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October 8, 2019

MEMORANDUM

TO: Power Committee

FROM: Gillian Charles

SUBJECT: Review State Clean Energy Policies and Impact on 2021 Plan Analysis

BACKGROUND:

Presenter: Gillian Charles

Summary: State energy policies govern the operation of existing resources and serve as boundaries and guideposts for future resource development. At the October Power Committee meeting, staff will present a summary of regional and WECC-wide state clean energy policies – including renewable portfolio standards, clean energy policies, and greenhouse gas emission standards – and describe how these policies are incorporated and reflected in the analysis for the 2021 Power Plan.

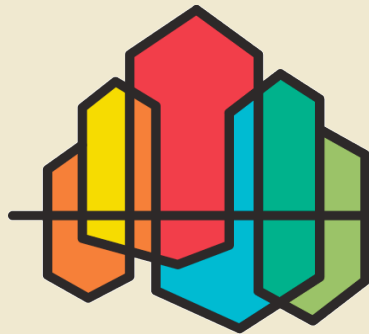
Workplan: A.4.2 Develop environmental methodology, existing system, transmission availability, renewable portfolio standards, emissions and other datasets for the 2021 Plan

Review state clean energy policies and impact on 2021 Plan Analysis

Power Committee – Seattle, WA

10/15/19

Gillian Charles



THE 2021
NORTHWEST
POWER PLAN

FOR A SECURE & AFFORDABLE
ENERGY FUTURE

Starting at the beginning...

The existing power system resources, including known future retirements, and the state policies that govern current resource operation and future resource development serve as the foundation and guideposts when determining the power plan's future resource strategy



- ❖ Policies are likely to be one of the major drivers to resource build-out in the 2021 Power Plan

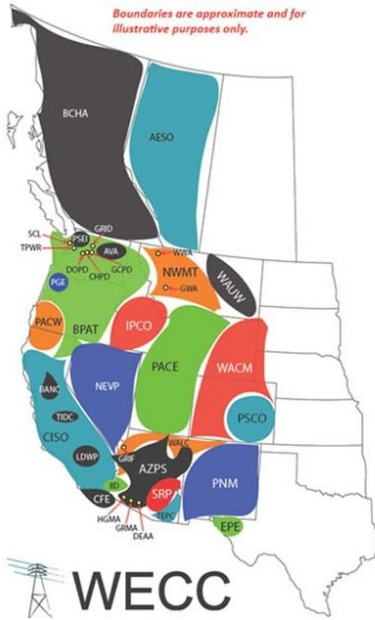


Policies and Regulations – in Region

- ✓ Existing **state** regulations governing the operation of existing system resources and development of future resources
- ✓ To the extent possible, existing **utility** and county/city-wide goals
- ✗ Proposed state regulations
- ✗ Federal regulations (catalogued and interpreted in environmental methodology process)
- ✗ Company/Corporation goals and pledges



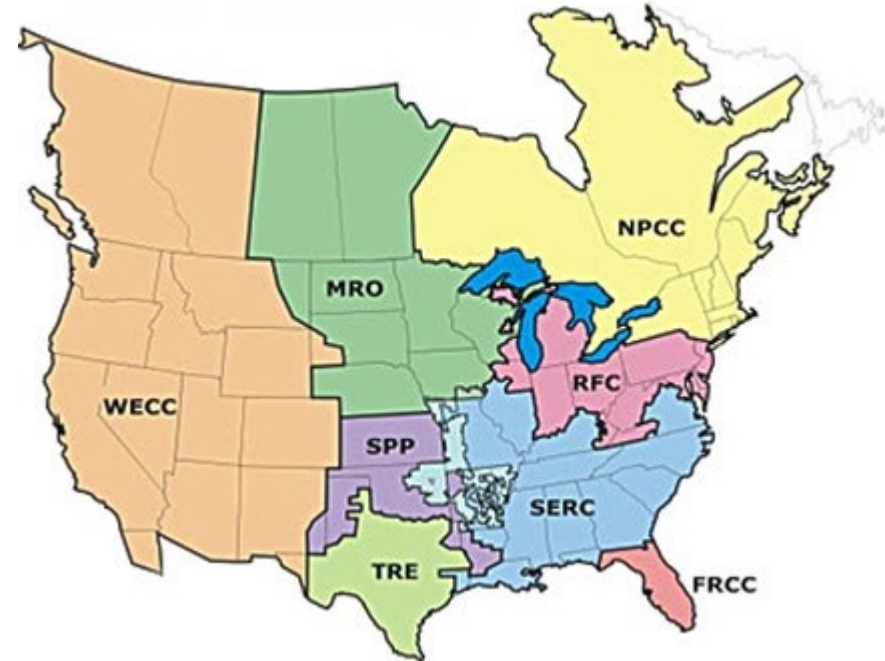
Quick note about the region and WECC



Western Interconnection Balancing Authorities (38)

- AESO - Alberta Electric System Operator
- AVA - Avista Corporation
- AZPS - Arizona Public Service Company
- BANC - Balancing Authority of Northern California
- BCHA - British Columbia Hydro Authority
- BPAT - Bonneville Power Administration - Transmission
- CFE - Comision Federal de Electricidad
- CHPD - PUD No. 1 of Chelan County
- CISO - California Independent System Operator
- DEAA - Arlington Valley, LLC
- DOPD - PUD No. 1 of Douglas County
- EPE - El Paso Electric Company
- GCPD - PUD No. 2 of Grant County
- GRID - Gridforce
- GRIF - Griffith Energy, LLC
- GRMA - Sun Devil Power Holdings, LLC
- GWA - NaturEner Power Watch, LLC
- HGMA - New Harquahala Generating Company, LLC
- ID - Imperial Irrigation District
- IPCO - Idaho Power Company
- LDWP - Los Angeles Department of Water and Power
- NEVP - Nevada Power Company
- NWMT - NorthWestern Energy
- PACE - PacifiCorp East
- PACW - PacifiCorp West
- PGE - Portland General Electric Company
- PNM - Public Service Company of New Mexico
- PSCo - Public Service Company of Colorado
- PSEI - Puget Sound Energy
- SCL - Seattle City Light
- SRP - Salt River Project
- TEPC - Tucson Electric Power Company
- TIDC - Turlock Irrigation District
- TPWR - City of Tacoma, Department of Public Utilities
- WACM - Western Area Power Administration, Colorado-Missouri Region
- WALC - Western Area Power Administration, Lower Colorado Region
- WAUW - Western Area Power Administration, Upper Great Plains West
- WWA - NaturEner Wind Watch, LLC

Power Plan is a plan
for the region...



