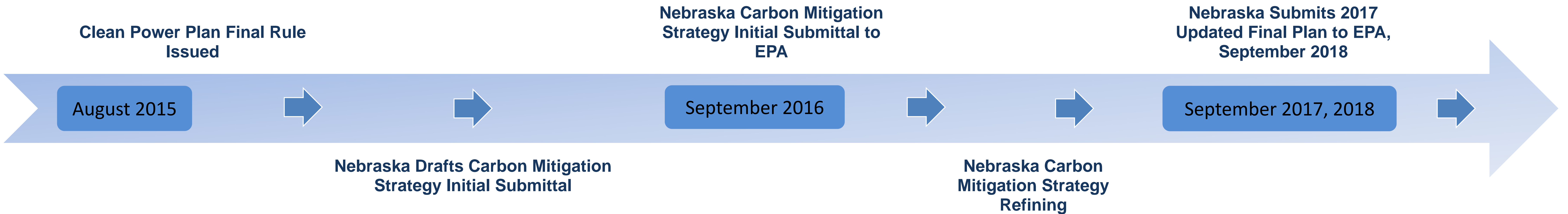


Nebraska's Carbon Mitigation Strategy: Development & Engagement Timeline



Strategy Development



Public Engagement

Public Surveys

The NDEQ works with the University of Nebraska-Lincoln to develop, distribute, and analyze public surveys. Surveys are designed to provide an initial assessment of the public's awareness, knowledge, and opinions about the carbon mitigation strategy and related topics.

Public Input Meetings

Public meetings are held across Nebraska to provide the public with information about the CPP and gather input regarding Nebraska's plan. These meetings conform to CPP requirements for meaningful engagement during the state planning process.

Public Comment

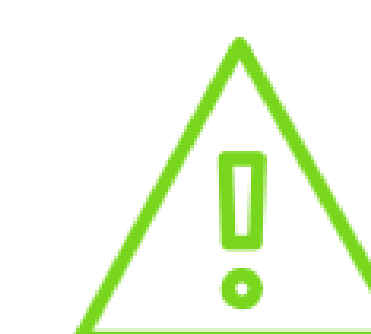
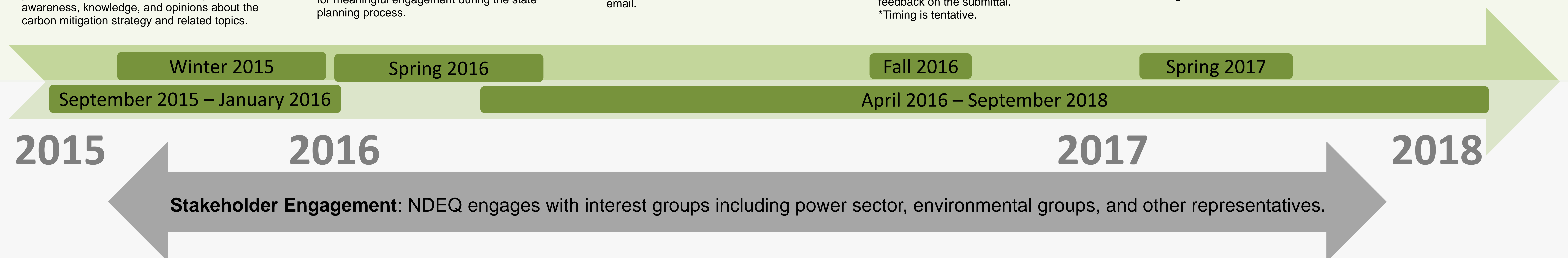
The public is asked to comment on Nebraska's draft plan, which will be publicly available. Comments can be made online, via mail, or by email.

Public Input Meetings*

The NDEQ will hold public listening sessions initial to gather public feedback on the submittal.
*Timing is tentative.

Public Hearings*

The NDEQ hosts formal public hearings designed to gather feedback and official comment on the proposed final approach.
*Timing is tentative.



Share your comments, suggestions, and ideas:
<https://ecmp.nebraska.gov/DEQ-CCP>

The U.S. Clean Power Plan: Implications for Nebraska



U.S. Clean Power Plan (CPP) Overview

At a Glance...

The U.S. Clean Power Plan was finalized in August of 2015 and requires states to reduce carbon dioxide emissions from power plants.

The plan focuses on reducing emissions from coal and natural gas power plants. In the U.S., coal and natural gas fired power plants are the largest source of carbon dioxide emissions, contributing 31% of U.S. total greenhouse gas emissions.⁽¹⁾

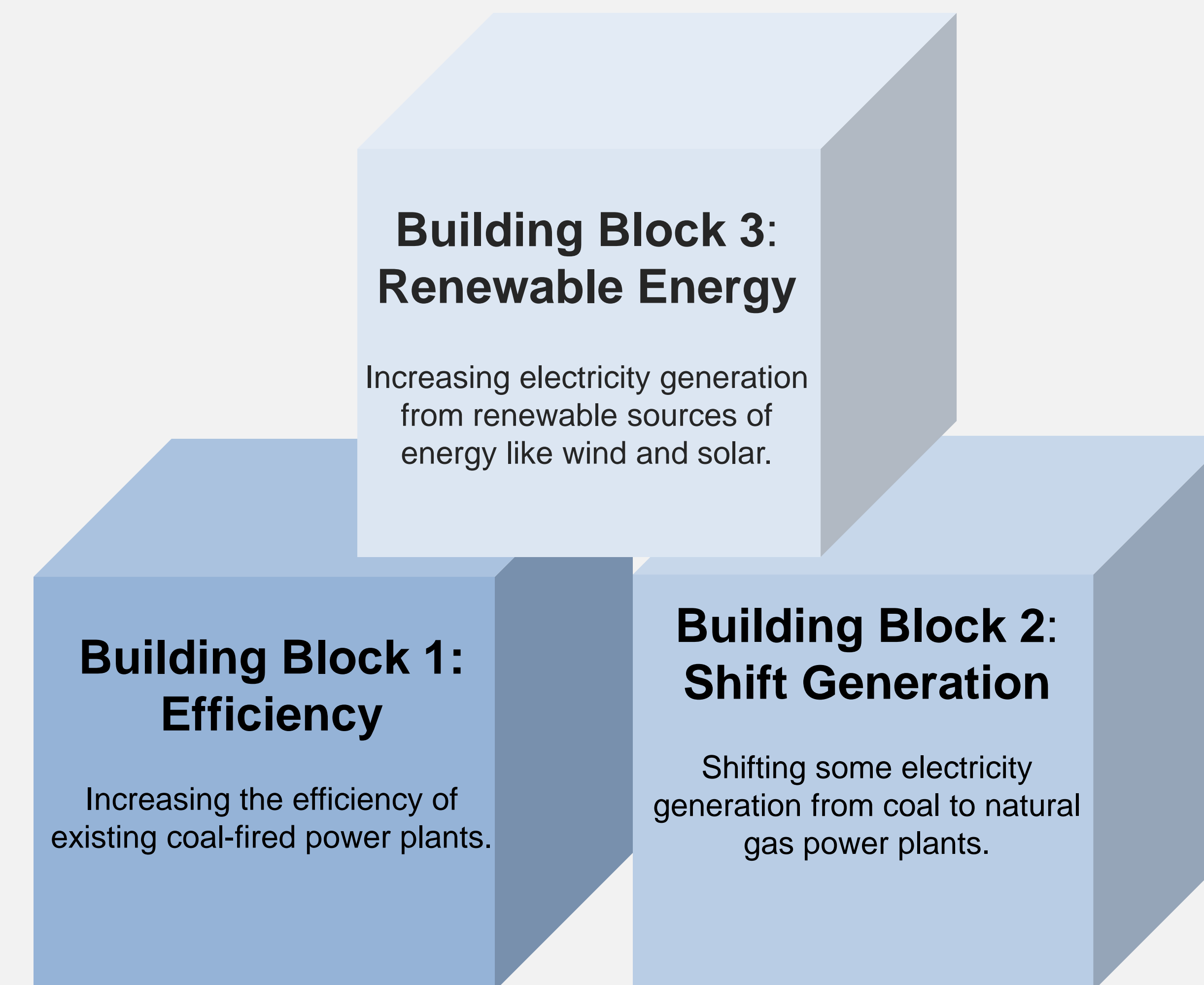
By 2030, carbon dioxide emissions from power plants nationwide are expected to be reduced by 32% of 2005 levels.⁽¹⁾

