MODELING & DEPLOYING ENERGY STORAGE:

Steps for a Successful Deployment

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July 26, 2023

Webinar Agenda

- MODELING ENERGY STORAGE ECONOMICS & SAVINGS
- PRE-COMMISSIONING
- COMMISSIONING
- OPERATIONS & MAINTENANCE (O&M)
- END-USER RESPONSIBILITIES & EDUCATION
- HOW ENERGY TOOLBASE CAN SUPPORT YOU

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Energy Toolbase Deploys ESS Projects Worldwide

ACUMEN EMS DEPLOYMENT

As of Q2 2023, we're operating or contracted in 4+ countries and rapidly expanding worldwide.

100+ Project Sites

50+ MWh ESS Capacity

16+ States/ Provinces

4+ Countries

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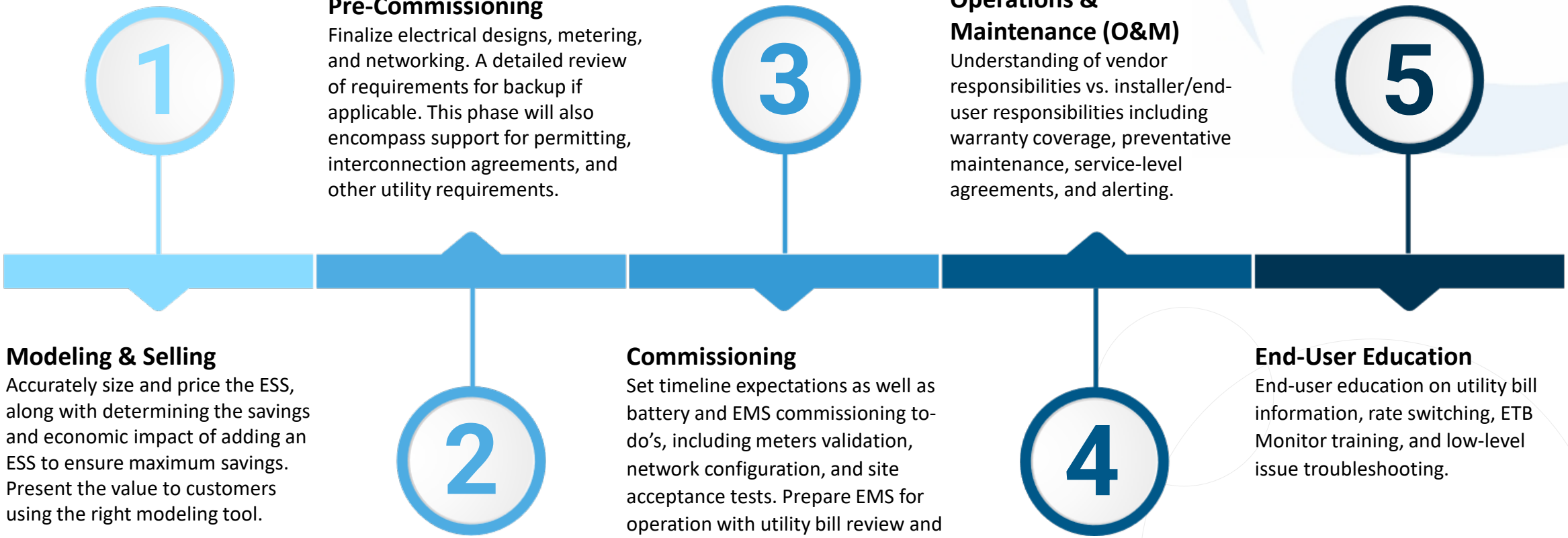
The Process of Deploying an ESS with Energy Toolbase



Modeling & Selling
Accurately size and price the ESS, along with determining the savings and economic impact of adding an ESS to ensure maximum savings. Present the value to customers using the right modeling tool.

Pre-Commissioning
Finalize electrical designs, metering, and networking. A detailed review of requirements for backup if applicable. This phase will also encompass support for permitting, interconnection agreements, and other utility requirements.

