How extending the investment tax credit would affect US solar build

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APPLIED RESEARCH – SOLAR ENERGY INDUSTRIES ASSOCIATION (SEIA)

Under current policy, the US can expect 73GW of solar PV online by year-end 2022. A pending reduction of the 30% investment tax credit (ITC) in 2017 will reduce build rates from an average of 8GW/year from 2014-16 to 6GW/year from 2017-22. A five-year extension of the 30% ITC would add over 22GW to the US solar PV install base, boosting average build rates to 10GW/year from 2017-22.

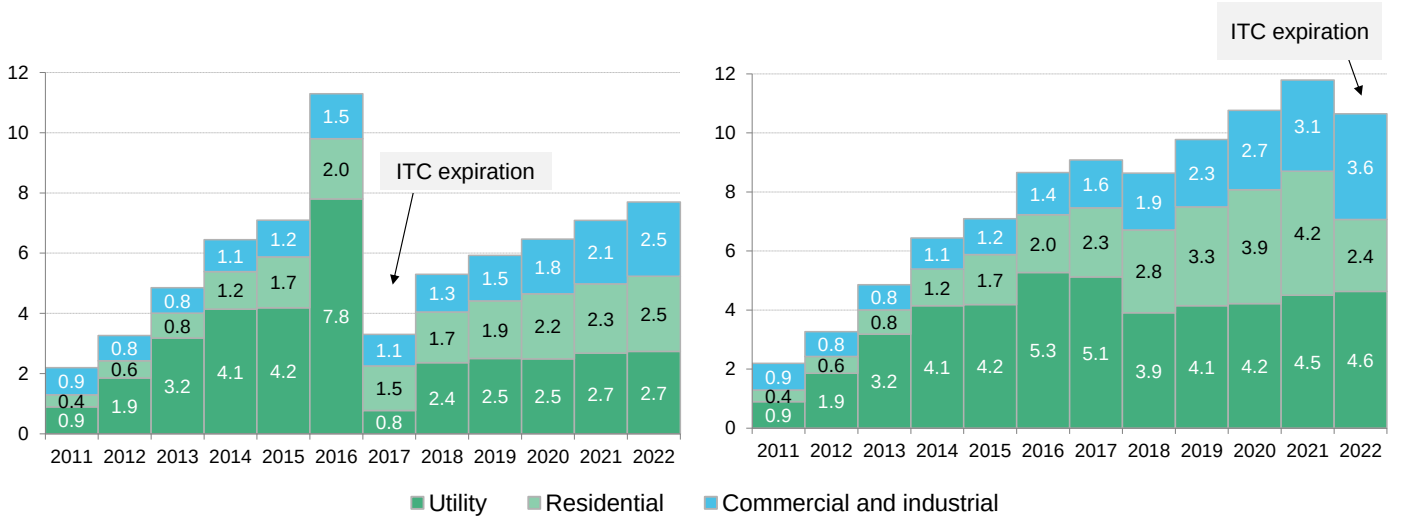
Figure 1: US solar build by customer segment, historical and forecast, 2011-22 (GW) – two ITC scenarios

Current policy

- 30% ITC steps down for projects commissioned after year-end 2016
- For 2017 onward, business-owned systems receive a 10% credit, while individual-owned systems receive no credit

ITC extension

- 5-yr extension of the ITC pushes the 2016 deadline back to 2021
- A 'commence construction' clause is added to the business credit (Section 48)



Source: Bloomberg New Energy Finance, EIA 826, 860 and 861. Note: For source of historical capacity (2011-14), see Figure 2.

NATIONAL SOLAR BUILD FORECAST

All eyes in the US solar industry are on 2017. The federal investment tax credit (ITC) – which provides a tax credit equal to 30% of the total system value – decreases for any project placed in service after 31 December 2016. The personal investment tax credit (Section 25D) fully expires, while the business energy investment tax credit (Section 48) falls to 10%.

