December 29, 2014

2014 INDUSTRIAL FACILITIES SITE ASSESSMENT: APPENDICES

Prepared by:

The Cadmus Group

Jeff Cropp, P.E.

Mesut Avci, Ph.D.

Heidi Ochsner

Dave Korn, CEM

720 SW Washington St, Suite 400

Portland, OR 97205

Northwest Energy Efficiency Alliance

PHONE

503-688-5400

FAX

503-688-5447

EMAIL

info@neea.org

Table of Contents

Appendix A. Sample Design Protocols

Cadmus developed a sampling plan and a dataset of sampled facilities for assessment and verification in order to conduct the NEEA Industrial Facility Site Assessment.

1.1 Sample Design

Cadmus proposes that since representation by state and the twenty-four industry sectors listed in the Evergreen Economics study is not possible at the study budget, our sampling design take the industry sectors into account, but concentrate on the most relevant sectors as determined by the working group. The remaining sectors may be addressed with smaller random samples if the working group members determine those are of interest.

1.1.1 Precision and Reporting Domains

Cadmus recommends that we treat each industrial sector as a unique population, as we do not believe there will be any relationship of energy use across sectors. We provided the list of industrial sectors to the Working Group members and requested that they rank each sector based on importance to Northwest energy planning efforts, from 1 (no importance) to 5 (high importance).

Several sectors were removed from consideration due to low contribution to overall electric consumption and lack of relevance to the industrial population as a whole.

Based on the feedback from the Delphi study and subsequent discussion, Cadmus targeted twelve sectors as candidates for sampling, as shown in the table below. The sample will be split across census (very large), large, medium, and small consumption facilities. The strata levels are defined on a sector by sector basis in an Excel analysis spreadsheet provided to the working group.

Table 1. Twelve Candidate Sectors for Sampling

NAICS	Industry Sector	Strata Quantity				Total (n)
		Census (n)	Large (n)	Medium (n)	Small (n)	
311	Food Manufacturing	0	3	7	5	15
321	Wood Products Manufacturing	1	4	5	5	15
322	Paper Manufacturing	0	5	6	7	18
324	Petroleum and Coal Products Manufacturing	0	2	3	2	7
325	Chemical Manufacturing	1	2	4	3	10
326	Plastics and Rubber Products Manufacturing	0	2	2	2	6
327	Nonmetallic Mineral Products Manufacturing	0	3	4	3	10
331	Primary Metal Manufacturing	2	2	2	1	7
332	Fabricated Metal Products Manufacturing	0	2	4	2	8
334	Computer and Electronic Products Manufacturing	0	2	4	2	8
336	Transportation Equipment Manufacturing	0	2	4	2	8
493	Refrigerated Warehousing and Storage	2	2	2	2	8
	Total					120

Cadmus will follow up with the working group members to determine any required modifications to the draft sample. We will include the relevant details of the sample in the final Sample Design Protocols document.

Cadmus and the working group noted several areas of concern related to the sampling population:

- We provided data to the working group on Evergreen Economic's modeling data in terms of energy consumption (kWh) and employees. These were considered as a method to normalize the final data to report to the Northwest Power and Conservation Council. However, the team noted numerous inconsistencies in the data which may prevent its use for normalization purposes.

- A working group member identified one large site in their service territory that had not been included in the Industrial Database. Cadmus acknowledges this may not be the only omission, which could have some impact on the overall sampling results.

- The modeled energy consumption may not correlate effectively to actual energy consumption at each facility. Cadmus believes the inconsistencies and omissions may prevent us from extrapolating end use consumption findings to each sector's overall population with any degree of confidence.

Appendix B. Data Collection Protocols

The data collection for the NEEA Industrial Facility Site Assessment requires protocols to resolve three critical portions of the effort:

- Collect End Use Consumption Data
- Operational Practices Survey
- Database Design

1.2 Collect End Use Consumption Data

Cadmus will categorize consumption for major end uses at each facility. We propose to focus end use data collection on motor systems (compressed air, material handling, pumping, and fans), refrigeration, process heating systems, steam systems, and cogeneration, as they typically represent the majority of energy consumption at each site. The on-site data collection may vary according to the industrial sector, fuels used, and end use systems that represent the majority of the energy consumption.

The final end use consumption estimates will be mapped to end uses from the Manufacturing Energy Consumption Survey (MECS).Those end uses are:

- Indirect Uses-Boiler Fuel
    - Conventional Boiler Use
    - CHP and/or Cogeneration Process
- Direct Uses-Total Process
    - Process Heating
    - Process Cooling and Refrigeration
    - Machine Drive
        - Pumps
        - Fans
        - Compressed Air
        - Material Handling

        - Material Processing
        - Other Systems
    - Electro-Chemical Processes
    - Other Process Use
- Direct Uses-Total Nonprocess
    - Facility HVAC
    - Facility Lighting
    - Other Facility Support
    - Onsite Transportation
    - Conventional Electricity Generation
    - Other Nonprocess Use

Machine Drives (such as pumps) are an integral component of many other systems (such as boiler systems). In those cases, the energy consumption for the pumps (or other drives) will be assigned to the appropriate end use that it serves. The proposed data collection methods for the expected major end uses are outlined as follows, along with the appropriate MECS category to which it will be mapped.

1.2.1 Motor Systems (Machine Drive)

We propose to determine the end use consumption of motor systems by motor size, efficiency, load factor, and hours of operation. During the assessment, our field engineer would collect nameplate information for motor size on as many motors as practical, prioritizing the largest motors first. Our team would compare motor efficiencies against existing databases, including manufacturer data and MotorMaster.

To estimate the load factor, the field engineer could perform a spot power measurement for motors greater than 50 HP. The load factor will likely vary throughout the production cycle, so the load factor variance will introduce additional uncertainty into the end-use consumption estimates. As an alternative, the engineer may apply the average load factors by motor size, as calculated by Cascade Energy in *Standard Savings Estimation Protocol for Premium Efficiency Motors*, Table 4.

The motor operating hours likely represent the parameter of greatest variability and significance for data collection. The Cascade Energy study outlined standard methods to obtain operating hours, such as SCADA (Supervisory Control and Data Acquisition) trend data, manual logs, and discussions with facility personnel, and these methods are appropriate for most motor applications.

As needed, the Cadmus team may choose to install motor run-time loggers to estimate operating hours on larger (greater than 200 HP) motors, if we cannot obtain the operating hours through a SCADA system. We standardize on the UX90 series run-time loggers from Onset Computer Corporation, which do not require the additional time and expense of installing true power loggers. This approach requires an additional site visit to remove the logger, or that the facility mail back the logger in a pre-paid shipping box. However, we recommend this step to improve the accuracy of end-use consumption estimates for motors that have the potential for a large impact on consumption.

1.2.2 Refrigeration (Process Cooling and Refrigeration)

The amount of energy used by refrigeration equipment is affected by outside (condensing) temperatures, production levels (often the mass of product cooled),how the refrigeration components are controlled, and the production hours. During the visit, we would interview the production manager or maintenance engineer to understand the operational load profile. For on-site data collection, we may determine operating parameters such as temperature, thermal characteristics, and power demand.

Because the entire system can affect the consumption and opportunities for improvement, we would look at all of the system elements. Some issues to investigate include the type of condensers, floating head or suction controls, types of fan motors on the evaporator coils (shaded pole, PSC, or ECM),evaporator controls, and refrigerant.

1.2.3 Steam/Hot Water End Uses (Conventional Boiler use)

We propose to first determine whether the boiler is the only (or predominant) source of gas consumption on a single gas meter (or facility).If so, we could use the gas utility bills to determine total energy consumption of the system. If there are multiple gas uses on the same meter, we could calculate boiler energy consumption through the following approach. We would determine boiler(s) size by checking the nameplate, recent inspection/maintenance documents, and as-built plans. As needed to obtain the horsepower or capacity rating, we would investigate the manufacturer make and model number.

To determine how much energy is being transferred into the distribution system versus waste, we would assess the boiler(s) efficiency using the following methods (listed in order from ideal to adequate):

- Check SCADA system for gas input and steam output values.
- Check for flow meters showing instantaneous readings on gas input and steam output (ensure this is undertaken during the production process).

- Check maintenance logs to see if the facility recently conducted a tuning/combustion analysis that measured efficiency.

- If we cannot definitively determine boiler efficiency through the previous methods, a field engineer will measure efficiency using a combustion analyzer. This is an accurate and relatively efficient method to determine boiler efficiency.
  Once we determine the total energy in the distribution system, we could use the following methods to calculate the distribution of that between production equipment and system losses caused by leaks, heat loss, etc. (These methods listed in order from ideal to adequate.)

- Check SCADA system for flow trends to all equipment.

- Check for flow meters on each branch of the system showing instantaneous flow readings and compare to equipment operating conditions. We would record heat exchanger efficiencies to account for waste heat.

- Check production equipment or heat exchangers for flow requirements.

Finally, we would assign a system loss factor (ranging from 5% to 15%) to account for leaks and other distribution losses based on engineering judgment of the condition of insulation, leaks, and other visual inspection.

1.2.4 Process Heating (Process Heating)

Process efficiency is commonly rated by the fuel used/product made. Our first approach would be to obtain this annual data from the facility (if willing).If this cannot be obtained, we would: (1) Check the SCADA system for relevant input power consumption; and (2) Obtain equipment specifications (size, efficiency, etc.) and compare with production data.

1.2.5 Cogeneration (CHP and/or Cogeneration Process)

First, we propose to determine how much fuel and what type of fuel provide the power for the cogeneration plant (or equipment with heat recovery).We would check the SCADA system, flow meters, or invoices/logs, depending on fuel type. Next, we would determine the distribution of energy between electric/mechanical and heat. We would estimate electrical generation by: (1) Investigating the SCADA system; (2) checking for an electric meter designated for the generator; (3) obtaining generator size and efficiency; and (4) subtracting the heat energy used for other useful production.

1.2.6 Space Conditioning (Facility HVAC)

Conventional HVAC loads typically represent a small portion of an industrial facility's energy consumption, except for special cases such as data centers. Typically, only a small portion of a site (such as the administrative and/or operations offices) will be conditioned. The field engineer could obtain nameplate data for HVAC equipment and gather operational schedules and set points for conditioning. Our analysis would consist of a simplified bin analysis to estimate equivalent full load hours, which the engineer would then multiply by each unit's heating or cooling capacity to estimate total consumption. Our engineer would also review the facility's utility billing data to determine whether there are out-sized seasonal impacts not reflected in the HVAC consumption calculations.

1.2.7 Lighting (Facility Lighting)

Typically, lighting represents a small portion of industrial facility energy consumption, so our field engineer would first determine the lighting power density for each representative space in the facility and then extrapolate that value to similar spaces. This would entail these activities: calculating the facility space area with a laser range-finder, recording the lamp and ballast information for each fixture, counting the number of fixtures installed, and determining whether fixtures are affected by lighting controls. We would also estimate lighting hours of operation for each site based on site interviews, monitoring, or data obtained through the SCADA system.

