Customer Manual

Energy Storage Incentives for Business

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1 Program overview

Energy storage systems (ESS) are an emerging technology in BC Hydro's service area and will play an important role in future non-wires, grid resilience and demand response solutions. BC Hydro has increasing interest in storage as it can be used to reduce peak demand and improve resiliency and reliability. Only electro-chemical (or battery) ESS are eligible for this program. Other types of energy storage will be assessed when they become commercially available and incorporated into the program if warranted.

The Energy Storage Incentives (ESI) product is offered province wide in BC Hydro territory, with the objective of helping customers who are interested in adopting energy storage overcome financial, technical and knowledge barriers.

Customers wishing to earn incentives from BC Hydro for energy storage solutions may participate in both ESI and Demand Response for Business:

- Energy Storage Incentives for Business
  - For customers seeking up-front funding assistance for the installation of an eligible ESS
  - Customers may receive study funding through the Feasibility Study offer
  - A study is not a mandatory precursor for this program.
  - Customers must sign a 10 year agreement to provide demand flexibility services to BC Hydro, via an eligible AutoDR offer
  - Repayments and claw backs are in place for ESS that do not fulfill event dispatch criteria for reliability and capacity or performance expectations and for customers leaving the program before the 10 year agreement expires.
  - After 10 years, the customer may join any demand response programs if they desire.
- Demand Response for Business
  - Customers with existing ESS may join Demand Response for Business and earn incentives for each season they successfully participate
  - Customers may join via the manual or AutoDR offer
  - Suitable for customers who already have a battery or do not wish to sign long term contracts with BC Hydro
  - Refer to the DR for Business manual and materials for eligibility and other details.

Customers seeking funding to study the potential or fit of ESS in their operation should refer to the Feasibility Study (FS) offer. This program does not provide separate study funding outside of the FS.

1.1 Target Markets

The target market for this program are customers who are:

- Business customers installing behind-the-meter batteries.
- Able to leverage ESS for site peak management, resiliency and participation in BC Hydro demand response programs (winter and summer)
- Not transmission or residential customers (including home based businesses on residential rates). These customers are not eligible for this program but may be eligible for other offers from BC Hydro to support ESS, like the Self Generation offer
- Not independent power producers that have power purchase agreements in place with BC Hydro.
- Not providing sole backup power for life-saving or sustaining equipment, as the battery may run out of charge at any time.

This program is not for front-of-the-meter batteries.

The ESS must integrate directly with BC Hydro's distributed energy resource management system (DERMS). This will allow the ESS to automatically respond to event dispatches from BC Hydro. See ESS System Requirements for more information.

Participants must be able to reliably reduce demand year-round at the request of BC Hydro, through the use of their ESS. This participation does not impact the level of service from BC Hydro.

1.2 Program Offer

Customers are offered a one-time up-front incentive of demand flexibility that can be sustained over a 4 hour duration. Incentives are calculated on the customer's nominated energy or demand of the storage system (i.e. amount excluding any customer elected reserve). In exchange for the up-front incentive, customers will agree to provide 10 years of year-round demand flexibility to BC Hydro.

Incentives are calculated using the lesser of three methods:

1) $10,000 * nominated kWh / 4
2) $10,000 * nominated kW
3) 80% of eligible project cost

Eligible ESS must connect to BC Hydro's DERMS platform, in order to receive automated signals that trigger the battery to provide demand flexibility, and accept pre- or re-charge commands. The connection must use:

- IEEE 2030.5,
- SCADA,
- established API for the BC Hydro DERMS,
- or other communications method approved by BC Hydro.

Funding for an Feasibility Study (FS) is available to customers requiring project analysis and scoping for their project. However, a study is not a mandatory pre-cursor for ES Incentives. Customers may go direct to incentives without a study.

BC Hydro will also cover the cost of the Distribution Generator Interconnections Facilities Study, where applicable, for customers installing batteries greater than 100 kW.

1.3 Customer Benefits

- Up front incentives to help pay capital costs of installing ESS
- Set it and forget it demand response path means customers do not have to take steps to ensure they meet demand response obligations
- Customers may elect to reserve a portion of battery to ensure site always has some storage available
- ESS can help customers manage their own demand charges and provide some resiliency for key loads at a facility
- Power Quality
- Reliability
- Demand Charge
- Demand Management
- No impact to production when event is called

2 Program Offers and Requirements

2.1 Study Funding

Customers wishing to complete a study prior to selecting or installing a battery may apply for a Feasibility Study or Integrated Energy Audit through BC Hydro. However, a study or audit is not required as a precursor to this offer. Customers may go direct to this incentive offer, without prior studies.

2.2 Energy Storage Incentives

ES Incentives are direct financial incentives paid to customers to support the acquisition, installation and operation of customer-sited ES system. These participating ESS are obligated to support demand flexibility requirements of BC Hydro, through response to dispatch signals from BC Hydro. Additionally the ESS must be non-exporting and not inject power to the grid as part of the demand flexibility services.

Participating customers may be eligible to receive an incentive for the installation and energization of an ESS at their site. The system must provide demand flexibility services back to BC Hydro, reliably, for 10 years.

The ESS must meet the technical requirements outlined in ESS System Requirements.

The demand flexibility services include:

- Discharging for up to 4 hours consecutive, up to 2 times per day
- Delaying recharging from the grid by up to 12 hours
- Pre-charging up to 12 hours before a discharge command
- Scheduling re-charging based on customer request

These demand flexibility services are to be provided year-round to BC Hydro. Participation in events is mandatory, to earn the entire incentive and not trigger claw backs. Eligible ESS must connect directly to BC Hydro's DERMS platform so that the ESS can receive automated signals from BC Hydro.

Key terminology:

- **Available** energy and capacity refer to the actual ability of the ESS to perform. Many systems only allow for discharge to 5% and maximum charge of 80 – 90% of the nameplate rating.

- **Reserve** refers the to amount of energy a customer will not discharge below when dispatched by BC Hydro, in order to retain some resiliency for the customer's site.

