



**Institute for Energy Economics
and Financial Analysis**

Dominion Virginia's Improbable IRP

*Virginia Regulators Should Reject the Utility's
Long-Term Resource Plan*

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Key Findings

Dominion Energy's latest long-term energy resource plan for Virginia is replete with questionable assumptions and highly uncertain projections for the 15 years that the plan covers.

The IRP features an extremely high capacity price forecast for the PJM power market, skewing the analysis in favor of keeping the company's old, polluting fossil fuel plants online.

The plan also includes projections that hydrogen will be a viable, cost-effective replacement for gas, without any hard cost and supply data.

As it stands, Dominion's IRP contains significant long-term risks for the utility's ratepayers and Virginia's energy security.



Executive Summary

Dominion Energy's latest long-term energy resource plan for Virginia is replete with questionable assumptions and highly uncertain projections for the 15 years (from 2024 through 2038) that the plan covers. Nothing illustrates this better than the utility's incandescent estimates for energy demand growth from data centers in its service territory—an average increase of roughly 11% a year for 15 years. But there are many other shortcomings in the company's 2023 integrated resource plan (IRP), which is now pending before the Virginia State Corporation Commission (SCC). Among these shortcomings:

- An extremely high capacity price forecast for the PJM power market, which covers Dominion's Virginia service area, that skews the analysis in favor of keeping the company's old, polluting fossil fuel plants online;
- Unlikely assumptions regarding future generation from both its old coal and newer gas assets;
- Projections that hydrogen will be a viable, cost-effective replacement for gas, without any hard cost and supply data; and
- A refusal to even examine additional energy efficiency measures, which have been shown repeatedly to be the least-cost supply option in many cases.

IEEFA believes state regulators would be well-advised to have the utility address and revise these shortcomings before endorsing the utility's plan.

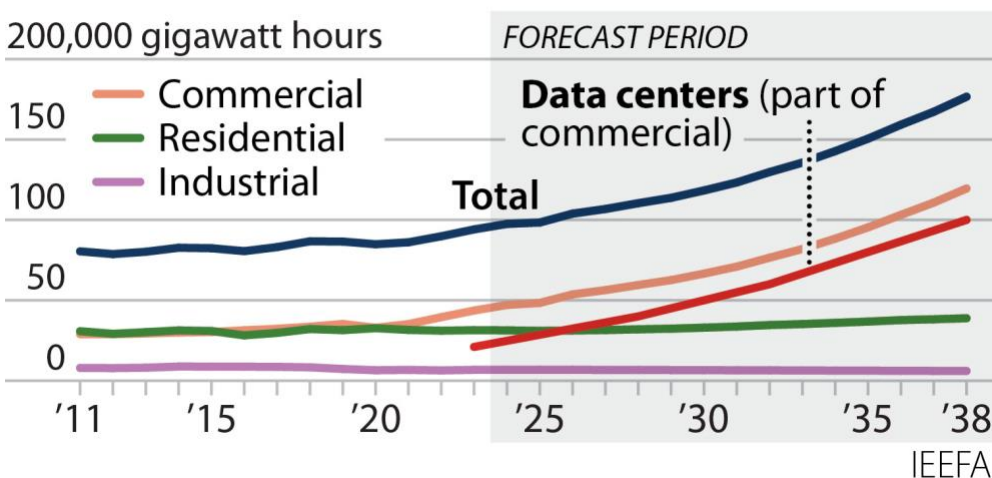
Dominion’s Forecast for Data Center Demand

Dominion’s 2023 long-range resource plan projects that data center demand growth will jump from an estimated 21,000 gigawatt-hours (GWh) this year to 100,000 GWh in 2038—a 376% increase that would amount to an average annual rise of 11%.

This projection, if borne out, would essentially transform Dominion into a data center generation subsidiary. By 2038, 83.6% of its commercial sales and 56.6% of its total sales would be consumed by data centers, according to the company’s estimates—hardly a scenario for balanced growth.

Figure 1: Dominion’s Virginia Demand Growth Forecast (GWh)

The outlook is entirely dependent on data center growth



Source: Dominion Virginia IRP.

