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Virginia Rate Impact Study

Prepared for the Virginia Alliance for a Better Renewable Energy System

Developed by: *La Capra Associates, Inc.*

Presented by: **Public Policy Virginia**

September 21, 2010

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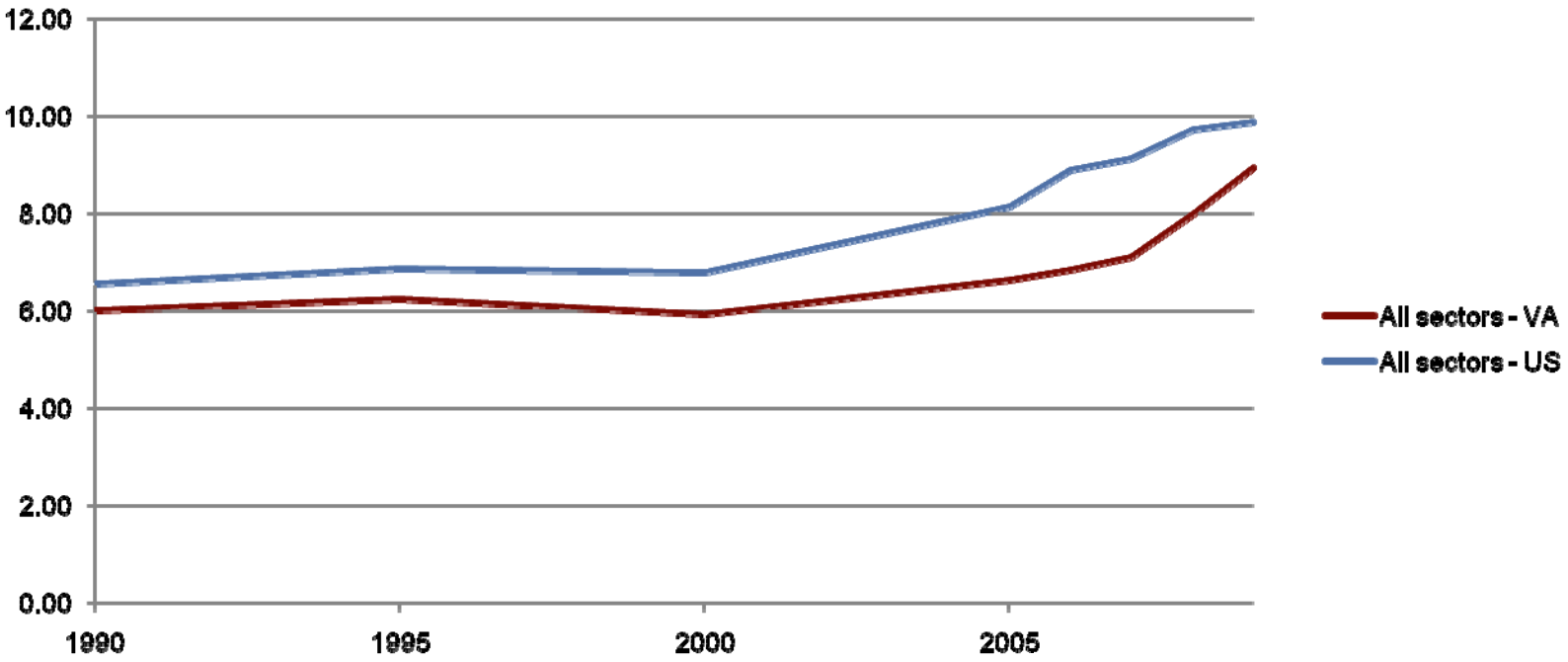
Average Retail Electric Rates by Customer Class (cents/kWh)



	1990	1995	2000	2005	2006	2007	2008	2009
All sectors - VA	6.03	6.26	5.94	6.64	6.86	7.12	8.00	8.95
All sectors - US	6.57	6.89	6.81	8.14	8.90	9.13	9.74	9.89
VA as % of US	91.8%	90.1%	87.2%	81.6%	77.1%	78.0%	82.1%	90.5%

Source: EIA State Electricity profiles, as quoted in Virginia Energy Plan, Table 2-6.