- **Nominated** refers to the amount of energy and capacity the customer makes available to BC Hydro in this program. **This amount may not exceed 100% of the site's average winter demand, measured from November 1 to February 28 from 4pm to 9pm of the prior year using hourly interval data.**

How to calculate the average winter demand:

Step 1: Log into MyHydro

Step 2: Retrieve the hourly demand data from the previous year for your site, covering the period from November 1 to February 28.

Step 3: Filter the data to include only the hours between 4 PM and 9 PM each day.

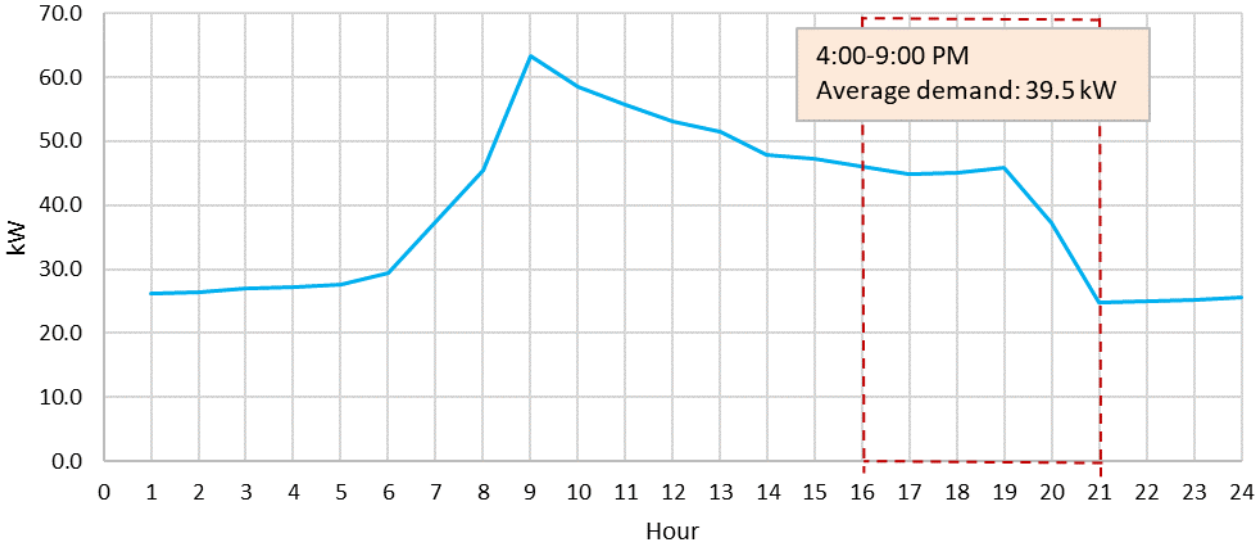
Step 4: Calculate the average demand by adding the kWh values for those hours and dividing by the total number of hours.

Example:

- Energy consumption from November 1, 2023, to February 28, 2024 (4:00 - 9:00 PM): 23,700 kWh
- Total number of hours: 120 (days) *5 (hours/day)= 600 hours
- Average winter demand of November 1 to February 28 (4:00-9:00 PM): $\frac{23{,}700\ \text{kWh}}{600\ \text{hour}}$ = 39.5 kW

Alternatively, create an average daily energy profile for the same period and then average the daily demand values during the 4-9 PM window.

In the example below, the average daily energy profile during the winter period (November 1 to February 28) is shown. The average winter demand during the 4-9 PM window is calculated as 39.5 kW, which determines the maximum nominated capacity.



The incentive amount is based on the amount of demand flexibility the battery can provide on a dispatchable basis, to BC Hydro, for 4 consecutive hours, excluding the reserve amount. The total financial incentive is calculated as the **lesser** of the two calculations:

a) $10,000 * (kWh nominated / 4) or;
b) $10,000 * kW nominated
c) 80% of eligible project costs

Examples:

A nameplate 480 kWh / 120 kW system with a 80% operating range would have 400 kWh/100 kW of available range. A 20% reserve would have 320 kWh / 100 kW nominated:

a) $10,000 * 320 / 4 = $800,000
b) $10,000 * 100 = $1,000,000
Eligible incentive = $800,000

An ESS with 400 kWh / 100 kW available and a 50% reserve could nominate 200 kWh / 100 kW:

a) $10,000 * 200 / 4 = $500,000
b) $10,000 * 100 = $1,000,000
Eligible incentive = $500,000

An ESS with 200 kWh / 100 kW available and a 20% reserve could nominate 160 kWh / 100 kWh:
a) $10,000 * 160 / 4 = $400,000
b) $10,000 * 100 = $1,000,000
Eligible incentive = $400,000

An ESS with 1,600 kWh / 200 kW available and a 20% reserve could nominate 1280 kWh / 200 kW:
a) $10,000 * 1280 / 4 = 3,200,000
b) $10,000 * 200 = $2,000,000
Eligible incentive = $2,000,000

Incentives are payable in three tranches:

- 50% of incentive upon delivery of the system to the customer
- 25% of incentive upon approval to energize from BC Hydro
- 25% of incentive upon successful integration to the BC Hydro DERMS

Total project incentive may not exceed 80% of eligible customer costs, made up of battery equipment, installation and permitting. Infrastructure costs are not eligible under this program. Refer to Eligible Costs section below for more details.

Projects located in eligible non-wires alternative or feeder relief areas may be eligible for additional top-up incentives. These incentives will be determined on an area-by-area basis by the respective non-wires alternatives project manager. Total incentives received after top-up may not exceed 100% of eligible costs.

