IEDR Use Cases

To: NYSERDA IEDR Team, iedr@nyserda.ny.gov,
July 2021

Cover Letter

Dear IEDR Team,

Please find below high level comments and documents as our initial input to the IEDR Use Case input gathering effort. This information is meant to be complementary to the comments submitted by Mission:data, whose membership includes several Flux Tailor clients.

The most immediate needs that the IEDR should address as soon as possible:

Access to Energy Data:

1. Automated access to bill images and bill metadata - develop a specification for a standard for New York utilities and implement in existing ConEd/National Grid APIs in preparation for creating a common gateway to this data via IEDR,
2. An authoritative, regularly refreshed set of property data(including parcel and building data) for New York State, with building identifiers and building types used consistently across the state that can be referenced from energy data at the property to ensure a complete set of data.
3. Representative 8760 time series with hourly load profiles by climate zone, customer class and customer usage profile(ex.: with or without electric baseboard heating or ground/air source heat pumps) that can be used as baseload where using real data is not available or feasible.
4. Representative 8760 time series with hourly solar PV load shapes by climate zone.
5. Structured data with unbundled charges and 24hr x summer/winter weekday/weekend&holiday rate period schedule, plus tariff rules, for example which days are considered holidays, what if any baseline allowances or other thresholds for "tariff blocks" exist, and for a given customer and tariff, what if any tariff alternatives exist.
6. Easier customer onboarding workflow:
    a. Means of accessing raw customer data authorized and requested by property/building identifier

b. Means of accessing customer data via asynchronous, delegated access — allowing for "Nth" party data access scenarios, see Flux Tailor & Mission:data's white paper "3rd Parties and Beyond: Promoting Innovation by Energy Data Sharing with Nth Parties." and below excerpt diagram.

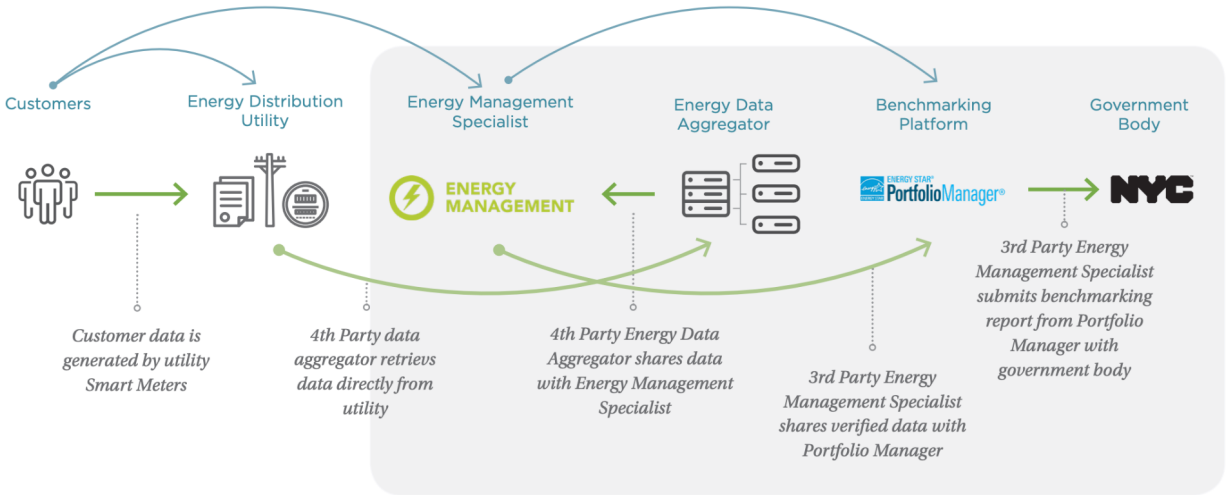
Energy Data Standards Work:

1. **Access to machine readable utility bill data** — see included Green Button Bills Initiative concept paper submitted to NYSERDA in August 2020.
2. **Integration with e-invoicing and faster payments** — allowing for innovative invoicing and faster payments by multiple market participants, enabling split distribution and supply billing and payment, on bill financing, etc.. Flux Tailor is involved in the Business Payments Coalition (BPC)'s Semantics Working Group and has initiated collaboration between the BPC and the OpenADE (Green Button) Task Force.
3. **Machine readable tariff data** — several initiatives (ex.: URDB) have tried to address this but there's no industry-supported standard. Commercial databases exist, but their fees are prohibitive to smaller companies.
4. Machine readable supply contract data & link from customer, accounts, sites, and meters to applicable supply cost — to date no industry accepted standard exists. Currently analysts have to collect this data manually by scanning their client's contracts and supplier bills and mapping to
5. Machine readable GHG emission data to be used for benchmarking

