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**UC2010**

**Real Time Information** — Currency of the New Decade

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# Cascades Energy Management and Information System

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# ABOUT Cascades Energy Action Group

- Cascades is a pulp and paper company well established in North America and Europe ([www.cascades.com](http://www.cascades.com))
- Tissue, Paperboard, Boxes, Specialized Products and Energy
- The Energy Action Group is a team of engineers devoted to energy efficiency improvement
- Cascades is “green by nature”

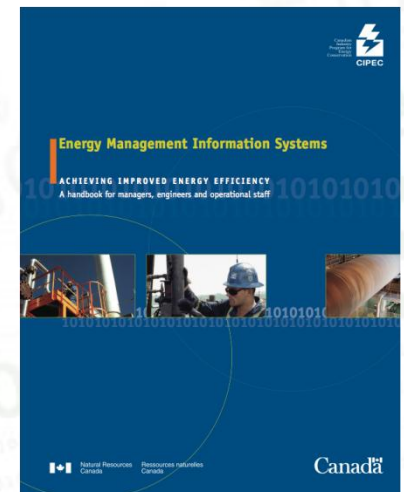


# PROBLEM OVERVIEW

- Overall energy bill close to 350MM\$
- Energy saving is net profit
- Mills focus mostly on production (lean management)
- Corporate goal for energy consumption reduction is 2% every year
- Energy Key Performance Indicators (KPI) hard to evaluate (weather, production...)
- We need simple KPI delivered in real time

# PROJECT HISTORY

- Previous KPI was GJ/Unit
- Not considering influencing factors
- Cascades learned about Energy Management and Information System (EMIS)
- Natural Resources Canada  
Office of Energy Efficiency  
Build a complete guide for the perfect EMIS





# DESIGN CONSIDERATIONS AND LIMITATIONS

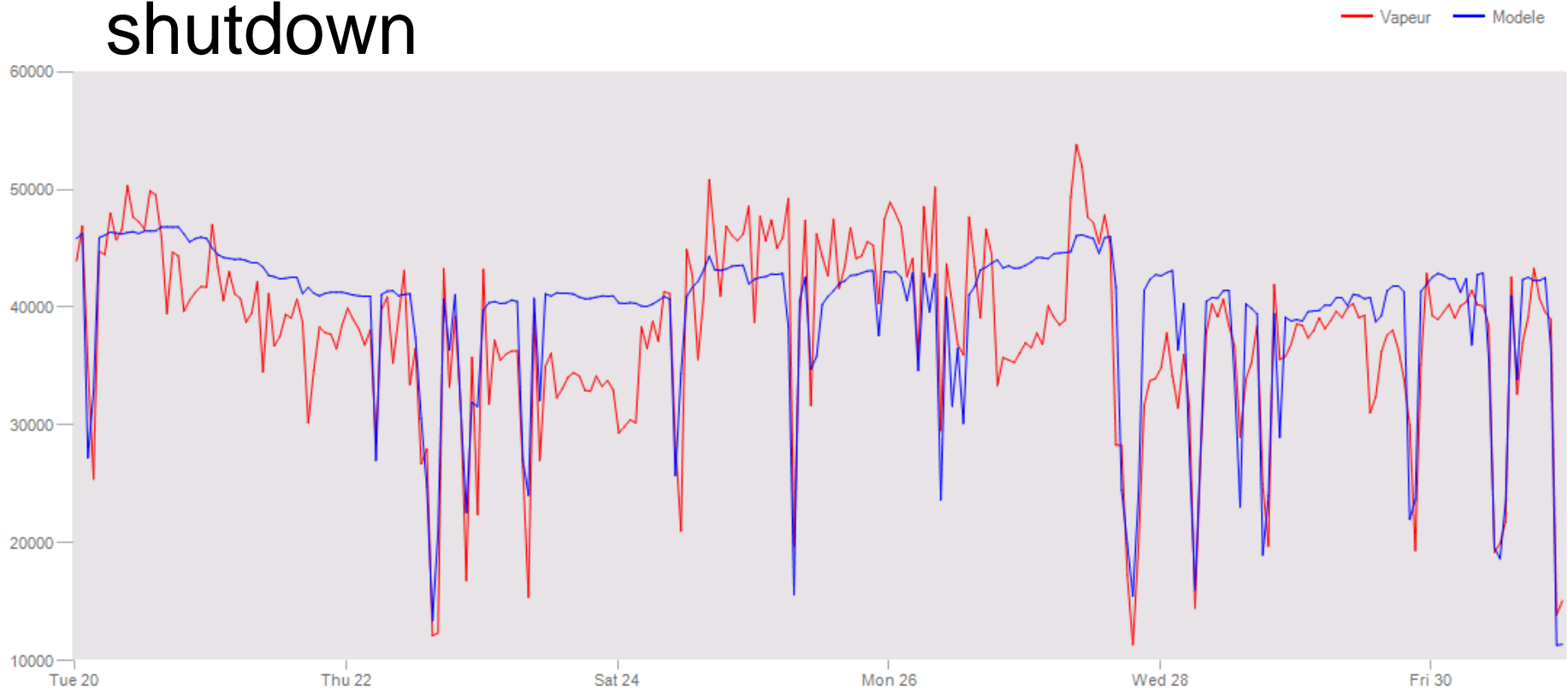
- You cannot perform if you don't measure
- Add metering, but what do we monitor?
- How do we deliver the right information to the right people? (Dashboards, Report...)
- What kind of KPI's will give significant information?
- Is modeling rocket science?
- Big brother is watching you.



