

# Energy Storage, Renewables & What's Coming

## *Maryland's Electricity Portfolio: The Past, The Present and the Future*

October 4, 2017

Susan Gray

Maryland Department of Natural Resources

Power Plant Research Program

# Presentation Purpose



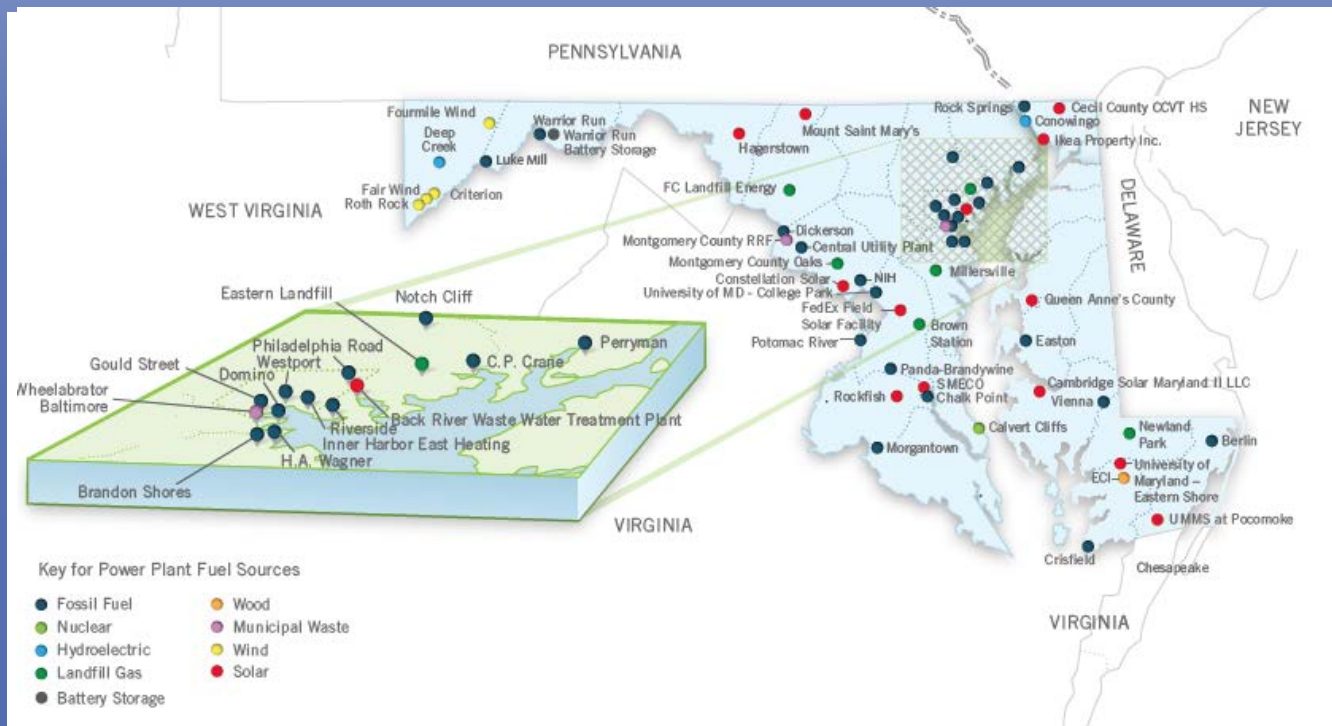
- **Set the stage** - some facts on MD's electricity infrastructure – past and present
- **Step through time** – how Maryland's electricity “past” has shaped how power plants are sited and permitted today

# Presentation Purpose



- **CPCN process** - basic principles of how power plants are permitted in Maryland
- **2 new PPRP initiatives** - Energy Storage Study and RPS Study
- **What's Next** – a look at what we may see in Maryland's electricity future

# Electric Service



Maryland is a net importer of electricity.

# Total MD Electric Consumption and Generation 2006-2015



Year	Retail Sales (Consumption)	Sales + T&D Losses*	Generation	Net Imports	Percentage of Sales Imported Plus Losses*
2006	63,173	66,964	48,957	18,007	27%
2007	65,391	69,314	50,198	19,116	28%
2008	63,326	67,125	47,361	19,764	29%
2009	62,589	66,344	43,775	22,570	34%
2010	65,335	69,256	43,607	25,648	37%
2011	63,600	67,416	41,818	25,598	38%
2012	61,814	65,522	37,810	27,713	42%
2013	61,899	65,613	35,851	29,763	45%
2014	61,684	65,385	37,834	27,551	42%
2015	61,709	65,412	36,390	29,022	44%

Units: thousands of MW-hrs

\*Assumes transmission and distribution (T&D) losses of 6%.

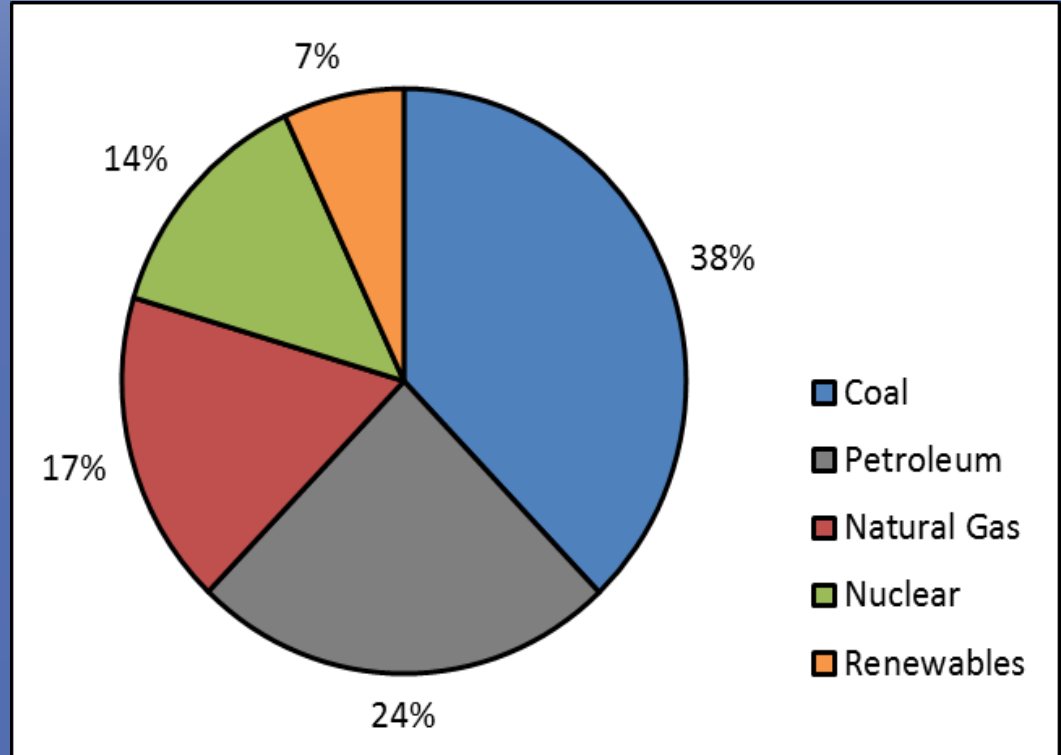
Source: U.S. Energy Information Administration, *Retail Sales of Electricity, Annually*.