Dominion has defended its estimates in testimony on the IRP by noting that the company has signed contracts for development work that will lock in at least a portion of the forecasted growth over the next five years or so. Farther out, however, the outlook is much less certain, as has been pointed out by several intervenors in the Dominion IRP case.

Enverus, a consulting firm hired by SCC staff to analyze the company’s proposals, has a much more conservative view of the utility’s likely demand growth. Its forecast, which runs to 2047, projects that Dominion’s electricity demand will never top 160,000 GWh, much lower than the company’s 176,000 GWh estimate for 2038. Commenting specifically on Dominion’s aggressive data center demand forecast, Enverus raised two related concerns.¹

First, the consulting firm said, transmission-related constraints already exist, which means meeting that rapid data center demand growth will require a significant buildout of the system, taking time

¹ Enverus, for staff of the Virginia State Corporation Commission. [Testimony of Bernadette Johnson](#). Dominion IRP proceeding PUR-2023-00066. Aug. 22, 2023, p. 24.

and money. This concern was highlighted in a news report last year showing that Dominion was already warning some data center developers that they may not be able to begin commercial operation until 2025-26.²

Secondly, Enverus noted that data centers aren't tied to a particular geographic area. Rather, demand will move to where land is cheap and readily available, and power prices are low and stable. Here, there are indications that the easy development phase in Virginia may already be coming to an end. Several recent proposals in the state have generated increasing public opposition, with rising concerns being voiced about noise, water use, and air pollution from backup generators.³

These concerns were echoed by Edward Burgess, a Strategen Consulting analyst testifying on behalf of Advanced Energy United. "Dominion's load forecast adjustment for data center load is overly aggressive and does not consider several factors that are likely to moderate data center load growth in Dominion's service territory within the next decade, including a) rising transmission costs, b) land use conflicts in northern Virginia, c) data center customer preferences for clean energy, and d) demand reduction opportunities."⁴

Perhaps most telling is an analysis done for PJM by Itron (a firm that specializes in analyzing energy consumption), examining the system operator's modeling for future demand growth. In its 2022 report, Itron concluded that Dominion would likely see continued increases in data center demand, but that the rate of growth would slow after the next five years: "Factors that will impact demand growth are transmission and other physical constraints, and demand for more localized data center capacity for services that require faster response time...."⁵

Dominion's slow walk on renewables and energy efficiency (details on this below) may also undercut future data center demand growth in its Virginia service territory. The largest companies, such as Google, Meta and Amazon, all have committed to reducing their carbon footprints, and cutting emissions from the power needed to run their data centers is a key component of their plans. That, in turn, means those facilities need to run on renewable energy. If Dominion can't provide that option, those developers may opt out and build elsewhere.

² Data Center Dynamics. [Dominion Energy admits it can't meet data center power demands in Virginia](#). July 29, 2022.

³ Virginia Mercury. [Temporary air pollution exception for data centers sparks opposition in North Virginia](#). Feb. 28, 2023.

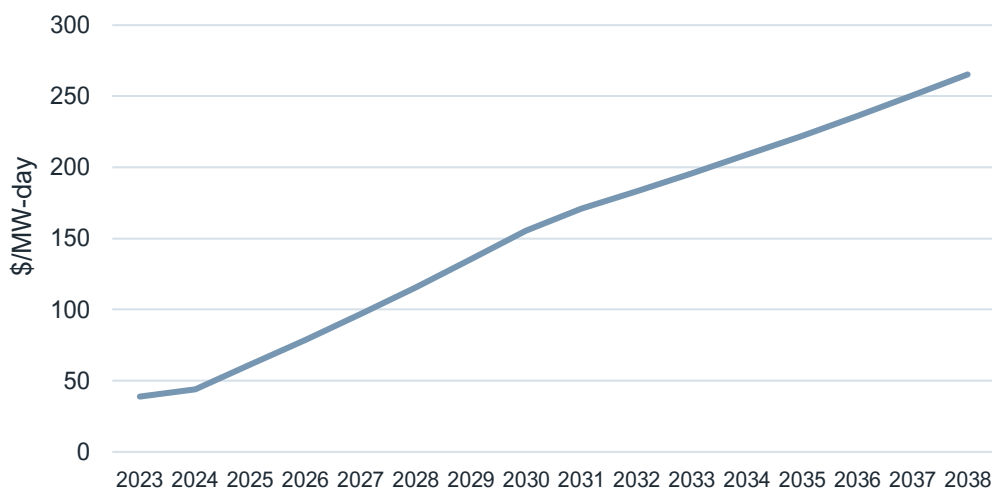
⁴ Strategen Consulting, for Advanced Energy United. [Testimony of Edward Burgess](#). Dominion IRP proceeding PUR-2023-00066. Aug. 8, 2023, p. 10.