This plan uses a federal and state partnership to:

1. Reduce carbon dioxide emissions from coal and natural gas power plants
2. Encourage use of lower-emitting and non-emitting power sources
3. Encourage additional development of non-emitting power sources, improvements in energy efficiency, and reductions in demand for energy

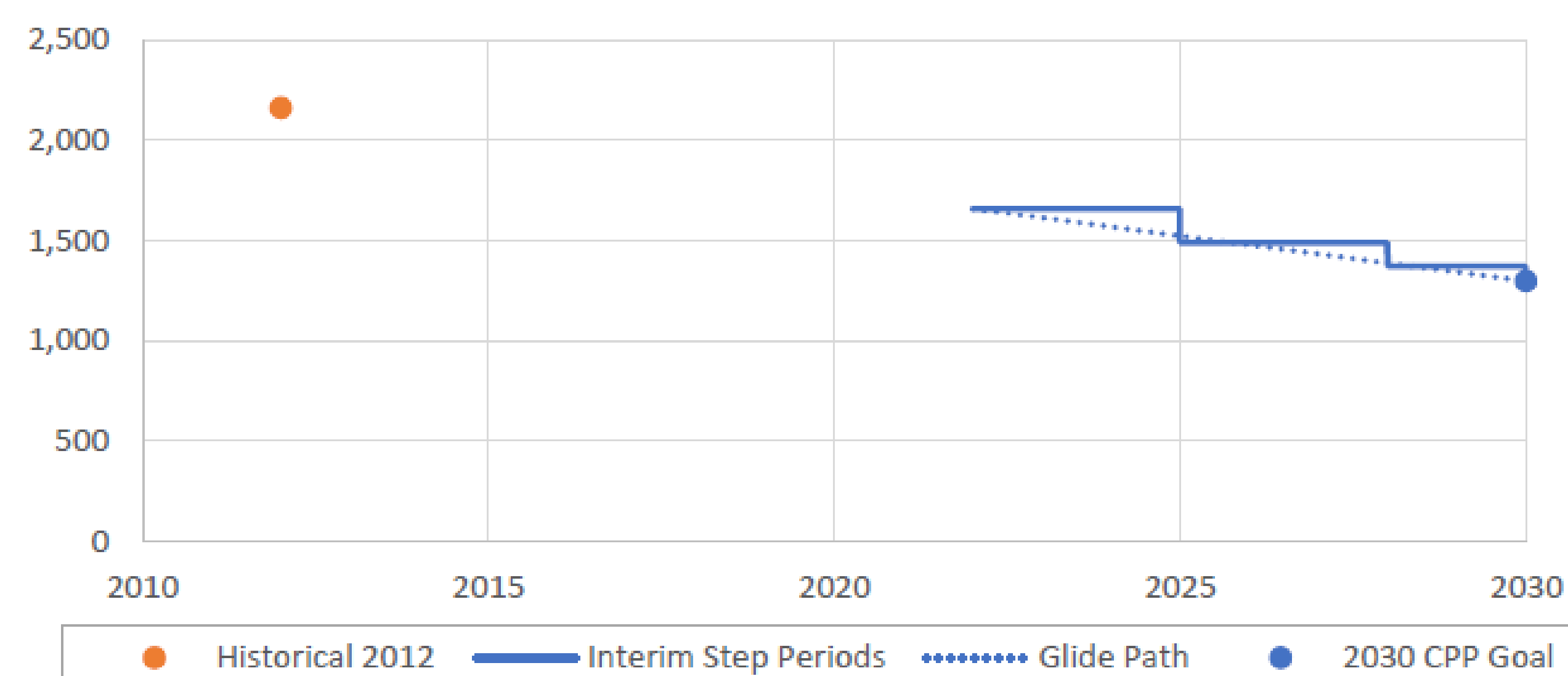
Clean Power Plan Building Blocks

In the final Plan, the Environmental Protection Agency (EPA) determined that the best way to reduce carbon dioxide emissions from power plants includes three building blocks:

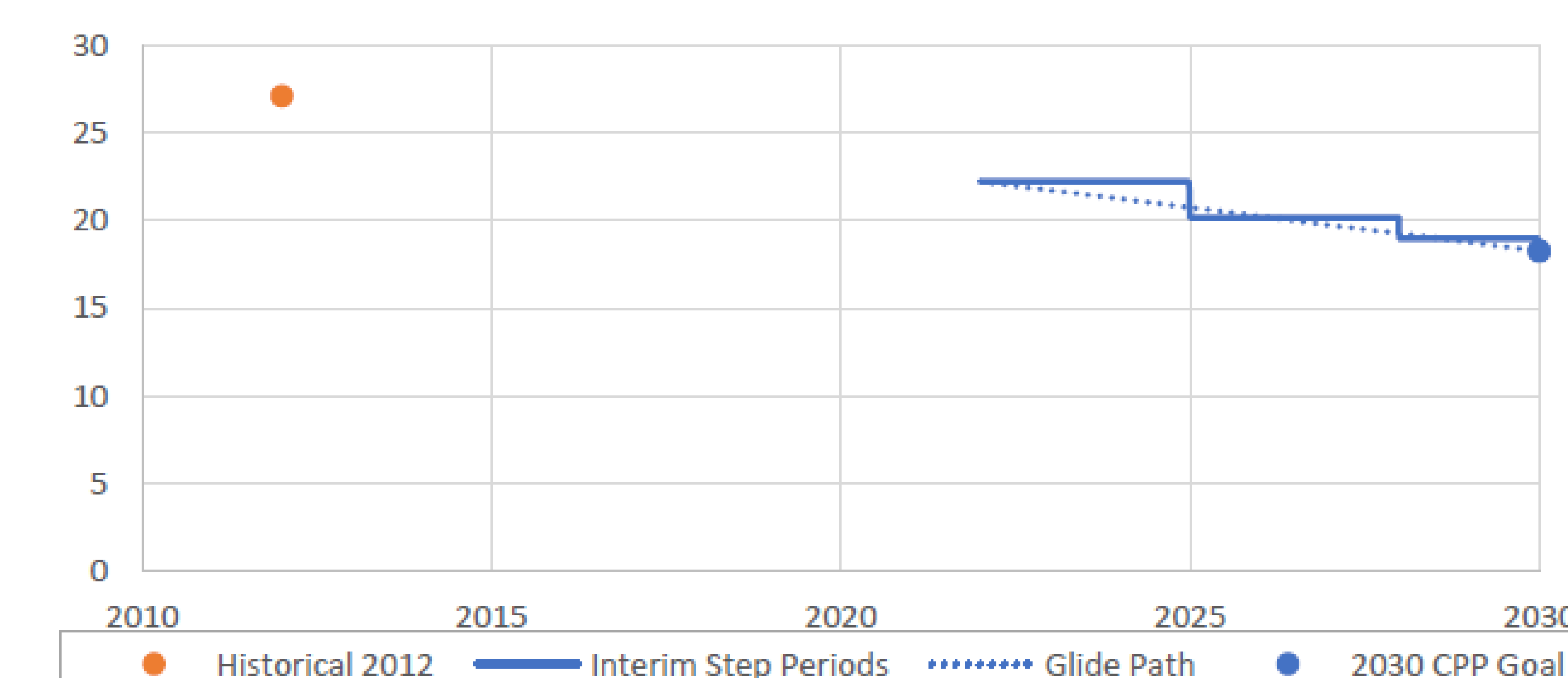


By using these building blocks, the EPA determined how much each state could reduce its emissions. Based on those calculations, the EPA determined state-specific goals.

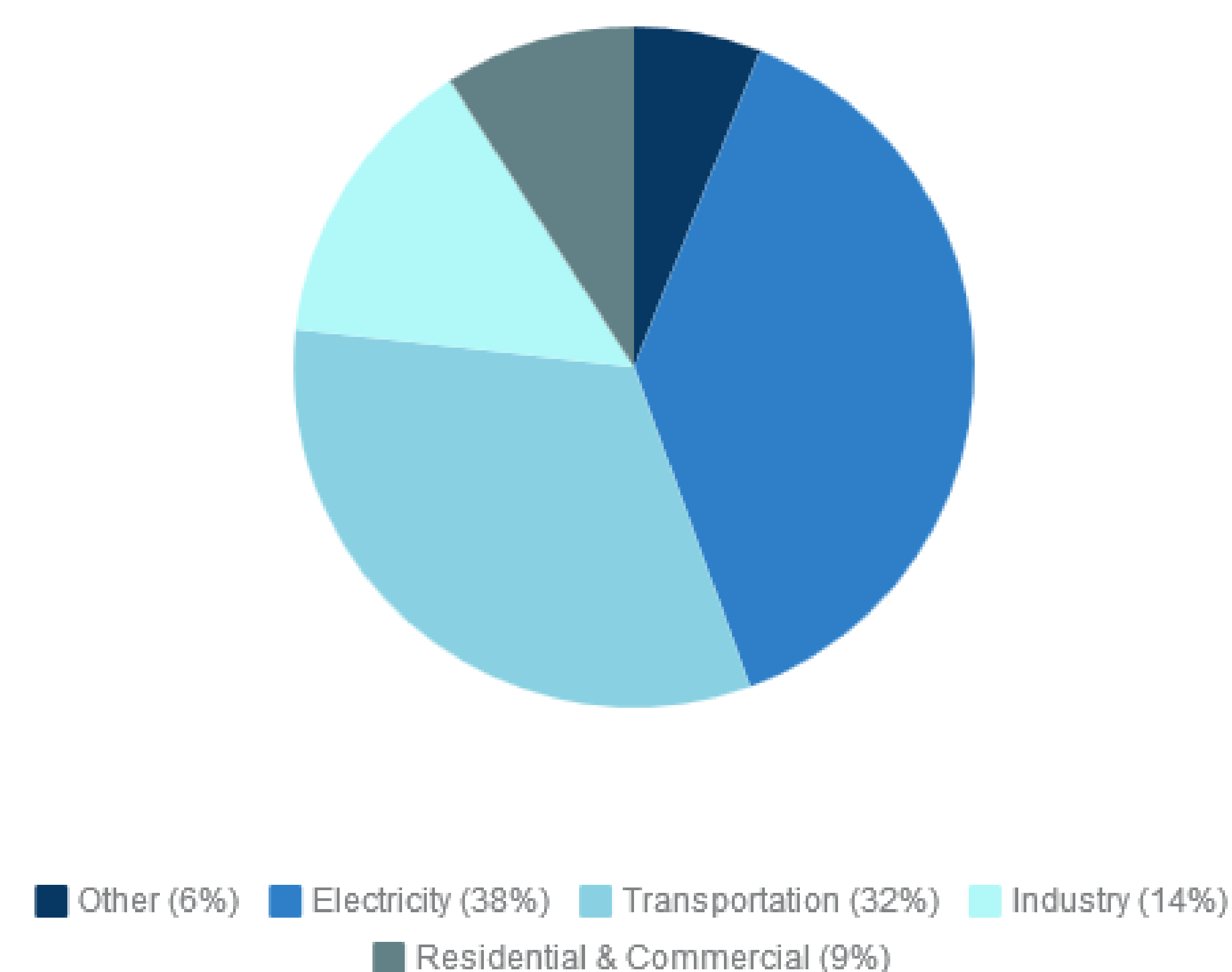
Nebraska CO₂ Rates (lbs/MWh)



Nebraska CO₂ Mass (million short tons)



U.S. Carbon Dioxide Emissions, By Source



Note: All emission estimates from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012*.

Nebraska-specific Goals

States are allowed to design their own plans to meet goals set by the Clean Power Plan. If a state does not design its own plan, the federal government will provide one.

Nebraska is developing its own, tailored carbon mitigation strategy to reduce emissions in response to the federal Clean Power Plan.

These goals represent a 33% reduction by mass from a 2012 baseline in carbon dioxide emissions for Nebraska, and we have several options by which we can meet this goal; starting with choosing either a rate- or mass-based approach.

Nebraska Goals for 2030:

- Rate-based goal = 1,296 lbs/MWh
- Mass-based goal = 18,272,739 units of short tons
- Mass Goal (Existing) & New Source Complement = 18,463,444 units of short tons

States are required to engage the public in discussions of carbon mitigation strategies that would best meet emission reduction goals.

