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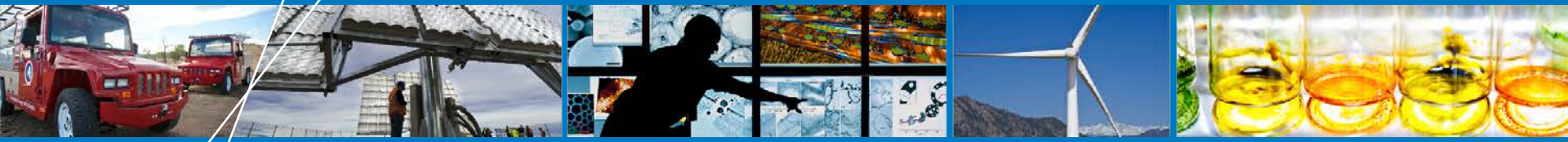
Overview of Western Renewable Energy Markets



DOI/BIA Utility-Scale Solar Energy Development Workshop

Phoenix, AZ

February 20, 2013

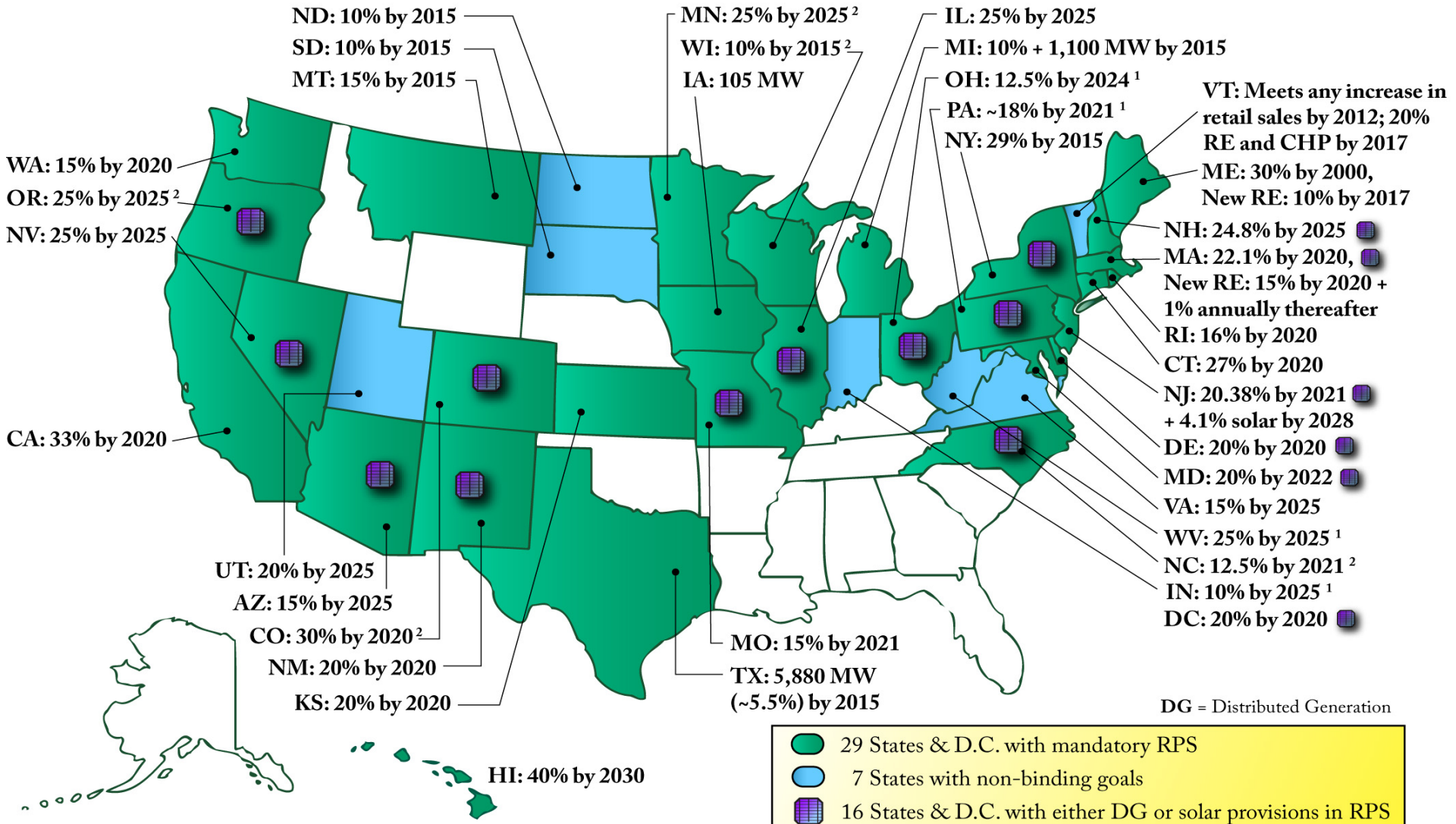
Scott Haase

Objectives

- Estimate current quantity of renewables installed in the western U.S.
- Understand market drivers through 2020 and beyond
- Provide background on several recent studies

States with Renewable Portfolio Standards

(indicating solar/DG set-asides)



DG = Distributed Generation

29 States & D.C. with mandatory RPS

7 States with non-binding goals

16 States & D.C. with either DG or solar provisions in RPS

[1] Includes non-renewable alternative resources

[2] Indicates variations by utility

Source: National Renewable Energy Laboratory and DSIRE (October 2012)

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Western Region Renewable Energy Markets: Implications for the Bureau of Land Management

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Produced under direction of the Bureau of Land Management by the National Renewable Energy Laboratory (NREL) under Interagency Agreement L11PG00030 and Task No WFH7.1004.

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http://www.nrel.gov/docs/fy12osti/53540.pdf