1.3 Operational Practices Survey

Cadmus proposes to obtain information on energy management strategies, high efficiency equipment, and operational practices related to energy use. Cadmus developed a brief survey to conduct on-site in order to obtain these details which can quantify the potential for strategic energy management. Through this survey, we can measure persistence of energy management practices for facilities that have already implemented strategic energy management.

1.4 Database Design

Cadmus will design and build the project database, which we propose to consist of a single database and two separate Web interfaces for collecting data and tracking facilities. Each interface should have its own set of reports. All reports could be exportable in a variety of formats including XLS, CSV, DOC, and PDF. Typically, we use Microsoft SQL server, as it is the platform clients tend to prefer, and we develop our Web-based software using the Microsoft ASP.NET platform.

1.4.1 IFSA Database

The key data elements to be stored in the database may include:

- Facility information
- Facility contact information
- Utility billing data
- Site assessment tracking
- Audit history

- Number of shifts per day
- Number of employees (if available)
- Total annual production units (if available)
- Equipment details
- End use energy consumption estimates
- Energy management survey results
- Estimate of strategic energy management potential

1.4.2 Data Collection Interface

The data collection interface would allow field staff to find facilities quickly and input information in a consistent manner. Cadmus recommends that each user be required to register for an account, which then must be approved by a Cadmus administrator.

1.4.3 Facility Tracking Interface

To assist stakeholders in tracking progress of site visits, Cadmus could develop a separate interface for managing individual facility details and keeping track of where each facility is in the overall process. This facility tracking interface would allow users to search quickly on various facility details, including up-to-date information collected in the field. Users would also be able to make updates to individual facilities while maintaining an audit trail for key changes and events.

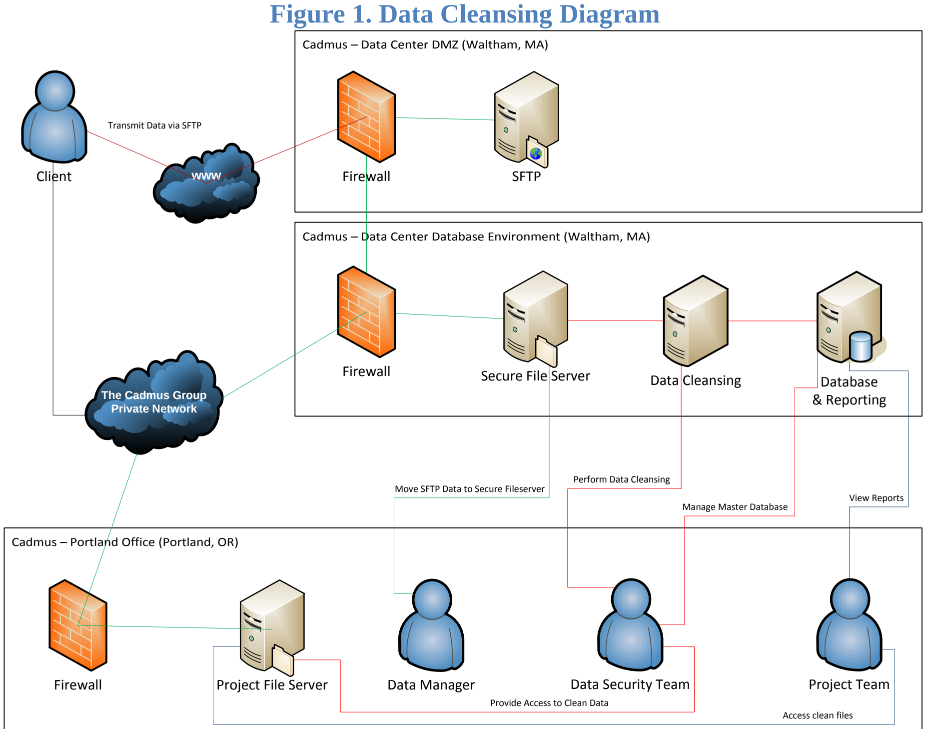
Appendix C. Data Security Protocols

Cadmus will develop data security and client confidentiality procedures to protect the privacy of data collected as part of the NEEA Industrial Facility Site Assessment.

1.5 Data Security

Cadmus uses a standardized process for sharing electronic data in a secure manner. Secure-FTP is used to transport all data to and from our highly secure data center. Once incoming information is in the data center, it is moved through a cleansing process that identifies and encrypts private information. Figure 1 **Error! Reference source not found.**shows our environments used for the cleansing process.

Figure 1. Data Cleansing Diagram



All of our Web interfaces use secure HTTPS, so any information collected in the field will be transmitted across encrypted channels. Also, we propose that all Web interfaces require individual accounts (user/password) for everyone who requires access. Individuals should also be assigned specific roles that dictate what level of access (read, write) they have on the various pieces of information.

We will limit access to the overall data structure to the three Cadmus members of the Data Security team and the NEEA Project Manager. All members will sign NDAs with NEEA to protect the security of the information.

The Cadmus Team will also follow these procedures to maintain the physical security of any data we receive:

1. Field engineers will not store any data related to sites on a flash drive.

2. Field engineers will not leave laptops or print outs with site data unsecured in their vehicle. If the field engineer must bring this material along, it will be either in the engineer’s physical possession or locked in the trunk.

3. Field engineers will leave sensitive materials locked in a safe in their hotel room, if a safe is available.

4. If a field engineer stores site data on a laptop computer, the laptop will be password protected.

5. If a field engineer will receive site data through an email account linked to their cell phone, the phone will have password protection.

6. Highly-sensitive information, such as utility account numbers, utility consumption data, and production data, will only be transferred via secure file transfer protocol (SFTP) rather than email.

Cadmus will also conduct criminal background checks on every field engineer.

1.6 Confidentiality

Cadmus will collect facility-level data and, where necessary, consumption histories from utilities. This information is an essential component of our data collection effort and a critical element in the database. We assume responsibility for coordinating with utilities and compiling consumption histories, and we will negotiate a non-disclosure agreement directly with utilities for obtaining the data.

In addition, because many industrial facilities have proprietary processes and intellectual property they wish to protect, we will negotiate a non-disclosure agreement with any facility that requests it. In conjunction with and based on feedback from the Data Security/Confidentiality Protocols Working Group, we will determine which specific individuals should have access to this information through the database, and how the assessment data will be disseminated.

We will not make any IFSA data or information publicly available at any point in the future. The Cadmus Team will provide data for future planning efforts in aggregate without specific identifying information for any facilities, such as state, production data, or product.

The data fields we will release for planning efforts by groups such as the Northwest Power and Conservation Council for each site include:

- NAICS code
- Estimated annual energy consumption by end use in kWh per employee (or unit of production) for electric consumption and kBtu[1] per employee (or unit of production) for gas consumption
- Whether the facility is served by a public power entity or investor-owned utility

[1] kBtu = thousands of British thermal units

Appendix D. Operational Practices Survey Questions

1.7 Introduction

As part of our site visit, we would also like to ask you some questions about how your facility manages energy. This will take approximately 15 minutes.

Before we get started, I'd like to note that your responses are confidential and will only be publicly reported in aggregate. Individual facility responses will not be identified in public documents, but will be made available to the Northwest Energy Efficiency Alliance who is sponsoring this study. [IF NEEDED: individual responses will be rolled up and reported anonymously as part of a group. We will not publicly report any identifying information]

I1. What is your job title?

I2a. How long have you been with **[facility name]**?

I2b. How long have you had this role?

I2. How do your job duties relate to energy use at your facility?

1.7.1 Assess Strategic Energy Management Practices

For the purposes of this survey, strategic energy management practices includes activities such as purchasing efficient equipment, tracking your energy bills, efficient operating and maintenance practices and training your personnel in managing energy or to operate your equipment efficiently. Before I continue, do you have any questions for me, particularly about the definition of "strategic energy management practices?"

EM1. Has your facility participated in a strategic energy management program in the past three years?

1. Yes, currently participating
2. Yes, in the past and no longer participating
3. No

-99. Don't know

[If EM1 = 1]

EM1a. Which program are you participating in? [DO NOT READ]

1. BPA's Energy Smart Industrial (ESI) OR Energy Management Pilot OR High Performance Energy Management (HPEM) OR Track & Tune (T&T) [note: these all refer to the same program, just different components]
2. NEEA's Industrial Initiative or Continuous Energy Improvement
3. Puget Sound Energy's Resource Conservation Manager
4. Energy Trust of Oregon's Industrial Energy Improvement
5. SnoPUD's Continuous Energy Improvement Pilot

-77. Other [Specify________________________]

-99. Don't Know

[IF EM1a ≠ -99 THEN THANK THEM AND TERMINATE SURVEY. USE YOUR BEST JUDGMENT ON WHETHER THEIR RESPONSE TO -77 SOUNDS PLAUSIBLE AND IF PLAUSIBLE THEN TERMINATE]

[If EM1 = 2]

EM1b. Why are you no longer participating? [Multiple response, do not read. Please record any additional information provided in their response]

1. Lack of staff time
2. Lack of capital to fund energy projects
3. Lack of management support
4. Felt we could continue with SEM on our own and no longer needed program support
5. The SEM program discontinued the technical support

-77. Other [Specify__________________]

-99. Don't know

[ASK ALL]

EM2. Is your facility currently seeking energy management certification through ISO 50001 or DOE Superior Energy Performance, or a similar certification method?

1. No
2. Yes, ISO 50001
3. Yes, DOE SEP

-77. Yes, Other [Specify ______________________]

-99. Don't know

EM3. How active is your facility in managing energy use, with 1 indicating energy use is not managed and 5 indicating that energy use is very closely managed?

EM3a.Can you explain why you gave that rating [Probe to get an overview of how they manage energy, what activities they are doing]?

[If answer to EM3 < 5]

EM4. What more would your facility like to be doing to manage energy?

1. Nothing more

-77. Other [Specify__________________________]

-99. (Don't know)

EM4a. What are the challenges to doing more to manage energy? [MULTIPLE RESPONSE; DO NOT READ; PROBE FOR A BETTER RESPONSE THEN JUST A "WE AREN'T INTERESTED – WHY AREN'T THEY INTERESTED?"]

1. (Too expensive to implement)
2. (Expensive to maintain)
3. (Lacking the technical skills or expertise)
4. (Cannot get approval from management)
5. (Other priorities demand resources)

-77.Other:[SPECIFY:____]

-99. (Don't know)

[IF EM3 = 1 AND EM4 = 1 THEN SKIP TO EM21 (THE VERY LAST QUESTION).]

EM5. How would you rate the level of management support for dedicating staff resources to energy management?**[Read responses]**

1. No support
2. Little support
3. Some support
4. Large support
5. Total support

EM6. How would you rate the level of management support for approving and providing funding for energy projects? **[Read responses]**

1. No support
2. Little support
3. Some support
4. Large support
5. Total support

[SKIP IF RESPONDENT SAID THEY ARE THE ENERGY MANAGER IN I2]

EM7. Is someone at your facility a designated “energy manager” or “energy champion”?

