

Job/Task Analysis for an Energy/ Sustainability Manager: Public Comment Draft

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Energy/Sustainability Manager Job Description

An Energy/Sustainability Manager monitors energy and material consumption in facilities by performing site audits and conducting energy and sustainability analyses, to identify opportunities to increase building efficiencies, promote renewable resources, and minimize the social, environmental, and financial impacts of an organization's operation.

A proposed content outline resulting from this Job/Task Analysis follows.

Energy/Sustainability Manager	
A	Developing Strategic Plans
B	Performing Site Audits
C	Performing Energy and Sustainability Accounting and Analysis
D	Improving Energy Efficiency and Sustainability
E	Communicating with Others

This Job/Task Analysis used input from a broad group of industry practitioners and was facilitated by Professional Testing, Inc. for the National Renewable Energy Laboratory and the U.S. Department of Energy.

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1.0 Introduction

The National Renewable Energy Laboratory secured the services of Professional Testing to help develop a job/task analysis (JTA) for energy/sustainability managers.

JTA is a procedure for analyzing the tasks performed by individuals in an occupation, as well as the knowledge, skills, and abilities required to perform those tasks. Specifically, a JTA can be defined as “any systematic procedure for collecting and analyzing job-related information to meet a particular purpose” (Raymond 2001). JTA can be used to describe, classify, and evaluate jobs; ensure compliance with legal and quasi-legal requirements; develop training, promote worker mobility, plan workforces, increase efficiency and safety, and appraise performance (Brannick et al. 2007).

JTA is traditionally used by secondary and postsecondary educators, test developers, and business, industry, government, and military trainers to help identify core knowledge areas, critical work functions, and skills that are common across a representative sampling of current practitioners.

This project used the “developing a curriculum” (DACUM) method to conduct a JTA. DACUM is an occupational analysis led by a trained facilitator, where practitioners in a specific occupation come together for a multiday workshop to provide input about the specific tasks, knowledge, and skills needed to perform their job.

This document provides draft results of the analysis and will form the basis for a subsequent “industry validation” phase, where a larger group of industry practitioners will evaluate the list of job-related tasks. This group will ensure that the identified tasks and weighting factors accurately represent the job of an energy/sustainability manager. This step will also provide an opportunity for industry to identify any missed tasks or any that were included erroneously.

The content presented in this document was created by industry practitioners and is intended to portray the job of an energy/sustainability manager as currently practiced.

2.0 Subject Matter Expert Selection Process

Professional Testing helped to establish the criteria for selecting the DACUM panel of subject matter experts (SMEs). To be eligible for the workshop panel, applicants were required to submit an electronic application and to demonstrate that they were active practitioners in their field. To create a representative panel of practitioners, Professional Testing selected SMEs from a larger applicant pool to ensure:

- Geographic diversity
- Representation of a wide range of experience levels (novice to expert)
- No single organization or organization size dominated the group
- All sectors were represented with no single sector dominating (public versus private)
- Diversity of industry-related credentials, represented by the panelists.

Ten applicants meeting the above criteria were selected to create the energy/sustainability manager SME panel.

3.0 Job/Task Analysis Workshop

The energy/sustainability manager JTA workshop was held in Greenwood Village, Colorado, May 24-26, 2011.

The DACUM Philosophy:

- Practitioners can describe and define their jobs more accurately than anyone else.
- One of the most effective ways to define a job is to describe the tasks practitioners perform.
- All jobs can be effectively and sufficiently described in terms of the tasks successful workers perform.
- All tasks, to be performed correctly, demand certain knowledge, skills, abilities, attributes, and tools.

Day 1 consisted of an introduction to the DACUM process. The trained DACUM facilitator explained the JTA process and provided the SME panel with duty and task statement definitions. A duty reflects a large area of work for a specific profession; multiple tasks describe how to perform each duty. The presentation then shifted to a discussion about energy/sustainability managers, more specifically the “who, how, what, and why” of the profession. The SME panelists compiled this information into a comprehensive list to capture key energy/sustainability manager job components.

The next step was to identify duty (or domain) areas. Once the SME panelists reached consensus on the duty areas, they delineated each duty by identifying the required tasks.

On Day 2, the facilitator projected a spreadsheet that contained the identified duty areas and corresponding task statements. The SMEs were asked to list the

steps under each task and to identify the knowledge, skills, abilities, and tools needed to complete each task.

On Day 3, work concluded with the SMEs finalizing an overarching job description for energy/sustainability managers.

4.0 Results

This document presents aspects of an energy/sustainability manager, as captured by the 10-member panel during the May 24-26, 2011 JTA workshop in Greenwood Village, Colorado. The tables that follow reflect job requirements and are meant to provide a clear understanding and detailed description of the work performed.

5.0 References

Brannick, M. T., Levine, E. L., & Morgeson, F. P. (2007). *Job and work analysis: Methods, research and applications for human resource management*. Thousand Oaks, CA: Sage.

Raymond, M.R. (2001). Job analysis and the specification of content for licensure and certification examinations. *Applied Measurement in Education* 14(4), 369-415.

6.0 Nomenclature

Table 1 provides a list of the acronyms and abbreviations used in this document. In addition to increasing the efficiency of communications, many technical and process acronyms are useful in memory retention and learning. Occupational acronyms are therefore of interest to trainers and curriculum designers.

Table 1: List of Acronyms and Abbreviations

Nomenclature	Definition
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BCA	Building Commissioning Association
BOMA	Building Owners and Managers Association International
CB ECS	Commercial Buildings Energy Consumption Survey
DACUM	Developing a curriculum
eGRID	Emissions & Generation Resource Integrated Database
EIS	Environmental impact statement
EISA	Energy Independence and Security Act
EO	Executive Order
EPA	Environmental Protection Agency
EPAct	Energy Policy Act
EPEAT	Electronic Product Environmental Assessment Tool
ESPC	Energy savings performance contracting
F	Fahrenheit
GSA	General Services Administration
HVACR	Heating, Ventilation, Air-Conditioning, and Refrigeration
IESNA	Illuminating Engineering Society of North America
IFMA	International Facilities Management Association
JTA	Job/task analysis
KSA	Knowledge, skills, and abilities
MERV	Minimum efficiency reporting value
MOU	Memorandum of understanding
MSDS	Material safety data sheets
NEBB	National Environmental Balancing Bureau
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and maintenance
PPE	Personal protection equipment
RCRA	Resource Conservation and Recovery Act
RFI	Request for information
RPN	Responsible Purchasing Network
SME	Subject matter expert
UESC	Utilities energy services contract
US	United States
USGBC	United States Green Building Council
WRI	World Resources Institute

7.0 Proposed Content Blueprint

The SMEs rated the list of job-related duties and tasks defined during the JTA workshop based on a two-factor scale: the importance of the duty area or task to overall job performance and the frequency with which duties and tasks are performed. The result is a weighted ranking of the duties and tasks known as a *content blueprint*.

The proposed content blueprint provides an initial basis from which an assessment (e.g., a certification or licensure examination) may be constructed and provides curriculum developers with a model to align training to the core needs of the occupation.

