What's the right path to illuminating your solar investment?

Investment drivers and ownership options for US utilities

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Introduction

Utility-scale solar power[1] technology continues to witness unprecedented growth in the US, with record-breaking new capacity coming online in 2016. While the majority of capacity has been concentrated historically in a few states, such as California, Arizona and North Carolina, the current project pipeline implies significant ongoing geographical diversification across the country.

The results of the 2016 elections are expected to have widespread implications for energy sector-related tax policies: notably, President Donald Trump and Republican majorities in Congress are seeking to engage in comprehensive tax reform. While the House GOP Blueprint for tax reform proposes to eliminate specialized energy tax credits, Treasury Secretary Mnuchin indicated during his Senate confirmation hearing on January 19, 2017 that he would support the "phase out" enacted by Congress in 2015 for solar and wind tax incentives. For solar projects, the investment tax credits (ITC) were extended for an additional five years and the rates phased down from 30 percent to 10 percent. Since the ITC is an up-front tax credit, the near-term project development activity should pick up as companies act to take full advantage of the incentives and avoid any risk of Congress making changes as part of tax reform. Also, the fast-declining development costs and relatively low-risk profile of solar photovoltaic (PV) technology will continue to support the ongoing growth in capacity.

Over the last few years, US investor-owned utilities have emerged as the leading investors in utility-scale solar projects. However, much of the operating capacity is concentrated among a few key players, who mainly own these projects through their non-regulated subsidiaries. Analyzing the 61 investor-owned electric utilities in the US shows that about half of these companies do not currently own any utility-scale solar capacity, with another 16 companies owning less than 100MW of aggregate solar capacity.

Historically, US utilities have procured solar generation through long-term power purchase agreements (PPAs) with specialized project developers instead of direct ownership. The PPA mechanism has been a preferred route given the inability of utilities to monetize tax credits effectively and the greater regulatory scrutiny of direct-ownership models. In addition, the elevated capital expenditure cycle over the past three to five years, largely on grid improvements and compliance with new environmental regulations, has left limited spare capital for these projects. However, the current market, solar PV module manufacturing overcapacity, provides opportunities to buy utility-scale solar assets at a reasonable price from stressed sponsors and developers.

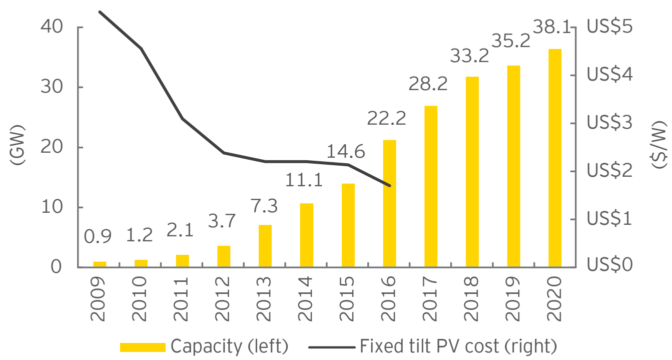
The utility-owned model for solar projects provides multiple benefits for both utilities and their customers. It benefits utilities by expanding their rate base, growing earnings, giving greater project control and providing the ability to capture the long-term residual value of the asset. Customers benefit from the lower cost of capital for these utilities, typically with investment-grade ratings, which could reduce customer rates and bills. However, utilities will still need to manage several risks with this model. These can include establishing a cost/benefit ratio of direct ownership with regulators and integrating more intermittent generation sources. Also, financing, delivery, and asset management present further opportunities for utilities to learn from solar acquisition strategies.

In this paper, we explore the outlook for utility-scale solar projects in the US, key drivers for investment by utilities, a comparison of self-build and PPA options, and the available ownership structures for these projects. We also provide a detailed framework for utilities to consider in connection with strategic decisions on these projects, focusing on project planning and investment parameters.