2.3 General Eligibility

To be eligible for ESS Incentives, customers must meet the following criteria:

1. Be on a small, medium or large general service (business rate) or irrigation rate under the Electric Tariff. Transmission customers are not eligible for this offer. Customers on Self Generation rate 1289 and Overnight rates 1640-1643 are not currently eligible.
2. Plan to install a new battery. Batteries that are already purchased or installed are not eligible.
3. Have an operating smart meter (no manually read meters)
4. Install and energize an ESS that meets all the system requirements of the program (outlined below), within 24 months of Distribution Generator Interconnections facility study completion or the Self Generation Application acceptance. Systems must be non-exporting to the grid.
5. Agree to a 10 year contract to provide demand flexibility services via the ESS to BC Hydro
    a. Provide demand flexibility year-round within the following parameters:
        Max. duration (hours / event): 4
        Max. daily frequency: 2
        Min. hours between events: 5
    b. Must reliably respond to flexibility dispatch events. Performance is considered reliable when the ESS is charged to provide at least 85% of its nominated capacity for all DR events, as measured at the start of the event.
    c. Customers wishing to earn incentives from BC Hydro for energy storage solutions may participate in both ESI and Demand Response for Business
6. Customers may elect to reserve a portion of their battery. See section Customer Reserve section below.
7. Customer has acceptable credit rating or security; if it fails, project may be eligible for internal exception through the Credit Review Process.

2.4 ESS System Requirements

There are codes and standards that apply to the ESS and related equipment. Individual technologies may have specific standards while improvements are pushing these standards to evolve. Systems installed in this program should comply with all applicable current standards including, but not limited to the following list:

a. Product/Process Standards
   - UL 9540
   - UL 9540A
   - UL 1973
   - UN 38.3

b. b. Power Conversion System Standards
   - UL 1741
   - UL 1741 SA
   - CSA C22.2 No. 107.1
   - IEEE 1547

c. c. Installation Standards
   - NFPA 855, latest version
   - CEC, latest version
   - BC and Local Building and Safety Codes, latest version

Pending compliance is not acceptable

2.4.1 Product selection requirements

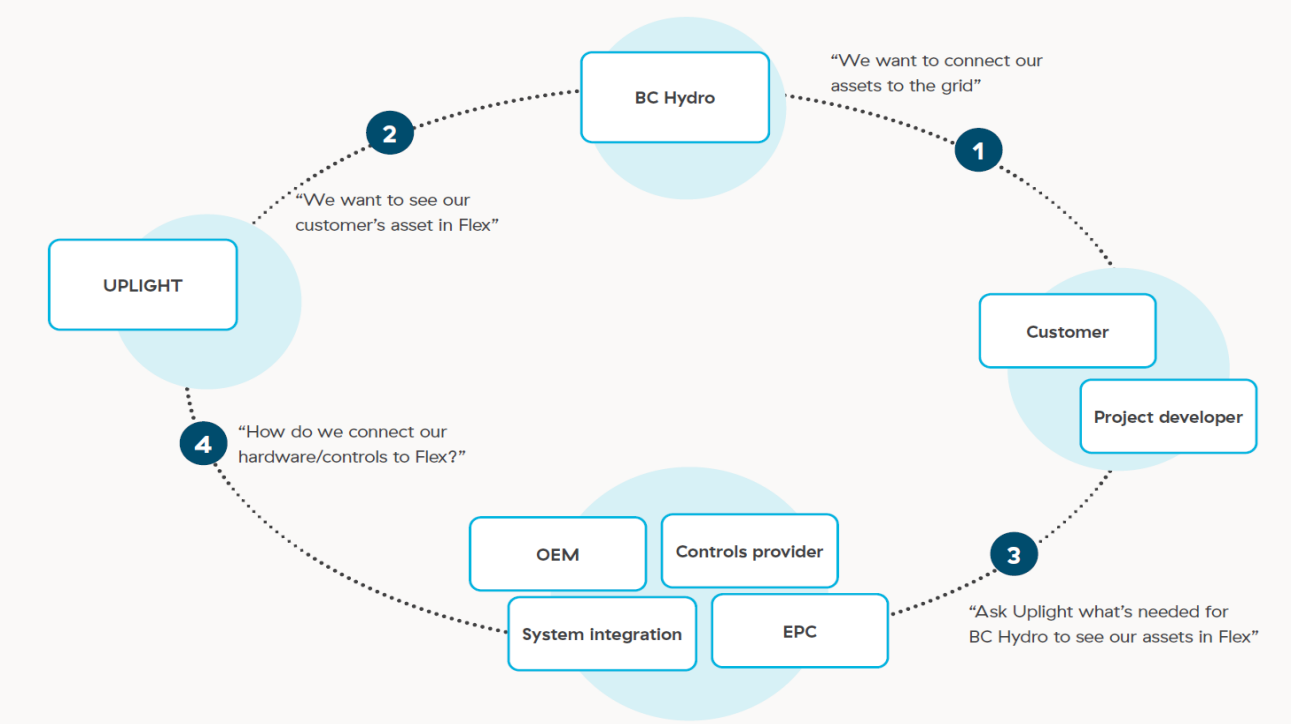
The ESS and related equipment must meet all appliable codes and standards. The system or assembly assures safe and successful design, fabrication, procurement and installation of a fully functioning ESS that meets or exceeds all technical requirements, including protections and controls, communications equipment/software and connection to the BC Hydro electric system and DERMS.

- An electrochemical energy storage system.
- Carries at least a 10-year manufacturer warranty.
- Operates at a minimum 80% round-trip efficiency.
- Includes fire and deflagration systems.
- Meets BC Hydro DERMS integration requirements.
- Meets BC Hydro interconnection requirements.
- Complies with structural, building, and codes, laws and regulations.
- Permanently installed, grid connected, and behind the meter.

2.4.2 DERMS connectivity

The ESS must connect to the BC Hydro DERMS platform in order to receive automated dispatch commands. This connection must be highly reliable in nature in order to meet the reliability requirements for this program. The ESS must be capable of receiving commands from BC Hydro through an IEEE 2030.5 certified connection, SCADA, existing API to the DERMS, or other method BC Hydro deems acceptable. Manual control of the battery to fulfill event commands is not permitted. It is the customer's responsibility to ensure that their connection of choice meets this criteria and that it remains operational for the duration of the 10 year contract.

