Energy Charting and Metrics Tool (ECAM) Part I: Introduction

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ECAM Credits and History

- Development by William Koran, P.E.
- Contracting Organizations
  - PECI, Portland Energy Conservation Inc.)
  - QuEST (Quantum Energy Services & Technologies Inc.)
  - NorthWrite Inc.
- Funding provided by the following organizations:
  - The Northwest Energy Efficiency Alliance
  - The California Energy Commission, Public Interest Energy Research (through the California Commissioning Collaborative)
  - Pacific Northwest National Laboratory (PNNL)
  - New Buildings Institute (NBI)

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Federal Energy Management Program (FEMP) Mission

- The U.S. Department of Energy (DOE) Federal Energy Management Program (FEMP) provides services, tools, and expertise to Federal agencies to help them achieve their legislated and executive-ordered energy, greenhouse gas, and water goals. These are delivered through project, technical, and program services.
- ECAM helps address FEMP's mission by helping Federal building managers and operators understand their energy consumption patterns and trends, interpret raw data from energy meters, identify underlying causes of inefficiencies, and pinpoint potential solutions.
- Universal Translator (UT2) addresses any data formatting issues that ECAM cannot handle, and pre-processes the data into ECAM format.

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Source: http://www1.eere.energy.gov/femp/program/om_requirements.html

Objectives of this Webinar Series

- To build off the Energy Policy Act (EPAct) requirement to install meters by October 1, 2012, to ensure efficient energy use and reduce the cost of electricity in Federal facilities. Advanced meters or metering devices must provide data at least daily and measure the consumption of electricity at least hourly.
- To show the capabilities of ECAM in analyzing the metering data (it is assumed that the meters are already in place and data is being collected).
- To show how the data from interval meters or from the building automation system (BAS) can be used with ECAM and Universal Translator (UT2), and help users install and begin processing collected data.

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Part I: Outline of this Webinar

- What is an interval meter?
- What is a building automation system (BAS)?
- What is ECAM? Who developed it? What are its features and tools?
- What is the Universal Translator (UT2)?
- ECAM Installation guide (Microsoft Excel 2007/2010)
- Pre-process (clean up) raw data extracted from interval meters and the BAS
  - Practice file to be made available to participants of the webinar

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What is an Interval Meter?

- Interval meters cover two categories
  - Electrical – can track whole-building energy use, sub-panel energy use, or a specific end use (i.e., motors, chillers, etc.)
  - Flow-related – water, steam, natural gas, and other flow-related meters installed in-line using positive displacement, insertion turbine, or pressure-related techniques.
- Output related to resource use (i.e., energy, water, natural gas, etc.)
- Data collection and automated meter reading (AMR) systems collect and report resource data usage through the central system (or BAS), depending on the facilities' ability to communicate with the meter.

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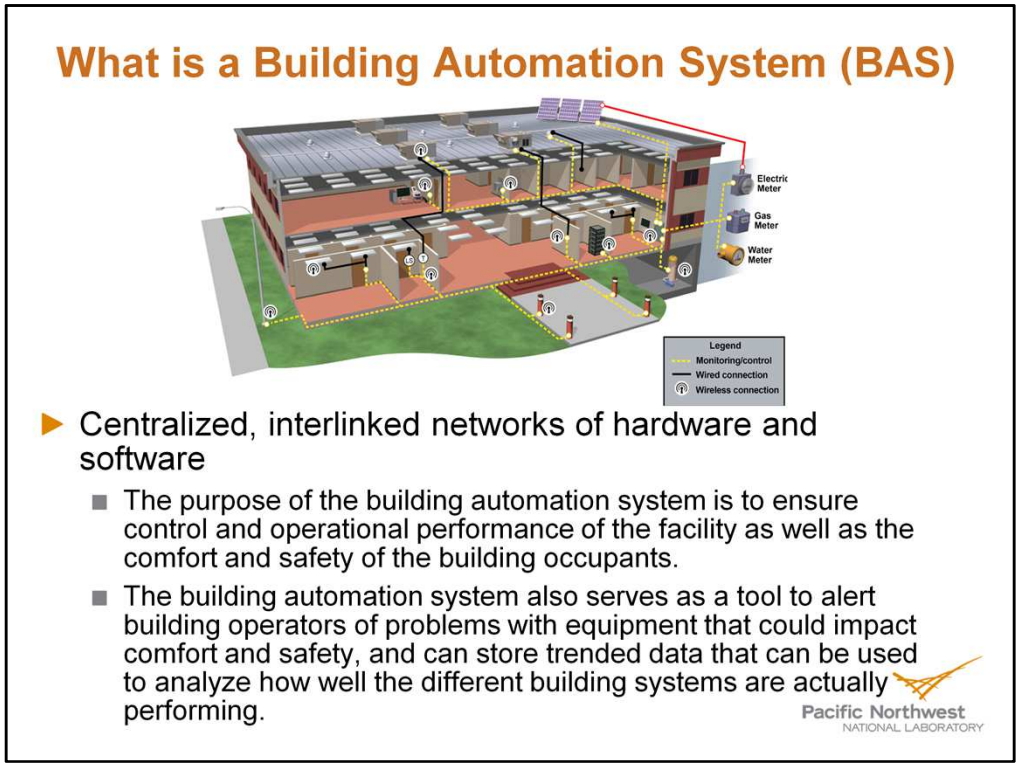
Source: http://www1.eere.energy.gov/femp/program/om_meteringsystems.html



Understanding Building Automation and Control Systems
Building automation systems (BAS) are centralized, interlinked, networks of hardware and software, which monitor and control the environment in commercial, industrial, and institutional facilities. While managing various building systems, the automation system ensures the operational performance of the facility as well as the comfort and safety of building occupants. Typically, such control systems are installed in new buildings or as part of a renovation where they replace an outdated control system.

What is Controlled?
Generally, building automation begins with control of mechanical, electrical, and plumbing (MEP) systems. For instance, the heating, ventilation, and air-conditioning (HVAC) system is almost always controlled, including control of its various pieces of equipment such as:
Air-handling units (AHUs)
Roof-top units (RTUs)
Fan coil units (FCUs)
Heat pump units (HPUs)
Variable-air-volume boxes (VAVs)
Chillers (BAS communicates with, but usually these have their own controllers)
Boilers (BAS communicates with, but usually these have their own controllers)

Other systems that are often controlled or integrated for remote monitoring include:
Lighting control is the low-hanging fruit for optimizing building performance
Security

Close circuit video (CCTV)
Card and keypad access
Fire alarm system
Elevators/escalators

What is ECAM?

- ECAM-Energy Charting and Metrics Tool
  - ECAM is an excel-based tool that is intended to help building owners and operators look at trended data (recommended 5 to 30 minute time interval data measurement) in a series of charts to analyze HVAC component data or utility meter data gathered from the interval meters or a BAS.

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Key Features of ECAM

- Pre-processing of data to input occupancy scheduling (e.g., 8:00AM to 5:00PM Mon. through Fri.) and day-type (e.g., weekdays, Saturdays, Sundays, Holidays) information to charts. Thus, the user can look at comparisons between days and hours within days.
  - Filtering data (analyze the data in greater depth) by:
    - Day-type
    - Occupancy schedule
    - Month/year/day
    - Pre/post (energy projects)
- Creation of load profile charts to analyze whole building energy consumption.
- Creation of standard-building PNNL re-tuning charts using trend data from the BAS.

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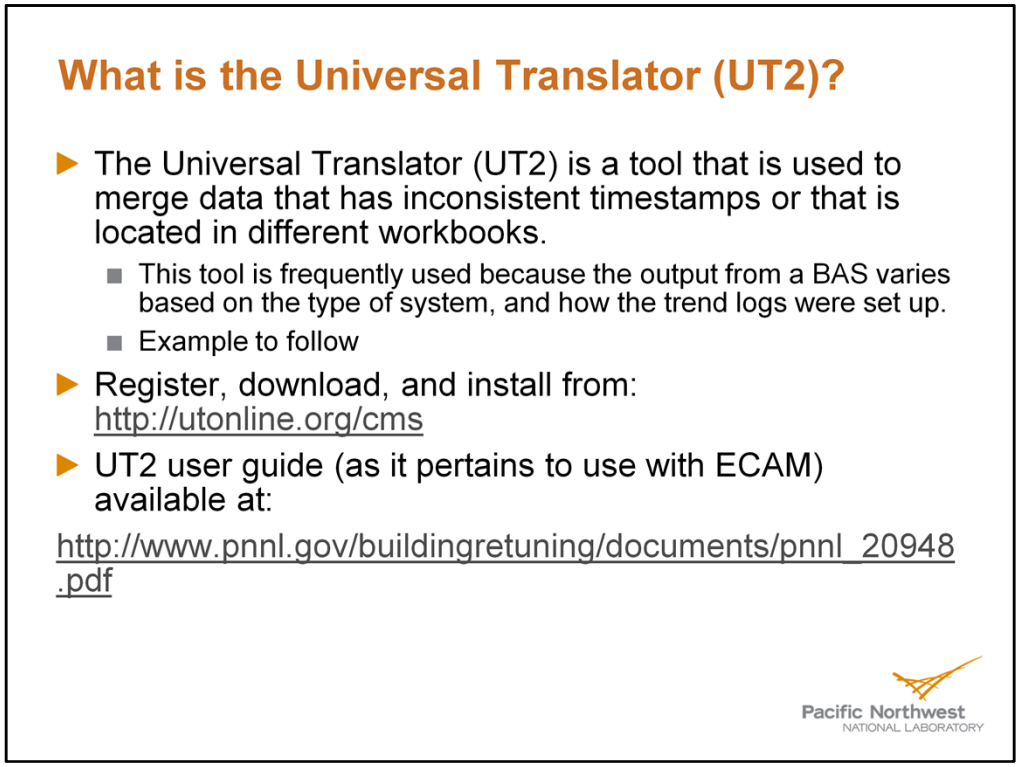

Universal Translator is used to merge data from different excel sheets and different timestamps. This is needed because BASs may be providing the data for one component (e.g., AHU) in multiple sheets (e.g., 2).

Also, if the user wants to merge data from more than one component, then he/she will use Universal Translator (UT) again to merge the data from AHU-1, AHU-2, etc.
Source: http://utonline.org/cms/node/103

How do I get a copy of the UT?
Registered users can download the latest version of the Universal Translator.

To register:
Create a new account from at the link above. Click on the "Create new account" link, fill out the account information form, and press the "Create new account" button. An email will be sent to you containing your user name, a temporary password and additional information.