Table 2: Proposed Content Blueprint for Energy/Sustainability Managers

Duties and Tasks		Weighting
A	Developing Strategic Plans	26%
1	Set-up Task Force	2%
2	Select Program Team	2%
3	Assess Existing Conditions	3%
4	Identify Future Industry Trends	2%
5	Establish Goals and Targets for Strategic Plan	3%
6	Develop Operational Matrix	2%
7	Write Energy Management and Sustainability Policies, Standards, and Guidelines	3%
8	Develop Implementation Plan	3%
9	Obtain Stakeholder Buy-In	3%
10	Develop Energy and Sustainability Program Budget	3%
B	Performing Site Audits	18%
1	Perform Sustainability Audit	2%
2	Perform Energy Audit	3%
3	Perform Water Audit	2%
4	Perform Universal Waste Audit	2%
5	Evaluate Energy and Sustainability Opportunities	3%
6	Identify Non-Financial Impacts	3%
7	Finalize Sustainability and Energy Recommendations	3%
C	Performing Energy and Sustainability Accounting and Analysis	22%
1	Conduct Building Energy Modeling	2%
2	Trend Operational Conditions	3%
3	Benchmark Sustainability Performance Measures	3%
4	Track Utility Costs and Consumption	4%
5	Track Sustainable Purchasing Programs	2%
6	Develop Performance Metrics for Energy and Sustainability Initiatives	3%
7	Calculate Carbon Footprint	2%
8	Determine Savings and Avoidance	3%

Table 2 (Continued): Proposed Content Blueprint for Energy/Sustainability Managers

Duties and Tasks		Weighting
D	Improving Energy Efficiency and Sustainability	22%
1	Improve Operations and Maintenance Procedures	3%
2	Optimize System Efficiency	3%
3	Ensure Optimum Performance of Equipment	3%
4	Manage Continuous Commissioning	3%
5	Integrate Energy and Sustainability Initiatives into Operations and Maintenance	3%
6	Implement Energy Conservation and Sustainability Measures	4%
7	Plan for New Construction	3%
E	Communicating with Others	12%
1	Provide Energy and Sustainability Updates	3%
2	Participate in Third Party Recognition Programs	3%
3	Create a Culture of Sustainability	3%
4	Create Public Outreach Program	3%
Total		100%

8.0 Knowledge

The SMEs identified and categorized specific types of knowledge needed to be a proficient energy/sustainability manager (Table 3). General knowledge areas (calculations, basic measurements, and communications), although not exclusive to this occupation, were also identified using a group consensus process (Table 4). The panelists concluded that a practitioner must master the knowledge in both tables to be competent as an energy/sustainability manager.

Table 3: Specialized Knowledge Required of Energy/Sustainability Managers

Specialized Knowledge	
Acceptable sustainability products	eGRID
Accounting principles	Electrical engineering principles
Basic architecture	Electrical equipment operations
Basic chemistry	Electrical systems
Basic engineering	Emerging energy and sustainability technologies
Basic physics	Emerging water technologies
Benchmarking	Energy accounting and analysis
Boundary conditions	Energy and sustainability best practices
Budget approval and submission processes	Energy conservation principles
Building automation systems	Energy market
Building codes	Energy statutes and requirements
Building construction techniques	Energy usage intensity
Building industry	Engineering best practices
Building management systems trends	Engineering economics
Building operations	Engineering rules of thumb
Building systems/interactions	Environmental impacts
Business acumen	Environmental preferable purchasing criteria
Carbon footprints	Environmental preferable purchasing legislative mandates
Carbon offsets	Environmental preferable purchasing principles
Change management	Environmental regulations
Cleaning principles	Equipment capabilities/lifecycles/operations
Commissioning principles/procedures/standards	Equipment ratings
Community needs, concerns, and standards	Equipment specifications
Construction finance	Expansion and contraction plans
Construction law	Expected outcomes of energy improvements
Construction techniques	Facility schedules
Control systems and devices	Financial principles and management
Conversion rates	Financing options
Corporate social responsibility	Fuel supply and pricing
Cost avoidance calculations	Funding sources
Cultural awareness	Future utility rates
Customer needs	Green branding
Data logging	Greenhouse gas accounting
Data normalization	Greenhouse gas emissions
Data validation processes	Historical consumption data
Discount rates	Implementation costs
Drawing and specification interpretation	Indoor environmental quality
Economic analysis techniques	Industry benchmarks
Economics of natural resources	Industry scorecards and dashboards

Table 3 (Continued): Specialized Knowledge Required of Energy/Sustainability Managers

Specialized Knowledge	
Industry sustainability standards and best practices	Purchasing procedures
Industry trends	Rebate opportunities and programs
Instrumentation capabilities	Regional and state cap and trade programs
Intellectual property limitations	Renewable energy trends
Irrigation systems	Safety practices
Lifecycle cost analysis techniques	Scope I, II, and III
Local recycling capabilities	Smart grid technologies
Local sustainability codes and requirements	Standards of consumption
Local waste management operators	Storm water best management practices
Marketing techniques	Subject matter expertise
Measurement and verification procedures	Sustainability goals
Measurement and verification standards	Sustainability product availability
Mechanical engineering principles	Sustainability statutes and requirements
Mechanical systems	System interactions/controls/operations
Modeling techniques	Technical abilities of personnel
NPDES regulations	Test and balance processes
O&M best practices	Test equipment operations
O&M historical and current practices	Third party certification systems/requirements
O&M requirements	Third party recognition application process
Occupant concerns and needs	Third party recognition costs
Offset market	Third party recognition program criteria
Operational purpose	Timelines for implementation
Operational schedules	Triple bottom line
Organizational charts	Utility commodity procurement
Organizational culture	Utility contracts
Organizational goals and benchmarks	Utility rate structure and cost breakdowns
Organizational operations	Utility units, bills, and billing rates
Organizational philosophy on sustainability	Variability of equipment loading
Organizational policies on media interaction	Wants and needs of stakeholders
Organizational return on investments	Waste collection practices
Organizational structure	Waste diversion opportunities/rates
Plumbing codes	Waste management practices
Plumbing equipment operations	Waste providers
Plumbing systems	Waste reduction principles
Power purchase agreements	Water efficiency technologies
Previous energy conservation measures	Water management best practices
Procurement standards	Water rebates
Program management	Water reduction principles
Project management	Water systems chemical treatments
Psychrometrics of air	

Table 4: General Knowledge Required of Energy/Sustainability Managers

General Knowledge	
Calculations	
Change numbers from fractions into decimals and back	Perform mathematical operations with fractions
Change numbers from percentages into decimals and back	Perform simple math operations of addition
Collect information to solve a problem	Perform simple math operations of division
Compare numbers	Perform simple math operations of multiplication
Figure averages	Perform simple math operations of subtraction
Make rough estimates	Solve formula calculations with more than one unknown
Measure angles	Solve formula calculations with one unknown
Multiply and factor algebraic expressions	Solve percent problems
Perform angular calculations	Solve problems with graphs
Perform math operations using exponential numbers	Solve ratio problems
Perform math operations using signed (positive and negative) numbers	Transfer number sequences from a source into a column
Perform math operations using single and multiple digit numbers	Use a calculator
Perform mathematical operations with decimals	
Basic Measurements	
Calculate the perimeter and areas of common figures	Measure volume (cubic inches, liters, etc.)
Convert measurements from one unit into another (English to metric, etc.)	Measure weights using devices calibrated in ounces
Estimate and approximate measurements	Measure weights using devices calibrated in pounds
Find distances and directions on land maps	Read and apply coefficient measurements indicated in a table or chart
Find the dimensions of an object from a scale drawing	Read and use the scale of a drawing
Make simple scale drawings	Read measurements taken with common measuring tools
Measure area (square inches, square centimeters, etc.)	Read, interpret, and use size-scale relationships
Measure length to 1/16 of an inch	Record measurements, using appropriate unit notations (feet, yards, etc.)
Measure linear distances (length, width, etc.)	Use tools to measure quantities and solve problems involving measurements
Measure temperature to within 1 degree F	