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# Big brother is watching you.

- Example: Steam over usage after a shutdown



# SOLUTION = EMIS

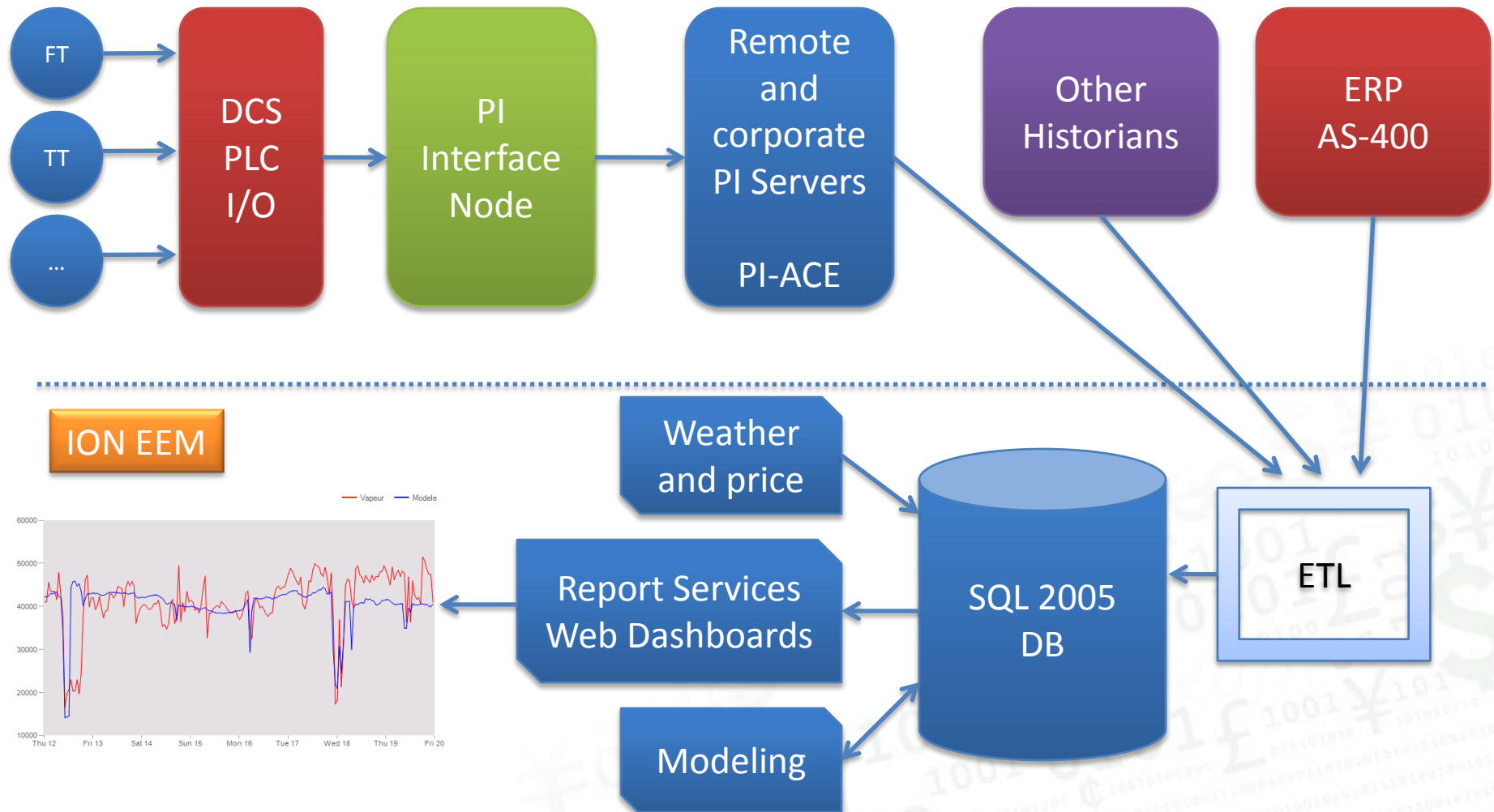
- Use the existing historians to grab production parameters and energy meters
- Add energy meters
- Buy and customize an Energy Management System available on the market (Schneider Electric ION EEM)
- Find a way the system is not the flavor of the month but a daily usage tool



# How will building an EMIS help?

- Real-time data of energy usage :  
Budget — Real-time Consumption = Your Bonu\$
- Modeling on a “good production” period will become a flexible target for your KPI's
- Include the parameters characterizing your product, not the way you produce it
- Improve the time spent analyzing results

# PI SYSTEM ARCHITECTURE



# RESULT\$

## Energy Savings

- Prevent waste
- React now, not when receiving the bill
- Identify best practices
- Optimize process set points
- Stabilize the process

## Monitoring and targeting also applies to:

- Process control / loop performances
- Quality control
- Chemical, water and raw material usage
- Greenhouse gas

