

# Curtailments and PI Event Framing the Wind

Presented by

Brandon Lake Iberdrola Renewables, LLC

# Iberdrola Renewables: Real-time View of Curtailments Across the Fleet

"Current curtailment event and lost generation analysis relies on a course 10 minute average dataset, although the evolving nature of curtailment events into higher frequency, shorter duration events, a capability of capturing events faster is required. The PI event frame capability has been demonstrated to capture the sub 10 minute events in a systematic and repeatable way and accurately captures lost generation associated with curtailments....and enhances our understanding of all types of curtailment events."

Nick Johansen, Iberdrola Renewables, LLC Technical Division

#### Solution

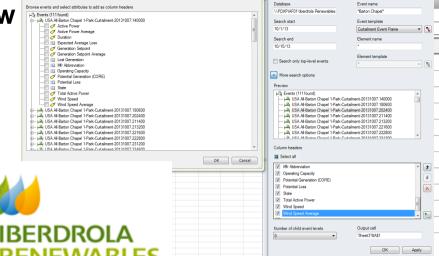
- Event Frame Site Curtailments
- Calculate relevant information in PI AF and PI ACE
- Real-Time Event Generation

## Results and Benefits

- High Resolution view of the lost generation
- Improved accessibility/ response time
- A better starting point for Investigation

#### **Business Challenge**

- Lost generation is only calculated Monthly
- The process for the calculation is semi-manual
- Time delay makes it too late to use data proactively



## **Agenda**

- Iberdrola Renewables, LLC
- Business Challenge
- OSIsoft Products and Services
- Approach and Process
- Solution and Results
- Other cool PI System stuff and Future Plans



## Iberdrola Group

#### More than 46,000 MWs of installed capacity...

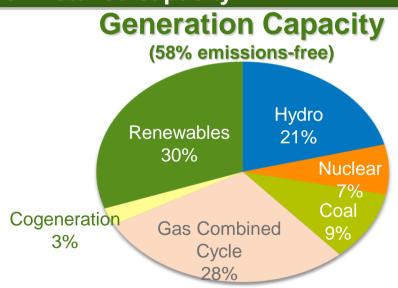
150-year history with roots in hydroelectric power

Leading renewables producer worldwide with >14 GW installed

30,000+ employees in nearly 40 countries

One of the lowest CO2 emissions levels in the electricity sector

Strategic focus on US, UK, Latin America and Spain



#### ...that is flexible and economical

Updated March 1, 2013



## Iberdrola Renewables, LLC

#### A collection of exceptional assets...

#2 owner of wind projects in the U.S. with more than 5.7 GWs owned and contracted

More than \$10 billion of U.S. assets at nearly 60 installed plants

750+ employees at the end of 2013, compared with 12 in 1999

636 MW of CCGT & peaking capacity on the strategic CA-OR border

Represents 39% of Iberdrola S.A.'s global wind capacity



Wind 5,700+ MW



536 MW CCGT 100 MW peaking

Power



50 MW Solar

55 MW Biomass

And clean gas generation

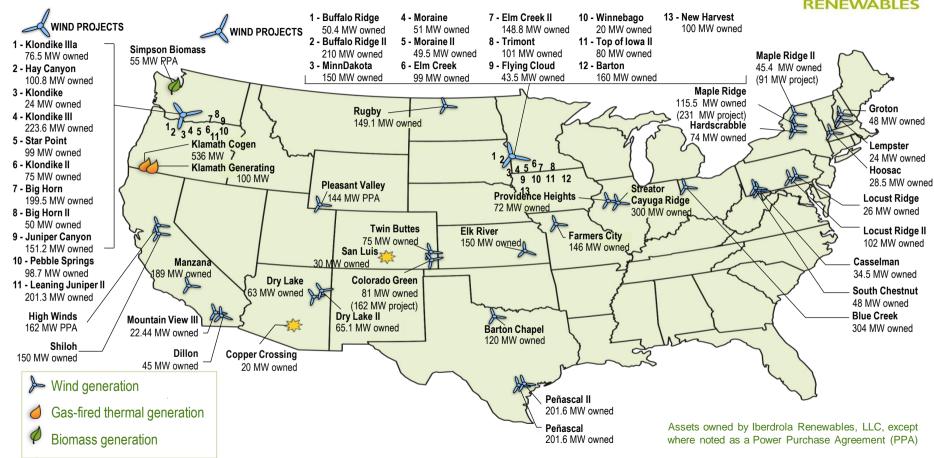
...focused on operational excellence and selective growth