⁵ Itron. [2022 PJM Model Review: Final Report](#). July 2022, p. 52.

Capacity Price Projections

Another key shortcoming in Dominion’s IRP is its forecast for capacity prices in the PJM market, the nation’s largest power market, stretching across all or parts of 13 states from the Atlantic Coast to Illinois. PJM makes capacity payments to generation companies to ensure enough power will be available throughout the year; the payments are in addition to what those companies get paid for actually delivering electricity. Dominion assumes that capacity prices will start climbing in the next PJM auction, currently scheduled for June 2024 for the 2025-26 delivery year (PJM power delivery years run from May 31-June 1), and continue rising through 2038.

Figure 2: Dominion’s PJM Capacity Price Forecast



Source: 2023 Dominion Virginia IRP.

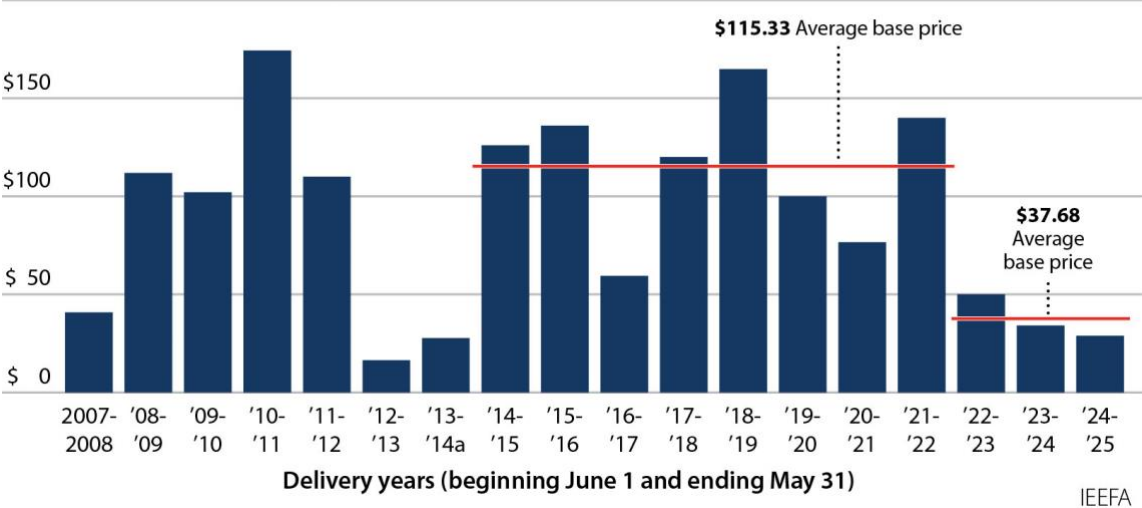
By the 2030 PJM auction, Dominion estimates capacity prices will have climbed to \$150 per megawatt-day (MW-day), a level seen only twice in PJM’s operating history. And Dominion expects them to continue climbing from there, reaching \$200/MW-day in 2034 and topping \$250/MW-day before the end of the forecast period.

Dominion’s forecast differs significantly from PJM’s historical results, where prices have declined significantly in recent years, as the graphic below illustrates. Dominion’s forecast also yields an average capacity price of \$161/MW-day—close to the highest base prices ever seen in the capacity auctions—with prices well above that average beginning in 2031 and continuing through the end of the forecast. These projections are much higher than the PJM-wide average of \$91/MW-day over the last 15 years.

