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PNNL-36156

Community Energy Storage Financing

Resources and structures under the Inflation Reduction Act

July 2024

Jay Barlow
Daniel S. Boff

U.S. DEPARTMENT OF ENERGY

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Richland, Washington 99354

Disclaimer

This report is for initial information purposes and is not advice. It simplifies some topics that have additional details and requirements. It describes financial mechanisms that are in a dynamic regulatory environment and the descriptions may not reflect the latest information. See the latest guidance from the Internal Revenue Service or appropriate agency. Work with a lawyer, accountant, or other professional as needed.

Summary

The Inflation Reduction Act of 2022 makes billions of dollars available for clean energy technology like energy storage. It also allows certain community entities to directly access tax credits that can support energy storage and other clean energy technologies. Now is an opportune time for communities considering energy storage projects to evaluate these new financial resources and mechanisms.

This paper aims to raise awareness of these developments and help community entities navigate some of the nuances. The paper lays out key financial considerations like project ownership and pursuing tax credits, then examines how the different sources of capital can be combined in a range of financial structures.

The key new sources of capital for community energy storage are:

- An investment tax credit (ITC) that is now available for stand-alone energy storage.
- An elective pay mechanism that makes the ITC available to certain community organizations like tax-exempt organizations and local and tribal governments.
- Multiple kinds of loans and other financial assistance, in particular through the Greenhouse Gas Reduction Fund.

The main financial structures identified are:

1. Grant funding, which has traditionally supported community energy storage projects and can support these projects on its own or in conjunction with other sources of capital like elective pay tax credits.
2. Grant funding + elective pay tax credit + bridge loan. A successful elective pay tax credit comes only after a project is placed in service, meaning other capital is needed upfront to build the project. A bridge loan is a type of short-term loan that is expected to play a role in filling this time gap. It is expected to be possible to combine grant funding with the bridge loan and tax credit, with certain accounting rules.
3. Financing + elective pay tax credit. Projects that generate savings or revenues may be able to attract debt financing to cover project costs. The elective pay tax credit can help pay this off or help refinance to a longer-term loan after the project is placed in service.
4. Third-party ownership. This structure allows a community entity to lease a project or pay for its services, without having to build and own it.

Each of these structures has potential benefits and drawbacks. Each will likely require administrative effort that can be a significant challenge for community entities, especially those new to working with tax credits or debt financing. Because the financial resources and structures are mostly new, this paper should be taken as presenting illustrative examples, not guidelines.

Acknowledgments

This work was funded by the U.S. Department of Energy—Office of Electricity, through the Energy Storage Program. The authors are grateful for informational discussions with several practitioners.

Acronyms and Abbreviations

CCIA: Clean Communities Investment Accelerator
DOE: Department of Energy
EPA: Environmental Protection Agency
EPC: engineering, procurement, and construction
GGRF: Greenhouse Gas Reduction Fund
IRA: Inflation Reduction Act
IRS: Internal Revenue Service
ITC: Investment Tax Credit
kW: kilowatt
kWh: kilowatt-hour
LIDAC: Low-Income and Disadvantaged Communities
LPO: Loan Programs Office
MW: megawatt
MW_{AC}: megawatt alternating current
MWh: megawatt-hour
NCIF: National Clean Investment Fund
PPA: power purchase agreement
PV: photovoltaic

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1.0 Introduction

New federal financial resources are available to community-based energy storage projects and new financing structures are emerging in response. Many of these new resources arise from the Inflation Reduction Act (IRA) of 2022, which makes billions of dollars available for clean energy technology like energy storage. It also makes clean energy tax credits available to certain community entities that have not traditionally been able to directly benefit from them. These new resources are a significant opportunity, but navigating their nuances may be challenging.

This paper aims to identify and raise awareness of these developments and serve as a guide for community entities considering or pursuing community energy storage. The paper is arranged around key considerations that a community entity might weigh: the benefits desired from the project, the costs to provide those benefits, project ownership, pursuing tax credits, and additional sources of capital. These considerations give rise to several potential financial structures that are identified and finally compared.

Because the financial resources and structures are mostly new, this content in this paper should be interpreted as illustrative examples, not guidelines. Entities that are considering or pursuing projects should work with an attorney, accountant, or other professional, as needed.

1.1 Community energy storage projects

Communities are using energy storage in numerous ways and *community* is defined in numerous ways. This paper focuses on energy storage projects that are owned by or provide benefits to a non-profit organization, a local government, or a tribal government. This definition generally aligns with the kinds of entities that are now eligible to access energy storage tax credits through the new elective pay mechanism.

Examples of community energy storage projects include:

- Community resilience hubs, which are buildings that provide backup power and other services to a local geographic area like a neighborhood (Clean Energy Group, 2024b; Urban Sustainability Directors Network, 2019).
- Mobile energy storage units, e.g., used in disaster response (Footprint Project, 2024).
- Non-profit healthcare centers, which often have requirements for backup power (Solar Energy Industry Association, 2023).
- Multi-facility microgrids, which might include public facilities like schools and emergency management units (Balducci et al., 2020).
- Large energy projects or groups of distributed projects that provide utility-scale benefits and can be owned by communities like tribal governments (Loan Programs Office, 2024).

These kinds of projects span a wide range of capacities, costs, and benefits, though some common themes emerge. Most projects use lithium-ion battery energy storage systems. Most are hybrid solar-plus-storage projects that combine energy storage with solar photovoltaic (PV), which can unlock additional value. Many are designed to provide backup power during grid

outage events. This is commonly termed *resilience* and though it is often the main value sought by the project stakeholders, it is also a difficult value to monetize. This affects the choice of financial resources and structures.

1.2 Community energy storage in the financial landscape

New federal financial resources and mechanisms for energy storage are now available through tax credits created by the Inflation Reduction Act (IRA) of 2022 and direct funding mechanisms created by the Environmental Protection Agency (EPA). These new programs can act as a catalyst that can channel both public and private money towards community energy storage. The most significant provisions relative to community energy storage are:

- An investment tax credit (ITC) that is now available for stand-alone energy storage.
- An elective pay mechanism that makes the ITC available to certain community organizations like tax-exempt organizations and local and tribal governments.
- Multiple kinds of loans and other financial assistance, in particular through the Greenhouse Gas Reduction Fund (GGRF).

Together, these three main mechanisms create long-term opportunities for community energy storage (Figure 1). The ITC is currently expected to be available through at least 2032, with possible extension until U.S. electricity sector greenhouse gas emissions fall below 25 percent of 2022 levels (Inflation Reduction Act of 2022, 2022). Elective pay is expected to follow a similar timeline. The GGRF National Clean Investment Fund (NCIF) and Clean Communities Investment Accelerator (CCIA) start in mid-2024 and have a seven-year and six-year period of performance, respectively. The funds may continue to be reinvested beyond the period of performance (Environmental Protection Agency, 2023b, 2023c).

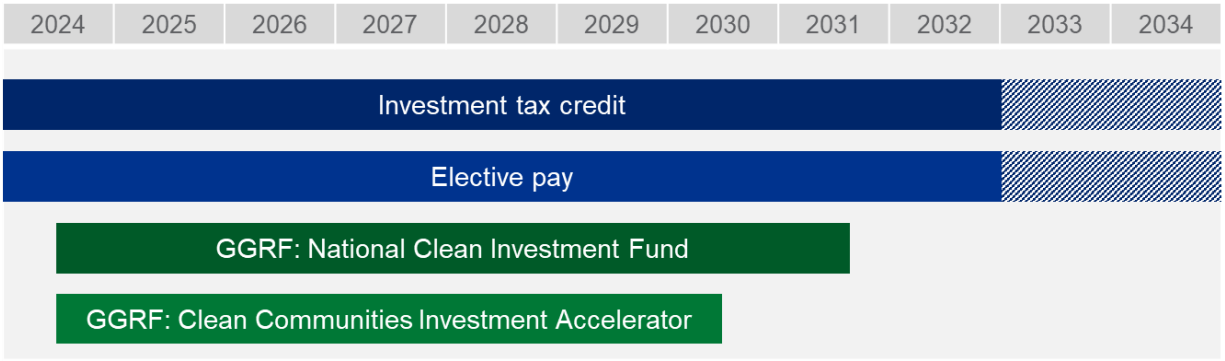

Figure 1: Current general timelines of ITC, elective pay, and GGRF.

This financial landscape also brings some significant challenges: community organizations may be new to working with tax credits, as the requirements and considerations for loans differ from those of grants, and the regulations and resources for these new mechanisms are still being developed and rapidly evolving. Each of these mechanisms has additional details and requirements that are not fully described in this paper. For applicable entities, the elective pay option is now an alternative to traditional tax equity financing and third-party ownership, which were commonly used by tax-exempt entities and others before the passage of the IRA. The financial structures identified in this paper will therefore focus on interactions with the elective pay tax credit. Some entities may still pursue tax equity structures for their potential financial

benefits, but we do not discuss them here. Tax equity and other commercial structures are covered in Baxter (2022), which is a pre-IRA guide to financing energy storage projects for social equity.

1.3 Approach

This paper lays out key considerations a community entity might evaluate in pursuing an energy storage project. The approach is organized around decisions that can affect the project design and the available financial sources. It consists of five main sections that reflect these considerations:

1. **Benefits and values:** What benefits and values are desired from the project, and which can it provide?

   Projects that generate bill savings or revenues may be able to generate a net financial benefit for the owner and attract more conventional financing like loans. Projects that provide mostly backup power or resilience may not generate significant savings or revenues. For projects connected to the electric grid, the local utility rate structure and market opportunities will likely determine what savings and revenues can be generated.

2. **Costs:** How much will it cost to build and operate a project that provides those values?

   After deciding what values are desired from the project, a cost estimate can be generated for a system capable of providing those benefits. This may require iteration with the first step. For example, a community may want a resilience project capable of providing a week of backup power, but then reduce this expectation to arrive at a lower capital cost.

3. **Ownership:** Who will own and operate the project?

   A community may own a project or decide that it only wants to pay for energy storage services, without having to build, own, or operate an energy storage system. A third-party ownership model can provide this. The main tradeoff is that any additional value will likely accrue to the third-party owner, rather than the community. There may also be intermediate options, like community ownership with third-party operations and maintenance contracts.

4. **Investment tax credit:** What is the expected investment tax credit level?

   A community entity that decides to own a project can generally pursue an investment tax credit through the elective pay mechanism. The level of anticipated credit will determine how much other capital is needed to pay for a project, and what type of capital would be best.

5. **Other capital:** What other sources of capital can support the project?

   The investment tax credit will not cover the full project cost and comes only after a project is placed in service. Other capital is therefore needed to build the project.

The following sections of this paper are laid out according to the approach above. This leads to a description of financial structures that arise from different decisions and different sources of capital and a comparison of those structures.