Commissioning
Set timeline expectations as well as battery and EMS commissioning to-do's, including meters validation, network configuration, and site acceptance tests. Prepare EMS for operation with utility bill review and rate schedule validation.

Operations & Maintenance (O&M)
Understanding of vendor responsibilities vs. installer/end-user responsibilities including warranty coverage, preventative maintenance, service-level agreements, and alerting.

End-User Education
End-user education on utility bill information, rate switching, ETB Monitor training, and low-level issue troubleshooting.

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01 MODELING

Model, Control, & Monitor Solar + Storage Projects

Pre-Install

Post-Install

MODEL THE SITE

ETB Developer

Gold standard, industry-leading software platform for modeling and proposing the economics of solar and storage projects.

CONTROL THE ASSETS

Acumen EMS™

Intelligent control system software utilizing machine learning and AI to forecast and optimally discharge energy storage systems.

MONITOR THE PERFORMANCE

ETB Monitor

Robust monitoring platform providing complete transparency into the real-time operation and performance of solar + storage projects.

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Why ETB Developer for ESS Projects?

- **Transparent Financial Analysis:** We precisely calculate utility costs, energy savings, and project economics in a transparent & defensible way.
- **In-House Utility Rates**: We are the only SaaS tool that has an in-house utility rates team. We're directly accountable for our rates; this is too important a task to outsource.
- **White-Glove Service:** Best-in-class support and customer service. We help you and your team get to know the platform and gain confidence in your project modeling and selling.
- **In-Platform Integrations:** Leverage energy storage and financing provider integrations to streamline workflows without leaving the platform.

A Roadmap of Modeling & Selling ESS

1

Introduction

- Discovery
- Orientation questionnaire

2

Orientation Plan Based on Need

- Account customization
- Tailored training

3

Walkthrough & Training

- Review features & functionalities

4

Specialized Team Member Consultations

- Data and Services Team
- Pre-Proposal service
- Enterprise Services Team

5

Review Support with Onboarding Manager

- Ensure you have the confidence to navigate ETB Developer

6

Introduction to Regional Account Manager

- Specialized geographic training
- Advanced project-specific support

7

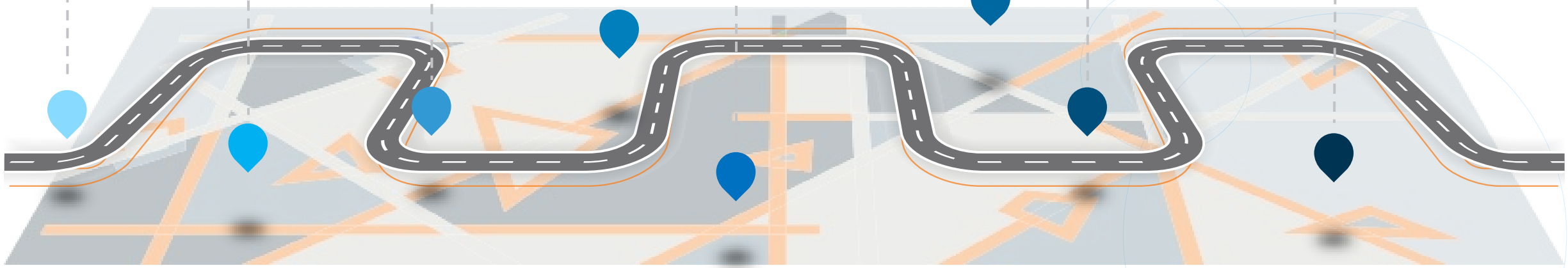
Intro to Full Product Suite & Specialists

- Acumen EMS ™
- ETB Monitor

8

Transition to Regional Sales Manager

- In-depth market analysis
- White-glove service for deployments



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Acumen EMS - Performance & Savings Summary

ESS Hardware:

ESS Vendor:	(1) Socomec HES L 100kW / 186 kWh
ESS Power Rating:	93.0 kW
ESS Capacity:	186.0 kWh

ESS Software:

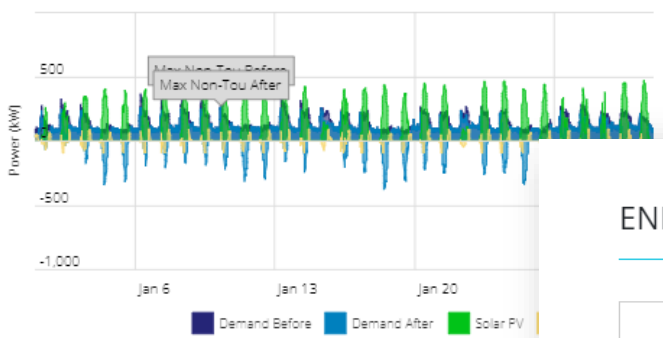
Energy Toolbase Acumen EMS

10 year license, software updates, performance reviews

ETB Monitor (10 Year License)

System monitoring, performance analytics, alerts

ESS Dispatch Simulation:



ESS Dispatch Summary:

Total ESS Energy Discharge:	63,994 kWh
Equivalent Full Discharge Cycles:	355
Round-trip Efficiency:	93.9%

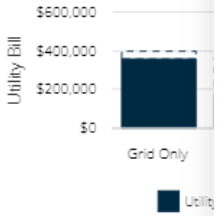
Utility Bill Details:

Utility:	SCE-NEM3
Rate Schedule (before):	TOU-8 (Option: D)
Rate Schedule (after):	TOU-8 (Option: E)

Utility Bill Savings:

Total Bill Savings:	$242,335
Energy Savings:	$82,733
Demand Savings:	$159,602
PV Savings:	$212,475
PV Savings ($/kWh):	$0.177 /kWh
ESS Savings:	$29,859
ESS Savings ($/kWh):	$160.534 /kWh

Annual Electric Bill



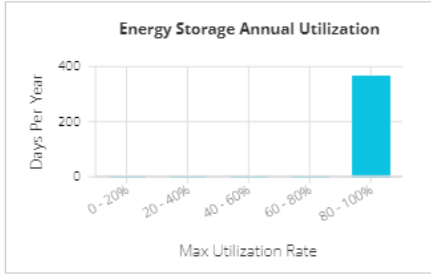
Cost & Savings Ove

Utility Bill Cost Do Not

Total Bill Savings:

Proposal Name: PV+ESS, max bill savings

ENERGY STORAGE SYSTEM (ESS) - PERFORMANCE SUMMARY REPORT



ESS System Rating	
Energy Capacity:	186.0 kWh
Power Rating:	93.0 kW
Total ESS Energy Discharge:	63,994 kWh
Equivalent Full Discharge Cycles:	355

ESS Equipment Description	
Battery Banks:	(1) Socomec HES L 100kW / 186 kWh
Inverters:	(1) Socomec HES L 100kW / 186 kWh

Energy Output and Demand Savings From Solar PV and Energy Storage

Date Range	ESS Energy Discharge (kWh)	Solar PV Generation (kWh)	Total Demand Savings
1/1/2014 - 2/1/2014	5,488	70,452	$6,877
2/1/2014 - 3/1/2014	4,905	70,196	$7,396
3/1/2014 - 4/1/2014	5,486	99,502	$6,242
4/1/2014 - 5/1/2014	5,501	105,729	$8,541
5/1/2014 - 6/1/2014	5,573	122,517	$9,067
6/1/2014 - 7/1/2014	5,273	128,379	$21,062
7/1/2013 - 8/1/2013	5,277	133,933	$23,439
8/1/2013 - 9/1/2013	5,289	127,343	$24,969
9/1/2013 - 10/1/2013	5,122	110,535	$28,962
10/1/2013 - 11/1/2013	5,392	91,447	$8,623
11/1/2013 - 12/1/2013	5,218	74,297	$6,996
12/1/2013 - 1/1/2014	5,470	63,547	$7,429
Total	**63,994**	**1,197,877**	**$159,602**

Proposal: PV+ESS, max bill savings

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2.1.3 ENERGY STORAGE SYSTEM (ESS) DETAILS