# TANGIBLE BENEFITS

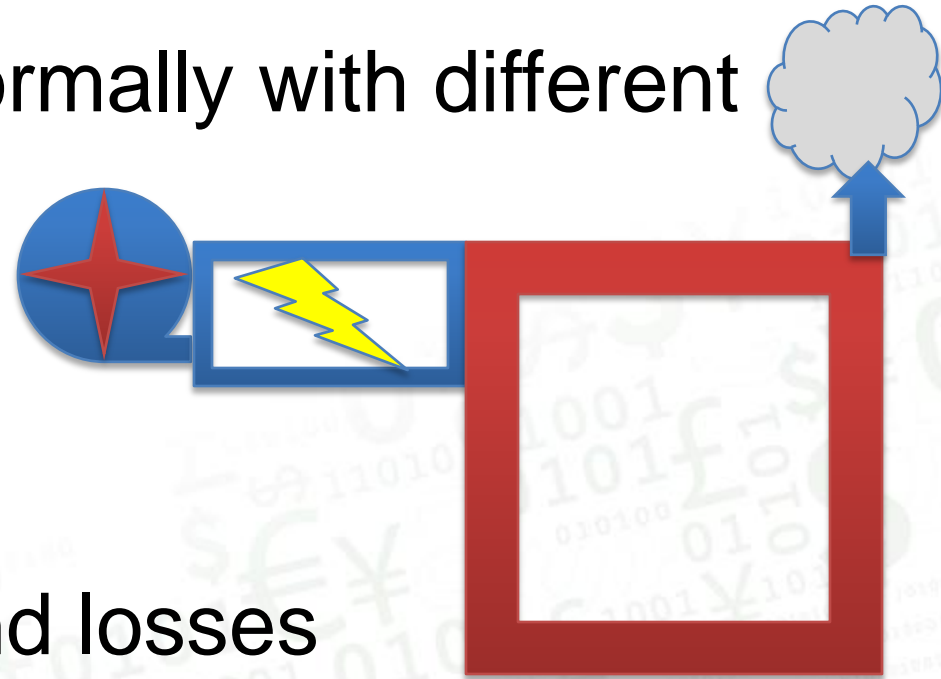
- A paper machine cut by 15% natural gas consumption by evaluating cross effects and optimizing dampers and an extra 115K\$/year in shutting down a 300HP fan.
- A paper machine's natural gas valve locked down (150K\$ saving/year)
- A small converting mill identified a problem costing them 10K\$ per month
- Paper mill saved 90K\$ in 3 months by optimizing energy source selection based on real-time pricing
- And the list expands every single day...
- ROI < 1 year at Corporate Level based on the deployment speed.

# INTANGIBLE BENEFITS

- An EMIS won't give results by itself, it depends of the action we take based on the information
- This operator just saved a few thousand by not wasting energy... Happens every day with an EMIS but hard to evaluate in \$\$\$

