

APPA Report on New Generating Capacity: 2011 Update

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A Look at America's New Generating Capacity: 2011 Update

This is APPA's fifth annual report on new generation capacity, focusing on the fuel type and location of the new capacity.

Almost 446,000 Megawatts (MW) of new capacity is under some degree of development. As in our most recent report, there is a growing trend in favor of renewable forms of generation, particularly wind, solar and hydro-electric. Coal and natural gas continue to be the primary fuels for plants already under construction, accounting for 62 percent of plants at this stage of development, and just over half of the plants at the permitted stage. The most popular form of renewable energy is wind, with 130,000 MWs of total potential capacity, although solar is the leading fuel choice at the pending application stage with nearly 30,000 MWs of potential capacity. Once again, a significant majority of the non-traditional forms of energy are slated to come on-line much further into the future.

The following tables highlight what type of fuels will be used for new plants, and where these plants will be built. The information on new capacity is from the new entrants section of the Velocity Suite database, accessed in January 2011. The database includes the plant operator, primary fuel type, NERC region, and capacity of the proposed unit, as well as the status of development (operating status). There is also a rough estimate of the proposed on-line date.

The tables show four categories of operating status in descending order of certainty: plants under construction, plants that have been permitted, plants with applications pending, and proposed new plants. All of the non-nuclear capacity under construction is scheduled to come on line by 2014, while permitted plants have estimated online dates extending to 2020. The under construction and permitted units account for a little less than 86,000 MWs of capacity, or 19 percent of the total planned capacity. Units pending application account for an additional 109,000 MWs of capacity, and proposed plants – the least certain to be built – account for over 251,000 MWs of capacity, or approximately 56 percent of the total.

The tables also summarize each category of operation by three additional criteria: primary fuel type of the new plant, owner type, and region. This report also contains a discussion of recent developments that might impact how much of this potential new capacity will ultimately come on-line.

Fuel mix of new plants

The following four tables highlight the fuel makeup of the new plants. The first table shows the fuel makeup of the 36,128 MWs of generating capacity that are currently under construction. While fossil fuel resources (natural gas, coal and petroleum coke) account for 63 percent of the combined capacity, zero-emission resources such as wind, nuclear, and solar account for an increasing share of new capacity already under construction compared with previous reports.

Plants under construction by:		
Fuel Type	Capacity (MW)	% Total
Natural Gas	14,816.90	41.0%
Coal	7,628.50	21.1%
Wind	6,583.66	18.2%
Nuclear	3,503.90	9.7%
Solar	1,567.15	4.3%
Water	480.10	1.3%
Wood	366.85	1.0%
Petroleum Coke	310.00	0.9%
Waste	285.40	0.8%
Geothermal	280.04	0.8%
Landfill Gas	122.10	0.3%
Biomass Solid	70.20	0.2%
Waste Heat	64.00	0.2%
Other Gas	21.80	0.1%
Other	20.00	0.1%
Biomass Gas	4.43	0.0%
Distillate Fuel Oil	2.00	0.0%
Agricultural Byproduct	0.75	0.0%
Total	36,127.77	100.0%

The second table shows the fuel makeup for plants that have received permits to begin construction. 49,590 MWs of capacity have been permitted to build but have not yet started construction. Natural gas accounts for just over one-third of the capacity in this category, with wind furnishing another quarter of the permitted capacity.

Permitted Plants by:		
Fuel Type	Capacity (MW)	% Total
Natural Gas	18,760.60	37.8%
Wind	12,416.14	25.0%
Coal	6,786.40	13.7%
Solar	5,210.76	10.5%
Other	2,700.00	5.4%
Petroleum Coke	1,320.00	2.7%
Nuclear	1,213.00	2.4%
Wood	484.37	1.0%
Water	430.53	0.9%
Geothermal	197.50	0.4%
Landfill Gas	49.65	0.1%
Biomass Solid	21.00	0.0%
Total	49,589.94	100.0%

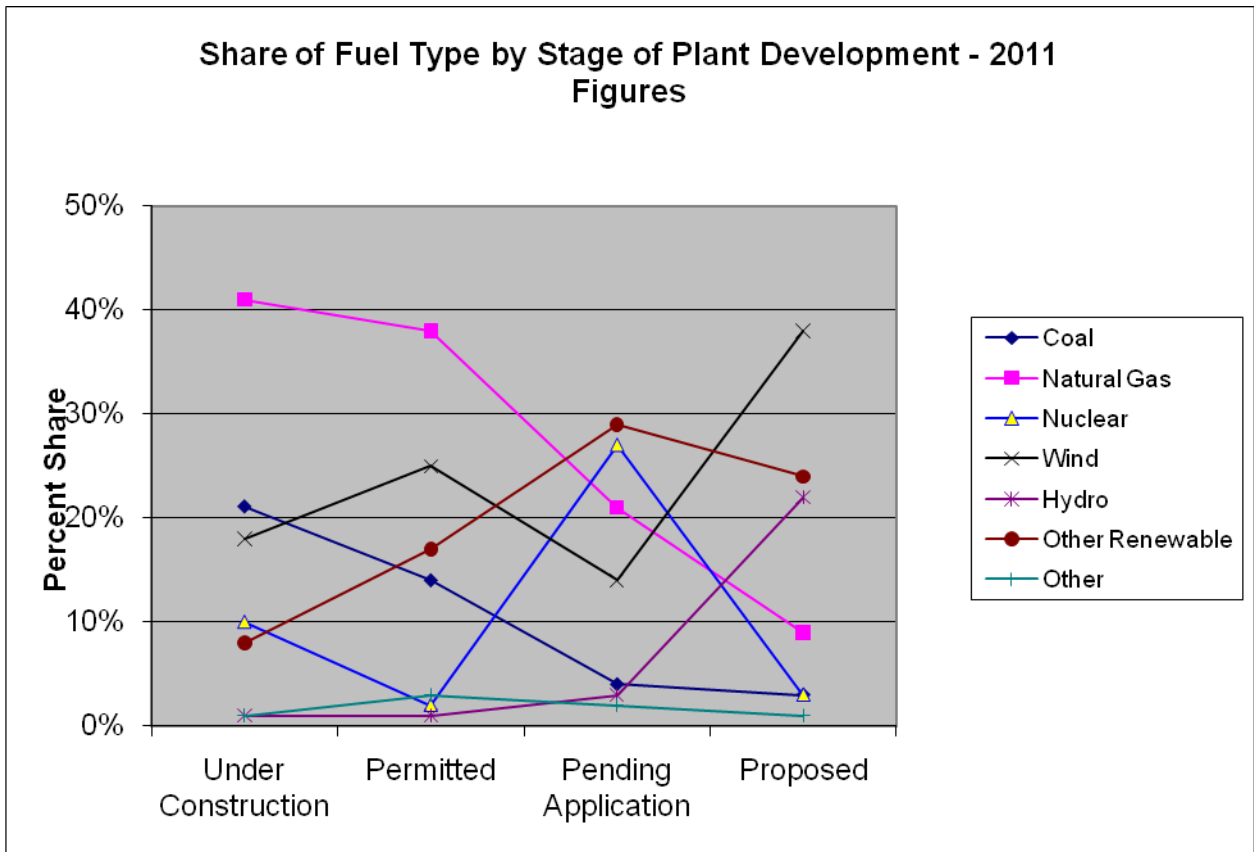
The following table shows the fuel mix for the 108,749 MWs of capacity that is still awaiting the approval of applications. Once again, nuclear generation’s share of the new capacity is significantly higher in the under construction and permitted categories. For the second report in a row, solar is the largest fuel source at this stage of development, accounting for just under 30,000 MWs, or 25 percent of the total capacity. The overall fuel mix is the most balanced of any category, with four different fuel sources accounting for ten percent or more of the capacity.

