Overall RES	9.6	10.1	12.6	2.5	12.4	16.0

* Mandatory share, after transfer to other MS

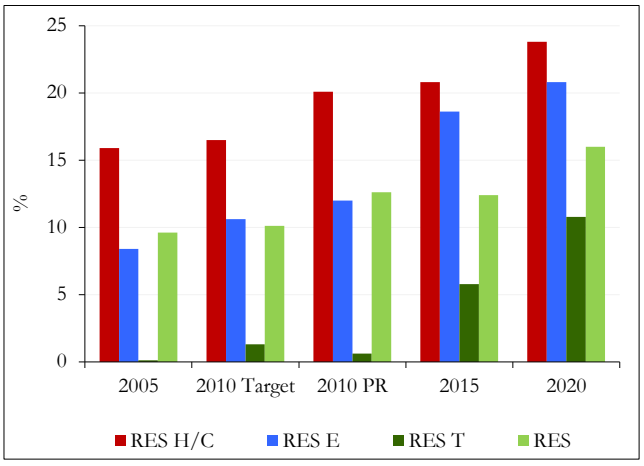

Figure 3-3. RES share in Bulgaria: projected growth and actual progress.

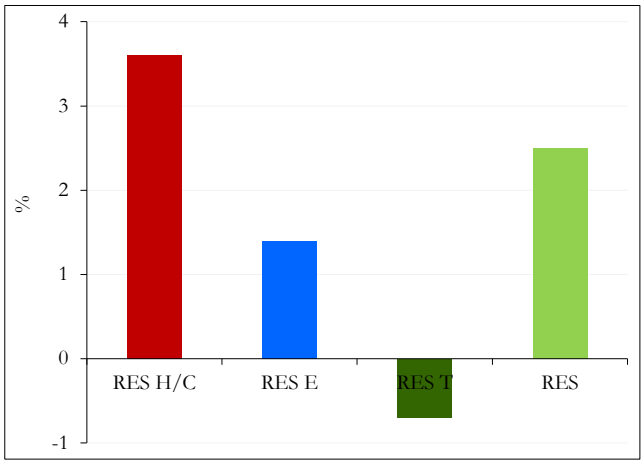

Figure 3-4. Deviation from NREAP in the share of RES in Bulgaria in 2010.

Bulgaria has exceeded the planned RES share for 2010 and already also the RES indicative target share for 2011/2012. The trajectory expected for the RES share is set in the NREAP according to the minimum indicative trajectory of overall RES share defined in RED Directive. Bulgaria is on track to reach the 2020 RES share.

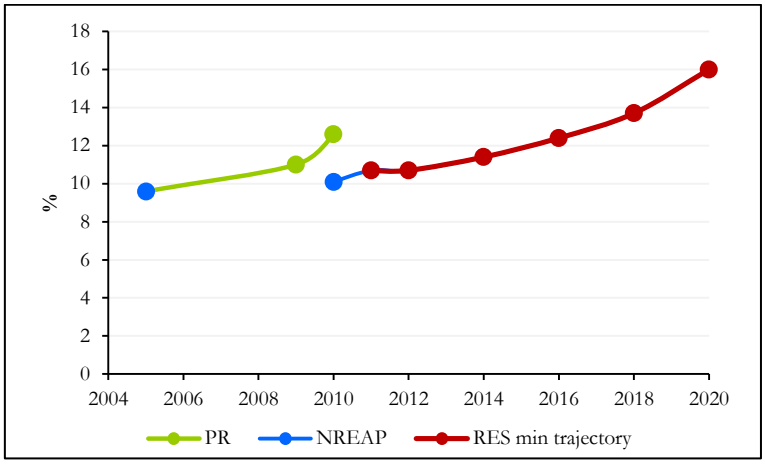

Figure 3-5. Progress of the overall RES share in Bulgaria

3.2. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity and heating & cooling (7.4 PJ), followed by hydropower (4.5 PJ), wind (2.6 PJ), geothermal (1.4 PJ) and solar thermal and solar electricity (0.5 PJ). More progress is expected in the period 2010-2020, especially in the use of biofuels (11.6 PJ), followed by biomass (10.3 PJ), wind (6.7 PJ) and solar (2.0 PJ), while the targets for 2020 have been already reached and exceeded by hydropower (2.2 PJ) and geothermal (1.0 PJ).

Table 3-3. The contribution of different sources of renewable energy in Bulgaria

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	11.0	11.6	15.6	12.3	13.4
Geothermal	0.0	0.0	1.4	0.1	0.4
Solar	0.0	0.3	0.5	1.7	2.4
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.0	2.2	2.6	8.3	9.3
Heat pumps	0.0	0.0	0.0	0.0	0.0
Biomass	30.3	30.7	37.7	41.8	48.0
Biofuels	0.0	1.4	0.5	6.7	12.0

In comparison with the expected contribution for 2010, the use of several renewable energy sources was above the NREAP target: for geothermal by +3200%, solar by +60.6%, hydropower by +34.3%, biomass by +22.8%, wind power by +19.3%, while the use of biofuels for transport was below the target by -66.7%.

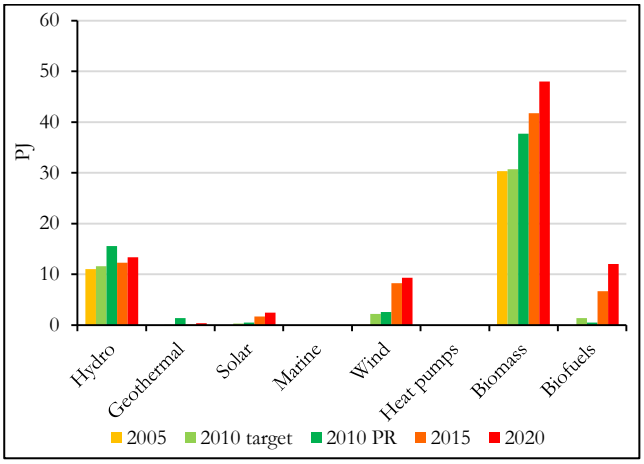

Figure 3-6. Contribution of renewable sources in Bulgaria: projected growth and actual progress

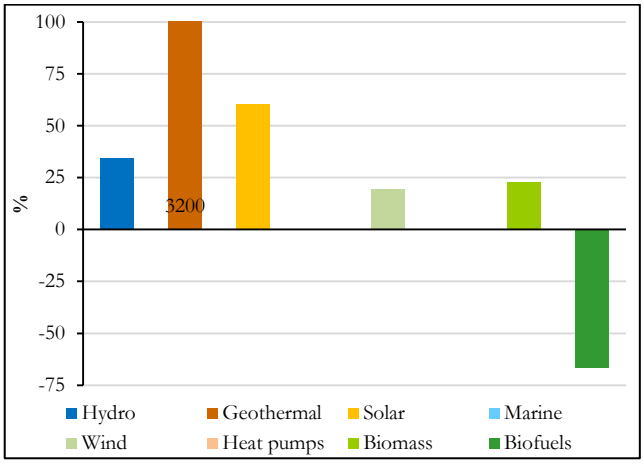

Figure 3-7. Deviation from NREAP in the contribution of renewable sources in Bulgaria in 2010

The use of biomass was the major contributor to RES use in 2010 with a 65% share, followed by hydro with 27%, wind with 4%, geothermal with 2% and solar with 1%. In 2020, the major contribution is expected to come from the use of biomass with 56%, followed by wind with 11%, biofuels with 14%, hydro with 16%, solar with 3%, and geothermal with 0.4%.

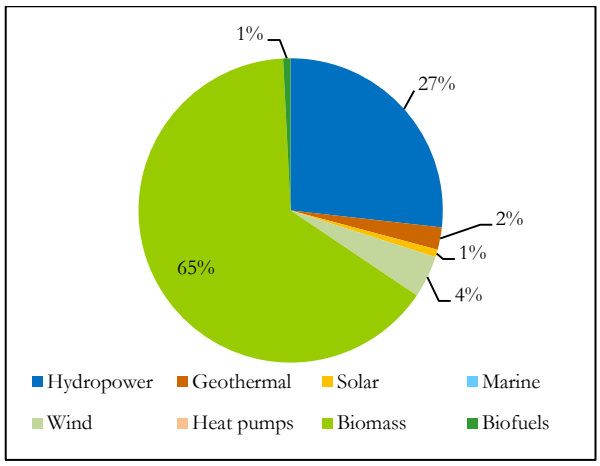

Figure 3-8. Share of renewable sources for electricity, heating & cooling in Bulgaria in 2010

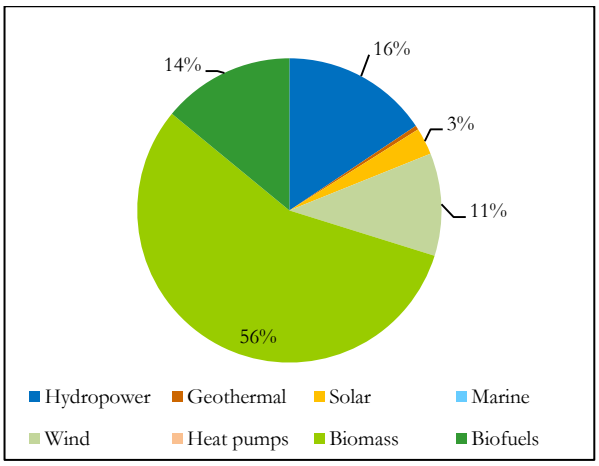

Figure 3-9. Share of renewable sources for electricity, heating & cooling in Bulgaria in 2020

3.3. Renewable electricity

The renewable electricity generation increased in Bulgaria by 2010 GWh (+65.4%), from 3073 GWh in 2005 to reach 5083 GWh in 2010, which is 32.4% above the NREAP projected value of 3840 GWh.

Significant progress was made between 2005-2010 in many sectors, especially in wind power (717 GWh), followed by far by biomass (16 GWh) and solar (15 GWh). In relative terms, the most significant increase was registered in wind power (+14340%).

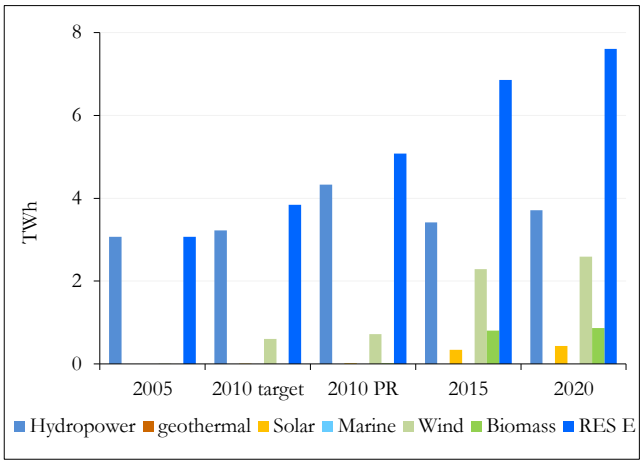

Figure 3-10. RES electricity projected growth and progress until 2010 in Bulgaria.

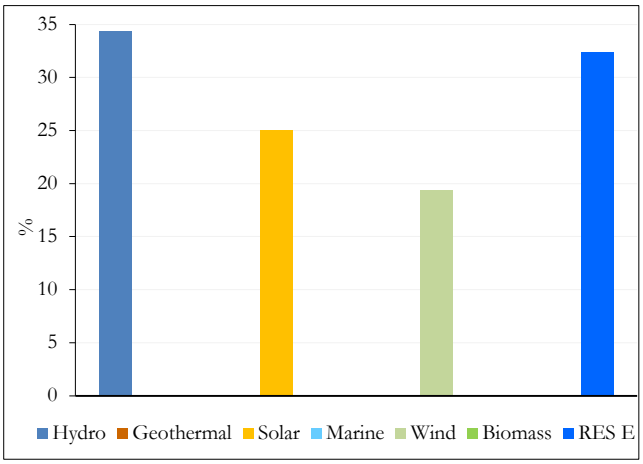

Figure 3-11. Deviation from NREAP in the RES electricity generation in Bulgaria in 2010.

Hydro power generation increased from 3068 GWh produced in 2005 to 4330 GWh in 2010, 34.3% above the projected value of 3223 GWh. Solar electricity production reached 15 GWh in 2010, 25% above the expected solar power generation of 12 GWh in 2010. Wind power grew from 5 GWh in 2005 to 722 in 2010, 19.3% above the expected wind power generation of 605 GWh in 2010. Biomass electricity generation increased to 16 GWh, while no contribution of biomass to electricity production was expected in the NREAP.

3.4. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Bulgaria by 9.1 PJ (+30.1%), from 30.3 PJ in 2005 to 39.4 PJ in 2010, which is 27.1% above the NREAP projected value of 31.0 PJ. Significant progress was made in most sectors, especially in biomass (+7.3 PJ), geothermal (+1.4 PJ) and solar (+0.4 PJ). In relative terms, significant increase was registered in biomass (+24.2%).

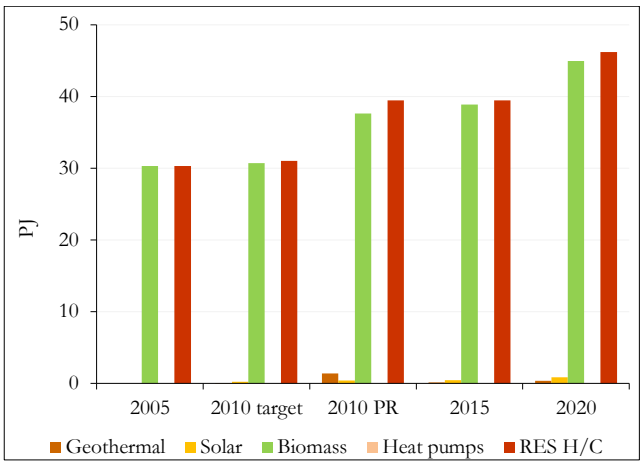

Figure 3-12. RES heat projected growth and progress until 2010 in Bulgaria.

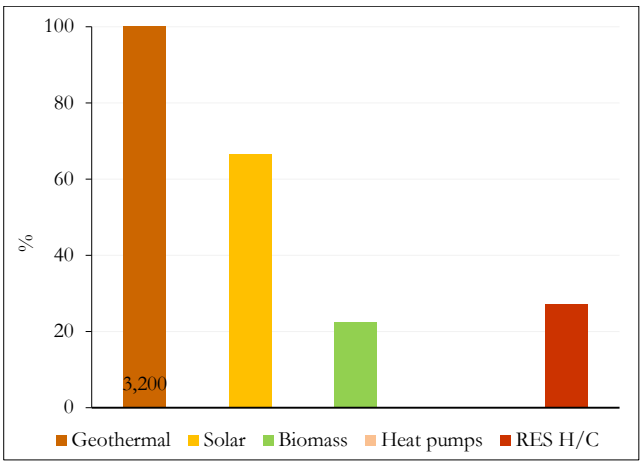

Figure 3-13. Deviation from NREAP in the RES heat generation in Bulgaria in 2010.

The use of renewable heating and cooling was well above the expected use for 2010. Geothermal heat utilisation increased to 1.38 PJ in 2010, in comparison with the expected heat use of 0.04 PJ. Solar heat production increased to 0.4 PJ in 2010, 66.7% above the projected value of 0.25 PJ. Biomass heat grew from 30.3 PJ in 2005 to 37.6 PJ in 2010, 22.5% above the expected biomass heat generation of 30.7 PJ in 2010. No contribution from heat pumps was neither planned nor achieved

3.5. Renewable energy in transport

The use of renewable energy in transport increased in Bulgaria from 0.1 PJ in 2005 to reach 0.6 PJ in 2010, 61.1% below the NREAP projected value of 1.5 PJ. The use of biodiesel in transport was the only source to show some increase between 2005 and 2010 by 0.5 PJ.

Biodiesel was the only biofuel in use in Bulgaria in 2010. The use of biodiesel grew to 0.46 PJ in 2010, 66.7% below the expected biodiesel use of 1.38 PJ. The use of renewable electricity in transport remained at the same level, 0.13 PJ since 2005, which was also expected for 2010.

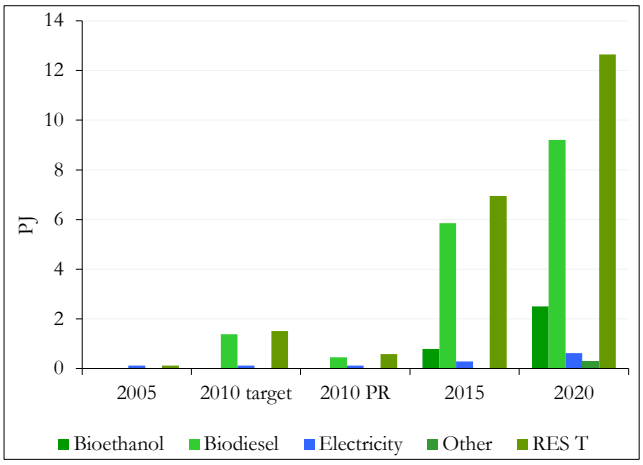

Figure 3-14. RES in transport projected growth and progress until 2010 in Bulgaria.

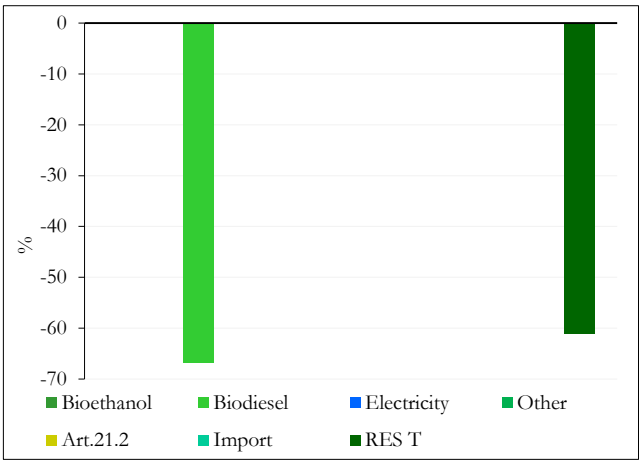

Figure 3-15. Deviation from NREAP in the RES use in transport in Bulgaria in 2010.

4. Renewable energy in Denmark

4.1. Deployment of renewable energy

The renewable energy deployment in Denmark increased from 113.8 PJ in 2005 by 40.8 PJ (+35.8%) to 154.6 PJ in 2010. The renewable use in Denmark was 3.6% above the NREAP projected RES use of 149.2 PJ. This is expected to further increase to 211.9 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to amount to 57.3 PJ, in comparison with the increase of 40.8 PJ in 2005-2010. Some transfer to other Member States should be available until 2020, as the RES progress is expected to exceed the target of 30% set for 2020.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 31.7 PJ, followed by far by renewable electricity with 9.0 PJ and renewable energy in transport with only 0.1 PJ. The highest relative increase was made by the heating and cooling (40.5%), electricity (25.4%) and the use of renewable energy in transport (20.0%).

The use of renewable energy in heating and cooling increased from 78.3 PJ in 2005 to 109.9 PJ in 2010, above the projected level of 103.8 PJ. The renewable electricity increased from 35.6 PJ in 2005 to 44.6 PJ in 2010, just below the target of 44.7 PJ. The use of renewable energy in transport grew from 0.4 PJ in 2005 to 0.5 PJ in 2010, well below the target of 1.8 PJ in 2010.

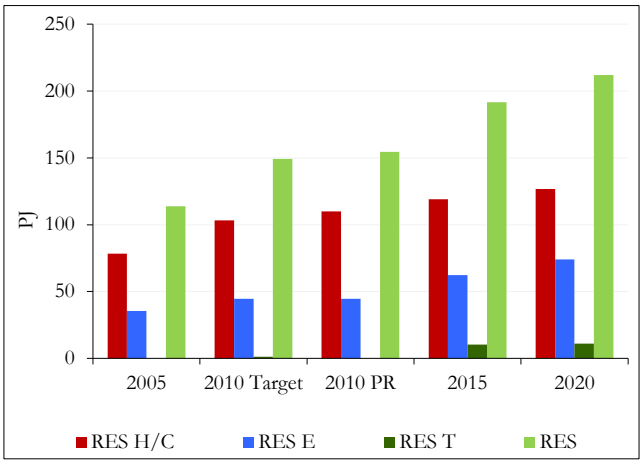

Figure 4-1. RES deployment in Denmark: projected growth and actual progress.

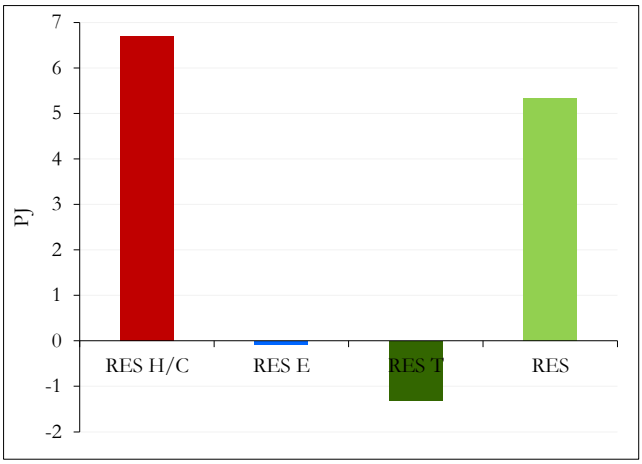

Figure 4-2. Deviation from NREAP in the RES production in Denmark in 2010.

Table 4-1. RES use in Denmark, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	109.9	6.7	6.5	31.7	40.5	16.8	15.3	126.8
RES-E	44.6	-0.1	-0.2	9.0	25.4	29.5	66.2	74.2
RES-T	0.5	-1.3	-74.3	0.1	20.0	11.7	2594.4	12.2
RES	154.6	5.3	3.6	40.7	35.8	57.3	37.1	211.9

4.2. Renewable energy share

The analysis of the Progress Report for Denmark shows that the overall share of RES increased from 16.5% in 2005 to 21.8% in 2010 and this should reach 30.4% in 2020. The highest progress in the share of renewable energy was made in heating and cooling (from 23.2% to 31.0%), followed by electricity (from 26.8% to 31.0%) and in transport (from 4.3% to 7.0%). Further increase is expected to be

achieved until 2020, according to the data provided in the NREAP, especially in electricity (from 31.0% to 54.5%), followed by heating & cooling (from 30.6% to 39.6%) and transport (from 0.3% to 10.1%).

The overall share of RES reached 21.8% in 2010, below the share of 21.9% projected in the NREAP. As the RES data shows that the RES share should reach 30.4% in 2020, the difference to the share of 30% should be available for transfer to other Member States. The RES share in heating and cooling reached 30.6%, just below the achieved the target of 30.8% for 2010. The share of renewable electricity is below the target by 3.3% points, reaching 31.0% in comparison with 34.3% projected value. The share of RES in transport is below the target by 0.74% points, reaching 0.26% in comparison with 1.0% projected RES share in transport.

Table 4-2. Projected growth in RES share in Denmark and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	23.2	30.8	30.6	-0.2	36.0	39.8
RES-E	26.8	34.3	31.0	-3.3	45.7	51.9
RES-T	0.2	1.0	0.3	-0.7	6.7	10.3
Overall RES	17.0	21.9	21.8	-0.1	27.6	30.4

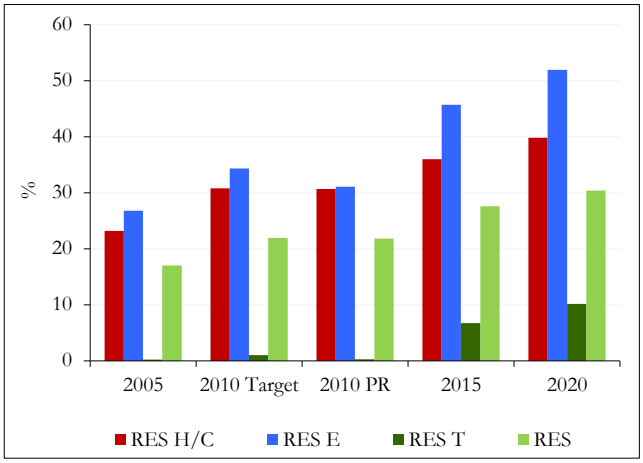

Figure 4-3. RES share in Denmark: projected growth and actual progress.

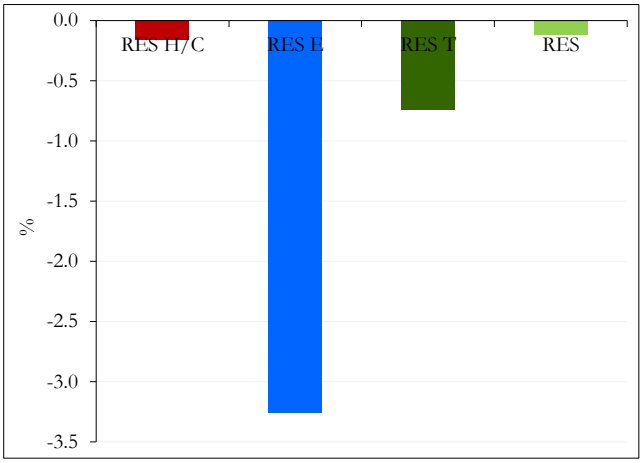

Figure 4-4. Deviation from NREAP in the share of RES in Denmark in 2010.

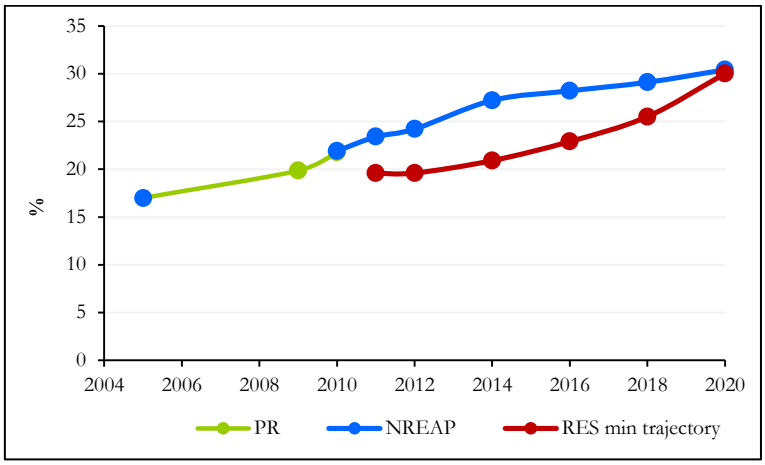

Figure 4-5. Progress of the overall RES share in Denmark

Denmark did not reached the planned overall RES share for 2010 by only 0.1%. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory of overall RES share defined in RED Directive. Denmark exceeded the minimum RES indicative share trajectory

for 2011/2012 and 2013/2014. According to Progress Report Denmark seems to be in track for the achievement of 2020 target.

4.3. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered in 2005-2010, especially by the use of biomass for electricity, heating & cooling (33.3 PJ), followed by wind (4.0 PJ), and solar thermal and solar electricity (0.2 PJ) and geothermal (0.2 PJ).

More progress is expected in 2010-2020, especially by the use of biomass (23.8 PJ), followed by wind (14.3 PJ), biofuels (10.9 PJ) and heat pumps (8.4 PJ), while the use of geothermal already exceeded the 2020 target (0.2 PJ) in 2010.

In comparison with the expected contribution, the use of several sources was above the NREAP 2010 target: solar by +38.9% and biomass by +10.3%, while the use of other sources was below: biofuels by -100%, hydro by -25.8%, heat pumps by -19.0% and wind by -10.2%.

Table 4-3. The contribution of different sources of renewable energy in Denmark

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	0.1	0.1	0.1	0.1	0.1
Geothermal	0.0	0.0	0.2	0.0	0.0
Solar	0.4	0.5	0.6	0.6	0.7
Marine	0.0	0.0	0.0	0.0	0.0
Wind	23.8	31.0	27.8	40.5	42.2
Heat pumps	4.2	8.8	7.1	12.6	15.5
Biomass	85.3	107.6	118.7	127.5	142.5
Biofuels	0.0	1.3	0.0	10.3	10.9

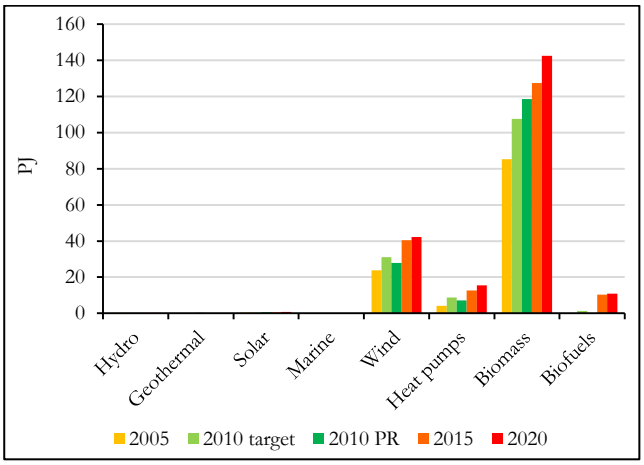

Figure 4-6. Contribution of renewable sources in Denmark: projected growth and actual progress

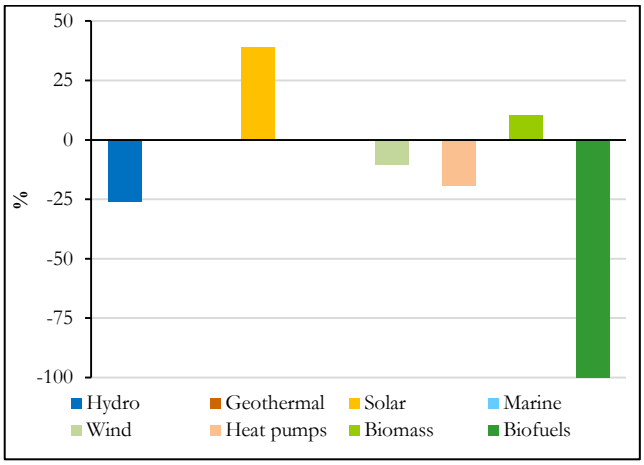

Figure 4-7. Deviation from NREAP in the contribution of renewable sources in Denmark in 2010

The use of biomass was the major contributor to RES use in 2010 with a 77% share, followed by wind with 18%, heat pumps with 5%, solar with 0.4%, hydro with 0.1% and geothermal with 0.1%. In 2020, the major contribution is expected to come also from the use of biomass with 67%, followed by wind with 20%, heat pumps with 7%, biofuels with 5%, solar with 0.3% and hydro with 0.1%.

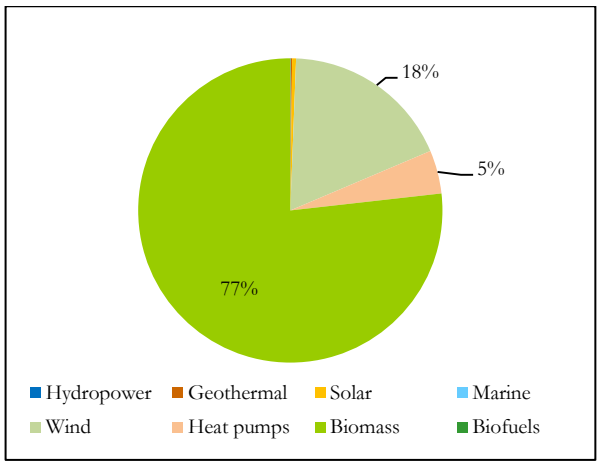

Figure 4-8. Share of renewable sources for electricity, heating & cooling in Denmark in 2010

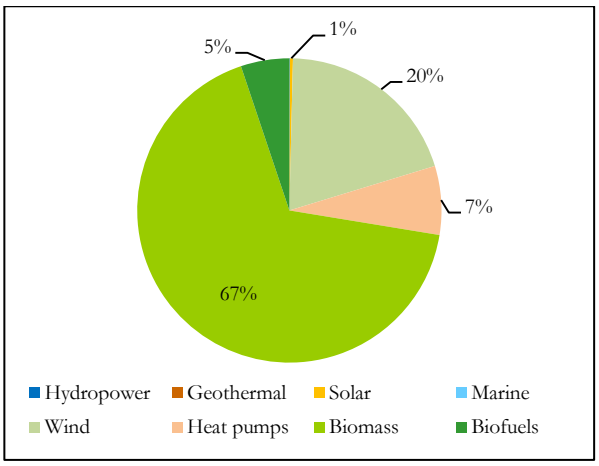

Figure 4-9. Share of renewable sources for electricity, heating & cooling in Denmark in 2020

4.4. Renewable electricity

The renewable electricity generation increased in Denmark by 2507 GWh (+25.4%), from 9882 GWh in 2005 to reach 12389 GWh in 2010, which is just 0.2% below the NREAP projected value of 12411 GWh. Significant progress was made in 2005-2010 in some sectors, especially in biomass power (+1389 GWh), followed by wind power (+1114 GWh) and solar (+4 GWh). In relative terms, the most significant increase was registered in solar power (+200%), followed by biomass (+42.8%) and wind (+16.8%).

Hydro power generation remained at the same level, 23 PJ, since 2005, 25.8% below the projected value of 31 GWh for 2010. Solar electricity generation grew from 2 GWh to 6 GWh in 2010, 200% above the expected solar power generation of 2 GWh in 2010. Wind power grew from 6614 GWh in 2005 to 7728 GWh in 2010, 10.2% below the expected wind power generation of 8606 GWh in 2010. Biomass electricity generation rose from 3243 GWh in 2005 to 4632 GWh generated in 2010, 22.8% above the 3772 GWh projected production.

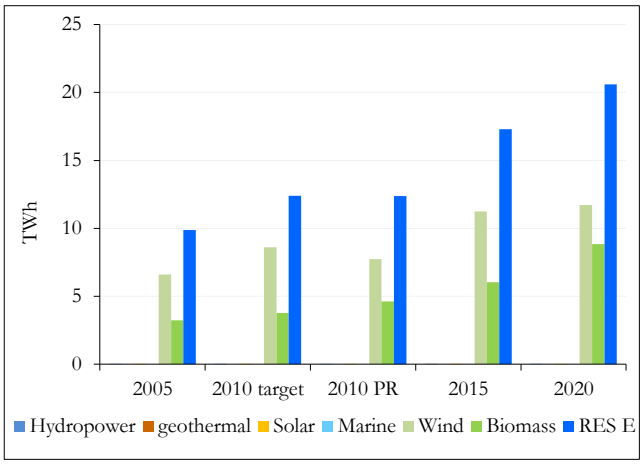

Figure 4-10. RES electricity projected growth and progress until 2010 in Denmark.

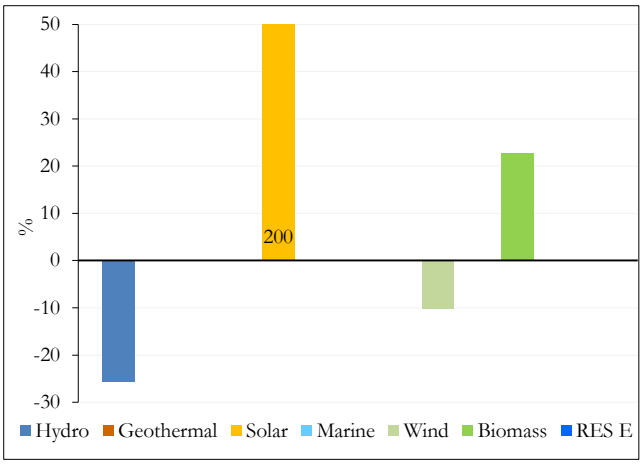

Figure 4-11. Deviation from NREAP in the RES electricity generation in Denmark in 2010.

4.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Denmark from 78.3 PJ in 2005 to 109.9 PJ in 2010, which is 6.5% above the NREAP projected value of 103.2 PJ. Significant progress was made in all sectors, with an increase of 31.7 PJ (+40.5%), especially in biomass (28.3 PJ), followed by far by heat pumps (2.9 PJ), solar (0.2 PJ) and geothermal (0.2 PJ). In relative terms, the most

significant increase was registered in heat pumps (+70.0%), followed by solar thermal (+50.0%) and biomass (+38.5%).

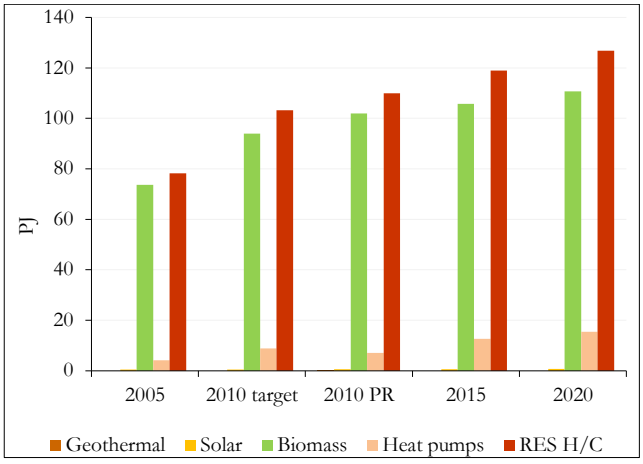

Figure 4-12. RES heat projected growth and progress until 2010 in Denmark.

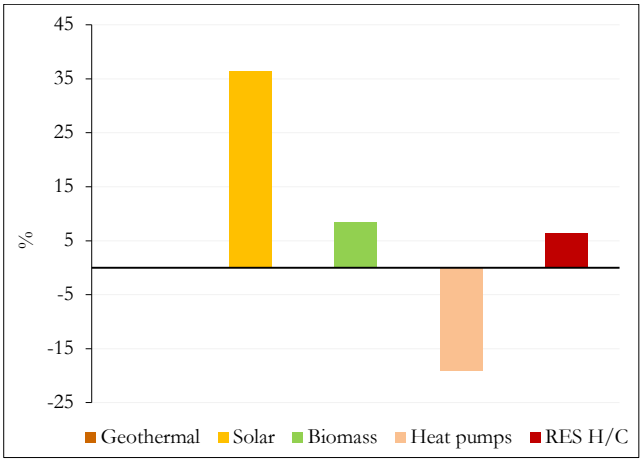

Figure 4-13. Deviation from NREAP in the RES heat generation in Denmark in 2010.

The heat use from geothermal sources increased to 0.2 PJ in 2010, while no contribution was expected for 2010. Solar heat utilisation increased from 0.4 PJ in 2005 to 0.6 PJ in 2010, 36.4% above the expected 0.5 PJ heat use. Biomass heat grew from 73.6 PJ in 2005 to 102.0 PJ in 2010, 8.5% above the expected biomass heat generation of 94.0 PJ in 2010. The heat production from heat pumps increased to 7.1 PJ in 2010, 19.0% below the expected heat generation of 8.8 PJ.

4.6. Renewable energy in transport

No data was reported in the Progress Report on the biofuel use in transport sector in Denmark. The use of renewable electricity in transport increased from 0.4 PJ in 2005 to 0.5 PJ in 2010, which is 1.8% below the expected consumption for 2010.

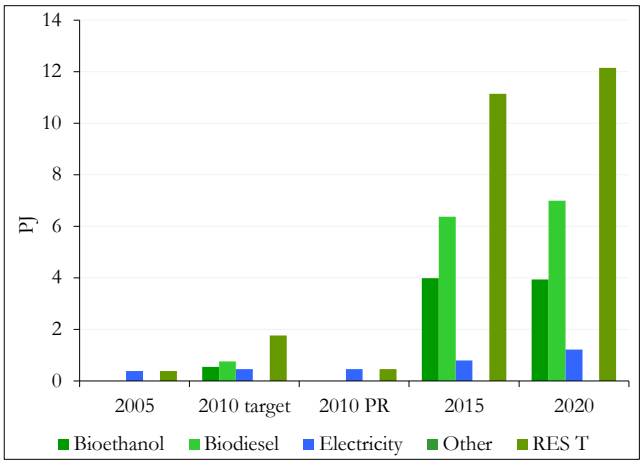

Figure 4-14. RES in transport projected growth and progress until 2010 in Denmark.

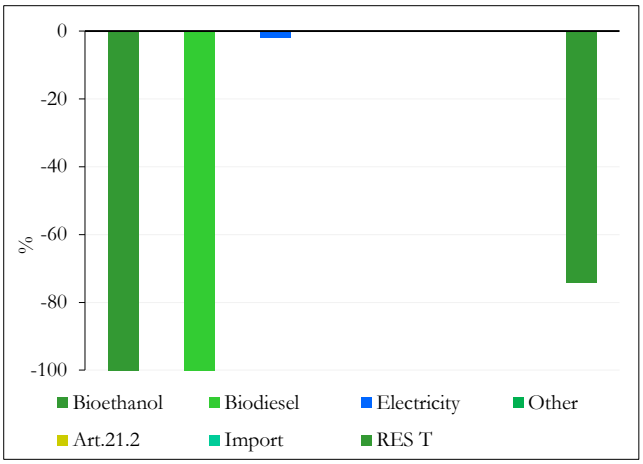

Figure 4-15. Deviation from NREAP in the RES use in transport in Denmark in 2010.

5. Renewable energy in Germany

5.1. Deployment of renewable energy

The RES deployment in Germany increased from 624.9 PJ in 2005 to 1052.3 PJ in 2010, an increase of 427.3 PJ or 68.4%. The renewable use in Germany was 11.3% (+106.5 PJ) above the NREAP projected RES use of 945.7 PJ for 2010. This is expected to further increase to 1614.4 PJ until 2020.

The additional use of renewable energy in 2010-2020 is expected to be 562.2 PJ, in comparison with the increase of 427.3 PJ in 2005-2010. Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 198.2 PJ, followed by renewable electricity with 181.8 PJ and renewable energy in transport with 47.0 PJ. The highest relative increases involved renewable electricity (81.9%), heating and cooling (61.4%) and the use of renewable energy in transport (53.8%).

The use of renewable energy in heating and cooling increased from 322.6 PJ in 2005 to 520.9 PJ in 2010, 100.9 PJ, 24.0% above the projected level of 420.0 PJ. The renewable electricity increased from 221.9 PJ in 2005 to 403.8 PJ in 2010, 25.9% above the target of 377.9 PJ. The use of renewable energy in transport grew from 87.4 PJ in 2005 to 134.4 PJ in 2010, 22.6% below the target of 157.0 PJ in 2010.

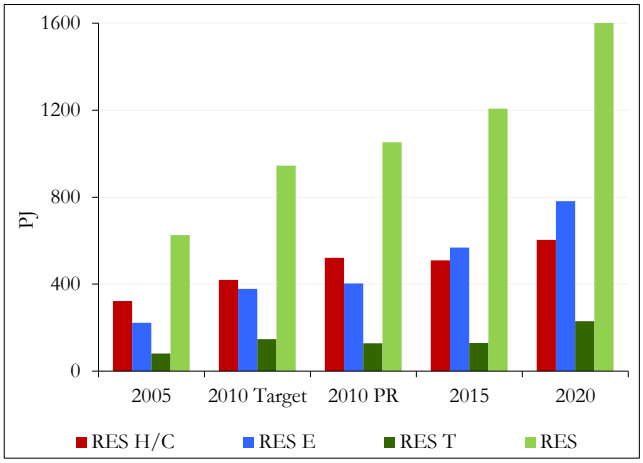

Figure 5-1. RES deployment in Germany: projected growth and actual progress.

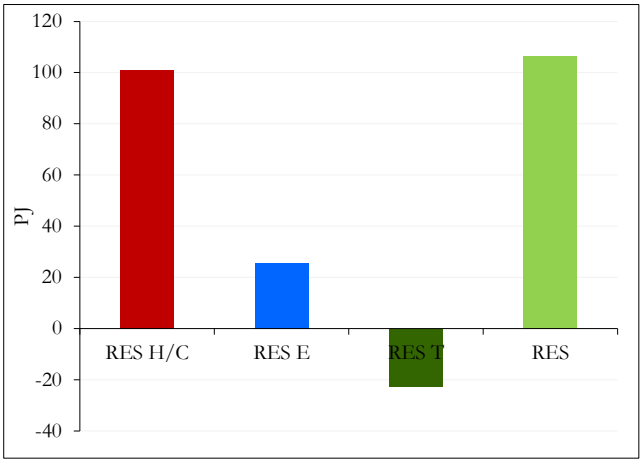

Figure 5-2. Deviation from NREAP in the RES production in Germany in 2010.

Table 5-1. RES use in Germany, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAPs
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	520.9	100.9	24.0	198.2	61.4	83.3	16.0	604.2
RES-E	403.8	25.8	6.8	181.8	81.9	377.3	93.5	781.1
RES-T	134.4	-22.6	-14.4	47.0	53.8	122.7	91.3	257.1
RES	1052.3	106.5	11.3	427.3	68.4	562.2	53.4	1614.4

5.2. Renewable energy share

The analysis of the Progress Report of Germany shows that the overall share of RES increased from 6.5% in 2005 to 11.3% in 2010 and this should reach 19.6% in 2020. The highest increase in the share of renewable energy was made in electricity (from 10.2% to 18.4%), followed by heating and cooling (from 6.6% to 11.0%) and in transport (from 3.9% to 6.2%). Major increase is expected to be achieved until 2020, according to the NREAP, especially in electricity (from 18.4% to 38.6%), followed by heating & cooling (from 11.0% to 15.5%) and transport (from 7.3% to 13.7%).

The overall RES share was above the target by 1.2% points, reaching 11.3% in 2010, in comparison with expected 10.1% share. The RES share in heating and cooling is above the projected value by 2.0% points, reaching 11.0% in comparison with expected share of 9.0% in 2010. The renewable electricity share was above the target by 1.0% points, reaching 18.4% in comparison with 17.4% planned value. The renewable share in transport was below the target by 1.1% points, reaching 6.2% in comparison with 7.3% expected.

Table 5-2. Projected growth in RES share in Germany and progress

	2005 NREAP	2010 NREAP	2010 PR	deviation from NREAP	2015 NREAP	2020 NREAP
	[%]	[%]	[%]	[% points]	[%]	[%]
RES H/C	6.6	9.0	11.0	2.0	11.7	15.5
RES E	10.2	17.4	18.4	1.0	26.8	38.6
RES-T	3.9	7.4	6.2	-1.2	7.1	13.8
Overall RES	6.5	10.1	11.3	1.2	13.5	19.6

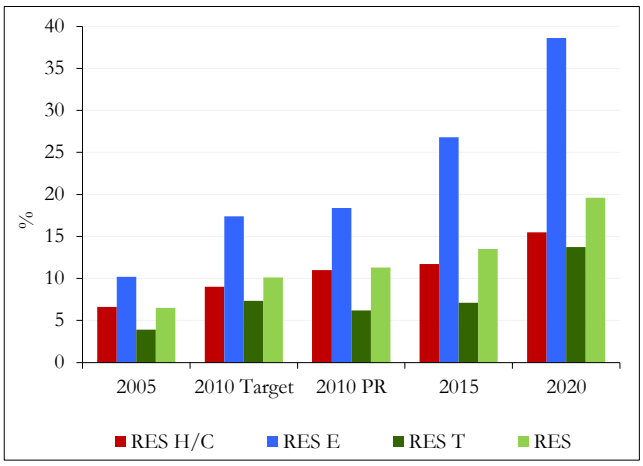

Figure 5-3. RES share in Germany: projected growth and actual progress.

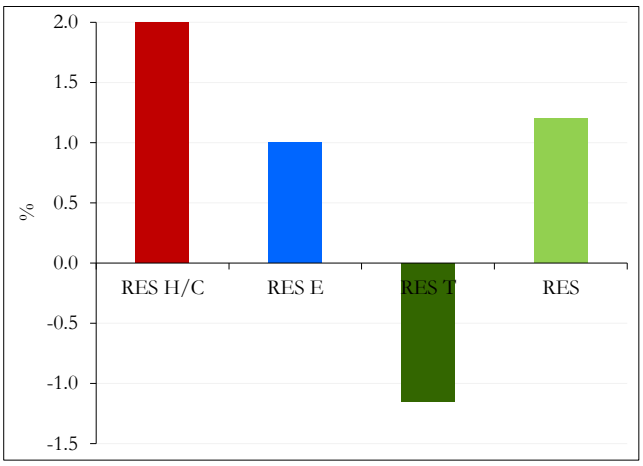

Figure 5-4. Deviation from NREAP in the share of RES in Germany in 2010.

Germany reached in 2009 its 2010 planned overall RES share and exceeded in 2010 the planned overall RES shares of 2010 and 2011, approaching the overall RES share for 2012. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory defined in RED Directive. Germany exceeded the RES indicative target shares for 2011/2012 and 2013/2014. If Germany will follow the trajectory of overall RES share in period 2009-2010 it will be in track for the achievement of the 2020 RES share target.

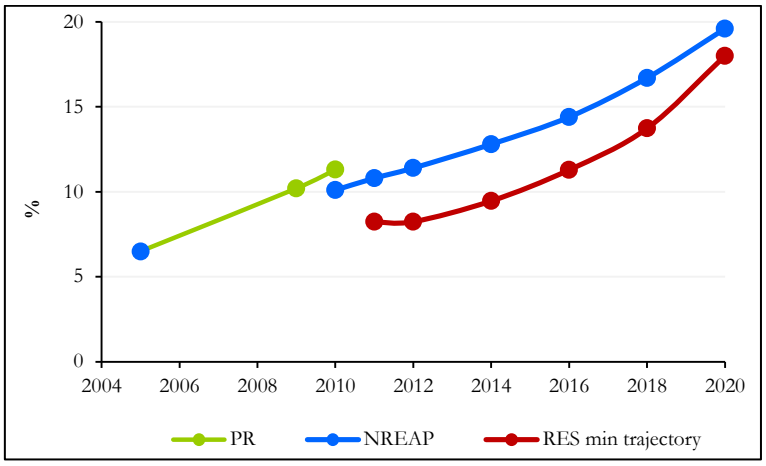

Figure 5-5. Progress of the overall RES share in Germany

5.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+249.6 PJ), followed by biofuels (+47.3 PJ), wind (+59.2 PJ), solar thermal and solar electricity (+46.3 PJ), hydro (+13.4 PJ), biofuels (+10.9 PJ) and geothermal (+0.7 PJ). More progress is expected for 2010-2020, especially for wind (220.8 PJ), followed by solar thermal and solar electricity (140.3 PJ), biofuels (101.5 PJ), biomass (49.4 PJ), geothermal (33.5 PJ) and heat pumps (28.8 PJ), while the use of hydro energy was already in 2010 above the 2020 target (12.2 PJ).

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: hydro energy by +30.0%, biomass by +21.1% and solar by +15.6%, while the use of other sources was below the 2010 targets: geothermal by -24.1%, biofuels by -12.9%, wind by -3.5% and heat pumps by -1.9%.

Table 5-3. The contribution of different sources of renewable energy in Germany

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	70.9	64.8	84.2	68.4	72.0
Geothermal	0.5	1.5	1.2	11.2	34.7
Solar	14.6	52.6	60.8	125.2	201.1
Marine	0.0	0.0	0.0	0.0	0.0
Wind	96.0	160.8	155.2	252.0	376.0
Heat pumps	8.2	19.5	19.1	33.5	47.9
Biomass	354.5	498.7	604.1	586.5	653.5
Biofuels	80.3	146.6	127.6	130.0	229.1

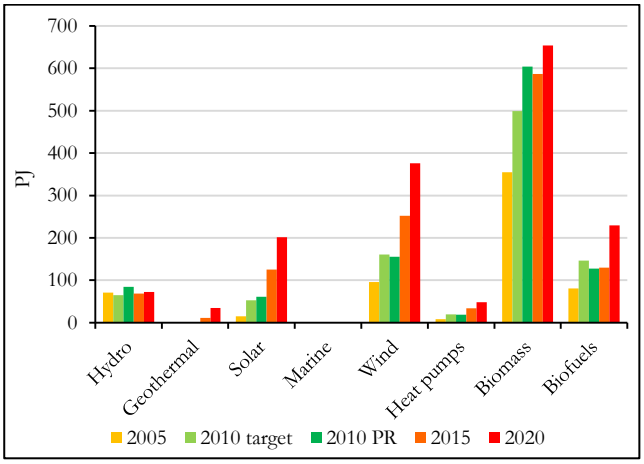

Figure 5-6. Contribution of renewable sources in Germany: projected growth and actual progress

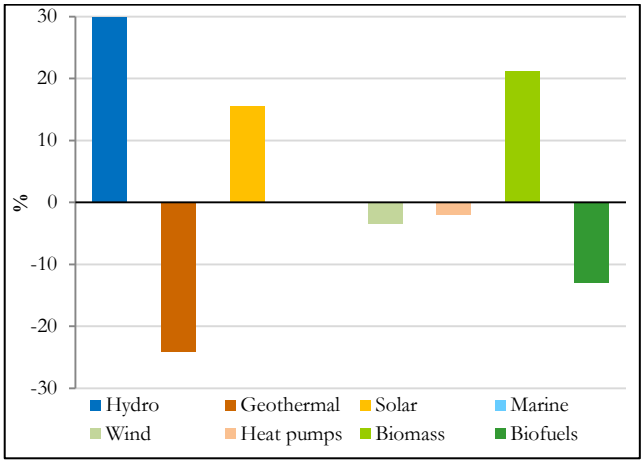

Figure 5-7. Deviation from NREAP in the contribution of renewable sources in Germany in 2010

Biomass was the major contributor to RES in 2010 with a 57% share, followed by wind with 15%, biofuels with 12%, hydro with 8%, solar with 6%, heat pumps with 2% and geothermal with 0.1% In 2020, the major contribution is expected to come from the use of biomass with 41%, followed by wind with 23%, biofuels with 14%, solar with 12%, hydro with 5% and geothermal with 2%.

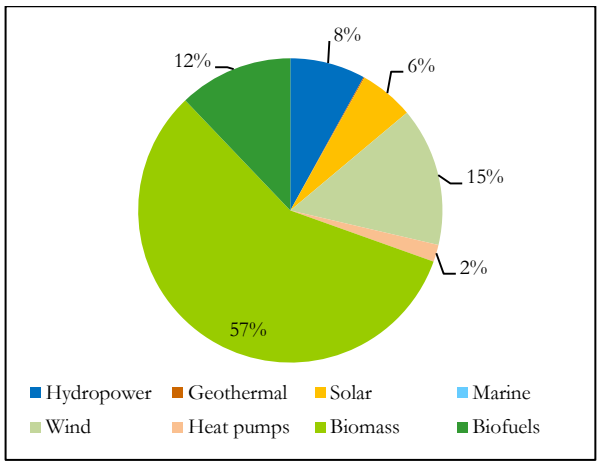

Figure 5-8. Share of renewable sources for electricity, heating & cooling in Germany in 2010

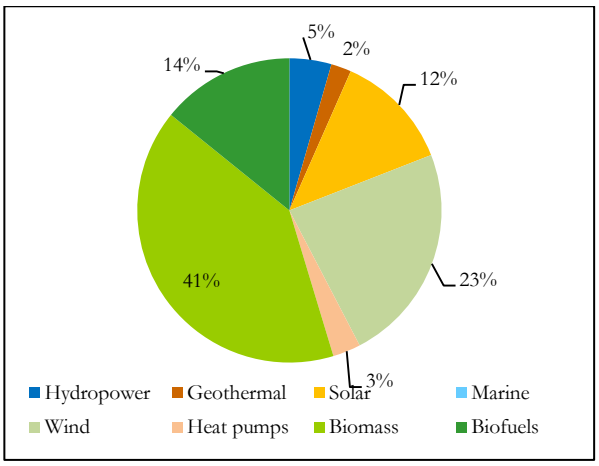

Figure 5-9. Share of renewable sources for electricity, heating & cooling in Germany in 2020

5.4. Renewable electricity

The renewable electricity generation increased by 50488 GWh (+81.9%), from 61652 GWh in 2005 to 112140 GWh in 2010, which is 6.8% above the projected value of 104471 GWh. Big progress was made between 2005-2010 in all sectors, especially in biomass power (+19875 GWh), followed by wind (+16452 GWh) and solar (+10418 GWh). In relative terms, the most significant increase was registered in geothermal (+14900%), followed by solar (+812.6%), biomass (+141.7%) and wind (+61.7%).

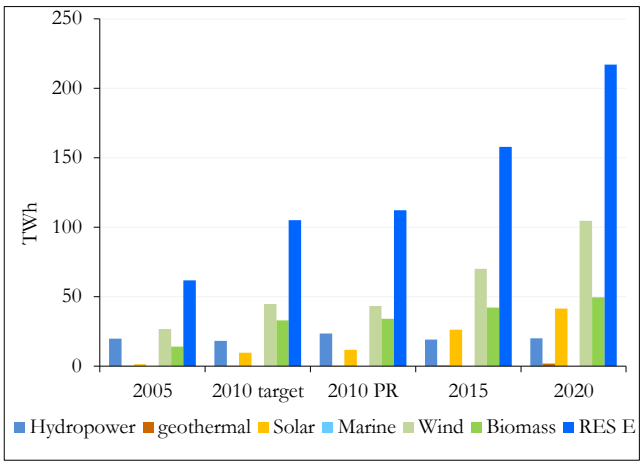

Figure 5-10. RES electricity projected growth and progress until 2010 in Germany.

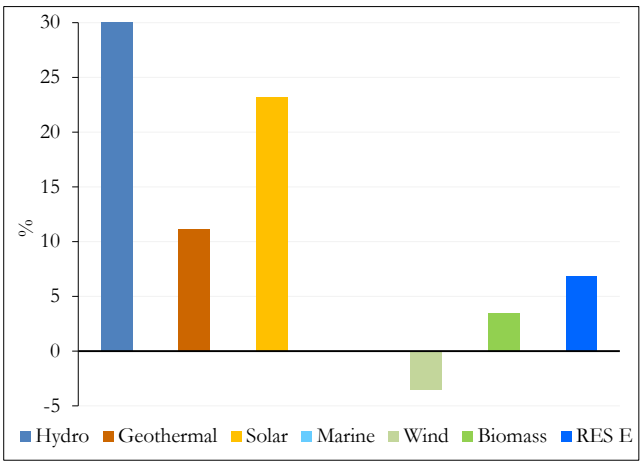

Figure 5-11. Deviation from NREAP in the RES electricity generation in Germany in 2010.

Hydro power generation increased from 19687 GWh produced in 2005 to 23400 GWh in 2010, 30.0% above the projected value of 18000 GWh. Geothermal electricity generation rose from 0.2 GWh to 30 GWh in 2010, 11.1% above the expected power production of 27.0 GWh in 2010. Solar electricity grew from 1282 GWh to 11700 GWh in 2010, well above the expected generation of 9499 GWh in 2010. Wind power increased from 26658 GWh in 2005 to 43110 GWh in 2010, 3.5% below the expected generation of 44668 GWh in 2010. Biomass electricity production was above the 32777 GWh projected value for 2010 by 3.4%, reaching 33900 GWh, in comparison with 14025 GWh generated in 2005.

5.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Germany by 198.2 PJ (+61.4%), from 322.7 PJ in 2005 to reach 520.9 PJ in 2010, which is 24.0% above the NREAP projected value of 420.0 PJ. Significant progress was made in all sectors, especially in biomass (178.0 PJ), heat pumps (10.9 PJ) and solar thermal (8.8 PJ). In relative terms, the most significant increase was registered in heat pumps (+132.7%), followed by geothermal (+108.3%), solar thermal (+87.8%) and biomass (+58.6%). The

use of geothermal heat rose from 0.5 PJ in 2005 to 1.0 PJ in 2010, 26.5% below the projected value of 1.4 PJ for 2010. Solar heat use increased from 10.0 PJ in 2005 to reach 18.7 PJ in 2010, just 1.6% above the expected production of 18.4 PJ. Biomass heat grew from 304.0 PJ in 2005 to 482.0 PJ in 2010, 28.6% above the expected biomass heat use of 380.7 PJ in 2010. The heat production from heat pumps increased from 8.2 PJ in 2005 to 19.1 PJ in 2010, 1.9% below the expected 19.5 PJ heat use.

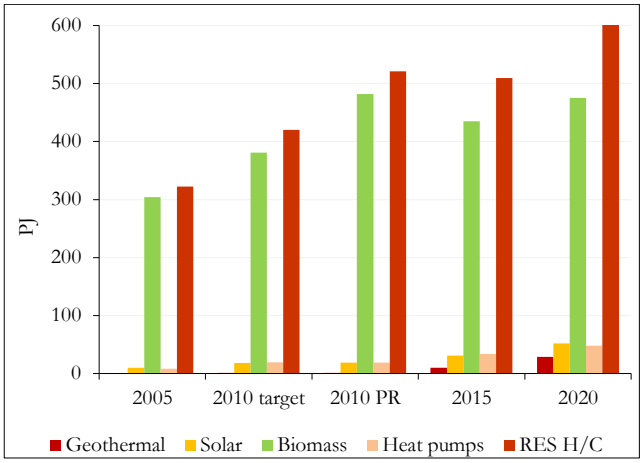

Figure 5-12. RES heat projected growth and progress until 2010 in Germany.

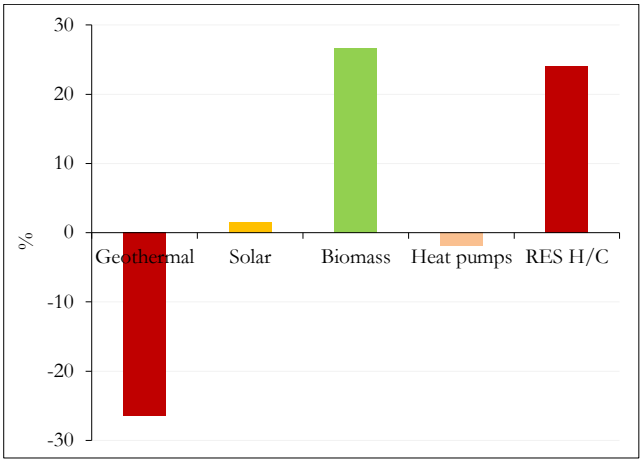

Figure 5-13. Deviation from NREAP in the RES heat generation in Germany in 2010.

5.6. Renewable energy in transport

The use of renewable energy in transport increased from 87.4 PJ in 2005 to reach 134.4 PJ in 2010, which is however 14.4% below the projected value of 157.0 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 47.0 PJ (+53.7%). The highest increase was achieved by biodiesel (+27.0 PJ) followed by bioethanol/bio-ETBE (+25.3 PJ). In relative terms, the most significant increase was registered by bioethanol/bio-ETBE (+420.1%) and biodiesel (+40.4%).

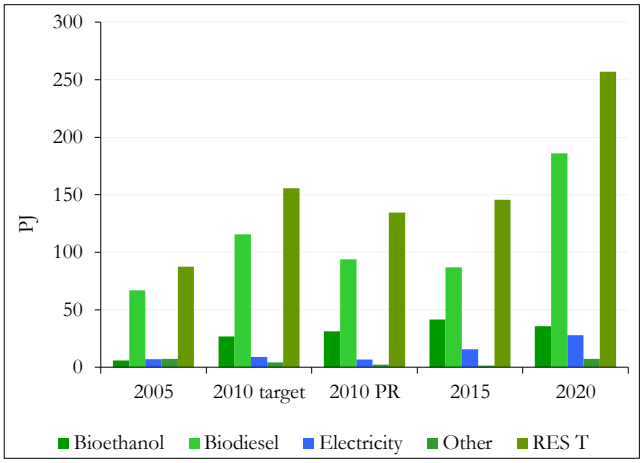

Figure 5-14. RES in transport projected growth and progress until 2010 in Germany.

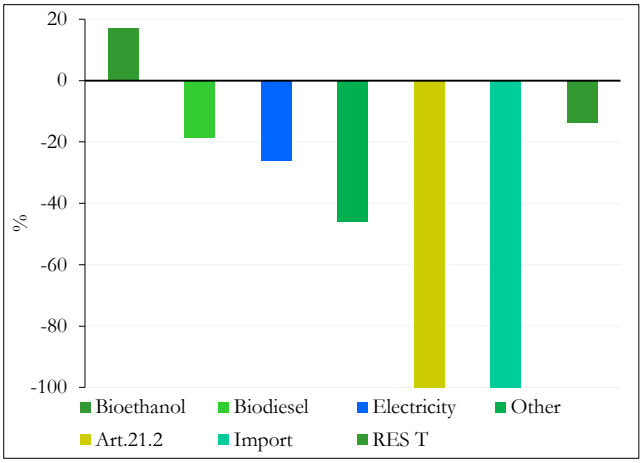

Figure 5-15. Deviation from NREAP in the RES use in transport in Germany in 2010.

Biodiesel was the major contributor to RES use in transport, increasing from 66.9 PJ in 2005 to 94.0 PJ in 2010, 19.6% below the 2010 projected value of 116.8 PJ. The use of bioethanol/bio-ETBE grew from 6.0 PJ in 2005 to 31.4 PJ in 2010, 17.2% above the expected use of 26.8 PJ in 2010. The use of other biofuels (biogas and vegetable oils) decreased from 7.1 PJ in 2005 to 2.3 PJ in 2010, 46.1% below the target of 9.2 PJ. No biofuels from wastes, residues, ligno-cellulosic material were used in transport, while their expected contribution was estimated at 4.1 PJ. No use of biofuels from import was reported for 2010 in comparison with expected import of 69.0 PJ. The use of renewable electricity decreased from 7.1 PJ in 2005 to 6.8 PJ in 2010, which is 26.0% below the expected target of 9.2 PJ for 2010.

6. Renewable energy in Estonia

6.1. Deployment of renewable energy

The renewable energy deployment in Estonia increased from 21.5 PJ in 2005 by 10.7 PJ (49.7%) reaching 32.2 PJ in 2010. The renewable energy use in Estonia was 15.8% above the NREAP projected RES use of 27.8 PJ for 2010. This is expected to further increase to 36.0 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to amount to 3.8 PJ, in comparison with the increase of 10.7 PJ in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 7.4 PJ, followed by renewable electricity with 3.2 PJ and renewable energy in transport with 0.03 PJ. The highest relative increase was made by the electricity (+842.3%) followed by the heating and cooling (+35.0%). RES heating increased from 21.1 PJ in 2005 to 28.6 PJ in 2010, 11.4% above the projected level of 25.6 PJ. The renewable electricity increased from 0.4 PJ in 2005 to 3.6 PJ in 2010, 67.1% above the target of 2.2 PJ. The use of renewable energy in transport reached 0.03 PJ[1] in 2010, in comparison with 0.04 PJ expected to be used, according to the NREAP.

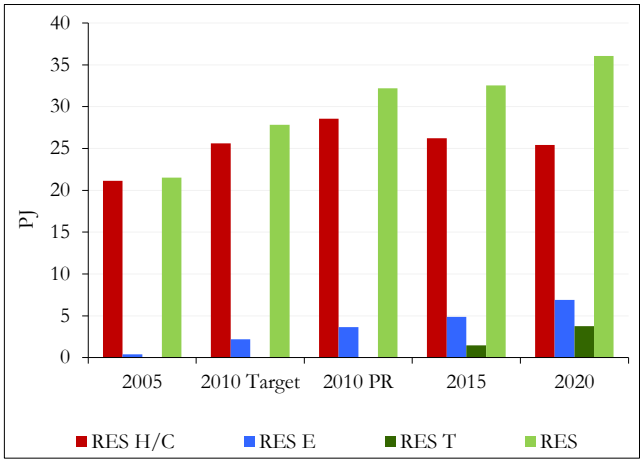

Figure 6-1. RES deployment in Estonia: projected growth and actual progress.

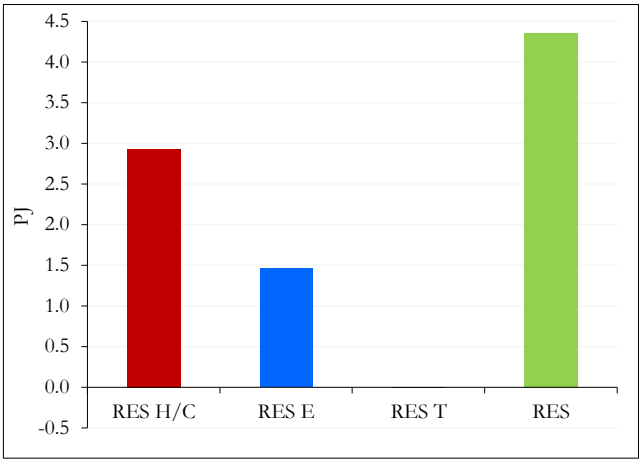

Figure 6-2. Deviation from NREAP in the RES production in Estonia in 2010.

Table 6-1. RES use in Estonia, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	28.6	2.9	11.4	7.4	35.0	-3.1	-11.0	25.4
RES-E	3.6	1.5	67.1	3.2	842.1	3.3	89.6	6.9
RES-T	0.0	0.0	-24.0	0.0	0.0	3.7	11742.1	3.8
RES	32.2	4.4	15.6	10.7	49.5	3.9	12.0	36.0

6.2. Renewable energy share

The analysis of the Progress Report for Estonia shows that the overall share of RES increased considerably from 16.6% in 2005 to 24.0% in 2010 and this should reach 25.0% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 31.3% to 42.6%), followed by electricity (from 1.2% to 10.4%) and in transport (from 0 to 0.2%). Thus, the share of renewable heating & cooling expected for 2020 was already exceeded before 2010. Major increase is

[1] Renewable energy used in Estonia in transport sector including only electricity, as no data were available on the use of sustainable certified biofuels, according to the Progress Report

expected to be achieved until 2020, according to the data provided in the NREAP, in transport (from 0.2% to 9.6%), and electricity (from 10.4% to 17.5%).

The overall share of renewable energy was above the target by 3.1% points, reaching 24.0% in 2010, in comparison with 20.9% expected in the NREAP. The share of renewable energy in heating and cooling was above the projected value by 3.7% points, reaching 42.6% in comparison with expected share of 38.9% in 2010. The share of renewable electricity was above the target by 4.0% points, reaching 10.4% in comparison with 6.4% projected. The share of renewable energy in transport reached 0.3% in comparison with the expected share of 0.1% in 2010.

Table 6-2. Projected growth in RES share in Estonia and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	31.3	38.9	42.6	3.7	39.7	38.4
RES-E	1.2	6.4	10.4	4.0	13.2	17.6
RES-T	0.0	0.1	0.3	0.2	4.0	9.6
Overall RES	16.6	20.9	24.0	3.1	23.6	25.0

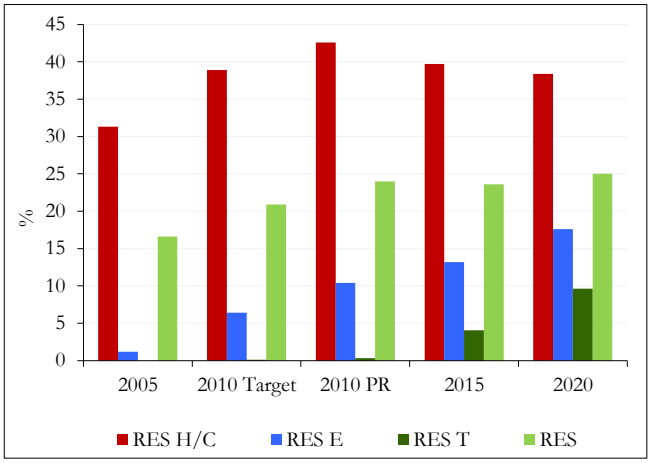

Figure 6-3. RES share in Estonia: projected growth and actual progress.

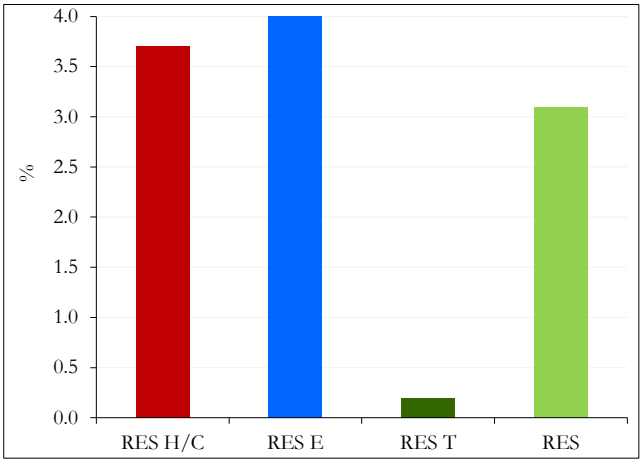

Figure 6-4. Deviation from NREAP in the share of RES in Estonia in 2010.