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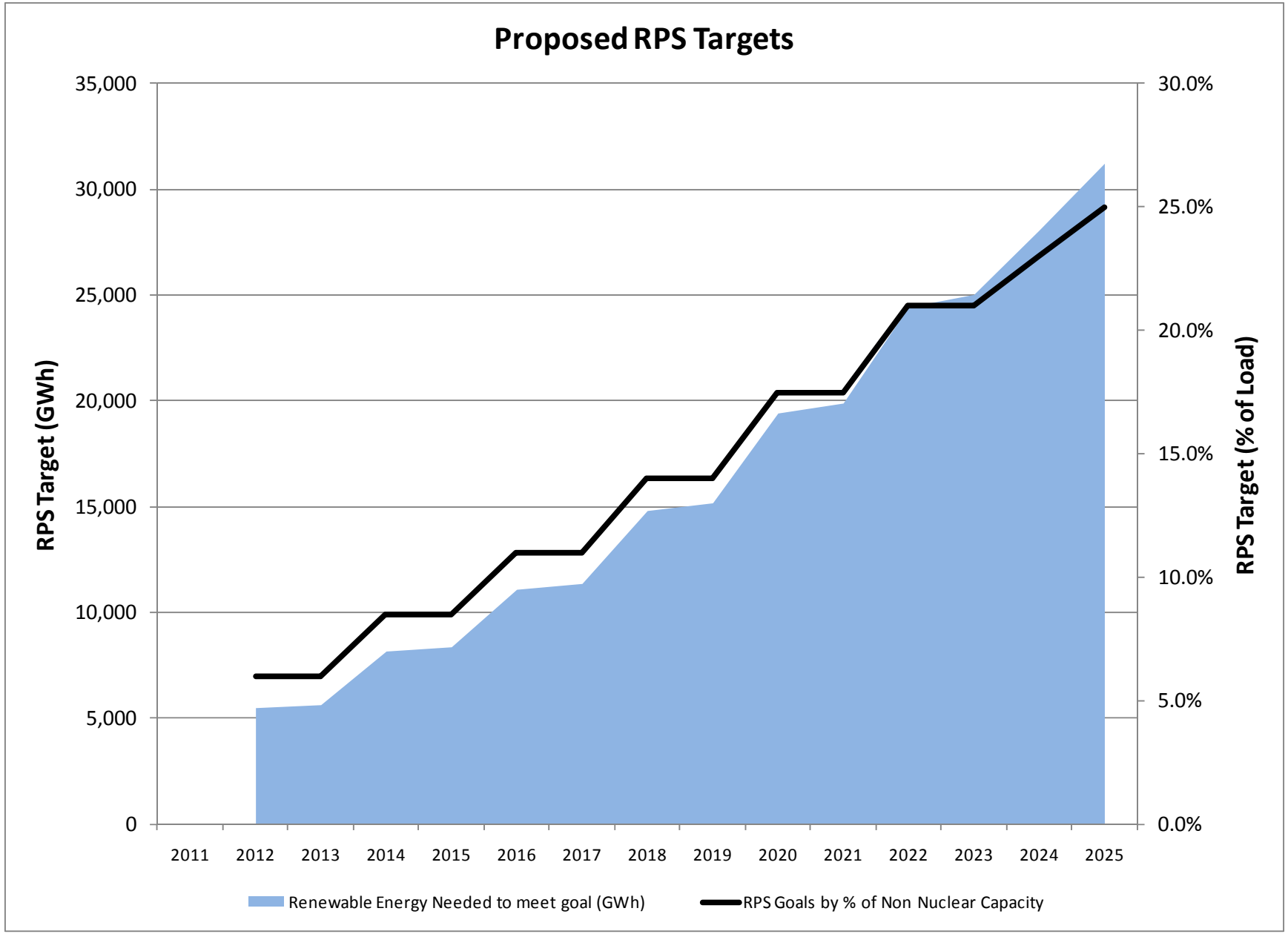