Pending Application by:		
Fuel Type	Capacity (MW)	% Total
Solar	29,935.55	27.5%
Nuclear	28,800.00	26.5%
Natural Gas	22,470.20	20.7%
Wind	15,328.75	14.1%
Coal	4,445.00	4.1%
Water	3,184.55	2.9%
Petroleum Coke	2,600.00	2.4%
Wood	817.90	0.8%
Geothermal	621.00	0.6%
Waste	226.30	0.2%
Waste Heat	135.00	0.1%
Other	90.00	0.1%
Landfill Gas	46.84	0.0%
Biomass Solid	26.50	0.0%
Distillate Fuel Oil	15.00	0.0%
Biomass Gas	5.93	0.0%
Total	108,748.52	100.0%

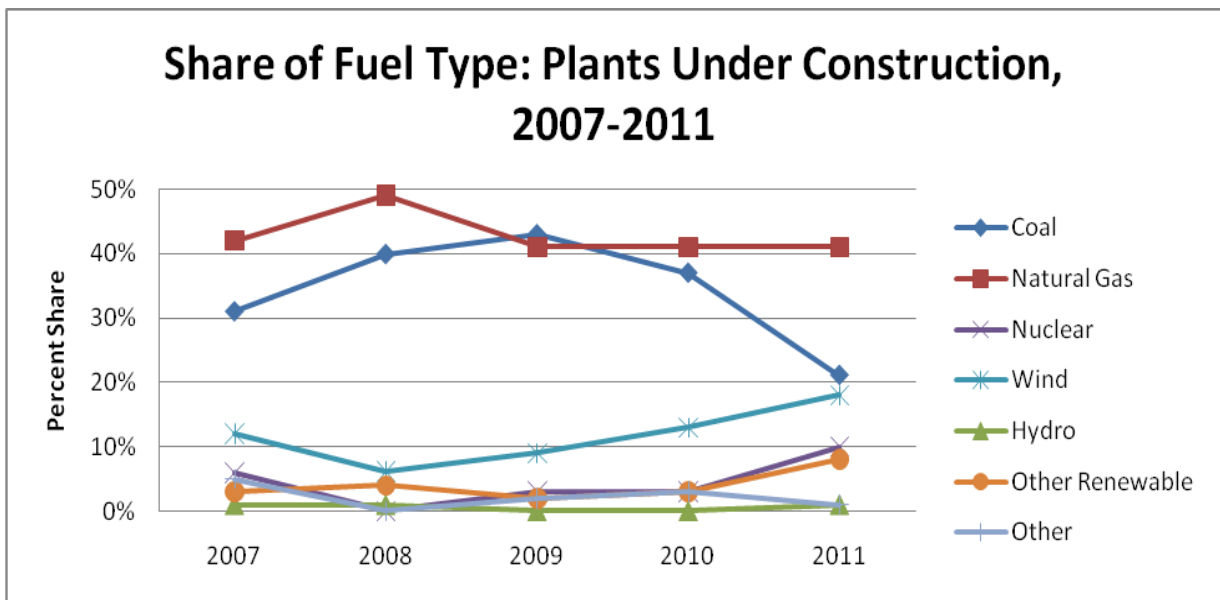
This final table shows the fuel mix for the 251,499 MWs of capacity still in the planning stages. This is the earliest and most uncertain stage of development, and includes the plants that are least certain to be built. Many of these plants are purely speculative, so caution should be used when analyzing this data. Three zero-emitting forms of renewable energy – wind, water, and solar – account for nearly 80 percent of the capacity in this category. If nuclear and other forms of renewable energy are included, nearly 87 percent of this new generation would be zero-emitting.

Proposed plants by:		
Fuel Type	Capacity (MW)	% Total
Wind	96,656.40	38.4%
Water	54,885.29	21.8%
Solar	49,271.87	19.6%
Natural Gas	23,358.64	9.3%
Nuclear	8,650.00	3.4%
Coal	8,568.80	3.4%
Geothermal	2,939.40	1.2%
Wood	1,988.00	0.8%
Biomass Solid	1,118.15	0.4%
Waste	896.80	0.4%
Other	835.00	0.3%
Petroleum Coke	600.00	0.2%
Blast Furnace Gas	600.00	0.2%
Biomass Gas	410.85	0.2%
Landfill Gas	279.98	0.1%
Waste Heat	141.80	0.1%
Agricultural Byproduct	99.22	0.0%
Other Biomass	98.00	0.0%
Jet Fuel	60.00	0.0%
Biomass Liquid	16.60	0.0%
Distillate Fuel Oil	14.20	0.0%
Other Gas	10.00	0.0%
Total	251,498.98	100.0%

The charts below tracks the share of each of the major fuel sources through each stage of the planning process. As the timeline grows more remote, the most popular fuel sources shift from fossil fuels to renewable forms of energy. In particular, natural gas and coal represent a declining share of the capacity mix through each stage of the planning process. Where construction has already begun, these traditional forms of energy still predominate. Where plans are more uncertain, non-emitting fuel types form larger and larger shares.

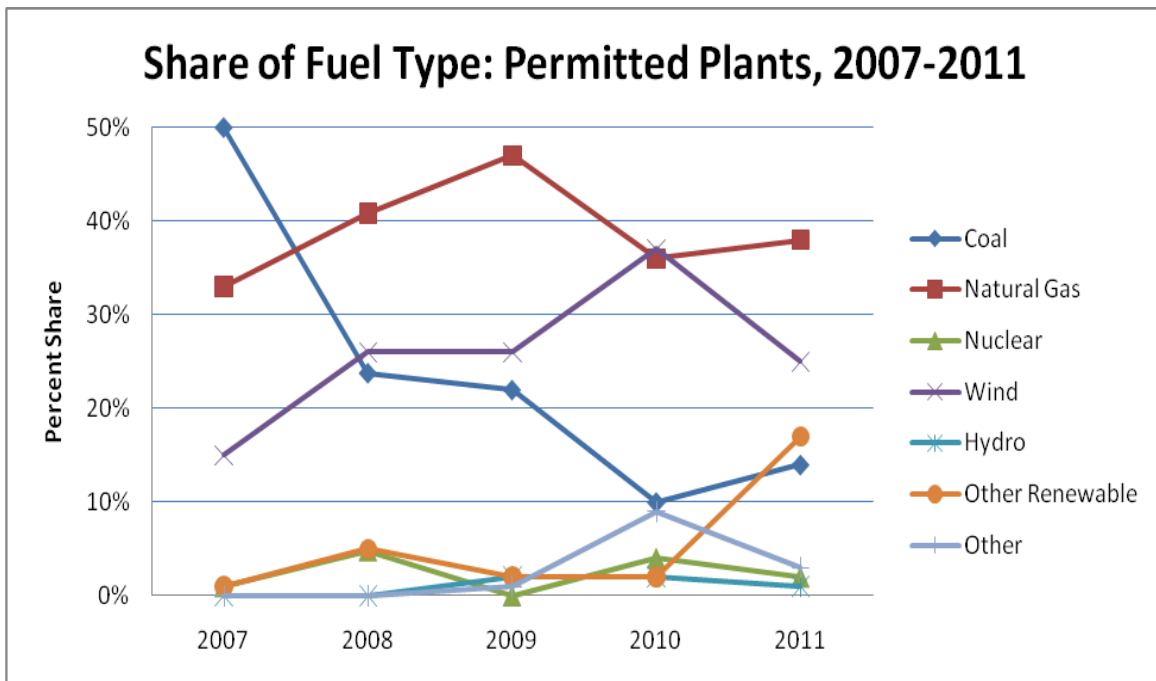


The following charts demonstrate how the fuel outlook has changed since APPA's first report on new generating capacity, published in 2007. The first chart shows each fuel's share of capacity under construction by year. This category has been the most stable, as most fuel types have remained fairly stable. There has been an upwards trend in wind plants and a downward trend in coal-fired plants.