1. Yes
2. It is informally designated
3. The role is shared across more than one person
4. No

-99.Don’t Know

EM8. Do you have an energy team that meets regularly?

1. Yes
2. Team exists but does not meet regularly
3. No

-99.Don’t Know

EM9. Has your facility undergone an organizational assessment for strategic energy management activities? [IF NEEDED: THIS ASSESSMENT LOOKS AT STAFF RESPONSIBILITIES AND ORG CHARTS FROM AN ENERGY MANAGEMENT PERSPECTIVE]

1. Yes, by a 3rd party
2. Yes, it was done internally
3. No

-99.Don’t Know

EM10.What energy-related activities is facility staff [outside of the energy team] engaged with? **[Read responses; multiple responses]**

1. Attend trainings on energy efficiency
2. Aware of energy use and make conscious efforts to minimize areas of potential waste (such as turning off lights or equipment when not used)
3. Identify areas where energy performance could be improved and report to the energy team

-77.Other:[SPECIFY:____]

-98. None of the above

-99.Don't Know

I'd like to ask you about your facility policies regarding energy efficiency, equipment replacement or energy project funding. Where facility practices or policies differ from the corporate practices, we would like to know what is happening at the facility.

[ASK EM12 IF THE AUDIT SHOWED EFFICIENT EQUIPMENT WAS INSTALLED OR ENERGY EFFICIENT PROCESSES ARE IN PLACE]

Our audit showed that your facility has implemented energy efficient projects such as [measure type 1, measure type 2, and measure type 3].

EM12. What motivated your facility to implement energy efficient projects? **[MULTIPLE RESPONSE; DO NOT READ]**

1. Meet our energy performance goals
2. Save energy and money
3. The equipment distributor or manufacturer recommended it
4. Recommended in an energy audit
5. Tax incentives or rebates

-77.Other:[SPECIFY:____]

-99. Don't Know

EM13.When considering energy efficiency projects versus other capital investments, is your company's requirement on Return on Investment (ROI) less stringent for energy efficiency projects than for other capital investments?

1. Yes
2. No

-99.Don't Know

EM14. Does your facility have a specific policy that says you should replace worn out equipment with high efficiency equipment? **[IF NEEDED:** high efficiency refers to equipment that is more efficient than what is considered standard efficiency or code at the time of purchase.**]**
[DO NOT READ]

1. Yes
2. No policy
3. No, but we have an informal policy **[DO NOT READ:** for example they consider efficient equip when purchasing new equipment but don't necessarily purchase efficient option**]**

-99. Don't Know

[SKIP IF THEY SAY THEY TRACK ENERGY IN I2]

EM15. Does someone at the company track electricity or natural gas use trends at your facility? Tracking energy use trends would include activities such as monitoring billing data or metering energy use of certain equipment.

1. Yes, both electricity and natural gas
2. Yes, just electricity
3. Yes, just natural gas
4. No **[GO TO EM16]**

-99.Don't Know **[GO TO EM16]**

[ASK ONLY IF EM15 IS Yes and if they do indeed track energy OR if they said they track energy in I2 lead with "You noted that one of your responsibilities is to track energy use…]

EM15a.How is energy tracked? [MULTIPLE RESPONSE; **DO NOT READ RESPONSES; RECORD IF DIFFERENT FOR NATURAL GAS VS. ELECTRICITY**]

1. Review billing data
2. Review progress towards energy performance metrics
3. Review metered energy use

-77.Other:[SPECIFY:____]

-99.Don't Know

[IF EM15 = YES]

EM15b.How often is that information reviewed?[**DO NOT READ RESPONSES; RECORD IF DIFFERENT FOR NATURAL GAS VS. ELECTRICITY**]

1. Daily
2. Weekly
3. Monthly
4. Quarterly
5. Twice a year
6. Annually

-77.Other:[SPECIFY:____]

-99.Don't Know

EM16. Does your facility set energy performance goals or goals to reduce energy use intensity?

1. Yes
2. No

-99.Don't Know

EM17. Does your facility have an energy management plan? An energy management plan would consist of energy performance goals to be reached within a certain timeframe and also includes a prioritized list of activities to be done to achieve those goals.

1. Yes
2. Not yet, a plan is in development
3. No

-99.Don't Know

[IF EM17 = YES]

EM17a. Do you revisit your plan on a regular basis, or update it as operations change?

1. Yes, we update on a regular basis
2. Yes, we update as operations change
3. We plan to update
4. No

-99.Don't Know

[If EM16=1 or EM17 = 1]

EM18. How do you measure energy performance?

[Probe for details to find out how sophisticated this process is. How was the baseline established? What metrics are they using (e.g. energy intensity)? How are they normalizing the data (e.g. take weather into account? Or production?)? Are they using a multiple variable regression? Are they using a software tool? Do they have technical support from a third party for this?]

[If EM16=1 or EM17 = 1]

EM19. Are you on track to meet your energy performance goals?

1. Yes
2. No

-99.Don't Know

[If EM16=1 or EM17 = 1]

EM20. Is progress toward your goal communicated to upper management on a regular basis?

1. Yes
2. Progress is reported, but not on a regular basis
3. No

-99.Don't Know

EM21. On a scale of 1 to 5, where 1 is not at all interested and 5 is extremely interested, how interested would your facility would be in participating in a program that provides long-term technical support to develop and implement a strategic energy management strategy?

Appendix E. Strategic Energy Management Scoring Methodology

Table 2. Scoring Overview

SEM Element	Corresponding Survey Question(s)	Max Score	Category Weight
1. Customer Commitment		100	0.3
top management support and communication	EM5, EM13, EM14, EM20		
SEM resourced properly	EM5, EM6, EM7		
regular review of SEM progress	EM7, EM8		
staff awareness of SEM	EM10		
2. EM Planning and Implementation		100	0.4
EM Assessment	EM9		
Baseline Energy Use	EM15		
Goals and Measures	EM16		
Planned Actions and Projects	EM17		
Employee Engagement	EM10		
Implementation	EM19		
Reassessment	EM17a		
3. MT&R	EM15a, EM15b, EM18	100	0.3
Measurement			
Analysis			
Data Collection and Availability			
Reporting			
Maximum Score Possible		100	
SEM Scoring	*Full* SEM	71 - 100	
	Some SEM	31 – 70	
	No SEM	0 – 30	

Table 3. Customer Commitment Scoring

Question	Response	Score	Other notes	Question Weight	Weighted Score
EM5. How would you rate the level of management support for dedicating staff resources to energy management?				0.2	1.8
EM5.1	No Support	0	1.9	1.10	0
EM5.2	Little Support	25	1.11	1.12	5
EM5.3	Some Support	50	1.13	1.14	10
EM5.4	Large Support	75	1.15	1.16	15
EM5.5	Total Support	100	1.17	1.18	20
1.19	1.20	1.21	1.22	1.23	1.24
EM6. How would you rate the level of management support for approving and providing funding for energy projects?				0.2	1.25
EM6.1	No Support	0	1.26	1.27	0
EM6.2	Little Support	25	1.28	1.29	5
EM6.3	Some Support	50	1.30	1.31	10
EM6.4	Large Support	75	1.32	1.33	15
EM6.5	Total Support	100	1.34	1.35	20
1.36	1.37	1.38	1.39	1.40	1.41
EM7. Is someone at your facility a designated “energy manager/champion”?			if this question was skipped, see I2 response	0.2	1.42
EM7.1	Yes	100	1.43	1.44	20
EM7.2	It is informally designated	50	1.45	1.46	10
EM7.3	The role is shared across more than one person	50	1.47	1.48	10
EM7.4	No	0	1.49	1.50	0
EM7.-99	Don't know	0	1.51	1.52	0
1.53	1.54	1.55	1.56	1.57	1.58
EM8. Do you have an energy team that meets regularly?				0.1	1.59
EM8.1	Yes	100	1.60	1.61	10
EM8.2	Yes, team exists but does not meet regularly	50	1.62	1.63	5
EM8.2	No	0	1.64	1.65	0
EM8.-99	Don't know	0	1.66	1.67	0
1.68	1.69	1.70	1.71	1.72	1.73
EM10.What energy-related activities is facility staff [outside of the energy team] engaged with?				0.1	1.74
EM10.1	Attend trainings on energy efficiency	0	will be incorporated under category 2		0
EM10.2	Aware of energy use and make conscious efforts to minimize areas of potential waste	50	1.75	1.76	5

Question	Response	Score	Other notes	Question Weight	Weighted Score
EM10.3	Identify areas where energy performance could be improved and report to the energy team	0	will be incorporated under category 2		0
EM10.-77	Other	50	responses will be reviewed to see if they qualify		5
EM10.-98	None of Above	0	1.77	1.78	0
EM10.-99	Don't know	0	1.79	1.80	0
1.81	1.82	1.83	1.84	1.85	1.86
EM13.When considering energy efficiency projects versus other capital investments, is your company's requirement on Return on Investment (ROI) less stringent for energy efficiency projects?				0.05	1.87
EM13.1	Yes	100	1.88	1.89	5
EM13.2	No	0	1.90	1.91	0
EM13.-99	Don't know	0	1.92	1.93	0
1.94	1.95	1.96	1.97	1.98	1.99
EM14. Does your facility have a specific policy that says you should replace worn out equipment with high efficiency equipment?				0.05	1.100
EM14.1	Yes	100	1.101	1.102	5
EM14.2	No	0	1.103	1.104	0
EM14.3	No, but we have an informal policy	50	1.105	1.106	2.5
EM14.-99	Don't know				
EM20. Is progress toward your goal communicated to upper management on a regular basis?				0.1	1.107
EM20.1	Yes	100	1.108	1.109	10
EM20.2	Progress is reported, but not on a regular basis	50	1.110	1.111	5
EM20.3	No	0	1.112	1.113	0
EM20.-99	Don't know	0	1.114	1.115	0
1.116	1.117	1.118	1.119	1.120	1.121
1.122	1.123	1.124	Total Possible Score	1	100

Table 4. Planning and Implementation Scoring

Question	Response	Score	Other notes	Question Weight	Weighted Score
EM9. Has your facility undergone an organizational assessment for strategic energy management activities?				0.2	1.125
EM9.1	Yes, by a 3rd party	100	1.126	1.127	20
EM9.2	Yes, it was done internally	50	1.128	1.129	10
EM9.3	No	0	1.130	1.131	0
EM9.-99	Don't know	0	1.132	1.133	0
1.134	1.135	1.136	1.137	1.138	1.139
EM10.What energy-related activities is facility staff [outside of the energy team] engaged with?				0.1	1.140
EM10.1	Attend trainings on energy efficiency	33	1.141	1.142	3.3
EM10.2	Aware of energy use and make conscious efforts to minimize areas of potential waste	0	accounted for under Commitment		0
EM10.3	Identify areas where energy performance could be improved and report to the energy team	33	1.143	1.144	3.3
EM10.-77	Other	33	responses will be reviewed to see if they qualify		3.3
EM10.-98	None of Above	0	1.145	1.146	0
EM10.-99	Don't know	0	1.147	1.148	0
1.149	1.150	1.151	1.152	1.153	1.154
EM15. Does someone at the company track electricity or natural gas use trends at your facility?				0.1	1.155
EM15.1	Yes, both electricity and natural gas	100	1.156	1.157	10
EM15.2	Yes, just electricity	50	1.158	1.159	5
EM15.3	Yes, just natural gas	50	1.160	1.161	5
EM15.4	No	0	1.162	1.163	0
EM15.-99	Don't know	0	1.164	1.165	0
1.166	1.167	1.168	1.169	1.170	1.171
EM16. Does your facility set energy performance goals or goals to reduce energy use intensity?				0.2	1.172
EM16.1	Yes	100	1.173	1.174	20
EM16.2	No	0	1.175	1.176	0
EM16.-99	Don't know	0	1.177	1.178	0
1.179	1.180	1.181	1.182	1.183	1.184