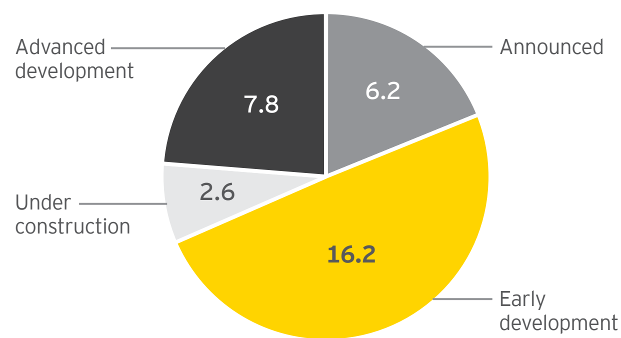
Market outlook

Utility-scale solar capacity is witnessing dramatic growth in the US, with approximately 8GW of new capacity added in 2016, up from about 4GW in 2015. As of February 2017, approximately 33GW of utility-scale solar capacity is in various stages of development across the US, with 2.6GW, or 8% of the total, under construction. Another 7.8GW, or 24%, is in advanced development stages. This underdevelopment capacity is largely non-regulated and is currently owned by specialized solar developers and non-regulated subsidiaries of diversified utilities.

Cumulative US utility-scale solar capacity and PV costs (2009–2020)



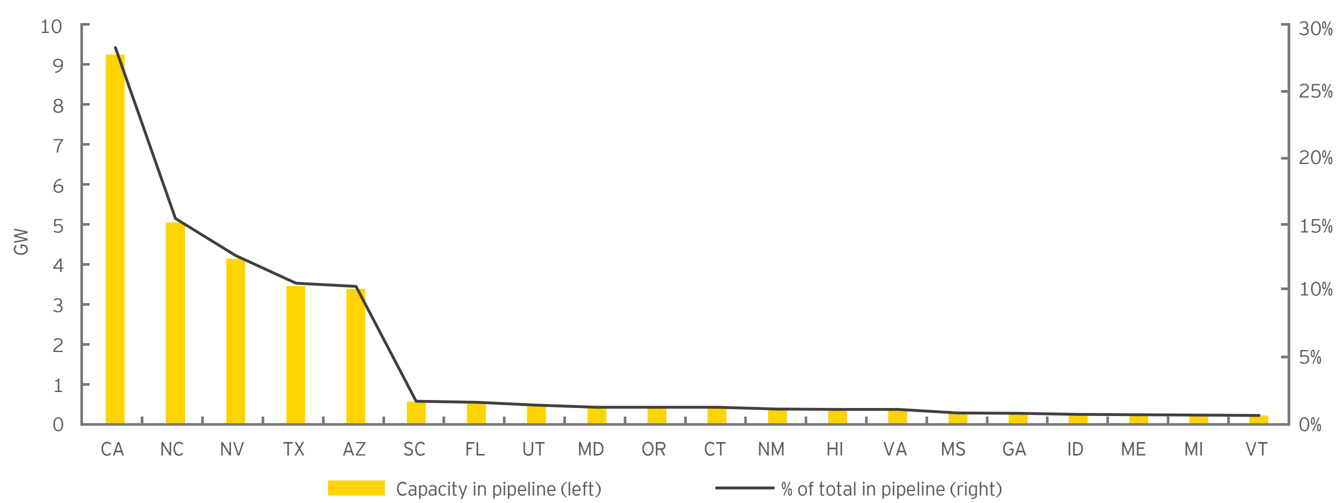
US utility-scale solar capacity under development
(GW, by stages of development)



Source: SNL Energy, an offering of S&P Global Market Intelligence, NREL, EY analysis.
Note: Future capacity is based on actual planned/underconstruction projects.
Only projects larger than 1MW are included in estimates.

The pipeline of new projects is at an all-time high, with new markets emerging every year. For example, Texas, a deregulated market, is poised to become one of the largest and fastest-growing solar markets.[2] These in-development projects provide acquisition opportunities for utilities looking to invest in solar power. The available solar ITC, along with the modified accelerated cost recovery system and accelerated depreciation programs, drive solar PV generation to achieve cost parity versus fossil fuel source, especially in the Southwest and Southeast regions with high capacity factors for solar projects.