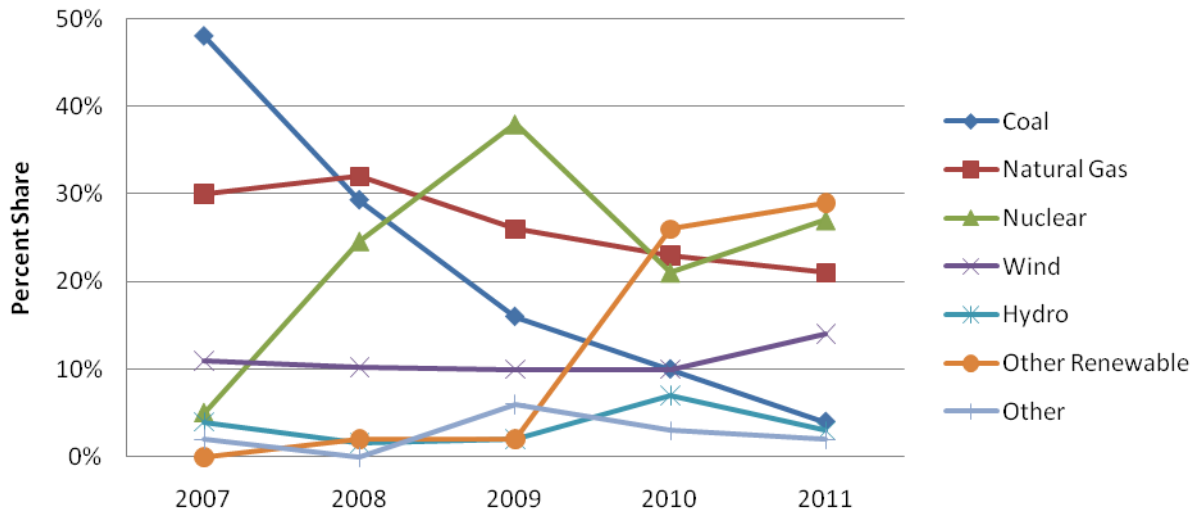


The following three charts track the other three planning stage categories. Entities responsible for planning capacity development have continuously shifted their focus towards renewable forms of energy. In 2007, coal accounted for a 32 percent share of the fuel capacity in the “proposed” category. This year, coal accounts for a three percent share of proposed fuel capacity additions. This is in part due to utilities and other power generators shifting their resources from coal, but that is only a partial explanation of the decline. The absolute total of coal-fired generation being proposed has not declined as sharply as its *share* of proposed capacity. In 2007, coal accounted for 26,628 MWs of proposed capacity, whereas in 2011 a total of 8,568 MWs of coal-fired plants are at the earliest stage of development.

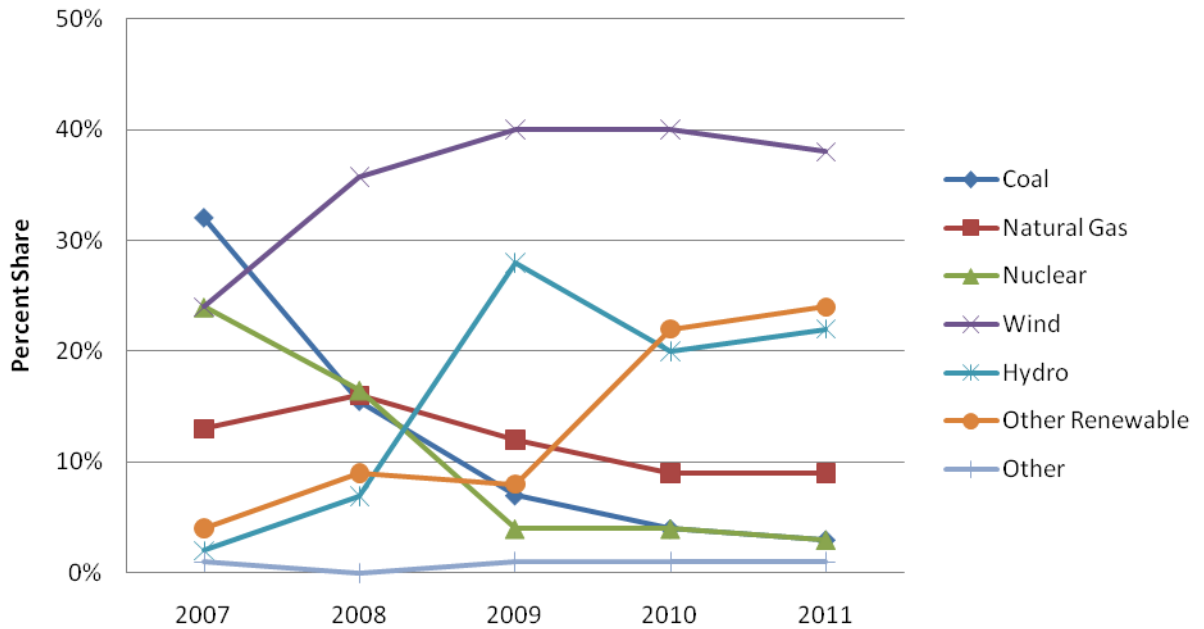
Not only have generators shifted to other forms of energy, more overall capacity is being considered. In 2007 a total of 84,560 MWs of capacity was at the proposed stage, and in 2011 that number has more than tripled to 251,499 MWs. As will be discussed later, a number of factors will influence how much of that proposed capacity is ever constructed and added to the nation’s resource mix. But generators are planning to add significantly more capacity, and they plan on fueling that capacity with non-emitting forms of energy.



Share of Fuel Type: Application Pending, 2007-2011



Share of Fuel Type: Proposed Plants, 2007-2011



Regional balance of new plant entrants

The following four tables show where the new plants are being built or are planned for construction. These tables show NERC regions and the percentage of planned plants in each region. (See Appendix One for definitions of each region, and states included therein.)

The first table shows the percentage of capacity under construction in each region. SERC and WECC lead the way with over 53 percent of the combined capacity. The second table shows the percentage of permitted plants by region. Here WECC has the most capacity, with ERCOT, SERC and RFC also developing a significant amount of capacity.