Figure 3: PJM Capacity Market Prices

The PJM capacity market base price is what the grid operator pays for commitments that generation resources will be ready and available to meet demand, and is determined through auctions.

\$200 base price per megawatt-day



Source: 2023 Dominion Virginia IRP.

Dominion’s high capacity price forecasts have major implications for the utility’s decisions regarding generation resources. When evaluating existing resources, higher forecasted capacity prices make replacement generation appear more expensive, encouraging the decision-making process toward keeping older operating resources online instead of retiring them. This is clearly the case in Dominion’s current IRP, which projects that keeping its three coal-fired power plants online would be enormously beneficial—but only if regional capacity prices are high and the analysis stretches 25 years. Consequently, Dominion’s IRP does not propose retiring any of the company’s coal plants, even though two of the plants run only sparingly (Clover and the Virginia City Hybrid Energy Center), and the youngest unit at the Mount Storm facility is already 50 years old.

Coal and Gas Generation

Regardless of future PJM capacity prices, Dominion’s analysis also strains credulity in its assumptions about future generation from both its existing coal plants and its fleet of combined cycle gas turbine (CCGT) facilities.

For example, the company assumes that all three units at the 1,629-megawatt (MW) Mount Storm plant will continue operating through 2038—and that they will generate more power in the future than they do today. Specifically, Dominion says the plant’s capacity factor (the amount of power produced compared to the maximum possible amount) will climb above 50% in 2035 and remain there through the end of the forecast period. The claim is made even though all three units will be more than 60 years old in 2035, with the oldest unit turning 70 that year.

There is a substantial body of research showing that as coal plants age, their maintenance costs rise, making them less economically competitive. In a recent regulatory analysis, the Environmental Protection Agency (EPA) said: "Older power plants tend to become uneconomic over time as they become more costly to maintain and operate, and as newer and more efficient alternative generating technologies are built."⁶

The Department of Energy's Argonne National Laboratory and the National Energy Technology Laboratory have also found that older plants typically cost more to operate and maintain, and are less reliable. In particular, they found coal plant heat rates increase as the plants age and that their availability declines. Higher heat rates mean a plant requires more fuel to generate electricity, effectively raising the cost of power.⁷

Beyond these aging issues, there is recent reality. Mount Storm's average annual capacity factor has been below 50% since 2016.

Dominion's forecasts for the two-unit, 877MW Clover coal-fired facility are equally curious. The company, which co-owns the plant with Old Dominion Electric Cooperative, had said in its 2020 IRP that it would close its share of the plant in 2025 because it was not economic.⁸ The company's tune changed in the current IRP, with its high capacity price forecast and 25-year study period indicating that the plant was economically viable, posting a net present value of \$828 million.^{9,10} As such, Dominion said it expected the plant to remain in service.

Regardless of the model's finding, Clover clearly is still not economically competitive in the broader PJM market. Dominion has repeatedly raised concerns about being dependent on market purchases to meet local demand, noting that transmission constraints are likely to limit PJM imports in the future.¹¹ Still, its current IRP projects the market purchases will climb from 13,545 GWh in 2023 to just over 33,000 GWh in 2038. Given this, it would be reasonable to expect the utility to run its existing resources as much as possible. However, Dominion says Clover's two units, which have the capacity to generate 6,000 GWh annually, will operate less than half of the time in 2038, only producing about 2,500 GWh. This begs two questions: If the plant is economic, why is it not running more? If it is not, then why is the utility planning to keep it open?

Already economically pressed, Clover will face additional financial challenges if it continues to operate past 2030, since it would be required to install new environmental control equipment to comply with the EPA's Good Neighbor rule. The rule, finalized in March, requires electric generation units in 23 states to reduce emissions so that states downwind can comply with the agency's ground-

⁶ EPA. [Regulatory Impact Analysis for the Good Neighbor Rule](#). p. 69.

⁷ U.S. Department of Energy. [Staff Report to the Secretary on Electricity Markets and Reliability](#). August 2017, p. 155.

