



Maryland
Department of
the Environment

The Clean and Renewable Energy Standard (CARES)

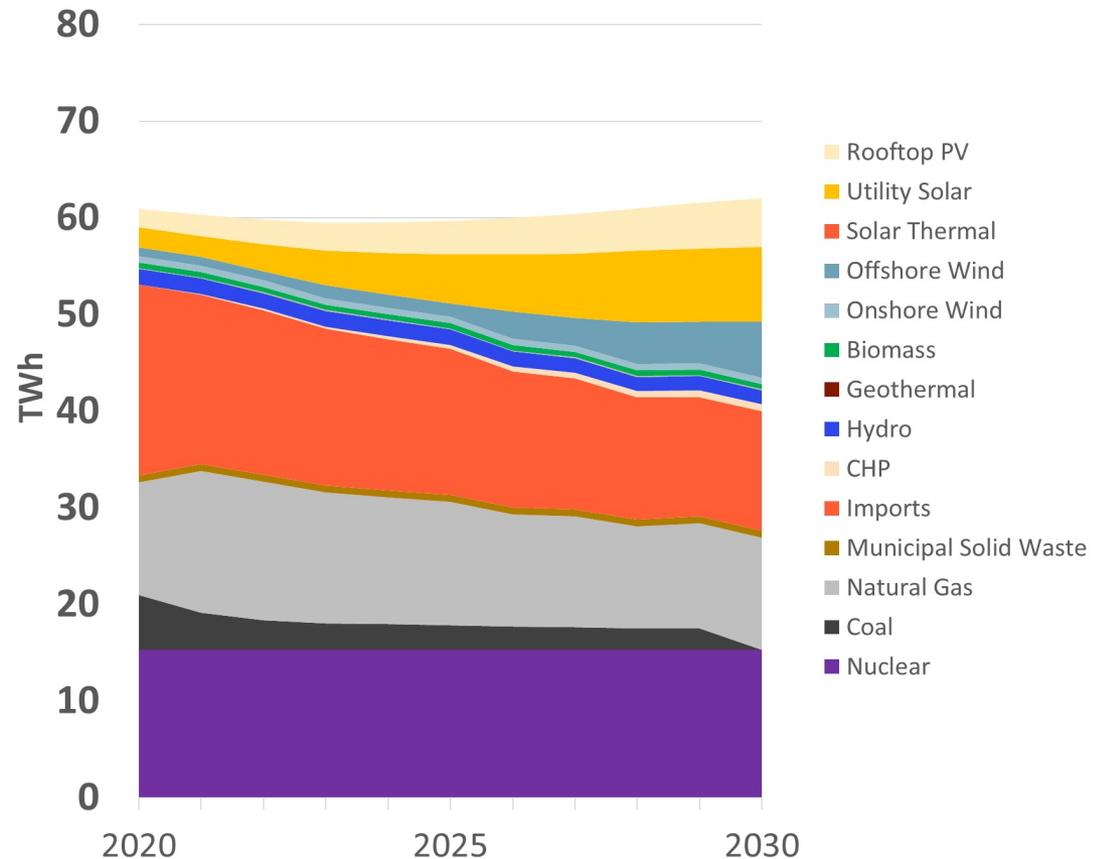
Mitigation Working Group
June 22, 2021



Electricity Strategy in GGRA

Electricity strategy: 100% Clean Electricity by 2040 by building more clean energy and capping emissions from fossil energy.

- CARES
 - Bills in 2020 and 2021 sessions
 - Builds upon existing RPS; 100% Clean Electricity by 2040
 - Our numbers drawn from analysis by Resources for the Future (RFF), which estimates substantial MD solar builds.
- RGGI
 - Carbon cap on power plants and state investment in clean energy (11 states participate now; 12 soon with PA)
 - Plan proposes long-term cap decline consistent with 100% Clean goal

