RENON | RENON BATTERY BANTER

Solar + Storage Readiness Guide

for Residential Installers

Market insights, project preparation, and customer conversation tools for North America solar professionals

> Understand how changing energy economics and regulations are reshaping residential solar, and evaluate your readiness to design, deliver, and sell solar + storage projects.

DESIGNED FOR

- ✓ Residential Solar Installers
- ✓ EPC Companies
- ✓ System Designers
- ✓ Distribution Partners

01

WHY SOLAR + STORAGE IS BECOMING THE NEW RESIDENTIAL ENERGY MODEL

WHY HOMEOWNERS ARE LOOKING BEYOND SOLAR-ONLY SYSTEMS

For years, residential solar adoption was primarily driven by a simple value proposition:

Generate your own power → reduce electricity bills → achieve payback over time.

However, the economics of residential energy are changing.

Rising electricity costs, evolving utility rate structures, and changing solar export compensation are shifting how homeowners evaluate solar investments.

California represents one of the clearest examples of this transition. With NEM 3.0 reducing the value of excess solar exported to the grid and time-of-use (TOU) rates increasing the cost of evening electricity consumption, homeowners are beginning to look beyond solar generation alone.

The core objective hasn't changed: **"how do I reduce my power bill?"** but the question of how that's done is changing.

THE KEY QUESTION IS NO LONGER ONLY:

“How much electricity can my solar system produce?”

INSTEAD, HOMEOWNERS ARE ASKING:

“How do I buy as little electricity as possible from the grid?”

This is driving the shift from: Solar-only → Solar + Storage

where the value expands from **Produce your own power** to:

- ✓ Produce your own power and control how it gets used
- ✓ Managing TOU energy costs
- ✓ Reducing dependency on the grid and ever increasing rates
- ✓ Improving energy independence and resilience

Installers who understand this transition can better guide homeowners, design more complete energy solutions, and adapt their sales approach to the next phase of residential solar.

The following example illustrates how a solar + storage system can change the economics of a residential energy project.

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EXAMPLE PROJECT ECONOMICS: CALIFORNIA RESIDENTIAL SOLAR + STORAGE

Note: This is a hypothetical project example based on representative assumptions. The calculations illustrate potential energy shifting and gross peak electricity purchase offsets only. Actual project economics depend on customer load profiles, utility tariff structures, export compensation rates, incentives, taxes, system design, and operating conditions.

SYSTEM CONFIGURATION

Location: California | **Utility Environment:** PG&E territory (example)

SOLAR PV	INVERTER	BATTERY
8 kW Solar System	**Fronius GEN24 Plus**	**Renon Xtreme HV 19.2 kWh**

EXAMPLE PROJECT INPUTS & CALCULATION BASIS

To illustrate a typical residential energy profile:

Energy Parameter	Example Value	Reference / Calculation
Average peak sun hours	**~5 hours/day**	*Based on California solar resource data and PV production modeling
PV system size	**~8 kW**	*Representative residential PV system size assumption
System performance factor	**~80%**	Representative derating factor accounting for temperature, inverter losses, wiring, mismatch, and other system losses
Estimated daily solar generation	**~32 kWh/day**	Calculation: 8 kW × 5 hrs/day × 80% performance factor
Annual household electricity consumption	**~12,000 kWh/ year**	Representative California residential electricity usage assumption
Average daily consumption	**~33 kWh/day**	= 12,000 kWh ÷ 365 days
Daytime household consumption	**~14 kWh/day**	Illustrative load profile assumption based on typical residential daily consumption patterns.
Evening peak-period consumption	**~19 kWh/day**	= 33 kWh/day − 14 kWh/day

*Reference Sources: NREL PV Watts · NREL NSRDB · Berkeley Lab Tracking the Sun · EIA Residential Energy Consumption Survey

