How Smart Permitting Could Accelerate Rooftop Solar in New Jersey

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Executive Summary

According to the New Jersey Department of Environmental Protection's "80x50 Report," the rate of solar development needs to increase 650% for the state to reach its 2050 clean energy goal.[1]

Unfortunately, permitting is a significant obstacle to rooftop solar across the Garden State. Homes that install solar first need to receive a permit from local governments to begin installation. In New Jersey, permitting is often a lengthy, bureaucratic, costly, and inconsistent process, which can discourage and prohibit families from investing in solar.

> Smart permitting could spur the installation of an additional 20,000 home solar systems by 2030 and 204,000–207,000 by 2040, an increase of 51–54% above business-as-usual.

This report traces how the current solar permitting process deters families from "going solar," and how streamlining this process using a standardized, online, and smart permitting software platform would help bring solar to more roofs in more neighborhoods. This report models the potential impacts of adopting such a platform in New Jersey, and projects that smart permitting could spur the installation of an additional 20,000 home solar systems by 2030 and 204,000–207,000 by 2040, an increase of 51–54% above business-as-usual.[2] These additional rooftop systems could add a combined generating capacity of 160 megawatts by 2030 and 1.6 gigawatts by 2040. In other words, a shift to smart permitting could add more generating capacity than a typical nuclear power plant.[3]

Making the process of getting solar projects approved more efficient would bring down the costs associated with the permitting process. As these costs get passed on to consumers, lower prices could spur increased demand.[4] As smart permitting cuts through red tape, families buying a new system could save $1,600–$1,900 on the cost of a new system by 2030, and $3,800–$4,500 by 2040. And that is only the beginning of the savings.

[1] Barr et al. (2020), p. 70.
[2] The model assumes that the market environment in which residential solar has developed to this point persists. Significant changes to the market, such as the expansion of the Successor Solar Incentive program or cuts to net metering, could expand or shrink the projections.
[3] Office of Nuclear Energy (2021).
[4] The projected cost reductions are derived from assumptions based on samples of the market. The components of a project's cost, which impact the projected cost savings achieved from smart permitting, can vary widely across the industry.

Over the lifetime of the panels, the typical family that "goes solar" as a result of smart permitting could save $78,000 in reduced electricity bills.[5] As electricity prices increase over time, the average family could save $1,900–$3,500 in electricity bills each year. Adding up the projected ratepayer savings over each system's expected lifetime, the additional families installing solar by 2030 as a result of smart permitting could eventually save a combined $1.6 billion. By 2040, the expected lifetime ratepayer savings of the additional systems could rise to a combined $16 billion. These projections assume only gradual increases in electricity prices over time: if utilities move forward with substantial rate increases then the value of generating power at home could increase even further.[6]

The increase in rooftop solar systems from smart permitting could cut annual greenhouse gas emissions across the state by 68,000–70,000 metric tons of CO_2 in 2030, and 561,000–570,000 tons in 2040. The cumulative emissions reductions from smart permitting could amount to 177,000–180,000 metric tons of CO_2 by 2030 and 3.3 million metric tons of CO_2 by 2040. This is equivalent to avoiding the emissions from driving 759,000–780,000 gasoline-powered cars for a year, burning 7.5–7.7 million barrels of oil, or using 150–153 million barbeque propane canisters.

The increase in demand for new solar installations could also create 560–610 jobs across the state by 2030, and 1,600–1,800 jobs by 2040. Higher installation volumes could also mean increased permitting fee revenue for jurisdictions, bringing in $6 million by 2030 and $61–67 million by 2040. Reduced labor required to review all permits could save 138,000–139,000 hours of staff time by 2030 and 588,000–603,000 by 2040, allowing plan reviewers to focus on other priorities, such as permitting new housing.

Up until recently, governments that wanted to implement smart permitting had no choice but to implement it themselves. This could be a costly and complicated task for an individual government to start from scratch, requiring specialist expertise and resources. But the recent launch of multiple smart permitting platforms available at no cost to governments mean that the status quo of slow, manual permitting processes is no longer difficult to escape. For families and the state to realize the benefits described in this report, New Jersey should ensure that smart solar permitting is widely available.

