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*phoenix* engineering

# phoenix engineering

- Established in 1985
- Based in Calgary, with offices in Lethbridge, Montreal and Katy, TX
- 32 Staff
- Designed 86% of Alberta's wind capacity
- 131 Alberta meteorological towers in Windserver database



## AESO Forecasting Study

- Alberta Variability Study
  - 55 Meteorological Towers Analyzed with WindServer
  - 30 Wind Facilities Modeled with 4 Growth Scenarios
  - Results Formed Basis of Analysis for Mitigation Strategies
- Forecasting Study Evaluation Committee



## AESO Forecasting Study

- Phoenix chosen to gather, format, and provide data for forecasting study
- A straight forward task with many unforeseen curveballs



## Networking: A giant undertaking

- Correspondence with 15 Different organizations
- 10 separate NDAs
- Not necessarily in interest of wind developer to relinquish data
- Sites ranging in age, equipment, data transfer methods, upgrade needs



# The Task



➤ Primary hurdle – real time met data



2007-04-27



- Second Wind's Nomad II satellite logger
- 10 minute data average sent every 10 minutes
- A giant leap for Windserver importing (monthly to daily to 10 minutes)
- New hardware troubleshooting



# Data Gathering

GAS				
UNIT	MCR	TNG	DCR	
ATCO Scotford Upgrader	184	135	20	
Air Liquide Scotford #1	80	80	0	
Bear Creek 1	50	0	0	
Bear Creek 2	30	0	0	
BuckLake	6	3	0	
Calpine Calgary Energy Centre	250	132	0	
Carseland Cogen	80	64	0	
Celanese	20	3	0	
Dow Hydrocarbon	310	200	0	
Drywood	6	0	0	
Elmworth- Northstone Power	12	1	0	
EnCana #1	120	59	0	
Encana Foster Creek	80	70	0	
Fort Nelson	47	40	0	
Gold Creek Facility	7	5	0	
Joffre #1	474	157	16	
MacKay River	165	166	0	
Mahkeses	180	152	0	
Maxim #2	8	0	8	
Maxim #3	7	0	7	
Maxim #4	6	0	6	
Medicine Hat #1	205	150	0	
Muskeg River	200	125	14	
Nexen Inc #1	120	0	35	
Poplar Hill #1	47	0	35	
Primrose #1	85	78	0	
Rainbow #1	26	0	0	
Rainbow #2	40	0	0	

HYDRO				
UNIT	MCR	TNG	DCR	
Bighorn Hydro	120	36	8	
Bow River Hydro	319	121	16	
Brazeau Hydro	350	10	159	
CUPC Oldman River	32	17	0	
Chin Chute	11	0	0	
Irrican Hydro	7	0	0	
Raymond Reservoir	18	0	0	
	12	0	0	

WIND				
UNIT	MCR	TNG	DCR	
Castle River #1	40	0		
Cowley Ridge	38	0	0	
Enmax Taber	81	6	0	
Kettles Hill	9	0	0	
McBride Lake Windfarm	75	12	0	
Soderglen Wind	68.3	9	0	
Summerview	68.4	0	0	
Suncor Chin Chute	30	18	0	
Suncor Magrath	30	5		
Taylor Wind Farm	3.6	1	0	

BIOMASS AND OTHER				
UNIT	MCR	TNG	DCR	
APF Athabasca	99	63	0	
Drayton Valley	11	10	0	
Grande Prairie EcoPower	25	16	0	
Westlock	17.5	14	0	
Whitecourt Power	25	25	0	