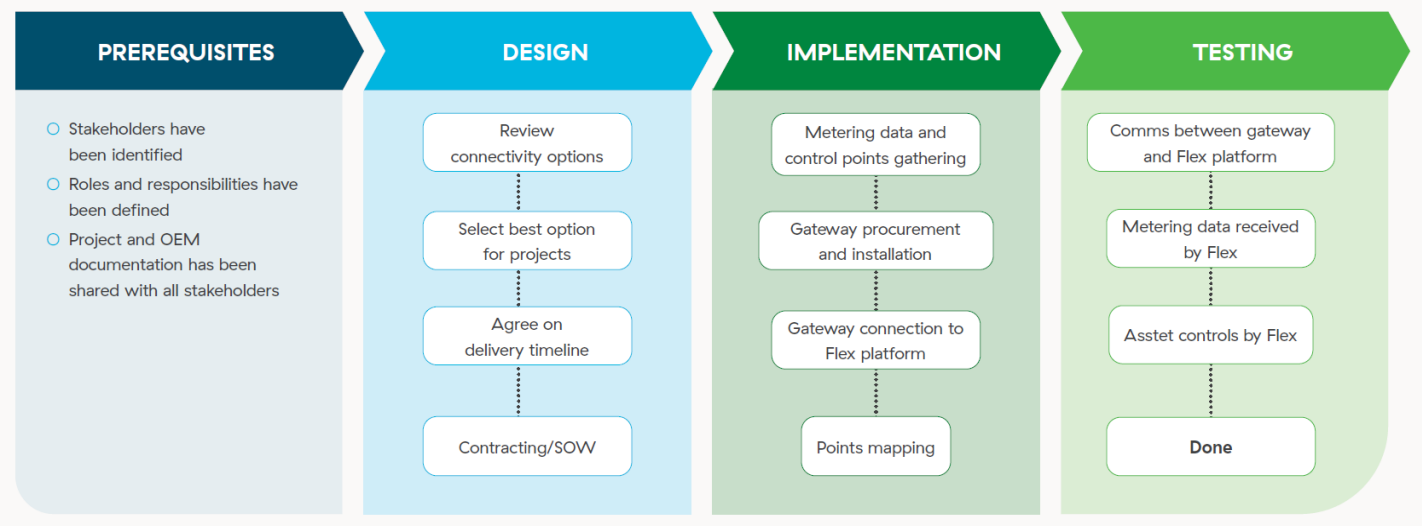
Connectivity Roles & Responsibilities



A. Customer / Project Developer ("Customer" or "Site")
B. Original Equipment Manufacturer (OEM) / Controls Provider/ Energy Performance Contract/Contractor (EPC) / Systems Integrator (SI) ("OEM")
C. BC Hydro
D. Uplight

Phase	Task	Customer	OEM	BC Hydro	Uplight
Design:	Review connectivity options	Y	Y		
Design:	Select best option for project	Y	Y		
Design:	Agree on delivery timeline	Y	Y		
Design:	Contracting/SOW	Y	Y	Y	Y
Implementation:	Metering data and control points gathering		Y	Y	
Implementation:	Gateway procurement and installation	Y			
Implementation:	Gateway connection to Flex platform	Y			Y
Implementation:	Points Mapping		Y		Y
Testing:	Comms between gateway and Flex platform	Y			Y
Testing:	Metering data received by Flex			Y	
Testing:	Asset controls testing by Flex	Y	Y	Y	Y
Operations:	Ongoing Control and Monitoring of Asset			Y	Y

Integration Workflow: Key Task Details and Timing



Design:

Step 1: Review connectivity options: Customer and OEM, with BC Hydro input.

- Review SCADA and IEEE 2030.5 options for commercial, non-utility scale batteries, unless there exists an API for the specific OEM.
- Discuss connectivity design, and gateway and network decision factors.
- (If IEEE 2030.5) Determine if OEM will be using aggregator cloud or a certified gateway directly to device controller with the customer. Confirm support for Out Of Band enrollment option and support for DER function set.
- Assumes asset use cases and sizing already determined.
- Duration: <1 day

Step 2: Select best option for project: Customer and OEM, with BC Hydro input

- Typically, if no API exists, OEM will have a preferred option between SCADA and IEEE 2030.5, based on which they support. (see also control points gathering in step 5 for additional details) Connectivity to be determined on site security requirements and use case/size of battery, with input from utility.
- Customer is responsible for ensuring site readiness, installing and maintaining BESS (in conjunction with OEM), payment of connectivity fees for their connection to internet/VPN and procurement of gateway hardware, if needed.
- Duration: ~1 week

Step 3: Agree on delivery timeline: Customer and OEM, with BC Hydro input

- Determine when BESS will be delivered to the Customer. Influenced by business needs and budget availability; site design/readiness timing; BESS availability; BC Hydro needs, expected timeframes for operating order.
- Duration: ~1 week

Step 4: Contracting/SOW: Customer and BC Hydro; Uplight and BC Hydro; Customer and OEM

- Customer submits program application and sign agreement with BC Hydro, including timing.
- Uplight and BC Hydro agree to SOW, if not previously agreed to, including timing. BC Hydro will confirm asset size and use case(s).
- Customer and OEM sign agreement
- Duration: ~ weeks (varies based on entities' processes)

Implementation:

Step 1: Metering data and control points gathering: OEM; BC Hydro

- OEM: For SCADA, review list of data streams required by Flex (Appendix A) and confirm that they can provided to Uplight. Complete points list form provided by Uplight.
- OEM: For IEEE 2030.5, confirm values delivered for Nameplate capacity field.
- BC Hydro: Ensure site has AMI meter and that historic meter data (30 days or more) can be delivered to Uplight. Also implement plan to deliver ongoing meter data.
- Duration: ~2 days

Step 2: Gateway procurement and installation: Customer

- If selecting a solution that requires a gateway; ensure device already is connected via a gateway; or install dedicated gateway. Uplight recommends Advantech 3241 Industrial Router or similar.
- If installing a new gateway, also ensure there are cellular links in place for connection between site and Uplight system.
- Duration: ~4 weeks (if needed)