Plants under construction by:		
Region	Capacity (MW)	% Total
SERC	10,987.98	30.4%
WECC	8,232.64	22.8%
RFC	5,760.88	15.9%
MRO	2,882.50	8.0%
ERCOT	2,589.00	7.2%
NPCC	2,462.70	6.8%
FRCC	1,683.50	4.7%
SPP	1,246.50	3.5%
ASCC	237.00	0.7%
HCC	45.07	0.1%
Total	36,127.77	100.0%

Permitted plants by:		
Region	Capacity (MW)	% Total
WECC	15,087.6	30.4%
ERCOT	9,583.0	19.3%
SERC	7,397.4	14.9%
RFC	6,652.7	13.4%
MRO	3,069.8	6.2%
FRCC	2,602.7	5.2%
NPCC	2,512.2	5.1%
SPP	2,345.0	4.7%
ASCC	339.6	0.7%
Total	49,589.9	100.0%

The third and fourth tables show plants in the pending application and proposed categories. WECC has far more potential capacity than any other region in both categories.

Pending Application by:		
Region	Capacity (MW)	% Total
WECC	49,423.35	45.4%
SERC	17,110.19	15.7%
ERCOT	14,529.00	13.4%
RFC	8,518.85	7.8%
FRCC	7,175.20	6.6%
NPCC	7,487.93	6.9%
MRO	2,711.10	2.5%
SPP	1,668.00	1.5%
HCC	83.70	0.1%
ASCC	41.20	0.0%
Total	108,748.52	100.0%

Proposed plants by:		
Region	Capacity (MW)	% Total
WECC	127,163.66	50.6%
MRO	23,973.97	9.5%
SERC	21,400.03	8.5%
RFC	21,065.71	8.4%
SPP	19,443.90	7.7%
NPCC	15,486.11	6.2%
ERCOT	14,688.50	5.8%
ASCC	3,987.13	1.6%
FRCC	3,187.75	1.3%
HCC	1,102.22	0.4%
Total	251,498.98	100.0%

New Capacity by Owner Type

The new capacity was also summarized by owner type. Among the plants under construction, the share is distributed almost evenly between regulated and unregulated entities (NUG). (“Municipal” category includes all units of state or local government.)

Plants under construction by:		
Utility Type	Capacity (MW)	% Total
IOU	10,168.28	28.1%
Municipals	2,567.68	7.1%
Co-Op	2,915.85	8.1%
Federal	2,221.90	6.2%
All Regulated	17,873.71	49.5%
NUG	18,254.06	50.5%
Total	36,127.77	100.0%

Non-regulated entities are responsible for a significant majority of the capacity at the earlier stages of development.

Permitted plants by:		
Utility Type	Capacity (MW)	% Total
IOU	6,593.90	13.3%
Municipals	486.50	1.0%
Co-Op	1,848.60	3.7%
Federal	606.50	1.2%
All Regulated	9,535.50	19.2%
NUG	40,054.44	80.8%
Total	49,589.94	100.0%

Pending Application by:		
Utility Type	Capacity (MW)	% Total
IOU	23,172.68	29.0%
Municipals	3,804.61	4.8%
Co-Op	1,797.20	2.2%
Federal	-	0.0%
All Regulated	28,774.49	26.5%
NUG	79,974.03	73.5%
Total	108,748.52	100.0%

Proposed plants by:		
Utility Type	Capacity (MW)	% Total
Municipals	17,425.94	6.9%
IOU	12,717.87	5.1%
Co-Op	3,383.87	1.3%
Federal	2,269.38	0.9%
All Regulated	35,797.06	14.2%
NUG	215,701.92	85.8%
Total	251,498.98	100.0%

Fuel Type by Region

Appendix Two contains two tables which show the fuels of choice for new capacity in each NERC region. The first table combines the plants under construction and the permitted plants, and the second combines plants pending application and proposed plants. The following discussion excerpts and summarizes some of the highlights of these tables.

Under Construction and Permitted Plants

For those plants most certain to be built – meaning those already under construction or permitted – the fuels of choice are predominantly natural gas, coal, and wind, which combined account for over 78 percent of all plants at these stages. Natural gas is the most popular fuel option in five of the ten regions, and accounts for at least sixty percent of the impending fuel capacity in ERCOT, FRCC and NPCC.

Region	Fuel Type	Capacity (MW)	% share of Region's new fuel capacity	Overall % share of selected fuel's emerging capacity
ERCOT	Natural Gas	7,332.00	60.2%	21.8%
	Coal	2,465.00	20.3%	17.1%
	Petroleum Coke	1,630.00	13.4%	100.0%
	Wind	600.00	4.9%	3.2%
	Wood	145.00	1.2%	17.0%
	Total	12,172.00		
FRCC	Natural Gas	3,926.00	91.6%	11.7%
	Solar	183.50	4.3%	2.7%
	Wood	175.00	4.1%	20.6%
	Landfill Gas	1.65	0.0%	1.0%
	Total	4,286.15		
NPCC	Natural Gas	3,036.90	61.0%	9.0%
	Wind	1,539.10	30.9%	8.1%
	Wood	131.50	2.6%	15.4%
	Coal	125.00	2.5%	0.9%
	Landfill Gas	52.40	1.1%	30.5%
	Other	40.00	0.8%	1.5%
	Solar	34.00	0.7%	0.5%
	Water	11.17	0.2%	1.2%
	Other Gas	4.80	0.1%	22.0%
	Total	4,974.87		

MRO and WECC alone make up over 60 percent of the wind capacity slated to come on line in the immediate future. RFC contributes another 14 percent of the new wind capacity.

Region	Fuel Type	Capacity (MW)	% share of Region's new fuel capacity	Overall % share of selected fuel's emerging capacity
MRO	Wind	5,229.90	87.9%	27.5%
	Natural Gas	360.40	6.1%	1.1%
	Coal	319.00	5.4%	2.2%
	Waste	20.50	0.3%	7.2%
	Biomass Solid	9.70	0.2%	10.6%
	Water	9.15	0.2%	1.0%
	Distillate Fuel Oil	2.00	0.0%	100.0%
	Landfill Gas	1.60	0.0%	0.9%
	Total	5,952.25		
RFC	Coal	3,480.50	28.0%	24.1%
	Natural Gas	2,849.20	23.0%	8.5%
	Other	2,680.00	21.6%	98.5%
	Wind	2,660.30	21.4%	14.0%
	Wood	254.99	2.1%	30.0%
	Water	220.30	1.8%	24.2%
	Waste	121.00	1.0%	42.4%
	Solar	75.93	0.6%	1.1%
	Waste Heat	57.00	0.5%	89.1%
	Landfill Gas	14.40	0.1%	8.4%
	Total	12,413.62		
WECC	Natural Gas	9,088.70	39.0%	27.1%
	Solar	6,469.36	27.7%	95.4%
	Wind	6,326.30	27.1%	33.3%
	Coal	710.00	3.0%	4.9%
	Geothermal	469.54	2.0%	98.3%
	Water	98.95	0.4%	10.9%
	Wood	84.35	0.4%	9.9%
	Landfill Gas	44.10	0.2%	25.7%
	Other Gas	17.00	0.1%	78.0%
	Waste Heat	7.00	0.0%	10.9%
	Biomass Gas	2.80	0.0%	63.2%
	Waste	1.40	0.0%	0.5%
	Agricultural Byproduct	0.75	0.0%	100.0%
	Total	23,320.25		

Plants Pending Application and Proposed Plants

Fuel mixes for more distant plants – those that are proposed or pending application– tend more towards wind and other renewable resources than do those plants that are scheduled to come online in the near future. Wind is slated to account for ten percent or more of new capacity in all but the Alaska and Florida regions (ASCC and FRCC), and is the leading resource in six of the regions. As for solar, over 98 percent of the proposed or application pending solar capacity is located in WECC, a region that once again accounts for much of the new renewable capacity, and for nearly half of all capacity in this category.