⁸ [Dominion Virginia 2020 IRP](#). May 1, 2020, p. 83.

⁹ Net present value is a means of calculating how much an investment is worth throughout its lifetime, measured in today's dollars. In Dominion Virginia's case, assuming a high capacity price greatly increased the value of its existing generation resources.

¹⁰ [Dominion Virginia 2023 IRP](#). Part 3. Docket# PUR-2023-00066. May 1, 2023, p. 84.

¹¹ [Dominion Virginia 2023 IRP](#). Part 4. Docket# PUR-2023-00066. May 1, 2023, pp. 112-113.

level ozone standards. Both Virginia and West Virginia (where Dominion's coal plants are located) are among the states affected by the new rule.

Finally, Dominion's forecast raises questions about the utility's gas-fired generation. The company added four large CCGT facilities in the 2010s—Bear Garden (2011), Warren (2014), Brunswick (2016), and Greenville (2018). These four plants have run well since coming online. Greenville, the largest at 1,710 MW, has posted an average capacity factor of 72% in its first four full years of operation. The other three have all averaged between 64% and 66%. Together with three smaller facilities, Dominion's CCGTs generated 33,087 GWh of power in 2022. In 2038, Dominion projects that the same seven units will generate 46,355 GWh of electricity. Based on the company's 6,313 MW of CCGT capacity, this implies that each of the units would operate at a capacity factor of 83.82%—a level that none of the plants has ever hit in the past.

Hydrogen Hope Is Just Hype

Another glaring shortcoming in Dominion's IRP is its treatment of a four-unit, 970MW combustion turbine (CT) gas facility that it is proposing to build to meet future peak demand needs. Whether the unit is needed at all hinges largely on the company's high demand growth forecast (discussed above) and its lack of support for energy efficiency (covered below).

The capital cost of the project is another uncertainty, with the company refusing to disclose cost estimates in the IRP, saying instead that details would be included in a subsequent filing. In 2019, when the company first floated plans for the gas-fired peaker plant, it estimated the project would cost \$600 million.¹² Costs likely have increased since. In a similar filing for a gas CT peaker, Northern Indiana Public Service Company (NipSCO), said earlier this year that the capital cost for its smaller proposed 400MW facility was \$560 million.¹³

Still, Dominion has included the plant in the IRP and says the facility is “assumed hydrogen capable by 2045,”¹⁴ but the details on that are spotty, at best. The 2045 date is important since existing Virginia law requires the state's utilities to retire all carbon emitting generation resources by then unless they have secured explicit state approval to continue operating a particular resource. Dominion says it “is committed to ... achieving net zero carbon and methane emissions by 2050” in its annual financial report for 2022.¹⁵

In response to data queries from Clean Virginia, Dominion estimated it would cost \$500 per kilowatt (kW) to convert the facility to run on hydrogen—\$485 million in total. But that is little more than a guess, the company acknowledged: “The estimated costs to convert facilities for hydrogen blending in 2045 is not yet known ... Therefore, the company used the \$500/kW estimated...as a high-level

¹² Chesterfield Observer. [Dominion seeks permits to build new power plant in Chesterfield](#). Dec. 13, 2019.

¹³ Charles River Associates, for NipSCO. [Testimony of Patrick Augustine](#). NipSCO CPCN proceeding 45947. Sept. 12, 2023, p. 39.

¹⁴ [Dominion Virginia 2023 IRP](#). Part 2. Docket# PUR-2023-00066. May 1, 2023, p. 24.

¹⁵ [Dominion Energy 2022 Securities and Exchange Commission 10-K filing](#), p. 9.

proxy value.”¹⁶ On top of that, the company said its estimate does not include any projected costs for fuel, hydrogen distribution or hydrogen infrastructure beyond the plant fence line.¹⁷

In other words, the company has no idea what the conversion would cost or if it is even feasible.