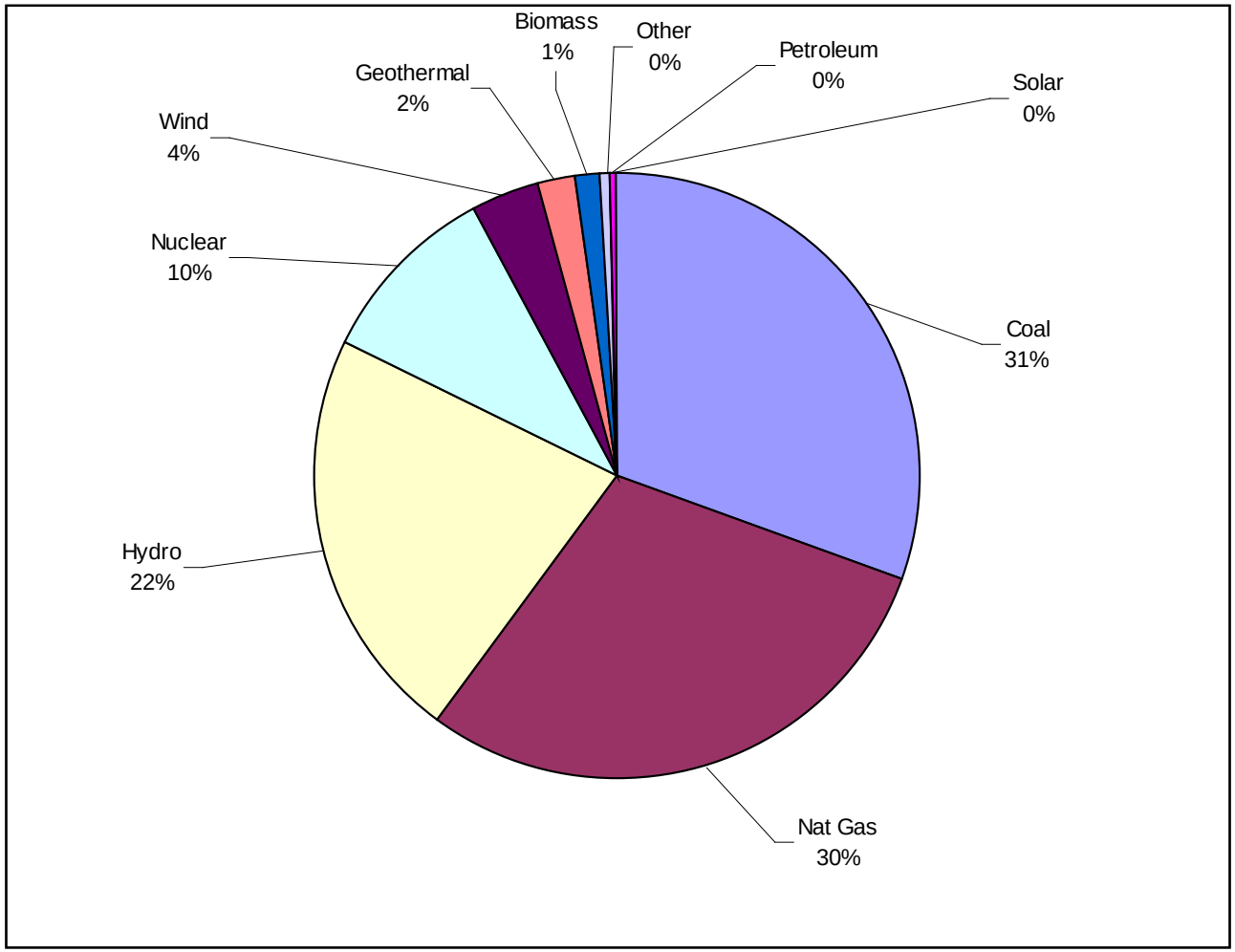
BLM Market Assessment - Study Overview

- Develop current electricity supply and demand profiles for 11 western states in the territory of the Western Electricity Coordinating Council (WECC)*
- Estimate 2020 demand for renewable energy
  - based only on existing renewable portfolio standards (RPS)
  - estimate 2020 projected load
- Estimate new renewable generation under construction or advanced development in WECC
- Evaluate balance between planned supply and projected demand
- Assist BLM with understanding how its projects fit within this broader market context

* In the BLM study, WECC refers to only the 11 U.S. states in WECC, not British Columbia or Mexico