# Power Plant Capacity in Maryland

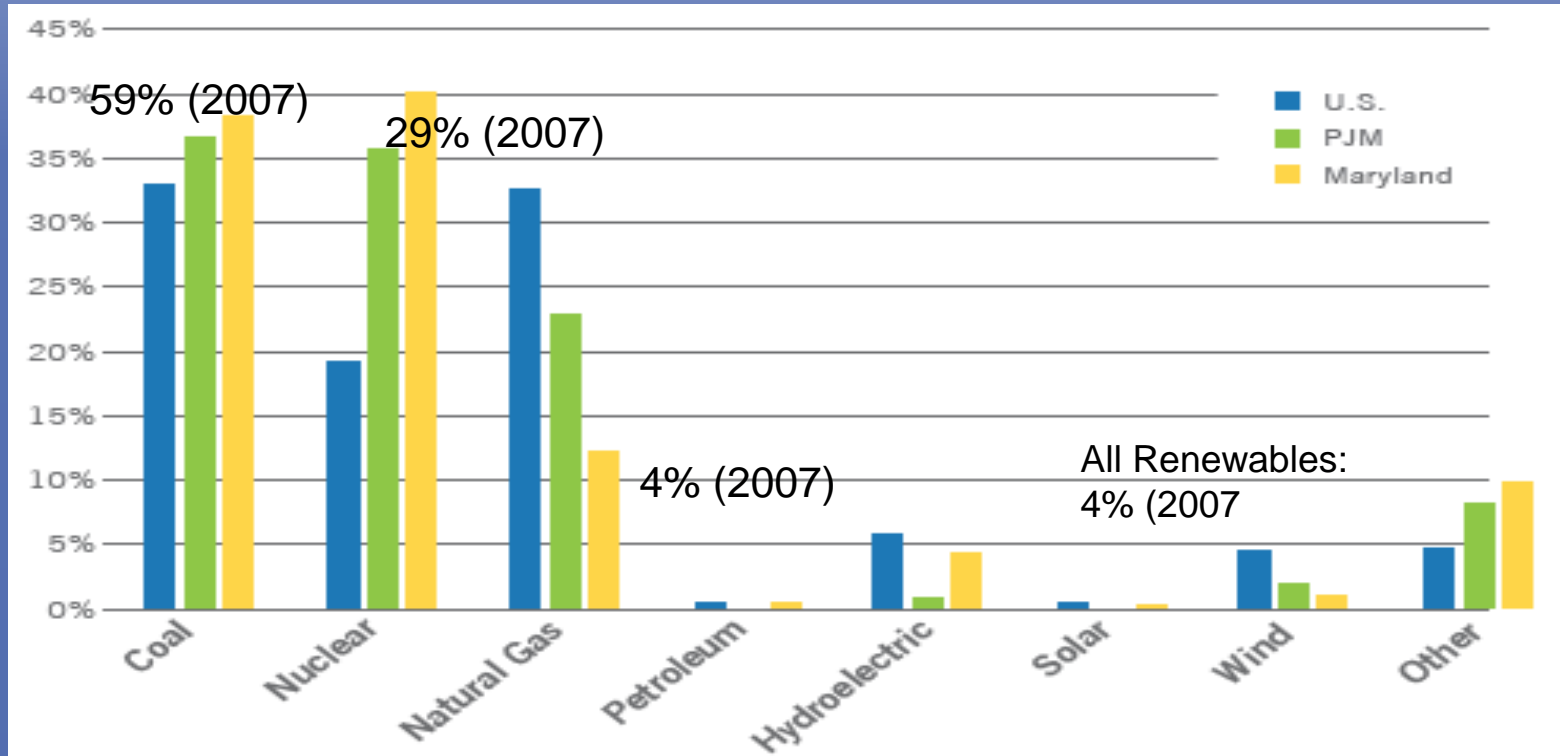


## Total In State Generation Capacity ~ 13,500 MW

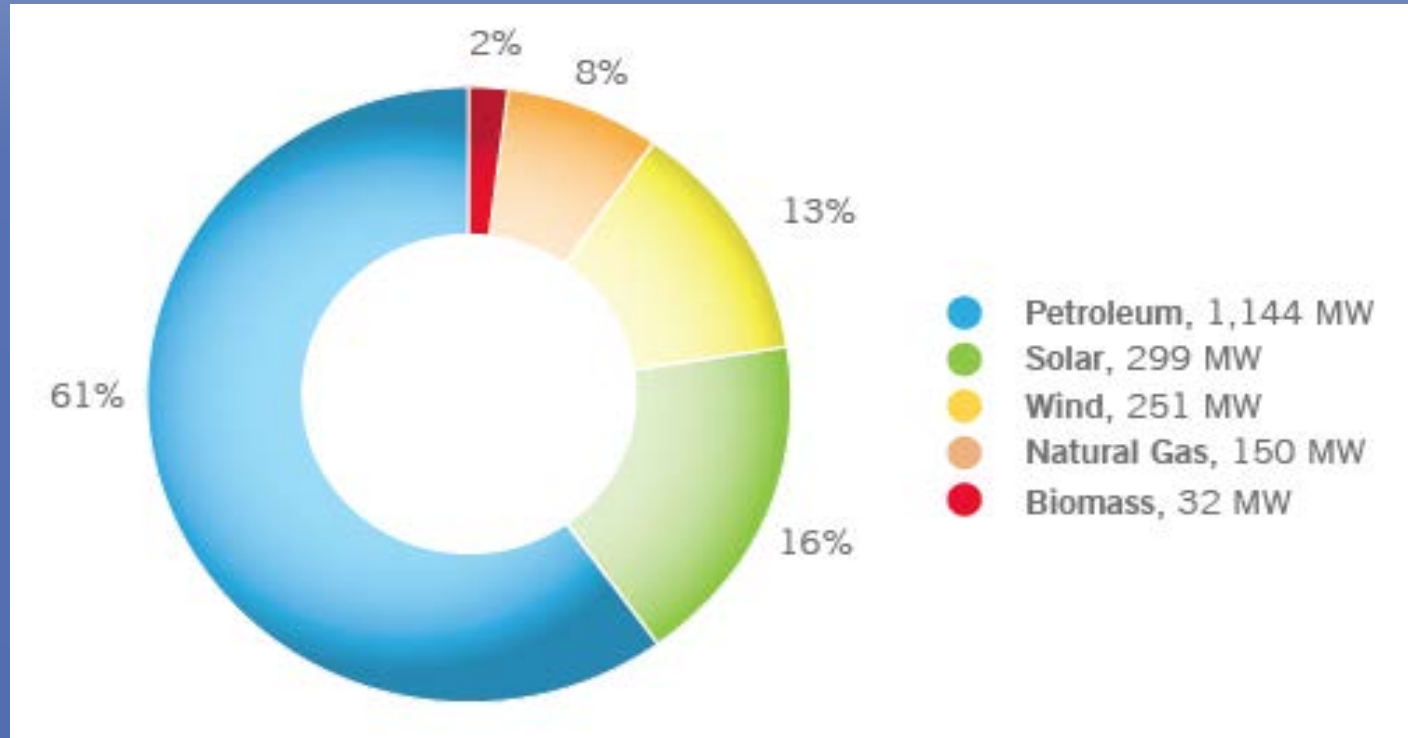
- Fossil Fuel ~ 10,800 MW
  - Coal ~ 5,100 MW
  - Petroleum ~ 3,300 MW
  - Natural Gas ~ 2,400 MW
- Nuclear ~ 1,800 MW
- Renewables ~ 900 MW



# 2015 Electric Generation by Fuel Type (USA, PJM, Maryland)



# Renewable Generation by Fuel Type (2015)



# Next...



- Set the stage
- Step through time – how Maryland's electricity “past” has shaped how power plants are sited and permitted today

# 1910: Creation of the Maryland PSC

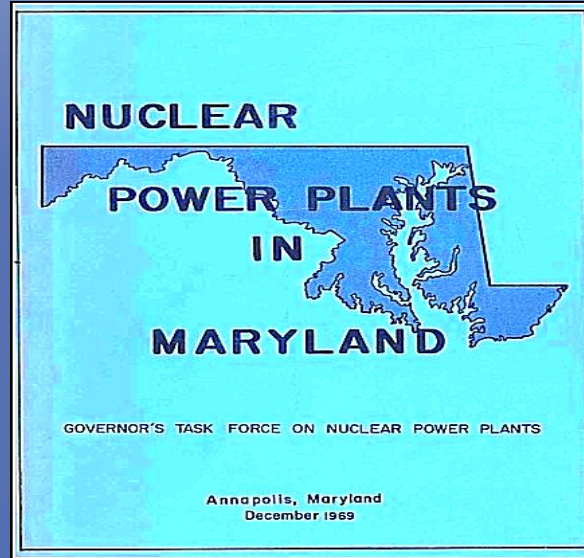


- Established by the General Assembly
- Independent agency within State government
- Many responsibilities including approval of Maryland electric generating plants and transmission lines through a process called the CPCN – Certificate of Public Convenience and Necessity