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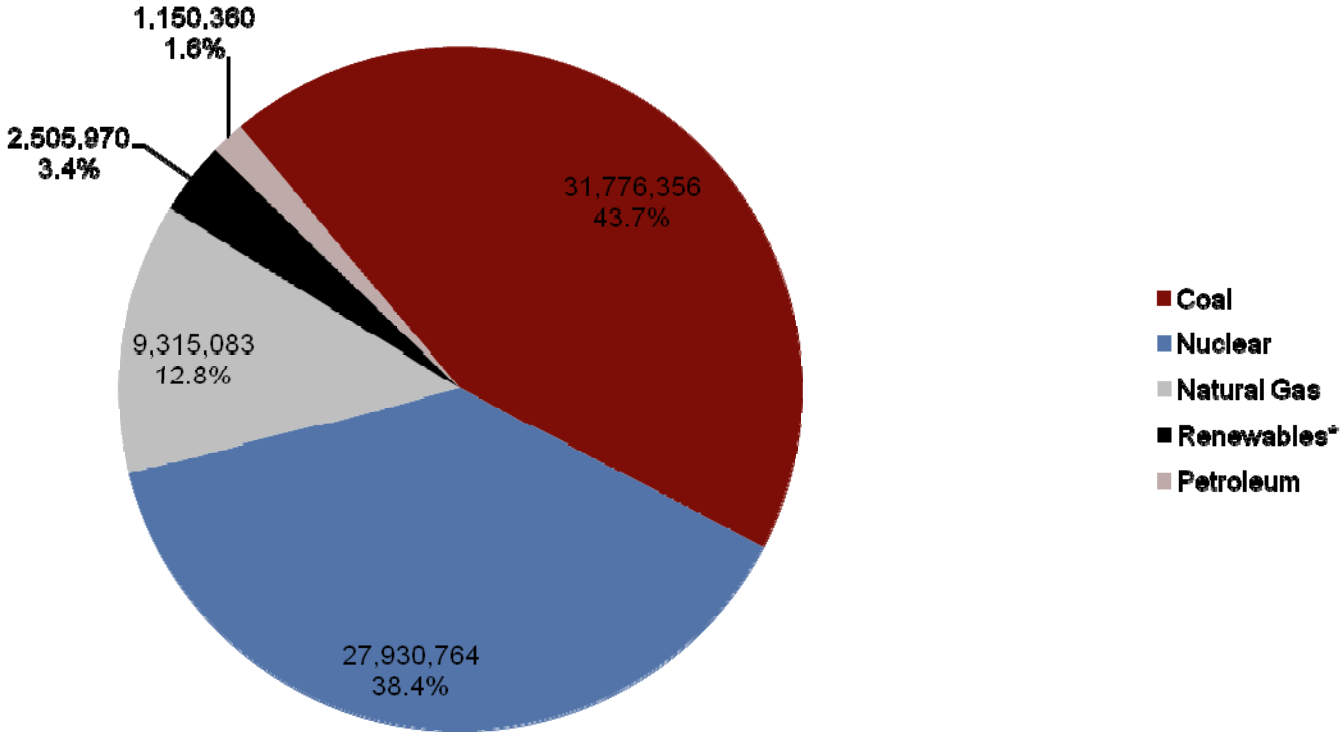
In-State Net Generation by Fuel Type (MWh), 2008



*Renewables category is sum of hydroelectric (1.4%), other renewables (3.7%), pumped storage (-2.3%), and other (0.6%). The same grouping is made in the Virginia Energy Plan, Figure 2-4.

Source: EIA, State Electricity Profile, http://www.eia.doe.gov/cneaf/electricity/st_profiles/sept05va.xls.

