Weatherization And Intergovernmental Programs Office

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Best Practices in Energy Data Collection & Tracking

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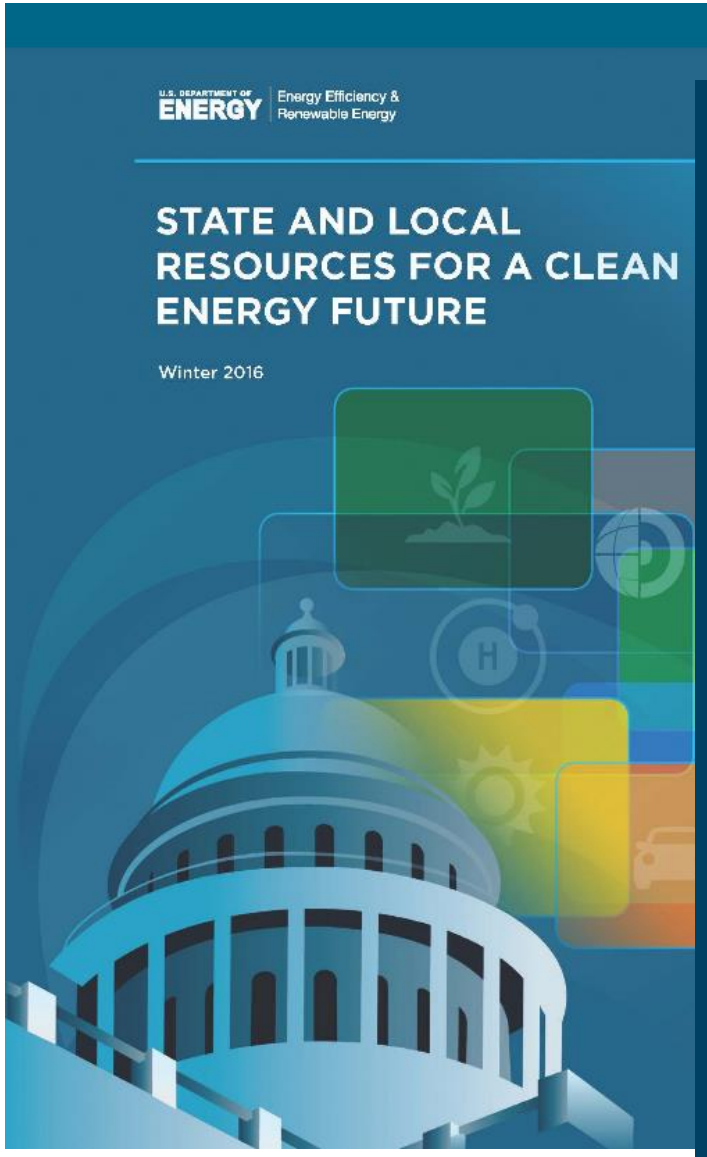
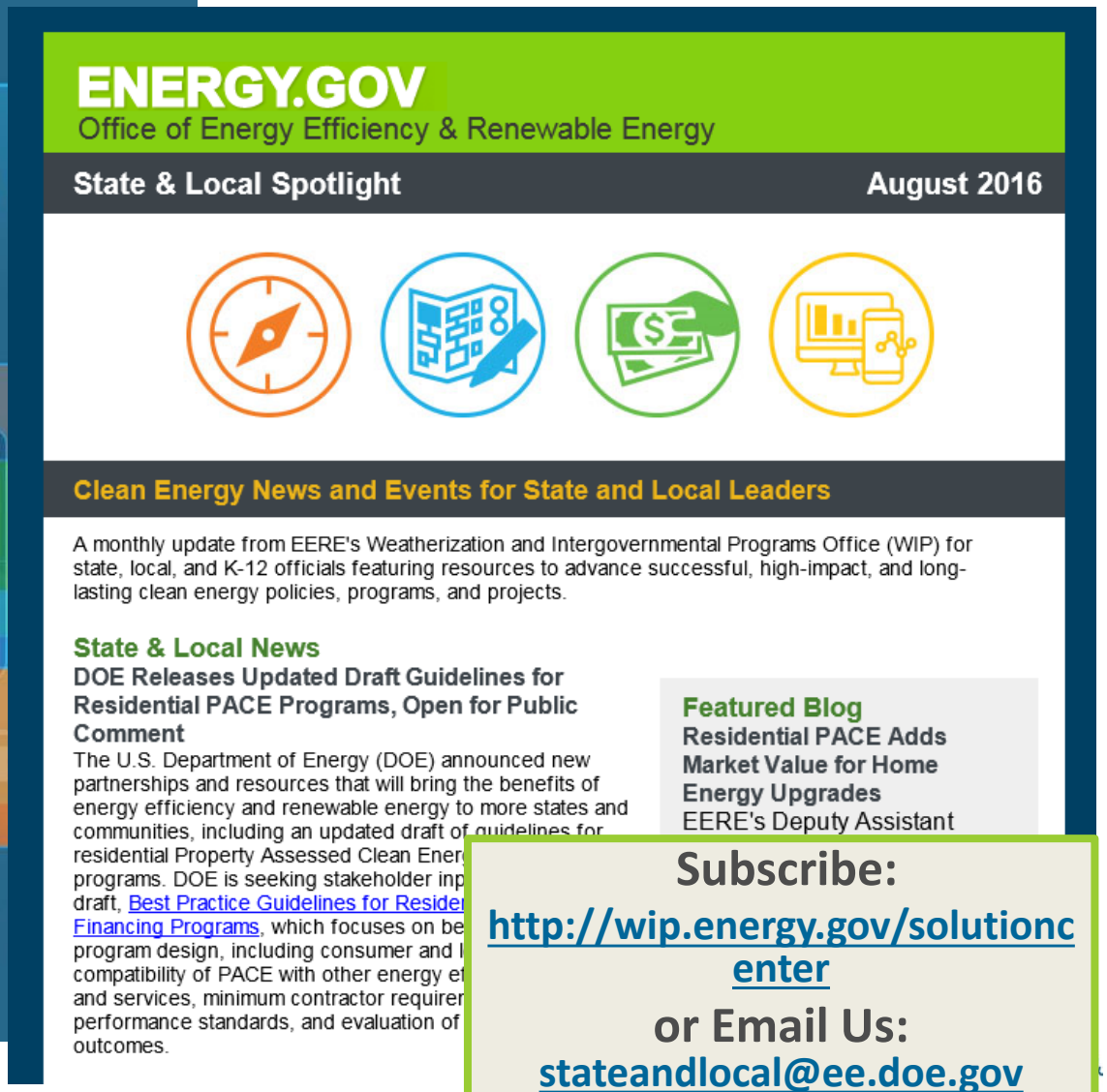
Technical Assistance to State and Local Governments