To download the Universal Translator Installer:
From the Home page log in with your new account. After you log in, click on the Downloads link in the "Primary links" menu. On the Downloads page, click the link of the Installer you wish to download. You will be redirected to an article with information regarding the UT version you have chosen. Scroll to the bottom of the page. The installer file is an executable program; just click on it and begin the installation.

UT2 Example

		Start Time of data	End Time of data
Excel file 1 (.csv format)	AHU* Supply Air Temperature	1/12/2012 12:00:00AM	1/28/2012 6:30:00 PM
Excel file 2 (.csv format)	AHU Mixed Air Temperature	1/5/2012 1:00:00 AM	1/26/2012 6:00:00 PM
Excel file 3 (.csv format)	AHU Return Air Temperature	1/1/2012 3:00:00 AM	1/31/2012 12:00:00PM
Excel file 4 (.csv format)	AHU Outside Air Temperature	1/24/2012 12:00:00AM	1/26/2012 9:00:00 PM

Max concurrent timestamps

- Scenario: Each AHU file is in a separate excel workbook.
- Goal: To merge all files into one excel workbook.
- Approach: Use UT2.
- How UT2 works: It matches concurrent timestamps across files, and linearly interpolates to match specified data frequency

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Note: UT2 requires that files be imported as comma-separated values (CSV) files.

How do the BAS, ECAM, and UT2 work together?

Building Automation System (BAS)	❑ Controls, manages, and collects data from HVAC components.
Universal Translator (UT2)	❑ Universal Translator is used to merge data from different excel sheets and data with different timestamps.
Energy Charting and Metrics Tool (ECAM)	❑ Graphs data from the BAS so the building operator can look at the trend data of HVAC components.

Result:

1) Building operators and building commissioners can translate data from different BASs into a common energy charting and metrics tool.
2) Charting HVAC data can identify improved control opportunities in buildings.

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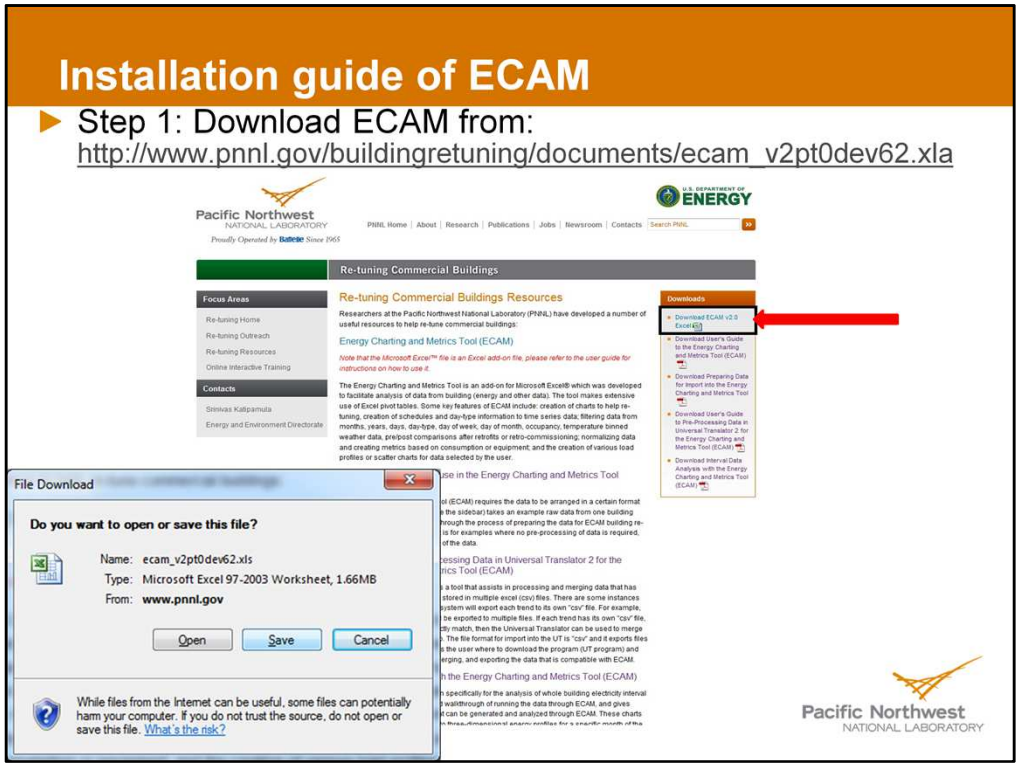
User Interaction: Installing ECAM

Installation guide of ECAM

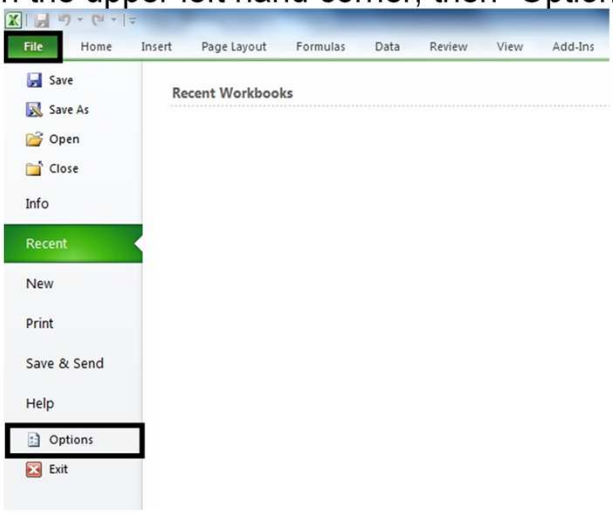
- Step 1: Download ECAM from:
  http://www.pnnl.gov/buildingretuning/documents/ecam_v2pt0dev62.xla



***Click on save, and change the file type from a .xls to a .xla.

Installation guide of ECAM (cont.)

- Step 2: Open Microsoft Excel 2007/2010 and click on "File" in the upper left hand corner, then "Options."



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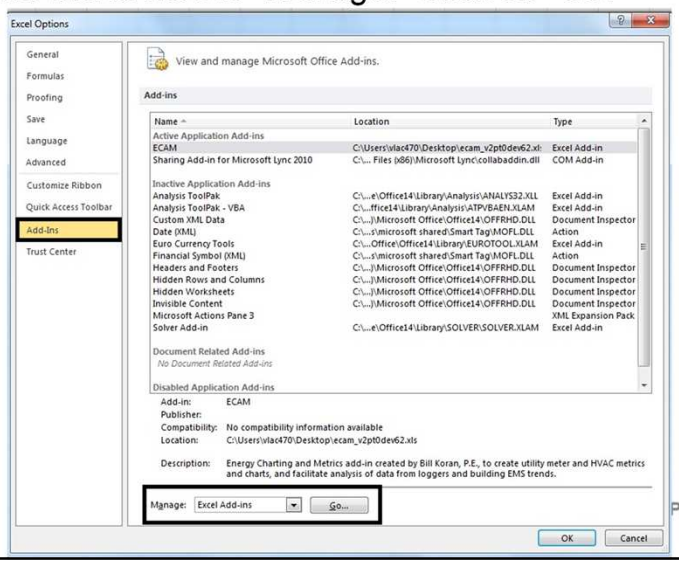
Installation guide of ECAM (cont.)

- Step 3: On the pop up options window click on “Add-Ins,” and make sure that “Excel Add-Ins” is visible in the drop down menu next to “Manage.” Click on “Go.”



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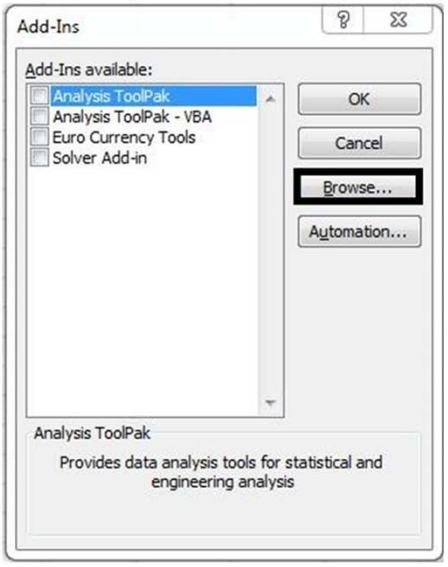
Installation guide of ECAM (cont.)

- Step 4: Click “Browse” and find the path where ECAM is saved.



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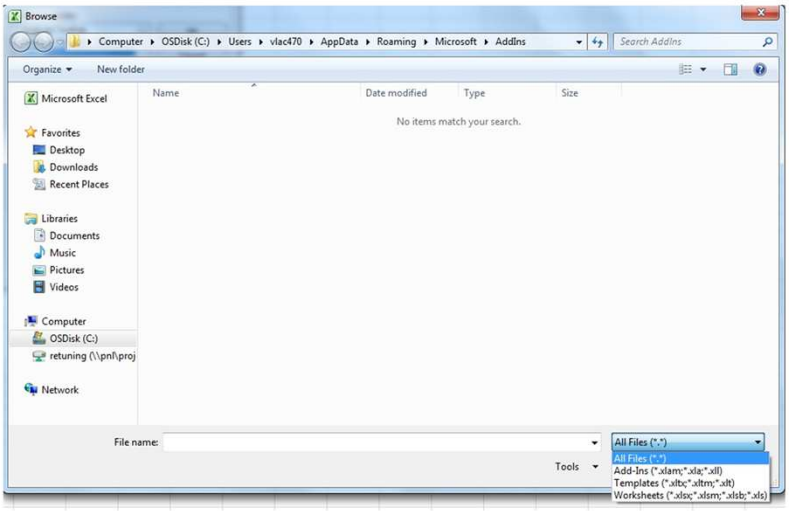
It is easiest to save the version of ECAM to your desktop so you don’t have to search for it in the future if/when you have to reinstall ECAM.

Installation guide of ECAM (cont.)

- Step 5: Select “All Files” from the drop down menu.