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Comparison of Current RPS and the Udall Model

RPS Attribute	Current RPS	VABRES Model
Mandatory/Voluntary	Voluntary	Mandatory
Percentage Renewables	15% of 2010 retail sales by 2025	25% of 2025 retail sales in 2025
RECs	Bonus RECs for onshore wind, offshore wind and solar	All resources receive the same RECs
Existing generators eligible?	Yes	No
Eligible Resources	solar, wind, geothermal, hydropower (excluding pumped storage), wave, tidal, and biomass energy	solar, wind, geothermal, hydropower (excluding pumped storage), wave, tidal, and biomass energy
Location of Resources	Virginia or in the interconnection region of the regional transmission entity	Virginia only

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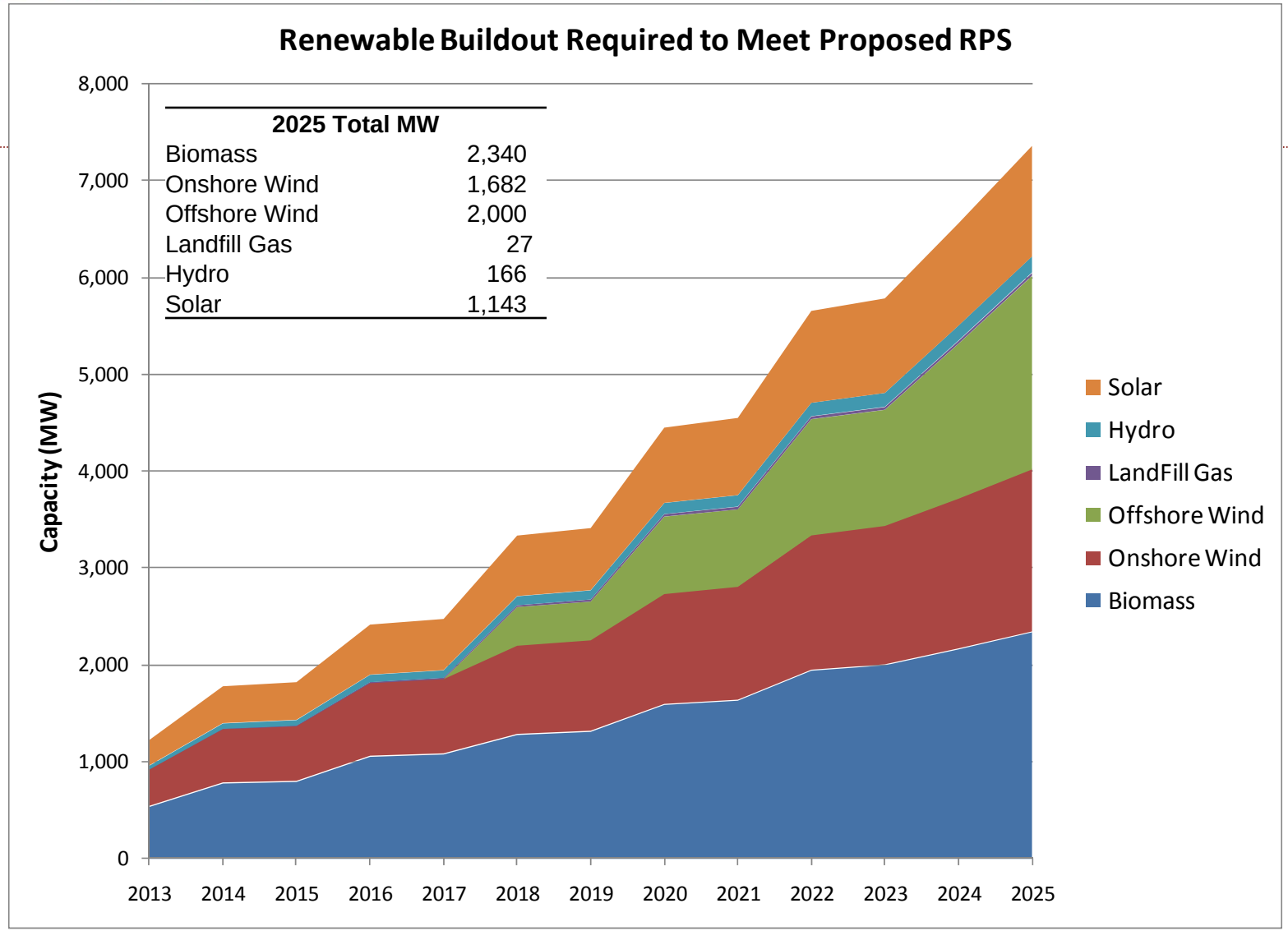