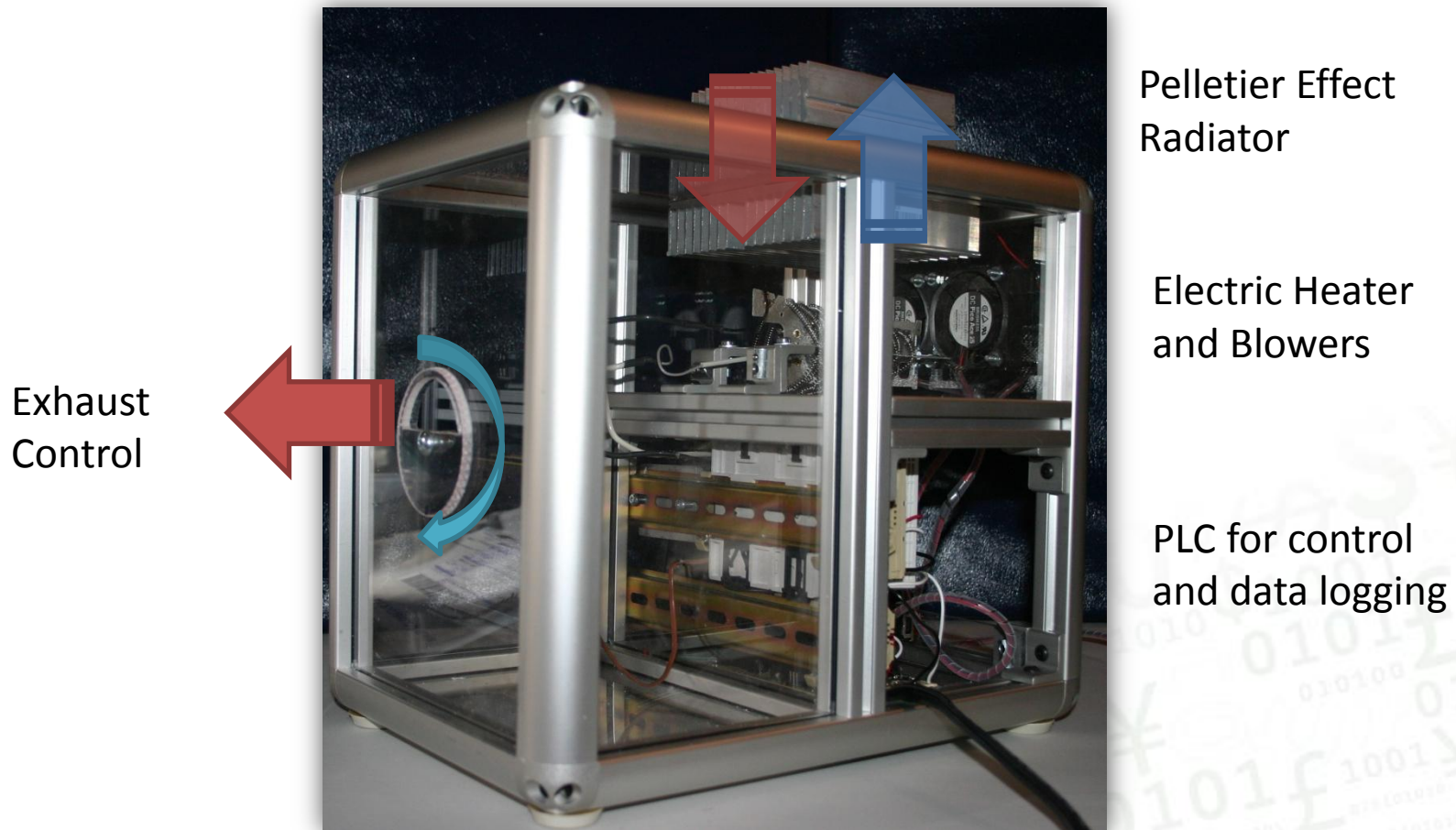
# DEMO AND MODELING 101

- Demo will show an oven/hood process
  1. Process description
  2. Running process normally with different set points
  3. Modeling
  4. Real-time vs Model
  5. Modify process and evaluate savings and losses

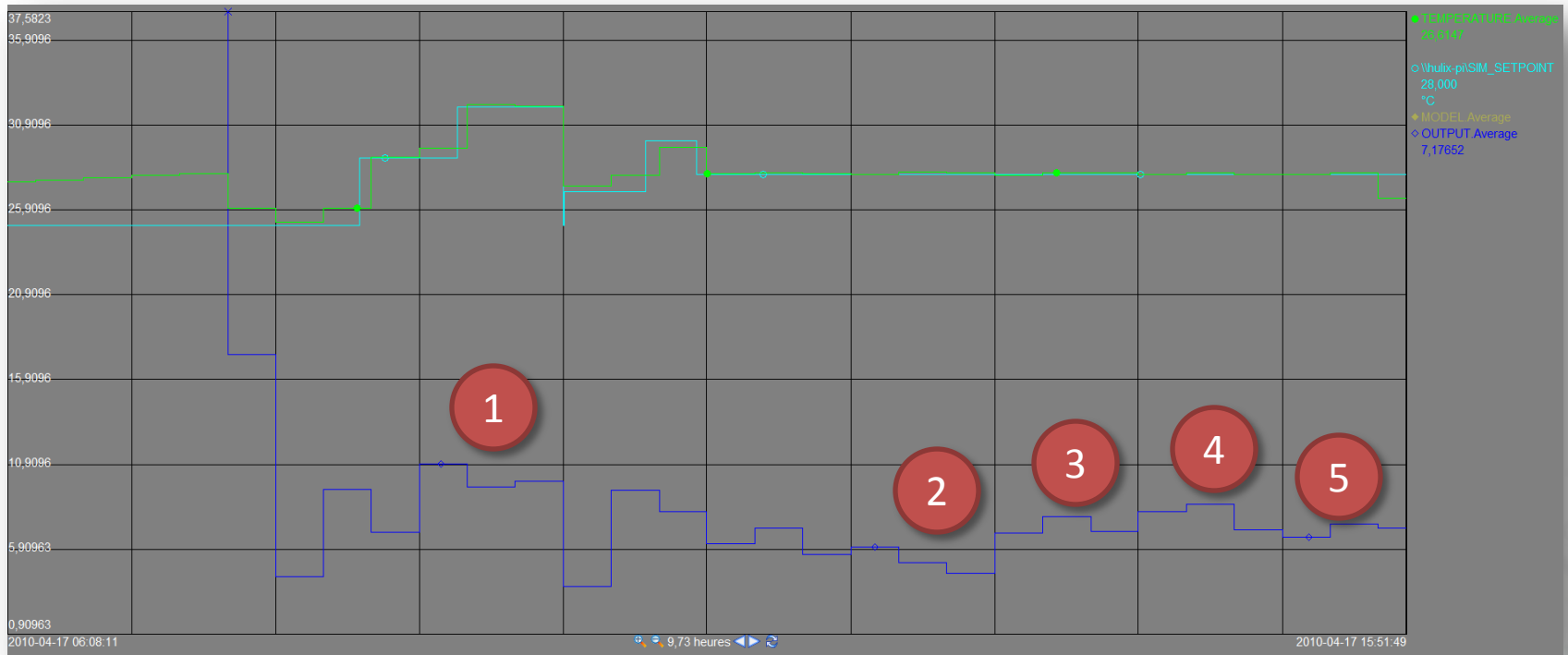




# The Process – Oven/Hood simulator



# The Sequence



- 1- Running at different temperature set points
- 2- Activate Heat addition
- 3- Open the dampers
- 4- Activate Heat extraction
- 5- Back to normal

