# Policy Assumptions in the BAU Case for the Virginia EPS

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| **Sector** | **BAU Scenario** | **Reference Scenario** | **2030 1.5C Targets Scenario (2030 metrics)** |
| Industry | * Assumes equipment performance improvements over time | *Same as BAU* | * 100$/ton carbon tax * 70% reduction of methane leakage * 77% reduction of F-gas emissions (by 2050) |
| Electricity | * Does not include VCEA * Assumes all currently planned retirements are completed on time | * VCEA: renewable electricity and retirement of fossil generators * Building energy efficiency | * 90% Clean Energy Standard * $100/ton carbon tax * Increase demand response and transmission |
| Buildings | * Assumes equipment performance improvements over time * Virginia’s EE policies are **not** explicitly modeled | * VCEA: Building energy efficiency | * All new appliance sales are electric * Retrofit 25% of existing buildings |
| On-Road Transportation | * Includes 2012 Federal Corporate Average Fuel Economy Standards (CAFE) standards * Federal EV subsidies * Economic adoption of EVs | *Same as BAU* | * 100% new light duty vehicles & buses are electric * 40% of all new freight HDVs electric and 20% hydrogen * 13% reduction of vehicles miles traveled from 2020 levels |
| Land use/Agriculture | * Agriculture, biomass, and forestry projections | *Same as BAU* | |
| Imports/Exports | * Imported electricity emissions held constant | * Assume no reductions in production, reductions in state consumption increase exports | * Reduce imports from coal and gas plants |

## Buildings

* Energy efficiency
  + Data includes some endogenous improvement in equipment performance based on external market data (as described [here](https://www.nrel.gov/docs/fy18osti/70485.pdf)). It is unclear which, if any, EE policies are explicitly included. We can assume Virginia’s EE policies are **not** explicitly modeled, included things like building rebates.

## Transportation

* Fuel efficiency
  + Start year data taken from NREL. Later years include fuel efficiency improvements from Corporate Average Fuel Economy Standards (CAFE) including the 2021-2025 phase 2 standards. Full text from [AEO](https://www.eia.gov/outlooks/aeo/assumptions/pdf/summary.pdf): *CAFE standards are increased for model years 2011 through 2016 to meet the final CAFE rulemakings for model years 2011 and 2012 to 2016. CAFE standards are increased for model years 2017 to 2025 to meet final CAFE joint rulemakings for model year 2017 to 2021 and to meet augural CAFE standards for model year 2022 to 2025, which will undergo a midterm evaluation to finalize. CAFE standards are held constant through the end of the projection period.*
  + Start year data taken from NREL. Includes Phase I and Phase II standards for HDVs. Full text from AEO: *HD National program Phase I and Phase II standards are modeled, with both engine and chassis technologies; compliance is modeled among 13 heavy-duty vehicle V regulatory classifications that represent the discrete vehicle categories set forth in the rule; the standards are held constant in model years after 2027.*
* EV subsidies
  + Includes federal subsidies for EVs, weighted based on available credits and model availability.

## Industry

* Non-energy emissions
  + No implementation of Kigali Amendment to the Montreal Protocol.
* Industry energy
  + Data includes some endogenous improvement in equipment performance based on external market data (as described [here](https://www.nrel.gov/docs/fy18osti/70485.pdf)). It is unclear which, if any, EE policies are explicitly included. We can assume Virginia’s EE policies are **not** explicitly modeled, included things like building rebates.

## Electricity

* Renewable portfolio standard: The Virginia Clean Economy Act is **not** included in the BAU case.

## Fuels

* Carbon pricing: No carbon pricing assumed (i.e. did not build joining of RGGI into the BAU).

# Policy Assumptions in the VCEA Case for the Virginia EPS

## Clean Electricity Standard and Plant Retirements

* The scenario estimates a weighted average clean electricity standard in every year, based on historical data on generation by utility and electricity demand projections from the model to approximate generation by utility. We subtract out nuclear generation, then calculate the clean generation requirements for Phase I and II utilities according to the VCEA targets. For implementation purposes, we then calculate the total clean electricity requirements in each year by summing the requirements by utility and adding nuclear generation back in (since the model includes nuclear as a qualifying source). We have **not** addressed any specific carve-outs.
* All existing gas and petroleum plants owned by Phase I and II utilities are retired by 2045. Plants are phased out linearly.
* All coal retired by 2024.
* All biomass retired by 2028.

## Offshore Wind

* Mandated offshore wind construction reaches 5.2 GW by 2035. The scenario uses Dominion’s planned ~2 GW construction for 2024-2026, then allocates the remaining additions evenly through 2027 to 2035.