...however the Northwest is obviously directly affected by the resources and policies that exist in the surrounding states and markets

It is our intent to capture both - to the *extent possible*



Examples of existing policies to catalog and interpret

Renewable portfolio standards

- State standards, rules, and eligible resources
- Qualified resources assigned to meet RPS, renewable energy credit (REC) bank balances

Clean energy policies

- Requirements of state legislation, rules, eligible resources
- Qualified resources in operation/under construction to meet targets

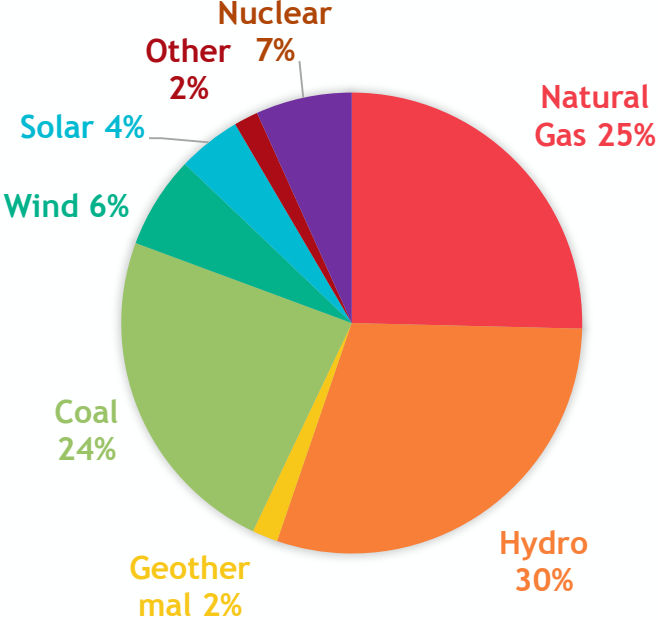
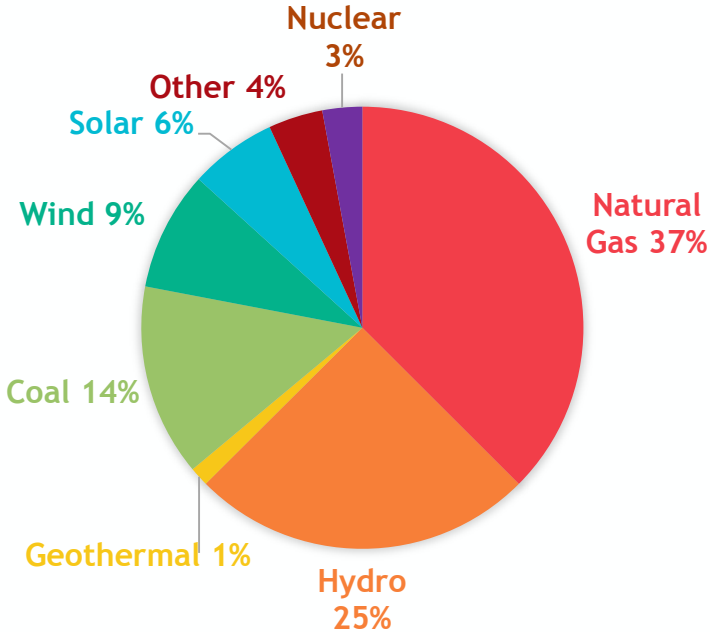
Analysis relies on staff interpretation and application of the policies; we rely on our advisory committees to aid us in this process



2017 WECC-wide Capacity and Generation

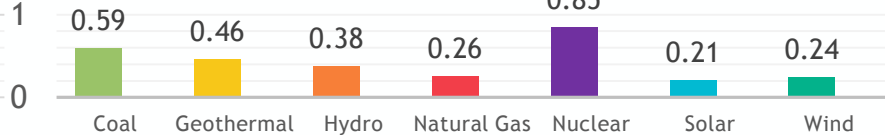
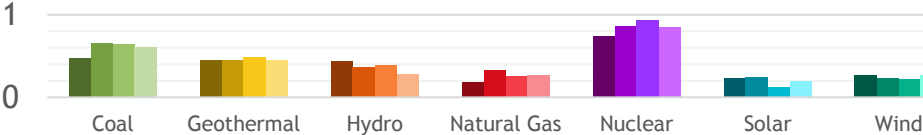
NAMEPLATE CAPACITY - 266,000 MW