Table 4 (Continued): General Knowledge Required of Energy/Sustainability Managers

General Knowledge	
Communications	
Apply assertiveness	Present to others
Ask questions	Read and follow a map, chart, plan, etc.
Communicate using the vocabulary/terminology of a related trade	Read and follow directions found in equipment manuals and code books
Communicate with co-workers and/or business people in writing (letters, memos)	Read and interpret directions found on labels, packages, or instruction sheets
Communicate with co-workers and/or business people verbally (face-to-face)	Read codes (building codes, electrical codes, standards, etc.)
Communicate with co-workers and/or business people verbally (telephone, radio)	Read drawings and specifications sheets
Compare names	Read flowcharts
Evaluate options/alternatives	Read information from tables and graphs (bar, circle, etc.)
Evaluate solutions	Read statistical data
Explain procedures	Research information
Find information in catalogs	Speak to large groups
Find information in references (machinery handbook, tap/drill charts, etc.)	Summarize information
Follow verbal job instructions	Write reports
Listen	Write words and numbers legibly
Participate in brainstorming	

9.0 Skills, Abilities, and Attributes

A proficient worker possesses key skills, abilities, and attributes that influence job success. Skills are developed through experience and training and may apply to a wide range of tasks; proper skills enable workers to perform their tasks with precision and quality.

Abilities and attributes are more fundamental than knowledge and skills; they represent underlying, enduring traits, both cognitive and physical, that support the successful performance of a wide range of job tasks.

The panelists identified task-specific skills and abilities, as well as broad attributes (e.g., analytic, creative, patient), to define the recommended traits an energy/sustainability manager should possess (Table 5).

Human Resource professionals and job analysts often analyze skills, abilities, and attributes to compare jobs in terms of worker characteristics.

Table 5: Skills, Abilities, and Attributes Required of Energy/Sustainability Managers

Skills, Abilities, and Attributes	
Ability to analyze bills	Goal-oriented
Accounting skills	Industrious
Accurate/precise	Initiative
Adaptable/flexible	Integrity
Analytical skills	Interview skills
Basic math skills	Investigative skills
Blueprint reading skills	Lack of prejudice (bias)
Caring/respectful	Leadership skills
Change management skills	Listening skills
Common sense	Manage stress/pressure
Communication skills	Marketing skills
Community relations skills	Master planning skills
Computer skills	Mediation skills
Confident/self esteem	Meeting effectiveness skills
Contracting skills	Meter reading skills
Cooperative	Metric skills
Coordination skills	Multi-tasker
Cost estimating skills	Neat
Courteous/friendly	Negotiation/persuasion skills
Creative thinking skills	Networking skills
Critical thinker	Organizational skills
Customer-oriented	Patience
Dependable	People/social skills
Detail-oriented	Persistent
Eager to learn new things	Political skills
Energy accounting and analysis skills	Positive attitude
Energy analysis skills	Presentation skills
Enthusiastic/passionate	Pride in job
Estimating skills	Prioritization skills
Ethical	Professional
Focused	Project management skills
Free of substance abuse	Public relations skills

Table 5 (Continued): Skills, Abilities, and Attributes Required of Energy/Sustainability Managers

Skills, Abilities, and Attributes	
Public speaking skills	Teaching skills
Quality focused	Team player
Research skills	Technical reading skills
Responsible/accountable	Technical writing skills
Safety conscious	Time management skills
Sales skills	Tolerant
Scheduling skills	Troubleshooting skills
Self-motivated	Tuning skills
Spreadsheet skills	Writing skills
Tactful	

10.0 Physical Conditions

In any job, the environment in which tasks are completed and the specific physical requirements necessary to complete each task must be understood. Awareness of physical conditions is useful for a variety of purposes, including ergonomic design, safety analysis, and the identification of job elements that are deemed essential functions for compliance with The Americans with Disabilities Act.

Table 6 contains the list of panelist-recommended physical conditions an energy/sustainability manager should possess.

Table 6: Physical Conditions Recommended for Energy/Sustainability Managers

Physical Conditions	
Carry objects of up to 25 pounds	Work around or near magnetic equipment or materials
Climb ladders, stairs, poles, etc. using legs and/or arms	Work at heights of 1 to 25 feet above ground or floor level
Crawl or creep	Work at heights of 26 to 75 feet above ground or floor level
Detect abnormal noises	Work in changing temperatures (in and out of buildings repeatedly)
Feel size, shape, and temperature or texture of objects with the hands	Work in confined spaces
Hear speech	Work in damp places (high humidity, some standing water)
Hold or move objects using the fingers	Work in dry places (lacking any natural moisture or humidity)
Judge depth (the position and distance of objects) with the eyes	Work in dust, oils, fumes, or smells
Lift objects from ground to overhead level	Work in high temperatures (85 to 130 degrees F)
Lift objects from ground to waist level	Work in low temperatures (0 to 45 degrees F)
Lift objects from waist to overhead level	Work in noisy places (85 decibels or higher with ear protection)
Reach with arms and hands in any direction	Work inside
See and discriminate colors	Work on slippery surfaces
See clearly at 20 feet or more (with/without optical assistance)	Work outside
See clearly at 20 inches or less (with/without optical assistance)	Work while sitting or standing on high roofs, overhangs, or I-beams
Sit part of the time	Work while standing on portable ladders
Stand at all	Work while standing on scaffolding
Stand part of the time	Work while wearing protective equipment (respirators, hoods, etc.)
Stoop, kneel, or crouch	Work with hands and arms over head level
Talk	Work with or near fiberglass or asbestos materials
Walk	Write or type at a fast speed
Work around or near high voltage power sources or equipment	

11.0 Tools, Equipment, and Resources

Each occupation requires a unique set of support materials. It is important to identify the tools, equipment, and other tangible objects, as well as the resources (e.g., information technologies, codes and standards) required for a worker to effectively accomplish tasks. Table 7 lists the panelist-identified inventory of tools, equipment, and resources necessary to perform the identified tasks.