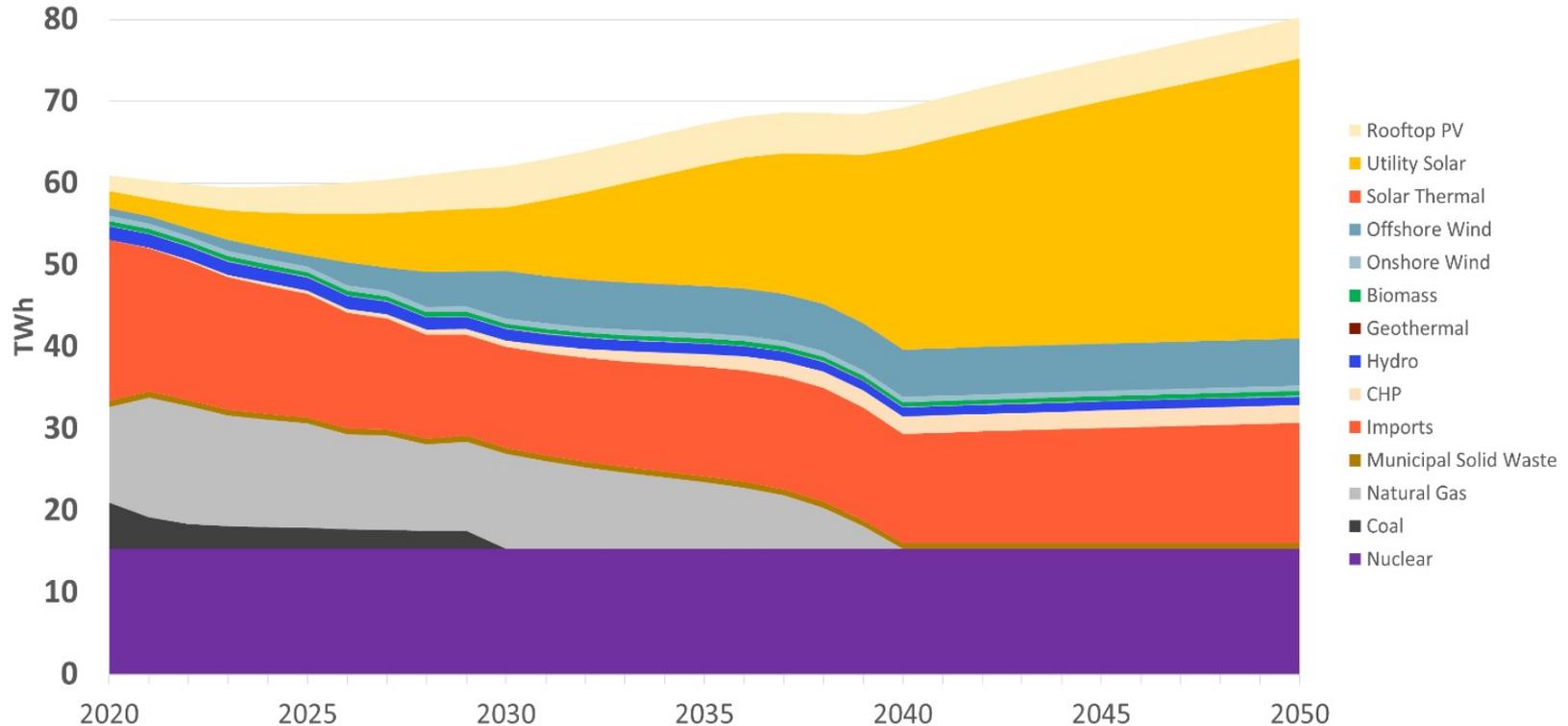


Maryland electricity generation and imports in GGRA Plan through 2030. CARES and RGGI reduce fossil generation and increase clean & renewable generation.

Analysis assumes no new nuclear or carbon capture before 2030



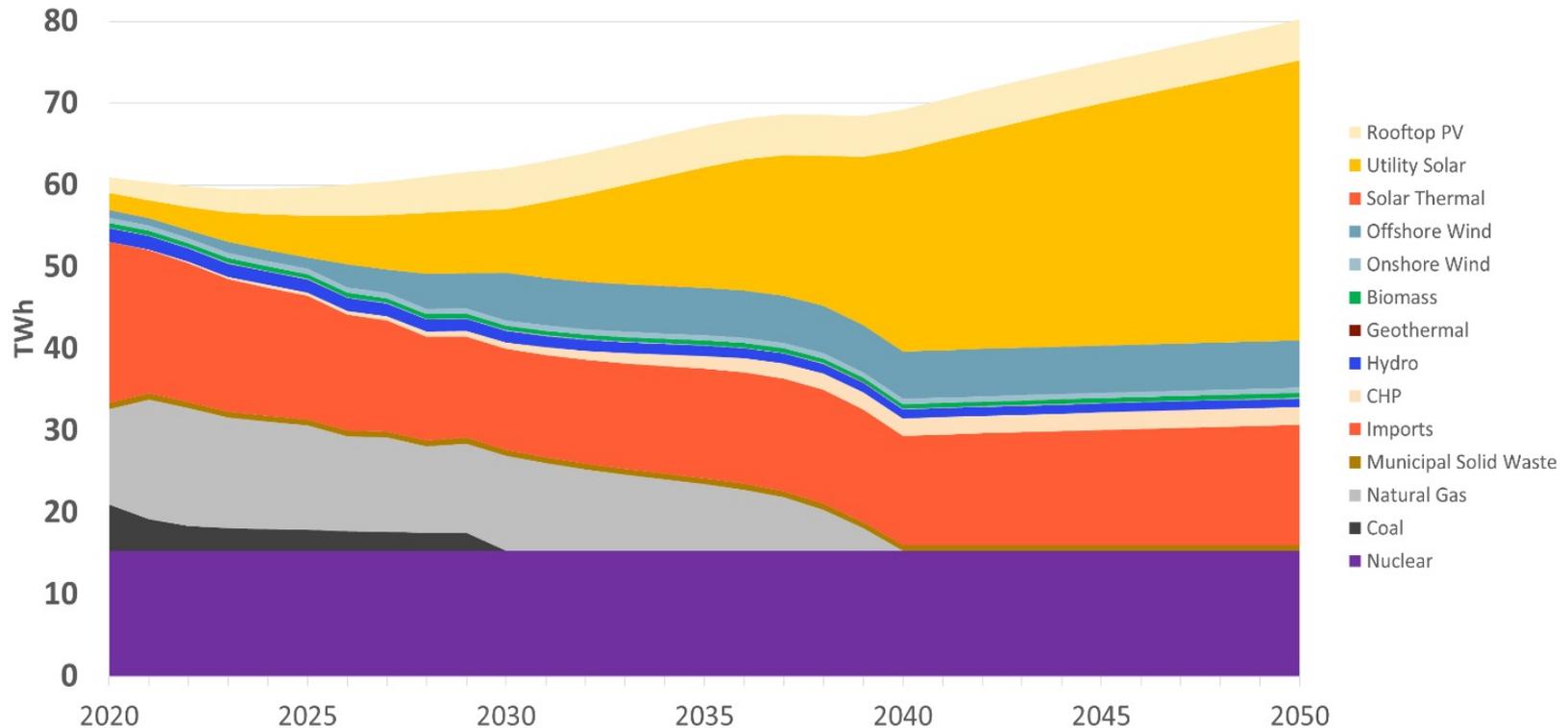
More on Electricity (1)