You can provide input to Nebraska's carbon mitigation strategy through 2016-2017.

Visit <http://deq.ne.gov/NDEQProg.nsf/OnWeb/NCMS> to learn more.

Sources

(1) <http://www.epa.gov/cleanpowerplan/fact-sheet-clean-power-plan-numbers>


Electricity 101

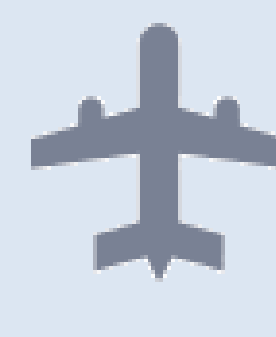


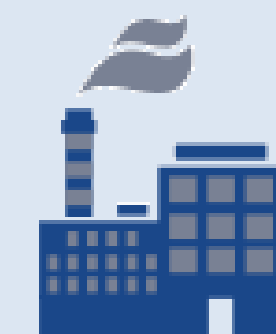
Measuring Electricity

Anything that consumes or produces electricity is rated in watts or multiples of watts.

 **Watts (W)** – light bulbs, personal computers, small appliances

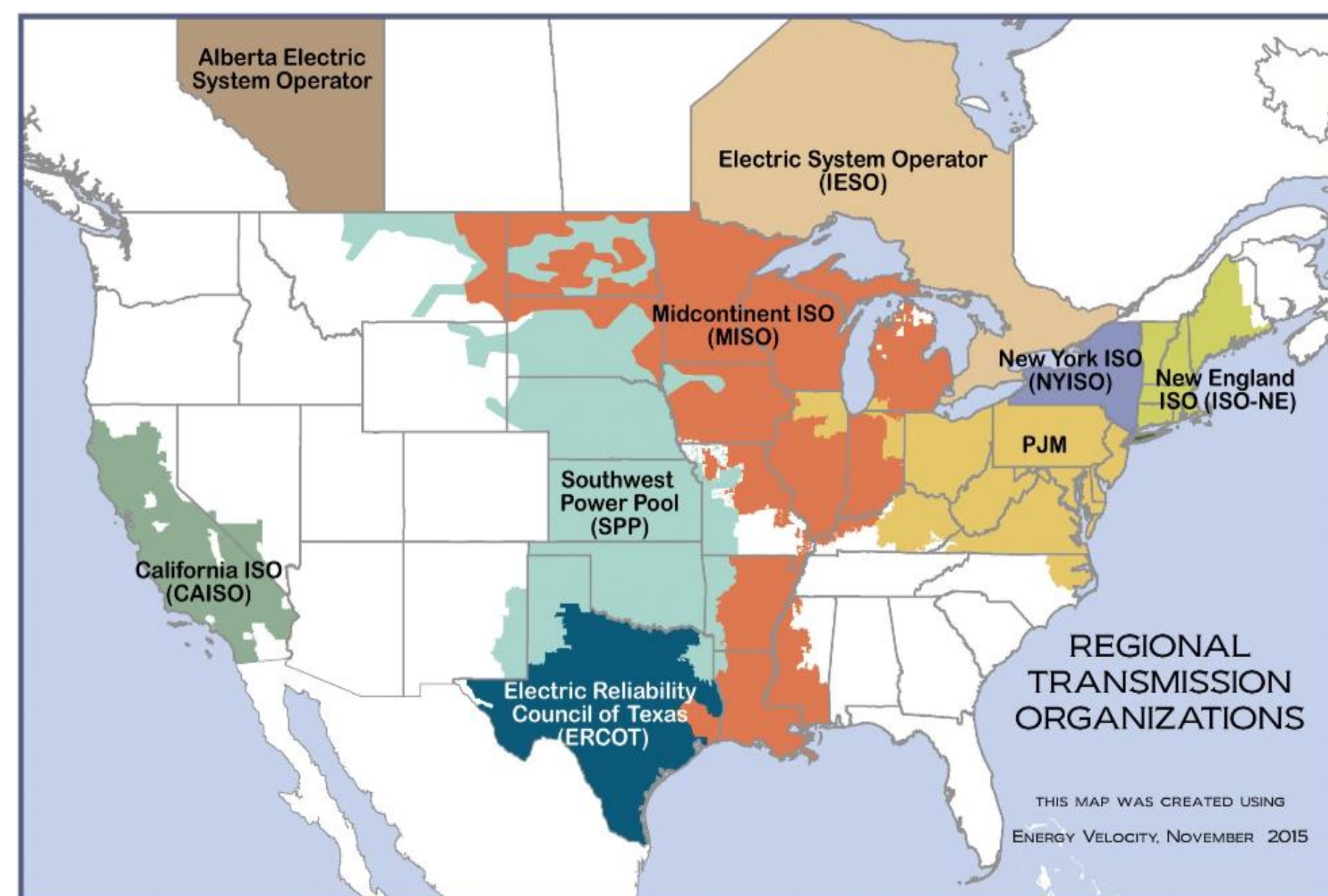
 **Kilowatts (kW)** – 1 kW = 1,000 W – individual home electricity usage, industrial HVAC units.
Kilowatt Hour (kWh) – a measure of how electricity is used and billed

 **Megawatts (MW)** – 1 MW = 1,000 kW – small and mid-size power plants, large data centers, heavy diesel-electric locomotives, aircraft carriers

 **Gigawatts (GW)** – 1 GW = 1,000 MW – large power plants like the Three Gorges Dam

Regional Transmission Organizations (RTO)

An RTO is an organization that is responsible for moving electricity over large areas. They ensure reliability and optimize supply and demand bids for wholesale electric power. There are 10 RTOs in the United States and Nebraska is a member of the Southwest Power Pool.

