Energy Toolbase – CPS
ENERGY STORAGE INTEGRATION
Resource Guide

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Version 1.1

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Overview CPS ESS Integration on Energy Toolbase

Energy Toolbase has integrated Chint Power Systems (CPS) Commercial Energy Storage System (ESS) solutions onto the Energy Toolbase (ETB) Platform. This integration enables ETB users to run energy storage dispatch simulations and savings analysis that are representative of how CPS ESS products controlled by the Energy Toolbase iEMS controller would operate in the field.

CPS 125kW/268kWh

CPS has introduced its next generation, turn-key commercial energy storage system (ESS) solution that begins with a building block of 62.5 kW / 268kWh and can be expanded upwards. CPS's ESS is paired with Energy Toolbase's Intelligent Energy Management System (iEMS) storage control software, providing a turnkey solution for solar + storage developers. The CPS system is contained in a pre-engineered, NEM 3R, UL9540A certified pending for plug and play operation. The system comes standard with a 10-year, full wrap warranty on all components: battery, inverter, enclosure, and all electronics. The CPS system comes standard with pre-factory testing prior to shipping and includes on site commissioning.

Energy Toolbase has worked with CPS to validate the ESS hardware specifications which have been pre-loaded onto the ETB platform. This allows users to quickly evaluate their standalone-ESS projects or PV+ESS projects, on any of Energy Toolbase's 60,000+ utility rate schedules. The CPS integration streamlines the project development workflow for commercial storage developers and gives them confidence to know they are running validated savings and economic analysis.

Energy Toolbase iEMS

The CPS Energy Storage System utilizes Energy Toolbase's iEMS (Intelligent Energy Management System) control software. This enables users to run CPS commercial storage dispatch simulations and savings analysis that are representative of how the CPS products, controlled by iEMS, would operate in the field. Energy Toolbase's iEMS controls software utilizes artificial intelligence and advanced machine learning to forecast and optimally discharge energy storage systems operating in the field.

iEMS enables developers to maximize the value of their storage asset:

- **Operating Modes.** Demand management, TOU arbitrage, PV self-consumption, and more.
- **Optimized.** Capture all available value streams in order of importance to maximize savings.
- **Experience.** 4+ years of operating history and R&D training our machine learning models.
- **Re-forecasting.** Ingests real-time data to recreate forecasts every 15 minutes.
- **Standards.** Supports all industry standard communication protocols.
- **Compliance.** OEM warranty and incentive program (e.g., ITC, SGIP) compliant operations.
- **Performance Guarantee.** Backed by an industry leading performance guarantee.

View the iEMS data sheet

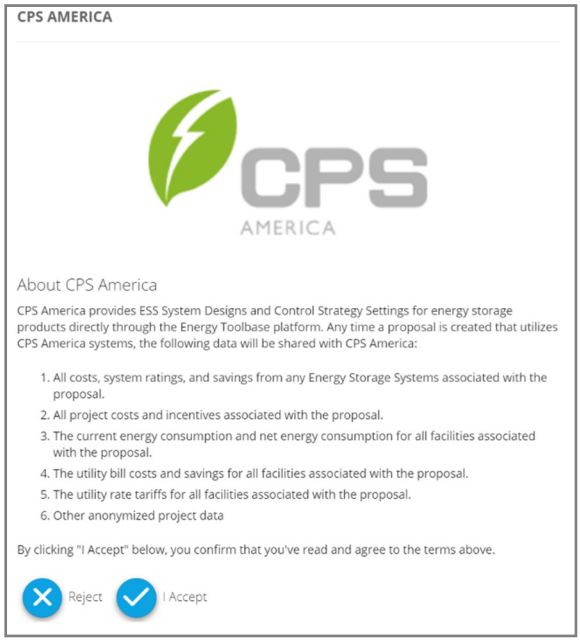
Signing Up CPS Commercial ESS Integration

There is no cost for Energy Toolbase users to use the CPS Commercial Energy Storage integration on the Energy Toolbase platform. There is a dual opt-in process, meaning ETB accounts must first apply to use the service, and then CPS must grant access.

