

Question	Answer
Is \$16-\$19 / MWh total value or net value after investment? If the former is this sufficient to drive adoption ... what's the cost curve for flex assets?	This result reflects system cost savings (across demand-side flexibility levels) that have been leveled by the corresponding increase in the magnitude of flexible load (megawatt-hours). The latter result should be interpreted within the context of many sources of uncertainty, including the assumption of full system-wide optimization for load shifting, necessary parameterizations given the fidelity of the modeling, and a lack of barriers and costs to implementing and operating demand-side programs.
To what degree is it anticipated that increased EV charging implementation will displace the need for massive industrial battery solutions? (edited)	I don't have any relevant expertise or insights here; our modeling does not consider or evaluate such a tradeoff.
Looking at Slide 7, seasonal share of top 100 hours/magnitude of peak, does this mean that electrification will spread peaks and improve utilization of assets?	Results on Slide 7 show the top 100 hours over the course of they year, color-coded by season; the main takeaway here is that electrification can result in the emergence of "dual peaks" over the course of the year. The hourly load profiles are available for download on our analysis website (https://data.nrel.gov/submissions/126) and would provide greater insights about whether peaks are spreading. We do see the potential for improved utilization of assets under increasing electrification.
Could you elaborate on the parameters and methodology used to quantify flexibility? Were they different for the different sectors/type of load?	In ReEDS, demand-side flexibility is modeled as "load shifting," which can be thought of as the ability of a central planner to control or provide incentives for a fraction of a subsector's electrical load to move from one hour to another. In the present representation of demand-side flexibility, we first estimate the amount of flexible load that can potentially be shifted for each end-use subsector (Mai et al. 2018), based on the load characteristics and end-use technology distribution within the subsector. The load is then further constrained by assumptions about the timing of shiftable load; direction load can be shifted; duration of time load can be shifted; and customer participation rate.
What was your assumption for EV charging infrastructure build out? Mostly in res. buildings? Or at offices/retailers? How does that change charging times?	Our EV charging infrastructure scales with the deployment of EVs, and reflects a combination of residential, commercial, and public charging. This does define our native load profiles, but it is also subject to our flexibility constraints (which allows for charging loads to be shifted throughout the day).

Is flexible demand dispatched according to consumer opportunity cost of shifting/curtailing demand, direct costs like battery lifetime impacts or other?	Flexible demand is dispatched to minimize bulk power system costs.
Do the generation capacity additions include both front-of-the-meter and behind-the meter?	They include front-of-the-meter additions for all technologies, as well as behind-the-meter PV additions.
many scenarios speak of deep electrification of residential sector to meet 2050 goal. you show no growth in consumption. due to efficiency improvements?	That's correct; our High electrification scenario involves deep electrification of the residential sector, but efficiency improvements (and the displacement of low-efficiency electric space heating) largely offset the growth in annual demand.
Is the impact on gas consumption, NG infrastructure utilization, and NG prices (impacting both direct consumption and gas elec gen) considered? 'death spiral'?	The analysis only considers the impact of reduced end-use gas consumption on natural gas prices in the power sector.
Especially for the Northeast, how did emission regulation programs like the Regional Greenhouse Gas Program factor into generation modeling?	All state-level and regional policy programs are included in the ReEDS model; however, recent updates in policies are not represented, simply due to when the model runs were performed.
Do the 2050 stacked bar charts include offshore wind development?	Yes.
Can you say anything about how your assumptions on flexibility of EV charging correspond with empirical findings on that subject?	EV charging assumptions are rooted in empirical findings on that subject, where the most successful flexibility programs helped to define our Enhanced flexibility scenario.
Spur line capacities, are they new investments?	In ReEDS, intra-regional spur lines are built within a given model balancing area to connect new wind and solar generators to the existing transmission network.
Why is there shifting of load away from night hours even when there is curtailment at night?	The graphic presents a national scale result, so the curtailment may occur in a different region than the load shifting.
I would like to understand more about the role of battery storage in your modeling	Please see the ReEDS model documentation and our annual Standard Scenarios report. All battery storage results in the presentation were utility-scale deployments.
Is it possible within ReEDS to impose a CO2 goal, say 90% reduction from 2005 into the result? Otherwise there is always a lot of gas.	Yes, that is possible to do in the ReEDS model.
Could you elaborate a bit on your assumptions related to the distinction between onshore and offshore wind in terms of the expected future generation mix?	Results show total wind capacity, including both onshore and offshore wind. The vast majority of wind capacity in our scenarios is onshore wind.
Slide 18: Does this include the utility system investments necessary to control & monitor the DR? What was installed v. achieved MW	No, it does not. MW comparison on this slide represents changes in total installed generation capacity on the bulk power system.

with respect to 2050, what is assumed about VRE resource availability in the high VRE cases. Is this "average: or "worst case" conditions?	VRE resource availability is based on standard assumptions in the ReEDS model.
What did you assume for the trajectory of battery costs, both for EVs and for utility storage?	Battery storage costs are based on established (but now somewhat dated) datasets. Please see the 2018 ReEDS documentation for more details.
How does GHG emissions vary by scenario, especially impact of demand flexibility?	We evaluate CO2 emissions in our study. Across all supply-side scenarios, electrification drives a reduction in CO2 emissions. Under our Low RE Cost scenario, 2050 emissions approach 80% reductions below 2005 levels. The isolated impact of demand-side flexibility is a slight increase in emissions (relative to lower levels of flexibility), but at a magnitude that is well below the electrification-driven reductions in emissions.
What are the prospects for the flexibility valuation determined by PLEXOS to be fed back to capacity expansion modeling that includes this valuation?	As this is the final phase of the EFS, we will not be pursuing additional analysis under this project. But this is technically feasible.
Did you consider demand elasticity (price response of demand), beyond time shifting?	We did not.
Are the forecasted capacity requirements based on current operational practices? Could market and operational changes impact EFS estimates?	Yes and yes.
Do you model higher natural gas prices caused by higher use of natural gas?	Lower natural gas prices cause higher use of natural gas in the power system.
What are the assumptions behind different demand side flexibility? Please give the source materials.	This information will be published soon, but in general, our Current demand-side flexibility holds customer participation constant at estimated levels for existing demand response, variable pricing, and demand-side management programs. Base demand-side flexibility reflects the implementation of the most successful demand response programs in-place today (by sector) across the contiguous United States. And Enhanced demand-side flexibility level represents an expansion of the most successful demand response programs into all sectors and regions of the contiguous United States (Kaluza, Almeida, and Mullen n.d.).