Question	Response	Score	Other notes	Question Weight	Weighted Score
EM17. Does your facility have energy management project plan(s)?				0.2	1.185
EM17.1	Yes	100	1.186	1.187	20
EM17.2	Not yet, a plan is in development	50	1.188	1.189	10
EM17.3	No	0	1.190	1.191	0
EM17.-99	Don't know	0	1.192	1.193	0
1.194	1.195	1.196	1.197	1.198	1.199
EM17a. Do you revisit your [EM] project plan on a regular basis, or update it as operations change?				0.1	1.200
EM17a.1	Yes, we update on a regular basis	100	1.201	1.202	10
EM17a.2	Yes, we update as operations change	100	1.203	1.204	10
EM17a.3	We plan to update	50	1.205	1.206	5
EM17a.4	No	0	1.207	1.208	0
EM17a.-99	Don't know	0	1.209	1.210	0
1.211	1.212	1.213	1.214	1.215	1.216
EM19. Are you on track to meet your energy performance goals?				0.1	1.217
EM19.1	Yes	100	1.218	1.219	10
EM19.2	No	50	1.220	1.221	5
EM19.-99	Don't know	0	1.222	1.223	0
1.224	1.225	1.226	1.227	1.228	1.229
1.230	1.231	1.232	Total Possible Score	1	100

Table 5. Monitoring, Tracking, and Reporting Scoring

Question	Response	Score	Other notes	Question Weight	Weighted Score
EM15a.How is energy tracked?			multiple response	0.25	1.233
EM15a.1	review billing data	15	1.234	1.235	3.75
EM15a.2	Review energy performance metrics	50	1.236	1.237	12.5
EM15a.3	Review metered energy use	25	1.238	1.239	6.25
EM15a.-77	Other	10	will review response to determine if it qualifies		2.5
EM15a.-99	Don't know	0	1.240	1.241	0
1.242	1.243	1.244	1.245	1.246	1.247
EM15b.How often is that information reviewed?				0.25	1.248
EM15b.1	Daily	100	1.249	1.250	25
EM15b.2	Weekly	100	1.251	1.252	25
EM15b.3	Monthly	75	1.253	1.254	18.75
EM15b.4	Quarterly	50	1.255	1.256	12.5
EM15b.5	Twice a year	25	1.257	1.258	6.25
EM15b.6	Annually	10	1.259	1.260	2.5
EM15b.-77	Other		will review response to determine score		0
EM15b.-99	Don't know	0	1.261	1.262	0
1.263	1.264	1.265	1.266	1.267	1.268
EM18. How do you measure energy performance?			will provide points for each area mentioned	0.5	1.269
EM18.1	Measurement	25	1.270	1.271	12.5
EM18.2	Analysis	25	1.272	1.273	12.5
EM18.3	Data Collection and Availability	25	1.274	1.275	12.5
EM18.4	Reporting	25	1.276	1.277	12.5
1.278	1.279	1.280	1.281	1.282	1.283
1.284	1.285	1.286	Total Possible Score	1	100

Table 6. Level of SEM Potential – Overall Scoring Methodology

Willingness	Corresponding Question(s)	Max Score	Min Score
Potential for SEM		100	-30
interest in doing more?	EM4, EM4a		
level of interest in participating in an SEM program in the future	EM21		
Level of SEM Potential	*Full* Potential	-30 to 0	
	Some Potential	1 to 50	
	No Potential	51 to 100	

Table 7. Level of SEM Potential – Scoring Methodology

Question	Response	Score	Other notes	Question Weight	Weighted Score
EM4.What more would your facility like to be doing to manage energy?				0.5	1.287
EM4.1	Nothing more	0	1.288	1.289	0
EM4.-77	Other	100	will review response to determine if it qualifies		50
EM4.-99	Don't know	0	1.290	1.291	0
1.292	1.293	1.294	1.295	1.296	1.297
EM4a. What are the challenges to doing more to manage energy?				0.3	1.298
EM4a.1	Too expensive to implement	-16.6667	1.299	1.300	-5
EM4a.2	Expensive to maintain	-16.6667	1.301	1.302	-5
EM4a.3	Lacking the technical skills or expertise	-16.6667	1.303	1.304	-5
EM4a.4	Cannot get approval from management	-16.6667	1.305	1.306	-5
EM4a.5	Other priorities demand resources	-16.6667	1.307	1.308	-5
EM4a.-77	Other	-16.6667	will review response to determine if it qualifies		-5
EM4a.-99	Don't know	-100	1.309	1.310	-30
1.311	1.312	1.313	1.314	1.315	1.316
EM21. On a scale of 1 to 5, where 1 is not at all interested and 5 is extremely interested, how interested would your facility would be in participating in a program that provides long-term technical support to develop and implement a strategic energy management plan?				0.5	1.317
EM21.1	1	0	1.318	1.319	0
EM21.2	2	25	1.320	1.321	12.5
EM21.3	3	50	1.322	1.323	25
EM21.4	4	75	1.324	1.325	37.5
EM21.5	5	100	1.326	1.327	50
1.328	1.329	1.330	1.331	1.332	1.333
1.334	1.335	1.336	Total Possible Score	1	100

Appendix F. Customer Contact Protocols

Contents:

1. Customer Contact Protocols Memorandum
2. Customer Contact Frequently Asked Questions
3. Decision Tree for Customer Contact Notification Process
4. Initial Draft Contact Email / Letter (for utility use)
5. Notification Call Script (for Cadmus notification and scheduling)
6. On-Site Assessment Information (for participant)
7. Additional Data Requests
8. Utility Data Authorization Form (for participant)

1.8 Customer Contact Protocols Memorandum

To: Customer Contact Working Group

From: Jeff Cropp

Subject: Final Customer Contact Protocols

Date: July 25, 2013

The Cadmus Team ("Cadmus") will recruit sites to visit from the industrial facility sample developed in the Sample Design Working Group as part of the NEEA Industrial Facility Site Assessment. This memo provides protocols to contact the industrial customers and address questions or concerns regarding the site assessment process. This document reflects input requested from the Customer Contact Working Group to modify or expand on the initial proposed protocols.

1.8.1 Customer Contact

While it may be argued that all of the working groups are critical, Cadmus recognizes the obvious implications for project success that adequate protocols governing customer contact must ensure. The likelihood of establishing a good response rate among industrial customers of NEEA's utility partners is predicated upon ensuring that customers understand approximately how much of their staff time is being requested to facilitate the study, what (if any) benefits they might derive from the study, why we are collecting the data we wish to collect, how that data will ultimately be used, who will have access to that data as necessary, and ensuring the utility partners have complete visibility over this process. While some of these issues will be addressed by the Data Security and Confidentiality Working Group, they have obvious relevance for those involved with Customer Contact protocols. We developed the protocol within this context.
The sample sites should include data from the Industrial Database that lists the relevant utility serving the site. Cadmus will work with NEEA and the Working Group to, ideally, connect us to the facility's account executive or energy efficiency representative, if one has been assigned. We recognize that this may be different for each utility. In our experience, utility customer-facing staff often possesses detailed knowledge of the facilities they work with, particularly among large industrial sites. This information can include the best contact with whom to arrange an on-site visit, as well as some of the preliminary assessment data (such as the facility's management structure, approach to energy management, and participation in utility incentive programs). At a minimum, we expect the utility can provide facility contact information sufficient to arrange an on-site visit.

We will refine the following site visit scheduling guidelines with the working group:

- All site-visit recruiting calls made by Cadmus to facilities will follow the script as approved by the working group and the coordination process described below.

- Information on sampled sites will be provided to the corresponding utilities as far in advance as possible, keeping in mind the somewhat compressed timeline of the IFSA. This list will contain information as collected within the Industrial Database, including firm/company name, address, facility contact information and title, as well as basic consumption information. Note this information will be accurate as of the time it was collected (2011/2012).

- The utility will be provided the first option to make the initial customer contact. If this option is chosen, the utility will then identify for Cadmus which sites they wish to contact. For those customers agreeing to participate, the utility will coordinate site visit scheduling with Cadmus. Those sites not identified for direct utility contact, will be contacted by Cadmus scheduling personnel.

- The person making the initial customer contact to schedule the visit will confirm that the facility contact is familiar with the facility and the end-use operational parameters to be verified. If the initial contact does not have this knowledge, an alternative contact will be sought. If no contact is aware of the operational parameters, Cadmus will select a replacement site.

- Upon agreement to participate, the contact will be queried about specific site requirements to be satisfied prior to walking on site such as a safety briefing, background check, special clothing, etc. In the event that specific site requirements, such as safety training, require more than two hours of field staff time prior to walking on site, Cadmus would have the option to reject that specific site.

- At the time the visit is scheduled, we will exchange contact information (such as name, telephone number—including cell phone—and e-mail address) so each party has the needed information if rescheduling the visit becomes necessary.

- To give the customer adequate notice, schedulers will attempt to make appointments at least one week in advance, providing more time if possible in advance. On the business day before the visit, field engineers will make confirmation calls, as necessary, to the site contact to confirm the appointment.

- Once a site is scheduled, Cadmus will provide a letter of introduction to tell the contact the purpose of the site visit and to present pictures of the field staff members for ease of identification by customers while on site.

- Cadmus will also provide to the customer the FAQs document.

- Cadmus will request from the participant any available data on energy using systems, their efficiency, operating hours, and operating patterns throughout the year; additionally requesting copies of previous energy studies performed, as well as status of energy efficiency upgrades. The Cadmus team’s lead engineer will work with the participant to refine an appropriate scope based on participant availability and time requirements.

- Cadmus will provide a utility data authorization form to be signed by the participant for the purpose of obtaining utility billing history in support of the energy use analysis.

1.9 Customer Contact Frequently Asked Questions

NEEA IFSA Frequently Asked Questions

Q: Who is NEEA?

A: The Northwest Energy Efficiency Alliance is a non-profit organization that uses the market power of the region to accelerate the innovation and adoption of energy-efficient products, services and practices. NEEA is supported by, and works in collaboration with, the Bonneville Power Administration, Energy Trust of Oregon and over 100 Northwest utilities on behalf of more than 12 million energy consumers.

Q: Who is Cadmus?