2.0 Benefits and sources of value

Energy storage systems can provide numerous benefits depending on how they are operated and where they are installed relative to the electric grid (Balducci et al., 2018). This paper focuses on the direct customer-facing benefits that come from installing energy storage, as outlined below. Benefits can be broken down into revenue, savings, and other values.

Table 1: Potential community energy storage benefits.

Value category	Examples
Revenue	• Compensation for services from participation in an aggregation market like a virtual power plant. • State and utility incentive programs.
Savings	• Reduction in electricity bill demand charges. • Reduction in electricity bill charges by optimizing consumption on a time-of-use tariff. • Self-consumption of onsite generation.
Other values	• Improved power reliability in grid outage or disruption events. • Deferral of distribution system upgrades. • Stakeholder and investor interest in values like sustainability, social equity, and economic development.

Revenue and savings can be readily factored into a financial analysis. Providers of financial capital may place emphasis on these when evaluating a project. The opportunity to generate savings and revenues will likely be determined by the local electric utility. The utility's rules will affect the size of the system that can be connected and how much power it can draw from or inject into the grid. The utility's rates will determine the amount of revenue or savings possible from operating within these rules.

Revenue generation may be limited to jurisdictions where there is a specific policy providing compensation or supporting market participation of distributed energy resources like energy storage. For example, New York's Value of Distributed Energy Resources (VDER) mechanism compensates resources like energy storage for the services they provide to the grid, even when connected behind a customer's meter (NYSERDA, 2024). Looking ahead, the Federal Energy Regulatory Commission's Order No. 2222 has ordered regional market operators in the U.S. allow customer-owned assets to aggregate their output and sell it into the regional wholesale energy markets that serve most of the country. Communities located in one of those regions may want to review current and pending opportunities created by that requirement in their region and incorporate that potential revenue into their plans.

Energy storage can generate savings when operated in a time-of-use rate structure by charging when electricity rates are low and discharging when they are high. Energy storage can also generate savings when the utility has a demand charge, which is a bill charge based on the amount of power drawn during periods of high demand on the electric grid. Energy storage can be configured to reduce a facility's power consumption at peak times to reduce this charge and generate savings for the customer.

On its own, any energy storage system will consume some energy in the course of charging and discharging. Combining solar and storage can add the benefit of electricity generation, which

can potentially generate revenue through the sale of excess energy or environmental attributes like renewable energy credits.

Community projects may be built with the goal of providing backup power for resilience during grid power outages. The monetary value of this service can be hard to estimate. Online calculators like the Customer Damage Function Calculator from the National Renewable Energy Laboratory can help provide estimates based on parameters for a given facility (Figure 2). Projects that focus only on providing resilience may have difficulty attracting debt financing, as lenders often require documentation of direct revenues or savings to underwrite loans. Communities interested in resilience may therefore want to design the project in a way that provides revenue when it is not needed for backup power.

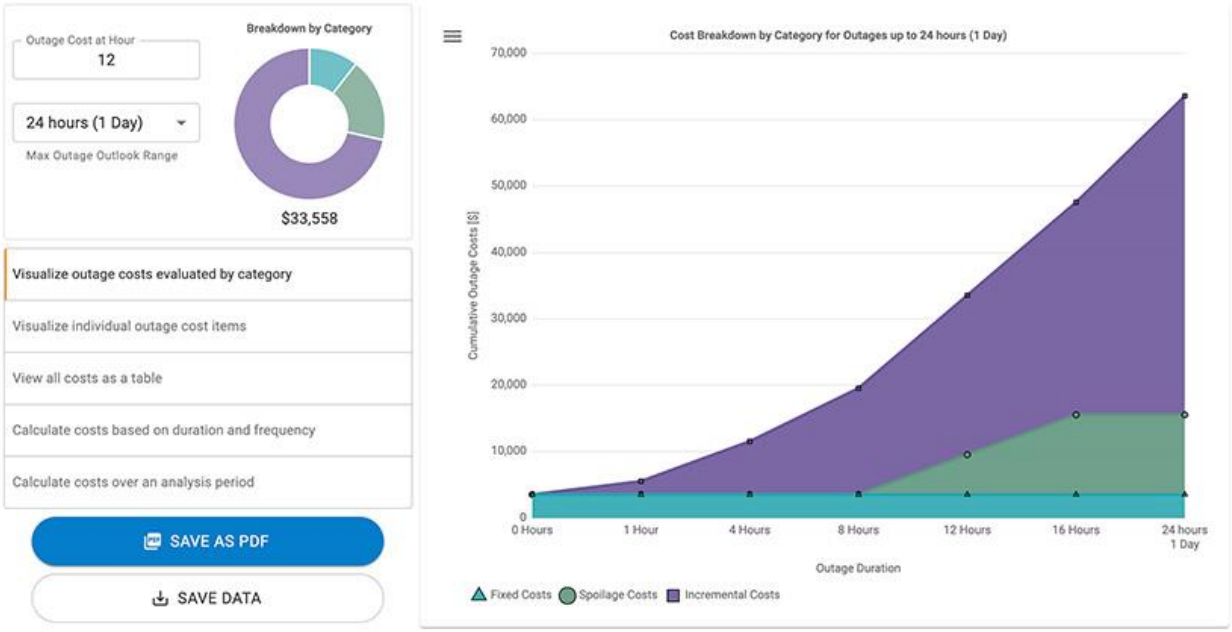

Figure 2: Customer Damage Function Calculator (National Renewable Energy Laboratory, 2022).

Certain investors may seek the other types of value that a community energy storage project can provide, like local economic development, pollution reduction, and social equity. Projects may be able to demonstrate non-monetary metrics of interest to these investors (Baxter, 2022).

Because energy storage can be applied in so many different ways, new values and structures are expected to emerge with increasing storage deployment.

3.0 Project costs

Energy storage generally has relatively high upfront costs and limited operating costs, meaning capital costs are typically the main financial consideration. These capital costs have declined significantly in recent years (Figure 3). Solar PV has benefited from a similar trend. Projects that community entities examined 5-10 years ago and turned down due to financial constraints may now be within reach based on these cost reductions alone. Incentives like the investment tax credit effectively take an additional fraction off this capital cost.

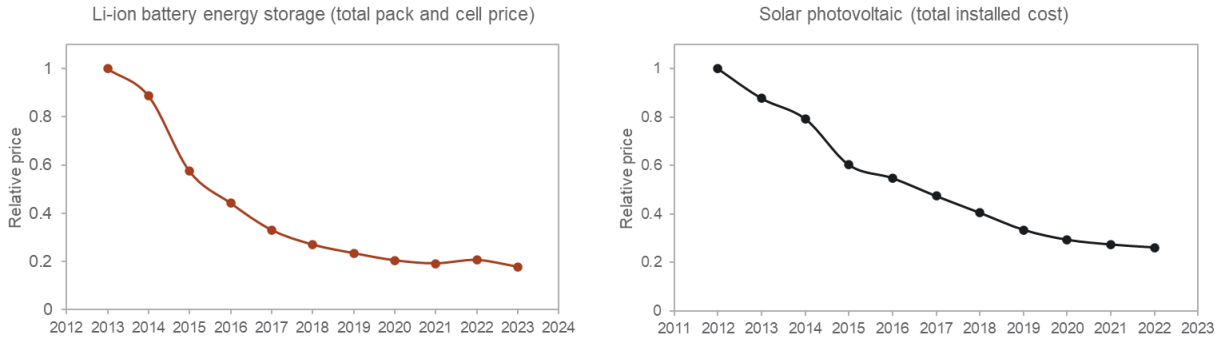

Figure 3: Relative price declines in lithium-ion batteries (left) and solar photovoltaic (right) (BloombergNEF, 2023; International Renewable Energy Agency, 2023)

A common type of energy storage used in stationary applications is a lithium-ion battery system. A battery energy storage system is usually described in terms of its power capacity (measured in kilowatts – kW – or megawatts – MW) and energy capacity (kW-hours – kWh – or MW-hours – MWh). Systems are commonly sized to provide four hours of energy storage for the rated power output, though the duration and power output can be configured to the project needs. Resilience-oriented projects, for example, may place greater emphasis on having a longer duration of storage but at a lower power output. Table 2 summarizes typical costs.

Table 2: Illustrative cost and performance of a 4-hour duration lithium-ion battery system (Pacific Northwest National Laboratory, 2023).

Total installed capital cost (in terms of power)	1619 $/kW
Total installed capital cost (in terms of energy)	405 $/kWh
Fixed operations and maintenance costs	4.59 $/kW-year
Recycling costs during decommissioning	2.65 $/kWh
Calendar life	16 years

Applying these to a 1 MW – 4 MWh system would yield a total installed cost of about $1.6 million and fixed operations and maintenance costs of about $4590 per year. This system size is a useful reference because projects under 1 MW output generally have fewer requirements in accessing the full value of the investment tax credit, as discussed later. There may also be additional costs to those shown here, like insurance, permitting, and system integration.

4.0 Project ownership

Community entities pursuing energy storage face a choice of directly owning the project or using a third-party ownership model where the community leases the project or pays for its services. Third-party ownership may be familiar to community entities since it has commonly been used to benefit from tax credits that haven't been directly available to entities without a tax liability. Now that the IRA elective pay mechanism allows certain community entities to directly benefit from the energy storage investment tax credit, additional emphasis is expected to be placed on considerations around project ownership.

For entities that have never engaged with financing and project development, the prospect of building and owning an energy storage system might be daunting. Third-party ownership may reduce these concerns. Third-party ownership has been used extensively in the residential solar energy industry (Environmental Protection Agency, 2024c). Two main structures have primarily been used:

- Power purchase agreements (PPAs): the customer buys solar power from the third-party system at agreed terms.
- Leasing: the customer pays for the use of the system overall, without owning it.

Similar arrangements may be applicable for energy storage systems. Instead of a PPA, the agreement might take the form of an energy storage services agreement, examples of which have emerged in the utility-scale energy storage sector (Central Hudson Gas and Electric, 2021; Hawai'i Electric Light, 2021), or an energy savings performance contract, which have been used in the energy efficiency sector (Baxter, 2022).

A third-party owner takes the risks of building and operating a project and finding a customer for its services. The third-party owner will likely expect to recover its investment and generate a profit. This may mean that system value accrues mostly to the third-party owner, rather than the community customer.

Communities may have an interest in owning and controlling energy assets and directly receiving their benefits (Boff & Twitchell, 2021; McNamara et al., 2022). Direct control may provide flexibility for operating the energy storage system to provide values and benefits that the community has identified. At the same time, direct community ownership means that the costs and burdens of the system are also taken directly.