Region	Fuel Type	Capacity (MW)	% share of Region's new fuel capacity	Overall % share of selected fuel's emerging capacity
WECC	Solar	77,940.94	44.1%	98.4%
	Wind	34,954.60	19.8%	31.2%
	Water	33,404.57	18.9%	57.5%
	Natural Gas	15,267.66	8.6%	33.3%
	Nuclear	5,000.00	2.8%	13.4%
	Coal	4,835.00	2.7%	37.2%
	Geothermal	3,405.40	1.9%	95.6%
	Waste	354.90	0.2%	31.6%
	Wood	326.70	0.2%	11.6%
	Biomass Gas	325.20	0.2%	78.0%
	Other	300.00	0.2%	32.4%
	Petroleum Coke	250.00	0.1%	7.8%
	Landfill Gas	123.09	0.1%	37.7%
	Biomass Solid	78.15	0.0%	6.8%
	Agricultural Byproduct	18.80	0.0%	18.9%
	Waste Heat	2.00	0.0%	0.7%
	Total	176,587.01		.

Among the most diversified regions are ERCOT, RFC, and SERC. At least three different fuel sources account for approximately 10 percent or more of the planned and proposed capacity in each region.

Region	Fuel Type	Capacity (MW)	% share of Region's new fuel capacity	Overall % share of selected fuel's emerging capacity	
ERCOT	Wind	9,547.50	32.7%	8.5%	
	Nuclear	9,116.00	31.2%	24.3%	
	Natural Gas	3,940.00	13.5%	8.6%	
	Coal	2,560.00	8.8%	19.7%	
	Petroleum Coke	2,520.00	8.6%	78.8%	
	Biomass Solid	523.00	1.8%	45.7%	
	Solar	420.00	1.4%	0.5%	
	Water	343.00	1.2%	0.6%	
	Wood	196.00	0.7%	7.0%	
	Other	40.00	0.1%	4.3%	
	Biomass Liquid	9.00	0.0%	54.2%	
	Waste Heat	3.00	0.0%	1.1%	
	Total		29,217.50		
	RFC	Wind	14,336.80	48.5%	12.8%
Natural Gas		6,045.10	20.4%	13.2%	
Nuclear		4,750.00	16.1%	12.7%	
Coal		2,329.30	7.9%	17.9%	
Water		907.61	3.1%	1.6%	
Solar		286.30	1.0%	0.4%	
Waste Heat		235.00	0.8%	84.9%	
Wood		207.50	0.7%	7.4%	
Other		132.20	0.4%	14.3%	
Blast Furnace Gas		100.00	0.3%	16.7%	
Waste		93.00	0.3%	8.3%	
Landfill Gas		89.15	0.3%	27.3%	
Biomass Solid		55.00	0.2%	4.8%	
Distillate Fuel Oil		10.00	0.0%	34.2%	
Biomass Liquid		7.60	0.0%	45.8%	
Total		29,584.56			
SERC	Natural Gas	10,311.00	26.8%	22.5%	
	Nuclear	9,034.00	23.5%	24.1%	
	Water	8,561.93	22.2%	14.7%	
	Wind	6,358.70	16.5%	5.7%	
	Coal	1,679.50	4.4%	12.9%	
	Wood	1,037.00	2.7%	37.0%	
	Blast Furnace Gas	500.00	1.3%	83.3%	
	Waste	272.90	0.7%	24.3%	
	Petr. Coke	230.00	0.6%	7.2%	
	Biomass Solid	176.50	0.5%	15.4%	
	Solar	100.75	0.3%	0.1%	
	Other Biomass	98.00	0.3%	100.0%	
	Agricultural Byproduct	55.00	0.1%	55.4%	
	Landfill Gas	51.59	0.1%	15.8%	
	Biomass Gas	34.15	0.1%	8.2%	
	Geothermal	5.00	0.0%	0.1%	
	Distillate Fuel Oil	4.20	0.0%	14.4%	
Total		38,510.22			

Recent Developments

This report presents a snapshot of emerging electric generating capacity. Though the tables tell us much about the trends in new capacity and generation developers' plans to add alternative forms of generation to the nation's fuel portfolio, a great deal of the proposed capacity is speculative. Unless shovels have dug into the ground, there is no guarantee that any of the emerging capacity will actually come on-line – and even then construction can be halted and plants postponed or canceled.

The greatest challenge to those proposing to develop new electric generating plants is the shifting and sometimes contradictory trends in government and popular support for certain forms of generation. As soon as events seem to favor one fuel type, other developments call into question that particular fuel's viability.

The most striking recent example concerns nuclear power. Not only are there two nuclear units currently in site preparation for the first time in two decades, there are over 37,000 MWs of nuclear capacity in the proposed and application pending stages of development. Popular and political support for nuclear power had been increasing, as evidenced by the Obama administration's support for nuclear power loan guarantees in his proposed 2011 budget, which came on the heels of a conditional \$8.3 billion loan guarantee last year to Georgia Power and its partners for the Vogtle plant expansion in Augusta, Georgia.¹

However, recent events surrounding the earthquake in Japan and accident at the Fukushima nuclear power plant cast doubt upon further expansion of nuclear capacity. The Department of Energy re-affirmed that nuclear energy will continue to be a part of the United States' energy policy. DOE Deputy Secretary Daniel Poneman said, "We will continue to seek to build nuclear into a part of a responsible energy future, and we will repose our confidence in the [Nuclear Regulatory Commission] to make sure that we only do so to the extent that it can be done safely."² Despite these assurances, other groups and political leaders are advocating that new nuclear construction be halted. Representative Ed Markey, the Ranking member on the House of Representatives Natural Resources Committee, has advocated that a moratorium be placed on new nuclear power construction "in seismically active areas" until further review.³ Plans to add advanced boiling water reactors to a South Texas nuclear facility are now in limbo, and a spokesman for NRG Energy, the principal funder of the project, said that an assessment of future plans will have to wait until the crisis had passed.⁴ As of this writing, the future of other planned nuclear capacity additions remain uncertain, but it serves as a reminder that events can change plans rather dramatically.

¹ William Freebairn, "Nuclear industry expects more loan guarantees," *Electric Power Daily*, February 11, 2011.

² Derek Sands, Keith Chum Paul Carlsen and William Freebairn, "Nuclear power to remain integral to US energy mix: DOE official," *Electric Power Daily*, March 15, 2011.

³ Ibid.

⁴ Housely Carr, Mary Powers, Hillary Costa and Steven Dolley, "Accident's effect on planned US nuclear development uncertain," *Electric Power Daily*, March 15, 2011.