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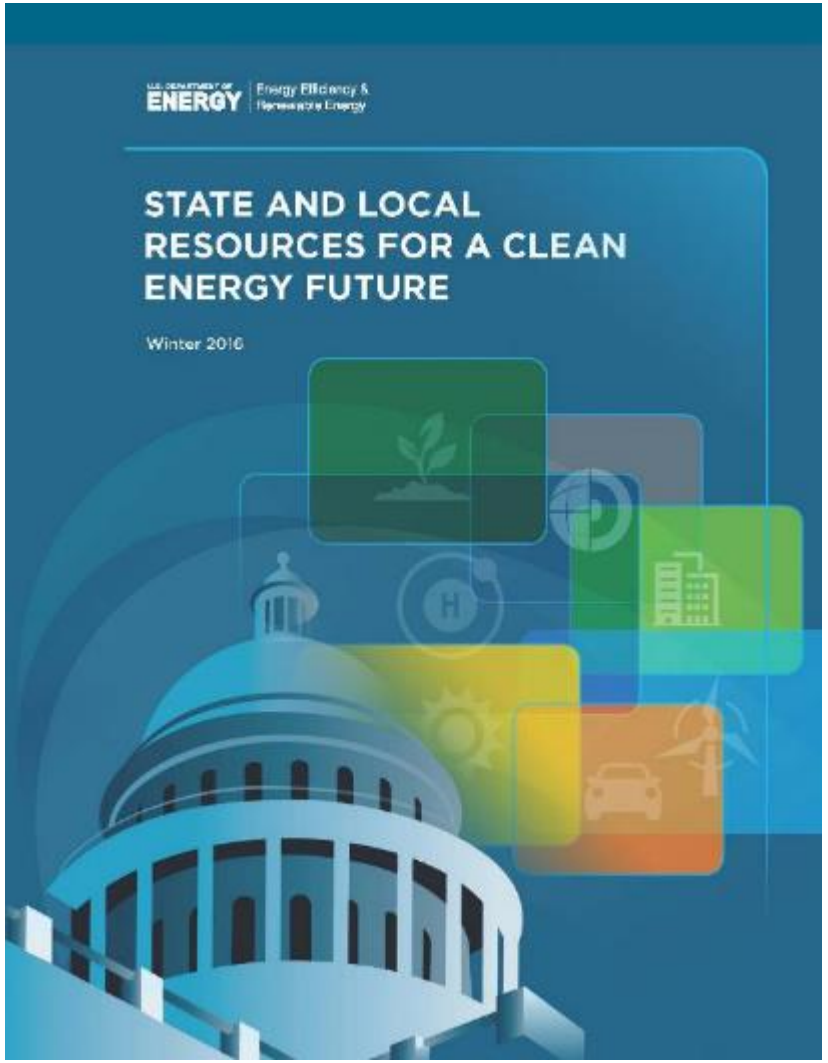
State and Local Resources for a Clean Energy Future

What you will find:

- Targeted opportunities for impact in your jurisdiction
- Key resources from each of the four action areas
- Information on initiatives and resources in renewable power, sustainable transportation, and energy-saving homes, buildings, and manufacturing from across EERE



Course Outline

- Introduction
- Creating an Asset Inventory
- Streamlining Access to Utility Data
- Tools and Analytics
- Organizational Structure
- Engagement and Communication
- Summary

Course Objectives

Intended Audience

Personnel from cities, communities, and states that involved with asset data collection and tracking for improving their performance

Learning Objectives

- Understand the methodology towards implementing robust data collection and tracking systems
- How to develop and maintain an inventory of energy consuming assets and options to access relevant utility data
- Options and strategies for establishing a robust and sustainable data management process
- Specific hurdles in data collection and tracking process.

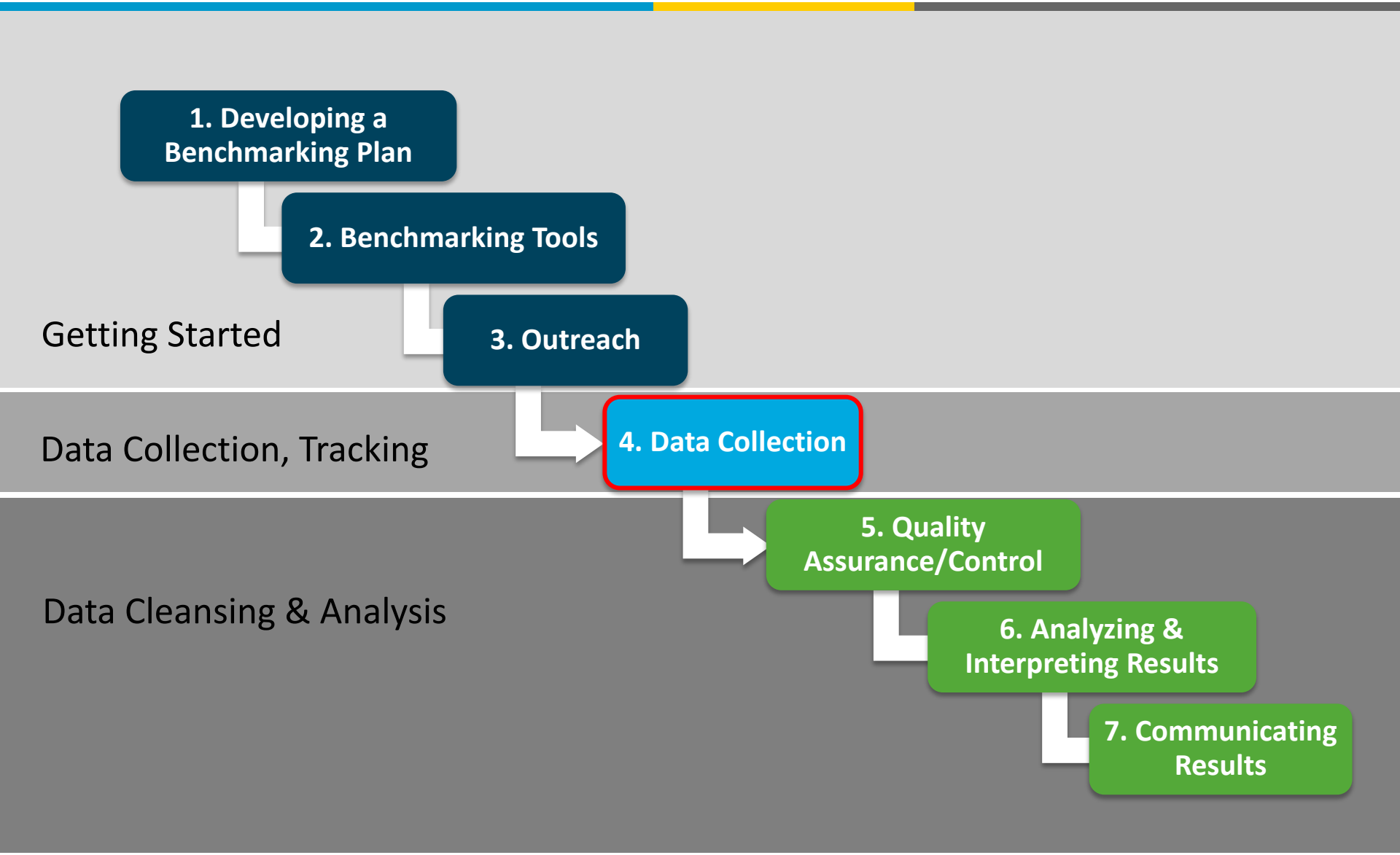
Introduction to Benchmarking

- Benchmarking compares the measured performance of a facility to itself, its peers, or established norms
- Benchmarking provides an empirical foundation for an organization's energy management strategy
- Benchmarking helps manage buildings effectively. You can't manage what you don't measure
- Benchmarking
  - facilitates energy accounting
  - assists in identifying opportunities for improvement
  - helps quantify/verify energy savings.

Benefits of Benchmarking

- Manage energy use proactively
- Assess and compare building's energy performance
- Identify billing errors and other anomalies
- Verify pre- and post-project energy use, greenhouse gas emissions, and energy costs
- Assess effectiveness of current operations, policies, and practices
- Assist in planning: set goals, targets, and timelines
- Communicate results in meaningful terms
- Participate in energy challenges or benchmarking programs

Building Benchmarking Process



Source: http://energy.gov/eere/wipo/building-energy-use-benchmarking

Why track energy data?