GENERAL INFORMATION

Facility: Meter #1
Address: Sierra Lakes CA 92336

ESS SYSTEM RATINGS

Energy Capacity: 186.0 kWh
Power Rating: 93.0 kW

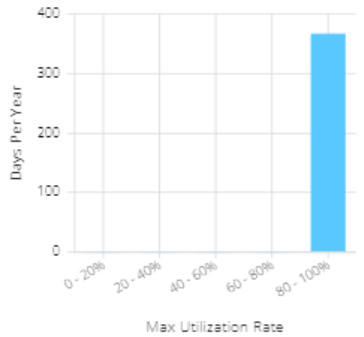
ESS EQUIPMENT DESCRIPTION

Battery Banks: (1) Socomec HES L 100kW / 186 kWh
Inverters: (1) Socomec HES L 100kW / 186 kWh

ESS EQUIPMENT TYPICAL LIFESPAN

Battery Banks: 15 Years
Inverters: 15 Years

ENERGY STORAGE ANNUAL UTILIZATION



ESS Cost and Incentives

ESS Cost	$297,378
State (CA) 10-yr Depreciation (ESS)	-$23,258
Federal Tax Credit (ESS)	-$89,213
Federal - MACRS Bonus Depreciation	-$53,082
Net ESS Cost	**$131,825**

Energy Output and Demand Savings From Solar PV and Energy Storage

Date Range	ESS Energy Discharge (kWh)	Solar PV Generation (kWh)	ESS Energy as % of PV Energy	Total Demand Savings
1/1/2014 - 2/1/2014	5,488	70,452	7.79%	$6,877
2/1/2014 - 3/1/2014	4,905	70,196	6.99%	$7,396
3/1/2014 - 4/1/2014	5,486	99,502	5.51%	$6,242
4/1/2014 - 5/1/2014	5,501	105,729	5.20%	$8,541
5/1/2014 - 6/1/2014	5,573	122,517	4.55%	$9,067
6/1/2014 - 7/1/2014	5,273	128,379	4.11%	$21,062
7/1/2013 - 8/1/2013	5,277	133,933	3.94%	$23,439
8/1/2013 - 9/1/2013	5,289	127,343	4.15%	$24,969
9/1/2013 - 10/1/2013	5,122	110,535	4.63%	$28,962
10/1/2013 - 11/1/2013	5,392	91,447	5.90%	$8,623
11/1/2013 - 12/1/2013	5,218	74,297	7.02%	$6,996
12/1/2013 - 1/1/2014	5,470	63,547	8.61%	$7,429
Total	63,994	1,197,877	5.34%	$159,602

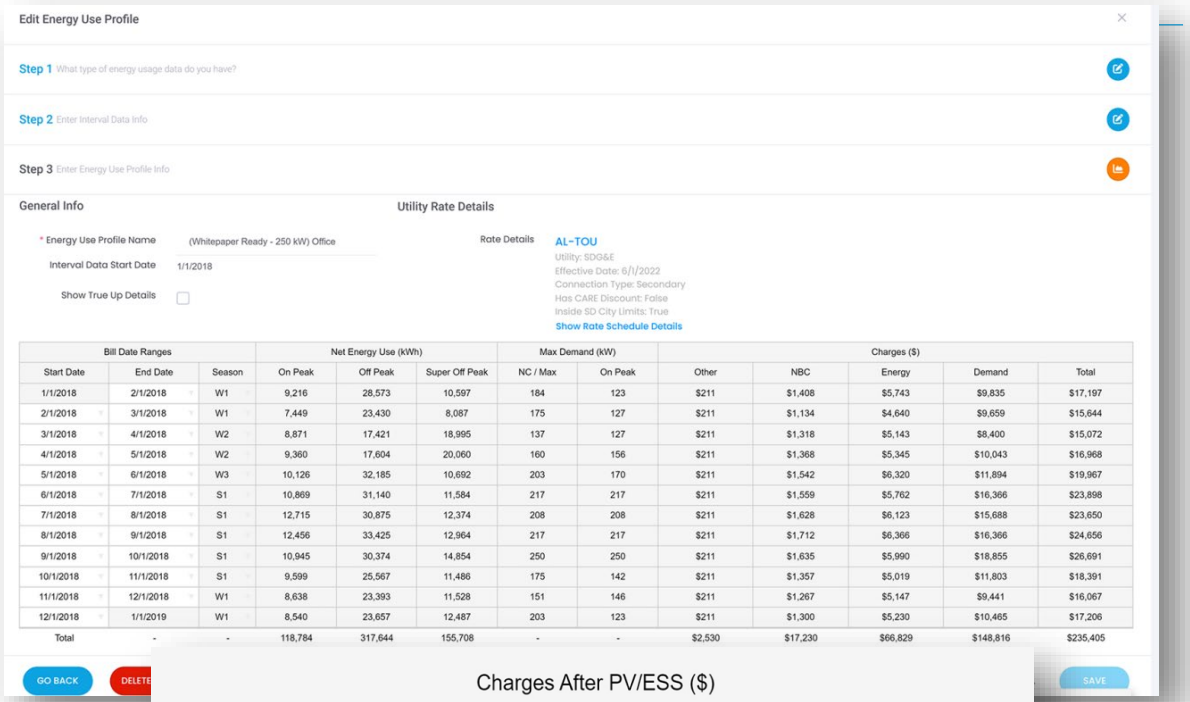
3.1 Cash Purchase (simple view)