There are also intermediate options. For example, a community entity could own the energy storage project, while paying a third party to operate and maintain the system. This can be visualized as a spectrum of ownership or control of the system (Figure 4).

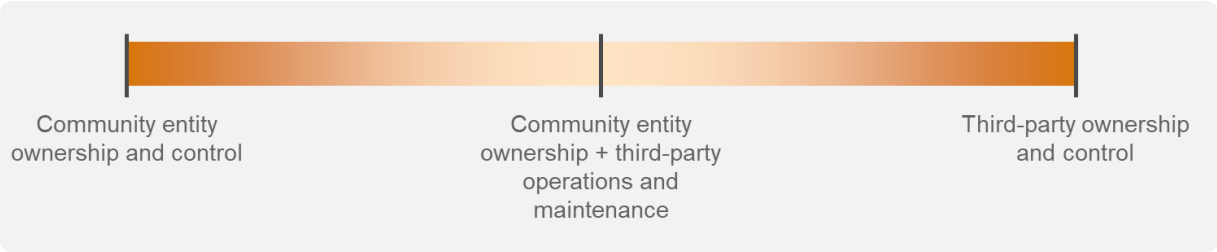

Figure 4: Ownership or control spectrum.

5.0 Investment tax credit and elective pay mechanism

Community entities that pursue energy storage development can generally benefit from a federal investment tax credit that could cover a significant portion of the overall project cost. The elective pay mechanism makes this tax credit available to certain entities that have not traditionally been able to directly access clean energy tax credits. Understanding in advance what level of credit a project can expect will allow the project to plan for and potentially attract the other financial resources needed to develop the project. Using elective pay requires meeting the requirements of the underlying tax credit, so these topics are covered together in this section.

5.1 Investment tax credit (ITC)

The ITC has existed in various forms for many years. This credit is currently called the Investment Tax Credit for Energy Property.[1] In 2025, it is expected to transition to a technology-neutral Clean Electricity Investment Credit.[2] Energy storage technology with a capacity greater than 5 kilowatt-hours is expected to be eligible for either credit[3] and we refer to both credits as the ITC (Inflation Reduction Act of 2022, 2022). The ITC referred to here is for organizations; there are separate but related tax credits for individuals and households. Figure 5 summarizes the ITC value stack, where the overall value depends on the criteria met for a series of base and bonus credits.

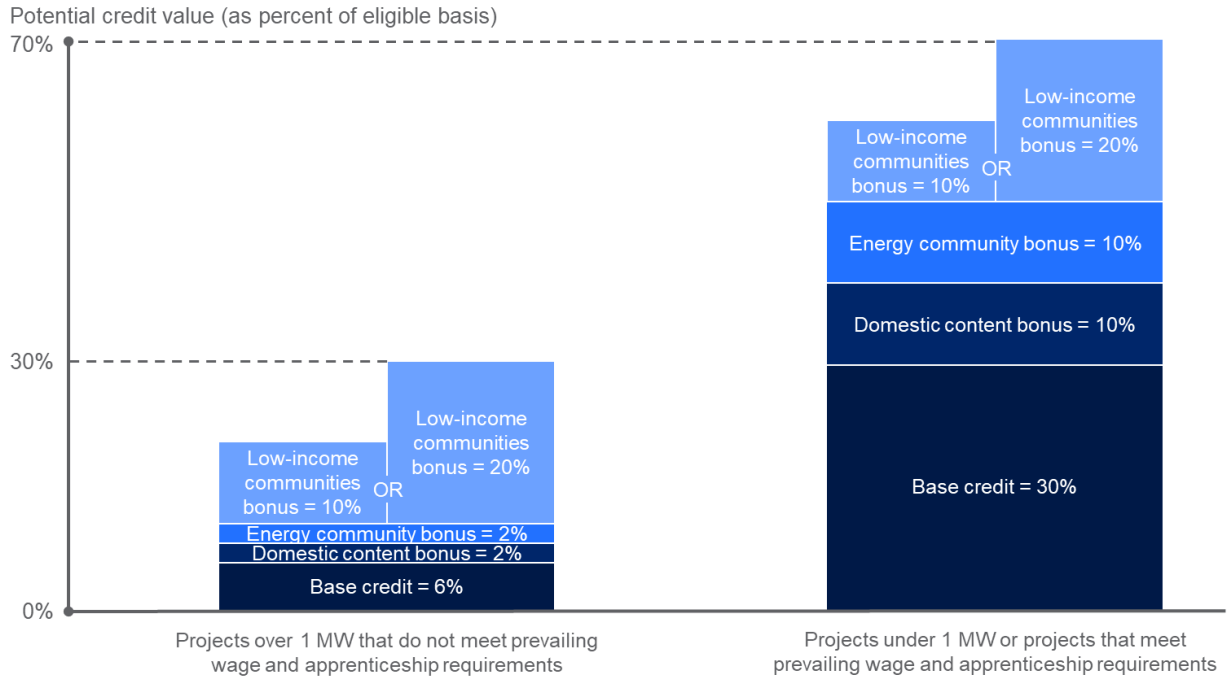

Figure 5: General summary of potential ITC value stack.

The ITC is credited as a percentage of eligible "basis." For purposes of the ITC, basis is generally the overall amount of investment that a tax credit can be applied to, which may be the

[1] Section 48 of the Internal Revenue Code.
[2] Section 48E of the Internal Revenue Code.
[3] The Clean Electricity Investment Credit is under proposed rulemaking; additional definitions or requirements may apply.

overall capital cost of the project and commonly includes the installation labor (Department of Energy, 2023; Internal Revenue Service, 2024e). For example, a 30% credit on a project with a qualified basis of $1 million would result in a credit of $300,000 (30% of $1 million). The ITC can also be applied to grid interconnection property associated with energy storage for projects under 5 MW (Inflation Reduction Act of 2022, 2022).

It is theoretically possible to reach a total ITC of 70%. The overall ITC value depends on which criteria are met for the base and bonus credits:

- **Base credit:** 6-30% of qualified basis. Projects over 1 MW maximum net output, measured in alternating current (MW_{AC}), must meet prevailing wage and apprenticeship requirements to achieve the 30% credit level and the full potential value of the energy community bonus and domestic content bonus (as applicable).

- **Domestic content bonus:** Additional 2-10 percentage points for meeting domestic content requirements. When using elective pay, projects over 1 MW_{AC} and starting construction after 2023 may have their credit value reduced if domestic content requirements are not met.

- **Energy community bonus:** Additional 2-10 percentage points for projects sited in energy communities, as defined in the IRA. Energy communities are generally areas with historic ties to fossil fuels and include areas where a coal power plant or coal mine has recently closed. The IRS has issued guidance on qualifying areas and the Department of Energy has developed an energy communities map[1] to help with initial identification of these areas.

- **Low-income communities bonus:** Additional 10-20 percentage points with requirements defined in IRS regulations and program materials from the Department of Energy. This is a special bonus that requires an upfront application and allocation of a credit amount. Energy storage can only potentially benefit from this bonus if installed in connection with a qualifying wind or solar project that is under 5 MW. The 10 percent credit is available to projects located in an eligible low-income community or on Indian land, while the 20 percent credit is available to projects that provide direct benefits to the members of a low-income community.

ITC resources: The ITC base credit and bonus rules are undergoing revisions and updates. The IRS posts updates here: IRS updates on IRA implementation

5.2 Elective pay mechanism

Elective pay – also sometimes called direct pay – is a new way to monetize certain energy tax credits under the IRA, including the ITC. It allows certain applicable entities to receive money from the government instead of a tax credit for qualifying projects like energy storage.

Entities need to meet the requirements for both elective pay and the underlying tax credit to benefit from this mechanism. In general, entities must also own the energy property that generates the underlying tax credit to be eligible for elective pay.[2]

[1] https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=a2ce47d4721a477a8701bd0e08495e1d

[2] Variations may be possible. See IRS Elective Pay Frequently Asked Questions.

Elective pay applicable entities: "Applicable entities include tax-exempt organizations, states, and political subdivisions such as local governments, Indian tribal governments and their subdivisions, Alaska Native Corporations, the Tennessee Valley Authority, rural electric cooperatives, U.S. territories and their political subdivisions, and agencies and instrumentalities of state, local, tribal, and U.S. territorial governments." – Internal Revenue Service Elective Pay Frequently Asked Questions

Timing is one of the most important considerations when using elective pay. A credit is received only after the project is placed in service and after the credit has been processed (Figure 6). The placed-in-service date is a key landmark in the project development process. The exact definition of placed-in-service will come from the applicable tax law but it generally means the date when the energy property – in this case energy storage – is ready and available for use (Internal Revenue Service, 2006).[1] Project costs begin during the engineering, procurement, and construction (EPC) phase, or even earlier, for example, for pre-development studies. Depending on the project development timeline, the time between incurring the first project costs and receiving the elective pay credit might be several years for a community-scale battery energy storage project.

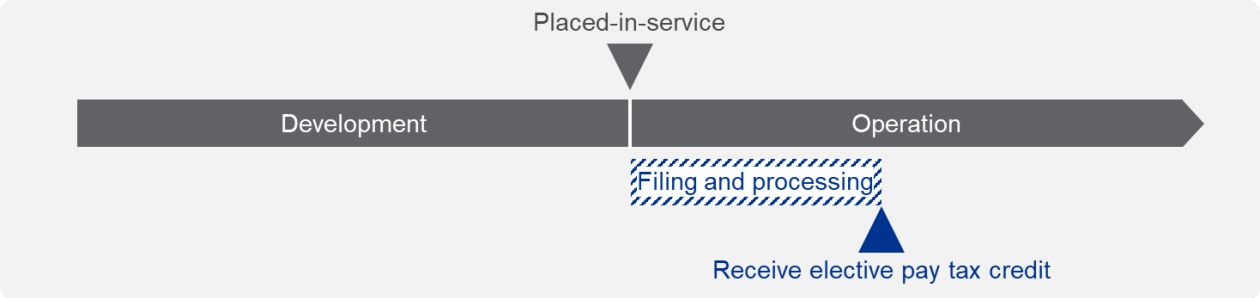

Figure 6: General elective pay tax credit timing.

There are three main steps in the process to receiving the elective pay tax credit (Figure 7). This is a new process and the steps and timelines may change. The steps here are informed by materials from the Internal Revenue Service (2023a, 2024b).

1. Place project in service. This is the activity that earns the underlying tax credit and is a pre-requisite for accessing elective pay. The project must be placed in service before a registration number will be issued.

2. Submit pre-filing registration. This provides the IRS with project-specific information. The IRS uses it to generate a pre-filing registration number, which needs to be included when filing the tax return (the next step). The IRS currently recommends completing this registration at least 120 days before the intended filing date.