Top 20 states with utility-scale solar capacity underdevelopment
(GW, all stages of development)



Source: SNL Energy, EY analysis.
Note: Future capacity is based on actual planned/under-construction projects, including projects with capacity greater than 1MW.

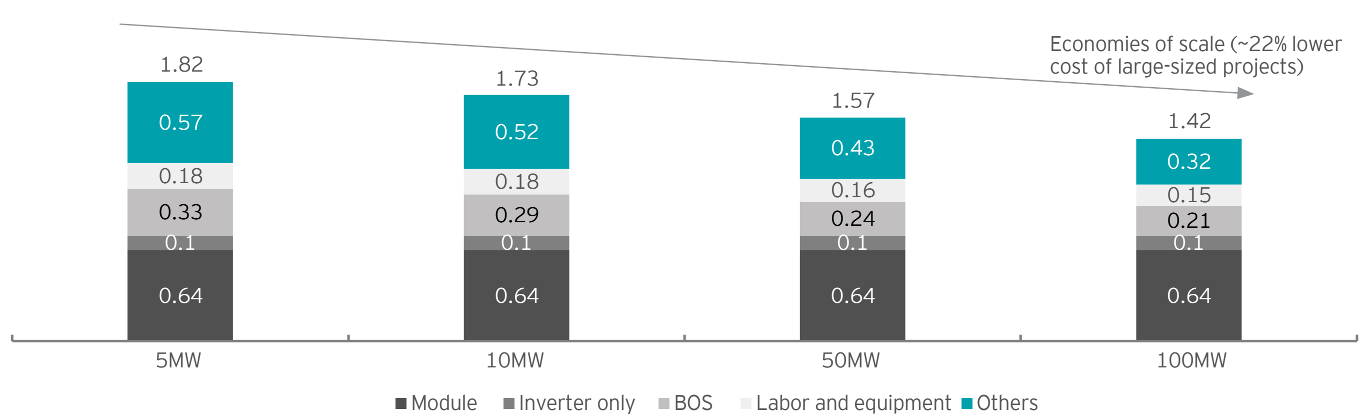
Investment drivers

Current market conditions provide a compelling case for direct ownership of solar projects by more utilities, assuming they effectively understand the benefits and risks. Key drivers for increasing investment include the fast-improving cost-effectiveness of solar PV, extension of federal ITC for a limited duration, and rising demand for solar generation by commercial and industrial (C&I) customers. Other supporting drivers in the near term include declining costs for enabling technologies such as storage and the potential expansion of renewable portfolio standards in several key states.

- **Capitalizing on declining cost.** The development costs for utility-scale solar projects near 100MW in size have fallen below $1.5 per watt, with industry experts estimating costs below $1.0 per watt over the next few years — driving a serious threat to the cheapest conventional source of power. Regions with low-cost labor, such as Texas and North Carolina, will reach these low-cost levels faster. In addition, the levelized cost of energy (LCOE) for utility-scale projects is expected to be nearly half those of residential-scale solar, with significantly greater emission-reduction benefits.[3]
- **Utilizing available tax credits.** The current 30% solar ITC includes projects that begin construction by year-end 2019, after which it will step down to 26% for projects that begin construction by year-end 2020, 22% for projects that begin construction by year-end 2021 and 10% for projects that begin construction each year thereafter. However, with the Trump Admin's stated goals of reducing the US corporate tax rates, incentives such as the ITC may be at risk in order to finance any major tax code rewrite.
- **Fulfilling renewable portfolio standard (RPS) expansions.** While renewable portfolio standards have historically been the driving force behind the proliferation of renewable technologies in the US, a significant portion of ongoing utility-scale solar development falls outside these obligations. However, a few states have recently expanded their RPS mandates, with many others considering the same, which could potentially drive the next phase of renewables growth. Jurisdictions that raised their RPS requirements in 2016 include New York, Oregon, Rhode Island, Michigan and the District of Columbia. More recently in Feb 2017, Maryland increased its RPS from 20% by 2022, to 25% by 2020.
- **Replacing retiring capacity.** The ongoing coal plant retirements in the US have been joined by nuclear shutdown announcements as a result of weak market fundamentals and rising operational costs. However, the Trump Administration is likely to introduce energy policies that affect the Environmental Protection Agency's environmental regulations and natural gas prices, creating some uncertainty.
- **Retaining large customers.** US corporations are increasingly procuring solar power directly from specialized solar developers, bypassing their local utilities or even buying these generation projects. For example, in 2015 more than 1GW of solar PV capacity was contracted by corporations in the retail, finance, technology and manufacturing industries, which is about four times the amount contracted in 2014. Thus, by investing in these projects and providing customized clean energy services, utilities can satisfy the growing demand from its customers.