- We calibrate against sophisticated modeling from RFF and RGGI. Models estimate substantial or total coal retirement by 2030.
- By 2040, 100% Clean Electricity would mean no fossil power plant generation without carbon capture.



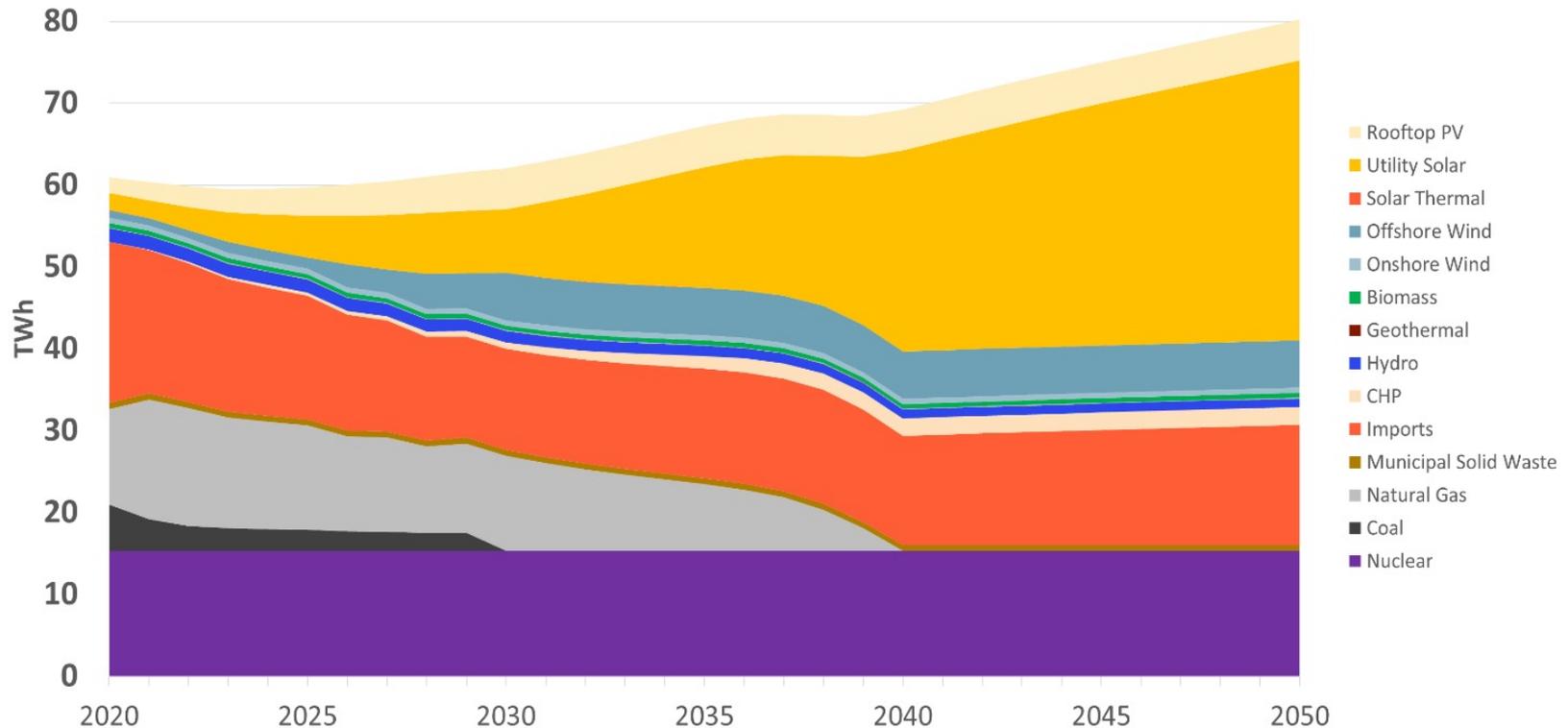
More on Electricity (2)



- The RFF model we looked to to estimate the balance of resources to meet CARES deployed much more solar than CHP, and no carbon capture or new nuclear, **but these scenarios remain uncertain.**
- CARES would deploy the most cost-effective clean and renewable energy based on how technologies mature.