Table 7: Tools, Equipment, and Resources Used by Energy/Sustainability Managers

Tools, Equipment, and Resources	
General Tools, Equipment, and Resources	
ASHRAE	Green Globes
Balanced score card	Green Guard
BCA	Green Seal
Benchmarking data	GSA
Binoculars	Health white papers
BOMA standards	IESNA
Budgeting software	IFMA benchmark standards
Building automation system	Industry periodicals
Building codes	Industry policy templates
Building drawings	Industry sustainability publications
Building management system	Instrumentation and control technicians
Camera	Labs21
Carbon footprint calculator	Ladder
Carbon footprint software	Lifecycle cost analysis software
CBECS	Light meter
Climate registry	Magnifying glass
Commissioning documentation	Manufacturer's representative
Community partners	Marketing materials
Computer	MERV
Contact lists	Mirror
Control systems software	Modeling software
Corrosion monitoring systems	MSDS
Cost estimating software	Multimeter
Dashboard	NEBB
Data loggers	Note taker
Database management software	O&M manuals
Design consultants	O&M staff
eGRID	Occupant comfort survey
Energy executive orders	Operational schedule
ENERGY STAR portfolio manager	Organizational personnel
EPA	Organizational style guides
EPA NPDES	Outside vendors
EPEAT	Pitot tubes
ESPC	Plastic biodegradable bags
Fans	Plumbing codes
Financial analysis template	Portfolio manager
Flow bags	PPE
Flow meters	Practice Greenhealth
Gloves	Presentation software

Table 7 (Continued): Tools, Equipment, and Resources Used by Energy/Sustainability Managers

Tools, Equipment, and Resources	
General Tools, Equipment, and Resources	
Press release guidelines	Test and balance organizations
Pressure gauge	Test and balance technicians
Product supply vendors	Test equipment
Product vendors	Thermal gun
Professional associations	Third party certification reference materials
Professional network	Third party certification systems/requirements
Program team	Training facilities
Project documents	Training materials
Promotional materials	Transportation executive orders
Purchasing software	UESC
Rate schedules	Ultrasonic tester
RCRA	USGBC
RPN	Utility bills
Scale	Utility company rebates
Scheduling software	Utility providers
Scope of work templates	Utility technical assistance
Screwdriver	Utility tracking software
Sheet plastic	Video-conferencing technology
Social network	Waste bills
Sonic detectors	Waste providers
Spreadsheet software	Water Sense
Strobe	Weather data
Survey tools	Web developers
Sustainability executive orders	Whole building design guide
Sustainability impact white papers	Word processing software
Sustainability plans	Work order system
Team charter template	WRI protocols
Test and balance contractors	
Codes, Standards, and Guidelines	
ASHRAE Standard 55-2010 – Thermal Environmental Conditions for Human Occupancy (ANSI approved)	
ASHRAE Standard 62.1-2010 – Ventilation for Acceptable Indoor Air Quality (ANSI approved)	
ASHRAE Standard 90.1-2010 – Energy Standard for Buildings Except Low-Rise Residential Buildings (ANSI approved; IESNA co-sponsored)	
ASHRAE Standard 169-2006 – Weather Data for Building Design Standards (ANSI approved)	
ASHRAE Standard 189.1-2009 – Standard for the Design of High-Performance Green Buildings (ANSI approved; USGBC and IESNA co-sponsored)	
EISA 2007	
EPA NPDES	
EPAct 2005	
Executive Order 12191 Federal Facility Ridesharing Program	
Executive Order 13423 January 2007, Strengthening Federal Environmental, Energy, and Transportation Management. (Repeals: E.O. 13101, 1998; E.O. 13123, 1999; E.O. 13134, 1999; E.O. 13148, 2000; E.O. 13149, 2000)	

Table 7 (Continued): Tools, Equipment, and Resources Used by Energy/Sustainability Managers

Tools, Equipment, and Resources
Codes, Standards, and Guidelines
Executive Order 13514 October 5, 2009, Federal Leadership in Environmental, Energy, and Economic Performance
Federal Leadership in High Performance and Sustainable Buildings MOU 2006; Refer to the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings MOU
Guideline 1.1-2007 – HVACR Technical Requirements for the Commissioning Process
NEPA; www.epa.gov/compliance/nepa
RCRA Section 6002
US Code Title 5, Part III, Subpart F, Chapter 79, Section 7905 – Programs to Encourage Commuting by Means Other Than Single Occupancy Vehicles

12.0 DACUM Chart

The DACUM chart (Table 8) is a tabular representation of the JTA. Capital letters identify major job duty areas. Numbers identify tasks, and lowercase letters identify the steps required to accomplish each task. Moving horizontally across the chart, adjacent columns detail (1) specialized knowledge, (2) skills and abilities, and (3) tools, equipment, and resources required to perform each task. The information contained in these columns is related to each task and does not necessarily correspond to a specific step.

The importance of the DACUM chart is to show the relationship between job tasks and the specialized knowledge, skills and abilities, and tools, equipment, and resources required to perform each task. This concept, called *job-relatedness*, is essential to compliance with key legal and professional validity standards pertaining to the use of JTA information in employee selection. Such information is also critical to the development of high-stakes assessments for occupational licensing and certification examinations.

The DACUM chart depicts the job element relationships associated with each task, and can therefore easily be used to assess the relevance of current programs (curriculum), develop instructional objectives and training content, sequence instructional materials, and develop examination, competency, and performance evaluation instruments.