# The Data

Modeling

Connect to AF EEM\_OVEN\_SIMULATOR

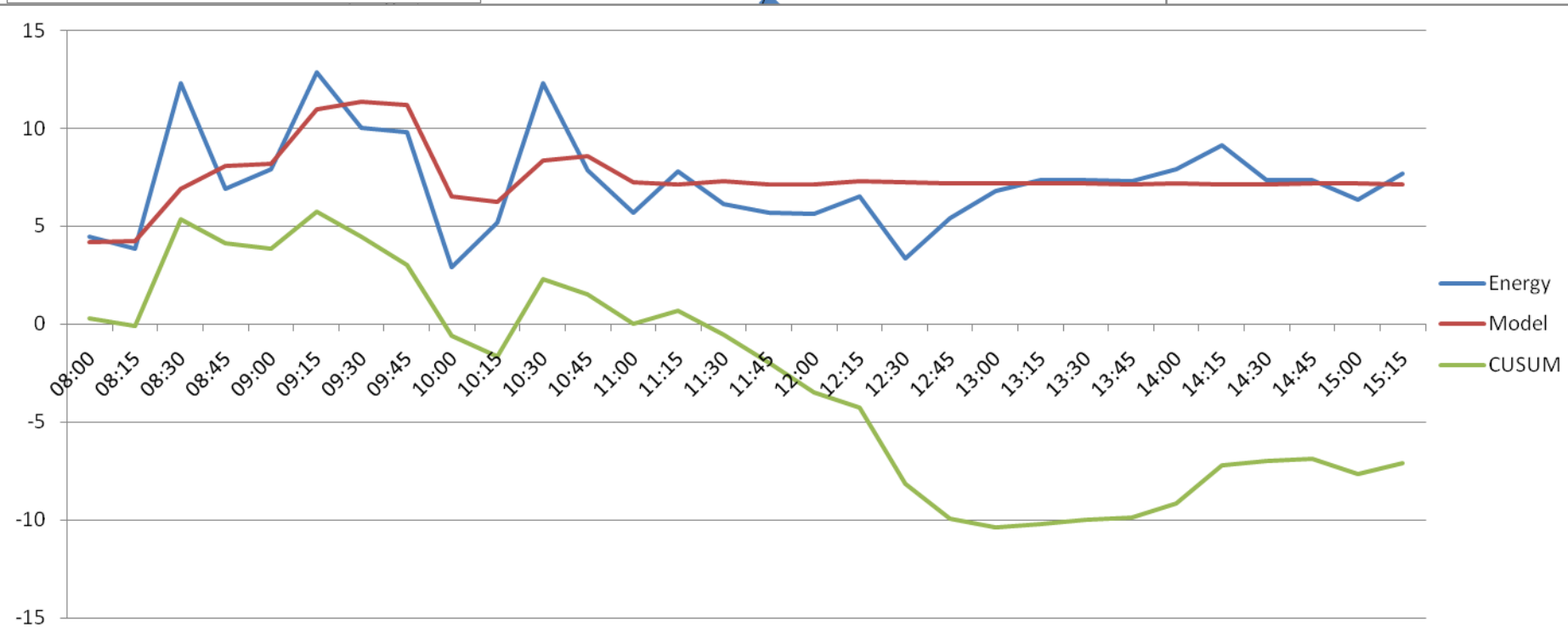
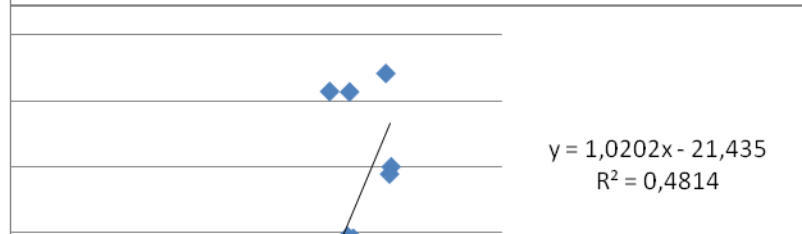
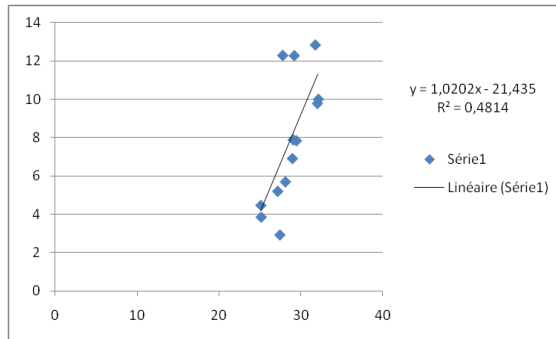
Start Time (UTC) 17-04-2010 12:00:00 End Time (UTC) 17-04-2010 19:30:00