3. File tax return. This step consists of submitting the required annual forms to the IRS. This may be unfamiliar for some entities that have not previously had to file tax returns. The filing requirements may also differ by organizational type. The pre-filing registration number (from the previous step) is submitted with the return.

[1] Another potential definition includes, "The taxable year in which the energy storage technology is placed in a condition or state of readiness and availability for the intended function…" (Proposed guidance on Clean Electricity Production Credit and Clean Electricity Investment Credit, 2024-11719, May 2024)

The elective payment is then processed by the IRS. Because this is a new mechanism, it is not clear how long it may take from filing to the receiving the payment.

Elective pay resources:

- IRS pre-filing registration portal
- IRS pre-filing registration tool
- IRS frequently asked questions on elective pay

Entities intending to use elective pay will need to navigate multiple timelines. The underlying project timeline is critical since the placed-in-service date is a pre-requisite to obtaining the credit. Entities must then navigate their tax year definition, filing deadlines and extensions, and the unknown processing time of receiving the credit.

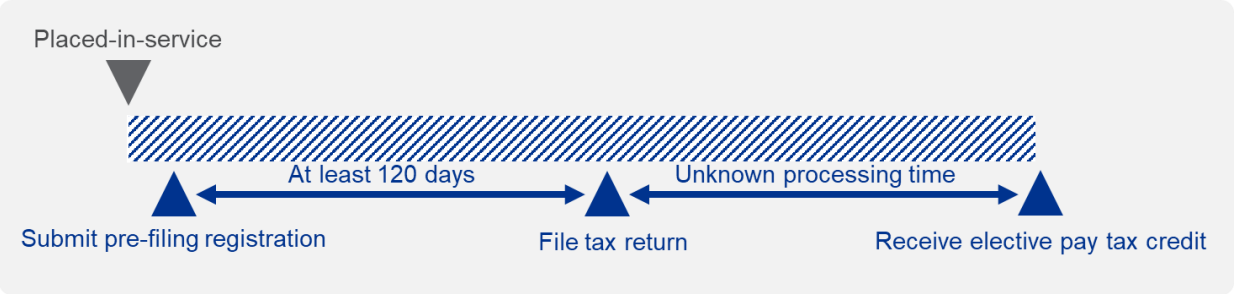

Figure 7: General timing of elective pay registration, filing, and processing (not to scale).

Timing considerations continue even after an entity has successfully received a credit payment. To avoid any “recapture” of the credit – which is when a tax credit loses validity and must be repaid to the government – entities must own the project for at least five years after it is placed in service. Recapture can also be triggered if the project “is disposed of, or otherwise ceases to be investment credit property during the five years after the property is placed in service” (Internal Revenue Service, 2024a). This might happen if a natural disaster destroys the project, for example (Burton, 2021).

Domestic content is another key elective pay consideration. When using elective pay, projects with a maximum net output over 1 MW_{AC} and starting construction after 2023 may have their credit value reduced if domestic content requirements are not met (Figure 8). These requirements are phased in from 2024-2026 (Inflation Reduction Act of 2022, 2022).

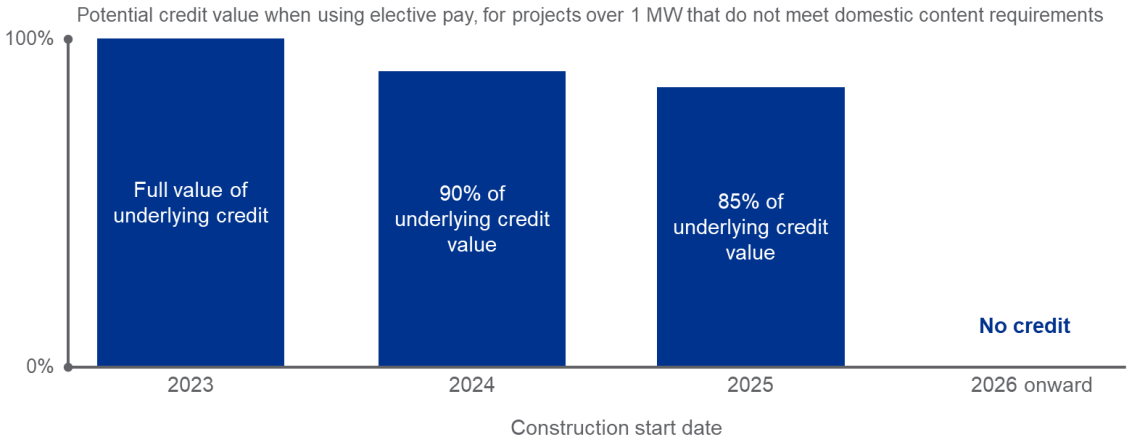

Figure 8: Domestic content requirement impacts on credit value when using elective pay.

Domestic content may be a key challenge in the near term. There appear to be very few – if any – currently available domestic content-compliant options for lithium-ion batteries. While US battery manufacturing capacity is expected to grow, it is currently unclear whether there will be sufficient supply by the time this requirement takes effect. Given the expected high demand for compliant products, they will likely come at a higher price initially. Further, as commercial developers are expected to drive this demand in order to claim the domestic content bonus on large projects, it may be difficult for smaller buyers like most community entities to procure compliant products.

Domestic content is especially important for elective pay entities because the value of the overall tax credit can be significantly reduced or even eliminated if domestic content requirements are not met (Figure 8). It may be possible to claim an exception from domestic content requirements if meeting the requirements would increase the overall costs of construction by more than 25 percent or if the domestic products are not sufficiently available or of a satisfactory quality (Internal Revenue Service, 2023b). Because projects with a maximum output of less than 1 MW_{AC} do not need to meet domestic content requirements in order to receive the full value of the elective pay credit, sizing projects under this capacity threshold is expected to be the simplest way for community entities to navigate this situation in the near term.

6.0 Other sources of capital

A successful elective payment of the investment tax credit comes only after a qualifying project is placed in service and after the payment has been processed. Because additional capital will be needed up front to build the project, understanding the anticipated tax credit amount can help determine how much additional capital is needed and which source might be the best fit. This section highlights some of the emerging and existing sources of capital that could complement the investment tax credit; there are additional sources not listed here. These sources of capital could also be pursued independently of the tax credit.

6.1 Greenhouse Gas Reduction Fund

The GGRF is an emerging source of capital that aims to develop a national clean energy finance ecosystem (Environmental Protection Agency, 2023a). The GGRF was funded with $27 billion through the IRA and is being initially administered by the Environmental Protection Agency (EPA). The GGRF consists of three funds (Figure 9):

1. The National Clean Investment Fund (NCIF): $13.97 billion for financing clean technology projects nationally (Environmental Protection Agency, 2023c).

2. The Clean Communities Investment Accelerator (CCIA): $6 billion for financing clean technology projects and building financial capacity in low income and disadvantaged communities (LIDACs) (Environmental Protection Agency, 2023b).

3. Solar for All: $7 billion for deploying distributed, residential-serving solar in low-income and disadvantaged communities, or LIDACs (Environmental Protection Agency, 2023d).

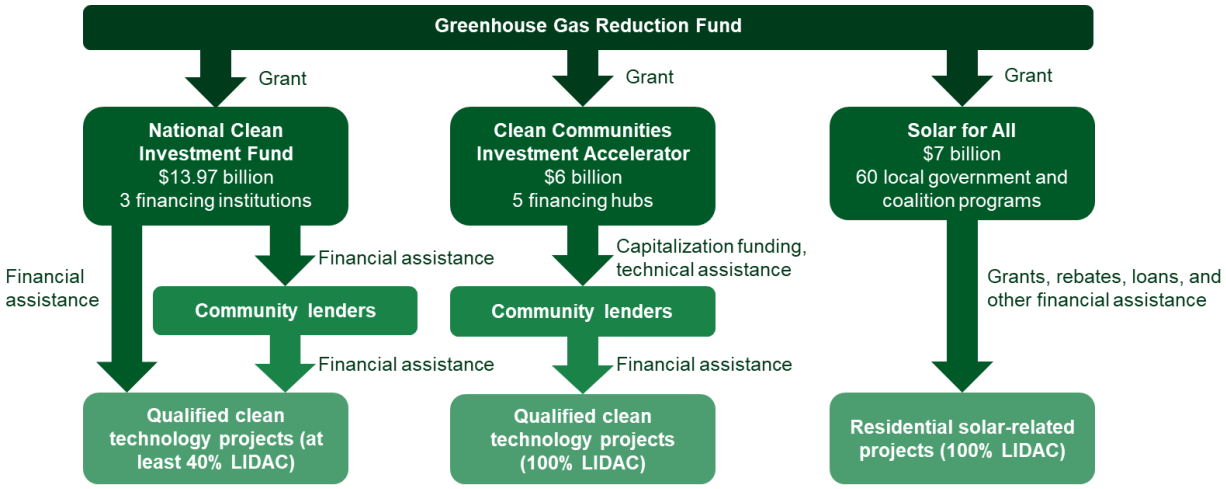

Figure 9: Outline of GGRF structure.

Energy storage could potentially be a qualifying project under any of the funds. We focus on the NCIF and CCIA, since they have a broader definition of qualifying project and some similar structures and requirements. Solar for All can support energy storage – associated with residential rooftop and residential-serving community solar – but there may be significant variation in the requirements and financial assistance offered by the 60 individual programs within Solar for All, so we do not cover them here.

Distributed energy generation and storage – illustratively ranging from 1 kW to 10 MW capacity – is a priority project category in both the NCIF and CCIA (Environmental Protection Agency, 2023b, 2023c). Both funds will support only commercial technologies, meaning those that "have been deployed for commercial purposes at least three times for a period of at least five years each in the United States for the same general purpose as the project, activity, or technology."

The two programs appear to differ mostly in the channels used for distributing funding to projects. The CCIA will capitalize a network of community lender intermediaries that will finance projects, whereas the NCIF can finance projects directly or through community lenders.

A given community energy storage project will likely have multiple ways to benefit from either program. Prospective projects will need to determine which channel is best suited to the project. For example, a community energy storage project connected to multi-family housing might engage with a community housing financing agency under the CCIA, whereas a standalone energy storage project for a community facility might engage an infrastructure-oriented entity under the NCIF.

Projects seeking one of these funding opportunities may also need to evaluate their ability to comply with program requirements that include:

- The Build America, Buy America Act (BABA): "Requires that all of the iron, steel, manufactured products, and construction materials used in infrastructure projects are produced in the United States" (Office of Management and Budget, 2023).

- Davis-Bacon and Related Acts: Sets out that "contractors and subcontractors must pay their laborers and mechanics employed under the contract no less than the locally prevailing wages and fringe benefits for corresponding work on similar projects in the area" (Department of Labor, n.d.).

These requirements are similar to domestic content requirements and prevailing wage and apprenticeship requirements in the investment tax credit value stack; however, some details differ.