DAILY ENERGY BALANCE: SOLAR ONLY VS. SOLAR + STORAGE

Time Period	Energy Flow	Before Solar	Solar Only	Solar + Storage
Daytime	solar generation	0 kWh	+32 kWh PV generation	**+32 kWh PV generation**
	Home electricity consumption	≈14 kWh supplied by grid	≈14 kWh from solar	≈14 kWh from solar
	Excess solar available	—	≈18 kWh exported to grid	**≈18 kWh available for battery charging**
	Daytime grid purchase	14 kWh	0	**0**
Evening Peak (5 PM–10 PM)	Household demand	≈19 kWh	≈19 kWh	≈19 kWh
	Usable battery discharge	—	—	**≈15 kWh***
	Grid electricity purchase	**≈19 kWh**	**≈19 kWh**	**≈4 kWh**
Daily Total	Total household consumption	≈33 kWh	≈33 kWh	≈33 kWh
	Peak grid dependence	High	Reduced during daytime	**Reduced during peak hours**

*Based on approximately 18 kWh available solar surplus after considering battery round-trip efficiency and operating reserve (~85%).

ILLUSTRATIVE GROSS PEAK ENERGY OFFSET

Based on the daily energy balance above, the battery shifts approximately 15 kWh/day of solar energy into evening peak consumption.

Parameter	Value	Reference
Off-Peak TOU electricity rate	≈$0.09/kWh	Illustrative PG&E residential TOU rate example. Actual rates vary by approved tariff plan, effective date, season, customer usage profile, and applicable charges.
Peak (5 PM–10 PM) TOU electricity rate	≈$0.17/kWh	
Usable battery discharge	≈15 kWh/day	Derived from Daily Energy Balance
Peak electricity offset value	≈$2.55/day	15 × $0.17
Illustrative Gross Peak Purchase Offset	≈$930/year	$2.55 × 365

Reference: PG&E Residential Rate Plans
Actual customer economics should be evaluated using the applicable approved tariff and customer-specific usage profile.

WHY THIS MATTERS FOR INSTALLERS

The value proposition is changing.
Previously: **Solar = Reduce electricity bills**
Today: **Solar + Storage = Manage energy costs, improve resilience, and provide greater energy control**

As utility rates, customer expectations, and grid conditions continue to evolve, homeowners are evaluating energy systems based on more than solar production and payback alone.

For installers, this creates an opportunity to move beyond selling solar generation and help customers design complete energy solutions — combining solar, storage, backup capability, and energy management.

Understanding this shift enables installers to better:

- ✓ Explain the value of storage;
- ✓ Design systems around customer priorities;
- ✓ Support more complete residential energy projects.

Example system reference used in this scenario: Fronius GEN24 Plus + Renon Xtreme HV 19.2 kWh

*Actual project economics depend on utility tariffs, customer usage patterns, installation costs, incentives, and system configuration.

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CALIFORNIA PROJECT REFERENCE: BUILDING CONFIDENCE WITH A VERIFIED SOLAR + STORAGE PAIRING

HOW THE FRONIUS GEN24 PLUS + RENON XTREME HV 1.0 CEC-LISTED PAIRING SUPPORTS GREATER PROJECT CERTAINTY

California represents one of the most mature residential solar + storage markets in North America, where installers increasingly need to evaluate more than equipment availability.

Project success depends on: system compatibility; documentation readiness; backup configuration; monitoring and commissioning preparation.

As permitting and interconnection expectations vary across jurisdictions, having a clearly defined system reference can help installers better prepare projects before they reach the field.

SYSTEM REFERENCE

INVERTER	BATTERY	SYSTEM TYPE	REFERENCE STATUS
Fronius GEN24 Plus (3.8~10.0kW)	Renon Xtreme HV1.0 (9.6,14.4,19.2kWh)	High-voltage residential solar + storage system	CEC-listed pairing

*A CEC-listed pairing can support project preparation and equipment qualification review. However, installers must still verify local AHJ requirements, utility interconnection rules, and project-specific approval conditions.