Estonia reached in 2010 an overall RES share only 1% below the 2020 target, exceeding all the NREAP planned shares until 2018. The trajectory expected for the overall RES share is set in the NREAP according to the minimum indicative trajectory of the overall share, defined in RED Directive. If Estonia will follow the 2009-2010 trajectory it will be able to reach well in advance the 2020 RES target.

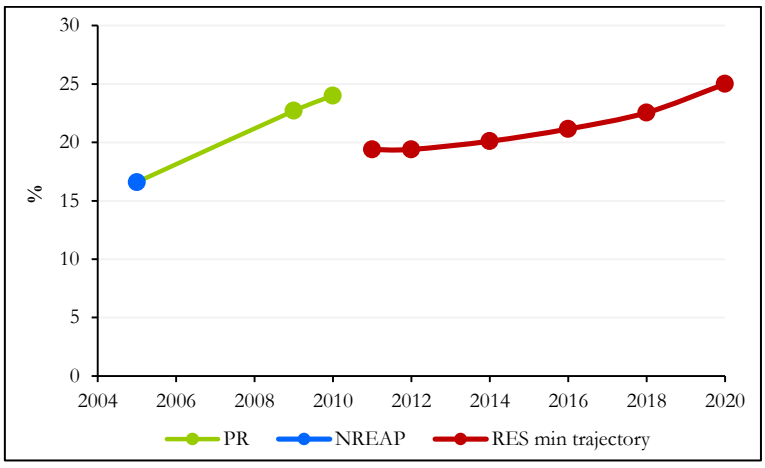

Figure 6-5. Progress of the overall RES share in Estonia

6.3. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered between 2005-2010, by the use of biomass for electricity, heating & cooling (+10.0 PJ) and wind energy (+0.7 PJ).

More progress is expected to be made in 2010-2020, especially by the use of wind energy (+4.6 PJ), while the use of biomass was already above the 2020 target (4.6 PJ).

In comparison with the expected contribution, the use of biomass was above the NREAP 2010 target by +17.8%, while the use of other sources of renewable energy was below: wind by -26.7%, hydro by -15.4% and biofuels by -100%.

Table 6-3. The contribution of different sources of renewable energy in Estonia

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	0.1	0.1	0.1	0.1	0.1
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	0.0	0.0	0.0	0.0	0.0
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.2	1.2	0.9	3.5	5.5
Heat pumps	0.0	0.0	0.0	0.0	0.0
Biomass	21.3	26.5	31.2	27.5	26.7
Biofuels	0.0	0.0	0.0	1.5	3.7

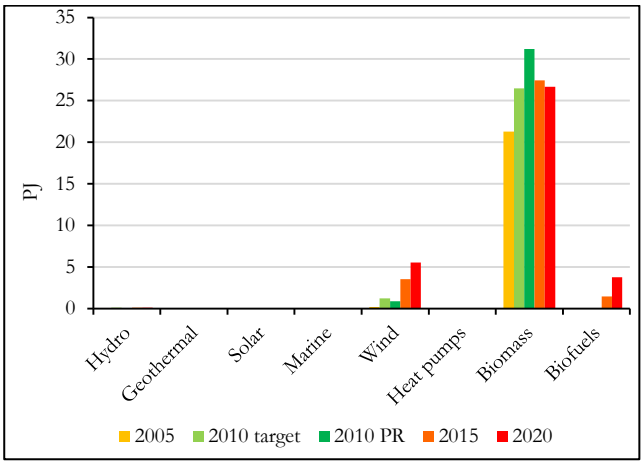

Figure 6-6. Contribution of renewable sources in Estonia: projected growth and actual progress

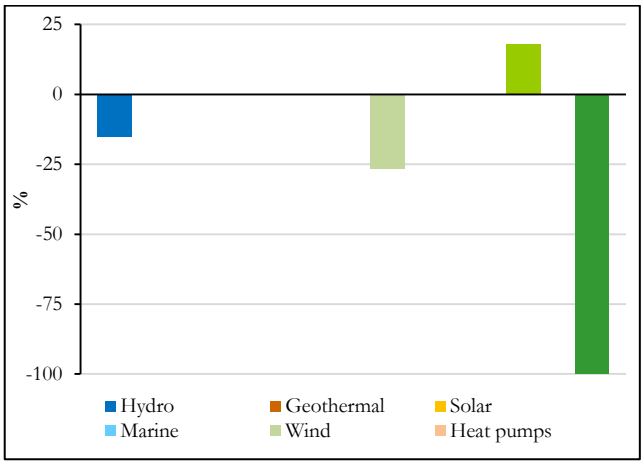

Figure 6-7. Deviation from NREAP in the contribution of renewable sources in Estonia in 2010

The use of biomass for electricity, heating & cooling was the major contributor to RES use in 2010 with a 97% share, followed by wind with 3% and hydro with 0.2%. In 2020, the major contribution is also expected to come from the use of biomass with 74%, followed by wind with 15%, biofuels with 10% and hydro with 0.3%.

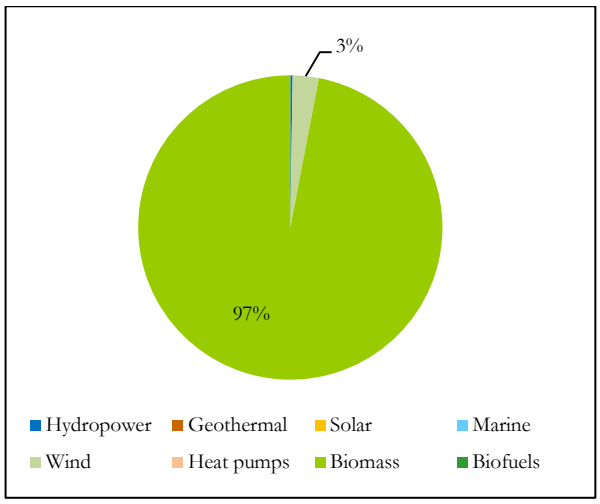

Figure 6-8. Share of renewable sources for electricity, heating & cooling in Estonia in 2010

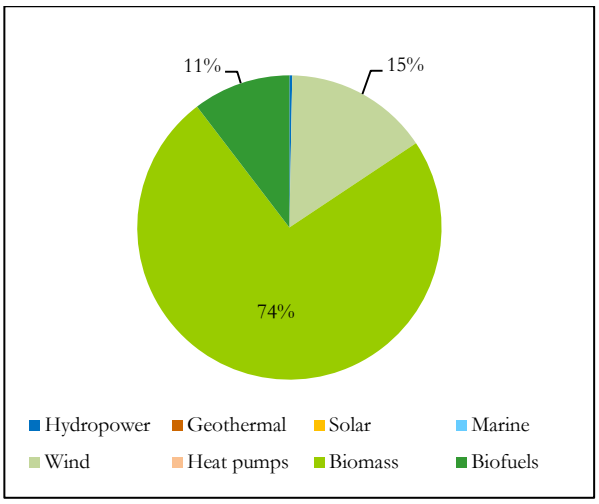

Figure 6-9. Share of renewable sources for electricity, heating & cooling in Estonia in 2020

6.4. Renewable electricity

The renewable electricity generation increased in Estonia by 902 GWh (+842.3%), from 107 GWh in 2005 to reach 1009 GWh in 2010, which is 67.1% above the NREAP projected value of 604 GWh. Significant progress was made between 2005-2010 in some sectors, especially in biomass power (+707 GWh), followed by wind (+193 GWh) and hydro (+2 GWh). In relative terms, the most significant increase was registered in biomass power (+2142.4%), followed by wind (+357.4%).

Hydro power generation increased from 20 GWh in 2005 to 22 GWh produced in 2010, 15.4% below the projected value of 26 GWh. Wind power generation grew from 54 GWh in 2005 to 247 GWh in 2010, which is however 26.7% below the expected wind power generation of 337 GWh in 2010. Biomass electricity generation rose from 33 GWh in 2005 to 740 GWh in 2010, which is 207.1% more than the expected biomass electricity generation of 241 GWh in 2010.

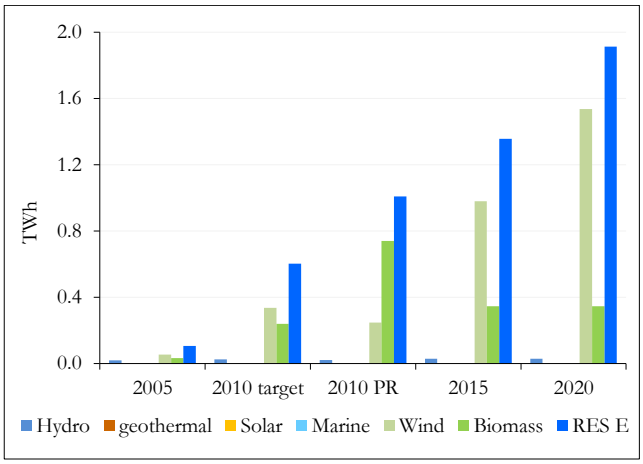

Figure 6-10. RES electricity projected growth and progress until 2010 in Estonia.

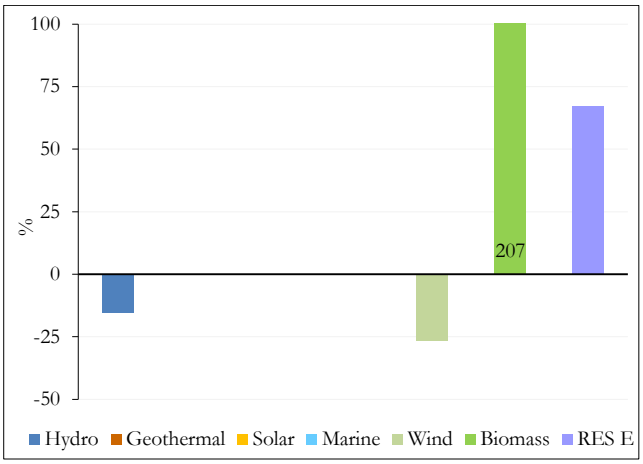

Figure 6-11. Deviation from NREAP in the RES electricity generation in Estonia in 2010.

6.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Estonia from 21.1 PJ in 2005 to 28.6 PJ in 2010, which is 11.4% above the NREAP projected value of 25.6 PJ. Biomass is the only renewable heat source in Estonia and increased between 2005 and 2010 by 7.4 PJ (35.0%).

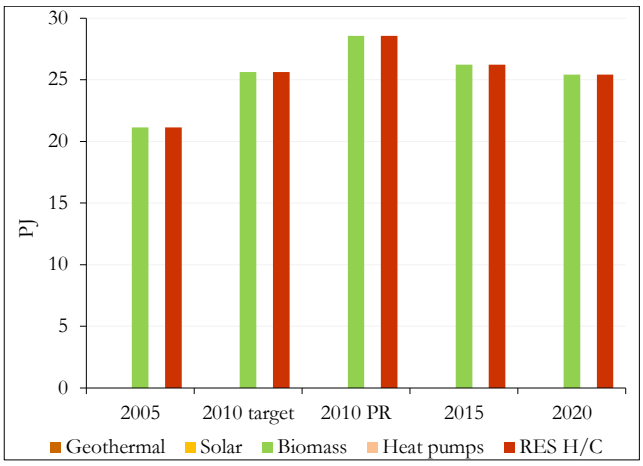

Figure 6-12. RES heat projected growth and progress until 2010 in Estonia.

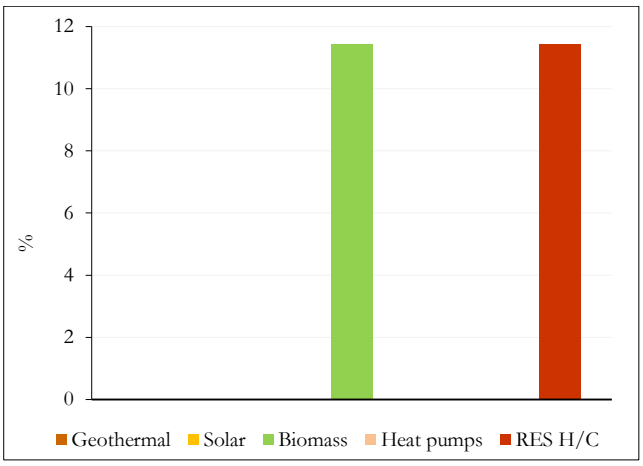

Figure 6-13. Deviation from NREAP in the RES heat generation in Estonia in 2010.

6.6. Renewable energy in transport

The use of renewable energy in transport increased in Estonia to 0.03 PJ in 2010, below the NREAP expected RES contribution of 0.04 PJ. This includes only electricity use in transport.

Estonia reported no use of biofuels in transport, considering the fact that the sustainability criteria for biofuels and the procedure for certifying compliance were not adopted in Estonia until December 2010. Therefore no data were available on the use of sustainable certified biofuels, according to the Progress Report.

Thus, the reported data shows that the use of renewable energy in transport was 0.01 PJ or 24% below the expected use, based on the NREAP forecasts.

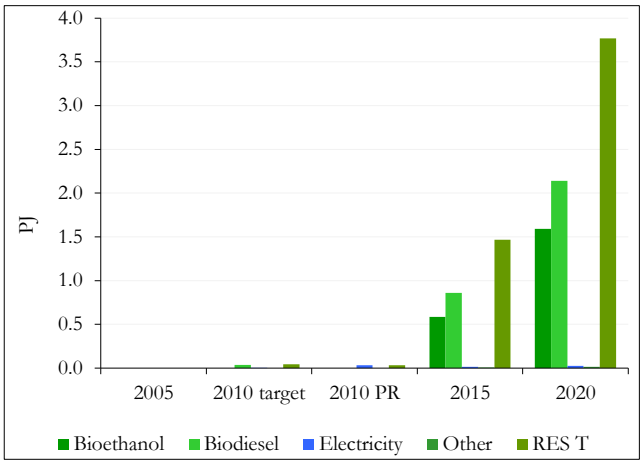

Figure 6-14. RES in transport projected growth and progress until 2010 in Estonia.

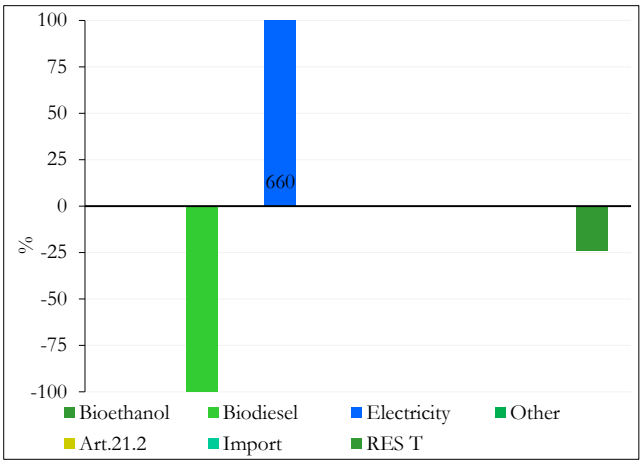

Figure 6-15. Deviation from NREAP in the RES use in transport in Estonia in 2010.

7. Renewable energy in Ireland

7.1. Deployment of renewable energy

The renewable energy deployment in Ireland increased from 17.0 PJ in 2005 to 27.9 PJ in 2010, with an increase of 10.9 PJ or 63.8%. The renewable use in Ireland was 22.6% below the NREAP projected RES use of 36.0 PJ for 2010. This is expected to further increase to 95.0 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 67.1 PJ, in comparison with the increase of 10.9 PJ achieved in 2005-2010.

Renewable electricity made some progress between 2005 and 2010, with an increase of 5.5 PJ, followed by renewable energy in transport with 3.8 PJ and heating and cooling with 1.5 PJ. The highest relative increase was made by the use of renewable energy in transport (+3878.9%) followed by the electricity (+62.5%) and heating and cooling (+18.7%).

The use of renewable energy in heating and cooling increased from 8.1 PJ in 2005 to 9.6 PJ in 2010, above the projected level of 9.2 PJ. The renewable electricity increased from 8.9 PJ in 2005 to 14.4 PJ in 2010, well below the target of 21.1 PJ. The use of renewable energy in transport grew to 3.9 PJ in 2010, below the expected use of 5.7 PJ in 2010.

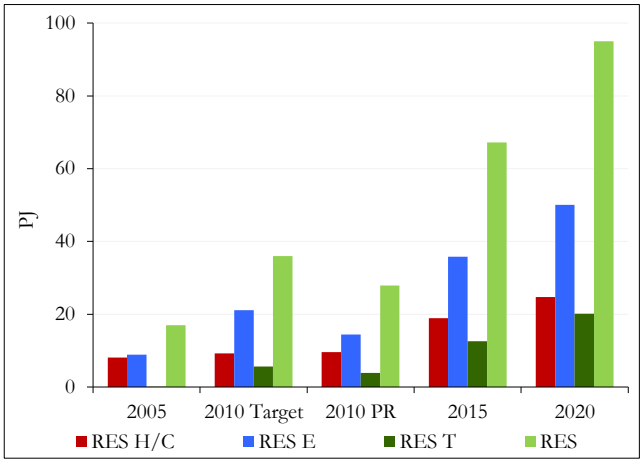

Figure 7-1. RES deployment in Ireland: projected growth and actual progress.

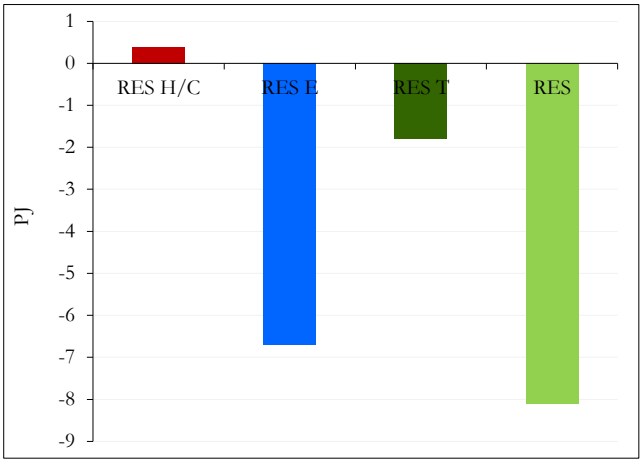

Figure 7-2. Deviation from NREAP in the RES production in Ireland in 2010.

Table 7-1. RES use in Ireland, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAPs
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	9.6	0.4	4.1	1.5	18.7	15.2	158.0	24.7
RES-E	14.4	-6.7	-31.7	5.5	62.5	35.7	247.3	50.1
RES-T	3.9	-1.8	-31.6	3.8	3978.9	17.8	458.0	21.7
RES	27.9	-8.1	-22.6	10.9	63.8	67.1	240.9	95.0

7.2. Renewable energy share

The analysis of the Progress Report for Ireland shows that the overall share of RES increased from 3.1% in 2005 to 5.5% in 2010 and this should reach 16.0% in 2020. The highest increase in the share of renewable energy was made in electricity (from 6.9% to 14.8%) and in transport (from 0.1% to 4.8%), while more modest increase was achieved in heating and cooling (from 3.5% to 4.4%). Major increase is expected to be achieved until 2020, according to the NREAP, in electricity (from 14.8% to 42.5%) and less in heating & cooling (from 4.4% to 12.0%) and transport (from 2.4% to 9.9%).

The overall share of renewable energy was below the target by 1.1% points, reaching 5.5% in 2010, in comparison with 6.6% projected in the NREAP. The RES share in heating and cooling is above the projected value by just 0.1% points, reaching 4.4% in comparison with expected share of 4.3% in 2010. The share of renewable electricity is below the target by 5.6% points, reaching 14.8% in comparison with 20.4% projected value. The share of RES reached 4.8% in 2010 being 1.8% points above the NREAP planned share of 3.0%.

Table 7-2. Projected growth in RES share in Ireland and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	3.5	4.3	4.4	0.1	8.9	12.0
RES-E	6.9	20.4	14.8	-5.6	32.4	42.5
RES-T	0.1	3.0	4.8	1.8	5.9	9.9
Overall RES	3.1	6.6	5.5	-1.1	10.3	16.0

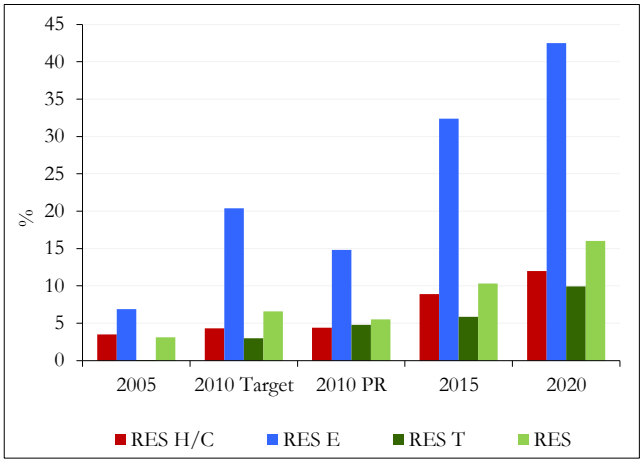

Figure 7-3. RES share in Ireland: projected growth and actual progress.

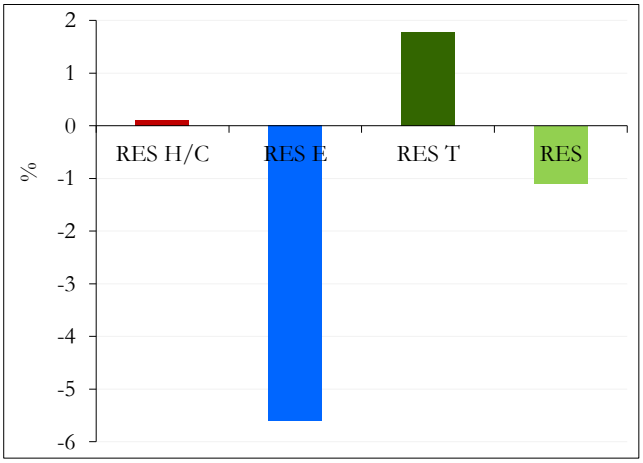

Figure 7-4. Deviation from NREAP in the share of RES in Ireland in 2010.

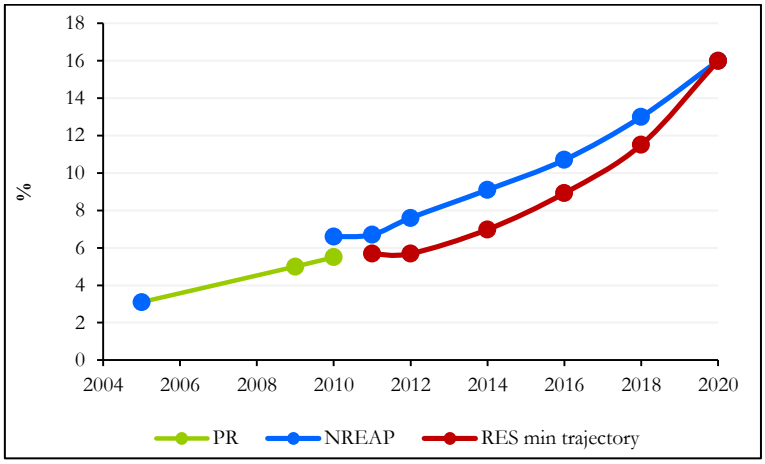

Figure 7-5. Progress of the overall RES share in Ireland

Ireland achieved both in 2009 and 2010 a smaller overall RES share than the planned overall RES share and the indicative target share of 2011/2012. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory of overall RES share defined in the RED Directive. Although Ireland has reached a smaller share that the 2010 planned share, it is still not far away from the minimum indicative trajectory and it can still reach the 2020 RES share target.

7.3. Sources of renewable energy

A significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by wind (+5.9 PJ), followed by biofuels (+3.8 PJ), heat pumps (+0.5 PJ), the use of biomass for electricity, heating & cooling (+0.4 PJ) and solar thermal and solar electricity (+0.2 PJ).

More progress is expected to be done between 2010-2020, especially by wind (+31.5 PJ), followed by biofuels (+16.3 PJ), biomass (+15.5 PJ), heat pumps (+2.6 PJ), marine energy (+0.8 PJ) and solar (+0.6 PJ), while the use of hydro energy already exceeded the 2020 targets (0.2 PJ).

Table 7-3. The contribution of different sources of renewable energy in Ireland

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	2.7	2.5	2.7	2.6	2.5
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	0.0	0.2	0.2	0.5	0.8
Marine	0.0	0.0	0.0	0.0	0.8
Wind	5.7	17.3	11.6	30.0	43.1
Heat pumps	0.4	0.8	1.0	2.1	3.5
Biomass	8.1	9.5	8.5	19.4	24.0
Biofuels	0.1	5.6	3.9	12.6	20.2

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: solar energy by +38.5%, heat pumps by +27.8% and hydropower by +6.8%, while the use of some renewable energy sources was below: wind by -33.0%, biofuels by -31.8% and biomass by -11.0%.

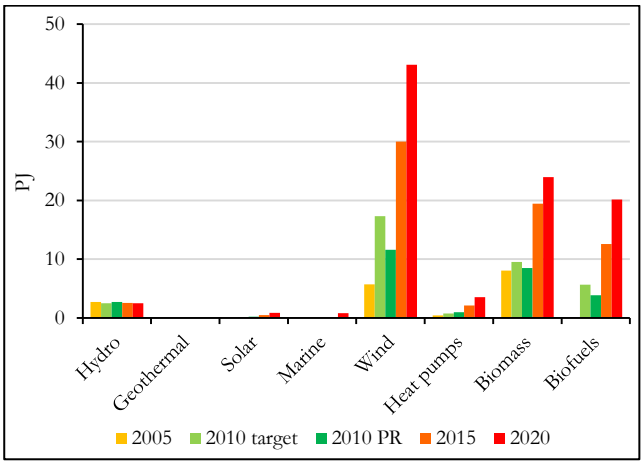

Figure 7-6. Contribution of renewable sources in Ireland: projected growth and actual progress

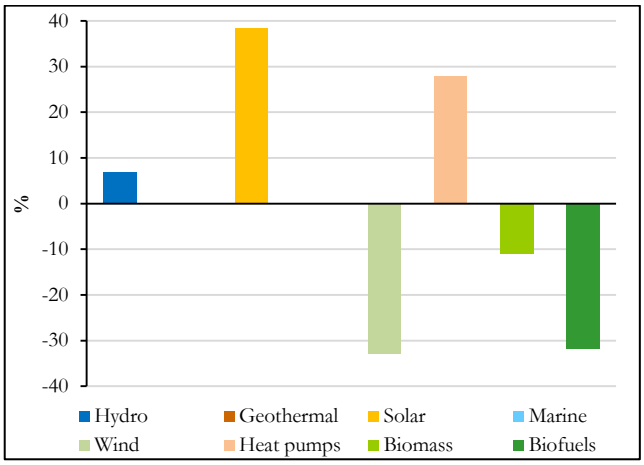

Figure 7-7. Deviation from NREAP in the contribution of renewable sources in Ireland in 2010

Wind was the major contributor to renewable energy in 2010 with a 42% share, followed by biomass with 31%, biofuels with 14%, hydro with 10%, heat pumps with 4% and solar with 1%. In 2020, the major contribution is also expected to come from wind with 45%, followed by biomass with 25%, biofuels with 21%, heat pumps with 4%, hydro with 3%, solar with 1%, and marine energy with 1%.

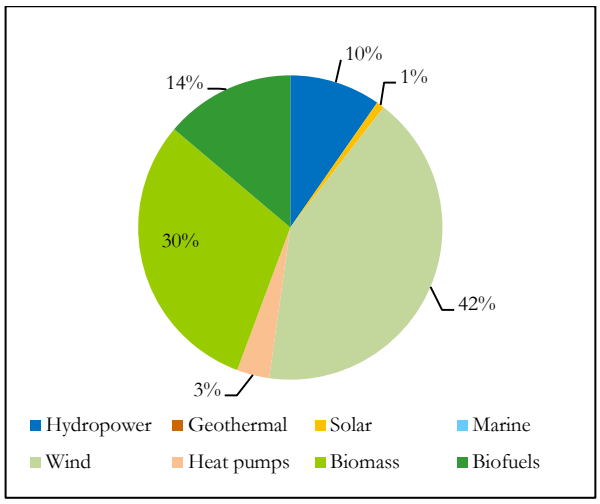

Figure 7-8. Share of renewable sources for electricity, heating & cooling in Ireland in 2010

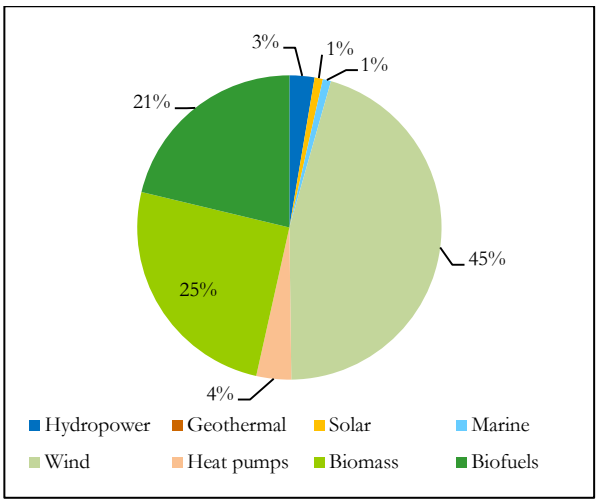

Figure 7-9. Share of renewable sources for electricity, heating & cooling in Ireland in 2020

7.4. Renewable electricity

The renewable electricity generation increased in Ireland by 1541 GWh (+62.5%), from 2464 GWh in 2005 to reach 4005 GWh in 2010, which is nevertheless 31.7% below the NREAP projected value of 5866 GWh. Significant progress was made between 2005 and 2010 in renewable electricity generation, namely in wind power (+1640 GWh) and solar power with 0.5 GWh. Other sources registered decrease in electricity production compared with 2005: biomass (-89 GWh) and hydro power (-11 GWh). In relative terms, important increase was registered in wind power (+103.3%), while other sectors showed some decrease in their contribution to electricity generation: biomass (-76.7%) and hydro (-1.4%). Hydro power generation has decreased to some extent from 760 GWh produced in 2005 to 749 GWh in 2010, 6.8% above the projected value of 701 GWh. Solar electricity generation has shown little increase from 0 to 0.5 GWh in 2010, in comparison with no contribution expected in 2010. Wind power grew from 1588 GWh in 2005 to 3228 in 2010, 33.0% below the expected wind power generation of 4817 GWh in 2010. Biomass electricity generation has decreased from 116 GWh in 2005 to only 27 GWh in 2010, 92.2% below the 348GWh projected production for 2010.

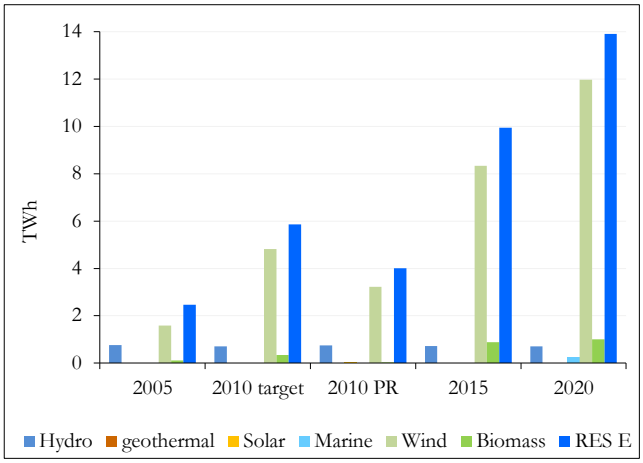

Figure 7-10. RES electricity projected growth and progress until 2010 in Ireland.

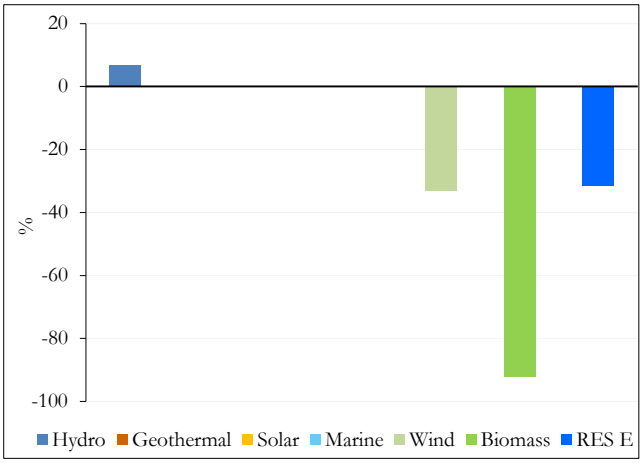

Figure 7-11. Deviation from NREAP in the RES electricity generation in Ireland in 2010.

7.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Ireland by 1.5 PJ (+18.7%), from 8.1 PJ in 2005 to 9.6 PJ in 2010, which is 4.1% above the NREAP projected value of 9.2 PJ. Some progress was made between 2005 and 2010 in several sectors, especially in biomass (+0.7 PJ), heat pumps (+0.5 PJ) and solar thermal (+0.2 PJ). In relative terms, the most significant increase was registered in heat

pumps (+130.0%), followed by biomass (+9.6%). The use of solar heat increased to 0.23 PJ in 2010, 37.5% above the projected value of 0.17 PJ. Biomass heat grew from 7.7 PJ in 2005 to 8.4 PJ in 2010, just 1.3% above the expected biomass heat generation. The heat use from heat pumps increased from 0.4 PJ in 2005 to 1.0 PJ in 2010, 27.8% above the expected heat pumps generation of 0.75 PJ in 2010.

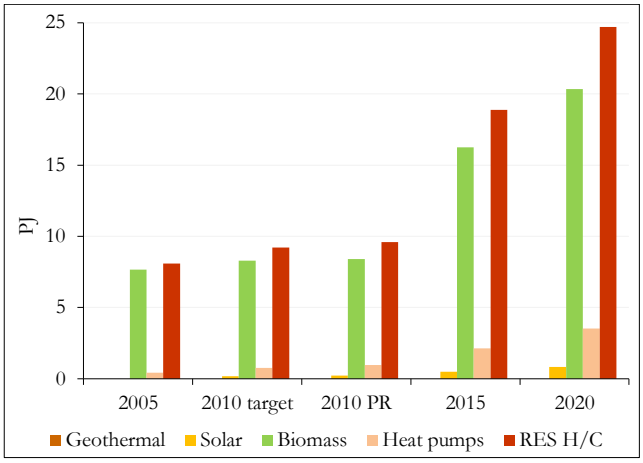

Figure 7-12. RES heat projected growth and progress until 2010 in Ireland.

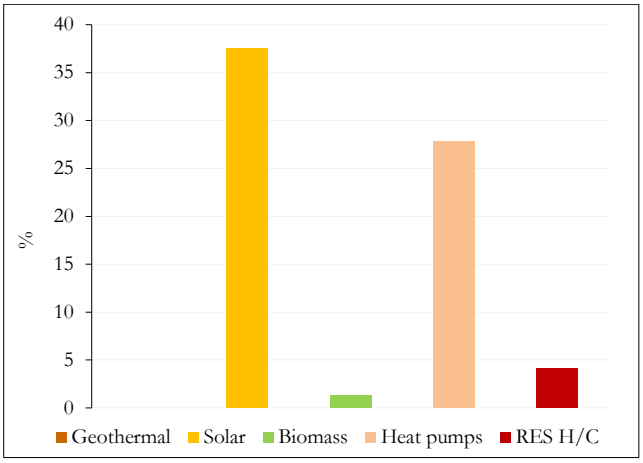

Figure 7-13. Deviation from NREAP in the RES heat generation in Ireland in 2010.

7.6. Renewable energy in transport

The use of renewable energy in transport increased in Ireland from 0.1 PJ in 2005 to 3.9 PJ in 2010, 31.9% below the NREAP projected value of 5.7 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 3.8 PJ (+3960%). The highest increase was achieved by biofuels from wastes, residues, ligno-cellulosic material (art 21.2 biofuels) (+3.8 PJ), followed by biodiesel (+2.5 PJ) and bioethanol/bio-ETBE (+1.3 PJ) and. In relative terms, the most significant increase was registered by bioethanol/bio-ETBE, followed by art 21.2 biofuels and biodiesel (+365.9%).

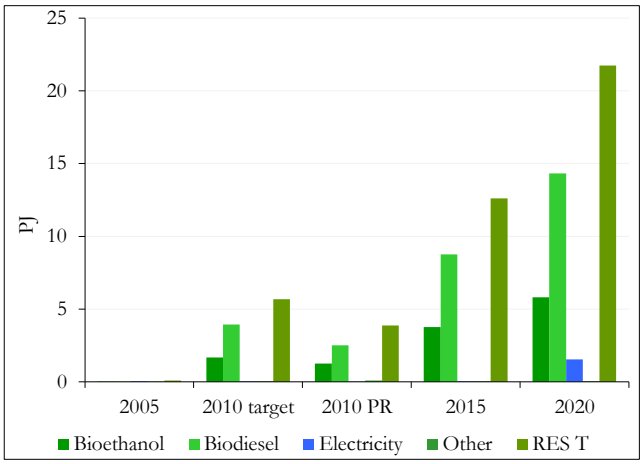

Figure 7-14. RES in transport projected growth and progress until 2010 in Ireland.

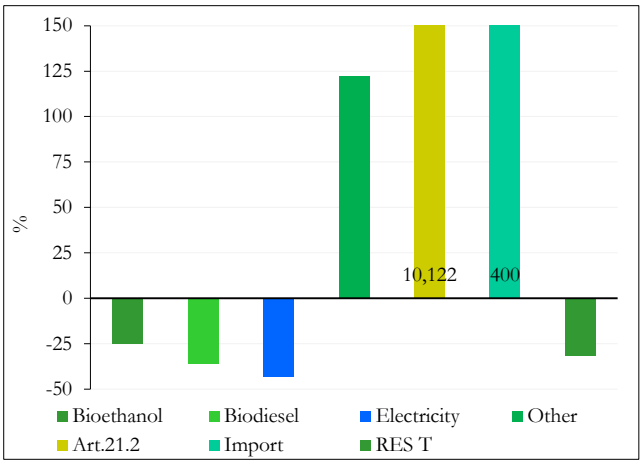

Figure 7-15. Deviation from NREAP in the RES use in transport in Ireland in 2010.

Biodiesel is the major contributor to RES use in transport, increasing to 2.5 PJ in 2010, which is 36.2% below the 2010 NREAP projected value of 3.9 PJ. The use of bioethanol/ bio-ETBE grew to 1.3 PJ in 2010, 25.0% below the expected bioethanol use of 1.7 PJ in 2010. The use of other biofuels (biogas and vegetable oils) has reached 0.08 PJ in 2010, 122.2% above the target of 0.04 PJ for 2010 PJ. The use of biofuels from wastes, residues, ligno-cellulosic material grew to 3.85 PJ in 2010, which well above the target of 0.04 for 2010. The use of biofuels from import increased to 1.5 PJ in 2010, 400% above the expected value of 0.3 PJ. The use of renewable electricity in transport has decreased from 0.04 PJ in 2005 to 0.02 PJ in 2010, 43.0% below the target of 0.04 PJ projected for 2010.

8. Renewable energy in Greece

8.1. Deployment of renewable energy

The renewable energy deployment in Greece increased from 67.6 PJ in 2005 to 82.1 PJ in 2010, an increase of 14.4 PJ (21.3%). The renewable use in Greece was 6.6 PJ below the NREAP projected RES use of 88.6 PJ for 2010 and it is expected to further increase to 210.0 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 128.0 PJ, in comparison with the increase of only 14.4 PJ in 2005-2010. The use of renewable energy in transport made some progress between 2005 and 2010, with an increase of 5.4 PJ, followed by renewable electricity with 5.1 PJ and renewable heating and cooling with 3.9 PJ. The highest relative increase was made by the use of renewable energy in transport (+13000%) followed by the electricity (+22.5%) and heating and cooling (+8.8%).

The RES production is projected to reach 210.0 PJ in 2020, well above the amount necessary to reach the country target of 18%. An important amount, about 28.3 PJ is thus expected to be available for transfer to other Member States. The use of renewable energy in heating and cooling increased from 44.6 PJ in 2005 to 48.6 PJ in 2010, below the projected level of 53.1 PJ. The renewable electricity increased from 23.0 PJ in 2005 to 28.1 PJ in 2010, below the target of 31.0 PJ. The use of renewable energy in transport grew to 5.5 PJ in 2010, above the target of 4.6 PJ in 2010.

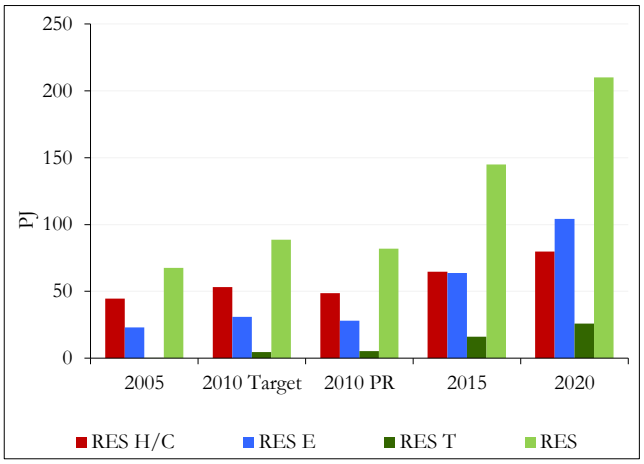

Figure 8-1. RES deployment in Greece: projected growth and actual progress.

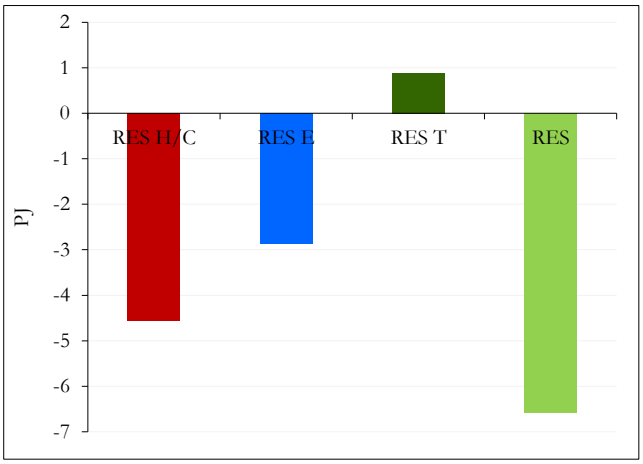

Figure 8-2. Deviation from NREAP in the RES production in Greece in 2010.

Table 8-1. RES use in Greece, progress and deviation from NREAPs

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	48.6	-4.6	-8.6	3.9	8.8	31.3	64.5	79.9
RES-E	28.1	-2.9	-9.3	5.2	22.5	76.2	270.8	104.3
RES-T	5.5	0.9	19.1	5.4	10816.7	21.1	384.0	26.5
RES	82.1	-6.6	-7.4	14.4	21.3	128.0	156.0	210.1

8.2. Renewable energy share

The analysis of the Progress Report for Greece shows that the overall share of RES increased from 7.0% in 2005 to 9.7% in 2010 and this should reach 18.0% in 2020. The highest increase in the share of renewable energy was made in heating & cooling (from 12.8% to 17.2%), followed by electricity (from 10.0% to 12.4%) and in transport (from 0% to 2.0%). Major increase is expected to be achieved until 2020, according to the NREAP, especially in electricity (from 12.4% to 42.3%), followed by transport (from 2.0% to 10.1%) and much less in heating & cooling (from 17.2% to 19.7%).

The overall share of RES is above the target by 1.7% points, reaching 9.7% in 2010, in comparison with 8.0% projected in the NREAP. The RES share in heating and cooling is above the projected value by 2.5% points, reaching 17.2% in comparison with expected share of 14.7% in 2010. The share of renewable electricity is below the target by 0.9%, reaching 12.4% in comparison with 13.3% projected value. The share of RES in transport was above the target by 0.5% points, reaching 2.2% in comparison with 1.7% planned share.

Table 8-2. Projected growth in RES share in Greece and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	12.8	14.7	17.2	2.5	17.9	19.7
RES-E	8.0	13.3	12.4	-0.9	27.6	39.8
RES-T	0.0	1.7	2.2	0.5	6.3	10.1
Overall RES	7.0	8.0	9.7	1.7	15.5	20.8
Minimum share*	7.0	9.0	9.7	1.7	11.4	18.0

* Mandatory share, after transfer to other MS

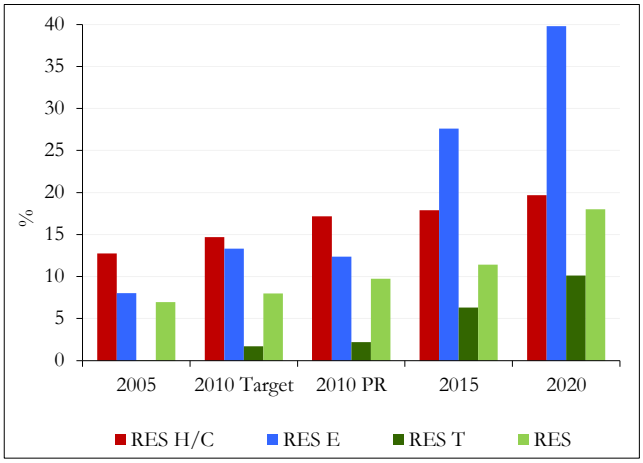

Figure 8-3. RES share in Greece: projected growth and actual progress.

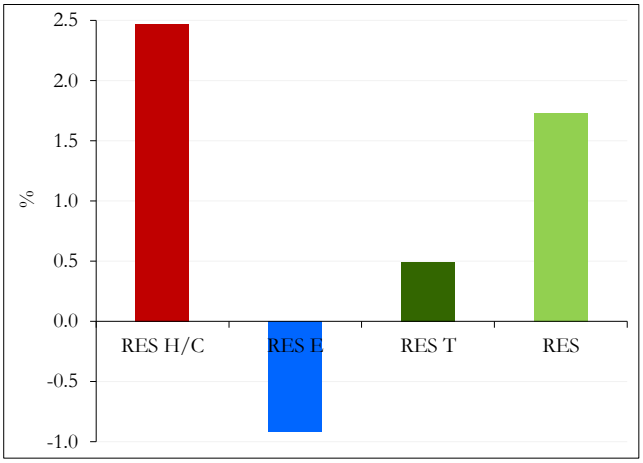

Figure 8-4. Deviation from NREAP in the share of RES in Greece in 2010.

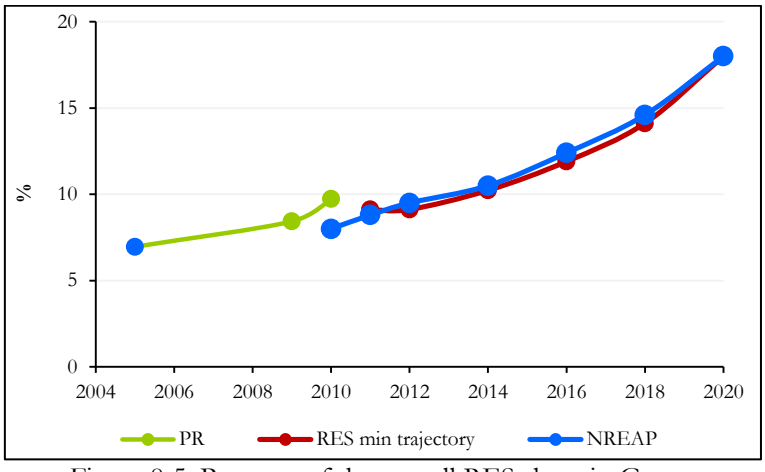

Figure 8-5. Progress of the overall RES share in Greece

Greece exceeded the overall RES share for 2010 since 2009 and also exceeded in 2010 both the planned overall RES share for year 2011 and the RES indicative target for 2011/2012. The trajectory expected for the RES share is set in the NREAP almost the same as the minimum indicative trajectory of overall RES share defined in RED Directive. If Greece will follow the trajectory of 2005-2010 period it will be in good track to achieve the 2020 RES share target.

8.3. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered between 2005-2010, especially by wind (+5.9 PJ) followed by the use of biofuels (+5.3 PJ), solar thermal and solar electricity (+4.0 PJ), heat pumps (+2.7 PJ) and geothermal (+0.3 PJ), while some decrease has been recorded by the use of biomass for electricity, heating & cooling (-2.0 PJ) and hydro energy (-1.8 PJ).

More progress is expected between 2010-2020, especially by wind (+50.0 PJ) followed by biofuels (+20.5 PJ), solar (+19.6 PJ), biomass (+17.6 PJ), heat pumps (+8.8 PJ), hydro (+7.4 PJ) and geothermal (+4.1 PJ).

In comparison with the expected contribution, the use of heat pumps (+305.9%) and biofuels (+19.6%) were above the NREAP 2010 target, while the use of several renewable sources was below: geothermal energy by -33.3%, solar by 16.7%, biomass by -11.9%, wind by -7.2% and hydro by -9.3%.

Table 8-3. The contribution of different sources of renewable energy in Greece

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	18.1	18.0	16.3	20.5	23.7
Geothermal	0.4	1.0	0.7	1.4	4.8
Solar	4.2	9.9	8.3	17.7	27.8
Marine	0.0	0.0	0.0	0.0	0.0
Wind	4.6	11.3	10.5	34.8	60.5
Heat pumps	0.2	0.7	2.9	5.3	11.7
Biomass	40.2	43.3	38.1	49.0	55.7
Biofuels	0.1	4.5	5.4	16.2	25.8

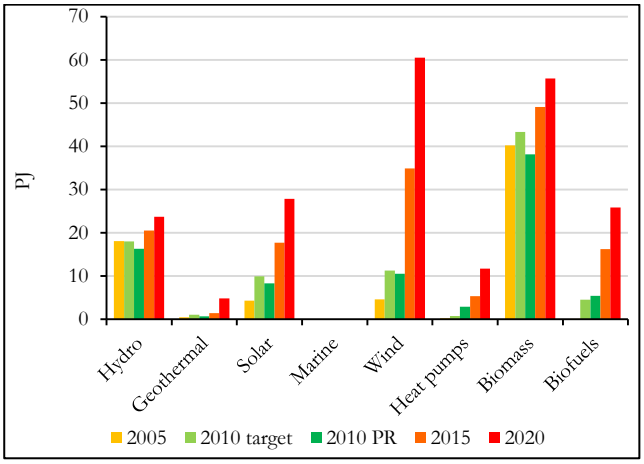

Figure 8-6. Contribution of renewable sources in Greece: projected growth and actual progress

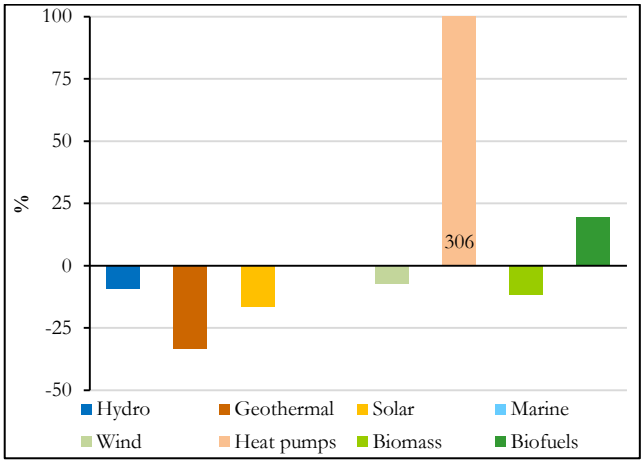

Figure 8-7. Deviation from NREAP in the contribution of renewable sources in Greece in 2010

The use of biomass was the major contributor to renewable energy use in 2010 with a 46% share, followed by hydro with 20%, wind with 13%, solar with 10%, biofuels with 7%, heat pumps with 3%, and geothermal with 1%. In 2020, the major contribution is expected to come from wind (29%) followed by the use of biomass with 27%, solar with 13%, biofuels with 12%, heat pumps with 6% and geothermal with 2%.

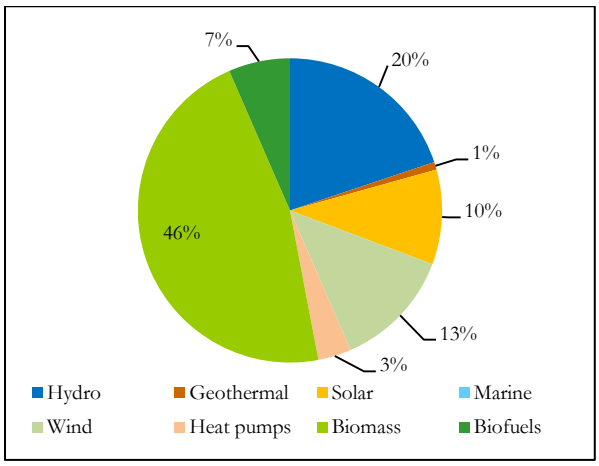

Figure 8-8. Share of renewable sources for electricity, heating & cooling in Greece in 2010

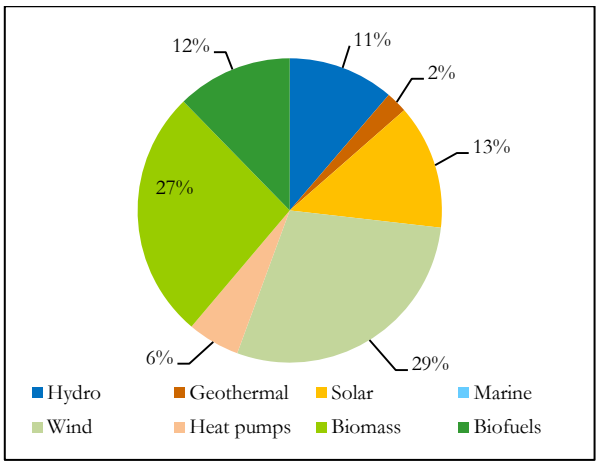

Figure 8-9. Share of renewable sources for electricity, heating & cooling in Greece in 2020

8.4. Renewable electricity

The renewable electricity generation increased in Greece by 1434 GWh (+22.5%), from 6379 GWh in 2005 to 7813 GWh in 2010, which is 9.3% below the NREAP planned value of 8613 GWh. Some progress was made between 2005-2010 in certain sectors, especially in wind power (+1638 GWh), followed by solar (+166 GWh) and biomass (+122 GWh). In relative terms, the most significant increase was made in solar power (+18455%), followed by biomass (+129.8%) and wind (+129.3%).

Hydro power decreased in comparison with the 5017 GWh produced in 2005, reaching 4525 GWh in 2010, 9.3% below the projected value of 4988 GWh. Solar electricity generation grew from 0.9 GWh to 167 GWh in 2010, but this is 31.0% below the expected solar power generation of 242 GWh in 2010. Wind power grew from 1267 GWh in 2005 to 2905 GWh in 2010, 7.2% below the expected power generation of 3129 GWh in 2010. Biomass electricity generation also is below the 254 GWh projected for 2010 by 15.0%, reaching 216 GWh, in comparison with 94 GWh generated in 2005.

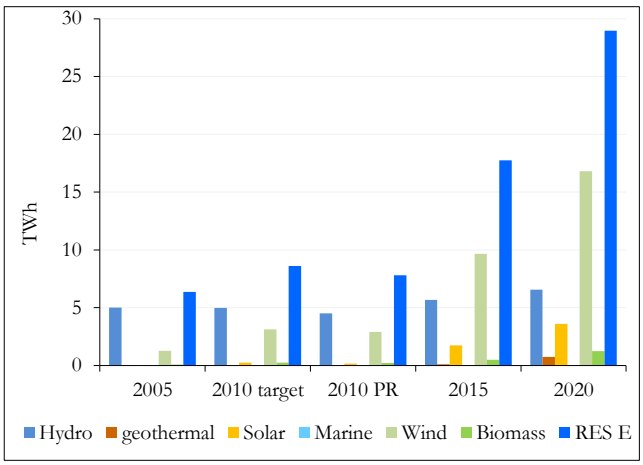

Figure 8-10. RES electricity projected growth and progress until 2010 in Greece.

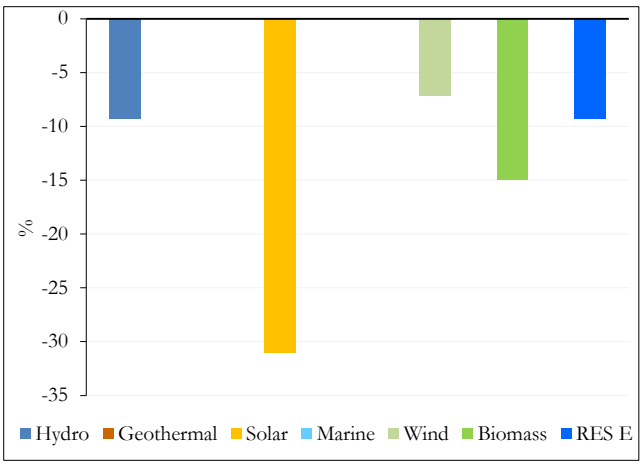

Figure 8-11. Deviation from NREAP in the RES electricity generation in Greece in 2010.

8.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Greece from 44.6 PJ in 2005 to 48.6 PJ in 2010, which is 8.6% below the NREAP projected value of 53.1 PJ. Some small progress, with an increase of 3.9 PJ (+8.8%), was made in several sectors between 2005-2010, especially in solar thermal (+3.4 PJ), heat pumps (+2.7 PJ) and geothermal (+0.3 PJ), while biomass heat showed some reduction (-2.5 PJ). In relative terms, the most significant increase was registered in heat pumps (+1625%), followed by solar thermal (+81.2%) and geothermal (+60.0%) while biomass heat decreased (-6.2%).

The utilisation of geothermal heat rose from 0.4 PJ in 2005 to reach 0.7 PJ in 2010, 33.3% below the expected value of 1.0 PJ for 2010. Solar heat production increased from 4.2 PJ in 2005 to reach 7.7 PJ in 2010, 15.3% below the expected value of 9.0 PJ. Biomass heat use has decreased from 39.8 PJ in 2005 to 37.3 PJ in 2010, 11.9% below the expected biomass heat generation of 42.4 PJ in 2010. The heat production from heat pumps has made the most significant increase, from 0.2 PJ in 2010 increasing to 2.9 PJ in 2010, 306% above the expected heat of 0.7 PJ in 2010.

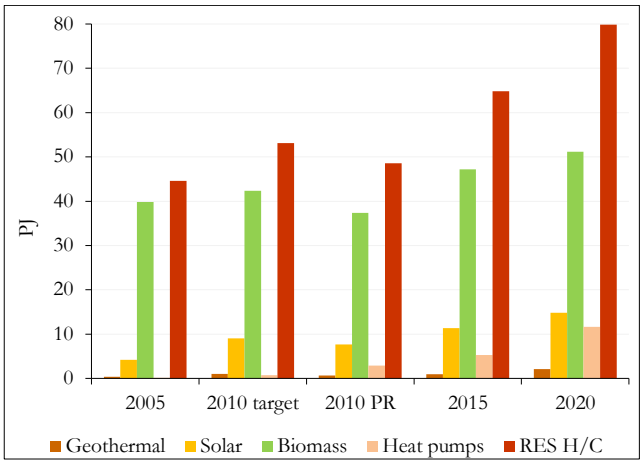

Figure 8-12. RES heat projected growth and progress until 2010 in Greece.

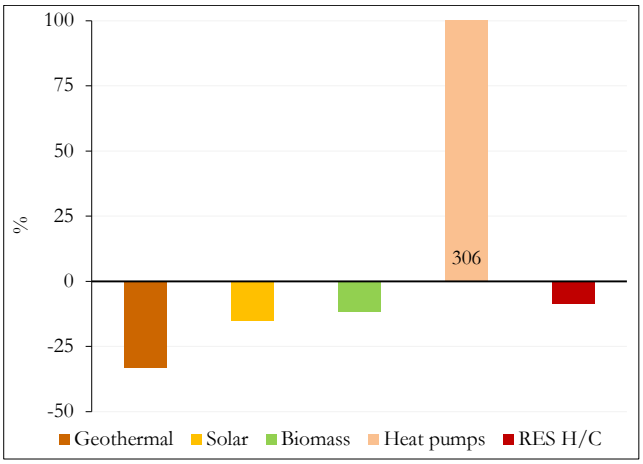

Figure 8-13. Deviation from NREAP in the RES heat generation in Greece in 2010.

8.6. Renewable energy in transport

The use of renewable energy in transport increased in Greece from 0.1 PJ in 2005 to 5.5 PJ in 2010, 19.7% above the NREAP projected value of 4.6 PJ. The use of renewable energy increased between 2005 and 2010 by 5.4 PJ. The highest increase was achieved by biodiesel (+5.3 PJ) followed by biofuels from wastes, residues, ligno-cellulosic material (+0.5 PJ) and renewable electricity (+0.1 PJ).

No bioethanol/bio-ETBE was used until 2010 in Greece, in comparison with an expected contribution of 1.8 PJ. The use of biodiesel grew from 0.1 PJ in 2005 to 5.4 PJ in 2010, 100.0% above the expected use of 2.7 PJ. Neither other biofuels (biogas and vegetable oils) nor biofuels from wastes, residues, ligno-cellulosic material were used. The use of biofuels from import increased to 0.6 PJ in 2010, but this is 65.1% below the expected import of 1.8 PJ. The use of renewable electricity also increased to 0.13 PJ in 2010, 25.0% above the target of 0.10 PJ projected for 2010.

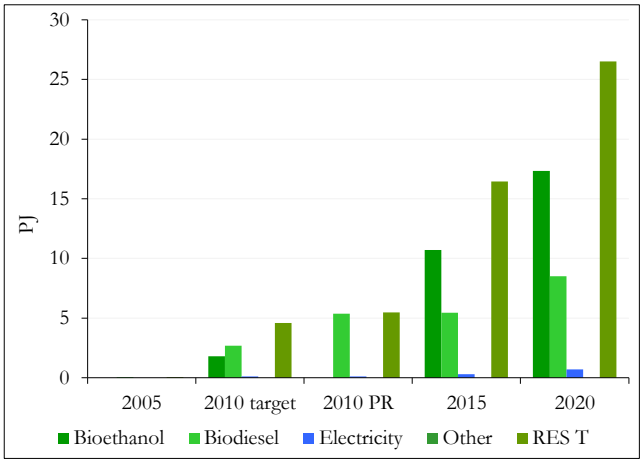

Figure 8-14. RES in transport projected growth and progress until 2010 in Greece.

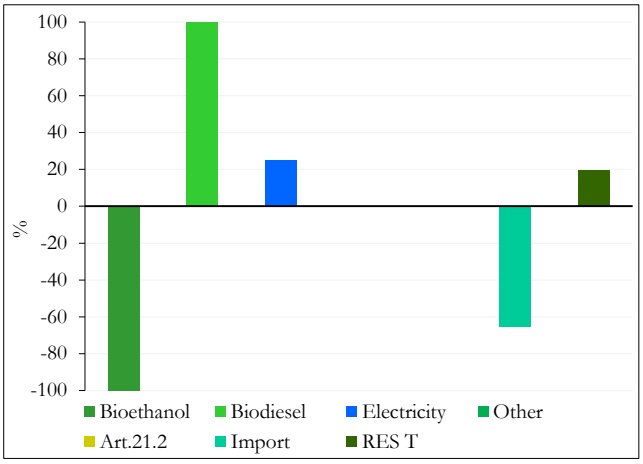

Figure 8-15. Deviation from NREAP in the RES use in transport in Greece in 2010.

9. Renewable energy in Spain

9.1. Deployment of renewable energy

The renewable energy deployment in Spain increased from 347.6 PJ in 2005 to 544.5 PJ in 2010, an increase of 196.9 PJ or 56.6%. The renewable use in Spain was 2.4% above the NREAP projected RES use of 531.6 PJ for 2010 and it is expected to further increase to 859.3 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 314.8 PJ, in comparison with the increase of 196.9 PJ achieved in 2005-2010.

Renewable electricity made the most significant progress between 2005 and 2010, with an increase of 113.5 PJ, followed by renewable energy in transport with 51.2 PJ and heating & cooling with 30.0 PJ.

The highest relative increase was made by the renewable energy in transport (+498.8%) followed by electricity (+58.6%) and heating and cooling (+20.2%). The use of renewable energy in heating and cooling increased from 148.3 PJ in 2005 to 178.3 PJ in 2010, 8.3% above the projected level of 164.7 PJ. The renewable electricity increased from 193.6 PJ in 2005 to 307.0 PJ in 2010, just 0.1% above the target of 306.6 PJ. The use of renewable energy in transport grew from 10.3 PJ in 2005 to 61.4 PJ in 2010, 4.6% below the target of 64.4 PJ in 2010.

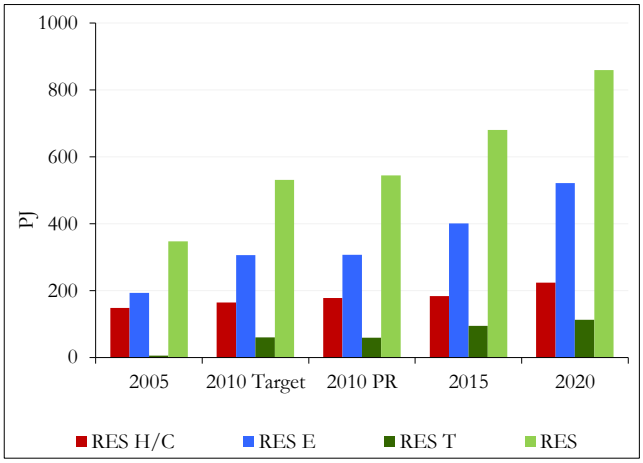

Figure 9-1. RES deployment in Spain: projected growth and actual progress.

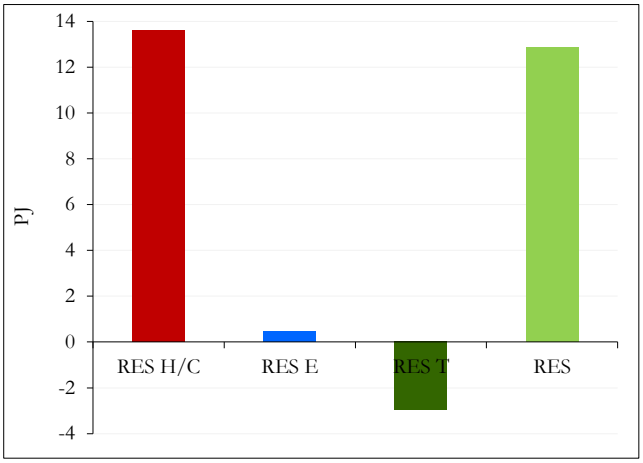

Figure 9-2. Deviation from NREAP in the RES production in Spain in 2010.

Table 9-1. RES use in Spain, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	178.3	13.6	8.3	30.0	20.3	46.0	25.8	224.3
RES-E	307.0	0.5	0.1	113.4	58.6	214.4	69.8	521.5
RES-T	61.4	-3.0	-4.6	51.2	498.8	73.2	119.2	134.6
RES	544.5	12.9	2.4	196.9	56.7	314.8	57.8	859.4

9.2. Renewable energy share

The analysis of the Progress Report for Spain shows that the overall share of RES increased from 8.2% in 2005 to 13.5% in 2010 and this should reach 20.8% in 2020. The highest increase in the share of renewable energy was made in electricity (from 18.4% to 29.2%), followed by transport (from 0.8% to 4.8%) and heating and cooling (from 8.9% to 11.9%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 29.2% to 39.0%), followed by transport (from 4.8% to 11.3%) and heating & cooling (from 11.9% to 17.3).

The overall share of RES is above the target by 0.3% points, reaching 13.5% in 2010, in comparison with 13.2% projected in the NREAP. The RES share in heating and cooling is above the projected value by 0.9% points, reaching 11.9% in comparison with expected share of 11.0% in 2010. The share of RES electricity was just at the projected level of 29.2%. The share of RES in transport is just below the target by 0.2%, reaching 4.8% in comparison with 5.0% projected RES share in transport.

Table 9-2. Projected growth in RES share in Spain and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	8.9	11.0	11.9	0.9	13.4	17.3
RES-E	18.4	29.2	29.2	0.0	34.1	39.0
RES-T	0.8	5.0	4.8	-0.2	8.3	11.3
Overall RES	8.2	13.2	13.5	0.3	16.7	20.8

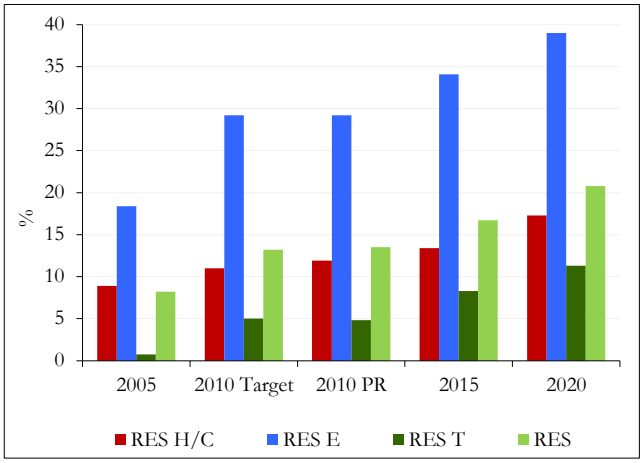

Figure 9-3. RES share in Spain: projected growth and actual progress.

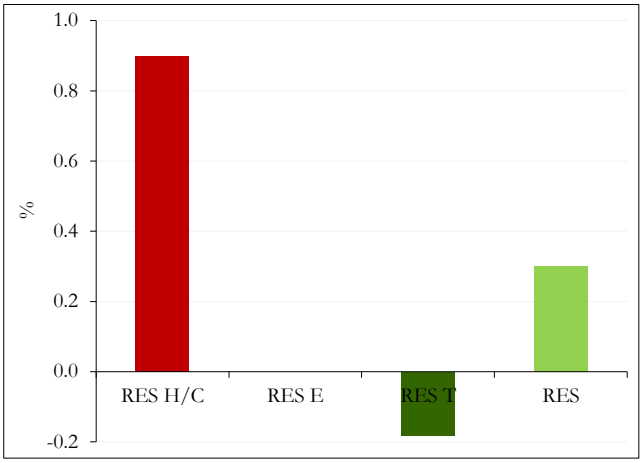

Figure 9-4. Deviation from NREAP in the share of RES in Spain in 2010.

Spain exceeded since in 2009 the RES indicative target share of 2011/2012 and 2013/2014 and met the 2010 planned overall RES share. The trajectory expected for the RES share is set in the NREAP well above the minimum indicative trajectory of the overall share defined in RED Directive. In 2010 Spain met the planned overall RES share showing that it is following the trajectory established for achievement of 2020 RES share target.

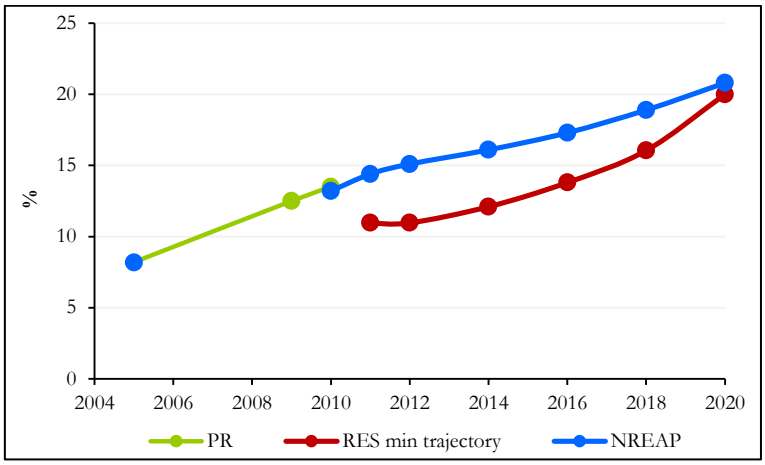

Figure 9-5. Progress of the overall RES share in Spain

9.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by wind (+79.2 PJ) followed by biofuels (+53.5 PJ), solar thermal and solar electricity (+30.5 PJ), the use of biomass for electricity, heating & cooling (+29.0 PJ), hydro (+4.3 PJ) and heat pumps (+0.4 PJ). More progress is expected to be done during 2010-2020, especially by wind (107.4 PJ) followed by solar (90.0 PJ), the use of biomass (55.0 PJ), biofuels (54.4 PJ), hydro (4.6 PJ), heat pumps (1.4 PJ), geothermal (1.3 PJ) and marine energy (0.8 PJ).