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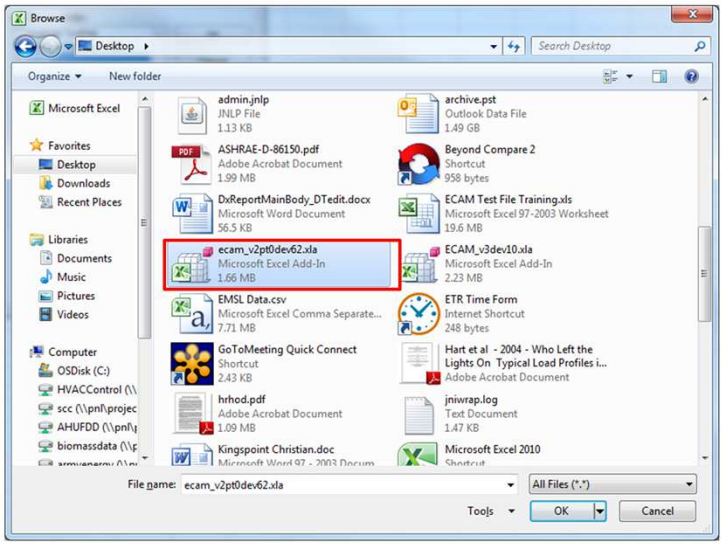
Installation guide of ECAM (cont.)

- Step 6: Find the ECAM .xla file and click “OK.”



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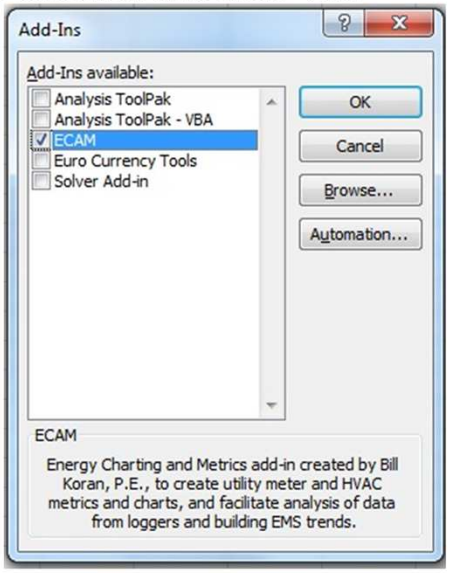
Installation guide of ECAM (cont.)

- Step 7: After selecting the ECAM add-in, make sure the check box is checked and click “OK.”



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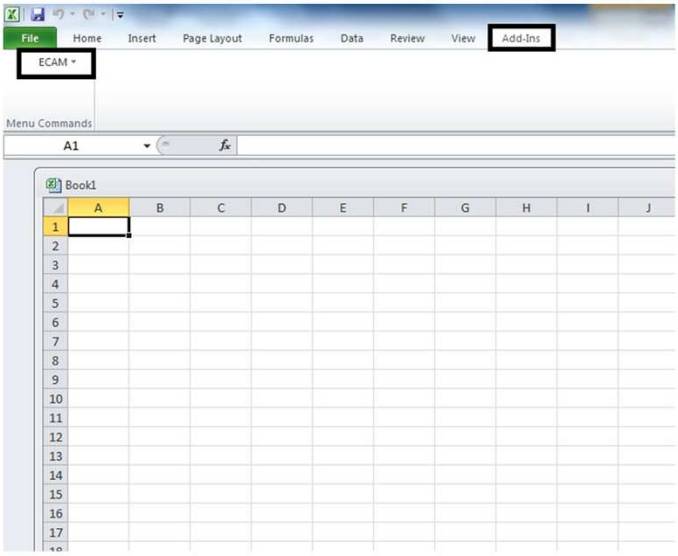
Installation guide of ECAM (cont.)

- ECAM will be added in the excel home screen under the "Add-Ins" tab



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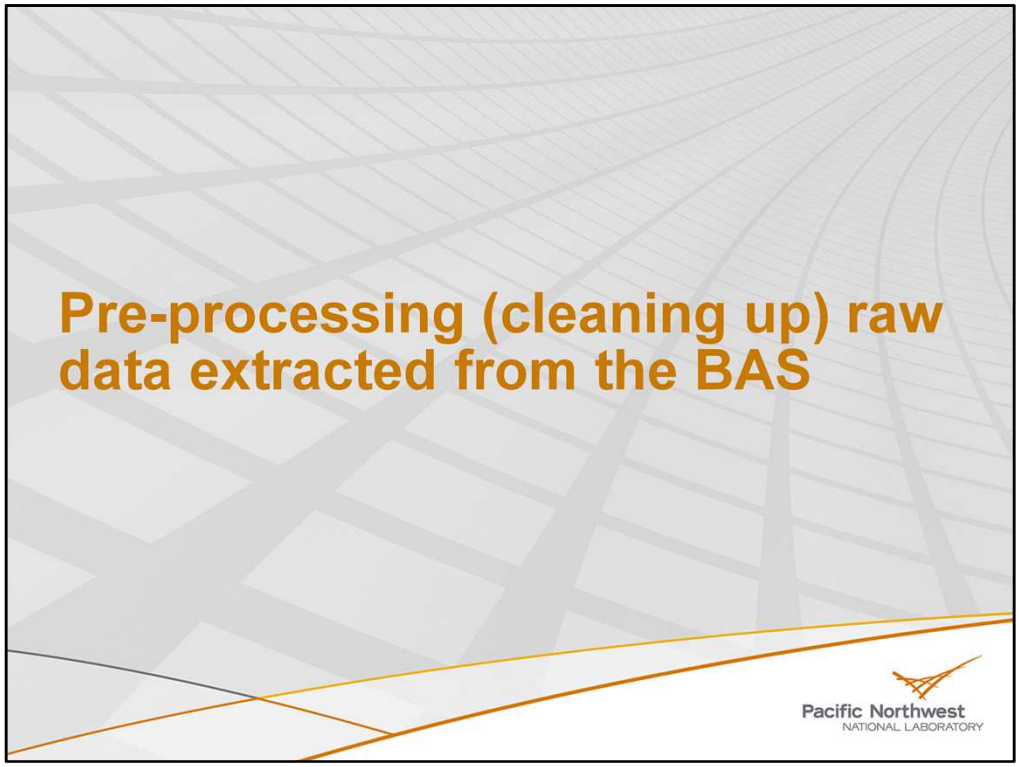
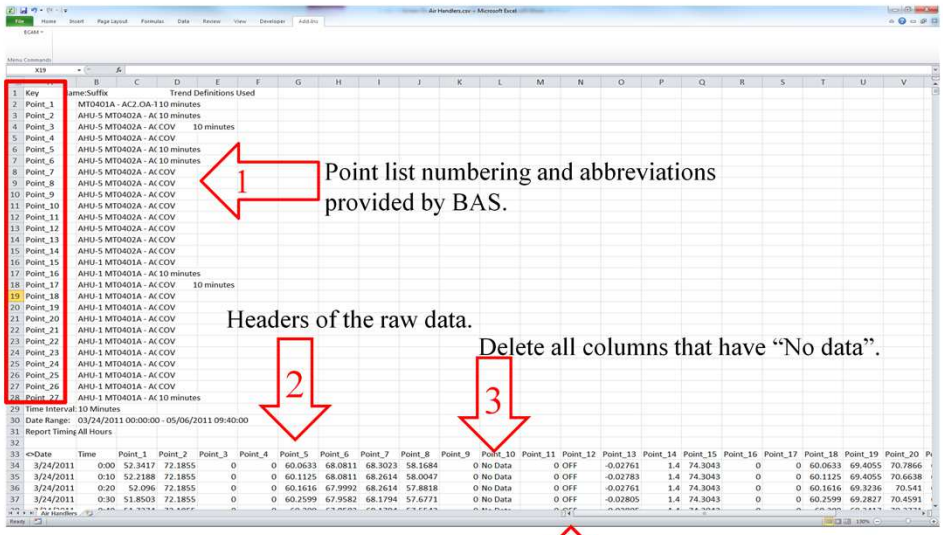


ECAM only accepts a specific form of raw data for processing. The following steps will demonstrate the process for getting a file into the proper ECAM format.

Pre-Processing Example



1 Point list numbering and abbreviations provided by BAS.

Headers of the raw data.

2

Delete all columns that have "No data".

3

Replace OFF & ON with 0 & 1.

4

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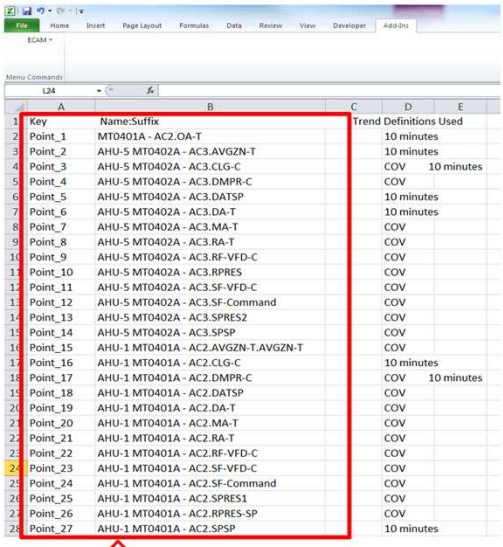
Pre-Processing Example (Cont.)

- Close up view (1) at the points list extracted from the BAS.



	A	B	C	D	E
1	Key	Name:Suffix		Trend Definitions Used	
2	Point_1	MT0401A - AC2.OA-T		10 minutes	
3	Point_2	AHU-5 MT0402A - AC3.AVGZN-T		10 minutes	
4	Point_3	AHU-5 MT0402A - AC3.CLG-C		COV	10 minutes
5	Point_4	AHU-5 MT0402A - AC3.DMPR-C		COV	
6	Point_5	AHU-5 MT0402A - AC3.DATSP		10 minutes	
7	Point_6	AHU-5 MT0402A - AC3.DA-T		10 minutes	
8	Point_7	AHU-5 MT0402A - AC3.MA-T		COV	
9	Point_8	AHU-5 MT0402A - AC3.RA-T		COV	
10	Point_9	AHU-5 MT0402A - AC3.RF-VFD-C		COV	
11	Point_10	AHU-5 MT0402A - AC3.RPRES		COV	
12	Point_11	AHU-5 MT0402A - AC3.SF-VFD-C		COV	
13	Point_12	AHU-5 MT0402A - AC3.SF-Command		COV	
14	Point_13	AHU-5 MT0402A - AC3.SPRES2		COV	
15	Point_14	AHU-5 MT0402A - AC3.SPSP		COV	
16	Point_15	AHU-1 MT0401A - AC2.AVGZN-T.AVGZN-T		COV	
17	Point_16	AHU-1 MT0401A - AC2.CLG-C		10 minutes	
18	Point_17	AHU-1 MT0401A - AC2.DMPR-C		COV	10 minutes
19	Point_18	AHU-1 MT0401A - AC2.DATSP		COV	
20	Point_19	AHU-1 MT0401A - AC2.DA-T		COV	
21	Point_20	AHU-1 MT0401A - AC2.MA-T		COV	
22	Point_21	AHU-1 MT0401A - AC2.RA-T		COV	
23	Point_22	AHU-1 MT0401A - AC2.RF-VFD-C		COV	
24	Point_23	AHU-1 MT0401A - AC2.SF-VFD-C		COV	
25	Point_24	AHU-1 MT0401A - AC2.SF-Command		COV	
26	Point_25	AHU-1 MT0401A - AC2.SPRES1		COV	
27	Point_26	AHU-1 MT0401A - AC2.RPRES-SP		COV	
28	Point_27	AHU-1 MT0401A - AC2.SPSP		10 minutes	