GENERATION - 866,422,000 MWH



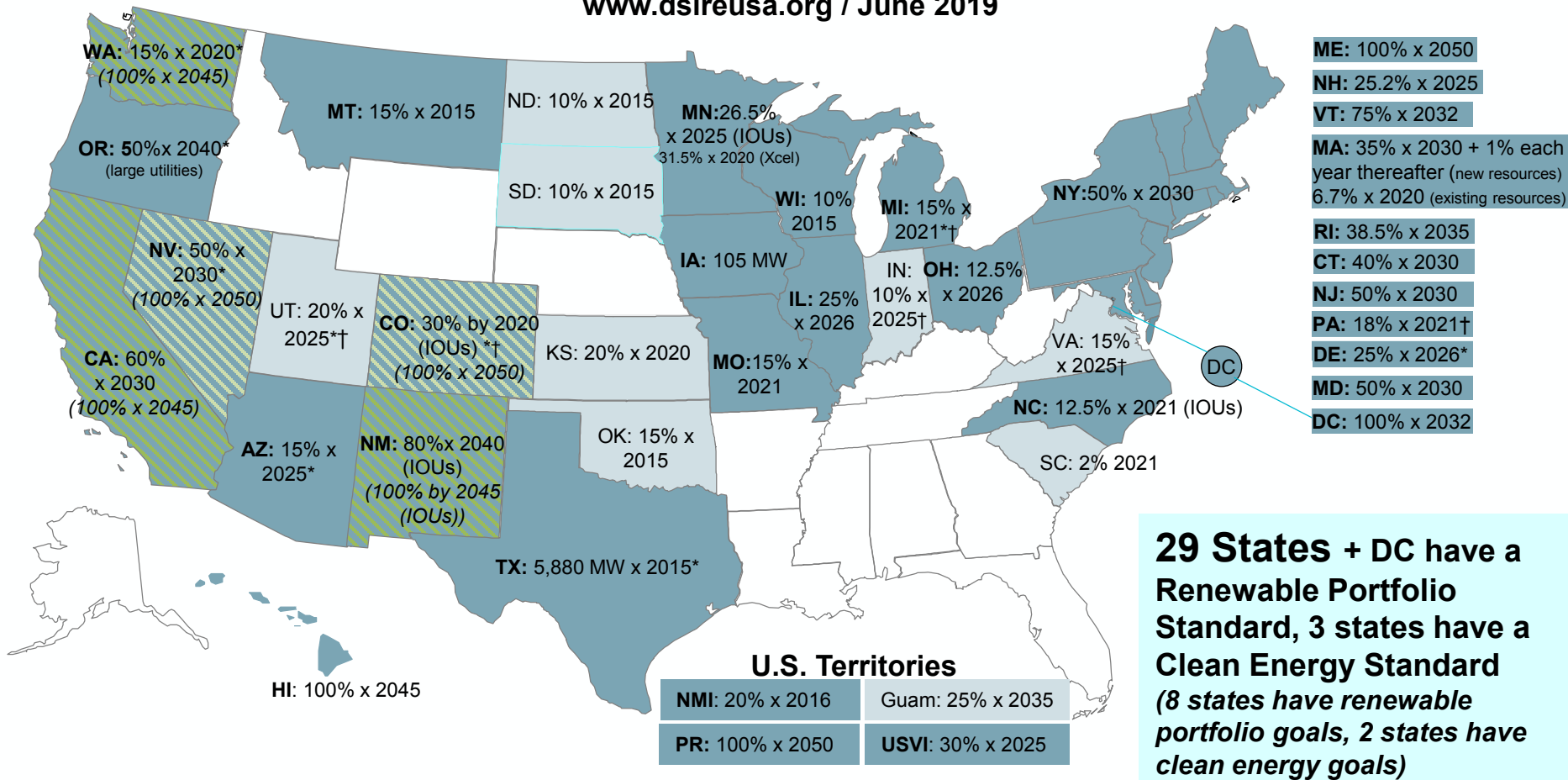
2017 Seasonal Sp/S/F/W Capacity Factors by Fuel Type

2017 Avg Annual Capacity Factors by Fuel Type

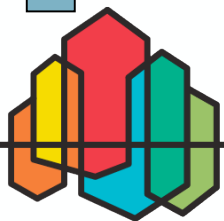


Renewable & Clean Energy Standards

www.dsireusa.org / June 2019



- Renewable portfolio standard
- Clean energy standard
- Renewable portfolio goal
- Clean energy goal
- * Extra credit for solar or customer-sited renewables
- † Includes non-renewable alternative resources



Carbon Regulations in WECC

- **Carbon Tax** – a tax/fee for every unit of carbon that is emitted; can cover multiple economic sectors
 - BC (2008)
 - AB (2007, 2017)
 - WA – effectively 20% compliance (2019)
 - ❖ City of Boulder (2007, 2015)
- **Carbon Cap-and-Trade** – limits emissions and issues allowances that decline in availability over time
 - California (2013)
 - Market is tied to Quebec
- **State GHG emission standards** for new power plants – effectively put a moratorium on new coal builds



Note: Other cap-and-trade regulation external to WECC is Regional Greenhouse Gas Initiative (RGGI) - 9 states in NE

(xxxx) - year program became active



Policy Summaries – Tour de WECC, by State and Province



- High level summary of renewable portfolio/energy standards, clean and/or carbon policies

RPS - Is there a state renewable standard?

Clean/Carbon - Is there a state clean or carbon standard?

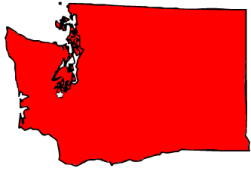
No Coal - Is there a “no new coal/coal retirement” provision?

- ✓ Yes - Standard/Regulation
- ✓ Yes - Goal (non-binding)
- ✗ No Standard/Goal



| | RPS | Clean/Carbon | No Coal |
|------------------|-------|--------------|---------|
| Washington | ✓ | ✓ | ✓ |
| Oregon | ✓ | ✗ | ✓ |
| Idaho | ✗ | ✗ | ✗ |
| Montana | ✓ | ✗ | ✗ |
| California | ✓ | ✓ | ✓ |
| Wyoming | ✗ | ✗ | ✗ |
| Nevada | ✓ | ✓ | ✗ |
| Colorado | ✓ | ✓ | ✗ |
| Utah | ✓ | ✗ | ✗ |
| Arizona | ✓ | ✗ | ✗ |
| New Mexico | ✓ | ✓ | ✗ |
| British Columbia | ✓ | ✓ | ✓ |
| Alberta | ✓ | ✓ | ✓ |
| Sum of ✓ | 10/13 | 5/13 | 5/13 |
| Sum of ✓ ✓ | 11/13 | 7/13 | 5/13 |





Washington (1)