TimeStamp	PowerOutput	Temperature
2010-04-17 08:00:00	25,1047879680463	4,46280131422095
2010-04-17 08:15:00	25,1432767803216	3,84790519773488
2010-04-17 08:30:00	27,7634998380147	12,3073548641367
2010-04-17 08:45:00	28,9482859891978	6,91483439683648
2010-04-17 09:00:00	29,0394734245176	7,89612240129366
2010-04-17 09:15:00	31,7422143853841	12,8546846377144
2010-04-17 09:30:00	32,1144782326941	10,015237677715
2010-04-17 09:45:00	32,0029673042207	9,79671474158457
2010-04-17 10:00:00	27,4232510312145	2,91471013963372
2010-04-17 10:15:00	27,1531457287748	5,19764475601349
2010-04-17 10:30:00	29,1806020130871	12,2942250263693
2010-04-17 10:45:00	29,4397499297133	7,84237069962097
2010-04-17 11:00:00	28,0961772562956	5,69501548233785
2010-04-17 11:15:00	27,9849914539148	7,77579178788123
2010-04-17 11:30:00	28,1886268004776	6,12857190244508
2010-04-17 11:45:00	28,0170607917839	5,69834790484831
2010-04-17 12:00:00	28,0212450622984	5,64781124157006
2010-04-17 12:15:00	28,1642694551095	6,53786370080904
2010-04-17 12:30:00	28,1365785353462	3,330731303176
2010-04-17 12:45:00	28,0374084699297	5,40287224795903
2010-04-17 13:00:00	28,0764717723211	6,79494374229925
2010-04-17 13:15:00	28,039919390161	7,33581939646841
2010-04-17 13:30:00	28,044680123318	7,3668462220094
2010-04-17 13:45:00	28,0254229102867	7,31050758944559
2010-04-17 14:00:00	28,0766210795892	7,90088851664869
2010-04-17 14:15:00	28,0191727774841	9,1131248190222
2010-04-17 14:30:00	28,0089614623906	7,3308294691698
2010-04-17 14:45:00	28,0638982804201	7,33856130281731
2010-04-17 15:00:00	28,0304977317785	6,36963771994739
2010-04-17 15:15:00	27,9880441464222	7,67424166499239

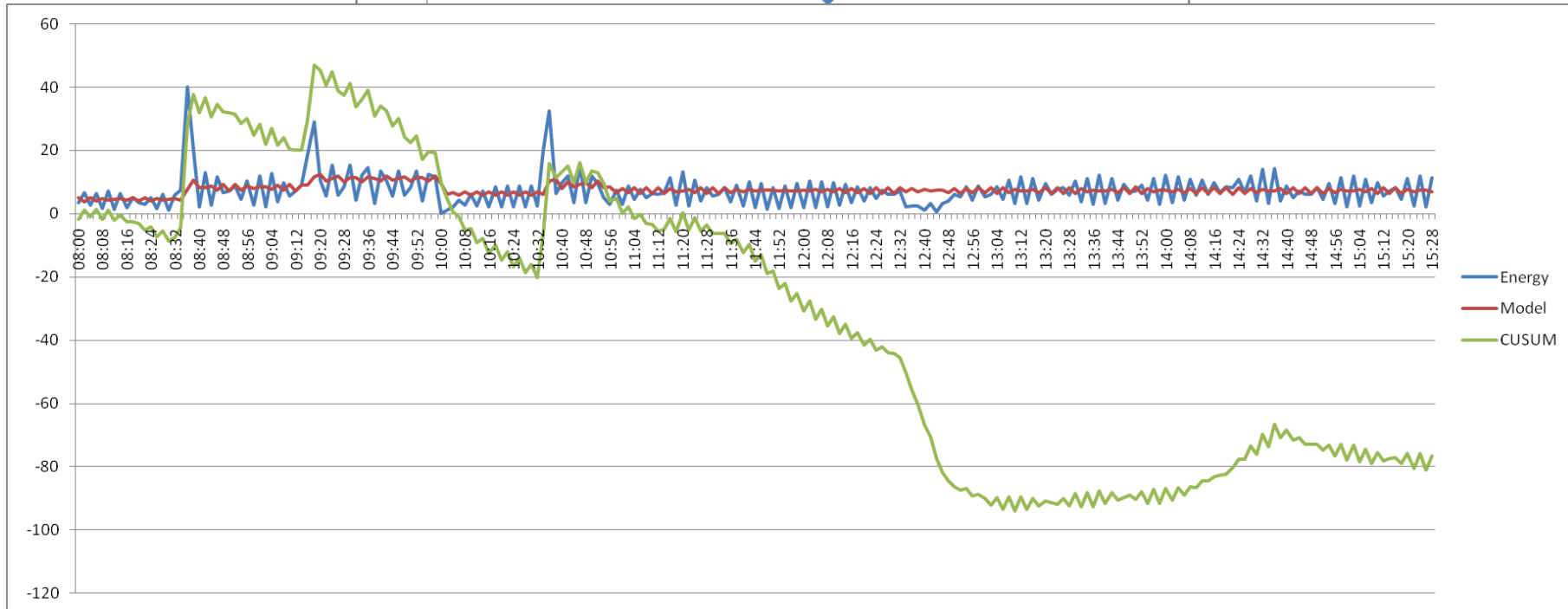
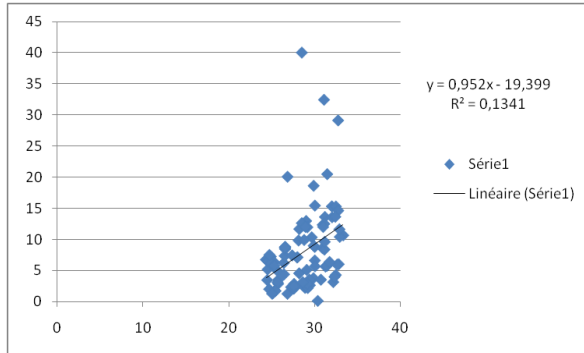
Interval (min) 15

