April 26, 2013

Hospital & Healthcare Initiative 2012 Energy Savings Validation

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M e m o r a n d u m

FROM: SBW Consulting
TO: Rita Siong, Northwest Energy Efficiency Alliance

DATE: February 27, 2013
RE: Hospital & Healthcare Initiative 2012 Energy Savings Validation
CC: John Boroski, Evergreen Economics

1. SUMMARY

This memorandum describes SBW Consulting's (SBW's) validation of the electrical energy savings from the Northwest Energy Efficiency Alliance's (NEEA's) Hospital and Healthcare (H&H) Initiative for the year 2012.

Table 1 summarizes the validated savings for the seven facilities included.

SBW's validation consisted of inspection and review of the documentation provided by NEEA, the utilities, and the facilities. In general, SBW did not have detailed records describing the measures installed. Where a utility has incentivized a measure, SBW verified that the amount claimed by NEEA matched the amount reported by the utility. Where more detailed information was available, SBW verified that the means used to arrive at the savings claim were reasonable, and that the results were within the range of expected savings for the measures.

Table 1: H&H Initiative Validated Electrical Energy Savings for 2012

Hospital Group*	2012 Validated kWh (aMW)
H1	170,776 (0.019)
H2	1,492,193 (0.170)
H3	446,373 (0.051)
H4	463,802 (0.053)
H5	1,026,485 (0.117)
H6	999,870 (0.114)
H7	235,033 (0.027)
Total	4,834,532 (0.552)

*Anonymized for confidentiality

2. H1

2.1. Methodology

The serving utility verified the savings for H1 as part of their energy efficiency incentive program. SBW examined the lighting calculator forms provided by the utility and verified that the savings were as reported.

2.2. Findings

Claimed savings were restricted to six lighting measures at six H1 facilities. Table 2 shows the savings at these six facilities. The July 25, 2012 H1 monthly Strategic Energy Management Plan (SEMP) report noted that incentivized lighting savings for the year at that time were already 300,000 kWh, but SBW had no documentation for any projects beyond the six projects shown below.

Table 2: H12012 Facility Lighting Projects

Project Title	Original Savings (kWh/year)	Validated Savings (kWh/year)
H1 Exit Signs	22,188	22,188
KK	42,530	42,530

Project Title	Original Savings (kWh/year)	Validated Savings (kWh/year)
H1	14,048	14,048
NWHC200	11,752	11,752
NWHC202	65,028	65,028
NWSA	15,230	15,230
Total	170,776	170,776

3. H2

Savings at H2 fell into two categories. NEEA reported Energy Expert savings, which are cumulative for the year based on reductions tracked on the main utility meter. In addition, the utility approved a data center cooling system upgrade on a different meter in December 2012.

3.1. Data Center Cooling System Upgrade

This project replaced the existing data center air conditioning direct expansion (DX) cooling system with a new cooling tower and a cooling tower water-cooled Liebert AC system (CRAH unit).

3.1.1. Methodology

SBW examined the documentation provided by the utility, summarized here. Utility staff verified the final scope of work with an onsite post-job walkthrough on December 20, 2012. They noted that H2 supplied and installed the equipment per the scope of work anticipated. H2 has shut down the DX units and can only operate them manually, as needed. SBW verified that the energy savings reported by the utility matched the amount claimed.

3.1.2. Findings

Table 3 shows the validated savings for the cooling system upgrade.

Table 3: 2012 H2 Cooling System Upgrade Energy Savings

Project	Original Savings (kWh/year)	Validated Savings (kWh/year)
Data Center cooling system upgrade	751,008	751,008

3.2. Main Meter Energy Expert Savings

Energy Expert is a utility billing meter monitoring package offered by Northwrite, Inc. The software captures and records pulses from the meter on 15-minute intervals. The program allows monitoring and comparison of energy usage.

3.2.1. Methodology

SBW reviewed the method used by Energy Expert to calculate savings, and compared the Energy Expert estimate with an itemized list of installed measures provided by the facility.

NEEA's Energy Expert consultant provided SBW with a tutorial on Energy Expert and explained how savings were calculated. The consultant estimated savings with 2011 as the baseline year. Energy Expert compared meter use in 2012 with 2011 usage on a weather-normalized basis. Energy Expert normalizes for weather by associating each meter reading with the outside air temperature. Meter readings are then "binned" in 5-degree temperature bins. The usage in these bins is compared from one year to the next, based on the assumption that energy usage is closely tied to outside air temperature. This process means that an improvement in late 2011 will have a small effect on the 2011 bins, and that some of these 2011 savings will actually accrue in 2012. Likewise, the 2012 reporting will not account for a project implemented in late 2012 in its entirety.

The Energy Expert consultant provided monthly and quarterly progress reports written by H2's staff. Table 4 shows the list of late 2011 and 2012 measures itemized in H2's December 2012 annual report. The report indicates conservation measures implemented, and gives a rough estimate of projected energy savings. This estimate was for planning purposes, and the consultant does not intend this as an M&V estimate. H2 did not claim the parking lighting measures separately with the utility. H2 thus reported these measures only as part of the Energy Expert savings. However, the consultant reported that not all the parking lot lighting is connected to the main meter, which means that some of the lighting savings are unclaimed.

