Chad Ringley
Manager of Atmospheric Modeling

Integration of WindSim's Forecasting Module into an Existing Multi-Asset Forecasting Framework

26 JUNE 2014
2014 WINDSIM USER'S MEETING
TONSBERG, NORWAY

Pattern

Pattern Energy Group Inc.

SAFE HARBOR STATEMENT

The following information contains, or may be deemed to contain, "forward-looking statements" (as defined in the U.S. Private Securities Litigation Reform Act of 1995 and Canadian securities laws). The words "may," "plan," "forecast," "seek," "target," "goal," "believe," "expect," "anticipate," "intend," "estimate" and other expressions that are predictions of or indicate future events and trends and that do not relate to historical matters identify forward-looking statements. You should not place undue reliance on these forward-looking statements about Pattern Energy Group Inc. (the "Company"). By their nature, forward-looking statements are not statements of historical facts and involve risks and uncertainties because they relate to events and depend on circumstances that may or may not occur in the future, many of which are outside the Company's control. Such risks and uncertainties could cause the actual results, performance or achievements of the Company to be materially different from its current expectations and include, but are not limited to: the Company's ability to complete construction of its construction projects and transition them into financially successful operating projects; fluctuations in supply, demand, prices and other conditions for electricity; the Company's electricity generation, projections thereof and factors affecting production, including wind and other conditions, other weather conditions, availability and curtailment; changes in law; and the Company's ability to keep pace with and take advantage of new technologies.

In particular, this presentation contains the Company's Adjusted EBITDA and cash available for distribution, which are not generally accepted accounting principles in the United States ("U.S. GAAP"). Adjusted EBITDA and cash available for distribution have been disclosed because the Company believes that these measures may assist investors in evaluating its financial performance and its ability to pay dividends. Neither Adjusted EBITDA nor cash available for distribution should be considered the sole measure of the Company's performance and should not be considered in isolation from, or as a substitute for, the Company's U.S. GAAP measures, including, but not limited to, the most directly comparable U.S. GAAP measures, net income (loss) and net cash provided by (used in) operating activities, respectively. The forecasts included in this presentation should not be relied upon as fact or as an accurate representation of future results. Assumptions and estimates underlying the forecast are inherently uncertain and the Company's future operating results are subject to a wide variety of risks and uncertainties, including significant business, economic, and competitive risks and uncertainties. There can be no assurance that such assumptions will be realized or that the Company will generate cash available for distribution during the forecast periods at the levels forecasted, in which event the Company may not be able to pay cash dividends at the Company's initial dividend level or at all.

All forward-looking statements speak only as of the date made, and the Company expressly disclaims any intention or obligation to revise or publicly update any forward-looking statements, including Adjusted EBITDA and cash available for distribution, whether as a result of new information, future events, or otherwise except as may be required by applicable law. For additional information regarding known material risks that could cause our actual results to differ from our projected results please read "Risk Factors" in our registration statement on Form S-1 and our annual report on Form 10-K for the year ended December 31, 2013.

PATTERN ENERGY METEOROLOGICAL HIGH PERFORMANCE COMPUTING CENTER (MHPCC)

- Pattern Energy's own private cluster, in operation since 2007, features 48 HP computing blades with up to dual six-core chips, for 448 computational cores for data processing, a 35 terabyte storage system, and Infiniband interconnections for lightning quick data transfer and execution.
- State of the art Mesoscale Numerical Weather Prediction (NWP) model customized for wind applications:
  - Community-wide, open source development; and primary forecast model by National Weather Service (NWS) and research institutions worldwide.
  - Preferred model of choice by resource assessment companies within the wind industry (e.g., DNV GL, 3Tier, etc.)
- Initialized with the NCEP/NCAR Global Reanalysis (2.5°) for pre-construction modeling and Global Forecast System (GFS) and North American Mesoscale (NAM) models for forecasting applications.

MHPCC HISTORY & FORECASTING APPLICATIONS

Pattern Energy's Santa Isabel, Puerto Rico (left) and El Arrayán, Chile (right) sites were original MHPCC generated prospects now in operation.

- 25 TB of data generated simulating more than 140 different project areas for wind development.
- Generate twice-daily automated forecasts of wind speed, density, wind direction and empirically-derived farm power for all in-operation and in-construction assets.

