Renewable Energy Generation by Fuel, Florida Reliability Coordinating Council, Reference case

Capacity, Generation, and Consumption	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Growth Rate (2010-2035)
Electric Power Sector 1/																												
Generating Capacity (gigawatts)																												
Conventional Hydropower	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00%
Geothermal 2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Municipal Waste 3/	0.47	0.47	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.00%
Wood and Other Biomass	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.20%
Solar Thermal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Solar Photovoltaic 4/	0.03	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.11	0.11	0.12	0.14	0.16	0.21	6.20%
Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Offshore Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Total	**0.68**	**0.7**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.77**	**0.78**	**0.79**	**0.81**	**0.83**	**0.88**	**0.90%**
Electricity Generation (billion kilowatthours)																												
Conventional Hydropower	0.02	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-10.60%
Geothermal 2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Biogenic Municipal Waste 5/	2.02	1.97	1.71	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	-0.50%
Wood and Other Biomass	0.33	0.36	0.38	0.27	0.39	1.05	2.55	2.29	2.16	2.49	2.39	2.65	2.07	1.92	1.54	1.56	1.56	3.39	3.95	3.92	4.16	4.45	4.65	4.69	4.74	4.84	5.05	11.20%
Solar Thermal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Solar Photovoltaic 4/	0.01	0.1	0.12	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.19	0.19	0.21	0.24	0.29	0.41	5.90%
Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Offshore Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Total	**2.38**	**2.45**	**2.21**	**2.16**	**2.27**	**2.94**	**4.44**	**4.18**	**4.05**	**4.38**	**4.28**	**4.53**	**3.96**	**3.81**	**3.42**	**3.45**	**3.45**	**5.28**	**5.84**	**5.81**	**6.05**	**6.36**	**6.56**	**6.62**	**6.7**	**6.86**	**7.18**	**4.40%**
Energy Consumption 6/ (quadrillion Btu)																												
Conventional Hydropower	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-10.60%
Geothermal 2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Biogenic Municipal Waste 5/	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.60%
Wood and Other Biomass	0	0	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	12.50%
Solar Thermal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Solar Photovoltaic 4/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.90%
Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Offshore Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Total	**0.03**	**0.03**	**0.03**	**0.03**	**0.04**	**0.04**	**0.06**	**0.05**	**0.05**	**0.05**	**0.05**	**0.06**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.06**	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**	**0.08**	**0.08**	**0.08**	**0.09**	**4.10%**
End-Use Generators 7/																												
Generating Capacity (gigawatts)																												
Conventional Hydropower 8/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Geothermal 2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Municipal Waste	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00%
Wood and Other Biomass	0.21	0.2	0.2	0.2	0.22	0.23	0.24	0.25	0.25	0.25	0.26	0.27	0.28	0.3	0.32	0.32	0.34	0.36	0.37	0.4	0.41	0.42	0.43	0.43	0.43	0.43	0.44	3.20%
Solar Photovoltaic 4/	0.02	0.04	0.1	0.19	0.28	0.39	0.53	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.69	0.69	0.7	0.7	0.7	0.7	0.71	0.71	12.60%
Wind	0	0	0	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	42.90%
Total	**0.26**	**0.27**	**0.33**	**0.44**	**0.55**	**0.69**	**0.84**	**0.99**	**0.99**	**0.99**	**1**	**1.01**	**1.02**	**1.04**	**1.06**	**1.07**	**1.09**	**1.11**	**1.12**	**1.15**	**1.17**	**1.18**	**1.18**	**1.19**	**1.19**	**1.2**	**1.21**	**6.20%**
Electricity Generation (billion kilowatthours)																												
Conventional Hydropower 8/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Geothermal 2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Municipal Waste	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.00%
Wood and Other Biomass	1.17	1.19	1.19	1.19	1.3	1.4	1.46	1.48	1.5	1.5	1.57	1.59	1.68	1.81	1.99	2.01	2.16	2.32	2.45	2.67	2.78	2.85	2.88	2.9	2.9	2.9	3	3.80%
Solar Photovoltaic 4/	0.02	0.05	0.14	0.28	0.41	0.58	0.79	1.01	1.01	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.03	1.03	1.03	1.03	1.04	1.04	1.04	1.05	1.05	1.06	1.06	12.80%
Wind	0	0	0	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	42.90%
Total	**1.47**	**1.51**	**1.6**	**1.75**	**2**	**2.27**	**2.54**	**2.79**	**2.8**	**2.81**	**2.88**	**2.9**	**3**	**3.12**	**3.3**	**3.33**	**3.48**	**3.65**	**3.77**	**3.99**	**4.11**	**4.19**	**4.22**	**4.24**	**4.25**	**4.25**	**4.36**	**4.30%**
Energy Consumption (quadrillion Btu)																												
Conventional Hydropower 8/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Geothermal 2/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	- -
Municipal Waste	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00%
Wood and Other Biomass	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	2.90%
Solar Photovoltaic 4/	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.80%
Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42.90%
Total	**0.01**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**2.50%**

1/ Includes electricity-only and combined heat and power plants whose primary business is to sell electricity, or electricity and heat, to the public.

2/ Includes both hydrothermal resources (hot water and steam) and near-field enhanced geothermal systems (EGS). Near-field EGS potential occurs on known hydrothermal sites, however this potential requires the addition of external fluids for electricity generation and is only available after 2025.

3/ Includes all municipal waste, landfill gas, and municipal sewage sludge. Incremental growth is assumed to be for landfill gas facilities. All municipal waste is included, although a portion of the municipal waste stream contains petroleum-derived plastics and other non-renewable sources.

4/ Does not include off-grid photovoltaics (PV). Based on annual PV shipments from 1989 through 2009, EIA estimates that as much as 245 megawatts of remote electricity generation PV applications (i.e., off-grid power systems) were in service in 2009, plus an additional 558 megawatts in communications, transportation, and assorted other non-grid-connected, specialized applications. See U.S. Energy Information Administration, Annual Energy Review 2010, DOE/EIA-0384(2010) (Washington, DC, October 2011), Table 10.9 (annual PV shipments, 1989-2009). The approach used to develop the estimate, based on shipment data, provides an upper estimate of the size of the PV stock, including both grid-based and off-grid PV. It will overestimate the size of the stock, because shipments include a substantial number of units that are exported, and each year some of the PV units installed earlier will be retired from service or abandoned.

5/ Includes biogenic municipal waste, landfill gas, and municipal sewage sludge. Incremental growth is assumed to be for landfill gas facilities. Only biogenic municipal waste is included. The U.S. Energy Information Administration estimates that in 2009 approximately 6 billion kilowatthours of electricity were generated from a municipal waste stream containing petroleum-derived plastics and other non-renewable sources. See U.S. Energy Information Administration, Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy, (Washington, DC, May 2007).

6/ Actual heat rates used to determine fuel consumption for all renewable fuels except hydropower, geothermal, solar, and wind. Consumption at hydroelectric, geothermal, solar, and wind facilities determined by using the fossil fuel equivalent of 9,760 Btu per kilowatthour.

7/ Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors; and small on-site generating systems in the residential, commercial, and industrial sectors used primarily for own-use generation, but which may also sell some power to the grid.

8/ Represents own-use industrial hydroelectric power.

Note: Totals may not equal sum of components due to independent rounding. Data for 2010 are model results and may differ slightly from official EIA data reports.

Sources: 2009 and 2010 generation: EIA, Annual Energy Review 2010, DOE/EIA-0384(2010) (Washington, DC, October 2011). Projections: EIA, AEO2012 National Energy Modeling System.