[5] This assumes a 30 year lifetime with 0.5% annual loss in panel capacity (DOE 2021).
[6] New Jersey ratepayers may face electricity price increases of 29% by the end of 2025 (Gribbins 2024' see also Rosen & Scarr 2024), which suggest our estimates of savings are potentially quite conservative. Our ratepayer savings calculations assume that rates increase gradually in real terms, doubling over the lifetime of the system.

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The Benefits of Residential Solar in New Jersey

New Jersey is the home of the modern solar panel. Seventy years since the first demonstration of a practical photovoltaic (PV) system in western Union County in 1954, New Jersey now has some of the highest demand for solar in the United States. New Jersey residents have installed more than 200,000 solar PV systems on or at their homes, and in 2022 New Jersey was one of the top five states for residential solar installations.[7] New Jersey has the tenth highest share of distributed solar power per person in the country, ahead of sunnier states like Colorado, New Mexico, or Florida.[8] Residential systems in New Jersey have a combined capacity of nearly 4 gigawatts: greater than two Hoover Dams or 400 offshore wind turbines.[9]

Solar PV is crucial to meeting New Jersey's greenhouse gas reduction goals. The state has committed to reducing emissions 50% below 2006 levels by 2030, and 80% by 2050. Meeting these targets requires adding 27.3 gigawatts of solar over the next 25 years, up from 4.9 gigawatts of solar capacity installed today.[10] According to the Department of Environmental Protection's "80x50 Report" issued in 2020, averaged over the proceeding 30 years, solar development would need to increase by 650 percent to reach the 2050 goal.[11] The Department of Environmental Protection recommended that, "To achieve this growth, the state must be prepared to use parking lots, roof tops, and marginal open spaces."[12]

Rooftop solar also benefits the grid by reducing the need for costly transmission and distribution upgrades, alleviating stress on the infrastructure, making the overall service more dependable.[13] In addition to the everyday benefits achieved by reducing the total demand for electricity, rooftop solar produces the most energy when the grid is most in need – afternoons on hot summer days when families are running their air conditioners.[14] When paired with a home battery, residential solar can provide clean energy to the residence and neighborhood once the sun sets.

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[7] See Dutzik et al. (2024).
[8] See McCoy (2023). "Distributed" power means a system that generates electricity at or near the place where it will be used, rather than in a traditional power plant. This includes solar PV systems mounted on the rooftops or in the yards of homes.
[9] See DOE (2024).
[10] Future value from Barr et al. (2020), p. 69. Current values from NJDEP (2024). New Jersey's solar targets combine generation from residential, commercial, and utility scale projects.
[11] Barr et al. (2020), p. 70.
[12] Barr et al. (2020), p. 70.
[13] Fields (2023) and DOE (2023).
[14] Fields (2023).

Solar electricity makes vital contributions to New Jersey's economy. The state has the tenth highest electricity prices in the continental United States, but solar PV systems can allow residents to cut their bills by $1,900–$3,500 annually.[15] The solar industry, including residential, commercial, and utility scale companies, employs 9,623 people in the state across more than 450 businesses (IREC 2024). Altogether, solar investments in New Jersey to date total more than $15.3 billion (SEIA 2024).

Despite the development to date and benefits of residential solar, deployment in New Jersey remains far below its potential. The "80x50" report calculated that the lion's share of the additional needed capacity needed for the state to meet its solar goals, 22 gigawatts, could be generated using residential rooftops.[16]

[15] Price data from EIA (2024), savings calculated using the NREL System Advisor Model (NREL 2024a).
[16] Barr et al. (2020), p. 70.

Bureaucratic Permitting Requirements Deter Families from Going Solar

Unfortunately, permitting is a significant obstacle to rooftop solar across the Garden State. Homes that install solar first need to receive a permit, which grants permission to begin the installation, from local government. In New Jersey, the permitting process is often lengthy, bureaucratic, inconsistent, and costly, which can discourage and prohibit families from making the investment.[17]

As of December 2024, according to data available from Ohm Analytics, New Jersey has the third slowest permitting timelines for rooftop solar in the country, placing it behind many states with no statutory climate goals at all.[18] In some cities, including Paterson and Trenton, most permits take more than one month. Statewide, the permitting timeline for 25% of projects is more than 21 business days.