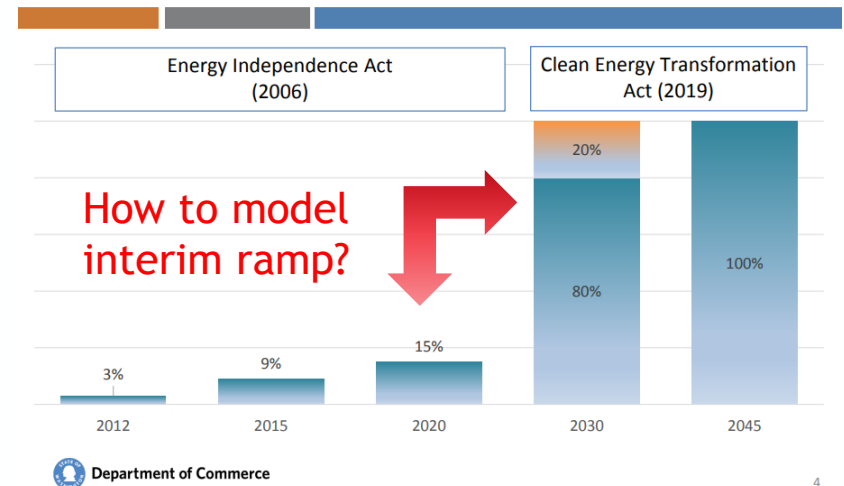
- ✓ RPS
- ✓ Clean/Carbon
- ✓ No Coal

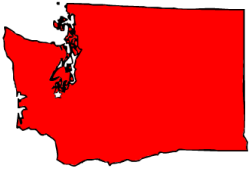
Clean Energy Transformation Act (CETA) (SB 5116, 2019)

Applies to: all electric utilities in WA

- **December 31, 2025 – Eliminate coal** from electricity supply
- **January 1, 2030 – Greenhouse gas neutral** (4-yr compliance periods)
 - 80% of electricity delivered to WA customers must be by non-emitting or renewable
 - 20% alternative compliance (ACP*, unbundled RECs, investments in energy transformation projects)
- **January 1, 2045 – 100% non-emitting or renewable resources**
- Renewable portfolio standard remains in effect

Clean Energy Transformation Act





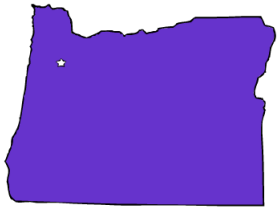
Washington (2)

- ✓ RPS
- ✓ Clean/Carbon
- ✓ No Coal

CETA Highlights

- **2% Cost Cap** - Utility to be considered in compliance if, over the four-year compliance period, the average annual incremental cost of compliance:
 - IOUs - **equals** a 2% increase of the utility's weather-adjusted sales revenue
 - COUs – **meets** a 2% increase of the utility's retail revenue requirement
- **Social Cost of Carbon** –
 - Consider and incorporate as a cost adder when evaluating conservation policies, developing IRPs and clean action plans, and evaluating/selecting intermediate and long-term resource options
- Rulemaking process has begun and will take a few years to complete





Oregon (1)

- ✓ RPS
- ✗ Clean/Carbon
- ✓ No Coal

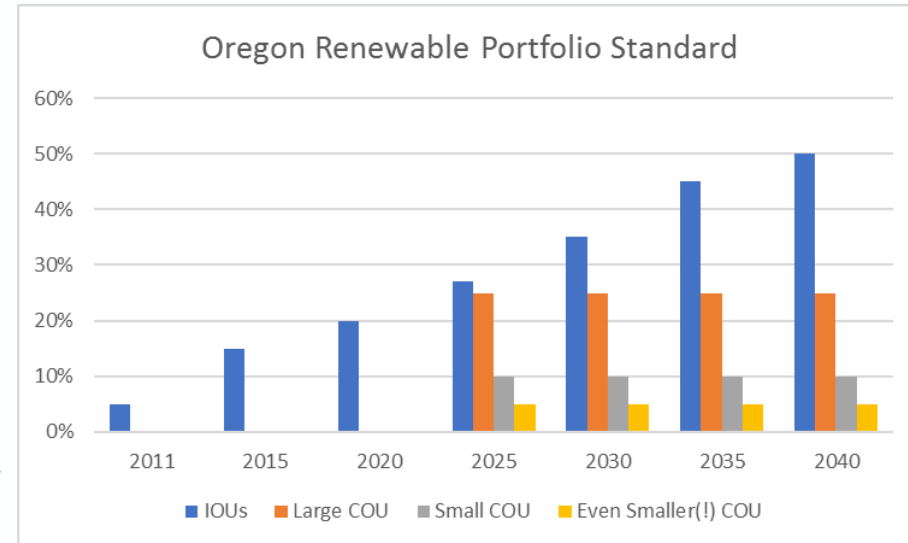
Oregon Clean Electricity & Coal Transition Plan (SB1547, 2016)

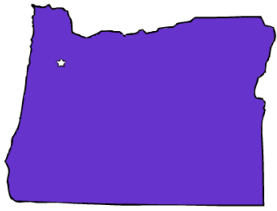
Applies to: IOUs (PGE, PAC); COUs still under original RPS

- **2030 – No coal** in the electricity supply
 - Exception for small portion of PGE’s ownership, no later than 2035
- **2040 - Renewable portfolio**

standard increased to 50%

- New rules on REC banking: unlimited RECs until 2022, 5 yr REC life post-2022
- By 2025, at least 8% from small-scale (<20 MW) community-based renewables or biomass cogen





Oregon (2)

- ✓ RPS
- ✗ Clean/Carbon
- ✓ No Coal

Oregon Clean Electricity & Coal Transition Plan (SB 1547)

- 4% incremental cost cap protection – utilities are not required to add renewables to their portfolio if the incremental cost to customers is greater than 4% higher than the cost of developing non-renewable resources
- PUC can institute a suspension of RPS if compliance would conflict with reliability of the grid
- Small-scale community based renewable energy projects – by 2025
- Other provisions encourage utilizing all cost-effective energy efficiency and demand response resources prior to new generating resource development, electrifying the transportation sector, community solar






Oregon's "Cap and Invest" GHG emission reduction proposal, w/ economy-wide reductions and a cap-and-trade program... failed in the 2019 legislature