CEC Solar Equipment Lists Program

HOW A VERIFIED PAIRING SUPPORTS PROJECT CONFIDENCE

1 Defined System Compatibility

Reduce uncertainty during system selection

A verified inverter + battery pairing provides a clearer reference for:

- ✓ compatible equipment selection;
- ✓ supported configurations;
- ✓ system design preparation.

2 Documentation Readiness

Support earlier project preparation

A defined system reference helps installers organize:

- ✓ datasheets;
- ✓ installation documentation;
- ✓ certification records;
- ✓ listing information.

3 Backup & Monitoring Confidence

Prepare for complete system operation

A complete solar + storage solution requires consideration of:

- ✓ backup configuration;
- ✓ communication pathways;
- ✓ monitoring setup;
- ✓ commissioning requirements.

4 Project Delivery Confidence

Build a stronger foundation before installation

By validating key system elements early, installers can better coordinate:

- ✓ design review;
- ✓ permitting preparation;
- ✓ field installation;
- ✓ system handoff.

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US RESIDENTIAL SOLAR + STORAGE PRE-INSTALLATION CHECKLIST

Stage 0: Project Intake and Requirements Definition

REQUIRED DOCUMENTS

- [ ] **Project Intake Form:** project type, scope of work, planned installation date, and target commissioning date
- [ ] **Customer Requirements Confirmation:** self-consumption, rate optimization, backup scope, target backup duration, and future expansion needs
- [ ] **Project Entity and Authorization Documents:** property owner, ownership status, applicant, and authorization for third-party filing
- [ ] **Utility Account and Energy-Use Information:** recent utility bill, account information, and available historical consumption data
- [ ] **Existing System Information:** PV, inverter, ESS, generator configuration, and current interconnection status
- [ ] **Critical Load Information:** backup loads, high-power loads, and motor or compressor starting surge requirements
- [ ] **Existing Approval Documents:** design drawings, permits, interconnection agreements, and PTO documentation, if applicable
- [ ] **Third-Party and Project Constraints:** HOA, property management, financing, incentive program, or other approval requirements, if applicable

Stage 1: Jurisdiction, Code, and Utility Pathway Identification

REQUIRED DOCUMENTS

- [ ] **Authority List:** AHJ, building department, electrical authority, fire authority, utility, and incentive program administrator
- [ ] **Permit and Fire Review Requirements:** application type, submission method, review scope, and estimated review timeline
- [ ] **Equipment Eligibility Requirements:** CEC lists, utility-approved equipment lists, or other applicable equipment registries
- [ ] **HOA, Planning, Financing, or Incentive Program Rules**, if applicable
- [ ] **Applicable Code Matrix:** locally adopted electrical, building, residential, and fire codes, including local amendments
- [ ] **Utility Interconnection Requirements:** interconnection category, export rules, application process, and pre-construction approval requirements
- [ ] **Contractor, Electrician, Designer, and Engineer Qualification Requirements**
- [ ] **Official Equipment List and Certification Directory Links**

OFFICIAL CEC EQUIPMENT LIST LINKS

Applicability of the CEC lists should be determined based on the project location, AHJ, utility, and incentive program requirements.

- CEC Solar Equipment Lists Program Page
- CEC Solar Equipment Lists Search Portal
- Grid Support Solar Inverter List
- Grid Support Battery Inverter List
- Grid Support Solar/Battery Inverter List
- Energy Storage System List
- Battery List
- Power Control System List
- Meter List

[Applicable Utility Approved Equipment List or Interconnection Equipment Search Portal], if required

