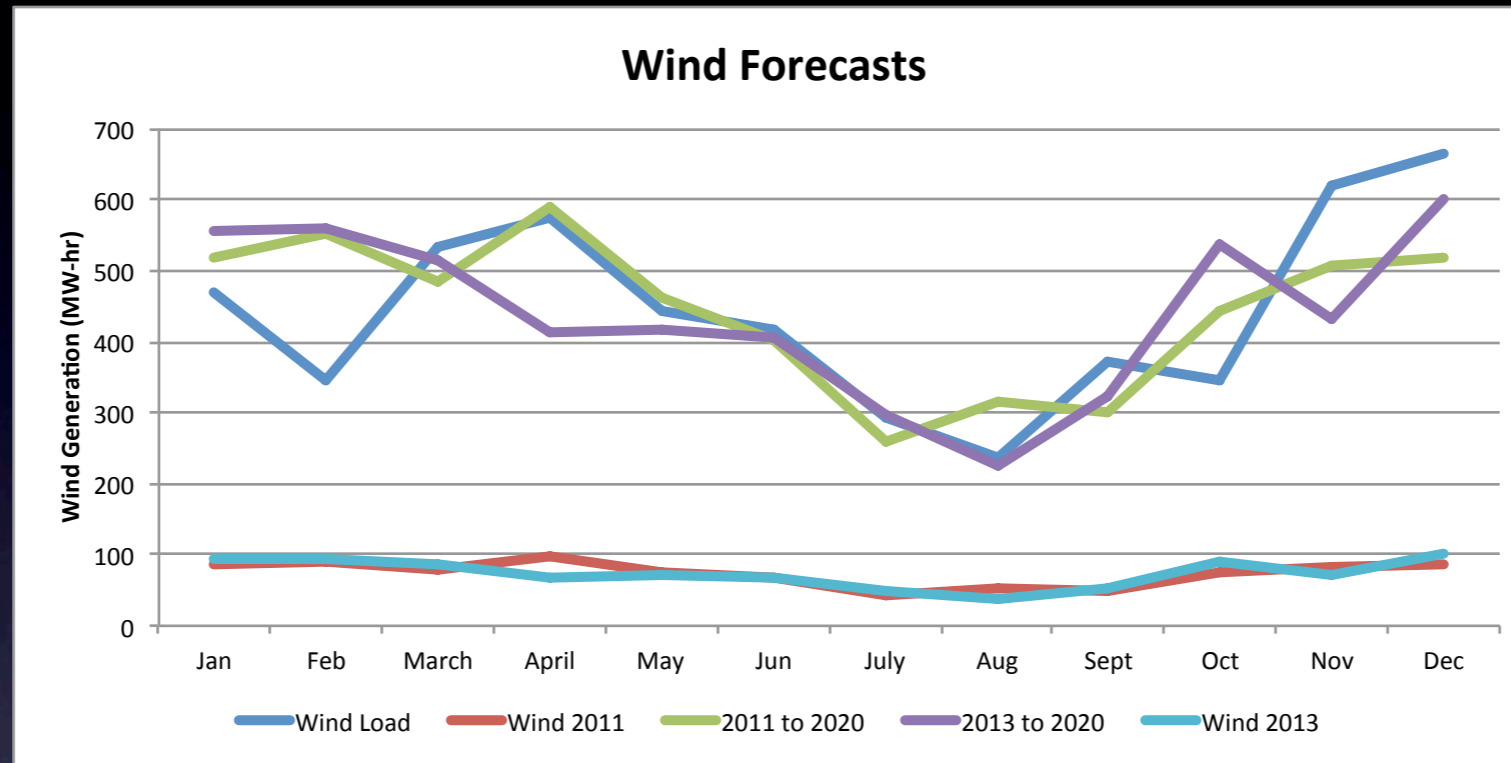


# Solar Profile Assumptions

- According to the EIA, wind energy accounts for about 10% of Colorado's generated electricity - on par with AC/DC<sup>1</sup>
- Only about 1% of Colorado's electricity comes from solar (an order of magnitude less compared to wind energy)<sup>1</sup>
- For this exercise, we'll assume AC/DC will generate about 1% of its electricity from solar in its first year
- Solar power exhibits a diurnal cycle: electricity generation only during daytime hours
- NREL's PWTatts calculator provides typical solar resource data which can be scaled for AC/DC
- Multiply solar data by a factor so solar is approximately 1% of the wind generation

<sup>1</sup><http://www.eia.gov/renewable/state/colorado/>

# Forecast Justification



- Blue is AC/DC wind generation profile
- Red and teal are wind profiles from a Colorado wind farm
- Green and purple are the 2011 and 2013 wind profiles forecasted to 2020 by multiplying by a constant (6)
- This justifies multiplying the solar data by a constant so it scales with the wind data

# Schedule

Max Load	Cumulative Load	Rate	Cumulative Cost
1450 MW-hr	1450 MW-hr	\$11.15/MW-hr	\$16166
786 MW-hr	2236 MW-hr	\$12.19/MW-hr	\$25751
153 MW-hr	2389 MW-hr	\$13.14/MW-hr	\$27762



Multiply Fuel Price (\$/BTU) (supplied) and Heat Rate (BTU/kW-hr) (supplied)

Result is Price per kW-hr (\$/kW-hr)

Calculate cost:

If Current Load < Cumulative Load,  
 (Current Load - Previous Cumulative Load)\*  
 Rate + Previous Cumulative Cost

Example:

Current Load: 2000 MW-hr

2000 MW-hr not less than 1450 MW-hr

20000 MW-hr is less than 2236 MW-hr

$$(2000 \text{ MW-hr} - 1450 \text{ MW-hr}) * \$12.19/\text{MW-hr} + \$16166 = \$22871$$

# Value of Solar

	Annual Cost Without Solar	Annual Cost With Solar	Annual Cost With 1 MW Solar	Value of Solar	Value of 1 MW of Solar
100% Uptime	\$1,076,014,049	\$1,053,972,885	\$1,076,013,992	\$22,041,164	\$57
95% Uptime	\$1,129,814,751	\$1,106,671,530	\$1,129,814,692	\$23,143,222	\$60

Since it's not realistic to calculate for 100% uptime, take the costs and add 5%  
The data suggests that most of the power plants have about 95% uptime

# Projections

Marginal Value	Savings
Base (1% of generation)	\$22 M
5% generation	\$108 M
7% generation	\$169 M
10% generation	\$243 M
12% generation	\$289 M

the marginal value of solar will rise  
with increasing penetration