1 Point list numbering and abbreviations provided by BAS.

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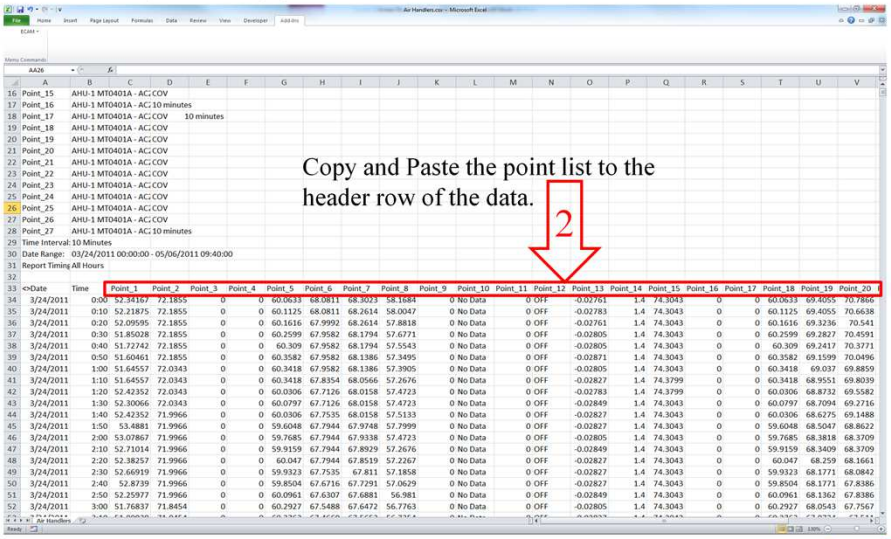
Pre-Processing Example (Cont.)

- Close up view (2) at the raw data.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
16	Point_15	AHU-1 MT0401A - AC; COV																				
17	Point_16	AHU-1 MT0401A - AC; 10 minutes																				
18	Point_17	AHU-1 MT0401A - AC; COV	10 minutes																			
19	Point_18	AHU-1 MT0401A - AC; COV																				
20	Point_19	AHU-1 MT0401A - AC; COV																				
21	Point_20	AHU-1 MT0401A - AC; COV																				
22	Point_21	AHU-1 MT0401A - AC; COV																				
23	Point_22	AHU-1 MT0401A - AC; COV																				
24	Point_23	AHU-1 MT0401A - AC; COV																				
25	Point_24	AHU-1 MT0401A - AC; COV																				
26	Point_25	AHU-1 MT0401A - AC; COV																				
27	Point_26	AHU-1 MT0401A - AC; COV																				
28	Point_27	AHU-1 MT0401A - AC; 10 minutes																				
29	Time Interval: 10 Minutes																					
30	Date Range:	03/24/2011 00:00:00 - 05/06/2011 09:40:00																				
31	Report Timing All Hours																					
32																						
33	<>Date	Time	Point_1	Point_2	Point_3	Point_4	Point_5	Point_6	Point_7	Point_8	Point_9	Point_10	Point_11	Point_12	Point_13	Point_14	Point_15	Point_16	Point_17	Point_18	Point_19	Point_20
34	3/24/2011	0:00	52.34167	72.1855	0	0	60.0633	68.0811	68.3023	58.1684	0	No Data	0	OFF	-0.02761	1.4	74.3043	0	0	60.0633	69.4055	70.7866
35	3/24/2011	0:10	52.21875	72.1855	0	0	60.1125	68.0811	68.2614	58.0047	0	No Data	0	OFF	-0.02783	1.4	74.3043	0	0	60.1125	69.4055	70.6638
36	3/24/2011	0:20	52.09595	72.1855	0	0	60.1616	67.9992	68.2614	57.8818	0	No Data	0	OFF	-0.02761	1.4	74.3043	0	0	60.1616	69.3236	70.541
37	3/24/2011	0:30	51.85028	72.1855	0	0	60.2599	67.9582	68.1794	57.6771	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.2599	69.2827	70.4591
38	3/24/2011	0:40	51.72742	72.1855	0	0	60.309	67.9582	68.1794	57.5543	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.309	69.2417	70.3771
39	3/24/2011	0:50	51.60461	72.1855	0	0	60.3582	67.9582	68.1386	57.3495	0	No Data	0	OFF	-0.02871	1.4	74.3043	0	0	60.3582	69.1599	70.0496
40	3/24/2011	1:00	51.64557	72.0343	0	0	60.3418	67.9582	68.1386	57.3905	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.3418	69.037	69.8859
41	3/24/2011	1:10	51.64557	72.0343	0	0	60.3418	67.8354	68.0566	57.2676	0	No Data	0	OFF	-0.02827	1.4	74.3799	0	0	60.3418	68.9551	69.8039
42	3/24/2011	1:20	52.42352	72.0343	0	0	60.0306	67.7126	68.0158	57.4723	0	No Data	0	OFF	-0.02783	1.4	74.3799	0	0	60.0306	68.8732	69.5582
43	3/24/2011	1:30	52.30066	72.0343	0	0	60.0797	67.7126	68.0158	57.4723	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	60.0797	68.7094	69.2716
44	3/24/2011	1:40	52.42352	71.9966	0	0	60.0306	67.7535	68.0158	57.5133	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.0306	68.6275	69.1488
45	3/24/2011	1:50	53.4881	71.9966	0	0	59.6048	67.7944	67.9748	57.7999	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.6048	68.5047	68.8622
46	3/24/2011	2:00	53.07867	71.9966	0	0	59.7685	67.7944	67.9338	57.4723	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	59.7685	68.3818	68.3709
47	3/24/2011	2:10	52.71014	71.9966	0	0	59.9159	67.7944	67.8929	57.2676	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	59.9159	68.3409	68.3709
48	3/24/2011	2:20	52.38257	71.9966	0	0	60.047	67.7944	67.8519	57.2267	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.047	68.259	68.1661
49	3/24/2011	2:30	52.66919	71.9966	0	0	59.9323	67.7535	67.811	57.1858	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.9323	68.1771	68.0842
50	3/24/2011	2:40	52.8739	71.9966	0	0	59.8504	67.6716	67.7291	57.0629	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.8504	68.1771	67.8386
51	3/24/2011	2:50	52.25977	71.9966	0	0	60.0961	67.6307	67.6881	56.981	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	60.0961	68.1362	67.8386
52	3/24/2011	3:00	51.76837	71.8454	0	0	60.2927	67.5488	67.6472	56.7763	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.2927	68.0543	67.7567

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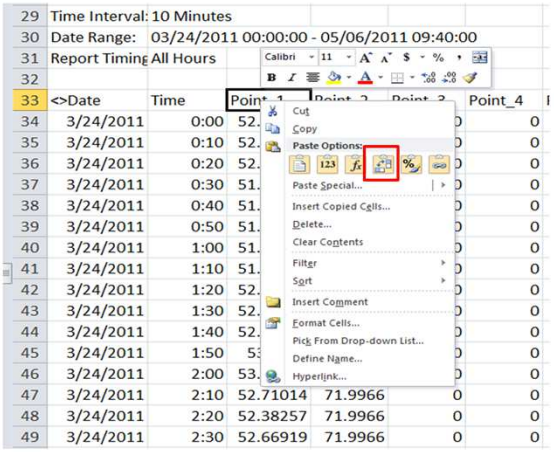
Pre-Processing Example (Cont.)

- Step 1: Highlight all of the sensor names (Column B from close up view (1)). Right-click and select "copy."
- Step 2: Right-click on the data header "Point 1," and select "paste transpose" under the "Paste Options:"



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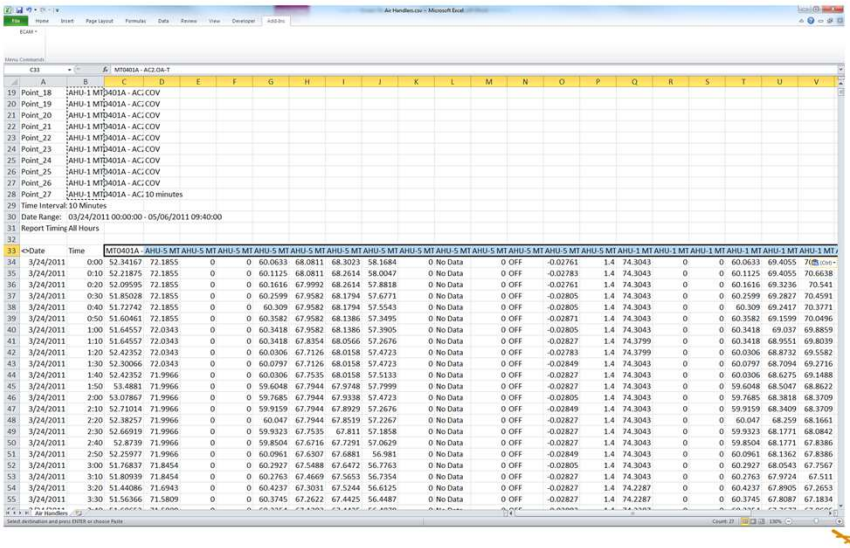
Note: Make sure the number of point names matches from view (1) to view (2) before copying and pasting the header list to the point names

Pre-Processing Example (Cont.)