Criteria Used to Prioritize Initial Use Cases

The most important criteria is whether the use case reduces or eliminates currently existing barriers. For example, making links to bill images available through Green Button Connect APIs would allow the utilities to eliminate web scraping, which is currently the predominant way in which energy service providers gather bill data. Highest priority use cases for IEDR to support are those that can be realized by updating current utility and state data systems in the next 6 months, prior to the IEDR portal being completed. This includes for example updates to the ConEd GBC implementation that would make it standards compliant and inclusive of the customer.xsd schema. Another important criteria is whether any data standards updates or other significant technical work will be needed prior to implementation. The standards work should be initiated, but the use case can not yet be prioritized for implementation. This is the case with for example machine readable tariff data.

FIGURE 5. *Energy Management Specialist, Data Aggregator, and EnergyStar benchmarking for commercial or multifamily buildings*



A suggested definition of use case to be used for the IEDR

Energy data access scenarios can be grouped into use cases by the common type of data being requested. The use cases can then be "sliced" into sets of features that support these scenarios. For more on this "Agile" approach to using use cases along with AGile development, see Ivar Jacobson's (free) ebook: https://www.ivarjacobson.com/sites/default/files/field_iji_file/article/use-case_2_0_jan11.pdf

Additional Considerations

The use case template mentions "Advocates submitting profiles of similar use cases will work together with the IEDR development teams to come to a consensus. " I want to keep contributing to this process, but doing so without funding would not be good for Flux Tailor. For your records: It took six hours in total to outline and write up these comments, and many more to compose the diagrams and other materials included. We have already spent hundreds of unbilled hours on comments writing and meeting attendance through the REV and IEDR process.

The input gathered during this stakeholder engagement process should not be seen as representative of the needs of those using energy data. Smaller organizations may not be aware that this is happening and will not be able to dedicate time to participating and will likely be underrepresented. This is important as use cases should be prioritized in such a way that 40% of energy program benefits can go to LMI households. Efforts should be made to reach out to especially nonprofits and MWBEs active in the energy industry to gather their input in a way that either doesn't demand much of their time or compensates them for their efforts, for example via a targeted web survey.

Similarly, a lack of representation of BPOC and women in the IEDR team at NYSERDA and Program Manager will affect the perspective from which decisions are made, for example with regards to the process of use case prioritization for phase I. So far, there has been a lack of true opportunity for MWBEs in the process. For example, there were only eight work days in between when the notice for the teaming facilitation list was sent out and the deadline for IEDR PM submission. Eight work days is not enough for establishing new teaming agreements and jointly drafting and submitting a proposal. We have pointed out this issue and in general the disadvantaged position of small MWBE's several times since we joined the 20-M-0082 docket and the IEDR stakeholder engagement effort and hope NYSERDA and IEDR Program Manager staff can be dedicated to addressing this issue.

Mechanisms can be developed to involve and support MWBEs throughout the design and development of IEDR, for example by helping them apply for existing funding mechanisms for technical support such as the Flexible Energy Technical (RFQL 3685) contractor pool that could potentially be leveraged by NYSERDA and the IEDR PM. Being registered in such a contractor pool also means that work on IEDR could lead to other work with NYSERDA and its vendors and partners.