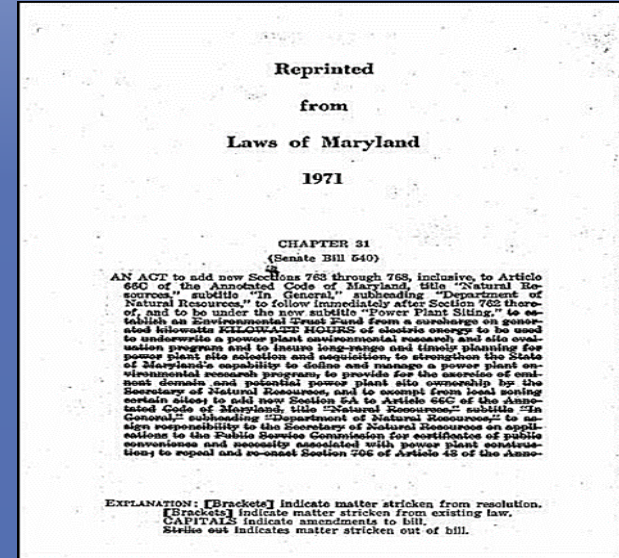
# 1971: The Power Plant Siting Act



Concerns over the ability of the State to provide significant technical review of the impacts of the proposed Calvert Cliffs Facility



Then Governor Mandel's 1969 Task Force Report on Power Plant Review



The Passage of The Power Plant Siting Act of 1971

resulted in

Ultimately resulting in

# Creation of PPRP



For the CPCN, PPRP:

- Conducts a comprehensive, objective assessments based on sound science of electrical generation and transmission lines
- Coordinates a consolidated State Agency review process

Reprinted

from

Laws of Maryland

1971

## CHAPTER 31

(Senate Bill 540)

AN ACT to add new Sections 768 through 768, inclusive, to Article 43 of the Annotated Code of Maryland, title "Natural Resources," subtitle "In General," subheading "Department of Natural Resources," to follow immediately after Section 762 thereof, and to be under the new subtitle "Power Plant Siting," to establish an Environmental Trust Fund from a surcharge on generated kilowatts KILOWATT HOURS of electric energy to be used to underwrite a power plant environmental research and site evaluation program and to insure long-range and timely planning for power plant site selection and acquisition, to strengthen the State of Maryland's capability to define and manage a power plant environmental research program, to provide for the exercise of eminent domain and potential power plant site ownership by the Secretary of Natural Resources, and to exempt from local zoning certain sites; to add new Section 5A to Article 66C of the Annotated Code of Maryland, title "Natural Resources," subtitle "In General," subheading "Department of Natural Resources," to assign responsibility to the Secretary of Natural Resources on applications to the Public Service Commission for certification of public convenience and necessity associated with power plant construction; to repeal and re-enact Section 706 of Article 43 of the Anno-

EXPLANATION: [Brackets] indicate matter stricken from resolution.  
[Brackets] indicate matter stricken from existing law.  
CAPITALS indicate amendments to bill.  
Strike out indicates matter stricken out of bill.

# 7 Secretaries Letter, Recommended Licensing Conditions and ERD



The Honorable Glenn F. Ivey  
Chairman  
Public Service Commission  
6 St. Paul Center  
Baltimore, Maryland 21202

Re: Case No. 8838

Dear Chairman Ivey:

In accordance with Section 3-7-207 and 7-208 of the Public Service Commission's recommendation in Case Number 8838, Environment, Agriculture, Transportation, Office of Planning and the Maryland Department of the Environment conditions relate to the application for Prince George's County to construct a Sanitary Landfill near Upper Marlboro.

As set forth more fully in the landfill gas collection at the Brown Station Landfill project. Four environmental impact statements are being prepared for the landfill gas collection at the Brown Station Landfill project. The four environmental impact statements are being prepared for the landfill gas collection at the Brown Station Landfill project. The four environmental impact statements are being prepared for the landfill gas collection at the Brown Station Landfill project.

Based on our review of the application, we have concluded that the site is suitable for the landfill gas collection at the Brown Station Landfill project. The four environmental impact statements are being prepared for the landfill gas collection at the Brown Station Landfill project. The four environmental impact statements are being prepared for the landfill gas collection at the Brown Station Landfill project.

Sincerely,



Henry A. Virts  
Department of Agriculture

Richard C. Mike Lewin  
Department of Business and  
Economic Development

Ronald Young  
Office of Planning

John D. Porcari  
Department of Transportation

Frederick H. Hoover, Jr.  
Maryland Energy Administration

Jane T. Nishida  
Department of the Environment

Dr. Sarah J. Taylor-Rogers, Ph. D.  
Department of Natural Resources

## Environmental Review Document (ERD)

PPSE-PB-1

PPRP

DNR Exhibit (js03)

### Recommended Licensing Conditions PSC Case No. 8838 Brown Station Road Landfill Generator

#### General Requirements

- Except as otherwise provided for in the following provisions, the application for the Certificate of Public Convenience and Necessity (CPCN) is considered to be part of this CPCN (certificate) for the Prince George's County Brown Station Landfill Project. The application consists of the original application received by the Maryland Public Service Commission (PSC) on March 22, 2000. Construction and operation of the facility shall be undertaken in accordance with the CPCN application and subsequent amendments. If there are any inconsistencies between the certificate conditions specified below and the application, the conditions in this certificate shall take precedence. In the application, estimates of dimensions, volumes, emission rates, operating rates, feed rates and hours of operation are not deemed to constitute enforceable numeric limits except to the extent that they are necessary to make a determination of compliance with applicable regulations.
- If any provision of this certificate shall be held invalid for any reason, the remaining provisions shall remain in full force and effect, and such invalid provision shall be considered severed and deleted from this certificate.

#### Air Quality Requirements

- Representatives of the Maryland Department of the Environment, Air and Radiation Management Administration (ARMA) shall be afforded access to the Brown Station Landfill property at any reasonable time to conduct inspections and evaluations necessary to assure compliance with the certificate. The Permittee shall provide such assistance as may be necessary to effectively and safely conduct such inspections and evaluations by representatives of the Department, that may include but need not be limited to the following:
  - inspecting construction authorized under this certificate;
  - sampling any materials stored or processed on site, or any waste, or discharge into the environment;
  - inspecting any monitoring or recording equipment required by this certificate or applicable regulations;



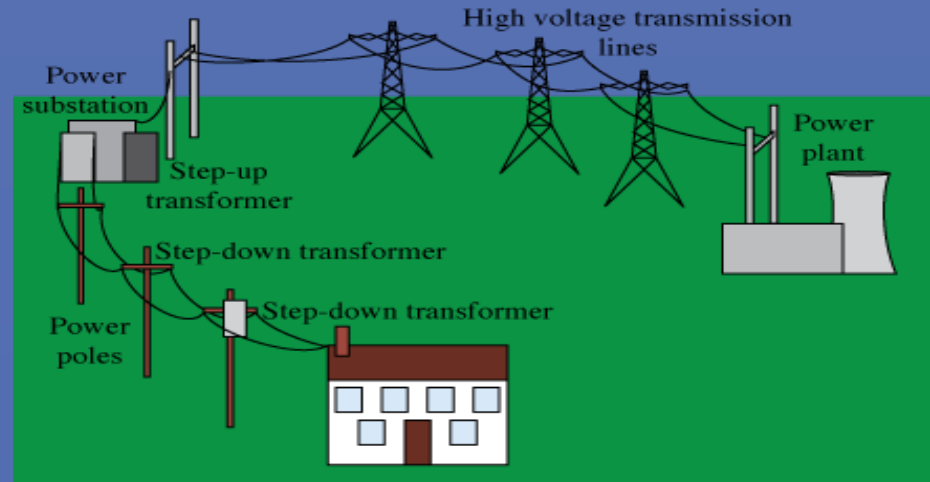
# 1999: Deregulation



- Maryland General Assembly passed legislation – Electric Customer Choice and Competition Act of 1999
  - Many other (but not all) states deregulated.
- Goal:
  - provide consumers with the lowest possible prices
  - allow customers to choose their power supplier
  - provide incentives for the creation and development of innovative products and services.