➤ Process created to scrape AESO web site

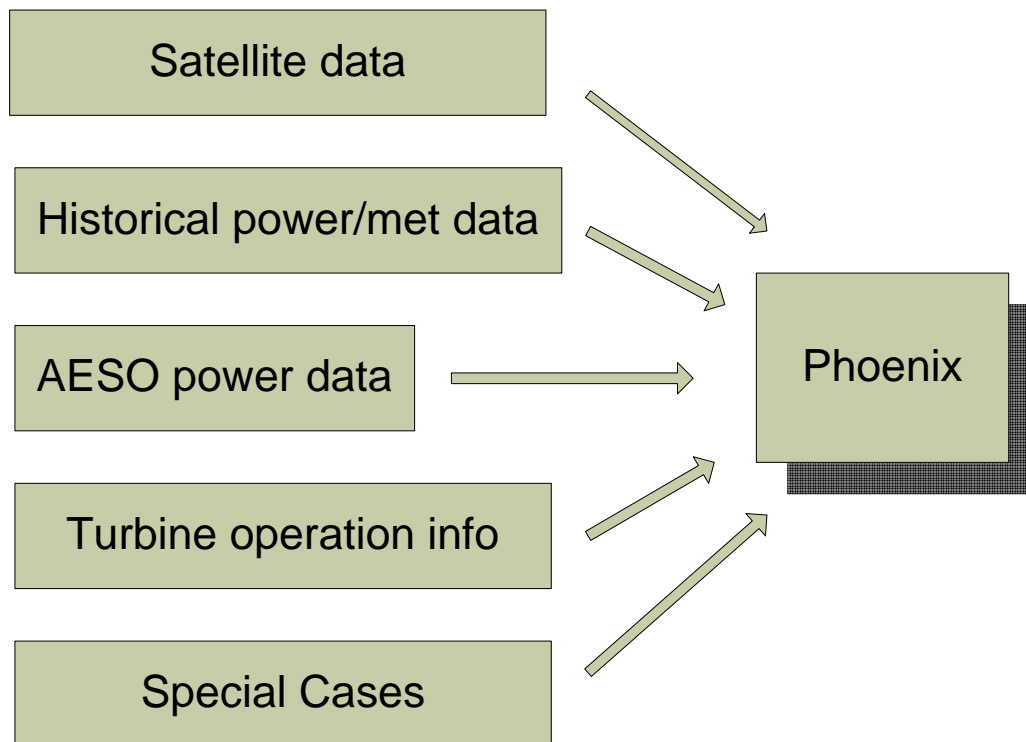
➤ Power data new to Windserver

➤ Live met and power data side by side



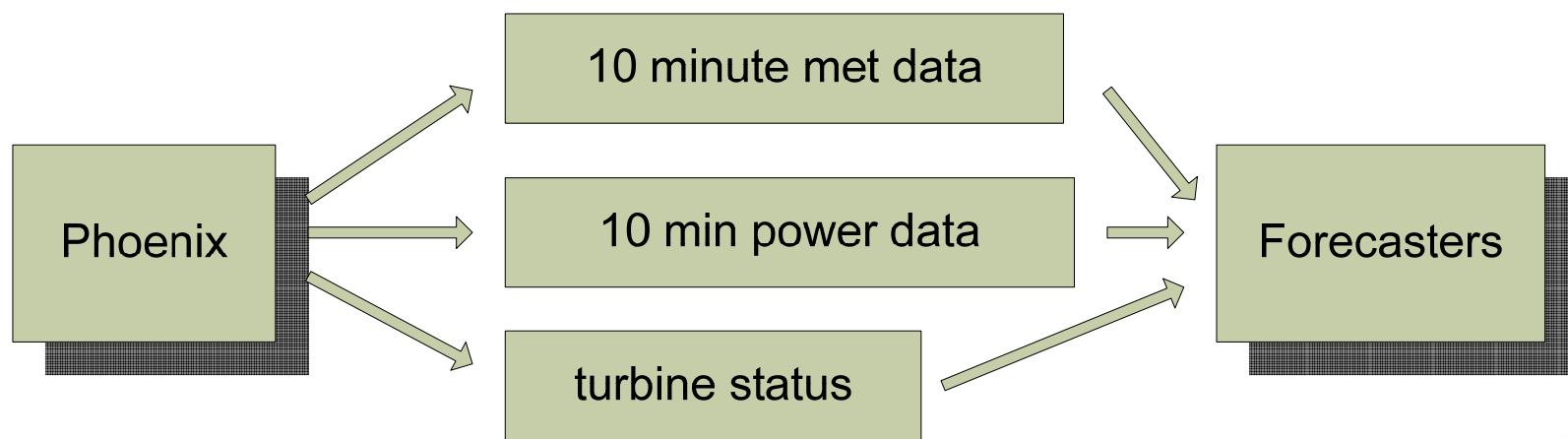
## Special Cases

- SCADA system modifications
- E-mailed turbine operation status
- All data has different formats