Applying for Access to CPS Integration:

(1) In 'Step 5 – Energy Storage' users will initially see a greyed-out CPS logo. Click to apply for access.

(2) The pop-up window summarizes CPS's commercial ESS offering on ETB. Note: when using the CPS ESS Integration on ETB, users are consenting to share proposal information with CPS, this does not include personally identifiable customer information. Click 'I Accept' to apply.



(3) CPS requires ESS developers to be approved prior to granting access to the integration. Approved users will receive the latest updates on CPS hardware, as well as personalized support on their projects.

(4) CPS will review applications and grant access accordingly. Approved users can expect to receive an email notification from both CPS and ETB when access is granted.

Using CPS ESS Integration

Once an ETB account is permissioned to access the CPS ESS Integration, the CPS logo will appear green in step 5. Both the CPS 'ESS Designs' and Energy Toolbase iEMS 'ESS Control Settings' have been pre-configured so that users can quickly run validated CPS ESS dispatch simulations and savings analysis.

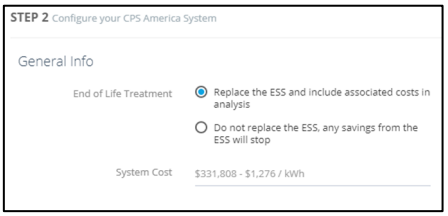
CPS ESS Designs:

These are the newest generation of CPS ESS solutions. Note: these will be periodically updated as new energy storage system configurations are launched.

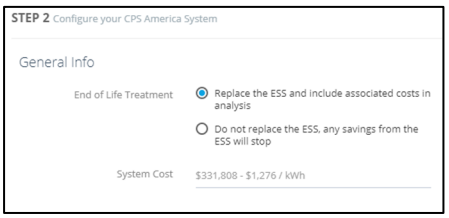
CPS – ESS 62.5kW / 268kWh	CPS – ESS 375kW / 804kWh
CPS – ESS 125kW / 268kWh	CPS – ESS 375kW / 1,608kWh
CPS – ESS 125kW / 536kWh	CPS – ESS 500kW / 1,072kWh
CPS – ESS 250kW / 1,072kWh	CPS – ESS 500kW / 2,144kWh

Using CPS ESS Integration:

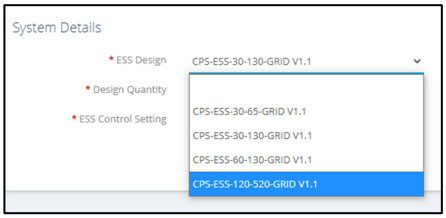
(1) **System Cost:** specify the all-in, total turnkey installed ESS cost, inclusive of all hardware, software, developer fees, EPC costs, labor, overhead and profit. *Note: the default suggested cost is set initially based on the ETB user's simple ESS costing in their 'Company Settings'.*



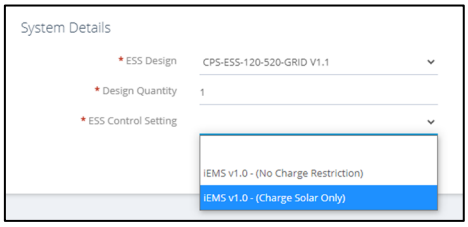
(2) **End of Life Treatment:** specify whether to replace the CPS ESS and associated costs at end of life. *Note: the transaction will determine if the replacement cost is reflected in the cash flow, which we will detail in the next section of this guide.*



(3) **ESS Design:** select the CPS validated 'ESS Design' from the drop-down menu list. *Note: CPS will periodically update these so ETB users can assume these are always up-to-date.*

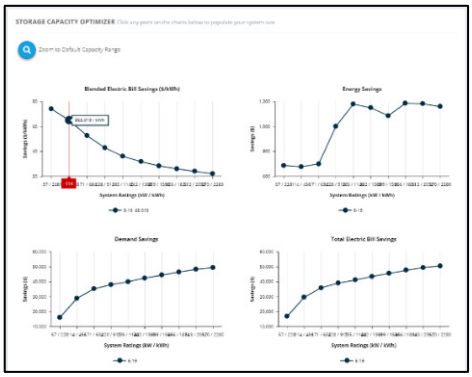


(4) **ESS Control Setting:** select the ETB iEMS control strategy from the drop-down list. *Note: "ETB iEMS (ESS must charge from PV)" assumes the CPS ESS is being paired with PV, and enforces a PV charging-only requirement in order for the ESS to be eligible for the Federal (ITC) Investment Tax Credit.*