Step 3: Gateway connection to Flex platform: Customer, Uplight

- Set up gateway and VPN, as needed
- Uplight will set up VPN if needed; will provide credentials and configuration details to Customer
- Customer will configure gateway and install VPN; exchange configuration details as needed with Uplight. The edge gateway must provide access to all the data streams listed in the tag template.
- If SCADA, Customer must provide a static public IP address to Uplight, for the edge gateway.
- Uplight will then allow connection from that IP address to the AutoGrid Flex SCADA EMS gateway router.
- Note IEEE 2030.5 uses HTTP over TCP/IP, and TLS for point to point security between Client and Server.
- Duration: ~1 week

Step 4: Points Mapping: OEM, Uplight

- (if SCADA) OEM provides completed tag template, which defines asset/site's monitoring & controls points, to Uplight. (e.g. Modbus points map if Modbus is used).
- (if IEEE 2030.5) OEM provides sample files of communications to IEEE 2030.5 server. (May be files from the certification process.)
- OEM/Uplight: iteration if needed to clarify template entries. Review content of any free-from entries.
- Uplight: configures start/stop logic, alarm mapping if utilized, monitoring in Flex.
- Duration: ~2 weeks

Testing:

Step 1: Comms between gateway and Flex platform: Uplight, Customer (or OEM if aggregator)

- Customer informs Uplight when comms are ready to be tested.
- If VPN, Uplight's opens the VPN tunnel connection from Flex to the edge gateway.
- Uplight and End User conduct test of communications, ensuring signals are received successfully. Includes VPN testing if needed.
- Duration: ~1 week for Uplight/OEM testing; ~1 week for Uplight/Customer testing

Step 2: Metering data received by Flex: BC Hydro

- BC Hydro ensures that Flex is configured with Customer account number and service point, and that service point is enrolled in the appropriate program.
- BC Hydro ensures meter data for Customer service point is being delivered to Flex. This includes ongoing daily data, as well as one-time historic 30-days of data, if needed for immediate optimization.
- BC Hydro confirms in Flex Configurator > Resources > Devices > [smart meter for this Customer] > Historical Device Data that data is populating
- Duration: <1 day

Step 3: Asset controls testing by Flex: Customer, Uplight, OEM, BC Hydro

- Uplight sets up and maintains SCADA or IEEE 2030.5 Server (server is the entity that manages the communications and control for the registered end devices/clients)
- (if 2030.5) OEM responsible for Function Set Assignments and EndDevice Registration
- (if 2030.5) Uplight and OEM complete OOB enrollment of lab device, including exchange of DNS information, PIN, short and long-form device ID.
- Uplight and OEM conduct pre-testing, using a device in OEM lab or other commissioned device, to ensure the ability to receive telemetry from the site and assets, to send control commands from Flex to the site, and to confirm asset responds as intended. Uplight will coordinate with OEM for this testing. Iterate as needed. This step only is needed the first time OEM/Uplight are connecting. Testing will include review of monitoring data, as well as testing of various control scenarios.
- BC Hydro informs Uplight when Customer device is ready to be tested.
- (if 2030.5) Uplight and Customer complete OOB enrollment of lab device, including exchange of DNS information, PIN, short and long-form device ID.
- Uplight and Customer conduct test of installed/commissioned Customer device, to ensure both network communications and asset monitoring and control are functioning properly. Uplight will coordinate with Customer for this testing. Iterate as needed. Testing will include review of monitoring data, as well as testing of various control scenarios.
- Duration: <1 week for the OEM device testing; and < 1 week for the Customer device testing

Contacts

Party	Roles	Contact Information
OEM	• Technical Lead - point person for configuration and testing of BESS, and connectivity decisions, in advance of installation and for final testing at site. • Business Lead - point person for non-technical questions.	To be provided by OEM
Customer	• Technical Lead - person who will set up and can confirm connectivity and asset operations, during implementation and beyond. • Business Lead - point person for non-technical questions.	To be provided by Customer
BC Hydro	• Interface with Customer and OEM regarding program	Typically either Key Account Manager or Program Manager
Uplight	• Technical Project Manager - contact during the implementation phase. Will serve as interface to the rest of the Uplight implementation team, as needed • Customer Success Manager - contact for general information about solution and process, outside of specific implementation tasks • Others - Other technical team members may be in direct contact with OEM or Customer staff, during testing or points mapping phases, or other technical discussions.	To be provided by BC Hydro after Customer/BC Hydro application in place

The customer is responsible for any costs incurred by them to connect to the DERMS. BC Hydro will cover costs that it's own DERMS provider may charge for the work on the DERMS platform itself.

2.4.3 Customer reserve

Customers may elect to reserve a portion of the available energy for their own purposes. Customers must determine their own reserve that will be programmed into the ESS and will be automatically excluded from demand flexibility events. This provides some level of resiliency for the participating customer's operation, in the event it is needed by the site.

The reserve is nominated by the customer on the application form. A feasibility study may help determine how much is required to manage the site load and the kW / kWh requirements.

2.4.4 Telemetry

Telemetry automatically collects, transmits and measures data from remote sources, using sensors and other devise to collect data.

Telemetry requirements:

a. At a minimum each individual ESS must be capable of location, charge, discharge, state of charge and event schedule.
b. The ES must be capable of providing a minimum of 15 minute interval performance data and store a minimum of 7 days of data locally. Shorter time intervals may be acceptable but must be confirmed with BC Hydro prior to application.
c. Performance data must come from the ESS, not a separate meter
d. For safety purposes. it is strongly recommended that customers or their battery operators monitor the following metrics on an ongoing basis:
    i. inverter AC and DC voltage, current, kW, kVA, kVAR, power factor
    ii. battery rack voltage and current
    iii. battery module min/max voltage
    iv. auxiliary system critical parameters
    v. fire detection/suppression monitoring points
    vi. state of charge
    vii. temperature monitoring points of the battery racks.