Interviewees report the ability to:

- Improve strategic energy management capabilities
- Build the case to leadership on the value of energy management and gain additional support
- Improve control and transparency of energy costs and budgets
- Improve operational efficiency
- Facilitate demand response and energy purchasing

> *"Measuring your energy usage and cost is the first step to properly managing energy"*
>
> - City of Virginia Beach Mayor William Sessoms, Jr.

Best Practices in Energy Data Collection and Tracking

Asset Inventory

Comprehensive
Centralized
Verified
Up to Date

Data Access

Comprehensive
Streamlined
Automatic
Prompt

Tools and Analytics

Flexible
Secure
Accessible
QA/QC

Organizational Structure

Integrated
Centralized
Dedicated Staff
Streamlined

Engagement Communication

Targeted
Clear
Transparent
Mission-focused

A. Asset Inventory

- **What is it?**
  - A comprehensive and centralized database:
    - Asset and their characteristics- all individual energy and water consuming assets that are owned or operated
    - Utility data -track utility consumption for which the entity pays utility bills, including leased spaces.
- **Why create it?**
  - Improves the ability of an organization to
    - manage energy consumption
    - optimize operations
    - prioritize energy efficiency projects and investments.
- **Who should be involved?**
  - The energy manager, sustainability manager, data administrator, or individuals with comparable roles and responsibilities
- **When to begin?**
  - Could take from 6 months to 2 years
  - Depend on portfolio size, the number of devoted staff devoted, degree of utility and organizational cooperation.

A. Asset Inventory

1. Locate Sources of Asset Data

- Identify internal data systems, departments, and individuals holding asset characteristics and utility data
- Determine the categories of data and metrics that will describe the inventory
- Collect utility bill data and asset characteristics
- Request all available account and meter data from commodity vendors
- Assess current energy baseline status by sector

2. Create Standard Organizational Structure

- Identify existing principles for organizing assets
- Identify inconsistencies and standardize nomenclature and definitions
- Design the organizational structure

3. Reconcile Collected Data and Fill Data Gaps

- Refine and confirm list of assets and utility bill data
- Match meters with assets, eliminate inactive accounts, and accurately attribute utility expenditures
- Investigate unmatched meters and assets

4. Maintain Inventory Integrity

- Design protocols for adding and removing assets from the asset inventory
- Establish a process for updating utility bill data
- Review and update inventory regularly

A. 1. Locate Sources of Asset Data

- Identify sources of data
  - Finance Department, Accounting System/Database, Tax records, Real Estate/ Architecture/ Engineering Division, Capital Improvement Plan, Risk/Insurance Department, Property Assessor Database, City Master Plan, Greenhouse Gas Emissions Inventory, Individual departments such as General Services, Facilities Management, Parks, etc.
- Types of data
  - Organizational data: fund or cost center; managing department or agency
  - Utility bill data
  - Asset and their characteristics
  - Energy performance contracts
- Commodity
  - Types, vendor details
  - Consumption and cost data
  - Collect utility bill data and characteristics
- Account and meter data from commodity vendors
- Assess current energy baseline status by sector

A.2. Create a Standard Organizational Structure

i. Identify existing principles for organizing assets

- Requires merging data from a variety of sources that may have organized the data using different sets of principles.
  - Department (DGS), funding source (general fund), activity type (offices, etc.)
- A well-structured inventory takes into account existing organizing principles and designs a consistent set of principles that can be applied

ii. Identify inconsistencies and standardize nomenclature and definitions

- Identify discrepancies in how asset characteristics are defined
  - GSF vs. NSF for building area, parking garages, parking lots, and/or basements may or may not be included in the building's area
- Consistent approach should be followed
- Create a standard nomenclature
- Develop and share a common data dictionary (BEDES)
- The use of a unique identifier can be employed as a way of ensuring that assets are properly accounted for across the organization.

A.2. Create a Standard Organizational Structure

Asset Inventory

iii. Design the organizational structure

- A hierarchical structure is a valuable tool for organizing assets within the inventory and is recommended for organizations of all sizes

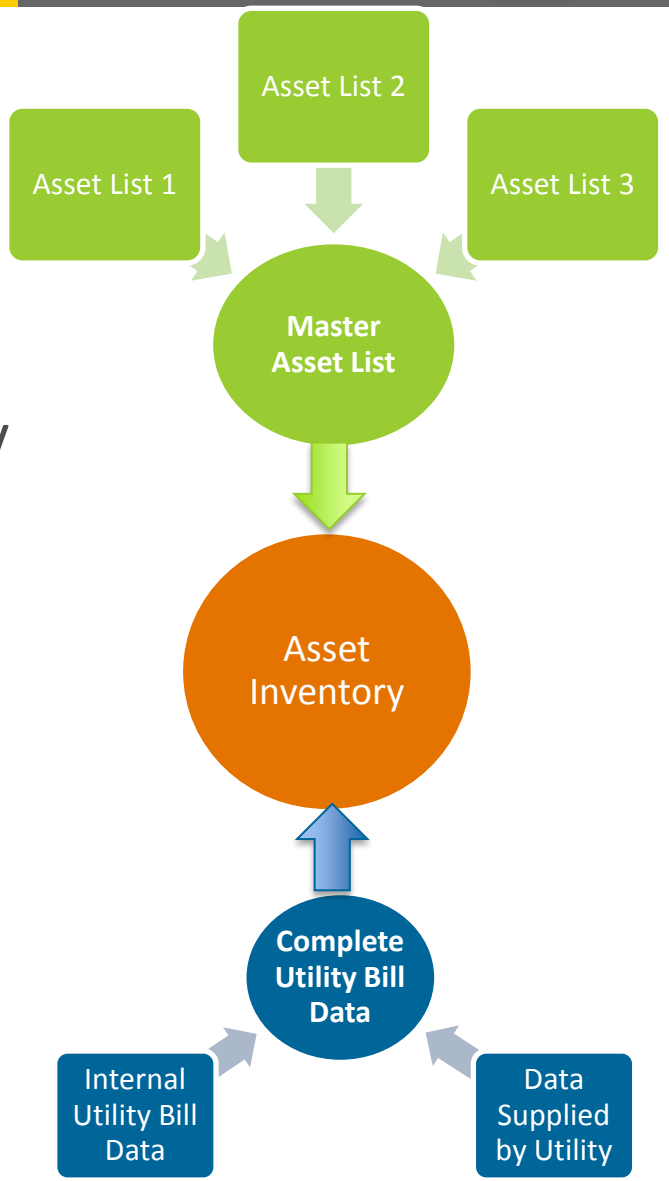
Field	Example
❖ Funding Source	General Fund, Revenue, School, etc.
➢ Department or Agency	Administration, Transportation, etc.
▪ Site	Campus or building complex
• Asset Identification Code or Name	Asset1
◆ Asset Type	Building/facility, street light, pumping station, etc.
➢ Primary Facility Type	Office, library, fire station, etc.
▪ Vendor Account	Second Electric and Gas
• Commodity Meter	Gas, electric, water, sewer, gasoline, fuel oil, etc.

- A tracking tool can be used to house an entity's inventory
- Ability to display, analyze, and report on the different fields
- Even without a sophisticated tool, data can be adequately sorted, filtered and displayed using Microsoft Excel and Access functionalities.