Kind Regards,

Klaar De Schepper

Use Cases

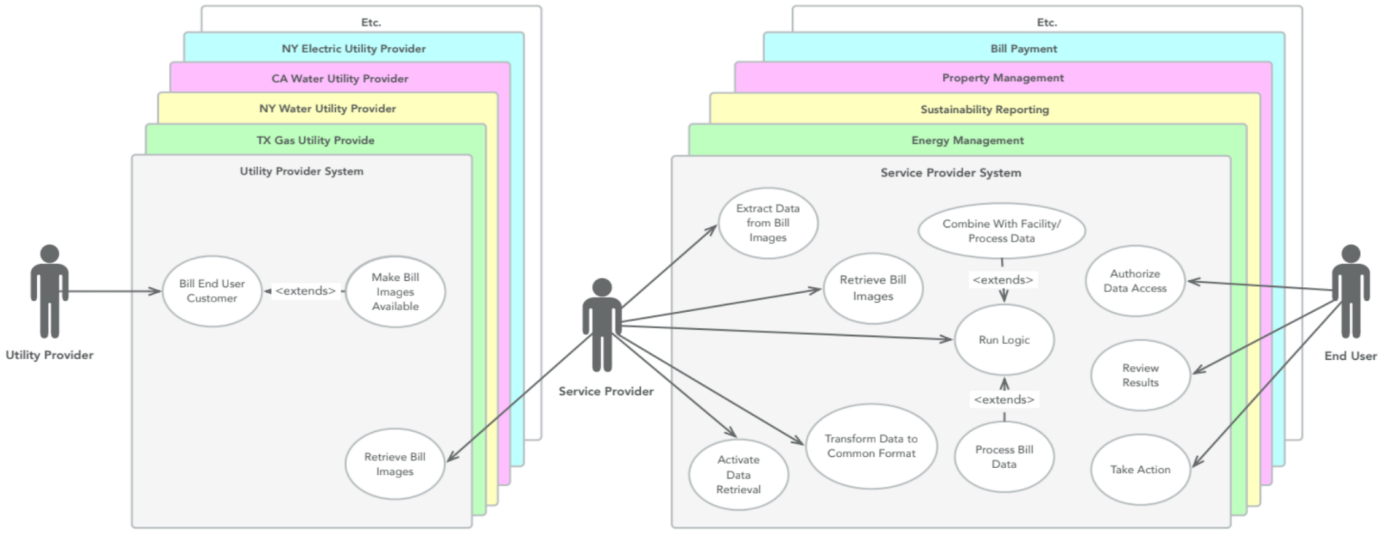
Use Case 1: Access to Billing Data

Flux Tailor works with clients accessing bill data by extraction from bill images in two predominant ways:

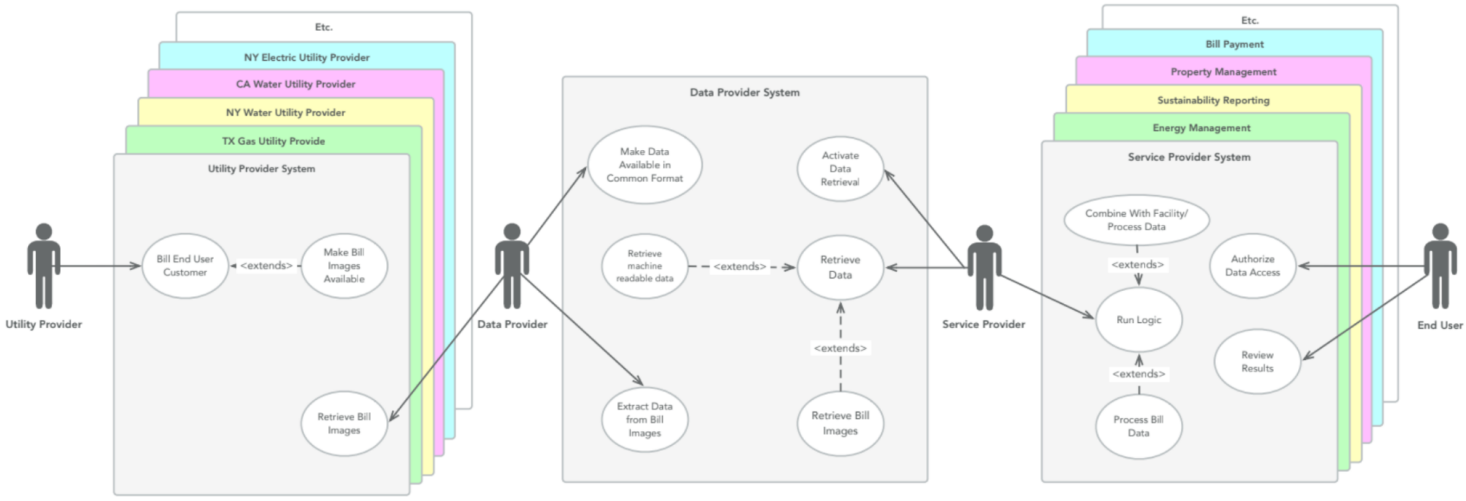
1. Service providers such as energy management or bill payment companies accessing bill data directly from utility companies. This is prevalent when data needs to be retrieved from a small number of utilities.
2. Data- as- a -service companies that serve service providers and clients that often have portfolios that extend across a large number of utility providers.