While RPS historically has been the primary driver for these projects, new drivers of utility-scale solar include voluntary utility procurement by companies as solar becomes competitive with natural gas and other benefits discussed above. Declining solar prices has made it possible for more and more regions to be economically viable. However, the extent of changes to US tax laws under the new administration and the potential impact on solar tax credits brings additional uncertainty to investors. Utilities will need to model these impacts under different scenarios to inform their decision making.

Bottom up cost breakdown of different-sized solar projects
(2016, fixed tilt solar PV technology)



Source: NREL, EY analysis.
Note: Estimates based on Q1 2016 US benchmark. Other costs include overheads, taxes, land acquisition, transmission, permitting fees, contingency, profits, etc.

Utility-owned versus PPA

Utility-scale solar projects present an interesting challenge for regulated utilities. Should they make direct capital expenditures, with consequent additions to the rate base, or should they procure power through third-party developers via PPAs?

Under the utility-owned model, the capital expenditure on the project is included in the utility rate base, with the asset earning a regulated return on equity alongside recovery of annual operations and maintenance (O&M) expenses and depreciation. Utilities pursuing direct ownership can see a meaningful uptick in their earnings relatively quickly, given the short gestation period of such projects.

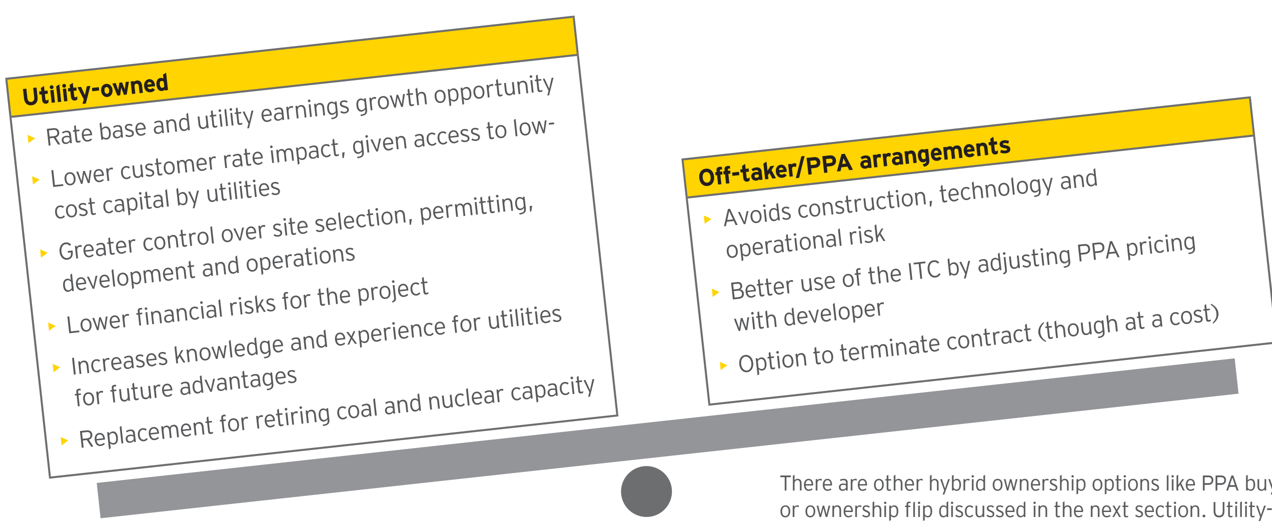
In contrast, PPAs do not contribute to utility earnings and likely deliver more expensive power than rate-based options, given the relatively higher cost of financing for developers. In addition, developers are not bound by any fixed capital structure and can leverage such projects to high debt levels, whereas regulated utilities require the capital structure to be near 50/50 debt and equity levels. PPAs also reduce construction and regulatory risks.