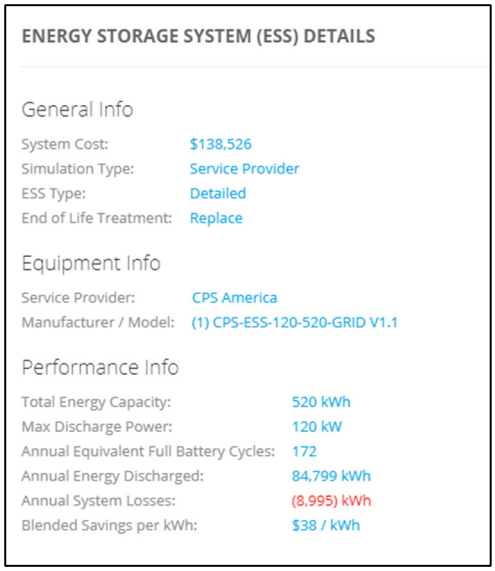
ETB Optimizer:

Energy Toolbase users can utilize the 'ETB Optimizer' feature, within the CPS ESS integration to simulate the performance and savings of (10) different CPS ESS system sizes at once, based on the selected Energy Toolbase iEMS control logic.



ESS Detail Summary:

Once the iEMS enabled CPS simulation has run, users will see the ESS Details performance summary, which displays the following values, based on the simulation performed:



Total Energy Capacity: rated kWh of the ESS

Max Discharge Power: rated kW of the ESS

Annual Equivalent Full Battery Cycles: # of cycles

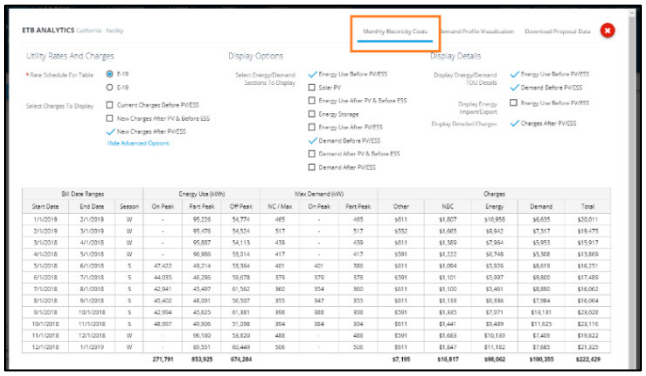
Annual Energy Discharged: kWh discharged from the ESS

Annual System Losses: kWh loss from ESS

Blended Savings per kWh: savings from ESS, displayed in $/kWh of ESS capacity

ETB Analytics:

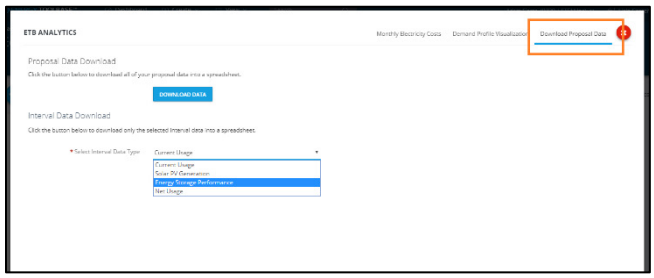
The 'ETB Analytics' feature enables users to view a project summary with detailed information of the iEMS enabled CPS ESS dispatch simulation and corresponding utility bill savings of the project.



'Monthly Electricity Costs' – users can view a 12-month summary view of: energy (kWh), demand (kW), and utility bill cost information both pre & post: PV & ESS. *Note: selecting the 'Show Advanced Options' hyperlink unlocks additional display options.*

'Demand Profile Visualization' – an interactive charting environment that allows users to visualize interval data, including usage data, solar PV data, ESS charge/discharge data, and net usage data. The charting element across the bottom displays the energy & demand costs of the selected utility rate schedule(s).