There is also significant uncertainty regarding the environmental benefits of hydrogen, particularly when it is produced from fossil fuels.¹⁸ Among the key concerns include:

- Current modeling assumes very low methane leakage at the point of production and during transportation, which significantly understates overall emissions (measured in terms of carbon dioxide [CO₂] equivalent).
- Use of a 100-year global warming potential (GWP) significantly downplays methane’s short-term impact since it is 83 times more dangerous than CO₂ measured over 20 years, vs. 33 times over the longer time period.¹⁹
- No leakage estimates are included downstream of the hydrogen production process.
- Hydrogen can produce high levels of nitrogen oxides when combusted in a turbine, worsening local air pollution.

Energy Efficiency—Or Not

The 2020 Virginia Clean Economy Act (VCEA) requires Dominion to gradually increase savings from energy efficiency efforts, reaching 5% of its 2019 retail sales by 2025. After that, the VCEA directs state regulators to establish new targets in 2026, and then again every three years.

Dominion’s plan assumes it reaches the 5% target in 2025, and then projects no additional energy efficiency savings through 2038 (see graphic below). That is questionable on two levels. First, with the VCEA calling for new efficiency standards every three years, it is highly unlikely Virginia regulators will keep the state’s energy efficiency standards unchanged through 2038. Second, with its high annual growth projections, rather than ignoring energy efficiency, the utility should be looking to boost these savings programs as much as possible instead of relying solely on new generation.

The key role energy efficiency could play in meeting Dominion’s future energy needs was highlighted in testimony submitted by Clean Virginia. The group’s modeling showed that achieving an incremental 1% reduction in energy use annually would significantly lower the utility’s future

¹⁶ Applied Economics Clinic, for Clean Virginia. [Testimony of Bryndis Woods](#). Dominion IRP proceeding PUR-2023-00066. Aug. 8, 2023, p. 37.

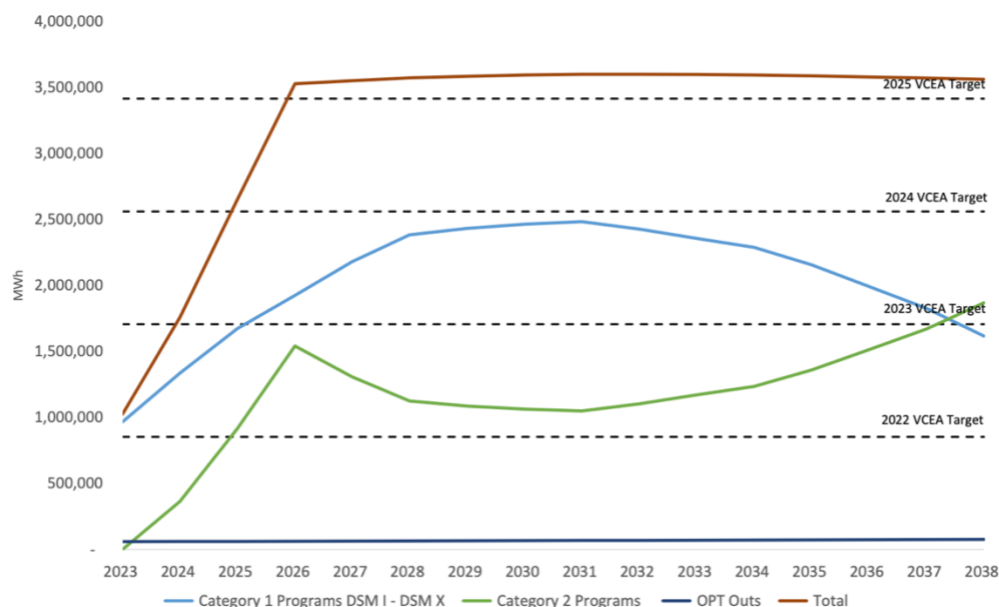
¹⁷ *Ibid.*, p. 38.

¹⁸ IEEFA released an in-depth report on the problems with methane-based hydrogen in September. It can be downloaded at [Blue hydrogen: Not clean, not low carbon, not a solution](#).