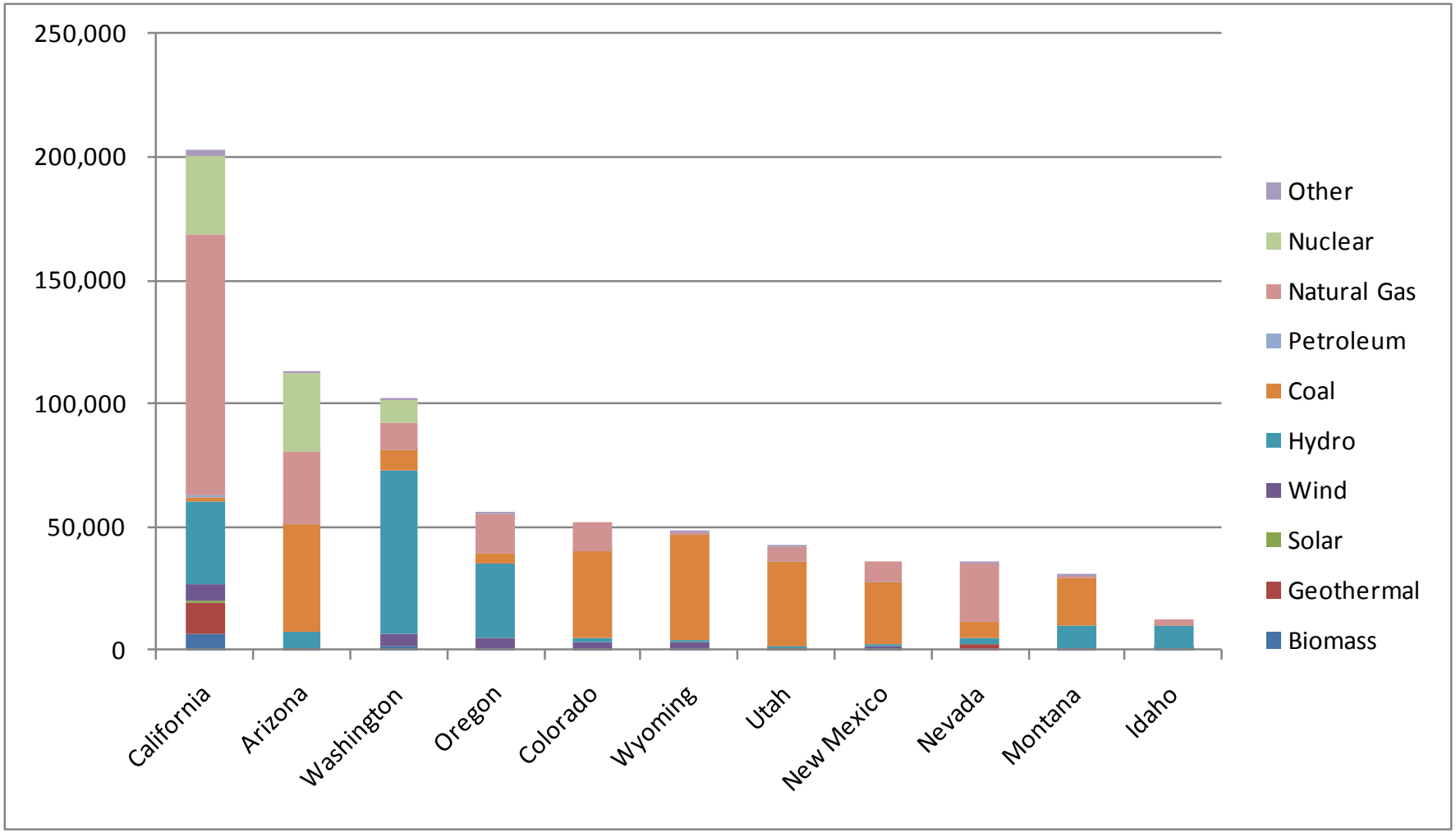
WECC Generation Mix (2010)

Total WECC generation: 726,000 GWh



- 7% non-hydro renewable
- 29% renewable w/hydro
- 61% coal and gas