Updated Jan. 2, 2014

#### **U.S. Power Assets**

Solar generation

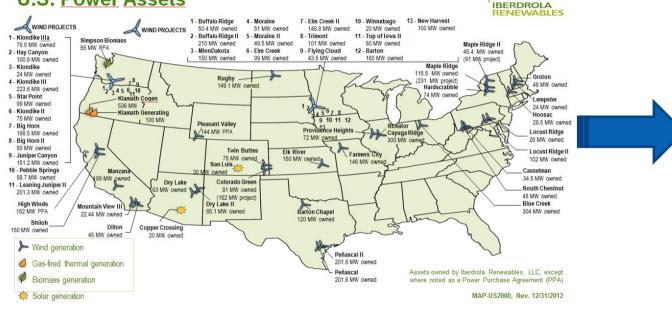






## **Background**

#### **U.S. Power Assets**









- First implemented in 2004
- Enterprise Agreement with OSIsoft Signed in 2011
- Tag Standardization Project in 2012
  - (Updated Name, Descriptor, and other attributes for > 200k points)
- PI AF Implementation 2013

## **Background**

- Daily Curtailments
- Lost Generation

Multiple Tools















- Discussions with CoE representatives and EPM (Thanks Ruth Kendall, John Stawiarski and Jack Fries)
- CoE workshops with Brandon Perry and Martin Bryant on AF
- vCampus and Dennis Kilgore help with ACE Calculations

## **Approach with Users**

IBERDROLA RENEWABLES

- Discuss approach with the user base
- Build the AF Backend
  - This supports a number of other efforts









#### PI Asset Framework

- Structure the Park
- Build the Trigger



#### **PIACE**

- •Model Based on vCampus Code
- •Repeatable and flexible



#### PI Event Frames

- •Structure the Curtailment Event Frame
- Structure the Results



#### Visualization

- •PI CoreSight
- •PI DataLink 2014 Beta
- •PI OLEDB Enterprise

#### Investment

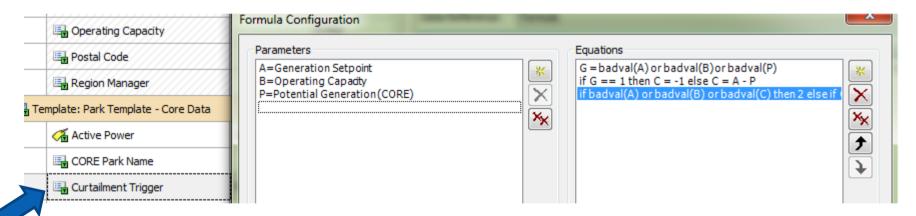


- AF, fundamental (if not necessary) for nearly everything (Element Relative Displays CoreSight OLEDB Enterprise)
- Coded samples up and available at vCampus 2012 were utilized
- Improved ACE Code to trigger PI Event Frames through an AF Attribute simplifying maintenance