Initial GGRF awards were made in April 2024 and programs are not actively funding projects at the time of this paper's publication. The descriptions below are based on initial public announcements and changes may occur as programs are implemented.

6.1.1 National Clean Investment Fund

The NCIF consists of three national-scale non-profit financing institutions. Table 3 presents a summary based on initial materials (Climate United, 2023; Coalition for Green Capital, 2023; Environmental Protection Agency, 2024b; Power Forward Communities, 2023).

Collectively, institutions under the NCIF have been referred to as a "national green bank." Green banks are "mission-driven institutions that use innovative financing to accelerate the transition to clean energy and fight climate change" (Coalition for Green Capital, n.d.). Under the NCIF, the Coalition for Green Capital contains a network of these green banks at state and local level. There were 39 green banks in the U.S. at the end of 2022 going by names including "green bank," "infrastructure bank," and "clean energy fund" (American Green Bank Consortium & Coalition for Green Capital, 2023). These all may be sources of capital for community energy storage projects even if certain institutions were not direct recipients of NCIF funding.

Table 3: Summary of NCIF institutions.

Institution	Total federal funding	Initial coalition members	Main anticipated market segments
Climate United Fund	$6.97 billion	A national nonprofit investment firm and two community-development financial institutions (CDFIs)	Community infrastructure, standalone generation and charging, consumers, small businesses and farms, and schools and minority serving institutions.
Coalition for Green Capital	$5 billion	16 state and local green banks and two non-profit investment organizations	Commercial, consumers, small businesses, non-profits, and affordable housing developers.
Power Forward Communities, Inc.	$2 billion	Two CDFIs and three other non-profit organizations	Single family and multi-family housing.

6.1.2 Clean Communities Investment Accelerator

The CCIA consists of five national-scale hubs. Table 4 provides a summary based on initial public announcements (Environmental Protection Agency, 2024a). Whereas the NCIF establishes national-scale institutions that can invest directly in projects, the CCIA's hubs will provide technical assistance and capitalization funding to an intermediate layer of community lenders. Community lenders could include credit unions, housing finance agencies, green banks, minority depository institutions, CDFIs, and others (Environmental Protection Agency, 2023b). The EPA anticipates that hundreds of these community lending programs will be established or expanded through the CCIA. All funds under the CCIA will be directed to LIDACs and lenders that serve them.

Table 4: Summary of CCIA hubs.

Hub	Total federal funding	Hub entities
Opportunity Finance Network	$2.29 billion	A network of over 400 community lenders, mostly CDFI loan funds
Inclusiv	$1.87 billion	A national network of over 900 credit unions, including CDFIs
Justice Climate Fund	$940 million	A network of over 1200 community lenders and a non-profit investor
Appalachian Community Capital	$500 million	A nonprofit CDFI launching a green bank to serve community lenders
Native CDFI Network	$400 million	Over 60 Native CDFIs

6.1.3 NCIF and CCIA financial instruments

The NCIF and CCIA use a specific definition of financial assistance, which includes debt, equity, hybrids, and credit enhancements (Environmental Protection Agency, 2023b, 2023c). Unlike grants, financing instruments like debt and equity generally have an expectation of repayment.

It is currently too early to know which specific financial instruments will be offered to projects under the NCIF and CCIA. Initial materials indicate a broad range of potential instruments.

Financial assistance definition in the NCIF and CCIA: "Financial assistance constitutes financial products, including debt (such as loans, partially forgivable loans, forgivable loans, zero-interest and below-market interest loans, loans paired with interest rate buydowns, secured and unsecured loans, lines of credit, subordinated debt, warehouse lending, loan purchasing programs, and other debt instruments), equity (such as equity project finance investments, private equity investments, and other equity instruments), hybrids (such as mezzanine debt, preferred equity, and other hybrid instruments), and credit enhancements (such as loan guarantees, loan guarantee funds, loan loss reserves, and other credit enhancement instruments)." (Environmental Protection Agency, 2023b, 2023c)

6.2 Grants

Grant funding has been a dominant source of capital in previous community energy storage deployments. The Bipartisan Infrastructure Law of 2021 created several multi-year federal grant programs that can support community energy storage programs. One example is DOE's Energy Improvements in Rural or Remote Areas program, which was funded with $1 billion to spend through fiscal year 2026. Program awards in 2024 included stand-alone community storage and hybrid community solar-storage projects (Department of Energy, 2024). Another example is the Grid Resilience State and Tribal Formula Grant program[1] that can support grid resilience investments including energy storage in certain applications.

Numerous other federal, state, and philanthropic grant opportunities can support community energy storage. Because the opportunities change frequently, it may be helpful to consult a funding opportunity dashboard. Examples are below.

Examples of funding dashboards:

- Grants.gov
- DOE State and Community Energy Programs dashboard
- DOE Office of Indian Energy dashboard
- Database of State Incentives for Renewables and Efficiency (DSIRE)

6.3 DOE Loan Programs Office

The DOE Loan Programs Office (LPO) can provide energy-related financing through multiple categories. The main categories expected to be of interest for community energy storage projects are:

- The State Energy Financing Institution (SEFI) category, which provides federal financial support to augment state and certain tribal programs. Energy storage is a potentially eligible technology category (Loan Programs Office, n.d.-a).

- The Tribal Energy Financing category, which can provide loans and loan guarantees to a range of tribal energy-related projects. The IRA expanded this program from $2 billion to $20 billion in lending authority (Loan Programs Office, n.d.-b).

LPO financing may be better suited to larger projects. For example, LPO recently announced a conditional commitment for a 38 MWh long-duration energy storage system in connection with a 15 MW solar PV system as part of a tribal microgrid (Loan Programs Office, 2024).

[1] Section 40101(d) of the Bipartisan Infrastructure Law

6.4 Bond financing

States and local governments have commonly used bond financing to support energy efficiency and renewable energy investments, suggesting that this may be a source of financing for energy storage projects as well. Though often used for larger projects, some energy-related bond issuances have been as small as $1-3 million (Department of Energy, 2020), which could support smaller community-scale energy storage projects. Public schools and municipal buildings, in particular, have used bond financing for capital investments and now can also access clean energy tax credits through elective pay. As these facilities often have community resilience value, bond financing may have an important role in supporting these sorts of projects.

6.5 Microfinancing

Microfinancing consists of providing financial products to small-scale projects or organizations. Microfinancing has previously been applied to energy-related projects in emerging markets like developing countries (ARC Finance, 2017). Microfinancing can consist of donations, loans to customers, which may have with flexible repayment terms, or a combination (Clean Energy Group, 2024a). Crowdfunding – aggregating donor funds through the internet – may also be an option suitable for smaller projects (ARC Finance, 2017).

7.0 Illustrative financial structures

The sections above have outlined considerations around energy storage benefits, costs, ownership, tax credits, and other capital sources. This section now brings those considerations together through financial structures.

The structures explored here were identified as plausible ways for combining the capital resources for a given community energy storage project. They focus on the capital needed to build a project and do not show the costs or revenues associated with the operation of a project. Given that several of the financial resources and mechanisms are new, these structures should be taken as illustrative examples and not guides.

The diagrams for each structure provide a rough timeline consisting of the development phase (which we assume here to include all upfront activities) and the operation phase. The development phase can include purchasing or leasing the project site, obtaining local permits, obtaining an agreement to interconnect with the local electric grid, and the engineering, procurement, and construction of the energy storage system. The placed-in-service date – when the project would become eligible to register for an elective pay tax credit – is a landmark separating the development and operation phases. Project developers may also refer to a commercial operations date (COD), which may be the same as placed-in-service. The diagrams below are meant to indicate the relative order of operations and are not necessarily to scale.

7.1 Grant funding

Summary: An upfront grant pays for development with no expectation of repayment.

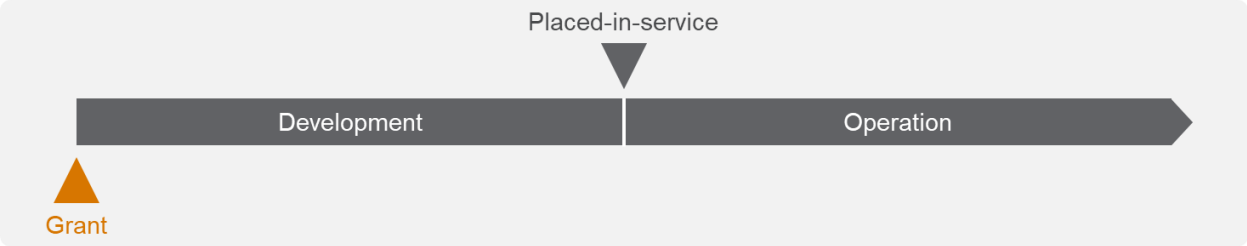

Figure 10: Grant funding.

Grant funding has traditionally been the dominant structure in community energy storage financing. Grant funding is generally awarded without an expectation of repayment. An upfront grant can therefore help pay for development and even sometimes assist with planning for and operating a project. Grants typically require significant effort during the application process. They may also require significant reporting and accounting effort during project construction (as funds are being used) and during long-term project operation.

It is often possible or necessary to combine multiple grants on a single project. Grants may have a cost-share requirement that requires the grantee to cover a certain portion of costs from other sources of funds. These could come from other grants, a grantee's own funds, or a private investor's funds, for example. Federal grants often have restrictions on combining with other federal funds, meaning cost share would come from state-level funds or private sources.

Some grants may be provided on a reimbursement basis, meaning the community entity must be able to cover some costs from other sources of funds until reimbursed by the grant. This kind

of situation is conceptually similar to the elective pay tax credit, which only comes after a project is placed in service. One possible arrangement for covering time gaps like these is discussed next.

7.2 Grant funding + elective pay tax credit + bridge loan

Summary: An upfront grant is provided for the upfront costs less the anticipated value of the elective pay tax credit. A bridge loan (or other form of bridge financing) provides the remaining upfront capital until the elective pay tax credit is received.

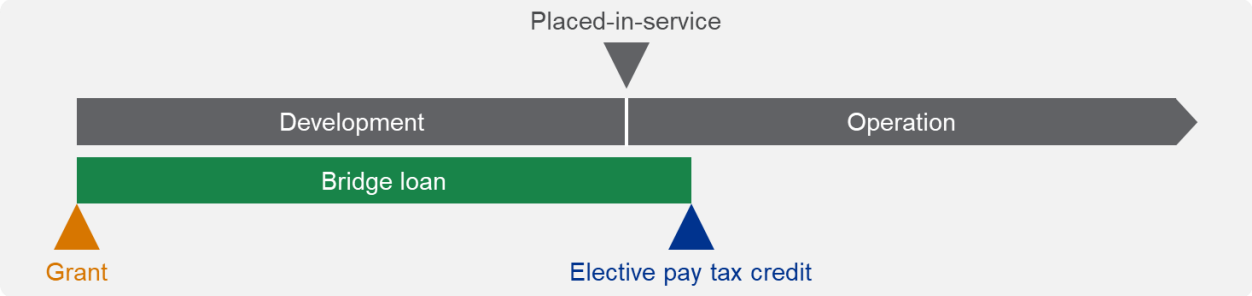

Figure 11: Grant funding + elective pay tax credit + bridge loan.