A: Cadmus is a consulting company contracted by NEEA to plan and perform the Industrial Facilities Site Assessment. NEEA chose Cadmus to conduct this work through a competitively bid process, which included input from regional utilities.

Q: What is the Industrial Facilities Site Assessment (IFSA)?

A: The IFSA is the industrial counterpart to NEEA's two other assessments, the Residential Building Stock Assessment (RBSA) and the Commercial Building Stock Assessment (CBSA). Stock (or Site) assessments provide information on the, age, characterization and energy efficiency potential of the sector (just within the Pacific Northwest). IFSA will provide the region with information useful for businesses (for better understanding the average/typical energy consumption of their peers), utilities (for use in program planning), researchers (for use in energy use characterization), as well as a key input into regional planning as conducted by the Northwest Power and Conservation Council (NPCC). The process is designed to gather aggregate end use consumption data from multiple sites in various industrial sectors. This data will be reported anonymously in a manner that will not compromise the proprietary information or operations of any facility.

The IFSA process is guided by four protocols developed by Cadmus under the direction of NEEA, utility representatives, and other regional stakeholders. Those four protocols are:

- Data Security and Confidentiality
- Data Collection and Database Design
- Sample Design
- Customer Contact

Q: How will this information be used?

A: We envision a number of different uses for the final study results, these include: 1) an assessment of conservation program potential for utilities in the region, NEEA, and energy efficiency organizations; 2) an input into the 7th power plan to be developed by the Northwest Power and Conservation Council; and 3) results of the study could be used by customers to gain a better understanding of how energy is used within their specific sector. These analyses should provide better methods for utilities to serve their industrial facility base with more targeted efficiency opportunities based on their specific industrial sector. The information can also allow the region to more effectively characterize current energy loads, plan to meet future loads, and ideally avoid expensive new power generation facilities that raise utility rates. Participants will also have an opportunity to discuss potential energy efficiency improvements with an independent engineer who isn't trying to sell them on a particular type of equipment.

Q: How many sites will be sampled during the IFSA?

A: Cadmus will conduct assessments on 120 facilities throughout the Northwest, spread across 21different industrial sectors. We will perform assessments on multiple facilities in each sector, ranging from three to twenty sites for those in the sectors that represent the largest portion of Northwest industrial energy use. Some sites will be selected based on their overall contribution to their industrial sector's overall energy consumption, while others will be sampled randomly.

Q: What is the process for collecting information from industrial sites?

A: Cadmus will notify the utility that provides service to each facility in the sample. The utility will be provided the first option to make the initial customer contact. If this option is chosen, the utility will then identify for Cadmus which sites they wish to contact. For those customers agreeing to participate, the utility will coordinate site visit scheduling with Cadmus. Those sites not identified for direct utility contact will be contacted by Cadmus scheduling personnel.

Cadmus field engineers will have specific questions for individuals familiar with plant/site processes and potentially individuals familiar with plant infrastructure. We will attempt to gather as much data as reasonable beforehand to make the on-site assessment more efficient.

Q: Can you provide a detailed list of the data that will be gathered during the IFSA?

A: Cadmus field engineers will gather sufficient data to characterize the energy consumption for each of the following end uses specified by the 2010 Manufacturing Energy Consumption Survey (MECS)[2]. Those end uses are:

- Indirect Uses - Boiler Fuel
  - Conventional Boiler Use
  - CHP and/or Cogeneration Process
- Direct Uses - Total Process
  - Process Heating
  - Process Cooling and Refrigeration
  - Machine Drive
  - Electro-Chemical Processes
  - Other Process Use
- Direct Uses - Total Nonprocess
  - Facility HVAC
  - Facility Lighting
  - Other Facility Support
  - Onsite Transportation
  - Conventional Electricity Generation
  - Other Nonprocess Use

The necessary data include equipment quantity, nameplate information, size or rating, annual operating hours, and other equipment-specific details. Based on this information, Cadmus will calculate the annual energy use for each end use and attempt to match that to the annual utility billing data.

[2] MECS survey information: http://www.eia.gov/consumption/manufacturing/

The Cadmus engineer will also conduct a brief (10-15 minute) operational practices survey with the facility manager, energy manger, or other appropriate staff member with detailed knowledge of the facility's energy practices. This information will provide information on each facility's potential for a strategic energy management plan.

Q: Will you collect information on electricity use? What about other types of fuels?

A: Yes. The IFSA will collect information regarding equipment that uses electricity, natural gas and other fuels as appropriate to individual sites. In addition, we will also assess the use of renewable energy and self-generation.

Q: How long will this assessment take?

A: Cadmus field engineers will remain on-site for no more than one day. The engineers will initially work with the site contact by phone or email to identify the specific information they hope to obtain, including motor inventories, energy studies, and any other details the site can provide on energy use parameters. At the site, Cadmus engineers will focus first on the systems expected to use the most energy, such as large motor systems, and then work their way down to smaller energy uses. Where necessary and permissible, Cadmus may send more than one field engineer to gather more on-site data. The Cadmus lead engineer for the project may follow up with the participant after the assessment to request more detail or try to determine the reason for any anomalies in the calculated energy use.

Q: Will utilities have the option to opt-out of the IFSA?

A: All building stock assessments, including those involving industrial sites, are based upon ensuring a representative sample. NEEA needs to draw a random sample from the region to be able to infer what is occurring across all industrial sites. From a research design standpoint, allowing entire service territories within the region to "opt-out" would diminish the value of being able to collect a truly representative sample. For this reason, NEEA is encouraging 100 percent participation from utilities where a random sample has identified sites in their service territories.

Q: Who will be able to see the data I provide?

A: Entities allowed to see the data provided are limited to:

1. Data Security Team (Cadmus and NEEA IT staff): responsible for loading and securing all data within Cadmus

2. Field staff engineers: responsible for collecting data on-site

Q: Where will the data be stored?

A: All data will be stored within Cadmus' data center located in Waltham, MA. The data center is managed and physically secured by SAAVIS. The SAVVIS facility has equipped physical security controls that include closed-circuit television (CCTV), ID badges, and biometric access. Access is limited to approved staff and all visits are logged by live guards 24/7.

Q: How will it be made secure?

A: There are 3 levels of security: physical, network/OS, and application. The physical level is managed by SAAVIS, as previously stated (above).

From a networking perspective:

All data are stored on Windows Server 2008 R2 machines that are part of the Cadmus domain and behind strict firewalls that only allow people to access data while remotely connected. Cadmus also manages security groups such that only approved individuals working on the project will have access to the files.

From an application perspective:

1. The IFSA data collection and reporting applications are designed to ensure that minimal information is accessible to users, such as NEEA staff and field engineers on other projects.

2. All users of the data collection, tracking, and reporting applications will be approved and granted specific rights to information by the Data Security Team. Rights for specific users are as follows:

    a. Field engineers – view and edit facility contact information and facility details

    b. Field schedulers – view and edit facility contact information

    c. Report users – view aggregated reports

    d. Analysts – view aggregated reports

3. All final reported data will be in aggregate form with no identifying details to connect the data back to a specific industrial facility.

Q: I don't want competitors to see my information. How will the data be kept confidential?

A: No information will be made publicly available. The end users, such as the Northwest Power and Conservation Council, will have access to aggregated reports that will not contain site-specific information. Only staff working on the study will have access to confidential information.

Each individual/group with access to your data will be required to sign non-disclosure agreements. Once access to information has been granted, the applications through which your data will be made available are designed to maintain anonymity, such that your facility's identifying information will not be exposed directly or indirectly.

Q: How will my data be used?

A: Cadmus will gather information on energy use for various end uses in multiple facilities in targeted industrial sectors. We will calculate the end use consumption data by industrial sector using a weighted average. The data will further be masked by reporting it on the basis of kWh per employee or unit of production. The final report will provide data for each end use in each industrial sector as described here, but without reporting any facility's actual energy consumption, employee numbers, or production information.

Q: What is the data transfer process?

A: All data are transferred via Secure FTP (encrypted).Each party involved in the transfer will be supplied with a username and complex password (8 or more alpha-numeric characters).
The receiving party is notified via email by the sending party that files are being transferred. Once the files have been received, the receiving party sends the appropriate response indicating that the transfer was successful.

Q: What is the data removal process?

A: The Cadmus Data Security Team will remove all site-specific data from our servers upon notification from NEEA that the study is complete. When this occurs, all data will be wiped from any storage facilities where data reside. NEEA will then be notified that all data have been successfully removed.

Q: What is the reporting protocol for security breaches?

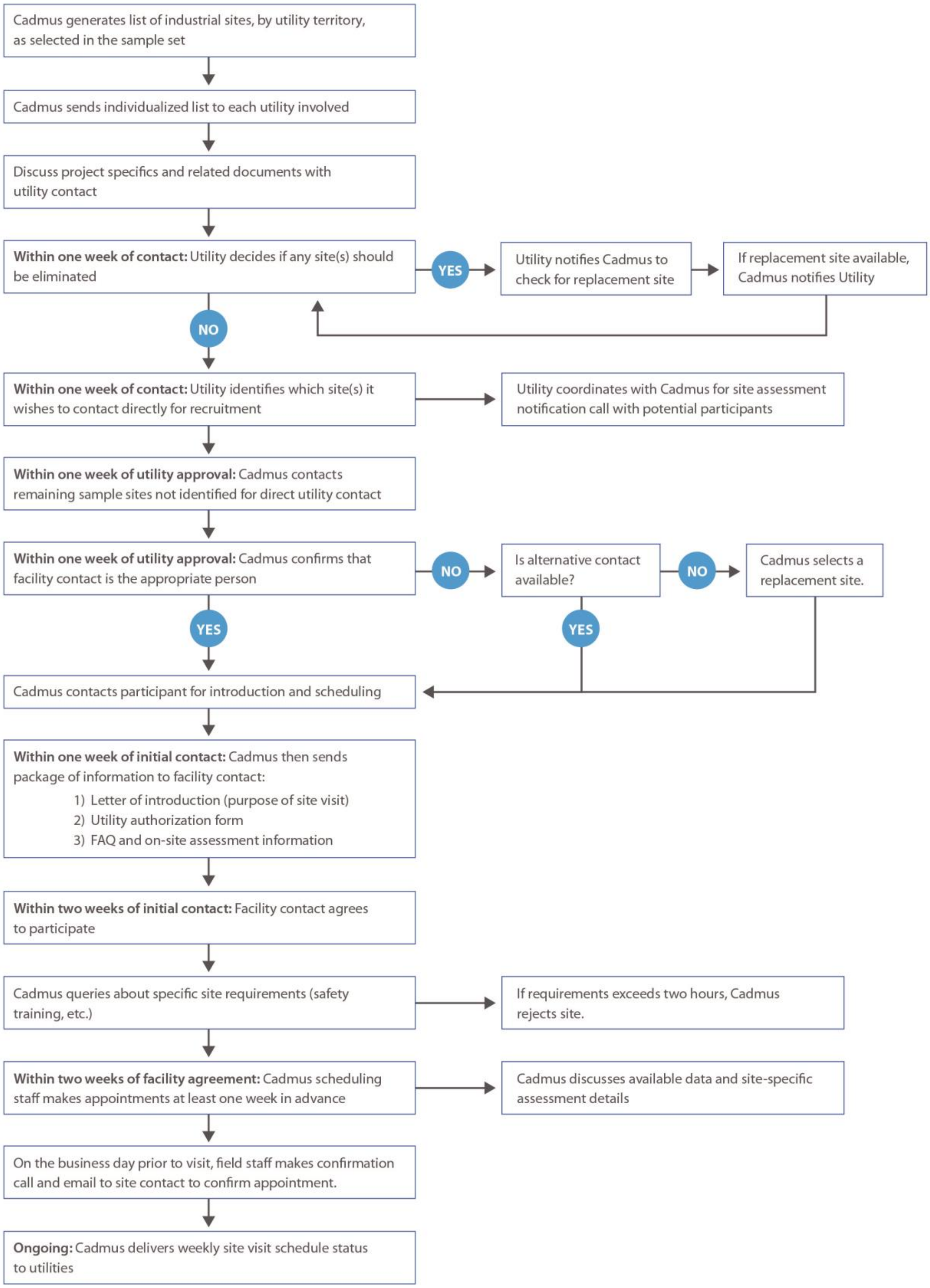
A: A security breach is defined as the point at which control of the data is lost. Should such a breach occur within Cadmus, Cadmus' CIO, Matt Pierce, will be notified and will be responsible for reporting the breach to NEEA and affected parties.
Other security events that do not result in breaches may also be reported, depending on the severity of the event. For example, a failure to follow protocol resulting in data being sent via email rather than Secure FTP, which did not result in a loss of control of the data. This type of event will be reported to Cadmus' CIO and NEEA, but most likely will not require further notification.