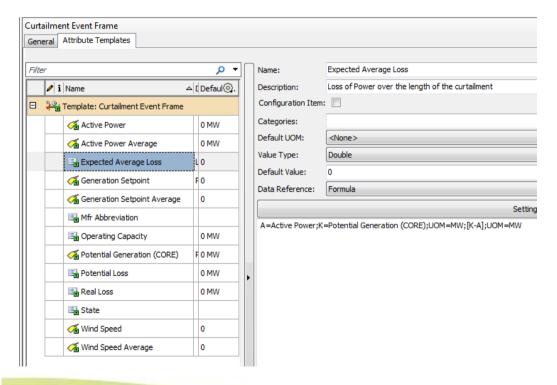


## **Summary**

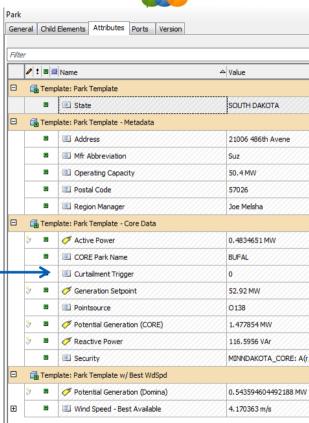
Easily Updateable, Easily Recalcuable



## **Working Results**









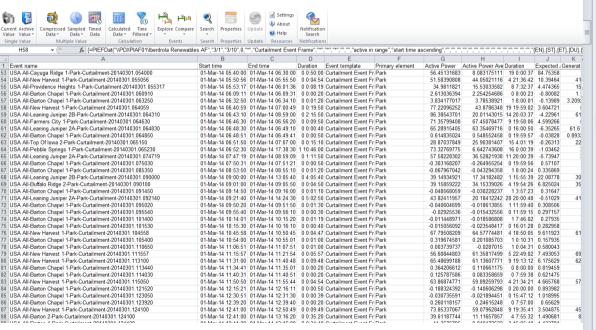


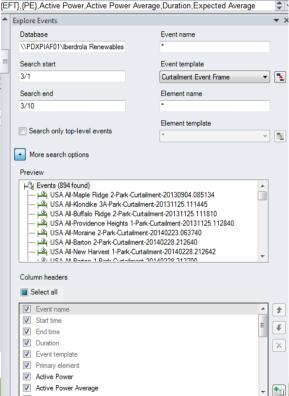
• Easily pull in curtailment data for a specific park and use this to see how long curtailments lasted and how much generation was lost.

WORKDOOK VIEWS 5now		Zoom		vvindow			
F129 ▼ (** f <sub>x</sub> ) =SUM(F2:F128)							
A		В	С	D	Е	F	
1 Event name		Start time	End time	Duration	Event template	Lost Generation	Pri
122 USA All-Barton Chapel 1-Park-Curtails	ment-20140309.222040	09-Mar-14 22:20:40	09-Mar-14 22:21:21	0 0:00:41	Curtailment Event Frame	0.107968415	Pai
123 USA All-Barton Chapel 1-Park-Curtailment-20140309.224110		09-Mar-14 22:41:10	09-Mar-14 22:41:30	0 0:00:20	Curtailment Event Frame	0.003172459	Pai
124 USA All-Barton Chapel 1-Park-Curtailment-20140309.231200		09-Mar-14 23:12:00	09-Mar-14 23:13:11	0 0:01:11	Curtailment Event Frame	0.011066379	Pai
125 USA All-Barton Chapel 1-Park-Curtailment-20140309.231340		09-Mar-14 23:13:41	09-Mar-14 23:14:01	0 0:00:20	Curtailment Event Frame	0.041107899	Pai
126 USA All-Barton Chapel 1-Park-Curtailment-20140309.232800		09-Mar-14 23:28:00	09-Mar-14 23:28:20	0 0:00:20	Curtailment Event Frame	0	Pai
127 USA All-Barton Chapel 1-Park-Curtailment-20140309.232840		09-Mar-14 23:28:40	09-Mar-14 23:29:40	0 0:01:00	Curtailment Event Frame	0.017858902	Pai
128 USA All-Barton Chapel 1-Park-Curtailment-20140309.233002		09-Mar-14 23:30:03	09-Mar-14 23:30:20	0 0:00:18	Curtailment Event Frame	0.002027318	Pai
129				0 2:00:58		3.751676853	
120				/			