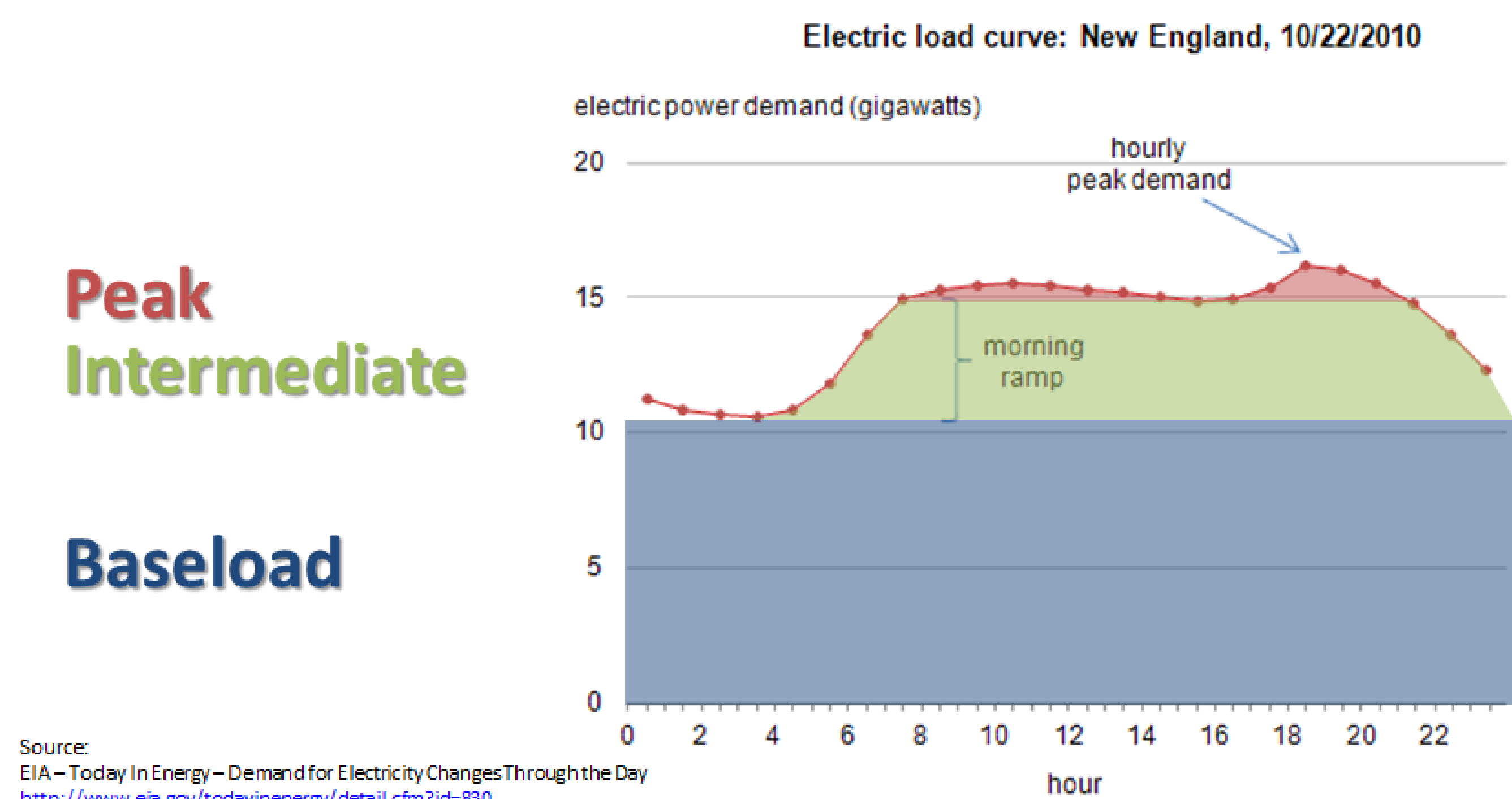


Types of Power Plants

There are three basic categories of power plants:

- **Base load** - These are used to serve continuous electricity demand on an around-the-clock basis.
 - Examples of base load power plants in Nebraska are NPPD Gerald Gentleman Station, Fort Calhoun Station, Nebraska City Station, and North Omaha Station.
- **Intermediate** – These are used to respond to predictable changes in electricity demand such as “the morning ramp.”
 - The Beatrice Power Station is an example of intermediate load power plant in Nebraska.
- **Peak** – These are used to respond to sudden changes in electricity demand such as a surge in people turning on lots of air conditioners in one area all at once.
 - Examples of peaking units in Nebraska are Jones Street Station, Sarpy County Station, and Cass County Station.

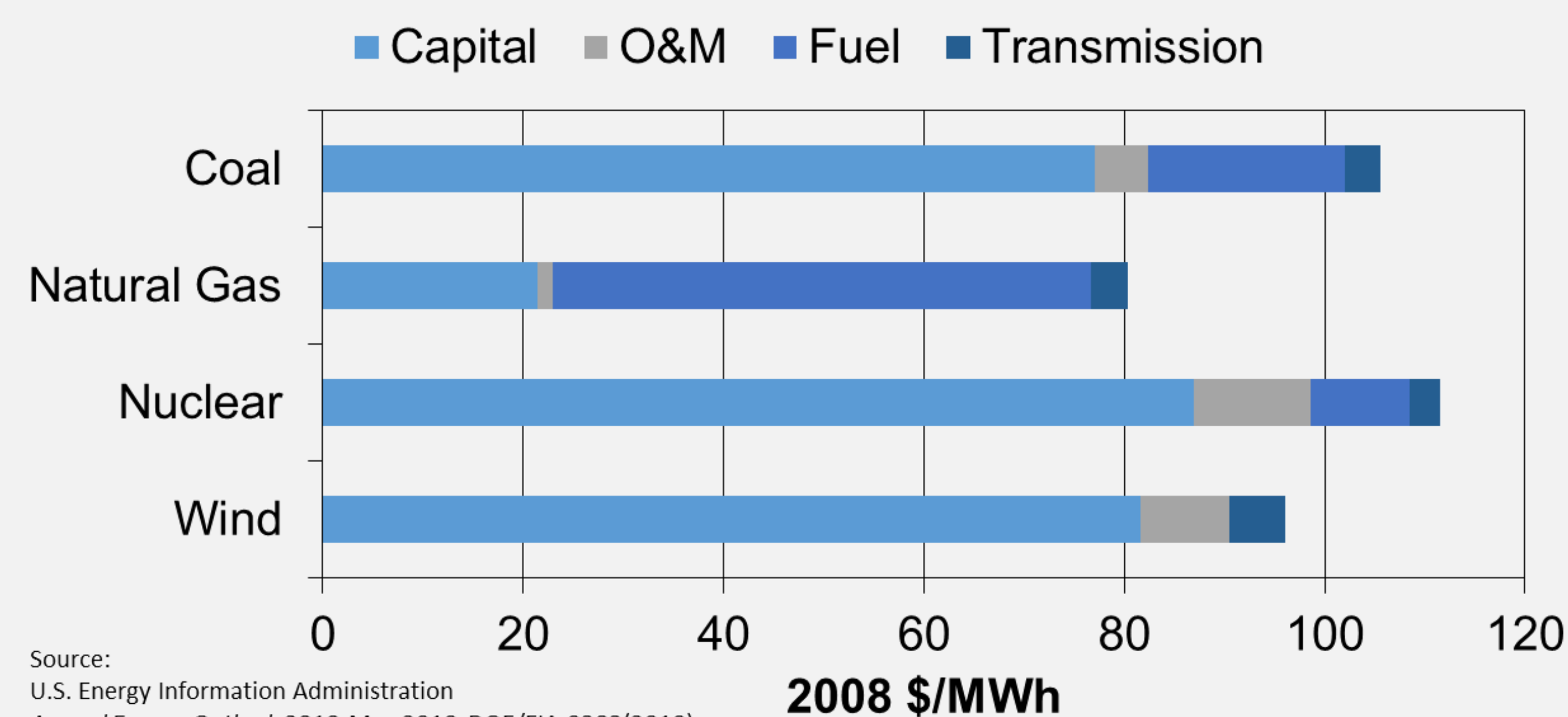
The Utility Power Sector Generating Capacity Categories