Idaho

-  RPS
-  Clean/Carbon
-  No Coal

- Idaho does not have a state RPS or clean energy regulation
- Idaho Power has set a goal for 100% clean energy by 2045, planning additional investments in wind, solar, storage, and other clean sources in addition to hydro
 - Includes a “Path Away from Coal”
 - Ending participation in Boardman (ret. 2020) and North Valmy 1, 2 (2019, 2025)
 - Discussions ongoing to reduce emissions and/or end participation in Jim Bridger
 - ❖ IPC serves ~80% load in state of Idaho
 - ❖ Currently 50% electricity delivered to customers is from hydro





Montana

- ✓ RPS
- ✗ Clean/Carbon
- ✗ No Coal

Montana Renewable Power Production and Rural Economic Development Act (April 2005)

- Renewable Portfolio Standard applies to IOUs and competitive electricity suppliers
- **15%** of electricity sales by 2015 and every year thereafter
- **Community Renewable Energy Project (CREP)**
 - 75MW by 2015 and each year thereafter (RECs + electricity output)
 - Encourage local, small-scale (<25 MW) renewables
 - Northwestern Energy's portion of CREP is 65 MW (MDU is 10MW)
 - Compliance issues tend to center around ownership rule – CREPs must be at least 50% owned by MT residents



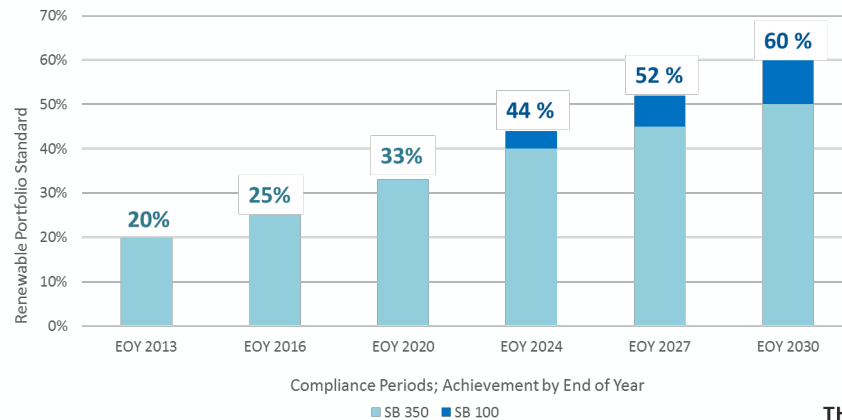


California (1)

- ✓ RPS
- ✓ Clean/Carbon
- ✓ No Coal

100 Percent Clean Energy Act (SB 100, 2018)

- Replaces and accelerates the existing 50% RPS (SB 350), which was codified October 2015
- Strengthens existing carbon goals (see AB 32)
- Two major components plus Executive Order
 - Increase **RPS from 50% to 60% in 2030**
 - **100% zero-carbon electricity by 2045**
 - EO B-55-10: 100% carbon-neutrality economy-wide





California (2)

- ✓ RPS
- ✓ Clean/Carbon
- ✓ No Coal

California Global Warming Solutions Act of 2006 (AB 32)

- Mandates GHG reductions **across multiple sectors** responsible for ~85% of total GHGs
 - 1990 levels by 2020 (~15% reduction *vs.* business as usual)
 - 40% below 1990 levels by 2030 (SB32)

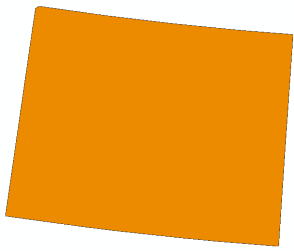
Emissions Performance Standard (SB 1368, 2006)

- Limits long-term investment meet emissions equal to that of a CCCT (1,100lbs CO₂/MWh), **effectively ending investments in coal**

Cap and Trade Program (started in 2012) provides transparent carbon allowance pricing in \$/Tonne- CO₂e

- Linked to Quebec market
- Decreasing the carbon intensity of the electricity sector could lead to process electrification to save on carbon allowance costs





Wyoming

- ~~X~~ RPS
- ~~X~~ Clean/Carbon
- ~~X~~ No Coal

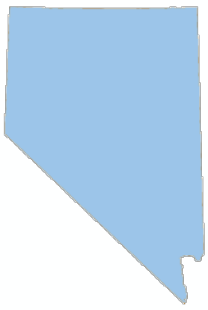
Wyoming does not have a RPS or clean/carbon regulation or goal

Senate File 159 (March 2019)

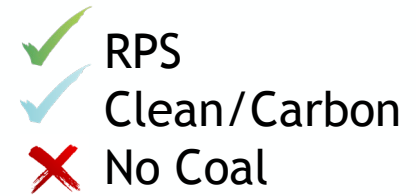
- Starting in 2022, legislation requires utility companies to first **search for a buyer to purchase their coal-fired power plant** before retiring/decommissioning them
- “a public utility will only be able to recover the costs of a new power plant built to replace coal-fired electric generation if the utility first makes *a good faith effort* to sell the facility to a third party operator, who could then sell electricity in the wholesale market or back to the utility”

March 25, 2019 - Argus Media reports that Glenrock Petroleum has emerged as a potential buyer of PacifiCorp’s Dave Johnston coal plant; Glenrock would equip unit 4 w/ CCS and use it for enhanced oil recovery





Nevada

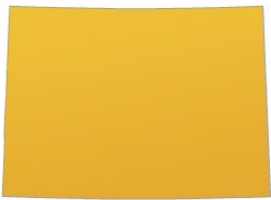


SB 358 (2019) doubled RPS to 50% by 2030; set goal of 100% carbon-free emissions by 2050

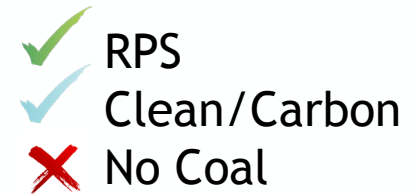
- Ensures RPS applies to all electricity providers
- Clarifies that definition of renewable resources includes *existing hydropower*
- Original RPS was 25% by 2025; only applied to NV Energy
- ❖ 100% clean energy by 2050 is goal – not regulation