Most every city in New Jersey has its own, frequently byzantine, process and requirements for obtaining the permit. Some cities require separate zoning applications. Some require notarized documents from the homeowners. Others require property surveys. There is a high degree of variation in the information that must be included on the solar plans from one jurisdiction to another. The variation in these processes and requirements persist despite the building code remaining consistent across the state and solar projects following the same design characteristics whether being installed in one city or another.

22 percent of residential solar projects that apply for permits are canceled.[19] According to national survey data, installers view the permitting process as the most

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[17] Inefficient permitting is also one of the largest barriers to maximizing the impact of grant programs, like the $156 million New Jersey was scheduled to receive from the federal Solar for All program for low- and moderate-income communities. At time of writing the future of this program is unclear, following an executive order pausing the program issued by President Trump on January 20, 2025 (Bolster 2025). If this program survives, smart permitting would help New Jersey take full advantage of this resource (Steinberg & Richardson 2024, p. 1).
[18] Ohm Analytics (2024). Permitting timelines are determined by the median for each state. New Jersey's median permitting timeline is tied for third longest with Mississippi. Ohm does not have permitting timeline data for five states, and data are limited for some states.
[19] Nationally, 22 percent of residential solar projects that apply for permits are canceled. (Cruce et al. 2022, p. 17). Data from Ohm Analytics (2024) tracing 684 applications in six jurisdictions in New Jersey show an average of 18% for the cancellation rate.

important cause of customer cancellations.[20] Installers' second most important cause of cancellation is changes in customer finances, a risk that likely increases with project delays.

> *"Usually getting the permits with the town is the real stumbling block. Every time it is different. There's absolutely no uniformity in New Jersey [...] Even in the same town, from project to project, they don't require the same things." (New Jersey solar installer expert, cited in Kocakusak et al. 2024)*

Permitting barriers directly discourage and prevent families from going solar. Additionally, permitting barriers drive up costs, which further discourage and prevent families from making the investment. The costs of permitting bureaucracy come from both the direct work of preparing, submitting, and revising permit applications and the costs caused in the rest of the installation process by uncertainty and complexity of permitting. These costs include:

- **Permit application preparation:** preparing the permit application requires developing a bespoke set of plans outlining the technical details of the project, tailored to the particular requirements of the jurisdiction. As previously stated, different jurisdictions can have different requirements and processes, and permit reviewers within the same jurisdiction may interpret codes differently.[21]
- **Permit submission:** in many jurisdictions in New Jersey, the plans and forms need to be printed out and submitted in person, adding labor and travel time. In the National Renewable Energy Laboratory's SolarTRACE data, only one jurisdiction in the state allows online submission of applications, and only three jurisdictions in the data offer same-day, in-person permitting.[22]
- **Permitting timelines and delays:** once an installer submits a permit application, they often need to wait weeks or months before receiving the approved permit. As stated above, the median permitting time in New Jersey is 13 business days, the third slowest permitting timelines for rooftop solar in the country.[23] While long permitting timelines are a problem on their own, they also can increase project costs by preventing installers from being able to develop the project schedule and manage work crews.

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[20] Cancellations during the permitting process itself are rare, but cancellations later in the process are still large, and contractors report permitting as the foremost driver. See Cook et al. (2021).

[21] Compare this with the situation in Germany, where "PV systems have been explicitly exempted from building permission requirements in the model building code" since 1997, "the overwhelming majority of rooftop PV systems have never been subject to any permit requirements placed by local authorities," and "planning and transaction costs related to municipal requirements are generally minimal to non-existent for most rooftop PV installations" (Strupeit 2016, p. 452).

[22] SolarTRACE 2024. Some jurisdictions are marked "N/A," so these numbers may not include all

[23] Ohm Analytics (2024).