Source: EIA – Today In Energy – Demand for Electricity Changes Through the Day
<http://www.eia.gov/todayinenergy/detail.cfm?id=830>

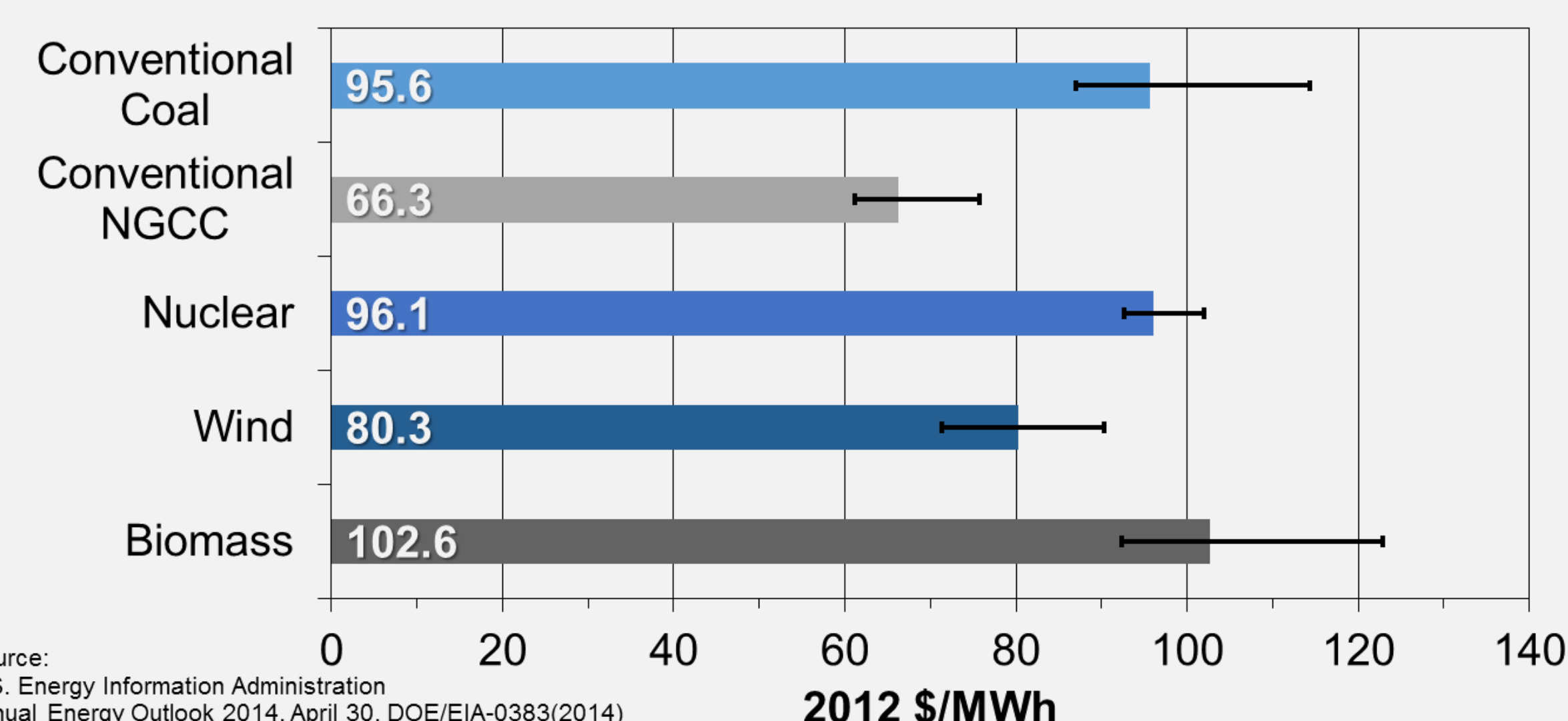
What is the cost of electricity?

Levelized Cost of Electricity (LCOE)



Source: U.S. Energy Information Administration
 Annual Energy Outlook 2010, May 2010, DOE/EIA-0383(2010)
<http://www.eia.gov/forecasts/archive/aes10/electricity.html>

Average LCOE of Generation Types



Source: U.S. Energy Information Administration
 Annual Energy Outlook 2014, April 30, DOE/EIA-0383(2014)
http://www.eia.gov/forecasts/aes14/electricity_generation.cfm

In September 2015, average retail price of electricity to the residential sector for **Nebraska** was **12.29 cents/kWh**, which ranks 27th in the nation. Nebraska ranked half of other states like Rhode Island, which has a rate of 21.6 cents/kWh.

<http://www.eia.gov/state/rankings/?sid=NE#series/31>

Rate-Based Plan Options



States can choose a plan.

The Clean Power Plan allows states to choose how they will comply. One of the primary choices a state needs to make is whether to meet a rate- or mass-based goal; plan approaches may then be determined. Any type of plan must result in carbon dioxide (CO₂) limits for coal and gas-fired plants in the state consistent with the rate- or mass-based goal assigned by EPA.

Major Features of Rate-Based Plans

Goal Measures & Standards

Rate-based plans use emission standards to achieve goals and assess whether goals are met.

That is, limits are placed on the number of pounds of carbon dioxide emitted per mega-watt hour of energy generated.