Table 9-3. The contribution of different sources of renewable energy in Spain

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	109.3	113.8	113.6	112.9	118.1
Geothermal	0.2	0.2	0.2	0.2	1.5
Solar	2.7	32.8	33.2	75.3	123.2
Marine	0.0	0.0	0.0	0.0	0.8
Wind	74.6	152.4	153.8	200.2	261.2
Heat pumps	0.3	0.7	0.7	1.3	2.1
Biomass	154.7	171.3	183.8	195.7	238.7
Biofuels	5.7	60.4	59.2	95.1	113.6

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: biomass by +7.2%, geothermal by +5.3%, solar by 1.5%, wind power by +0.9%, while the use of some renewable sources was below the 2010 target: heat pumps by -2.3%, biofuels by -2.0% and hydro by -0.2%.

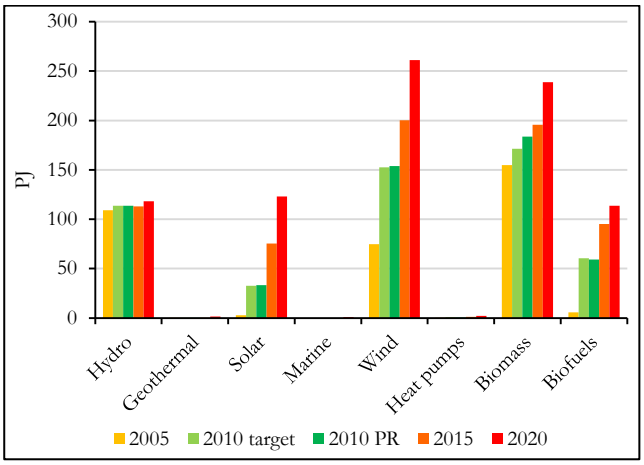

Figure 9-6. Contribution of renewable sources in Spain: projected growth and actual progress

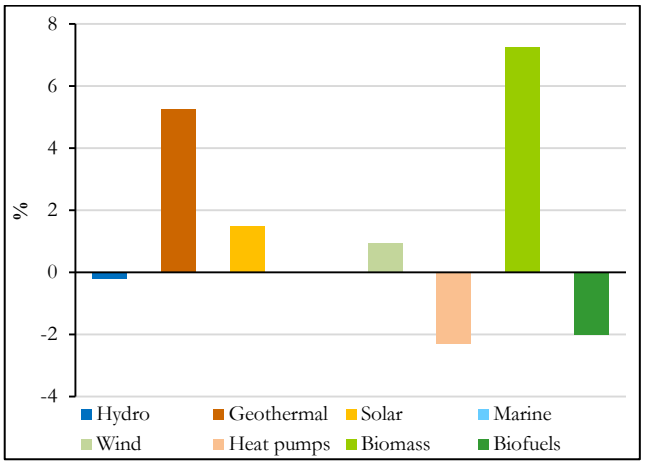

Figure 9-7. Deviation from NREAP in the contribution of renewable sources in Spain in 2010

The use of biomass was the major contributor to RES use in 2010 with a 34% share, followed by wind with 28%, hydro with 21%, biofuels with 11% and solar with 6%. In 2020, the major contribution is expected to come from wind with 30% followed by biomass with 28%, solar with 14%, hydro with 14%, biofuels with 13%, heat pumps with 0.2%, geothermal with 0.2% and marine energy with 0.1%.

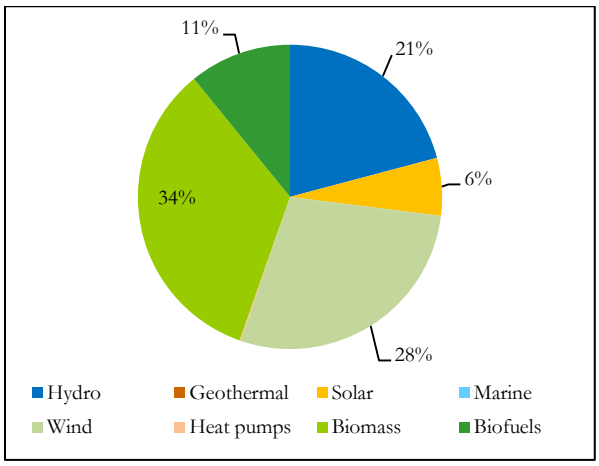

Figure 9-8. Share of renewable sources for electricity, heating & cooling in Spain in 2010

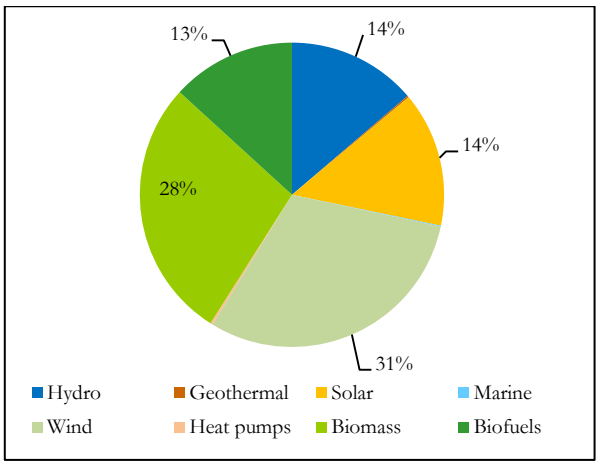

Figure 9-9. Share of renewable sources for electricity, heating & cooling in Spain in 2020

9.4. Renewable electricity

The renewable electricity generation increased in Spain by 31504 GWh (+58.6%), from 53772 GWh in 2005 to 85276 GWh in 2010, which is just 0.1% above the NREAP projected value of 85149 GWh. Significant progress was made between 2005-2010 in all sectors, especially in wind power (+22003 GWh), followed by solar power (+7064 GWh) and biomass (+1242 GWh). In relative terms, the most significant increase was registered in solar power (+17229%), wind (+106.1%) and biomass (+46.8%).

Hydro power generation increased from 30350 GWh produced in 2005 to 31545 GWh in 2010, only 0.2% below the projected value of 31614 GWh. Solar electricity generation grew from 41 GWh to 7105 GWh in 2010, above the expected solar power generation of 6970 GWh in 2010. Wind power grew from 20729 GWh in 2005 to 42732 in 2010, only 0.9% above the expected wind power generation of 42337 GWh in 2010. Biomass electricity generation also rose from 2652 GWh in 2005 to 3984 GWh in 2010, 7.9% below the projected production of 4228 GWh for 2010.

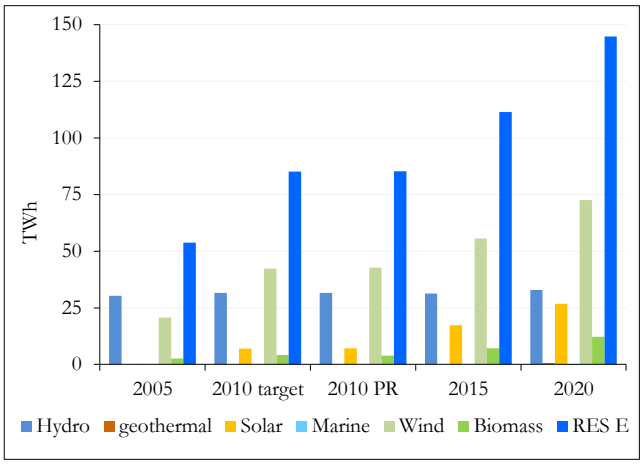

Figure 9-10. RES electricity projected growth and progress until 2010 in Spain.

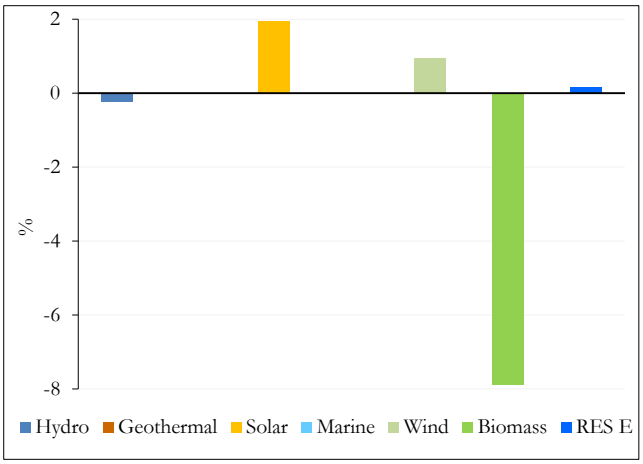

Figure 9-11. Deviation from NREAP in the RES electricity generation in Spain in 2010.

9.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Spain by 30.0 PJ (+20.3%), from 148.2 PJ in 2005 to 178.3 PJ in 2010, which is 8.3% above the NREAP projected value of 164.7 PJ. Some progress was made in most sectors, especially in biomass (+24.5 PJ), solar thermal (+5.1 PJ) and heat pumps (+0.4 PJ). In relative terms, the most significant increase was registered in solar thermal (+200.0%) followed by heat pumps (+12.37%), and biomass (+16.9%).

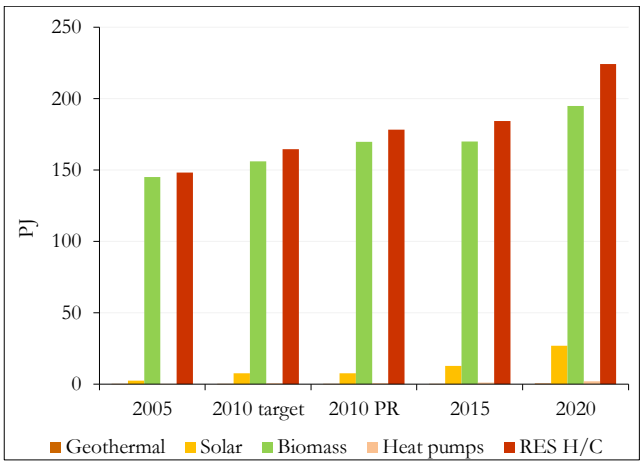

Figure 9-12. RES heat projected growth and progress until 2010 in Spain.

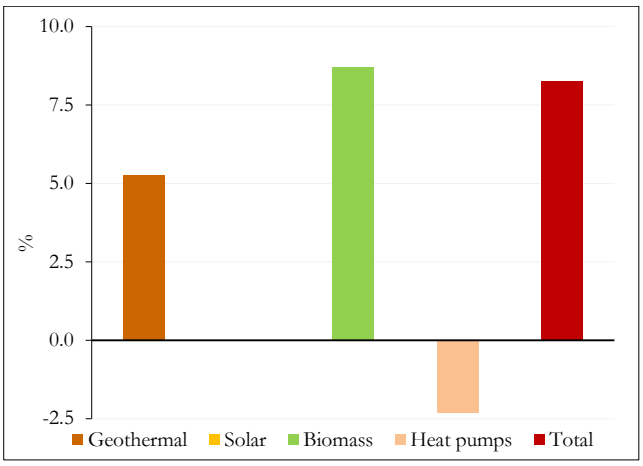

Figure 9-13. Deviation from NREAP in the RES heat generation in Spain in 2010.

The use of geothermal heat remained at about the same level of 0.2 PJ since 2005, which is only 5.3% above the projected value for 2010. Solar heat utilisation increased from 2.6 PJ in 2005 to 7.7 PJ in 2010, which is just the expected level for 2010. The use of biomass heat grew from 145.2 PJ in 2005 to 169.7 PJ in 2010, 8.7% above the expected biomass heat generation of 156.1 PJ in 2010. The heat production from heat pumps increased from 0.3 PJ in 2005 to 0.7 PJ in 2010, only 2.3% below the expected heat pumps generation for 2010.

9.6. Renewable energy in transport

The use of renewable energy in transport increased in Spain from 10.2 PJ in 2005 to 61.4 PJ in 2010, 4.6% below the projected value of 64.4 PJ. The use of renewable energy increased between 2005 and 2010 by 51.2 PJ (+500%). The highest increase was achieved by biodiesel (+48.5 PJ) and small increase was achieved by biofuels from wastes, residues, ligno-cellulosic material (art 21.2 biofuels) (0.2 PJ).

Biodiesel become the major contributor in transport, increasing from 1.0 PJ in 2005 to 49.5 PJ in 2010, 2.8% below the 2010 projected value of 51.0 PJ. The use of bioethanol/bio-ETBE grew from 4.7 PJ in 2005 to 9.7 PJ in 2010, 2.2% above the expected use of 9.5 PJ. The use of biofuels from wastes, residues, ligno-cellulosic material grew to 0.2 PJ in 2010, which is just at the expected level for 2010. The use of biofuels from import increased significantly from zero in 2005 to reach 32.4 PJ in 2010, which is also the expected value. The use of renewable electricity decreased from 4.5 PJ in 2005 to 2.2 PJ in 2010 by 2.3 PJ (-50.7%), which is 44.5% below the target of 4.0 PJ projected for 2010.

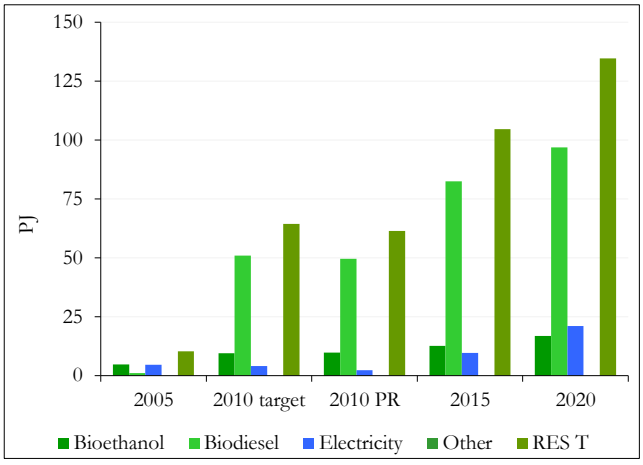

Figure 9-14. RES in transport projected growth and progress until 2010 in Spain.

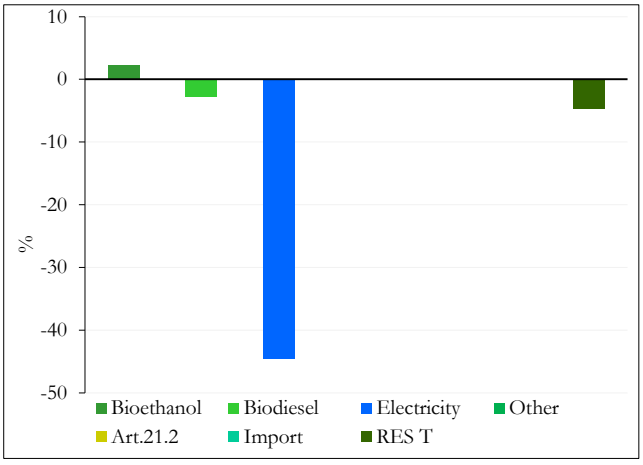

Figure 9-15. Deviation from NREAP in the RES use in transport in Spain in 2010.

10. Renewable energy in France

10.1. Deployment of renewable energy

The renewable energy use in France increased from 683.3 PJ in 2005 to 884.5 PJ in 2010, (an increase of 201.1 PJ or 29.4%). The renewable use was 1.0% below the projected use of 893.9 PJ for 2010 and it is expected to further increase to 1538.5 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 653.9 PJ, in comparison with the increase of 201.2 PJ in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 110.1 PJ, followed by renewable energy in transport with 87.5 PJ. A much modest increase was registered in the renewable electricity with 4.1 PJ. The highest relative increase was made in transport (+384.4%) followed by the heating and cooling (+28.0%) and much less in electricity (+1.5%).

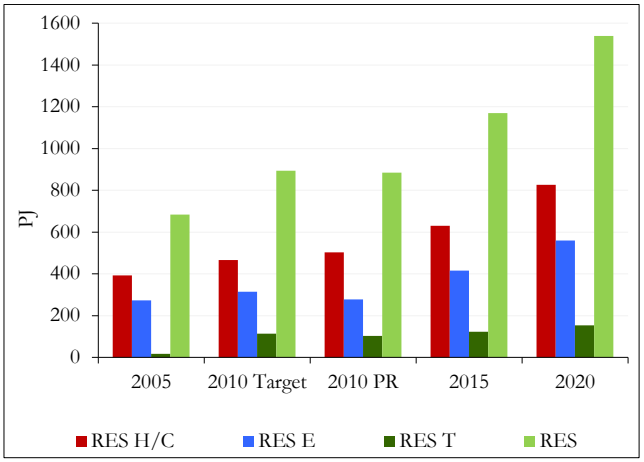

Figure 10-1. RES deployment in France: projected growth and actual progress.

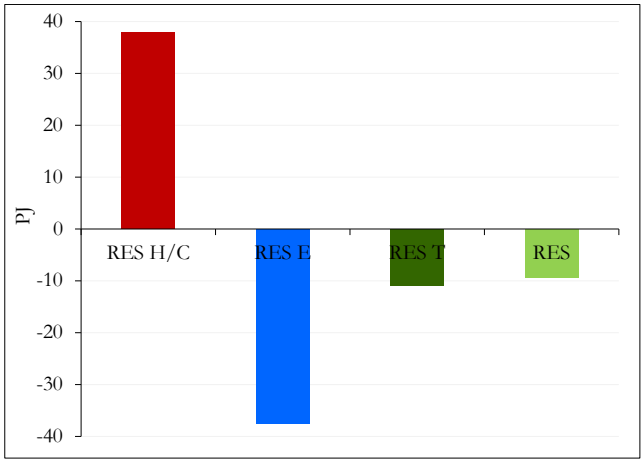

Figure 10-2. Deviation from NREAP in the RES production in France in 2010.

The use of renewable energy in heating and cooling increased from 393.4 PJ in 2005 to 503.5 PJ in 2010, 8.1% above the projected level of 465.7 PJ. The renewable electricity increased from 273.0 PJ in 2005 to 277.1 PJ in 2010, but this is 11.9% below the target of 314.5 PJ. The use of renewable energy in transport grew from 22.8 PJ in 2005 to 110.3 PJ in 2010, which is 9.1% below the target of 121.3 PJ.

Table 10-1. RES use in France, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	503.5	37.9	8.1	110.1	28.0	322.6	64.1	826.1
RES-E	277.1	-37.4	-11.9	4.1	1.5	282.0	101.7	559.1
RES-T	110.3	-11.0	-9.1	87.5	384.4	59.7	54.2	170.1
RES	884.5	-9.3	-1.0	201.1	29.4	654.0	73.9	1538.5

10.2. Renewable energy share

The analysis of the Progress Report for France shows that the overall share of RES increased from 9.6% in 2005 to 12.8% in 2010 and this should reach 23.7% in 2020. The highest increase in the share of renewable energy was made in transport (from 1.2% to 6.0%), followed by heating and cooling (from 13.6% to 17.1%), while less progress was made in electricity (from 14.4% to 14.7%). Major increase is expected to be achieved until 2020, according to the NREAP, in electricity (from 14.7% to 28.5%), followed by heating & cooling (from 17.1% to 33.0%) and transport (from 6.0% to 10.2%).

Table 10-2. Projected growth in RES share in France and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	13.6	17.0	17.1	0.1	24.0	32.9
RES-E	13.5	15.5	14.7	-0.8	20.5	28.5
RES-T	1.2	6.3	6.0	-0.3	7.4	10.2
Overall RES	9.6	12.5	12.8	0.3	17.0	23.7

The overall share of RES is above the target by 0.3% points, reaching 12.8% in 2010, in comparison with 12.5% expected. The RES share in heating and cooling is above the projected value by 0.1% points, reaching 17.1% in comparison with expected share of 17.0% in 2010. The share of renewable electricity is below the target by 0.8% points, reaching 14.7% in comparison with 15.5% projected value. The share of RES in transport was below by 0.3% points, reaching 6.0% in comparison with 6.3% projected RES share.

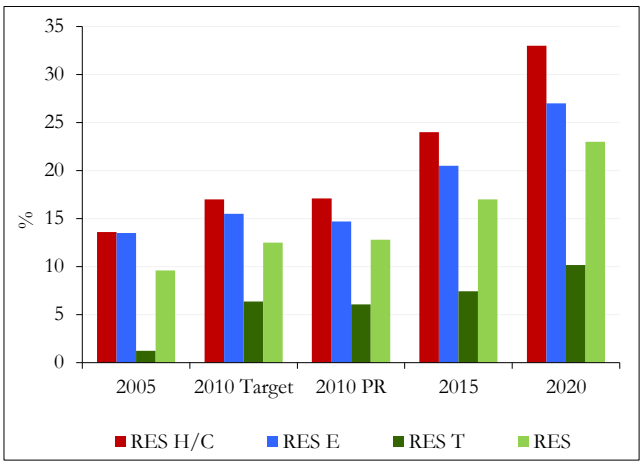

Figure 10-3. RES share in France: projected growth and actual progress.

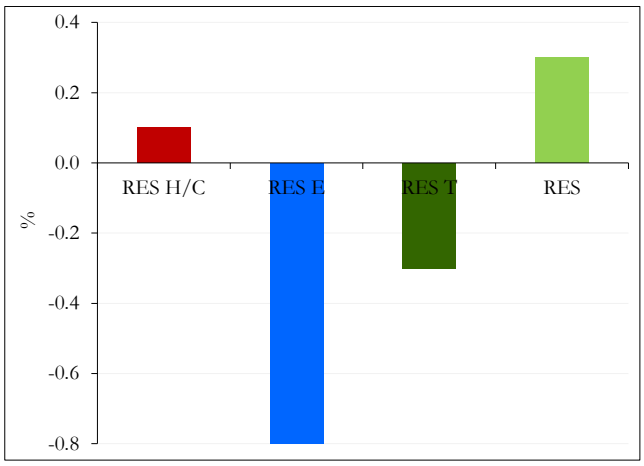

Figure 10-4. Deviation from NREAP in the share of RES in France in 2010.

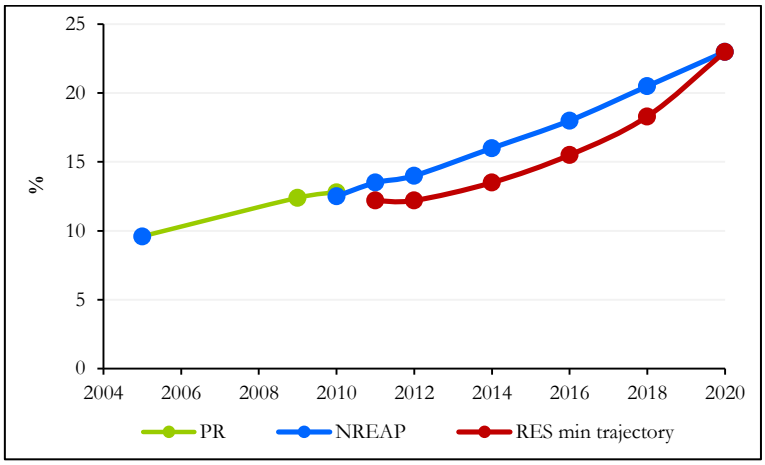

Figure 10-5. Progress of the overall RES share in France

France exceeded since 2009 its indicative target for 2011/2012 and in 2010 exceeded the planned NREAP overall RES share. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory defined in RED Directive. France seems to follow the established trajectory of overall RES share according to its NREAP for the achievement of 2020 RES share target.

10.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-

2010, especially by biofuels (+87.0 PJ) followed by the use of biomass for electricity, heating & cooling (+74.4 PJ), heat pumps (+39.0 PJ), wind (+33.7 PJ), and solar thermal and solar electricity (+4.6 PJ). Other sources recorded a decrease: hydro (-35.3 PJ), geothermal electricity, heating & cooling (-2.0 PJ) and marine energy (-0.2 PJ). More progress is expected to be done between 2010-2020, especially by the use of biomass (279.4 PJ), followed by wind (170.6 PJ), solar (57.4 PJ), biofuels (49.4 PJ), hydro (40.6 PJ), heat pumps (35.3 PJ), and geothermal (18.8 PJ), and marine energy (2.4 PJ). In comparison with the expected contribution, the use of two sources was above the 2010 target: heat pumps by +13.8% and biomass by +8.0%. The use of several renewables was below the targets: geothermal by -45.7%, solar by -19.5%, hydro by -12.5%, wind by -9.8%, marine energy by -4.8%.

Table 10-3. The contribution of different sources of renewable energy in France

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	252.9	248.5	217.5	253.3	258.1
Geothermal	5.8	7.0	3.8	14.1	22.6
Solar	1.7	7.6	6.2	30.2	63.6
Marine	1.9	1.8	1.7	2.8	4.1
Wind	4.1	41.9	37.8	110.3	208.4
Heat pumps	3.2	37.1	42.2	63.0	77.5
Biomass	397.0	436.3	471.4	572.0	750.8
Biofuels	16.9	113.7	103.8	123.7	153.2

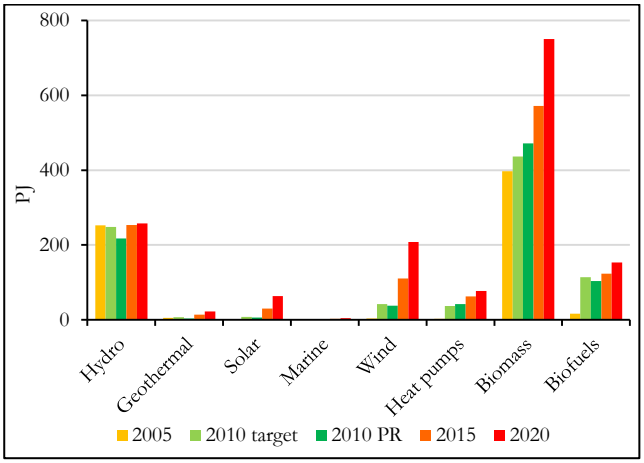

Figure 10-6. Contribution of renewable sources in France: projected growth and actual progress

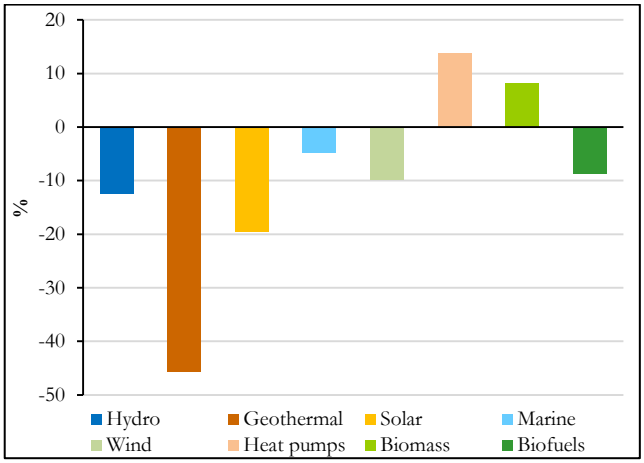

Figure 10-7. Deviation from NREAP in the contribution of renewable sources in France in 2010

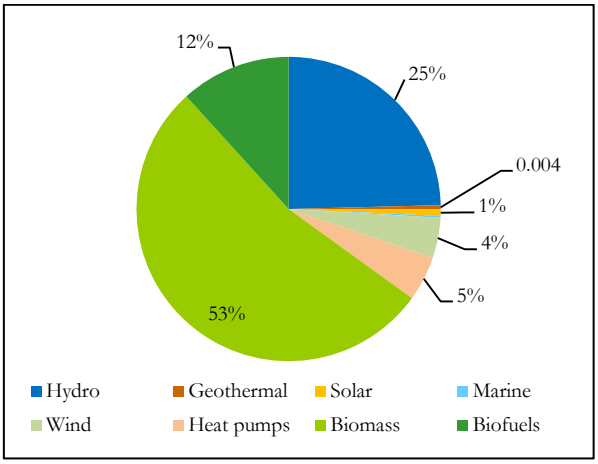

Figure 10-8. Share of renewable sources for electricity, heating & cooling in France in 2010

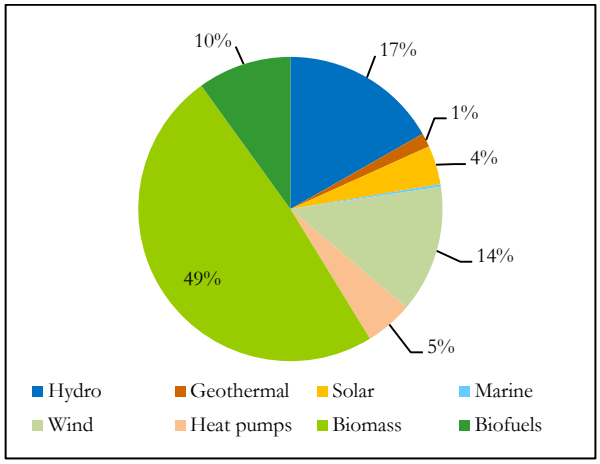

Figure 10-9. Share of renewable sources for electricity, heating & cooling in France in 2020

Biomass was the major contributor to RES use in 2010 with a 53% share, followed by hydro with 25%, biofuels with 12%, heat pumps with 5%, wind with 4%, solar with 0.7%, geothermal with 0.4% and marine energy with 0.2%. In 2020, the major contribution is expected to come from biomass with 49%, followed by hydro with 17%, wind with 14%, biofuels with 10%, heat pumps with 5%, solar with 4%, geothermal with 1%, and marine energy with 0.3%.

10.4. Renewable electricity

The renewable electricity generation increased in France by 1131 GWh (+1.5%), from 75838 GWh in 2005 to reach 76969 GWh in 2010, which is 11.9% below the NREAP projected value of 87368 GWh. Some progress was made between 2005-2010 in several sectors, especially in wind power (+9371 GWh), followed by biomass (+1057 GWh) and solar (+654 GWh). However, some decrease was showed in geothermal electricity with -80.0 GWh (-84.2%) and marine electricity with -59 GWh (-11.0%). In relative terms, the most significant increase was registered in solar power (+2972.7%), followed by wind (+830.8%) and biomass (+27.7).

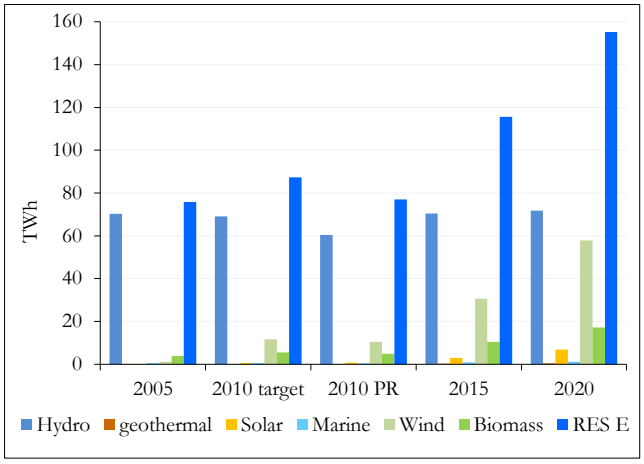

Figure 10-10. RES electricity projected growth and progress until 2010 in France.

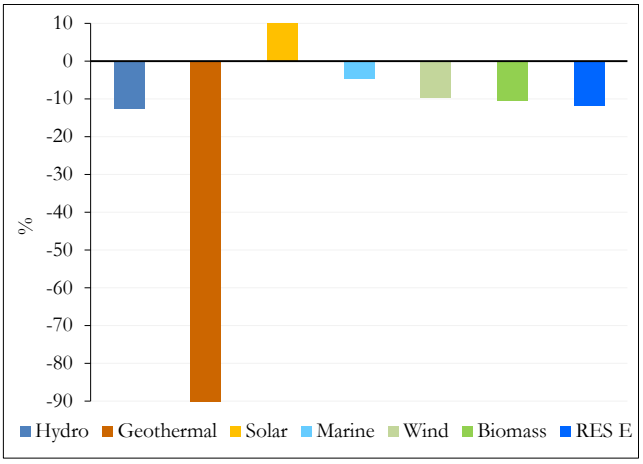

Figure 10-11. Deviation from NREAP in the RES electricity generation in France in 2010.

Hydro power generation decreased in comparison with 70239 GWh produced in 2005, reaching 60427 GWh in 2010, 12.5% below the projected value of 69023 GWh. Geothermal power generation also decreased from 95 GWh to only 15 GWh in 2010, 90.2% below the expected geothermal electricity production of 153 GWh in 2010. Solar electricity generation grew from 22 GWh to 676 GWh in 2010, 10.3% above the expected power generation of 613 GWh in 2010, solar electricity being the only renewable source above the expected production level for 2010. Electricity produced from marine energy decreased from 535 GWh in 2005 to 476 in 2010, 4.8% below the expected power generation of 500 GWh. Wind power grew from 1128 GWh in 2005 to 10499 GWh in 2010, 9.8% below the expected power generation of 11638 GWh. Biomass electricity generation has also increased from 3819 GWh to 4876 GWh in 2010, 10.4% below the projected production of 5441 GWh for 2010.

10.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in France by 110.1 PJ (+28.0%), from 393.4 PJ in 2005 to 503.5 PJ in 2010, 8.1% above the NREAP projected value of 465.7 PJ. Some progress was made in several sectors, especially in biomass (+70.6 PJ), heat pumps (+39.0 PJ) and solar (+2.1 PJ). In relative terms, the most important increase was registered in heat pumps (+1226.3%), followed by solar thermal (+134.2%) and biomass (+18.4%).

The use of geothermal heat decreased from 5.4 PJ in 2005 to 3.8 PJ in 2010, 41.9% below the projected value of 6.5 PJ for 2010. Solar heat production increased from 1.6 PJ in 2005 to 3.7 PJ in 2010, which is however 31.5% below the projected value of 5.4 PJ for 2010. The use of biomass heat grew from 383.2

PJ in 2005 to 453.8 PJ in 2010, 8.9% above the expected biomass heat generation of 416.7 PJ in 2010. The heat production from heat pumps increased significantly from only 3.2 PJ in 2005 to 42.2 PJ in 2010, 13.8% above the expected heat pumps generation of 37.1 PJ in 2010.

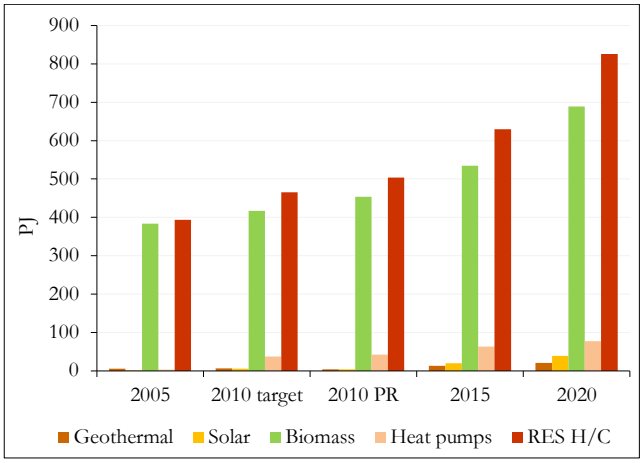

Figure 10-12. RES heat projected growth and progress until 2010 in France.

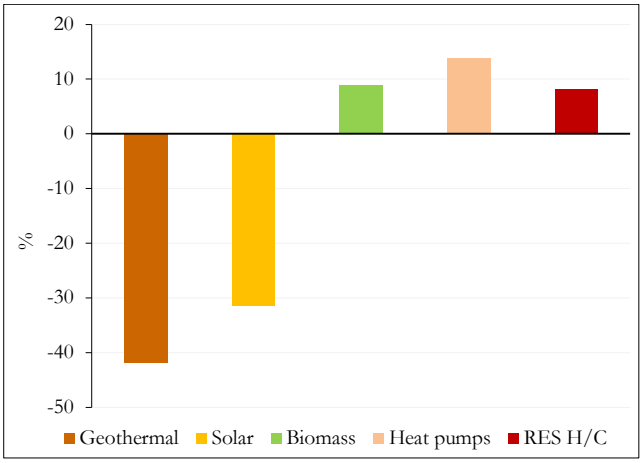

Figure 10-13. Deviation from NREAP in the RES heat generation in France in 2010.

10.6. Renewable energy in transport

The use of renewable energy in transport increased in France from 22.8 PJ in 2005 to 110.3 PJ in 2010, but this is 9.1% below the NREAP projected value of 121.3 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 87.5 PJ (+384.4%). The highest increase was achieved by biodiesel (+73.6 PJ) followed by bioethanol/bio-ETBE (+13.4 PJ) and biofuels from wastes, residues, ligno-cellulosic material (art 21.2 biofuels) (+2.6 PJ). In relative terms, the most significant increase was registered by biodiesel (+536.0%), followed by art 21.2 biofuels (1882.6%), followed by bioethanol/bio-ETBE (+425.3%). The use of biofuels from import increased by 181.2 PJ (+2583.6%).

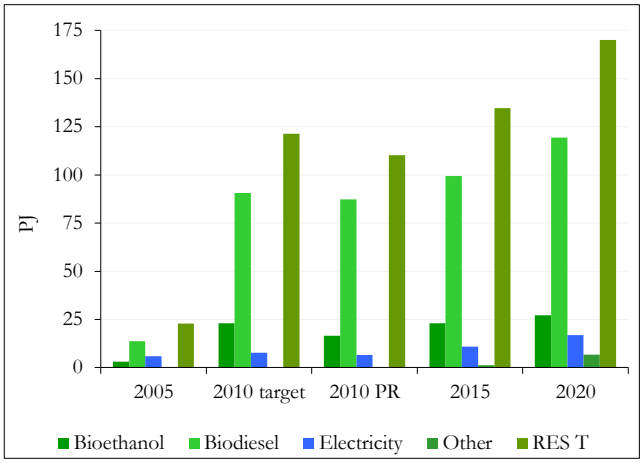

Figure 10-14. RES in transport projected growth and progress until 2010 in France.

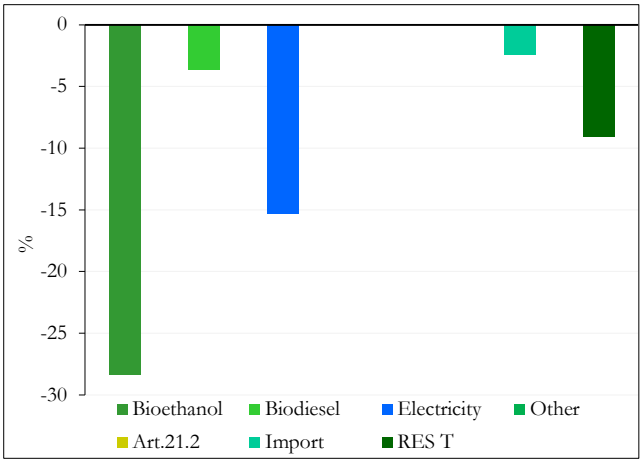

Figure 10-15. Deviation from NREAP in the RES use in transport in France in 2010.

Biodiesel is the major contributor to RES use in transport, increasing from 13.7 PJ in 2005 to 87.3 PJ in 2010, just 3.6% below the 2010 NREAP projected value of 90.6 PJ. The use of bioethanol/ bio-ETBE grew from only 3.1 PJ in 2005 to 16.5 PJ in 2010, 28.4% below the expected bioethanol use of 23.0 PJ in 2010. No other biofuels (biogas and vegetable oils) were used in France. While no contribution was expected for 2010 for the use of biofuels from wastes, residues, ligno-cellulosic material, their use grew to 2.6 PJ. The use of biofuels from import increased by 14.7 PJ (+2804%) from 0.5 PJ in 2005 to 15.2 PJ in 2010, 2.4% below the expected value of 15.6 PJ. The use of renewable electricity in transport also increased from 5.9 PJ in 2005 to 6.5 PJ in 2010, but this is 15.3% below the target of 7.7 PJ.

11. Renewable energy in Italy

11.1. Deployment of renewable energy

The renewable energy use in Italy increased from 290.6 PJ in 2005 to 531.9 PJ in 2010, an increase of 241.3 PJ (+83.0%). The renewable use was 19.7% above the projected use of 444.4 PJ for 2010. This is expected to increase to 946.9 PJ until 2020 (including RES from transfer from other MS and third countries through cooperation mechanism). The additional use of renewable energy in 2010-2020 is expected to be 415.0 PJ (+78%), in contrast with the increase of 241.3 PJ (+83%) achieved in 2005-2010. This includes a significant amount of 47.2 PJ to be transferred through cooperation mechanism.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 149.9 PJ, followed by renewable energy in transport with 55.8 PJ and renewable electricity with 37.5 PJ. The highest relative increase was made by the use of renewable energy in transport (+418.9%) followed by the heating and cooling (+186.8%) and electricity (+18.5%). The use of renewable heating and cooling increased from 80.2 PJ in 2005 to 230.1 PJ in 2010, 42.7% above the expected level of 161.2 PJ. The renewable electricity increased from 202.9 PJ in 2005 to 240.4 PJ in 2010, almost at the level of 240.5 PJ. The use of renewable energy in transport grew from 7.5 PJ in 2005 to 69.1 PJ in 2010, 38.7% above the expected target of 42.7 PJ for 2010.

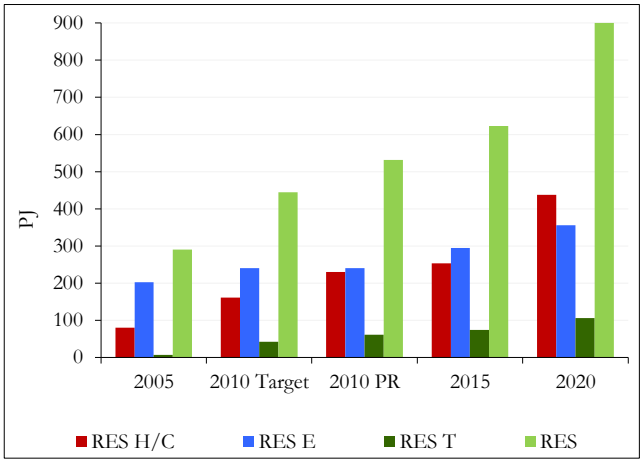

Figure 11-1. RES deployment in Italy: projected growth and actual progress.

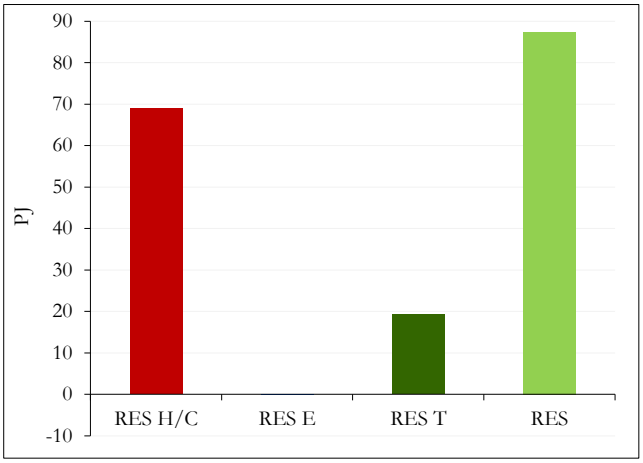

Figure 11-2. Deviation from NREAP in the RES production in Italy in 2010.

Table 11-1. RES use in Italy, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	230.1	68.9	42.7	149.8	186.7	207.7	90.2	437.8
RES-E	240.4	-0.1	0.0	37.5	18.5	115.7	48.1	356.1
RES-T	69.1	19.3	38.7	55.8	418.9	52.3	75.7	121.4
RES	531.9	87.4	19.7	241.2	83.0	367.9	69.2	899.7
RES total*	531.9	87.4	19.7	241.2	83.0	415.0	78.0	946.9

*including RES from transfer from other MS and third countries through cooperation mechanism

11.2. Renewable energy share

The analysis of the Progress Report for Italy shows that the overall share of RES increased from 4.9% in 2005 to 10.1% in 2010 and this should reach 17.0% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 2.8% to 9.5%), followed by electricity (from 16.3% to 20.1%) and in transport (from 0.9% to 4.8%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in heating & cooling (from 9.5% to 17.1%), followed by electricity (from 20.1% to 26.4%) and transport (from 4.8% to 10.1%).

Table 11-2. Projected growth in RES share in Italy and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	2.8	6.5	9.5	2.9	10.1	17.1
RES-E	16.3	18.7	20.1	1.4	22.4	26.4
RES-T	0.9	3.5	4.9	1.4	6.6	10.1
Overall RES	4.91	8.1	10.1	2.1	11.24	17.0

The overall share of renewable energy was above the target by 2.1% points, reaching 10.1% in 2010, in comparison with 8.1% projected. The RES share in heating and cooling is above the projected value with 2.9% points, reaching 9.5% in comparison with expected share of 6.5% in 2010. The share of renewable electricity is above the target by 1.4% points, reaching 20.1% in comparison with 18.7% projected value. The share of RES in transport was above by 1.4% points, reaching 4.9% in comparison with 3.5% projected RES share.

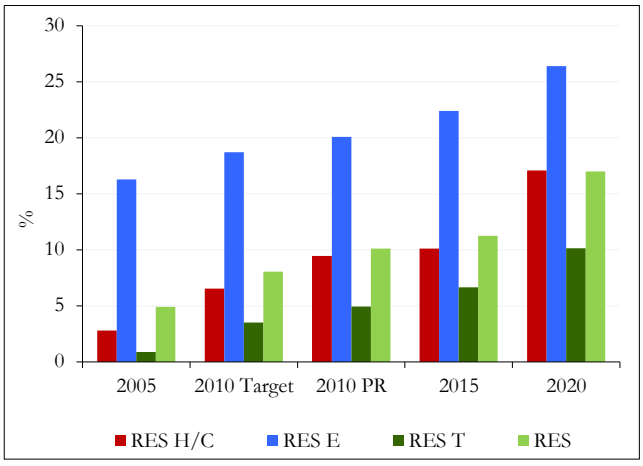

Figure 11-3. RES share in Italy: projected growth and actual progress.

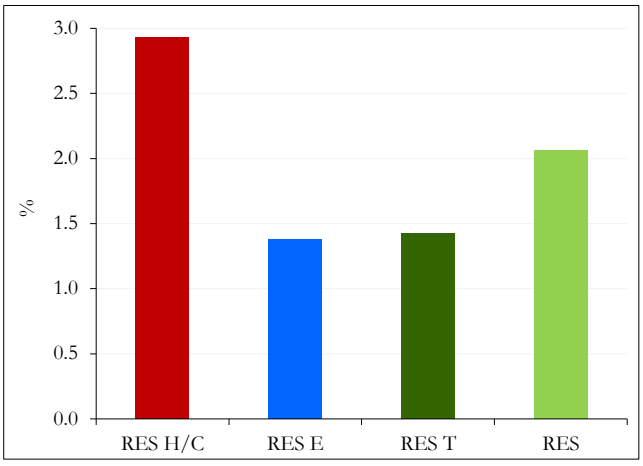

Figure 11-4. Deviation from NREAP in the share of RES in Italy in 2010.

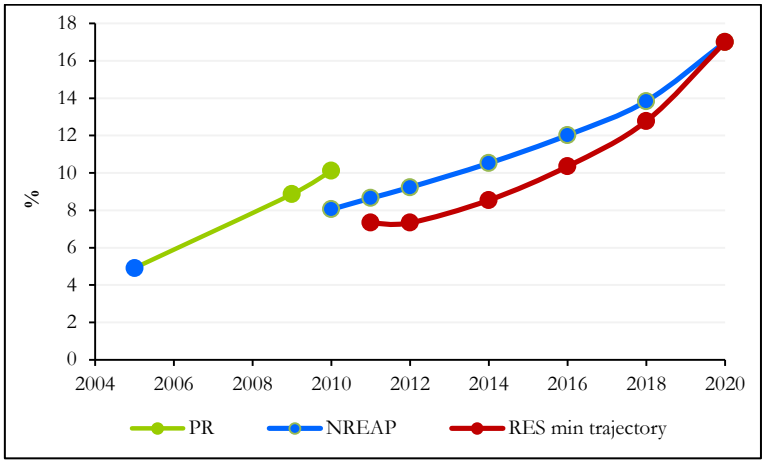

Figure 11-5. Progress of the overall RES share in Italy

Italy exceeded since 2009 the 2010 and 2011 planned overall RES share and also the RES indicative target shares for 2011/2012 and 2013/2014. In 2010 Italy exceeded even the overall RES share planned for 2012. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory of overall RES share as defined in RED Directive. If Italy will follow the 2009-2010 trajectory it will be in good track for the achievement of 2020 RES share target.

11.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was noticed between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+116.5 PJ), followed by biofuels (+53.9 PJ), heat pumps (+49.1 PJ), wind (+22.4 PJ) and solar thermal and solar electricity (+11.2 PJ). Some decrease was recorded by hydro (-9.0 PJ) and geothermal (-2.1 PJ). More progress is expected between 2010-2020, especially by the use of biomass (+102.4 PJ), followed by solar (+94.8 PJ), heat pumps (+71.4 PJ), biofuels (+44.5 PJ), wind (+40.4 PJ), geothermal (+11.7 PJ) and hydro (+2.7 PJ).

Table 11-3. The contribution of different sources of renewable energy in Italy

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	157.6	151.7	148.5	151.5	151.2
Geothermal	28.1	29.7	25.2	33.2	36.9
Solar	1.2	11.8	12.5	40.4	107.3
Marine	0.0	0.0	0.0	0.0	0.0
Wind	9.2	30.2	31.6	49.1	72.0
Heat pumps	0.9	53.3	50.0	77.7	121.4
Biomass	86.1	124.9	202.6	196.7	305.0
Biofuels	7.5	42.7	61.4	74.3	105.9

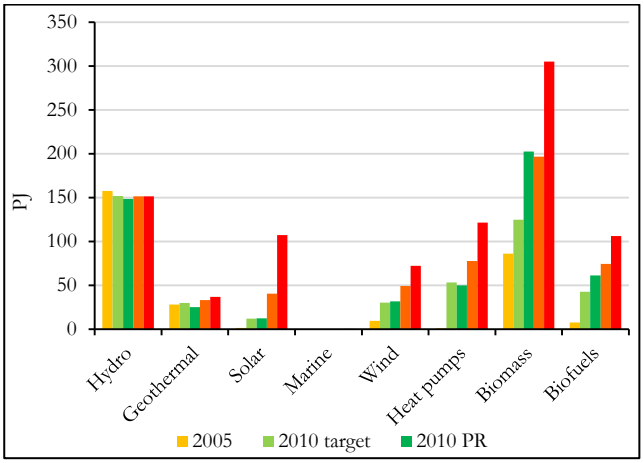

Figure 11-6. Contribution of renewable sources in Italy: projected growth and actual progress

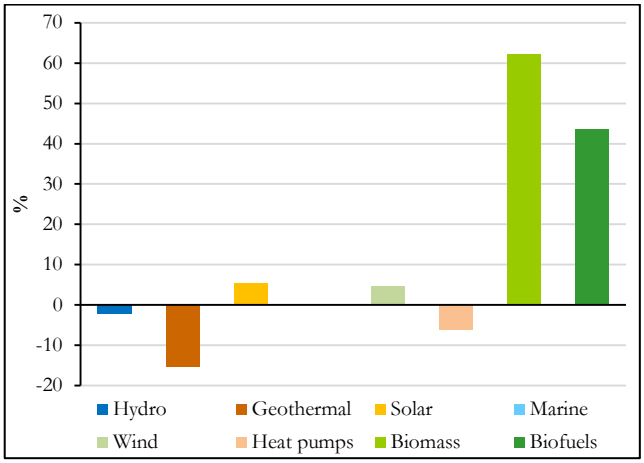

Figure 11-7. Deviation from NREAP in the contribution of renewable sources in Italy in 2010

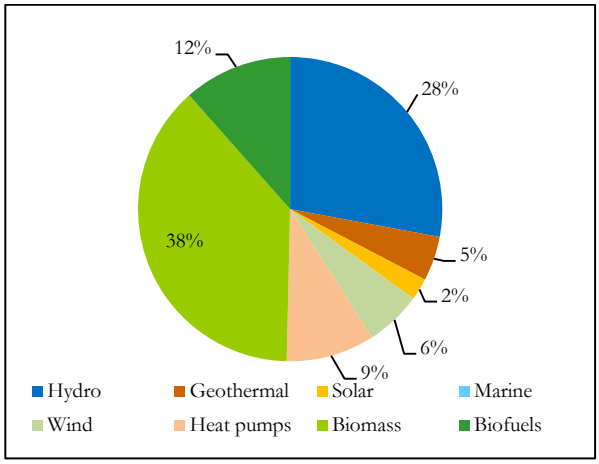

Figure 11-8. Share of renewable sources for electricity, heating & cooling in Italy in 2010

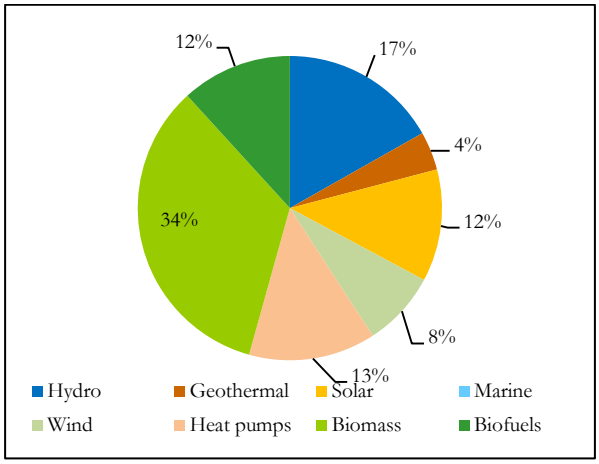

Figure 11-9. Share of renewable sources for electricity, heating & cooling in Italy in 2020

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: biomass by +62.3%, biofuels by +43.6%, solar by +5.3%, wind by +4.6%, while the use of other sources was below the target: geothermal energy by -15.3%, heat pumps by -6.1% and hydro energy by -2.1%.

The use of biomass was the major contributor to RES use in 2010 with a 38% share, followed by hydro by 28%, biofuels with 12%, heat pumps with 9%, wind with 6%, geothermal with 5% and solar with 2%. In 2020, the major contribution is expected from biomass with 34%, followed by hydro with 17%, heat pumps with 13%, biofuels with 12%, solar with 12%, wind with 8% and geothermal with 4%.

11.4. Renewable electricity

The renewable electricity generation increased in Italy by 10409 GWh (+18.5%), from 56356 GWh in 2005 to 66765 GWh in 2010, which is almost equal to the NREAP projected value of 66793 GWh. Some progress was made between 2005-2010 in all sectors, especially in wind power (+6225 GWh), followed by biomass (+4765 GWh) and solar (+1875 GWh). In relative terms, the most significant increase was registered in solar power (+6048%), followed by wind (+243.5%) and biomass (+101.9%).

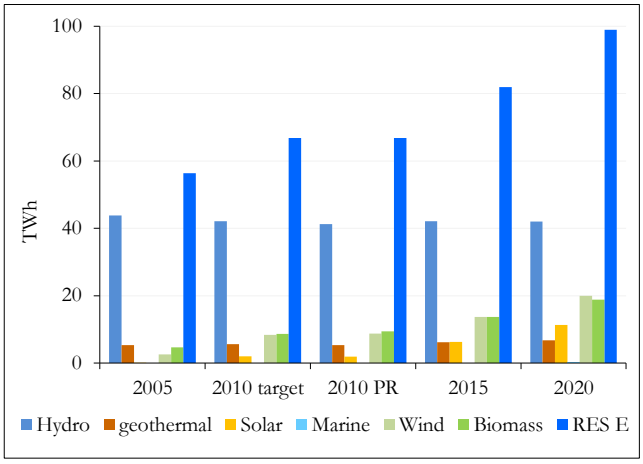

Figure 11-10. RES electricity projected growth and progress until 2010 in Italy.

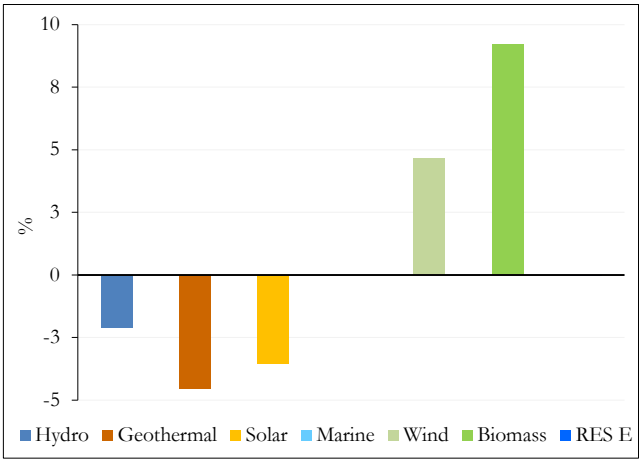

Figure 11-11. Deviation from NREAP in the RES electricity generation in Italy in 2010.

Hydro power generation has decreased in comparison with 43767 GWh produced in 2005, reaching 41256 GWh in 2010, 2.1% below the projected value of 42142 GWh. Electricity generation from geothermal rose from 5325 GWh produced in 2005 to 5376 GWh in 2010, 4.5% below the projected value of 5632 GWh. Solar electricity generation has made a significant progress from 31 GWh in 2005 to 1906 GWh in 2010, which is nevertheless 3.5% below the expected solar power generation of 1976 GWh in 2010. Wind power grew from 2558 GWh in 2005 to 8787 in 2010, 4.6% above the expected wind power generation of 8398 GWh in 2010. Biomass electricity generation also is above the 8645 GWh projected production for 2010 by 9.2%, reaching 9440 GWh, in comparison with 4675 GWh generated in 2005.

11.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Italy from 80.3 PJ in 2005 to reach 230.1 PJ in 2010, 42.8% above the NREAP projected value of 161.2 PJ. Significant progress was made in all sectors, with an increase of 149.8 PJ (+186.7%), especially in biomass (+99.4 PJ), heat pumps (+49.1 PJ) and solar (+4.5 PJ). In relative terms, the most significant increase was registered in heat pumps (+5331.8%), followed by solar thermal (+396.3%) and biomass (+143.4%).

The use of geothermal heat decreased from 8.9 PJ in 2005 to 5.8 PJ in 2010, 38.5% below the projected value of 9.5 PJ for 2010. The generation of solar heat increased from 1.1 PJ in 2005, reaching 5.6 PJ in

2010, 18.6% above the projected value of 4.7 PJ for 2010. Biomass heat grew from 69.3 PJ in 2005 to 168.6 PJ in 2010, 79.9% above the expected biomass heat generation of 93.7 PJ in 2010. The heat production from heat pumps increased from only 0.9 PJ in 2005 to reach 50.0 PJ in 2010, but this is 6.1% below the expected heat pumps generation of 53.3 PJ for 2010.

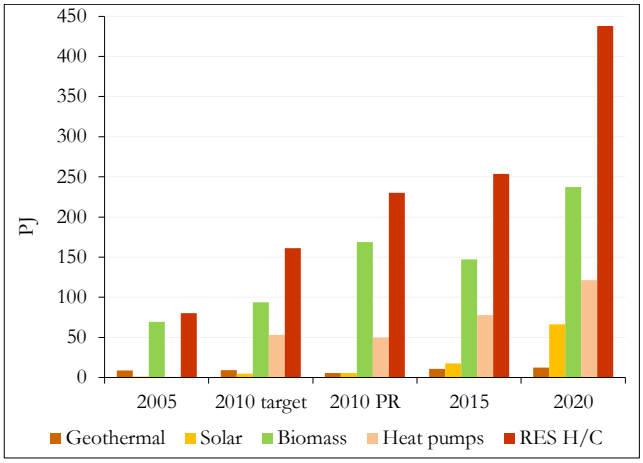

Figure 11-12. RES heat projected growth and progress until 2010 in Italy.

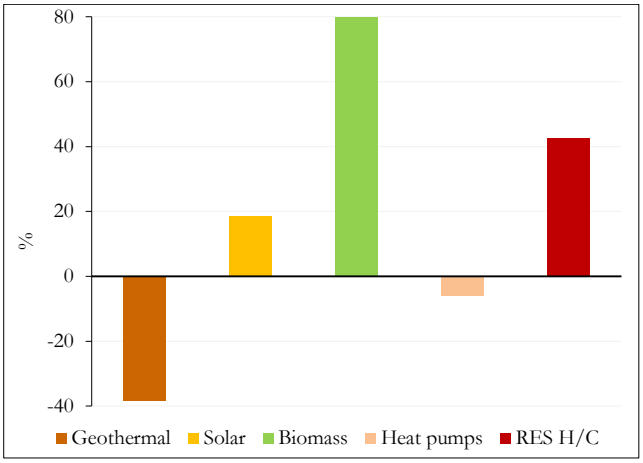

Figure 11-13. Deviation from NREAP in the RES heat generation in Italy in 2010.

11.6. Renewable energy in transport

The use of renewable energy in transport increased in Italy from 13.3 PJ in 2005 to reach 69.1 PJ in 2010, 38.5% above the NREAP projected value of 49.9 PJ for 2010. The use of renewable energy in transport increased between 2005 and 2010 by 55.8 PJ (+418.9%). The highest increase was achieved by biodiesel (+47.4 PJ) followed by bioethanol/bio-ETBE (+6.5 PJ) and renewable electricity (+1.9 PJ). In relative terms, the most significant increase was registered by biodiesel (+632.4%) followed by art 21.2 biofuels (+81.0%) and electricity (+32.4%).

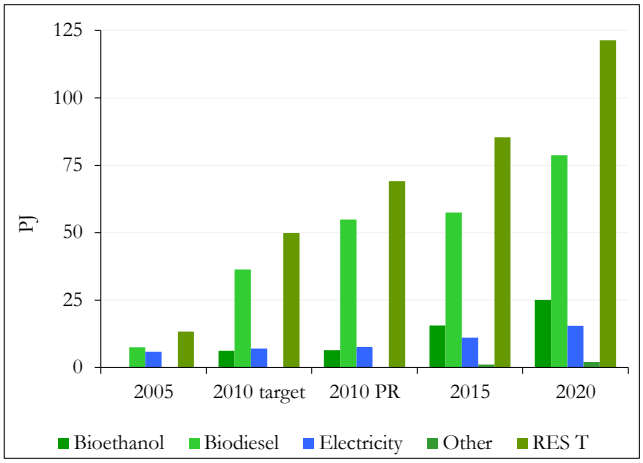

Figure 11-14. RES in transport projected growth and progress until 2010 in Italy.

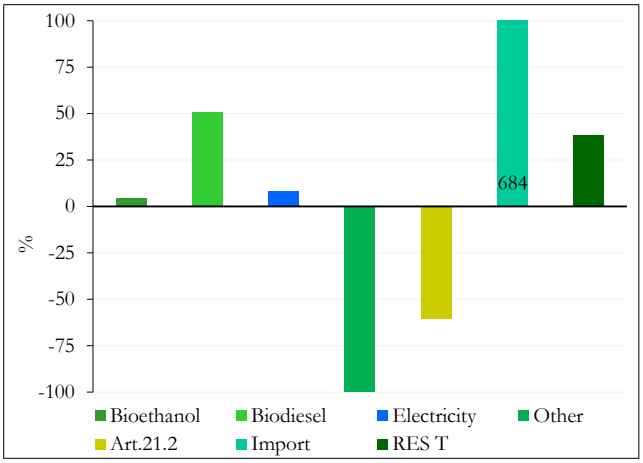

Figure 11-15. Deviation from NREAP in the RES use in transport in Italy in 2010.

Biodiesel was the major contributor to RES use in transport in 2010, increasing from 7.5 PJ in 2005 to 54.9 PJ, 51.0% above the projected value of 36.3 PJ. The use of bioethanol/bio-ETBE grew to 6.5 PJ in 2010, 4.7% above the expected use of 6.2 PJ in 2010. The use of other biofuels (biogas and vegetable oils) made no progress, in comparison with a planned contribution of 0.2 PJ in 2010. The use of biofuels from wastes, residues, ligno-cellulosic material grew from 0.9 PJ in 2005 to 1.6 PJ in 2010, which is 60.4% below the target of 4.0 PJ for 2010. The use of biofuels from import increased significantly to 29.9 PJ in 2010, 683.5% above the expected value of 3.8 PJ. The use of renewable electricity also grew from 5.8 PJ in 2005 to 7.7 PJ in 2010, which is 8.2% above the 7.1 PJ projected for 2010.

12. Renewable energy in Cyprus

12.1. Deployment of renewable energy

The RES deployment in Cyprus increased from 2.0 PJ in 2005 to 4.3 PJ in 2010, an increase of 2.3 PJ (+113.7%). The renewable use in Cyprus was 0.1 PJ or 3.3% above the NREAP projected RES use of 4.2 PJ for 2010 and it is expected to further increase to 11.0 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 6.7 PJ, in comparison with the increase of 2.3 PJ achieved in 2005-2010.

Renewable heating & cooling made the highest progress between 2005 and 2010, with an increase of 1.4 PJ, followed by renewable energy in transport with 0.6 PJ and renewable electricity with 0.3 PJ. The use of renewable energy in heating and cooling increased from 2.0 PJ in 2005 to 3.4 PJ in 2010, 4.2% above the projected level of 3.3 PJ. The renewable electricity increased to 0.3 PJ in 2010, but this is 68.7% below the target of 0.8 PJ. The use of renewable energy in transport grew to 0.6 PJ in 2010, 4.7% below the expected level of 0.7 PJ in 2010.

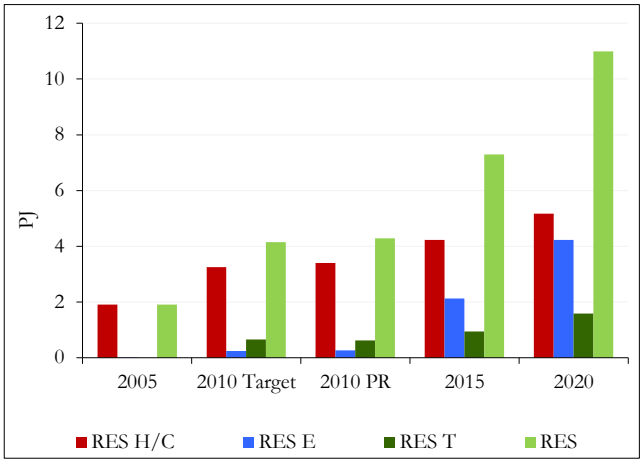

Figure 12-1. RES deployment in Cyprus: projected growth and actual progress.

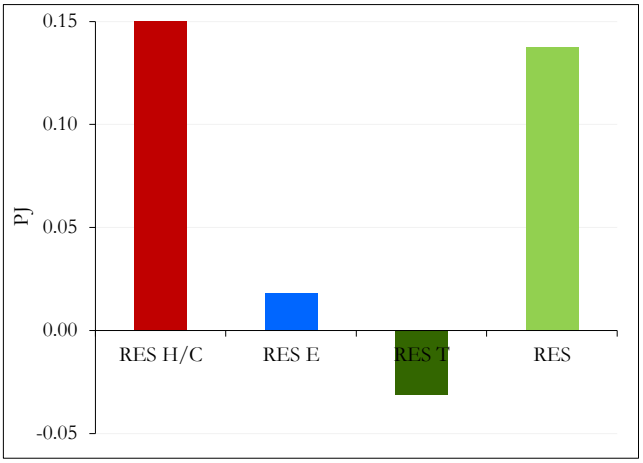

Figure 12-2. Deviation from NREAP in the RES production in Cyprus in 2010.

Table 12-1. RES use in Cyprus, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	3.4	0.2	4.6	1.5	78.7	1.8	52.1	5.2
RES-E	0.3	0.0	7.4	0.3		4.0	1512.0	4.2
RES-T	0.6	0.0	-4.7	0.6	0.0	1.0	156.7	1.6
RES	4.3	0.1	3.3	2.4	125.3	6.7	156.1	11.0

12.2. Renewable energy share

The analysis of the Progress Report for Cyprus shows that the overall share of RES increased from 2.9% in 2005 to 5.2% in 2010 and this should reach 13.0% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 9.1% to 17.7%), followed by transport (from 0 to 2.0%) and electricity (from 0 to 1.4%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 1.4% to 16.0%), followed by heating & cooling (from 17.7% to 23.5%) and transport (from 2.0% to 10.0%).

The overall share of RES is below the target by 1.3% points, reaching 5.2% in 2010, in comparison with 6.5% projected in the NREAP. The RES share in heating and cooling is above the projected value by 1.5% points, reaching 17.7% in comparison with expected share of 16.2% in 2010. The share of renewable electricity is below the target by 2.9% points, reaching 1.4% in comparison with 4.3% projected value. The share of RES in transport was below by 0.2% points, reaching 2.0% in comparison with 2.2% projected RES share.

Table 12-2. Projected growth in RES share in Cyprus and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	9.1	16.2	17.7	1.5	20.0	23.5
RES-E	0.0	4.3	1.4	-2.9	8.3	16.0
RES-T	0.00	2.2	2.0	-0.2	3.3	10.0
Overall RES	2.9	6.5	5.2	-1.3	9.0	13.0

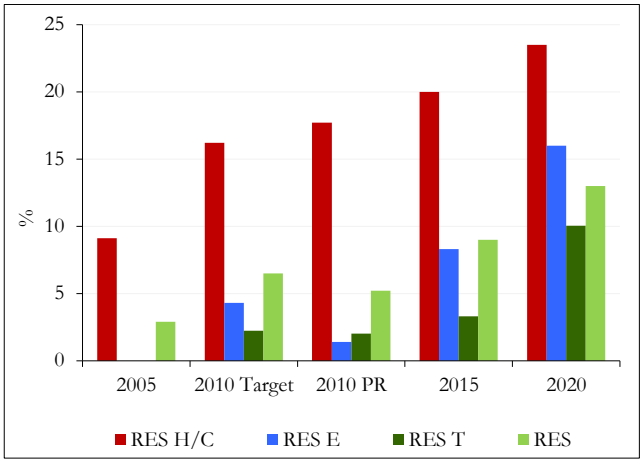

Figure 12-3. RES share in Cyprus: projected growth and actual progress.

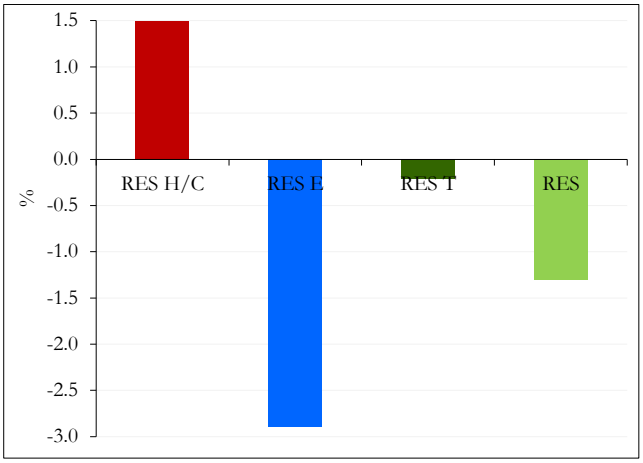

Figure 12-4. Deviation from NREAP in the share of RES in Cyprus in 2010.

The overall RES share for Cyprus in 2010 was below than the planned NREAP share but it exceeded the RES minimum indicative trajectory for 2011/2012. The trajectory expected for the RES share is set in the NREAP well above the minimum indicative trajectory of overall RES share defined in RED Directive. Although the RES share is still above the minimum indicative trajectory, it is well below its NREAP target, which raises some doubts about the long term progress.

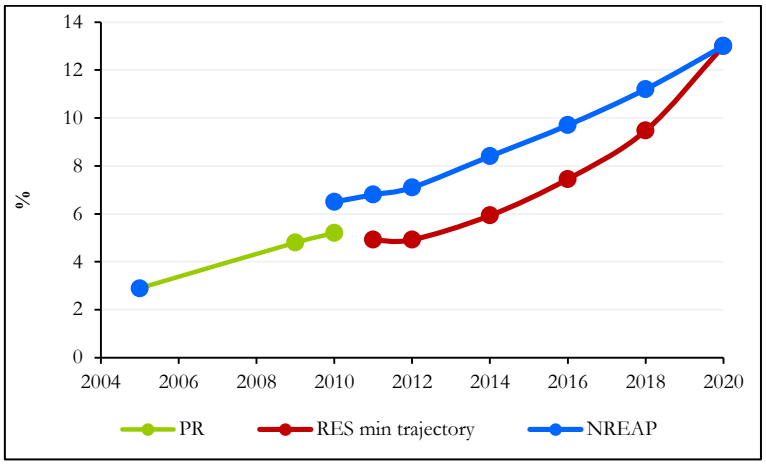

Figure 12-5. Progress of the overall RES share in Cyprus

12.3. Sources of renewable energy

Some increase of the use of various renewable energy sources was registered between 2005-2010, especially by solar thermal and solar electricity (+0.9 PJ) followed by the use of biomass for electricity, heating & cooling (+0.8 PJ), biofuels (+0.6 PJ) and wind (+0.1 PJ). More progress is expected to be done during 2010-2020, especially by solar (+3.1 PJ), wind (+1.7 PJ), biofuels (+1.0 PJ), biomass (+0.8 PJ) and heat pumps (+0.1 PJ). In comparison with the expected level, the use of several renewable sources was above the NREAP 2010 target: heat pumps by +120.6%, biomass by +7.5% and solar (+3.4%), while the use of other sources was below the target: biofuels by -4.7% and wind by -0.1%.