*Note that the installed renewables required to meet the RPS are close to or greater that the potential given in the Virginia Energy Plan. The Plan gives the following potentials: Onshore Wind (1,793 MW), Offshore Wind (28,000 MW, 3,000 MW in less than 30 M depth), Biomass (760 MW), LFG (30 MW). In addition the near term hydro potential given in "A study of Increased Use of Renewable Energy Resources in Virginia" is estimated to be only 200 MW)

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Key Input Assumptions

- **Assumed VA load growth of 1.94% based on a weighted average of Dominion and AEP growth rates in PJM's 2010 projections**
- **Production Tax Credit (PTC) expires in 2012/2013 and is not re-extended**
- **Technology improvements will reduce the capital costs of offshore wind by one percent per year and solar power by two percent per year**
- **Nuclear and CCS are desired in the nuclear/CCS scenario (60/40)**
- **No transmission upgrade costs are included**

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General Methodology

- Required energy to meet RES model was calculated using estimated VA load and RES percentage from the Udall model.
- Renewable build-out was determined based on resource potential listed in the VEP, as modified.
- A levelized revenue was estimated based on expected energy prices in VA and capacity prices in PJM
- A levelized cost was calculated for each resource type for each year
- The net cost was calculated for each resource type
  - Net cost = levelized cost – levelized revenue
- The net cost was multiplied by the incremental energy required each year and added to the total net cost from the previous year increased by inflation, so:
  - Total RPS cost in $Year_X$ = (Cost in $Year_{X-1}$)x(1+inflation) + (net cost x energy needed)
- The total cost in each year is divided by the total load to determine the rate impact

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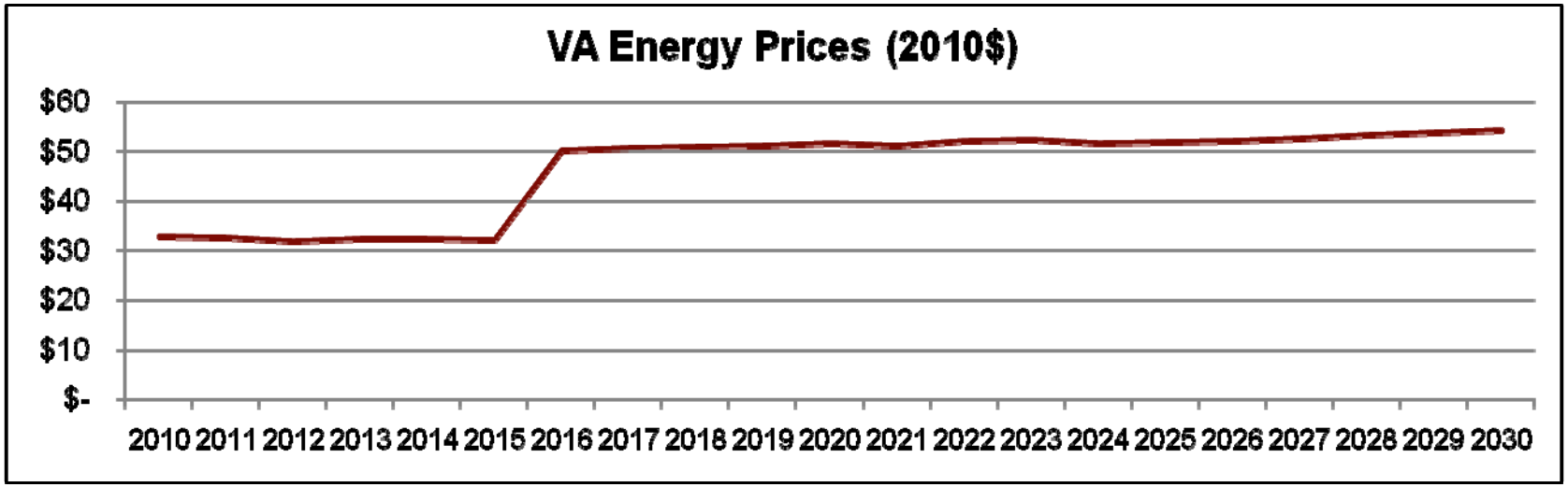
Energy and Capacity Price Assumptions