The elective pay tax credit in some ways looks like a project grant – it is provided in connection with a specific purpose and generally doesn't have an expectation of repayment – but the elective payment comes only *after* a project is placed in service and after the credit has been processed. Some form of upfront capital is therefore needed to support building the project.

Under this structure, a grant is obtained for the upfront costs less the anticipated value of the elective pay tax credit. Financing is obtained to cover the remaining upfront costs and act as a bridge until reception of the elective pay tax credit, which comes only after the project has been placed in service and the IRS has processed the credit. Figure 12 shows generally how this might work, with the elective pay tax credit being used to replace the principal and interest of the bridge loan.

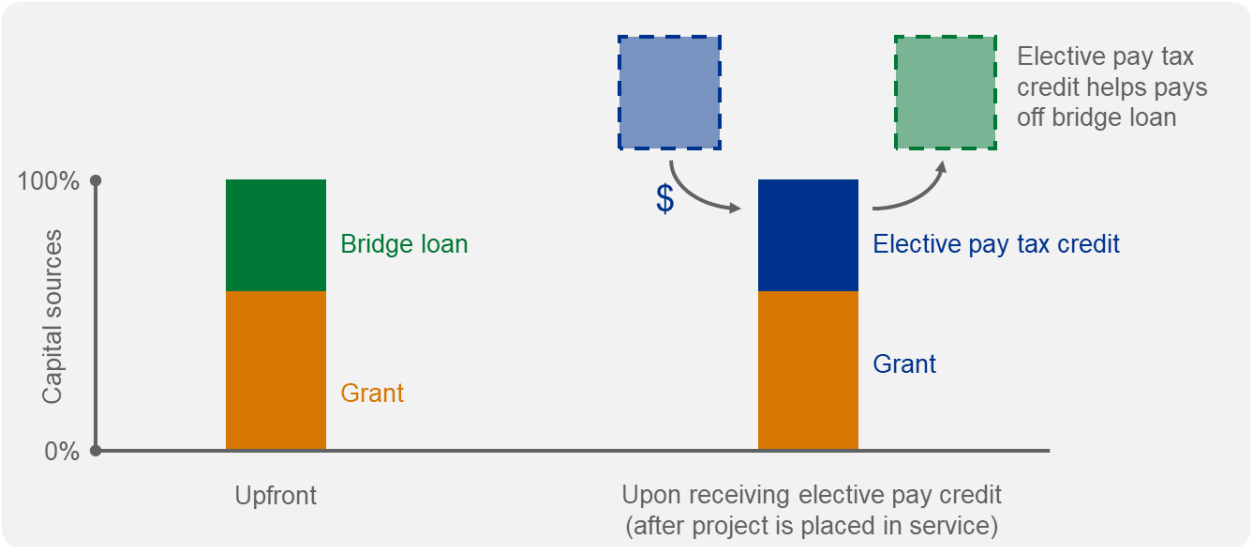

Figure 12: General illustration of bridge loan and elective pay tax credit.

The cost of bridge financing may not be exactly the same as the value of the elective pay credit. The financing may have fees and interest payments that will need to be covered from other sources like the community entity's own funds. The timing and amount of the elective pay credit are not certain until it is received, meaning bridge finance lenders will likely expect some compensation for these risks.

A key consideration for communities is how the IRS treats different kinds of grant funding in combination with the elective pay tax credit. It is generally expected to be possible to combine an elective pay tax credit with grant funding and bridge financing,[1] with certain accounting rules meant to prevent projects from acquiring an excess benefit through the elective pay tax credit. In general terms, if an entity receives a grant, forgivable loan, or other tax-exempt income specifically for the project, then the combined value of this funding and the elective pay tax credit cannot exceed the cost of the project.

"**No excess benefit from restricted tax-exempt amounts.** If an applicable entity receives a grant, forgivable loan, or other income exempt from taxation under subtitle A or otherwise excluded from taxation (tax exempt amount) for the specific purpose of purchasing, constructing, reconstructing, erecting, or otherwise acquiring an investment-related credit property (restricted tax exempt amount), and the sum of any restricted tax exempt amounts plus the applicable credit otherwise determined with respect to that investment-related credit property exceeds the cost of the investment-related credit property, then the amount of the applicable credit is reduced so that the total amount of applicable credit plus the amount of any restricted tax exempt amounts equals the cost of investment-related credit property." https://www.federalregister.gov/documents/2024/03/11/2024-04604/elective-payment-of-applicable-credits-elective-payment-of-advanced-manufacturing-investment-credit

Figure 13 illustrates an example of adjusting the elective pay tax credit to avoid excess benefit. The situation is based on an example in the elective pay regulations from April 2024 (Internal Revenue Service, 2024c). In this example an applicable entity receives a $60,000 grant towards building a project that costs $80,000. The $60,000 grant is the restricted tax-exempt amount. The entity uses $20,000 of its own funds and the $60,000 grant to construct the project. The eligible basis of the project is $80,000. The project qualifies for an investment tax credit worth 50% of the basis, or $40,000. Because the combined value of the tax credit and the grant exceeds the total basis, the tax credit is reduced to $20,000 so the total value of the tax credit plus the grant equals the basis.

[1] Tax-exempt bonds may result in a reduction of the underlying credit amount (IRS Elective Pay Frequently Asked Questions #42).

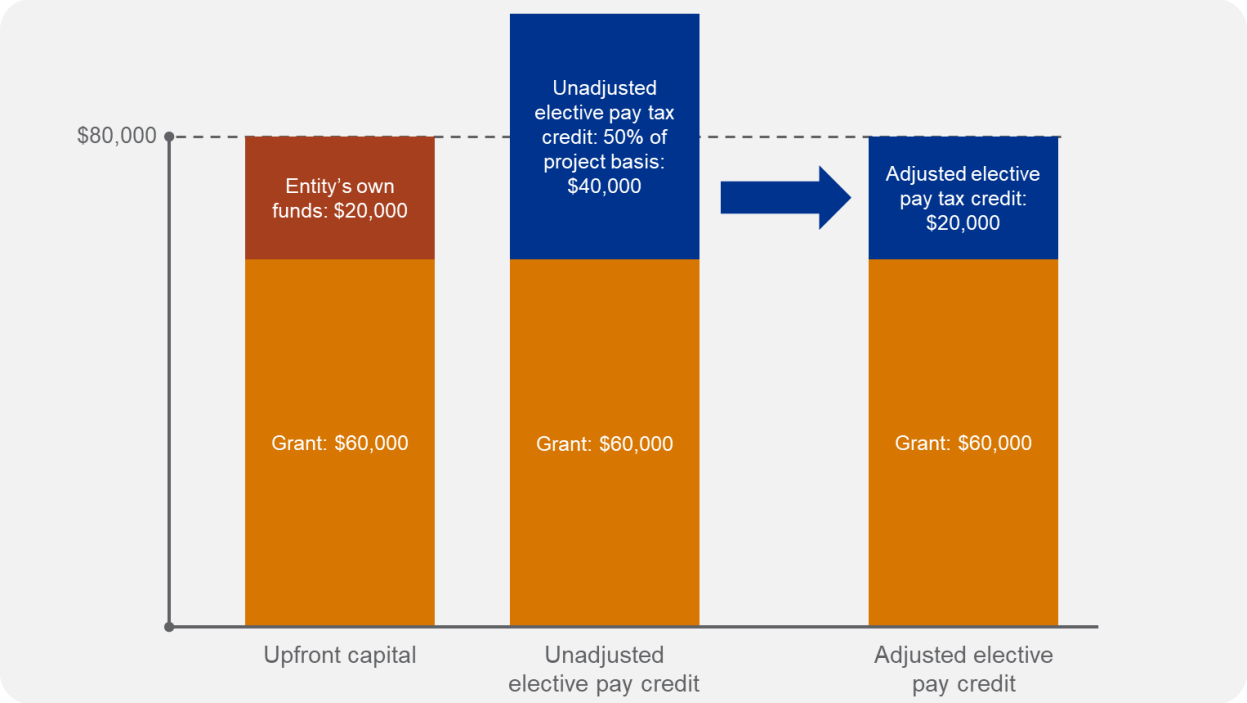

Figure 13: Adjustment of elective pay credit to avoid excess benefit.

The bridge financing structure shown here is a generalization. Many variations might emerge as familiarity is gained with elective pay tax credits.

7.3 Financing + elective pay tax credit

Summary: A loan (or related form of financing) is obtained to cover upfront costs. The elective pay tax credit is used to help repay the loan. Other funds or value streams are used to pay off the remaining portion of the loan over time.

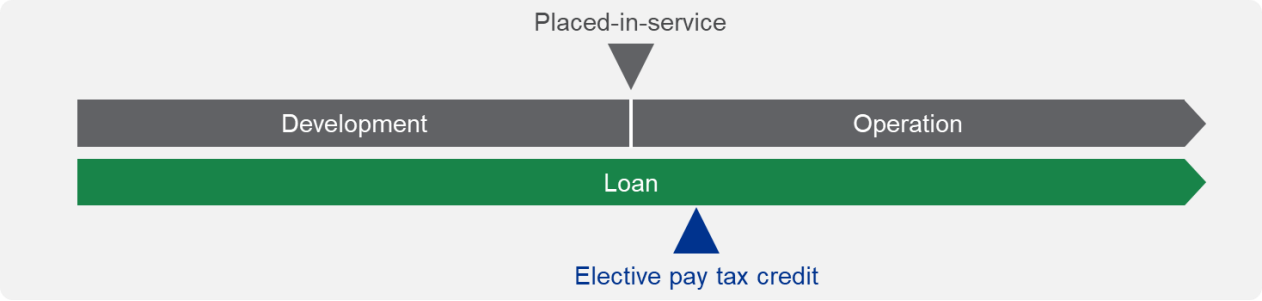

Figure 14: Debt financing plus elective pay tax credit.

The most basic version of this model would involve obtaining a loan to cover the full project costs, then using the elective pay tax credit to repay a portion of the loan after the credit is received. The remaining portion of the loan would need to be repaid from other sources of value, e.g., the community entity's own funds, or revenues or savings from operation of the storage system.