To quantify the impact of the ITC change, Bloomberg New Energy Finance forecasted US solar build under two scenarios (Figure 1 and Figure 2):

- **Current policy:** The personal and business tax credits step down to 0% and 10%, respectively, for projects commissioned in 2017 onward.
- **ITC extension:** The ITC is extended 5-years, pushing the year-end 2016 deadline to 2021. In addition, a 'commence construction' clause is added to the business tax credit, which allows projects that begin construction prior to 1 January 2022 to receive the full 30% credit (instead

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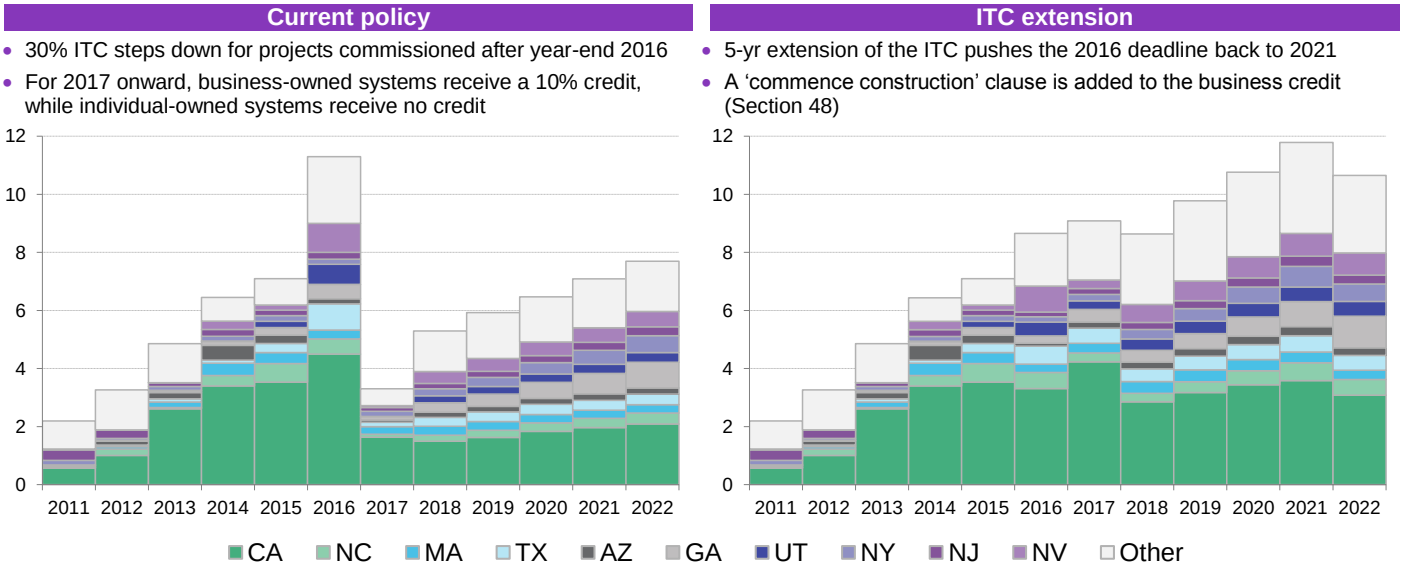
of only those that are fully commissioned). Our forecast assumes that the extension is confirmed in mid- 2016, giving projects time to prepare for the new policy.

Under existing policy, we expect the US to add 54GW of new capacity between 2015 and 2022 (6.8GW/year) – a nearly three-fold increase over the 19GW built through 2014. But the incremental capacity gained with an ITC extension exceeds 22GW: the US builds over 76GW from 2015 to 2022 in the extension case.

The timing of the extension is important. We view summer 2016 as the latest deadline needed for an extension to significantly affect developers' timelines for utility-scale projects. The uncertainty alone regarding the policy could force 2016 to look closer to the existing policy case in Figure 1 and Figure 2, even if an extension did eventually pass by end-of-year; few large project owners would risk losing the 30% credit.

Total build for top states are shown in Figure 2. State-level results for each customer segment – utility, residential, and commercial and industrial (C&I) – are highlighted in Figures 3-5 below.

Figure 2: US solar build by state, historical and forecast, 2011-22 (GW) – two ITC scenarios



Source: Bloomberg New Energy Finance, EIA 826, 860 and 861. Note: Historical build in 2011-13 is obtained from EIA. For utility-scale, 2014 is based on BNEF's project database; for rooftop (residential + commercial and industrial), 2014 is a combination of 826 data and our economic modelling of those utilities excluded from the 826 sample base. Additional segment-specific assumptions are included in Figures 3-5 below.