- Result: The point list names are copied and pasted to the header list of the data.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
19	Point_18	AHU-1 MT	401A - AC	COV																		
20	Point_19	AHU-1 MT	401A - AC	COV																		
21	Point_20	AHU-1 MT	401A - AC	COV																		
22	Point_21	AHU-1 MT	401A - AC	COV																		
23	Point_22	AHU-1 MT	401A - AC	COV																		
24	Point_23	AHU-1 MT	401A - AC	COV																		
25	Point_24	AHU-1 MT	401A - AC	COV																		
26	Point_25	AHU-1 MT	401A - AC	COV																		
27	Point_26	AHU-1 MT	401A - AC	COV																		
28	Point_27	AHU-1 MT	401A - AC	10 minutes																		
29	Time Interval: 10 Minutes																					
30	Date Range:	03/24/2011 00:00:00 - 05/06/2011 09:40:00																				
31	Report Timing All Hours																					
32																						
33	<>Date	Time	MT0401A	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT
34	3/24/2011	0:00	52.34167	72.1855	0	0	60.0633	68.0811	68.3023	58.1684	0	No Data	0	OFF	-0.02761	1.4	74.3043	0	0	60.0633	69.4055	70
35	3/24/2011	0:10	52.21875	72.1855	0	0	60.1125	68.0811	68.2614	58.0047	0	No Data	0	OFF	-0.02783	1.4	74.3043	0	0	60.1125	69.4055	70.6638
36	3/24/2011	0:20	52.09595	72.1855	0	0	60.1616	67.9992	68.2614	57.8818	0	No Data	0	OFF	-0.02761	1.4	74.3043	0	0	60.1616	69.3236	70.541
37	3/24/2011	0:30	51.85028	72.1855	0	0	60.2599	67.9582	68.1794	57.6771	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.2599	69.2827	70.4591
38	3/24/2011	0:40	51.72742	72.1855	0	0	60.309	67.9582	68.1794	57.5543	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.309	69.2417	70.3771
39	3/24/2011	0:50	51.60461	72.1855	0	0	60.3582	67.9582	68.1386	57.3495	0	No Data	0	OFF	-0.02871	1.4	74.3043	0	0	60.3582	69.1599	70.0496
40	3/24/2011	1:00	51.64557	72.0343	0	0	60.3418	67.9582	68.1386	57.3905	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.3418	69.037	69.8859
41	3/24/2011	1:10	51.64557	72.0343	0	0	60.3418	67.8354	68.0566	57.2676	0	No Data	0	OFF	-0.02827	1.4	74.3799	0	0	60.3418	68.9551	69.8039
42	3/24/2011	1:20	52.42352	72.0343	0	0	60.0306	67.7126	68.0158	57.4723	0	No Data	0	OFF	-0.02783	1.4	74.3799	0	0	60.0306	68.8732	69.5582
43	3/24/2011	1:30	52.30066	72.0343	0	0	60.0797	67.7126	68.0158	57.4723	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	60.0797	68.7094	69.2716
44	3/24/2011	1:40	52.42352	71.9966	0	0	60.0306	67.7535	68.0158	57.5133	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.0306	68.6275	69.1488
45	3/24/2011	1:50	53.4881	71.9966	0	0	59.6048	67.7944	67.9748	57.7999	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.6048	68.5047	68.8622
46	3/24/2011	2:00	53.07867	71.9966	0	0	59.7685	67.7944	67.9338	57.4723	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	59.7685	68.3818	68.3709
47	3/24/2011	2:10	52.71014	71.9966	0	0	59.9159	67.7944	67.8929	57.2676	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	59.9159	68.3409	68.3709
48	3/24/2011	2:20	52.38257	71.9966	0	0	60.047	67.7944	67.8519	57.2267	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.047	68.259	68.1661
49	3/24/2011	2:30	52.66919	71.9966	0	0	59.9323	67.7535	67.811	57.1858	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.9323	68.1771	68.0842
50	3/24/2011	2:40	52.8739	71.9966	0	0	59.8504	67.6716	67.7291	57.0629	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.8504	68.1771	67.8386
51	3/24/2011	2:50	52.25977	71.9966	0	0	60.0961	67.6307	67.6881	56.981	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	60.0961	68.1362	67.8386
52	3/24/2011	3:00	51.76837	71.8454	0	0	60.2927	67.5488	67.6472	56.7763	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.2927	68.0543	67.7567
53	3/24/2011	3:10	51.80939	71.8454	0	0	60.2763	67.4669	67.5653	56.7354	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.2763	67.9724	67.511
54	3/24/2011	3:20	51.44086	71.6943	0	0	60.4237	67.3031	67.5244	56.6125	0	No Data	0	OFF	-0.02827	1.4	74.2287	0	0	60.4237	67.8905	67.2653
55	3/24/2011	3:30	51.56366	71.5809	0	0	60.3745	67.2622	67.4425	56.4487	0	No Data	0	OFF	-0.02827	1.4	74.2287	0	0	60.3745	67.8087	67.1834

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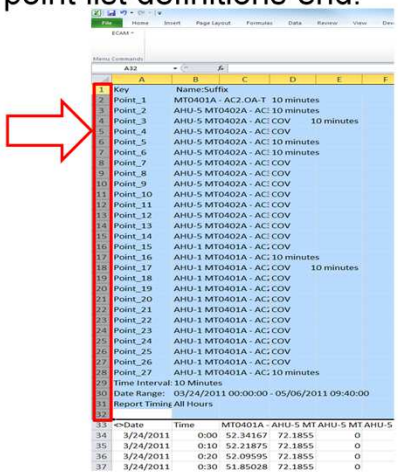
Pre-Processing Example (Cont.)

- Step 3: After copying and pasting the point list names, all information above the data header row must be deleted for ECAM to recognize it. Select all rows above this by clicking on the 1st row and drag down until the row where the point list definitions end.



	A	B	C	D	E	F
1	Key	Name:Suffix				
2	Point_1	MT0401A - AC2.OA-T 10 minutes				
3	Point_2	AHU-5 MT0402A - AC; 10 minutes				
4	Point_3	AHU-5 MT0402A - AC; COV 10 minutes				
5	Point_4	AHU-5 MT0402A - AC; COV				
6	Point_5	AHU-5 MT0402A - AC; 10 minutes				
7	Point_6	AHU-5 MT0402A - AC; 10 minutes				
8	Point_7	AHU-5 MT0402A - AC; COV				
9	Point_8	AHU-5 MT0402A - AC; COV				
10	Point_9	AHU-5 MT0402A - AC; COV				
11	Point_10	AHU-5 MT0402A - AC; COV				
12	Point_11	AHU-5 MT0402A - AC; COV				
13	Point_12	AHU-5 MT0402A - AC; COV				
14	Point_13	AHU-5 MT0402A - AC; COV				
15	Point_14	AHU-5 MT0402A - AC; COV				
16	Point_15	AHU-1 MT0401A - AC; COV				
17	Point_16	AHU-1 MT0401A - AC; 10 minutes				
18	Point_17	AHU-1 MT0401A - AC; COV 10 minutes				
19	Point_18	AHU-1 MT0401A - AC; COV				
20	Point_19	AHU-1 MT0401A - AC; COV				
21	Point_20	AHU-1 MT0401A - AC; COV				
22	Point_21	AHU-1 MT0401A - AC; COV				
23	Point_22	AHU-1 MT0401A - AC; COV				
24	Point_23	AHU-1 MT0401A - AC; COV				
25	Point_24	AHU-1 MT0401A - AC; COV				
26	Point_25	AHU-1 MT0401A - AC; COV				
27	Point_26	AHU-1 MT0401A - AC; COV				
28	Point_27	AHU-1 MT0401A - AC; 10 minutes				
29	Time Interval: 10 Minutes					
30	Date Range:	03/24/2011 00:00:00 - 05/06/2011 09:40:00				
31	Report Timing: All Hours					
32						
33	<>Date	Time	MT0401A - AHU-5 MT	AHU-5 MT	AHU-5	
34	3/24/2011	0:00	52.34167	72.1855	0	
35	3/24/2011	0:10	52.21875	72.1855	0	
36	3/24/2011	0:20	52.09595	72.1855	0	
37	3/24/2011	0:30	51.85028	72.1855	0	

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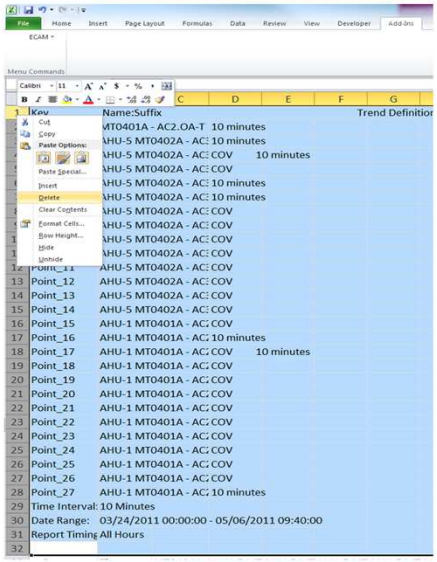
Pre-Processing Example (Cont.)

- Step 4: Right-click after the rows have been selected and select “delete.”



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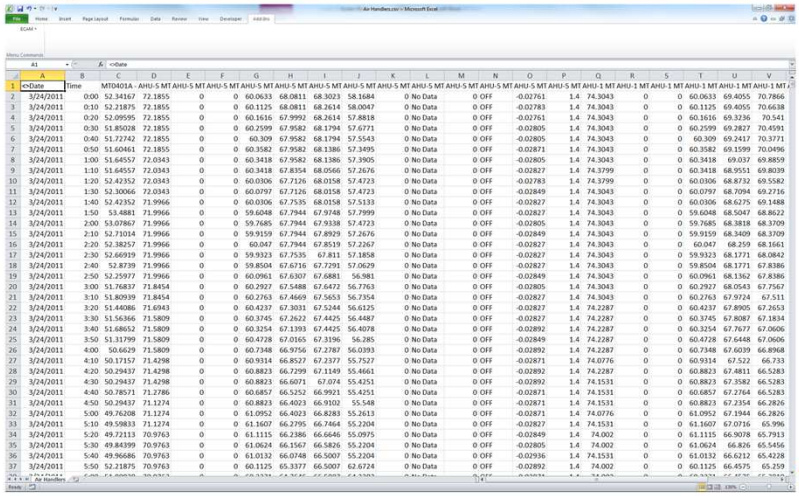
Pre-Processing Example (Cont.)

- Intermediate Result: Point descriptions are now deleted, and the data appears at the top of the sheet. Now, all columns with "No Data" and text format (e.g., ON and OFF) must be handled.