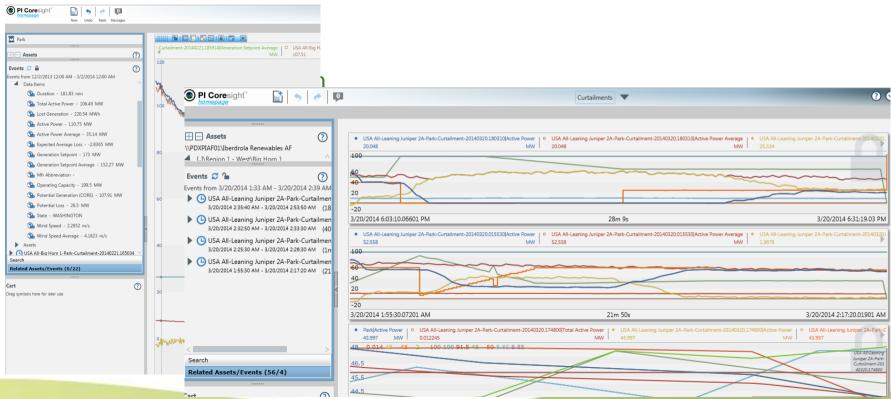
#### Results







## **Summary**



# Iberdrola Renewables: Real-time View of Curtailments Across the Fleet

- "Current curtailment event and lost generation analysis relies on a course 10 minute average dataset, although the evolving nature of curtailment events into higher frequency, shorter duration events, a capability of capturing events faster is required. The PI event frame capability has been demonstrated to capture the sub 10 minute events in a systematic and repeatable way and accurately captures lost generation associated with curtailments....and enhances our understanding of all types of curtailment events."
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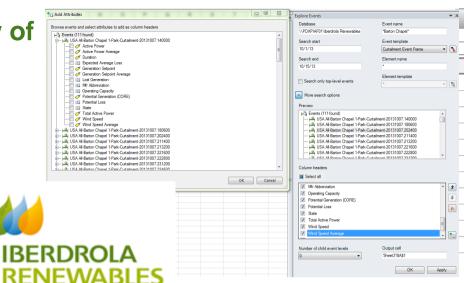
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- Calculate relevant information in PLAF and PLACE
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## **Next Steps**

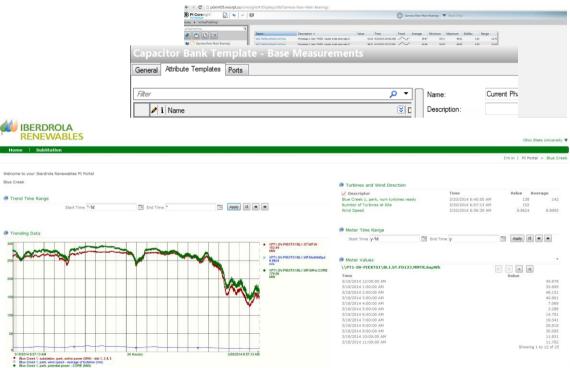


- Full DataLink 2014 Rollout once released
- Expansion from site curtailment reporting to turbine level curtailment reporting (Easily expanded through PI Analytics)
- Additional Calculated Attributes
  - (Start in development database, then Production after business consensus)



### One Benefit Among a Multitude

- PI CoreSight (and Mobile)
- PI AF AutoTag Creation
- Externally
   Available
   SharePoint Site







Brandon Lake

Brandon.lake@iberdrolaren.com

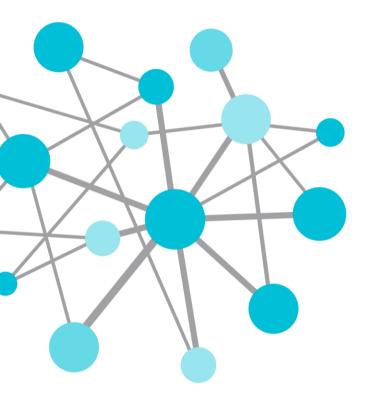
Ld./Sr. PI System Analyst

Iberdrola Renewables, LLC

Kevin Sohal

Kevin.Sohal@iberdrolaren.com

PI System Analyst
Iberdrola Renewables, LLC

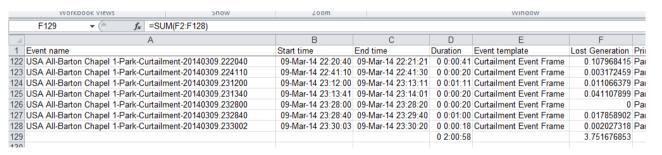


# THANK YOU



## **Screenshot**

 Easily pull in curtailment data for a specific park and use this to see how long curtailments lasted and how much generation was lost.



## Screenshots