Summary of forecast methodology

Our solar build forecast is the total of: the visible **pipeline** of utility-scale projects in development; a calculation of how much build will be **economic**; and any remaining build needed to satisfy binding **policy** requirements, such as RPS standards or capacity targets.

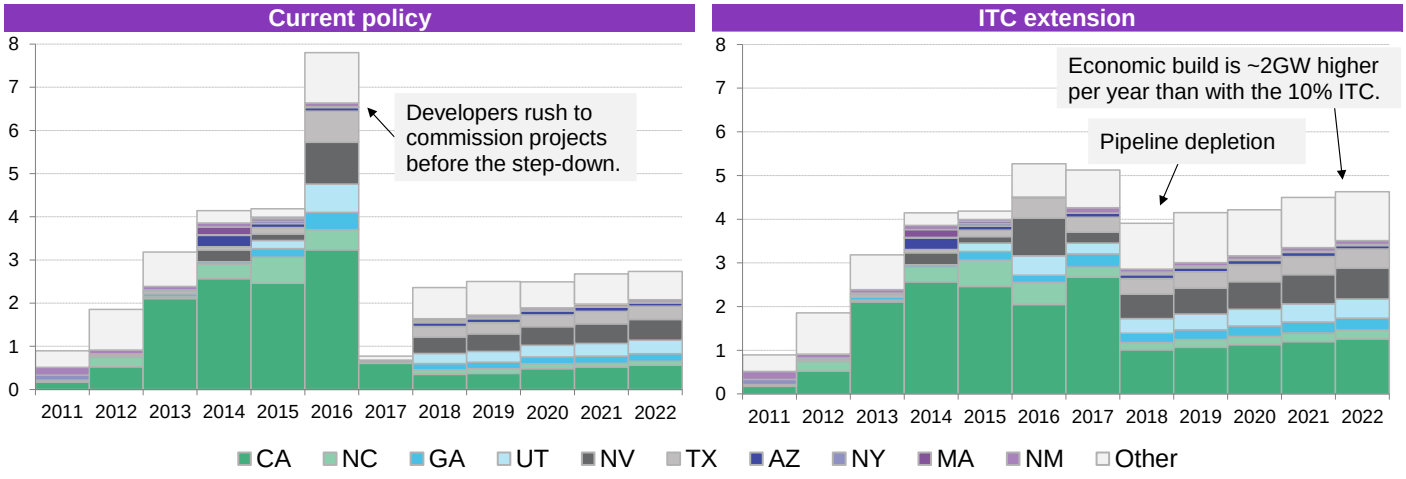
Of these three sources, the calculation of economic build requires the greatest number of assumptions. These include state-level capex estimates; a value for solar generation, measured by retail and wholesale power prices; how both costs and power prices will change in time; and the ultimate relationship between economic measures and the total MW put into the ground.

We chose our assumptions for this analysis to ensure forecasted **build is a reflection the patterns of historical adoption**, across customer segments in each state, and **the fundamental economics of building a new system**. Key modelling decisions by segment are included in the notes for Figures 3-5.

Utility-scale

The impact of the ITC extension is greatest for utility-scale among the three segments. With current policy, we expect total build to hit nearly 26GW from 2015-22; an extension boosts build to over 36GW, for an increase of over 10GW (Figure 3). The states that gain the most, on an absolute basis, are California (4.3GW), Nevada (1.1GW) and Texas (0.7GW).

Figure 3: Utility-scale solar build by scenario and state, historical and forecast, 2010-22 (GW)