Extract

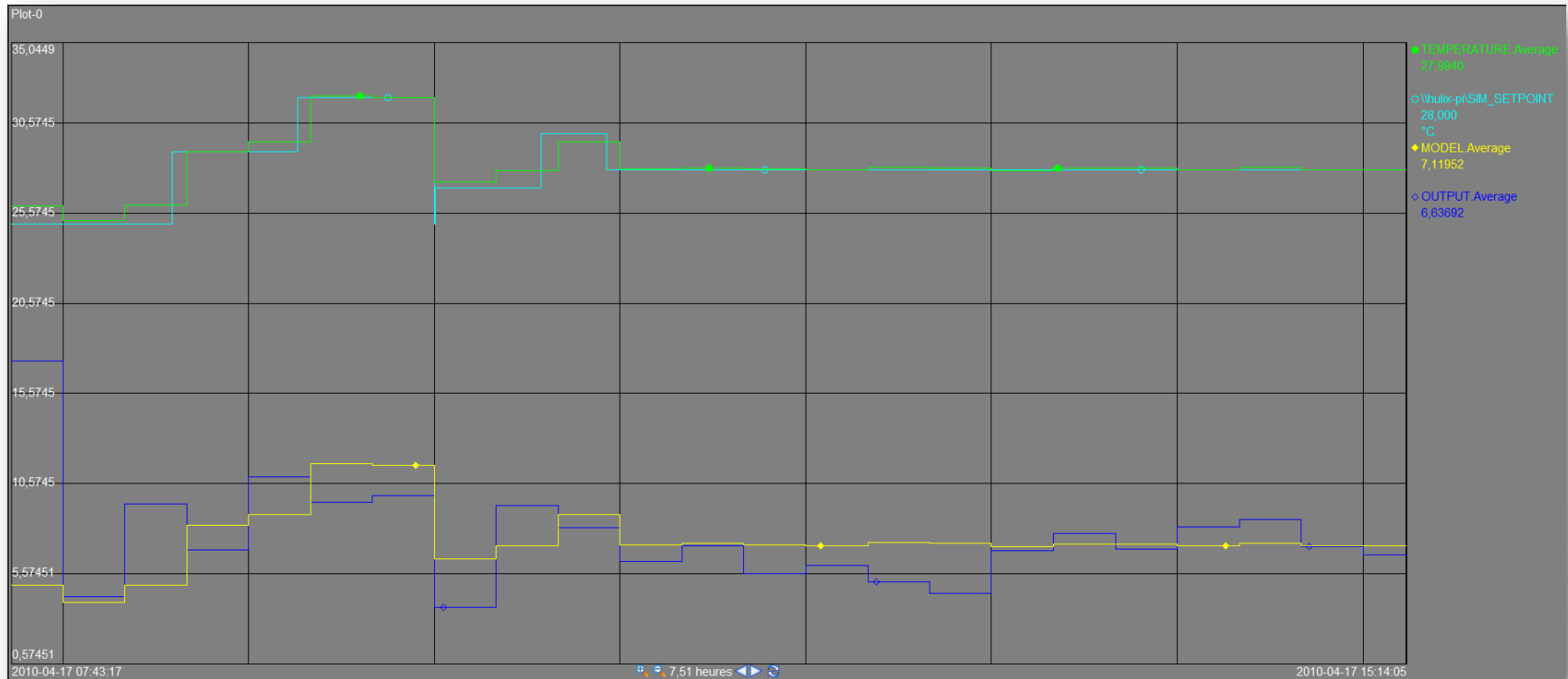
# Modeling (15 minutes interval)