Below diagrams illustrate these two instances of the "Access to Billing Data" use case.

Use Case Diagram: Utility Bill Image Retrieval by Service Provider



Use Case Diagram: Utility Bill Image Retrieval via Data Provider



Use Case Slice 1A: Access to Bill Images via API

The below addresses some of the current pain points experienced by for example LMI Housing Organizations utility bill payment and energy management that can be resolved by making bill images and bill data available via a standard API.

4. Questions to be Answered	• What properties have the greatest opportunity for improvement? • Are retrofits performing as expected? • Have we paid the Pay-for-performance contractor correctly? • How much would we save if we switch to a different rate? • What's the community solar credit that should be applied/was it applied correctly? • Have our bills been paid? • How much is due and when? • Have there been any late charges or disconnection notices? • How much could we save from XYZ retrofit?
5. Information Produced by The Use Case	• Highest priority: An image of the bill PDF (currently accessed from Utility web portals via web scraping or manually) and limited metadata. • For later, once we've developed a standard for it: Structured bill data with all 100% information elements from customer bills.
5. a) Use of Information Produced by This Use Case	Bill payment, energy management, alternative credit scoring, community solar development and operation.
5 b) Minimum Necessary Attributes:	1. Link to bill image plus limited set of metadata points: Date of issuance, amount due and due date, account and meter identifiers, service period start/end dates 2. Later: All information on the bill: Customer, usage, cost, transaction, resource mix, etc.
6. User Interface	In addition to an API with documentation and ability to obtain API keys and perform tests, a user interface should be developed for those who do not have the ability to integrate with an API and prefer to export data as files. It should be possible to grant access starting from the service provider's web page, or from the IEDR interface. It should be easy to grant access to "nth party" data acquisition and processing service providers, for example to integrate into energy management or Accounts Payable software.
7. Data Elements Needed	Bill, Customer, Account, Meter, Tariff, Usage, Cost, Transaction data
7. a) Minimum Necessary Data Elements Attributes	Less than 2 hours latency from bill issuance by the utility Ongoing access with >95% uptime (as bill payment depends on this) 1. The complete set of elements and attributes should be developed with a diverse set of stakeholders. A draft of an MVP set: a. GBC UsageSummary representing bill b. Service period start and duration for the UsagePoint c. Reference to the bill image applicable d. Unique Invoice id e. bill issuance date f. amount due, due date g. date on which the next bill is expected

	h. an indication of whether this bill replaces any preceding bill, and if so a reference to the invoice ID of the bill that this bill replaces. 2. Complete set of data representing usage, charges, and transaction data, with 100% accurate, machine readable representation of all elements from customer bills.
5. b) Minimum Necessary Information Attributes	Less than 2 hours latency from bill issuance by the utility Ongoing access with >95% uptime (as bill payment depends on this)
8. Data Relationships Needed	It should be possible to request all bills associated with a property, so this means a relationship must exist between a unique property id, the service points associated with it, the service addresses and meters at those service points, the accounts on which those meters are billed, and the bill images for those bills.
9. Analysis Functions	No analysis cases needed, just raw data
9. a) User Input Variables Needed	No analysis cases needed, just raw data
10. Data Access Frequency	The time from data request to response should be <60 seconds for 1 year of bill data for a given account. Bill data status for a given account may be accessed only once or multiple times a day for multiple years. The latter is the case where bill data is used for M&V, bill payment, and ongoing energy management and benchmarking.
11. Use Case Benefit	● Save money on energy manager and data provider fees for acquiring and processing bill data ● Get bills paid in time, no late fees ● Verify savings ● Discover opportunities (procurement, EE, DER solutions) ● Better overview
12. Why is this Use Case a Priority?	Current access to bill data is problematic as the only way to access bill image PDFs is through a customer online account, which brings risks.
9. b) Customer Consent Process (Added Optional Question)	An energy manager obtains authorization from customers at contract signing to share data access with a data provider to access data.Ideally, access can be granted electronically for a list of properties at the time of energy manager and data services contract signing, with no additional action required on behalf of the customer after that for the data services provider to access data for those properties at a later point within the authorized timeframe.
9. c) Current Process Pain Points (Added Optional Question)	Currently, separate actions are required for each customer account at the time of the authorization request. Ideally, customer consent can be granted both in advance and at the moment of the request, and it should be possible to grant access via mobile phone.