- **Energy price forecast was estimated from La Capra's Aurora model.**



- **Energy prices include a carbon price based upon EIA's basic case modeling for the American Power Act and start at $34 per ton in 2016**
- **Capacity prices start at $27.75 per MW Day in 2013 and increase with inflation based on PJM Reliability Pricing Model Auction results for 2013**

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Resource Cost Assumptions

	Capacity Factor	Modeled Project Size (MW)	Total Installed Cost (2010$/kW of rated max output)	Technology Decline Rate (% in Real$)	Fixed O&M (2010$/kw-yr)	Variable O&M Costs (2010$/MWh)	Fuel Heat Rate (btu/kWh)	PTC Eligible	2025 Levelized Cost ($2010)
Onshore Wind	33%	60	$ 2,300	0.0%	$ 47	$ 2.00		100%	$122
Offshore Wind	38%	400	$ 4,100	1.0%	$ 105	$ 2.00		100%	$168
Biomass CHP	83%	20	$ 4,500	0.0%	$ 105	$ 11	17,500	0%	$92
Hydro Upgrades	50%	5	$ 1,800	0.0%	$ 25	$ 5		0%	$92
Landfill Gas	90%	5	$ 2,400	0.0%	$ 105	$ 13.00	10,000	50%	$62
Solar	15%	2	$ 5,500	2.0%	$ 6	$ -		0%	$200
Nuclear	90%	1350	$ 4,013	0.0%	$ 96	$ 0.53	10,488	0%	$125
Coal with CCS	85%	380	$ 3,967	0.0%	$ 41	$ 4.75	8,765	0%	$135

Sources

Onshore Wind, Offshore Wind, Solar and Landfill Gas information comes from La Capra Associates work with developers and research on recent projects

Biomass Capital and O&M Costs come from work La Capra Associates did from NYSERDA, and the fuel cost of $1.95/MMBTU comes from Public Policy Virginia

Hydro Costs come from the Idaho National Laboratory database of potential hydropower projects (http://hydropower.inel.gov/resourceassessment/index.shtml)

