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NJ EMP CONSULTANT REPORT: https://www.nj.gov/emp/pdf/New\_Jersey\_2019\_IEP\_Technical\_Appendix.pdf

Page 12 2.3.2. **Least cost energy supply side decisions**   
Resource capacity is shown in Figure 5 and Figure 6 Figure 6 at 5 year increments from 2020 to   
2050. There is significant growth in capacity in the Least Cost Case and in the Variations.

**In the Least Cost Case, installed generating capacity is 3.5 times the capacity of today’s fleet. This is partly due to the doubling of load due to electrification. The additional growth is due to the lower capacity factor of renewables compared to the thermal generation supplying New Jersey with electricity today.   
Firm capacity increases from 12 GW to 17.5 GW by 2050. This is driven by the need for reliability when renewable output is low.**

**By 2050 the least cost option for providing firm [electricity generation] capacity is burning 100% clean gas (biogas and small amounts of hydrogen) in existing and new gas generators. While capacity increases, the utilization of the capacity drops significantly. The economic use of this capacity in 2050 is to provide energy during infrequent weather events that limit the quantity of available renewables.** Burning limited amounts of biogas during these periods is more cost   
effective than building a high‐duration battery energy storage fleet that would be discharged   
infrequently.

Economy wide,   
**gas usage drops over time, shown in Figure 10, with the biofuels component of pipeline gas supply in 2050 feeding the electricity system to comply with the 100% Clean Electricity requirement.**   
The remaining natural gas in 2050 is used for non‐electrified space and water heating loads and industrial processes.   
**Overall [gas] consumption declines by approximately 75% from 2020 to 2050.**   
Offshore wind and energy storage build exceed current mandates, with 11 GW of offshore wind   
and 9 GW of storage built by 2050.   
**Nuclear is found to be cost effective and is extended beyond its current permit lifetimes.**

**New Jersey also imports energy from out‐of‐state resources (Figure 7), serving 21% of load by 2050 (Figure 8). Transmission expands from 7 GW to 9 GW to import additional out‐of‐state generation (Figure 9). It is more cost effective to build additional in‐state resources than expand the transmission further to the maximum 14 GW allowed in the model assumptions.**

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**Pg 14:** 2.3.3. Costs   
Costs include demand‐side equipment, such as vehicles and appliances, supply‐side equipment,   
such as wind turbines and power plants, and their fuel and operating costs. The components of   
cost include the annualized capital costs of demand‐ and supply‐side energy equipment   
investments, variable fuel costs, and fixed and variable operations and maintenance costs. This   
can be thought of as an   
**“energy system revenue requirement” – the annual cost of producing, distributing and consuming energy in New Jersey.**   
The costs presented here do not include costs outside of the energy system or benefits from   
avoiding climate change and air pollution. **All costs are in 2018 dollars**.   
Because costs include investments in technologies and fuels beyond the electricity system, they   
are not indicative of rate impacts. Investment in vehicles is a large component of costs for   
example, as is the investment in fuel for vehicles or the costs saved when not purchasing fuel in   
the case of electric vehicles.   
Figure 11 shows the cost components of each of the cases relative to Reference Case 1. All costs   
on the positive side of the y axis are things that New Jersey spends more on than in Reference   
Case 1. An example is the electricity grid shown in light blue. Load growth from electrification   
requires additional T&D investment over Reference 1. All costs on the negative side of the y axis   
are things that New Jersey spends less on than in Reference Case 1.   
**The largest savings when decarbonizing the New Jersey economy is avoided purchases of fossil fuel products**.   
The difference between the positive components and the negative components gives the net cost to   
New Jersey per year of decarbonizing its economy. These are shown by the black diamonds.   
Figure 12 plots these net costs side by side to compare the annual costs of all variations relative   
to Reference Case 1.   
Costs follow a similar pattern in many of the cases where there are early net cost increases as   
more expensive demand side equipment, such as electric vehicles, are invested in at the same   
time as transitioning the electricity system towards renewables.   
**As technology costs decline in the future, net costs begin to drop as prices for clean technology become more cost effective relative to the equivalent reference investments made in the Reference Case.**   
  
**In the Least Cost Case, this dynamic is clear going into 2045. Net costs tick upwards again to get to 2050 because of investments in offshore wind and the need for biofuels to displace natural gas in electricity production to achieve 100% Clean Electricity.**