'Download Proposal Data' tab – allows users to download out different types of data into Excel (.csv) formatted files. The Proposal Data Download file shows all the raw project inputs and calculated values. The Interval Data Download exports 365-days of 15-minute interval data for Current Usage, PV Generation, ESS Performance, and Net Usage in a multi-column format.



Transactions When Using the CPS ESS Integration

Energy Toolbase has created a special transaction template that is designed to be used with the CPS ESS Integration. The transaction has the iEMS renewal fee pre-configured, so it will dynamically auto-calculate based on the selected size of the CPS energy storage system. The transaction is entitled: **"ETB iEMS – Cash Purchase".**

Specifying Project Cost:

As noted in the previous section, when using the CPS ESS Integration, users should specify the all-in, total turnkey installed ESS cost, which is inclusive of all hardware, EMS software, developer fees, EPC costs, labor, overhead and profit. Note: this is advantageous for tax purposes as it allows users to have a higher tax basis when claiming the Federal (ITC) Investment Tax Credit and any Depreciation benefit.

'Equipment Replacement' Cost:

By default, the "ETB iEMS – Cash Purchase" transaction includes a cash flow for Equipment Replacement. Therefore, it is important that users intentionally set their CPS ESS Hardware - Equipment Replacement costing estimate in their company settings, as this flows into the financial analysis. This applies when users select 'Replace ESS and include associated costs' for their project in Step 5.

The CPS 'Replacement Cost' is initially defaulted based on how users have defined their 'Simple Battery Replacement $/kWh' cost in their company settings.

When setting your CPS Replacement Cost, only include your estimate for ESS Hardware, as the iEMS control software replacement cost, which renews at year 11, is already dynamically calculated in the transaction, and has its own dedicated cash flow column as shown below. The iEMS replacement cost value is based on ESS kWh capacity.

Sample: "ETB iEMS – Cash Purchase" cash flow table:

3.1 Cash Purchase - EMS Services Paid Upfront

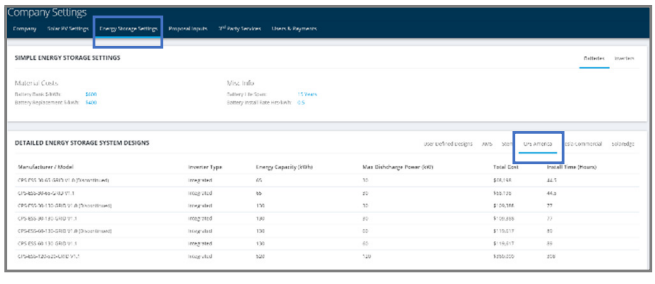
Inputs and Key Financial Metrics

Total Project Costs	$360,000	20-Year ROI	161.9%	Electricity Escalation Rate	3%
20-Year IRR	14.77%	PV Degradation Rate	0.8%	Federal Income Tax Rate	30%
20-Year NPV	$257,687	Discount Rate	5%	State Income Tax Rate	8%
Payback Period	5.8 Years				

Years	Project Costs	O&M & Equipment Replacement	iEMS License Renewal	SGIP Incentive	Electric Bill Savings	Change in State Tax Liability	Change in Federal Tax Liability	Total Cash Flow	Cumulative Cash Flow
Upfront	-$360,000	-	-	$6,930	-	-	-	-$353,070	-$353,070
1	-	-	-	$3,707	$36,716	$5,760	$93,600	$139,783	-$213,287
2	-	-	-	$3,223	$37,357	$9,216	-	$49,797	-$163,490
3	-	-	-	-	$38,004	$5,530	-	$43,533	-$119,957
4	-	-	-	-	$38,655	$3,318	-	$41,973	-$77,984
5	-	-	-	-	$39,312	$3,318	-	$42,630	-$35,354
6	-	-	-	-	$39,973	$1,659	-	$41,632	$6,278
7	-	-	-	-	$40,639	-	-	$40,639	$46,917
8	-	-	-	-	$41,308	-	-	$41,308	$88,225
9	-	-	-	-	$41,981	-	-	$41,981	$130,206
10	-	-	-	-	$42,657	-	-	$42,657	$172,863
11	-	-$1,000	-$12,000	-	$43,336	-	-	$30,336	$203,199
12	-	-$1,000	-	-	$44,017	-	-	$43,017	$246,216
13	-	-$1,000	-	-	$44,701	-	-	$43,701	$289,917
14	-	-$1,000	-	-	$45,385	-	-	$44,385	$334,302
15	-	-$1,000	-	-	$46,071	-	-	$45,071	$379,373
16	-	-$76,000	-	-	$52,726	-	-	-$23,274	$356,099
17	-	-$1,000	-	-	$53,591	-	-	$52,591	$408,690
18	-	-$1,000	-	-	$54,460	-	-	$53,460	$462,150
19	-	-$1,000	-	-	$55,333	-	-	$54,333	$516,483
20	-	-$1,000	-	-	$56,209	-	-	$55,209	$571,691
Totals:	-$360,000	-$85,000	$0	$13,860	$892,431	$28,800	$93,600	$571,691	-