WINDSIM FORECASTING INTEGRATION

Pattern

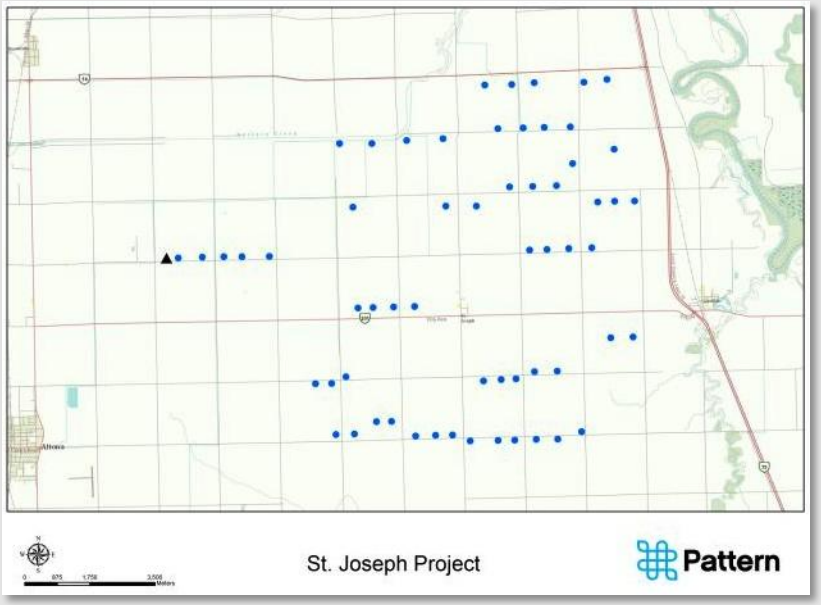
BENEFIT OF WINDSIM'S FORECASTING MODULE

- MHPCC forecasts use mesoscale modeled point directly from 1-km spatial resolution grid.
- Despite this high-resolution, model error and bias is common and repeatable:
  - Noted some low biases during specific seasons and wind flow patterns at certain assets;
  - Execution time of higher-resolution grid not-cost effective and can lead to compounding error.
- WindSim module with neural-network corrected training can account for known biases in the mesoscale modeled data.
- Execution time is 5-10 minutes (depending on park size and forecast length); substantially less than full NWP simulation.
- Benefit from higher-resolution wind flow modeling, particularly important in complex topography.

TESTING METHODOLOGY

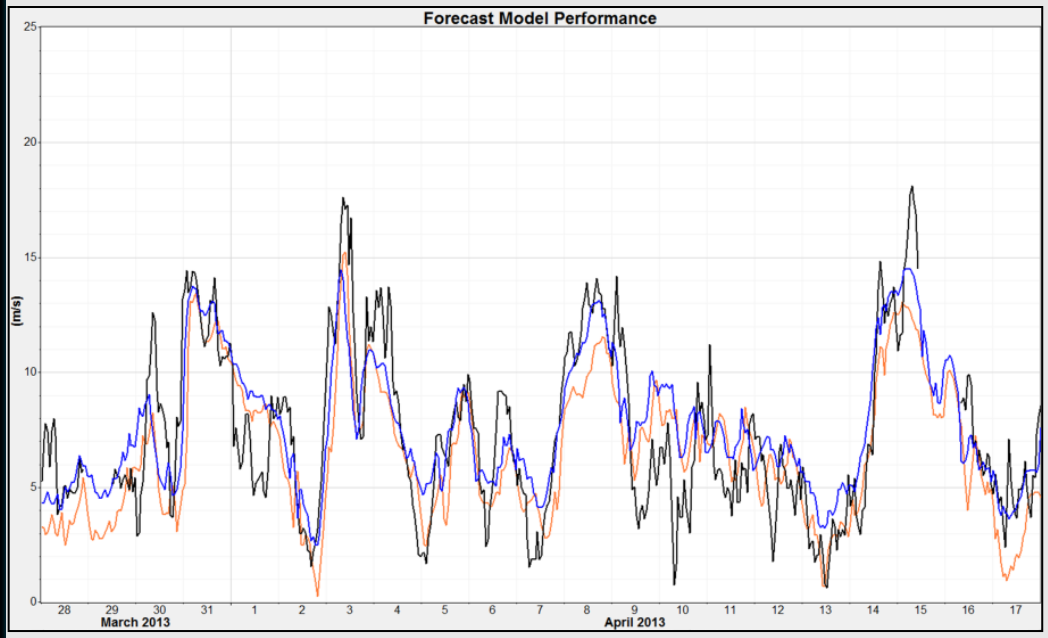
- Forecast data: historical 2-day running forecasts from the 00 UTC NAM raw model cycles for the past 18 months at three assets with varying terrain complexity and flow.
- Forecasts from the 36-48 hour time wind utilized in the process.
- Observed data: permanent met tower at hub height for the concurrent time period.
  - Mesoscale modeled point typically very close to permanent tower.
  - Algorithm to correct for waked wind sectors undertaken.
- Use WindSim NN correction on “forecast” and “observed” for (1) entire data set and (2) broken into seasons.
- Compare forecast wind speed and direction from raw NAM and WindSim-corrected **against** the observations for possible reduction of error.
- Compare forecasted power from the raw NAM wind speed forecast and empirical power curve **against** the WindSim Forecasting Module power with dynamic wake-loss and neural network correction to determine power error.