<=Date	Time	MT0401A - AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT
3/24/2011	0:00	52.34167	72.1855	0	0	60.0633	68.0811	68.3023	58.1684	0	No Data	0	OFF	-0.02761	1.4	74.3043	0	0	60.0633	69.4055	70.7866	
3/24/2011	0:10	52.21875	72.1855	0	0	60.1125	68.0811	68.2614	58.0047	0	No Data	0	OFF	-0.02783	1.4	74.3043	0	0	60.1125	69.4055	70.6638	
3/24/2011	0:20	52.09595	72.1855	0	0	60.1616	67.9992	68.2614	57.8818	0	No Data	0	OFF	-0.02761	1.4	74.3043	0	0	60.1616	69.3236	70.541	
3/24/2011	0:30	51.85028	72.1855	0	0	60.2599	67.9582	68.1794	57.6771	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.2599	69.2827	70.4591	
3/24/2011	0:40	51.72742	72.1855	0	0	60.309	67.9582	68.1794	57.5543	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.309	69.2417	70.3771	
3/24/2011	0:50	51.60461	72.1855	0	0	60.3582	67.9582	68.1386	57.3495	0	No Data	0	OFF	-0.02871	1.4	74.3043	0	0	60.3582	69.1599	70.0496	
3/24/2011	1:00	51.64557	72.0343	0	0	60.3418	67.9582	68.1386	57.3905	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.3418	69.037	69.8859	
3/24/2011	1:10	51.64557	72.0343	0	0	60.3418	67.8354	68.0566	57.2676	0	No Data	0	OFF	-0.02827	1.4	74.3799	0	0	60.3418	68.9551	69.8039	
3/24/2011	1:20	52.42352	72.0343	0	0	60.0306	67.7126	68.0158	57.4723	0	No Data	0	OFF	-0.02783	1.4	74.3799	0	0	60.0306	68.8732	69.5582	
3/24/2011	1:30	52.30066	72.0343	0	0	60.0797	67.7126	68.0158	57.4723	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	60.0797	68.7094	69.2716	
3/24/2011	1:40	52.42352	71.9966	0	0	60.0306	67.7535	68.0158	57.5133	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.0306	68.6275	69.1488	
3/24/2011	1:50	53.4881	71.9966	0	0	59.6048	67.7944	67.9748	57.7999	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.6048	68.5047	68.8622	
3/24/2011	2:00	53.07867	71.9966	0	0	59.7685	67.7944	67.9338	57.4723	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	59.7685	68.3818	68.3709	
3/24/2011	2:10	52.71014	71.9966	0	0	59.9159	67.7944	67.8929	57.2676	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	59.9159	68.3409	68.3709	
3/24/2011	2:20	52.38257	71.9966	0	0	60.047	67.7944	67.8519	57.2267	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.047	68.259	68.1661	
3/24/2011	2:30	52.66919	71.9966	0	0	59.9323	67.7535	67.811	57.1858	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.9323	68.1771	68.0842	
3/24/2011	2:40	52.8739	71.9966	0	0	59.8504	67.6716	67.7291	57.0629	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	59.8504	68.1771	67.8386	
3/24/2011	2:50	52.25977	71.9966	0	0	60.0961	67.6307	67.6881	56.981	0	No Data	0	OFF	-0.02849	1.4	74.3043	0	0	60.0961	68.1362	67.8386	
3/24/2011	3:00	51.76837	71.8454	0	0	60.2927	67.5488	67.6472	56.7763	0	No Data	0	OFF	-0.02805	1.4	74.3043	0	0	60.2927	68.0543	67.7567	
3/24/2011	3:10	51.80939	71.8454	0	0	60.2763	67.4669	67.5653	56.7354	0	No Data	0	OFF	-0.02827	1.4	74.3043	0	0	60.2763	67.9724	67.511	
3/24/2011	3:20	51.44086	71.6943	0	0	60.4237	67.3031	67.5244	56.6125	0	No Data	0	OFF	-0.02827	1.4	74.2287	0	0	60.4237	67.8905	67.2653	
3/24/2011	3:30	51.56366	71.5809	0	0	60.3745	67.2622	67.4425	56.4487	0	No Data	0	OFF	-0.02827	1.4	74.2287	0	0	60.3745	67.8087	67.1834	
3/24/2011	3:40	51.68652	71.5809	0	0	60.3254	67.1393	67.4425	56.4078	0	No Data	0	OFF	-0.02892	1.4	74.2287	0	0	60.3254	67.7677	67.0606	
3/24/2011	3:50	51.31799	71.5809	0	0	60.4728	67.0165	67.3196	56.285	0	No Data	0	OFF	-0.02849	1.4	74.2287	0	0	60.4728	67.6448	67.0606	
3/24/2011	4:00	50.6629	71.5809	0	0	60.7348	66.9756	67.2787	56.0393	0	No Data	0	OFF	-0.02892	1.4	74.2287	0	0	60.7348	67.6039	66.8968	
3/24/2011	4:10	50.17157	71.4298	0	0	60.9314	66.8527	67.2377	55.7527	0	No Data	0	OFF	-0.02871	1.4	74.0776	0	0	60.9314	67.522	66.733	
3/24/2011	4:20	50.29437	71.4298	0	0	60.8823	66.7299	67.1149	55.4661	0	No Data	0	OFF	-0.02892	1.4	74.2287	0	0	60.8823	67.4811	66.5283	
3/24/2011	4:30	50.29437	71.4298	0	0	60.8823	66.6071	67.074	55.4251	0	No Data	0	OFF	-0.02892	1.4	74.1531	0	0	60.8823	67.3582	66.5283	
3/24/2011	4:40	50.78571	71.2786	0	0	60.6857	66.5252	66.9921	55.4251	0	No Data	0	OFF	-0.02871	1.4	74.1531	0	0	60.6857	67.2764	66.5283	
3/24/2011	4:50	50.29437	71.1274	0	0	60.8823	66.4023	66.9102	55.548	0	No Data	0	OFF	-0.02871	1.4	74.1531	0	0	60.8823	67.2354	66.2826	
3/24/2011	5:00	49.76208	71.1274	0	0	61.0952	66.4023	66.8283	55.2613	0	No Data	0	OFF	-0.02871	1.4	74.0776	0	0	61.0952	67.1944	66.2826	
3/24/2011	5:10	49.59833	71.1274	0	0	61.1607	66.2795	66.7464	55.2204	0	No Data	0	OFF	-0.02827	1.4	74.1531	0	0	61.1607	67.0716	65.996	
3/24/2011	5:20	49.72113	70.9763	0	0	61.1115	66.2386	66.6646	55.0975	0	No Data	0	OFF	-0.02849	1.4	74.002	0	0	61.1115	66.9078	65.7913	
3/24/2011	5:30	49.84399	70.9763	0	0	61.0624	66.1567	66.5826	55.2204	0	No Data	0	OFF	-0.02805	1.4	74.002	0	0	61.0624	66.826	65.5456	
3/24/2011	5:40	49.96686	70.9763	0	0	61.0132	66.0748	66.5007	55.2204	0	No Data	0	OFF	-0.02936	1.4	74.1531	0	0	61.0132	66.6212	65.4228	
3/24/2011	5:50	52.21875	70.9763	0	0	60.1125	65.3377	66.5007	62.6724	0	No Data	0	OFF	-0.02892	1.4	74.002	0	0	60.1125	66.4575	65.259	

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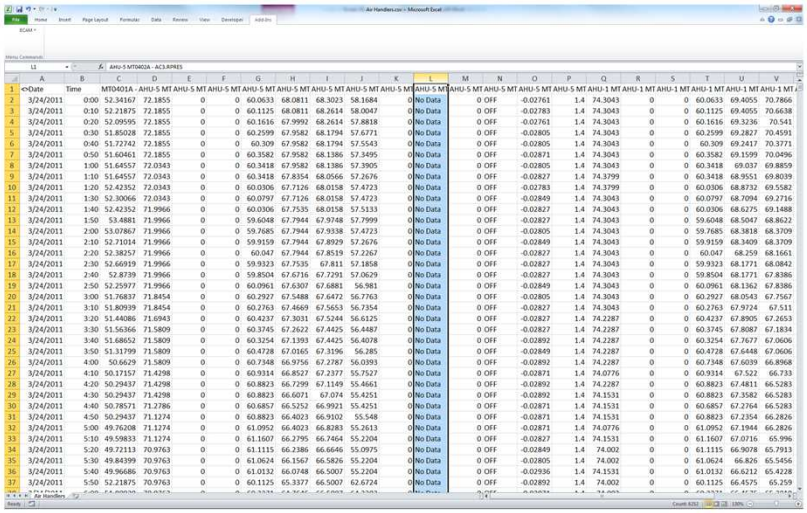
Pre-Processing Example (Cont.)

- Step 5: Select all columns that have "No Data" and delete them. Click on each column header (e.g., column C), then right-click and select delete.



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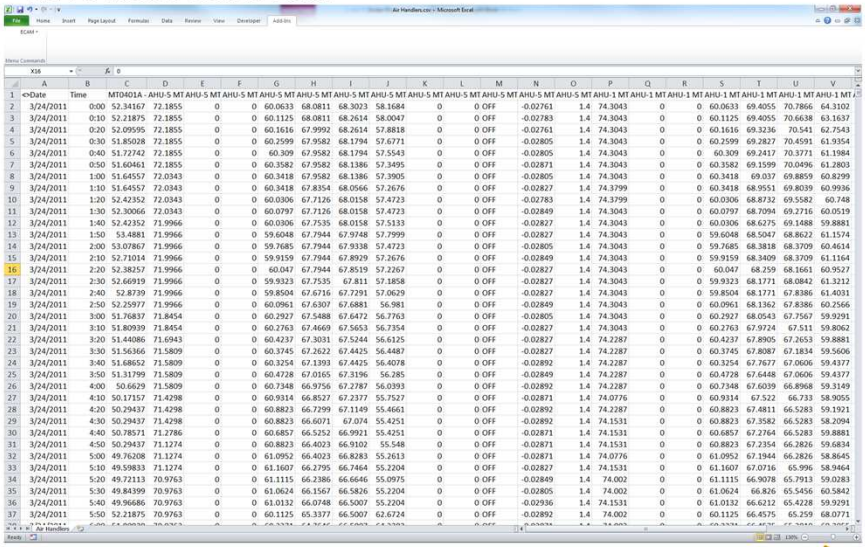
Make sure the entire column has "No Data." Sometimes, the trends will start on a delay from one another so there may be data further down the sheet. The goal is to keep as much useful data as possible, but if the majority of the column displays "No Data," then it should be removed completely.

Pre-Processing Example (Cont.)

