

Leveraging "Big Data" to Control Costs and Improve Performance

GVRAHE Meeting September 20, 2013

Justin Del Vecchio, P.E.



"Big Data" Revolution in Healthcare



- 90% of the world's digital data was collected in the last 2 years and doubles every 18 months.
- Standard EKG collects ~1,000 data points per second
- Leveraging healthcare data is improving outcomes and lowering costs:
 - \$300,000,000,000 a year in new value can be created in healthcare by 2021 (*McKinsey Global Institute*)
 - Examples include better diabetes treatment, fraud detection, and adaptive pharmaceutical pricing and reimbursement
 - Overall objective is to find ways to put massive amounts of data to good use in a productive way ... (without pushing CIO's blood pressure to dangerous levels!)
 - Technology spending is outpacing facilities budgets due to better perceived value

What can "Big Data" do to reduce facilties OpEx?



What "Big Energy Data" is available?



- **Opportunity**: "Smart Meters" collect "Big Data" (electricity KW every 15 minutes = 35,000 pts per year) at medium to large bldgs
- Challenge: The data are difficult to manage and interpret graphically
- **Solution**: "Visualization" services support energy efficiency efforts by providing a fast, easy and inexpensive way to understand:
 - Operational patterns and deficiencies
 - ROI analysis of potential energy efficiency options
 - Opportunities for improvement
 - Benefits of submetering
 - Did my project deliver?
 - Importance of credibility across departments and up the leadership chain





What is KW interval data?