NV Energy plans to add 1GW solar PV (six projects) in 25-yr PPAs by 2023 and seeks to build 100MW battery storage; retire Valmy Units 1 & 2 in 2021, 2025





Colorado (1)



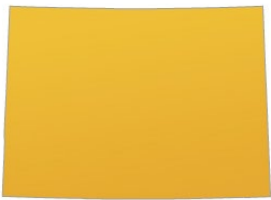
Clean Energy Plan (SB19-236) (June 2019)

- Essentially codified Xcel Energy's goal of 100% carbon free electricity by 2050 (applies to utilities serving >500K customers)
- Goal of reducing carbon emissions by 80% from 2005 levels by 2030
- Requires the use of the SCC to calculate NPV including carbon emissions in each optimized portfolio run in IRP process
- Allows Xcel to own 50% of its *future* renewable energy assets as it builds out a cleaner portfolio

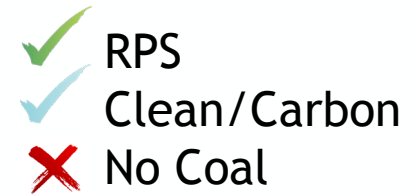
Xcel's Clean Energy Plan (2018 IRP)

- Specifically commits to no new coal resources for the utility
- Accelerates retirement of Comanche 1,2 and seeks ~2GW new renewable resources (1,100 MW wind, 700MW solar, 275MW battery, use of existing 380MW gas peaking resources)





Colorado (2)

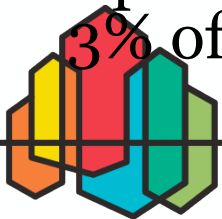


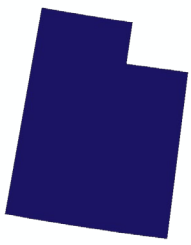
Climate Action Plan to Reduce Pollution (HB19-1261, 2019)

- Economy-wide goal to reduce GHG below 2005 levels:
 - 26% below 2005 levels by 2025
 - 50% below 2005 levels by 2030
 - 90% below 2005 levels by 2050

Renewable Portfolio Standard (2004)

- IOUs: 30% renewables by 2020
- Electric coops serving 100K+ meters: 20% by 2020
- Electric coops serving <100K: 10% by 2020
- Municipal utilities serving 40K+ customers: 10% by 2020
- ❖ Specific carve-outs for distributed generation (e.g. For IOUs, 3% of retail sales must come from DG by 2020)





Utah

- ✓ RPS
- ✗ Clean/Carbon
- ✗ No Coal

Energy Resource and Carbon Emission Reduction Initiative (SB 202, 2008)

- Renewable portfolio **goal** (not regulatory standard) of **20% of adjusted retail sales by 2025**
 - Basically, goal is for 20% of *non-nuclear* retail sales; e.g. if a utility has 100MWh and 10MWh of that was nuclear, the utility only has to procure 20% renewables from the remaining 90% (~18%).
- Applies to IOUs, muni's, electric co-ops
- No interim targets, although progress reports every ~5 yrs since 2010

While Utah has no state-level carbon/clean goal or standard, several large cities and load centers have passed joint resolutions committing to a transition to 100% renewables by 2032

- Salt Lake City, Cottonwood Heights, Moab, Park City





Arizona

- ✓ RPS
- ✗ Clean/Carbon
- ✗ No Coal

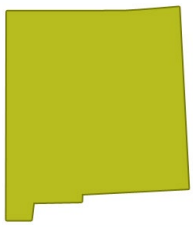
Renewable Portfolio Standard is 15% by 2025, adopted in 2006

- Carve out for distributed generation (30% of target)
- Compliance target builds annually from 1.25% in 2006 up to 15% in 2025
- ❖ Arizona has already met the 15% target, well in advance!

Current state proposals to increase RPS are up for discussion – decision due later this year

- Increase RPS to 45% by 2035, with a “clean peak” goal for sales at peak times to 20% by 2035 (proposed by Arizona Corporation Commission staff)
- Other proposals – 50% renewables by 2030 and 100% clean by 2045





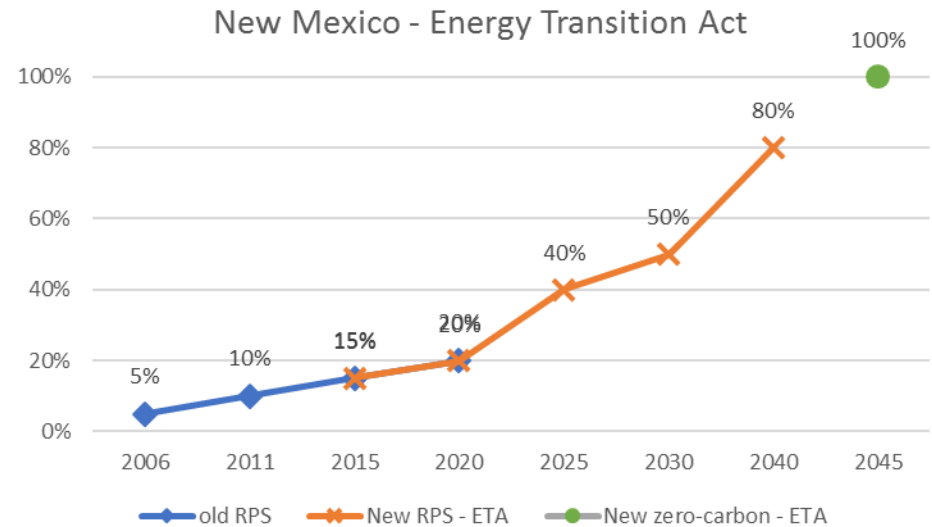
New Mexico

- ✓ RPS
- ✓ Clean/Carbon
- ✗ No Coal

Energy Transition Act (SB 489, March 2019)

- Renewable energy standard for retail electricity sales:
 - 40% by 2025
 - **50% by 2030**
 - **80% by 2040**
- Zero-carbon resource standard:
 - **100%** of retail electricity sales must be zero-carbon resources by 2045 (2050 for co-ops)
 - “reasonable and consistent progress shall be made over time toward this requirement” (SB 489)
- Directs re-investment in communities affected by coal unit closures