Table 8: DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
A	Developing Strategic Plans			
1	Set-up Task Force			
a	Identify key members	<ul style="list-style-type: none"> • Organizational culture 	<ul style="list-style-type: none"> • Leadership skills • Meeting effectiveness skills • Networking skills • Organizational skills • Time management skills 	<ul style="list-style-type: none"> • Note taker • Video-conferencing technology
b	Identify stakeholders			
c	Identify task force leader			
d	Identify purpose of task force			
e	Set-up task force meeting schedule			
f	Invite task force members			
g	Create task force charter			
h	Promote task force			
2	Select Program Team			
a	Identify span of control	<ul style="list-style-type: none"> • Organizational structure • Subject matter expertise 	<ul style="list-style-type: none"> • Contracting skills • Leadership skills • Mediation skills • Negotiation/persuasion skills 	<ul style="list-style-type: none"> • Computer • Team charter template • Video-conferencing technology
b	Assess KSAs of staff			
c	Identify program team competency needs			
d	Obtain team commitment			
e	Ensure team diversity			
f	Obtain management buy-in			
3	Assess Existing Conditions			
a	Identify mission of organization	<ul style="list-style-type: none"> • Building operations • Building systems/interactions • Energy statutes and requirements • Industry sustainability standards and best practices • Organizational structure • Standards of consumption • Sustainability statutes and requirements 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Computer skills • Critical thinker • Leadership skills • Master planning skills • Political skills 	<ul style="list-style-type: none"> • Computer • Database management software • Presentation software • Spreadsheet software
b	Identify other groups performing similar tasks			
c	Poll management council			
d	Identify organizational structure			
e	Investigate historic data			
f	Identify vision of organization			
g	Determine baseline of sustainability program			
h	Identify stakeholders			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
A	Developing Strategic Plans			
4	Identify Future Industry Trends			
a	Research sources of energy	<ul style="list-style-type: none"> • Basic engineering • Basic physics • Building industry • Economics of natural resources • Utility contracts 	<ul style="list-style-type: none"> • Analytical skills • Leadership skills • Networking skills • Political skills 	<ul style="list-style-type: none"> • Computer • Industry periodicals • Product vendors • Professional associations • Professional network
b	Identify future rate projections			
c	Identify upcoming utility rebate programs			
d	Identify availability of sustainability technologies			
e	Identify industry metrics			
f	Assess competitive trends			
g	Assess regulatory trends			
h	Research emerging technologies			
i	Attend industry conferences			
j	Read industry periodicals			
5	Establish Goals and Targets for Strategic Plan			
a	Review baseline results	<ul style="list-style-type: none"> • Basic physics • Expected outcomes of energy improvements • Industry sustainability standards and best practices 	<ul style="list-style-type: none"> • Basic math skills • Political skills 	<ul style="list-style-type: none"> • Balanced score card • Computer • Dashboard
b	Identify mandated goals			
c	Identify management desired goals			
d	Document energy and sustainability goals			
e	Perform gap analysis			
f	Assess feasibility of goals			
g	Align sustainability goals with organizational goals			
h	Define strategic objectives			
6	Develop Operational Matrix			
a	Identify stakeholders	<ul style="list-style-type: none"> • Intellectual property limitations • Organizational charts 	<ul style="list-style-type: none"> • Communication skills • Master planning skills • Organizational skills • People/social skills • Research skills 	<ul style="list-style-type: none"> • Computer • Contact lists • Operational schedule
b	Perform impact assessment			
c	Create an execution plan			
d	Determine review process			
e	Analyze security constraints			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
A	Developing Strategic Plans			
7	Write Energy Management and Sustainability Policies, Standards, and Guidelines			
a	Obtain organization's style guide	<ul style="list-style-type: none"> • Community needs, concerns, and standards • Energy statutes and requirements • Environmental regulations • Industry sustainability standards and best practices • Local sustainability codes and requirements • Organizational goals and benchmarks • Sustainability statutes and requirements • Third party certification requirements 	<ul style="list-style-type: none"> • Communication skills • Leadership skills • Political skills • Research skills • Team player • Writing skills 	<ul style="list-style-type: none"> • ASHRAE • Building codes • Computer • Energy executive orders • ENERGY STAR • EPA NPDES • Green Globes • Industry policy templates • Organizational style guides • Practice Green Health • Sustainability executive orders • Third party certification reference materials • Transportation executive orders • US Green Building Council • Water Sense
b	Participate in committees and workgroups			
c	Research sustainability legislative requirements			
d	Research sustainability industry trends			
e	Determine purpose of policies, standards, and guidelines			
f	Create waste management standards, and guidelines			
g	Create energy efficiency policies, standards, and guidelines			
h	Create water efficiency policies, standards, and guidelines			
i	Create comfort policies, standards, and guidelines			
j	Create alternative energy policies, standards, and guidelines			
k	Create integrated pest management policy			
l	Create environmental preferable purchasing policy			
m	Create indoor air quality guidelines			
n	Create cleaning policies, standards, and guidelines			
o	Create transportation policies, standards, and guidelines			
p	Create third party certification criteria			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
A	Developing Strategic Plans			
7	Write Energy Management and Sustainability Policies, Standards, and Guidelines			
q	Identify community concerns			
8	Develop Implementation Plan			
a	Create initiatives to meet goals	<ul style="list-style-type: none"> • Energy statutes and requirements • Financing options • Sustainability goals • Sustainability statutes and requirements • Timelines for implementation 	<ul style="list-style-type: none"> • Estimating skills • Organizational skills • Scheduling skills • Writing skills 	<ul style="list-style-type: none"> • Cost estimating software • Lifecycle cost analysis software • Scheduling software
b	Develop sustainability metrics			
c	Develop timelines for implementation			
d	Identify responsible parties for implementation			
e	Identify funding sources			
f	Estimate energy savings			
g	Estimate first cost			
h	Prioritize energy and sustainability indicatives			
i	Identify tools and resources required for initiatives			
j	Update implementation plan			
9	Obtain Stakeholder Buy-In			
a	Educate stakeholders	<ul style="list-style-type: none"> • Organizational culture • Wants and needs of stakeholders 	<ul style="list-style-type: none"> • Communication skills • Community relations skills • Listening skills • Negotiation/persuasion skills • Presentation skills • Public relations skills • Public speaking skills • Sales skills • Writing skills 	<ul style="list-style-type: none"> • Computer • Presentation software
b	Perform strength, weaknesses, opportunities, and threats analysis			
c	Prepare benefit analysis			
d	Create narrative for audience			
e	Give presentations to stakeholders			
f	Ask stakeholders for input			
g	Respond to stakeholder questions			
h	Provide ongoing updates to stakeholders			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
A	Developing Strategic Plans			
10	Develop Energy and Sustainability Program Budget			
a	Review historical utility consumption data	<ul style="list-style-type: none"> • Budget approval and submission processes • Emerging energy sustainability technologies • Energy market • Energy statutes and requirements • Expansion and contraction plans • Funding sources • Future utility rates • Historical consumption data • Offset market • Power purchase agreements • Rebate opportunities and programs • Renewable energy trends • Sustainability statutes and requirements • Utility commodity procurement 	<ul style="list-style-type: none"> • Accounting skills • Analytical skills • Basic math skills • Communication skills • Negotiation/persuasion skills • Networking skills • Political skills • Sales skills 	<ul style="list-style-type: none"> • Budgeting software • Portfolio manager • Product supply vendors • Spreadsheet software • Utility providers • Utility units, bills, and billing rates • Waste bills
b	Review historical sustainability program expenses			
c	Forecast project implementation needs			
d	Identify funding sources			
e	Identify alternative financing mechanisms			
f	Identify annual project budget			
g	Identify annual training budget			
h	Identify annual waste management budget			
i	Identify annual utility budget			
j	Identify annual outreach budget			
k	Identify third party certification expenses			
l	Compile total program budget			
m	Submit program budget			
n	Update program budget			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
B	Performing Site Audits			
1	Perform Sustainability Audit			