# Modeling (2 minutes interval)

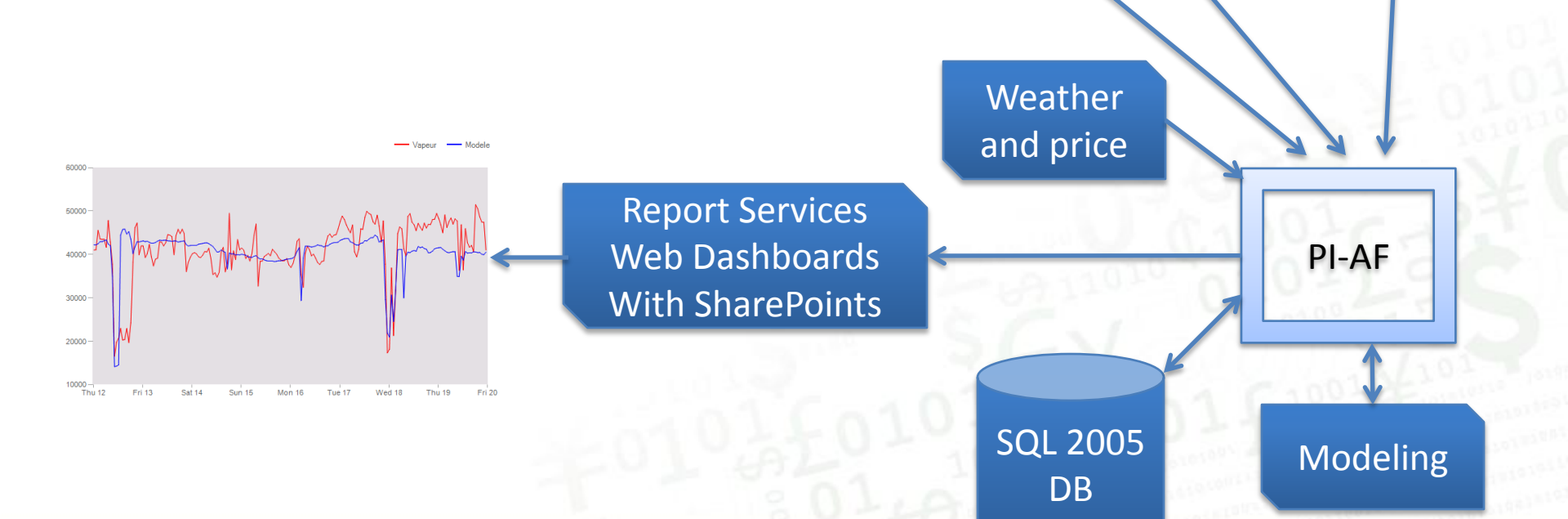


# ProcessBook Example



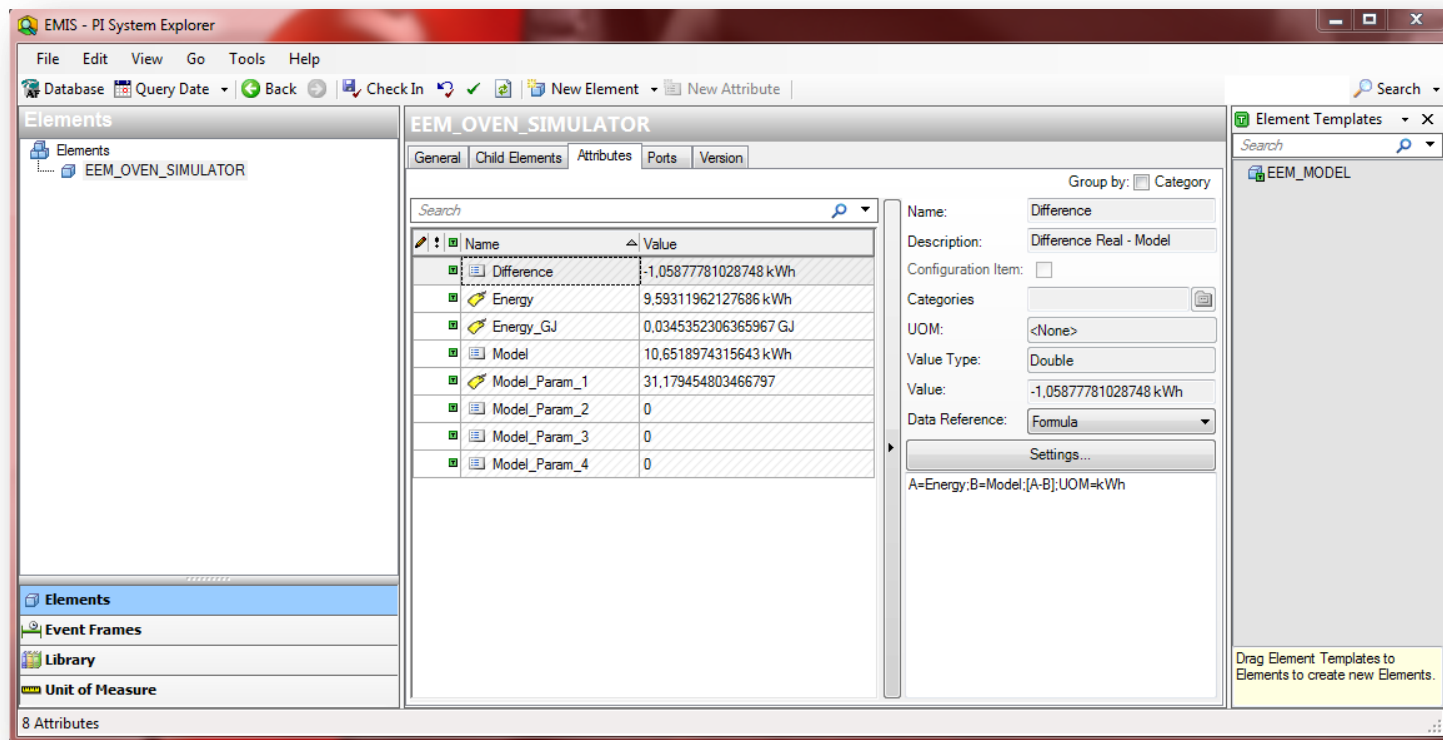


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# PI-AF

- UOM
- AF-SDK: Open to the world
- Report Services/PI System OLEDB
- SharePoint/WebParts
- vCampus support



# FUTURE PLANS / NEXT STEPS

- Performance issues and lack of flexibility caused Cascades to consider other options
- As demonstrated in the demo, PI-AF will be the main abstraction layer for linking PI, ERP, other Historians and Modeling software.
- Web dashboard still available with PI WebParts
- PI-Notifications will be useful for peak management and alarming
- AF-SDK will allow us to create a script to import configurations from actual SQL/XML system

# RECOMMENDATIONS

- Use utility meters (pulses, Modbus)
- Main consumption or detail monitoring?
- Deliver the information automatically
- Use time weighted averages (15min)
- Send back the information to operation
- Talk with \$\$\$
- Identify significant drivers/parameter
- Cumulative Sum charts provides crucial information
- Benchmark teams, best practices identification



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**Thank you**

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