- **Permit revision:** when reviewers identify a problem with an application, installers must spend additional time preparing and submitting a revised application. The back and forth between jurisdictions and contractors can stretch out timelines significantly, as revised applications can end up at the back of the line. The whole process raises costs for both the reviewing agency (which has to revisit the same application multiple times) and families (since the cost of paying installers to revise and resubmit applications drives up the price of the system).[24]
- **Permit fees:** installers must pay a fee to the jurisdiction for review, and may have to pay additional fees for revisions.
- **Overhead:** installers must keep customers updated throughout this process, arranging additional site visits as needed and discussing potential changes in response to rejections, adding communication costs. All of this activity needs to be tracked and coordinated, adding to project management costs.
- **Cancellations:** As previously stated, 22 percent of residential solar projects that apply for permits are canceled,[25] and installers cite the permitting process as the most important cause of the cancellations.[26] Canceled projects drive up the costs for all remaining projects, since deposits (when collected) are rarely enough to cover the lost spending on customer acquisition, project design, permitting, and overhead.[27]
- **Customer acquisition:** customer acquisition includes sales, marketing, and initial system design, and represents the single largest component of solar soft costs. The uncertainty of approval timelines creates difficulty for installers to guarantee delivery dates, making sales more difficult. The same negative experiences that drive cancellations can reduce the willingness of customers who do end up installing systems to recommend solar to others.[28] This can increase the cost of acquiring new customers, since peer recommendations are a key driver of solar adoption.[29]
- **Barriers to entry:** permitting complexity can act as a barrier to entry (Dong and Wiser 2013 p. 540). Installers must develop experience with each jurisdiction's

[24] Surveyed installers say that inconsistent standards across authorities having jurisdiction cause delays: "interviewees cited inconsistent permitting inspections as a key driver of project delays, given that an installation with the exact same characteristics could pass inspection in one AHJ but fail an inspection in another AHJ" (Cook et al. 2021, p. 156).
[25] Cruce et al. (2022), p. 17 and Ohm Analytics (2024).
[26] According to Cook et al. (2021), cancellation during the permitting process itself are rare, but cancellations later in the process are still large, and contractors report permitting as the foremost driver.
[27] Cook et al. (2021).
[28] One solar installer we spoke with had a third party survey their customers after installation to find out how likely they were to recommend the company. If the installation was completed within 30 days, 70% of customers said that they would recommend the company to others. But once the installation took 120 days, 0% of customers were willing to make a recommendation. Beyond that time, customers were inclined to actively warn others against working with the company.
[29] Wolske et al. 2020.

rules and how individual reviewers interpret those rules.[30] This increases startup costs for new firms and slows the expansion of existing firms.

- **Installer reactions:** Some installers raise prices in difficult jurisdictions, while others spread the cost across all their customers. Some firms avoid the most difficult jurisdictions altogether, reducing the number of contractors competing for families' business, further driving up costs.

Taken together, all these permitting-driven installation costs raise the price of residential solar in New Jersey. Unnecessary and inflated permitting costs create a vicious circle: high upfront prices reduce demand for solar, which drives up customer acquisition costs. Higher customer acquisition costs, in turn, drive up prices for future customers. These effects compound over time, keeping solar more expensive than it otherwise would be.

Generally, the United States has many more permitting and bureaucratic barriers compared to other high-income industrialized countries. As a result, in 2020, the price for a typical residential solar system in the United States was $28,600, while the price in peer countries was $9,000–$16,700.[31] In 2023, the price for a typical residential solar system in the US had actually increased since 2020 to $31,500 despite prices in countries like Australia continuing to decline.[32] The price in New Jersey for a 7.5kW system in 2023 was even higher, hitting $36,000.[33]

[30] This could be especially difficult for larger firms trying to develop high-volume, low-cost business models (Overholm 2015). This could also help explain why large national solar firms do not necessarily have lower costs than small firms, despite the potential for economies of scale.

[31] IRENA (2021). 2020 prices were $1.20/W in South Korea, $1.22/W in Australia, $1.38/W in Italy, $1.40/W in Spain, $1.61/W in Germany, $1.84/W in France, and $2.22/W in the United Kingdom. In the same year, prices were $4.24/W in California and $3.52/W in other US states, creating a national weighted average of $3.808/W. Roughly 40% of solar systems in the U.S. are in California (Lyons 2024). Prices for the solar system assume a typical system size of 7.5kW.