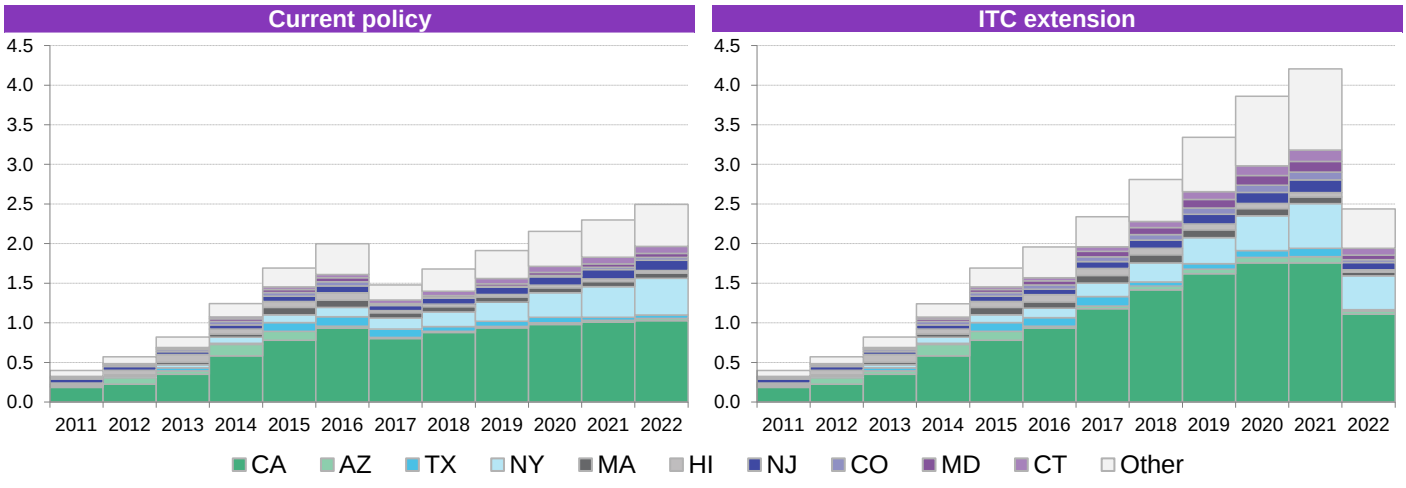
Source: Bloomberg New Energy Finance, EIA 826, 860 and 861. Note: Historical capacity for 2011-13 is obtained from EIA. Pipeline capacity is a combination of EIA 860 data and BNEF's project database. The ITC extension shifts projects with an expected commissioning date in Q4 2016 and boosts the likelihood of commissioning for second-tier developers. Economic build is based on the relationship between levelised cost of energy and state wholesale price estimates. Forward wholesale prices are based on market traded prices quoted to the Bloomberg Terminal.

Residential

We model 15.7GW of new residential capacity from 2015-22 under current policy – a 4x growth over the 3.8GW operating in 2014. Annual build rates average 2GW/year after the 2017 ITC step-down, and the national market takes 3 years to bounce back to 2016 install levels.

An extension increases total build to 22.6GW, and annual build steadily climbs each year through 2021, averaging 3.2GW/year after 2017. Those states that gain the most with an extension are California (3.2GW), New York (0.4GW) and Maryland (0.4GW).

Figure 4: Residential solar build by scenario and state, historical and forecast, 2010-22 (GW)



Source: Bloomberg New Energy Finance, EIA 826, 860 and 861. Note: Historical data for 2011-13 is obtained from EIA; 2014 is a combination of 826 data and our economic modelling of those utilities excluded from the 826 sample base. 'Commence construction' clause in ITC extension scenario does not apply to the personal ITC, leading to the drop in economic build in 2022 when the 30% credit expires. Consumer adoption is modelled by major utility in each state, and the total addressable market is scaled by annual economics. Economics are modelled assuming host ownership. Retail rates are based on bottom-up tariff analysis of variable rates and are assumed to remain flat from 2015-22.

Ownership assumptions for residential economic build

Our residential forecast is based on a consumer adoption model, and we scale the total addressable market based on the fundamental economics of building a new system, measured by the payback period (how many years are required for a consumer to break even on the upfront equipment costs). In this analysis, we calculated the payback period for *host-owned* systems – meaning that, no project receives a tax credit after 2016 in the policy as usual scenario.