Nuclear and CCS Costs were taken from the 2010 EIA Annual Energy Outlook

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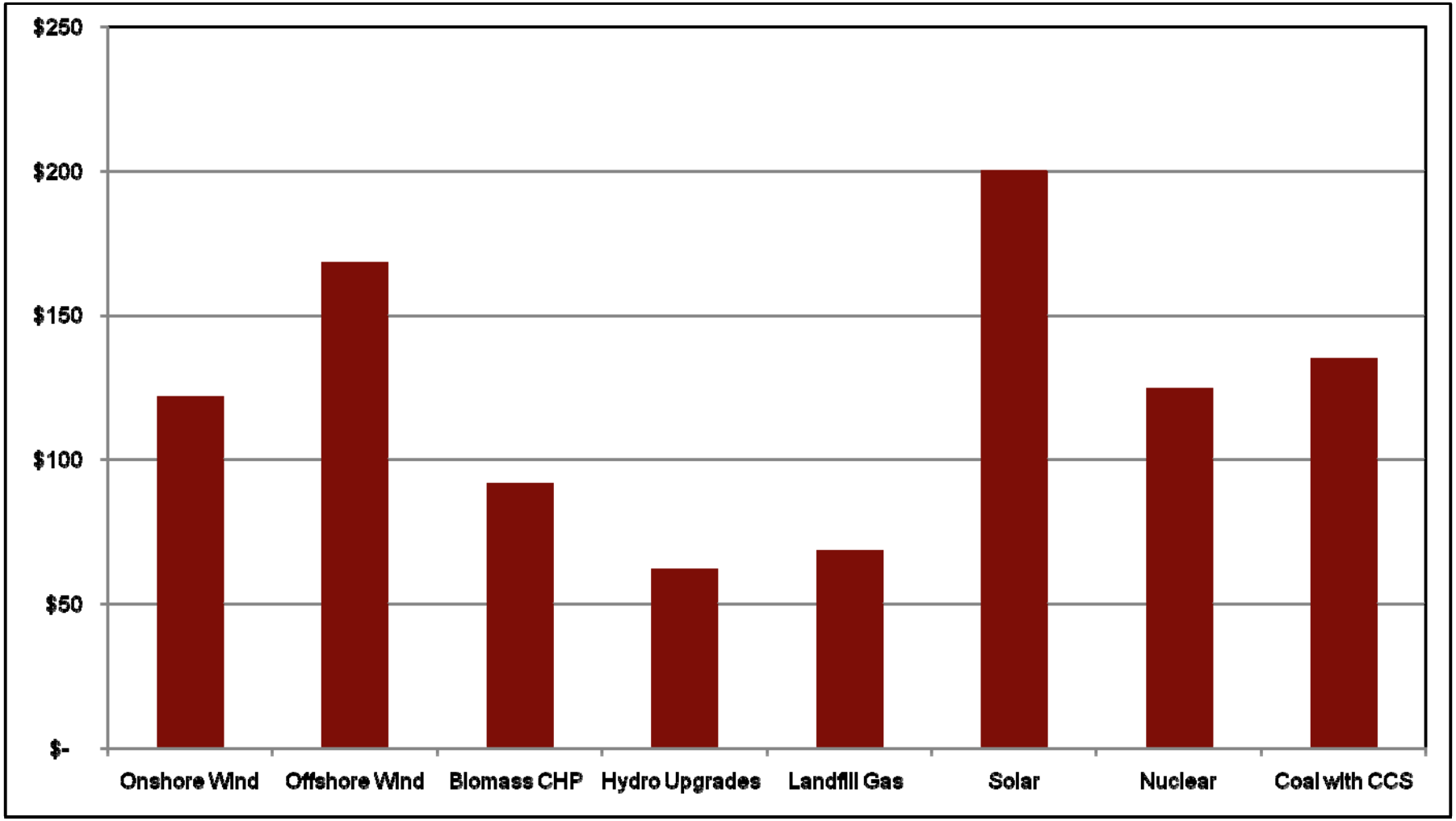
RENEWABLES: 20-year levelized cost of renewable technologies – 2025 (2010$)