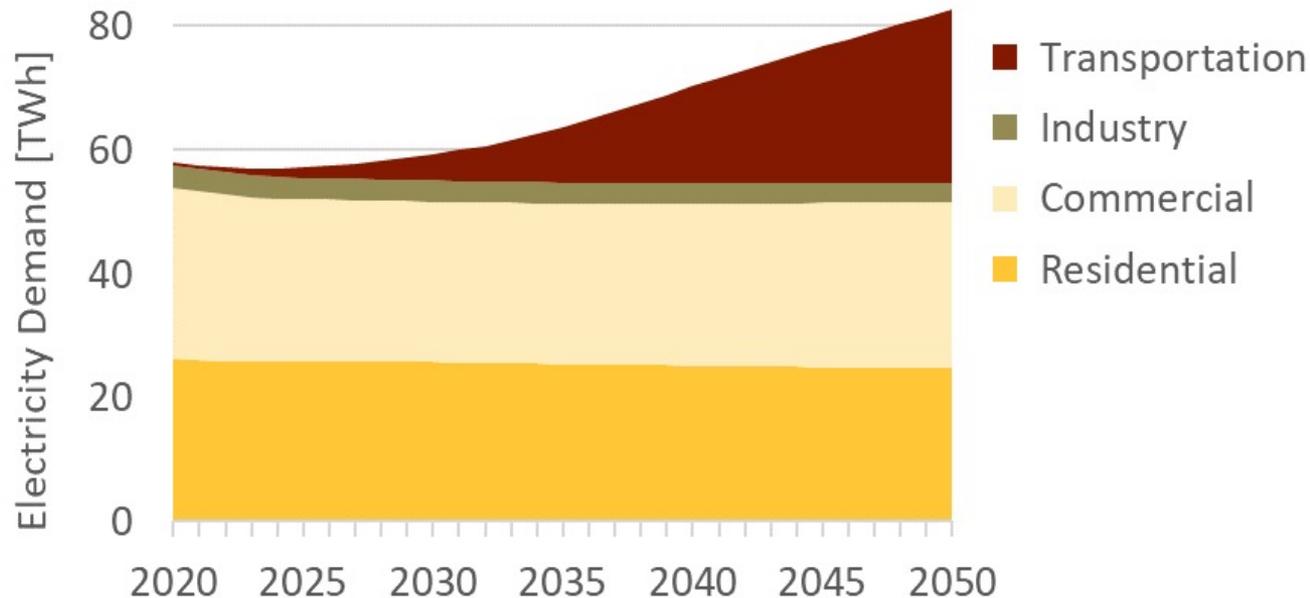
More on Electricity (3)



- We currently lack detailed electricity dispatch modeling that incorporates energy storage, so we do not have quantitative estimates of the need for battery storage, flexible load, and other measures to accommodate the long-term degree of renewable generation, but those improvements are necessary to deploy beginning in this decade. (We may have opportunity to incorporate that later)



Effects of Electrification



- Overall annual electricity demand in buildings is flat or declining as efficiency counteracts electrification, but changes in timing of demand are important and must be managed.
- Long-term increase in overall electricity demand driven by EVs, but is not material until 2030s.



What does CARES do?

Before 2030:

1. Build upon current RPS (CEJA) Solar and Offshore Wind
2. Disqualify black liquor* and municipal waste combustion from Tier 1
3. Replace that with Maryland clean and renewable energy

Through 2040:

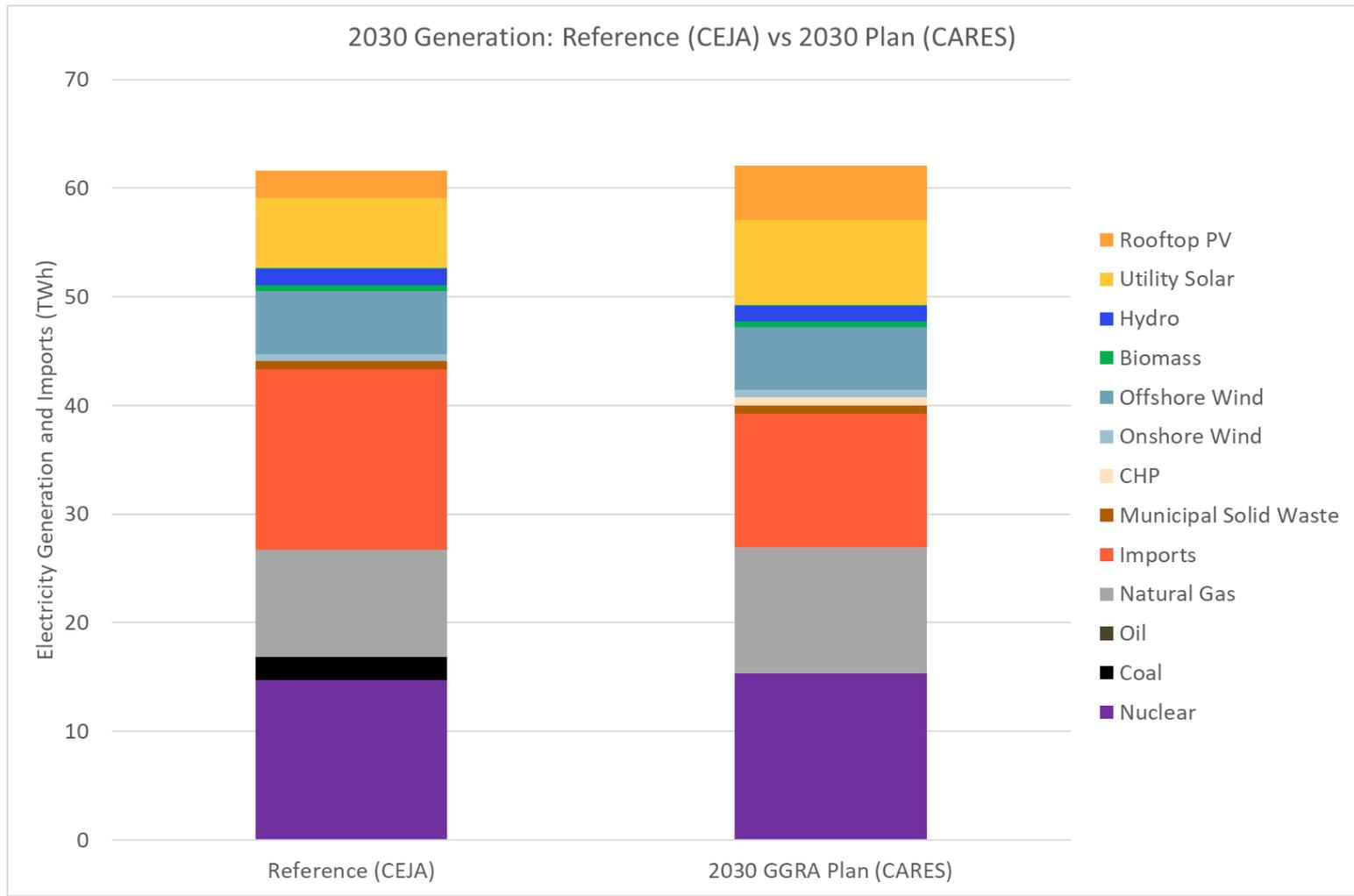
4. Count existing nuclear (Calvert Cliffs), but don't credit it.
5. Get to 100% by 2040

*Legislation that passed this year (SB65) disqualifies BLQ and makes other changes to the solar and Tier 2 carve-outs. CARES will be revised accordingly.



2030 Generation Effects

- CARES expected to deploy significantly more solar, some CHP

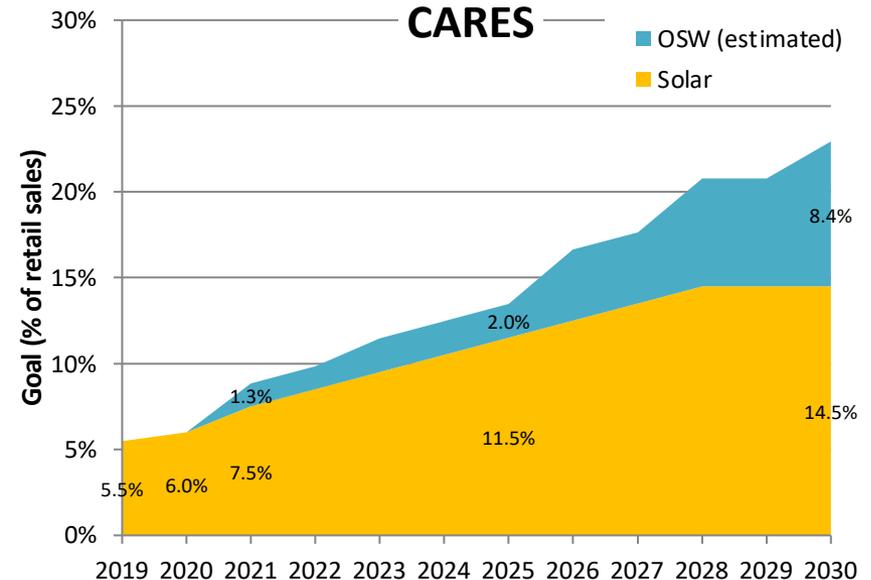
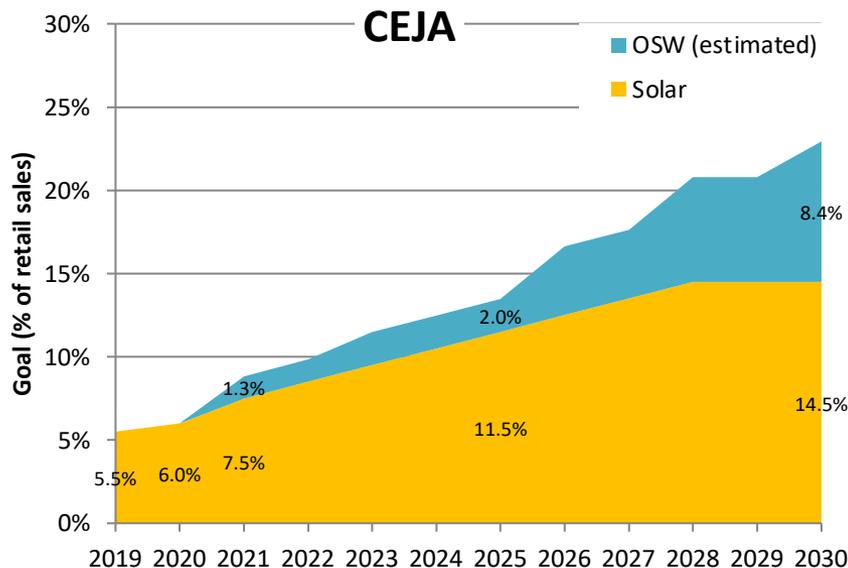