A variation on this structure might include refinancing at the time the elective pay tax credit is received (Figure 15). The engineering, procurement, and construction phase of a project could be covered by a short-term construction loan. Because the construction loan covers a high-risk period in the project lifecycle, it would likely have a higher interest rate (Groobey et al., 2010). The relative risk is expected to decrease once the project is placed in service – the construction uncertainties are reduced, the project begins generating value, and, after filing and processing time, the elective pay tax credit can be received. Around this time, the project may shift to term financing, a longer-term option that may have a lower interest rate. The construction loan and term loan might be covered by a single transaction with terms agreed at the beginning of the development phase.

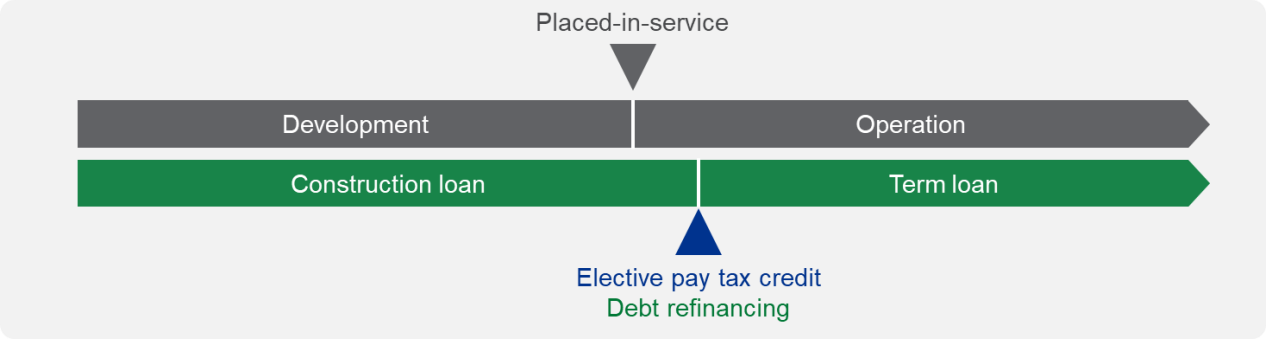

Figure 15: Refinancing around the time when the elective pay tax credit is received.

The timing in this structure will likely vary by project and lender. Construction financing might only cover the true construction period, for example, meaning other funds would need to cover earlier efforts in the development phase. It is also not yet clear how much time might elapse between placing a project in service and receiving the elective pay tax credit, and when in this period refinancing might occur. Alternative refinancing milestones might be the placed-in-service date or commercial operations date. Finally, it might also be possible that a construction loan and bridge loan both cover the development period, with the elective pay credit used to repay only the bridge loan.

Another variation under this structure might be combining a loan with a loan guarantee (Figure 16). A loan guarantee is a financial instrument that accompanies a loan and commits the guarantor to paying the loan if the borrower fails to. By reducing risk to lenders, loan guarantees can increase access to capital and decrease the costs of capital for borrowers. Loan guarantees may come with additional administrative burden and costs and may therefore be better suited for larger projects.

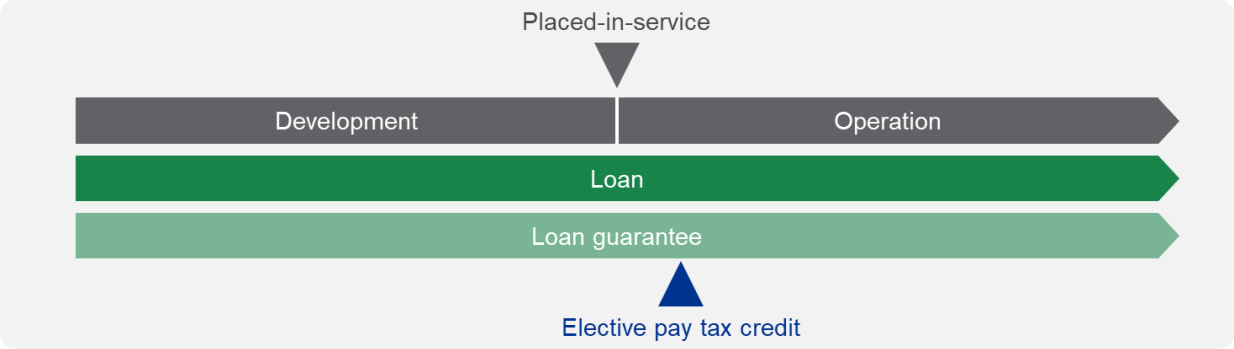

Figure 16: Loan and loan guarantee.

Any of the above structures involving loans might also function without the elective pay tax credit.

7.4 Third-party ownership

Summary: A third-party builds, owns, and operates the energy storage system while the community entity leases it or pays for the services it generates.

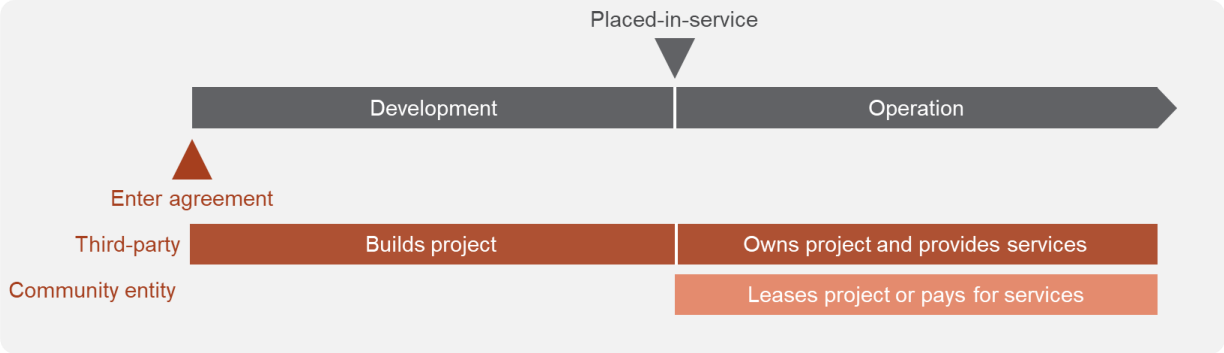

Figure 17: Third-party ownership.

This structure provides an alternative for community entities that want to benefit from energy storage but might not want the potential burdens of financing, owning, and managing a battery energy storage system. A community can develop a request for proposals that specifies its goals and system requirements for prospective third-party developers/owners. The community entity and a third-party owner enter an agreement that sets out what services the community entity can derive from the energy storage system and on what financial terms. The third-party owner manages the construction and operation of the system and would likely claim the ITC. In this way, the community entity could still benefit from this ITC, but indirectly through reduced service costs, rather than directly through reduced capital costs.

Third-party ownership structures may be subject to certain state laws and additional tax considerations under the IRS.

8.0 Comparison of structures

Each of the structures above has its own potential advantages and disadvantages. In Table 5 we compare these and attempt to identify the relative strengths and weaknesses of each, as well as the potential best application for each structure.

Table 5: Comparison of financial structures.

Structure	Potential best application	Potential advantages	Potential disadvantages
1. Grant funding	Community entities with philanthropic connections Combining with the other financial structures as a capital supplement	Generally, no expectation of repayment	Often comes with cost-sharing requirements Sometimes provided on reimbursement basis
2. Grant + elective pay tax credit + bridge loan	Projects focused on energy resilience or other services that may not generate monetizable savings or revenues	Allows a community to benefit from elective pay tax credit without having to produce the equivalent capital upfront	May involve transactions with multiple parties, increasing complexity and administrative burden
3. Financing + elective pay tax credit	Projects that are expected to generate significant monetizable savings or revenues	A single transaction could include refinancing at the time the elective pay tax credit is received	Likely requires a project or entity that has a reasonable prospect of repayment, demonstrated through credit history or project savings/revenues
4. Third-party ownership	Projects unable to raise upfront capital Community entities that may not want the risk or burden of building and owning a project	No or limited upfront capital cost for community entity Reduced administrative burden for community entity, during financing and elective pay interactions	Contracts may be complex Services to the community entity will likely be priced to cover the third-party's costs plus a return on capital

9.0 Conclusions and considerations

Recent policies have created new and significant incentives for energy storage. As a result, it is an opportune time for communities to examine the new resources and mechanisms available to support these sorts of projects. The IRA creates a large influx of clean-energy capital. Billions of dollars are available through multiple instruments like tax credits and loans. In navigating these new resources, key conclusions and considerations include:

- Under current laws, IRA resources make a **long-term opportunity landscape** that should allow time for interested entities to plan and execute projects. At the same time, project planning and development can take significant time, so entities may need to act decisively to take full advantage of this window of opportunity.

- New financial resources and mechanisms come with **uncertainty**. It may take time for new programs to reach full functionality. It may also take time for practitioners to reach consensus and comfort. Bridge financing, in particular, comes with uncertainty around the timing and amount of expected tax credit for a given project.

- Project design considerations can interact with financial considerations. In particular:

    - Projects under **1 MW net maximum output** (measured in alternating current) are expected to have easier access to the ITC and elective pay. These projects do not need to meet the prevailing wage and apprenticeship requirements or the domestic content requirements for using elective pay.

    - Projects designed to provide **savings or revenues** can attract and help pay off capital like loans.

- **Administrative effort** is a consideration for each financial structure considered in this paper. Effort on behalf of the community entity will be required to apply for, fulfill, administer, and monitor the various financial products or arrangements. Even the third-party ownership structure, which is expected to reduce financial and maintenance burden for community entities, will likely demand significant effort associated with the contractual arrangements for services. Across these structures, professional assistance may be needed and may be in high demand as industry familiarity is built up around the new mechanisms.

10.0 References

American Green Bank Consortium, & Coalition for Green Capital. (2023). *Green Banks in the United States: 2022 U.S. Green Bank Annual Industry Report with data from Calendar Year 2021 and 2022*. https://mcusercontent.com/3e3337737c870aa879b2ef144/files/58657110-26b4-3ee5-a3e4-45fda1bb6594/CGC_Consortium_AnnualReport.01.pdf

ARC Finance. (2017). *Renewable Energy Microfinance and Microenterprise Program (REMMP)*. Retrieved May 2024 from https://arcfinance.org/projects/remmp/

Balducci, P., Alam, M. J. E., Hardy, T., & Wu, D. (2018). Assigning value to energy storage systems at multiple points in an electrical grid. *Energy & Envioronmental Science*.