Editing CPS 'Replacement Cost' go to 'Company Settings' > 'Energy Storage Settings' tab > 'CPS America' > click on individual 'detailed ESS system design' > to redefine those values.

Note: be mindful of how the PV inverter 'replacement cost' is defined in 'company settings', as that value will also pull into the financial model when modeling PV+ESS projects.



CPS ESS Life Span & Degradation:

CPS has set the ESS Battery Life Span at 10 years, and Battery Degradation Rate at 3%. Approved ETB uses can view the 'CPS ESS System Design' characteristics in their company settings. Please contact your CPS sales representative for additional details.

Term (Years) of the Transaction:

For this default Transaction, ETB has fixed the Transaction Term to 20 years. If a user prefers to model and present a different transaction term, you can simply copy/duplicate the Transaction and custom configure the term in the 'transaction details' section like any other Transaction.

As shown in the sample cash flow table on the preceding page, the Energy Toolbase iEMS license renews at year 11, and the CPS energy storage system is replaced at year 11 also.

Including other ESS Monetary Value Streams:

Users can elect to further customize their Financial Transaction template(s) to include additional cash flows, to account for additional value streams in their financial analysis. Cash flows can be structured as either a one-time payment or as an annual recurring payment.

One example of a recurring value stream could a Grid Services program, where the CPS ESS captures value by providing a benefit to the utility or independent system operator. An example of a one-time value stream could be the Resiliency value that a CPS ESS provides for a specific customer, by providing back-up power in the event of a grid outage and eliminating the need for a generator.

Creating other Transaction Types:

Users can easily configure other Transaction types (e.g., Loan, Lease, PPA) by copy/duplicating the existing ETB iEMS transaction template. We encourage you to contact your ETB account manager for assistance on this.

Final Checklist

We have compiled a final checklist of items for users to ensure that they are accurately modeling and optimizing the project economics of CPS ESS projects for their customers.

Final Checklist Items:

1. **ESS System Price –** doublecheck to confirm that your 'System Cost' in Step 5 represents the all-in, total turnkey installed cost of the ESS System.

2. **Transaction –** make sure to utilize the 'ETB iEMS – Cash Purchase' transaction template, which dynamically calculates the EMS renewal fee. Contact your ETB account manager if you want to create different variations of the transaction, like a Loan, Lease or PPA.

3. **Equipment Replacement Cost –** make sure you define the CPS ESS Hardware 'Equipment Replacement Cost' in 'Company Settings', which will flow into your cash flow statement and project economics when you elect to 'Replace the ESS' for the 'End of Life Treatment'.

4. **Utility Rate Schedule –** select the most advantageous, eligible utility rate schedule option for post-ESS or post-PV+ESS savings.

5. **Demand Throttle –** verify the demand reduction throttle in 'Step 2' is set to 100% to capture the full demand charge management savings opportunity from both PV & ESS.

6. **Incentives –** in 'Step 3' be sure to select all eligible ESS incentives for the project, based on the customer's eligibility (i.e. SGIP, SMART, Federal ITC, Depreciation, etc.).

Contact your Energy Toolbase Account Manager to discuss any of these items in more detail.