# Before 1999

- **Vertically integrated electric utilities**
- **Competitive firms** prohibited from marketing and selling generation service within the franchised service area of the utility



# After 1999



- Divestiture of Maryland's utility power plants
- Relieved the utilities of their integrated planning function
  - The market determines the proposed type, size, and location of new generation



# After 1999 (cont.)



- Made retail generation competitive; so the PSC
  - Doesn't regulate the cost of electricity generated by plants located in Maryland
  - Is responsible for setting rates for electric distribution
  - Approves new/modified electric generating plants and transmission lines via the CPCN process

# Next...



- Step through time
- Basic principles of how plants are permitted in Maryland

# Back to 2017



What must a Generator do to construct and operate a Power Plant in MD?

- PJM - Interconnection Agreement
- County Permits
- **Public Service Commission – CPCN**
- Other State and Federal Permits

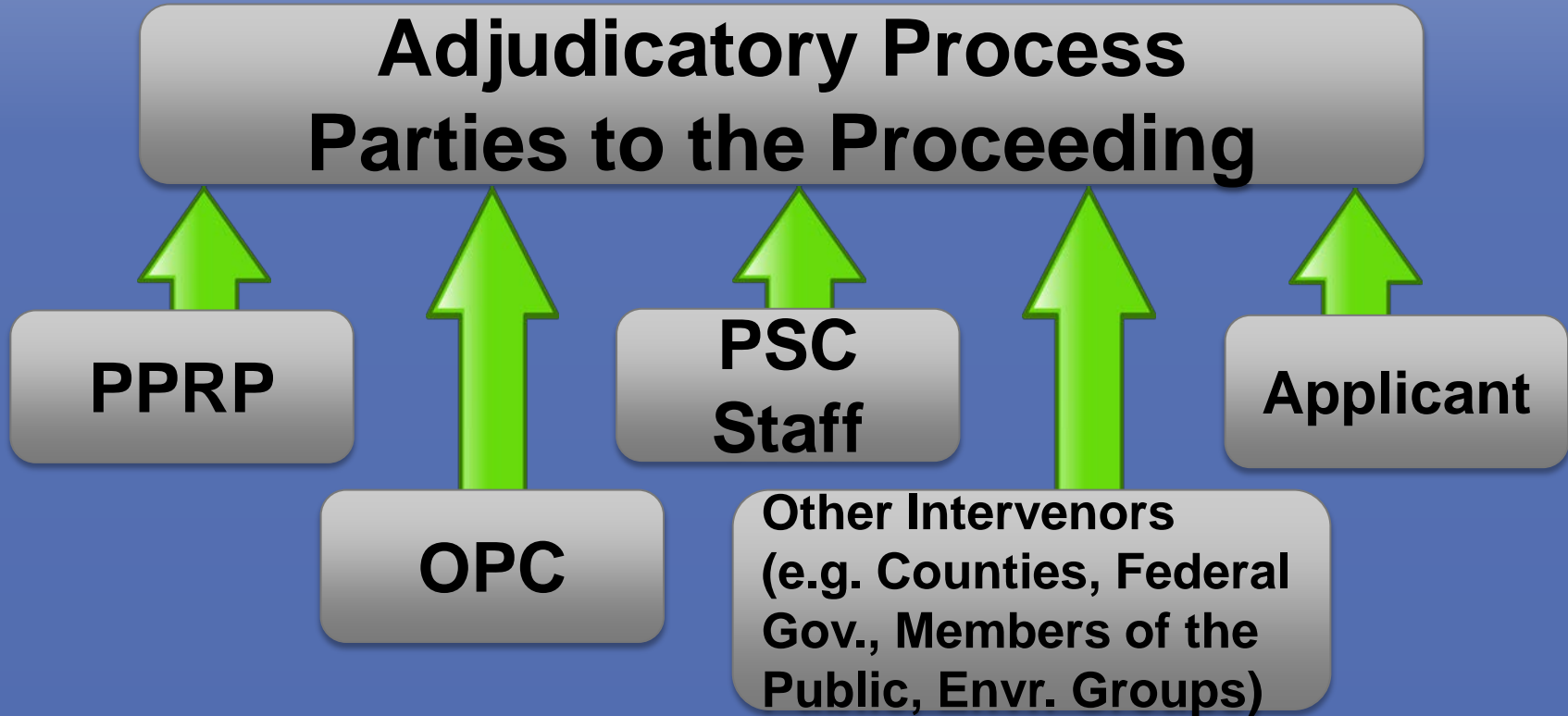
Resource: PPRP Cumulative Environmental Impact Report -18 Chapter 1 and Appendix A for a more complete listing. (<http://pprp.info/ceir18/HTML/Report-18-Chapter-1.html>)

# CPCN Exemptions

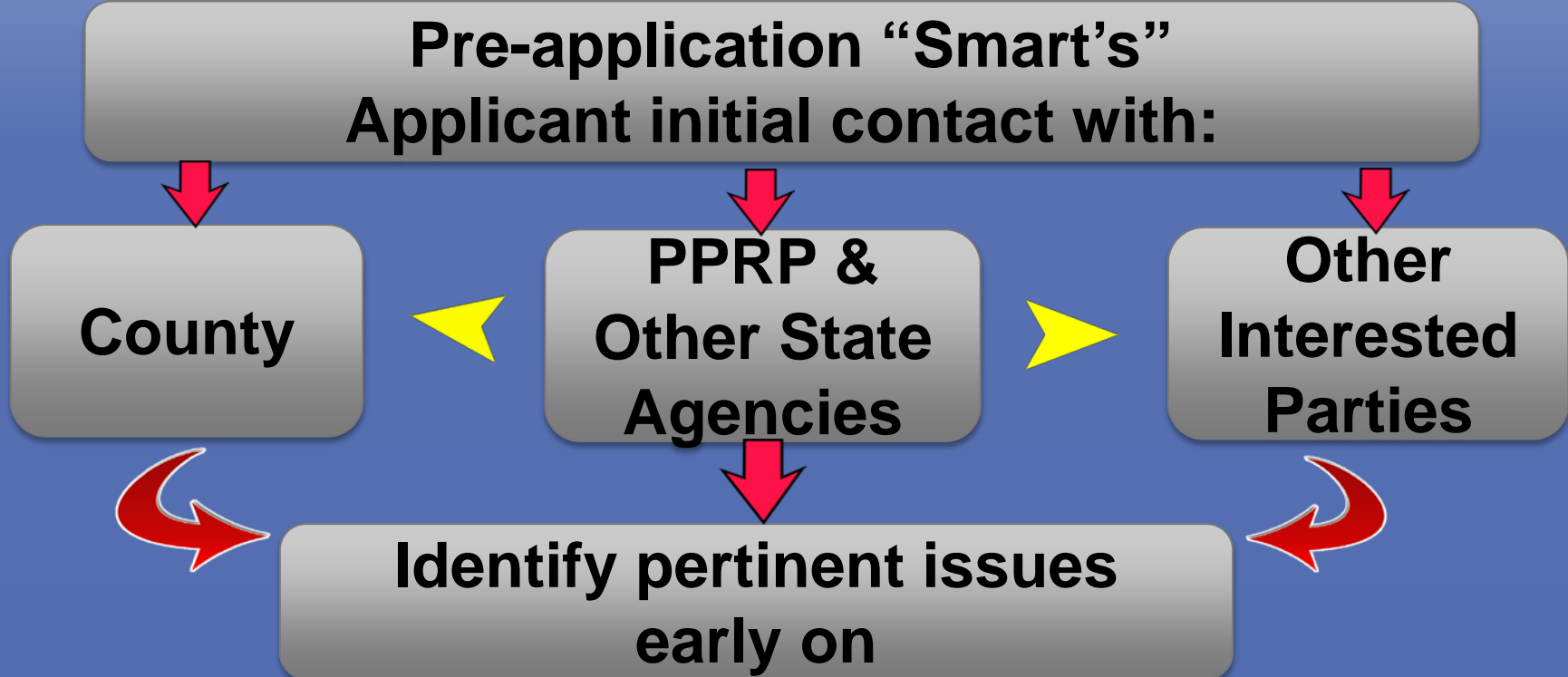


- Generation capacity  $\leq$  to 2MW
- On-site generation capacity (up to 25 MW) and at least 10% is consumed on site
- On-site generation capacity (up to 70 MW) and at least 80% is consumed on site
- Land-based wind generation capacity (up to 70 MW)