Nuclear is far from being the only fuel source that experiences cross-currents of popular and political support. Though natural gas has been touted as a replacement for coal in the wake of a potential scale back on new coal generation, environmental concerns may have an impact on natural gas production in the United States. Tropospheric ozone or smog levels in western Wyoming – where there has been a boom in natural gas drilling – reached 124 parts per billion last year, two-thirds higher than the limit advised by the Environmental Protection Agency (EPA), and worse than the levels recorded recently in major cities like Los Angeles.⁵

There are also worries about shale and tight gas extraction methods. Maryland regulators blocked drilling using hydraulic fracking for shale gas production in the western part of the state until studies proved that it would not harm drinking water. One state legislator in Maryland even suggested a total ban on drilling until it was deemed that it would not taint the water supply.⁶ Meanwhile, three House Democrats sent a letter to the EPA in early 2011 declaring that “12 drilling companies had acknowledged using diesel or diesel-containing fluids in ‘fracking’ operations without ensuring that benzene and other toxic chemicals in diesel would not migrate into nearby water supplies.” Approximately 32 million gallons of fluid had been used in these operations between 2005 and 2009.⁷

Considering the various environmental concerns related to coal, nuclear and natural gas, it would seem that wind and other renewable forms of electric generation might have some advantage. Indeed both federal and state governments have announced initiatives meant to provide incentives for the development of renewable resources. An interagency plan offered by the Department of Energy and the Department of the Interior calls for funding opportunities for up to \$50.5 million for offshore wind projects. The goal is to have 54 gigawatts (GW) of offshore wind generating capacity by 2030.⁸ Additionally, the federal government designated four zones in the Atlantic Ocean for offshore wind development.⁹ It should be noted that wind and all forms of interruptible power need to be backed up by natural gas or other traditional forms of generation.

⁵ Wendy Koch, “Wyoming’s smog exceeds Los Angeles’ due to gas drilling,” *USA Today*, March 9, 2011. “Preliminary data show ozone levels last Wednesday got as high as 124 parts per billion. That’s two-thirds higher than the Environmental Protection Agency’s maximum healthy limit of 75 parts per billion and above the worst day in Los Angeles all last year, 114 parts per billion, according to EPA records. Ozone levels in the basin reached 116 on March 1 and 104 on [March 5].”

Source: http://www.huffingtonpost.com/2011/03/08/wyoming-ait-pollution-gas-drilling_n_833027.html

⁶ Darryl Fears, “Maryland county caught up in fight over energy extraction method,” *Washington Post*, February 6, 2011.

⁷ George Lobsenz, “House Dems Reveal Massive Diesel Fuel Use In Well Fracking,” *The Energy Daily*, February 1, 2011. For a discussion of other concerns related to natural gas, and factors which may influence future development of natural gas capacity, see the paper produced for APPA by Aspen Environmental Group, *Implications of Greater Reliance on Natural Gas for Electricity Generation*, July 2010, available at <http://www.publicpower.org/aboutappa/appa.cfm?ItemNumber=29060>.

⁸ “Salazar, Chu Announce Major Offshore Wind Initiatives,” *Electric Energy Online*, February 7, 2011, accessed at http://www.electricenergyonline.com/?page=show_news&id=148433. For the complete proposal, see *A National Offshore Wind Strategy: Creating an Offshore Wind Industry in the United States*, available at http://www1.eere.energy.gov/windandhydro/pdfs/national_offshore_wind_strategy.pdf.

⁹ Derek Sands, “US designates four offshore wind zones in Atlantic Ocean,” *Electric Power Daily*, February 8, 2011.

In addition to the federal government, states are taking action. New Jersey's Board of Public Utilities has established an offshore wind renewable energy certificate (OREC) in order to support the construction of 1,100 MW of offshore wind generation. The program would allow utilities to buy ORECs instead of entering into long-term contracts.¹⁰

Despite these efforts, there are still roadblocks in promoting on-shore and off-shore wind farms. Alliant CEO Bill Harvey said, "The reality is that there's been a break, if you will, in the public's affection for the deployment of renewable energy resources." He notes that while certain regions continue to promote wind energy, other areas are ramping down efforts.¹¹ In Michigan, for example, a bill has been introduced in the state legislature to ban offshore wind development in the Great Lakes.¹² And though Democrats in Colorado defeated efforts to roll back the state's renewable portfolio standard (RPS), it is an indication of increasing political opposition to financial and regulatory support for the wind industry.¹³ This is on top of environmentalist opposition to certain projects, either based on financial concerns¹⁴ or worries about the impact on birds and other wildlife.¹⁵

Aside from the specific issues related to each fuel type, general funding for federal programs for all energy programs could be scaled back due to efforts to reduce the federal budget deficit. During the most recent debate over the continuing budget resolution, House Republicans sought to cut millions for nuclear, clean-coal technology, fossil energy research and other energy programs. The Obama administration fought against these cuts, and the future of all these programs remains uncertain in the absence of a final resolution on the Fiscal 2011 budget.¹⁶

Considering the uncertain financial and political outlook, it is impossible to accurately predict generation fuel choices for future capacity. Though this report provides an overview of trends in new capacity development, ever shifting events and political trends could result in a radically different fuel portfolio than what is presented here.

¹⁰ Mary Powers, "New Jersey rules aim to boost offshore wind development," *Electric Power Daily*, February 11, 2011.

¹¹ Ethan Howland, "Alliant CEO sees interests in renewables ebbing; Q4 slips," *Electric Power Daily*, February 11, 2011.

¹² Bob Matyi, "Michigan legislation bans offshore wind in the Great Lakes," *Electric Power Daily*, April 13, 2011.

¹³ Ethan Howland, "Colo. Bills to roll back renewables targets killed by panel," *Electric Power Daily*, February 11, 2011.

¹⁴ "Vermont group pledges continued opposition to wind farm," December 28, 2010, accessed at <http://www.brighterenergy.org/21375/news/wind/vermont-group-pledges-continued-opposition-to-wind-farm/>.

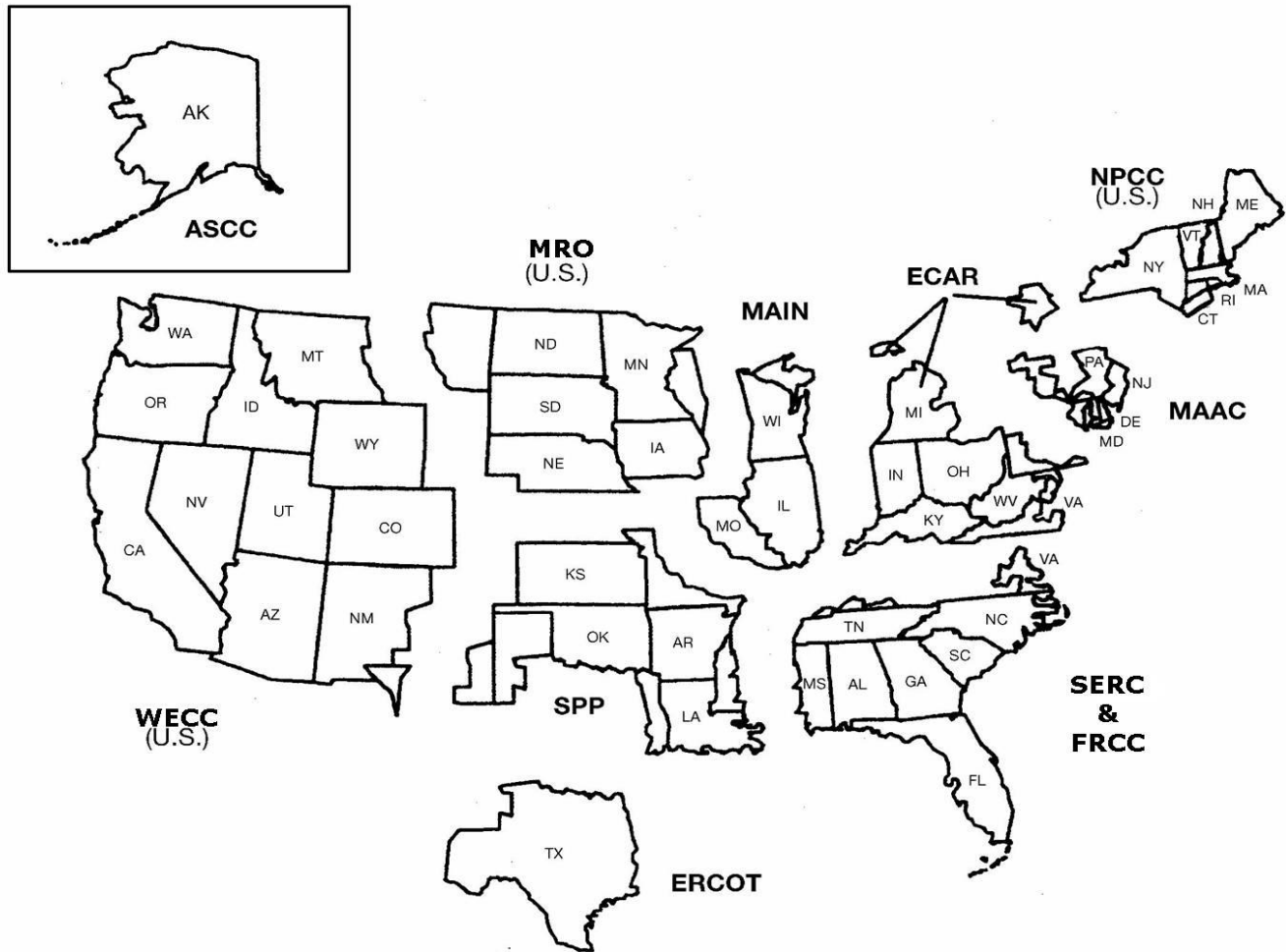
¹⁵ "Nevada wind farm faces opposition from environmentalists," February 1, 2011, accessed at <http://www.newenergyworldnetwork.com/renewable-energy-news/by-technology/wind/nevada-wind-farm-faces-opposition-from-environmentalists.html>.