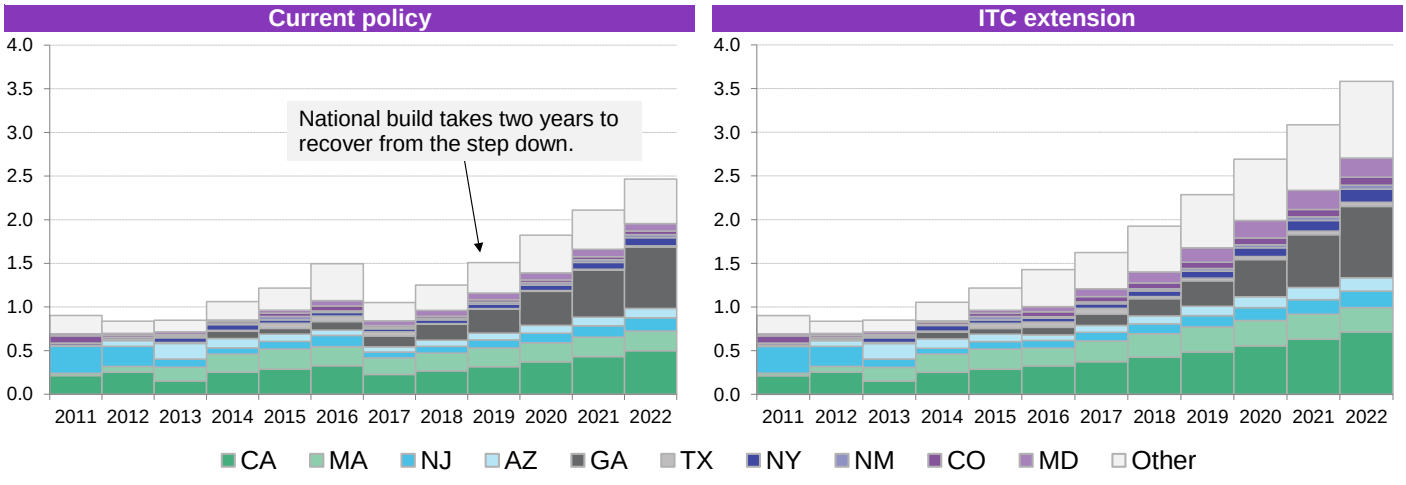
This choice is conservative. It ensures that forecasted build reflected fundamental changes in system costs without the ITC, rather than an assumption for the future distribution between host- and third-party owned systems. In addition, the calibration of our model against historical adoption by state inherently captures the growth where third-party ownership is used. The economics scale the market, but the adoption curves determine the rate of build.

But in reality, under current policy, we expect that third-party installers will have an advantage because they will be able to monetize the remaining 10% business investment credit after 2016. As a result, a greater uptake of third-party ownership in the absence of the extension represents an *upside* risk to our forecast.

Commercial and industrial

Under current policy, we forecast 12.9GW of new C&I capacity from 2015-22, just under a 3x increase over 4.6GW of operating capacity in 2014 (Figure 5). With an extension, build grows to 17.8GW over the same time period, with annual build rates averaging 2.2GW/year.

Figure 5: Commercial and industrial solar build by scenario and state, historical and forecast, 2010-22 (GW)



Source: Bloomberg New Energy Finance, EIA 826, 860 and 861. Note: Historical data for 2011-13 is obtained from EIA; 2014 is a combination of 826 data and our economic modelling of those utilities excluded from the 826 sample base. Consumer adoption is modelled by major utility in each state, and the total addressable market is scaled by annual economics. Economics are modelled assuming host ownership. Retail rates are based on bottom-up tariff analysis of variable rates and are assumed to remain flat from 2015-22.

A note on C&I economics

The economics for commercial and industrial systems (C&I) are subject to greater variation than to residential systems. Electricity tariffs are more complicated – often featuring the addition of demand, fixed, and time-of-use charges – and the variable portion, which solar generation can directly offset, is usually lower. (Our rate assumptions are based on a bottom-up analysis of C&I tariffs by utility. While far from perfect – we do not know how many customers ultimately lie within each tariff – the analysis does provide a better estimate of actual value to C&I customers over utilizing EIA average rates.)

But, C&I projects have two cost advantages host-owned residential systems do not: they can monetize the 10% business tax credit post-2016 and take advantage of other tax benefits that host-owned residential systems are not (such as accelerated depreciation).

The states with the greatest C&I build in Figure 5 are those that have strong historical patterns of adoption and feature short payback periods, driven either by low system costs or higher-than-average variable rates.

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