A key factor to consider when comparing the economics of these options is that a rate-based system can be used for its entire useful life of 35 to 40 years, with the surrounding infrastructure, including land, interconnection facilities and siting authority, lasting even longer. PPAs, however, have a typical life of 20 to 25 years. Following expiration of the PPA, plant operations could generate significant residual value for the asset owner through the sales of generation and renewable credits. During this time, the asset would be largely depreciated and the markets would have improved versus the current low pricing environment.

Utilities pursuing direct ownership will need to build a compelling investment case with regulators, who are primarily interested in the benefits for rate payers and customers. The key benefits under the utility-owned model include:

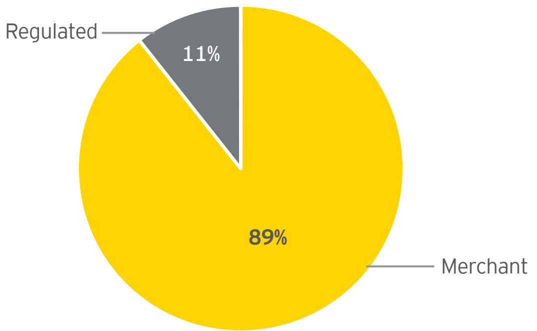
- The utility-owned project is expected to have a relatively lower LCOE, given the lower cost of capital for utilities, thereby driving lower bills for customers. According to a large cap utility in Northeast US, utility ownership of a solar asset translates to a 30% reduction in customer bills when compared to private developer ownership, given the access to low cost of capital by the utility. Also, utilities can ease any interconnection or transmission issues and costs with the project.
- The utility-owned model retains the full asset value for local customers and provides for the depreciated asset's low cost generation and renewable credits to stay within the state for the entire life of the asset. This is not always the case with PPAs after the off-take contract expires.
- Any O&M cost improvements achieved in the future due to asset management improvements would be passed on to customers under the utility-owned model. Under the PPA approach, these benefits would go to the asset owner.
- Any higher-than-expected earnings through tax credits, energy and capacity market value would benefit customers, given the reduction in revenue requirements for utilities.

Advantages of utility-owned option outweigh those of third-party PPAs
(Comparison of pros of utility-owned versus PPA option)



There are other hybrid ownership options like PPA buyout or ownership flip discussed in the next section. Utility-owned projects also come with numerous risks that should be addressed in the development of a comprehensive strategic considerations framework (see p7)

Regulatory status of current operating plants owned by US electric utilities
Category capacity as a % of total operating utility-scale capacity



Source: SNL Energy, EY analysis.
Note: Including projects with capacity greater than 1MW.

Utility ownership mechanisms include the following:

- **Asset Aquisitions.** Under direct ownership, utilities typically can purchase the assets after they have been designed and developed by private developers. While there are higher margins in developing projects, the large pipeline of projects currently in various development stages provides utilities with lower-risk acquisition opportunities. In addition, the PV solar manufacturing industry is in a state of excess capacity, putting financial pressure on vertically integrated developers, given the weakness in solar panel sales. These stressed companies could look to rebalance their asset portfolio, providing bargain acquisitions of in-development projects by utilities.
- **JV with project developers.** Another option for utilities is to form a joint venture (JV) with an experienced developer. Such arrangements bring together multiple advantages, including the utility's access to cheap capital and debt markets, the utility's relationships with regulators and customers, and the developer's execution and operational experiences. Build-transfer transaction structures are gaining traction, allowing a developer to develop its own site and agree to transfer the asset to the utility upon completion prior to commercial operation.
- **PPA buyout or ownership flip.** Under this structure, the developer owns the asset and sells to the utility under a PPA for 7 to10 years to effectively monetize the ITC. The utility then can set an option to purchase the project at its net book value. This structure allows customers to benefit from the ITC monetization and utilities to own and control the project over the long term.