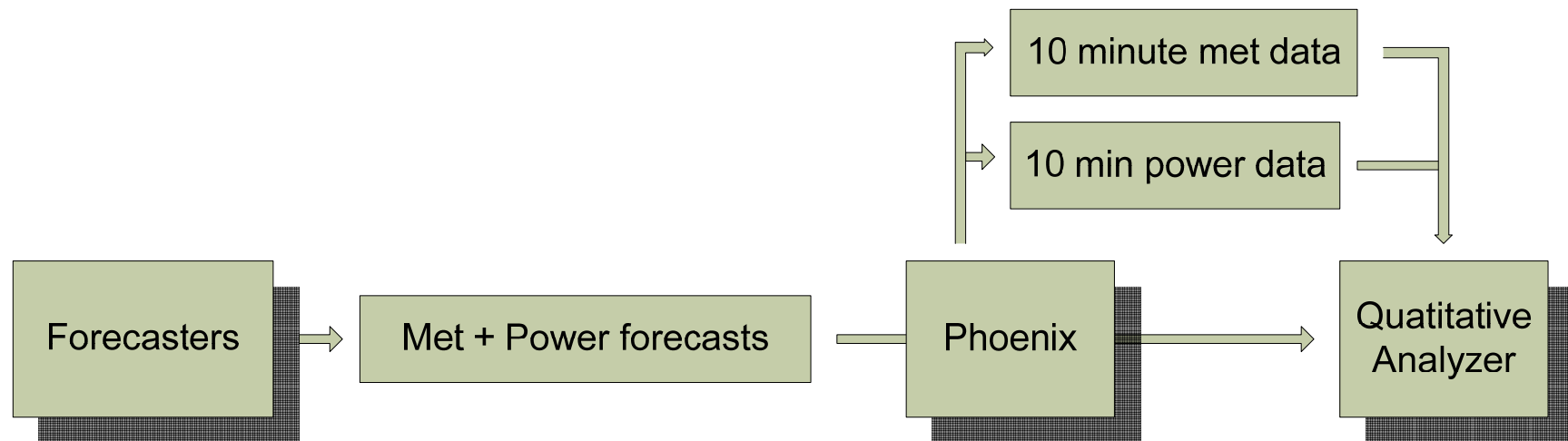
## Delivery to Forecasters

- Windserver modified to display latest logger readings
- Forecasters can retrieve data online
  - .xml files for latest readings
  - .csv files for historical readings



## Delivery to Quantitative Analyzer

- Data passed from forecasters to ORTECH through Phoenix
- Web folders created for ORTECH to access forecasts



## Volume of data

- Satellite met data every 10 minutes per site
- Power data from AESO website every 10 minutes
- turbine operation status e-mails hourly or 10 minutes
- 3 forecasters providing 48 hours of power and met forecasts every hour



## Volume of data

Per Month:

Met:  $6 \times 20 \text{ records} \times 720 \text{ hours} \times 10 \text{ sites} = 864000 \text{ records}$

Power:  $6 \times 20 \text{ records} \times 720 \text{ hours} = 86400 \text{ records}$

op-status:  $(6 + 1) \text{ records} \times 720 \text{ hours} = 5040 \text{ records}$

SCADA:  $6 \times 20 \text{ records} \times 720 \text{ hours} = 86400 \text{ records}$

Forecasts:  $3 \times 30 \times 4 \text{ records} \times 720 \text{ hours} = 259200 \text{ records}$

total: 1,301,040 records per month

15,612,480 records per year



- **Phoenix has successfully implemented system to:**
  - Collect near real time met, power, and turbine operating data
  - Convert the wide variety of formats and import the data
  - Provide a flexible data access to forecasters
  - Receive and track forecasts
  - Provide access to data and forecasts to ORTECH
  
- **Requirements of the forecasting study have been satisfied**





## Looking Forward

- Phoenix data system has been designed to support the future expansion of Alberta's wind forecasting system.