Table 12-3. The contribution of different sources of renewable energy in Cyprus

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	1.7	2.5	2.6	3.9	5.7
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.1	0.1	1.1	1.8
Heat pumps	0.0	0.0	0.0	0.1	0.1
Biomass	0.2	0.9	0.9	1.3	1.8
Biofuels	0.0	0.7	0.6	0.9	1.6

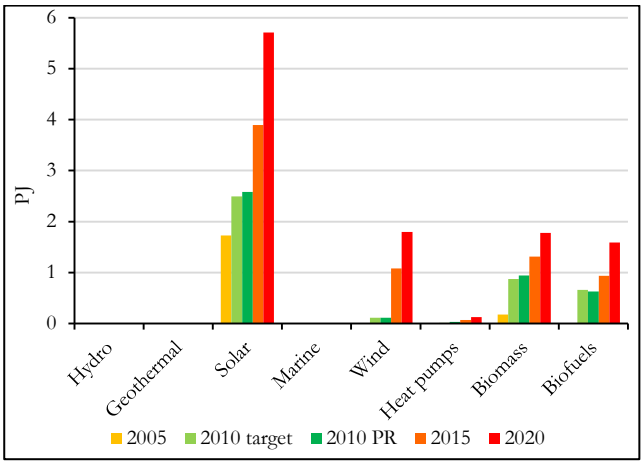

Figure 12-6. Contribution of renewable sources in Cyprus: projected growth and actual progress

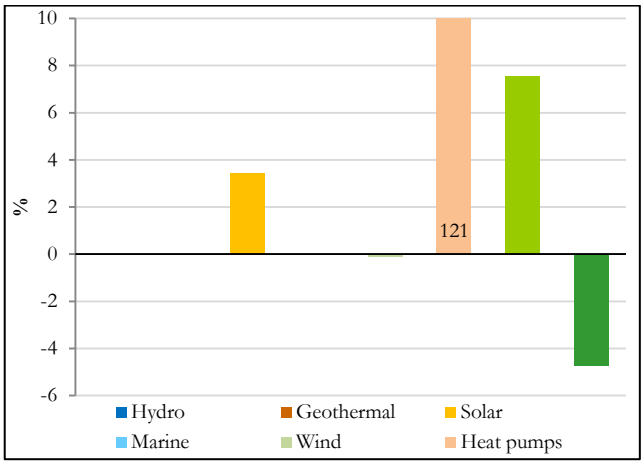

Figure 12-7. Deviation from NREAP in the contribution of renewable sources in Cyprus in 2010

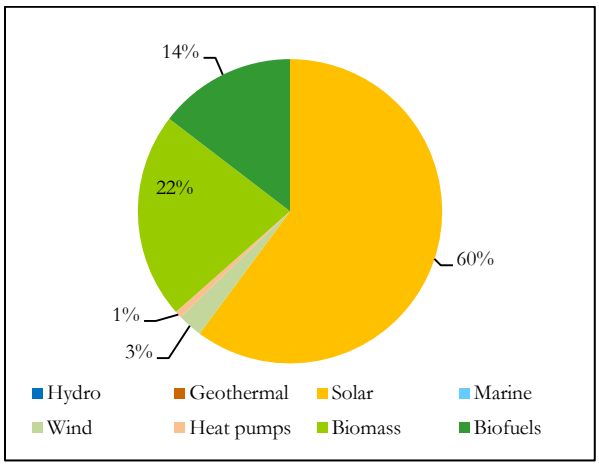

Figure 12-8. Share of renewable sources for electricity, heating & cooling in Cyprus in 2010

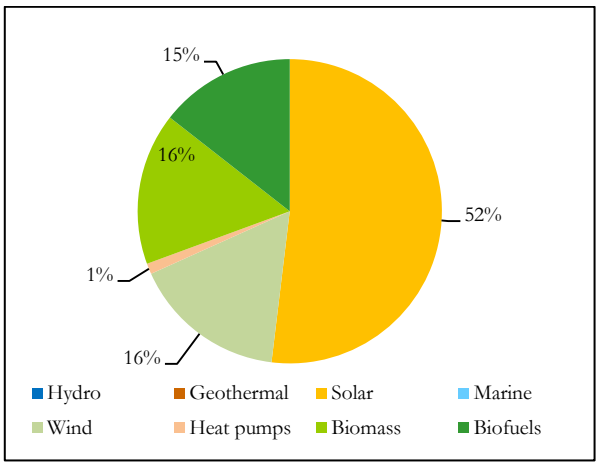

Figure 12-9. Share of renewable sources for electricity, heating & cooling in Cyprus in 2020

Solar energy was the major contributor to RES use in 2010 with a 60% share, followed by biomass with 22%, biofuels with 14%, wind with 3% and heat pumps with 0.7%. In 2020, the major contribution is expected to come from solar energy with 52%, followed by wind with 16%, biomass with 16%, biofuels with 15% and heat pumps with 1%.

12.4. Renewable electricity

The renewable electricity generation increased in Cyprus by 72.8 GWh, from only 0.07 GWh in 2005 to 72.9 GWh in 2010, which is 7.4% above the NREAP projected value of 67.9 GWh. Significant progress was made between 2005-2010, especially in biomass electricity (+35.1 GWh), followed by wind power (+31.4 GWh) and solar (+6.3 GWh). Solar electricity production grew from 0.07 GWh to 6.4 GWh in 2010, 1.1% below the expected power generation of 6.5 GWh in 2010. Wind power grew to 31.4 GWh in 2010, only 0.1% below the expected wind power generation for 2010. Biomass electricity generation reached 35.1 GWh in 2010, 17.1% above the projected production of 30 GWh.

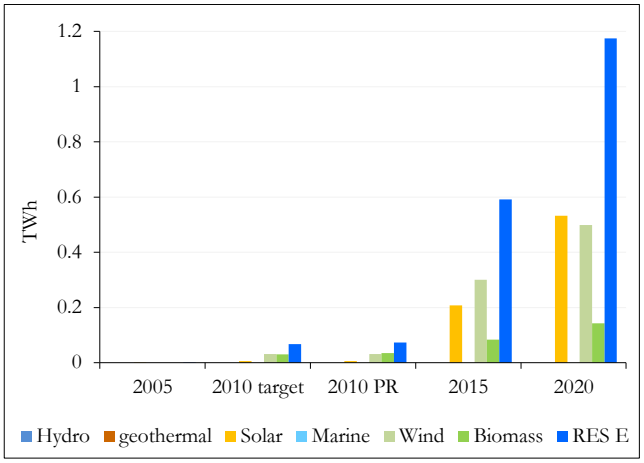

Figure 12-10. RES electricity projected growth and progress until 2010 in Cyprus.

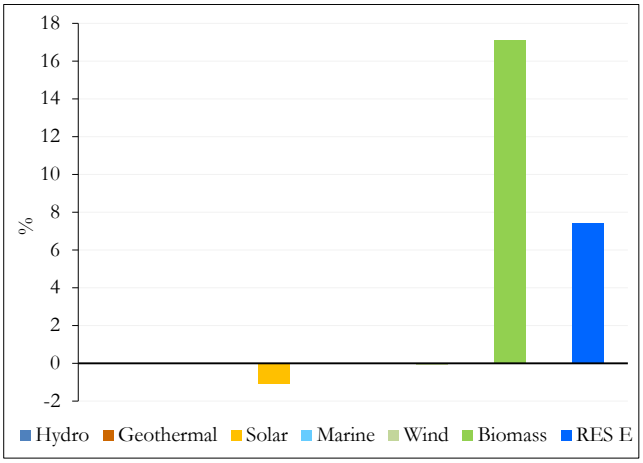

Figure 12-11. Deviation from NREAP in the RES electricity generation in Cyprus in 2010.

12.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Cyprus by 1.5 PJ (+78.7%), from 1.9 PJ in 2005 to 3.4 PJ in 2010, which is 4.6% above the NREAP projected value of 3.3 PJ. Some progress was made in renewable heating & cooling, namely in biomass (+0.8 PJ) and solar thermal (+0.6 PJ). In relative terms, the most significant increase was registered in biomass (+362.6%), followed by solar thermal (+48.0%).

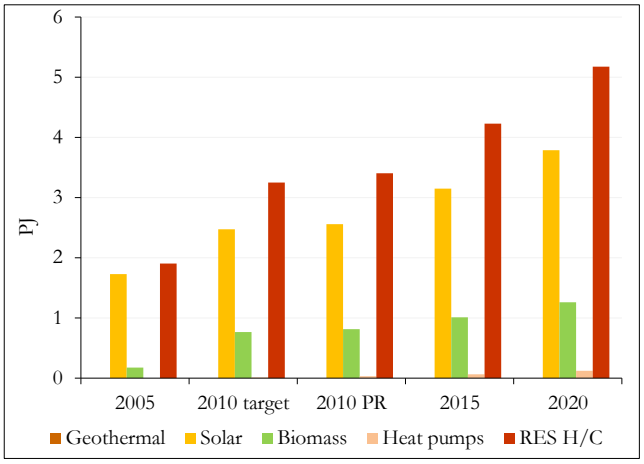

Figure 12-12. RES heat projected growth and progress until 2010 in Cyprus.

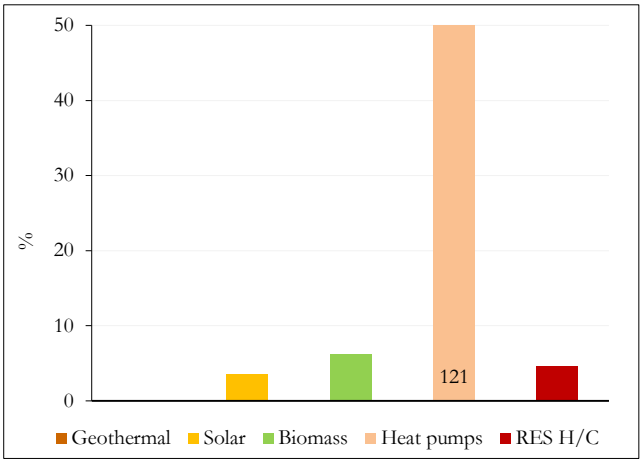

Figure 12-13. Deviation from NREAP in the RES heat generation in Cyprus in 2010.

The utilisation of solar heat increased in comparison from 1.7 PJ in 2005 to reach 2.6 PJ in 2010, 3.5% above the projected value. Biomass heat consumption grew from 0.2 PJ in 2005 to 0.8 PJ in 2010, 6.2% above the expected biomass heat generation in 2010. The heat production from heat pumps increased to 0.03 PJ in 2010, 120.6% above the expected heat pumps generation of 0.01 PJ in 2010.

12.6. Renewable energy in transport

The use of renewable energy in transport increased in Cyprus to 0.63 PJ in 2010, 4.7% below the NREAP projected value of 0.66 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 0.6 PJ.

Biodiesel was the only biofuel used, reaching 0.63 PJ in 2010, 4.7% below the expected biodiesel use of 0.66 PJ in 2010. Only 0.004 PJ biofuels from wastes, residues, ligno-cellulosic material were used, in comparison with an expected contribution of 0.01 PJ in 2010, which is 70% below the target for 2010. The use of biofuels from import increased to 0.43 PJ in 2010, 8.7% above the expected value of 0.39 PJ.

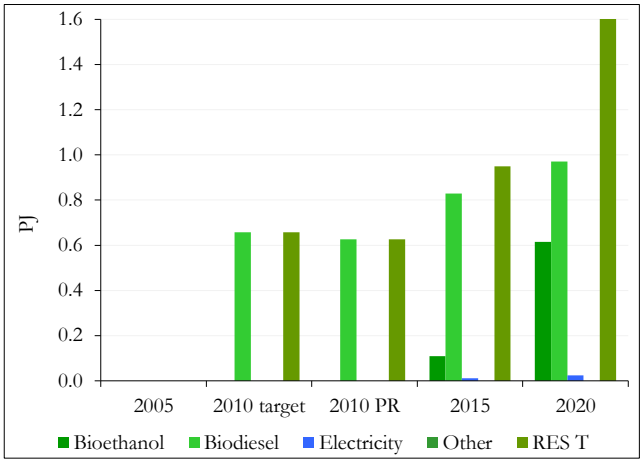

Figure 12-14. RES in transport projected growth and progress until 2010 in Cyprus.

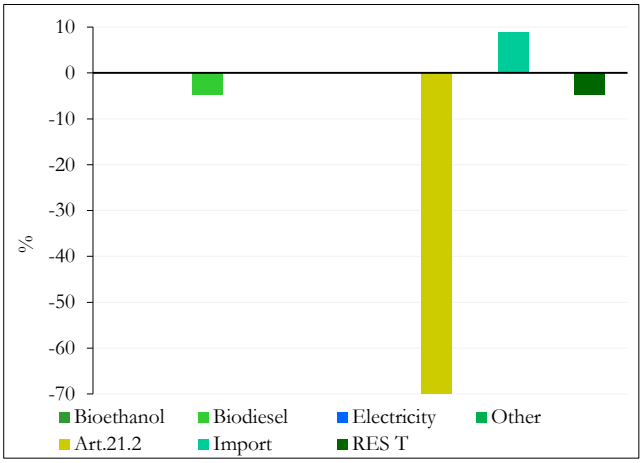

Figure 12-15. Deviation from NREAP in the RES use in transport in Cyprus in 2010.

13. Renewable energy in Latvia

13.1. Deployment of renewable energy

The renewable energy deployment in Latvia increased from 57.7 PJ in 2005 to 61.0 PJ in 2010, an increase of 3.3 PJ (5.7%). The renewable use in Latvia was 10.3% above the NREAP projected RES use of 55.3 PJ for 2010. This is expected to further increase to 80.4 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 19.5 PJ, in comparison with the increase of 3.3 PJ achieved in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 1.8 PJ, followed by renewable energy in transport with 1.0 PJ and renewable electricity with 0.4 PJ. The highest relative increase was made by the use of renewable energy in transport (+342.9%) followed by the heating and cooling (+3.9%) and electricity (+3.9%).

The use of renewable energy in heating and cooling increased from 46.6 PJ in 2005 to 48.5 PJ in 2010, 13.5% above the projected level of 42.7 PJ. The renewable electricity increased from 10.9 PJ in 2005 to 11.4 PJ in 2010, which is 3.9% above the target of 10.9 PJ. The use of renewable energy in transport grew from 0.3 PJ in 2005 to 1.3 PJ in 2010, below the target of 1.8 PJ in 2010.

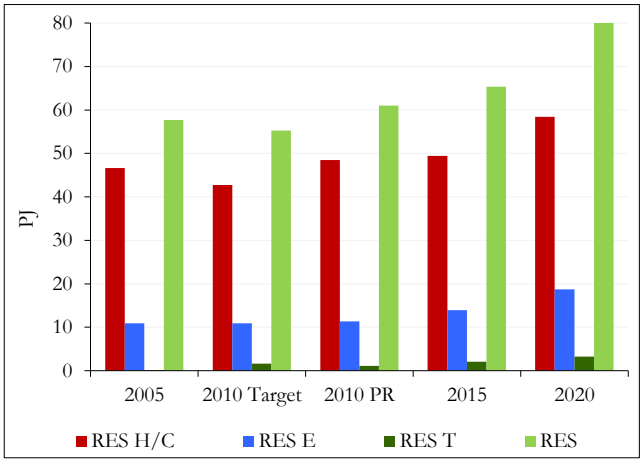

Figure 13-1. RES deployment in Latvia: projected growth and actual progress.

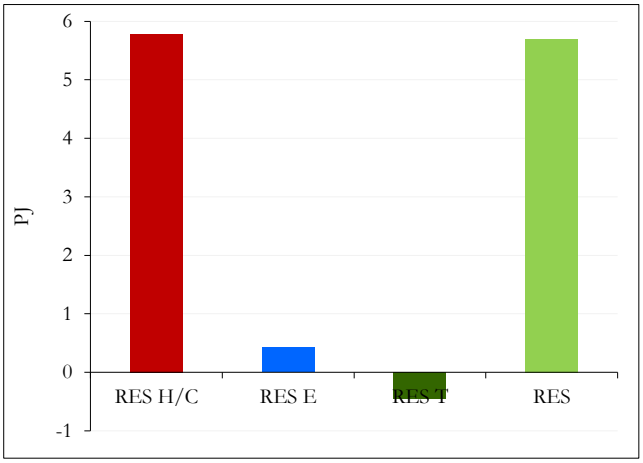

Figure 13-2. Deviation from NREAP in the RES production in Latvia in 2010.

Table 13-1. RES use in Latvia, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	48.5	5.8	13.5	1.8	3.9	10.0	20.6	58.4
RES-E	11.4	0.4	3.9	0.4	4.1	7.3	64.6	18.7
RES-T	1.3	-0.5	-26.2	1.0	342.9	2.2	167.7	3.5
RES	61.0	5.7	10.3	3.3	5.7	19.4	31.8	80.4

13.2. Renewable energy share

The analysis of the Progress Report for Latvia shows that the overall share of RES remained at 32.5% from 2005 until 2010 and should reach 40.1% in 2020. The highest increase in the share of renewable energy was made in transport (from 0.9% to 3.6%), followed by electricity heating and cooling (from 42.7% to 43.8%) while in electricity the RES share decreased (from 44.9% to 42.1%).

Major increase is expected to be achieved until 2020 in electricity (from 42.1% to 59.8%), followed by heating & cooling (from 43.8% to 53.5%) and transport (from 3.3% to 10.0%).

The overall share of RES is below the target by 0.2% points, reaching 32.5% in 2010, in comparison with 32.7% projected in the NREAP. The RES share in heating and cooling is below the projected value by 1.5% points, reaching 43.8% in comparison with expected share of 45.3% in 2010. The share of renewable electricity was below the target by 2.6% points, reaching 42.1% in comparison with 44.7% projected value. The share of RES in transport was below by 0.4% points, reaching 3.6% in comparison with 4.0% projected RES share.

Table 13-2. Table 2. Projected growth in RES share in Latvia and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	42.7	45.3	43.8	-1.5	48.6	53.4
RES-E	44.9	44.7	42.1	-2.6	51.4	59.8
RES-T	0.9	4.0	3.6	-0.4	4.7	10.0
Overall RES	32.6	32.7	32.5	-0.2	35.6	40.0

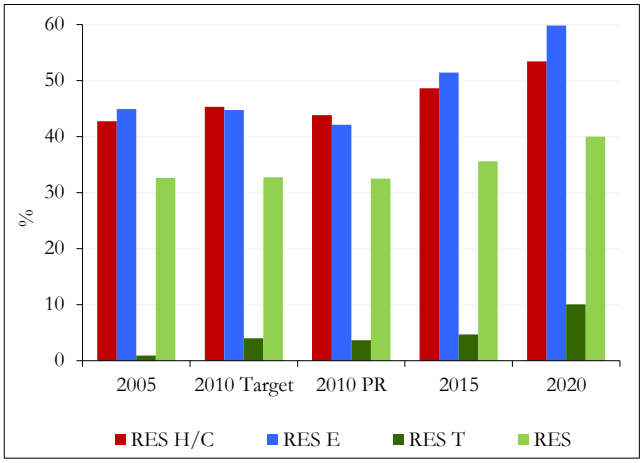

Figure 13-3. RES share in Latvia: projected growth and actual progress.

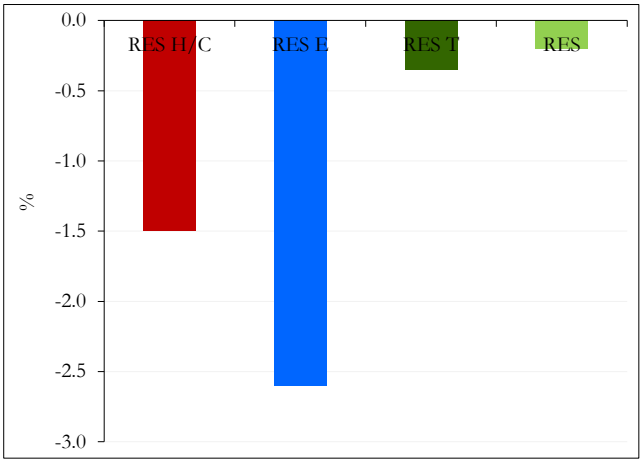

Figure 13-4. Deviation from NREAP in the share of RES in Latvia in 2010.

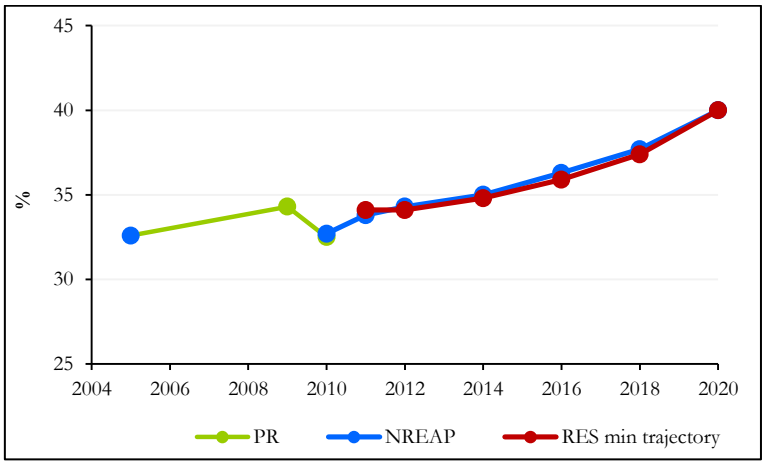

Figure 13-5. Progress of the overall RES share in Latvia

Latvia reached in 2009 an overall RES share higher than the planned overall RES share target for 2010 and 2011. Nevertheless, in 2010 Latvia decreased its overall RES share just below its NREAP planned share. The trajectory expected for the RES share is set in the NREAP close to the minimum indicative trajectory of overall RES share defined in RED Directive. According to the Progress Report, Latvia can

still reach its 2020 target, but the developments in the RES share in 2009-2010 raises some doubts about the long term progress.

13.3. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+1.9 PJ), followed by biofuels (+1.0 PJ) and hydro (+0.3 PJ).

More progress is expected to be done between 2010-2020, especially by the use of biomass for electricity, heating and cooling (+14.0 PJ), followed by wind (+3.1 PJ), biofuels (+2.1 PJ), heat pumps (+0.2 PJ), solar (+0.2 PJ) and hydro (+0.1 PJ).

In comparison with the expected contribution, the use of two renewable energy sources was above the NREAP 2010 target: biomass by +13.4% and hydro by +4.4%, while the use of other renewable sources was below the target: biofuels by -30.8% and wind by -5.2%.

Table 13-3. The contribution of different sources of renewable energy in Latvia

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	10.6	10.5	10.9	10.7	11.0
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	0.0	0.0	0.0	0.0	0.1
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.2	0.2	0.2	0.8	3.3
Heat pumps	0.0	0.0	0.0	0.1	0.2
Biomass	46.8	43.0	48.7	51.7	62.7
Biofuels	0.1	1.6	1.1	2.1	3.2

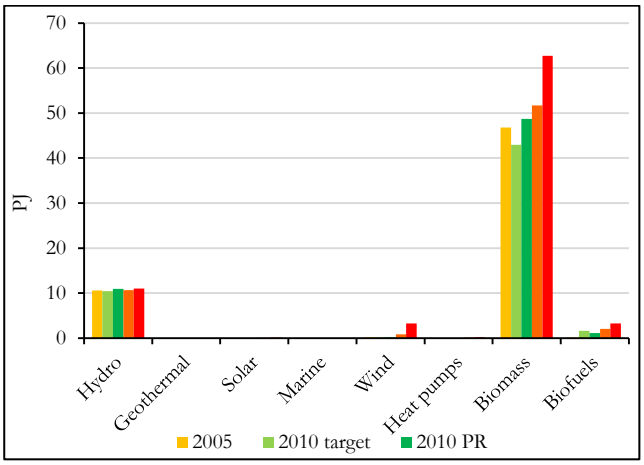

Figure 13-6. Contribution of renewable sources in Latvia: projected growth and actual progress

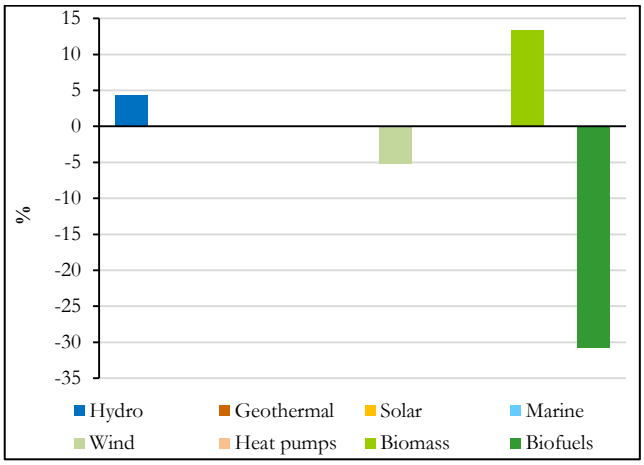

Figure 13-7. Deviation from NREAP in the contribution of renewable sources in Latvia in 2010

Biomass was the major contributor to RES in 2010 with a 80% share, followed by hydro with 18% and biofuels with 2%. In 2020, the major contribution is expected to come from the use of biomass with 78%, followed by wind with 4%, biofuels with 4%, heat pumps with 0.2% and solar with 0.1%.

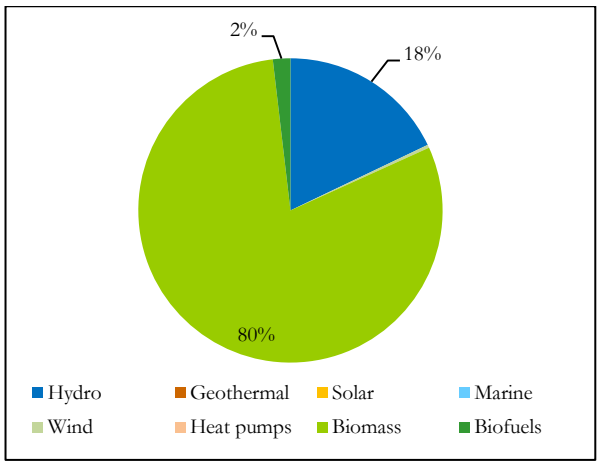

Figure 13-8. Share of renewable sources for electricity, heating & cooling in Latvia in 2010

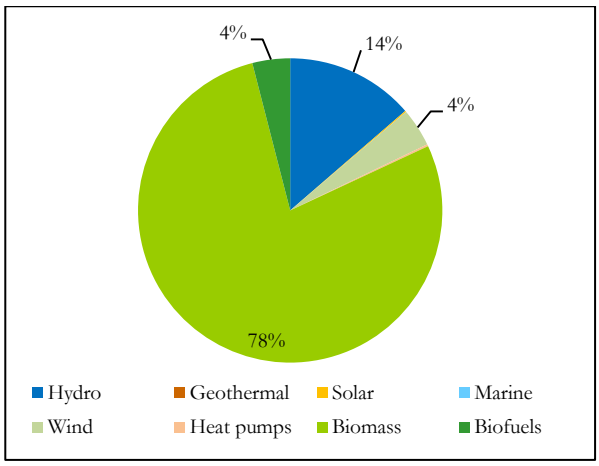

Figure 13-9. Share of renewable sources for electricity, heating & cooling in Latvia in 2020

13.4. Renewable electricity

The renewable electricity generation made little progress in Latvia, increasing by 124 GWh (+4.1%), from 3030 GWh in 2005, reaching 3154 GWh in 2010, which is nevertheless 3.9% above the NREAP projected value of 3036 GWh.

Some progress between 2005-2010 was made in hydro (+91 GWh), biomass (+25 GWh) and wind power (+8 GWh). In relative terms, the most significant increase was registered in biomass (+61.0%), followed by wind (+17.0%) and biomass (+61.0%). Hydro power generation increased in comparison from 2942 GWh produced in 2005, to 3033 GWh in 2010, 4.4% above the projected value of 2906 GWh. Wind power generation grew from 47 GWh in 2005 to 55 in 2010, 5.2% below the expected wind power generation of 58 GWh in 2010. Biomass electricity generation also rose from 41 GWh in 2005 to 66 GWh in 2010, which is however 8.3% below the 72 GWh expected production for 2010.

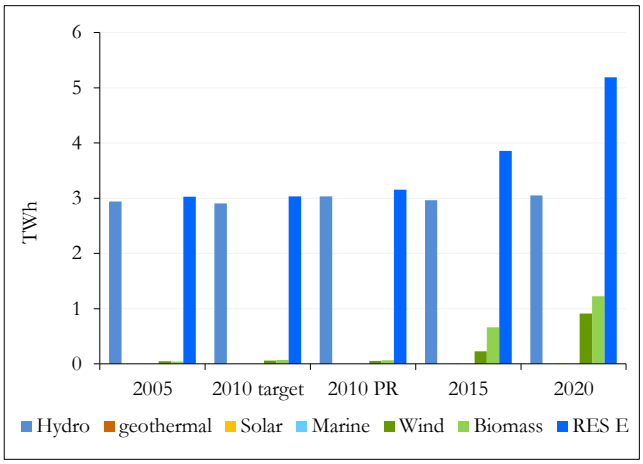

Figure 13-10. RES electricity projected growth and progress until 2010 in Latvia.

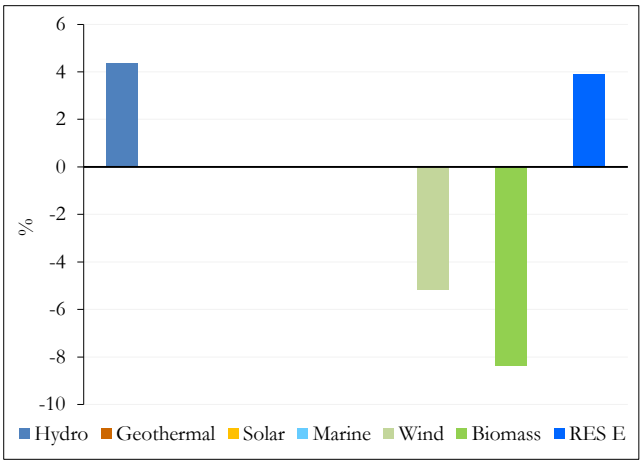

Figure 13-11. Deviation from NREAP in the RES electricity generation in Latvia in 2010.

13.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Latvia from 46.6 PJ in 2005 to reach 48.5 PJ in 2010, 13.5% above the NREAP projected value of 42.7 PJ. Biomass was the only source of renewable heat in Latvia until 2010. Thus, biomass heat consumption grew by 1.8 PJ (+3.9%), from 46.6 PJ in 2005 to 48.5 PJ in 2010, 13.5% above the expected biomass heat of 42.7 PJ in 2010.

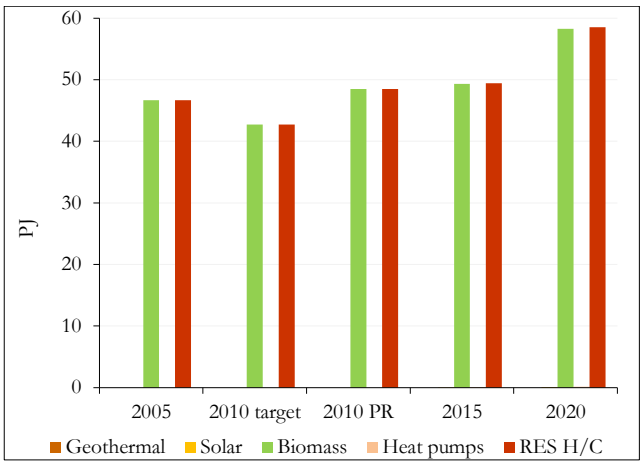

Figure 13-12. RES heat projected growth and progress until 2010 in Latvia.

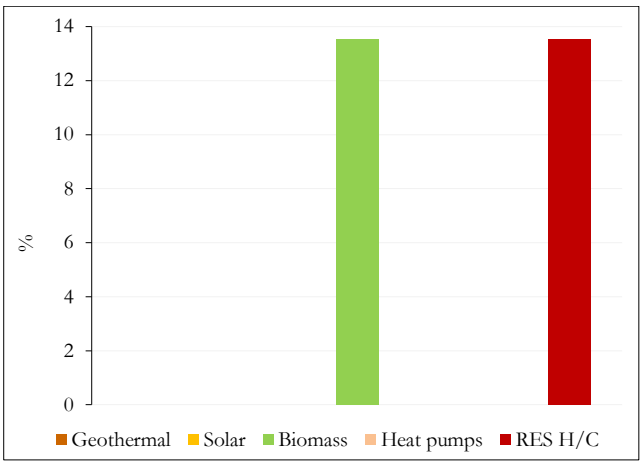

Figure 13-13. Deviation from NREAP in the RES heat generation in Latvia in 2010.

13.6. Renewable energy in transport

The use of renewable energy in transport increased in Latvia by 1.0 PJ (+342.9%) from 0.3 PJ in 2005 to reach 1.3 PJ in 2010, 26.2% below the NREAP projected value of 1.8 PJ.

The highest increase was achieved by biodiesel with 0.7 PJ, followed by bioethanol/bio-ETBE with 0.3 PJ. Biodiesel is the major contributor to RES use in transport, increasing to 0.8 PJ in 2010, 24.0% below the 2010 NREAP projected value of 1.0 PJ. The use of bioethanol / bio-ETBE has reached 0.3 PJ in 2010, 42.9% below the expected bioethanol / bio-ETBE use of 0.6 PJ in 2010.

Neither other biofuels (biogas and vegetable oils) nor biofuels from wastes, residues, ligno-cellulosic material were used. No biofuels from import were used in transport. The use of renewable electricity in transport remained at 0.17 PJ, the level of 2005, i.e., 33.3% above the target of 0.13 PJ projected for 2010.

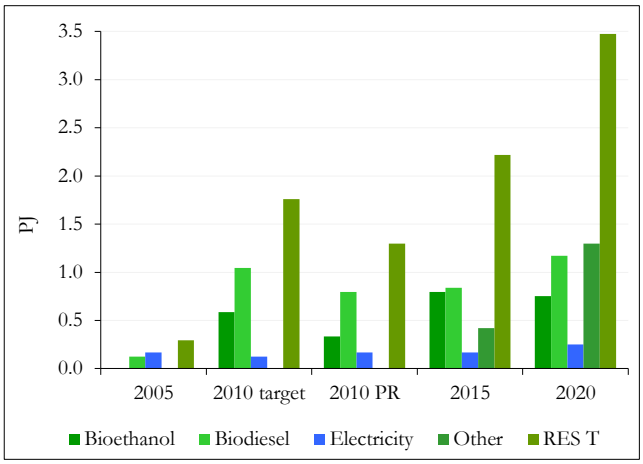

Figure 13-14. RES in transport projected growth and progress until 2010 in Latvia.

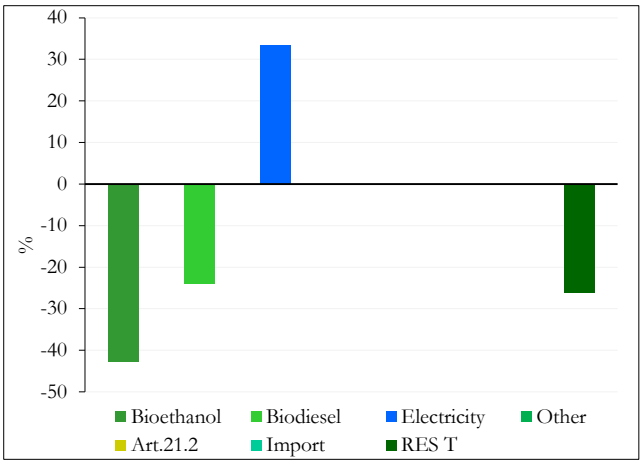

Figure 13-15. Deviation from NREAP in the RES use in transport in Latvia in 2010.

14. Renewable energy in Lithuania

14.1. Deployment of renewable energy

The renewable energy deployment in Lithuania increased from 30.5 PJ in 2005 to 41.7 PJ in 2010, an increase of 11.1 PJ (+36.4%). The renewable use in Lithuania was 25.2% above the NREAP projected RES use of 33.3 PJ for 2010. This is expected to further increase to 61.6 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 19.9 PJ (+47.9%), in comparison with the increase of 11.1 PJ in 2005-2010.

Renewable heating & cooling made the most significant progress between 2005 and 2010, with an increase of 8.1 PJ, followed by renewable energy in transport with 1.8 PJ and electricity with 1.3 PJ. The highest relative increase was made by the use of renewable energy in transport (+1177.8%) followed by the electricity (+83.3%) and heating and cooling (+28.1%).

The use of renewable energy in heating and cooling increased from 28.8 PJ in 2005 to 36.9 PJ in 2010, 32.3% above the projected level of 27.9 PJ. The renewable electricity increased from 1.7 PJ in 2005 to 2.9 PJ in 2010, but this is 7.6% below the target of 3.2 PJ. The use of renewable energy in transport grew from 0.2 PJ in 2005 to 1.9 PJ in 2010, 16.8% below the target of 2.3 PJ.

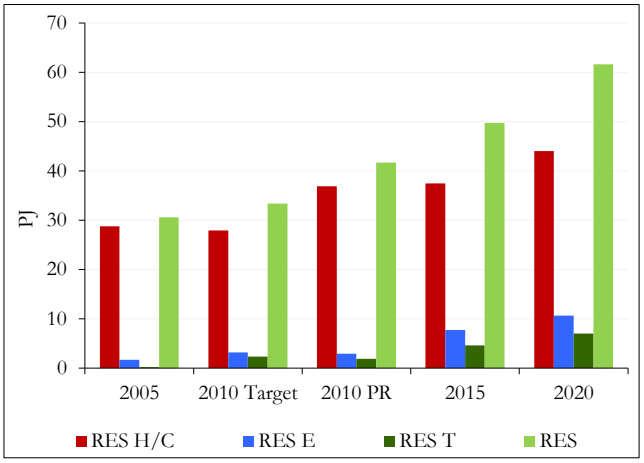

Figure 14-1. RES deployment in Lithuania: projected growth and actual progress.

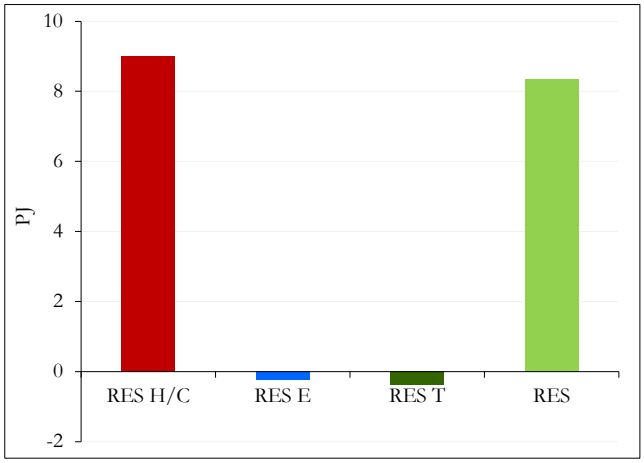

Figure 14-2. Deviation from NREAP in the RES production in Lithuania in 2010.

Table 14-1. RES use in Lithuania, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	36.9	9.0	32.3	8.1	28.1	7.1	19.3	44.0
RES-E	2.9	-0.2	-7.6	1.3	76.1	7.7	265.2	10.7
RES-T	1.9	-0.4	-16.8	1.8	1177.8	5.2	268.5	7.1
RES	41.7	8.3	25.0	11.1	36.3	20.0	47.9	61.6

14.2. Renewable energy share

The analysis of the Progress Report for Lithuania shows that the overall share of RES increased from 15.0% in 2005 to 19.7% in 2010 and this should reach 24.0% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 27.0% to 33.0%), followed by electricity (from 4.0% to 7.4%) and in transport (from 0.3% to 3.7%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 7.4% to 21.0%), followed by heating & cooling (from 33.0% to 39.0%) and transport (from 3.7% to 9.8%).

Table 14-2. Projected growth in RES share in Lithuania and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	27.0	28.0	33.0	5.0	34.0	39.0
RES-E	4.0	8.0	7.4	-0.6	17.0	21.0
RES-T	0.3	4.1	3.7	-0.4	7.2	9.8
Overall RES	15.0	16.0	19.7	3.7	21.0	24.0

The overall share of RES is above the target by 3.7% points, reaching 19.7% in 2010, in comparison with 16.0% projected in the NREAP. The RES share in heating and cooling is above the projected value by 5.0% points, reaching 33.0% in comparison with expected share of 28.0% in 2010. The share of renewable electricity was below the target by 0.6% points, reaching 7.4% in comparison with 8.0% projected value. The share of RES in transport was below by 0.4% points, reaching 3.7% in comparison with 4.1% projected RES share.

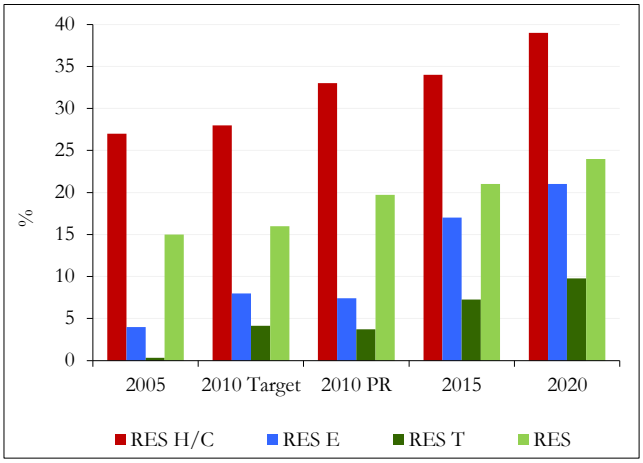

Figure 14-3. RES share in Lithuania: projected growth and actual progress.

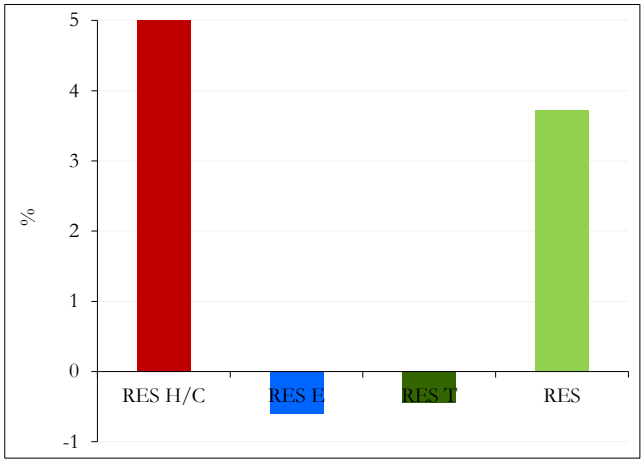

Figure 14-4. Deviation from NREAP in the share of RES in Lithuania in 2010.

Lithuania almost reached its overall expected RES share for 2014 since 2009. The overall RES share in 2010 decreased slightly compared with year 2009 but still exceeding the overall RES share for 2010 and the minimum indicative trajectory until 2016. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory defined in RED Directive, and should reach 24% according to the NREAP in comparison with 23% minimum RES share. Since the RES share is well above the NREAP planned target Lithuania can reach its 2020 RES share target.

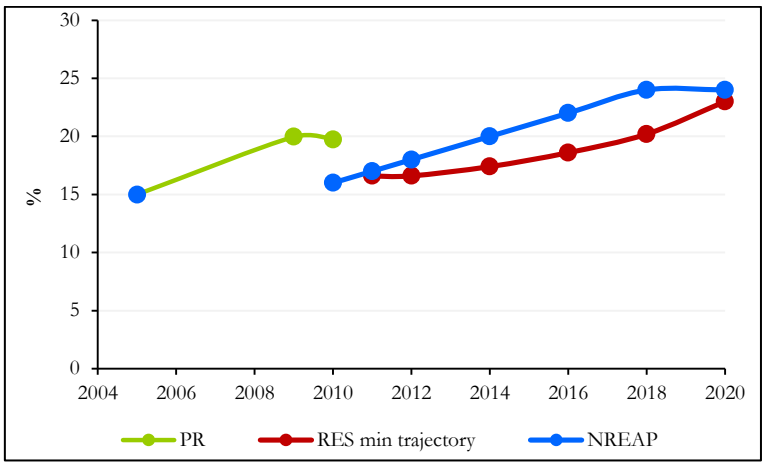

Figure 14-5. Progress of the overall RES share in Lithuania

14.3. Sources of renewable energy

Significant increase of the use of various renewable energy sources was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+8.6 PJ), followed by biofuels (+1.7 PJ) and wind (+0.9 PJ) while hydro energy decreased (+0.1 PJ).

More progress is expected to be done between 2010-2020, especially by the use of biomass (+9.9 PJ), followed by wind (+3.6 PJ), biofuels (+5.1 PJ), heat pumps (+0.6 PJ), solar electricity, heating & cooling (+0.4 PJ), hydro (+0.2 PJ) and geothermal (+0.1 PJ).

In comparison with the expected contribution, only the use of biomass was above the NREAP 2010 target by +32.0, while the use of several renewable energy sources biomass was below the target: geothermal by -33.3%, biofuels by -18.2%, wind by -17.8% and hydropower by -3.0%.

Table 14-3. The contribution of different sources of renewable energy in Lithuania

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	1.6	1.6	1.5	1.6	1.7
Geothermal	0.1	0.1	0.1	0.2	0.2
Solar	0.0	0.0	0.0	0.3	0.4
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.0	1.1	0.9	3.3	4.5
Heat pumps	0.0	0.0	0.0	0.3	0.6
Biomass	28.7	28.3	37.3	39.5	47.2
Biofuels	0.2	2.3	1.9	4.6	7.0

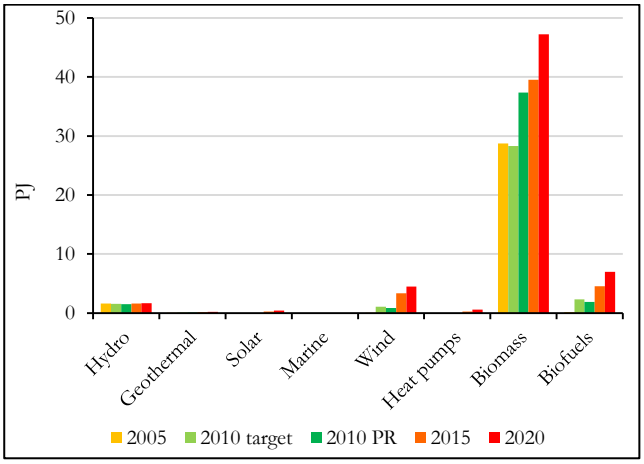

Figure 14-6. Contribution of renewable sources in Lithuania: projected growth and actual progress

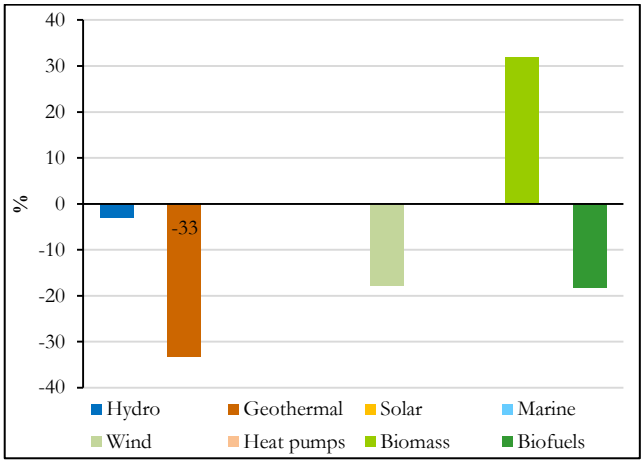

Figure 14-7. Deviation from NREAP in the contribution of renewable sources in Lithuania in 2010

The use of biomass was the major contributor to RES use in 2010 with a 90% share, followed by biofuels with 4%, hydro with 4% and wind with 2%. In 2020, the major contribution is expected to come from the use of biomass with 77%, followed by biofuels with 11%, wind with 7%, hydro with 3%, heat pumps with 1%, solar with 0.7% and geothermal with 0.3%.

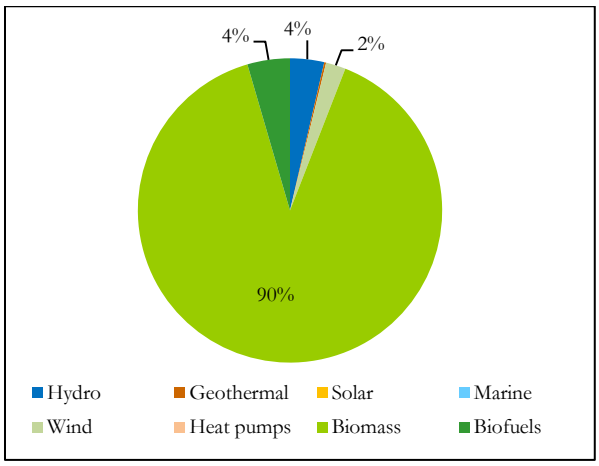

Figure 14-8. Share of renewable sources for electricity, heating & cooling in Lithuania in 2010

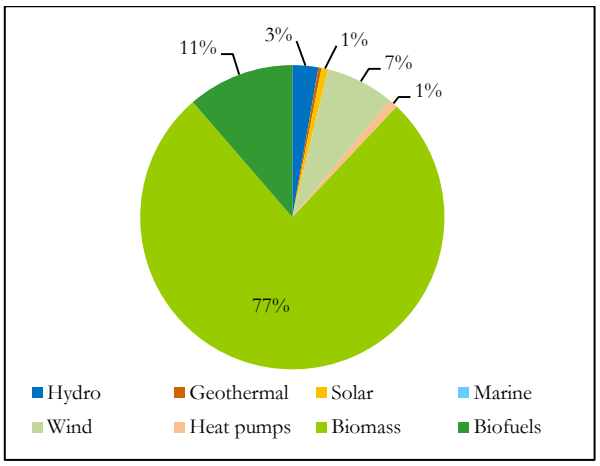

Figure 14-9. Share of renewable sources for electricity, heating & cooling in Lithuania in 2020

14.4. Renewable electricity

The renewable electricity generation increased in Lithuania by 350 GWh (+76.1%), from 460 GWh in 2005, to 810 GWh in 2010, which is 7.6% below the NREAP projected value of 877 GWh. Significant progress was made between 2005-2010 in wind power (242 GWh) and biomass (140 GWh). In relative terms, the most significant increase was registered in wind power (+12100%), followed by wind (+2000%) and biomass (+78.7%).

Hydro power generation decreased in comparison with the 451 GWh produced in 2005, reaching 419 GWh in 2010, 3.0% below the projected value of 432 GWh. Wind power grew from 2 GWh in 2005 to 244 in 2010, which is about 17.8% below the expected wind power generation of 297 GWh in 2010. Biomass electricity generation rose from 7 GWh in 2005 to 147 GWh, only 0.7% below the projected electricity generation of 148 GWh for 2010.

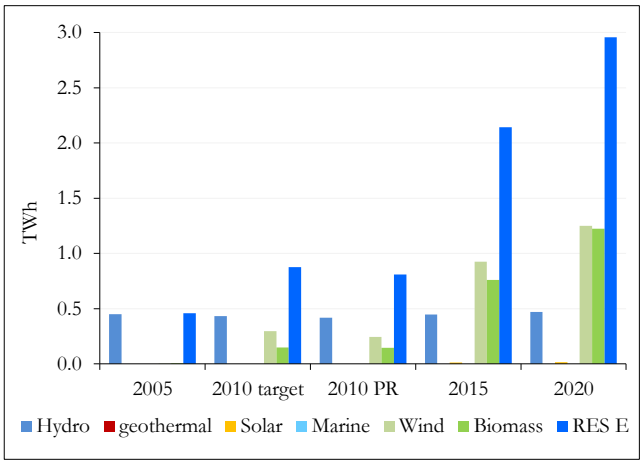

Figure 14-10. RES electricity projected growth and progress until 2010 in Lithuania.

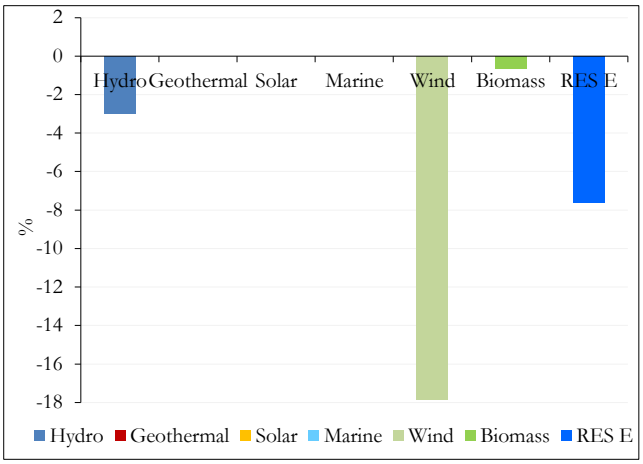

Figure 14-11. Deviation from NREAP in the RES electricity generation in Lithuania in 2010.

14.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Lithuania from 28.8 PJ in 2005 to 36.9 PJ in 2010, which is 32.3% above the NREAP projected value of 27.9 PJ.

Some progress was made in biomass (+8.1 PJ) and geothermal (+0.02 PJ). In relative terms, the most significant increase was registered in geothermal (+33.3%), followed biomass (+28.1%). The use of geothermal heat increased from 0.06 PJ in 2005 to 0.08 PJ in 2010, 33.3% below the expected level of

0.13 PJ for 2010. Biomass heat grew from 28.7 PJ in 2005 to 36.8 PJ in 2010, 32.6% above the expected biomass heat generation of 27.8 PJ in 2010.

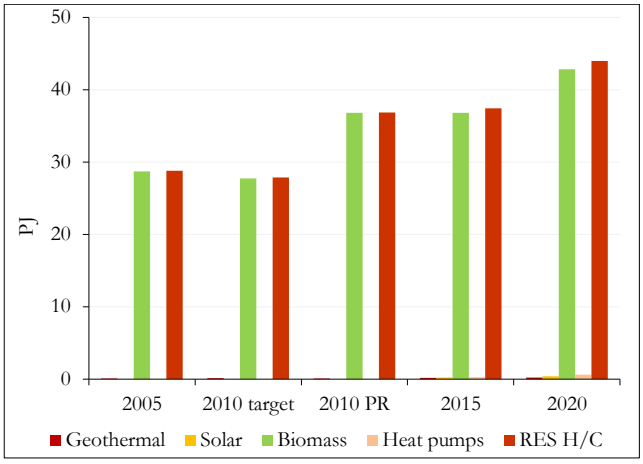

Figure 14-12. RES heat projected growth and progress until 2010 in Lithuania.

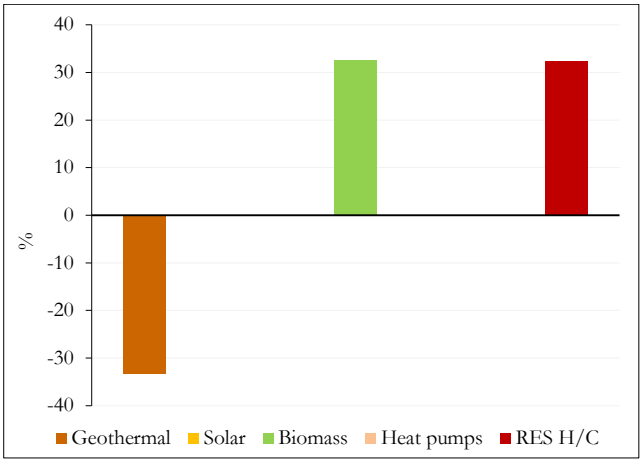

Figure 14-13. Deviation from NREAP in the RES heat generation in Lithuania in 2010.

14.6. Renewable energy in transport

The use of renewable energy in transport increased in Lithuania from 0.15 PJ in 2005 to reach 1.93 PJ in 2010, 16.8% below the NREAP projected value of 2.32 PJ.

The use of renewable energy in transport increased between 2005 and 2010 by 1.8 PJ (+1177.8%). The highest increase was achieved by biodiesel (+1.3 PJ) followed by bioethanol/bio-ETBE (+0.4 PJ). In relative terms, the most significant increase was registered by biodiesel (+1150%) and bioethanol/bio-ETBE (+1150%).

Biodiesel is the major contributor to RES use in transport, increasing from 0.12 PJ in 2005 to 1.47 PJ in 2010, 16.7% below the 2010 projected value of 1.76 PJ. The use of bioethanol/ bio-ETBE grew from 0.03 PJ in 2005 to 0.42 PJ in 2010, 23.1% above the expected bioethanol use of 0.54 PJ in 2010. The use of renewable electricity increased to a small extent to 0.04 PJ in 2010, 233.3% above the target of 0.01 PJ projected for 2010.

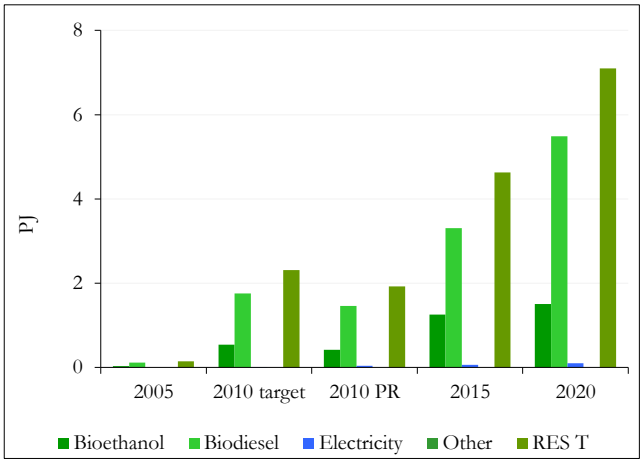

Figure 14-14. RES in transport projected growth and progress until 2010 in Lithuania.

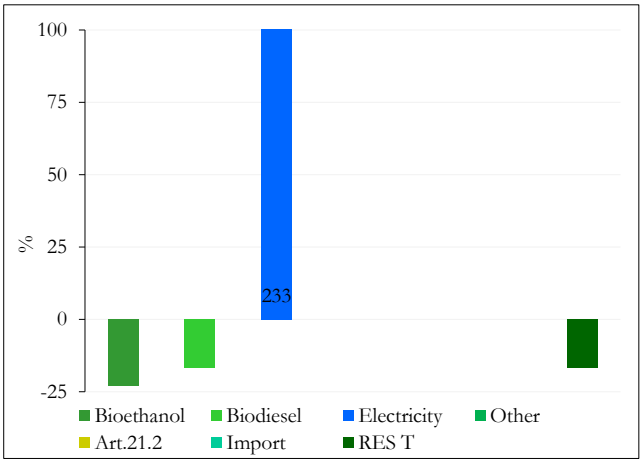

Figure 14-15. Deviation from NREAP in the RES use in transport in Lithuania in 2010.

15. Renewable energy in Luxembourg

15.1. Deployment of renewable energy

The renewable energy deployment in Luxembourg increased from 1.6 PJ in 2005 to 5.1 PJ in 2010, an increase of 3.5 PJ (+216%). The renewable energy use was 36.5% above the NREAP projected RES use of 3.7 PJ for 2010. This is expected to further increase to 20.2 PJ until 2020 (including RES from transfer from other MS and third countries through cooperation mechanism). The additional use of renewable energy in 2010-2020 is expected to be 15.1 PJ, in comparison with the increase of 3.4 PJ achieved in 2005-2010.

Renewable energy in transport made the most significant progress between 2005 and 2010, with an increase of 1.8 PJ, followed by renewable heating and cooling with 1.5 PJ and renewable electricity with 0.2 PJ. The highest relative increase was made by the use of renewable energy in transport (+1995%) followed by the heating and cooling (+187.2%) and electricity (+28.0%).

The use of renewable energy in heating and cooling increased from 0.8 PJ in 2005 to 2.4 PJ in 2010, 120.8% above the projected level of 1.1 PJ. The renewable electricity increased from 0.8 PJ in 2005 to 1.0 PJ in 2010, 4.8% above the target of 0.9 PJ. The use of renewable energy in transport grew from 0.1 PJ in 2005 to 1.8 PJ in 2010, which is about 1.4% above the expected level for 2010.

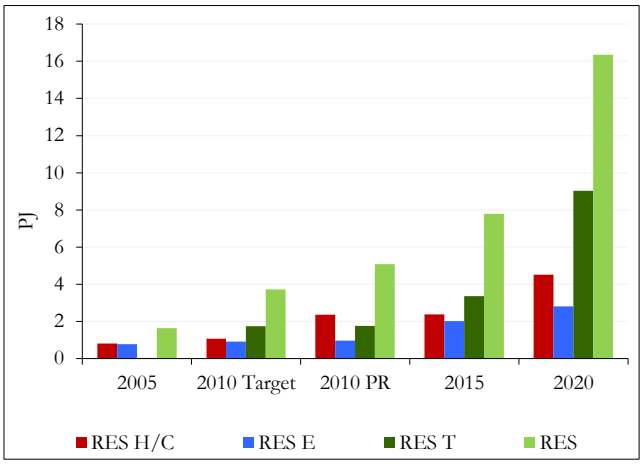

Figure 15-1. RES deployment in Luxembourg: projected growth and actual progress.

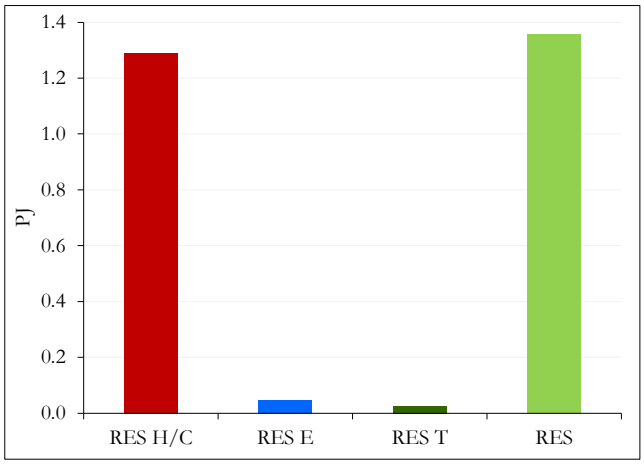

Figure 15-2. Deviation from NREAP in the RES production in Luxembourg in 2010.

Table 15-1. RES use in Luxembourg, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	2.4	1.3	120.8	1.5	187.2	2.2	91.5	4.5
RES-E	1.0	0.0	5.1	0.2	25.1	1.8	191.4	2.8
RES-T	1.8	0.0	1.4	1.8	1995.2	7.6	413.9	9.5
RES	5.1	1.4	36.5	3.4	210.9	11.3	221.9	16.4
RES*	5.1	1.4	37.1	3.5	216.1	15.1	296.4	20.2

* including RES from transfer from other MS and third countries through cooperation mechanism

15.2. Renewable energy share

The analysis of the Progress Report for Luxembourg shows that the overall share of RES increased from 0.9% in 2005 to 3.0% in 2010 and this should reach 11.0% in 2020 (with transfer of some renewable energy from other MS or third countries). The highest increase in the share of renewable energy was made in heating and cooling (from 1.7% to 5.0%), followed by transport (from 0.2% to

2.0%) and electricity (from 3.2% to 3.8%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 3.8% to 11.8%), followed by transport (from 2.0% to 10.0%) and heating & cooling (from 5.0% to 8.5%).

The overall share of renewable energy was above the target by 0.8% points, reaching 3.0% in 2010, in comparison with 2.2% projected in the NREAP. The RES share in heating and cooling was above the projected value by 2.9% points, reaching 5.0% in comparison with expected share of 2.1% in 2010. The share of renewable electricity was below the target by 0.2% points, reaching 3.8% in comparison with 4.0% projected value. The share of RES in transport is just below the target by 0.06% points, reaching 2.04% in comparison with 2.1% projected RES share.

Table 15-2. Projected growth in RES share in Luxembourg and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	1.7	2.1	5.0	2.9	4.6	8.5
RES-E	3.2	4.0	3.8	-0.2	8.9	11.8
RES-T	0.2	2.1	2.0	-0.06	3.8	10.0
Overall RES	0.9	2.2	3.0	0.8	5.4	11.0

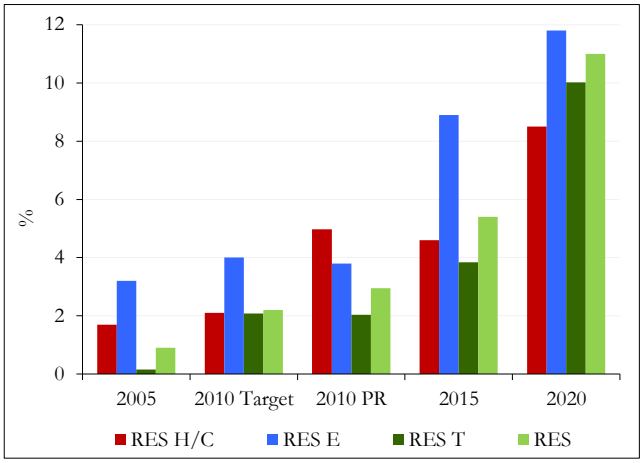

Figure 15-3. RES share in Luxembourg: projected growth and actual progress.

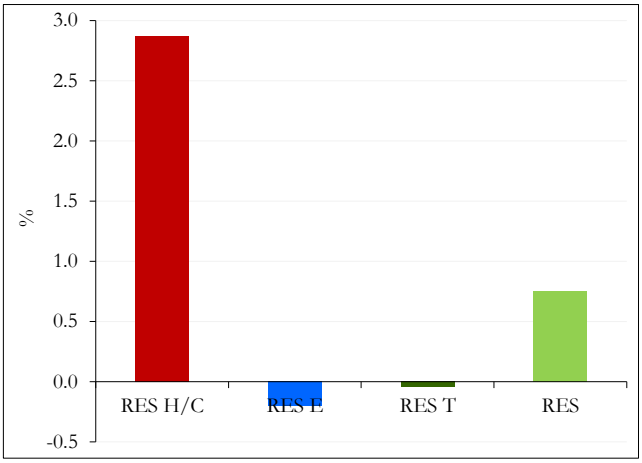

Figure 15-4. Deviation from NREAP in the share of RES in Luxembourg in 2010.

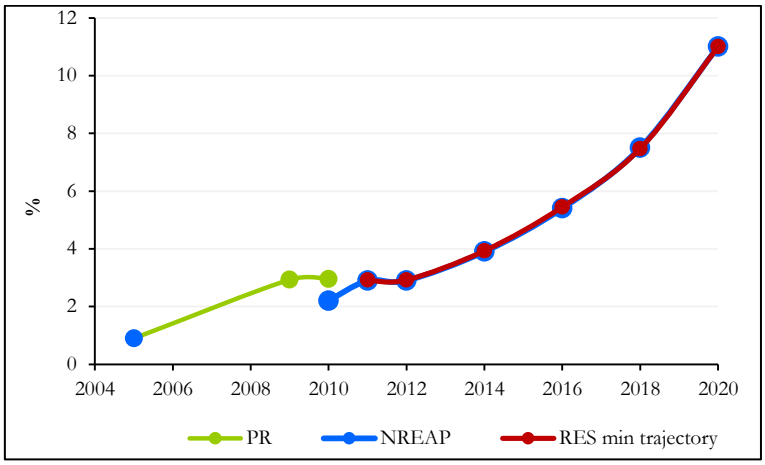

Figure 15-5. Progress of the overall RES share in Luxembourg

Luxembourg has to achieve a significant increase in overall RES share in gross final energy consumption in 2020 from the baseline year 2005. Luxembourg slightly exceeded the 2010 planned RES share since in 2009, meeting also the overall expected RES share for 2011 and 2012 and the

minimum indicative share for 2011/2012. The trajectory expected for the RES share is set in the NREAP just like the minimum indicative trajectory defined in RED Directive. Since the RES share is well above the NREAP planned target Luxembourg can still reach its 2020 RES share target.

15.3. Sources of renewable energy

Some increase of the use of renewable energy was registered between 2005-2010, especially by the use of biofuels (+1.7 PJ), biomass for electricity, heating & cooling (+1.6 PJ) and solar thermal and solar electricity (+0.04 PJ). More progress is expected to be done between 2010-2020, especially by the use of biofuels (+7.3 PJ), followed by biomass (+2.1 PJ), wind (+0.3 PJ), heat pumps (+0.3 PJ), solar (+0.5 PJ), and hydro (+0.1 PJ).

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: biomass by +110.1%, solar by +11.8%, hydro by +1.9% and biofuels by +1.2%, while the use of other renewable sources was below the target: heat pumps by -28.6% and wind by -8.3%.

Table 15-3. The contribution of different sources of renewable energy in Luxembourg

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	0.4	0.4	0.4	0.4	0.4
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	0.1	0.1	0.1	0.3	0.6
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.2	0.2	0.2	0.7	0.9
Heat pumps	0.0	0.1	0.0	0.2	0.7
Biomass	1.0	1.2	2.6	2.8	4.7
Biofuels	0.0	1.7	1.8	3.4	9.0

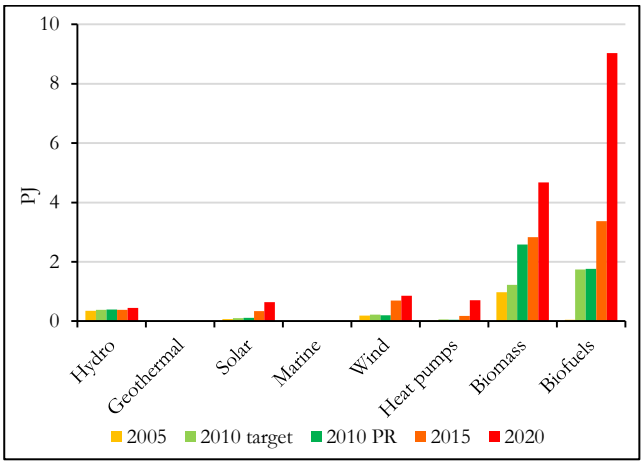

Figure 15-6. Contribution of renewable sources in Luxembourg: projected growth and actual progress

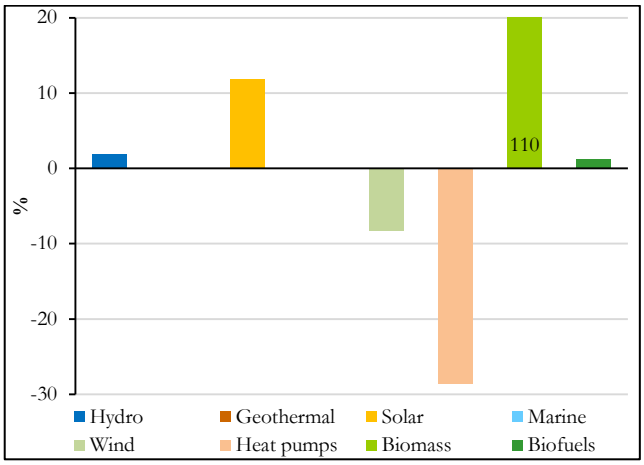

Figure 15-7. Deviation from NREAP in the contribution of renewable sources in Luxembourg in 2010

The use of biomass was the major contributor to RES use in 2010 with a 51% share, followed by biofuels with 34%, hydro with 8%, wind with 4%, solar with 2% and heat pumps with 0.8%. In 2020, the major contribution is expected to come from the use of biofuels with 55%, followed by biomass with 29%, wind with 5%, heat pumps with 4%, solar with 4% and hydro with 3%.