Q: Who can I contact for more information?

A: NEEA: Steve Phoutrides, sphoutrides@neea.org or (503) 688-5488

Cadmus: Jeff Cropp, jeff.cropp@cadmusgroup.com or (503) 467-7120

1.10 Decision Tree for Customer Contact Notification Process



1.11 Initial Draft Contact Email / Letter (for utility use)

Hello [*contact*]. The Northwest Energy Efficiency Alliance (NEEA) is conducting an industrial facility site assessments throughout the Pacific Northwest to better understand industrial energy usage characteristics within the region. NEEA has hired Cadmus to implement this important study. We spoke with [*utility contact*] at your utility company, [*utility*], and he/she gave us permission to contact you directly.

We have an engineer available to visit your facility between [*date range*]. The visit is anticipated to take [*time*] hours to complete. Is there a time on either of those days that you would prefer for our engineers to come to your site?

We have provided more information on the study below, and at the links below. Please let us know if you have questions, and we'd be glad to discuss the study with you further.

Thank you,

[*Cadmus contact staff member*]

<u>Background:</u>

- The Industrial Facility Site Assessment (IFSA) is being undertaken by NEEA in close coordination with the Bonneville Power Administration (BPA), Energy Trust of Oregon (ETO), and its utility partners throughout the Northwest. The end result of this assessment will be a report to NEEA summarizing the industrial energy use characteristics and power requirements for the Pacific Northwest region. The reported data and information will not be identifiable by individual facility sites. The data collected, which will remain confidential, provides critical information for planning among NEEA's utility partners, for NEEA itself, as well as a key input into the Northwest Power and Conversation Council power planning efforts.

- Customers can review the information for their site to gain a better understanding of how energy is used in their facilities. They can also discuss potential energy efficiency improvements with an independent engineer on-site who isn't trying to sell you a particular product or system.

- Engineering technicians (field staff) are all trained in assessing energy use in industrial facilities, and are aware of industrial safety and site requirements.

- Site visits should take up to 2 hours, depending on the size and complexity of the facility's energy systems.

- During the walk-through, it would be most helpful if the facility escort is familiar with all facility energy uses and associated equipment, as well as recent energy projects/improvements.

- For industrial sites, there may be a requirement for safety training and other proprietary concerns to be addressed prior to the walk-through. Should the training requirement exceed two hours, the site may be rejected.

1.12 Notification Call Script (for Cadmus notification and scheduling)

- Please make sure to use a professional tone and language.
- Confirm that contact person is familiar with facility operations; if not, request to speak with the appropriate person.
- When speaking to the contact person, please follow the language in the script below.
- Follow-up with an email to confirm visit schedule and contact information. Also include the customer FAQ, utility authorization form, and the customer contact protocols.

Background:

- The Industrial Facility Site Assessment (IFSA) is being undertaken by NEEA in close coordination with the Bonneville Power Administration (BPA), Energy Trust of Oregon (ETO), and its utility partners throughout the Northwest. The end result of this assessment will be a report to NEEA summarizing the industrial energy use characteristics and power requirements for the Pacific Northwest region. The reported data and information will not be identifiable by individual facility sites. The data collected, which will remain confidential, provides critical information for planning among NEEA's utility partners, for NEEA itself, as well as a key input into the Northwest Power and Conversation Council power planning efforts. Customers can review the information for their site to gain a better understanding of how energy is used in their facilities. They can also discuss potential energy efficiency improvements with an independent engineer on-site who isn't trying to sell you a particular product or system.
- Engineering technicians (field staff) are all trained in assessing energy use in industrial facilities, and are aware of industrial safety and site requirements.
- Site visits should take from 4 to 8 hours, depending on the size and complexity of the facility's energy systems.
- During the walk-through, it would be most helpful if the facility escort is familiar with all facility energy uses and associated equipment, as well as recent energy projects/improvements.
- For industrial sites, there may be a requirement for safety training and other proprietary concerns to be addressed prior to the walk-through. Should the training requirement exceed two hours, the site may be rejected.

Site Visit Scheduling Script:[for customers not recruited by local utility]

[script to be expanded to include skip options, strategy for recruitment questions, etc.]

Hi, my name is _____________ from Cadmus. I am calling on behalf of (NEEA/utility) about the Industrial Facility Site Assessment for the purpose of gathering end use consumption data from facilities in various industrial sectors to support regional energy efficiency planning efforts. NEEA has hired Cadmus to conduct a field survey of a select sample of industrial facilities throughout the Pacific Northwest to better understand industrial energy usage characteristics within the region. As part of our work, we are conducting on-site visits for a sample of facilities in your area.

We have an engineer/technician, <Insert Field Staff Name if known>, in the field on _<Insert date range>. The visit is anticipated to take ______ hours to complete. Is there a time on either of those days that you would prefer for our technicians to come to your site?

Are there any specific site requirements for visitors to be addressed prior to the walk-through? [a list of typical requirements should be available]

May I confirm the facility address and name of the person to contact upon our arrival?

Thank you for your time and willingness to participate in this very important regional assessment!

1.13 On-Site Assessment Information(for participant)

The Cadmus Team will contact your facility to obtain initial information, followed by a one-day site assessment to collect end use equipment and operating data. The team then performs a detailed analysis to calculate the estimated energy consumption for each major end use in your facility. The end use data will be combined with data from other facilities in the same industrial sector and be reported in aggregate (and anonymously) to the Northwest Energy Efficiency Alliance (NEEA).

Pre Site Visit Schedule

- **Initial Discussion (30 min) –**We would like to coordinate a time and date for the on-site assessment, as well as briefly review your processes and major equipment. We would also like to address any of your questions related to the on-site work and how the resulting data will be used and reported.

- **Baseline Data Collection (1 to 2 weeks) -** We will collect preparatory data such as an annual profile of your monthly energy bills and 15-minute interval data, if available from your utility. We need your permission to obtain this information directly from your utility companies.

Site Visit Agenda

For the on-site assessment, a team of Cadmus engineers will spend the day touring your facility and collecting data on your process and the operation of your equipment. Our visit will last about eight hours, and include the following parts.

- **Introductions (10 to 15 min) -** We would like a few minutes to meet the staff who will guide our field engineers around the facility and answer questions.

- **Plant Tour (30 min to 1 hr) -** We would like to spend a brief period touring your plant with an employee who has knowledge about all aspects of your plant. It will help us work more efficiently if the person leading the tour can point out areas we should focus on.

- **Data Collection (4 to 8 hrs) -** We will collect required information including measuring temperatures, pressures, power, and flow rates, as well as collecting operating schedules, quality statistics, and downtime reports. We will need assistance from qualified plant personnel when measuring electrical loads and steam temperatures. We may request to install motor run-time loggers or other meters on select pieces of equipment to gather more data on annual operating hours.

- **Wrap-up meeting (30 min) -** Before we leave we would like to meet with key members of your staff to discuss the data we've collected and clarify any issues or discrepancies with the operating parameters we've obtained. We would like confirmation that we've collected sufficient data on the systems that contribute most to end use consumption.

- **Operational Practices Survey (15 min) -** The Cadmus engineer will also conduct a brief (10-15 minute) operational practices survey with the facility manager, energy manger, or other appropriate staff member with detailed knowledge of the facility's energy practices.

1.14 Additional Data Requests

If you can provide any of the following information before we get to your facility we will be able to do an even better job assessing the end use consumption. Please return the "Utility Data Authorization Form" at your earliest opportunity.

- Production records for the same 12-month period as the utility bills. Monthly production records help explain variations in productivity and energy use. Whatever measures you have, such as number of units or pounds, would be fine.

- To aid us in gathering data it will be helpful for us to spend some time with people filling the positions listed in the following table.

Position	Name	Phone Number
Electrician		
Plant Engineer		
Production Manager		
Maintenance/Facilities Manager		
Environmental Manager		

- Plant layout showing main buildings, dimensions, production and office areas, and equipment would be helpful if you have one.

- Equipment lists. We will need to gather nameplate data for major production equipment at the plant, including motors, compressors, and boilers. Equipment lists are helpful if you already have them.

- Previous assessment. Any reports you already have, including partial studies for process equipment, waste, lights, power factor, or refrigeration, will be helpful. For example, if a previous study includes a list of equipment, we can avoid duplicating that effort.

- Report. A quarterly or annual report or product brochure, if available, will help us learn more about your operation.

1.15 Utility Data Authorization Form (for participant)

I hereby give permission to the servicing utility or utilities listed below, or their agents, to provide the Northwest Energy Efficiency Alliance (NEEA) and its contractors with energy use information related to this business. This information is being collected as part of a research project sponsored by the NEEA to gain a better understanding of energy use characteristics of industrial facilities in the Pacific Northwest and to help update the regional power plan.

I authorize the utilities supplying my fuel and/or electricity to provide monthly usage histories and interval meter data, where available, for the past thirty-six months. I understand that this information will remain confidential, and will be used for purposes of statistical analysis only. I further understand that the information related to my business will not be published, and neither NEEA nor its contractors will contact me for advertising or promotional purposes.