[32] Barbose et al. (2024). The median 2023 price was $4.2/W. Price for the solar system assumes a typical system size of 7.5kW. Note, IRENA (2021) and Barbose (2024) used different methodologies to calculate $/W costs, yielding different $/W figures.

[33] Barbose et al. (2024). The median 2023 price in New Jersey was $4.8/W. Note, IRENA (2021) and Barbose (2024) used different methodologies to calculate $/W costs, yielding different $/W figures. Except where noted otherwise, prices in the rest of the report are reported in 2023 dollars.

Smart Permitting Encourages Families to Go Solar

New Jersey can reduce permitting barriers and spur residential solar growth by switching to a smart permitting process, allowing families using licensed contractors to get immediate feedback on their projects and receive permits instantly. Overall, smart permitting can eliminate permitting timelines, reduce unnecessary bureaucracy, reduce inconsistencies in permitting processes and requirements, and reduce costs.

Today, both the federal government and private vendors have created software platforms that can instantly review applications and issue permits for residential solar projects. Starting in 2019, the National Renewable Energy Laboratory, a branch of the federal Department of Energy, began working with the building safety community, jurisdictions, and the solar industry to create a smart solar permitting software platform. The resulting platform, SolarAPP+, has been deployed in more than 260 jurisdictions around the country as of January 24, 2025, with more than 59,300 permits issued.[34] There are now also private platforms that can provide permitting automation for residential solar, such as Symbium, which as of January 5, 2025 has launched in 43 jurisdictions.[35]

Smart permitting can eliminate the weeks or months families must wait to receive permission from local government to begin installation. Smart permitting can eliminate both expected delays (e.g., when the permit application is approved within the expected two weeks) and unexpected delays (e.g., when the permit application is expected to be approved within two weeks, but is actually approved in two months). If an installer submits a project that is not up to code, smart permitting software notifies the installer in real time. The installer can then make changes to the plans, resubmit the application, and receive the approved permit instantly. Additionally, smart permitting software can approve revisions instantly, further smoothing the installation process (e.g., if the type of solar panels in the approved plans are no longer available when construction begins, and the installer must submit a revised permit application to the jurisdiction).

Smart permitting can standardize the process and requirements for obtaining permits across jurisdictions. This benefit is most visible when the smart permitting platform in operation is consistent between jurisdictions. However, this benefit can persist between different permitting platforms due to the digitization of the process and

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[34] "Over 260" includes both 222 jurisdictions that have fully adopted SolarAPP+ and 44 that are currency running pilots See SolarAPP+ (2024a).
[35] Symbium (2025).

similarities in input fields needed for the systems to automate the code compliance checks.

Smart permitting reduces cancellations in two ways. First, smart permitting reduces the instances in which the permit for the intended design cannot be obtained. Second, smart permitting can eliminate long project timelines and the back-and-forth between the jurisdiction, installer, and homeowner, which frequently cause the homeowner to become exasperated and walk away from the project before installation could otherwise begin.

Smart permitting can significantly reduce the resources, complexity, and uncertainty involved in residential solar projects, which directly reduces the cost of solar. These “first-order” effects include:

- **Simplified submission:** permit automation software accepts applications online, eliminating the need for physical plans and in-person submissions. Standardized portals also allow installers to submit plans through one consistent interface, rather than preparing plans with different details for different jurisdictions.
- **Instant feedback:** software can review plans without human intervention, check code compliance, and mark errors instantly. This allows designers to make necessary modifications during the initial design process, without the need for follow-up visits or repeat trips to the jurisdiction.[36]
- **Standardization:** if many jurisdictions adopt smart permitting, the process becomes more consistent. Even if jurisdictions have different requirements, the use of the same platform minimizes the complexity in working across borders.
- **Enhanced government efficiencies:** because smart permitting systems reduce the need for manual staff review, jurisdictions can do more with the same number of building department staff, or re-assign them to other pressing departmental needs. The expected upfront costs of implementation are moderate and should ultimately pay off for the government and the people of New Jersey.
- **Shortened timelines:** smart permitting can eliminate wait times and delays for solar projects to be reviewed and approved. In 2023, SolarAPP+ eliminated approximately 142,000 days where a project would have otherwise been awaiting approval at the jurisdiction.[37]
- **Enhanced safety:** software-driven plan review can be more comprehensive and thorough than the process that many jurisdictions are following today.