A.3. Reconcile Collected Data and Fill Data Gaps

Asset Inventory

i. Reconcile and confirm list of assets and utility bill data
   - Gather, merge, and reconcile data from different sources
   - Compare internal with external utility data
     - Utility data from A/P must be reconciled with vendor data
     - Work with responsible parties to resolve the differences
   - Augment and supplement data from other sources
     - Utility information from internal sources may be incomplete



A. 3. Reconcile Collected Data and Fill Data Gaps

Asset Inventory

ii. Match meters with assets, eliminate inactive accounts, and accurately attribute utility expenditures

- Identify a common data field — the service or street address
- Eliminate inactive accounts
- Accurately attribute utility expenditures

Type of Data Error/Gap	Potential Causes	Consequences
Utility meter does not have a corresponding asset on entity's record	• Utility vendor was not notified of divestments in assets and continues to bill the entity for service to an asset that the entity no longer owns or occupies • Meter or the meter number was changed by utility • Meter was deactivated	• Total energy use and cost are inflated for the portfolio • The entity is overpaying and could receive a refund for the amount paid while the asset was under separate ownership or occupation
Asset does not have a corresponding utility account	• Newly constructed, acquired, or occupied asset has not been assigned an account with the utility or accounts have not been updated by A/P • The asset is part of a site that is master metered or accounts belong to tenants	• The entity owes money to the utility and could be docked additional late fees for non-payment • The entity has no access to the account consumption data
Bills with zero consumption	• Vacant property • Fuel switch • Old meter number	• Unnecessary burden to track bills in the case of a fuel that is no longer being used or a meter which was replaced • The entity is overpaying
Lack of bill	• Meter was deactivated and not removed from the entity's database	• Unnecessary burden to track meters and accounts which are no longer active

A. 3. Reconcile Collected Data and Fill Data Gaps

iii. Investigate unmatched meters and assets

Match Meters Using Existing Data

- **Utility Rate Codes**
  - Utilities assign different rate codes to meters based on the assets they serve
  - Knowing the rate code for a meter may help resolve some of the discrepancies
  - Errors can also arise from assets with a wrong rate code.
  - Fixing these errors can lead to additional cost savings.
- **Online Mapping**
  - Map the address of the unmatched asset or the service address of an unmatched meter
- **Geographic information system (GIS)**
  - Capture, store, manipulate, analyze, and display multiple layers of geographical data
  - Analyze clusters of meter and asset addresses to help with matching
- **Asset Characteristics**
  - Asset type, gross square footage, primary facility type can predict the expected energy use.
    - Higher EUI for data centers compared to offices
    - Utility data from transportation department only responsible for traffic lights will help address some of the discrepancies
  - CBECS data can be used as a guide to help resolve some of the mismatches

A. 3. Reconcile Collected Data and Fill Data Gaps

iii. Investigate unmatched meters and assets

Collect Additional Data

- **Asset Survey Tool**
  - Given to staff responsible for managing specific assets
  - Helps not only match meters to assets, also confirms data accuracy
  - Makes most sense for large organizations
- **Site Visits**
  - Site walk with the responsible facility manager to gather more details
    - May reveal that a retail space has been turned into office space and help explain some of data inconsistencies
  - All meter types and numbers located on site should be recorded and used to search through utility bill data
- **Utility Meter Readers**
  - Leverage utility relationships to locate meters and record their identification numbers during their monthly rounds
  - When data gaps arise, consider investigating unmatched assets in an manner that reflects their contribution to the overall energy/cost

A.4. Maintain the Integrity of the Inventory

- Entity's asset inventory & utility information need to be updated as:
  - assets are acquired, divested, and/or newly constructed
  - meters are removed, added, or replaced
  - utility vendors are substituted
- Maintaining the integrity of the inventory involves:
  - i. Design protocols for adding and removing assets from the asset inventory
  - Establish a communication policy for the inventory manager
    - sales, purchases, new construction, office moves, and new leases
    - Changes to staff responsible for managing the asset inventory and accounting
  - Inventory manager participates in meetings involving new construction and acquisitions
  - ii. Establish a process for updating utility information
  - Work with utility vendors to exchange most current account information
  - Institute a policy where modifications to utility vendors are relayed
  - iii. Review and update inventory regularly
  - Circulate the revised inventory annually to the responsible staff
  - Opportunity to inform about on trends in commodity usage

B. Streamlining Access to Utility Bill Data

Data Access

- **What is it?**
  - Optimizes the flow of data from the utility to the customer by creating shortcuts and/or automating
  - Automated data transfer solutions retrieves data from the utility's records and imports the data into a customer's tracking database
- **Why streamline?**
  - Reduces the time spent collecting data from vendors,
  - Reduces errors related to manual data entry, and allows for consistent and timely data collection.
- **Who should work with vendors to obtain it?**
  - The energy manager, sustainability manager, data administrator, or individuals with comparable roles within an organization should leverage their knowledge and utility relationships as they develop a more streamlined data access solution.
- **When to begin?**
  - Investigate data access options in parallel with asset inventory development
  - Can take anywhere from 6 months to a year or longer to implement a streamlined data access solution.

B. Data Access Solutions

Access Type	Description
Manual Entry of Paper/Online Bills	A standard utility bill generated by a utility monthly or quarterly for each individual account held by an entity
Consolidated Billing	The utility aggregates multiple accounts and corresponding utility bill data into a single spreadsheet file.
Electronic Data Interchange (EDI)	allows entities to automatically receive and read utility bill data from multiple accounts. All data contained in the bill is captured and transmitted.
Portfolio Manager Web Services	API allows utilities to export cost, consumption, and billing period data directly into EPA's ENERGY STAR Portfolio Manager platform via software-to-software communication.
Third Party Services	Aggregates utility bill data for accounts on behalf of the client. Companies can use a variety of formats including paper bills, consolidated bills and EDI. Companies may use proprietary technology to read individual bills by gaining access to utility web portals and translating the data into a usable format.

The efficacies of each solution can be evaluated based upon the magnitude of their impact on the following elements:

- Reduction in Staff Time Intensity
- Increase in Speed to Data Receipt/Review
- Ability to Obtain Comprehensive Utility Bill Data
- Reduction of Data Entry Errors
- Improvement in Operational Efficiency

Emerging Solutions

- **Advanced Meters**
  - Leverage advances made possible through smart meters that record energy consumption in intervals of 15, 30, 60 minutes, or 24 hours
  - Helps to monitor, manage and diagnose problems quicker
- **Green Button**
  - An industry-led initiative to provide electricity customers with easy access to interval consumption and cost data via a utility's website.
  - Provides customers data in an XML format that is based on a common technical standard developed in collaboration with a public-private partnership
- **Better Buildings Energy Data Accelerator**
  - Local governments joining forces with local utilities to make it easier for building owners to get access to whole-building energy usage data for the purposes of benchmarking building energy performance.

Process to determine an optimal data access solution

Steps:

1. Assess the Current Process for Collecting Energy Data
2. Investigate Data Access Solutions
3. Determine the Data Access Solutions
4. Implement Solution(s)
5. Test solution
6. Make improvements

B.1. Assess the Current Process for Collecting Energy Data

Data Access

- Identify all the actors involved for reviewing and paying bills
- Identify all the systems that are used to support bill payment.
- Work with relevant staff to obtain a list of the utility vendors along with the organization's portfolio of assets they serve
- Process on how those vendors provide utility bill data to the organization