¹⁶ Brian Hansen, "Republicans in Congress offer deep cuts to energy programs," *Electric Power Daily*, February 10, 2011.

Conclusion

The future of America's generating capacity indicates a shift away from traditional forms of energy. Renewable forms of electric generation continue to gain prominence both for plants that are presently under construction and for planned capacity additions. A large amount of wind, solar, and hydro capacity is in the pipelines, and if these planned additions come to fruition, it would mark a significant change in the overall resource mix.

There remains tremendous uncertainty, however, with these capacity additions. Political, financial, and popular pressures will all shape the direction of America's electric fuel portfolio. Dramatic shifts can occur quickly, causing entities to change their plans. But even with all this uncertainty, there is an overall trend towards alternative forms of electric generation.



APPENDIX ONE – REGIONAL DEFINITIONS

The regions used for this report correspond to regions of the North American Electric Reliability Council (NERC) as specified below.

NERC Regions

ASCC - Alaska Systems Coordinating Council

ERCOT – Electric Reliability Council of Texas

FRCC – Florida Reliability Coordinating Council

HCC – Hawaii Coordinating Council (not shown on map)

NPCC - Northeast Power Coordinating Council

MRO – Midwest Reliability Organization

RFC – Reliability First Corporation (includes ECAR - East Central Area Reliability Coordination Agreement, MAIN – Mid-America Interconnected Network, and MAAC - Mid-Atlantic Area Council)

SERC - Southeastern Electric Reliability Council

SPP – Southwest Power Pool

WECC - Western Electricity Coordinating Council

APPENDIX TWO: REGIONAL FUEL MIX TABLES

Permitted Plants and Plants Under Construction: Fuel by Region				
Region	Fuel Type	Capacity (MW)	% share of Region's new fuel capacity	Overall % share of selected fuel's emerging capacity
ASCC	Water	334.60	58.0%	36.7%
	Natural Gas	183.00	31.7%	0.5%
	Wind	59.00	10.2%	0.3%
	Total	576.60		
ERCOT	Natural Gas	7,332.00	60.2%	21.8%
	Coal	2,465.00	20.3%	17.1%
	Petroleum Coke	1,630.00	13.4%	100.0%
	Wind	600.00	4.9%	3.2%
	Wood	145.00	1.2%	17.0%
Total	12,172.00			
FRCC	Natural Gas	3,926.00	91.6%	11.7%
	Solar	183.50	4.3%	2.7%
	Wood	175.00	4.1%	20.6%
	Landfill Gas	1.65	0.0%	1.0%
Total	4,286.15			
HCC	Wind	30.00	66.6%	0.2%
	Geothermal	8.00	17.8%	1.7%
	Solar	7.07	15.7%	0.1%
Total	45.07			
MRO	Wind	5,229.90	87.9%	27.5%
	Natural Gas	360.40	6.1%	1.1%
	Coal	319.00	5.4%	2.2%
	Waste	20.50	0.3%	7.2%
	Biomass Solid	9.70	0.2%	10.6%
	Water	9.15	0.2%	1.0%
	Distillate Fuel Oil	2.00	0.0%	100.0%
	Landfill Gas	1.60	0.0%	0.9%
Total	5,952.25			
NPCC	Natural Gas	3,036.90	61.0%	9.0%
	Wind	1,539.10	30.9%	8.1%
	Wood	131.50	2.6%	15.4%
	Coal	125.00	2.5%	0.9%
	Landfill Gas	52.40	1.1%	30.5%
	Other	40.00	0.8%	1.5%
	Solar	34.00	0.7%	0.5%
	Water	11.17	0.2%	1.2%
	Other Gas	4.80	0.1%	22.0%
	Total	4,974.87		

Permitted Plants and Plants Under Construction: Fuel by Region (continued)				
RFC	Coal	3,480.50	28.0%	24.1%
	Natural Gas	2,849.20	23.0%	8.5%
	Other	2,680.00	21.6%	98.5%
	Wind	2,660.30	21.4%	14.0%
	Wood	254.99	2.1%	30.0%
	Water	220.30	1.8%	24.2%
	Waste	121.00	1.0%	42.4%
	Solar	75.93	0.6%	1.1%
	Waste Heat	57.00	0.5%	89.1%
	Landfill Gas	14.40	0.1%	8.4%
	Total	12,413.62		
SERC	Natural Gas	6,768.30	36.8%	20.2%
	Coal	5,811.40	31.6%	40.3%
	Nuclear	4,716.90	25.7%	100.0%
	Wind	552.50	3.0%	2.9%
	Water	191.66	1.0%	21.0%
	Waste	140.50	0.8%	49.2%
	Biomass Solid	81.50	0.4%	89.4%
	Wood	60.38	0.3%	7.1%
	Landfill Gas	52.60	0.3%	30.6%
	Solar	8.05	0.0%	0.1%
	Biomass Gas	1.63	0.0%	36.8%
	Total	18,385.41		
SPP	Wind	2,002.70	55.8%	10.5%
	Coal	1,504.00	41.9%	10.4%
	Water	44.80	1.2%	4.9%
	Natural Gas	33.00	0.9%	0.1%
	Landfill Gas	5.00	0.1%	2.9%
	Waste	2.00	0.1%	0.7%
	Total	3,591.50		
WECC	Natural Gas	9,088.70	39.0%	27.1%
	Solar	6,469.36	27.7%	95.4%
	Wind	6,326.30	27.1%	33.3%
	Coal	710.00	3.0%	4.9%
	Geothermal	469.54	2.0%	98.3%
	Water	98.95	0.4%	10.9%
	Wood	84.35	0.4%	9.9%
	Landfill Gas	44.10	0.2%	25.7%
	Other Gas	17.00	0.1%	78.0%
	Waste Heat	7.00	0.0%	10.9%
	Biomass Gas	2.80	0.0%	63.2%
	Waste	1.40	0.0%	0.5%
	Agricultural Byproduct	0.75	0.0%	100.0%
	Total	23,320.25		