- Intermediate Result: All columns displaying "No Data" have been removed.



<>Date	Time	MT0401A - AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT
3/24/2011	0:00	52.34167	72.1855	0	0	60.0633	68.0811	68.3023	58.1684	0	0 OFF	-0.02761	1.4	74.3043	0	0	60.0633	69.4055	70.7866	64.3102	
3/24/2011	0:10	52.21875	72.1855	0	0	60.1125	68.0811	68.2614	58.0047	0	0 OFF	-0.02783	1.4	74.3043	0	0	60.1125	69.4055	70.6638	63.1637	
3/24/2011	0:20	52.09595	72.1855	0	0	60.1616	67.9992	68.2614	57.8818	0	0 OFF	-0.02761	1.4	74.3043	0	0	60.1616	69.3236	70.541	62.7543	
3/24/2011	0:30	51.85028	72.1855	0	0	60.2599	67.9582	68.1794	57.6771	0	0 OFF	-0.02805	1.4	74.3043	0	0	60.2599	69.2827	70.4591	61.9354	
3/24/2011	0:40	51.72742	72.1855	0	0	60.309	67.9582	68.1794	57.5543	0	0 OFF	-0.02805	1.4	74.3043	0	0	60.309	69.2417	70.3771	61.1984	
3/24/2011	0:50	51.60461	72.1855	0	0	60.3582	67.9582	68.1386	57.3495	0	0 OFF	-0.02871	1.4	74.3043	0	0	60.3582	69.1599	70.0496	61.2803	
3/24/2011	1:00	51.64557	72.0343	0	0	60.3418	67.9582	68.1386	57.3905	0	0 OFF	-0.02805	1.4	74.3043	0	0	60.3418	69.037	69.8859	60.8299	
3/24/2011	1:10	51.64557	72.0343	0	0	60.3418	67.8354	68.0566	57.2676	0	0 OFF	-0.02827	1.4	74.3799	0	0	60.3418	68.9551	69.8039	60.9936	
3/24/2011	1:20	52.42352	72.0343	0	0	60.0306	67.7126	68.0158	57.4723	0	0 OFF	-0.02783	1.4	74.3799	0	0	60.0306	68.8732	69.5582	60.748	
3/24/2011	1:30	52.30066	72.0343	0	0	60.0797	67.7126	68.0158	57.4723	0	0 OFF	-0.02849	1.4	74.3043	0	0	60.0797	68.7094	69.2716	60.0519	
3/24/2011	1:40	52.42352	71.9966	0	0	60.0306	67.7535	68.0158	57.5133	0	0 OFF	-0.02827	1.4	74.3043	0	0	60.0306	68.6275	69.1488	59.8881	
3/24/2011	1:50	53.4881	71.9966	0	0	59.6048	67.7944	67.9748	57.7999	0	0 OFF	-0.02827	1.4	74.3043	0	0	59.6048	68.5047	68.8622	61.1574	
3/24/2011	2:00	53.07867	71.9966	0	0	59.7685	67.7944	67.9338	57.4723	0	0 OFF	-0.02805	1.4	74.3043	0	0	59.7685	68.3818	68.3709	60.4614	
3/24/2011	2:10	52.71014	71.9966	0	0	59.9159	67.7944	67.8929	57.2676	0	0 OFF	-0.02849	1.4	74.3043	0	0	59.9159	68.3409	68.3709	61.1164	
3/24/2011	2:20	52.38257	71.9966	0	0	60.047	67.7944	67.8519	57.2267	0	0 OFF	-0.02827	1.4	74.3043	0	0	60.047	68.259	68.1661	60.9527	
3/24/2011	2:30	52.66919	71.9966	0	0	59.9323	67.7535	67.811	57.1858	0	0 OFF	-0.02827	1.4	74.3043	0	0	59.9323	68.1771	68.0842	61.3212	
3/24/2011	2:40	52.8739	71.9966	0	0	59.8504	67.6716	67.7291	57.0629	0	0 OFF	-0.02827	1.4	74.3043	0	0	59.8504	68.1771	67.8386	61.4031	
3/24/2011	2:50	52.25977	71.9966	0	0	60.0961	67.6307	67.6881	56.981	0	0 OFF	-0.02849	1.4	74.3043	0	0	60.0961	68.1362	67.8386	60.2566	
3/24/2011	3:00	51.76837	71.8454	0	0	60.2927	67.5488	67.6472	56.7763	0	0 OFF	-0.02805	1.4	74.3043	0	0	60.2927	68.0543	67.7567	59.9291	
3/24/2011	3:10	51.80939	71.8454	0	0	60.2763	67.4669	67.5653	56.7354	0	0 OFF	-0.02827	1.4	74.3043	0	0	60.2763	67.9724	67.511	59.8062	
3/24/2011	3:20	51.44086	71.6943	0	0	60.4237	67.3031	67.5244	56.6125	0	0 OFF	-0.02827	1.4	74.2287	0	0	60.4237	67.8905	67.2653	59.8881	
3/24/2011	3:30	51.56366	71.5809	0	0	60.3745	67.2622	67.4425	56.4487	0	0 OFF	-0.02827	1.4	74.2287	0	0	60.3745	67.8087	67.1834	59.5606	
3/24/2011	3:40	51.68652	71.5809	0	0	60.3254	67.1393	67.4425	56.4078	0	0 OFF	-0.02892	1.4	74.2287	0	0	60.3254	67.7677	67.0606	59.4377	
3/24/2011	3:50	51.31799	71.5809	0	0	60.4728	67.0165	67.3196	56.285	0	0 OFF	-0.02849	1.4	74.2287	0	0	60.4728	67.6448	67.0606	59.4377	
3/24/2011	4:00	50.6629	71.5809	0	0	60.7348	66.9756	67.2787	56.0393	0	0 OFF	-0.02892	1.4	74.2287	0	0	60.7348	67.6039	66.8968	59.3149	
3/24/2011	4:10	50.17157	71.4298	0	0	60.9314	66.8527	67.2377	55.7527	0	0 OFF	-0.02871	1.4	74.0776	0	0	60.9314	67.522	66.733	58.9055	
3/24/2011	4:20	50.29437	71.4298	0	0	60.8823	66.7299	67.1149	55.4661	0	0 OFF	-0.02892	1.4	74.2287	0	0	60.8823	67.4811	66.5283	59.1921	
3/24/2011	4:30	50.29437	71.4298	0	0	60.8823	66.6071	67.074	55.4251	0	0 OFF	-0.02892	1.4	74.1531	0	0	60.8823	67.3582	66.5283	58.2094	
3/24/2011	4:40	50.78571	71.2786	0	0	60.6857	66.5252	66.9921	55.4251	0	0 OFF	-0.02871	1.4	74.1531	0	0	60.6857	67.2764	66.5283	59.8881	
3/24/2011	4:50	50.29437	71.1274	0	0	60.8823	66.4023	66.9102	55.548	0	0 OFF	-0.02871	1.4	74.1531	0	0	60.8823	67.2354	66.2826	59.6834	
3/24/2011	5:00	49.76208	71.1274	0	0	61.0952	66.4023	66.8283	55.2613	0	0 OFF	-0.02871	1.4	74.0776	0	0	61.0952	67.1944	66.2826	58.8645	
3/24/2011	5:10	49.59833	71.1274	0	0	61.1607	66.2795	66.7464	55.2204	0	0 OFF	-0.02827	1.4	74.1531	0	0	61.1607	67.0716	65.996	58.9464	
3/24/2011	5:20	49.72113	70.9763	0	0	61.1115	66.2386	66.6646	55.0975	0	0 OFF	-0.02849	1.4	74.002	0	0	61.1115	66.9078	65.7913	59.0283	
3/24/2011	5:30	49.84399	70.9763	0	0	61.0624	66.1567	66.5826	55.2204	0	0 OFF	-0.02805	1.4	74.002	0	0	61.0624	66.826	65.5456	60.5842	
3/24/2011	5:40	49.96686	70.9763	0	0	61.0132	66.0748	66.5007	55.2204	0	0 OFF	-0.02936	1.4	74.1531	0	0	61.0132	66.6212	65.4228	59.9291	
3/24/2011	5:50	52.21875	70.9763	0	0	60.1125	65.3377	66.5007	62.6724	0	0 OFF	-0.02892	1.4	74.002	0	0	60.1125	66.4575	65.259	68.0771	

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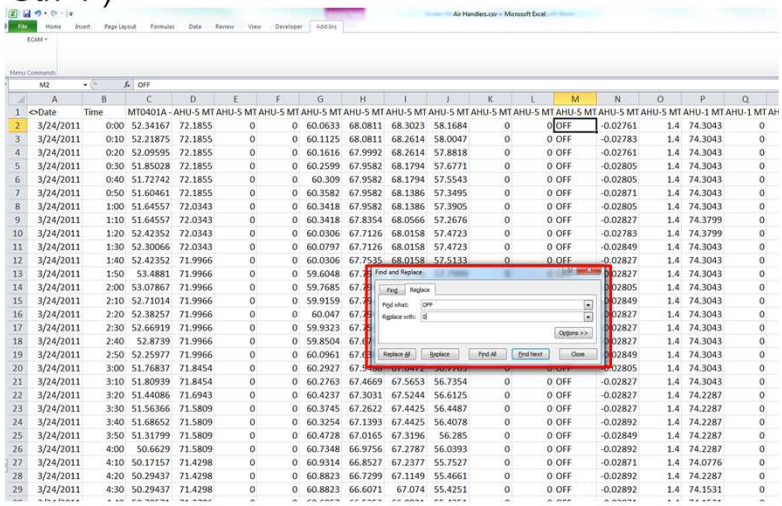
Pre-Processing Example (Cont.)

- Step 6: Click on any cell within a status column (i.e., ON or OFF). Then hold down the Ctrl key and hit "F" (i.e., Ctrl+F)



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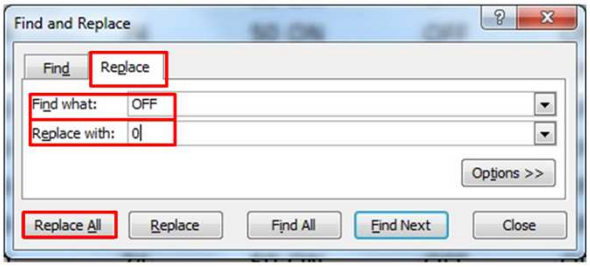
Pre-Processing Example (Cont.)