Balducci, P., Mongird, K., Wu, D., Wang, D., Fotedar, V., & Dahowski, R. (2020). An Evaluation of the Economic and Resilience Benefits of a Microgrid in Northampton, Massachusetts. *Energies*, *13*(18). https://doi.org/10.3390/en13184802

Baxter, R. (2022). *Energy Storage Financing for Social Equity*. https://www.pnnl.gov/sites/default/files/media/file/Energy%20Storage%20Financing%20for%20Social%20Equity%20Report.pdf

BloombergNEF. (2023, November 26, 2023). *Lithium-Ion Battery Pack Prices Hit Record Low of $139/kWh*. BloombergNEF. Retrieved April from https://about.bnef.com/blog/lithium-ion-battery-pack-prices-hit-record-low-of-139-kwh/

Boff, D., & Twitchell, J. (2021, June 28, 2021). *Community Energy Storage and Energy Equity* Energy Storage for Social Equity Roundtable, https://www.pnnl.gov/sites/default/files/media/file/Community%20Energy%20Storage%20Memo.pdf

Burton, D. (2021, June 09, 2021). *ITC recapture following a casualty event*. Norton Rose Fulbright. Retrieved May 2024 from https://www.projectfinance.law/tax-equity-news/2021/june/itc-recapture-following-a-casualty-event/

Central Hudson Gas and Electric. (2021). *Energy Storage Services Agreement*. Retrieved May 2024 from https://www.cenhud.com/globalassets/pdf/about-us/projects/chge-draft-appendix-d1-energy-storage-services-agreement-2021.pdf

Clean Energy Group. (2024a). *Micro-Financing and Locally Led Development: A Scalable Model for Resilient Power in Rural Communities*. Retrieved May 2024 from https://www.cleanegroup.org/wp-content/uploads/TAF-Webinar-5-16-24-slides.pdf

Clean Energy Group. (2024b). *Petersburg Resiliency Hub*. Retrieved April from https://www.cleanegroup.org/initiatives/technical-assistance-fund/featured-installations/petersburg-resiliency-hub/

Climate United. (2023). *Narrative Proposal Document*. Retrieved May 2024 from https://www.epa.gov/system/files/documents/2024-04/cuf_narrative_proposal1.pdf

Coalition for Green Capital. (2023). *Narrative Proposal Document*. Retrieved May 2024 from https://www.epa.gov/system/files/documents/2024-04/cgc_narrative_proposal1_0.pdf

Coalition for Green Capital. (n.d.). *What is a Green Bank*. Retrieved May 2024 from https://coalitionforgreencapital.com/what-is-a-green-bank/#:~:text=Green%20Banks%20are%20mission%2Ddriven,energy%20rather%20than%20maximizing%20profit.

Department of Energy. (2020). *Leveraging Bond Financing to Support Energy Efficiency and Renewable Energy Goals: A Resource Summary for State and Local Governments*. Retrieved May 2024 from https://www.energy.gov/scep/slsc/articles/leveraging-bond-financing-support-energy-efficiency-and-renewable-energy-goals-1

Department of Energy. (2023). *Federal Solar Tax Credits for Businesses*. Department of Energy Solar Energy Technologies Office. Retrieved April 2024 from https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses

Department of Energy. (2024). *Biden-Harris Administration Announces $78 Million to Further Drive Down Energy Costs and Enhance Energy Security in Rural and Remote Communities*

Across America. Retrieved May 2024 from https://www.energy.gov/articles/biden-harris-administration-announces-78-million-further-drive-down-energy-costs-and

Department of Labor. (n.d.). *Davis-Bacon and Related Acts*. Retrieved May 2024 from https://www.dol.gov/agencies/whd/government-contracts/construction

Elective pay and transferability frequently asked questions: Elective pay. (2024). https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-elective-pay#makeapaymentelection

Environmental Protection Agency. (2023a, April 19, 2023). *EPA Releases Framework for the Implementation of the Greenhouse Gas Reduction Fund as Part of President Biden's Investing in America Agenda* https://www.epa.gov/newsreleases/epa-releases-framework-implementation-greenhouse-gas-reduction-fund-part-president

Environmental Protection Agency. (2023b). *Request for Applications: Clean Communities Investment Accelerator* (EPA-R-HQ-CCIA-23).

Environmental Protection Agency. (2023c). *Request for Applications: National Clean Investment Fund* (EPA-R-HQ-NCIF-23).

Environmental Protection Agency. (2023d). *Request for Applications: Solar for All*. EPA-R-HQ-SFA-23-01

Environmental Protection Agency. (2024a). *CCIA Selected Applicant Details*. Retrieved May 2024 from https://www.epa.gov/greenhouse-gas-reduction-fund/ccia-selected-applicant-details#ACC

Environmental Protection Agency. (2024b). *NCIF Selected Applicant Details*. Retrieved May 2024 from https://www.epa.gov/greenhouse-gas-reduction-fund/ncif-selected-applicant-details#CAF

Environmental Protection Agency. (2024c). *Understanding Third-Party Ownership Financing Structures for Renewable Energy* Retrieved May 2024 from https://www.epa.gov/greenpower/understanding-third-party-ownership-financing-structures-renewable-energy

Footprint Project. (2024). *Build Power*. Retrieved April from https://www.footprintproject.org/build-power

Groobey, C., Pierce, J., Faber, M., & Broome, G. (2010). *Project Finance Primer for Renewable Energy and Clean Tech Projects*. https://www.wsgr.com/PDFSearch/ctp_guide.pdf

Hawai'i Electric Light. (2021). *Draft Model Energy Storage Services Agreement*. Retrieved May 2024 from https://www.hawaiianelectric.com/documents/clean_energy_hawaii/selling_power_to_the_utility/competitive_bidding/20211101_exhibit_5.pdf

Inflation Reduction Act of 2022. (2022). *Inflation Reduction Act of 2022*. Retrieved from https://www.congress.gov/bill/117th-congress/house-bill/5376/text

Internal Revenue Service. (2006). *Depreciation Reminders* (FS-2006-27). https://www.irs.gov/pub/irs-news/fs-06-27.pdf

Internal Revenue Service. (2023a). *Inflation Reduction Act (IRA) and CHIPS Act of 2022 (CHIPS) Pre-Filing Registration Tool: User Guide and Instructions* (IRS Publication 5884). https://www.irs.gov/pub/irs-pdf/p5884.pdf

Internal Revenue Service. (2023b). *Statutory Exceptions to Phaseout Reducing Elective Payment Amounts for Applicable Entities if Domestic Content Requirements are Not Satisfied* (Notice 2024-9). https://www.irs.gov/pub/irs-drop/n-24-09.pdf

Internal Revenue Service. (2024a). *Elective pay and transferability frequently asked questions: Elective pay*. Retrieved May 2024 from https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-elective-pay#:~:text=Q17.%20Are%20there,then%20recapture%20applies.

Internal Revenue Service. (2024b). *Elective Pay Overview*. https://www.irs.gov/pub/irs-pdf/p5817.pdf

Elective Payment of Applicable Credits; Elective Payment of Advanced Manufacturing Investment Credit; Final Rules; Election To Exclude Certain Unincorporated Organizations Owned by Applicable Entities From Application of the Rules on Partners and Partnerships; Proposed

Rule, 51 17546 (2024c). https://www.federalregister.gov/documents/2024/03/11/2024-04604/elective-payment-of-applicable-credits-elective-payment-of-advanced-manufacturing-investment-credit

Internal Revenue Service. (2024d). *Notice 2024-41: Domestic Content Bonus Credit Amounts under the Inflation Reduction Act of 2022: Expansion of Applicable Projects for Safe Harbor in Notice 2023-38 and New Elective Safe Harbor to Determine Cost Percentages for Adjusted Percentage Rule*. https://www.irs.gov/pub/irs-drop/n-24-41.pdf

Internal Revenue Service. (2024e). *Topic no. 703, Basis of assets*. Retrieved April 2024 from https://www.irs.gov/taxtopics/tc703

International Renewable Energy Agency. (2023). *Renewable Power Generation Costs in 2022* (ISBN: 978-92-9260-544-5). https://www.irena.org/Publications/2023/Aug/Renewable-Power-Generation-Costs-in-2022

Loan Programs Office. (2024). *LPO Announces Conditional Commitment to Viejas Microgrid to Build Renewable, Utility-Scale Generation and Storage on Tribal Lands*. Department of Energy. Retrieved April from https://www.energy.gov/lpo/articles/lpo-announces-conditional-commitment-viejas-microgrid-build-renewable-utility-scale#:~:text=Today%2C%20the%20U.S.%20Department%20of,the%20Kumeyaay%20Indians%20near%20Alpine%2C

Loan Programs Office. (n.d.-a). *State Energy Financing Institutions (SEFI)-Supported Projects*. Retrieved May 2024 from https://www.energy.gov/lpo/state-energy-financing-institutions-sefi-supported-projects

Loan Programs Office. (n.d.-b). *Tribal Energy Loan Guarantee Program*. Retrieved May 2024 from https://www.energy.gov/lpo/tribal-energy-loan-guarantee-program

McNamara, W., Passell, H., Montes, M., Jeffers, R., & Gyuk, I. (2022). Seeking energy equity through energy storage. *The Electricity Journal*, *35*(1). https://doi.org/10.1016/j.tej.2021.107063

National Renewable Energy Laboratory. (2022). *What's the Damage? New Customer Damage Function Calculator Estimates Costs of an Electric Grid Outage*. Retrieved May 2024 from https://www.nrel.gov/news/program/2022/new-customer-damage-function-calculator-estimates-costs-of-an-electric-grid-outage.html

NYSERDA. (2024). *The Value Stack*. New York State Energy Research and Development Authority Retrieved May 2024 from https://www.nyserda.ny.gov/All-Programs/NY-Sun/Contractors/Value-of-Distributed-Energy-Resources

Office of Management and Budget. (2023). *Build America, Buy America Act -- Federal Financial Assistance*. Retrieved May 2024 from https://www.whitehouse.gov/omb/management/made-in-america/build-america-buy-america-act-federal-financial-assistance/#:~:text=The%20Build%20America%2C%20Buy%20America,produced%20in%20the%20United%20States.

Pacific Northwest National Laboratory. (2023). *Energy Storage Cost and Performance Database: Lithium-ion Battery (LFP and NMC)*. Pacific Northwest National Laboratory. Retrieved May 2024 from https://www.pnnl.gov/lithium-ion-battery-lfp-and-nmc

Power Forward Communities, I. (2023). *Narrative Proposal Document*. Retrieved May 2024 from https://www.epa.gov/system/files/documents/2024-04/pfc_narrative_proposal1.pdf

Solar Energy Industry Association. (2023, October 2, 2023). *Clean Energy in Your Community: Solar Powers America's Hospitals, Churches, and Rec Centers*. Retrieved April from https://www.seia.org/blog/clean-energy-your-community-solar-powers-americas-hospitals-churches-and-rec-centers

Urban Sustainability Directors Network. (2019). *Guide to Developing Resilience Hubs*. https://resilience-hub.org/wp-content/uploads/2019/10/USDN_ResilienceHubsGuidance-1.pdf

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