## Battery Storage

* 3,100 MW battery storage modeled by 2035. We do **not** assume additional increases after 2035.

## Energy Efficiency

* Annual BTU electricity savings were calculated based on the energy efficiency improvement requirements by utility. The scenario meets these annual BTU targets through the building component efficiency and retrofit policy levers. We do **not** assume increasing efficiency requirements after 2025.

# Customized Assumptions in the Virginia EPS

* Changes in fuel demand will be met by changes in imports and exports, not through changes in in-state production.
* The total amount of imported electricity will be held constant.

| **Sector** | **Subsectors** | **Source** | **Methodology** | **Benchmarking Sources for Comparisons** |
| --- | --- | --- | --- | --- |
| ELECTRICITY | In-state capacity and generation; out of state imports | For capacity and generation: EIA’s [Form 923](https://www.eia.gov/electricity/data/eia923/) and EIA’s [Form 860](https://www.eia.gov/electricity/data/eia860/)  For imports/exports: EIA’s State Electricity Profiles [Table 10.](https://www.eia.gov/electricity/state/minnesota/state_tables.php) | No scaling needed. Added all utility-owned generation and capacity in-state. | **Emissions -** EPA “[State CO2 Emissions from Fossil Fuel Combustion, 1990-2017](https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion-1990-2017)” &  AEO “[State CO2 Emissions from Fossil Fuel Combustion](https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion-1990-2017)” |
| BUILDING ENERGY USE | All energy use, all building components, residential and commercial buildings | [NREL Electrification Futures Study - Reference Scenario](https://www.nrel.gov/analysis/electrification-futures.html) | No scaling needed. NREL reports total energy use by fuel type and demand technology in VA for each year 2017-2050. | **Energy Use -** EIA’s “[State Energy Data Systems](https://www.eia.gov/state/seds/seds-data-fuel.php?sid=US)” 2018  **CO2 Emissions -** AEO “[State CO2 Emissions from Fossil Fuel Combustion](https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion-1990-2017)” |
| INDUSTRIAL ENERGY USE | All fuel use for industrial sector | [Energy Information Association’s Annual Energy Outlook tables on Industrial Energy Use](https://www.eia.gov/outlooks/aeo/tables_ref.php) &  EIA’s “[State Energy Data Systems](https://www.eia.gov/state/seds/seds-data-fuel.php?sid=US)” | Scaled down by Census Data ([County Business Patterns](https://www.census.gov/programs-surveys/cbp/data/tables.html)) employment by industrial subsector and state compared to national employment by industrial sector | **Energy Use -** NREL Electrification Futures and SEDS  **Emissions -** EPA “[State CO2 Emissions from Fossil Fuel Combustion, 1990-2017](https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion-1990-2017)” &  AEO “[State CO2 Emissions from Fossil Fuel Combustion](https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion-1990-2017)” |
| INDUSTRIAL PROCESS EMISSIONS | Process Emissions | [EPA Global Non-CO2 Greenhouse Gas Emissions Projections & Mitigation Potential: 2015-2050](https://www.epa.gov/global-mitigation-non-co2-greenhouse-gases/global-non-co2-greenhouse-gas-emission-projections) | Scaled down US data to state data using a variety of sources, including data from EPA’s [FLIGHT](https://ghgdata.epa.gov/ghgp/main.do) tool and [EPA’s State Inventory Tool Output Dataframe](https://www.epa.gov/statelocalenergy/download-state-inventory-and-projection-tool) | **Emissions –** VA GHG Inventories: “[Virginia’s Accomplishments Since the 2008 Climate Action Plan Release](http://ccrm.vims.edu/Report_FINAL_ExeSum.pdf)” and The Center for Climate Strategies’ “[Virginia Greenhouse Gas Inventory and Forecast](http://www.climatestrategies.us/policy_tracker/policy/index/47)” |
| LAND USE AND FORESTRY |  | [EPA’s State Inventory and Projection Tool](https://www.epa.gov/statelocalenergy/download-state-inventory-and-projection-tool) | No scaling needed. LULUCF data is already estimated by state by EPA |  |
| TRANSPORTATION | All energy use, vehicle miles | [NREL Electrification Futures Study - Reference Scenario](https://www.nrel.gov/analysis/electrification-futures.html) | No scaling needed. NREL reports miles by vehicle type and total energy use by fuel type in VA for each year 2017-2050. | **Emissions -** EPA “[State CO2 Emissions from Fossil Fuel Combustion, 1990-2017](https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion-1990-2017)” &  AEO “[State CO2 Emissions from Fossil Fuel Combustion](https://www.epa.gov/statelocalenergy/state-co2-emissions-fossil-fuel-combustion-1990-2017)” |