- 39% CO2 neutral or zero (nuclear, hydro, RE)

2010 WECC Generation Mix, by State (GWh)



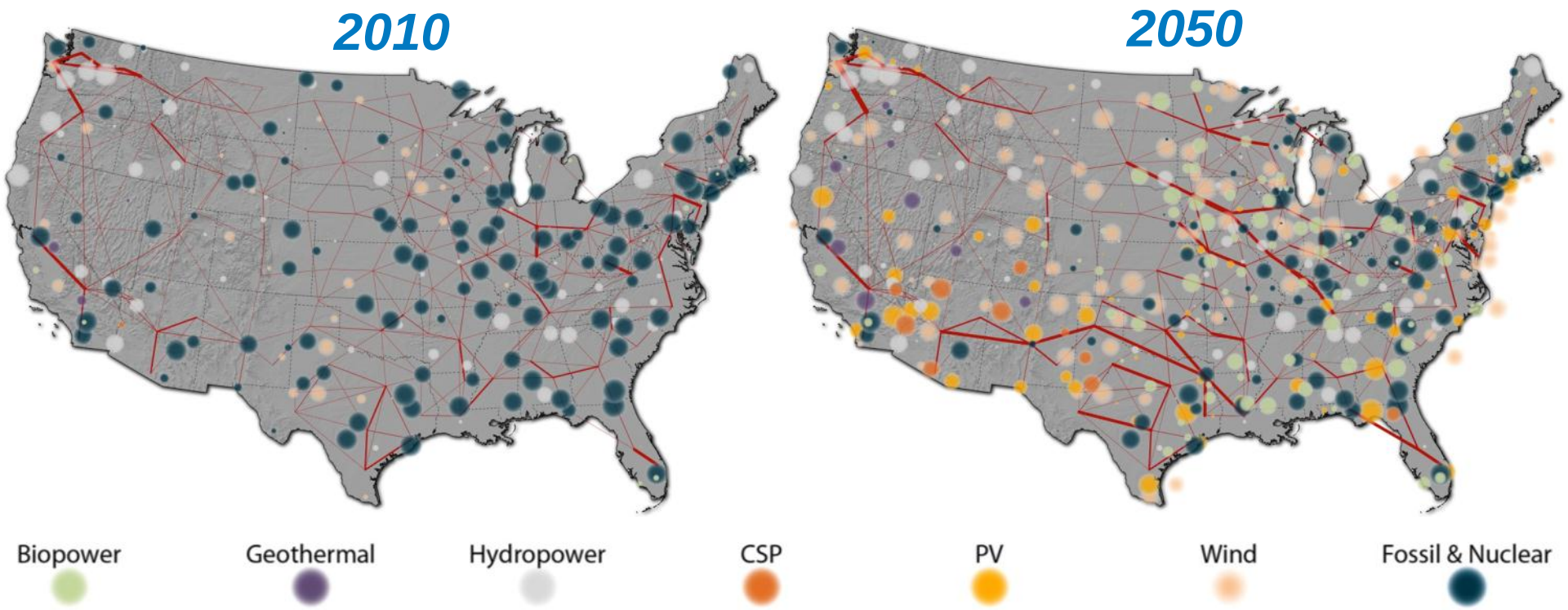
Source US DOE, EIA:
http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html