Green Button Bills Initiative

Included with these comments is a concept paper Flux Tailor submitted to NYSERDA PON 4359 for the "Green Button Bills Initiative" in collaboration with two bill data provider companies. The goal of this initiative is to establish a standard specification for references to bill images and structured billing data. Those reviewing saw the significant value of implementing this to the energy industry but didn't approve the market test proposal because they wanted a guarantee that the utilities would implement the specification. Work is underway at the OpenADE Task Force to make the needed changes to the Green Button Standard, but additional funding for development and testing would need to be dedicated to the project to allow for the necessary requirements gathering, schema and API update work, testing, documentation, and other technical work to take place. Flux Tailor is open to teaming arrangements and funding options to further this work either as part of the IEDR process or as a separate effort.

Use Case Slice 2a: Access to Property and Building Data with Hourly Estimated Energy Consumption and Cost

This use case slice is based on our experience working with utilities, software developers, and government agencies to perform modeling and build market engagement tools. As the needed data points described aren't readily available, analysts and data engineers currently spend a significant amount of time repeating the redundant exercise of:

1. Gathering data inputs:
    - Massaging property parcel and building data sets, ex.:
        - estimating gross square feet and available outdoor area on a parcel by polygon area and estimated building height
        - mapping property classes to a simplified list of categories that can be mapped to energy usage models
    - Extracting tariff data from tariff PDFs
2. Building models for baseload vs. energy solution comparison:
    - Consumption: Defining energy models for estimated energy consumption and energy solution load shape
    - Cost: building a tariff calculation model that can be tied to models for grid support solutions such as battery or Volt/VAR regulation dispatch
3. Maintaining data inputs as they change over time: By the time a model is up and running, there is a great likelihood that some or all of the inputs have changed. Since data inputs currently need to undergo manual processing, this means either using the work knowing that the results will be inaccurate or repeating expensive data processing and validation work. If data were to be available via regularly refreshed, pre-processed, standardized file exports and API, the cost of maintaining systems will decrease significantly.

Some examples of feasibility calculator and high level analysis projects that Flux Tailor has completed that are instances of this use case slice:

- An EV Rate Comparison tool for PG&E calculator built with ZappyRide: ev.pge.com/rates — Flux Tailor provided tariff data modeling, bill calculation, data input specifications, technical documentation, usage data specification, quality assurance, and user acceptance testing for the project.

- A ground source heat pump feasibility screening tool funded by NYSERDA, currently just for Westchester County: geopossibilities.ny.gov. — Flux Tailor provided a user study, property data processing, technical documentation, and QA testing for the project.
- Flux Tailor provides data acquisition, processing, information architecture, and collaborative modeling services for "internal" feasibility analyses for clients, for example:
    - **A study of the impact of potential reductions in tenant electricity consumption on LL97 penalties**, for an organization interested in promoting real time energy metering solutions.
    - **A feasibility analysis for Aquifer Thermal Energy Storage in the Northeast U.S.** — as part of Flux Tailor's liaison officer work for the Consulate General of the Netherlands, see dutch-ates.com
    - **Portfolio aggregation of a VPP solution according to different dispatch and TOU rate scenarios and portfolio composition**, for a Community Choice Aggregator

4. Questions to be Answered	• What properties have the greatest feasibility/what is my specific project's ROI for a clean energy transition project such as solar PV or EV charging? • How much could be saved by switching to a different rate? • How much could we save from XYZ retrofit/implementation of clean energy systems in new construction? • What is the overall impact of potential changes in expected consumption based on known impact of implemented measures?
5. Information Produced by The Use Case	A ballpark estimate of potential savings from switching to/implementing an energy measure for a specific project or portfolio of projects.
5. a) Use of Information Produced by This Use Case	The information gathered provides the first step in customer engagement, and allows aggregators to model the potential value of portfolios of projects.
5 b) Minimum Necessary Attributes:	• Customer class/Property class and category • Tariff ID • Climate Zone • User Type • Energy Solution Type
6. User Interface	It should be possible to access data files via a user interface, and also to connect directly to data via an API. This data should be made available publicly so it's available to both commercial and nonprofit academic entities, and others, and should not require ESE registration.
7. Data Elements Needed	• Representative 8760 time series with hourly load profiles by climate zone, customer class, property type, and customer usage profile(ex.: apartment vs. single family home, pre-war vs. post-war, with or without electric baseboard heating or ground/air source heat pumps, etc.) that can be used as baseload where using real data is not available or feasible. • Representative 8760 time series with hourly solar PV load shapes by climate

