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AMPds

The Almanac of Minutely Power Dataset (incl. water and natural gas consumption)

The AMPds dataset has been released to help load disaggregation/NILM and eco-feedback researcher test their algorithms, models, systems, and prototypes. This dataset was intended to be a multi-year capture of the consumption of my house. This dataset contains electricity, water, and natural gas measurements at one minute intervals. A total of 525,600 readings per year per meter. More details about the house, meters uses, measurements taken, and how to get access to the dataset are described below (on this webpage) and in my research paper (the below citation information).

> Stephen Makonin, Fred Popowich, Lyn Bartram, Bob Gill, and Ivan V. Bajic, "AMPds: A Public Dataset for Load Disaggregation and Eco-Feedback Research," in *Electrical Power and Energy Conference (EPEC), 2013 IEEE*, 2013. DOI: 10.1109/EPEC.2013.6802949

Dataset Access

For access to download AMPds (R2013) goto http://dx.doi.org/10.7910/DVN/MXB7VO.

The House

We monitored a house built in 1955 in the greater Vancouver region in British Columbia (Canada), which underwent major renovations in 2005 and 2006-receiving a Canadian Government EnerGuide rating of 82%.

Electricity Sub-Metering			
ID	**Description**	**Voltage**	**Breaker Type**
WHE	Whole-House Meter	240V	200A Double-Pole
B1E	North Bedroom	120V	15A Single-Pole
B2E	Master and South Bedroom	120V	15A Single-Pole
BME	Basement Plugs and Lights	120V	15A Single-Pole
CDE	Clothes Dryer	240V	30A Double-Pole
CWE	Clothes Washer	120V	15A Single-Pole
DNE	Dining Room Plugs	120V	15A Single-Pole
DWE	Dishwasher	120V	15A Single-Pole
EBE	Electronics Workbench	120V	15A Single-Pole
EQE	Security/Network Equipment	120V	15A Single-Pole
FGE	Kitchen Fridge	120V	15A Single-Pole
FRE	Forced Air Furnace: Fan and Thermostat	120V	15A Single-Pole
GRE	Garage	240V	60A Double-Pole
HPE	Heat Pump	240V	40A Double-Pole

ID	Description	Voltage	Breaker Type
HTE	Instant Hot Water Unit	120V	15A Single-Pole
OFE	Home Office	120V	15A Single-Pole
OUE	Outside Plug	120V	15A Single-Pole
TVE	Entertainment: TV, PVR, AMP	120V	15A Single-Pole
UTE	Utility Room Plug	120V	15A Single-Pole
WOE	Wall Oven	240V	30A Double-Pole
UNE	Unmetered Loads Soft-Meter	n/a	
Natural Gas Sub-Metering			
WHG	Whole-House Meter	n/a	
FRG	HVAC/Furnace Fan Heating	n/a	
Water Sub-Metering			
WHW	Whole-House Meter	n/a	
HTW	Instant Hot Water Unit	n/a	

Electricity measurements are taken by 2 DENT PowerScout 18 units metering 24 loads at the electrical circuit breaker panel. Measurements are read over an RS-485/Modbus communication link by data acquisition equipment. Natural gas measurements are taken by an Elster AC250 gas meter and an Elster BK-G4 gas meter; both send pulses to the data acquisition equipment. Water measurements are taken by 2 Elster/Kent V100 water meters, which also send pulses to the data acquisition equipment.

Electricity Measurements			
Description	**Units**	**Description**	**Units**
Voltage (V)	V	Current (I)	A
Real Power (P)	W	Real Energy (Pt)	Wh
Reactive Power (Q)	VAR	Reactive Energy (Qt)	VARh
Apparent Power (S)	VA	Apparent Energy (St)	VAh
Displacement Power Factor (DPF)	*ratio*	Apparent Power Factor (APF)	*ratio*
Frequency (f)	Hz		
Natural Gas Measurements		**Water Measurements**	
Description	**Units**	**Description**	**Units**
Pulse Counter	dm^3	Pulse Counter	L
Average Rate	dm^3/h	Average Rate	L/min
Instantaneous Rate	dm^3/h	Instantaneous Rate	L/min

FAQ - Frequently Asked Questions

How are timestamps used?

All data file rows begin with the timestamp integer value of **1333263600**. The house used in AMPds is in the *America/Vancouver* timezone. So the timestamp 1333263600 is equivalent to **April 01, 2012 12:00:00 AM (local time)** or **Apr 01, 2012 07:00:00 (GMT or UTC)**.

Where can I get weather data?

Historical weather data for this house can be downloaded from the Canada Wether Office's National Climate Data and Information Archive found here.

Do you have more details about the HVAC system?

The house HVAC setup is often called a duel-fuel system, using forced air. Natural gas is used, but only when it is too cold. At about 2°C (or 35.5°F) there would be a change over from electric heating from the heat pump to gas heating from the central furnace. At that temperature there is not heat that the heat pump can give, it is a stain on the compressor. The FRG meter will have data for the furnace using gas. HPE is the breaker for the heat pump. FRE is the breaker for he furnace fan and thermostat. The gas furnace (where the fan is) is a 2-stage, variable speed fan forced air and is rated at 94% efficient.. The heat pump has a 2-stage compressor and is rated at 17 SEER. The heat pump is there central unit for air conditioning, there are not other air conditioning units in the house (besides the windows).

What appliances use natural gas?

Appliance that use natural gas in my house are: the furnace (FRG), the instant hot water unit, the cooking stove (not oven), and the fireplace (rarely used).

Why does it appear that the water meter readings reset?

This problem was first found by the NILMTK developers. Before July 14, 2012 (timestamp 1342287780) the water main was metered by a DLJ 75C meter and hot water was metered by an Elster S130 meter. These meters pulse once per Gallon which was too course of a measurement. They where replaced with 2 Elster/Kent V100 water meters which pluse every 0.5L. To correct this simply add the counter amount to all other amount after timestamp 1342287780.