Estimated 2020 Gap or Oversupply of RE (MW)

Note: 3,800 MW of hydro not included in the supply numbers

				Arizona	California	Colorado	Idaho	Montana	Nevada	New Mexico	Oregon	Utah	Washington	Wyoming	Total WECC
SUPPLY	As of December 2011 – Not Including Hydropower[4]	Existing Renewable Energy Plant Capacity (MW)[1] (SNL 2011c)		194	7,880	1,372	441	404	589	738	2,558	287	2,547	1,419	**18,429**
		Planned Renewable Energy Projects Capacity (MW) (SNL 2011a)		1,045	10,367	91	564	300	1,374	130	864	0	1,245	2,841	**18,820**
		Sum of Existing and Planned Renewable Energy Capacity (MW)		1,239	18,247	1,462	1,005	704	1,963	868	3,422	287	3,792	4,260	**37,249**
DEMAND	Capacity Required in 2020 to Meet Current RPS Requirements (MW)[2]	A	High Capacity Factor, Low Capacity (MW)	1,380	18,653	2,741	0	325	958	896	1,733	0	1,807	0	**28,493**
		B	LBNL Capacity Factors (Barbose 2011) (MW)	1,415	27,944	2,741	0	382	896	985	1,811	0	2,952	0	**39,126**
		C	Low Capacity Factor, High Capacity (MW)	2,144	31,354	2,741	0	662	1,421	896	3,079	0	3,238	0	**45,535**
GAP	Oversupply or **(Unmet Demand)** in 2020[3]	A	High Capacity Factor, Low Capacity (MW)	**(141)**	**(406)**	**(1,279)**	1.005	379	1,005	**(28)**	1,689	287	1,985	4,260	**8,756**
		B	LBNL Capacity Factors (Barbose 2011) (MW)	**(176)**	**(9,697)**	**(1,279)**	1,005	322	1,067	**(117)**	1,611	287	840	4,260	**(1,877)**
		C	Low Capacity Factor, High Capacity (MW)	**(905)**	**(13,107)**	**(1,279)**	1,005	42	542	**(28)**	343	287	554	4,260	**(8,286)**

Renewable Electricity Futures:
A Transformation of the U.S. Electricity System



Renewable energy generation from technologies that are commercially available today, in combination with a more flexible electric system, is more than adequate to supply 80% of total U.S. electricity generation in 2050 while meeting electricity demand on an hourly basis in every region of the country.

http://www.nrel.gov/analysis/re_futures/

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Leading the Way to a Clean Energy Future