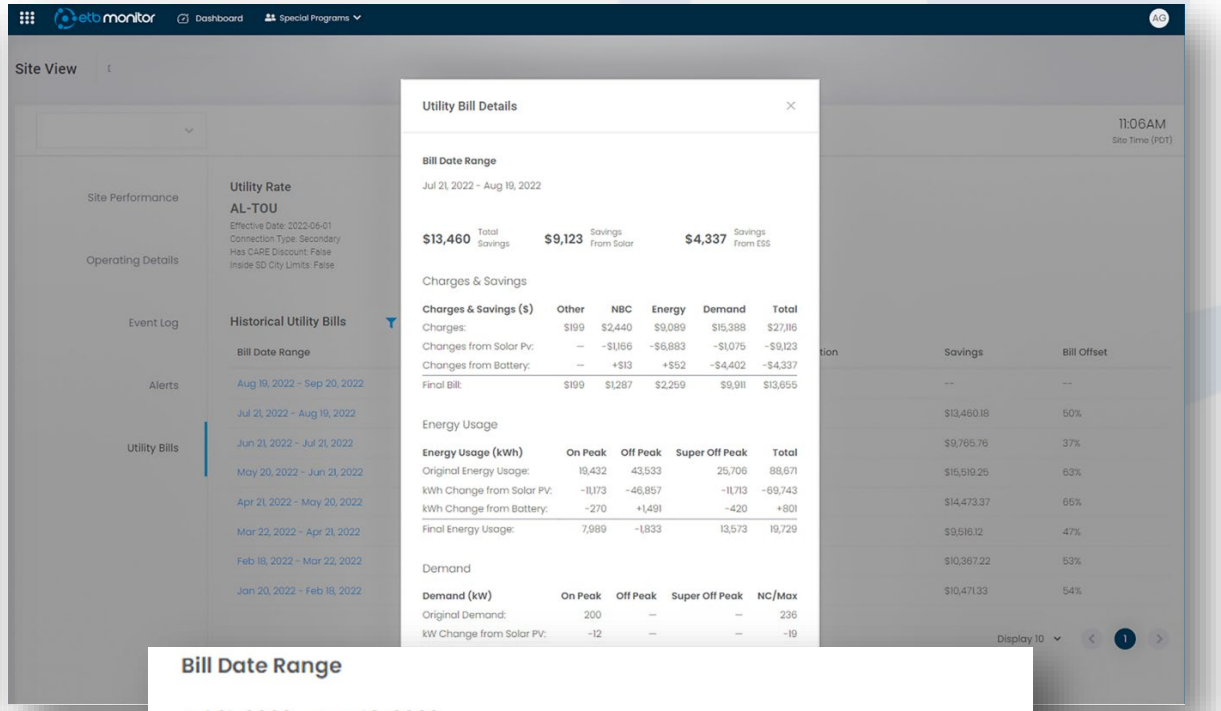
Assumptions and Key Financial Metrics

IRR - Term	14.4%	Net Present Value	$1,957,410	Payback Period	6.1 Years
ROI	190.2%	PV Degradation Rate	0.80%	Discount Rate	5.0%
Energy Cost Escalation Rate	3.0%	Federal Income Tax Rate	21.0%	State Income Tax Rate	9.9%
Total Project Costs	$2,556,473				

Years	Project Costs	O&M / Equipment Replacement	Electric Bill Savings	State Tax Effect	Federal Tax Effect	Total Cash Flow	Cumulative Cash Flow
Upfront	-$2,556,473	-	-	-	-	-$2,556,473	-$2,556,473
1	-	-	$265,819	-$1,007	$1,021,636	$1,286,448	-$1,270,025
2	-	-	$270,394	-$1,460	$1,934	$270,868	-$999,157
3	-	-	$275,005	-$1,916	-$22,302	$250,786	-$748,371
4	-	-	$279,649	-$2,376	-$37,200	$240,073	-$508,297
5	-	-	$284,324	-$2,839	-$38,084	$243,401	-$264,896
6	-	-	$289,028	-$3,305	-$49,488	$236,235	-$28,661
7	-	-	$293,759	-$3,773	-$60,897	$229,089	$200,427
8	-	-	$298,513	-$4,244	-$61,796	$232,472	$432,900
9	-	-	$303,287	-$4,716	-$62,700	$235,871	$668,771
10	-	-	$308,080	-$5,191	-$63,607	$239,283	$908,054
11	-	-$3,317	$312,888	-$30,648	-$58,574	$220,349	$1,128,403
12	-	-$3,367	$317,706	-$31,120	-$59,476	$223,744	$1,352,147