ST. JOSEPH WIND



- 138 MW project using SWT-2.3-101 turbines located in flat farm land in Southern Manitoba.
- Driven heavily by synoptic flow during most seasons.
- Considered simple terrain and simple flow complexity.

ST. JOSEPH ERROR ANALYSIS



SJW

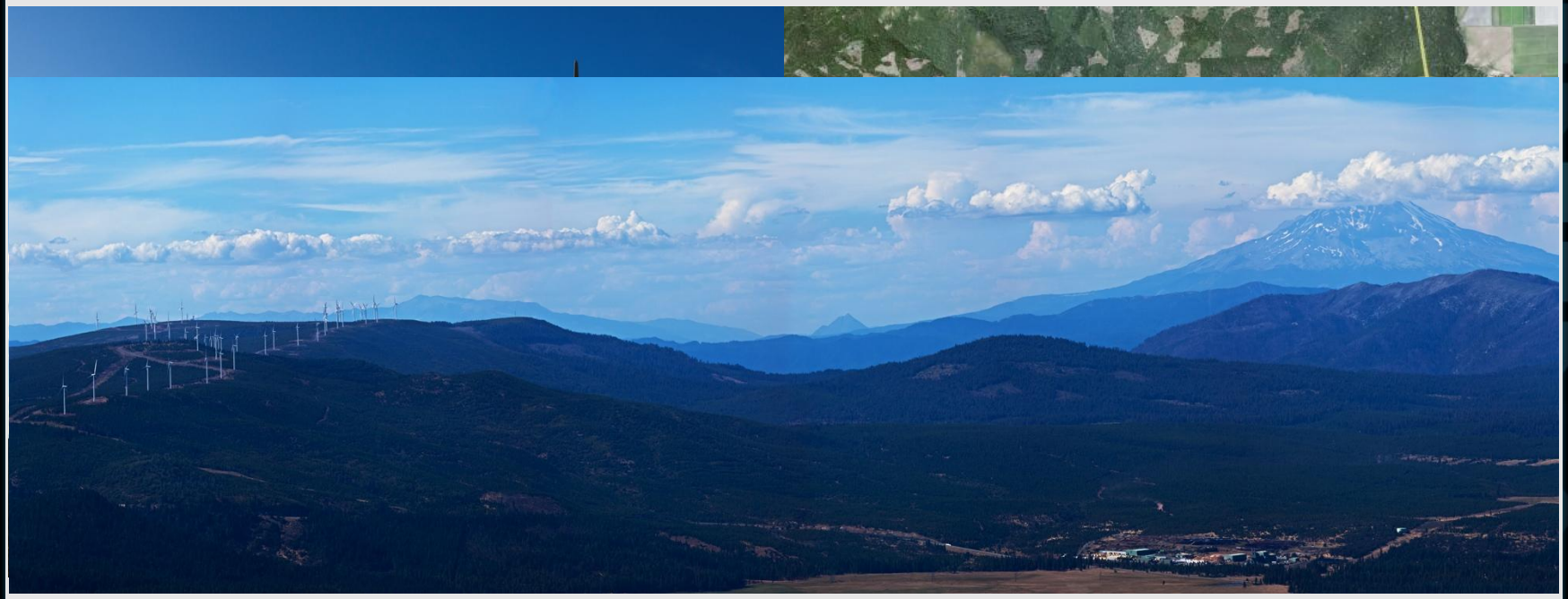
Relative (%)	Raw NAM	WS	Improvement
MBE	-12.29%	-0.01%	12.3%
MAE	28.25%	23.95%	4.3%
RMSE	36.70%	31.20%	5.5%