3 Policies and Procedures

3.1 Application Process

Policy: Customers may not purchase equipment until their Energy Storage Incentive application has been pre-approved by BC Hydro. Customers may not apply for incentives for projects that are already purchased or installed.

3.2 10 Year Agreement Term

Policy: Customers must agree to provide demand response services to BC Hydro for 10 years.

- The anniversary date for each ESS is set as the date on which the test dispatch event is successfully completed, marking the eligibility of the ESS for full program participation.
- Customers who terminate their BC Hydro account, wish to terminate the 10 year agreement or do not meet the performance requirements for the duration of the 10 years will be subject to a claw back of incentive funding in proportion to the % of time remaining on the agreement. For example, a customer terminating the agreement after completing 6 years would be required to pay back 40% of the incentive funding received. See Performance Penalties below.
- Customers who do not wish to sign a long term agreement may choose to enroll directly into the Demand Response for Business program instead, which provides more flexibility and a pay-for-performance incentive model.
- Customers may participate in manual or automated demand response through DR for Business and the ES offer at the same time.

3.3 Eligible Costs

Policy: Incentives will be paid up to 80% of total eligible costs of the ESS. Eligible costs are as follows:

- ES equipment costs including the ESS itself, and related communications equipment to facilitate receiving dispatch event notices and signals from DERMS
- Costs to connect the system to the BC Hydro DERMS (e.g. software programming, battery energy management system programming or set up)
- Installation costs
- Permit costs

Ineligible costs include:

- BC Hydro service upgrade costs, interconnection agreement fees
- Insurance premiums
- Facility and building upgrades
- Costs of system impact study by BC Hydro Distribution Generator Interconnections

3.4 BC Hydro Interconnection Study Costs

Policy: The costs related to any required BC Hydro Interconnection study costs will be direct-billed from the Customer Interconnections Distribution team to the ESI charge codes. Participating customers in ESI will not be required to pay these fees to BC Hydro. The customer may not claim these study costs as part of the eligible project costs.

3.5 Incentive Payments

Policy: Incentives are paid out within 6 weeks of receipt of required documentation proving each tranche milestone.

Incentives are payable in three tranches:

- 50% of incentive upon delivery of the system to the customer
- 25% of incentive upon approval to energize from BC Hydro
- 25% of incentive upon successful integration to the BC Hydro DERMS

3.6 Performance Requirements

Policy: The ESS must be available for demand response dispatch events per program criteria.

- Events may occur at any time
    - Event notifications will be sent by email 24 hours before the event is called
        - If two events are being called on the same day it will be noted in the event notification
- Events are typically associated with colder or hotter days
- Events will be no longer than 4 hours and no more than twice per day
- Events may occur on consecutive days

Policy: The ESS must provide reliable performance, for the duration of the agreement. Reliable performance is defined as follows:

- the ESS is charged to provide at least 85% of its nominated capacity for 85% of dispatch events as measured at the start of each event.

Exceptions are made if the facility is experiencing a power outage at the time of the event command due to be enacted.

3.7 Incentive Claw backs

Policy: A prorated incentive claw back will be applied to any customer's ESS that does not meet the performance requirements for the duration of the 10 years. This policy includes situations where:

- the customer chooses to terminate their participation
- the customer closes their BC Hydro account but does not withdraw
- the ESS fails the annual reliability performance assessment

Incentive claw backs are only based on the cash incentive received through the offer and do not include costs related to interconnections studies.

Claw backs are calculated as follows:

- For customers withdrawing or who have closed their account:
  - Claw backs are calculated based on the number of months remaining on the contract after the withdrawal notice is received or performance failure is triggered.
  - This is determined by calculating a straight proration of the incentive over 120 months.
    - For example: if a customer withdraws at the end of the 3rd month in year 4, and originally received a $100,000 incentive, the amount owing from the customer to BC Hydro would be $100,000 / (120 months) * (120-39 months) = $67,500
- For ESS that have failed the annual reliability performance assessment:
  - Claw backs are calculated as 10% of the total incentive paid.
    - For example: If the customer received $100,000 in incentives, they owe 10% x $100,000 = $10,000

3.8 Timelines

Policy: Customers have 24 months from agreement signed date to complete their installation and submit a Schedule B confirming the project completion.

3.9 Event Management

Policy: Events are dispatched from the BC Hydro DERMS. Events will called within the following parameters:

- Events may occur at any time
  - Event notifications will be sent by email 24 hours before the event is called
    - If two events are being called on the same day it will be noted in the event notification
- Events are typically associated with colder or hotter days, but may occur at any time
- Events will be no longer than 4 hours and no more than twice per day

3.10 Eligible Days

- "Eligible days" are days that are not weekends, holidays, in lieu holidays or prior event days.
  - Holidays, for the purpose of this program are defined as:
    - Statutory holidays include those defined by the Province of British Columbia (https://www2.gov.bc.ca/gov/content/employment-business/employment-standards-advice/employment-standards/statutory-holidays)
      - New Year's Day
      - Family Day
      - Good Friday
      - Victoria Day
      - Canada Day
      - B.C. Day
      - Labour Day
      - Thanksgiving Day
      - Remembrance Day
      - Christmas Day
    - Additional ineligible days are:
      - Boxing Day
      - Easter Monday
      - National Day of Truth & Reconciliation
- "Prior Event Days" refers to any day in which a demand response event had already been called

3.11 Pre-charging & recharging

Policy: BC Hydro may trigger the battery to pre-charge up to 12 hours prior to an event and delay the recharge of an ESS from the grid for up to 12 hours after an event.

Generally speaking ESS may recharge as soon as the event ends. However, there may be some conditions under which BC Hydro may defer the recharging of the battery from the grid, up to 12 hours after an event. Batteries with on-site renewables such as solar, may recharge the battery at any time from their renewable source.

Additionally, BC Hydro may trigger the ESS to pre-charge before an event, if it is not fully charged. Pre-charging may begin up to 12 hours before an event. BC Hydro may also pre-charge batteries prior to any upcoming storm or weather events identified.