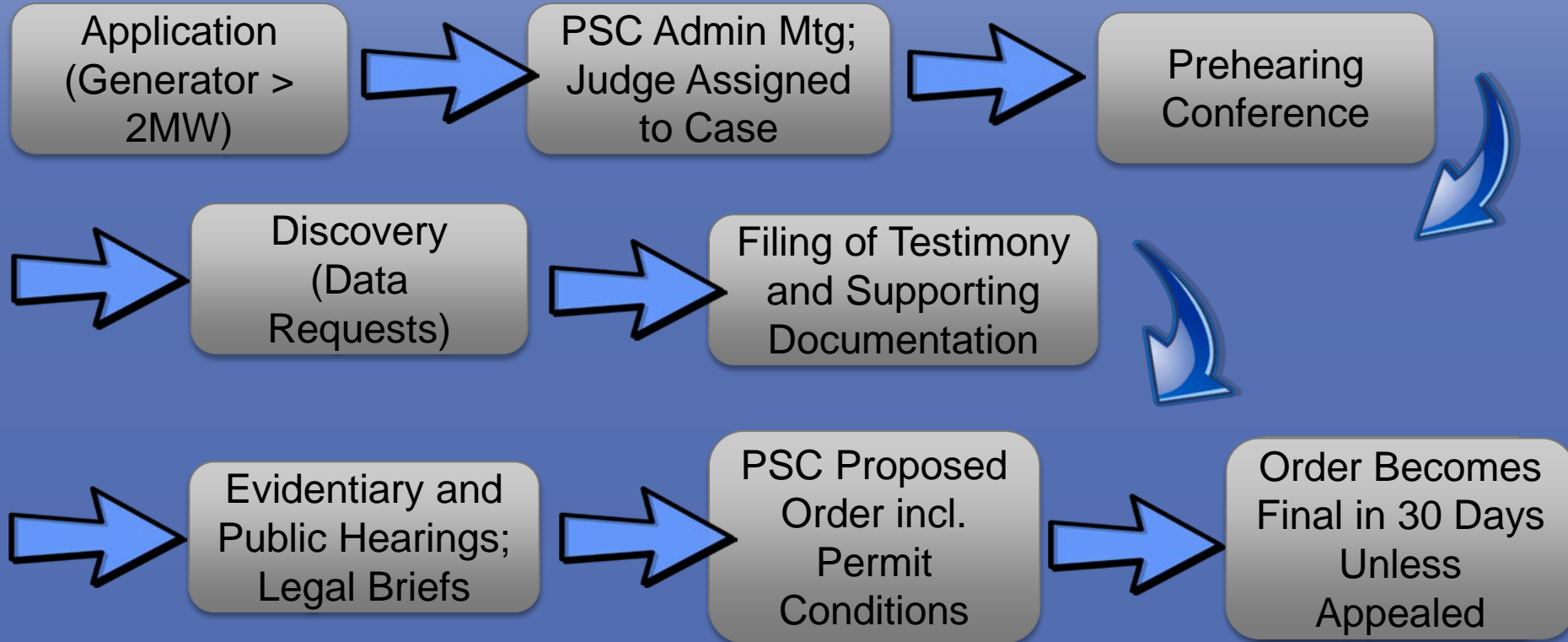
# What is the CPCN Process?



# Before a CPCN Application is Filed



# CPCN Process Summary Steps



# CPCN Appeals



## Any party to the Proceeding Can Appeal

1. Utility Law Judge Proposed Order can be appealed to the full 5-Member PSC Commission

## Anyone Can Appeal

1. 5-Member Commission order can be appealed to the Circuit Court
2. Circuit Court Order can be appealed to the Court of Special Appeals

# CPCN Appeals (cont.)



**Timeframe for Appeals: 6 to 24 months** (Note: Without certain, additional legal actions, Developer can construct at its own risk once PSC issues its Final Order)

# Due Consideration



Reference: PUC §7-207

- **PSC can take final action on a CPCN application only after due consideration of:**
  - the recommendation of the governing body of the county or municipal corporation
  - County's comprehensive plan
  - the effect of the generating station on:
    - stability & reliability of the grid
    - environmental & economics/socioeconomics impacts
    - safety (e.g., aviation safety)

# New & Ongoing CPCN Projects



Power Plant Research Program

dnr.maryland.gov/pprp/Pages/default.aspx

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**Power Plant Research Program**

- > Power Plant Home
- > Power Plant Research Advisory Committee
- > Other Program Activities
- > Power Plants in Maryland
- > Projects Under Review
- > Smart Siting
- > Contact the Program

Projects Under Review

**Quick Links**

- Cumulative Environmental Impact Report Web Pages
- Cumulative Environmental Impact Report Summary
- Electricity Fact Book
- Long-Term Electricity Report
- Bibliography

Maryland Power Plants and the Environment

Electricity in MARYLAND

MARYLAND POWER PLANT

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# Presentation Purpose



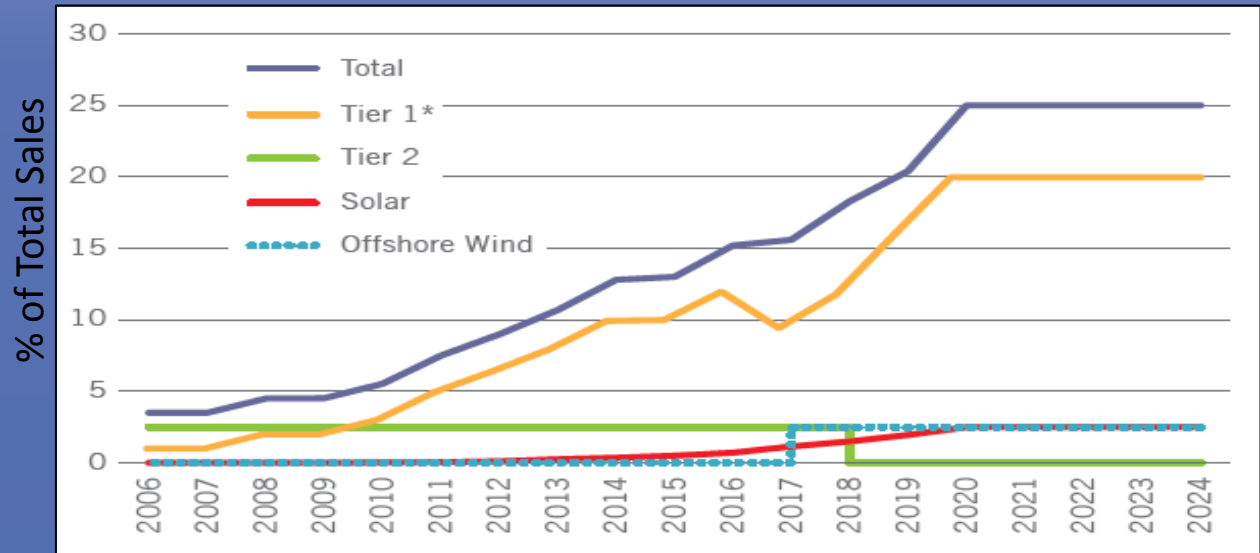
- **CPCN process** - basic principles of how power plants are permitted in Maryland
- **2 new PPRP initiatives** - **Energy Storage Study and RPS Study**
  - RPS Study (HB1414/SB1146)
  - Energy Storage Study (HB773)

# Maryland's RPS



Electricity suppliers demonstrate compliance with Maryland's Renewable Portfolio Standard (RPS) by accumulating renewable energy credits (RECs) based on their retail sales