13	-	-$3,417	$322,532	-$31,592	-$60,380	$227,143	$1,579,290
14	-	-$3,468	$327,362	-$32,065	-$61,284	$230,544	$1,809,834
15	-	-$15,520	$332,191	-$32,538	-$59,668	$224,464	$2,034,298
16	-	-$3,573	$374,413	-$36,713	-$70,167	$263,960	$2,298,258
17	-	-$3,627	$380,350	-$37,296	-$71,280	$268,148	$2,566,406
18	-	-$3,681	$386,306	-$37,880	-$72,396	$272,349	$2,838,755
19	-	-$3,736	$392,277	-$38,466	-$73,516	$276,559	$3,115,314
20	-	-$3,792	$398,259	-$39,052	-$74,637	$280,777	$3,396,091
21	-	-$3,849	$404,246	-$39,639	-$75,759	$284,998	$3,681,090
22	-	-$3,907	$410,234	-$40,226	-$76,881	$289,220	$3,970,309
23	-	-$3,966	$416,218	-$40,813	-$78,002	$293,437	$4,263,746
24	-	-$4,025	$422,191	-$41,398	-$79,121	$297,647	$4,561,393
25	-	-$4,085	$428,149	-$41,982	-$80,237	$301,844	$4,863,237
Totals:	-$2,556,473	-$67,331	$8,493,179	-$582,256	-$423,882	$4,863,237	-

Transparent Utility Bill Cost & Savings





Charges After PV/ESS ($)

Other	NBC	Energy	Demand	Total
$211	$789	$2,204	$4,866	$8,071
$211	$509	$1,010	$3,925	$5,654
$211	$471	$476	$2,891	$4,049
$211	$440	$62	$2,820	$3,532
$211	$570	$546	$3,612	$4,939
$211	$529	$787	$4,370	$5,896
$211	$560	$776	$4,472	$6,020