ST M HOS (ROC	IARY'S PITAL CHEST	S ER NY	·)																						
Date: 3:06:	: 9/5/20 00 PM	013																							
Acco	unt																								
PoD	ID: R0	1																							
Date	Units	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
9/5/201	1 kwh	984.4	963.8	928.4	931.9	968.4	1002.5	1064.7	1063.8	1079.6	1098.7	1113.6	1122.2	1125.4	1119.7	1089.6	1077.9	1058.1	1043.5	1039.1	1011.3	966.5	949.5	927.1	910.5
9/6/201	1 kwh	894.1	888.3	881.9	898	929.6	966.9	1029.4	1089	1146.5	1192.4	1190.7	1190.6	1190.5	1183	1174.2	1160.8	1135.4	1082.6	1052.2	1025.3	974.8	958.7	930	911.2
9/7/201	1 kwh	898.6	898.4	890.6	904.9	952.9	983.9	1040.8	1118.6	1168.4	1197.9	1220.1	1223.7	1223.6	1217.1	1209.2	1200	1166.5	1116.7	1063.8	1046.9	1000.6	976.1	951.9	930.3
9/8/201	1 kwh	906.6	904	902	916.9	964.9	1013.6	1062.6	1136.4	1206.8	1259.6	1266.7	1266.3	1270	1283.3	1258.1	1245.6	1221.6	1174.1	1118.6	1087.5	1021	996.4	961	928.1
9/9/201	1 kwh	917.8	905.2	899.4	912.6	947	996.9	1054.3	1119.3	1201.2	1257.7	1262.4	1271.7	1288.3	1276.7	1252.9	1225.8	1197.5	1154.3	1098.9	1070.8	1000.3	984.2	951.4	908.3
9/10/201	1 kwh	902.2	893.5	887.8	897.3	914.8	940.2	978.8	992.3	1012.9	1052	1066.1	1064	1074.9	1072.4	1059.1	1045.6	1024.2	1022.6	1017.9	995.1	965.8	938.7	917.2	777.8
9/11/201	1 kwh	597.8	571.5	567.4	579.4	591.8	613.5	635.8	648.7	705.9	1039.2	1002.8	1028.6	1042.3	1042.7	1025.4	1022.5	1019.6	1028.5	1026.5	1001.5	981	945.6	916.9	899.9
9/12/201	1 kwh	884.6	882.1	877.7	890.7	915.4	972.8	1035.5	1096.9	1173.3	1241	1267.4	1295.4	1308	1303.1	1284.2	1274.4	1250.3	1193	1151.8	1090	1033.8	1000	968.4	939.9
9/13/201	1 kwh	925.4	926	922.8	935.4	980.1	1014.9	1097.2	1158.5	1224.1	1270.2	1284.1	1311.3	1312.2	1309.8	1303.3	1287.7	1255.4	1218.8	1187.7	1122	1030.1	1000.5	977.9	935.7
9/14/201	1 kwh	916.1	890	884.9	891.2	927.2	973	1021	1093.7	1149.5	1185.6	1189.6	1214.1	1235.2	1238.4	1222.6	1219.6	1184.4	1140.9	1092.6	1062.5	999	959.4	935.4	908.3
9/15/201	1 kwh	900.1	893.7	887.4	900.4	830.2	701.4	723.6	791.5	835.6	863.9	866.7	865.8	875.7	1053.5	1181.1	1150.1	1120.3	1081.7	1050.4	988.2	698.3	651.1	629.9	605
9/16/201	1 kwh	594	588.5	584.9	596.6	632.6	669.2	721.2	779.5	830.6	868.3	1019.4	1179.1	1166.6	1161.2	1149.5	1138.1	1111	1076.5	1039	923.1	700.6	642.5	629.1	607.6
9/17/201	1 kwh	596.6	595.1	586.7	598.9	621.1	637.1	677.2	692.5	707.3	722.3	1043.9	986.5	989	987.4	988.1	974.5	968.8	957.6	964.5	945	685.2	640	606	591.2
9/18/201	1 kwh	582.3	579.7	580	588.3	607.8	625.2	653.4	656.7	664	994.3	966.2	973.9	983	984.1	992.9	983.8	983.6	976.2	971.4	929	902.2	907.1	894.6	874.7
9/19/201	1 kwh	613.1	586.7	575.5	587.9	620.7	657	721.6	765.5	875.8	1211.4	1173.5	1210.7	1238.9	1229.4	1214.3	1212.2	1183.8	1136.4	1093.8	1048	982.3	954.9	929.6	898.3
9/20/201	1 kwh	893.6	896.3	893.9	903.9	939.2	995.1	1058.6	1131.2	1179.3	1193.6	1192.1	1209.5	1222.4	1236.9	1241	1212.8	1195.5	1147.7	1093.5	1046.5	966	959.8	713	621.7
9/21/201	1 kwh	601.4	602.9	593.5	603.5	638.3	668.7	912	1110.8	1159	1204	1250.6	1200.9	1293.5	1289.9	1280	1252.1	1231.4	1182.4	1145.2	1104.2	1028.5	1003	976.9	952.9
9/22/201	1 kwh	949.3	946	942	951.9	1004.3	1042.3	1123.3	1191.3	1238.3	1268.4	1275.6	1283.4	1286	1286.9	1271.6	1240.1	1193.2	1150.4	1097.1	1059.5	1003.2	987.3	955.5	905.7
9/23/201	1 kwh	900	901	893.6	905.2	945.1	968.2	1041.8	1090.3	1133	1179.1	1216.3	1243.5	1267.4	1284.5	1274.3	1270.7	1249.7	1206	1162.6	1140.2	1056.7	1032.7	999.5	967.8
9/24/201	1 kwh	956.9	917.4	894.9	895.7	914.9	951.2	974.6	987.3	1008.1	1014.9	1008.6	1041.8	1058.9	1058.6	1057.1	1043.7	1033.2	1025.7	1006.9	988	940.5	932.8	905.7	874.3
9/25/201	1 kwh	865.4	860	853.1	865.9	887.7	911.8	937.5	963.8	957.3	991.1	1023.2	1034	1046.5	1051.2	1047.5	1056.9	1059.6	1057.2	1049	1012	956.7	942.2	929.6	920.2
9/26/201	1 kwh	910.3	903.3	903.9	913.2	940.7	982.7	1041.3	1095.2	1185.9	1224.2	1289.1	1313.5	1338.1	1329.9	1314.2	1306.6	1273.7	1230.5	1191.7	1136.3	1058.2	1034.3	1005.2	977.7
9/27/201	1 kwh	975.8	961.5	957.7	971.9	1006.5	1049	1133.5	1192.4	1261.5	1304	1322.5	1338.4	1353.7	1349.1	1339.7	1317.5	1284.5	1247.4	1210.9	1142.3	1058.4	1041.1	1006	967.6
9/28/201	1 kwh	956.3	936.5	931.5	937	989.8	1034.8	1107	1183.5	1214.1	1242.9	1254.3	1293.2	1301.9	1290.7	1284.5	1275.5	802.9	720.5	823.9	1149.4	1039	1008.6	970.7	936.8
9/29/201	1 kwh	925.6	913.5	911.3	917.6	941.8	985.2	1054.2	1133.4	1185	1206.7	1223.4	1254.3	1260.6	1204.4	1199.4	1167.1	1150.5	1094.2	1046.3	1012.6	954.4	940.8	926.5	895.2
9/30/201	1 kwh	890	885.3	883.8	896	923.7	978.8	1014	1064.7	1115.5	1151	1155.2	1171	1168.1	1168.5	1145.5	1140.2	1111	1075	1038.9	1001.7	882.6	680	638.8	613.2