Table 4: Energy Savings Measures Implemented at H2

Project	Month Finished	Estimated Annual Savings [kWh]	Estimated FY 12 Savings [kWh]	Estimated FY 13 Savings [kWh]
RF-4 (E-3) motor and VFD	11-Jun	108,878	108,878	108,878
Day Surgery AHU-1 discharge air setback	11-Aug	37,352	31,127	37,352
Day Surgery AHU-2 discharge air setback	11-Aug	45,981	38,318	45,981
Central Tower AHU-7 discharge air reset	11-Sep	112,256	84,192	112,256
Central Tower AHU-8 discharge air reset	11-Sep	95,147	71,360	95,147
Central Tower AHU-5 discharge air reset	11-Nov	58,255	33,982	58,255
Central Tower AHU-6 discharge air reset	11-Nov	83,072	48,459	83,072
CT public area VAV night setbacks	12-Jan	16,704	6,960	16,704

Project	Month Finished	Estimated Annual Savings [kWh]	Estimated FY 12 Savings [kWh]	Estimated FY 13 Savings [kWh]
Day Surgery OR #1-4 LED upgrade	12-Jan	1,109	462	1,109
Day Surgery AHU-2 VFD and night setback	12-Feb	336,200	112,067	336,200
Central Tower 6th floor shelled space lights	12-Mar	23,354	5,839	23,354
CT public area VAV night setbacks (round 2)	12-May	5,983	499	5,983
NT main fan mixed air damper actuators (east)	12-Jul	92,653	--	84,932
Parking lot pole light upgrade	12-Sep	218,557	--	163,918
Central Tower AHU-2 discharge air reset	12-Oct	138,361	--	92,241
Central Tower AHU-3 discharge air reset	12-Oct	25,612	--	17,075
Family Maternity AHU-9 discharge air reset	12-Oct	52,961	--	35,307
Day Surgery AHU-1 airflow night setback	12-Oct	62,903	--	41,935
Parking garage LED upgrade	12-Dec	50,449		25,225
Total Energy Saved [kWh]		1,565,787	542,143	1,384,924

Notes: Based on "Yearly Progress Report," Strategic Energy Management Plan, H2, December 2012.

3.2.2. Findings

As noted above, 2011 measures will have part of their impact in 2011 and part of their impact in 2012, and some of the 2012 savings will be deferred until 2013 Energy Expert accounting. For this reason, the facility estimate of 2012 energy savings shown above does not include any savings for measures implemented in the second half of 2012. This is a conservative methodology.

The use of meter readings to measure energy savings has limitations. Energy usage changes from year to year for reasons other than the implementation of conservation measures. The Energy Expert consultant stated that he often sees a constant increase in electrical consumption due to the addition of new information technology (IT) equipment. At this facility, most IT load is on a different meter in the data center. The consultant is very familiar with operations at H2, and is confident that no major changes in electrical load occurred during the 2011-2012 period, other than the conservation measures.

In spite of their limitations, program implementers commonly use tools such as Energy Expert to estimate savings in resource manager type programs. SBW finds that Energy

Expert's methodology is a valid way to compare year-to-year energy consumption. SBW further finds that Energy Expert's estimate is a reasonable estimate of savings for the list of measures reported. Table 5 shows the validated savings.

Table 5: 2012 H2Energy Expert Energy Savings

Project	Original Savings (kWh/year)	Validated Savings (kWh/year)
Multiple commissioning and capital measures	741,185	741,185

4. H3

4.1. Methodology

The serving utility verified the savings for this facility as part of their energy efficiency incentive program. SBW verified that the savings were as reported.

4.2. Findings

SBW verified that the amount claimed by NEEA matched the savings claimed by the utility. No information was available on specific measure savings. Table 6 shows the total savings.

Table 6: H3 2012 Facility HVAC Projects

Project Title	Original Savings (kWh/year)	Validated Savings (kWh/year)
Total	446,373	446,373

5. H4

5.1. Methodology

The serving utility, verified the savings for this facility as part of their energy efficiency incentive program. SBW verified that the savings were as reported.

5.2. Findings

Claimed savings were restricted to two HVAC measures for 2012. SBW verified that the amount claimed by NEEA matched the savings claimed by the utility. Table 7 shows the savings for H4.

Table 7: H4 2012 Facility HVAC Projects

Project Title	Original Savings (kWh/year)	Validated Savings (kWh/year)
Reduce AHU1A & 1B Operating Hours	382,910	382,910
Reduce EF-1 Operating Schedules	80,892	80,892
Total	463,802	463,802

6. H5

6.1. Methodology

The serving utility verified the savings as part of their energy efficiency incentive program for four facilities within H5's hospital system. SBW verified that the savings were as reported.

6.2. Findings

SBW verified that the amount claimed by NEEA matched the savings claimed by the utility. No information was available on specific measure savings. Table 8 shows the total savings for all four facilities.

Table 8: H5 2012 Facility HVAC Projects

Project Title	Original Savings (kWh/year)	Validated Savings (kWh/year)
Total	1,026,485	1,026,485

7. H6

Methodology

The serving utility verified the savings as part of their energy efficiency incentive program for one facility within H6's hospital system. SBW verified that the savings were as reported.

Findings

SBW verified that the amount claimed by NEEA matched the savings claimed by the utility. The customer installed a single measure at the site ("HVAC Controls Improvements (non-VFDs")), which included the following components: HVAC improvements, lighting upgrade, and daylighting. The utility prorated the verified savings for the measure (1,714,064 kWh) so that it included only savings for 2012 (999,870 kWh).

Table 9: H6 2012 Measure

Project Title	Original Savings (kWh/year)	Validated Savings (kWh/year)
HVAC Controls Improvements (non-VFD)	999,870	999,870

8. H7

8.1. Methodology

The serving utility, verified the savings for this facility as part of their energy efficiency incentive program. SBW verified that the savings were as reported.

8.2. Findings

Claimed savings were due to one HVAC measure, chiller VFD controls. SBW verified that the amount claimed by NEEA matched the savings claimed by the utility. Table 10 shows the savings for H7.

Table 10: H7 2012 Facility HVAC Projects

Project Title	Original Savings (kWh/year)	Validated Savings (kWh/year)
Chiller VFD Controls	235,033	235,033