1. Building Upon the RPS/CEJA

- CARES fully incorporates existing MD solar and offshore wind goals
- New MD clean energy category could deploy even more solar

(Note SB65 changed near-term solar carve-outs; CARES will be revised accordingly)



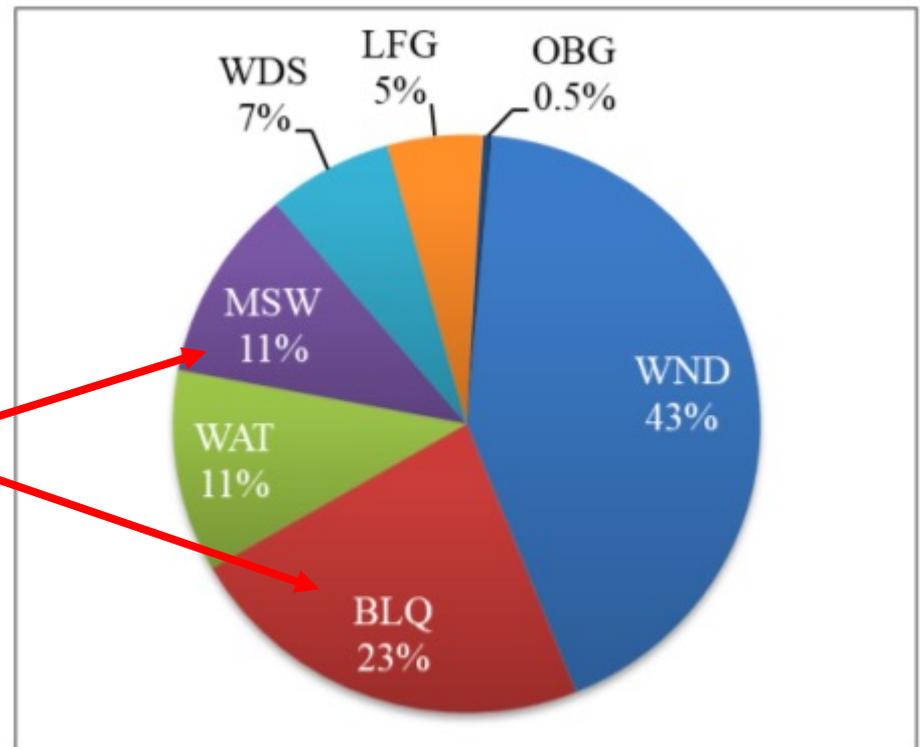
Note: OSW shown as estimated share of sales, but is MW requirement in law. Estimates here reflect already approved 368MW plus 1,200MW of rou



2. Disqualify MSW & BLQ

- Disqualifies Municipal Solid Waste and Black Liquor from Tier 1.
- These resources have historically been used for ~25% to ~45% of non-carve-out Tier 1

Figure 2 2019 Tier 1 Retired RECs by Fuel Source²⁹



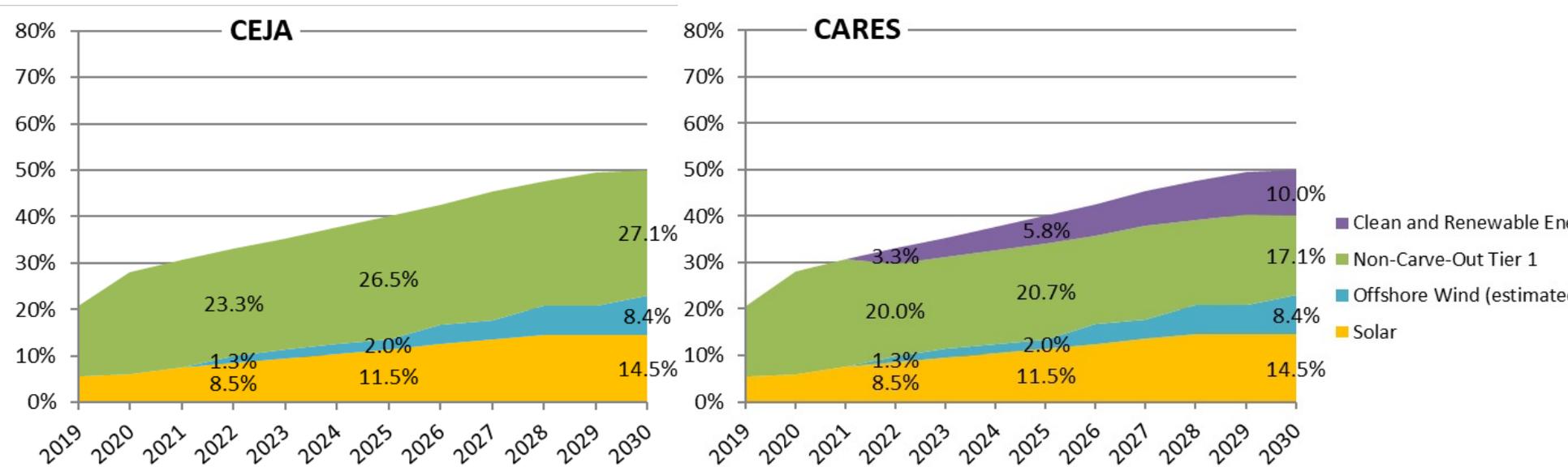
Abbreviations: BLQ, Black Liquor; LFG, Landfill Gas; MSW, Municipal Solid Waste; OBG, Other Biomass Gas; WAT, Small Hydroelectric; WDS, Wood and Waste Solids; WND, Wind.