KEY
Black: Obs **Orange**: NAM **Blue**: WS

Absolute (m/s)	Raw NAM	WS	Improvement
MBE	-0.97	0.00	0.97
MAE	2.24	1.89	0.34
RMSE	2.91	2.47	0.44

- WindSim corrected wind speeds lower all error measures 4-12%, with a noticeable improvement in the mean bias error.
- Already very good forecast improved quite a bit; higher MAE due to large number of frontal passages and associated ramps.

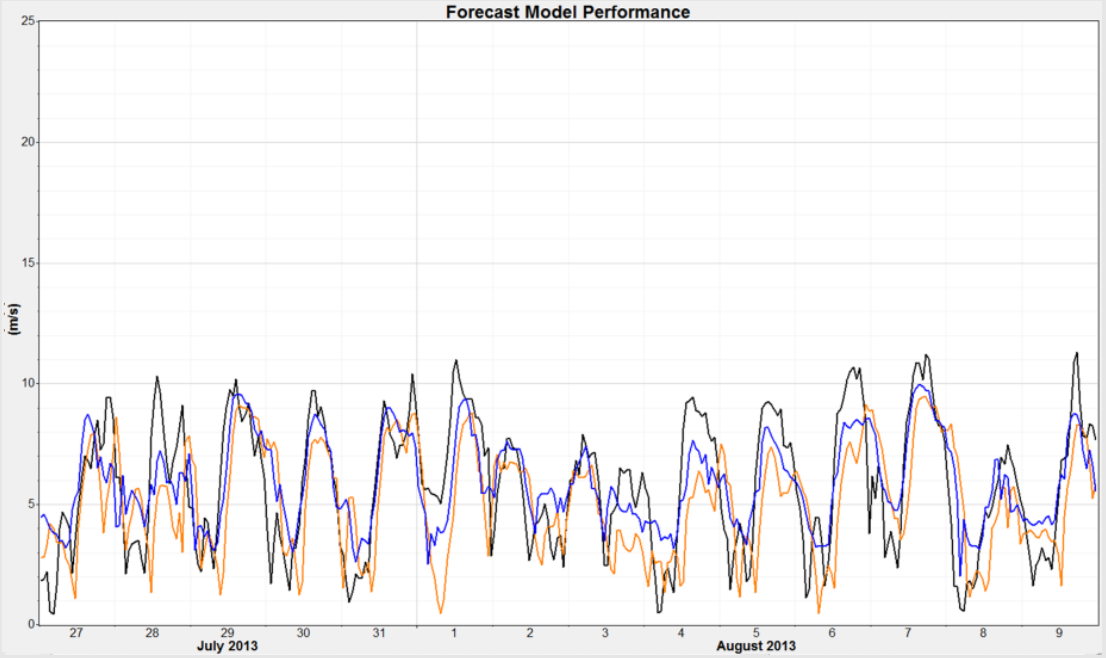
HATCHET RIDGE



- 101 MW project using SWT-2.3-93 machines located on isolated ridge line in Northern California.
- Driven heavily by synoptic flow in winter/fall, but a very noticeable summertime diurnal pattern.
- Considered moderate terrain and high flow complexity.