A photocopy of this authorization may be accepted with the same authority as the original. Data will be provided for multiple meters at a single premise provided they are on the above noted utilities account(s)

Authorized by (please print): ______________________________

Title: ______________________ Tel.: ______________________

Service Address: Business Name: ______________________________

Street: ______________________________

City, State, Zip: ______________________________

Servicing Utilities (check Gas or Electric, and print full name of each utility company):

❑ Electric Meter Num.: ______________________

❑ Gas Name: ______________________ Acct. Num.: ______________________

❑ Electric Meter Num.: ______________________

❑ Gas Name: ______________________ Acct. Num.: ______________________

Please fill out the information and give to the auditor –or– fax this signed waver back to:

Cadmus, Attn: Jeff Cropp at

Fax: (503) 228-3696

Email: jeff.cropp@cadmusgroup.com

If you have any questions, please call Steve Phoutrides of NEEA at (503) 688-5488.

Appendix G. Sample Site-Specific Report

NEEA Industrial Facility Site Assessment Report – [*sample facility*]

The Northwest Energy Efficiency Alliance (NEEA) is a non-profit organization that uses the market power of the region to accelerate the innovation and adoption of energy-efficient products, services, and practices. NEEA is supported by, and works in collaboration with, the Bonneville Power Administration, Energy Trust of Oregon, and over 100 Northwest utilities on behalf of more than 12 million energy consumers.

Industrial Facilities Site Assessment

The Industrial Facilities Site Assessment (IFSA) is the industrial counterpart to NEEA's two other site (stock) assessments, the Residential Building Stock Assessment (RBSA) and the Commercial Building Stock Assessment (CBSA), which provide information on the age, characterization, and energy efficiency potential of the sector. The results of the IFSA study can be used by:

- Industrial facilities, to gain a better understanding of how energy is used within their specific industry in the region
- Energy efficiency organizations, to assess the potential for industrial energy conservation programs in the region
- Utilities, to serve their industrial facility base with more targeted efficiency opportunities based on their specific industrial sector
- Regional personnel, to more effectively characterize current energy loads, provide more accurate forecasts of energy demand, and, in turn, avoid unnecessary power generation facilities that raise utility rates
- The Northwest Power and Conservation Council (NWPCC), to help develop the region's Seventh Power Plan
- Researchers, to understand the industrial energy use characterization in the region

The IFSA process was designed to gather aggregate end use consumption data from 120 sites across 11 industrial sectors throughout the Northwest. Assessments are performed on multiple facilities in each sector, ranging from three to twenty sites for those types of facilities in the sectors that represent the largest portion of Northwest industrial energy use. The sites are sampled randomly, with the exception of some sites that are automatically included due to their overall contribution to their industrial sector's overall energy consumption.

With funding in part from Avista Utilities, this effort is being managed by NEEA in coordination with Cadmus, Nexant, and Energy350. Results from the IFSA will help the region characterize energy use in the industrial sector and ensure that aggregate estimates of future energy demand are as accurate as possible. With accurate energy forecasts, the regional utilities will be able to plan and allocate resources cost-effectively, benefitting the entire region.

Utility Data

The Cadmus assessment team first analyzed [*sample facility*]'s annual energy use. Avista provided monthly electricity (kWh) and natural gas (MMBtu)[3] consumption data for 2012. This information is shown in Figure 2and Figure 3, respectively.

Figure 2.Monthly Electricity Consumption (kWh) in 2012

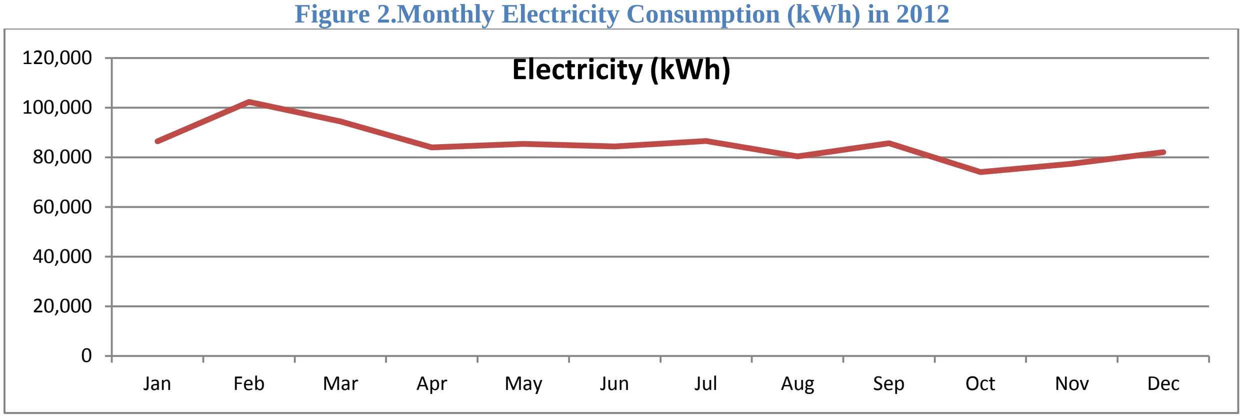
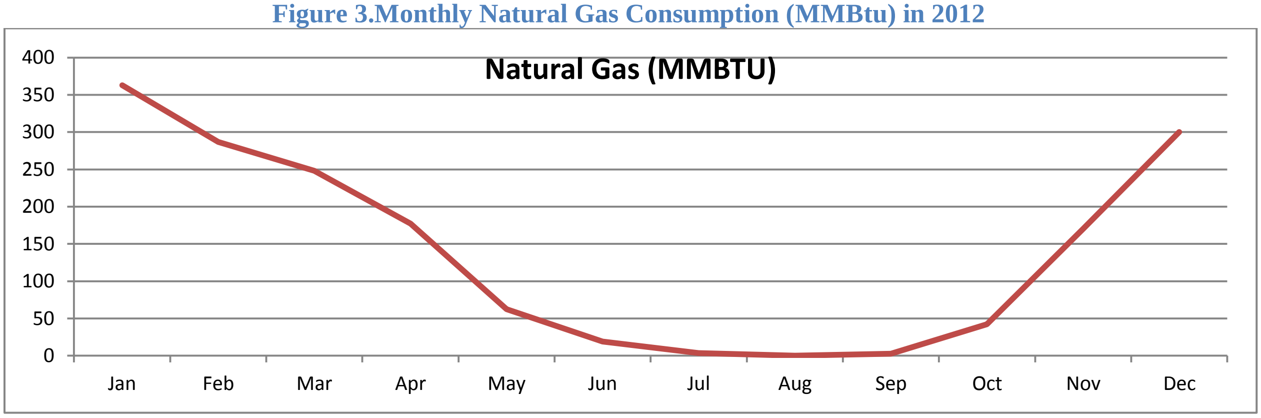


Figure 3.Monthly Natural Gas Consumption (MMBtu) in 2012



Energy Mapping

Based on information the assessment team gathered, we performed a detailed analysis to calculate the estimated energy consumption for each major end use in the facility. At the end of the study, we will combine the facility end use data with that from other facilities in the same industrial sector, and will report the results in aggregate (and anonymously) to NEEA.

The field engineers gathered sufficient data to characterize the energy consumption for each end use listed in Table 8 and specified by the 2010 Manufacturing Energy Consumption Survey

[3] MMBtu = millions of British thermal units. One MMBtu is equivalent to 10 therms.

(MECS).[4]The table illustrates the overall energy mapping of the facility based on 2010 MECS end uses.

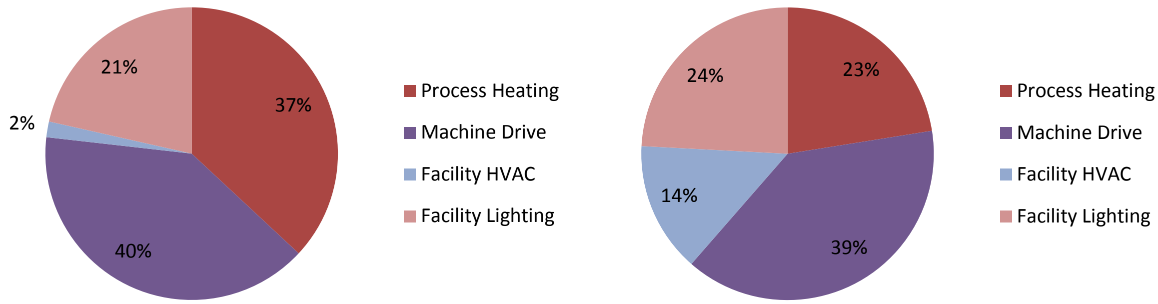
Table 8.Overall Energy Mapping Based on 2010 MECS End Uses

	Fuel Type	Unit	Electricity	Natural Gas
Indirect Uses-Boiler Fuel			0.00	0.00
Conventional Boiler Use	Natural Gas	MMBTU	NA	0.00
Conventional Boiler Use	Electricity	kWh	0.00	NA
CHP and/or Cogeneration Process	Diesel or Distilate	Gallons	NA	NA
Direct Uses-Total Process			794,378.29	0.00
Process Heating	Natural Gas	MMBTU	-	0.00
Process Heating	Electricity	kWh	382,074.51	-
Process Cooling and Refrigeration	Electricity	kWh	0.00	NA
Machine Drive	Electricity	kWh	412,303.79	NA
Pumps	*Electricity/MD*	*kWh*	0.00	NA
Fans	*Electricity/MD*	*kWh*	7,916.81	NA
Compressed Air	*Electricity/MD*	*kWh*	67,288.33	NA
Material Handling	*Electricity/MD*	*kWh*	0.00	NA
Material Processing	*Electricity/MD*	*kWh*	337,098.65	NA
Other Systems	*Electricity/MD*	*kWh*	0.00	NA
Electro-Chemical Processes	Electricity	kWh	0.00	NA
Other Process Use	Electricity	kWh	0.00	NA
Direct Uses-Total Nonprocess			240,030.48	1,674.80
Facility HVAC	Natural Gas	MMBTU	NA	1,674.80
Facility HVAC	Electricity	kWh	17,940.00	NA
Facility Lighting	Electricity	kWh	222,090.48	NA
Other Facility Support	Electricity	kWh	0.00	-
Onsite Transportation	Electricity	kWh	0.00	NA
Conventional Electricity Generation	Natural Gas	MMBTU	NA	0.00
Other Nonprocess Use	Electricity	kWh	0.00	-
TOTAL			**1,034,408.77**	**1,674.80**

Our analysis revealed that 77% of total electricity consumption was process related, while 23% was non-process related. Figure 53a displays the analysis results for the distribution of total electricity consumption within applicable end uses on the site. The typical distribution of total electricity consumption for the same industrial sector in the corresponding region, according to the 2010 MECS, is shown in Figure 53b.