Source: MD PSC most recent (2019) RPS report.



3. Replace MSW & BLQ with MD Clean and Renewable Energy

- CARES adds a new clean energy carve-out for new clean resources and additional MD renewables.
- That carve-out supplants non-carve-out Tier 1, approximately at MSW & BLQ shares.





3 (cont'd). Maryland Clean and Renewable Energy

Eligible resources for Clean Energy Carve-Out:

1. RECs from any Maryland Tier 1 resource (including Solar)
2. Clean Energy Resource Credits (CERCs) from:
 - a) New nuclear power in MD
 - b) New efficient Combined Heat and Power (CHP) in MD
 - Would need to apply new & emerging tech to achieve full credit
 - c) Natural gas or qualifying biomass with Carbon Capture and Utilization or Storage (CCUS) that results in indefinite sequestration of captured CO₂
 - Qualifying biomass with CCUS gets double credit
 - d) Large hydropower in MD
 - Credits accrue to the state & fund remediation projects
 - e) Other emerging net-zero technology recognized by the PSC



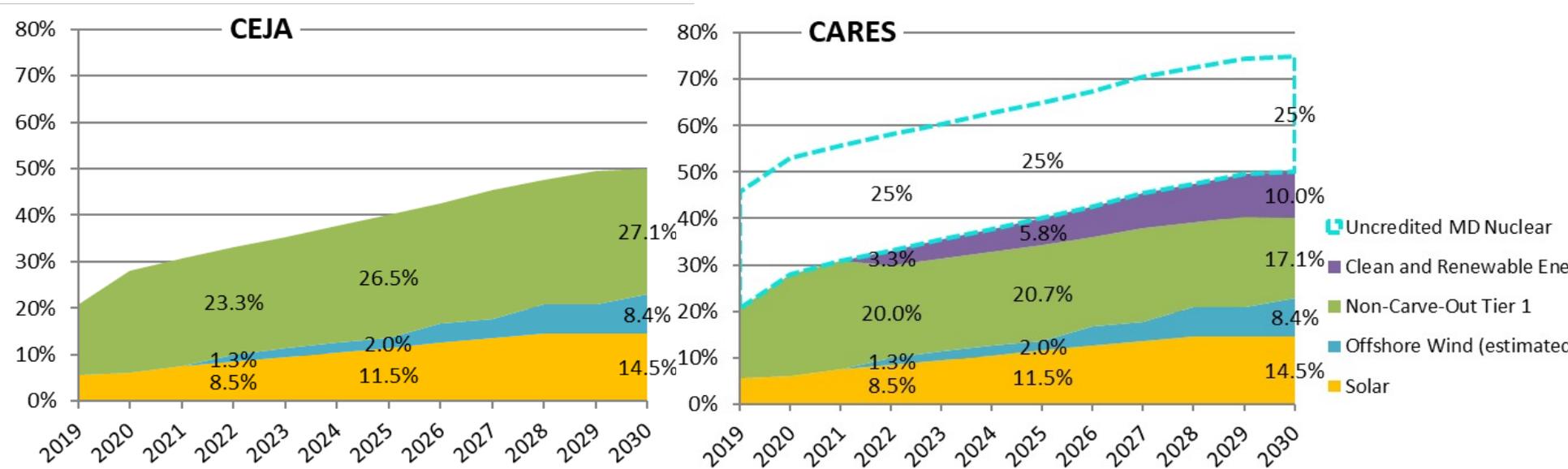
3 (cont'd). What resources will be deployed for Clean carve-out?