Pattern

HATCHET RIDGE ERROR ANALYSIS



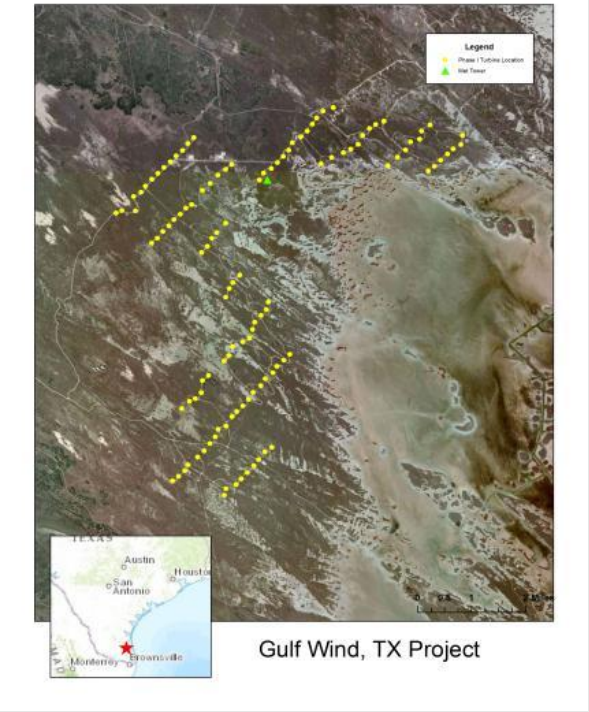
HRW			
Relative (%)	Raw NAM	WS	Improvement
MBE	-6.73%	0.41%	7.1%
MAE	29.77%	25.25%	4.5%
RMSE	39.03%	33.64%	5.4%

KEY
Black: Obs **Orange**: NAM **Blue**: WS

Absolute (m/s)	Raw NAM	WS	Improvement
MBE	-0.50	-0.07	0.43
MAE	2.21	0.30	1.91
RMSE	2.90	0.39	2.51

- WindSim corrected wind speeds lower all error measures 4-7%, with a noticeable improvement again in the summer-time conditions.
- Less improvement noted in strongly synoptically-forced events.

GULF WIND

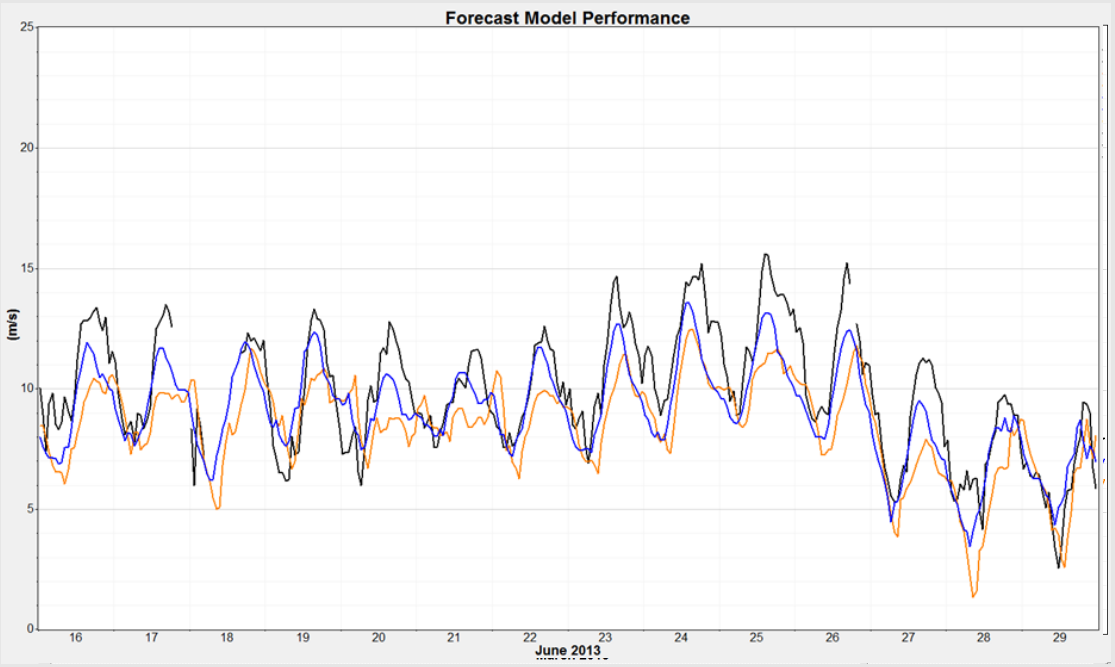


Gulf Wind, TX Project

- 283 MW project using MWT-2.4-95 located on lower south Texas coast near Gulf of Mexico.
- Strong diurnal wind speed profile from sea breeze & influence from pressure systems in the Southern Plains.
- Considered simple terrain with moderate flow complexity.