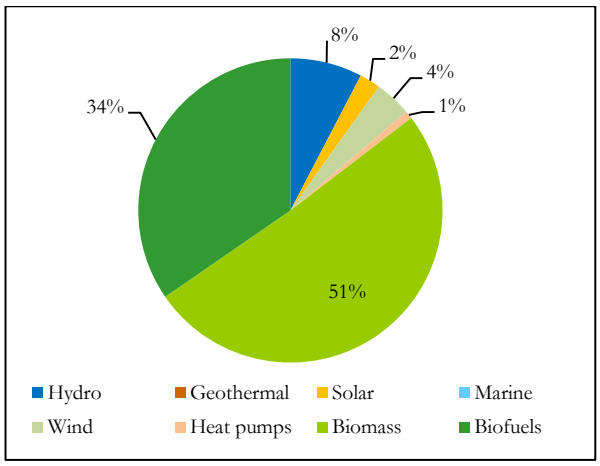

Figure 15-8. Share of renewable sources for electricity, heating & cooling in Luxembourg in 2010

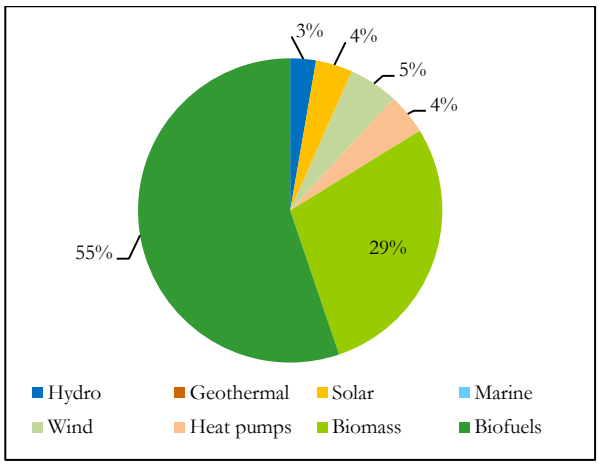

Figure 15-9. Share of renewable sources for electricity, heating & cooling in Luxembourg in 2020

15.4. Renewable electricity

The renewable electricity generation increased in Luxembourg by 54 GWh (+25.1%), from 214 GWh in 2005, to 268 GWh in 2010, which is 5.1% above the NREAP projected value of 255 GWh. Some progress was made between 2005-2010 in several sectors, especially in biomass power (+38 GWh), followed by hydro power (+10 GWh), solar (+3 GWh) and wind (+3 GWh). In relative terms, the most significant increase was registered in biomass (+82.2%), followed by solar power (+18.6%) and hydro power (+10.1%).

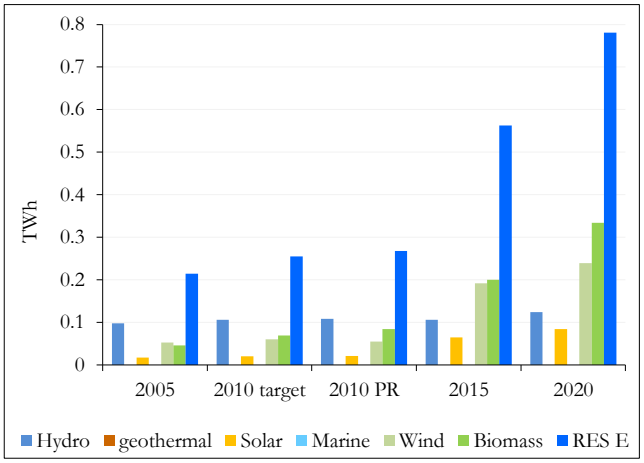

Figure 15-10. RES electricity projected growth and progress until 2010 in Luxembourg.

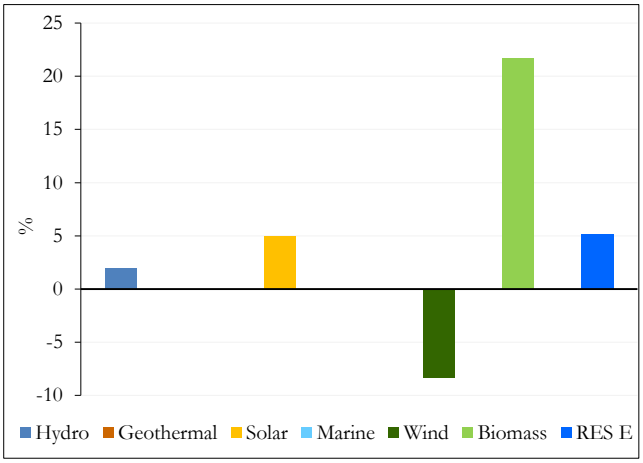

Figure 15-11. Deviation from NREAP in the RES electricity generation in Luxembourg in 2010.

Hydro power generation has increased in comparison with 98 GWh produced in 2005, reaching 108 GWh in 2010, which is just 1.9% above the projected value of 106 GWh. Solar electricity generation grew from 18 GWh to 21 GWh in 2010, 5.0% above the expected solar power generation of 20 GWh in 2010. Wind power grew from 52.4 GWh in 2005 to 55 GWh in 2010, which is 8.3% below the expected wind power generation of 60 GWh in 2010. Biomass electricity generation rose from 46 GW in 2005 to 84 GWh in 2010, which is 21.7% above the projected production of 69 GWh.

15.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Luxembourg by 1.5 PJ (+187.2%), from 0.8 PJ in 2005 to 2.4 PJ in 2010, which is 120.8% above the NREAP projected value of 1.1 PJ. Significant progress was made in several sectors, especially in biomass (+1.5 PJ), heat pumps (+0.03 PJ) and solar (+0.03 PJ). In relative terms, the most significant increase was registered in heat pumps (+400.0%), followed by solar thermal (+350.0%) and biomass (+183.3%).

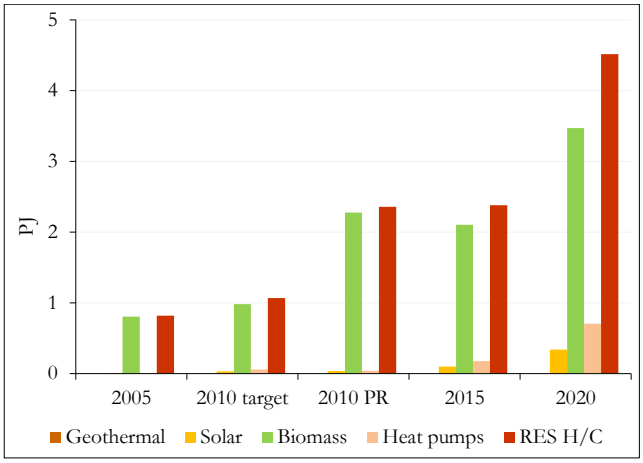

Figure 15-12. RES heat projected growth and progress until 2010 in Luxembourg.

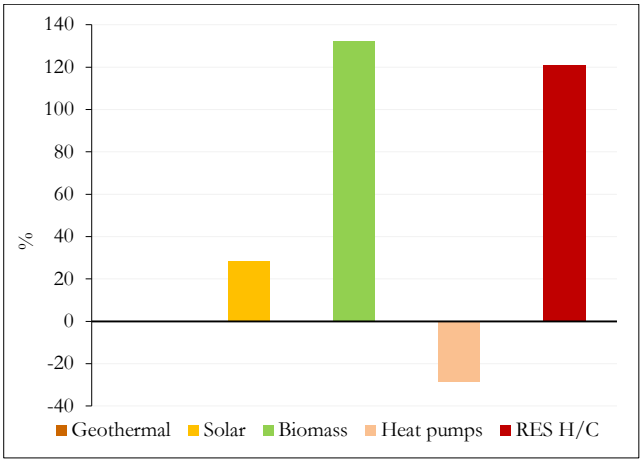

Figure 15-13. Deviation from NREAP in the RES heat generation in Luxembourg in 2010.

Biomass heat utilisation grew from 0.8 PJ in 2005 to 2.3 PJ in 2010, 132.5% above the expected biomass heat generation of 1.0 PJ in 2010. Solar heat increased from 0.01 PJ in 2005 to 0.04 PJ in 2010, 28.6% above the expected solar heat generation of 0.03 PJ in 2010. The heat use from heat pumps made modest progress, reaching 0.04 PJ, 28.6% below the expected heat generation of 0.1 PJ in 2010.

15.6. Renewable energy in transport

The use of renewable energy in transport increased in Luxembourg from 0.1 PJ in 2005 to reach 1.84 PJ in 2010, 1.4% above the NREAP projected value of 1.82 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 1.8 PJ (+1995.2%). The highest increase was achieved by biodiesel (+1.7 PJ) followed by bioethanol/bio-ETBE (+0.04 PJ) and electricity (+0.04 PJ). In relative terms, the most significant increase was registered by biodiesel (+4000%) and electricity (+81.8%).

Biodiesel is the major contributor to RES use in transport, increasing from 0.04 PJ in 2005 to 1.72 PJ in 2010, 11.7% above the 2010 NREAP projected value of 1.54 PJ. The use of bioethanol/ bio-ETBE grew to 0.04 PJ in 2010, 78.7% below the expected bioethanol use of 0.20 PJ in 2010. The use of biofuels from import increased from 0.04 PJ in 2005 to 1.76 PJ in 2010, 1.2% above the expected value of 1.74 PJ. The use of renewable electricity in transport also increased from 0.05 PJ in 2005 to 0.08 PJ in 2010, 5.3% above the projected level for 2010.

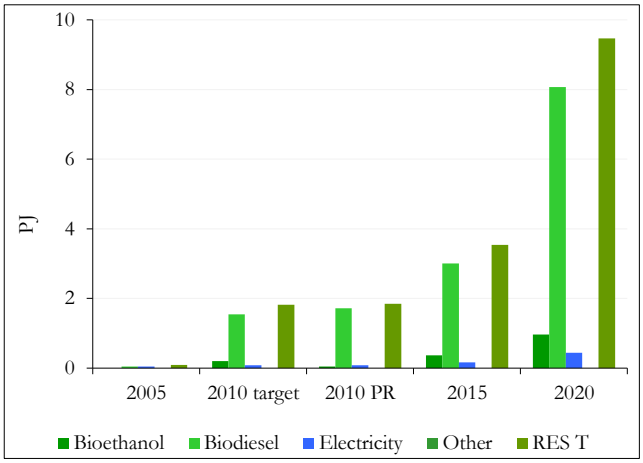

Figure 15-14. RES in transport projected growth and progress until 2010 in Luxembourg.

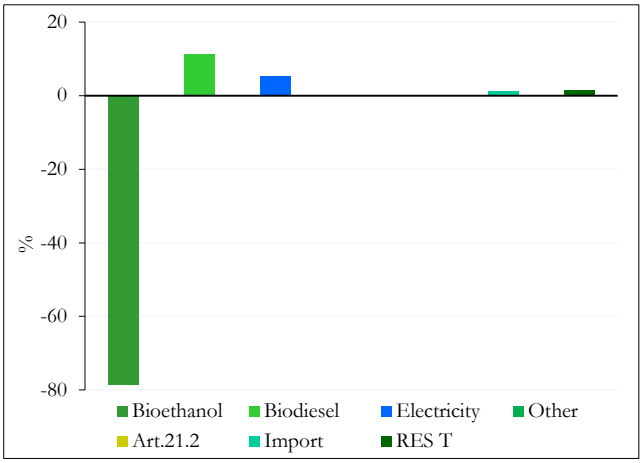

Figure 15-15. Deviation from NREAP in the RES use in transport in Luxembourg in 2010.

16. Renewable energy in Hungary

16.1. Deployment of renewable energy

The renewable energy deployment in Hungary increased to 62.4 PJ in 2010[1], 11.5% above the NREAP projected RES use of 56.0 PJ. The additional use of renewable energy in 2010-2020 is expected to be 57.1 PJ.

The use of renewable energy in heating and cooling increased to 44.2 PJ in 2010, 11.2% above the projected level of 39.7 PJ. The renewable electricity increased to 10.9 PJ in 2010, 6.5% above the target of 10.2 PJ. The use of renewable energy in transport grew to 8.0 PJ in 2010, 27.3% above the target of 6.3 PJ.

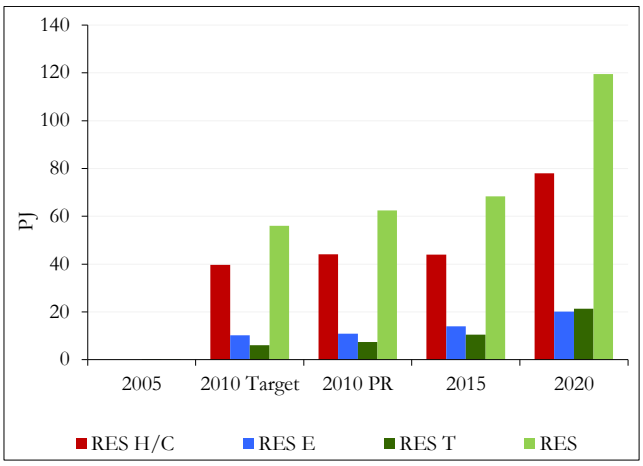

Figure 16-1. RES deployment in Hungary: projected growth and actual progress.

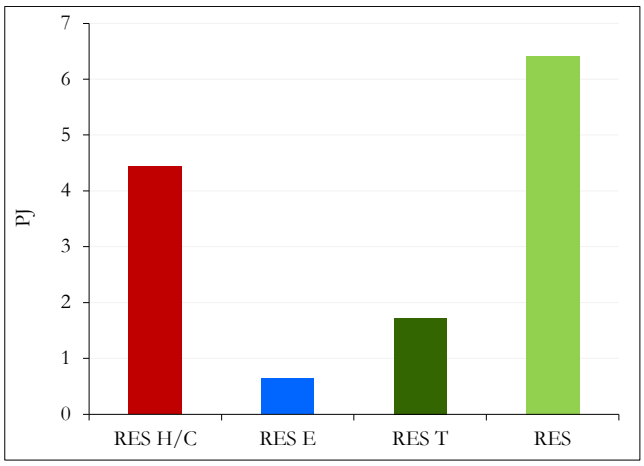

Figure 16-2. Deviation from NREAP in the RES production in Hungary in 2010.

Table 16-1. RES use in Hungary, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	44.2	4.4	11.2	44.2	0.0	33.8	76.6	78.0
RES-E	10.9	0.6	6.3	10.9	0.0	9.3	85.3	20.2
RES-T	8.0	1.7	27.3	7.8	3720	14.4	180.1	22.4
RES	62.4	6.4	11.5	62.2	29716	57.1	91.5	119.5

16.2. Renewable energy share

The analysis of the Progress Report for Hungary shows that the overall share of RES increased to 8.8% in 2010 and this should reach 14.5% in 2020. The highest share of renewable energy was achieved in heating and cooling (11.1%), followed by electricity (7.1%) and in transport (4.7%). Major increase is expected to be achieved until 2020 in heating & cooling (from 11.1% to 18.9%), followed by electricity (from 7.1% to 10.9%) and transport (from 4.7% to 10.6%).

The overall share of RES was above the target in 2010 by 1.4% points, reaching 8.8%, in comparison with 7.4% projected in the NREAP. The RES share in heating & cooling was above the projected value by 2.1% points, reaching 11.1% in comparison with expected share of 9.0% in 2010. The share of RES electricity was above the target by 0.4% points, reaching 7.1% in comparison with 6.7% projected

[1] No data was reported in the NREAP for the use of renewable energy in 2005

value. The share of RES in transport was above by 0.6% points, reaching 4.7% in comparison with 4.1% projected RES share.

Table 16-2. Projected growth in RES share in Hungary and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	5.4	9.0	11.1	2.1	9.8	18.9
RES-E	4.3	6.7	7.1	0.4	8.1	10.9
RES-T	0.13	4.1	4.7	0.6	5.8	10.6
Overall RES	4.2	7.4	8.8	1.4	8.3	14.7

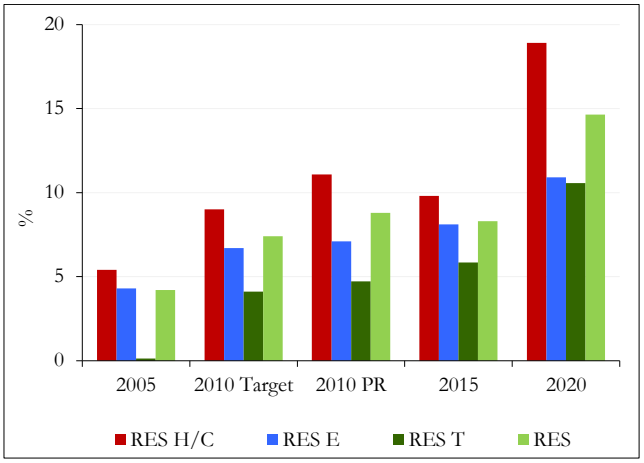

Figure 16-3. RES share in Hungary: projected growth and actual progress.

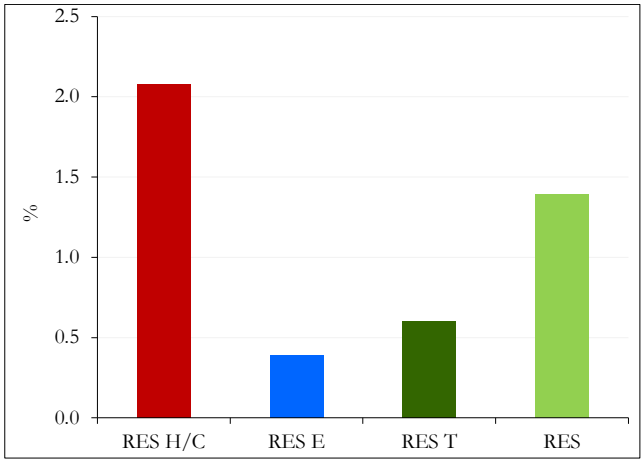

Figure 16-4. Deviation from NREAP in the share of RES in Hungary in 2010.

The development of overall renewable energy deployment between 2005-2010 led to a two fold increase in its overall RES share. Hungary exceeded the 2010 planned overall RES share since 2009, as well as the planned shares for 2011 until 2014 and the RES minimum indicative trajectory until 2016.

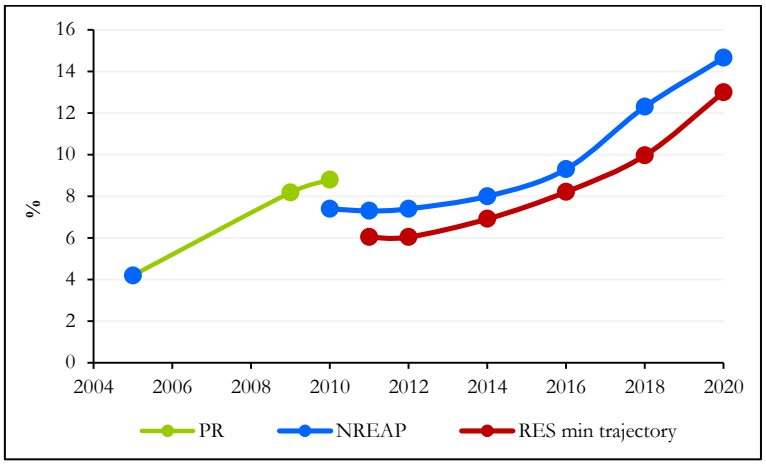

Figure 16-5. Progress of the overall RES share in Hungary

The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory defined in RED Directive, and Hungary should reach 14.7% according to the NREAP in comparison with 13% minimum RES share. If Hungary will follow the 2005-2010 trajectory it will be in good position for the achievement of its 2020 RES share target.

16.3. Sources of renewable energy

The highest contribution to renewable energy in 2010 was made by biomass for electricity, heating & cooling (+48.1 PJ), followed by biofuels (+7.4 PJ), geothermal electricity and heating & cooling (+4.1 PJ) and wind (+1.9 PJ), hydro (+0.8 PJ) and solar thermal and solar electricity (+0.2 PJ).

Significant progress is expected to be made between 2010-2020, especially by the use of biomass (+17.5 PJ), followed by biofuels (+14.0 PJ), geothermal (+12.3 PJ), heat pumps (+6 PJ), wind (+3.7 PJ), solar (+3.5 PJ), and minor growth in hydropower (+0.1 PJ).

In comparison with the expected contribution, the use of some renewable energy sources was above the NREAP 2010 target: biofuels by +22.2%, biomass by +17.1% and hydro by +8.8%, while the use of other renewable sources was below the target: heat pumps by -100%, wind by -25.1%, solar by -17.6% and the use of geothermal energy by -2.0%.

Table 16-3. The contribution of different sources of renewable energy in Hungary

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydro		0.7	0.8	0.7	0.9
Geothermal		4.1	4.1	6.3	16.4
Solar		0.3	0.2	1.4	3.7
Marine		0.0	0.0	0.0	0.0
Wind		2.5	1.9	5.0	5.6
Heat pumps		0.3	0.0	1.5	6.0
Biomass		41.0	48.1	42.9	65.6
Biofuels	0.2	6.0	7.4	10.5	21.4

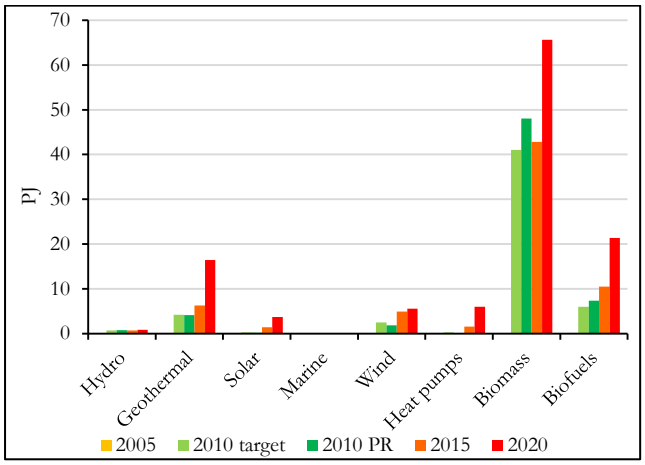

Figure 16-6. Contribution of renewable sources in Hungary: projected growth and actual progress

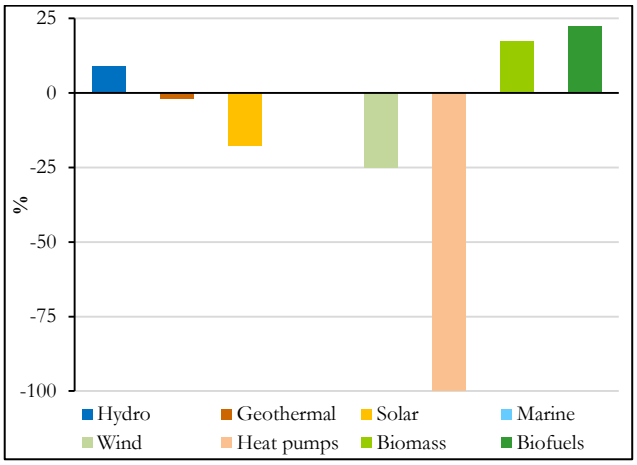

Figure 16-7. Deviation from NREAP in the contribution of renewable sources in Hungary in 2010

Biomass was the major contributor to RES use in 2010 with a 77% share, followed by biofuels with 12%, geothermal with 7%, wind with 3% and hydro with 1%. In 2020, the major contribution is expected to come from the use of biomass with 55%, followed by biofuels with 18%, geothermal with 16%, heat pumps with 5%, wind with 4.7%, solar with 3% and hydro with 0.7%.

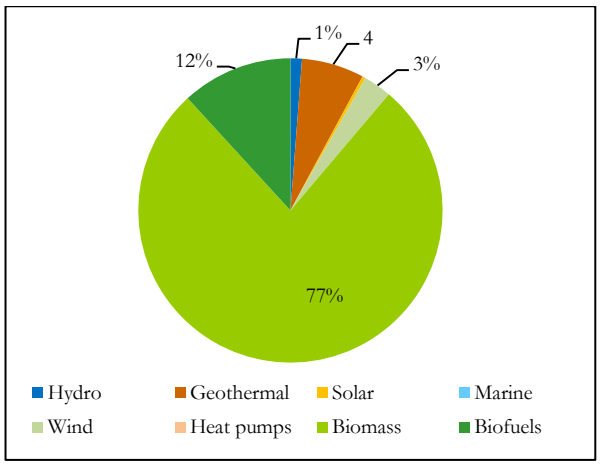

Figure 16-8. Share of renewable sources for electricity, heating & cooling in Hungary in 2010

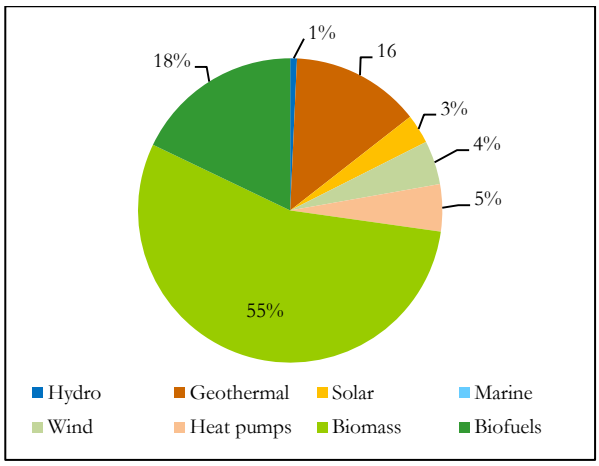

Figure 16-9. Share of renewable sources for electricity, heating & cooling in Hungary in 2020

16.4. Renewable electricity

The renewable electricity generation increased in Hungary to 3021 GWh in 2010, which is 6.3% above the NREAP projected value of 2843 GWh. Hydro power generation grew to 211 GWh in 2010, 8.8% above the projected value of 194 GWh. Solar electricity production grew to 1 GWh in 2010, but this is 50% below the expected power generation of 2 GWh in 2010. Wind power grew to 518 GWh in 2010, which is 25.1% below the expected generation of 692 GWh in 2010. Biomass electricity generation reached 2291 GWh in 2010, 17.2% above the 1955 GWh expected.

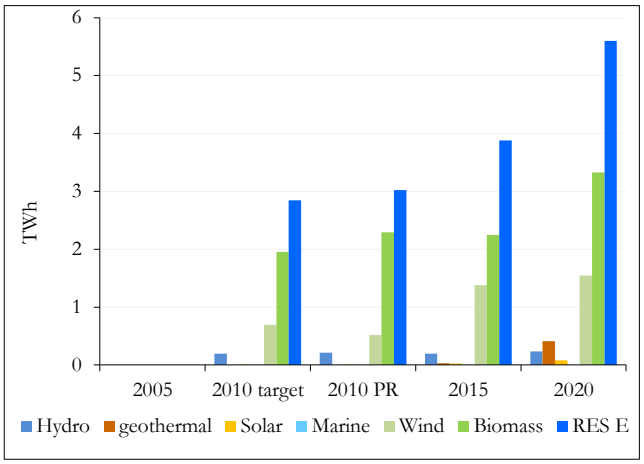

Figure 16-10. RES electricity projected growth and progress until 2010 in Hungary.

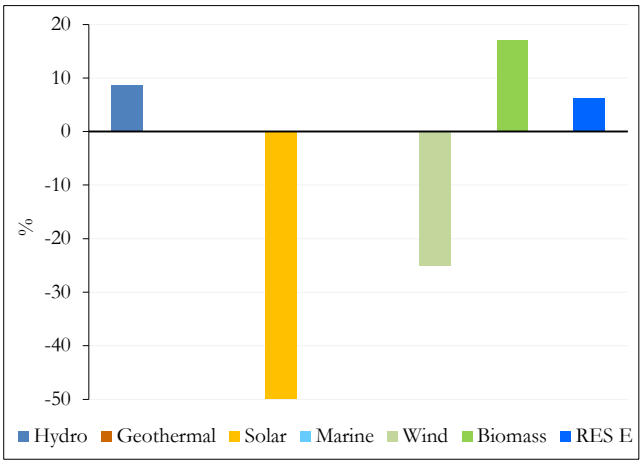

Figure 16-11. Deviation from NREAP in the RES electricity generation in Hungary in 2010.

16.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Hungary to 44.2 PJ in 2010, which is 14.1% above the NREAP projected value of 38.7 PJ.

The use of geothermal heat reached the level of 4.1 PJ in 2010, 2.0% below the expected level for 2010. Solar heat utilisation increased to 0.2 PJ in 2010, which is however 16.7% below the projected value of 0.3 PJ for 2010. Biomass heat grew to 39.8 PJ in 2010, 17.1% above the expected biomass heat generation of 34.0 PJ in 2010. The heat production from heat pumps remained absent, in comparison with the expected heat generation of 0.3 PJ in 2010.

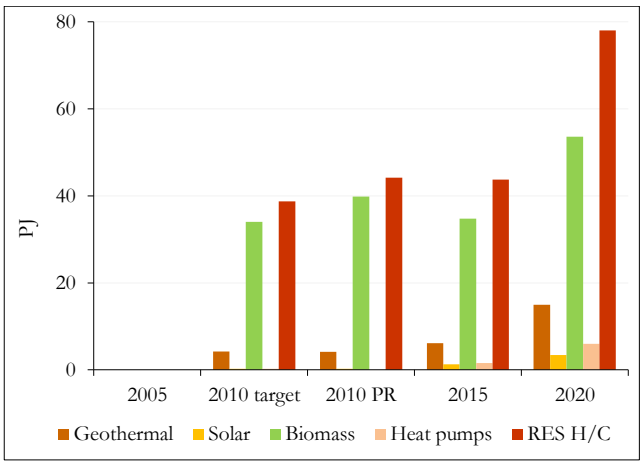

Figure 16-12. RES heat projected growth and progress until 2010 in Hungary.

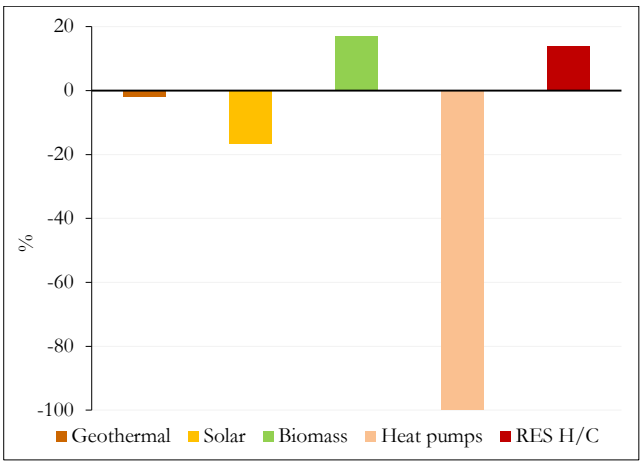

Figure 16-13. Deviation from NREAP in the RES heat generation in Hungary in 2010.

16.6. Renewable energy in transport

The use of renewable energy in transport increased in Hungary from 0.2 PJ in 2005 to reach 8.0 PJ in 2010, 27.3% above the projected value of 6.3 PJ. Biodiesel is the major contributor to RES in transport, increasing to 5.0 PJ in 2010, 8.2% above the 2010 projected value of 4.6 PJ. The use of bioethanol/bio-ETBE grew to 2.4 PJ in 2010, 67.6% above the expected use of 1.4 PJ in 2010.

The use of biofuels from wastes, residues, ligno-cellulosic material remained absent, in comparison with a contribution of 0.8 PJ expected for 2010. The use of other biofuels (biogas and vegetable oils) increased from 0.3 PJ in 2005 to 3.2 PJ in 2010, 22.2% above the target of 2.6 PJ. The use of biofuels from import reached 2.7 PJ in 2010, while no biofuels were expected to be imported. The use of renewable electricity also reached 0.62 PJ in 2010, 150.0% above the 0.25 PJ projected target.

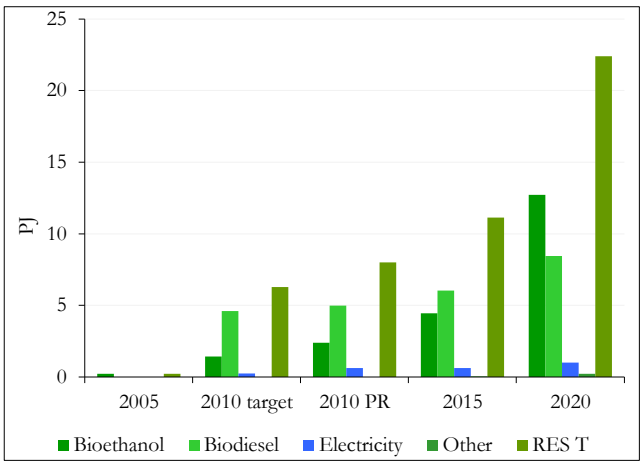

Figure 16-14. RES in transport projected growth and progress until 2010 in Hungary.

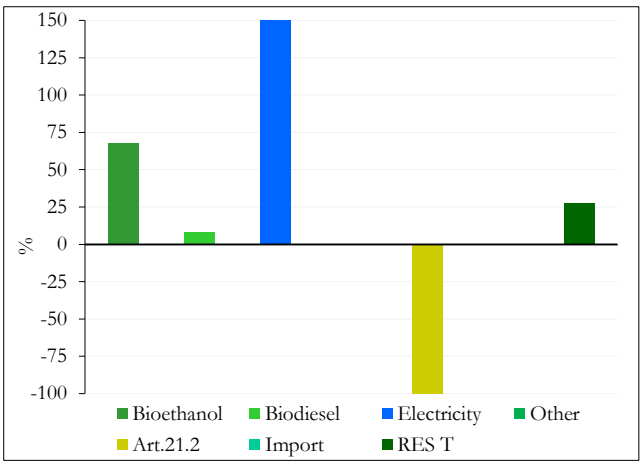

Figure 16-15. Deviation from NREAP in the RES use in transport in Hungary in 2010.

17. Renewable energy in Malta

17.1. Deployment of renewable energy

The renewable energy deployment in Malta increased to 0.16 PJ in 2010, below the NREAP projected RES use of 0.33 PJ. The additional use of renewable energy in 2010-2020 is expected to be 2.13 PJ, in comparison with the increase of 0.16 PJ achieved in 2005-2010.

The use of renewable energy in heating and cooling increased to 0.13 PJ in 2010, below the projected level of 0.15 PJ. The renewable electricity increased to only 0.01 PJ in 2010, below the target of 0.05 PJ. The use of renewable energy in transport grew to 0.02 PJ in 2010, below the target of 0.12 PJ.

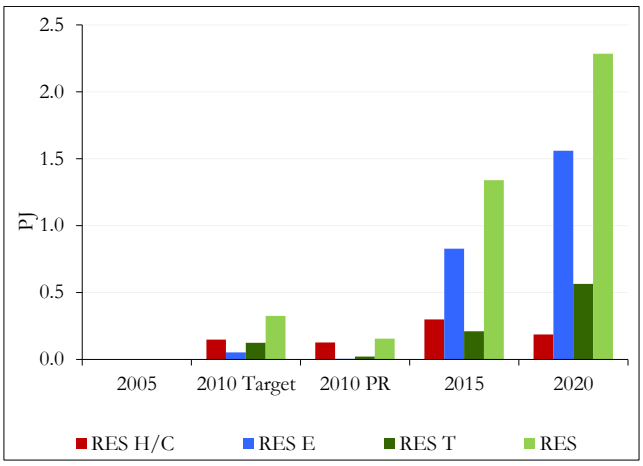

Figure 17-1. RES deployment in Malta: projected growth and actual progress.

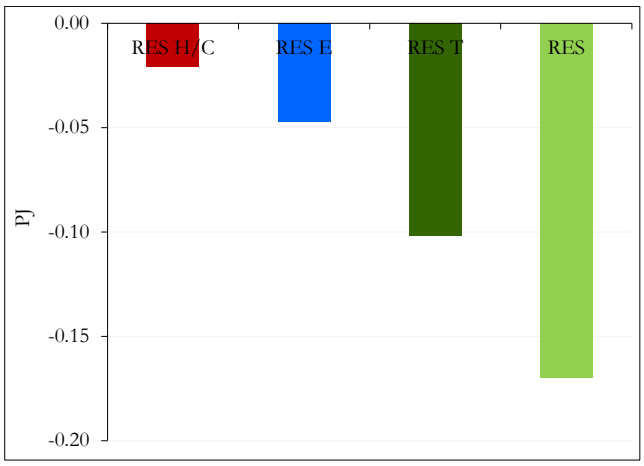

Figure 17-2. Deviation from NREAP in the RES production in Malta in 2010.

Table 17-1. RES use in Malta, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	0.13	-0.02	-14.2	0.13		0.06	47.9	0.2
RES-E	0.01	-0.05	-88.4	0.01		1.55	24903.4	1.6
RES-T	0.02	-0.10	-81.5	0.02		0.54	2358.2	0.6
RES	0.16	-0.17	-52.1	0.16		2.13	1361.1	2.3

17.2. Renewable energy share

The analysis of the Progress Report for Malta shows that the overall share of RES increased to 0.9% in 2010 and this should reach 10.2% in 2020. The highest share of renewable energy was achieved in heating and cooling (9.5%), followed by transport (1.3%) and electricity (0.1%).

Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 0.1% to 13.8%) and transport (from 0.7% to 13.1%), while the share of renewable energy in heating & cooling in 2010 (9.5%) was already above the expected share in 2020 (6.2%).

The overall share of RES was below the target by 0.9% points, reaching 0.9% in 2010, in comparison with 1.8% projected in the NREAP. The RES share in heating and cooling was above the projected value by 1.6% points, reaching 9.5% in comparison with expected share of 7.9% in 2010. The share of renewable electricity was below the target by 0.5% points, reaching 0.1% in comparison with 0.6% projected value. The share of RES in transport is below the target by 2.1%, reaching 0.7% in comparison with 2.8% projected RES share.

Table 17-2. Projected growth in RES share in Malta and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	0.0	7.9	9.5	1.6	7.9	6.2
RES-E	0.0	0.6	0.1	-0.5	7.0	13.8
RES-T	0.0	2.8	0.7	-2.1	4.2	13.1
Overall RES	0.0	1.8	0.9	-0.9	5.5	10.2

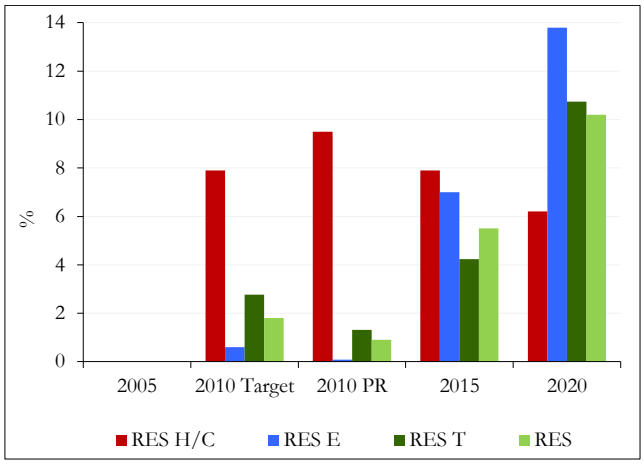

Figure 17-3. RES share in Malta: projected growth and actual progress.

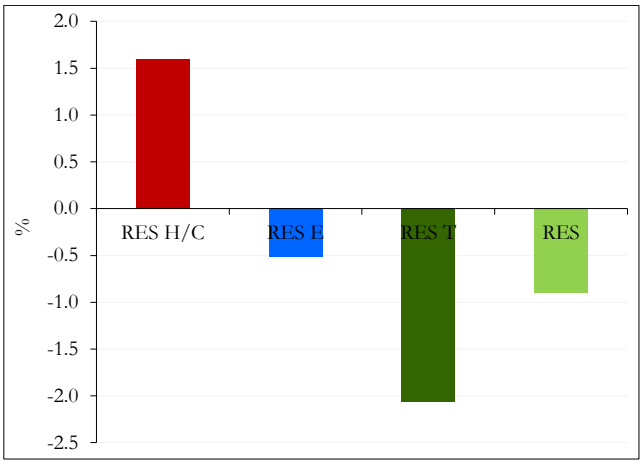

Figure 17-4. Deviation from NREAP in the share of RES in Malta in 2010.

Malta has an ambitious renewable energy target for 2020, starting from a very low level in 2005. The development of overall RES share in Malta during 2005-2010 was very low. Malta did not reach its planned overall RES share for 2010. The trajectory expected for the RES share is set in the NREAP, until 2010, above the minimum indicative trajectory of overall RES share defined in RED Directive. This development of overall RES share shows that Malta is currently not in good position for the achievement of its 2020 RES share target.

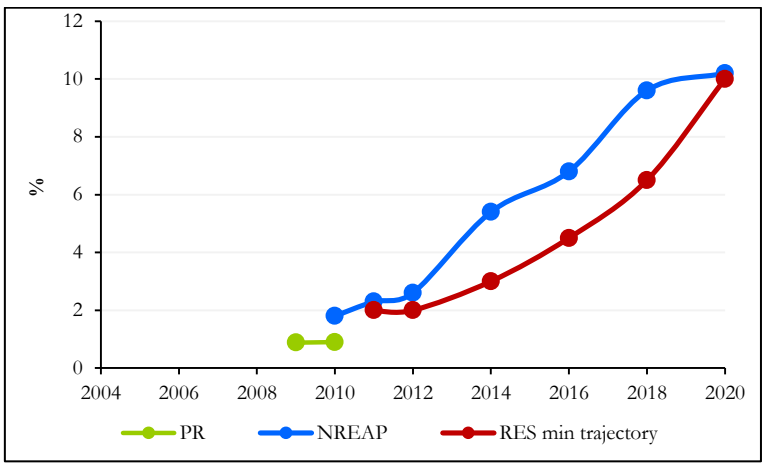

Figure 17-5. Progress of the overall RES share in Malta

17.3. Sources of renewable energy

Small increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of solar thermal and solar electricity (+0.11 PJ), followed by biomass for electricity, heating & cooling (+0.02 PJ) and biofuels (+0.02 PJ). More progress is expected to be done between 2010-2020, especially by wind (+0.9 PJ), followed by the use of biomass (+0.7 PJ), biofuels (+0.5 PJ) and solar (+0.2 PJ). In comparison with the expected contribution, the use of all renewable energy sources was below the NREAP 2010 target: wind power by -100%, biofuels by -81.5%, biomass by -44.6% and solar by -14.2%.

Table 17-3. The contribution of different sources of renewable energy in Malta

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydro	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	0.0	0.13	0.11	0.26	0.27
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.06	0.92
Heat pumps	0.0	0.0	0.0	0.0	0.0
Biomass	0.0	0.04	0.02	0.71	0.69
Biofuels	0.0	0.12	0.02	0.21	0.54

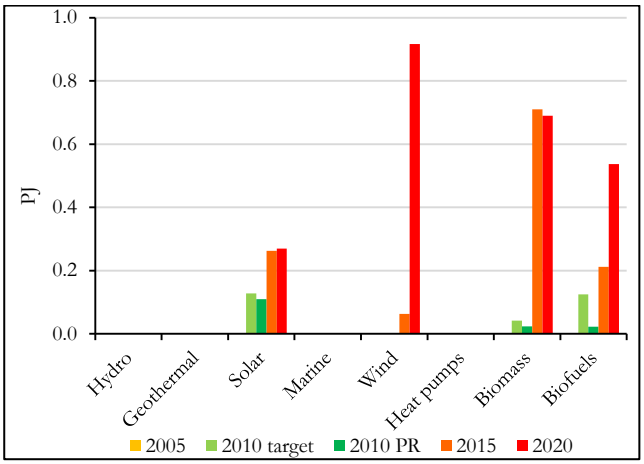

Figure 17-6. Contribution of renewable sources in Malta: projected growth and actual progress

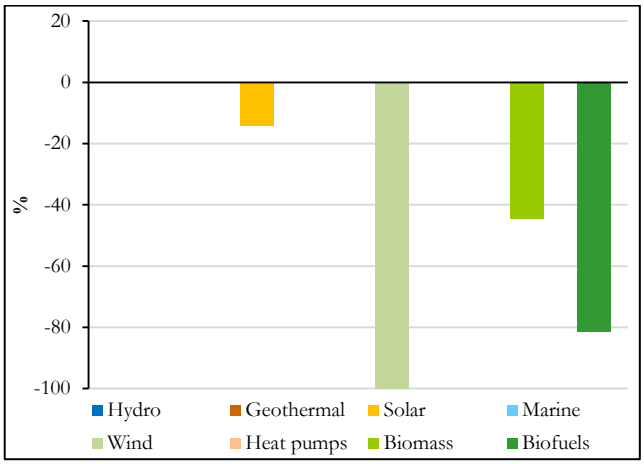

Figure 17-7. Deviation from NREAP in the contribution of renewable sources in Malta in 2010

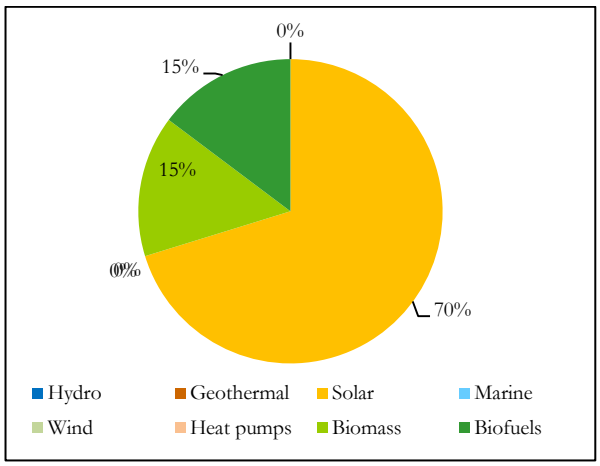

Figure 17-8. Share of renewable sources for electricity, heating & cooling in Malta in 2010

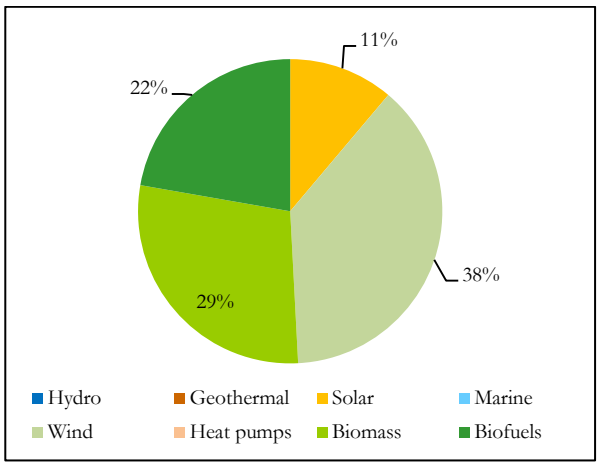

Figure 17-9. Share of renewable sources for electricity, heating & cooling in Malta in 2020

The use of solar energy was the major contributor to RES use in 2010 with a 70% share, followed by biomass with 15% and biofuels with 15%. In 2020, the major contribution is expected to come from wind with 38% followed by the use of biomass with 29%, biofuels with 22% and solar with 11%.

17.4. Renewable electricity

The renewable electricity generation increased in Malta to 1.73 GWh in 2010, which is 88.4% below the NREAP projected value of 14.9 GWh.

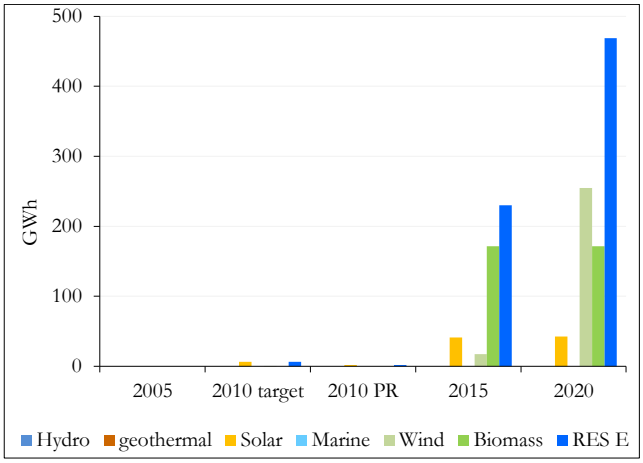

Figure 17-10. RES electricity projected growth and progress until 2010 in Malta.

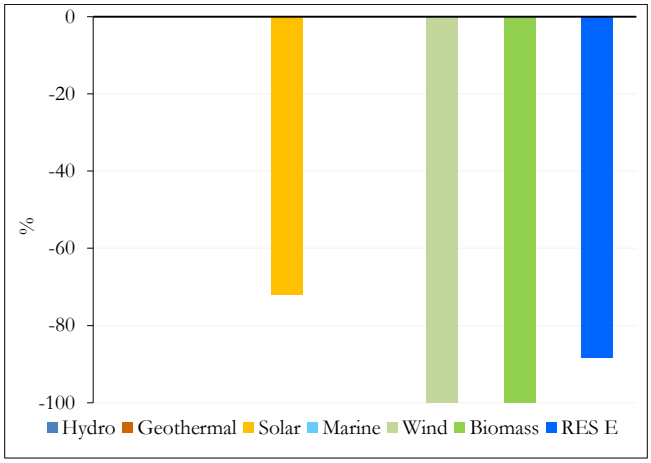

Figure 17-11. Deviation from NREAP in the RES electricity generation in Malta in 2010.

Solar electricity production grew to 1.73 GWh in 2010, which is 72.1% below the expected power generation of 6.19 GWh in 2010. Wind power had no contribution to renewable electricity generation, in comparison with 0.01 GWh expected production in 2010. Biomass electricity had no contribution to renewable electricity generation, in comparison with 8.7 GWh expected production in 2010.

17.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Malta to 0.13 PJ in 2010, which is 14.2% below the projected value of 0.15 PJ. Solar heat utilisation increased to 0.10 PJ in 2010, 2.0% below the projected value of 0.11 PJ for 2010. The use of biomass heat grew to 0.02 PJ in 2010, 44.6% below the expected biomass heat generation of 0.04 PJ in 2010.

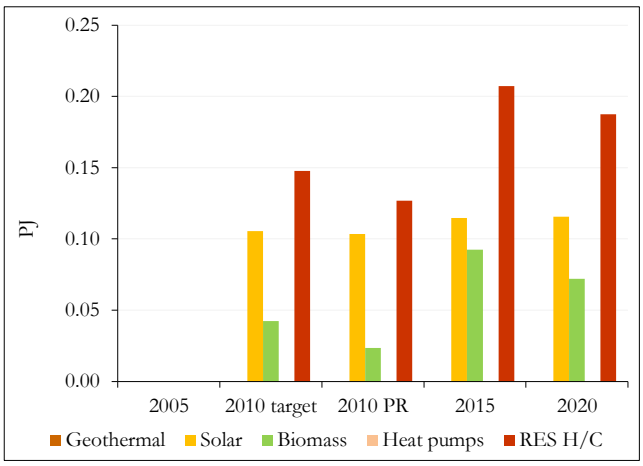

Figure 17-12. RES heat projected growth and progress until 2010 in Malta.

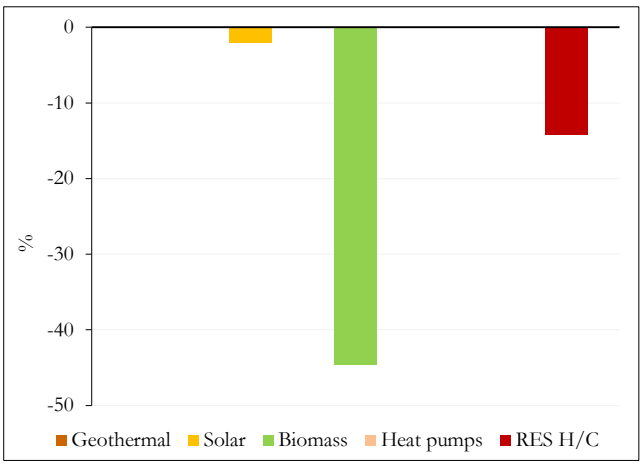

Figure 17-13. Deviation from NREAP in the RES heat generation in Malta in 2010.

17.6. Renewable energy in transport

The use of renewable energy in transport increased in Malta to 0.02 PJ in 2010, 81.5% below the NREAP projected value of 0.12 PJ. Biodiesel is the major contributor to RES use in transport, increasing to 0.02 PJ in 2010, 55.3% below the 2010 NREAP projected value of 0.05 PJ. Bioethanol/ bio-ETBE had no contribution to biofuel use in transport in 2010, in comparison with 0.07 PJ expected use of 0.07 PJ in 2010. The use of biofuels from wastes, residues, ligno-cellulosic material increased to 0.02 PJ in 2010, but this was 55.3% below the projected value of 0.05 PJ in 2010. No biofuels from import were used in 2010, as compared with the expected import of 0.07 PJ in 2010.

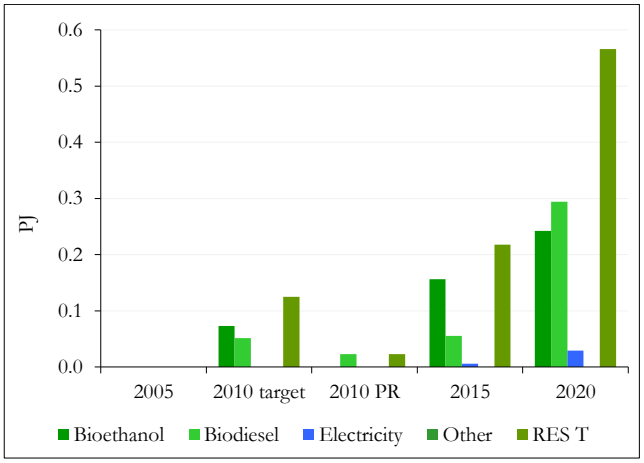

Figure 17-14. RES in transport projected growth and progress until 2010 in Malta.

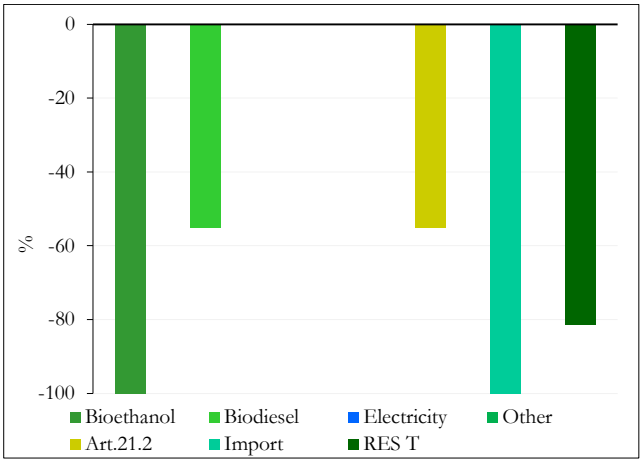

Figure 17-15. Deviation from NREAP in the RES use in transport in Malta in 2010.

18. Renewable energy in the Netherlands

18.1. Deployment of renewable energy

The renewable energy deployment in the Netherlands increased from 56.1 PJ in 2005 to 86.4 PJ in 2010, an increase of 30.3 PJ (+54.1%). The renewable use was 3.1% below the NREAP projected use of 89.1 PJ for 2010 and it is expected to further increase to 307.3 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 220.9 PJ, in comparison with the increase of 28.7 PJ achieved in 2005-2010.

Renewable electricity generation made the most significant progress between 2005 and 2010, with an increase of 16.2 PJ, followed by renewable energy in transport with 10.3 PJ and renewable heating and cooling with 4.6 PJ. The highest relative increase was made by the use of renewable energy in transport (+3075%) followed by electricity (+62.5%) and heating and cooling (+15.3%). The use of renewable energy in heating and cooling increased from 30.0 PJ in 2005 to 34.6 PJ in 2010, 8.7% below the projected level of 37.9 PJ. The renewable electricity increased from 26.0 PJ in 2005 to 42.2 PJ in 2010, which is 10.2% above the target of 38.3 PJ. The use of renewable energy in transport grew from 0.3 PJ in 2005 to 10.6 PJ in 2010, 20.4% below the target of 13.4 PJ.

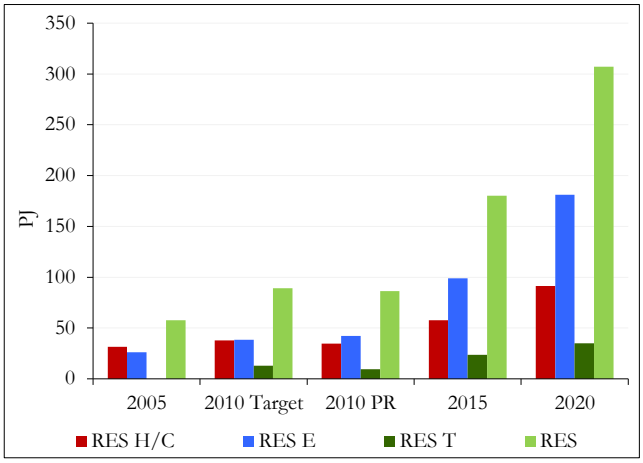

Figure 18-1. RES deployment in the Netherlands: projected growth and actual progress.

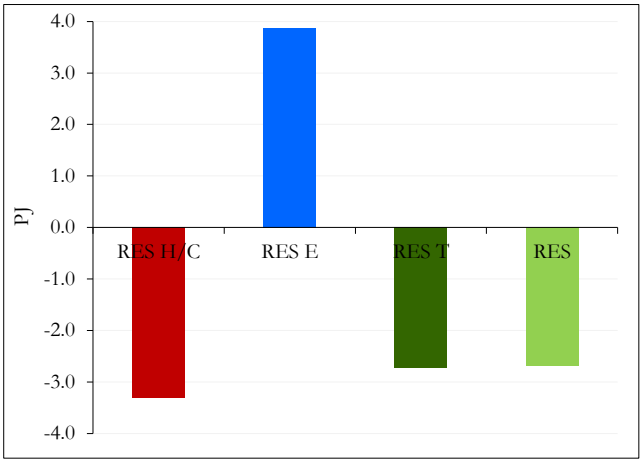

Figure 18-2. Deviation from NREAP in the RES production in the Netherlands in 2010.

Table 18-1. RES use in The Netherlands, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	34.6	-3.3	-8.7	3.0	9.5	56.6	163.5	91.2
RES-E	42.2	3.9	10.1	16.1	61.7	139.0	329.2	181.2
RES-T	10.6	-2.7	-20.4	10.3	3075.0	27.3	256.3	37.9
RES	86.4	-2.7	-3.0	28.7	49.8	220.9	255.6	307.3

18.2. Renewable energy share

The analysis of the Progress Report for the Netherlands shows that the overall share of RES increased from 2.5% in 2005 to 3.7% in 2010 and this should reach 14.5% in 2020. The highest increase in the share of renewable energy was made in electricity (from 6.0% to 9.7%), followed by transport (from 0.1% to 4.0%), while the progress made in the share of renewable energy in heating and cooling was much more reduced (from 2.5% to 2.7%).

Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 9.7% to 37.0%), followed by transport (from 3.0% to 10.3%) and heating & cooling (from 2.7% to 8.7%).

The overall share of RES was below the target by 0.5% points, reaching 3.7% in 2010, in comparison with 4.2% projected in the NREAP. The RES share in heating and cooling was below the projected value by 1.0% points, reaching 2.7% in comparison with expected share of 3.7% in 2010. The share of renewable electricity was above the target by 1.1% points, reaching 9.7% in comparison with 8.6% projected value. The share of RES in transport was below the target by 0.04% points, reaching 4.0% in comparison with 4.1% projected RES share.

Table 18-2. Projected growth in RES share in the Netherlands and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	2.5	3.7	2.7	-1.0	5.6	8.7
RES-E	6.0	8.6	9.7	1.1	21.0	37.0
RES-T	0.1	4.1	4.0	-0.04	6.0	10.3
Overall RES	2.5	4.2	3.7	-0.5	8.5	14.5

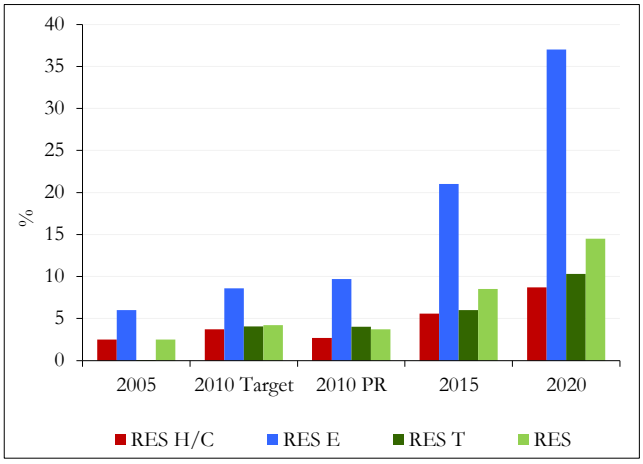

Figure 18-3. RES share in the Netherlands: projected growth and actual progress.

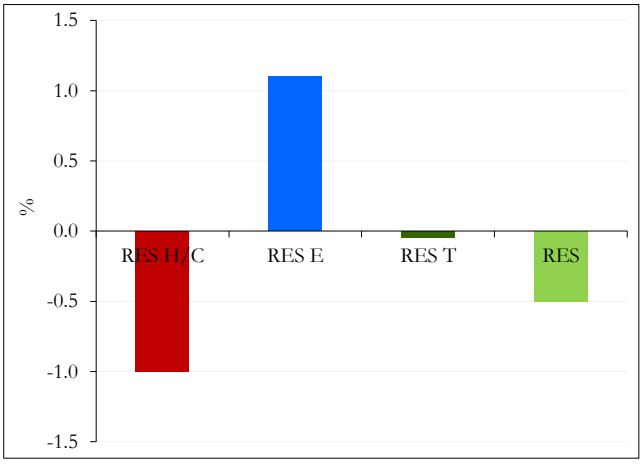

Figure 18-4. Deviation from NREAP in the share of RES in the Netherlands in 2010.

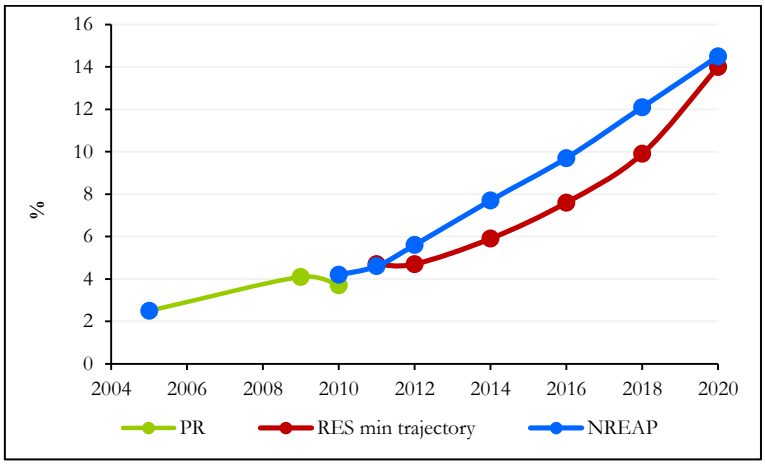

Figure 18-5. Progress of the overall RES share in the Netherlands

The Netherlands has to achieve a significant increase of the share of renewable energy in gross final energy consumption during period 2005-2020. The overall RES share almost met since 2009 the planned 2010 share, while in 2010, the overall RES share decreased below the planned value. The

trajectory expected for the RES share is set in the NREAP until 2020 above the minimum indicative trajectory of overall RES share defined in RED Directive. Despite of the developments during 2009-2010, Netherlands can still reach its 2020 RES share target.

18.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biofuels (+9.6 PJ) followed by biomass for electricity, heating & cooling (+9.4 PJ), wind (+8.8 PJ), solar thermal and solar electricity (+0.4 PJ) and geothermal (+0.3 PJ).

More progress is expected to be done during 2010-2020, especially by wind (+100.5 PJ) followed by the use of biomass (+68.9 PJ), biofuels (+25.3 PJ), heat pumps (+11.7 PJ), geothermal (+10.5 PJ), and lower growth in marine energy (+1.9 PJ), solar (+1.8 PJ) and hydropower (+0.3 PJ).

In comparison with the expected contribution, the use of three renewable energy sources was above the NREAP 2010 target: solar by +11.0%, biomass by +6.2% and wind by +0.7%, while the use of several other renewable sources was below the target: geothermal energy by -79.5%, heat pumps by -26.5%, biofuels by -25.4% and hydropower by -20.5%.

Table 18-3. The contribution of different sources of renewable energy in the Netherlands

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	0.4	0.5	0.4	0.7	0.7
Geothermal	0.0	1.6	0.3	5.4	10.8
Solar	0.8	1.1	1.2	1.6	3.0
Marine	0.0	0.0	0.0	0.0	1.9
Wind	7.4	16.1	16.2	49.2	116.7
Heat pumps	2.3	5.5	4.1	10.6	15.8
Biomass	45.2	51.4	54.6	89.1	123.5
Biofuels	0.0	12.9	9.6	23.7	34.9

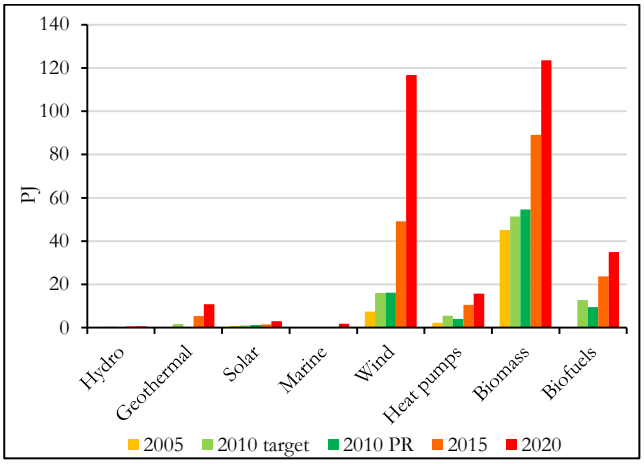

Figure 18-6. Contribution of renewable sources in the Netherlands: projected growth and actual progress

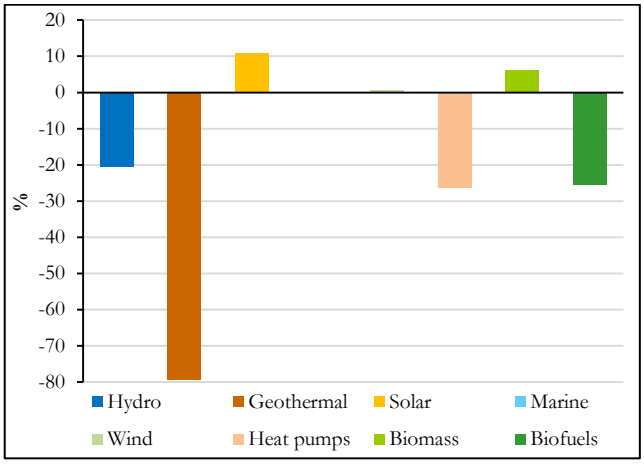

Figure 18-7. Deviation from NREAP in the contribution of renewable sources in the Netherlands in 2010

Biomass was the major contributor to RES use in 2010 with a 63% share, followed by wind with 19%, biofuels with 11%, heat pumps with 5%, solar with 1.4% and hydro with 2%. In 2020, the major contribution is expected from biomass with 40%, followed by wind with 38%, biofuels with 11%, heat pumps with 5%, geothermal with 4%, solar with 1%, marine with 0.6% and hydro with 0.2%.

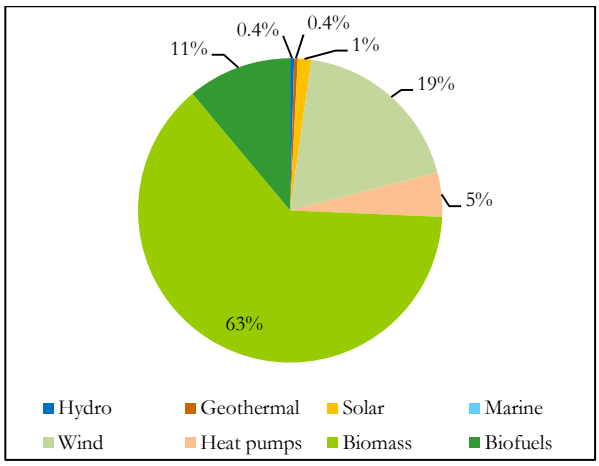

Figure 18-8. Share of renewable sources for electricity, heating & cooling in the Netherlands in 2010

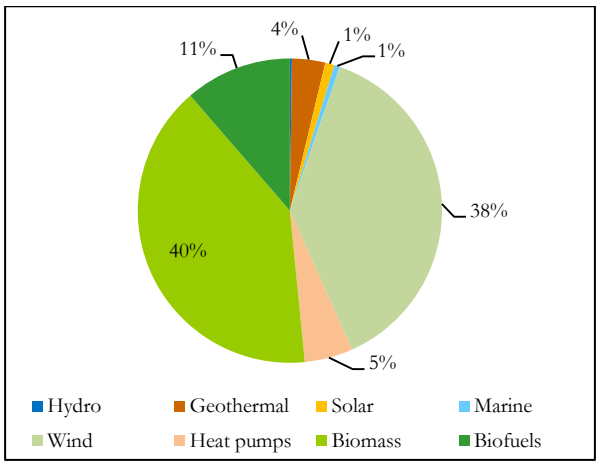

Figure 18-9. Share of renewable sources for electricity, heating & cooling in the Netherlands in 2020

18.4. Renewable electricity

The renewable electricity generation increased in the Netherlands by 4474 GWh (+61.7%), from 7248 GWh in 2005, to 11722 GWh in 2010, which is 10.1% above the NREAP projected value of 10645 GWh. Significant progress was made between 2005-2010 in all sectors, especially in wind power (2435 GWh), followed by biomass (2018 GWh) and solar (20 GWh). In relative terms, the most significant increase was registered in wind power (+117.8%), followed by solar (+50.0%) and biomass (+40.0%).

Hydro power generation remained at about the same level in comparison with 101 GWh produced in 2005, reaching 101 GWh in 2010, 20.5% below the projected value of 127 GWh. Solar electricity generation grew from 40 GWh to 60 GWh in 2010, but this is 17.8% below the expected solar power generation of 73 GWh in 2010. Wind power grew from 2067 GWh in 2005 to 4502 GWh in 2010, which is 0.7% above the expected wind power generation of 4470 GWh in 2010. Biomass electricity generation increased significantly from 5041 GWh in 2005 to 7059 GWh in 2010, above the projected production for 2010 by 18.1% in comparison with 5975 GWh projected for 2010.

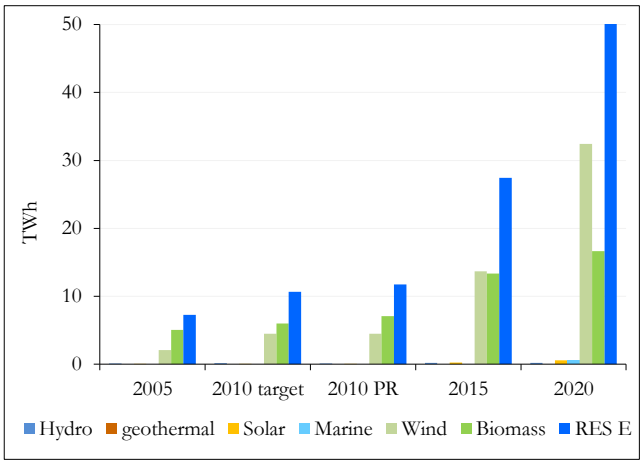

Figure 18-10. RES electricity projected growth and progress until 2010 in the Netherlands.

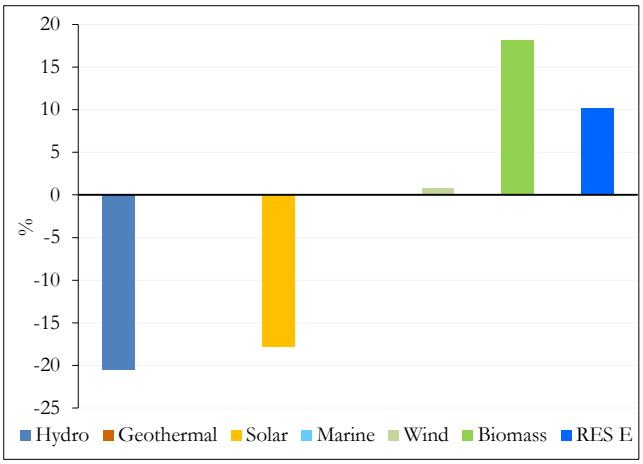

Figure 18-11. Deviation from NREAP in the RES electricity generation in the Netherlands in 2010.

18.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in the Netherlands by 4.6 PJ (+15.3%), from 30.0 PJ in 2005 to 34.6 PJ in 2010, which is however 8.7% below the NREAP projected value of

37.9 PJ. Some progress was made in most sectors, especially in biomass (+2.1 PJ), heat pumps (+1.8 PJ), solar (+0.3 PJ) and geothermal (+0.3 PJ). In relative terms, the most significant increase was registered in heat pumps (+79.6%), followed by solar thermal (+50.0%) and biomass (+7.9%).