Bill Date Range

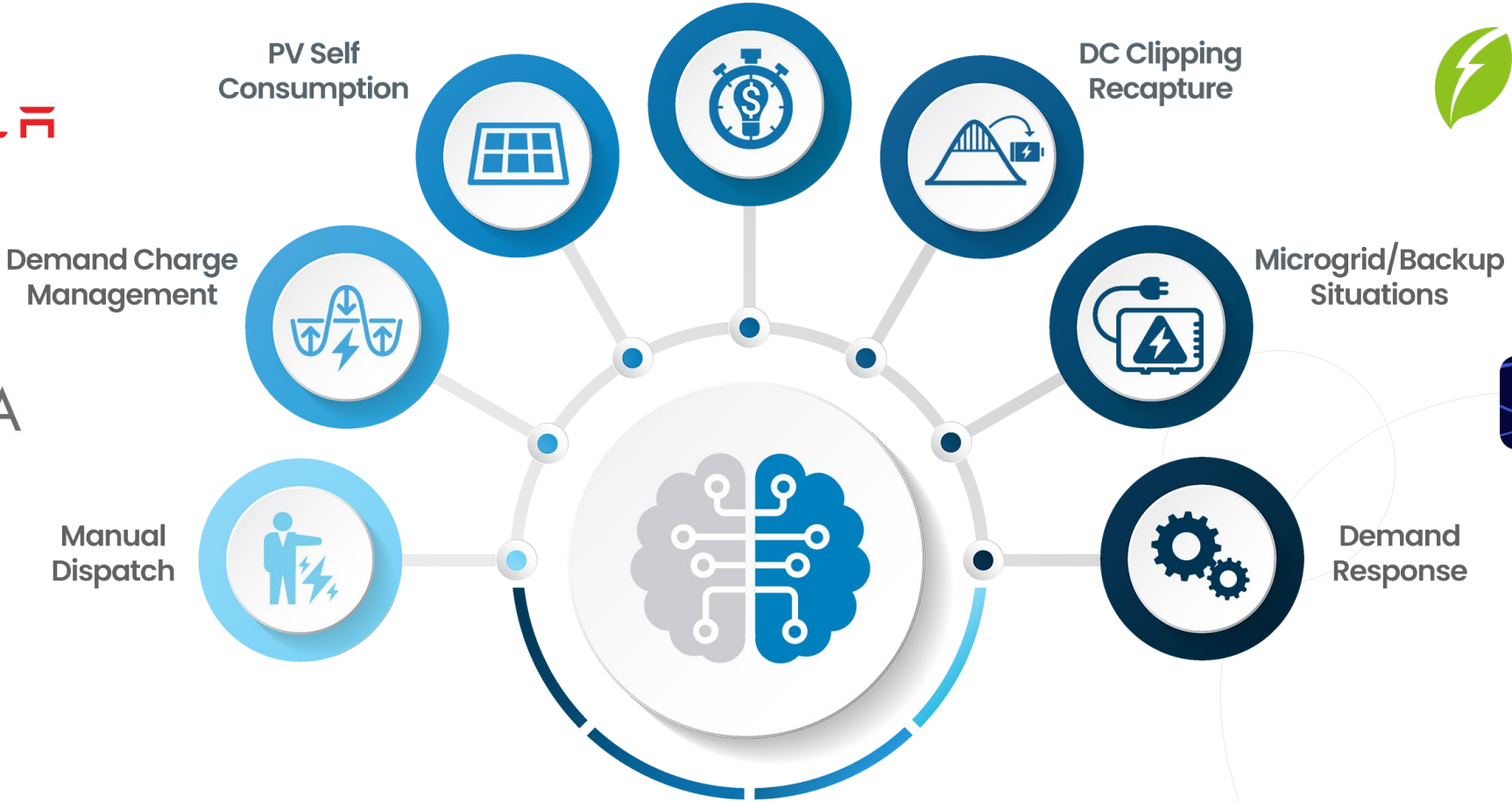
Jul 21, 2022 - Aug 19, 2022

$13,460 Total Savings **$9,123** Savings From Solar **$4,337** Savings From ESS

Charges & Savings

Charges & Savings ($)	Other	NBC	Energy	Demand	Total
Charges:	$199	$2,440	$9,089	$15,388	$27,116
Changes from Solar Pv:	—	-$1,166	-$6,883	-$1,075	-$9,123
Changes from Battery:	—	+$13	+$52	-$4,402	-$4,337
Final Bill:	$199	$1,287	$2,259	$9,911	$13,655