Pattern

GULF WIND ERROR ANALYSIS



PGW			
Relative (%)	Raw NAM	WS	Improvement
MBE	-4.93%	-0.95%	4.0%
MAE	24.02%	19.08%	4.9%
RMSE	31.38%	25.12%	6.3%

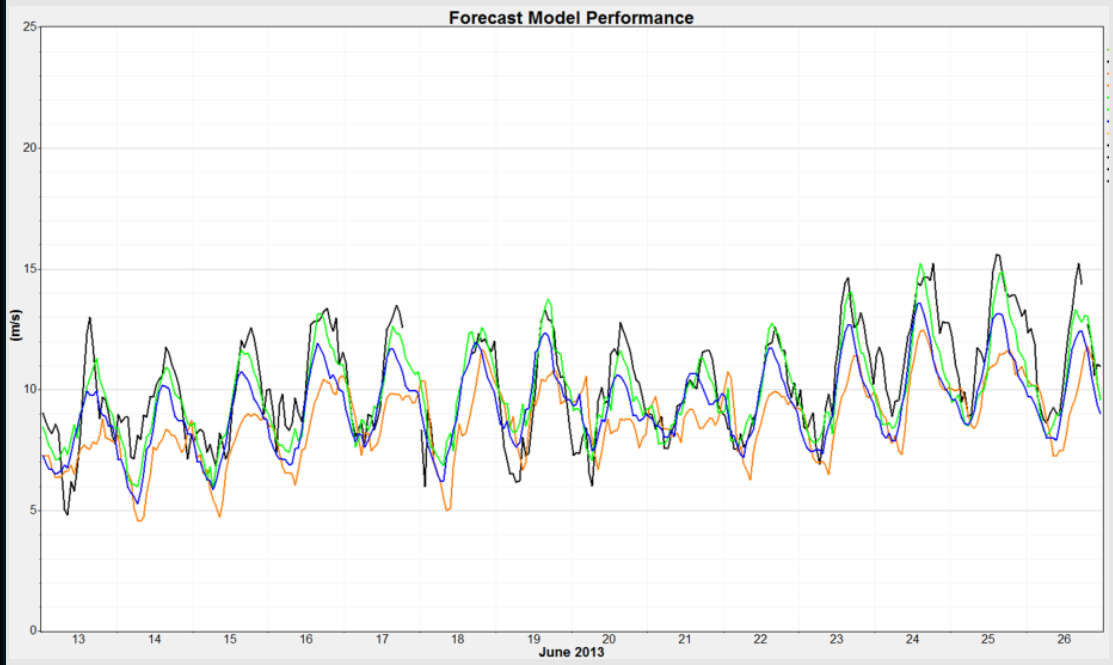
KEY
Black: Obs **Orange**: NAM **Blue**: WS

MAE (%)	Raw NAM	WS	Improvement
Non-Seasonal			
Winter	23.78	19.47	4.31
Spring	22.03	17.32	4.71
Summer	**23.05**	**17.39**	**5.66**
Fall	27.94	22.63	5.31

- WindSim corrected wind speeds lower by all error measures 4-6%, particularly in the summer months, where error improves 5% during a critical high-energy and high-price period.
- Despite improvement, room for even better prediction may lie in breaking neural network correction by season rather than using the entire training period (more later).

Pattern

GULF WIND SEASONAL CORRECTION



PGW

Relative (%)	Raw NAM	WS	Improvement
MBE	-4.93%	-0.95%	4.0%
MAE	24.02%	19.08%	4.9%
RMSE	31.38%	25.12%	6.3%

PGWS

Relative (%)	Raw NAM	WS	Improvement
MBE	-4.93%	-1.42%	3.5%
MAE	24.02%	17.77%	6.3%
RMSE	31.38%	23.67%	7.7%

Relative (%)	Improvement
MAE	-0.5%
MBE	1.3%
RMSE	1.5%

KEY
Black: Obs **Orange**: NAM **Blue**: WS **Green**: WS

- By doing the NN correction by season, the training improved most error statistics. Interestingly, MAE dropped some (perhaps due to the mix of seasonal influences in Apr-Jun).
- MAE has improved more than 7% from the original raw mesoscale forecasts.