a	Evaluate landscaping techniques	<ul style="list-style-type: none"> • Acceptable sustainability products • Building operations • Electrical systems • Industry sustainability standards and best practices • Mechanical systems • NPDES regulations • Storm water best management practices • Sustainability statutes and requirements • Third party certification systems/requirements 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Investigative skills • Listening skills • Troubleshooting skills • Writing skills 	<ul style="list-style-type: none"> • ASHRAE • Building codes • Camera • Green Globes • Green Guard • Green Seal • Ladder • MERV • MSDS • Occupant comfort survey • PPE • Professional associations • Test equipment • USGBC • Whole building design guide • Word processing software
b	Evaluate exterior lighting for light pollution			
c	Evaluate building and hardscape management practices			
d	Evaluate exterior pest management practices			
e	Evaluate storm water management practices			
f	Evaluate building envelope			
g	Evaluate indoor environmental quality			
h	Evaluate thermal comfort			
i	Evaluate filtration systems			
j	Evaluate cleaning program			
k	Review purchasing records			
l	Generate action item list			
m	Identify sustainability opportunities			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
B	Performing Site Audits			
2	Perform Energy Audit			
a	Inventory energy consuming equipment	<ul style="list-style-type: none"> • Building construction techniques • Control systems and devices • Electrical engineering principles • Electrical equipment operations • Equipment capabilities/lifecycles/operations • Measurement and verification standards • Mechanical engineering principles • Plumbing equipment operations • Safety practices • Smart grid technologies • Test equipment operations 	<ul style="list-style-type: none"> • Analytical skills • Investigative skills • Troubleshooting skills 	<ul style="list-style-type: none"> • Binoculars • Camera • Control systems software • Ladder • Light meter • Magnifying glass • Mirror • Multimeter • Pitot tubes • Strobe • Test equipment • Thermal gun • Ultrasonic tester
b	Evaluate system efficiency			
c	Detect leaks (e.g., water, steam, air)			
d	Prepare capital replacement list			
e	Analyze rate structure			
f	Review historical consumption usage			
g	Review historical consumption costs			
h	Analyze consumption trends			
i	Create inventory schedule			
j	Allocate consumption by system or building			
k	Interview building occupants			
l	Interview facility staff			
m	Install recording equipment			
n	Record energy measurements			
o	Analyze energy consumption data			
p	Review energy management control system			
q	Evaluate building envelope			
r	Create energy conservation opportunities list			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
B	Performing Site Audits			
3	Perform Water Audit			
a	Inventory water consuming equipment	<ul style="list-style-type: none"> • Basic chemistry • Emerging water technologies • Irrigation systems • Plumbing codes • Plumbing systems • Water efficiency technologies • Water management best practices • Water rebates • Water systems chemical treatments 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Investigative skills 	<ul style="list-style-type: none"> • Flow bags • Flow meters • Plumbing codes • Pressure gauge • Sonic detectors • Spreadsheet software • Test equipment
b	Evaluate flow rates			
c	Perform water leak detection			
d	Compile water usage and cost			
e	Gather water usage data			
f	Analyze water and sewer utility data			
g	Create water use baseline			
h	Determine occupancy rates and schedules			
i	Analyze wastewater quality			
j	Evaluate irrigation systems			
k	Create water conservation opportunities list			
4	Perform Universal Waste Audit			
a	Determine waste sources	<ul style="list-style-type: none"> • Building operations • Local recycling capabilities • Local waste management operators • Safety practices • Waste collection practices • Waste management practices 	<ul style="list-style-type: none"> • Analytical skills • Coordination skills 	<ul style="list-style-type: none"> • Camera • Fans • Gloves • Plastic biodegradable bags • PPE • Scale • Sheet plastic • Spreadsheet software
b	Collect representative waste stream			
c	Determine consistency of waste stream			
d	Coordinate collection with janitorial staff			
e	Segregate waste into categories			
f	Weigh collected waste by category			
g	Evaluate waste collection method			
h	Calculate total waste generated			
i	Calculate waste diversion rates			
j	Identify opportunities for improvement			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
B	Performing Site Audits			
5	Evaluate Energy and Sustainability Opportunities			
a	Identify energy and sustainability opportunities	<ul style="list-style-type: none"> • Building systems/interactions • Discount rates • Economic analysis techniques • Energy accounting and analysis • Engineering economics • Fuel supply and pricing • Implementation costs • Lifecycle cost analysis techniques • Organizational return on investments • Utility units, bills, and billing rates 	<ul style="list-style-type: none"> • Analytical skills • Basic math skills • Communication skills • Creative thinking skills • Detail-oriented • Investigative skills 	<ul style="list-style-type: none"> • Financial analysis template • Lifecycle cost analysis software • Spreadsheet software
b	Calculate energy and sustainability savings			
c	Perform lifecycle cost analysis			
d	Prioritize energy and sustainability opportunities			
6	Identify Non-Financial Impacts			
a	Evaluate waste reduction impacts	<ul style="list-style-type: none"> • Carbon footprints • Community needs, concerns, and standards • Corporate social responsibility • Industry sustainability standards and best practices • Occupant concerns and needs • Third party certification systems/requirements • Triple bottom line 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Creative thinking skills • Political skills • Public relations skills • Sales skills 	<ul style="list-style-type: none"> • Carbon footprint calculator • Health white papers • Industry sustainability publications • Spreadsheet software • Sustainability impact white papers
b	Evaluate greenhouse gas impacts			
c	Evaluate operational impacts			
d	Evaluate community impacts			
e	Evaluate community health impacts			
f	Evaluate impacts to occupants			
g	Determine recognition opportunities			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
B	Performing Site Audits			
7	Finalize Sustainability and Energy Recommendations			
a	Evaluate results of financial and non-financial analysis	<ul style="list-style-type: none"> • Engineering economics • Financial principles and management • Industry sustainability standards and best practices 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Energy accounting and analysis skills • Marketing skills • Master planning skills • Negotiation/persuasion skills • Prioritization skills • Writing skills 	<ul style="list-style-type: none"> • Presentation software • Spreadsheet software • Word processing software
b	Select energy and sustainability measures			
c	Develop implementation plan			
d	Distribute plan for stakeholder review			
C	Performing Energy and Sustainability Accounting and Analysis			
1	Conduct Building Energy Modeling			
a	Develop building characteristic assumptions	<ul style="list-style-type: none"> • Emerging energy sustainability technologies • Engineering best practices • Engineering rules of thumb • Mechanical engineering principles • Modeling techniques 	<ul style="list-style-type: none"> • Analytical skills • Computer skills 	<ul style="list-style-type: none"> • ASHRAE • Building drawings • Computer • IESNA • Modeling software
b	Input baseline case facility parameters			
c	Input desired facility parameters			
d	Evaluate modeling results			
e	Re-evaluate assumptions based on modeling results			
f	Validate the modeling results with energy audit findings			
g	Interpret modeling results			
h	Choose best model option			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
C	Performing Energy and Sustainability Accounting and Analysis			
2	Trend Operational Conditions			
a	Select facility control points	<ul style="list-style-type: none"> • Control systems and devices • Electrical systems • Instrumentation capabilities • Mechanical systems 	<ul style="list-style-type: none"> • Analytical skills • Presentation skills 	<ul style="list-style-type: none"> • Computer • Data loggers • Spreadsheet software
b	Install instrumentation			
c	Validate calibration of instrumentation			
d	Collect data from instrumentation			
e	Validate results of instrumentation			
f	Interpret trending results			
g	Present trending results			
3	Benchmark Sustainability Performance Measures			
a	Normalize data collected under site audits	<ul style="list-style-type: none"> • Energy usage intensity • Industry benchmarks • Organizational goals and benchmarks • Utility units, bills, and billing rates 	<ul style="list-style-type: none"> • Analytical skills 	<ul style="list-style-type: none"> • BOMA standards • CBECS • Computer • ENERGY STAR • IFMA benchmark standards • Labs 21 • Professional network • Utility tracking software
b	Determine appropriate benchmarks			
c	Compare data to benchmarks			
d	Perform gap analysis			
e	Interpret benchmark results			
f	Identify potential energy and sustainability opportunities			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
C	Performing Energy and Sustainability Accounting and Analysis			
4	Track Utility Costs and Consumption			