AGILIS / ENERGY Energy Analytics & Solutions

Confidential

1913 TRANE 2013

5

Traditional energy use analysis (limited value)...



6

For the SAME BUILDING, visualization of 3000X more data helps to quickly and more thoroughly understand a building's operation.



7

Energy Use (kWh) vs. Similar Temperature Days





Daily Demand (kW) vs Similar Temperature Days





The ability to detect performance issues increases dramatically with smaller time intervals.



Energy Star and LEED awards do not equate to best performance and/or lowest cost operations.



"What If Analysis": Visualization of low-cost savings opportunity at the same LEED/Energy Star School.





3D Load Profiles

Daily Demand Profile:

Sample Report Deliverable





Value of Submetering – Example of Master-Metered Hospital (Florida)

Trane Energy Optics



1913 7

TRANE

Same hospital with 6 Submeters



Trane Energy Optics





Powered by AGILIS/ENERGY

Same hospital: Cooling Load Meters



Trane Energy Optics









1913 TRANE 2013

Daily Load Profiles













Submetering Data Analysis (12 motor loads via EMS) – August 11 v 12 (Weather Corrected)



Interpret Energy Use Impacts Across Comparable Weather Days (Before and After)

TRANE®





What other "data visualization" could help healthcare facility managers?

- Natural gas usage (hourly data available from supplier can support retrofit sizing to save on project sizing and costs)
- Critical temperature/humidity performance (affect of other variables on T/RH control over 15 minute intervals)
- Impact of a different/negotiated electricity tariff

What if I don't have an interval meter?

 If your electricity cost is over ~\$40,000/year, consider adding a kW meter with data logging system and/or tieing into your EMS system



Grant Opportunity: NYSERDA PON 2689 Emerging Technologies & Accelerated Commercialization (ETAC)



'Focused Demonstrations' Targeted Categories

Building or energy system-focused technologies or approaches that offer energy data analytics and performance information; must produce actionable information for, and demonstrated responsiveness from, end-users in identifying and implementing energy savings opportunities.

Examples include:

- Remote energy audits
- Advanced energy information systems, for instance, building energy performance analytics software with dashboards

Applicants, if selected, are eligible to receive up to \$150,000 from NYSERDA, as well as M&V services funded by NYSERDA.





Questions?

Justin Del Vecchio, Trane (585) 370-3404 jdelvecchio@trane.com