- Close up view:
  - Step 1: Select the “Replace” tab
  - Step 2: Type “OFF” in the “Find What:” box
  - Step 3: Type “0” in the “Replace with:” box
  - Step 4: Select “Replace All”
  - Repeat steps 1-4 for “ON,” but in step 3 replace “0” with “1.”



Note: We are replacing “OFF” and “ON” with “0” and “1” respectively because ECAM charting functions only accept numerical values and not text.

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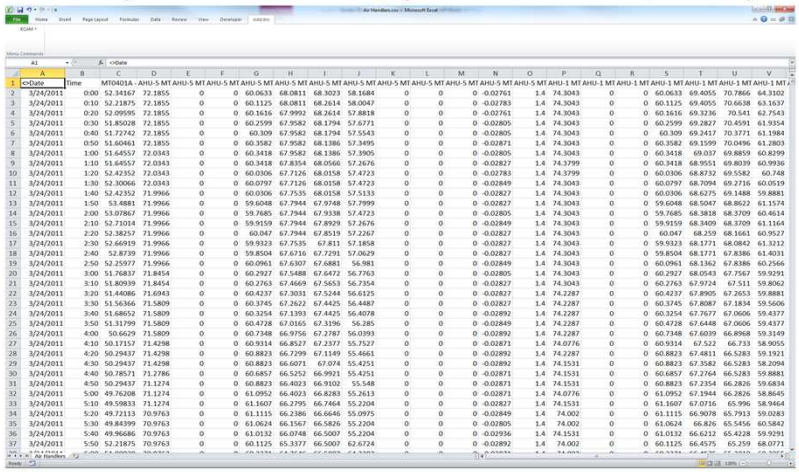
Pre-Processing Result

- The headers of row 1 contain the names of the sensors. These sensor names will be used later in ECAM, so make sure they are understood by the user. If not, modify them.



<Date	Time	MT0401A - AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-5 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT	AHU-1 MT
3/24/2011	0:00	52.34167	72.1855	0	0	60.0633	68.0811	68.3023	58.1684	0	0	0	-0.02761	1.4	74.3043	0	0	60.0633	69.4055	70.7866	64.3102		
3/24/2011	0:10	52.21875	72.1855	0	0	60.1125	68.0811	68.2614	58.0047	0	0	0	-0.02783	1.4	74.3043	0	0	60.1125	69.4055	70.6638	63.1637		
3/24/2011	0:20	52.09595	72.1855	0	0	60.1616	67.9992	68.2614	57.8818	0	0	0	-0.02761	1.4	74.3043	0	0	60.1616	69.3236	70.541	62.7543		
3/24/2011	0:30	51.85028	72.1855	0	0	60.2599	67.9582	68.1794	57.6771	0	0	0	-0.02805	1.4	74.3043	0	0	60.2599	69.2827	70.4591	61.9354		
3/24/2011	0:40	51.72742	72.1855	0	0	60.309	67.9582	68.1794	57.5543	0	0	0	-0.02805	1.4	74.3043	0	0	60.309	69.2417	70.3771	61.1984		
3/24/2011	0:50	51.60461	72.1855	0	0	60.3582	67.9582	68.1386	57.3495	0	0	0	-0.02871	1.4	74.3043	0	0	60.3582	69.1599	70.0496	61.2803		
3/24/2011	1:00	51.64557	72.0343	0	0	60.3418	67.9582	68.1386	57.3905	0	0	0	-0.02805	1.4	74.3043	0	0	60.3418	69.037	69.8859	60.8299		
3/24/2011	1:10	51.64557	72.0343	0	0	60.3418	67.8354	68.0566	57.2676	0	0	0	-0.02827	1.4	74.3799	0	0	60.3418	68.9551	69.8039	60.9936		
3/24/2011	1:20	52.42352	72.0343	0	0	60.0306	67.7126	68.0158	57.4723	0	0	0	-0.02783	1.4	74.3799	0	0	60.0306	68.8732	69.5582	60.748		
3/24/2011	1:30	52.30066	72.0343	0	0	60.0797	67.7126	68.0158	57.4723	0	0	0	-0.02849	1.4	74.3043	0	0	60.0797	68.7094	69.2716	60.0519		
3/24/2011	1:40	52.42352	71.9966	0	0	60.0306	67.7535	68.0158	57.5133	0	0	0	-0.02827	1.4	74.3043	0	0	60.0306	68.6275	69.1488	59.8881		
3/24/2011	1:50	53.4881	71.9966	0	0	59.6048	67.7944	67.9748	57.7999	0	0	0	-0.02827	1.4	74.3043	0	0	59.6048	68.5047	68.8622	61.1574		
3/24/2011	2:00	53.07867	71.9966	0	0	59.7685	67.7944	67.9338	57.4723	0	0	0	-0.02805	1.4	74.3043	0	0	59.7685	68.3818	68.3709	60.4614		
3/24/2011	2:10	52.71014	71.9966	0	0	59.9159	67.7944	67.8929	57.2676	0	0	0	-0.02849	1.4	74.3043	0	0	59.9159	68.3409	68.3709	61.1164		
3/24/2011	2:20	52.38257	71.9966	0	0	60.047	67.7944	67.8519	57.2267	0	0	0	-0.02827	1.4	74.3043	0	0	60.047	68.259	68.1661	60.9527		
3/24/2011	2:30	52.66919	71.9966	0	0	59.9323	67.7535	67.811	57.1858	0	0	0	-0.02827	1.4	74.3043	0	0	59.9323	68.1771	68.0842	61.3212		
3/24/2011	2:40	52.8739	71.9966	0	0	59.8504	67.6716	67.7291	57.0629	0	0	0	-0.02827	1.4	74.3043	0	0	59.8504	68.1771	67.8386	61.4031		
3/24/2011	2:50	52.25977	71.9966	0	0	60.0961	67.6307	67.6881	56.981	0	0	0	-0.02849	1.4	74.3043	0	0	60.0961	68.1362	67.8386	60.2566		
3/24/2011	3:00	51.76837	71.8454	0	0	60.2927	67.5488	67.6472	56.7763	0	0	0	-0.02805	1.4	74.3043	0	0	60.2927	68.0543	67.7567	59.9291		
3/24/2011	3:10	51.80939	71.8454	0	0	60.2763	67.4669	67.5653	56.7354	0	0	0	-0.02827	1.4	74.3043	0	0	60.2763	67.9724	67.511	59.8062		
3/24/2011	3:20	51.44086	71.6943	0	0	60.4237	67.3031	67.5244	56.6125	0	0	0	-0.02827	1.4	74.2287	0	0	60.4237	67.8905	67.2653	59.8881		
3/24/2011	3:30	51.56366	71.5809	0	0	60.3745	67.2622	67.4425	56.4487	0	0	0	-0.02827	1.4	74.2287	0	0	60.3745	67.8087	67.1834	59.5606		
3/24/2011	3:40	51.68652	71.5809	0	0	60.3254	67.1393	67.4425	56.4078	0	0	0	-0.02892	1.4	74.2287	0	0	60.3254	67.7677	67.0606	59.4377		
3/24/2011	3:50	51.31799	71.5809	0	0	60.4728	67.0165	67.3196	56.285	0	0	0	-0.02849	1.4	74.2287	0	0	60.4728	67.6448	67.0606	59.4377		
3/24/2011	4:00	50.6629	71.5809	0	0	60.7348	66.9756	67.2787	56.0393	0	0	0	-0.02892	1.4	74.2287	0	0	60.7348	67.6039	66.8968	59.3149		
3/24/2011	4:10	50.17157	71.4298	0	0	60.9314	66.8527	67.2377	55.7527	0	0	0	-0.02871	1.4	74.0776	0	0	60.9314	67.522	66.733	58.9055		
3/24/2011	4:20	50.29437	71.4298	0	0	60.8823	66.7299	67.1149	55.4661	0	0	0	-0.02892	1.4	74.2287	0	0	60.8823	67.4811	66.5283	59.1921		
3/24/2011	4:30	50.29437	71.4298	0	0	60.8823	66.6071	67.074	55.4251	0	0	0	-0.02892	1.4	74.1531	0	0	60.8823	67.3582	66.5283	58.2094		
3/24/2011	4:40	50.78571	71.2786	0	0	60.6857	66.5252	66.9921	55.4251	0	0	0	-0.02871	1.4	74.1531	0	0	60.6857	67.2764	66.5283	59.8881		
3/24/2011	4:50	50.29437	71.1274	0	0	60.8823	66.4023	66.9102	55.548	0	0	0	-0.02871	1.4	74.1531	0	0	60.8823	67.2354	66.2826	59.6834		
3/24/2011	5:00	49.76208	71.1274	0	0	61.0952	66.4023	66.8283	55.2613	0	0	0	-0.02871	1.4	74.0776	0	0	61.0952	67.1944	66.2826	58.8645		
3/24/2011	5:10	49.59833	71.1274	0	0	61.1607	66.2795	66.7464	55.2204	0	0	0	-0.02827	1.4	74.1531	0	0	61.1607	67.0716	65.996	58.9464		
3/24/2011	5:20	49.72113	70.9763	0	0	61.1115	66.2386	66.6646	55.0975	0	0	0	-0.02849	1.4	74.002	0	0	61.1115	66.9078	65.7913	59.0283		
3/24/2011	5:30	49.84399	70.9763	0	0	61.0624	66.1567	66.5826	55.2204	0	0	0	-0.02805	1.4	74.002	0	0	61.0624	66.826	65.5456	60.5842		
3/24/2011	5:40	49.96686	70.9763	0	0	61.0132	66.0748	66.5007	55.2204	0	0	0	-0.02936	1.4	74.1531	0	0	61.0132	66.6212	65.4228	59.9291		
3/24/2011	5:50	52.21875	70.9763	0	0	60.1125	65.3377	66.5007	62.6724	0	0	0	-0.02892	1.4	74.002	0	0	60.1125	66.4575	65.259	68.0771		

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Final Result

1.) Save the file as extension type xlsx or csv. Recommend saving as extension csv, because it will also work with the Universal Translator if required.

2.) The data extracted from the BAS was pre-processed in an excel sheet.

3.) The pre-processing consisted of removing rows or columns of “No Data,” and substituting equipment status (ON or OFF) with “0” and “1,” respectively.

4.) Be sure that there are no empty cells within the final excel sheet. If there are, then delete that row. This will help processing in UT2 and ECAM.

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All Resources Available at:
www.pnnl.gov/buildingretuning/resources.stm

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Thank You

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