Plan Options

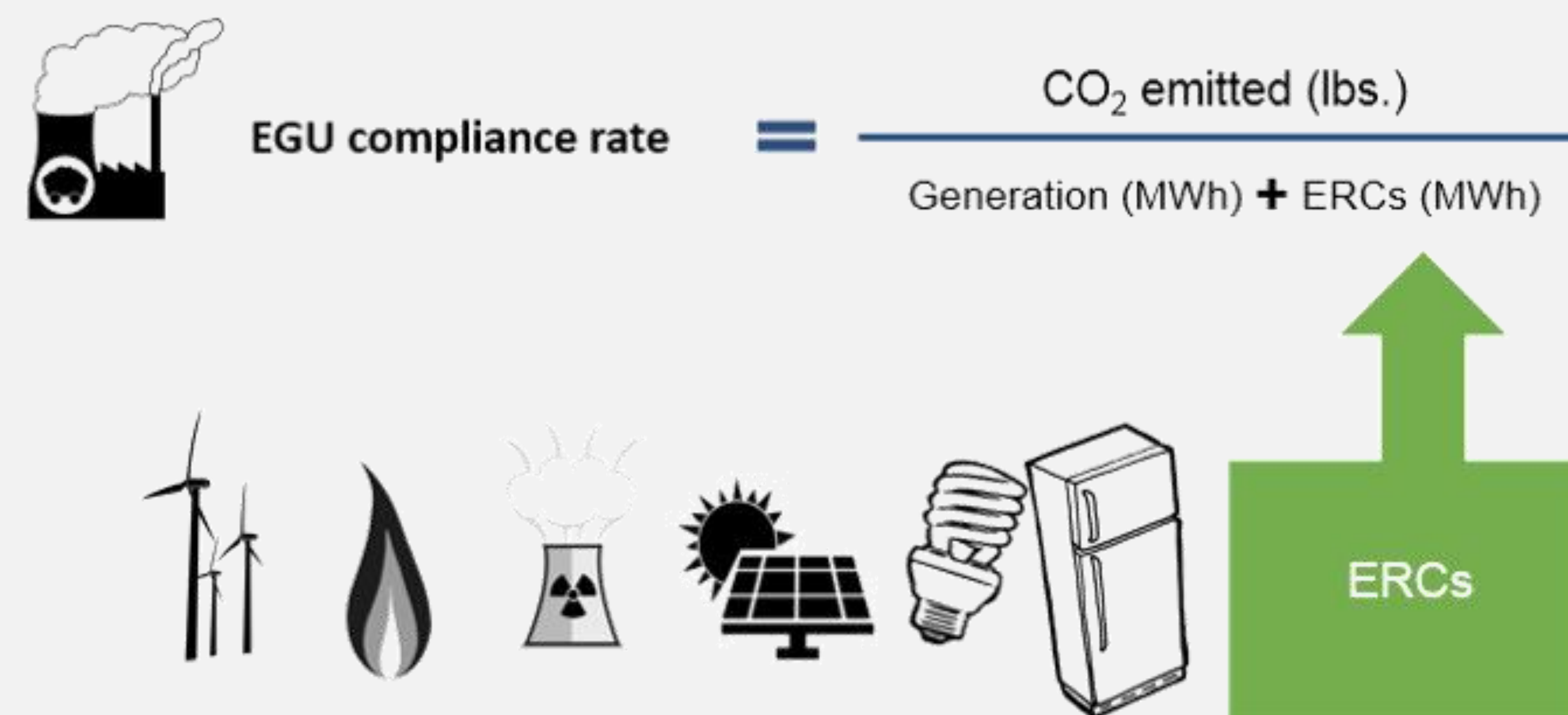
States may choose to set goals based on:

1. Subcategory specific performance rates that apply to natural gas and coal plants, or
2. an overall state-wide rate applied to all plants, or
3. different rates for different specific existing plants, so long as the overall statewide goal is still met.

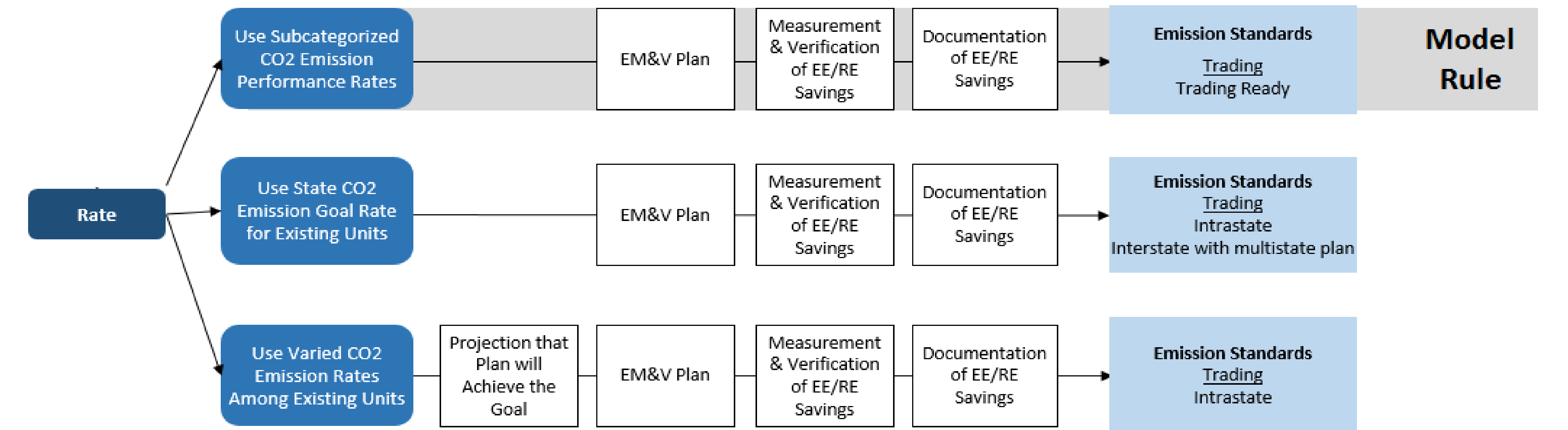
Requirements & Responsibilities

Requirements to meet goals fall upon the power plants (also known as electricity generating units, or EGUs).

Each of the rate-based options requires states to have a plan to evaluate, measure, and verify the plan is working.



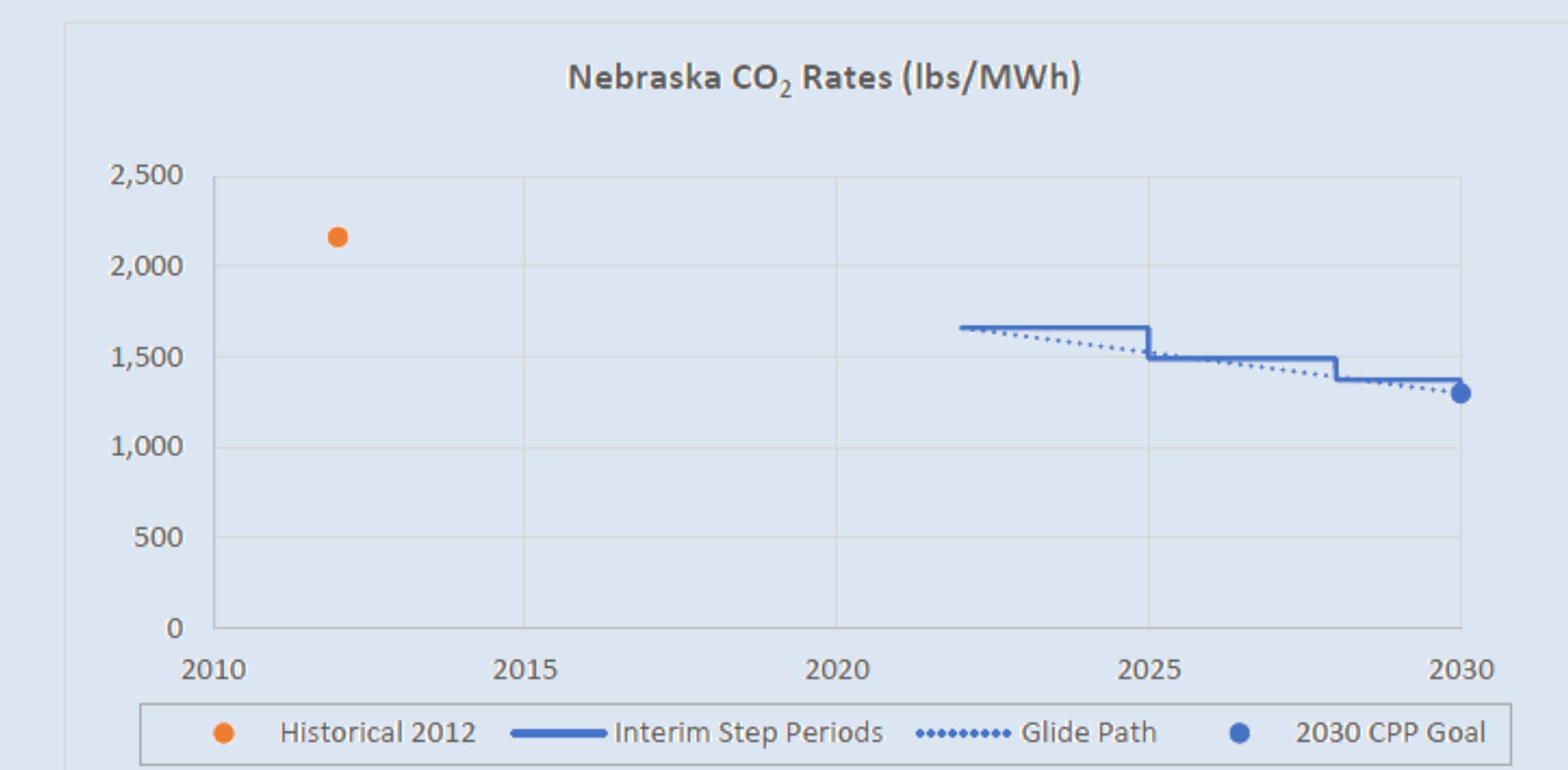
1 ERC = 1 MWh of zero-CO₂ electricity generated
 1 ERC = 1 prorated MWh of low-CO₂ electricity generation
 1 ERC = 1 MWh of fossil-generated electricity saved