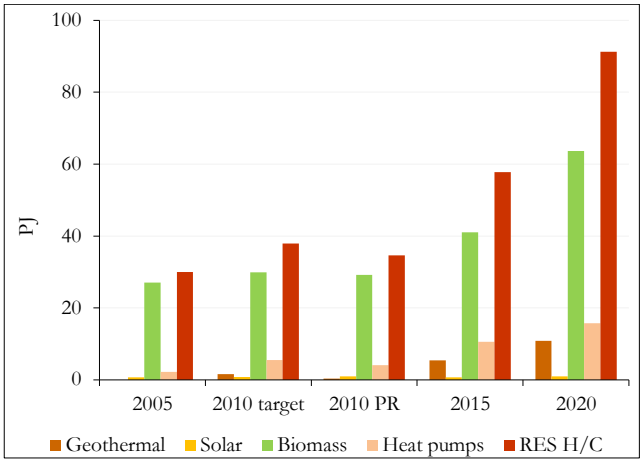

Figure 18-12. RES heat projected growth and progress until 2010 in the Netherlands.

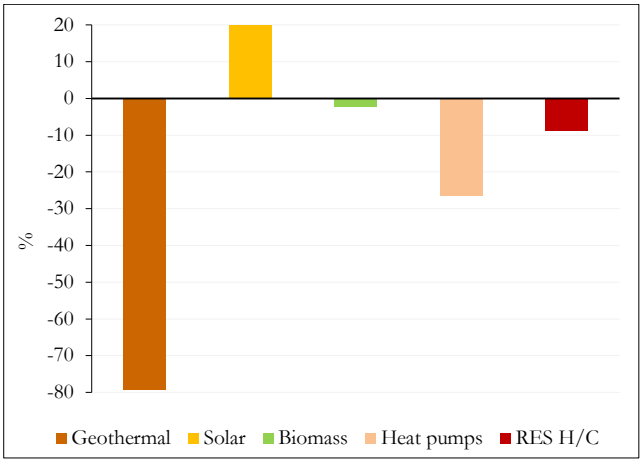

Figure 18-13. Deviation from NREAP in the RES heat generation in the Netherlands in 2010.

The consumption of geothermal heat increased to a limited extent to 0.3 PJ in 2010, 79.5% below the expected level of 1.6 PJ for 2010. Solar heat use grew from 0.7 PJ in 2005, reaching 1.0 PJ in 2010, 20.0% above the projected value of 0.8 PJ for 2010. Biomass heat grew from 27.1 PJ in 2005 to 29.2 PJ in 2010, 2.4% below the expected heat generation of 29.9 PJ in 2010. The heat production from heat pumps increased from 2.3 PJ in 2005 to 4.1 PJ in 2010, but this is 26.5% below the expected heat generation of 5.5 PJ in 2010.

18.6. Renewable energy in transport

The use of renewable energy in transport increased in the Netherlands from 0.3 PJ in 2005 to reach 10.6 PJ in 2010, 20.4% below the NREAP value of 13.4 PJ. Bioethanol/ bio-ETBE was the major contributor to RES use in transport, increasing 5.6 PJ in 2010, 20.2% below the 2010 NREAP projected value of 7.0 PJ. The use of biodiesel grew to 4.0 PJ in 2010, 31.7% below the expected biodiesel use of 5.8 PJ in 2010. The use of biofuels from wastes, residues, ligno-cellulosic material (biofuels art 21.2) increased to 3.6 PJ in 2010, which is 44.9% below the expected value of 6.5 PJ. According to the Progress Report, no biofuels from import were used in transport in 2010, in comparison of 9.3 PJ expected to be provided from import. The use of renewable electricity also increased from 0.5 PJ in 2005 to 1.0 PJ in 2010, 108.3% above the target of 0.5 PJ projected for 2010.

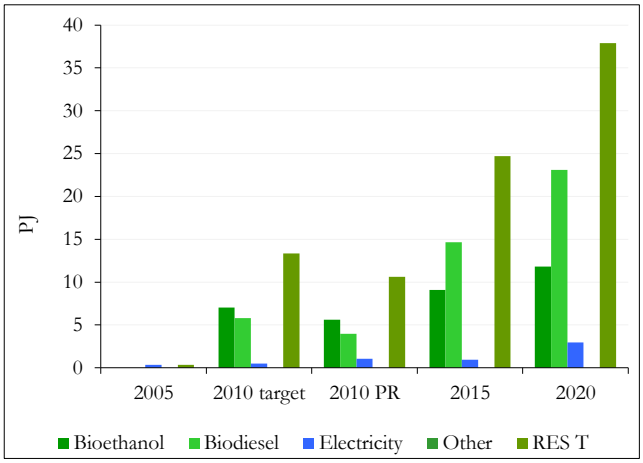

Figure 18-14. RES in transport projected growth and progress until 2010 in the Netherlands.

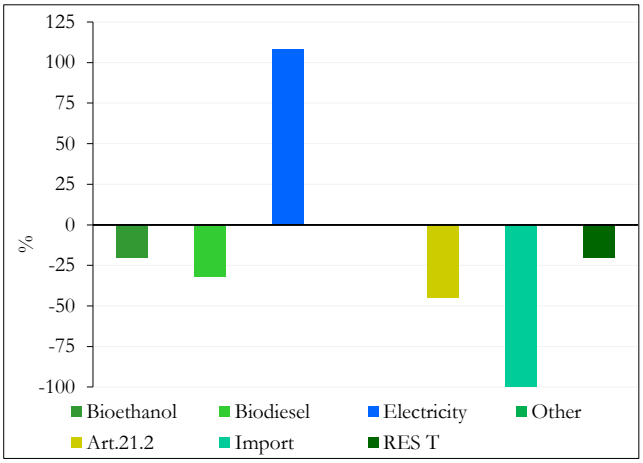

Figure 18-15. Deviation from NREAP in the RES use in transport in the Netherlands in 2010.

19. Renewable energy in Austria

19.1. Deployment of renewable energy

The renewable energy deployment in Austria increased from 285.1 PJ in 2005 to 340.9 PJ in 2010, an increase of 55.9 PJ (19.6%). The renewable use in Austria was 2.4% above the NREAP projected RES use of 332.9 PJ for 2010 and it is expected to further increase to 388.0 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 47.0 PJ, in comparison with the increase of 45.9 PJ achieved in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 35.9 PJ, followed by renewable energy in transport with 21.3 PJ, while no progress was made in renewable electricity. The highest relative increase was made by the use of renewable energy in transport (+247.8%) followed by the heating and cooling (+26.7%).

The use of renewable energy in heating and cooling increased from 134.5 PJ in 2005 to 170.4 PJ in 2010, above the projected level of 153.1 PJ. The renewable electricity remained at the same level of 148.8 PJ since 2005 until 2010, but this is below the expected target of 163.4 PJ. The use of renewable energy in transport grew from 8.6 PJ in 2005 to 29.9 PJ in 2010, above the target of 23.6 PJ.

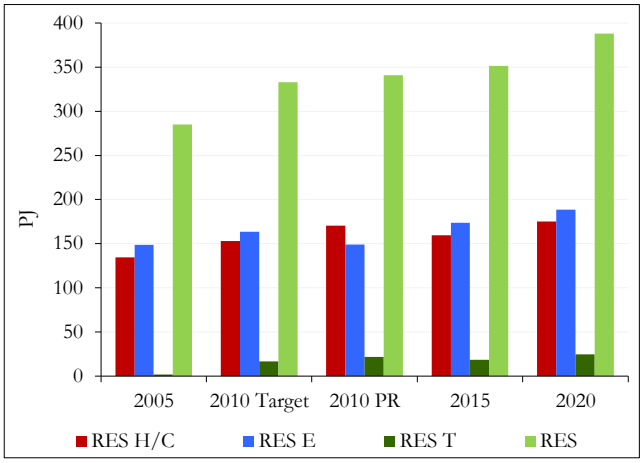

Figure 19-1. RES deployment in Austria: projected growth and actual progress.

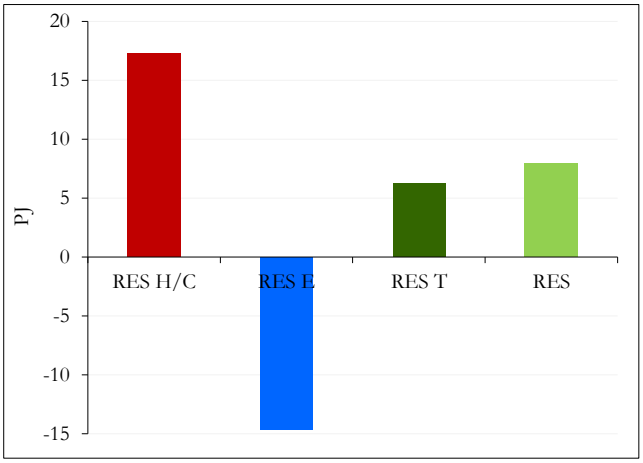

Figure 19-2. Deviation from NREAP in the RES production in Austria in 2010.

Table 19-1. RES use in Austria, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	170.4	17.3	11.3	35.9	26.7	4.5	2.7	174.9
RES-E	148.8	-14.6	-8.9	0.0	0.0	39.8	26.7	188.6
RES-T	29.9	6.2	26.4	21.3	247.8	6.0	20.1	35.8
RES	340.9	8.0	2.4	55.9	19.6	47.0	13.8	388.0

19.2. Renewable energy share

The analysis of the Progress Report of Austria shows that the overall share of RES increased from 23.3% in 2005 to 30.8% in 2010 and this should reach 34.2% in 2020. The highest increase was made in heating and cooling (from 20.2% to 32.2%), followed by transport (from 2.3% to7.9%) and electricity (from 59.8% to 65.3%). Major increase is expected until 2020 in electricity (from 65.3% to 70.6%), followed by transport (from 7.9% to 11.4%) and heating & cooling (from 32.2% to 32.6%).

Table 19-2. Projected growth in RES share in Austria and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	20.2	30.1	32.2	2.1	31.0	32.6
RES-E	59.8	73.2	65.3	-7.9	74.2	70.6
RES-T	2.3	6.8	7.9	1.1	7.8	11.4
Overall RES	23.3	31.1	30.8	-0.3	32.3	34.2

The overall share of RES was below the target by only 0.3% points, reaching 30.8% in 2010, in comparison with 31.1% projected. The RES share in heating was above the projected value by 2.1% points, reaching 32.2% in comparison with expected share of 30.1% in 2010. The share of renewable electricity was below the target by 7.9% points, reaching 65.3% in comparison with 73.2%projected value. The RES share in transport was above the target by 1.1%, reaching 7.9% in comparison with 6.8% expected share.

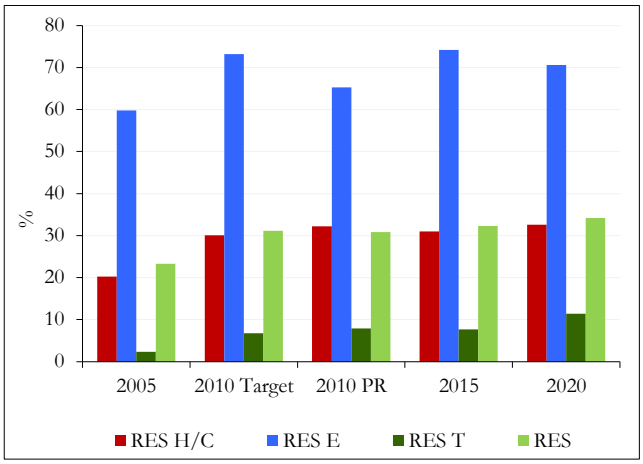

Figure 19-3. RES share in Austria: projected growth and actual progress.

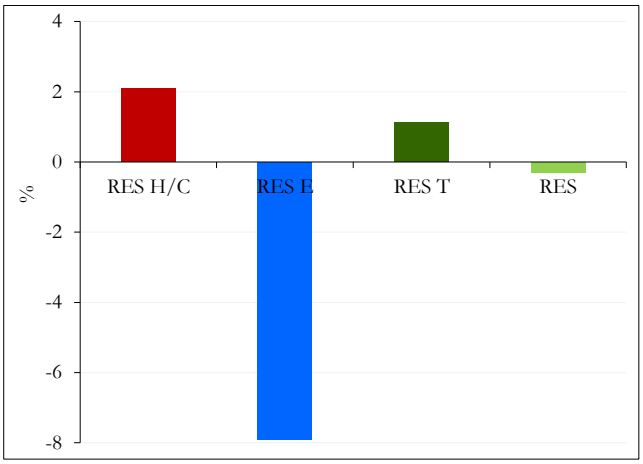

Figure 19-4. Deviation from NREAP in the share of RES in Austria in 2010.

Austria had an important development during 2005-2010, missing the 2010 planned overall RES share by only 0.3%. The overall RES share during period 2005-2010 exceeded the RES minimum indicative trajectory until 2017/2018. The minimum indicative trajectory of overall RES share defined in RED Directive is much lower than the trajectory expected in the NREAP for the RES share. The RES developments show that Austria is in a good position for the achievement of its 2020 RES share target.

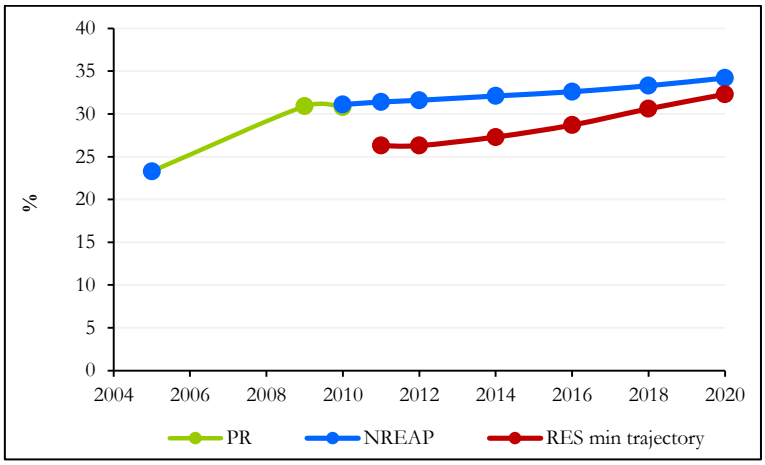

Figure 19-5. Progress of the overall RES share in Austria

19.3. Sources of renewable energy

Significant increase of the use of renewable energy was registered between 2005-2010, especially by the use of biomass (+37.0 PJ), followed by biofuels (+19.9 PJ), solar (+3.3 PJ), wind (+2.5 PJ) and heat pumps (+2.1 PJ), while the use of hydro energy decreased (-8.9 PJ). More progress is expected to be done between 2010-2020, especially by hydro (+26.9 PJ), wind (+10.0 PJ), heat pumps (+6.0 PJ), solar (+5.2 PJ), and geothermal (+0.8 PJ), while the use of biomass was already above the 2020 target by 4.6 PJ. In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: biofuels +32.1%, solar by +27.8%, heat pumps by +24.0%, biomass by +8.8%, geothermal by +4.8%, while the use of hydro energy was below by -10.1%.

Table 19-3. The contribution of different sources of renewable energy in Austria

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	133.7	138.8	124.7	141.9	151.6
Geothermal	0.8	0.8	0.8	1.1	1.7
Solar	3.9	5.6	7.2	8.2	12.4
Marine	0.0	0.0	0.0	0.0	0.0
Wind	4.8	7.3	7.3	13.6	17.3
Heat pumps	2.9	4.0	5.0	5.7	11.0
Biomass	137.1	160.0	174.1	162.4	169.5
Biofuels	1.8	16.5	21.7	18.5	24.5

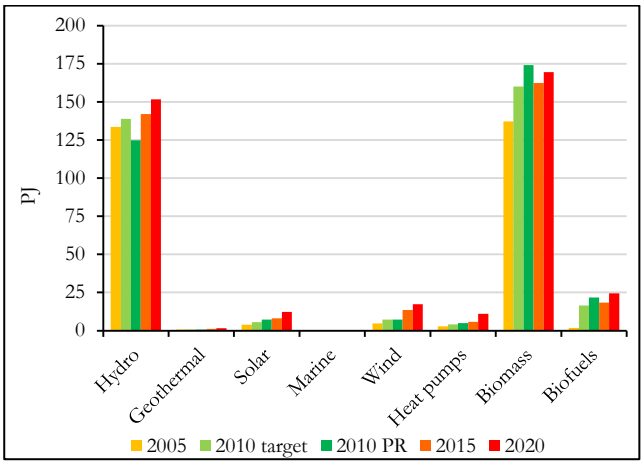

Figure 19-6. Contribution of renewable sources in Austria: projected growth and actual progress

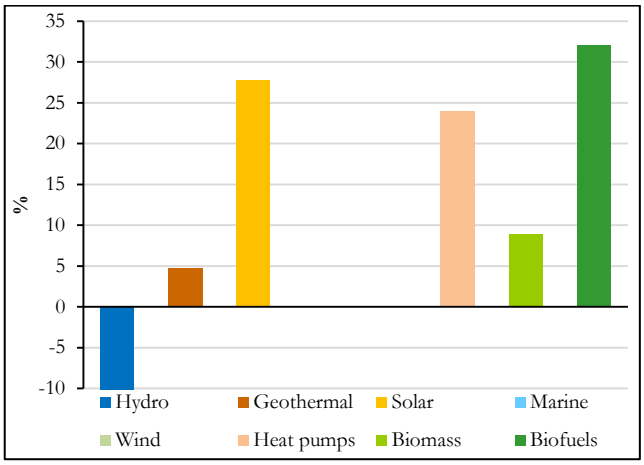

Figure 19-7. Deviation from NREAP in the contribution of renewable sources in Austria in 2010

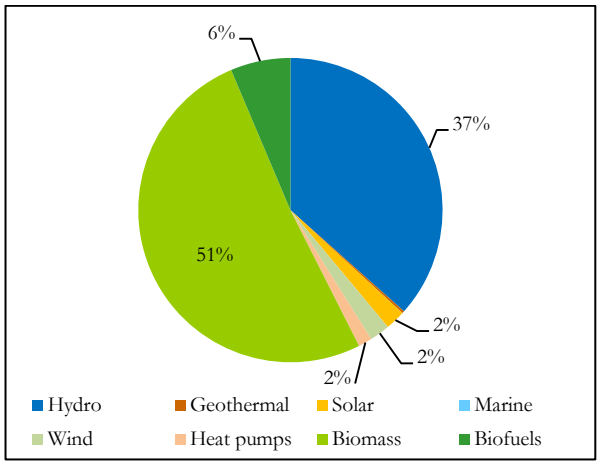

Figure 19-8. Share of renewable sources for electricity, heating & cooling in Austria in 2010

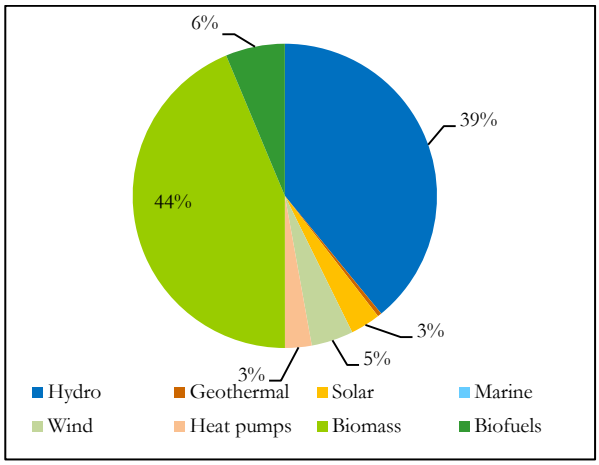

Figure 19-9. Share of renewable sources for electricity, heating & cooling in Austria in 2020

Biomass was the major contributor to RES use in 2010 with a 63% share, followed by hydro with 37%, biofuels with 6%, wind with 2%, solar with 2%, heat pumps with 1.5% and geothermal with 0.3%. In 2020, the major contribution is expected to come from biomass with 44%, followed by hydro with 39%, biofuels with 6%, wind with 5%, solar with 3%, heat pumps with 3% and geothermal with 0.4%.

19.4. Renewable electricity

The renewable electricity generation increased in Austria from 41314 GWh in 2005, to only 41326 GWh in 2010, which is 8.9% below the NREAP projected value of 45383 GWh. Some progress was made between 2005-2010 in most sectors, such biomass power (+1732 GWh), followed by wind power (+692 GWh) and solar (+68 GWh). In relative terms, the most significant increase was registered in solar power (+323.8%), followed by biomass (+61.4%) and wind (+51.5%).

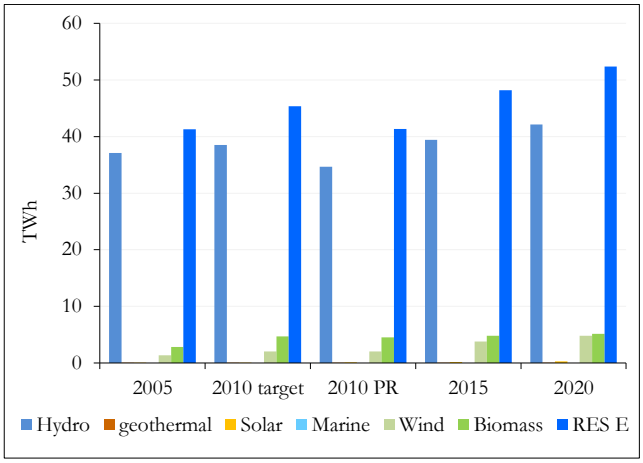

Figure 19-10. RES electricity projected growth and progress until 2010 in Austria.

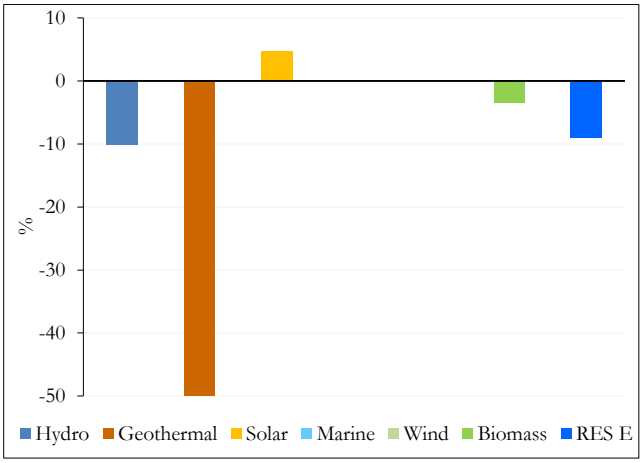

Figure 19-11. Deviation from NREAP in the RES electricity generation in Austria in 2010.

Hydro power generation decreased by 6.7% from 37125 GWh produced in 2005, reaching 34647 GWh in 2010, 10.1% below the projected value of 38542 GWh. Geothermal electricity production decreased from 2 GWh to 1 GWh in 2010, below the expected generation of 2 GWh in 2010.

Solar electricity grew from 21 GWh to 89 GWh in 2010, 4.7% above the expected level of 85 GWh in 2010. Wind power increased from 1343 GWh in 2005 to 2035 GWh in 2010, which is about the expected power generation of 2034 GWh in 2010. Biomass electricity also was below the 4720 GWh projected production for 2010 by 3.5%, reaching only 41326 GWh, in comparison with 41314 GWh generated in 2005.

19.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Austria by 35.9 PJ (+26.7%), from 134.5 PJ in 2005 to 170.4 PJ in 2010, which is 11.3% above the projected value of 153.1 PJ. Important progress was made in most sectors, especially in biomass (+30.7 PJ), solar (+3.0 PJ) and heat pumps (+2.1 PJ). In relative terms, the most significant increase was registered in solar thermal (+78.3%), followed by heat pumps (+72.5%) and biomass (+24.2%).

The use of geothermal heat has remained at the same level of 0.8 PJ since 2005, only 5.3% above the expected level for 2010. Solar heat utilisation increased from 3.9 PJ in 2005, reaching 6.9 PJ in 2010, 29.1% above the projected value of 5.3 PJ for 2010. Biomass heat grew from 127.0 PJ in 2005 to 157.7 PJ in 2010, 10.3% above the expected biomass heat generation of 143.0 PJ in 2010. The heat production from heat pumps increased from 2.9 PJ in 2005 to 5.7 PJ in 2010, 24.0% above the expected heat generation of 5.0 PJ in 2010.

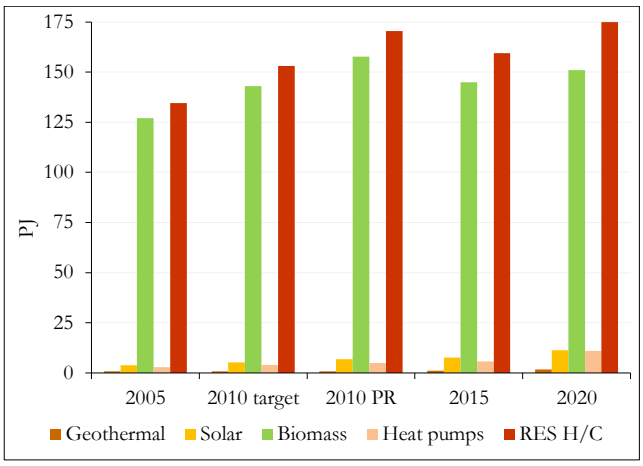

Figure 19-12. RES heat projected growth and progress until 2010 in Austria.

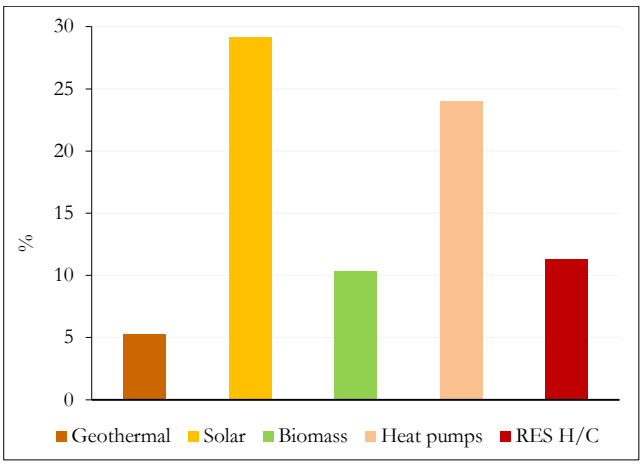

Figure 19-13. Deviation from NREAP in the RES heat generation in Austria in 2010.

19.6. Renewable energy in transport

The use of renewable energy in transport increased in Austria from 8.6 PJ in 2005 to reach 29.9 PJ in 2010, 26.4% above the NREAP projected value of 23.6 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 21.3 PJ (+247.8%). The highest increase was achieved by biodiesel (+14.2 PJ) followed by other biofuels (+2.9 PJ) and bioethanol/bio-ETBE (+2.9 PJ). In relative terms, the most significant increase was registered by biodiesel (+968.6%), followed by other biofuels (+862.5 %) and electricity (19.8%). The use of biofuels from import increased by 13.7 PJ (+961.8%).

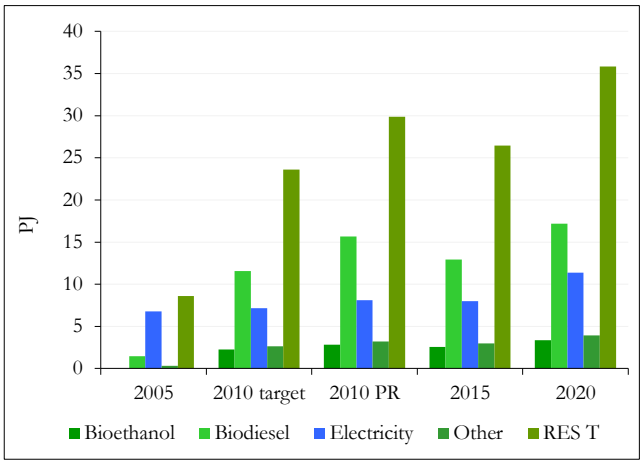

Figure 19-14. RES in transport projected growth and progress until 2010 in Austria.

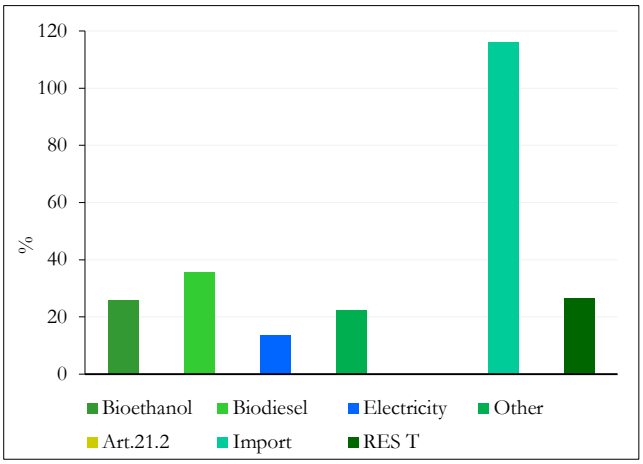

Figure 19-15. Deviation from NREAP in the RES use in transport in Austria in 2010.

Biodiesel is the major contributor to RES in transport, increasing from 1.5 PJ in 2005 to 15.7 PJ in 2010, 35.5% above the 2010 NREAP projected value of 11.6 PJ. The use of Bioethanol/ bio-ETBE grew to 2.8 PJ in 2010, 25.9% above the expected use of 2.3 PJ in 2010. The use of other biofuels (biogas and vegetable oils) rose from 0.3 PJ in 2005 to 3.2 PJ in 2010, 22.2% above the target of 2.6 PJ. The use of biofuels from import increased significantly from 1.4 PJ in 2005 to 15.1 PJ in 2010, 116.2% above the expected value of 7.0 PJ. The use of renewable electricity also increased from 6.8 PJ in 2005 to 8.1 PJ in 2010, 13.5% below the target of 7.2 PJ projected for 2010.

20. Renewable energy in Poland

20.1. Deployment of renewable energy

Poland did not provide complete data for the use of renewable energy in 2005 in the NREAP. The renewable energy deployment in Poland increased to 268.7 PJ in 2010, 9.5% above the projected RES use of 245.3 PJ for 2010 and it is expected to further increase to 445.0 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 176.3 PJ.

The use of renewable energy in heating and cooling increased to 194.1 PJ in 2010, 16.5% above the projected level of 166.6 PJ. The renewable electricity increased to 37.4 PJ in 2010, but this is 2.1% below the expected target of 38.2 PJ. The use of renewable energy in transport grew from 2.3 PJ in 2005 to 37.9 PJ in 2010, but 3.1% below the target of 41.1 PJ in 2010.

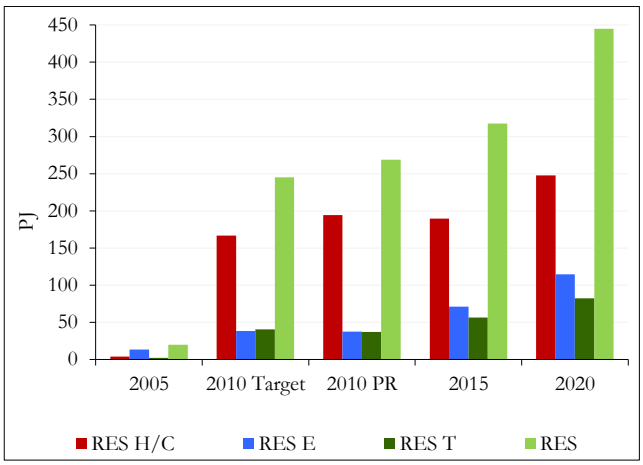

Figure 20-1. RES deployment in Poland: projected growth and actual progress.

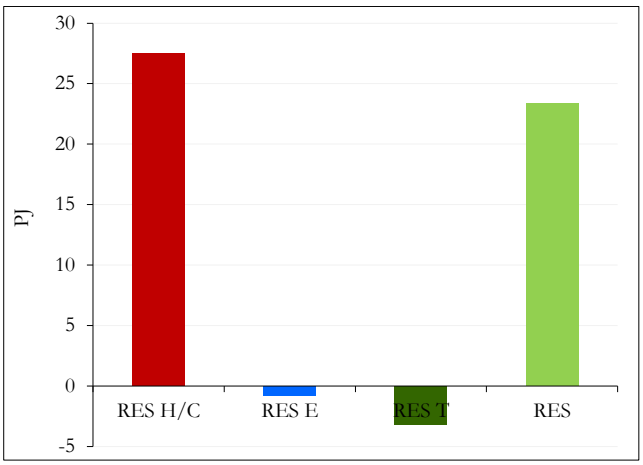

Figure 20-2. Deviation from NREAP in the RES production in Poland in 2010.

Table 20-1. RES use in Poland, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	194.1	27.5	16.5	189.9	4531.9	53.8	27.7	247.9
RES-E	37.4	-0.8	-2.1	23.8	174.4	77.2	206.4	114.7
RES-T	37.9	-3.1	-7.6	35.7	1577.8	46.1	121.4	84.0
RES	268.7	23.4	9.5	248.6	1237.4	176.3	65.6	445.0

20.2. Renewable energy share

The analysis of the Progress Report for Poland shows that the overall share of RES increased from 7.2% in 2005 to 9.5% in 2010 and this is expected to reach 15.9% in 2020, according to the NREAP. This is above the target of 15% requested in the Renewable Energy Directive.

The highest increase in the share of renewable energy was made in transport (from 0.4% to 7.3%), followed by electricity (from 2.6% to 6.7%), heating and cooling[1] (from 11.0% to 12.0%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 6.7% to 19.1%), followed by transport (from 7.3% to 11.4%) and heating & cooling (from 12.0% to 17.1%).

[1] Calculated, based on data reported in NREAP

The overall share of RES was just below the target in 2010 by only 0.1% points, reaching 9.5% in 2010, in comparison with 9.6% projected in the NREAP. The RES share in heating and cooling is below the projected value by 0.3% points, reaching 12.0% in comparison with expected share of 12.3% in 2010. The share of renewable electricity was below the target by 0.8% points, reaching 6.7% in comparison with 7.5% expected value. The share of RES in transport was above by 1.4% points, reaching 7.3% in comparison with 5.8% projected RES share.

Table 20-2. Projected growth in RES share in Poland and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	0.0	12.3	12.0	-0.3	13.7	17.1
RES-E	0.0	7.5	6.7	-0.8	13.0	19.1
RES-T	0.4	5.8	7.3	1.4	8.4	11.4
Overall RES	0.0	9.6	9.5	-0.1	12.1	15.9

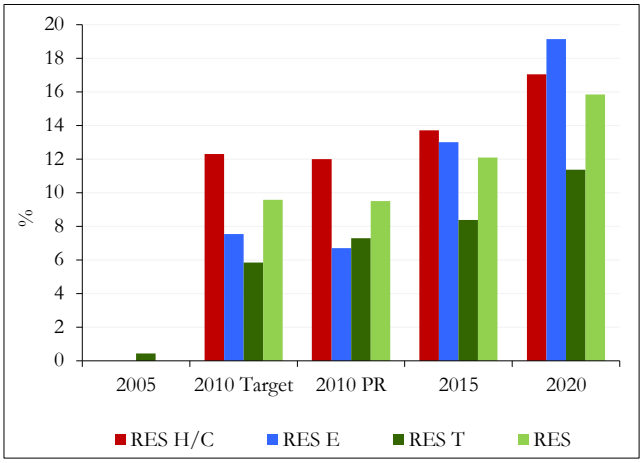

Figure 20-3. RES share in Poland: projected growth and actual progress.

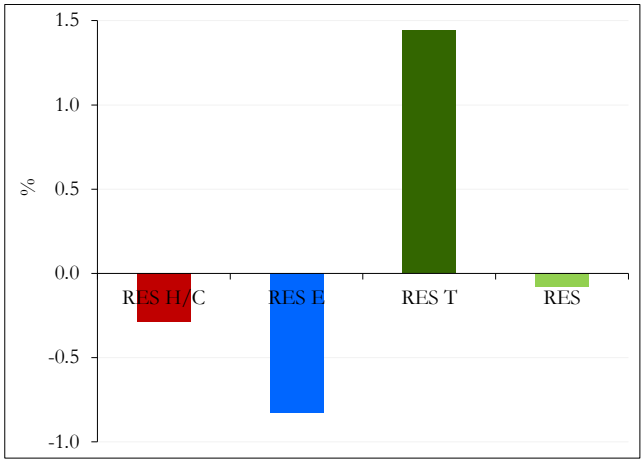

Figure 20-4. Deviation from NREAP in the share of RES in Poland in 2010.

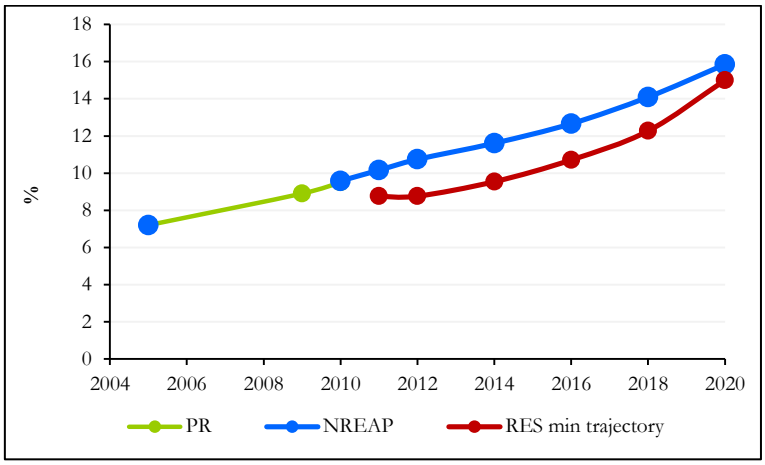

Figure 20-5. Progress of the overall RES share in Poland

Poland overall RES share trajectory during period 2005-2010 seems to follow the trajectory established in its NREAP, meeting in 2010 the planned share. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory defined in RED Directive. Poland exceeded since 2009 the RES minimum indicative share for 2011/2012 and met in 2010 the RES minimum indicative share for 2013/2014. Poland is on track of reaching its RES share target for 2020.

20.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+206.3 PJ) and biofuels (+45.3 PJ), and little growth by wind (+5.6 PJ), hydro (+0.7 PJ), heat pumps (+0.9 PJ), solar thermal and solar electricity (+0.1 PJ) and geothermal (+0.1 PJ). Some progress is expected to be done between 2010-2020, especially by the use of biomass (+49.0 PJ), followed by wind (+46.7 PJ), biofuels (+45.3 PJ), solar (+21.1 PJ), geothermal (+6.9 PJ), heat pumps (+5.3 PJ) and hydro (+2.1 PJ).

In comparison with the expected contribution, the use of two renewable energy sources was above the NREAP 2010 target: biomass by +16.1% and hydro by +4.9%, while the use of several renewable sources was below the target: solar by -87.9%, geothermal by -41.7%, wind by -26.4%, heat pumps by -15.2% and biofuels by -8.2%.

Table 20-3. The contribution of different sources of renewable energy in Poland

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	7.9	8.2	8.6	8.8	10.7
Geothermal	0.5	1.0	0.6	2.4	7.5
Solar	0.0	0.9	0.1	7.4	21.2
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.5	8.3	6.1	26.5	52.8
Heat pumps	0.0	1.0	0.9	3.0	6.2
Biomass	8.9	185.4	215.3	212.6	264.3
Biofuels	2.3	40.4	37.1	56.6	82.4

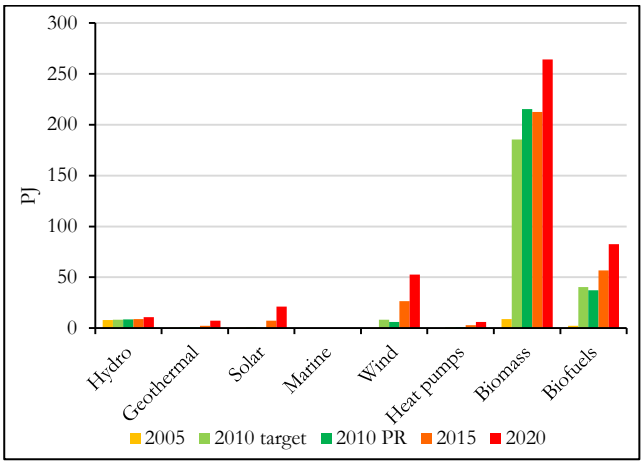

Figure 20-6. Contribution of renewable sources in Poland: projected growth and actual progress

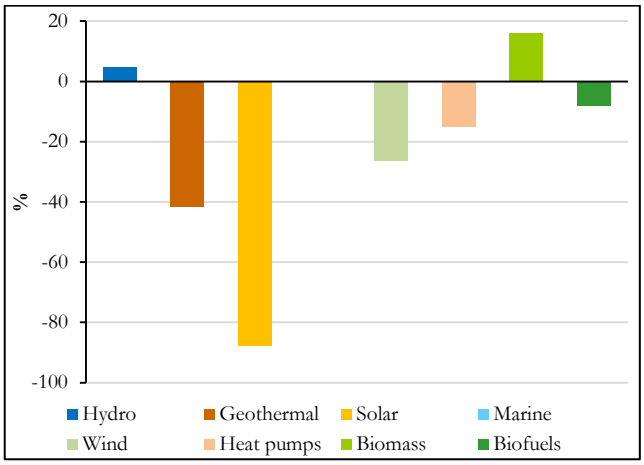

Figure 20-7. Deviation from NREAP in the contribution of renewable sources in Poland in 2010

The use of biomass was the major contributor to RES use in 2010 with an 80% share, followed by biofuels with 14%, hydro with 3%, wind with 2%, and heat pumps with 0.3%. In 2020, the major contribution is expected to come from the use of biomass with 59%, followed by wind with 12%, solar with 5%, hydro with 2%, geothermal with 2% and heat pumps with 1.4%.

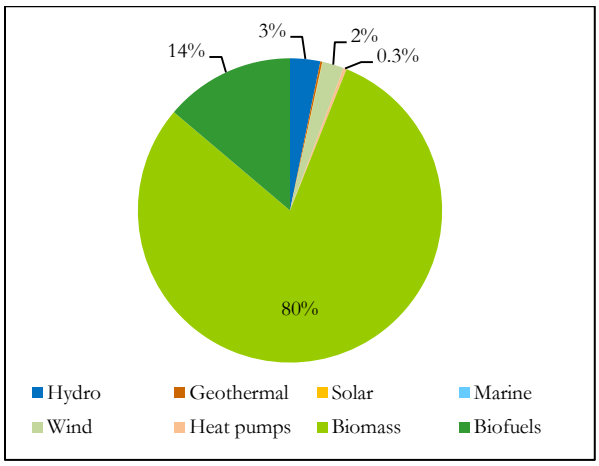

Figure 20-8. Share of renewable sources for electricity, heating & cooling in Poland in 2010

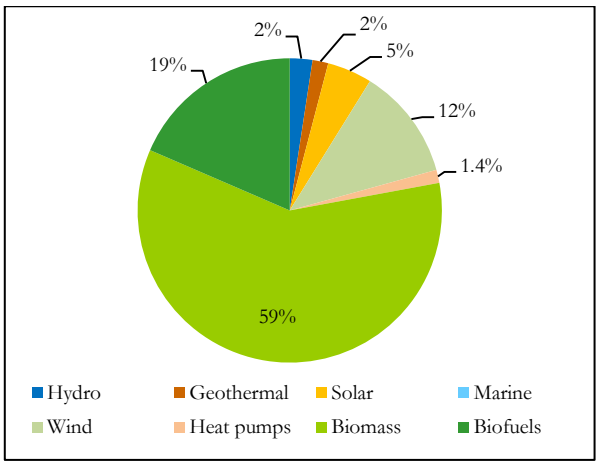

Figure 20-9. Share of renewable sources for electricity, heating & cooling in Poland in 2020

20.4. Renewable electricity

The renewable electricity generation increased in Poland by 6608 GWh (+174.4%), from 3788 GWh in 2005, reaching 10396 GWh in 2010, which is 2.1% below the NREAP projected value of 10618 GWh. Significant progress was made between 2005-2010 in all sectors, especially in biomass power (+4853 GWh), followed by wind (+1564 GWh) and hydro (+189 GWh). In relative terms, the most significant increase was registered in wind power (+1150%), followed by biomass (+334.4%) and hydro (+8.6%).

Hydro power generation increased from 2201 GWh in 2005 to reach 2390 GWh in 2010, 4.9% above the projected value of 2279 GWh. Solar electricity generation grew to 1.7 GWh in 2010, 67.2% above the expected solar power generation of only 1 GWh in 2010. Wind power grew from 136 GWh in 2005 to 1700 in 2010, 26.4% below the expected wind power generation of 2310 GWh in 2010. Biomass electricity generation increased significantly from 1451 GWh to 6304 GWh, 4.6% above the projected level of 6028 GWh in 2010.

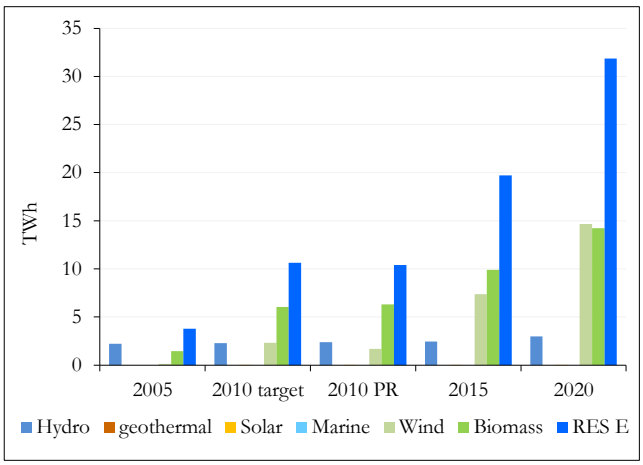

Figure 20-10. RES electricity projected growth and progress until 2010 in Poland.

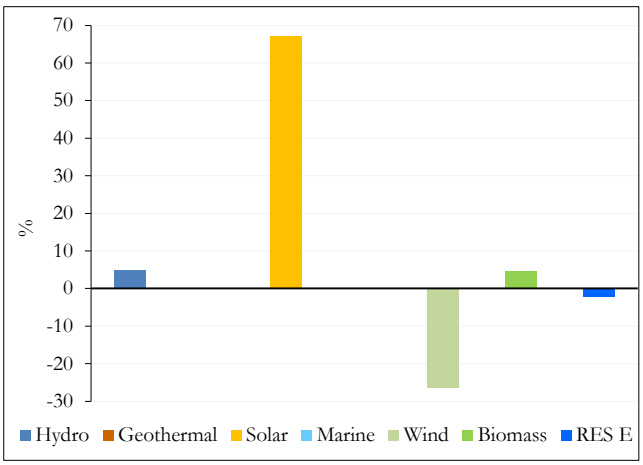

Figure 20-11. Deviation from NREAP in the RES electricity generation in Poland in 2010.

20.5. Renewable energy in heating & cooling

The use of renewable heating and cooling[1] increased in Poland to 194.1 PJ in 2010, which is 16.5% above the expected value of 166.6 PJ. Some progress was made in heating & cooling between 2005-2010 in heat pumps with 0.9 PJ, solar thermal with 0.1 PJ (+1100%) and geothermal with 0.1 PJ

[1] Data for 2005 includes only biomass for district heat; biomass used for local heating is not given.

(+17.5%). The use of geothermal heat increased from 0.5 PJ in 2005 to reach 0.6 PJ in 2010, which is 41.7% below the projected value of 1.0 PJ for 2010. Solar heat utilisation rose to 0.1 PJ in 2010, 88.6% below the projected value of 0.9 PJ. The heat generation from heat pumps increased to 0.9 PJ in 2010, 15.2% below the expected heat pumps generation of 1.0 PJ in 2010. Biomass heat reached 192.6 PJ in 2010, 17.6% above the expected biomass heat generation of 163.7 PJ in 2010.

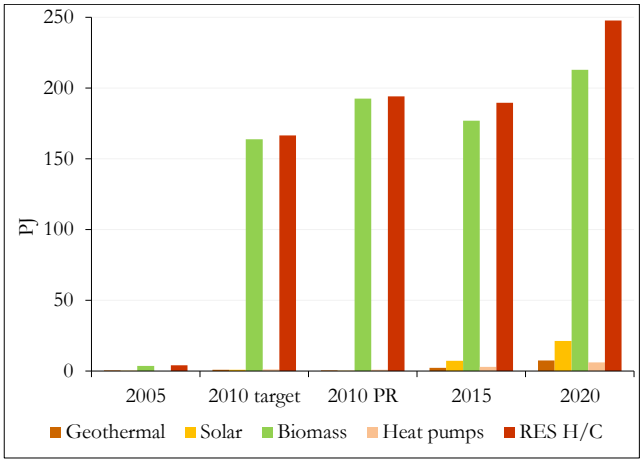

Figure 20-12. RES heat projected growth and progress until 2010 in Poland.

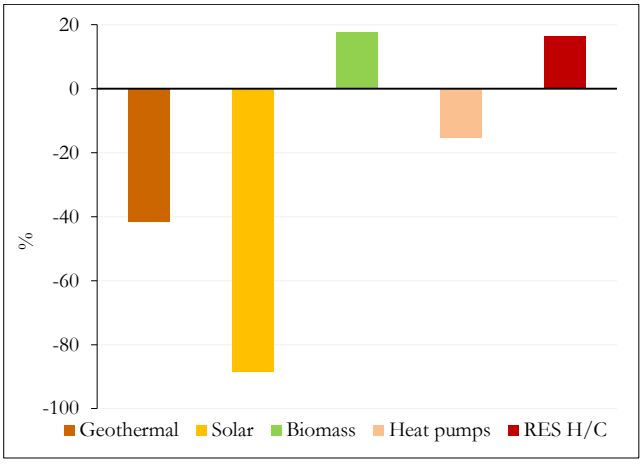

Figure 20-13. Deviation from NREAP in the RES heat generation in Poland in 2010.

20.6. Renewable energy in transport

The use of renewable energy in transport increased in Poland from 2.3 PJ in 2005 to reach 37.9 PJ in 2010, 7.6% below the NREAP projected value of 41.1 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 35.7 PJ (+1578%). The highest increase was achieved by biodiesel (+28.6 PJ) followed by biofuels from wastes, residues, ligno-cellulosic material (art 21.2 biofuels) (+8.9 PJ) and bioethanol/bio-ETBE (+6.3 PJ). In relative terms, the most significant increase was registered by biodiesel (+4262%) and bioethanol/bio-ETBE (+397.4%).

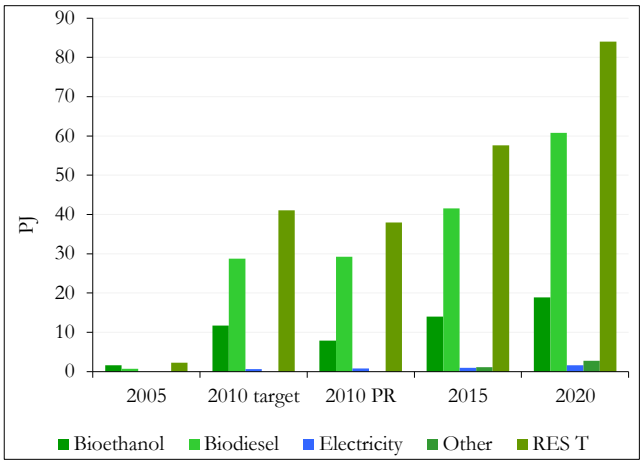

Figure 20-14. RES in transport projected growth and progress until 2010 in Poland.

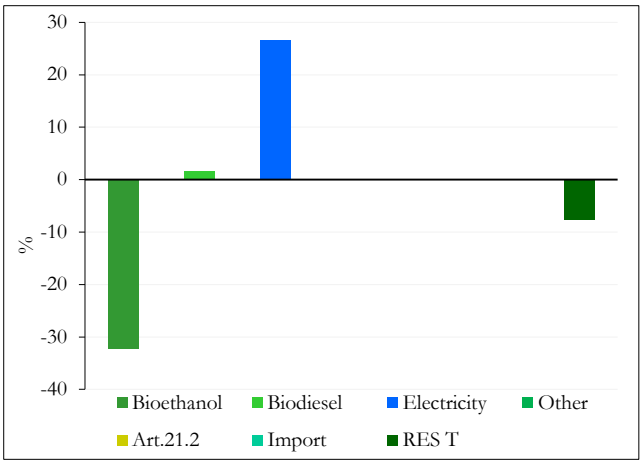

Figure 20-15. Deviation from NREAP in the RES use in transport in Poland in 2010.

Biodiesel is the major contributor to RES use in transport, increasing from 0.7 PJ in 2005 to 29.2 PJ in 2010, 1.6% above the 2010 NREAP projected value of 28.8 PJ. The use of bioethanol/ bio-ETBE grew from 1.6 PJ in 2005 to 7.9 PJ in 2010, 32.3% below the expected bioethanol use of 11.7 PJ in 2010. The use of biofuels from import increased significantly to 18.8 PJ in 2010, while the expected amount was zero for 2010. The use of renewable electricity in transport increased to 0.8 PJ in 2010, which is 26.7% above the target of 0.6 PJ projected for 2010.

21. Renewable energy in Portugal

21.1. Deployment of renewable energy

The renewable energy deployment in Portugal increased from 138.0 PJ in 2005 to 205.7 PJ in 2010, an increase of 67.7 PJ (+49.0%). The renewable use in Portugal was 9.7% above the NREAP projected RES use of 187.5 PJ for 2010 and it is expected to further increase to 253.1 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 47.4 PJ (23.0%), in comparison with the increase of 67.6 PJ (49.0%) achieved in 2005-2010.

Renewable electricity made the most significant progress between 2005 and 2010, with an increase of 48.1 PJ, followed by the use of renewable energy in transport with 14.1 PJ and heating and cooling with 5.8 PJ. The highest relative increase was made by renewable energy in transport (+2805%) followed by electricity (+149.7%) and heating & cooling (+5.5%). The use of renewable energy in heating and cooling increased from 105.9 PJ in 2005 to 111.7 PJ in 2010, well above the projected level of 93.8 PJ. The renewable electricity increased from 32.1 PJ in 2005 to 80.2 PJ in 2010, but this is below the target of 81.9 PJ. The use of renewable energy in transport grew from 0.5 PJ in 2005 to 14.6 PJ in 2010, above the target of 12.6 PJ in 2010.

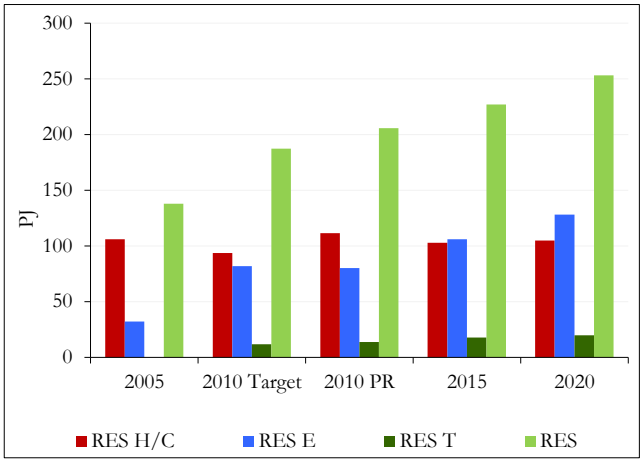

Figure 21-1. RES deployment in Portugal: projected growth and actual progress.

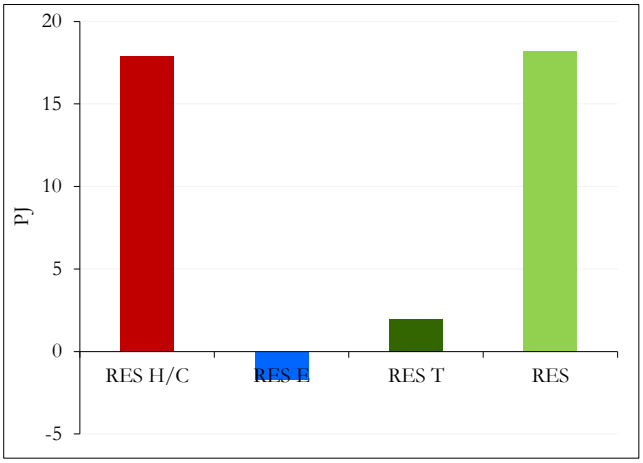

Figure 21-2. Deviation from NREAP in the RES production in Portugal in 2010.

Table 21-1. RES use in Portugal, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	111.7	17.9	19.1	5.7	5.4	-6.7	-6.0	105.0
RES-E	80.2	-1.7	-2.1	48.1	149.6	47.9	59.7	128.1
RES-T	14.6	2.0	15.8	14.1	2805.0	7.8	53.5	22.4
RES	205.7	18.2	9.7	67.6	48.9	47.4	23.0	253.1

21.2. Renewable energy share

The analysis of the Progress Report for Portugal shows that the overall share of RES increased from 19.8% in 2005 to 24.6% in 2010 and this should reach 31.0% in 2020. The highest increase in the share of renewable energy was made in electricity (from 29.3% to 41.2%), followed by transport (from 0.2% to 5.6%) and in heating and cooling (from 31.9% to 34.5%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 41.2% to 55.2%), followed by transport (from 5.6% to 10.0%), while the share of renewable energy in heating & cooling is expected to decrease to 30.6% in 2020.

The overall share of renewable energy was above the target by 0.5% points, reaching 24.6% in 2010, in comparison with 24.1% projections. The RES share in heating and cooling is above the projected value by 3.8% points, reaching 34.5% in comparison with expected share of 30.7% in 2010. The share of renewable electricity is below the target by only 0.2% points, reaching 41.2% in comparison with 41.4% NREAP projected value. The share of RES in transport was above the target by 0.6% points, reaching 5.6% in comparison with 5.0% projected RES share for 2010.

Table 21-2. Table 21-3rojected growth in RES share in Portugal and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	31.9	30.7	34.5	3.8	31.9	30.6
RES-E	29.3	41.4	41.2	-0.2	50.5	55.3
RES-T	0.2	5.0	5.6	0.6	8.0	10.0
Overall RES	19.8	24.1	24.6	0.5	28.4	31.0

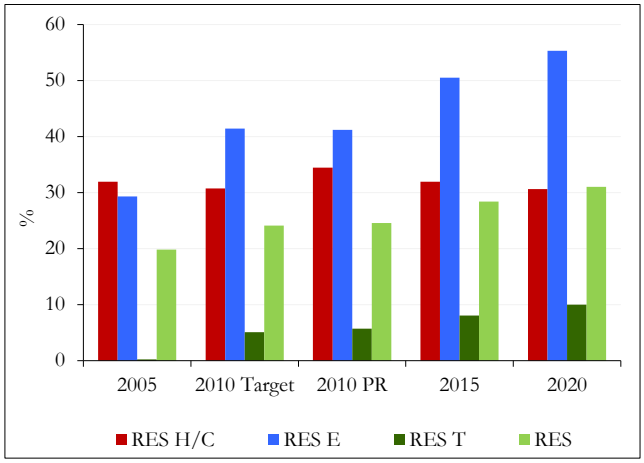

Figure 21-3. RES share in Portugal: projected growth and actual progress.

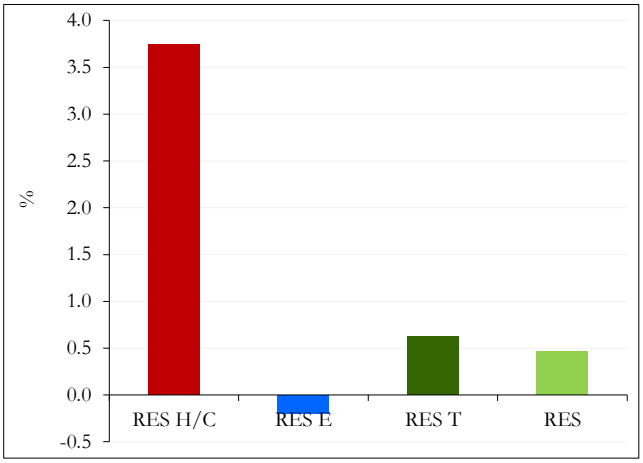

Figure 21-4. Deviation from NREAP in the share of RES in Portugal in 2010.

The overall RES share in Portugal increased significantly during 2005-2010. The overall RES share slightly decreased between 2009-2010. Nevertheless, Portugal exceeded since 2009 the 2010 planned share. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory of the share defined in RED Directive. Portugal is still in good position for reaching its 2020 RES share target.

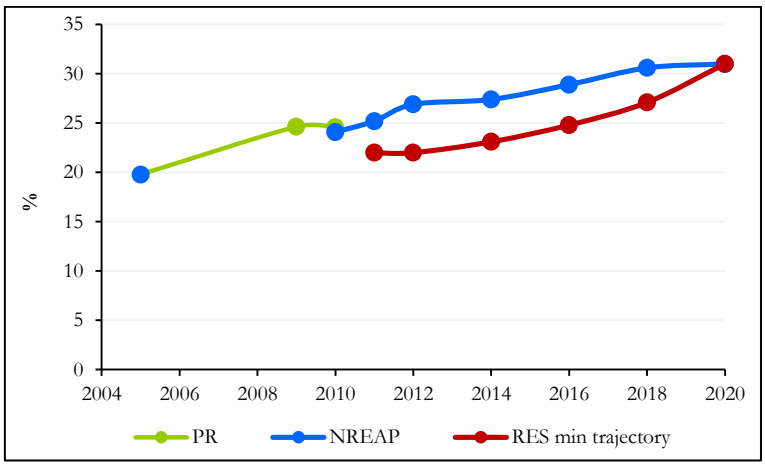

Figure 21-5. Progress of the overall RES share in Portugal

21.3. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered between 2005-2010, especially by wind (+23.8 PJ), followed by hydro (+19.7 PJ), biofuels (+13.8 PJ), the use of biomass for electricity, heating & cooling (+7.6 PJ), solar thermal and solar electricity (+1.8 PJ) and geothermal (+0.9 PJ).

Some progress is expected to be done during 2010-2020, especially by wind (+22.3 PJ) followed by solar (+12.9 PJ), hydro (+12.6 PJ), biofuels (+6.2 PJ), geothermal (+1.7 PJ) and marine energy (+1.6 PJ), while the use of biomass was already above the 2020 target by 9.8 PJ.

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: biomass by +19.8%, biofuels by +17.3%, geothermal by +12.2% and hydro by 8.6, while the use of other renewable sources was below the target: marine by -100%, wind by -17.8% and solar by -6.4%.

Table 21-4. The contribution of different sources of renewable energy in Portugal

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	18.4	35.1	38.1	40.0	50.7
Geothermal	0.2	1.0	1.1	1.7	2.8
Solar	0.9	2.9	2.7	8.6	15.6
Marine	0.0	0.0	0.0	0.3	1.6
Wind	6.4	36.8	30.2	48.5	52.5
Heat pumps	0.0	0.0	0.0	0.0	0.0
Biomass	112.1	99.9	119.7	110.0	109.9
Biofuels	0.0	11.8	13.8	18.0	20.0

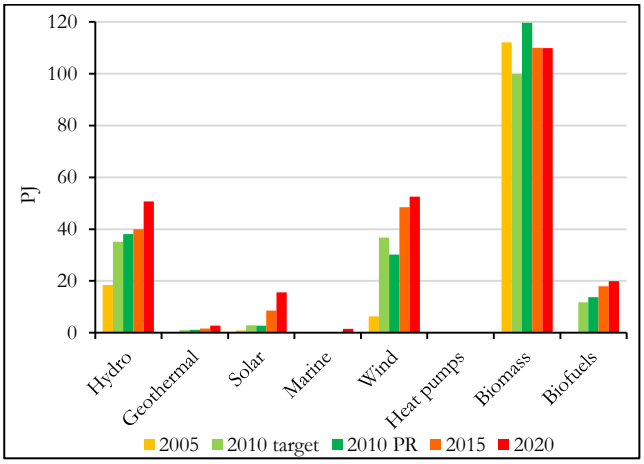

Figure 21-6. Contribution of renewable sources in Portugal: projected growth and actual progress

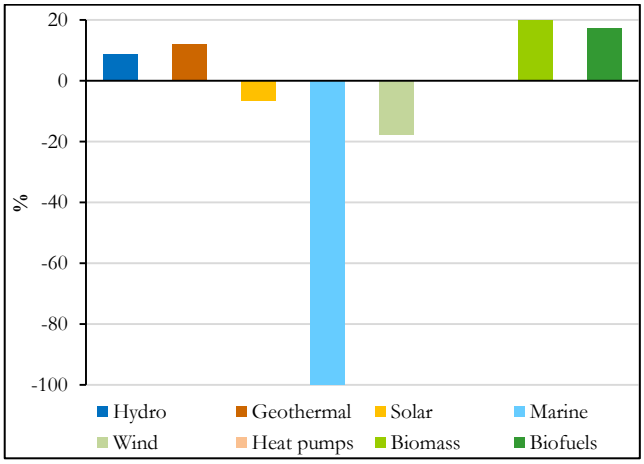

Figure 21-7. Deviation from NREAP in the contribution of renewable sources in Portugal in 2010

The use of biomass was the major contributor to RES use in 2010 with a 58% share, followed by hydro with 18%, wind with 15%, biofuels with 7%, solar with 1% and geothermal with 0.5%. In 2020, the major contribution is expected to come from the use of biomass with 43%, followed by wind with 21%, hydro with 21%, biofuels with 8%, solar with 6%, geothermal with 1% and marine with 0.6%.

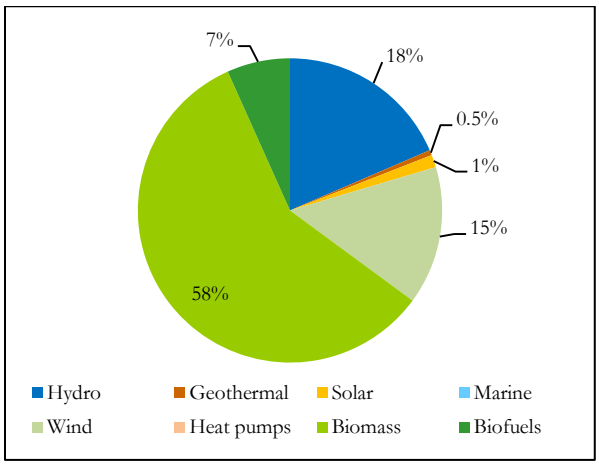

Figure 21-8. Share of renewable sources for electricity, heating & cooling in Portugal in 2010

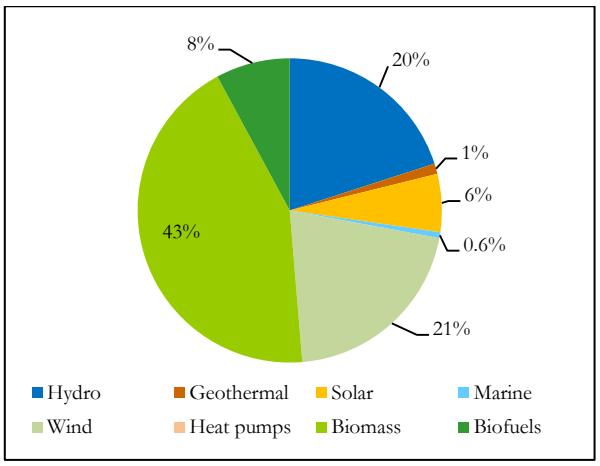

Figure 21-9. Share of renewable sources for electricity, heating & cooling in Portugal in 2020

21.4. Renewable electricity

The renewable electricity generation increased in Portugal by 13356 GWh (+149.6%), from 8925 GWh in 2005 to 22281 GWh in 2010, which is 2.1% below the projected value of 22750 GWh. Significant progress was made between 2005-2010 in all sectors, especially in wind power (+84833 GWh), followed by biomass (+54341 GWh) and solar (+21694 GWh). In relative terms, the most significant increase was registered in solar power (+1476%), followed by wind (+120.6%) and biomass (+78.7%).

Hydro power generation increased from 5118 GWh in 2005, to reach 10584 GWh in 2010, 8.6% above the projected value of 9743 GWh. Geothermal electricity grew from 55 GWh to 197 GWh in 2010, 20.9% above the expected power generation of 163 GWh in 2010. Electricity production from marine sources made no progress until 2010, in comparison with an expected production of 1 GWh. Solar electricity generation increased from 3 GWh to 201 GWh in 2010, 12.6% below the expected power generation of 230 GWh in 2010. Wind power grew from 1773 GWh in 2005 to 8395 in 2010, 17.8% below the expected wind power generation of 10214 GWh in 2010. Biomass electricity generation was above the 2400 GWh projected production for 2010 by 21.0%, reaching 2904 GWh, in comparison with 2400 GWh generated in 2005.

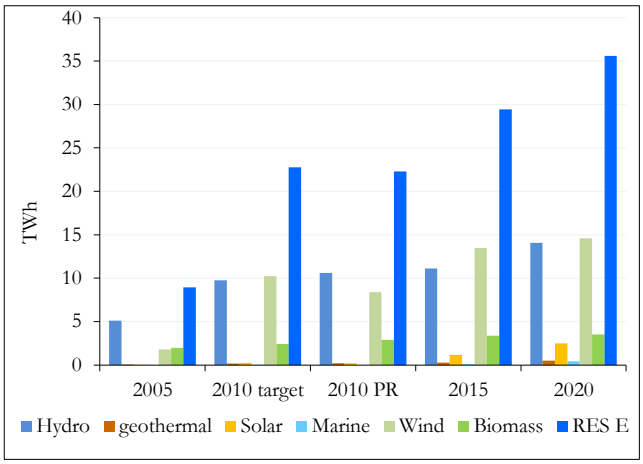

Figure 21-10. RES electricity projected growth and progress until 2010 in Portugal.

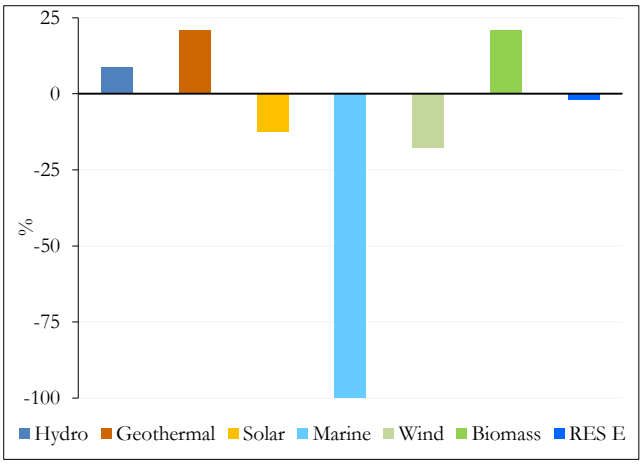

Figure 21-11. Deviation from NREAP in the RES electricity generation in Portugal in 2010.

21.5. Renewable energy in heating & cooling

The use of renewable energy in heating & cooling increased in Portugal by 5.7 PJ (+5.5%), from 106.0 PJ in 2005 to reach 111.7 PJ in 2010, which is 19.1% above the NREAP projected value of 93.7 PJ.

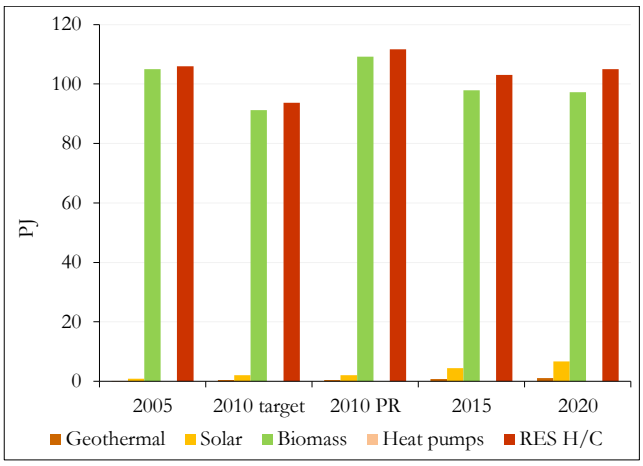

Figure 21-12. RES heat projected growth and progress until 2010 in Portugal.