Organization Name: Anywhere, USA

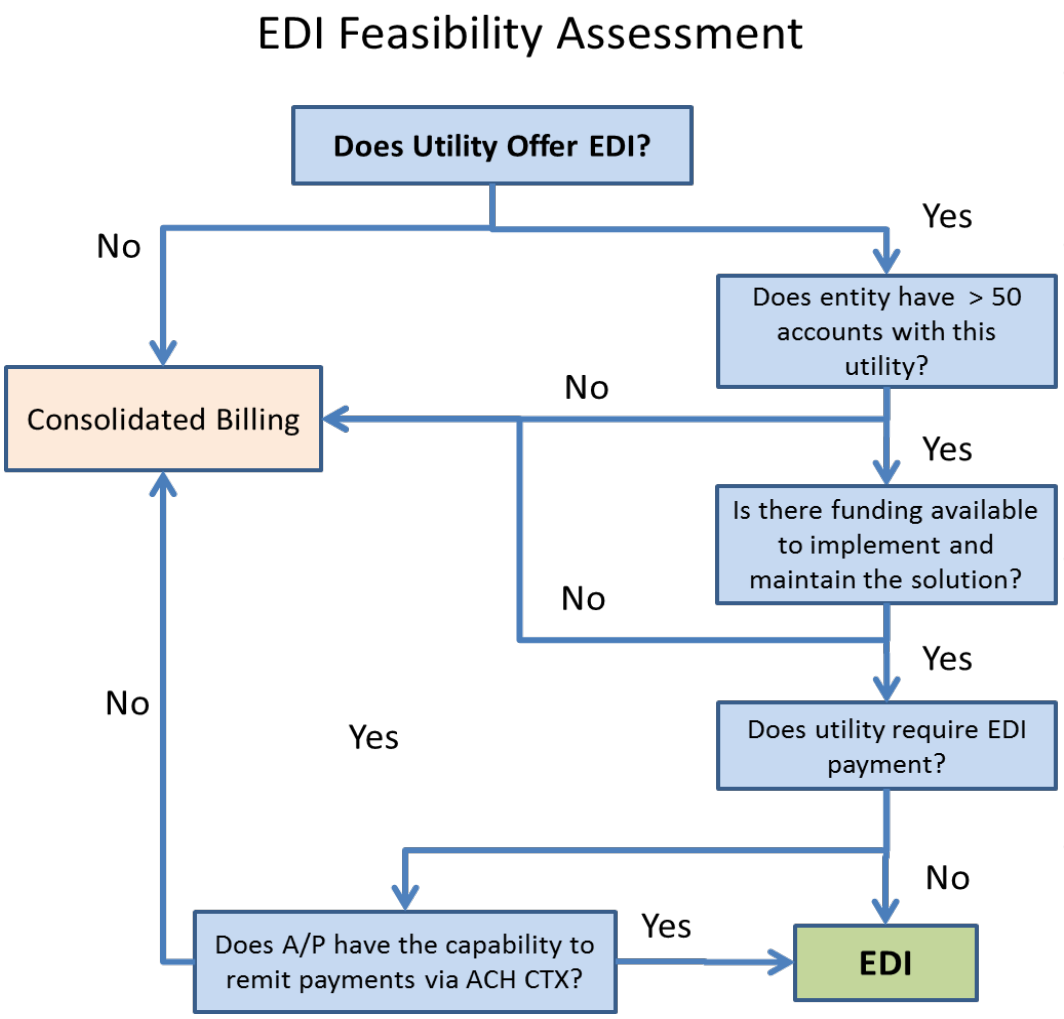
Utility	Commodity Type	# of Meters	Method of Collection	Frequency of Collection	Databases for Cost Data	Payment Entity	Database for Usage Data
AB&C	Electric	300	Consolidated Bill	Monthly	Oracle	Public Works	Portfolio Manager
AB&C	Gas	200	Consolidated Bill	Monthly	Oracle	Public Works	Portfolio Manager
ENRG1	Water	50	Manual Entry from Paper Bills	Quarterly	Excel Spreadsheet	Water Dept.	Excel Spreadsheet
Total		550					

B. 2. Investigate Data Access Options

- Data access options available from utilities vary greatly by vendor
- Very unlikely that's one unified solution can be used with all the vendors
- Contact vendor account representatives to list available options and supporting tools offered by the utilities for each of the accounts
- Take into consideration future utility infrastructure upgrades that may influence an organization's ability to retrieve its utility bill data
  - Smart meters that provide real time consumption readings
  - Utility's EDI capabilities
  - Green Button format

B.3. Determine Solution- EDI Feasibility

Data Access



- EDI is the most efficient data access solution currently available
- Factors affecting feasibility of EDI
  - Utility offering
  - Number of meters
  - Budgetary constraints
  - Utility requirements for payment
- EDI becomes less economical for entities that have a small number of accounts with a vendor that can share data using EDI.
- If EDI is not an available option, consolidated billing should be explored.

City of Virginia Beach: Integrated Tracking & Payment

Data Access

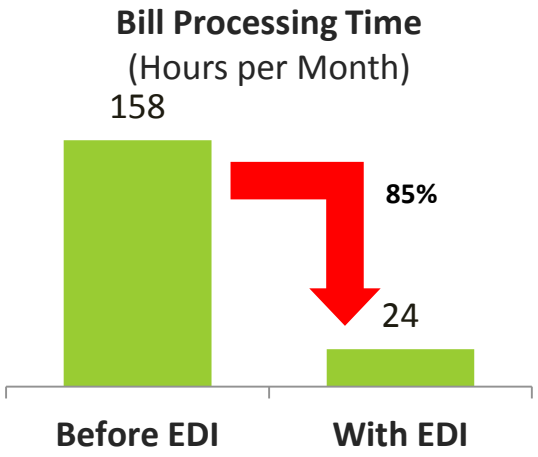
- **Goal:** Improve efficiency of operations and control of energy budget
- **Solution:** The City of Virginia Beach has eliminated nearly 1,000 paper bills monthly, reducing staff time needed for data entry by 85% . VB metropolitan area is now ranked fourth among mid-sized cities for ENERGY STAR certified buildings. CVB received the Government Finance Officers Association's Award for Innovation in Government for the utility bill management process

Energy Management and Conservation

- Track energy usage
- perform energy savings verification on completed retrofits
- Energy reports to motivate occupants to take action

City Planning, Budgeting and Operations

- Make wise energy purchasing decisions
- Eliminate billing errors and late payment
- Improve budgeting, accruals, accounting



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B.3. Determine Solution- Contracting Third Party

Data Access

- Does the amount of time needed to collect and aggregate data from the various vendors limit the organization's ability to adequately analyze the data and manage energy use for the portfolio?
- Is this caused by:
  - limited staff time and/or expertise?
  - large amounts of utility bill data that must be manually entered?
  - a large number of vendors servicing an organization's assets from which utility bill data must be obtained?
  - a large number of accounts payable departments from which utility bill data must be obtained?

If the answer to any of the questions is yes the organization should develop a cost benefit analysis

Estimated benefits from engaging a third party contractor to collect data			
Position	***Average Monthly Hours Devoted to Data Entry***	***Rate***	***Annual Total***
Energy Specialist	20	$43.62	$10,468
Resource Conservation Manager	8	$45.78	$4,395
Finance Clerk I	18	$29.44	$6,359
Annual Service Contract Adjustment			$1,975
Total Annual Personnel Savings			**$23,897**
Estimated cost of third party services			
Annual Cost1			**$25,284**
Example provided by Portland Public School District		**Net**	**($1,387)**

B.4. Implement Chosen Solution

Data Access

i. General Guidance

- Obtain and leverage leadership's buy-in to improve data access
- Identify energy data champion
- Compile a current asset inventory
- Identify utility contact for data access needs
- Communicate the value proposition of data tracking effort to drive participation

ii. Manual data entry

- Devote time each week to data entry
- Conduct error check during data entry
- Utilize utility's web portals
- Engage interns

iii. Consolidated billing

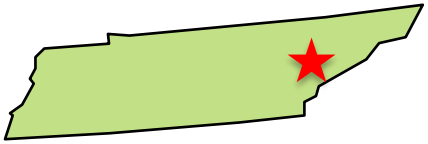
- Determine if utility offers a consolidated bill solution
- Identify and match all meters associated with the consolidated bill and remove inactive accounts
- Determine content and format of consolidated bill
- Ask utility to align billing periods for all accounts included on consolidated bill
- Determine the medium of exchange for the consolidated bill
- Establish process for review of account changes