GULF WIND SEASONAL CORRECTION

MAE (%)	Raw NAM	WS	Improvement
Non-Seasonal			
Winter	23.78	19.47	4.31
Spring	22.03	17.32	4.71
Summer	**23.05**	**17.39**	**5.66**
Fall	27.94	22.63	5.31

MBE (%)	Raw NAM	WS	Improvement
Non-Seasonal			
Winter	-1.47	-0.20	1.27
Spring	-7.69	-4.67	3.02
Summer	**-9.50**	**-0.70**	**8.80**
Fall	-0.90	2.29	3.19

RMSE (%)	Raw NAM	WS	Improvement
Non-Seasonal			
Winter	31.81	25.08	6.7
Spring	29.39	23.67	5.7
Summer	**28.74**	**22.33**	**6.4**
Fall	35.86	29.41	6.5

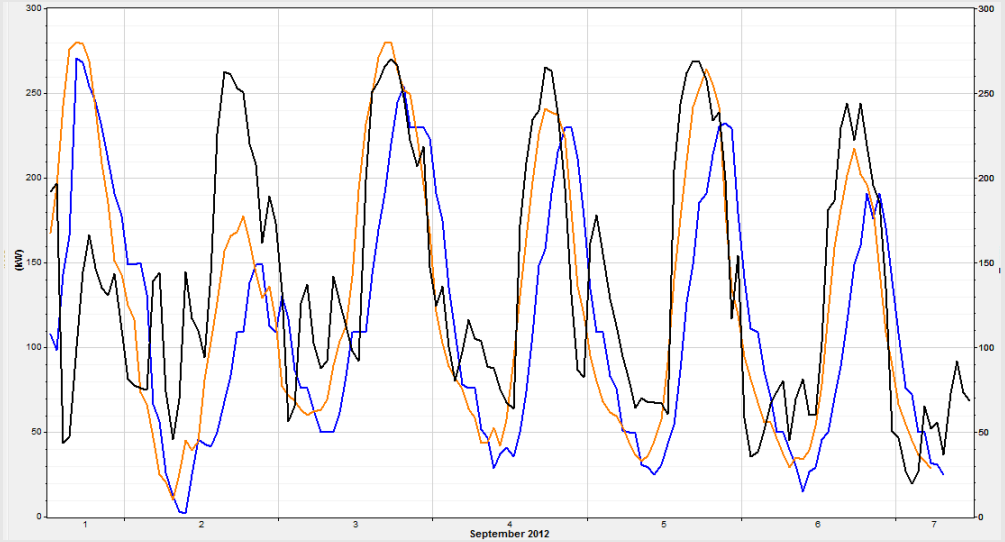
MAE (%)	Raw NAM	WS	Improvement
Seasonal			
Winter	23.73	17.22	6.51
Spring	22.05	18.80	3.25
Summer	**23.09**	**14.31**	**8.78**
Fall	27.89	20.56	7.33

MBE (%)	Raw NAM	WS	Improvement
Seasonal			
Winter	-1.52	0.01	1.53
Spring	-7.50	-4.20	3.30
Summer	**-9.40**	**0.00**	**9.40**
Fall	-0.68	-0.81	-0.13

RMSE (%)	Raw NAM	WS	Improvement
Seasonal			
Winter	31.80	22.10	9.7
Spring	29.47	25.57	3.9
Summer	**28.79**	**18.70**	**10.1**
Fall	35.75	26.51	9.2

- Biggest impact of seasonal NN correction in the summer, where MAE has improved almost 9%, MBE has improved 9.4%, and RMSE has improved over 10%.
- This is critical for revenue applications, as merchant power prices are highest in the summer months and a more accurate forecast reduces exposure for Day-Ahead generation committal.