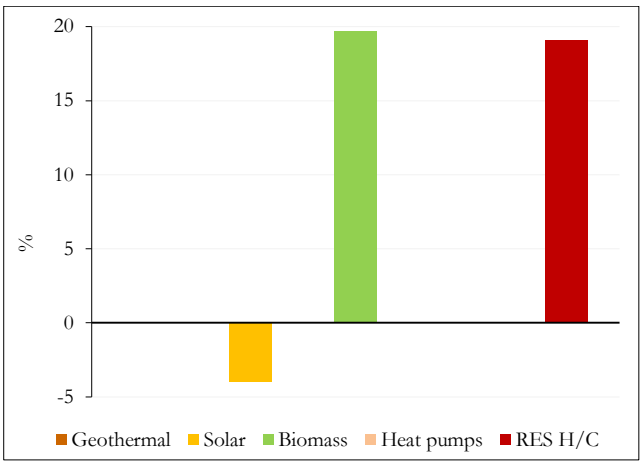

Figure 21-13. Deviation from NREAP in the RES heat generation in Portugal in 2010.

Small progress was made in certain sectors, especially in biomass (+4.2 PJ), solar (+1.1 PJ) and geothermal (+0.4 PJ). In relative terms, the most significant increase was registered in geothermal (+900%), followed by solar thermal (+118.2%) and biomass (+4.0%).

The use of renewable energy in heating & cooling is above the expected target of 105.0 PJ for 2020. Geothermal heat use increased to 0.4 PJ in 2010, just at the projected value for 2010. Solar heat generation rose in comparison with 0.9 PJ in 2005, reaching 2.0 PJ in 2010, 4.0% below the projected value of 2.1 PJ. Biomass heat grew from 105.0 PJ in 2005 to 109.2 PJ in 2010, 19.7% above the expected biomass heat generation of 91.2 PJ in 2010.

21.6. Renewable energy in transport

The use of renewable energy in transport increased in Portugal from 0.5 PJ in 2005 to reach 14.6 PJ in 2010, 15.8% above the NREAP projected value of 12.6 PJ. Biodiesel consumption grew to 13.6 PJ in 2010, 16.0% above the expected use of 11.8 PJ in 2010. The use of other biofuels (biogas and vegetable oils) rose to 0.2 PJ in 2010, in comparison with zero contribution expected. The use of biofuels from wastes, residues, ligno-cellulosic material grew to 0.2 PJ in 2010, which is only 2.5 % below the target for 2010. The use of biofuels from import increased to 0.7 PJ in 2010, while no biofuels were expected to be imported in 2010, according to NREAP. The use of renewable electricity in transport has also increased from 0.5 PJ in 2005 to 0.8 PJ in 2010, which this is 5.0% below the target projected for 2010.

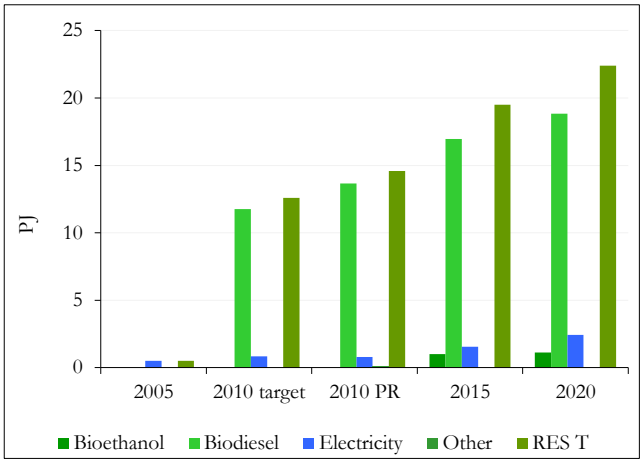

Figure 21-14. RES in transport projected growth and progress until 2010 in Portugal.

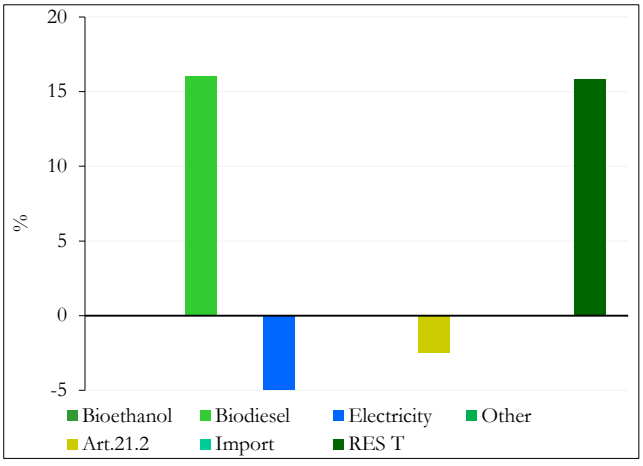

Figure 21-15. Deviation from NREAP in the RES use in transport in Portugal in 2010.

22. Renewable energy in Romania

22.1. Deployment of renewable energy

The renewable energy deployment in Romania increased from 191.2 PJ in 2005 to 230.1 PJ in 2010, an increase of 38.9 PJ (+20.4%). The renewable use in Romania was 21.8% above the NREAP projected RES use of 189.0 PJ for 2010 and it is expected to further increase to 302.9 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 72.8 PJ (31.6%), in comparison with the increase of 38.9 PJ (20.4%) achieved in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 33.2 PJ, followed by renewable electricity with 5.8 PJ, while the use of renewable energy in transport has decreased[1]. The highest relative increase was made by heating and cooling (+13.1%) followed by electricity (+10.0%). The use of RES heating increased from 133.3 PJ in 2005 to 166.4 PJ in 2010, 41.0% above the projected level of 118.0 PJ. The renewable electricity increased from 57.9 PJ in 2005 to 63.7 PJ in 2010, 3.5% above the target of 61.5 PJ. The use of renewable energy in transport decreased by 19.0% from 1.7 PJ in 2005 to 1.4 PJ in 2010, 87.3% below the target of 10.9 PJ in 2010.

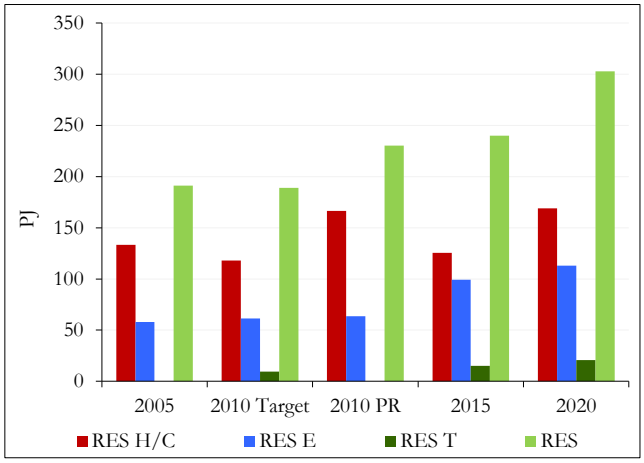

Figure 22-1. RES deployment in Romania: projected growth and actual progress.

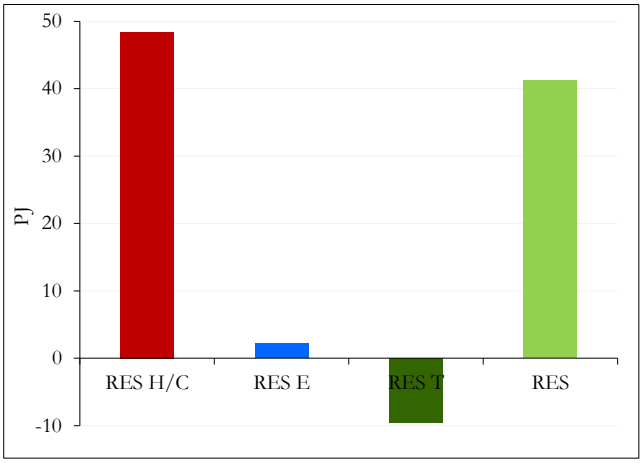

Figure 22-2. Deviation from NREAP in the RES production in Romania in 2010.

Table 22-1. RES use in Romania, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	166.4	48.4	41.0	33.2	24.9	2.6	1.6	169.1
RES-E	63.7	2.2	3.5	5.8	9.9	49.3	77.4	113.0
RES-T	1.4	-9.5	-87.3	-0.3	-19.0	21.7	1561.9	23.1
RES	230.1	41.2	21.8	38.9	20.4	72.8	31.6	302.9

22.2. Renewable energy share

The analysis of the Progress Report for Romania shows that the overall share of RES increased from 17.8% in 2005 to 22.4% in 2010 and this should reach 24.0% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 18.7% to 24.2%), followed by electricity (from 30.1% to 32.1%), while the share of renewable energy used in transport decreased from 1.4% to

[1] Although biofuels were actually used in transport, since no legislative framework was available to verify the compliance with the sustainability criteria, the amount of biofuels was not included as renewable energy used in transport, in the progress report.

0.7%. Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 32.1% to 42.6%), followed by transport (from 0.7% to 12.1%), while the share of renewable energy in heating & cooling was already above the expected share for 2020 (22.0%).

The overall share of RES was above the target by 4.9%, reaching 22.4% in 2010, in comparison with 17.5% projected. The RES share in heating and cooling was above the planned value by 6.4% reaching 24.2% in comparison with expected share of 17.9% in 2010. The share of renewable electricity was above the target by 4.6%, reaching 32.1% in comparison with 27.5% projected value. The share of RES in transport was below the target, reaching 0.7%[1] in comparison with 5.8% projected share.

Table 22-2. Projected growth in RES share in Romania and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	18.7	17.9	24.2	6.4	17.1	22.0
RES-E	30.1	27.5	32.1	4.6	41.9	42.6
RES-T	1.4	5.8	0.7	-5.1	8.0	2.1
Overall RES	17.9	17.5	22.4	4.9	20.1	24.0

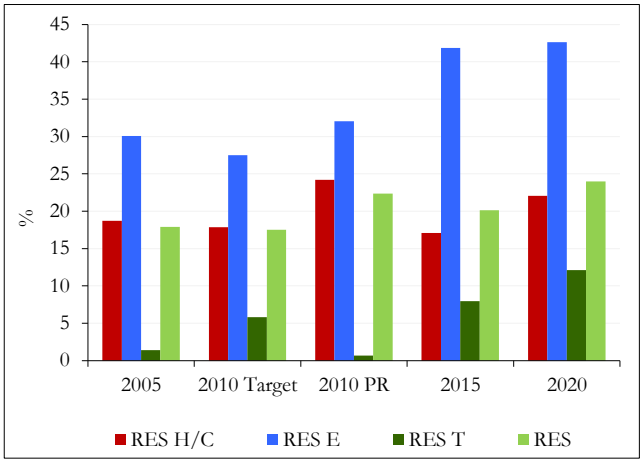

Figure 22-3. RES share in Romania: projected growth and actual progress.

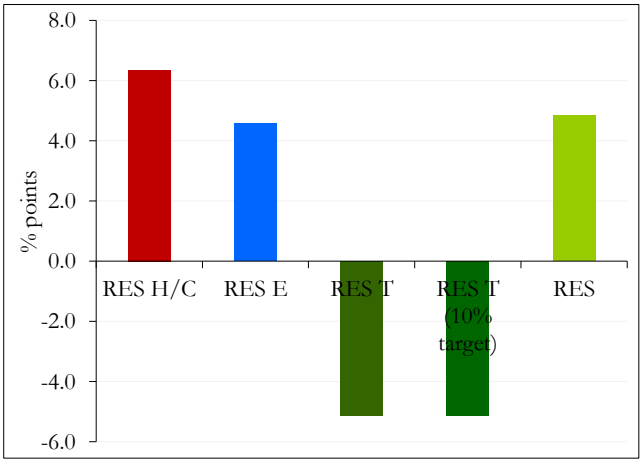

Figure 22-4. Deviation from NREAP in the share of RES in Romania in 2010.

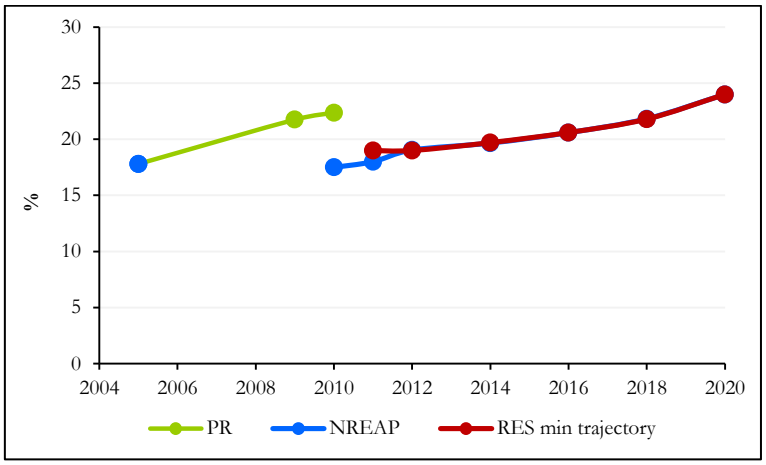

Figure 22-5. Progress of the overall RES share in Romania

[1] Without considering biofuels used in transport, because of lack of certification legislative framework.

The overall RES share for Romania increased significantly between 2005-2010, exceeding the planned RES share for 2010 and the expected targets until 2018 as well as the RES minimum indicative trajectory until 2017/2018. The trajectory expected for the RES share is set in the NREAP just like the minimum indicative trajectory of overall RES share defined in RED Directive. Romania is in good position for the achievement of its 2020 RES share target.

22.3. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+33.1 PJ), followed by hydro (+4.4 PJ) and wind (+1.1 PJ) and solar thermal and solar electricity (+2.4 PJ). More progress is expected to be done between 2010-2020, especially by wind (+29.2 PJ), biofuels (+20.7 PJ), hydro (+8.8 PJ), biomass (+7 PJ), geothermal (+2.3 PJ), and heat pumps (+0.5 PJ).

In comparison with the expected contribution, only the use of two renewable sources was above the NREAP 2010 target: biomass by +41.3% and hydro by +4.6%, while the use of other renewable sources was below the target: biofuels by -100%, wind power by -35% and geothermal energy by -2.6%.

Table 22-3. The contribution of different sources of renewable energy in Romania

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	57.9	59.6	62.4	67.2	71.2
Geothermal	0.7	1.0	1.0	2.2	3.3
Solar	0.0	0.0	0.0	1.2	4.1
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.0	1.7	1.1	23.8	30.2
Heat pumps	0.0	0.0	0.0	0.1	0.5
Biomass	132.6	117.2	165.7	130.1	172.7
Biofuels	0.0	9.4	0.0	15.2	20.7

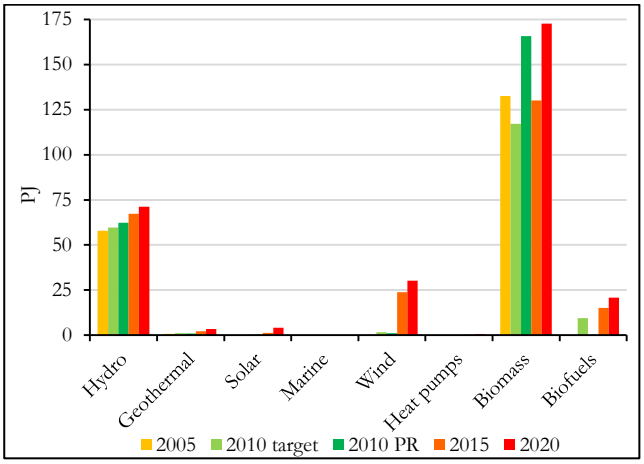

Figure 22-6. Contribution of renewable sources in Romania: projected growth and actual progress

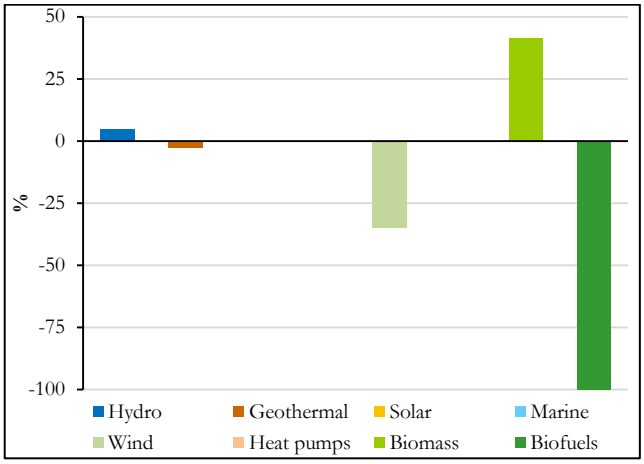

Figure 22-7. Deviation from NREAP in the contribution of renewable sources in Romania in 2010

The use of biomass was the major contributor to RES use in 2010 with a 72% share, followed by hydro with 27%, wind with 0.5% and geothermal with 0.4%. In 2020, the major contribution is expected to come from the use of biomass with 57%, followed by hydro with 24%, wind with 10%, biofuels with 10%, solar with 1% geothermal with 1% and heat pumps with 0.2%.

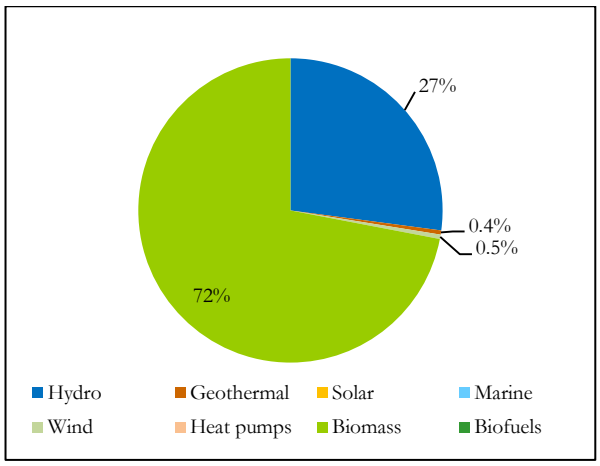

Figure 22-8. Share of renewable sources for electricity, heating & cooling in Romania in 2010

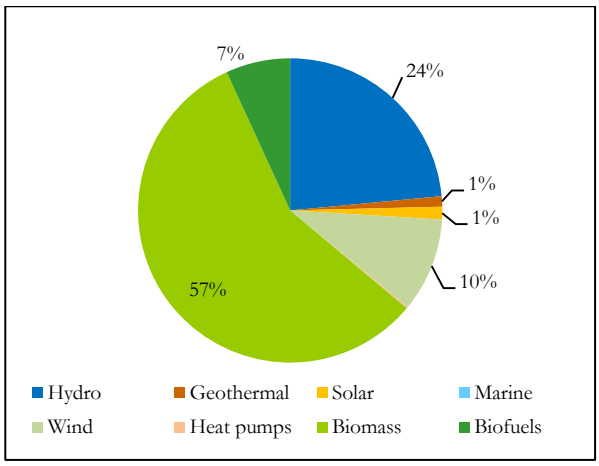

Figure 22-9. Share of renewable sources for electricity, heating & cooling in Romania in 2020

22.4. Renewable electricity

The renewable electricity generation increased in Romania by 1600 GWh (+10.0%), from 16092 GWh in 2005, reaching 17692 GWh in 2010, which is 3.5% above the NREAP projected value of 17094 GWh. Some progress was made between 2005-2010, especially in hydro power (+1232 GWh), followed by wind (+299 GWh) and biomass (+69 GWh).

Hydro power is the major contributor to renewable electricity generation in Romania, increasing from 16092 GWh produced in 2005, to reach 17324 GWh in 2010, 4.6% above the projected value of 16567 GWh. Solar electricity generation has made a very small contribution to electricity generation to 0.02 GWh in 2010. Wind power increased from 0.2 GWh in 2005 to 299 GWh in 2010, 35.0% below the expected wind power generation of 460 GWh in 2010. Biomass electricity generation increased to 69 GWh, which is 3.7% above the 67 GWh projected production for 2010.

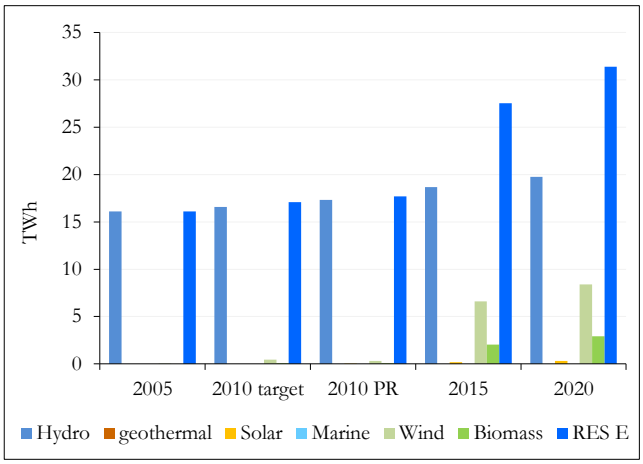

Figure 22-10. RES electricity projected growth and progress until 2010 in Romania.

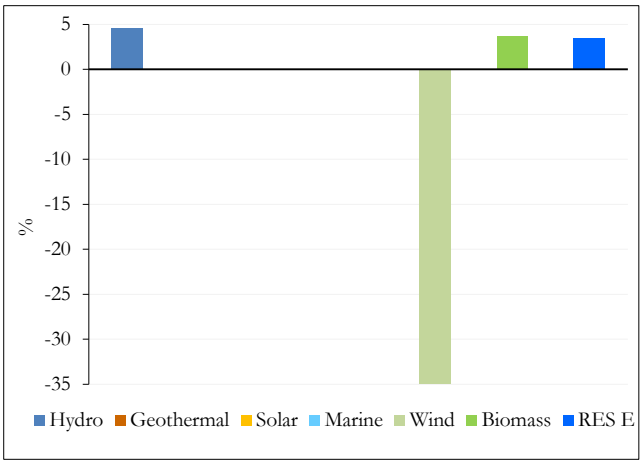

Figure 22-11. Deviation from NREAP in the RES electricity generation in Romania in 2010.

22.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Romania from 133.3 PJ in 2005, reaching 166.4 PJ in 2010, which is 41.0% above the NREAP projected value of 118.0 PJ. Some progress was made in biomass heating & cooling (+32.9 PJ) and geothermal (+0.3 PJ). In relative terms, the most significant increase was registered in the use of geothermal heat (+43.2%), followed by biomass (+24.8%).

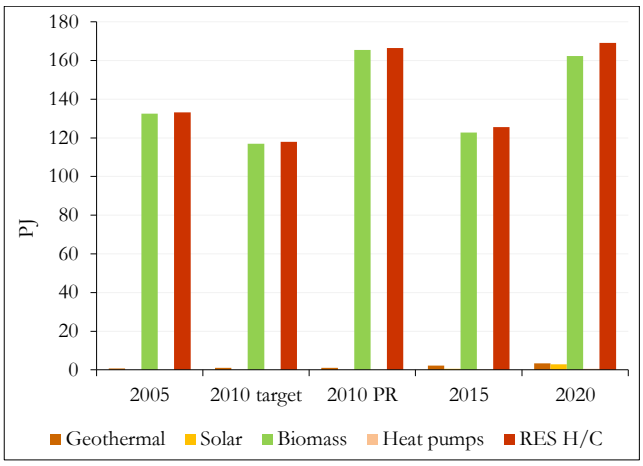

Figure 22-12. RES heat projected growth and progress until 2010 in Romania.

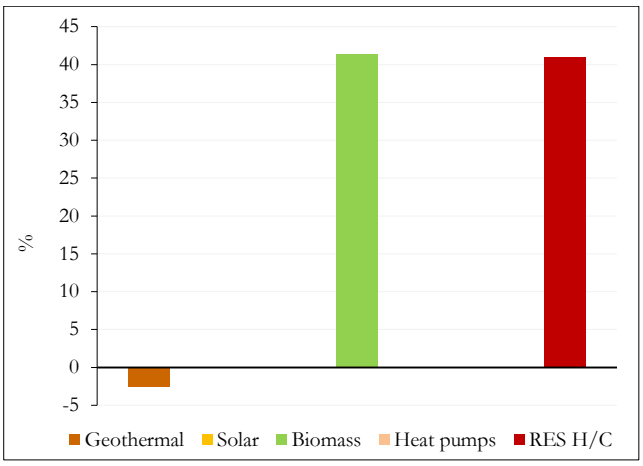

Figure 22-13. Deviation from NREAP in the RES heat generation in Romania in 2010.

The use of geothermal heat utilisation increased from 0.7 PJ in 2005 to 1.0 PJ in 2010, just 2.6% below the expected level for 2010. Biomass heat is the major contributor to RES heat, increasing from 132.6 PJ in 2005 to 165.4 PJ in 2010, 41.4% above the expected biomass heat generation of 117.0 PJ in 2010.

22.6. Renewable energy in transport[1]

Although biofuels were actually used in transport, since no legislative framework was available to verify the compliance with the sustainability criteria, the amount of biofuels was not included as renewable energy used in transport, in the progress report. The use of renewable energy in transport decreased in Romania from 1.7 PJ in 2005 to reach 1.4 PJ in 2010, 87.3% below the NREAP projected value of 10.9 PJ. The use of renewable electricity in transport decreased by 19.0% from 1.7 PJ in 2005 to 1.4 PJ in 2010, which is 8.2% below the target of 1.5 PJ projected for 2010.

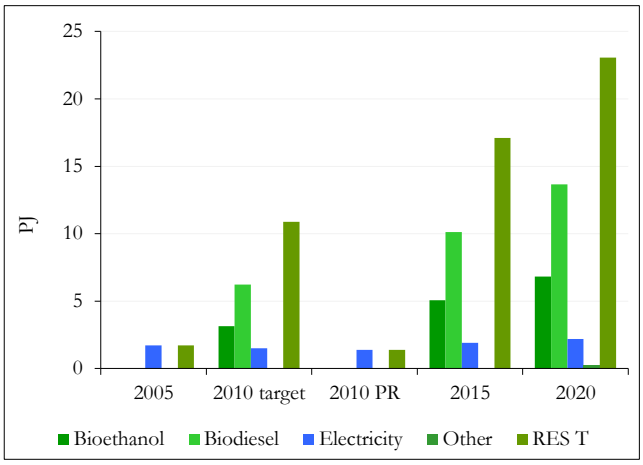

Figure 22-14. RES in transport projected growth and progress until 2010 in Romania.

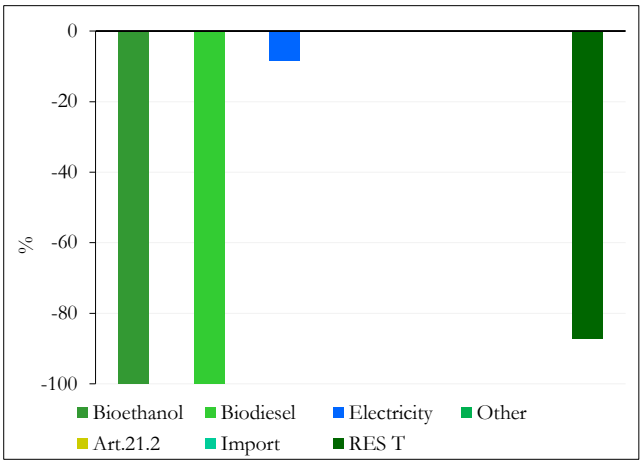

Figure 22-15. Deviation from NREAP in the RES use in transport in Romania in 2010.

The progress report showed that the actual use of biofuels increased to 119.7 PJ in 2010. Biodiesel was the major contributor to RES in transport, increasing to 6.0 PJ in 2010, 4.4% below the 2010 NREPprojected value of 6.2 PJ. The use of bioethanol/ bio-ETBE grew to 4.6 PJ in 2010, 47.9% above the expected use of 3.1 PJ in 2010. The use of biofuels from import grew to 4.9 PJ in 2010, while the expected contribution was zero for 2010.

[1] Romania has reported no contribution of biofuels to transport, as no proof was provided as complying with the sustainability criteria

23. Renewable energy in Slovenia

23.1. Deployment of renewable energy

The renewable energy deployment in Slovenia increased from 34.6 PJ in 2005 to 43.6 PJ in 2010, an increase of 9.1 PJ (+32.1%). The renewable use in Slovenia was 19.3% above the NREAP projected RES use of 36.6 PJ for 2010. This is expected to further increase to 56.3 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 12.6 PJ (29.0%), in comparison with the increase of 9.1 PJ achieved in 2005-2010.

Renewable heating & cooling made the most significant progress between 2005 and 2010, with an increase of 7.2 PJ and renewable electricity with 1.9 PJ. The highest relative increase was made by the renewable heating & cooling (+36.9%) and electricity (+12.8%). The use of renewable energy in heating & cooling increased from 19.4 PJ in 2005 to 26.5 PJ in 2010, 42.5% above the projected level of 18.6 PJ. The renewable electricity increased from 15.2 PJ in 2005 to 17.1 PJ in 2010, 5.2% above the target of 16.2 PJ.

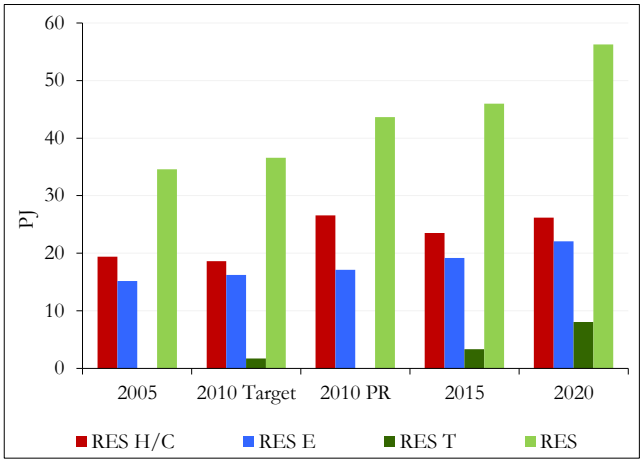

Figure 23-1. RES deployment in Slovenia: projected growth and actual progress.

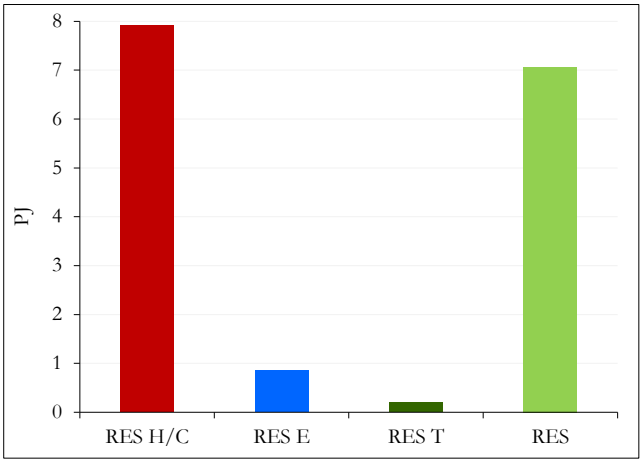

Figure 23-2. Deviation from NREAP in the RES production in Slovenia in 2010.

Table 23-1. RES use in Slovenia, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	26.5	7.9	42.5	7.2	36.9	-0.4	-1.4	26.2
RES-E	17.1	0.8	5.2	1.9	12.7	5.0	29.1	22.1
RES-T	2.1	0.2	10.1	2.0	1195	6.4	301.2	8.5
RES	45.8	9.2	25.2	11.2	32.5	10.5	23.0	56.3

23.2. Renewable energy share

The analysis of the Progress Report for Slovenia shows that the overall share of RES increased from 16.2% in 2005 to 19.9% in 2010 and this should reach 25.3% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 20.0% to 26.6%), followed by electricity (from 28.5% to 32.2%) and in transport (from 0.3% to 2.9%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in transport (from 2.9% to 10.5%), followed by and heating & cooling (from 26.6% to 30.8%) and electricity (from 32.2% to 39.3%).

The overall share of RES was above the target in 2010 by 2.2% points, reaching 19.9%, as compared with 17.7% projected in the NREAP. The RES share in heating & cooling is above the projected value by 4.3% points reaching 26.6% in comparison with expected share of 22.3% in 2010. The share of renewable electricity is below the target by 0.2% points, reaching 32.2% in comparison with 32.4% projected value. The share of RES in transport was above by 0.3% points, reaching 2.9% in comparison with 2.6% projected RES share.

Table 23-2. Projected growth in RES share in Slovenia and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	20.0	22.3	26.6	4.3	27.3	30.8
RES-E	28.5	32.4	32.2	-0.2	35.4	39.3
RES-T	0.3	2.6	2.9	0.3	4.7	10.5
Overall RES	16.2	17.7	19.9	2.2	21.2	25.3

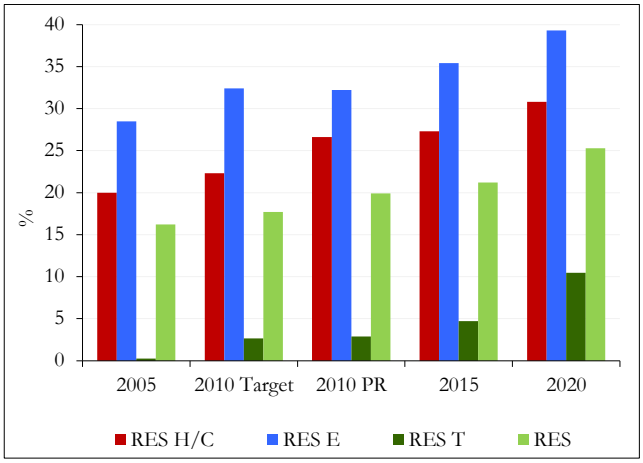

Figure 23-3. RES share in Slovenia: projected growth and actual progress.

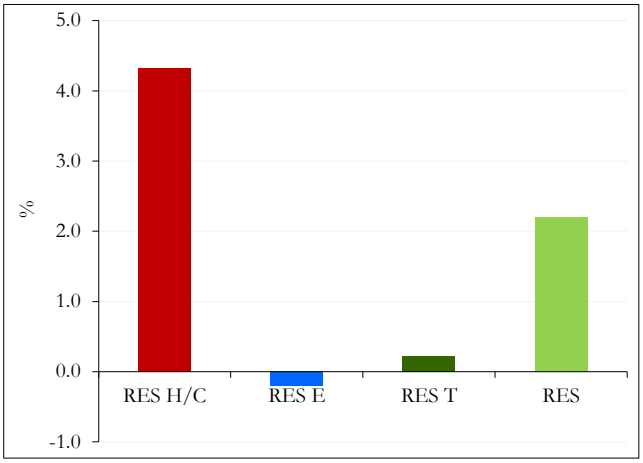

Figure 23-4. Deviation from NREAP in the share of RES in Slovenia in 2010.

The overall RES share for Slovenia increased since 2005 and exceeded the 2010, 2011 and 2012 RES planned shares, as well as the RES minimum indicative trajectory until 2013/2014. The trajectory expected for the RES share is set in the NREAP just above the minimum indicative trajectory of overall RES share defined in RED Directive. If Slovenia will continue the development between 2005-2010 it will be able to reach the 2020 RES share target.

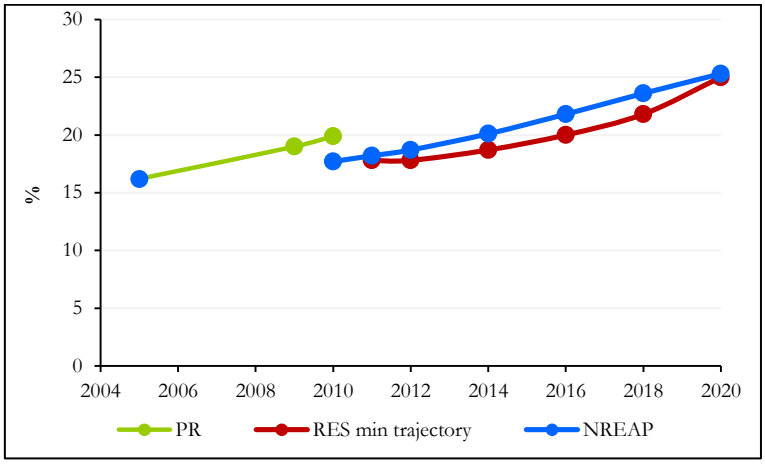

Figure 23-5. Progress of the overall RES share in Slovenia

23.3. Sources of renewable energy

Some increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+7.0 PJ), followed by hydro (+1.5 PJ), geothermal (+0.4 PJ) and solar thermal and solar electricity (+0.1 PJ).

More progress is expected to be done between 2010-2020, especially by the use of biofuels (+8.0 PJ), followed by heat pumps (+2.4 PJ), hydro (+2.2 PJ), solar (+1.1 PJ), and wind (+9.9 PJ), while the use of some renewable sources as already above the 2020 target: biomass (+1.6 PJ) and geothermal (+0.3 PJ).

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: geothermal by +44.4%, biomass by +41.2% and solar by 1.4%, while the use of several renewable sources was below: wind by -100%, heat pumps by -100% and biofuels by -100%.

Table 23-3. The contribution of different sources of renewable energy in Slovenia

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	14.8	15.1	16.2	16.4	18.4
Geothermal	0.7	0.8	1.1	0.8	0.8
Solar	0.1	0.3	0.3	0.6	1.4
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.4	0.7
Heat pumps	0.0	0.3	0.0	1.6	2.4
Biomass	19.0	18.4	26.0	23.0	24.4
Biofuels	0.0	1.7	0.0	3.3	8.0

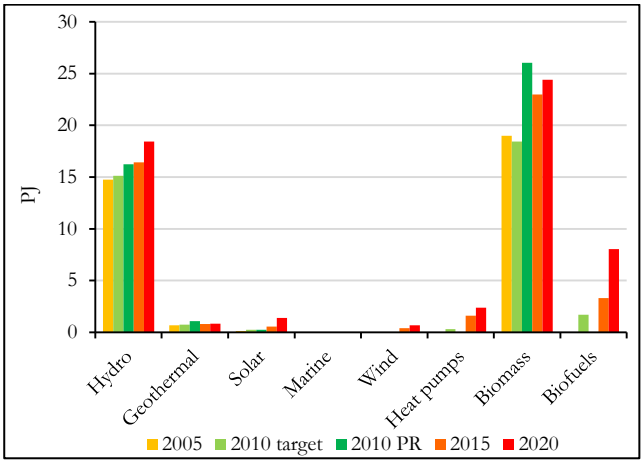

Figure 23-6. Contribution of renewable sources in Slovenia: projected growth and actual progress

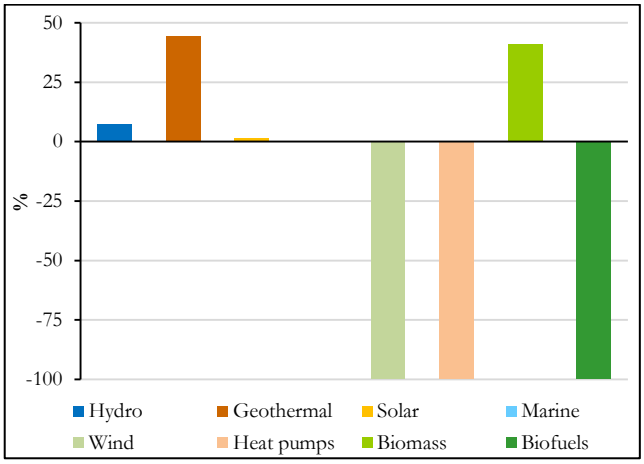

Figure 23-7. Deviation from NREAP in the contribution of renewable sources in Slovenia in 2010

The use of biomass was the major contributor to RES use in 2010 with a 60% share, followed by hydro with 37%, geothermal with 2.4% and solar with 0.6%. In 2020, the major contribution is expected to come from the use of biomass with 43%, followed by hydro with 33%, biofuels with 14%, heat pumps with 4%, solar with 2.5% geothermal with 1.5% and wind with 1%.

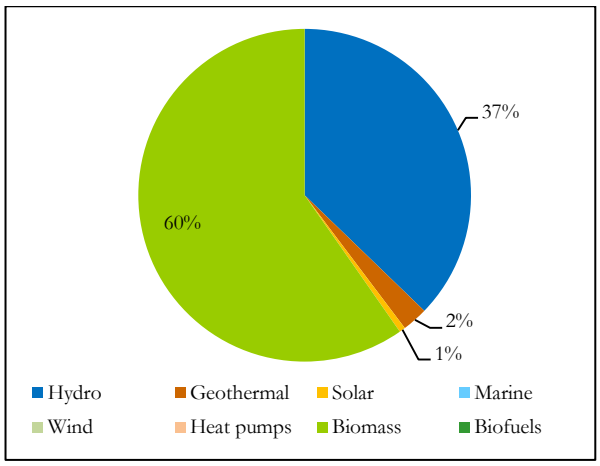

Figure 23-8. Share of renewable sources for electricity, heating & cooling in Slovenia in 2010

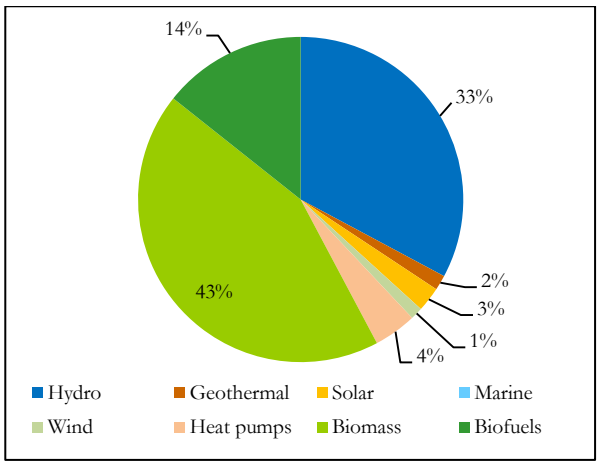

Figure 23-9. Share of renewable sources for electricity, heating & cooling in Slovenia in 2020

23.4. Renewable electricity

The renewable electricity generation increased in Slovenia by 533 GWh (+12.7%), from 4213 GWh in 2005, reaching 4746 GWh in 2010, which is 5.2% above the NREAP projected value of 4510 GWh. Some progress was made between 2005-2010 in some sectors, namely in biomass (+108 GWh) and solar (13 GWh). In relative terms, the most significant increase was registered in biomass power (+94.7%), followed by hydro (+10.1%).

Hydro power generation increased in comparison with 4099 GWh produced in 2005, reaching 4511 GWh in 2010, 7.5% above the projected value of 4198 GWh. Solar electricity generation grew to 13 GWh in 2010, 8.3% above the expected solar power generation of 12 GWh in 2010. Wind power has made no progress until 2010, compared to the expected wind power generation of 2 GWh in 2010. Biomass electricity generation increased from 114 GWh in 2005 to 222 GWh, which is 25.5% below the 298 GWh projected production for 2010.

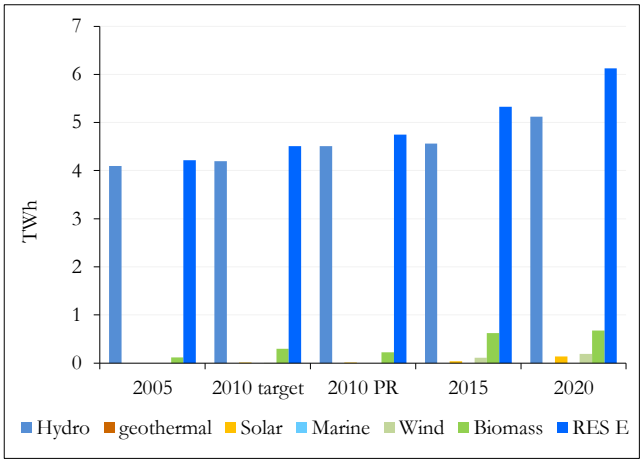

Figure 23-10. RES electricity projected growth and progress until 2010 in Slovenia.

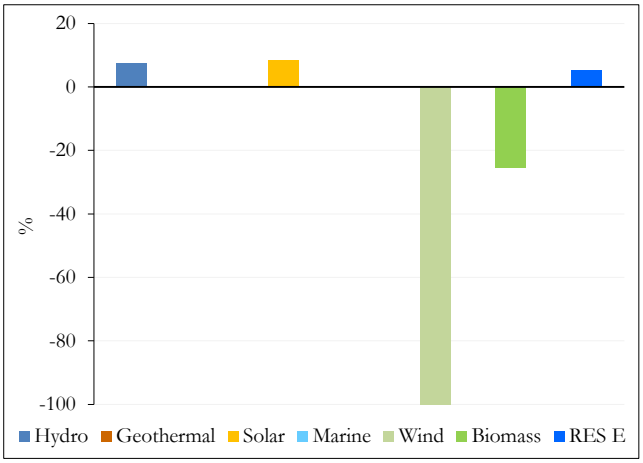

Figure 23-11. Deviation from NREAP in the RES electricity generation in Slovenia in 2010.

23.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Slovenia by 7.2 PJ (+36.9%), from 19.4 PJ in 2005, reaching 26.5 PJ in 2010, which is 42.5% above the NREAP projected value of 18.6 PJ. Some progress was made in some sectors, especially in biomass (+6.7 PJ), geothermal (+0.4 PJ) and solar (+0.1 PJ). In relative terms, the most significant increase was registered in solar thermal (+66.7%), followed by geothermal (+62.5%) and biomass (+31.0%).

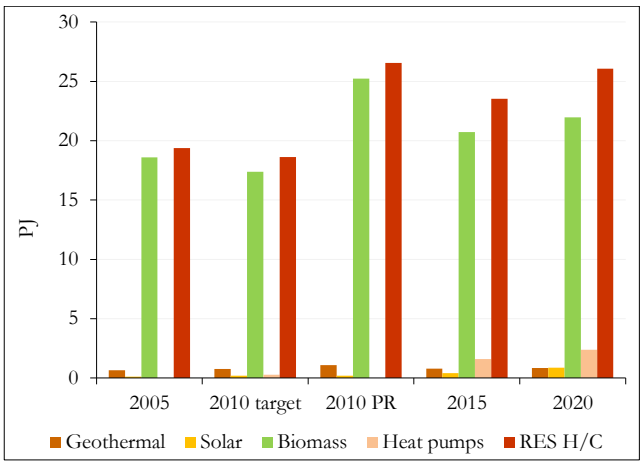

Figure 23-12. RES heat projected growth and progress until 2010 in Slovenia.

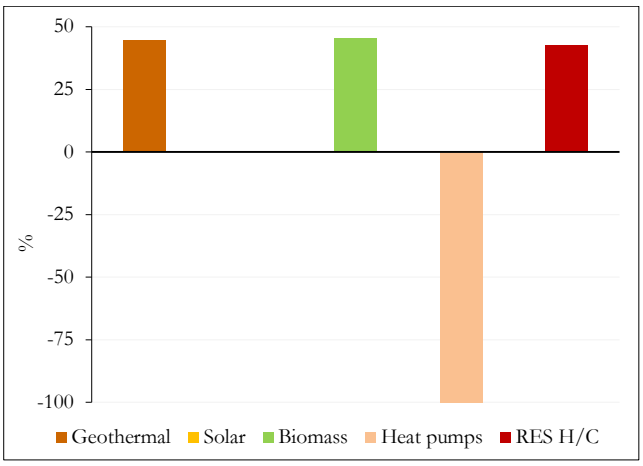

Figure 23-13. Deviation from NREAP in the RES heat generation in Slovenia in 2010.

Geothermal heat utilisation increased in comparison with 0.7 PJ in 2005, reaching 11 PJ in 2010, 44.4% above the projected value of 0.8 PJ. Solar heat increased from 0.1 PJ in 2005 to 0.2 PJ in 2010, at the expected solar heat generation expected for 2010. Biomass heat grew from 18.6 PJ in 2005 to 25.2 PJ in 2010, 45.3% above the expected biomass heat generation of 17.4 PJ in 2010. The heat pumps utilisation has not made any progress until 2010, remaining 0.3 PJ below the expected level for 2010.

23.6. Renewable energy in transport

Although Slovenia has reported a use of 2.1 PJ and a share of 2.9% renewable energy in transport, no data was provided on the contribution of biofuels and renewable electricity in 2010 in this sector. In comparison a RES amount of 1.7 PJ was expected to be reached in 2010, according to the NREAP.

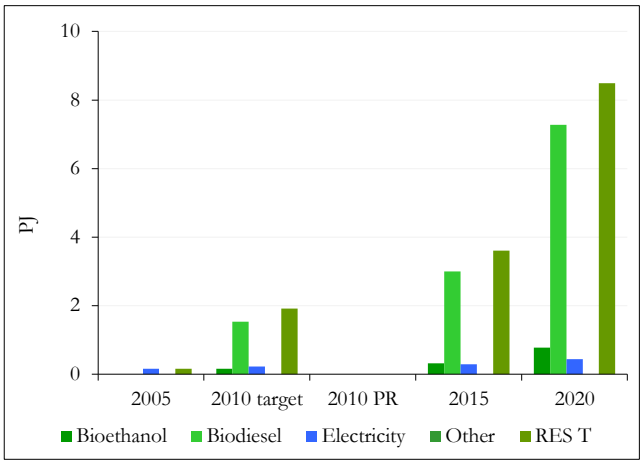

Figure 23-14. RES in transport projected growth and progress until 2010 in Slovenia.

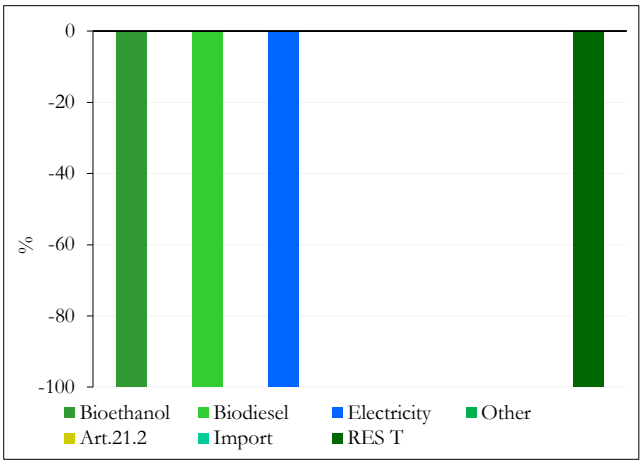

Figure 23-15. Deviation from NREAP in the RES use in transport in Slovenia in 2010.

24. Renewable energy in Slovakia

24.1. Deployment of renewable energy

The renewable energy deployment in Slovakia increased from 32.0 PJ in 2005 to 45.4 PJ in 2010, an increase of 13.4 PJ (+41.8%). The renewable use in Slovakia was 7.9% above the NREAP projected RES use of 42.1 PJ for 2010. This is expected to further increase to 71.1 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 25.7 PJ (+56.5%), in comparison with the increase of 13.4 PJ achieved in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 7.8 PJ, followed by renewable energy in transport with 3.4 PJ and renewable electricity with 2.2 PJ. The highest relative increase was made by the use of renewable energy in transport (+1013%) followed by the heating and cooling (+51.8%) and electricity (+12.8%).

The use of renewable energy in heating and cooling increased from 15.1 PJ in 2005 to 22.9 PJ in 2010, well above the projected level of 18.9 PJ. The renewable electricity increased from 16.9 PJ in 2005 to 19.1 PJ in 2010, below the target of 19.7 PJ. The use of renewable energy in transport grew from 0.3 PJ in 2005 to 3.7 PJ in 2010, just below the target of 3.8 PJ in 2010.

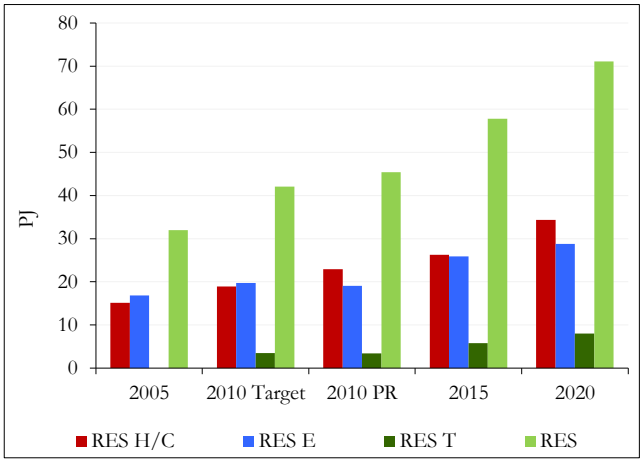

Figure 24-1. RES deployment in Slovakia: projected growth and actual progress.

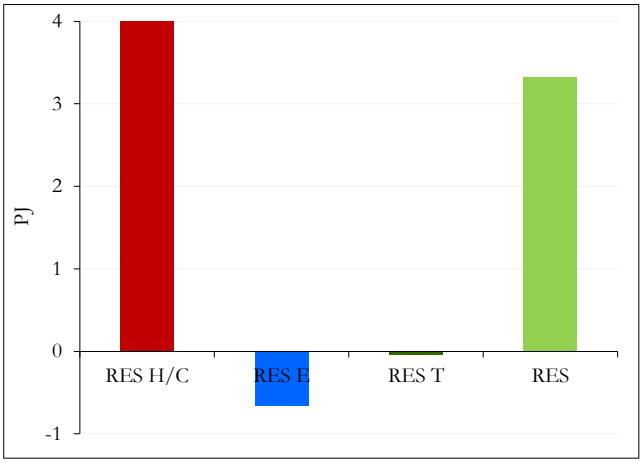

Figure 24-2. Deviation from NREAP in the RES production in Slovakia in 2010.

Table 24-1. RES use in Slovakia, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	22.9	4.0	21.2	7.8	51.8	11.4	49.6	34.3
RES-E	19.1	-0.7	-3.4	2.2	13.3	9.7	51.0	28.8
RES-T	3.7	0.0	-1.1	3.4	1012.5	4.9	132.6	8.7
RES	45.4	3.3	7.9	13.5	42.1	25.7	56.5	71.1

24.2. Renewable energy share

The analysis of the Progress Report for Slovakia shows that the overall share of RES increased from 6.7% in 2005 to 10.2% in 2010 and this should reach 15.3% in 2020. The highest increase in the share of renewable energy was made in transport (from 0.5% to 4.0%), followed by heating and cooling (from 6.1% to 9.2%) and electricity (from 16.7% to 18.6%).

Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in transport (from 4.0% to 10.0%), followed by heating & cooling (from 9.2% to 14.6%) and electricity (from 18.6% to 24.0%).

The overall share of renewable energy was above the target by 0.7% points, reaching 10.2% in 2010, in comparison with 9.5% projected in the NREAP. The RES share in heating and cooling was above the projected value by 1.6% points reaching 9.2% in comparison with expected share of 7.6% in 2010. The share of renewable electricity was below the target by 0.5% points, reaching 18.6% in comparison with 19.1% projected value. The share of RES in transport was below by 0.1% points, reaching 4% in comparison with 4.1% projected RES share for 2010.

Table 24-2. Projected growth in RES share in Slovakia and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	6.1	7.6	9.2	1.6	10.9	14.6
RES-E	16.7	19.1	18.6	-0.5	23.0	24.0
RES-T	0.6	4.1	4.0	-0.1	6.0	10.0
Overall RES	6.7	9.5	10.2	0.7	12.7	15.3
Overall minim RES	6.7	9.5	10.2	0.7	10.0	14.0

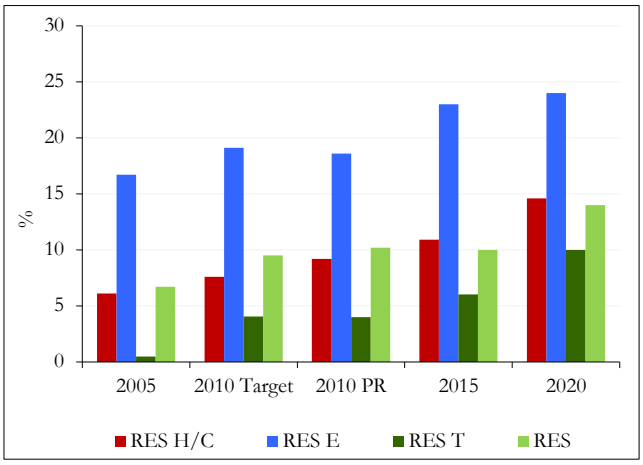

Figure 24-3. RES share in Slovakia: projected growth and actual progress.

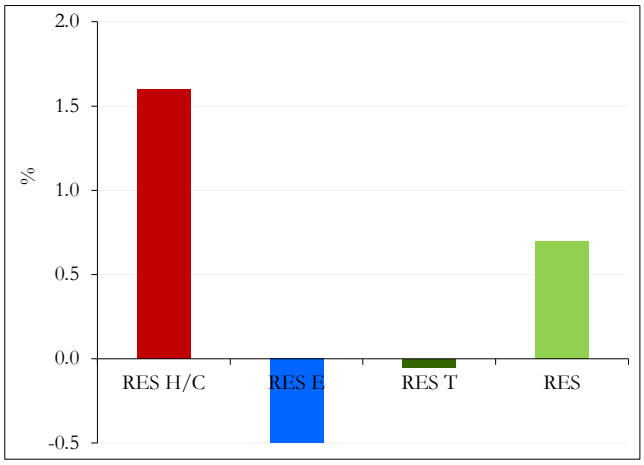

Figure 24-4. Deviation from NREAP in the share of RES in Slovakia in 2010.

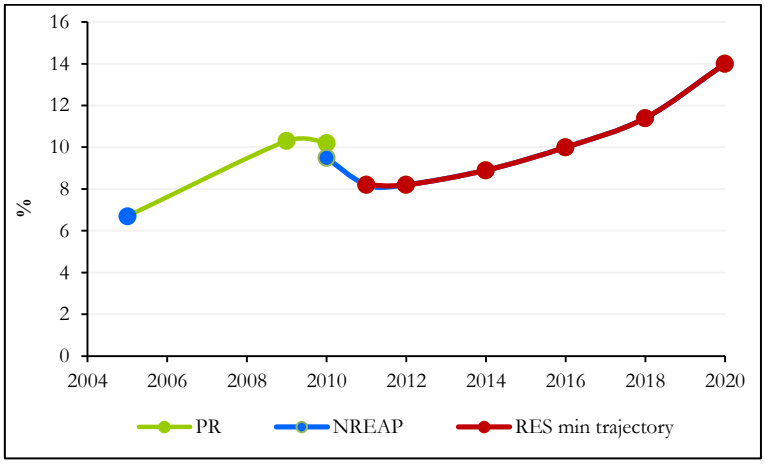

Figure 24-5. Progress of the overall RES share in Slovakia

The overall RES share in Slovakia increased significantly in 2005-2010, decreased slightly during 2009-2010 but still exceeding the planned overall NREAP expected RES share and RES minimum indicative

share for the period 2010-2016. The trajectory expected for the RES share is set in the NREAP just like the minimum indicative trajectory of overall RES share defined in RED Directive. Slovakia is still in good position to reach the 2020 RES share target.

24.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+9.9 PJ), followed by biofuels (+3.4 PJ) and geothermal (+0.2 PJ), while the use of hydro energy decreased (+0.1 PJ). More progress is expected to be done between 2010-2020, especially by the use of biomass (+10.0 PJ), followed by bio-fuels (+4.6 PJ), geothermal (+3.5 PJ), hydro (+2.8 PJ), solar (+2.3 PJ), wind (+2.0 PJ) and heat pumps (+0.4 PJ).

In comparison with the expected contribution, the use of two renewable energy sources was above the NREAP 2010 target: geothermal by +166.7% and biomass by +42.2%, while the use of several sources was below: solar by -79.3%, wind by -143%, hydropower by -4.6% and biofuels by -1.1%.

Table 24-3. The contribution of different sources of renewable energy in Slovakia

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	16.7	17.4	16.6	18.6	19.4
Geothermal	0.1	0.1	0.3	1.8	3.9
Solar	0.0	0.2	0.0	0.9	2.3
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	1.7	2.0
Heat pumps	0.0	0.0	0.0	0.2	0.4
Biomass	15.1	20.9	25.0	29.0	35.0
Biofuels	0.0	3.4	3.4	5.7	8.0

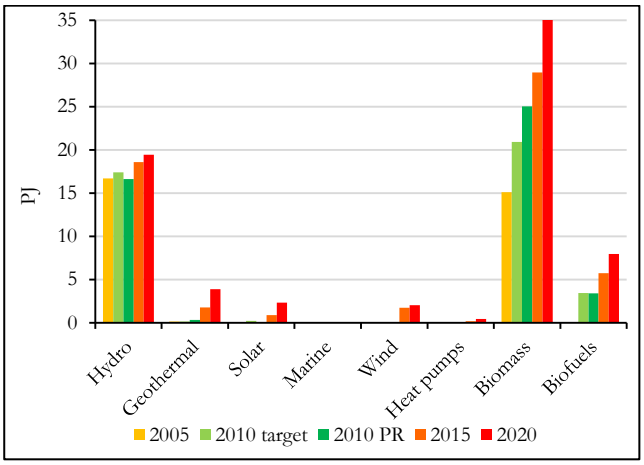

Figure 24-6. Contribution of renewable sources in Slovakia: projected growth and actual progress

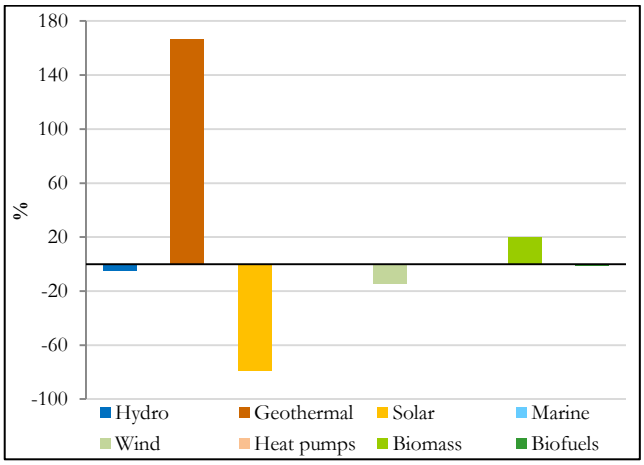

Figure 24-7. Deviation from NREAP in the contribution of renewable sources in Slovakia in 2010

The use of biomass was the major contributor to RES use in 2010 with a 55% share, followed by hydro with 37%, biofuels with 7% and geothermal with 1%. In 2020, the major contribution is expected to come from the use of biomass with 49%, followed by hydro with 27%, biofuels with 11%, geothermal with 6%, solar with 3%, wind with 3% and heat pumps with 1%.

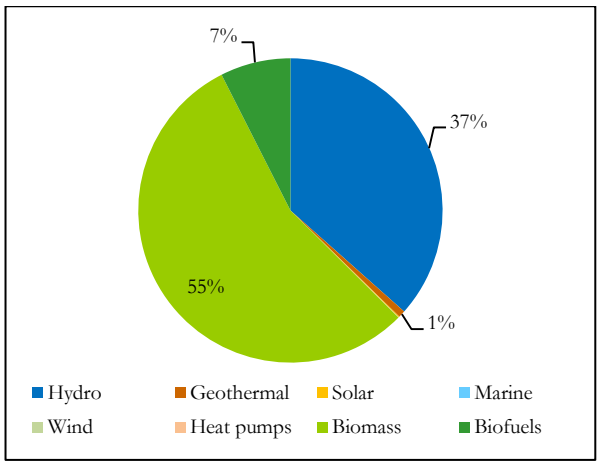

Figure 24-8. Share of renewable sources for electricity, heating & cooling in Slovakia in 2010

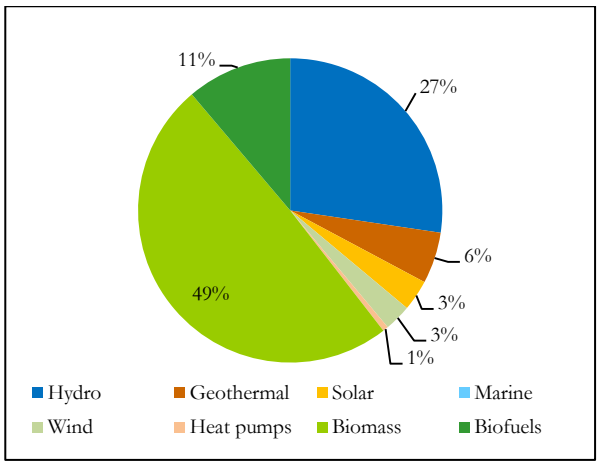

Figure 24-9. Share of renewable sources for electricity, heating & cooling in Slovakia in 2020

24.4. Renewable electricity

The renewable electricity generation increased in Slovakia by 620 GWh (+13.3%), from 4677 GWh in 2005, reaching 5297 GWh in 2010, which is 3.4% below the NREAP projected power generation of 5481 GWh. Some progress was made between 2005-2010, especially in biomass (+636 GWh) and solar electricity (+11 GWh). In relative terms, a significant increase was registered in biomass (+1988%).

Hydro power generation has decreased in comparison with 4638 GWh produced in 2005, reaching 4612 GWh in 2010, 4.6% below the projected value of 4834 GWh. Solar electricity generation grew to 11 GWh in 2010, 63.3% below the expected solar power generation of 30 GWh in 2010. Wind power grew to 6 GWh in 2010, 14.2% below the expected wind power generation of 7 GWh in 2010. Biomass electricity generation is the only RES source which is above the projected production for 2010, with 610 GWh, by 9.5%, reaching 668 GWh, in comparison with 32 GWh generated in 2005.

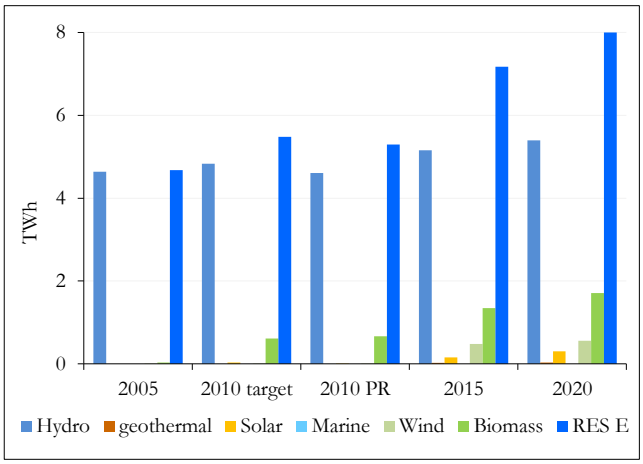

Figure 24-10. RES electricity projected growth and progress until 2010 in Slovakia.

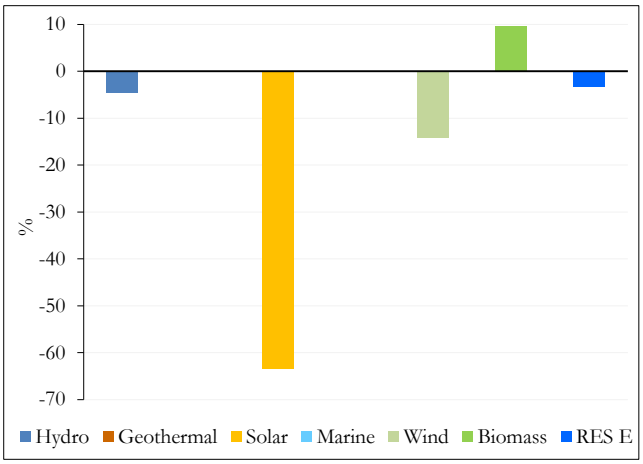

Figure 24-11. Deviation from NREAP in the RES electricity generation in Slovakia in 2010.

24.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Slovakia by 7.8 PJ (+51.8%), from 15.1 PJ in 2005, reaching 22.9 PJ in 2010, which is 21.2% above the NREAP projected value of 18.9 PJ. Some progress was made between 2005-2010, notably in biomass (+7.6 PJ) and geothermal (+0.2 PJ). In relative terms, the most significant increase was registered in geothermal heat (+166.7%), followed by biomass (+50.8%).

The use of geothermal heat increased in comparison with 0.1 PJ in 2005, reaching 0.3 PJ in 2010, 167.7% above the projected value of 0.1 PJ. Solar heat generation made no progress until 2010, remaining below the expected solar heat generation of 0.1 PJ in 2010. Biomass heat grew from 15.0 PJ in 2005 to 20.6 PJ in 2010, 20.8% above the expected biomass heat generation of 18.7 GWh in 2010.

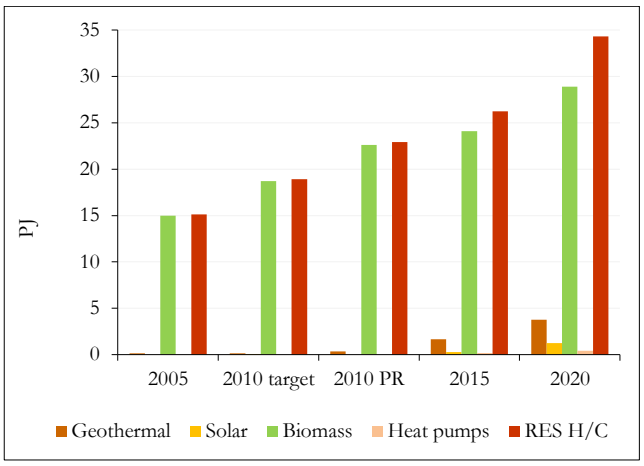

Figure 24-12. RES heat projected growth and progress until 2010 in Slovakia.

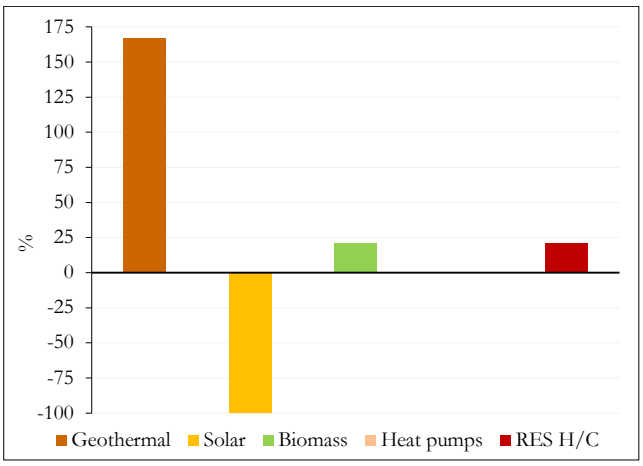

Figure 24-13. Deviation from NREAP in the RES heat generation in Slovakia in 2010.

24.6. Renewable energy in transport

The use of renewable energy in transport increased in Slovakia by 1012.5%, from 0.3 PJ in 2005 to reach 3.7 PJ in 2010, just 1.1% below the NREAP projected value of 3.8 PJ. Biodiesel is the major contributor to RES use in transport, increasing to 2.8 PJ in 2010, 1.5% below the 2010 NREAP projected value. The use of bioethanol/bio-ETBE grew to 0.6 PJ in 2010, 0.7% above the expected bioethanol use in 2010. No biofuels from wastes, residues, ligno-cellulosic material were used in 2010, which is according to the NREAP projections. No biofuels were imported. The use of renewable electricity in transport decreased to a limited extent since 2005, with only 1.3% below the projected value of 0.3 PJ for 2010.

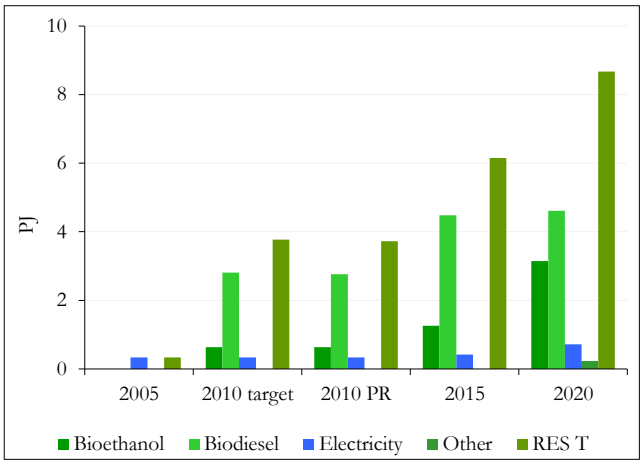

Figure 24-14. RES in transport projected growth and progress until 2010 in Slovakia.

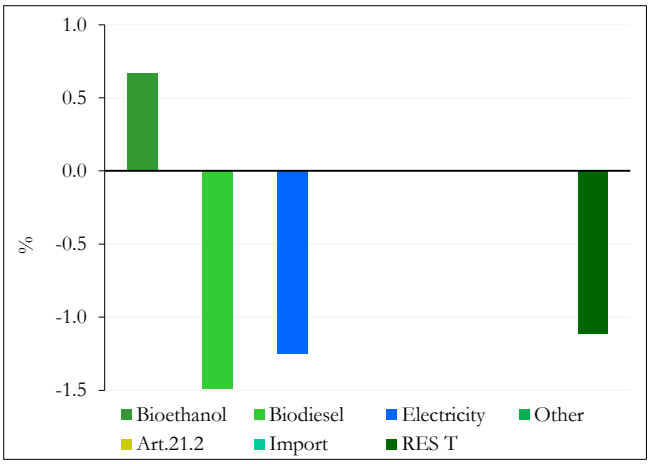

Figure 24-15. Deviation from NREAP in the RES use in transport in Slovakia in 2010.