City of Knoxville, TN: Consolidated Billing

Data Access

Goal: Track and manage the city's progress in achieving a 20% reduction in energy intensity by 2020

Solution: The City of Knoxville worked with the municipal utility to develop a consolidated bill containing electric, natural gas, water, and sewer cost and consumption data for the city's facilities and non-metered fire hydrant and outdoor lighting infrastructure



CITY OF KNOXVILLE

Ability to Track Progress

- The city tracks energy consumption, cost and rate structure for more than 1,000 utility accounts
- Achieved a 13% reduction in GHG in 2014 relative to 2005

Energy Project Savings Verification

- Verification of savings from ESPCs and other retrofit projects
- Data demonstrates savings from EE upgrades to buildings and other city infrastructure

Efficient Use of City Staff Time

- It takes 1 hour per month to import data into the tracking software
- Project Manager spends 8-10 hours per month on data management activities centered on data analysis, reporting, and entry updating.

B.4. Implement Chosen Solution- Contd.

Data Access

iv. Electronic Data Interchange

- Determine which accounts are available for transfer via EDI
- Identify and match all meters associated with the EDI transfer
- Decide on preferred method of implementing EDI (in house vs third party)
- Identify the utility's preferred method for transmitting the EDI file (AS2, VAN)
- Determine frequency of EDI file download from EDI hosting service
- Identify the file format compatible with internal tracking tool and A/P software
- Establish electronic payment (EFT) if required
- Determine whether accounting office protocols necessitate the receipt of invoice hard copies
- Test EDI invoice and remittance transfer with utility and bank
- Establish a QC/QA process to identify data errors and utility-derived format changes

B.4. Implement Chosen Solution- Contd.

Data Access

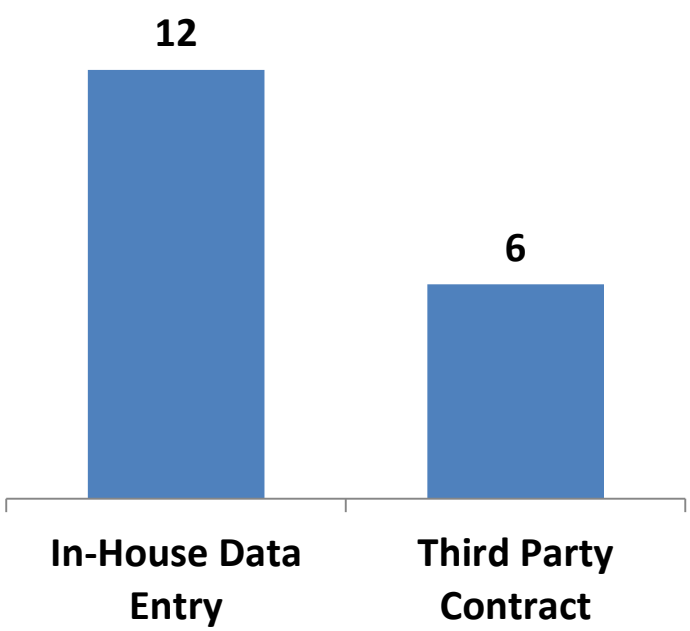
v. Third party service

- If manual is the primary means of obtaining utility bill data, organizations should look to work with a company that specializes in manual entry.
- If EDI is the primary solution, entities should look to contract with an EDI specialist.
- Organizations that have a number of solutions should consider a full service energy management company.
- Many companies offer a complimentary data tracking tool with their data collection services.
- All contracts should include provisions for training services.
- Dedicated staff to manage the contract and liaise directly with the contractor and the utility.

Portland Public Schools: Outcomes

Data Access

- Manual data entry of utility bills is virtually eliminated through the third party vendor contract
- Staff time reallocated to address usage anomalies and improve the energy performance of school facilities
- Decreased invoice processing times
- Automated usage and cost notifications
- Process flow efficiencies
- Access to data



C. Data Tools and Analytics

Tools and Analytics

Structure

- Data management, organization
- Data entry and interoperability
- Flexibility
- Data back-up and security

Analytics

- Data processing
- Data analysis
- Search and sort functions
- Data auditing

Users

- Dashboards and reporting
- Stakeholder access to data
- Customer support and training

SEED STANDARD ENERGY EFFICIENCY DATA PLATFORM™ U.S. DEPARTMENT OF ENERGY

ENERGY STAR® PortfolioManager™

C. Data Tools and Analytics -Structure

Tools and Analytics

- Data management, organization
  - System to store data for analysis and reporting.
  - Third party can perform this function through a subscription model
  - Database vendors help companies house their data on site if that option is desired.
- Data entry and interoperability
  - Ability to enter new data and revise old
  - Compatibility with other systems/data bases
- Flexibility
  - Ability to add additional fields and records
- Data back-up and security

C. Data Tools and Analytics - Analytics

- Data processing
  - Combine, map, and cleanse data
  - Synchronize data to regular time intervals
  - Ability to interpolate and extrapolate data
  - Compute statistics (average, sum, etc.)
- Data analysis
  - Compare data to historical data
  - Compare data with other buildings and benchmarks
- Search and sort functions
  - Search asset or meter level data
  - Sort/filter data by certain characteristics
    - Higher energy consumer, biggest jump in electricity consumption in a building
- Data auditing
  - Data checks for QA/QC
    - Site EUI>1000 Btu/Sft, GSF> 3 million sft

C. Data Tools and Analytics -Users

Tools and Analytics

Stakeholder/ User Type	Levels/Purpose	Building Information Displayed	Targeted Uses
Public	Top-level, overall energy consumption, for public information	Weekly, monthly, and quarterly consumption (electricity, natural gas, and water consumption)	Identify energy use and compare buildings and benchmark against each other, to encourage best practices.
Occupant	All levels of energy consumption, to enable occupants to compare their energy use with other occupants. Provides tools for them to identify and control real-time energy use.	Daily, weekly, quarterly, and yearly utility consumption.	Create key performance indicators to benchmark their performance with others and themselves. Assess the impact of their actions.
Agency Administrators or Building operators	Track building energy consumption at a building or sub-level and reward particular departments or buildings that reduce energy consumption and promote sustainability.	Monthly and quarterly consumption (electricity, natural gas, and water consumption)	Create key performance indicators to benchmark building performance with other buildings in the portfolio.
Building Managers and Facility Personnel	Offers all levels of energy consumption except office level, to support energy management, both at macro and micro scales.	Configurable data from sources. Can display total building electricity and natural gas consumption as well as disaggregated energy data.	Create charts that will analyze data internally and to export data into various formats for external analysis. Scope ranges from total building use to floor or zone, but excludes individual offices or cubicles to protect occupant privacy.
Researchers	Researchers can use tools and analytics to identify wasteful areas and systems of commercial buildings and initiate research into these particular areas.	Hourly, daily, weekly, monthly, and quarterly consumption data	Analyze data for researching issues like automatic fault detection and diagnostics.