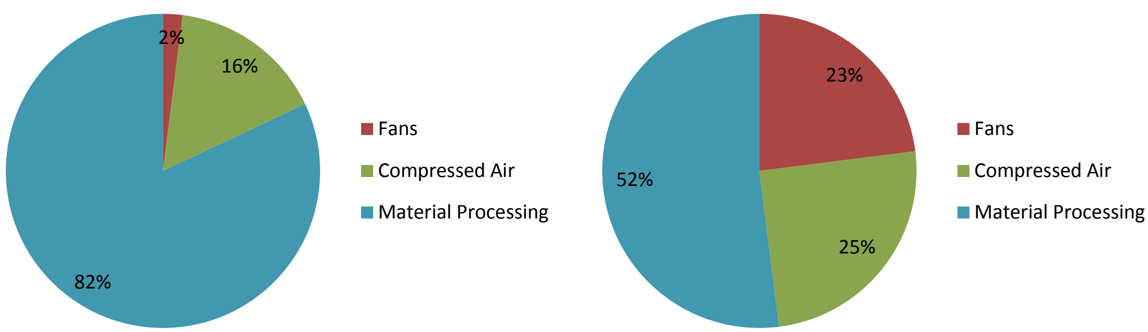
[4] MECS survey information is available online: http://www.eia.gov/consumption/manufacturing/

Figure 4. Total Electricity Distribution
Figure 53a. Analysis Results for the Site **Figure 53b. 2010 MECS Results**



The analysis results for the Machine Drive end use are further explained with composing end uses in Figure 54a, while Figure 54bpresents the 2010 MECS distribution.

Figure 5.Machine Drive Distribution
Figure 54a. Analysis Results for the Site **Figure 54b. 2010 MECS Results**



One-hundred percent of the total natural gas consumption in the facility is non-process related, (HVAC) as shown in Figure 55a. Figure 55b displays the typical natural gas distribution based on 2010 MECS.

Figure 6.Total Natural Gas Distribution

Figure 55a. Analysis Results for the Site

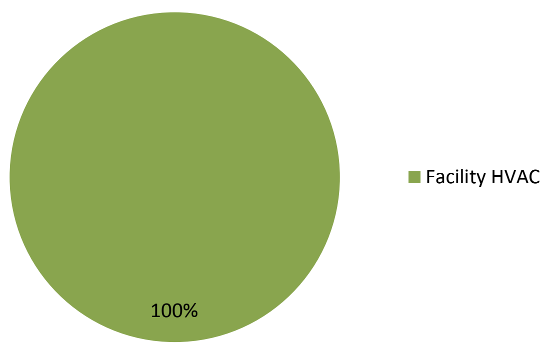
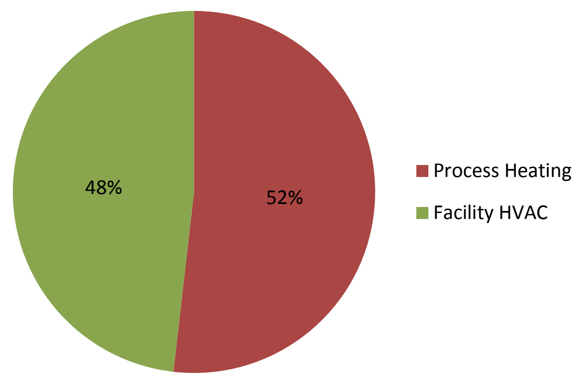


Figure 55b. 2010 MECS Results



Site Observations and Opportunities

The Cadmus team field engineers identified the following opportunities for energy efficiency improvements based on their observations during the assessment:

- The heated processing tanks are uncovered during operating hours due to relatively frequent equipment transfer between these tanks. Significant electricity saving and some water savings (from evaporation) can be achieved by installing practical insulated covers on these tanks.

- The recorded air compressor pressure was 145 psi. By identifying and fixing air leaks throughout the plant, the air compressor can be operated at a lower pressure. Every 2 psi reduction in air compressor pressure saves 1% of total air compressor consumption.

- According to the facilities maintenance personnel, the roll-up door next to the machine shop operates quite often and stays open for several minutes each time. Since the main plant is heated during winter, natural gas can be saved by installing an air curtain on top of the roll-up door, preventing excessive heat transfer.

Avista Energy Efficiency Programs

Avista offers a variety of rebate and incentive programs for its industrial customers in [*state*]. These programs can be divided into two groups: (1)Standard Rebate and Incentive Programs and (2) Custom and/or Site-Specific Programs. Some of the standard rebates are for:

- Interior and Exterior Lighting Conversions

- Premium Efficiency Motors

- Customer Retro-Commissioning
- Green Motors Initiative

Custom and Site Specific Programs incentives are available for many energy efficiency projects, in addition to the standard rebates and incentives. Avista works with qualifying customers to identify opportunities within their facilities that can be operated operate more efficiently. Cash incentives are available for hard-wired improvements that result in verifiable energy savings. The incentive is based on the first-year energy savings in kilowatt-hours.

To be eligible for incentives, customers need to contact Avista prior to purchasing any equipment or services. Avista does not pay site-specific incentives for projects that are already under construction or that are being developed without Avista's involvement.

For more information, please visit Avista website[5] and contact **[*account executive*]** to inquire about incentives.

Avista Account Executive for [*location*]:
Name: [*account executive*]
Office:
Cell:
Fax:
E-mail:

[5]Rebates are listed on the Avista website: http://www.avistautilities.com/business/rebates/Pages/IDCommercialRebates.aspx

Appendix H. Proposed Energy Efficiency Opportunities

The following information represents energy efficiency opportunities identified by field engineers during the on-site assessment, organized by NAICS code. The team included these recommendations in site-specific reports to be provided to each participant. The individual recommendations for each site have been aggregated to the list below.

NAICS 311

- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Use blowers instead of air compressor
- Install high efficiency air dryer
- Install VFDs on motors with varying loads (pumps, fans, etc.)
- Recover waste heat
- Install automatic controllers in process equipment
- Optimize scheduling for HVAC equipment
- Utilize free cooling through cooling tower water
- Consolidate chilled storage rooms to a single area
- Upgrade lighting
- Replace compressed air pneumatic pump with electric pump
- Replace old equipment(air compressors, process chiller, etc.) with new, more efficient, VFD model
- Retrofit air-cooled refrigeration system to water-cooled refrigeration system
- Upgrade refrigeration system controls (implement condenser reset strategy, optimize sequencing/staging of compressors, etc.)

NAICS 321

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Install VFDs on motors with varying loads (defibrators, conveyor belts, etc.)
- Reduce equipment idle time
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Recover waste heat from air compressors
- Insulate equipment (boiler, steam lines, etc.)
- Reduce equipment idle time
- Install high efficiency air dryer
- Replace old equipment (air compressors, refrigeration units, etc.) with new, more efficient, VFD model
- Install VFDs on motors with varying loads (bag house, etc.)
- Insulate building envelope (roofs, walls, doors, etc.)
- Enclose glue curing process

NAICS 322

- Reduce equipment idle time
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Install high efficiency air dryer
- Recover waste heat from air compressors
- Replace old equipment(coarse and fine screen rotors) with new, more efficient model
- Install VFDs on motors with varying loads
- Insulate equipment (steam lines, etc.)
- Recover waste heat from digester blow gases
- Upgrade paper machines
- Implement fine bubble diffusion for aeration
- Implement thick-bed combustion of hog fuel
- Add carbon dioxide to brown stock washers
- Reduce fresh water consumption
- Collect/reuse mill hot water
- Conduct quarterly combustion analysis on boilers to help optimize the combustion ratio

NAICS 324

- Upgrade lighting
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Upgrade compressed air system controls (install VFD on the trim compressor)
- Convert plant-wide voltage from 240 V to 480 V

NAICS 325

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Reduce equipment idle time
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Reduce refrigeration discharge pressure and suction pressure
- Replace old equipment (pumps, presses, etc.) with new, more efficient model
- Install VFDs on motors with varying loads (air compressors, augers, fans, etc.)
- Retrofit radiant heater controls with outdoor air temperature lockout

NAICS 326

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Reduce lighting power density throughout facility
- Install portable task lighting

- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Use blowers instead of air compressor
- Install high efficiency air dryer
- Recover waste heat from air compressors
- Replace equipment (air compressor, etc.) with properly sized models
- Install VFDs on motors with varying loads (blowers, etc.)
- Install automatic shut off controls for motors associated with equipment that is involved in batch processing
- Optimize scheduling for process heaters and coolers
- Install properly designed ductwork to utilize waste heat released from freezers

NAICS 327

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Recover waste heat from air compressors
- Replace old equipment with new, more efficient model
- Install VFDs on motors with varying loads (pumps, blowers, mixers, conveyor belts, etc.)
- Install automatic shut off controls for motors associated with equipment that is involved in batch processing
- Insulate equipment (steam generator, steam lines, etc.)
- Insulate building envelope (roofs, walls, doors, etc.)
- Conduct quarterly combustion analysis on boilers to help optimize the combustion ratio

NAICS 331

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Reduce lighting power density throughout facility
- Reduce equipment idle time
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Use blowers instead of air compressor
- Install high efficiency air dryer
- Increase compressed air storage capacity
- Recover waste heat from air compressors
- Replace old equipment(air compressors, chillers, etc.) with new, more efficient, VFD model
- Install VFDs on motors with varying loads (chillers, pumps, fans, etc.)
- Replace equipment (fans, etc.) with properly sized models
- Upgrade fan speed control

- Install larger cooling tower and utilize for water side economizing
- Insulate building envelope (roofs, walls, doors, etc.)
- Recover waste heat
- Install precise infrared temperature sensors to reduce furnace consumption
- Optimize scheduling for HVAC equipment

NAICS 332

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Reduce lighting power density throughout facility
- Reduce equipment idle time
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Install high efficiency air dryer
- Replace old equipment(air compressors, pumps, etc.) with new, more efficient, VFD model
- Install VFDs on motors with varying loads (pumps, fans, material handling equipment, etc.)
- Replace equipment (conveyor motors, etc.) with properly sized models
- Optimize scheduling for exhaust fans
- Optimize scheduling for water pumps
- Recover waste heat
- Upgrade to inverter duty welders
- Further reduce pre-heat oven temperatures during non-production times
- Schedule paint booth exhaust fans so they do not run when the booth is off
- Upgrade forced air natural gas heating to radiant heating
- Optimize scheduling for HVAC equipment
- Retro-commission roof top HVAC units

NAICS 334

- Upgrade lighting
- Reduce equipment idle time
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Recover waste heat
- Convert generators to UPS with high efficiency ratings
- Conduct quarterly combustion analysis on boilers to help optimize the combustion ratio

NAICS 336

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Reduce lighting power density throughout facility

- Reduce idle time on motors, fans, pumps
- Upgrade compressed air system (minimize wasted air – leaks, nozzles; reduce pressure; etc.)
- Upgrade compressed air system controls (optimize compressor sequencing, etc.)
- Use blowers instead of air compressor
- Increase compressed air storage capacity
- Recover waste heat from air compressors
- Replace old equipment (presses, etc.) with new, more efficient model
- Consolidate small fans to a central fan
- Insulate equipment (heated processing tanks, roll-up doors, etc.)
- Install air curtain on roll-up door
- Install vinyl curtains between conditioned and unconditioned spaces
- Upgrade to inverter duty welders
- Optimize scheduling for plant equipment to reduce peak demand

NAICS 493

- Upgrade lighting
- Install motion sensors on lighting fixtures
- Recover heat from compressors
- Replace vinyl curtains more frequently