## Maryland RPS Requirements



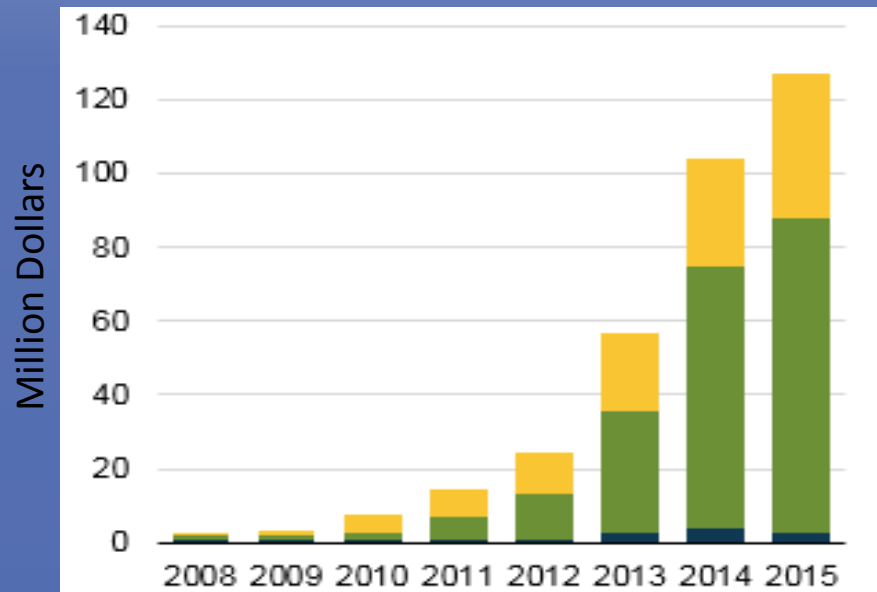
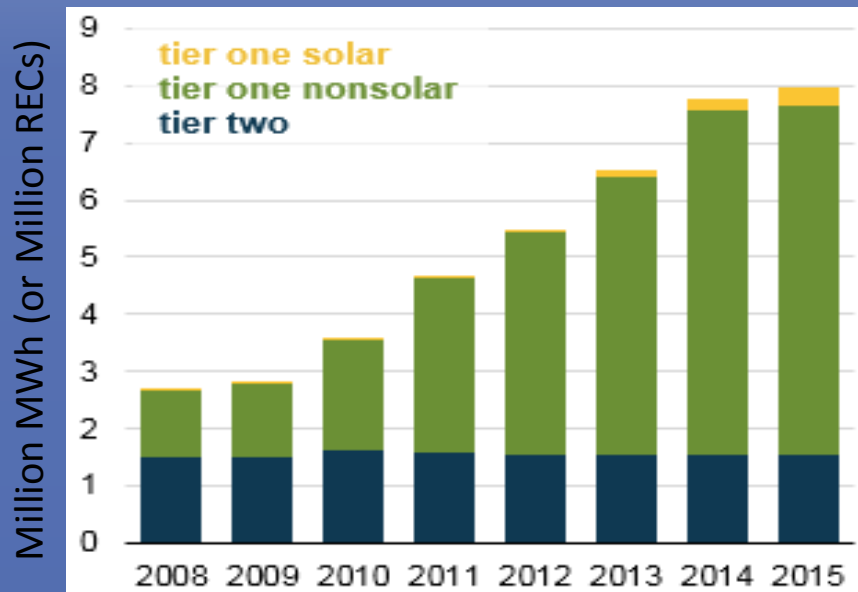
\*Does not include solar or offshore wind