3.12 Demand Charge Impacts

Policy: BC Hydro is not responsible for any increased demand charges a customer occurs at their site due to battery charging times. BC Hydro will reasonable efforts, through its DERMS platform, to try to schedule pre-charging and re-charging at times not coincident to a customer's site peak.

3.13 Maintenance

Policy: Customers are responsible for maintaining the equipment and performing any maintenance specified by the manufacturer including, but not limited to maintaining:

- ESS and ensure it is in good working order to respond to dispatch events from BC Hydro
- Internet connection to ensure dispatches are received and data is sent back to BC Hydro DERMS as required
- ESS programming to ensure required minimums are maintained and that all nominated capacity and energy is available to meet performance requirements. Customers will be required to monitor their system for degradation and anticipate that incentive claw backs may be enacted if performance measures are not met over time.

3.14 Failure to complete

Policy: Projects that do not fully complete installation, energization and DERMS connection within 24 months from the time of Distribution Generators Interconnections Facility Study completion or Self Generation Application acceptance, will be required to repay any incentives they have received and have the application cancelled.

3.15 Performance Penalties

Policy: Customers will be required to repay a prorated portion of the incentives if the ESS, in any participation year, fails to perform reliability for 85% of the event dispatches

Performance will be measured each year on the project Anniversary Date.

Customers must notify BC Hydro within 7 days of their ESS becoming inoperable for any reason and unable to respond to event dispatches. Notice must be given by emailing demand.response@bchydro.com

Customers must also notify BC Hydro when their ESS becomes operable again, by following the same email procedure above.

3.16 Other Demand Response Programs and Offers

Policy: Customers may not participate in other BC Hydro or third-party demand response programs with the ESS while participating in this offer. Applications to this offer will be checked for any duplicate submissions under other programs, offers and products.

4 Performance & Incentive Calculations

4.1 Terminology

Key terminology:

- **Available** energy and capacity refer to the actual ability of the ESS to perform. Many systems only allow for discharge to 5% and maximum charge of 80 – 90% of the nameplate rating.

- **Reserve** refers the to amount of energy a customer will not discharge below when dispatched by BC Hydro, in order to retain some resiliency for the customer's site.

- **Nominated** refers to the amount of energy and capacity the customer makes available to BC Hydro. **This amount may not exceed 100% of the site's average winter demand, measured from November to February between the hours of 4pm – 9pm measured in hourly interval readings of the prior year.**

4.2 Performance calculations

Participating ESS must perform reliably to remain enrolled in this offer. Reliability is defined as having at least 85% of nominated energy stored in the battery at start of at least 85% of events for each 12 month period after the Anniversary date (i.e. each year of participation.)

For clarity, this means the battery must be ready to supply at least 85% of the energy nominated, for at least 85% of the events called each 12 month period the ESS participates.

The procedure for calculating performance reliability for each event is:

- Collect event data from DERMS
- Collect ESS state of charge data at time of each event
- Discount state of charge to available amount (based on application form amount)
- Subtract reserve amount
- Compare remaining state of charge (kWh) to the nominated kWh
    - Pass = remaining state of charge => 85% of nominated amount
    - Fail = remaining state of charge is < 85% of nominated amount

The procedure for calculating annual performance reliability is:

- # of passed events / total number of events in 12 month period = % reliability
- Pass = reliability is => 85%
- Fail = reliability is < 85%

5 Measurement & Verification

5.1 Measurement & Verification

BC Hydro uses the AutoGrid Flex platform ("Flex") as its DERMS. The DERMS operators will issue dispatches from this platform. Additionally, the Virtual Power Plant module will be used to monitor each ESS' performance and state of charge, storing this data for performance reliability calculations.

Flex has an API available to allow internal BC Hydro analytics teams to access the data and conduct any analysis not available in any of Flex's standardized reports.

Additionally, Flex has the capability to perform the M&V analysis at varying levels of aggregation including the offer level, individual customer or device. M&V can be manually performed via Flex at an individual customer level for a sample of the events to review participation levels, on an as-needed basis.

Glossary

Acronym	Meaning	Notes
API	Application Programming Interface	Definition of how two applications exchange data using requests and responses.. APIs are an accessible way to extract and share data within and across organizations.
BESS	Battery Energy Storage Systems	In addition to one or more batteries, which store energy and distributes it in the form of electricity, the system may include - Inverters: devices that transform direct current (DC) into the alternating current(AC) used in homes and businesses. - Controllers: components which manage the charging and discharging of the batteries and regulate the flow of electricity to and from the grid. - Integrated Sensors: sensors monitor the BESS's performance and conditions.
DCM	Demand Charge Management	Demand charges are peak usage charges based on the maximum electricity load within any 15 (or 30 min) period in a given month — the highest amount of electricity delivered to a business at any given time. Flex enables demand charge management, by predicting when those peak periods will be and shifting load, reducing the consumer's cost.
DER	Distributed Energy Resource	Assets like smart thermostats, microgrids, electric vehicles, front of the meter and behind the meter batteries, wind turbines and more.
DERMS	Distributed Energy Resource Management System	DERMS combine demand response (sending load control signals and user notifications to control devices and shed load/reduce energy) with DER optimization functionality. For batteries and generators, the DERMS platform can optimize the charging/power output behavior to support various local value streams (ex. ToU, DCM); inform users on the available flexibility that can be dispatched; and orchestrate the operation of a collection of DERs, ensuring efficient utilization and maximizing economic benefits while minimizing operational expenses.
EMS	Energy Management System	A combination of software and hardware that helps companies manage their energy usage. EMS can help companies optimize their energy generation, storage, and consumption to reduce costs and emissions. EMS can also help stabilize the power grid. EMS are used to monitor system health and issue alerts.
EPC	Energy Performance Contract/Contractor	Energy Performance Contract A financing method that uses energy cost savings to repay the cost of installing energy conservation measures. Energy Service Companies (ESCOs) are responsible for executing EPCs. The contractor's compensation is based on the cost savings achieved.
Flex	Uplight's Flex DERMS	Utilities and other energy providers use Uplight's Flex platform to -Monitor and control DERs. Manage millions of devices in real-time with high-performance, low-latency, data processing capabilities. -Aggregate flexible capacity. Dynamically orchestrate and aggregate DERs for dispatch and distribution flexibility management. -Forecast and optimize. Proactively anticipate and mitigate grid instability or congestion issues, and optimize energy resources based on tariffs, market pricing and asset constraints.