25. Renewable energy in Finland

25.1. Deployment of renewable energy

The renewable energy deployment in Finland increased from 316.9 PJ in 2005 to 367.4 PJ in 2010, an increase of 50.5 PJ (+15.9%). The renewable energy use in Finland was 19.1% above the NREAP projected RES use of 309.0 PJ for 2010. This is expected to further increase to 447.8 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 80.5 (21.9%) PJ, in comparison with the increase of 50.5 PJ achieved in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 39.8 PJ, followed by renewable energy in transport with 5.4 PJ and renewable electricity with 5.2 PJ. The highest relative increase was made by the use of renewable energy in transport (+643.5%) followed by the heating and cooling (+17.2%) and electricity (+6.0%). The use of renewable energy in heating and cooling increased from 231.5 PJ in 2005 to 271.3 PJ in 2010, 24.4% above the projected level of 218.1 PJ. The renewable electricity increased from 85.4 PJ in 2005 to 90.6 PJ in 2010, 10.9% above the target of 81.6 PJ. The use of renewable energy in transport grew from 0.8 PJ to 6.2 PJ, 38.0% below the target of 10.0 PJ in 2010.

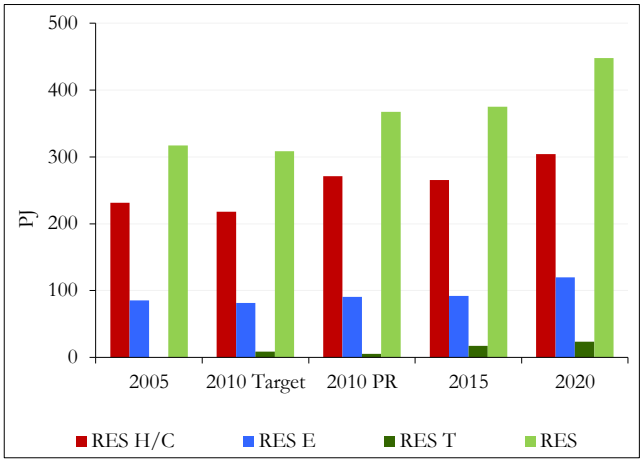

Figure 25-1. RES deployment in Finland: projected growth and actual progress.

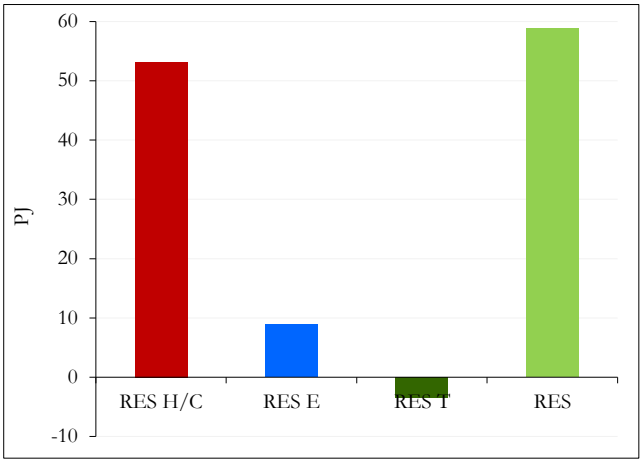

Figure 25-2. Deviation from NREAP in the RES production in Finland in 2010.

Table 25-1. RES use in Finland, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	271.3	53.2	24.4	39.8	17.2	33.1	12.2	304.4
RES-E	90.6	8.9	10.9	5.1	6.0	29.5	32.5	120.0
RES-T	6.2	-3.4	-35.3	5.4	643.5	18.9	303.5	25.1
RES	367.4	58.8	19.1	50.4	15.9	80.5	21.9	447.8

25.2. Renewable energy share

The analysis of the Progress Report for Finland shows that the overall share of RES increased from 28.8% in 2005 to 33.1% in 2010 and this should reach 38.0% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 40.0% to 46.4%), followed by transport (from 0.5% to 3.8%) while the progress in the share of renewable energy in electricity was much more modest (from 27.0% to 27.6%).

Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in

transport (from 3.8% to 19.5%), followed by electricity (from 27.6% to 32.8%) and heating & cooling (from 46.4% to 47.5%).

The analysis of the Progress Report for Finland shows that the overall share of RES is above the target by 4.4% points, reaching 33.1% in 2010, in comparison with 28.7% projected in the NREAP. The RES share in heating and cooling is above the projected value by 9.4% points, reaching 46.4% in comparison with expected share of 37.0% in 2010. The share of renewable electricity is above the target by 1.6% points, reaching 27.6% in comparison with 26.0% projected value. The share of RES in transport was below the target by 2.2%, reaching 3.8% in comparison with 6.0% projected RES share.

Table 25-2. Projected growth in RES share in Finland and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	40.0	37.0	46.4	9.4	42.0	47.0
RES-E	27.0	26.0	27.6	1.6	27.0	33.0
RES-T	0.5	6.0	3.8	-2.2	12.4	19.50
Overall RES	28.8	28.7	33.1	4.4	32.6	38.0

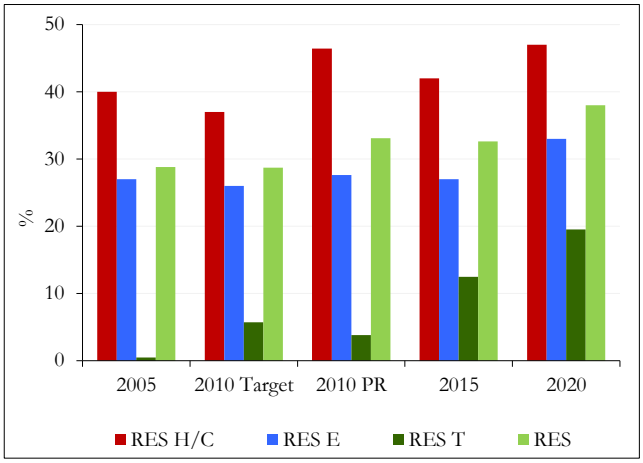

Figure 25-3. RES share in Finland: projected growth and actual progress.

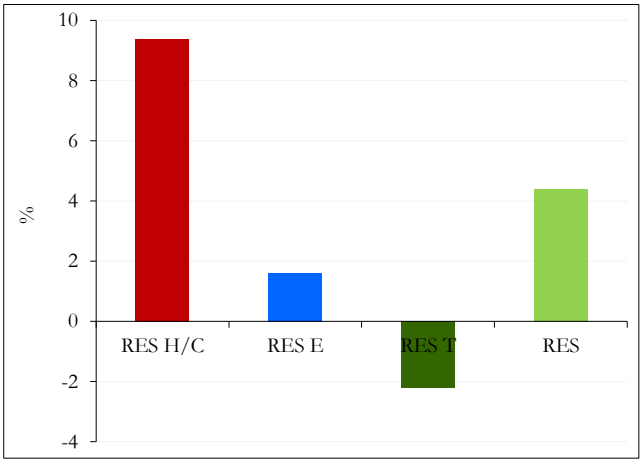

Figure 25-4. Deviation from NREAP in the share of RES in Finland in 2010.

Finland exceeded since 2009 the planned overall RES share for the period 2010-2012 and the minimum indicative shares until 2013/2014. The trajectory expected for the RES share is set in the NREAP just above the minimum indicative trajectory of overall share defined in RED Directive. If Finland will follow the 2005-2010 trajectory it will be in good position for the achievement of 2020 RES share.

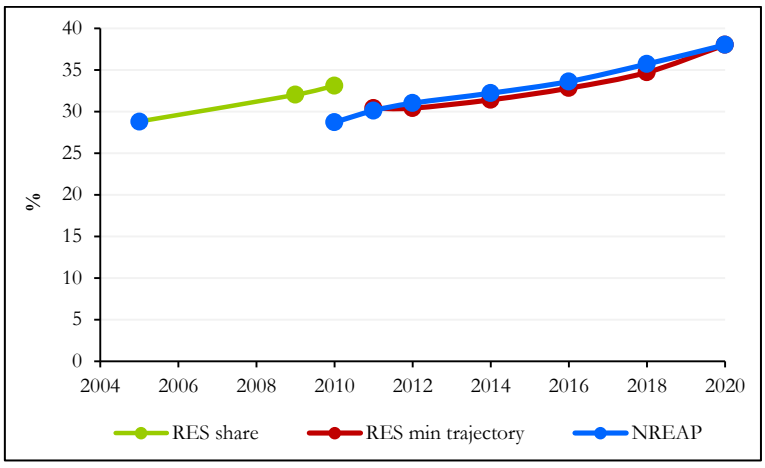

Figure 25-5. Progress of the overall RES share in Finland

25.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass (+36.5 PJ), followed by heat pumps (+7.9 PJ), biofuels (+5.5 PJ) and wind (+0.6 PJ), while the use of hydro energy decreased (-0.1 PJ). More progress is expected to be done between 2010-2020, especially by the use of biomass (+22.1 PJ), followed by wind (+20.5 PJ), heat pumps (+18.0 PJ), biofuels (+17.9 PJ) and hydropower (+1.9 PJ). In comparison with the expected contribution, the use of biomass was above the NREAP 2010 by +26.5%, while the use of several sources was below the target: biofuels by -40.2%, wind by -12.8% and hydro by -2.4%.

Table 25-3. The contribution of different sources of renewable energy in Finland

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydropower	50.1	51.2	50.0	51.2	51.9
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	0.0	0.0	0.0	0.0	0.0
Marine	0.0	0.0	0.0	0.0	0.0
Wind	0.5	1.3	1.1	5.5	21.6
Heat pumps	1.7	9.6	9.6	22.2	27.6
Biomass	264.6	238.0	301.1	278.8	323.2
Biofuels	0.0	9.2	5.5	17.6	23.4

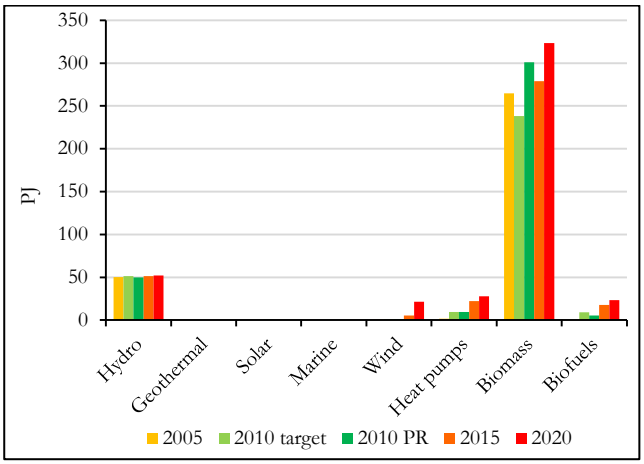

Figure 25-6. Contribution of renewable sources in Finland: projected growth and actual progress

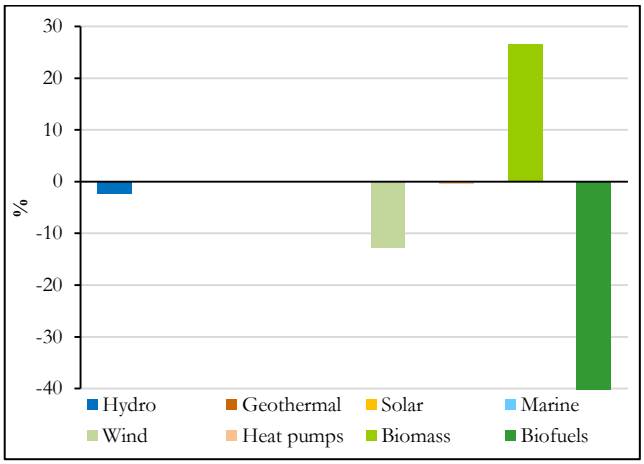

Figure 25-7. Deviation from NREAP in the contribution of renewable sources in Finland in 2010

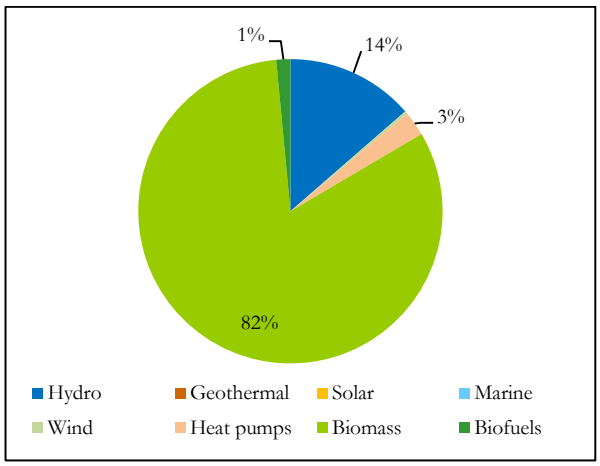

Figure 25-8. Share of renewable sources for electricity, heating & cooling in Finland in 2010

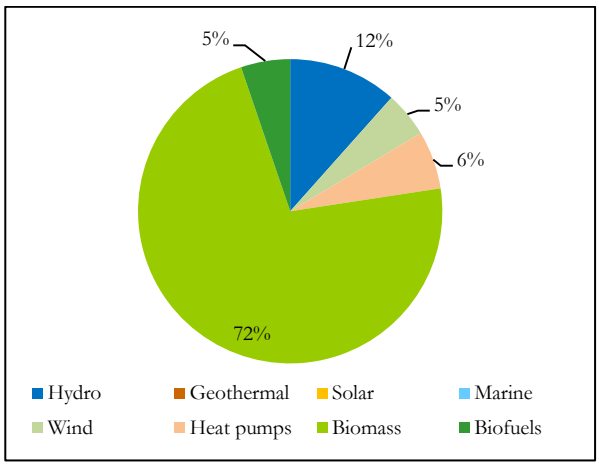

Figure 25-9. Share of renewable sources for electricity, heating & cooling in Finland in 2020

The use of biomass was the major contributor to RES use in 2010 with an 82% share, followed by hydro with 14%, heat pumps with 3%, and biofuels with 1%. In 2020, the major contribution is expected to come from the use of biomass with 72%, followed by hydro with 12%, heat pumps with 6%, biofuels with 5% and biofuels with 5%.

25.4. Renewable electricity

The renewable electricity generation increased in Finland by 1430 GWh (+6.0%), from 23720 GWh in 2005, reaching 25150 GWh in 2010, which is 10.9% above the NREAP projected value of 22670 GWh.

Some small progress was made between 2005-2010, especially in biomass (+1288 GWh), followed by wind power (+164 GWh) and solar (+6 GWh). In relative terms, the most significant increase was registered in wind power (+109.3%), followed by biomass (+13.3%).

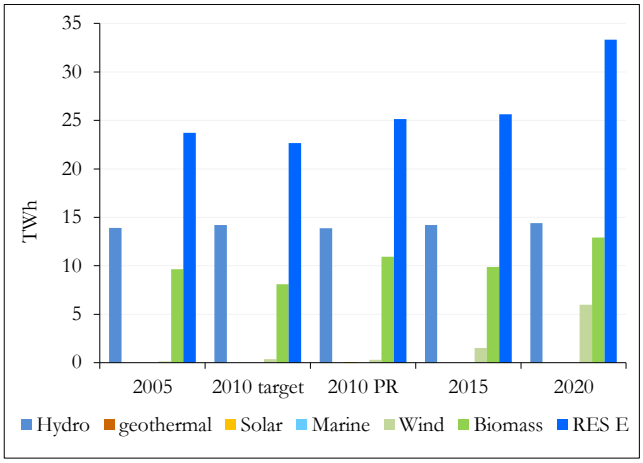

Figure 25-10. RES electricity projected growth and progress until 2010 in Finland.

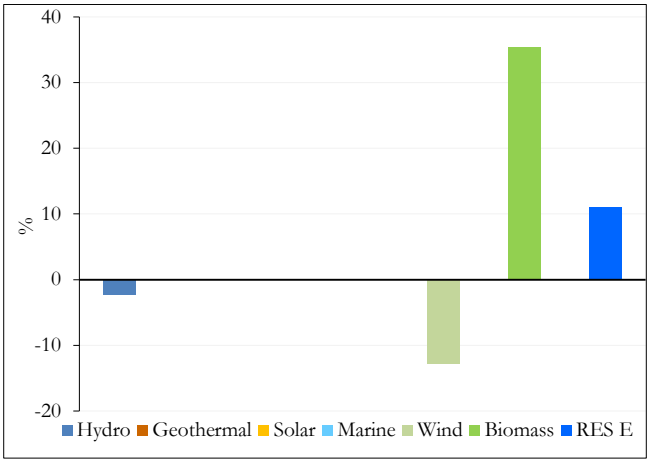

Figure 25-11. Deviation from NREAP in the RES electricity generation in Finland in 2010.

Hydro power generation has decreased in comparison with 13910 GWh produced in 2005, reaching 13883 GWh in 2010, 2.4% below the projected value of 14220 GWh. Wind power grew from 150 GWh in 2005 to 314 GWh in 2010, 12.8% below the expected wind power generation of 360 GWh in 2010. Biomass electricity generation is the only RES source which is above the projected production of 8090 GWh by 35.3%, reaching 10948 GWh, in comparison with 9660 GWh generated in 2005.

25.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Finland by 39.8 PJ (+17.2%), from 231.5 PJ in 2005, reaching 271.3 PJ in 2010, which is 24.1% above the NREAP projected value of 218.6 PJ.

Some progress was made in between 2005-2010, in biomass (+31.9 PJ) and heat pumps (+7.9 PJ). In relative terms, the most significant increase was registered in heat pumps (+472.5%), followed by biomass (+13.9%).

The use of biomass heat grew from 229.9 PJ in 2005 to 261.7 PJ in 2010, 25.3% above the expected biomass heat generation of 208.9 PJ in 2010. The utilisation of heat from heat pumps increased in comparison with 1.7 PJ in 2005, reaching 9.6 PJ in 2010, just 0.4% below the projected value.

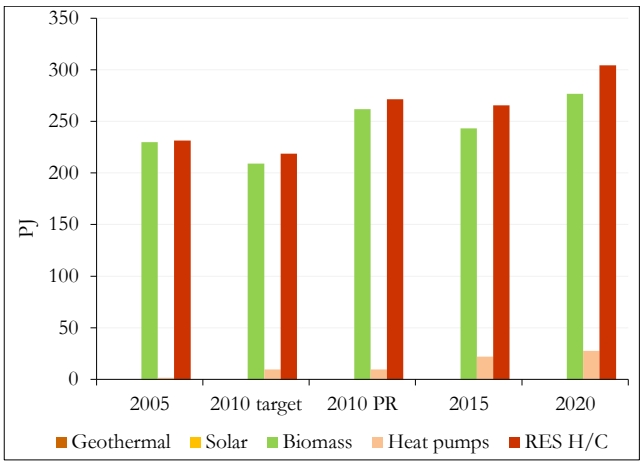

Figure 25-12. RES heat projected growth and progress until 2010 in Finland.

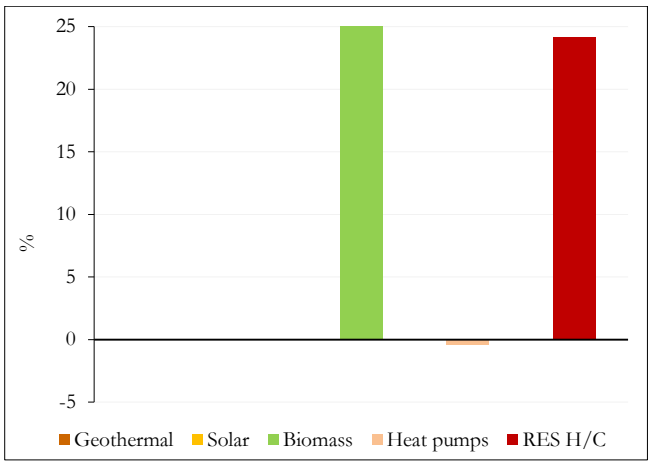

Figure 25-13. Deviation from NREAP in the RES heat generation in Finland in 2010.

25.6. Renewable energy in transport

The use of renewable energy in transport increased in Finland by 643.5%, from 0.8 PJ in 2005 to reach 6.2 PJ in 2010, below by 38.0% the NREAP projected value of 10.0 PJ. Bioethanol/bio-ETBE is the major contributor to RES use in transport, increasing to 3.0 PJ in 2010, 2.1% above the 2010 NREAP projected value of 2.9 PJ.

The use of biodiesel grew to 2.5 PJ in 2010, but this is 60% below the expected biodiesel use of 6.3 PJ in 2010. No biofuels from wastes, residues, ligno-cellulosic material and no other biofuels (biogas of vegetable oils) were used in 2010, which is according to the NREAP projections. The use of biofuels from import increased to 3.1 PJ in comparison with the expectations that no biofuels will be imported in 2010. The use of renewable electricity decreased by 14.0% from 0.8 PJ in 2005 to 0.7 PJ in 2010, which is 14.0% below the expected value for 2010.

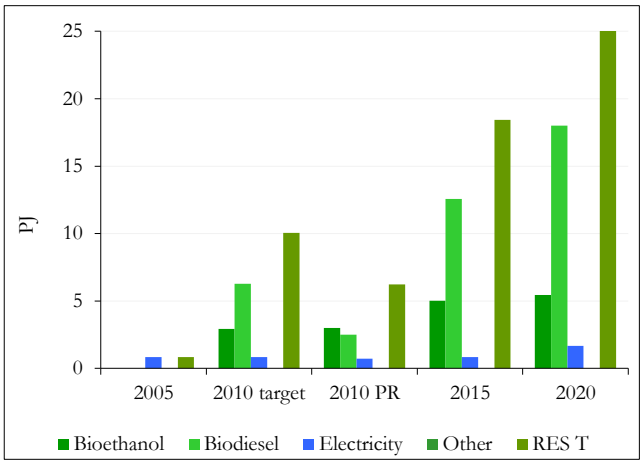

Figure 25-14. RES in transport projected growth and progress until 2010 in Finland.

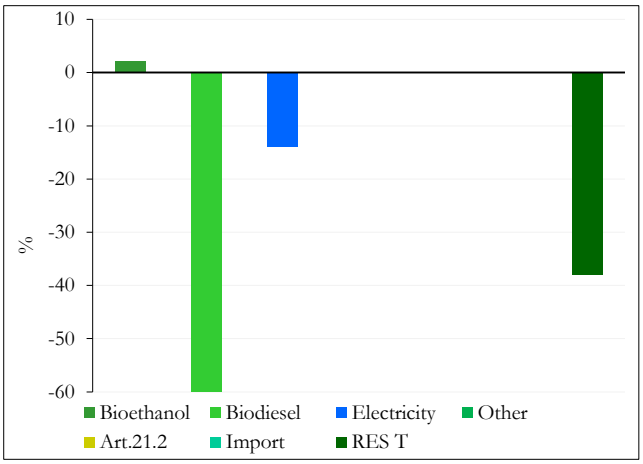

Figure 25-15. Deviation from NREAP in the RES use in transport in Finland in 2010.

26. Renewable energy in Sweden

26.1. Deployment of renewable energy

The renewable energy deployment in Sweden increased from 580.5 PJ in 2005 to 729.2 PJ in 2010, an increase of 148.6 PJ (25.6%). The renewable use in Sweden was 10.1% above the NREAP projected RES use of 657.1 PJ for 2010 and it is expected to further increase to 825.5 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 96.3 PJ (13.2%), in comparison with the increase of 148.6 PJ achieved in 2005-2010.

Renewable heating and cooling made the most significant progress between 2005 and 2010, with an increase of 111.7 PJ, followed by renewable electricity with 25.9 PJ and renewable energy in transport with 11.8 PJ. The highest relative increase was made by the use of renewable energy in transport (+97.9%) followed by the heating and cooling (3+7.7%) and electricity (+9.4%). The use of renewable energy in heating and cooling increased from 296.6 PJ in 2005 to 408.3 PJ in 2010, 18.4% above the projected level of 344.9 PJ. The renewable electricity increased from 276.9 PJ in 2005 to 302.9 PJ in 2010, just 0.5% above the target of 301.4 PJ. The use of renewable energy in transport grew from 12.1 PJ in 2005 to 23.9 PJ in 2010, 8% above the target of 22.1 PJ in 2010.

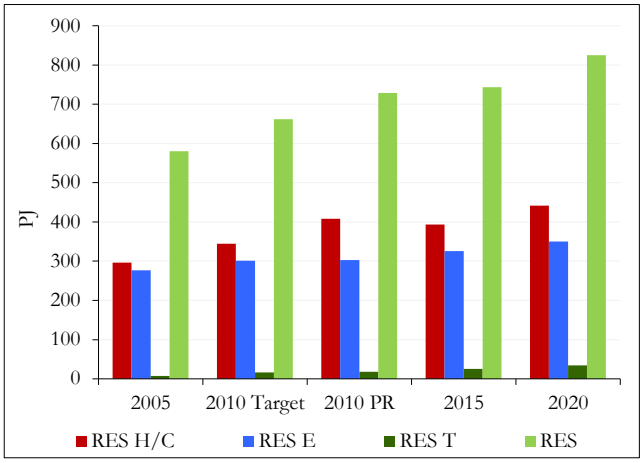

Figure 26-1. RES deployment in Sweden: projected growth and actual progress.

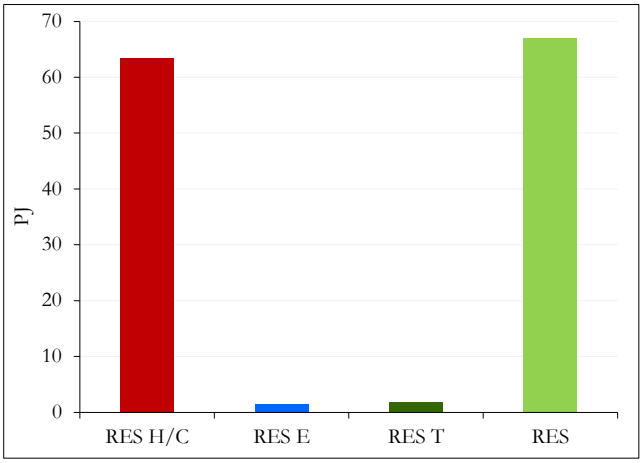

Figure 26-2. Deviation from NREAP in the RES production in Sweden in 2010.

Table 26-1. RES use in Sweden, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	408.3	63.4	18.4	111.7	37.7	33.1	8.1	441.4
RES-E	302.9	1.5	0.5	25.9	9.4	47.3	15.6	350.2
RES-T	23.9	1.8	8.0	11.8	97.9	18.3	76.8	42.2
RES	729.2	67.0	10.1	148.6	25.6	96.3	13.2	825.5

26.2. Renewable energy share

The analysis of the Progress Report for Sweden shows that the overall share of RES increased from 39.7% in 2005 to 47.8% in 2010 and this should reach 50.2% in 2020. The highest increase in the share of renewable energy was made in heating and cooling (from 53.7% to 65.3%), followed by electricity (from 50.9% to 56.0%) and in transport (from 4.0% to 8.0%).

Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 56.0% to 62.9%), followed by transport (from 8.0% to 13.8%), while the share of renewable energy in heating and cooling is already above the expected share for 2020 (62.1%).

The overall share of RES was above the target by 4.3% points, reaching 47.8% in 2010, in comparison with 43.5% projected in the NREAP. The RES share in heating and cooling was above the projected value by 8.3% points, reaching 65.3% in comparison with expected share of 57.0% in 2010. The share of renewable electricity was above the target by 1.0% points, reaching 56.0% in comparison with 55.0% projected value. The share of RES in transport was just above the target by 0.6% points, reaching 8.0% in comparison with 7.4% projected RES share.

Table 26-2. Projected growth in RES share in Sweden and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	53.7	57.0	65.3	8.3	59.8	62.1
RES-E	50.9	55.0	56.0	1.0	59.0	62.9
RES-T	4.0	7.4	8.0	0.6	10.7	13.8
Overall RES	39.7	43.5	47.8	4.3	47.0	50.2

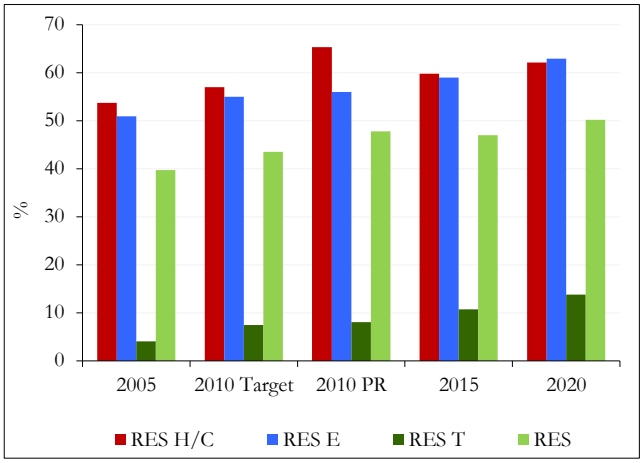

Figure 26-3. RES share in Sweden: projected growth and actual progress.

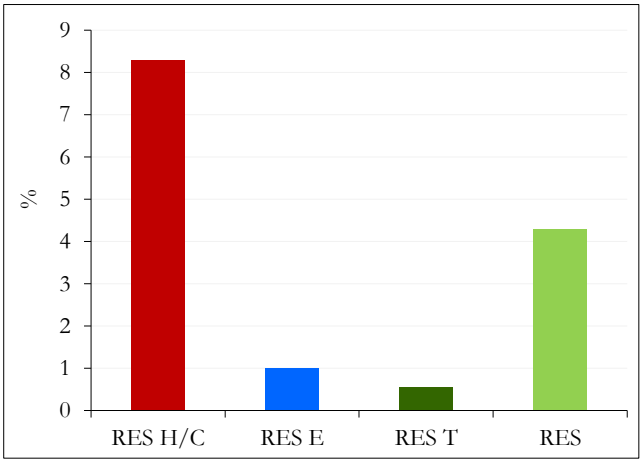

Figure 26-4. Deviation from NREAP in the share of RES in Sweden in 2010.

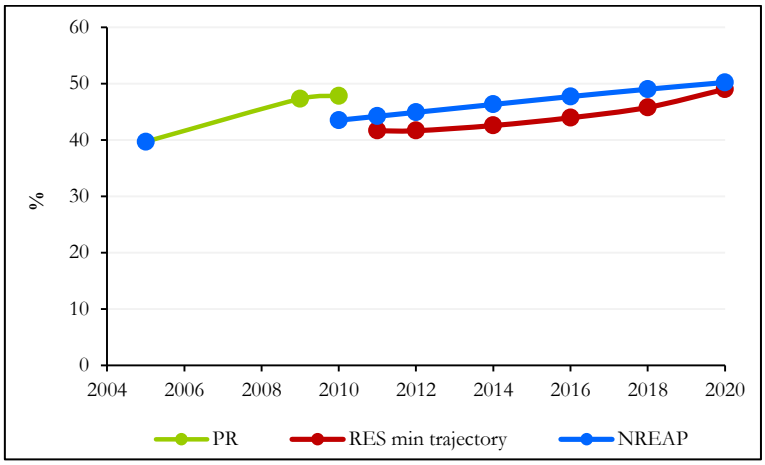

Figure 26-5. Progress of the overall RES share in Sweden

The overall RES share increased significantly during 2005-2010 and the 2010 overall RES share almost met the 2016 overall RES share and the minimum indicative share until 2015/2016. The trajectory expected for the RES share is set in the NREAP above the minimum indicative trajectory of overall

RES share defined in RED Directive. If Sweden will follow the 2009-2010 trajectory it will be in good track for the achievement of 2020 RES share target.

26.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered between 2005-2010, especially by the use of biomass for electricity, heating & cooling (+94.4 PJ), followed by heat pumps (+33.2 PJ), biofuels (+11.1 PJ), wind (+10.3 PJ) and solar thermal and solar electricity (+0.2 PJ), while the use of hydro decreased (-0.5 PJ).

Some progress is expected to be done between 2010-2020, especially by the use of biomass (+39.7 PJ), followed by wind (+31.3 PJ), biofuels (+15.9 PJ), heat pumps (+10.6 PJ), while the use of some renewable sources was already above the 2020 target: hydro by 1.1 PJ and solar by 0.2 PJ.

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: heat pumps by +127.2%, solar by +76.0%, biomass by +13.5% and biofuels by +13.2%, hydropower by +2.8%, while the use of wind energy was below by -20.7%.

Table 26-3. The contribution of different sources of renewable energy in Sweden

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydro	246.3	245.8	245.9	245.3	244.8
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	0.3	0.3	0.5	0.3	0.3
Marine	0.0	0.0	0.0	0.0	0.0
Wind	3.4	17.3	13.7	31.1	45.0
Heat pumps	0.0	14.6	33.2	29.2	43.8
Biomass	323.6	368.3	418.0	413.0	457.7
Biofuels	7.0	15.9	18.0	24.9	33.9

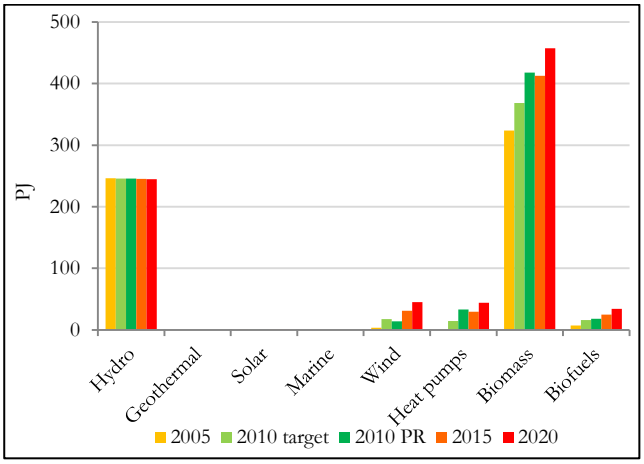

Figure 26-6. Contribution of renewable sources in Sweden: projected growth and actual progress

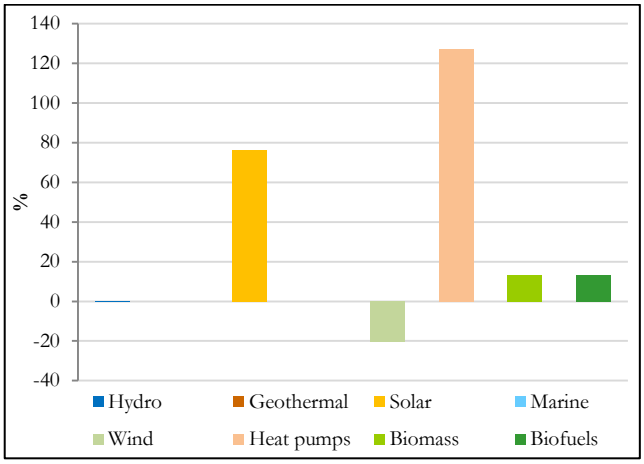

Figure 26-7. Deviation from NREAP in the contribution of renewable sources in Sweden in 2010

The use of biomass was the major contributor to RES use in 2010 with a 57% share, followed by hydro with 34%, heat pumps with 5%, biofuels with 2% and wind with 2%. In 2020, the major contribution is expected to come from the use of biomass with 55%, followed by hydro with 30%, wind with 6%, heat pumps with 5% and biofuels with 4%.

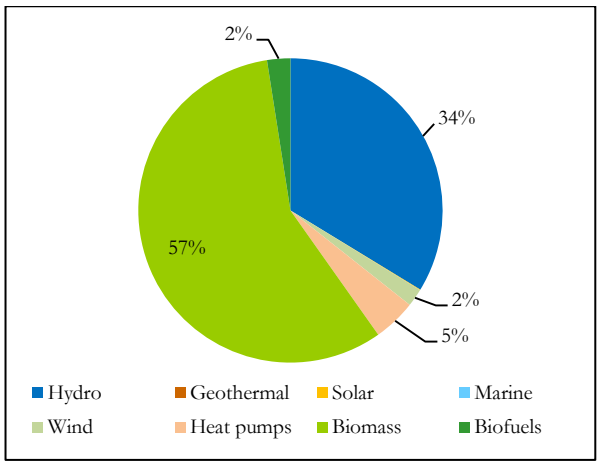

Figure 26-8. Share of renewable sources for electricity, heating & cooling in Sweden in 2010

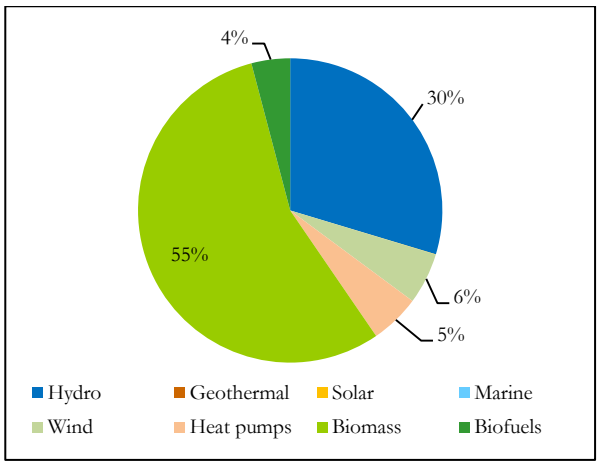

Figure 26-9. Share of renewable sources for electricity, heating & cooling in Sweden in 2020

26.4. Renewable electricity

The renewable electricity generation increased in Sweden by 7202 GWh (+9.4%), from 76929 GWh in 2005, reaching 84131 GWh in 2010, which is 0.5% above the NREAP projected value of 83705 GWh. Some progress was made between 2005-2010, especially in biomass (+4459 GWh), followed by wind power (+2861 GWh) and solar (+9 GWh). In relative terms, the most significant increase was registered in solar power (+8900%), followed by wind (+304.7%) and biomass (+58.9%).

Hydro power generation decreased in comparison with 68420 GWh produced in 2005, reaching 68293 GWh in 2010, just below the projected value of 68280 GWh. Solar electricity grew from 0.1 GWh in 2005 to 9 GWh in 2010, well above the expected solar power generation of 1.4 GWh in 2010. Wind power grew from 939 GWh in 2005 to 3800 in 2010, 20.7% below the expected power generation of 4793 GWh in 2010. Biomass electricity generation was also above the 10631 GWh expected production for 2010 by 14.7%, reaching 12029 GWh, in comparison with 7570 GWh generated in 2005.

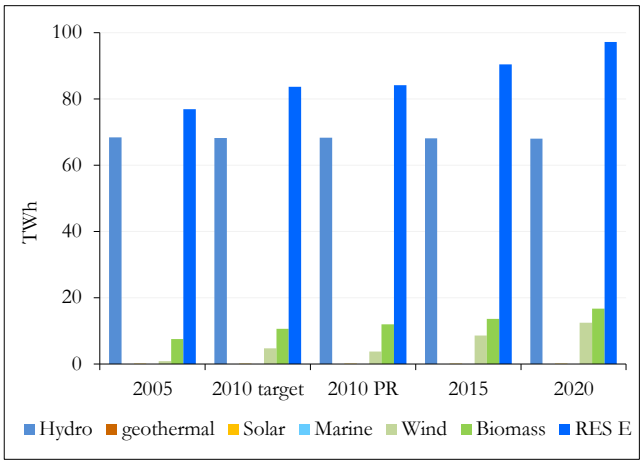

Figure 26-10. RES electricity projected growth and progress until 2010 in Sweden.

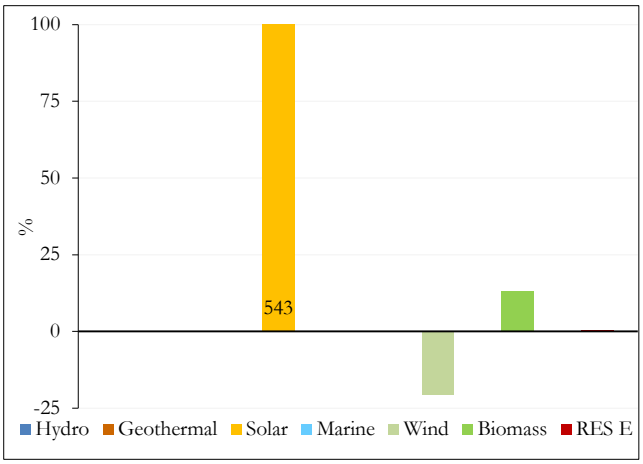

Figure 26-11. Deviation from NREAP in the RES electricity generation in Sweden in 2010.

26.5. Renewable energy in heating & cooling

The use of renewable energy in heating and cooling increased in Sweden by 111.7 PJ (+37.7%), from 296.6 PJ in 2005, reaching 408.3 PJ in 2010, which is 18.4% above the projected value of 344.9 PJ. Significant progress was made in most sectors, especially in biomass (+78.3 PJ), heat pumps (+33.2 PJ) and solar (+0.2 PJ). In relative terms, significant increase was registered in solar thermal (+66.7%) and biomass (+26.4%). The use of solar heat increased from 0.3 PJ in 2005, reaching 0.4 PJ in 2010, 66.7% above the projected value. Biomass heat grew from 296.3 PJ in 2005 to 374.7 PJ in 2010, 13.5% above

the expected biomass heat generation of 330.0 PJ in 2010. The heat production from heat pumps increased to 33.2 PJ in 2010, 127.2% above the expected heat pumps generation of 14.6 PJ in 2010.

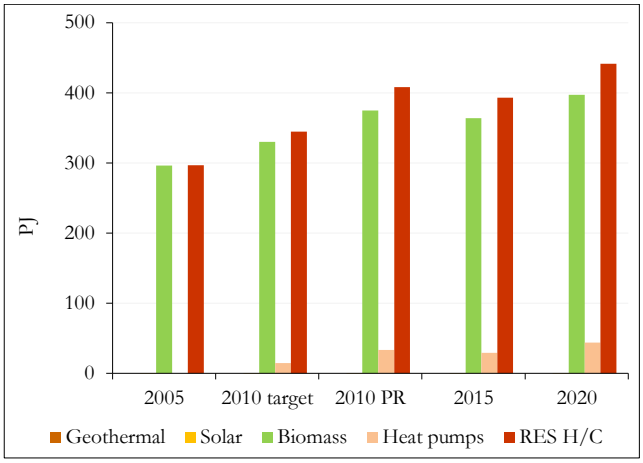

Figure 26-12. RES heat projected growth and progress until 2010 in Sweden.

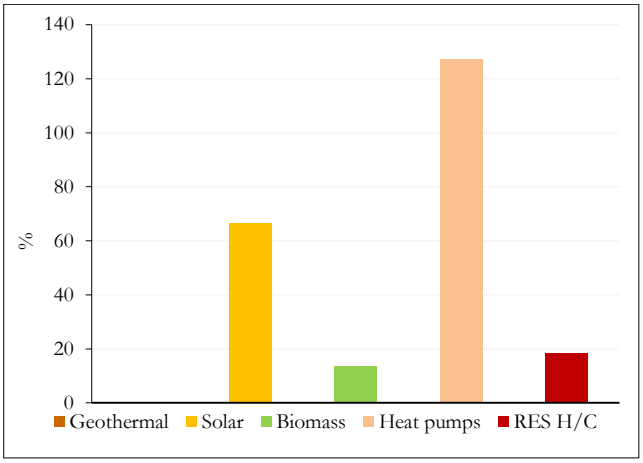

Figure 26-13. Deviation from NREAP in the RES heat generation in Sweden in 2010.

26.6. Renewable energy in transport

The use of renewable energy in transport increased in Sweden from 12.0 PJ in 2005 to 23.9 PJ in 2010, 19.1% above the NREAP projected value of 22.1 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 11.9 PJ (+98.6%). The highest increase was achieved by biodiesel (7.1 PJ) followed by bioethanol/bio-ETBE (2.5 PJ) and biofuels from wastes, residues, ligno-cellulosic material (art 21.2 biofuels) (1.8 PJ). In relative terms, the most significant increase was registered by biodiesel (+1877.8%) followed by art 21.2 biofuels (+323.1%), other biofuels (+276.9%) and bioethanol/bio-ETBE (41.0%%). The use of biofuels from import increased by 4.8 PJ (+98.6%).

Bioethanol/bio-ETBE was the major contributor to RES in transport, increasing from 6.0 PJ in 2005 to 8.5 PJ in 2010, 19.1% below the 2010 projected value of 10.5 PJ. The use of biodiesel grew from 0.4 PJ in 2005 to 7.5 PJ in 2010, 100.0% above the expected use of 3.7 PJ in 2010. The use of other biofuels (biogas and vegetable oils) made Sweden a leading country, raising from 0.5 PJ in 2005 to 2.1 PJ in 2010, 22.5% above the target of 1.7 PJ. The use of biofuels from wastes, residues, ligno-cellulosic material grew from 0.5 PJ in 2005 to 2.3 PJ in 2010, 37.5% above the target of 1.7 PJ. The use of biofuels from import increased notably from 4.9 PJ in 2005 to 9.7 PJ in 2010, 66.0% above the expected value of 5.9 PJ. The use of renewable electricity also increased from 5.1 PJ in 2005 to 5.9 PJ in 2010, 4.8% below the target of 6.2 PJ projected for 2010.

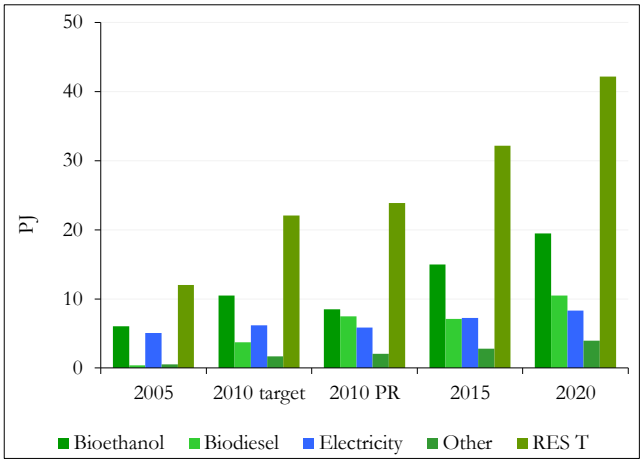

Figure 26-14. RES in transport projected growth and progress until 2010 in Sweden.

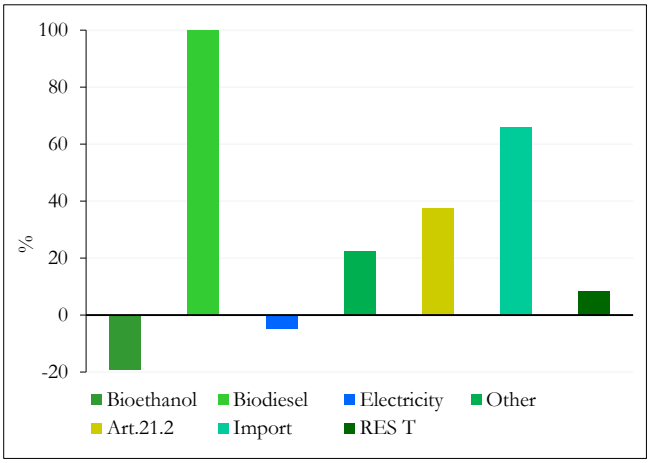

Figure 26-15. Deviation from NREAP in the RES use in transport in Sweden in 2010.

27. Renewable energy in United Kingdom

27.1. Deployment of renewable energy

The renewable energy deployment in UK increased considerably from 88.8 PJ in 2005 to 195.5 PJ in 2010, an increase of 106.7 PJ (+120.1%). The renewable energy use in the UK was 10.3% above the NREAP projected RES use of 177.2 PJ for 2010 and it is expected to further increase to 856.8 PJ until 2020. The additional use of renewable energy in 2010-2020 is expected to be 661.3 PJ, in comparison with the increase of 106.7 PJ achieved in 2005-2010.

Renewable energy in transport made the most significant progress between 2005 and 2010, with an increase of 42.5 PJ, followed by renewable heating and cooling with 39.7 PJ and renewable electricity with 22.0 PJ. The highest relative increase was made by the use of renewable energy in transport (+540%) followed by the heating and cooling (+89.1%) and electricity (+65.2%). The use of renewable energy in heating and cooling increased from 24.7 PJ in 2005 to 46.7 PJ in 2010, 115.4% above the projected level of 21.7 PJ. The renewable electricity increased from 61.0 PJ in 2005 to 100.7 PJ in 2010, 11.5% below the target of 113.9 PJ. The use of renewable energy in transport grew from 3.1 PJ in 2005 to 50.4 PJ in 2010, 6.4% above the target of 47.4 PJ in 2010.

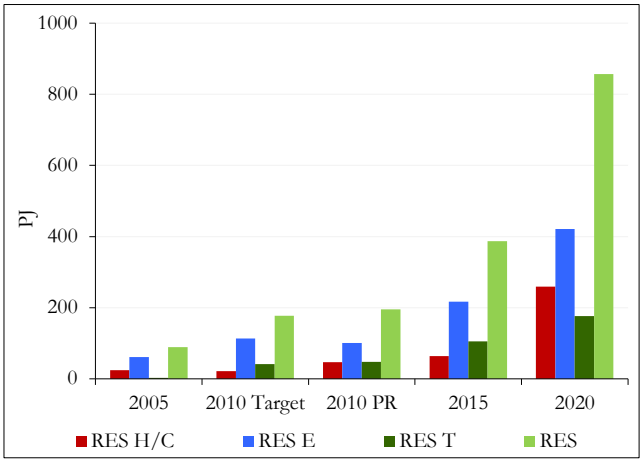

Figure 27-1. RES deployment in UK: projected growth and actual progress.

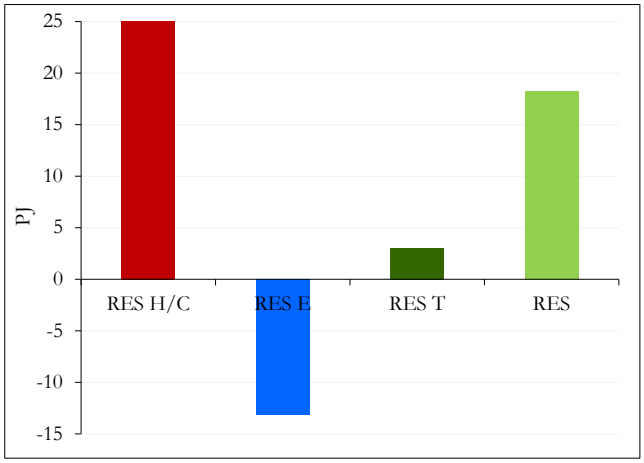

Figure 27-2. Deviation from NREAP in the RES production in UK in 2010.

Table 27-1. RES use in UK, progress and deviation from NREAPs.

	2010 PR	deviation from NREAP		growth 2005-2010		growth 2010-2020		2020 NREAP
	[PJ]	[PJ]	[%]	[PJ]	[%]	[PJ]	[%]	[PJ]
RES-H/C	46.7	25.0	115.4	22.0	89.2	212.8	455.6	259.5
RES-E	100.7	-13.1	-11.5	39.7	65.1	320.5	318.1	421.2
RES-T	50.4	3.0	6.4	42.5	540.4	136.8	271.4	187.2
RES	195.5	18.3	10.3	106.7	120.1	661.3	338.2	856.8

27.2. Renewable energy share

The analysis of the Progress Report for the UK shows that the overall share of RES increased from 1.4% in 2005 to 3.3% in 2010 and this should reach 15.0% in 2020. The highest increase in the share of renewable energy was made in electricity (from 4.7% to 7.4%), followed by transport (from 0.5% to 2.9%) and in heating and cooling (from 0.7% to 1.8%). Major increase is expected to be achieved until 2020, according to the data provided in the NREAP, in electricity (from 7.4% to 31.0%), followed by heating & cooling (from 1.8% to 12.0%) and transport (from 2.9% to 10.8%).

The analysis of the Progress Report for UK show that the overall share of RES is above the target by 0.3% points, reaching 3.3% in 2010, in comparison with 3.0% projected in the NREAP. The RES share in heating and cooling is above the projected value by 0.8% points reaching 1.8% in comparison with expected share of 1.0% in 2010. The share of renewable electricity is below the target by 1.6%, reaching 7.4% in comparison with 9.0% projected value. The share of RES in transport is above the target by 0.1%, reaching 2.9% in comparison with 2.8% projected RES share.

Table 27-2. RES share in UK and progress

	2005 NREAPs	2010 NREAPs	2010 PR	deviation from NREAP	2015 NREAPs	2020 NREAPs
	[%]	[%]	[%]	[% points]	[%]	[%]
RES-H/C	0.7	1.0	1.8	0.8	3.0	12.0
RES-E	4.7	9.0	7.4	-1.6	16.0	31.0
RES-T	0.5	2.8	2.9	0.1	6.4	10.8
Overall RES	1.4	3.0	3.3	0.3	7.0	15.0

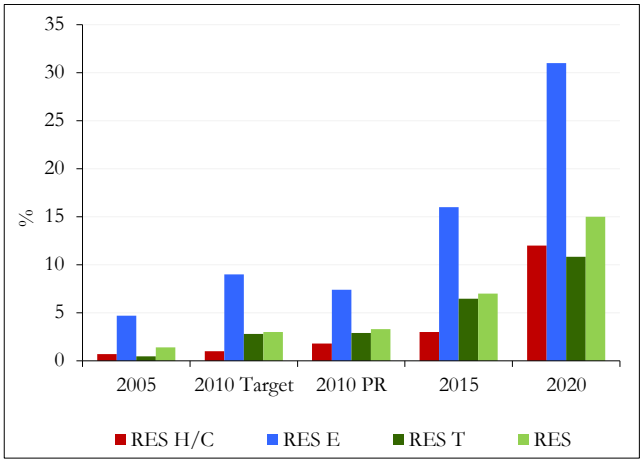

Figure 27-3. RES share in UK: projected growth and actual progress.

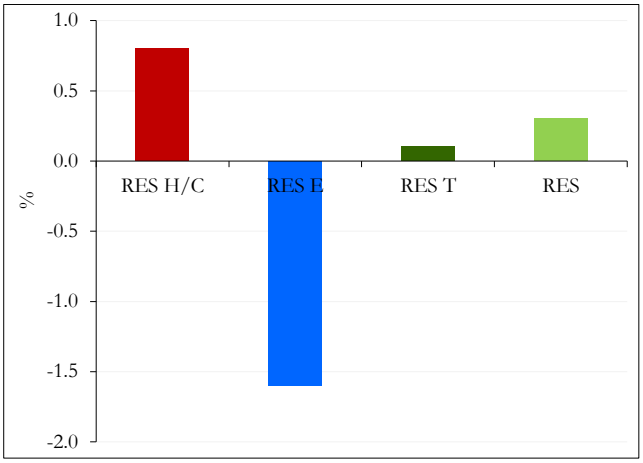

Figure 27-4. Deviation from NREAP in the share of RES in UK in 2010.

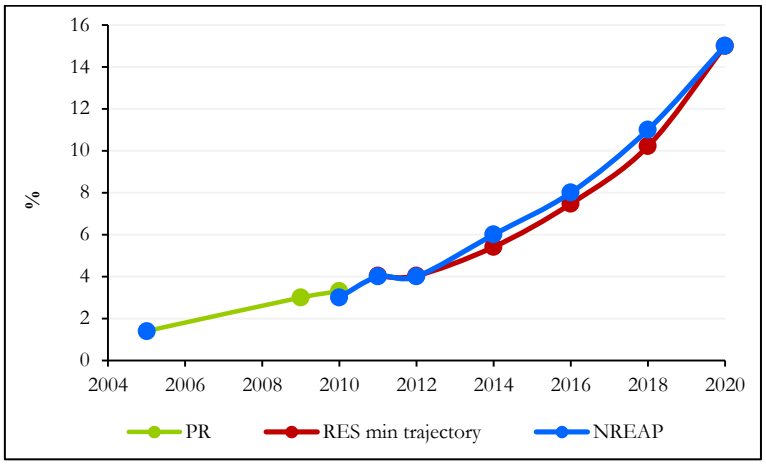

Figure 27-5. Progress of the overall RES share in the UK

The UK has to achieve a significant increase of the overall RES share during 2005-2020. The overall share increased during period 2005-2010, exceeding by only 0.3% the 2010 NREAP planned share for 2010. The trajectory expected for the RES share is set in the NREAP just above the minimum indicative trajectory of overall RES share defined in RED Directive. United Kingdom can still reach its 2020 RES share target.

27.3. Sources of renewable energy

Significant increase of the use of various sources of renewable energy was registered during 2005-2010, especially by the use of biofuels (+44.9 PJ) followed by wind (+30.0 PJ), biomass for electricity, heating & cooling (+27.1 PJ), heat pumps (+2.6 PJ), solar thermal and solar electricity (+2.5 PJ), while the use of hydro decreased (-0.5 PJ).

More progress is expected to be done during 2010-2020, especially by wind (+241.3 PJ) followed by the use of biomass (+174.7 PJ), biofuels (+128.0 PJ), heat pumps (+91.8 PJ), marine energy (+14.2 PJ) solar (+5.7 PJ) and hydro (+5.7 PJ).

In comparison with the expected contribution, the use of several renewable energy sources was above the NREAP 2010 target: solar by +140.0%, biomass by +44.0% and biofuels by +15.3%, while the use of some renewable sources was below: heat pumps by -67.2%, wind by -6.1% and hydro by -6.1%.

Table 27-3. The contribution of different sources of renewable energy in the United Kingdom

	2005 NREAP	2010 NREAP	2010 PR	2015 NREAP	2020 NREAP
	[PJ]	[PJ]	[PJ]	[PJ]	[PJ]
Hydro	17.7	18.4	17.2	20.6	22.9
Geothermal	0.0	0.0	0.0	0.0	0.0
Solar	1.2	1.6	3.8	4.6	9.5
Marine	0.0	0.0	0.0	0.0	14.2
Wind	10.5	50.9	40.5	141.9	281.8
Heat pumps	0.0	7.8	2.6	22.9	94.4
Biomass	56.2	57.9	83.4	91.6	258.0
Biofuels	3.1	41.7	48.1	105.1	176.1

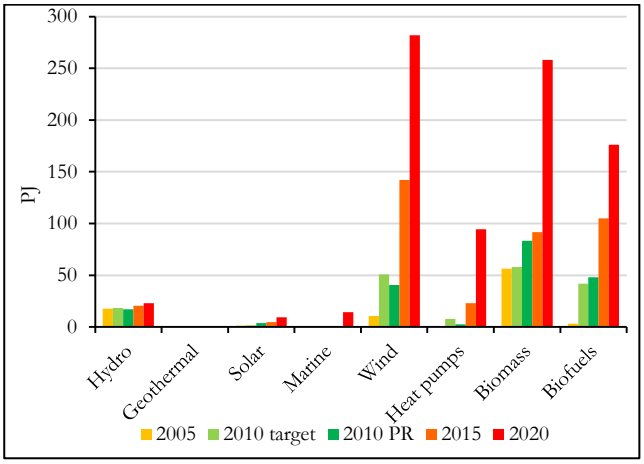

Figure 27-6. Contribution of renewable sources in the UK: projected growth and actual progress

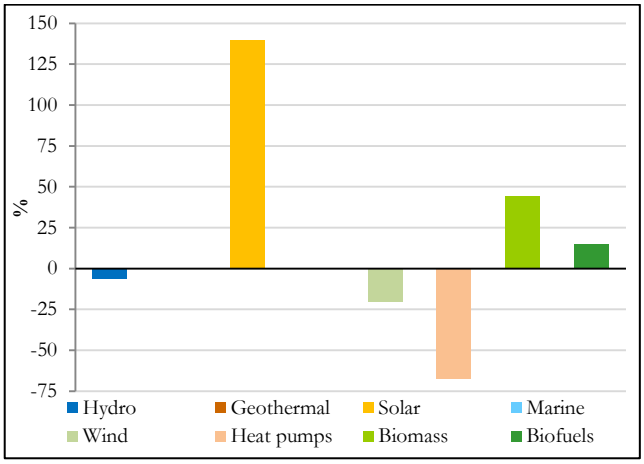

Figure 27-7. Deviation from NREAP in the contribution of renewable sources in the UK in 2010

The use of biomass was the major contributor to RES use in 2010 with a 43% share, followed by biofuels with 24%, wind with 21, hydro with 9%, solar with 2% and heat pumps with 1%. In 2020, the major contribution is expected to come from wind with 33% followed by the use of biomass with 30%, heat pumps with 11%, hydro with 3%, marine energy with 2% and solar with 1%.

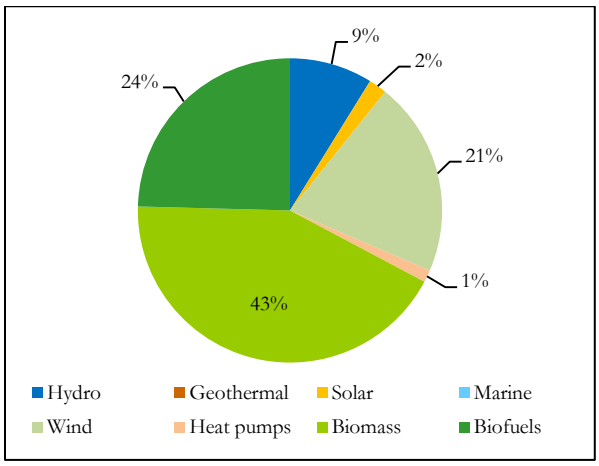

Figure 27-8. Share of renewable sources for electricity, heating & cooling in the UK in 2010

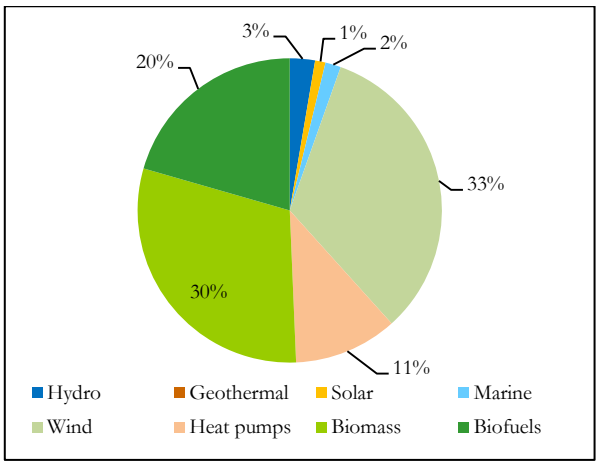

Figure 27-9. Share of renewable sources for electricity, heating & cooling in the UK in 2020

27.4. Renewable electricity

The renewable electricity generation increased in UK by 11036 GWh (+65.2%) from 16942 GWh in 2005, reaching 27978 GWh in 2010, which is 11.5% below the NREAP projected value of 31620 GWh. Significant progress was made between 2005-2010 in several sectors, especially in wind power (+8335 GWh), followed by biomass (+2805 GWh), solar (+25 GWh) and marine energy (+2 GWh). In relative terms, the most significant increase was registered in solar power (+312.5%), followed by wind (+287.0%) and biomass (+30.8%).

Hydro power generation decreased in comparison with 4921 GWh produced in 2005, to 4790 GWh in 2010, 6.1% below the expected value of 5100 GWh. The electricity production from marine sources increased to 1.8 GWh in 2010, although no contribution was expected in the NREAP. Solar electricity generation grew to 33 GWh in 2010 from 8 GWh in 2005, 17.5% below the expected power generation of 40 GWh in 2010. Wind power grew to 11239 GWh in 2010, 20.6% below the expected power generation of 14150 GWh in 2010. Biomass electricity generation was also 3.4% below the target of 12330 GWh, reaching 11914 GWh in 2010, in comparison with 12330 GWh produced in 2005.

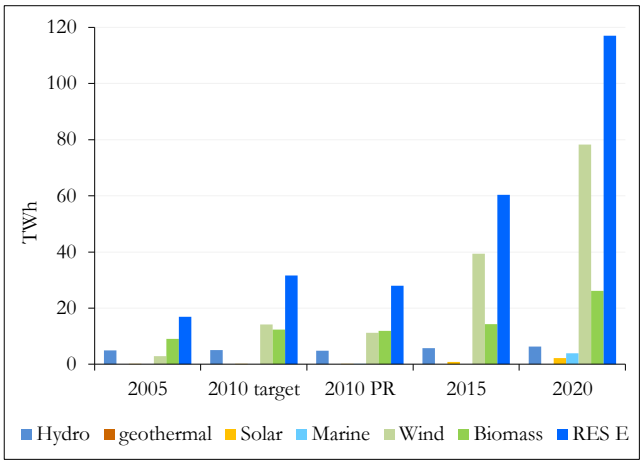

Figure 27-10. RES electricity projected growth and progress until 2010 in UK.

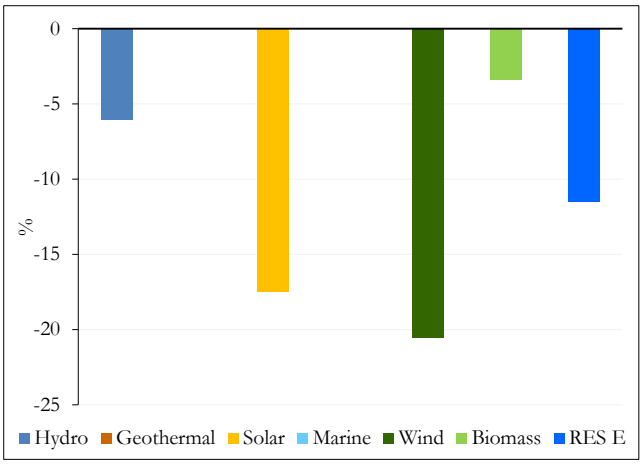

Figure 27-11. Deviation from NREAP in the RES electricity generation in UK in 2010.

27.5. Renewable energy in heating & cooling

The use of renewable heating and cooling increased in UK by 22.0 PJ (+89.1%), from 24.7 PJ in 2005, reaching 46.7 PJ in 2010, which is 105.5% above the expected value of 22.7 PJ. Significant progress was made in several sectors, especially in biomass (+17.0 PJ), heat pumps (+2.6 PJ) and solar (+2.4 PJ). In relative terms, the most significant increase was made in solar thermal (+200%) and biomass (+72.7%).

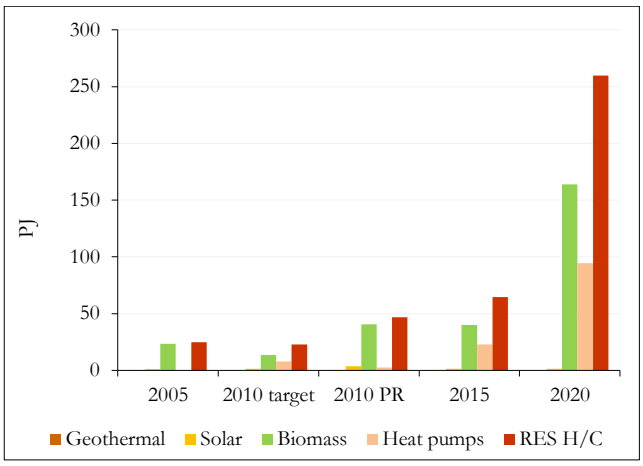

Figure 27-12. RES heat projected growth and progress until 2010 in UK.

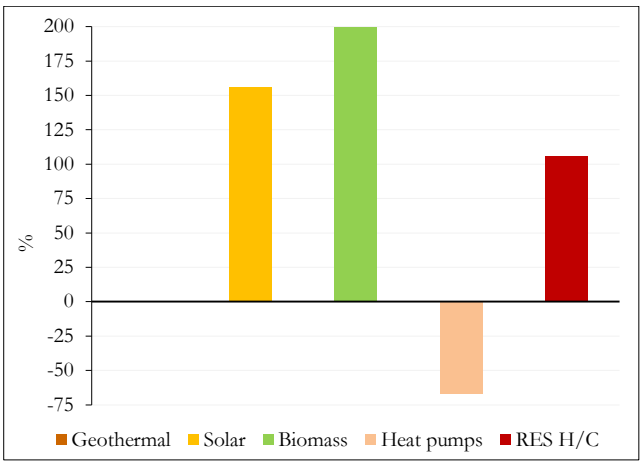

Figure 27-13. Deviation from NREAP in the RES heat generation in UK in 2010.

The use of solar heat has made significant progress until 2010, arriving at 3.6 PJ in 2010, in comparison with 1.4 PJ expected for 2010, 155.9% above the target. Biomass heat utilisation also grew from 23.4 PJ in 2005 to 40.5 PJ in 2010, 199.4% above the expected biomass heat generation of 18.7 GWh in 2010. The heat generation from heat pumps increased to a lower extent compared to other sources to 2.6 PJ, which represents 67.2% below the 7.8 PJ target for 2010.

27.6. Renewable energy in transport

The use of renewable energy in transport increased in UK from 7.9 PJ in 2005 to reach 50.4 PJ in 2010, 6.4% more than the NREAP projected value of 47.4 PJ. The use of renewable energy in transport increased between 2005 and 2010 by 42.5 PJ (+540.4%). The highest increase was achieved by biodiesel (+32.2 PJ) followed by bioethanol/bio-ETBE (1+2.6 PJ). In relative terms, the most significant increase was registered by bioethanol/bio-ETBE (+1683.3%) and biodiesel (+1350.9%).

Biodiesel was the major contributor to RES use in transport, increasing from 2.4 PJ in 2005 to 34.6 PJ in 2010, 3.9% below the 2010 NREAP projected value of 36.0 PJ. The use of bioethanol/bio-ETBE grew from 0.8 PJ to 13.4 PJ in 2010, 137.8% above the expected use in 2010. Neither other biofuels (biogas or vegetable oils) nor biofuels from wastes, residues, ligno-cellulosic material were used in 2010, which is according to the NREAP projections. About 39.2 PJ biofuels were imported, 4.6% above the 37.5 PJ expected level for 2010. The use of renewable electricity decreased since 2005, from 4.7 PJ to 2.3 PJ, 58.8% below the projected value of 5.7 PJ for 2010.

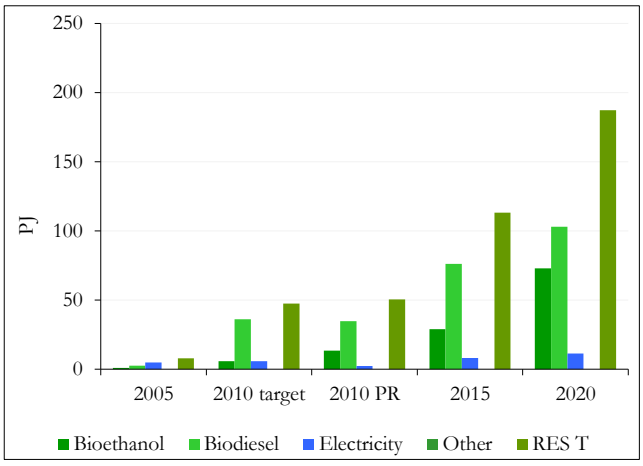

Figure 27-14. RES in transport projected growth and progress until 2010 in UK.

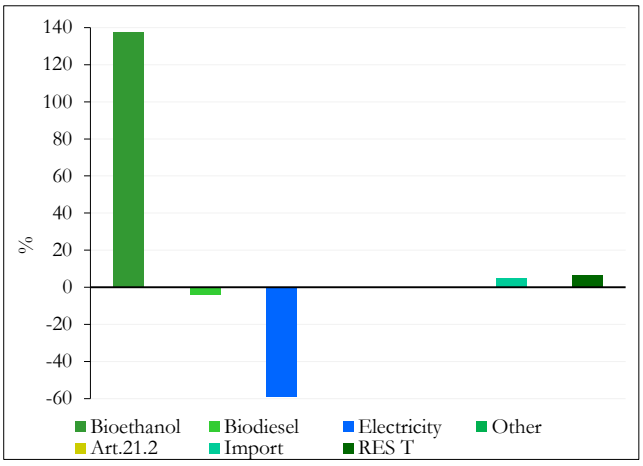

Figure 27-15. Deviation from NREAP in the RES use in transport in UK in 2010.

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Abstract
This report presents a snapshot of the use of renewable energy in the European Union, the status in 2010, the progress and the deviations from the targets set in the National Renewable Energy Action Plans. The report describe the developments in the overall contribution of renewable energy in each Member State since 2005 according to their first Progress Reports, the progress made in the use of each renewable energy source and their share in heating and cooling, electricity and in transport sector.

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