EMS Applications for Any Type of ESS Project



Energy Storage Deployment with Acumen EMS™

SOLAR FARM

Location: Deerfield, Massachusetts

Deployment Date: February 2023

ESS Provider: Sungrow

System Size: 1000kw

Facility Type: Community Solar Farm

EMS Applications: Front-of-the-Meter

BEVERAGE MANUFACTURER

Location: San Diego, California

Deployment Date: 2022

ESS Provider: BYD

System Size: 240kw/532kwh

Facility Type: Distribution Center

EMS Applications: Demand Charge Management

PETCO PARK

Location: San Diego, California

Deployment Date: June 2022

ESS Provider: BYD

System Size: 120kW

Facility Type: Sports Stadium

EMS Applications: Demand Response & TOU Arbitrage

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Support Throughout Your Project's Entire Lifecycle

02

PRE-COMMISSIONING

The Pre-Commissioning Process

Site Assessment
(know your design , understand what you need to make it work)

- Electrical design
- Metering & device networking
- Internet connection requirements
- Requirements for backup (if applicable)

Compliance & Approvals

- Interconnection agreements
- Permitting
- Utility requirements

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Understanding Hardware & Software Vendor Scope

Hardware Supply

- Electrical design needs (outside of the ESS)
- Do you need a backup-capable system?

Remote & Onsite Services

- What services are provided by which vendor?
- When do you expect them?

Ongoing Operations & Maintenance (O&M)

- Who is providing that?

Importance of Hardware Selection

Choosing to work with top-tier hardware vendors is *critical*

- **Coming Soon:**

03 COMMISSIONING

The Commissioning Process

Installation Complete to System Fully Commissioned

- Typically takes 1 to 2 months (could be longer)

Energy Storage System VS Energy Management System

- Systems have separate commissioning times

Testing & Final Configuration of ESS

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The Division of Responsibilities

RESPONSIBILITIES	INSTALLER	VENDOR	ETB	END-USER
➢ Ensure correct physical installation of the system	✓	✗	✗	✗
➢ Ensure on-time delivery of the equipment	✗	✓	✗	✗
➢ Confirm all associated electrical equipment and conductors	✓	✗	✗	✗
➢ Get network connection and meter testing/validation	✓	✗	✗	✗
➢ Oversee entire commissioning of the system	✗	✓	✗	✗
➢ Commissioning checklists and approval photos	✓	✗	✗	✗
➢ Onsite commissioning (1-3 days)	✗	✓	✗	✗
➢ Gather any necessary equipment ESS warranty items.	✗	✓	✗	✗
➢ Remote EMS configuration and ESS Site Acceptable Testing	✗	✗	✓	✗
➢ Rate schedule validation	✗	✗	✗	✓
➢ Provide utility bills & interval data	✗	✗	✗	✓

04 OPERATIONS & MAINTENANCE

The Operations & Maintenance Process (O&M)

ESS Vendor Responsibilities

- Warranty Coverage
- Preventative Maintenance (if applicable)

ETB Responsibilities

- Alerting/Notifications
- Case Tracking
- Coordination

Client Responsibilities

- Tier 1 Onsite Troubleshooting
- Preventative Maintenance
- Warranty Responsibilities

05 END-USER EDUCATION

Educating Your Customers

➢ Understanding Installation

- Commissioning Timelines
- Timelines for optimized savings and machine learning models

➢ Rate Switching

- Understanding the rate schedule's impact on a system
- Client must notify ETB for rate changes

➢ ETB Monitor & Ongoing Service

- User access and role assignment
- Alert & notification settings
- Proper onsite support contacts

➢ Low Level Issue Troubleshooting

- Device operation & health
- Network communication & internet
- Physical checks

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Q & A

Have a question?
Reach out to us at
contact@energytoolbase.com

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