Prior to the ETA, the original RPS was 20% by 2020





Canada



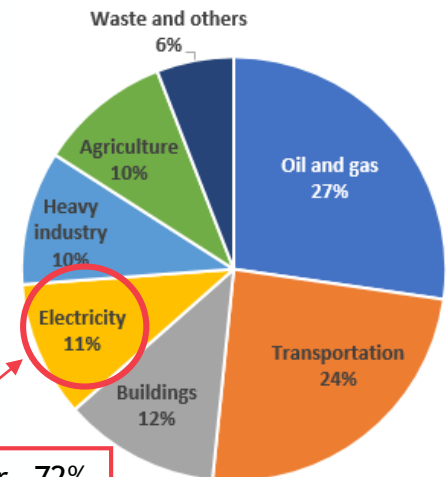
December 12, 2018, federal rules on electricity sector carbon emissions published

- 90% of Canada's electricity from non-emitting sources by 2030
- Accelerate phase-out of coal-fired generation by 2030
 - Previous ruling would have allowed coal generation through 2053 (at least)
- Performance standard of 420 tons/GWh for new coal-fired units and units at end-of-life
- Encourage investment and exploration of CCS technologies

Nation-wide carbon tax implemented in 2019



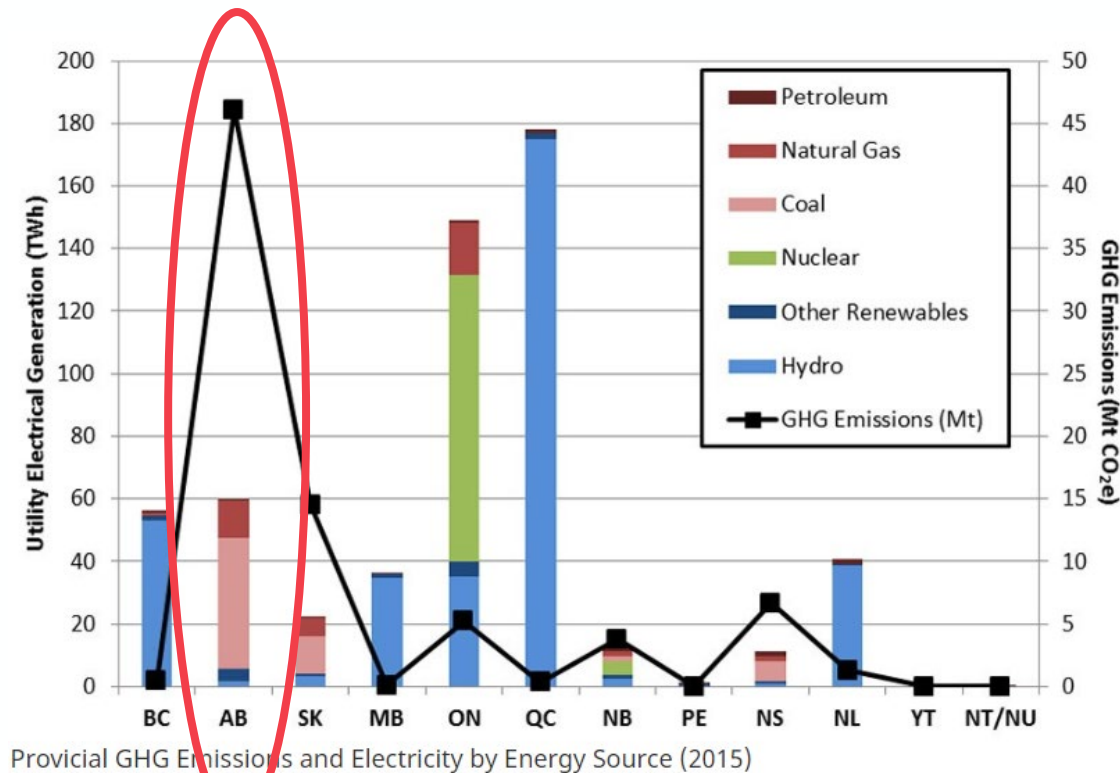
2017 Emissions by Sector (mT/CO₂e)



Coal accounted for ~72% of electricity emissions

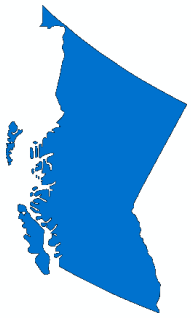
THE 2021
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Canada by the Provinces: Generation and Emissions



- In 2015, ~80% electricity came from non-emitting sources – primarily hydro and nuclear
- Post-Ontario’s coal phase-out (committed to in 2007, last unit retired in 2014), **Alberta** has the greatest coal-fired fleet in Canada – easily contributing to the majority of electricity GHG emissions in the country





British Columbia

- ✓ RPS
- ✓ Clean/Carbon
- ✓ No Coal

2007 BC Energy Plan

- 100% self sufficient electricity supply by 2016, of which 90% must be renewable, clean sources

Carbon Tax Act of 2008

- Enacted “revenue-neutral” carbon tax

2010 Clean Energy Act

- Increased to **93% clean or renewable** energy sources

Climate Act (several versions! Last updated 2018?)