- RPS and CARES are market mechanisms, so the least-cost resource mix ought to be deployed
 - Utilities will purchase cheapest credits available
- CARES carve-out accepts any CERCs or MD RECs
 - MD Solar is likely most plentiful & lowest cost growth opportunity



4. Count existing nuclear

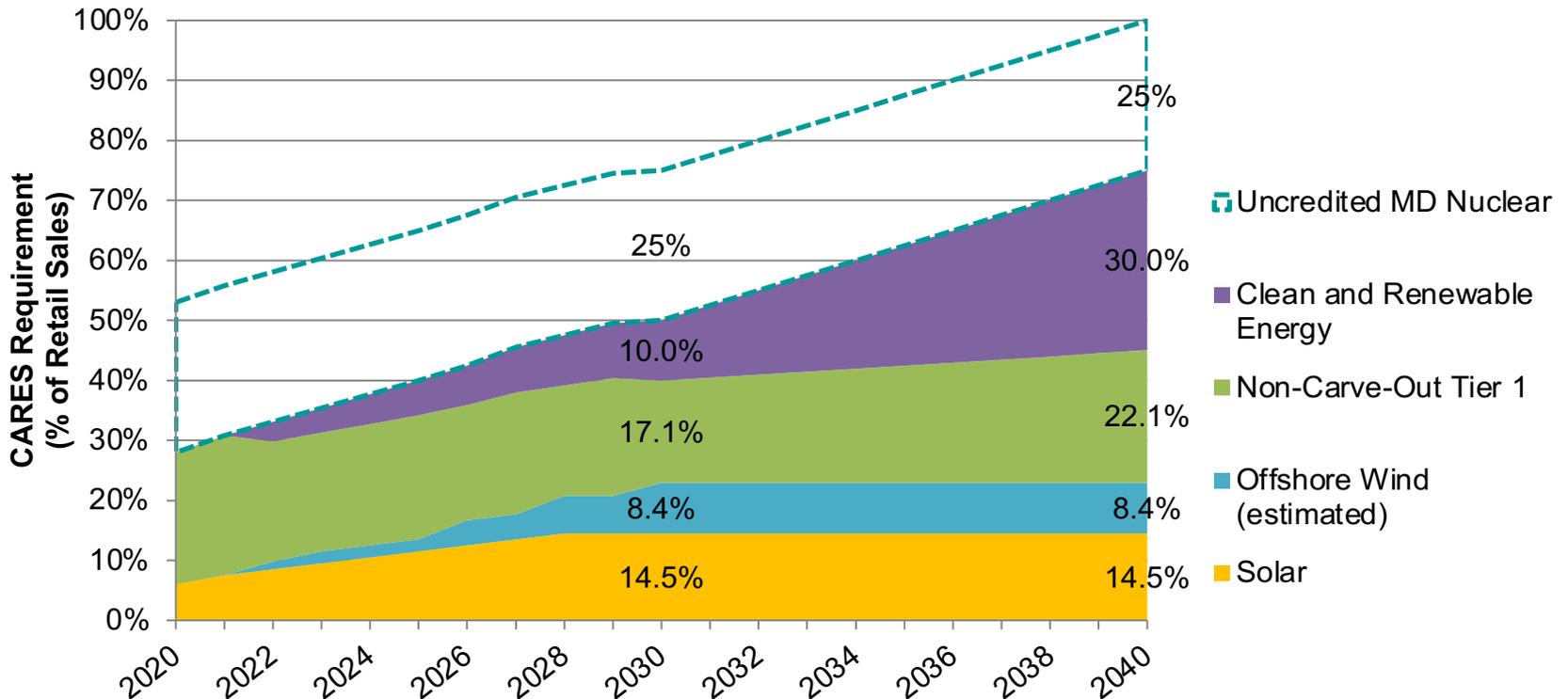
- Existing nuclear provides ~22% - ~25% of retail sales.
- CARES counts that generation toward the goal, and increases the goal accordingly.
- CARES does not currently provide credits for that generation.





5. Get to 100% by 2040

- From 2030 to 2040, CARES increases the new clean energy carve-out (eligibility includes all clean resources and all MD renewables) to reach 100%.





Technology-Specific Considerations

- Decarbonization of the electricity sector is technology-dependent
- To obtain low cost decarbonization, we need to advance among other things, technology related to:
 - new storage
 - new interstate transmission capacity
 - carbon capture utilization and storage (CCUS)



Hydropower

- 2021 CARES bill includes MD large hydro as a clean energy resource (important to account for that significant generation in a 100% standard).
- Credits for eligible generation accrue to the state; proceeds from credit sales used for remediation projects.
- Generation owner does not receive credits or incentives.



Carbon Capture

- May or may not be technically or economically feasible
 - Would compete with other clean energy and MD renewables, so would not be deployed unless competitive
- CARES credits it in proportion to share of carbon captured (eg capturing 50% of emissions gets 50% credit)
- Crediting requires either permanent storage or utilization that results in indefinite sequestration



Bioenergy with Carbon Capture (BECCS)

- Potential negative-emissions technology
- Gets double-credit under CARES
- Qualifying biomass facilities with CCUS get:
 - 1 REC for using qualifying biomass
 - 1 CERC for capturing the carbon (partial credit for partial capture)



Combined Heat and Power

- Partial credit based on efficiency:
 - >90% efficiency gets full credit (1 CERC per MWh)
 - 75% to <90% gets $\frac{3}{4}$ credit (0.75 CERC per MWh)
 - 60% to <75% gets half credit (0.5 CERC per MWh)
 - <60% efficiency gets no credit
- Recent installations in Maryland averaged 77% efficiency (0.75 CERC per MWh)
- Above 90% efficiency extremely difficult to achieve using conventional gas-powered CHP



Contact

Chris Beck

Acting Program Manager, Climate Change

Maryland Department of the Environment

christopher.beck@maryland.gov

Follow us



@ClimateChangeMaryland