a	Inventory meter locations	<ul style="list-style-type: none"> • Utility units, bills, and billing rates • Conversion rates • Data logging • Utility rate structure and cost breakdowns 	<ul style="list-style-type: none"> • Analytical skills • Meter reading skills 	<ul style="list-style-type: none"> • Computer • Spreadsheet software • Utility tracking software • Weather data
b	Identify what is metered			
c	Identify meter owner			
d	Track utility usage and cost by facility			
e	Track utility usage and cost by system			
f	Track utility usage and cost by portfolio			
g	Track utility usage and cost by process			
h	Track utility usage and cost by meter and sub meter			
i	Track utility usage and cost by equipment			
j	Track utility usage and cost by electrical panel			
k	Track utility usage and cost by organizational structure			
l	Track utility usage and cost by stakeholder			
m	Track utility usage and cost by utility type			
n	Analyze peak demand costs			
o	Request electronic version of utility bill			
p	Reconcile utility bill to meter reading			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
C	Performing Energy and Sustainability Accounting and Analysis			
5	Track Sustainable Purchasing Programs			
a	Obtain data on all purchases	<ul style="list-style-type: none"> • Emerging energy sustainability technologies • Environmental preferable purchasing criteria • Environmental preferable purchasing legislative mandates • Procurement standards • Purchasing procedures • Sustainability product availability 	<ul style="list-style-type: none"> • Communication skills • Detail-oriented • Investigative skills • Technical reading skills 	<ul style="list-style-type: none"> • ENERGY STAR • EPA • EPEAT • GSA • Purchasing software • RCRA • RPN • Spreadsheet software
b	Categorize data on all purchases			
c	Evaluate data on all purchases			
d	Compare to sustainability criteria			
e	Calculate sustainability purchasing percentage			
f	Document compliance with environmental preferable purchasing criteria			
6	Develop Performance Metrics for Energy and Sustainability Initiatives			
a	Identify energy and sustainability goals	<ul style="list-style-type: none"> • Industry scorecards and dashboards 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Detail-oriented • Investigative skills • Metric skills • Presentation skills 	<ul style="list-style-type: none"> • Spreadsheet software
b	Determine how to measure goals			
c	Ensure management commitment			
d	Communicate goals and purposes to stakeholders			
e	Measure ongoing progress			
f	Re-evaluate goals and metrics			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
C	Performing Energy and Sustainability Accounting and Analysis			
7	Calculate Carbon Footprint			
a	Determine carbon footprint boundary	<ul style="list-style-type: none"> • Carbon footprints • Carbon offsets • eGRID • Greenhouse gas emissions • Regional and state cap and trade programs • Scope I, II, and III 	<ul style="list-style-type: none"> • Analytical skills • Detail-oriented • Presentation skills 	<ul style="list-style-type: none"> • Carbon footprint software • Climate registry • eGRID • WRI protocols
b	Determine inclusion of scope I, II, and/or III emissions			
c	Determine carbon footprint tool			
d	Gather required carbon footprint data			
e	Validate carbon footprint input data			
f	Calculate carbon footprint			
g	Categorize results by source			
h	Identify carbon footprint reduction opportunities			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
C	Performing Energy and Sustainability Accounting and Analysis			
8	Determine Savings and Avoidance			
a	Outline equipment system characteristics assumptions	<ul style="list-style-type: none"> • Electrical engineering principles • Environmental impacts • Financial principles and management • Greenhouse gas accounting • Mechanical engineering principles • Previous energy conservation measures • System interactions/controls/operations • Variability of equipment loading • Waste diversion opportunities • Waste diversion rates 	<ul style="list-style-type: none"> • Accounting skills • Analytical skills • Basic math skills • Energy analysis skills • Investigative skills 	<ul style="list-style-type: none"> • Carbon footprint calculator • eGRID • Rate schedules • Spreadsheet software • Utility providers • Utility units, bills, and billing rates • Waste providers
b	Collect occupancy census			
c	Collect operating schedules			
d	Collect weather data			
e	Account for previous energy conservation projects on same system			
f	Collect utility consumptions			
g	Compare utility consumptions to baseline			
h	Calculate greenhouse gas reductions			
i	Establish rate and usage forecast			
j	Utilize utility rate structure for cost avoidance			
k	Calculate waste reduction and avoidance			
l	Determine load factors			
m	Determine power factors			
n	Calculate benefits and penalties from other system interactions			
o	Calculate total cost savings and avoidance			
p	Calculate total non-financial savings and avoidance			
q	Calculate electrical loss reductions			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
D	Improving Energy Efficiency and Sustainability			
1	Improve Operations and Maintenance Procedures			
a	Solicit energy conservation and sustainability opportunities ideas	<ul style="list-style-type: none"> • Benchmarking • Equipment capabilities/lifecycles/operations • Emerging energy sustainability technologies • Industry sustainability standards and best practices • O&M historical and current practices • O&M requirements • System interactions/controls/operations 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Investigative skills • Marketing skills • Writing skills 	<ul style="list-style-type: none"> • O&M manuals • Professional associations • Survey tools • Word processing software • Work order system
b	Review existing O&M procedures			
c	Update existing O&M procedures			
d	Educate O&M staff regarding energy and sustainability practices			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
D	Improving Energy Efficiency and Sustainability			
2	Optimize System Efficiency			
a	Identify areas for improvement	<ul style="list-style-type: none"> • Boundary conditions • Building automation systems • Building codes • Building management systems trends • Customer needs • Electrical engineering principles • Energy statutes and requirements • Equipment capabilities • Facility schedules • Mechanical engineering principles • Operational purpose • Operational schedules • Psychrometrics of air • Sustainability statutes and requirements • Test and balance processes 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Investigative skills • Troubleshooting skills • Tuning skills 	<ul style="list-style-type: none"> • Building automation system • Building management system • Instrumentation and control technicians • Manufacturer's representative • O&M manuals • O&M staff • Screwdriver • Test equipment
b	Review building management system parameters			
c	Analyze operating conditions of building management system			
d	Conduct field survey			
e	Monitor conditions in all occupancy modes			
f	Compare operations with design parameters			
g	Compare operations with best practices			
h	Evaluate impacts of changes on occupant comfort			
i	Verify successful performance			
j	Perform maintenance operational check			
k	Right sizing equipment			
l	Modify process flows			
m	Evaluate appropriateness of system type			
n	Optimize sequence of operations and controls			
o	Solicit manufacturer representative for system operational capabilities			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
D	Improving Energy Efficiency and Sustainability			
3	Ensure Optimum Performance of Equipment			
a	Verify preventative maintenance is being performed	<ul style="list-style-type: none"> • Benchmarking • Electrical engineering • Emerging energy sustainability technologies • Equipment operations • Equipment ratings • Equipment specifications • Mechanical engineering • O&M best practices 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Investigative skills • Troubleshooting skills • Tuning skills 	<ul style="list-style-type: none"> • Benchmarking data • O&M manuals • O&M staff • Test equipment
b	Review equipment performance against specifications			
c	Verify proper operation of equipment components			
d	Review equipment efficiencies			
e	Engage manufacturer's representative for factory approved start-up			
4	Manage Continuous Commissioning			
a	Read building management system reports	<ul style="list-style-type: none"> • Basic engineering • Building automation systems • Commissioning principles/procedures/standards • Measurement and verification procedures • System interactions/controls/operations • Test and balance processes 	<ul style="list-style-type: none"> • Analytical skills • Computer skills • Detail-oriented • Investigative skills • Organizational skills • Patience • Technical writing skills • Troubleshooting skills • Tuning skills 	<ul style="list-style-type: none"> • ASHRAE • BCA • Building automation system • NEBB • Test and balance organizations • Test and balance technicians
b	Read trending reports			
c	Query energy management system			
d	Monitor building energy management alarms			
e	Ensure post commissioning set points are still in place			
f	Audit post commissioning set points			
g	Ensure instrumentation and controls are functional			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
D	Improving Energy Efficiency and Sustainability			
5	Integrate Energy and Sustainability Initiatives into Operations and Maintenance			