Source: PPRP

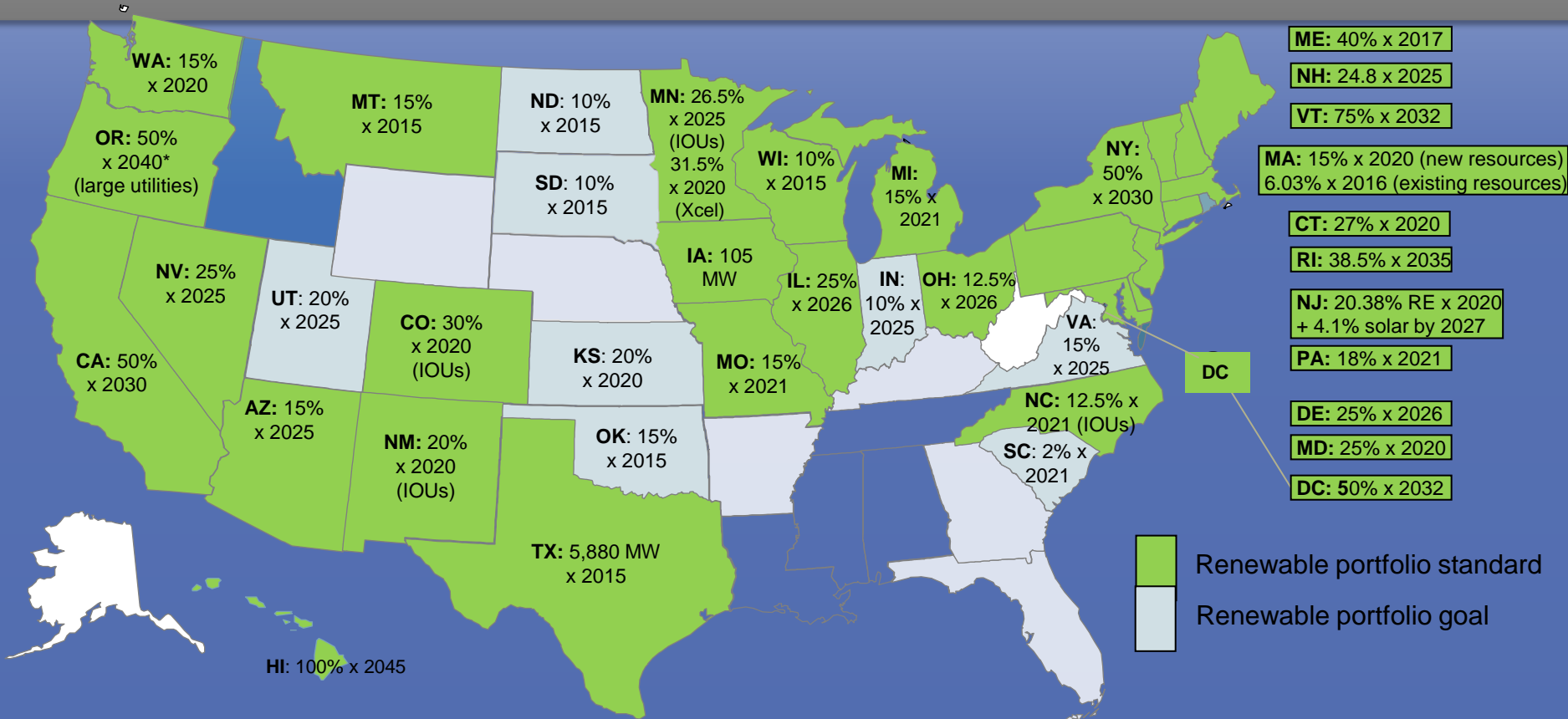
# Maryland's RPS



## Maryland RPS Compliance Credits and Costs



# Other States with a RPS

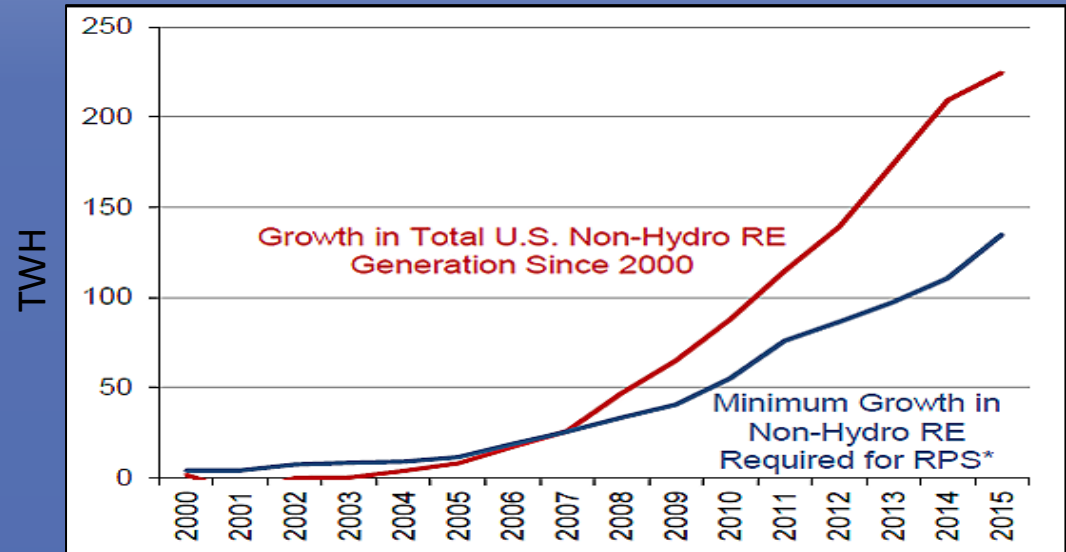


# RPS Policies as Drivers of Renewable Generation



- 60% of all growth in renewable energy (RE) generation since 2000 was required by RPS policies
- Additional drivers include: voluntary green power markets, accelerated RPS procurement, and economic purchases

Growth in Total U.S. Non-Hydro Renewable Energy Generation Since 2000



Source: Lawrence Berkeley National Laboratory

# HB1414



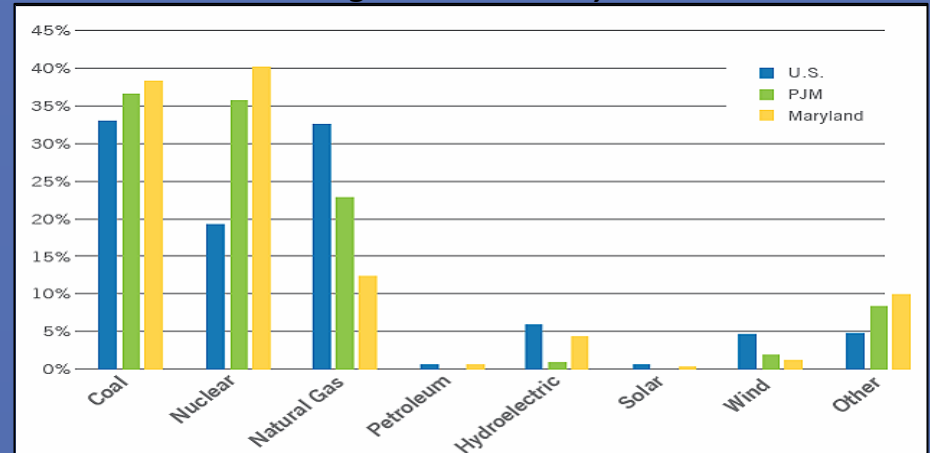
- “PPRP shall conduct a study of the RPS... The study shall be a comprehensive review of the history, implementation, overall costs and benefits and effectiveness of the RPS in relation to the energy policies of the state.”
- Interim / Final Report due December 1, 2018 / 2019 to Governor, Senate Finance Committee, and House Economic Matters Committee

# Subjects to be Addressed

The role and effectiveness that the standard may have in reducing the carbon content of imported electricity and whether... complementary policies or programs could help address carbon emissions associated with electricity imported into the State.

In 2015, Maryland imported  
44% of its electricity

*Electric Generation by Fuel Type for the United States, the PJM Region, and Maryland, 2015*



Source: EIA

# Subjects to be Addressed



The net environmental and fiscal impacts that may be associated with long-term contracts (LTCs) tied to clean energy projects including... ratepayer impacts... and whether the use of LTCs incentivized new renewable energy generation development.

- In competitive states RECs are typically sold separately from electricity via spot-market transactions or short-term contracts
- Long-term contracting shifts some RECs into longer-term, bundled power purchase agreements

Source: LBNL

# Subjects to be Addressed



Whether the State is able to meet current and potential future targets without the inclusion of certain technologies

What industries are projected to grow, and to what extent, as a result of incentives associated with the standard

Whether the public health and environmental benefits of the growing clean energy industries supported by the standard are by equitably distributed across... environmental justice communities

# Subjects to be Addressed



Whether the State is likely to meet its existing goals... and if the State were to increase those goals, whether electricity suppliers should expect to find an adequate supply to meet the additional demand for credits

Additional opportunities that may be available to promote local job creation within the industries that are projected to grow as a result of the standard

System flexibility that the State would need under future goals... including the quantities for peak and ramping that may be required

# Subjects to be Addressed



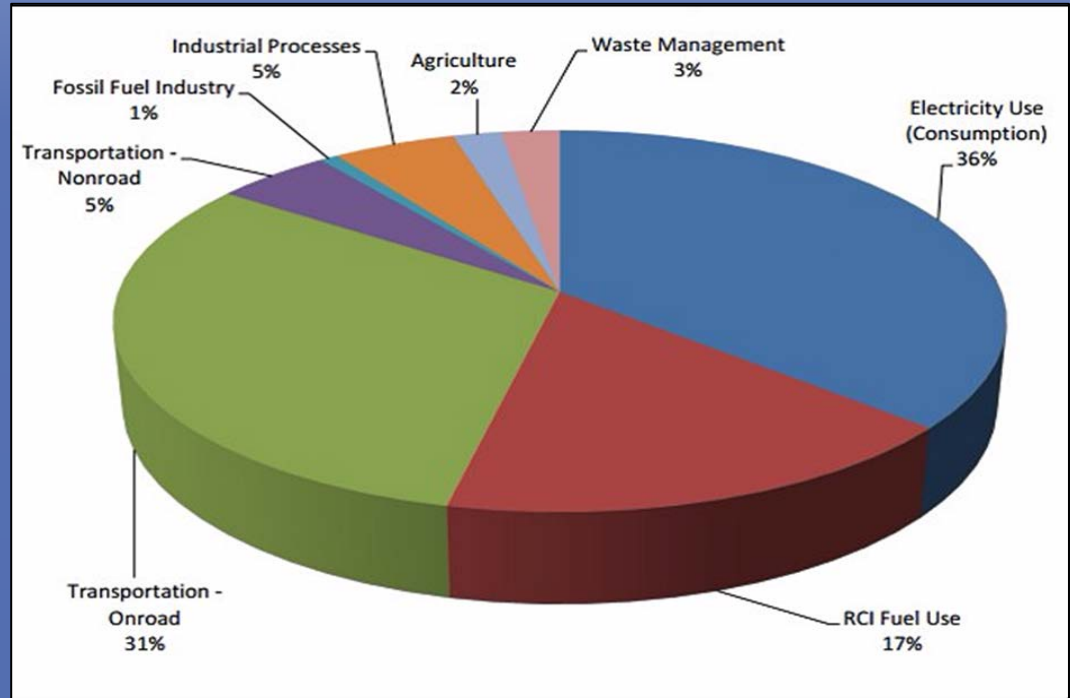
How **energy storage technology** and other flexibility resources should continue to be addressed... including:

- (I) Whether the resources should be encouraged through a procurement, a production, or an installation incentive
- (II) The advisability of providing incentives for energy storage devices to increase hosting capacity of increased renewable on-site generation on the distribution system
- (III) Discussion of the costs and benefits of energy storage deployment in the State under future goals scenarios

# Subjects to be Addressed

The role of in-State  
clean energy in  
achieving  
greenhouse gas  
emission  
reductions and  
promoting local  
jobs and economic  
activity