Proposed plants and plants pending application: Fuel by Region				
Region	Fuel Type	Capacity (MW)	% share of Region's new fuel capacity	Overall % share of selected fuel's emerging capacity
ASCC	Water	3,323.93	82.5%	5.7%
	Natural Gas	260.30	6.5%	0.6%
	Geothermal	150.00	3.7%	4.2%
	Coal	100.00	2.5%	0.8%
	Wind	95.90	2.4%	0.1%
	Jet Fuel	60.00	1.5%	100.0%
	Waste Heat	35.00	0.9%	12.6%
	Landfill Gas	3.20	0.1%	1.0%
	Total	4,028.33		
ERCOT	Wind	9,547.50	32.7%	8.5%
	Nuclear	9,116.00	31.2%	24.3%
	Natural Gas	3,940.00	13.5%	8.6%
	Coal	2,560.00	8.8%	19.7%
	Petroleum Coke	2,520.00	8.6%	78.8%
	Biomass Solid	523.00	1.8%	45.7%
	Solar	420.00	1.4%	0.5%
	Water	343.00	1.2%	0.6%
	Wood	196.00	0.7%	7.0%
	Other	40.00	0.1%	4.3%
	Biomass Liquid	9.00	0.0%	54.2%
	Waste Heat	3.00	0.0%	1.1%
		Total	29,217.50	
FRCC	Nuclear	5,250.00	50.7%	14.0%
	Natural Gas	2,950.50	28.5%	6.4%
	Water	816.00	7.9%	1.4%
	Wood	550.00	5.3%	19.6%
	Solar	323.80	3.1%	0.4%
	Waste	248.00	2.4%	22.1%
	Biomass Solid	213.00	2.1%	18.6%
	Landfill Gas	11.65	0.1%	3.6%
	Total	10,362.95		
HCC	Wind	927.00	78.2%	0.8%
	Water	109.30	9.2%	0.2%
	Solar	46.50	3.9%	0.1%
	Agricultural Byproduct	25.42	2.1%	25.6%
	Biomass Solid	24.00	2.0%	2.1%
	Landfill Gas	20.00	1.7%	6.1%
	Other Gas	10.00	0.8%	100.0%
	Other	10.00	0.8%	1.1%
	Waste	7.30	0.6%	0.6%
	Wood	6.40	0.5%	0.2%
	Total	1,185.92		

Proposed plants and plants pending application: Fuel by Region (continued)				
MRO	Wind	21,357.00	80.0%	19.1%
	Water	2,373.17	8.9%	4.1%
	Coal	1,300.00	4.9%	10.0%
	Natural Gas	1,047.90	3.9%	2.3%
	Other	268.00	1.0%	29.0%
	Petroleum Coke	200.00	0.7%	6.3%
	Waste	87.00	0.3%	7.7%
	Wood	50.00	0.2%	1.8%
	Solar	2.00	0.0%	0.0%
		Total	26,685.07	
NPCC	Wind	8,970.57	39.0%	8.0%
	Water	6,128.51	26.7%	10.6%
	Natural Gas	5,471.98	23.8%	11.9%
	Nuclear	1,600.00	7.0%	4.3%
	Wood	382.30	1.7%	13.6%
	Other	174.80	0.8%	18.9%
	Waste	60.00	0.3%	5.3%
	Biomass Gas	57.43	0.2%	13.8%
	Coal	50.00	0.2%	0.4%
	Solar	35.13	0.2%	0.0%
	Landfill Gas	26.53	0.1%	8.1%
	Distillate Fuel Oil	15.00	0.1%	51.4%
	Waste Heat	1.80	0.0%	0.7%
		Total	22,974.04	
RFC	Wind	14,336.80	48.5%	12.8%
	Natural Gas	6,045.10	20.4%	13.2%
	Nuclear	4,750.00	16.1%	12.7%
	Coal	2,329.30	7.9%	17.9%
	Water	907.61	3.1%	1.6%
	Solar	286.30	1.0%	0.4%
	Waste Heat	235.00	0.8%	84.9%
	Wood	207.50	0.7%	7.4%
	Other	132.20	0.4%	14.3%
	Blast Furnace Gas	100.00	0.3%	16.7%
	Waste	93.00	0.3%	8.3%
	Landfill Gas	89.15	0.3%	27.3%
	Biomass Solid	55.00	0.2%	4.8%
	Distillate Fuel Oil	10.00	0.0%	34.2%
	Biomass Liquid	7.60	0.0%	45.8%
		Total	29,584.56	

Proposed plants and plants pending application: Fuel by Region (continued)				
SERC	Natural Gas	10,311.00	26.8%	22.5%
	Nuclear	9,034.00	23.5%	24.1%
	Water	8,561.93	22.2%	14.7%
	Wind	6,358.70	16.5%	5.7%
	Coal	1,679.50	4.4%	12.9%
	Wood	1,037.00	2.7%	37.0%
	Blast Furnace Gas	500.00	1.3%	83.3%
	Waste	272.90	0.7%	24.3%
	Petr. Coke	230.00	0.6%	7.2%
	Biomass Solid	176.50	0.5%	15.4%
	Solar	100.75	0.3%	0.1%
	Other Biomass	98.00	0.3%	100.0%
	Agricultural Byproduct	55.00	0.1%	55.4%
	Landfill Gas	51.59	0.1%	15.8%
	Biomass Gas	34.15	0.1%	8.2%
	Geothermal	5.00	0.0%	0.1%
	Distillate Fuel Oil	4.20	0.0%	14.4%
	Total	38,510.22		
SPP	Wind	15,437.09	73.1%	13.8%
	Nuclear	2,700.00	12.8%	7.2%
	Water	2,101.82	10.0%	3.6%
	Natural Gas	534.40	2.5%	1.2%
	Coal	160.00	0.8%	1.2%
	Biomass Solid	75.00	0.4%	6.6%
	Solar	52.00	0.2%	0.1%
	Wood	50.00	0.2%	1.8%
	Landfill Gas	1.60	0.0%	0.5%
	Total	21,111.91		
WECC	Solar	77,940.94	44.1%	98.4%
	Wind	34,954.60	19.8%	31.2%
	Water	33,404.57	18.9%	57.5%
	Natural Gas	15,267.66	8.6%	33.3%
	Nuclear	5,000.00	2.8%	13.4%
	Coal	4,835.00	2.7%	37.2%
	Geothermal	3,405.40	1.9%	95.6%
	Waste	354.90	0.2%	31.6%
	Wood	326.70	0.2%	11.6%
	Biomass Gas	325.20	0.2%	78.0%
	Other	300.00	0.2%	32.4%
	Petroleum Coke	250.00	0.1%	7.8%
	Landfill Gas	123.09	0.1%	37.7%
	Biomass Solid	78.15	0.0%	6.8%
	Agricultural Byproduct	18.80	0.0%	18.9%
	Waste Heat	2.00	0.0%	0.7%
	Total	176,587.01		