a	Identify stakeholder involvement	<ul style="list-style-type: none"> • Cleaning principles • Energy conservation principles • Environmental preferable purchasing principles • Indoor environmental quality • Industry sustainability standards and best practices • Industry trends • Mechanical engineering principles • Organizational operations • Organizational structure • Technical abilities of personnel • Triple bottom line • Waste reduction principles • Water reduction principles 	<ul style="list-style-type: none"> • Analytical skills • Communication skills • Leadership skills • Organizational skills • Political skills • Presentation skills • Public speaking skills • Teaching skills • Writing skills 	<ul style="list-style-type: none"> • ASHRAE • ENERGY STAR • O&M staff • Presentation software • Professional associations • Spreadsheet software • Third party certification requirements • Word processing software
b	Identify hurdles to implementation			
c	Secure financial resources			
d	Secure human resources			
e	Obtain stakeholder buy-in			
f	Implement pilot program			
g	Educate stakeholders regarding new initiatives			
h	Identify external support for initiatives			
i	Build infrastructure to support initiative			
j	Measure success of pilot program			
k	Adjust pilot program			
l	Implement initiative			
m	Perform ongoing measurement and management of initiative			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
D	Improving Energy Efficiency and Sustainability			
6	Implement Energy Conservation and Sustainability Measures			
a	Review energy conservation or sustainability gaps	<ul style="list-style-type: none"> • Accounting principles • Commissioning principles/procedures/standards • Construction finance • Construction law • Construction techniques • Control systems and devices • Industry sustainability standards and best practices • Measurement and verification standards • Mechanical engineering principles • Project management • Rebate opportunities and programs • Third party certification systems/requirements 	<ul style="list-style-type: none"> • Analytical skills • Accounting skills • Cost estimating skills • Political skills • Project management skills 	<ul style="list-style-type: none"> • Design consultants • ESPC • Scheduling software • Scope of work templates • UESC • Utility company rebates
b	Identify project requirements			
c	Evaluate project-specific site logistics			
d	Investigate feasibility of implementation			
e	Engage stakeholders for input on optimum solution			
f	Apply for energy rebates			
g	Create a scope of work			
h	Prepare cost estimates			
i	Obtain project funding			
j	Identify deliverables required by project			
k	Write specifications required to complete deliverables			
l	Request proposals or quotations			
m	Analyze proposals or quotations			
n	Select and award project			
o	Coordinate training of maintenance staff			
p	Validate completion (commissioning) of project			
q	Conduct measurement and verification requirements			
r	Obtain project documentation that reflects as-built conditions			
s	Notify finance of capital project completion for depreciation start date			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
D	Improving Energy Efficiency and Sustainability			
7	Plan for New Construction			
a	Identify opportunities to incorporate utility rebates and incentives	<ul style="list-style-type: none"> • Basic architecture • Basic engineering • Commissioning principles/procedures/standards • Construction techniques • Drawing and specification interpretation • Energy and sustainability best practices • Third party certification systems/requirements 	<ul style="list-style-type: none"> • Analytical skills • Blueprint reading skills • Communication skills • Detail-oriented • Investigative skills • Organizational skills • Technical writing skills 	<ul style="list-style-type: none"> • Commissioning documentation • PPE • Professional associations • Project documents • Sustainability plans • Test and balance contractors • Third party certification reference materials • Utility technical assistance
b	Establish energy and sustainability project goals and targets			
c	Establish energy and sustainability design parameters			
d	Review measurement and verification plan			
e	Review project documents for compliance with energy and sustainability goals and targets			
f	Maximize instrumentation to capture energy consumption			
g	Prepare construction waste management requirements			
h	Identify sustainable criteria for products and materials			
i	Prepare indoor environmental quality construction requirements			
j	Make recommendations for changes during design to energy and sustainability project goals and targets			
k	Respond to RFIs			
l	Oversee commissioning process			
m	Prepare erosion and sedimentation control requirements			
n	Verify compliance with third party certification			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
D	Improving Energy Efficiency and Sustainability			
7	Plan for New Construction			
	o Verify completed project complies with strategic goals and implementation plans			
	p Field verify construction processes meet project requirements related to energy and sustainability goals and targets			
	q Create punch list for energy and sustainability requirements			
E	Communicating with Others			
1	Provide Energy and Sustainability Updates			
	a Communicate energy and sustainability efforts with stakeholders	<ul style="list-style-type: none"> • Business acumen • Cost avoidance calculations • Data normalization • Data validation processes • Marketing techniques 	<ul style="list-style-type: none"> • Ability to analyze bills • Accounting skills • Analytical skills • Basic math skills • Communication skills • Presentation skills • Public relations skills • Public speaking skills • Spreadsheet skills • Writing skills 	<ul style="list-style-type: none"> • ENERGY STAR portfolio manager • Presentation software • Spreadsheet software • Utility tracking software
	b Publicize savings and benefits information			
	c Prepare sustainability report			
	d Compare usage and cost reports to baselines, goals, or model projections			
	e Calculate savings or cost avoidance			
	f Document cost savings or avoidance			
	g Prepare financial summary report			
	h Prepare utility usage and cost report			
	i Distribute reports to stakeholders			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
E	Communicating with Others			
2	Participate in Third Party Recognition Programs			
a	Review third party recognition options	<ul style="list-style-type: none"> • Third party recognition costs • Third party recognition application process • Third party recognition program criteria 	<ul style="list-style-type: none"> • Detail-oriented • Investigative skills • Time management skills • Writing skills 	<ul style="list-style-type: none"> • Organizational personnel • Outside vendors • Professional associations • Professional network • Program team • Spreadsheet software • Third party certification reference materials • Word processing software
b	Choose third party recognition program			
c	Determine third party recognition requirements			
d	Perform gap analysis			
e	Implement required projects to meet third party requirements			
f	Submit application for third party recognition			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
E	Communicating with Others			
3	Create a Culture of Sustainability			
a	Determine needs and concerns of stakeholders	<ul style="list-style-type: none"> • Change management • Marketing techniques • Program management 	<ul style="list-style-type: none"> • Change management skills • Communication skills • Enthusiastic/passionate • Listening skills • Marketing skills • Persistent • Presentation skills • Public relations skills • Public speaking skills • Teaching skills 	<ul style="list-style-type: none"> • Marketing materials • Promotional materials • Social network • Training facilities • Training materials • Word processing software
b	Identify areas for improvement			
c	Build narrative around success stories			
d	Educate occupants regarding sustainability successes			
e	Create competitions to engage employees in sustainability program			
f	Reward employees for sustainable measures			
g	Incentivize employees to change behavior			
h	Create promotional campaign			
i	Distribute promotional campaign			
j	Create mission statements, logos, or slogans			
k	Participate in community events			

Table 8 (Continued): DACUM Chart for Energy/Sustainability Managers

	Duties, Tasks, and Steps	Specialized Knowledge	Skills and Abilities	Tools, Equipment, and Resources
E	Communicating with Others			
4	Create Public Outreach Program			
a	Create public profile of energy and sustainability program	<ul style="list-style-type: none"> • Community needs, concerns, and standards • Cultural awareness • Green branding • Industry sustainability standards and best practices • Organizational philosophy on sustainability • Organizational policies on media interaction 	<ul style="list-style-type: none"> • Communication skills • Creative thinking skills • Interview skills • Listening skills • Marketing skills • Presentation skills • Public speaking skills • Writing skills 	<ul style="list-style-type: none"> • Community partners • Presentation software • Press release guidelines • Web developers
b	Contribute to organizational website			
c	Present at industry conferences and other community events			
d	Provide tours to public			
e	Respond to media requests			
f	Write periodicals related to energy and sustainability program			
g	Create community competitions			
h	Create community incentive programs			
i	Provide proving ground for emerging technologies			
j	Share best practices with industry			

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