GULF WIND POWER ERROR

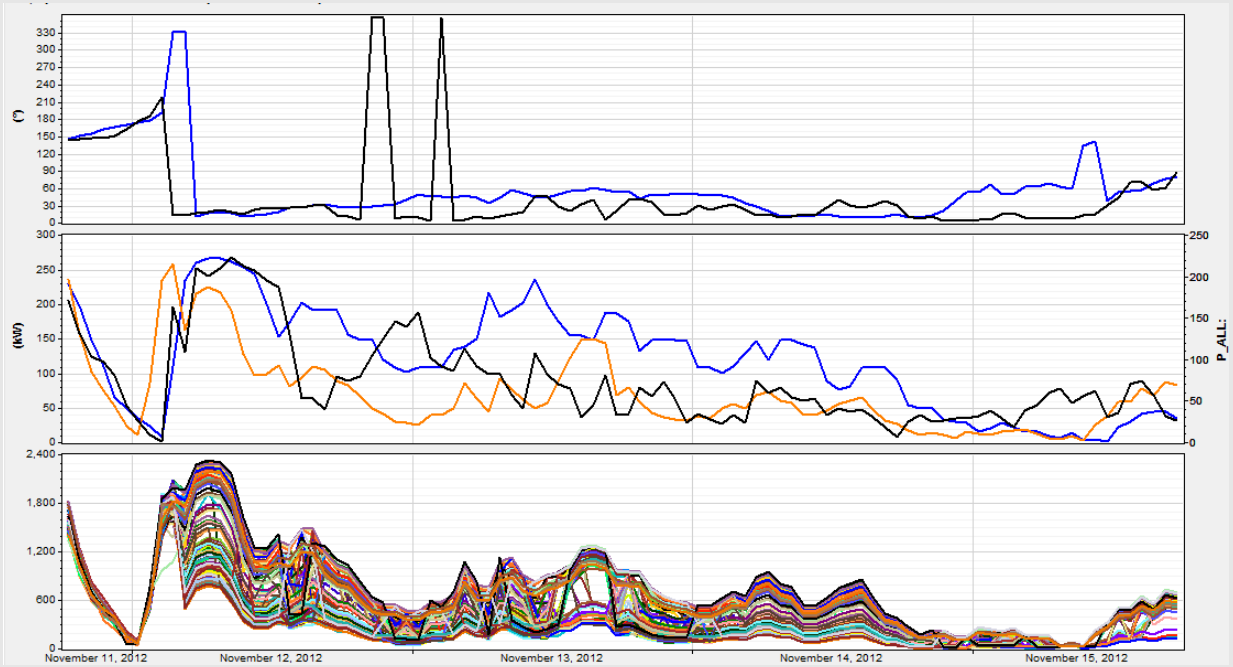


Base Mesoscale		
Power		
MBE	(9,501.44)	-3.4%
MAE	48,186.97	17.2%
RMSE	64,936.27	23.2%
Full Correction WS		
Power		
MBE	(8,882.69)	-3.2%
MAE	38,774.64	13.8%
RMSE	54,400.00	19.4%

- Using the raw NAM forecast hit with the empirical power curve and the WindSim Forecast module power with dynamic wake and neural network correction to the wind data, we see a noticeable improvement in power prediction across all seasons.
- Using the WindSim power forecasting module leads to a 4-6% improvement in power error, particularly in the summer months.
- The 13.8% MAE achieved is on a 36-48 hour forecast, in line with current industry standards.

Pattern

GULF WIND POWER ERROR IN WAKED SECTOR



Base Mesoscale	***Waked***	
Power		
MBE	38,066	13.6%
MAE	53,287	19.0%
RMSE	71,185	25.4%
Full Correction WS	***Waked***	
Power		
MBE	(1,970)	-0.7%
MAE	29,267	10.5%
RMSE	44,192	15.8%

- MBE drops 13%, from a 13% over prediction to a slight under-prediction in the off-axis sector (15-45 degrees).
- MAE and RMSE drops 10% as well, indicating a better prediction of farm power in the waked sector.

CONCLUSIONS

- WindSim's neural network corrected forecasting module helped improve our mesoscale forecasting error by different measures by 4-10% at three different sites of varying flow and terrain complexity.
  - Low biases noted in all three sites.
  - Mesoscale model doing quite well with site generally but improved with WindSim Forecasting.
- Promise shown in breaking neural network training by season, particularly for sites with strong seasonally changing wind flow.
  - Coastal site with varying influencing wind pattern aided in breaking by site's known pattern.
- Power error also reduced and WindSim's Forecasting Module's predicted power with dynamic wake able to replicate closely the production patterns observed.
- Biggest improvement is in waked sector with solving dynamically for wakes in off-axis sectors.
- Ability to integrate WindSim Forecasting for multiple tools within operating business.

THANK YOU

Pattern