[36] Our installer interviews suggested that each system engineer could handle 50% to 100% more permit applications if all an installer’s sales were in AHJs with smart permitting.
[37] Cook et al. (2024). In 2023, SolarAPP processed 14,072 solar-only permits and 4,834 PV+storage permits (p. 9). For traditional permitting, median permitting timelines are 7 days for solar-only projects and 9 days for solar projects that include storage (pp. 12-13). 14,072 times 7 plus 4,834 times 9 equals 142,010.

SolarAPP+, for example, which was built in collaboration with codes- and standards-development bodies including the International Code Council, National Fire Protection Association, and UL, performs a comprehensive review of relevant electrical, fire, and structural codes, ensuring the proposed system meets safety requirements.[38] SolarAPP+ also stays up to date with new code editions and technologies, avoiding circumstances of plan reviewer error due to delayed training.[39]

- **Easier customer acquisition:** shorter timelines and less uncertainty could produce better customer experiences, which should increase customers' likelihood of recommending their installer to others, lowering customer acquisition costs. Additionally, if installers can guarantee installation timelines with more confidence, that may increase sales at the margin as well.
- **Fewer cancellations:** smart permitting can shorten projected timelines, which provides customers with more confidence in the efficacy of the contractor, and avoid major project revisions, which provides customers with assurance in their investment. These factors can increase customer satisfaction and reduce cancellations, saving installers from spreading the expenses from canceled projects across their remaining customers.
- **Fewer failed inspections:** if automatic review catches errors that manual review would have missed, it can reduce the chance that installed systems fail their inspections. One study found that systems permitted through SolarAPP+ failed inspections in most jurisdictions studied less often than those permitted through existing methods.[40]
- **Reduced overhead:** simpler permitting processes, elimination of paper plans, fewer trips to the site and the jurisdiction, and less correspondence with customers can reduce the need for tracking and coordination, cutting overhead.

In addition to the above "first-order" effects, over time smart permitting can also have "second-order" effects, which happen in response:

- **Volume effects:** as cost savings are passed to consumers, demand for solar PV systems should increase. This should lower some of installers' fixed costs, like sales and marketing expenses and general overhead, because they can spread them across a higher number of successful projects.
- **New business models:** over the long term, automation can allow solar installers to overhaul their business models to emphasize speed and volume, becoming much leaner operations that earn smaller profit margins but with higher volume. Fully realizing this model would likely require other process

[38] See SolarAPP+ (2024b) and UL (2024).
[39] SolarAPP+ (2024c).
[40] Cook et al. (2024), p. 20.

simplifications, like making the inspection and interconnection processes more efficient as well.

Taken together, these second-order cost reductions have the potential to create a “virtuous” circle, in which direct reductions in installer costs gradually bring down prices, leading to increased demand, which allows for further cost reductions through economies of scale, leading to further cost reductions, and beginning the cycle again.

So far this report has reviewed the benefits of residential solar permit automation in general terms. The next section quantifies the benefits New Jersey might expect from automation.

Modeled Impacts of Permit Automation in New Jersey

To estimate the impact of smart online permitting in New Jersey, this report models how automation could change the costs faced by installers, lower the prices paid by consumers, reduce cancellations, improve the purchasing experience for families, raise the financial appeal of rooftop solar, and increase the number of solar systems installed. It then projects impacts on individual households and on the state as a whole. The full details of the methodology are available in a Technical Appendix.[41]

The model assumes a 7.9kW system with 22 panels (close to the median size of a system in New Jersey). To make sure we capture the different environments in the state, the model run is repeated for New Jersey's different climate zones. In each climate zone, the population center of the most populous county in the zone is used as the reference point. The utility rates are also taken from that county, and correspond to the most current rates available. The model takes into account the hourly weather and electricity consumption for a typical home in each reference county. The cost modeling is done in Excel and Python, and the performance modeling is done using NREL's System Advisor Model.[42]