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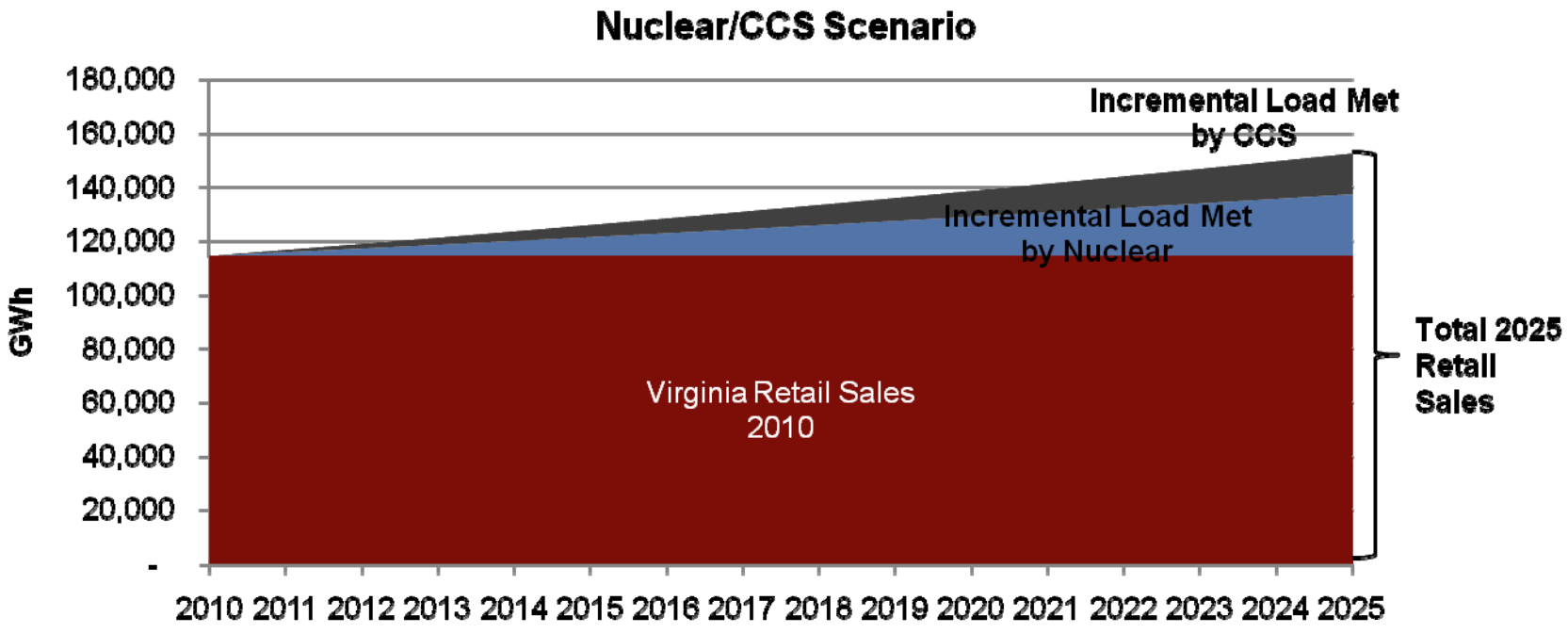
Nuclear and Carbon Capture and Storage (CCS) Scenario

- **In this scenario, we assume that all load growth in Virginia from 2010 though 2025 is met by Nuclear or CCS**
- **Nuclear satisfies 60 percent of the load growth and CCS satisfies the remaining 40 percent**



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Preliminary Rate Impact

- **The rate impact for the RPS is about 1 cent per KWh in 2025**
- **The rate impact of the Nuclear/Carbon Capture and Storage scenario is about 1.6 cents per KWh in 2025**

Rate Impact per KWh (2010$)		
	Nuclear/CCS	**RPS**
2015	NA	$ 0.002
2020	$ 0.011	$ 0.006
2025	$ 0.016	$ 0.010

Note: rate impact would be .5 cents higher in 2025 with $4/MMBTU Biomass costs

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Our Observations

- Key question is what are key policy objectives – there is no free lunch.
- Rate impacts driven by level of assumed technology potential and technology costs
- A large chunk of the Model is satisfied with biomass CHP fueled by switchgrass. The Appendix discusses biomass assumptions provided by Public Policy Virginia.
- In-state potential for cheapest resources such as on-shore wind will max out requiring less economic renewable resources to meet PPV target
- Renewables may require substantial transmission investments
- Economic impact of renewable build out could be evaluated to determine job impact

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Some Conclusions: Public Policy Virginia for VABRES

- **Renewable Energy appears to be the least cost answer to meeting demand in Virginia.**
- **Renewable energy generation – and supporting jobs – will be an entirely new industry for Virginia.**
- **Even with 25% renewables, Virginia's energy costs are likely to be well below other states or US average.**
- **Minimal increase in rates will support creation of thousands of jobs:**
  - **Biomass study – 22 construction jobs and 10 operating jobs per mW. (23,400 steady jobs at buildout.)**