Maryland 2014 GHG Emissions by Sector

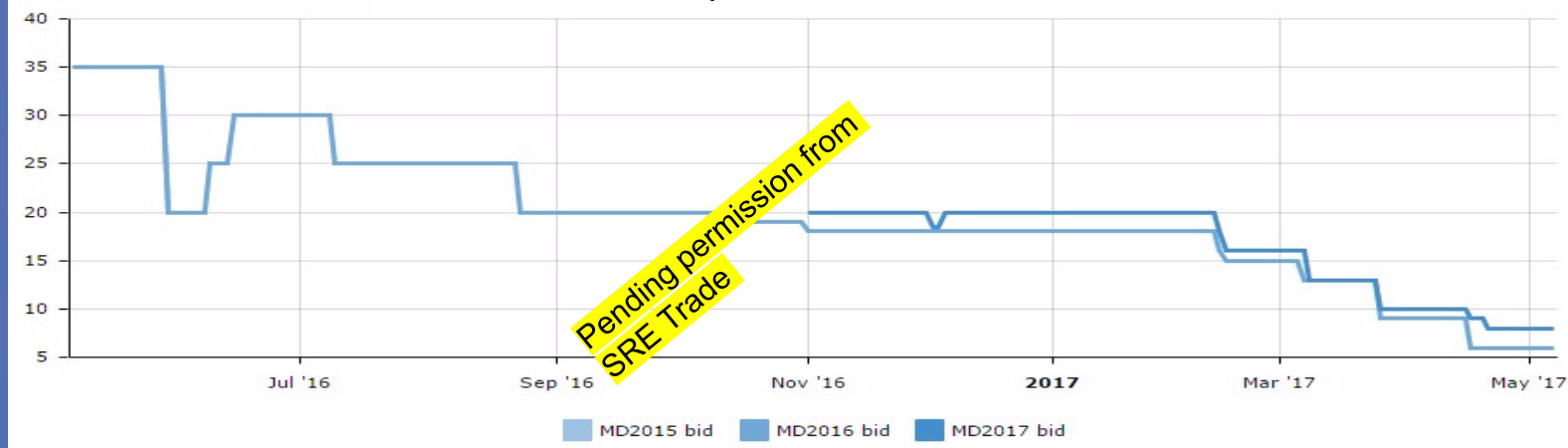


# Subjects to be Addressed



An assessment of any change in Solar REC prices over the immediate 24 months preceding the Interim Report

Bid Prices for Maryland, Last 12 Months



# PPRP Next Steps



**Maryland Department of  
Natural Resources**

**Request for Proposals  
Solicitation RFP-XXX**

**Issue Date: TBD**



**PPRAC WG**

**Power Plant Research Advisory  
Council (PPRAC)**

# Presentation Purpose



- **2 new PPRP initiatives - Energy Storage Study and RPS Study**
  - RPS Study (HB1414/SB1146)
  - Energy Storage Study (HB773/SB715)

# Purpose and Timeline

- HB 773 states, “PPRP shall conduct a study to determine what regulatory reforms and market incentives are necessary or beneficial to increase the use of energy storage devices in the State in a manner that is fair and open to all stakeholders.”
- Major Milestones:
  - Jan. 31, 2018: Preliminary Findings
  - Jul. 31, 2018: Draft Report
  - Aug. 2018: Public Meetings (TBD)
  - Dec. 1, 2018: Final Report



# Subjects Listed in HB 773



- The types and viability of different technologies and applications
- Wholesale market opportunities and challenges
- What other states are doing to promote energy storage
- Policy-related barriers to capturing societal benefits
- Cost recovery mechanisms

# Subjects Listed in HB 773



- Efficient and timely interconnection processes
- Whether pumped hydro should be eligible for policy support
- Supporting both BTM systems and T&D-connected systems
- Appropriate standards and metrics for comparing systems
- Promoting diverse ownership models

# Stakeholders Listed in HB 773



- The Public Service Commission (PSC);\*
- The Office of People's Counsel (OPC);\*
- The Maryland Energy Administration (MEA);\*
- Environmental organizations;
- Electric companies;\*
- Third-party providers of energy storage devices;\*
- Associations of third-party providers;\*
- The UMD Energy Innovation Institute (EII);\*
- The Maryland Clean Energy Center (MCEC);\*
- Developers and owners of electricity generation; and
- Other interested parties.\*



\*Overlaps with the Public Power Research Advisory Committee (PPRAC) Energy Storage Study Working Group are starred

# Project Strategy

- Literature review of reports by EEI, EPRI, ESA, FERC, IREC, PJM, other states, etc.)
- Close cooperation with the PSC PC-44 Working Group
- PPRAC meetings (every spring and fall) and Working Group webinars/meetings (monthly, as needed)
- Site visit(s) to view and discuss features of one or more working energy storage systems in the region
- 1-on-1 conversations with stakeholders
- Public meeting(s) to preview major findings and invite feedback on Draft Report
- News monitoring (Energy Storage News, Utility Dive, etc.)



# Recent Activities



- Meetings/Calls with Storage Development Community
  - Alevo Analytics, Energy Storage Association, Ingersoll Rand and Calmec, Flonium, Schneider Electric, Sunverge, Tesla, WindSoHy
- Meetings/Calls with other organizations
  - Edison Electric Institute, Del. Korman, UMD Energy Innovation Institute
- Field trip to AES storage project



AES 10 MW Energy Storage Battery in Cumberland, MD

# Recent Activities (cont.)



- PSC-PPRP-MEA Coordination
  - Ongoing monitoring of PC 44 Integration & Energy Storage workgroups;
  - Monthly calls with MEA and PPRP;
  - Meeting with PSC staff experts to discuss regulatory sections of Energy Study outline, which PSC staff has agreed to draft or provide input on;
  - Coordination with Andrew Johnston on meetings/calls with stakeholders.
- Report Development
  - Completed draft report outline and style guide
  - Completing draft of Chapter 2. *Energy Storage Technologies*
  - Working on detailed outlines of Chapter 5. *Policies in Other States and* Chapter 7. *Wholesale Market Factors.*

# Presentation Purpose



- **2 new PPRP initiatives** - Energy Storage Study and RPS Study
- **What's Next** – a look at what we may see in Maryland's electricity future

# What's next?

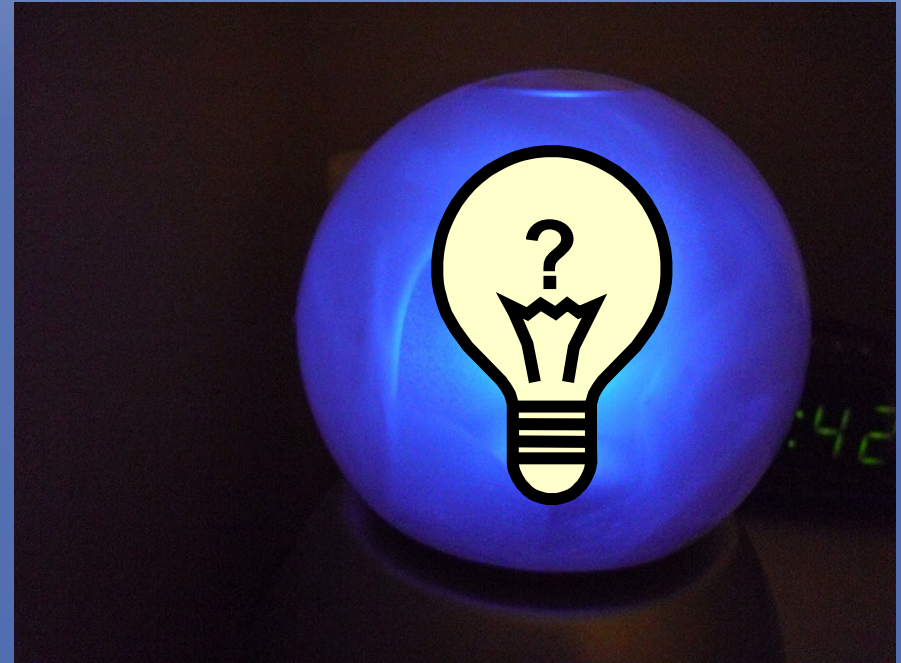
“It's tough to make predictions, especially about the future.”

— Yogi Berra



# What's next?

- Increase in renewables to meet the RPS
- Several new Transmission Lines
- Natural gas?
- Onshore wind?
- Energy Storage?
- Offshore Wind?
- Other renewables?



# Thank You!