Stage 2: Candidate Product and System Combination Qualification

REQUIRED DOCUMENTS

- [ ] **Product Datasheets:** inverter, PCS, battery, controller, meter, and gateway
- [ ] **Product Installation Manuals and Wiring Instructions**
- [ ] **Product Certification Documents:** certificates, applicable standards, certification body, file number, and online certification directory record
- [ ] **ESS System-Level Certification and Fire-Test Documentation**
- [ ] **Inverter–Battery Pairing Documentation, including:**
  - Exact product models and model suffixes
  - Voltage, current, and power ranges
  - Supported hardware and firmware versions
  - Permitted battery quantities and connection configuration
  - BMS communication protocol
  - Supported grid-connected and backup operating modes
- [ ] **Equipment Listing Verification Record:** official link, verification date, exact model, and search result, if applicable
- [ ] **Backup Power and Islanding Capability Documentation:** automatic transfer, islanded operation, black start, and power-restoration capability
- [ ] **Communications and Monitoring Compatibility Documentation:** gateway, meter/CT, communication protocol, monitoring platform, and remote diagnostics
- [ ] **Grid and Export Control Documentation:** grid profile, PCS, zero-export, export-limiting, and fail-safe logic
- [ ] **Warranty and Technical Support Documentation**

Stage 3: Site Survey and Installation Feasibility Assessment

REQUIRED DOCUMENTS

- [ ] **Site Survey Report**
- [ ] **Installation-Area Photos and Measurements:** equipment clearances, service access, and cable-routing paths
- [ ] **Existing Electrical System Information:** service voltage, main disconnect, bus rating, distribution panels, meter, and grounding information
- [ ] **Existing Energy Equipment Information:** PV, inverter, ESS, generator, and points of interconnection
- [ ] **Load Survey Information:** critical loads, high-power loads, and starting surge loads
- [ ] **Backup System Site Assessment:** critical-load panel, transfer equipment location, and backup wiring path
- [ ] **Communications Infrastructure Assessment:** network coverage, gateway location, communications cabling, and meter/CT installation conditions
- [ ] **Preliminary Point-of-Interconnection Assessment**
- [ ] **Installation Environment and Safety Risk Assessment:** temperature, rain, snow, flooding, sunlight exposure, access, and vehicle-impact risk
- [ ] **Site Remediation List:** panel upgrades, service upgrades, foundation work, impact protection, communications work, and other required corrections

Stage 4: Capacity, Operating Mode, and System Architecture Design

REQUIRED DOCUMENTS

- [ ] **Design Basis Document**
- [ ] **Capacity and Load Calculation Package:** energy capacity, continuous power, surge capability, and target backup duration
- [ ] **Operating Modes and Control Narrative:** grid-connected, self-consumption, backup, export-limited, zero-export, or off-grid logic
- [ ] **Single-Line Diagram**
- [ ] **Site Plan and Equipment Layout**
- [ ] **Backup Power and Islanding Readiness Checklist, including:**
  - Critical-load matching
  - Automatic transfer and grid isolation
  - Grid restoration and reconnection logic
  - Continuous and surge power capability
  - Islanded operation and black start
- [ ] **Electrical Design Package:** conductors, raceways, overcurrent protection, disconnects, grounding, and bonding
- [ ] **PCS, Meter, CT, and Export-Control Design**
- [ ] **Communications, Monitoring, and Data Acquisition Readiness Checklist, including:**
  - System communications topology
  - Site network conditions
  - Data acquisition and remote diagnostics
  - Gateway, meter, and CT configuration
  - Installer and customer accounts
  - Utility or VPP data interface, if applicable
- [ ] **Preliminary BOM and Design Constraints List**