The model uses two benchmarks to track the cost of installing residential solar systems. The first comes from the National Renewable Energy Laboratory (Ramasamy et al. 2022) and the second comes from data shared by a major solar installer software platform (OpenSolar 2024). These data are combined to produce a range of estimates. In both cases, the prices are modified from their original national estimates to reflect local prices in New Jersey.[43]

The model assumes that the market environment in which residential solar has developed to this point will persist. Significant changes to the market, such as the expansion of the Successor Solar Incentive program or cuts to net metering, could change outcomes either positively or negatively. The model also assumes that cost reductions for installers will gradually be passed on to consumers as the market adjusts, and that these cost reductions will drive increased consumer demand. While the model is grounded in real cost data, it is important to note that individual project cost components can vary significantly between companies and markets.

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[41] The Technical Appendix is available at http://www.greenhouse.institute/research/2025/solar_permitting_nj/.
[42] NREL (2024a).
[43] Prices are adjusted from national values to New Jersey values using Regional Price Parities (BEA 2024).

The results suggest that if New Jersey rolled out smart permitting statewide beginning in 2026, it could have major impacts on solar deployment. By 2030, an additional 19,800–20,500 families could go solar compared with a business-as-usual scenario. As contractors reconfigure operations to take full advantage of the simplifications and efficiencies of smart permitting, the model projects installations could take off even faster. By 2040, the model suggests that New Jersey could have 204,000–207,000 more residential rooftop solar systems than we would currently expect. This is a 51%–54% increase over business-as-usual installations. It is equivalent to roughly a gigawatt of additional generating capacity, the same as a typical nuclear reactor. In other words, New Jersey families would add more generating capacity than 1.5 nuclear power plants—without building any new nuclear power plants.[44]

All these additional solar systems could produce major savings for families. As smart permitting cuts through red tape, families buying a new system could save $1,600–$1,900 on the cost of a new system by 2030, and $3,800–$4,500 by 2040. These savings are independent of state or federal incentives and financing arrangements that can further reduce the price of a new system.

Savings could continue to accumulate over the lifetime of the system, as solar generation can reduce electricity bills significantly. New solar systems last 30 years without significant performance drops, and can continue to operate longer (though parts of the system may need to be replaced).[45] But even if the model assumes that systems are replaced entirely after 30 years, the savings over that time dwarf the upfront costs of the system. The model suggests that a typical 7.9kW system could cut the average family's annual electricity bills by $1,900–$3,500 depending on the location of the system and the year of operation. This is equivalent to a (rounded) monthly bill reduction of $156–$288. Over a 30-year system lifetime, these savings could amount to $78,000, much larger than the typical cost of a system.

Across all the additional families installing solar, the savings could be quite significant. The roughly 20,000 additional systems installed by 2030 could produce $37 million in savings that year. By 2040, the roughly 200,000 additional systems could produce annual savings of $422–$430 million. Adding together all the savings over the modeled 30-year lifetime, the additional systems installed by 2040 because of smart permitting could produce a combined $16 billion worth of savings for New Jersey families.

By replacing electricity that households would otherwise buy from the grid, and generating excess electricity that can be sold to other households, these additional

[44] Office of Nuclear Energy (2021).
[45] This is a conservative assumption since new systems often produce power for 30-35 years or more (DOE 2021).

solar installations could also significantly reduce emissions in the Garden State. An average family installing solar could cut emissions by 3.5 metric tons of CO_2e per year in 2030 and 2.8 tons in 2040.[46] That's the equivalent of burning 315–394 gallons of gasoline or 3,100–3,900 pounds of coal. It would take 2.8–3.5 acres of U.S. forests a year to sequester the same amount of emissions.[47]

Looking across all the additional systems, by 2030 New Jersey families could collectively avoid 68,000–70,000 metric tons of CO_2e emissions each year compared to business as usual. That's equivalent to taking 16,000 gasoline-powered cars off the road. By 2040, annual emissions savings could expand to 561,000–570,000 metric tons of CO_2e. It would take 563,000 acres of U.S. forests to sequester the same amount of carbon. Families would need to divert 48 million trash bags of waste from landfills to recycling every year to achieve the same emissions reduction.