Strategic considerations framework

Developing a utility-scale solar project involves a thorough understanding of the local regulatory environment and collaborations with many stakeholders, including owners and developers, landowners, grid operators, regulatory authorities and financing parties. The key due diligence activities and considerations include:

- Understanding local regulatory policies and support
- Establishing regional demand and Customer & Industrial customer interest
- Identifying economically feasible sites with transmission access
- Understanding local, state and federal permitting requirements
- Identifying best-suited solar technology
- Selecting ideal partners, such as developers and O&M contractors

Key considerations for investing and developing utility-scale solar projects

		Investment decision	Project development
1	Local regulatory construct	**Understanding local regulations** ‣ Regulated versus deregulated market structure ‣ Public utilities commission (PUC) support for renewables; special riders and recovery of capital expenditures ‣ RPS 2.0 developments, solar carve-outs ‣ Potential new regulatory frameworks to own/rate base solar	**Key approvals** ‣ PUC approval ‣ Construction permits ‣ Zoning approvals ‣ Air quality ‣ Water use
2	Market outlook	**Understanding of local market conditions** ‣ Customer mix – percentage of residential, customer, industrial customers ‣ New generation supply/demand outlook ‣ Penetration of rooftop solar ‣ Large C&I customers contracting capacity with third parties ‣ Potential of community solar among key customers	**Key activities** ‣ Contracting capacity with customers – PPA with C&I customer or community solar
3	Project economics	**Understanding of project economic profile** ‣ Expected LCOE – project development costs, O&M expenses, capacity factors, expected output pricing ‣ Comparison with other sources of energy ‣ Federal and local incentives, tax structures, project financing	**Key estimates** ‣ Project cash flows and distributions ‣ Financial returns ‣ Sensitivities to cost/revenue estimates ‣ Tax considerations
4	Ownership structure and partnerships	**Understanding ownership options** ‣ Regulated versus merchant asset ‣ JV with project developers ‣ Specialized structures like Yieldco ‣ Debt/equity structure	**Key estimates** ‣ Regulated return versus merchant internal rate of return ‣ Impact on customer rates ‣ Impact of changing project leverage
5	Internal knowledge	**Understanding available capabilities** ‣ Project management during construction phase ‣ Operation and maintenance after capacity comes online ‣ Development of partnership, PPA and permitting documentations by legal team ‣ Development of risk mitigation plan	**Key activities** ‣ Establish project steering committee ‣ Establish internal capabilities ‣ Hire external resources – full-time equivalent or consultants

Summary

Solar power should be explored by more utility management teams because of the increasing attractiveness of solar power economics, the rising demand for solar-based generation by C&I customers, and potential state RPS expansions.

The current market environment looks ideal for utilities to move from PPAs to directly owning more renewable assets, as public utility commissions are becoming increasingly aware of such projects' value proposition. As utilities increase their investment in these projects, with regulatory approvals to add capital spending to the rate base, there should be a meaningful uptick in overall earnings. Furthermore, utilities can also position themselves as value-added service providers to include other disruptive technologies, such as energy storage or energy management, as they mature and move to the deployment phase.

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Notes and sources

[1] Utility-scale projects are defined as grid-connected solar generation projects with capacity greater than 1MW and supplying more than 50% of power generated to the grid

[2] Solar Energy Industries Association (SEIA)

[3] Brattle Group Study (Comparative Generation Costs Of Utility-Scale And Residential-Scale PV In Xcel Energy Colorado's Service Area)

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