	zone. • Structured tariff data with unbundled distribution and supply charges, including the (expected) effective date of the tariff. • Structured data for remuneration values of generation and grid support by individual projects or portfolios of projects Also helpful would be: • For each utility, the proportion of customers/meters per tariff class for a given county in their territory
7. a) Minimum Necessary Data Elements Attributes	• Baseload and energy solution load shape data is dated by year and refreshed annually. • The methodology used to create the representative load profiles is documented and there is high quality support for questions about the data sets. • Tariff data is made available in structured format as soon as it's proposed to the Public Service Commission by a utility • Ongoing access with >99% uptime (this should be achievable as data sets are static)
5. b) Minimum Necessary Information Attributes	• Baseload and energy solution load shape data is dated by year and refreshed annually. • The methodology used to create the representative load profiles is documented and there is high quality support for questions about the data sets. • Tariff data is made available in structured format as soon as it's proposed to the Public Service Commission by a utility • Ongoing access with >99% uptime (this should be achievable as data sets are static)
8. Data Relationships Needed	• For each building structure, the parcel(s) it is on, and the property data it is associated with • For each property class (in parcel data) a mapping to a "simplified" list of property categories that can be mapped to for example default consumption values per square foot • For each structure, a unique id (current best is the SWIS & SBL or SWIS & PRINT KEY unique identifier for each parcel, but those do not correlate 1 to 1 to buildings. See buildingid.pnnl.gov • For each tariff class, the other tariff class options available
9. Analysis Functions	Generate representative baseload and energy solution profiles using existing modeling tools and best practice methods such as outlier detection and K-means clustering analysis. Here a list of academic references as background:

	• Lavin, A. & Klabjan, D., 2015. Clustering Time-Series Energy Data from Smart Meters, Available at: https://arxiv.org/pdf/1603.07602.pdf • Luo, X. et al., 2017. Electric load shape benchmarking for small- and medium-sized commercial buildings. Applied Energy. Building Technology and Urban Systems Division, Lawrence Berkeley National Laboratory. Available at: https://escholarship.org/content/qt6sk7f50z/qt6sk7f50z.pdf • Mutanen, A. et al., 2011. Customer Classification and Load Profiling Method for Distribution Systems. IEEE Transactions on Power Delivery, 26(3), pp.1755–1763. Available at: http://ieeexplore.ieee.org/document/5771144. • Kim, Y.-I. et al., 2012. Repeated Clustering to Improve the Discrimination of Typical Daily Load Profile. Journal of Electrical Engineering & Technology, 7(3), pp.281–287. Available at: http://dx.doi.org/10.5370/JEET.2012.7.3.281 • Richard, M.-A. et al., Daily load profiles clustering: a powerful tool for demand side management in medium-sized industries, Available at:https://aceee.org/files/proceedings/2017/data/polopoly_fs/1.3687878.1501159057!/fileserver/file/790265/filename/0036_0053_000073.pdf • Tureczek, A., Nielsen, P.S. & Madsen, H., 2018. Electricity consumption clustering using smart meter data. Energies, 11(4), pp.1–18. Available at: https://www.mdpi.com/1996-1073/11/4/859/htm
9. a) User Input Variables Needed	• Customer type mix for a project/property (residential/commercial/industrial) • Existing Tariff class(es) at the property • Income range (for discounted rate eligibility) • Property Type • Fuel type • Heating System Type • Cooling System Type • Energy solution applicable • Year Built • Envelope upgrade y/n • Annual/Seasonal Occupancy % • (list is not exhaustive)
10. Data Access Frequency	Interactive analysis visualization and feasibility calculator tools will be made available on public websites and may be accessed anywhere from once a year to hundreds or up to hundreds of thousands of times a day.
11. Use Case Benefit	Save money on consultant and data engineer fees for acquiring and processing property, energy consumption, and cost+remuneration data Discover opportunities (procurement, EE, DER solutions) First step towards gaining insight for customer

12. Why is this Use Case a Priority?	Current access to this data is problematic, relatively little effort to standardize the data would bring enormous value and decrease a significant barrier to market engagement.
9. b) Customer Consent Process (Added Optional Question)	No customer consent process is necessary, data should be made publicly available.
9. c) Current Process Pain Points (Added Optional Question)	See the redundant steps taken by each analyst in the introduction of this use case slice.