- GHG emissions reduction targets, below 2007:
 - 40% by 2030, 60% by 2040, 80% by 2050





Alberta

- ✓ RPS
- ✓ Clean/Carbon
- ✓ No Coal

Climate Leadership Plan (2015)

- Phase-out and retire all coal-fired electricity by 2030
 - Transition payments from government to existing owners to aide the loss of power purchase agreements
 - Allows for conversion of existing coal-fired plants to transition to natural gas (dual fuel to natural gas, for most)
- Renewables to account for 30% of electricity by 2030 (does hydro count? I think yes?)
 - Estimated to equal about 5,000 MW
 - In 2017, renewables accounted for 10%
- Implement carbon tax (launched Jan. 2017)
- Reduce methane emissions from oil and gas operations by 45% (from 2014 levels) by 2025
- Limit oil sands emissions to 100 megatonnes/yr



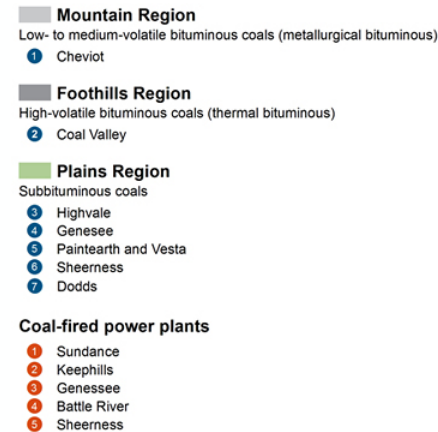


Alberta Coal Units

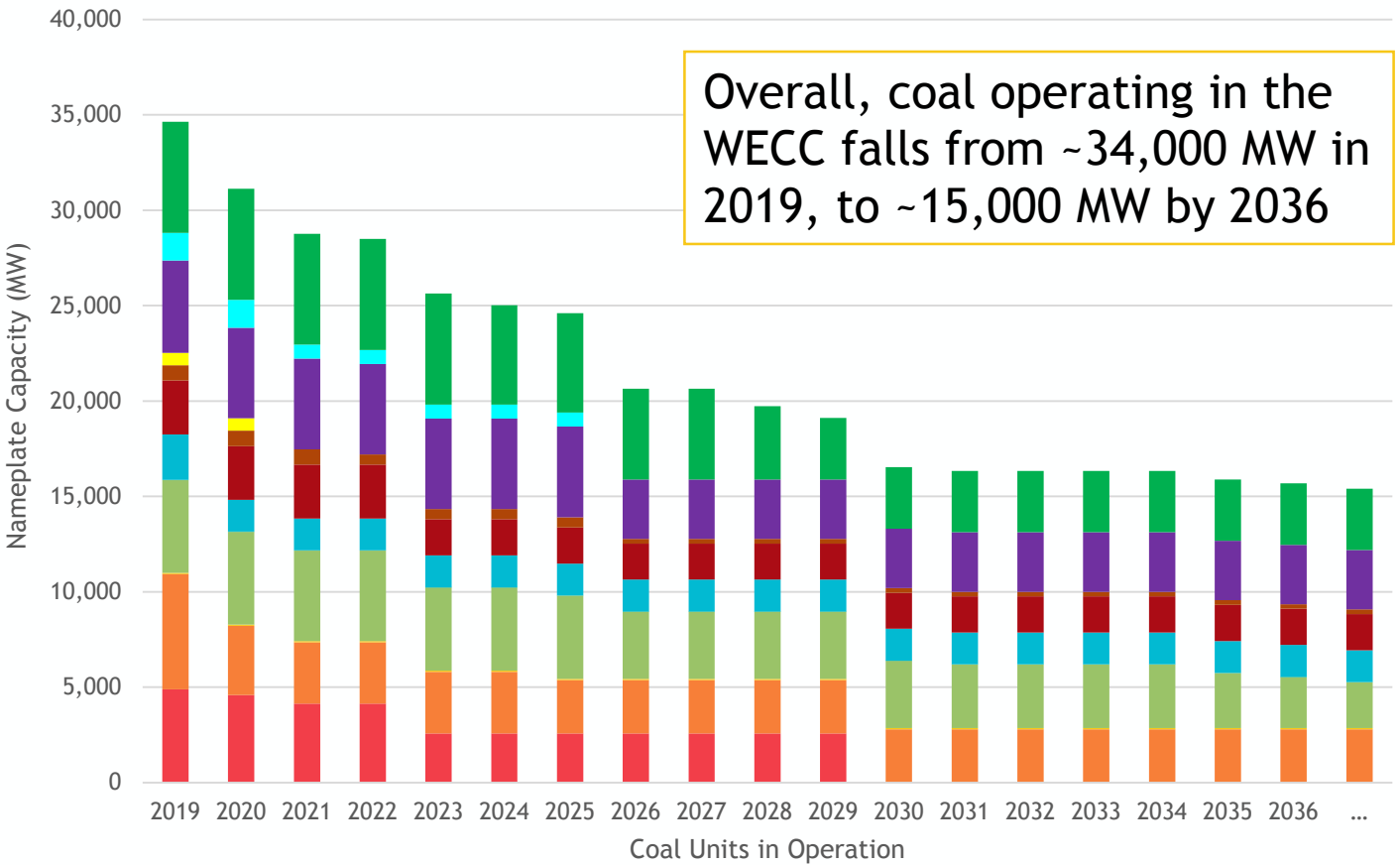


- All plants must cease coal-firing by 2030
- Currently, ~5,500 MW nameplate capacity coal plants in operation in Alberta
 - A few units have been mothballed for enhanced generation at other units
- TransAlta and ATCO have announced plans to convert all coal units to natural gas, in 2020-2023
 - This equals about ~3,600 MW coal-fired capacity set for conversion to natural gas

Figure S8.2
Producing surface coal mines
and coal-fired power plants in
Alberta in 2017



WECC Coal Units in Operation, Decreasing over Next 20 Years



AB AZ CA CO ID MT NM NV OR UT WA WY

How do we translate policies to models and analysis?

Example: Renewable Portfolio Standards/Clean policies

- RPM –track regional existing RPS resources, REC banking, new resource requirements
- Aurora – extra-regional RPS/clean requirements, builds will be to physical compliance (ignore some of the unbundled REC compliance opportunities)
- Coal retirements – per retirement schedules or scenario analysis

Enhanced modeling capabilities to more accurately represent policies

- ❖ Policies are likely to be one of the major drivers to resource build-out in the 2021 Power Plan, along with coal unit retirements



What's Next

2019 wholesale electricity price forecast – November

- First opportunity to see how these policies are effecting build out of new resources in the WECC, prices, and emissions



Additions and Retirements since the Seventh Power Plan (incl. announced planned retirements)