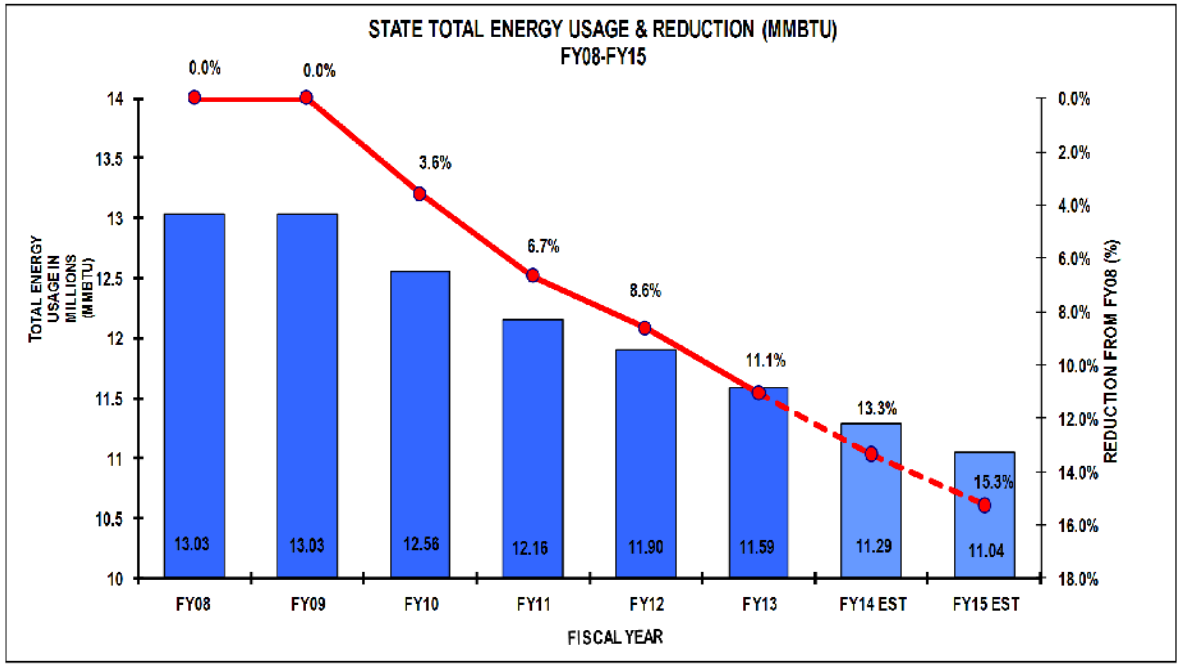
State of Maryland: Centralized Energy Database

Tools and Analytics

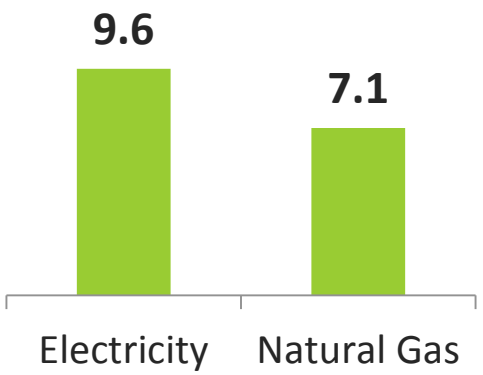
Goal: Track consumption across all facilities (124 vendors, >16,000 utility accounts, 120 accounts payable departments, 58 agencies)

Solution: A centralized energy data collection and tracking process using a third party to assist in the compilation of a central energy database, development of streamlined utility data access solutions, and maintenance of a transparent web-based portal.

Annual energy budget >$200MM, Cost of contract: $0.8-1MM



FY2013 Block & Index Commodity Purchasing Savings
(Millions $)



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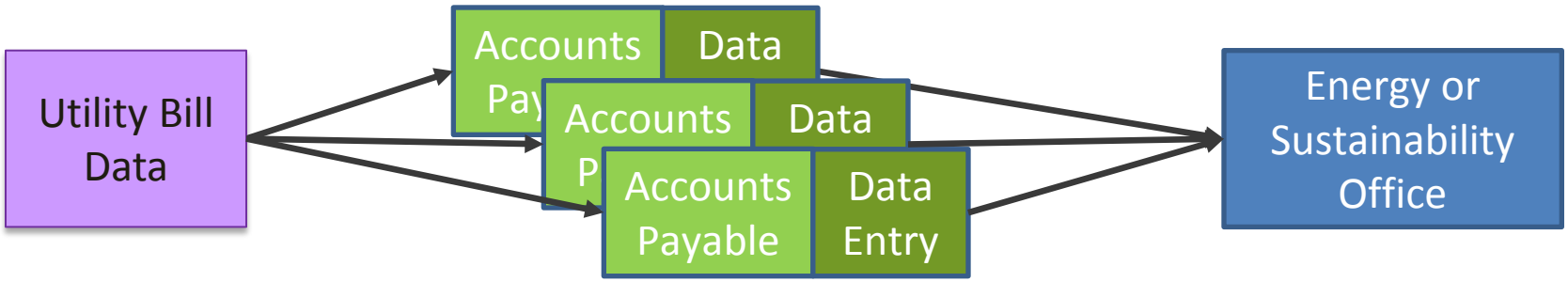
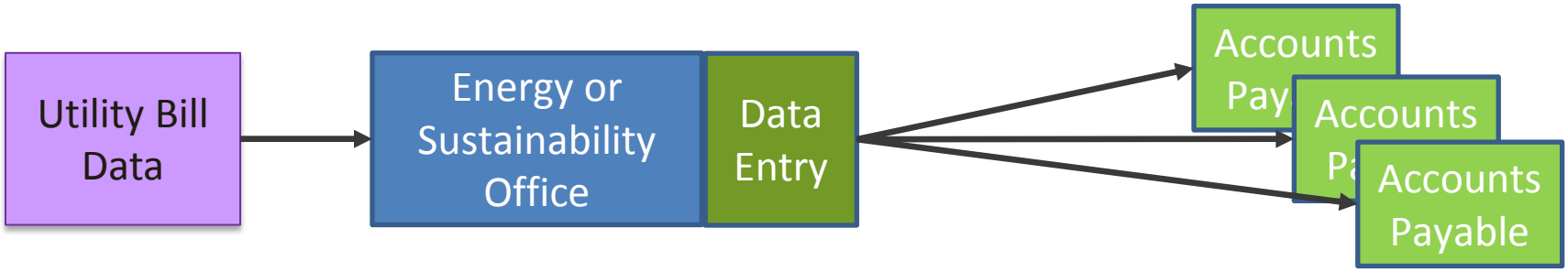
D. Organizational Structure