¹⁹ GWP allows for the comparison of the climate warming impacts of different gases, with CO₂ given a GWP of 1 and other gases ranked relative to that, both on a 20-year and 100-year time frame.

generation needs. By 2048, the group said, Dominion’s energy demand would be 13% lower, saving an estimated 40,000 GWh.²⁰

Figure 4: Dominion Virginia Energy Efficiency Forecast



Source: 2023 Dominion Virginia IRP.

Note from the original: All values shown are at the customer meter and do not include line losses.

Those savings, the group said, “would allow Dominion to avoid unnecessary capacity purchases and potentially avoid the need for gas-fired power plants as well, lowering costs for consumers.”²¹

Lost Leadership Opportunity

Dominion’s IRP also represents an abandonment of the energy leadership role the company briefly assumed in its previous long-term resource plan, released in 2020. In that plan, the company proposed adding 23,700 MW of solar, wind and battery storage to its system in the following 15 years.²² None of the five alternatives in the 2023 plan include more than 17,050 MW of renewables.²³

Dominion has also backtracked significantly on plans for its coal-fired power plants. As discussed above, the company did an about-face regarding the retirement of the two-unit Clover facility. It also now expects significantly more output from Mount Storm and its third plant, the 624MW Virginia City Hybrid Energy Center (VCHEC). In its 2020 plan, Dominion projected that both those facilities would still be online in 2035, but that they essentially would not be used. The company’s preferred

²⁰ Op. Cit. Clean Virginia, p. 26.

²¹ *Ibid*, p. 27.

²² PV Magazine. [Dominion plans 16 GW of solar for Virginia by 2035](#). May 4, 2020.

²³ [Dominion Virginia 2023 IRP](#). Part 2. Docket# PUR-2023-00066. May 1, 2023, p. 25-29.

alternative in the 2020 IRP estimated that the units would only generate 862 GWh of electricity in 2035—less than 1% of the utility's projected generation that year.²⁴ The current plan, by contrast, projects that coal will generate 9,967 GWh—more than 7% of its generation in 15 years, even as the company expects a significant increase in its overall generation numbers (they are forecast to climb by 60%).²⁵

Xcel, a utility with major operations in Minnesota and Colorado, offers a notable counterpoint to Dominion's languid approach to the energy transition. It is planning to retire all its coal-fired generation in those two states by 2030, a considerable effort given it still owns more than 4,000 MW of operating capacity. And at two of its plants—the three-unit, 2,238MW Sherco facility in Minnesota and the two-unit, 1,085MW Comanche facility in Colorado—the company is moving forward with long-duration energy storage demonstration projects designed to ensure that renewable energy production is available for days at a time. These two projects, both in partnership with Form Energy, just received \$70 million in funding from the U.S. Department of Energy to test a novel iron-air battery technology that promises as much as 100 hours of discharge capability.^{26, 27}

Conclusion

Dominion's proposed 2023 IRP contains a myriad of shortcomings and flawed assumptions with serious economic consequences, including:

- Little or no attention paid to potential savings from energy efficiency and demand side management measures;
- An incredible series of capacity price estimates for the PJM market;
- Optimistically high projections of future generation from both its coal- and gas-fired power plants;
- Its assessment, without backup on technical grounds or financial feasibility, that a hydrogen-burning combustion turbine will be a viable future generation option; and
- Demand growth forecasts that run completely counter to actual results in the past 10+ years.

Virginia regulators should ask for new, more realistic modeling on all of these issues. As it stands, Dominion's IRP contains significant long-term risks for the utility's ratepayers and Virginia's energy security.

²⁴ [Dominion Virginia 2020 IRP](#). May 1, 2020, p. 236.

²⁵ [Dominion Virginia 2023 IRP](#). Part 5. Docket# PUR-2023-00066. May 1, 2023, p. 33.

²⁶ The Colorado Sun. [Feds give Xcel \\$70 million for innovative clean energy storage in Colorado and Minnesota](#). Sept. 22, 2023.

²⁷ ETN. [Xcel Energy to build multi-day battery storage project using Form Energy's iron-air batteries](#). July 7, 2023.

About IEEFA

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At IEEFA, Dennis Wamsted analyzes the transition from fossil fuels to green generation resources, focusing particularly on the electric power sector.

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