Table A16. Renewable energy generating capacity and generation
(gigawatts, unless otherwise noted)

Net summer capacity and generation	Reference case							Annual growth 2013-2040 (percent)
	2012	2013	2020	2025	2030	2035	2040	
Electric power sector[1]								
Net summer capacity								
Conventional hydroelectric power	78.1	78.3	79.2	79.6	79.7	79.8	80.1	0.1%
Geothermal[2]	2.6	2.6	3.8	5.3	7.0	8.2	9.1	4.7%
Municipal waste[3]	3.6	3.7	3.8	3.8	3.8	3.8	3.8	0.1%
Wood and other biomass[4]	2.9	3.3	3.5	3.5	3.6	4.2	5.5	1.8%
Solar thermal	0.5	1.3	1.8	1.8	1.8	1.8	1.8	1.2%
Solar photovoltaic[5]	2.6	5.2	14.4	14.7	15.7	17.9	22.2	5.5%
Wind	59.2	60.3	82.0	83.0	86.3	95.6	108.2	2.2%
Offshore wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0	- -
Total electric power sector capacity	**149.4**	**154.7**	**188.6**	**191.6**	**198.0**	**211.2**	**230.6**	**1.5%**
Generation (billion kilowatthours)								
Conventional hydroelectric power	273.9	265.7	291.0	292.8	293.4	293.8	295.6	0.4%
Geothermal[2]	15.6	16.5	26.8	38.5	52.4	62.3	69.6	5.5%
Biogenic municipal waste[6]	16.9	16.5	20.0	20.3	20.1	20.0	20.2	0.8%
Wood and other biomass	11.1	12.2	24.7	36.2	40.4	47.1	58.8	6.0%
Dedicated plants	9.9	11.1	13.4	15.1	16.7	20.4	30.3	3.8%
Cofiring	1.2	1.1	11.3	21.1	23.7	26.7	28.5	12.7%
Solar thermal	0.9	0.9	3.6	3.6	3.6	3.6	3.6	5.1%
Solar photovoltaic[5]	3.3	8.0	29.7	30.3	32.6	37.6	47.1	6.8%
Wind	140.7	167.6	230.6	233.8	243.3	276.1	317.1	2.4%
Offshore wind	0.0	0.0	0.1	0.1	0.1	0.1	0.1	- -
Total electric power sector generation	**462.3**	**487.4**	**626.4**	**655.6**	**685.9**	**740.7**	**812.1**	**1.9%**
End-use sectors[7]								
Net summer capacity								
Conventional hydroelectric power	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	- -
Municipal waste[8]	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0%
Biomass	4.9	5.0	5.4	5.4	5.4	5.5	5.6	0.4%
Solar photovoltaic[5]	4.6	6.2	11.4	15.5	21.5	28.7	36.7	6.8%
Wind	0.2	0.2	0.7	0.7	0.9	1.1	1.5	7.7%
Total end-use sector capacity	**10.4**	**12.1**	**18.2**	**22.4**	**28.6**	**36.0**	**44.6**	**4.9%**
Generation (billion kilowatthours)								
Conventional hydroelectric power	1.4	1.4	1.4	1.4	1.4	1.4	1.4	0.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	- -
Municipal waste[8]	3.6	3.6	3.6	3.6	3.6	3.6	3.6	0.0%
Biomass	26.5	27.2	29.1	29.3	29.4	29.4	30.5	0.4%
Solar photovoltaic[5]	7.1	9.6	17.9	24.8	34.7	46.3	59.3	7.0%
Wind	0.2	0.3	0.9	1.0	1.2	1.5	2.1	8.0%
Total end-use sector generation	**38.8**	**42.1**	**52.9**	**60.1**	**70.2**	**82.3**	**96.9**	**3.1%**

Table A16. Renewable energy generating capacity and generation (continued)

(gigawatts, unless otherwise noted)

Net summer capacity and generation	Reference case							Annual growth 2013-2040 (percent)
	2012	2013	2020	2025	2030	2035	2040	
Total, all sectors								
Net summer capacity								
Conventional hydroelectric power	78.4	78.5	79.5	79.9	80.0	80.1	80.4	0.1%
Geothermal	2.6	2.6	3.8	5.3	7.0	8.2	9.1	4.7%
Municipal waste	4.1	4.1	4.3	4.3	4.3	4.3	4.3	0.1%
Wood and other biomass[4]	7.8	8.3	8.9	8.9	9.1	9.6	11.1	1.1%
Solar[5]	7.6	12.7	27.6	31.9	39.0	48.3	60.6	6.0%
Wind	59.4	60.5	82.7	83.8	87.3	96.7	109.7	2.2%
Total capacity, all sectors	**159.8**	**166.8**	**206.8**	**214.1**	**226.6**	**247.2**	**275.2**	**1.9%**
Generation (billion kilowatthours)								
Conventional hydroelectric power	275.2	267.1	292.3	294.2	294.7	295.2	297.0	0.4%
Geothermal	15.6	16.5	26.8	38.5	52.4	62.3	69.6	5.5%
Municipal waste	20.6	20.1	23.7	23.9	23.7	23.7	23.8	0.6%
Wood and other biomass	37.6	39.4	53.8	65.5	69.8	76.5	89.3	3.1%
Solar[5]	11.2	18.5	51.3	58.7	70.9	87.5	110.1	6.8%
Wind	141.0	167.8	231.5	234.9	244.6	277.8	319.3	2.4%
Total generation, all sectors	**501.2**	**529.5**	**679.4**	**715.6**	**756.2**	**823.0**	**909.1**	**2.0%**

[1]Includes electricity-only and combined heat and power plants that have a regulatory status.
[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 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]Facilities co-firing biomass and coal are classified as coal.
[5]Does not include off-grid photovoltaics (PV). Based on annual PV shipments from 1989 through 2013, EIA estimates that as much as 274 megawatts of remote electricity generation PV applications (i.e., off-grid power systems) were in service in 2013, plus an additional 573 megawatts in communications, transportation, and assorted other non-grid-connected, specialized applications. See U.S. Energy Information Administration, *Annual Energy Review 2011*, DOE/EIA-0384(2011) (Washington, DC, September 2012), Table 10.9 (annual PV shipments, 1989-2010), and Table 12 (U.S. photovoltaic module shipments by end use, sector, and type) in U.S. Energy Information Administration, *Solar Photovoltaic Cell/Module Shipments Report, 2011* (Washington, DC, September 2012) and U.S. Energy Information Administration, *Solar Photovoltaic Cell/Module Shipments Report, 2012* (Washington, DC, December 2013). 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.
[6]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 2013 approximately 7 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).
[7]Includes combined heat and power plants and electricity-only plants in the commercial and industrial sectors that have a non-regulatory status; 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]Includes municipal waste, landfill gas, and municipal sewage sludge. All municipal waste is included, although a portion of the municipal waste stream contains petroleum-derived plastics and other non-renewable sources.
- - = Not applicable.
Note: Totals may not equal sum of components due to independent rounding. Data for 2012 and 2013 are model results and may differ from official EIA data reports.
Sources: 2012 and 2013 capacity: U.S. Energy Information Administration (EIA), Form EIA-860, "Annual Electric Generator Report" (preliminary). 2012 and 2013 generation: EIA, *Monthly Energy Review*, DOE/EIA-0035(2014/11) (Washington, DC, November 2014). **Projections:** EIA, AEO2015 National Energy Modeling System run REF2015.D021915A.