Stage 5: Internal Compliance Review and Design Freeze

REQUIRED DOCUMENTS

- [ ] **Internal Design Review Checklist**
- [ ] **Product Documentation Consistency Review:** referencing product documentation verified in Stage 2
- [ ] **Final Inverter–Battery Pairing Confirmation**
- [ ] **Electrical, Fire, and Utility Compliance Review Record**
- [ ] **Final Single-Line Diagram, Site Plan, Equipment Layout, and Calculations**
- [ ] **Final BOM**
- [ ] **Final Backup Power and Islanding Readiness Record**
- [ ] **Final Communications, Monitoring, and Data Acquisition Readiness Record**
- [ ] **Commissioning and Functional Verification Package, including:**
  - Commissioning guide
  - Grid profile and parameter-setting sheet
  - Functional test and acceptance checklist
  - Backup transfer, islanding, and grid-reconnection test plan
  - Monitoring account, data-upload, and access-permission requirements
  - Hardware and firmware version matrix
  - Startup, shutdown, and fault-recovery sequence
  - PCS, zero-export, or export-limit verification plan
  - Meter, CT, and monitoring-data verification requirements
  - Required commissioning tools, apps, and communications devices
- [ ] **Design Review Comments, Revision Log, and Internal Approval Record**

Stage 6: AHJ / Fire / Electrical Permit Submission

REQUIRED DOCUMENTS

- [ ] **Permit Application and Applicant Information**
- [ ] **Permit-Submission Single-Line Diagram, Site Plan, and Equipment Layout**
- [ ] **Electrical and Structural Calculations**
- [ ] **Product Technical and Compliance Attachment Package:** referencing Stage 2 verified datasheets, installation manuals, certification documents, and system-level certification records
- [ ] **Inverter–Battery Pairing Documentation**
- [ ] **Equipment Listing Verification Record:** CEC or other equipment listing result, if required by the AHJ
- [ ] **Fire-Test and Installation-Limit Documentation:** system capacity, equipment quantity, installation location, and required separation distances
- [ ] **Backup Power and Islanding Design Narrative**
- [ ] **PCS, Export Control, and System Communications Architecture Description**
- [ ] **Labels and Warning Placard Drawings**
- [ ] **Review Comments, Resubmittal Responses, and Revision Records**
- [ ] **Final Approved Drawings and Permit Documents**

Stage 7: Utility Interconnection and Program Eligibility Submission

REQUIRED DOCUMENTS

- [ ] **Utility Interconnection Application and Customer Authorization**
- [ ] **Single-Line Diagram and Site Plan:** referencing the Stage 5 frozen design
- [ ] **Existing and New DER Capacity Summary**
- [ ] **Interconnection Compliance Attachment Package:** referencing Stage 2 verified equipment datasheets, interconnection certifications, and equipment listing records
- [ ] **Maximum Output, Maximum Export, and Battery Charging Source Description**
- [ ] **PCS and Export Control Narrative**
- [ ] **Metering and Sensing Configuration**
- [ ] **Backup Power, Islanding, and Reconnection Narrative**
- [ ] **Communications, Telemetry, and Data Interface Requirements**
- [ ] **Commissioning, Functional Verification, and Witness Testing Requirements**
- [ ] **Existing Interconnection Agreement and PTO Documentation, if applicable**
- [ ] **Utility Review Comments, Supplemental Submissions, Interconnection Agreement, and Approval Records**
- [ ] **Incentive Program or VPP Pre-Approval Documentation, if applicable**
- [ ] **Authorization to Install or Equivalent Pre-Construction Approval**

05

CUSTOMER CONVERSATION FRAMEWORK

TURNING SOLAR + STORAGE FEATURES INTO HOMEOWNER VALUE

RESILIENCE

MORE CONFIDENCE IN YOUR HOME ENERGY FUTURE

“Solar helps generate your own energy, while storage can help you better manage how that energy is used. Together, they provide a more resilient energy solution designed around your household needs.”

BACKUP CONFIDENCE

UNDERSTANDING WHAT MATTERS MOST DURING OUTAGES

“Every home has different priorities during an outage. We help you identify the important loads and design a system around your backup expectations.”

SYSTEM COMPATIBILITY

A SYSTEM DESIGNED TO WORK TOGETHER

“A successful solar + storage system depends on how the components work together. We evaluate system compatibility, configuration, and installation requirements to create a reliable project experience.”

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NEXT STEP

Need Support for Your Next Project?

Connect with Renon Power & Fronius to explore:

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