Organizational Structure

Decentralized



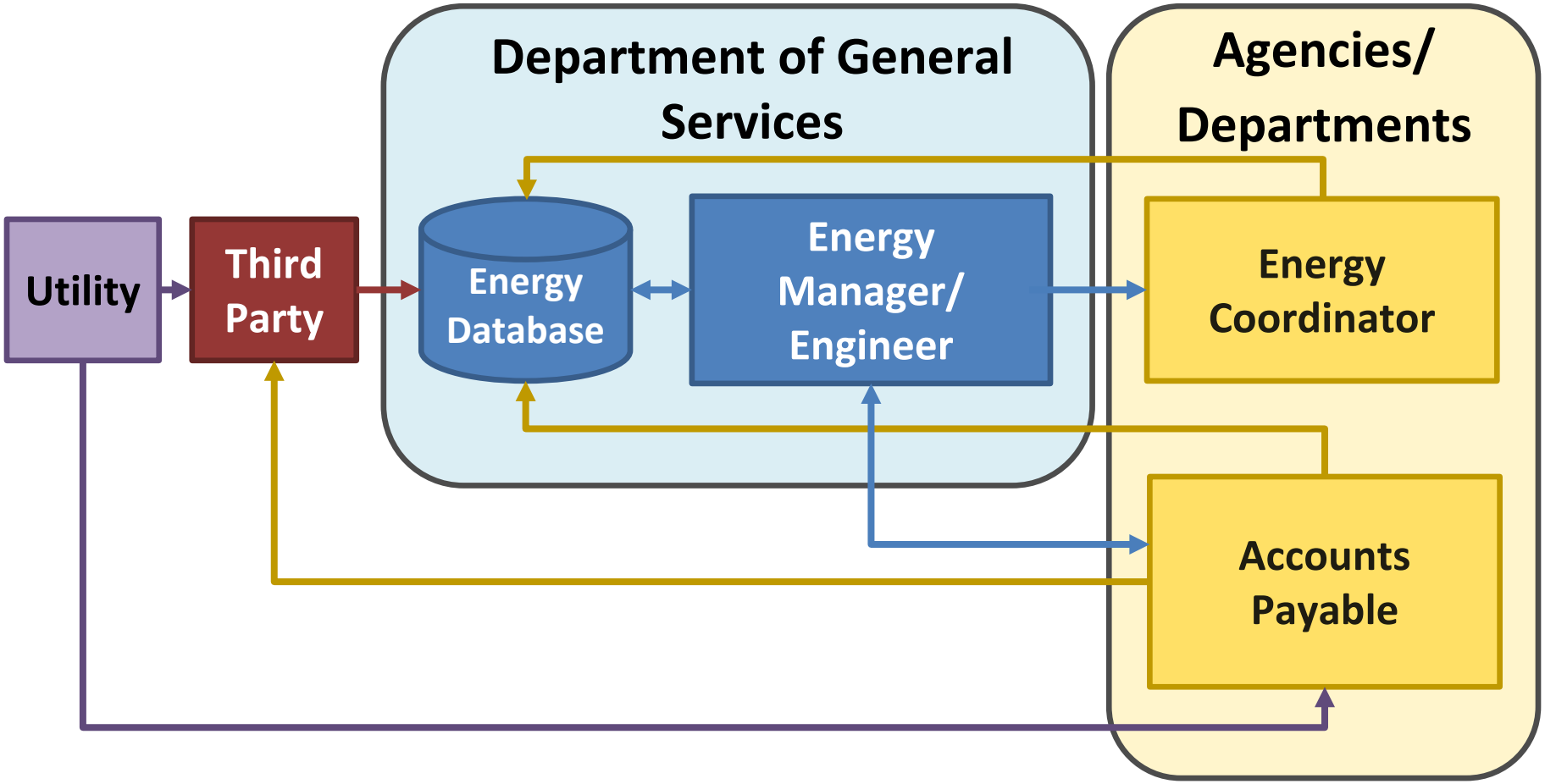
Centralized



D. Organizational Structure

Organizational Structure

Example of a Partially-Centralized Organizational Structure

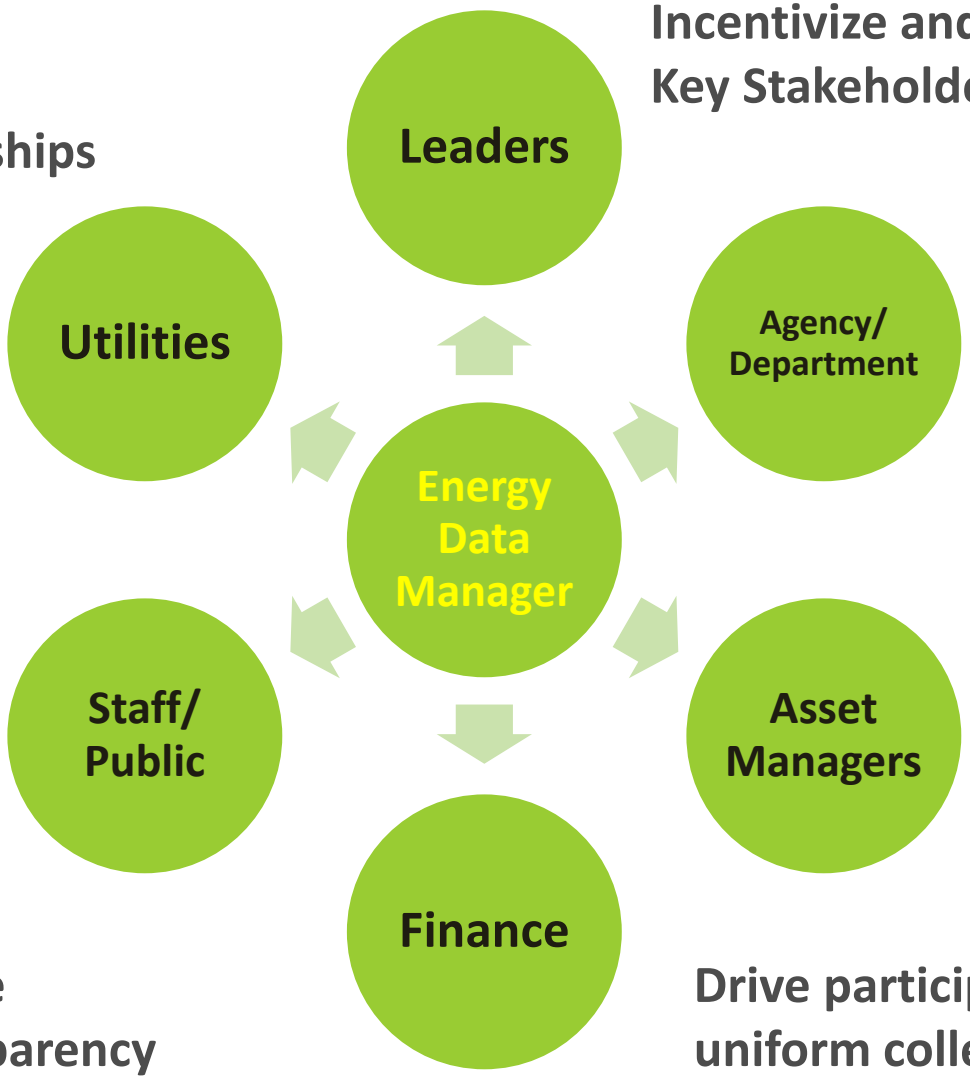


E. Engagement and Communications

Engagement Communication

Develop Partnerships

Incentivize and Recognize Key Stakeholders



Establish Effective Working Groups

Tailor Reports to Individual Audiences

Create Transparency

Drive participation through a uniform collection platform

Summary

- A robust data tracking strategy is a foundation for strategic energy management and pays additional dividends
- Development of a robust tracking system takes time
- Start with assets that contribute the most to utility consumption
- Develop an asset inventory and a system to keep it up to date
- Dialogue and collaboration with utilities is critical to develop and implement a streamlined data access solutions
- Medium to large entities use a combination of approaches to gain access to data
- A robust analysis tool is critical for “making good use of the data collected”
- An integrated and centralized structure can create a win-win situation for all stakeholders
- It’s important to implement available solutions, while remaining flexible to adopt new and more efficacious solutions as they become available

Resources

- ENERGY STAR Portfolio Manager
  - http://www.energystar.gov/buildings
- Standard Energy Efficiency Data Platform (SEED)
  - http://energy.gov/eere/buildings/standard-energy-efficiency-data-platform
- Building Energy Data Exchange Specification (BEDES)
  - http://energy.gov/eere/buildings/building-energy-data-exchange-specification-bedes
- Benchmarking Data Cleansing: A Rite of Passage along the Benchmarking Journey, April 2015 http://energy.gov/eere/slsc/downloads/benchmarking-data-cleansing-rite-passage-along-benchmarking-journey
- Energy Data Collection and Tracking for Internal Benchmarking and Energy Management: Best Practices from State and Local Governments and School Districts, December 18, 2014

Questions

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