List of Materials Included

File Name	Description
UseCaseCategoriesApplicable_FluxTailor_2021-07-23.pdf	Matrix indicating the categories and subcategories applicable to the use case slices included — picking just one for each use case slice wouldn't be accurate.
ThirdPartiesAndBeyond_FluxTailorMissionData.pdf	White paper written in collaboration with Mission:data and support from Amperon, describing use cases for "Nth" party energy data sharing, current obstacles towards achieving them, and recommended solutions such as "Cascading Authorization"
GreenButtonBillsInitiative_PON 4359_ConceptPaper_2020-08-21	Concept paper submitted to NYSERDA PON 4359 together with Urjanet and UtilityAPI.

Use Case (Sub)Categories and Use Cases

LEGEND = Required/Useful
= Not Required/Useful/Applicable

FLUX tailor

Use Case Categories and Subcategories	Use Case Slice 1a: Access to Bill Images Via Standard API	Use Case Slice 2a: Access to Property and Building Data with Estimated Energy Consumption and Cost
For DER Development and Use:		
o identifying, evaluating, and/or selecting potential DER locations;		
o identifying, evaluating, and/or engaging potential DER customers;		
o preparing and/or optimizing DER development plans;		
o preparing and/or optimizing DER operating plans;		
o designing, implementing, and/or operating DER aggregations;		
o monitoring and evaluating the deployment and use of DERs;		
o designing and implementing Community Distributed Generation (CDG) solutions; or,		
o other : Bill Payment		
• For Transportation Electrification:		
o identifying, evaluating, and/or engaging existing EV owners/operators;		
o identifying, evaluating, and/or engaging potential EV owners/operators;		
o monitoring and/or evaluating EV acquisitions and uses;		
o identifying, evaluating, and/or selecting potential locations for EV charging facilities;		
o preparing and/or optimizing plans for developing EV charging facilities;		
o preparing and/or optimizing plans for operating EV charging facilities;		
o monitoring and/or evaluating the deployment and use of EV charging facilities		
o other (please describe)		
• For Building Electrification:		
o identifying, evaluating, and/or engaging energy consumers and energy managers in existing buildings;		
o identifying, evaluating, and/or engaging energy consumers and energy managers in planned buildings;		
o monitoring and/or evaluating acquisitions and uses of building electrification solutions;		
o building energy benchmarking;		
o identifying, evaluating, and/or selecting opportunities for building electrification;		
o preparing and/or optimizing plans for developing building electrification solutions;		
o preparing and/or optimizing plans for operating building electrification solutions;		
o monitoring and/or evaluating the deployment and performance of building electrification solutions		
o other (please describe)		
• For Energy Efficiency (EE):		
o identifying, evaluating, and/or engaging customers with existing EE solutions;		
o identifying, evaluating, and/or engaging potential EE customers;		
o monitoring and/or evaluating EE acquisitions and uses;		
o building energy benchmarking;		
o identifying, evaluating, and/or selecting EE opportunities;		
o preparing and/or optimizing plans for deploying EE solutions;		

o monitoring and/or evaluating the deployment and use of EE solutions;		
o designing and implementing Community Choice Aggregation (CCA) solutions		
o Bill Payment		
o Procurement		
• For Electric Utility Functions:		
o system planning;		
o DER interconnection;		
o system operations;		
o market enablement;		
o market operations;		
o customer programs and services;		
o regulatory/statutory compliance;		
o other (please describe)		
• For Gas Utility Functions:		
o system planning;		
o system operations;		
o market enablement;		
o market operations;		
o customer programs and services;		
o regulatory/statutory compliance;		
o other (please describe)		
• For Local Government Functions:		
o building energy benchmarking;		
o Community Choice Aggregation;		
o Community Distributed Generation;		
o facility siting and permitting;		
o environmental justice initiatives;		
o economic development;		
o planning and zoning;		
o Bill Payment		
o Procurement		
• For State Government Functions:		
o energy-related R&D;		
o regulatory research and planning;		
o regulatory oversight;		
o building energy benchmarking;		
o facility siting and permitting;		
o environmental justice initiatives;		
o economic development;		
o Bill Payment		
o Procurement		