		-Measure and verify. Leverage statistically rigorous processes for load analysis, logging, auditing, and change management.
IEEE 1547	IEEE (Institute of Electrical and Electronics Engineers) Standard for Interconnection between utility electric power systems and DERs	This standard provides the technical specifications for, and testing of, the interconnection and interoperability between utility electric power systems (EPSs) and distributed energy resources (DERs). It provides requirements relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection. It also includes general requirements, response to abnormal conditions, power quality, islanding, and test specifications and requirements for design, production, installation evaluation, commissioning, and periodic tests. It further requires that all DERs are able to communicate via one of the following standards: IEEE 2030.5, IEEE 1815 or Sunspec Modbus. (see additional applicable standards in Kitu Glossary.)
IEEE 2030.5	IEEE (Institute of Electrical and Electronics Engineers) Standard for Smart Energy Profile Application Protocol	A communication protocol which can be used between a DERMS and DERs. Communications are done over HTTP and messages are packaged in XML format The application layer with TCP/IP providing functions in the transport and Internet layers to enable utility management of the end user energy environment, including demand response, load control, time of day pricing, management of distributed generation, electric vehicles, etc. is defined in this standard. The mechanisms for exchanging application messages, the exact messages exchanged including error messages, and the security features used to protect the application messages are defined in this standard.
ISP	Internet Service Provider	Internet Service Provider. ISPs are companies that provide internet access to their customers.
OEM	Original Equipment Manufacturer	The vendor manufacturing the battery or other components
SCADA	Supervisory Control and Date Acquisition	SCADA systems are used in the energy industry to monitor and control energy consumption in real time. They help keep the flow of energy consistent by measuring variables like temperature and power usage. SCADA systems are used in many types of energy systems, including microgrids and industrial operations. SCADA systems include software and hardware components that allow for remote and on-site data collection.
SI	Systems Integrator	Entity that assembles component subsystems into a whole and ensuring that the subsystems function together.
SOW	Statement of Work; also Scope of Work	Statement of Work: A document that outlines the scope, timeline, and cost of a project agreed upon between two parties. Scope of Work: A subset of the Statement of Work which details the work to be performed.
TOU	Time of Use	TOU tariffs segment each billing month into smaller hourly windows each with a separate pricing level related to production costs.

Appendix A – Flex Points List

Name	Description	Unit	Stream Type (Suggested)
Instantaneous real power production	The power production measured by a meter or directly by the device.	kW	GEN_POWER_ACTUAL
Forecasted real power production	The power production forecasted for a device	kW	GEN_POWER_FORECAST
Instantaneous real power consumption	The power consumption measured by a meter or directly by the device.	kW	LOAD_POWER_ACTUAL
Instantaneous baseline load (power)	The power consumption expected, based on a baseline calculation.	kW	LOAD_POWER_BASELINE
Interval baseline load (energy)	The energy consumption expected, based on a baseline calculation.	kWh	LOAD_ENERGY_BASELINE
Real-time Interval baseline load (energy)	The energy consumption expected, based on a baseline calculation using real time data.	kWh	LOAD_ENERGY_BASELINE_RT
System power consumption	The power consumption for a system (e.g. ISO or distribution grid)	MW	SYSTEM_LOAD_POWER_FORECAST
Absolute state of energy	Current energy state, in kWh, for any energy-containing device. This could be a battery's state-of-charge, a water heater's energy content, etc.	kWh	SOE_ABS_ACTUAL
Absolute state of energy	Current energy state for any energy-containing device, as a percentage of it's maximum storage capacity	PCT [0, 100]	SOE_ABS_ACTUAL
Actual Load	The energy consumption measured by a meter. This represents energy consumed over a defined interval	kWh	INTERVAL_ENERGY_ACTUAL
Delivered Flex	The flex power delivered relative to a baseline	kW	GEN_FLEX_ACTUAL
Absolute Set Point	The absolute target setpoint dispatched to an asset	kW	SET_POINT_ABS
Absolute Set Point Confirmation	the absolute target setpoint reported by an asset	kW	SET_POINT_CONF_ABS
Heartbeat	The heartbeat or liveness indicator for the asset	N/A	HB_OUT (from Flex), HB_IN (to Flex), HEARTBEAT (to Flex)
Fault Status	A status bit indicating whether an asset is faulted (and unable to follow instructions) or normal (and able to follow instructions if in REMOTE mode)	N/A	FAULT_STATUS
Remote Status	A status bit indicating whether the device is under our control or following some other control scheme. See Event Based Dispatch to industrial loads via RTCC	N/A	REMOTE_STATUS
Microgrid status	A status bit indicating whether or not the remote system is electrically connected to the power grid (ie: whether it is an electrical island or not).	N/A	ISLAND_STATUS
Trigger DR Load Shed Notification	A status bit which toggles site load shed warning (siren, strobe, SCADA signal, etc)	N/A	RTCC_DR_PREACTION

Trigger load shed	A status bit which signals the load shed control to happen	N/A	RTCC_DR_DEPLOY
Generation output not to exceed	Instantaneous real power generation output limit. Equivalent to ((WMaxLimPct / 100) * WMax) in datablock 123 of the SunSpec model.	kW	GEN_POWER_PRODUCTION_LIMIT
Frequency	The Frequency measurement provided by the asset	Hz	FREQUENCY
Reactive Power	The Reactive power measurement provided by the asset	kVAR	REACTIVE_POWER_ACTUAL
Air temperature	Air temperature measured at (or in) the device or facility	F or C	AIRTEMP
Humidity	Relative humidity measured at or in the facility	%	HUMIDITY