Looking again at the modeled 30-year system lifetime, the additional systems installed by 2040 because of smart permitting could eventually save 17 million metric tons of CO_2e. That's the equivalent of shutting 4 coal-fired power plants or 44 methane gas-fired power plants for a year. To achieve the same emissions reductions through cutting fuel usage, the state would need to reduce fuel consumption by 39 million barrels of oil, 765 million home barbeque propane canisters, 1.9 billion gallons of gasoline, or 18.5 billion pounds of coal. It would take a forest three times the size of New Jersey a year to sequester the equivalent amount of carbon dioxide.

Jurisdictions could see benefits at building departments as well. Smart residential solar permitting could save 588,000-603,000 hours of staff time at building departments through 2040, allowing plan reviewers to focus on other priorities, such as permitting new housing.[48] Additionally, the increased volume of solar installations could mean more revenue in the form of permitting fees. The model suggests that fee revenue through 2040 could increase by a cumulative $49–$50 million dollars.

All these additional panels could also increase the number of jobs in solar installation in New Jersey. Even though smart permitting would reduce the total labor hours needed to install solar panels on an individual house, the increase in overall demand is projected to more than make up for more efficient project timelines. The model suggests that New Jersey could have more than 560–630 additional residential solar installation jobs by 2030, and 1,300–1,500 more residential solar jobs by 2040, an increase of 24%–28% above current residential solar employment.

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[46] The size of the avoided emissions is lower in 2040 because the grid is assumed to be getting cleaner over that time, which reduces the emissions impact of residential solar. The Cambium model we use to calculate avoided emissions reflects state policies to enforce cleaner grids through mechanisms like renewable portfolio standards (Gagnon et al. 2024).
[47] These emissions comparisons and those that follow are calculated using the EPA Greenhouse Gas Equivalencies Calculator (EPA 2024).
[48] Cook et al. (2024).

Data from the EIA suggests that batteries paired with residential solar systems are currently uncommon in New Jersey, with 0.7% of solar systems paired with home batteries. As costs for batteries fall or if energy tariffs are reformed, this figure could well increase. Were New Jersey families to install home batteries at the same rate as California families, then the increased demand for solar as a result of smart permitting could deliver between 0.14 GWh of new battery capacity by 2030 and 1.4 GWh by 2040 – a significant portion of the state's 2030 battery capacity goal of 2GW.[49] This could insulate families from energy tariff changes, as well as generate further carbon emissions reductions which are not modelled in this report.[50]

[49] For uptake rates in California see Palmere (2024). For a discussion of New Jersey's battery storage goals and converting them from MW to MWh, see NJBPU (2022).

[50] Battery uptake is likely linked to the prices utilities pay for solar exported to the grid by families. While it is beyond the scope of this paper, if utilities were to reduce the rates they pay for such exports then batteries could help limit the financial impact of that change.

Policy Recommendations

Given the expected benefits, all families in New Jersey should have the opportunity to install rooftop solar with a permit obtained via a smart process. State policymakers should consider encouraging or requiring permitting authorities to pursue smart permitting. Other states, including California, Colorado, Illinois, Maryland, Minnesota, and Washington, have implemented or are implementing programs to support smart review. The sooner this process begins in New Jersey, the sooner the benefits will start to accrue.

There are also other bureaucratic barriers to solar adoption, particularly around building inspection, utility interconnection, and homeowner association approvals. Though these are beyond the scope of this report, finding ways to lower these barriers while maintaining installation quality and grid balance would also likely speed up solar installation and bring down solar prices. New Jersey leaders, jurisdictions, and utilities should look for ways to minimize unnecessary delays and costs here as well.

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Acronyms

CO_2e	CO_2-equivalents
$mTCO_2e$	Metric Tons of CO_2-equivalents
$MMTCO_2e$	Million Metric Tons of CO_2-equivalents

W	Watt	1 W
kW	Kilowatt	1000 W
kWh	Kilowatt-hour	1000 Wh
MW	Megawatt	1,000,000 W
MWh	Megawatt-hour	1,000,000 Wh
GW	Gigawatt	1,000,000,000 W
GWh	Gigawatt-hour	1,000,000,000 Wh