Note: Abbreviations are for Evaluation, Measurement and Verification (EM&V), energy efficiency (EE), renewable energy (RE)

Nebraska-Specific Goals

Decrease in CO₂ Emissions over Time



Option 1: Subcategory Specific Emission Performance Rates

For Nebraska Option 1, the interim and final subcategory-specific emission performance rates are:

Unit Type	2022-2024	2025-2027	2028-2029	Final (begin 2030)
Steam generating unit (coal)	1,671	1,500	1,380	1,305
Stationary combustion turbine (natural gas)	877	817	784	771

Note: Rates shown are in units of lbs CO₂/net MWh

Option 2: Nebraska Statewide Rate-Based Goal

For Nebraska Option 2, the interim and final subcategory-specific emission performance rates are:

2022-2024	2025-2027	2028-2029	Final (begin 2030)
1,658	1,488	1,369	1,296

Note: Rates shown are in units of lbs CO₂/net MWh

Option 3: Varying Rates

For Nebraska Option 3, different rates could be set for different energy generating units (EGUs) or plants. However, the overall statewide rate-based goal would still need to be met.

Mass-Based Plan Options



States can choose a plan.

The Clean Power Plan allows states to choose how they will comply. One of the primary choices a state needs to make is whether to meet a rate- or mass-based goal; plan approaches may then be determined. Any type of plan must result in carbon dioxide (CO₂) limits for coal and gas-fired plants in the state consistent with the rate- or mass-based goal assigned by EPA.

Major Features of Mass-Based Plans

Goal Measures & Standards

Mass-based plans use the mass of emissions of carbon dioxide to define goals and whether they are met.

That is, carbon dioxide emissions are measured in short tons, and production is limited to a total *number of tons*.

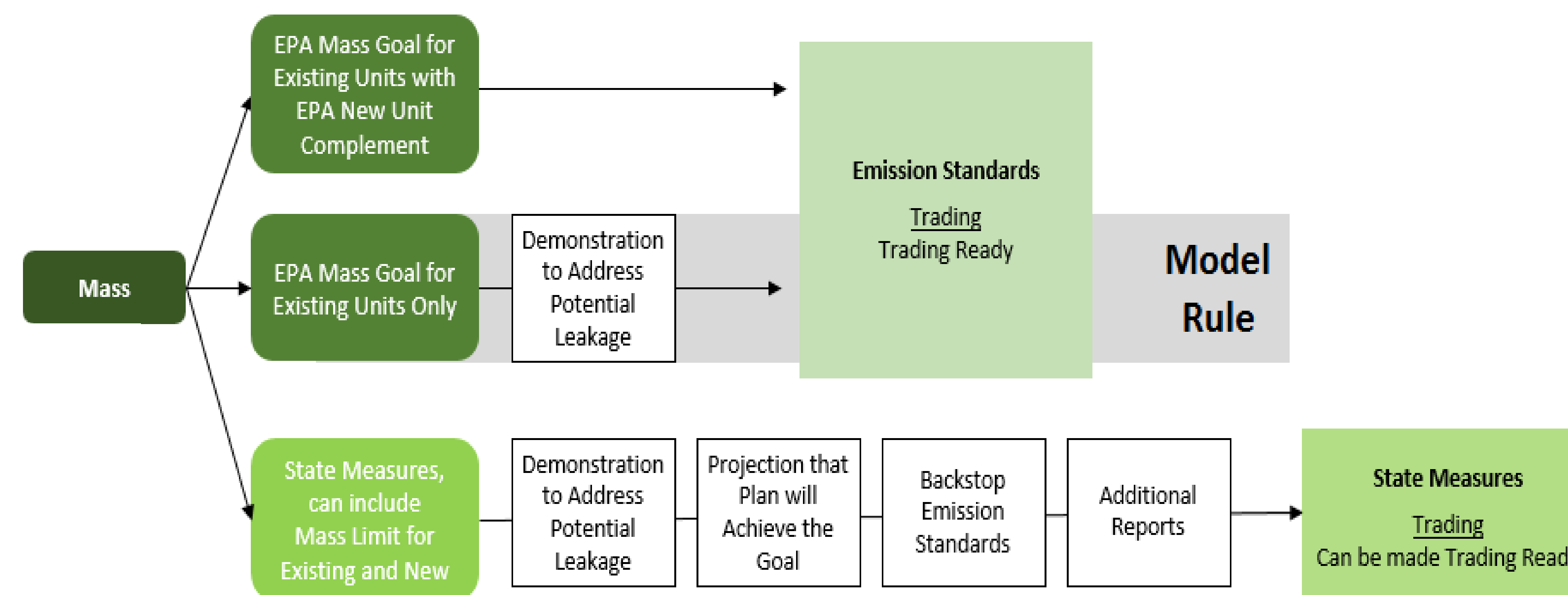
In emissions standards plans approaches, states may choose to apply mass-based goals in different ways:

1. to existing and new plants,
2. to existing plants only, or
3. at the state level rather than at the plant level.

Plan Options

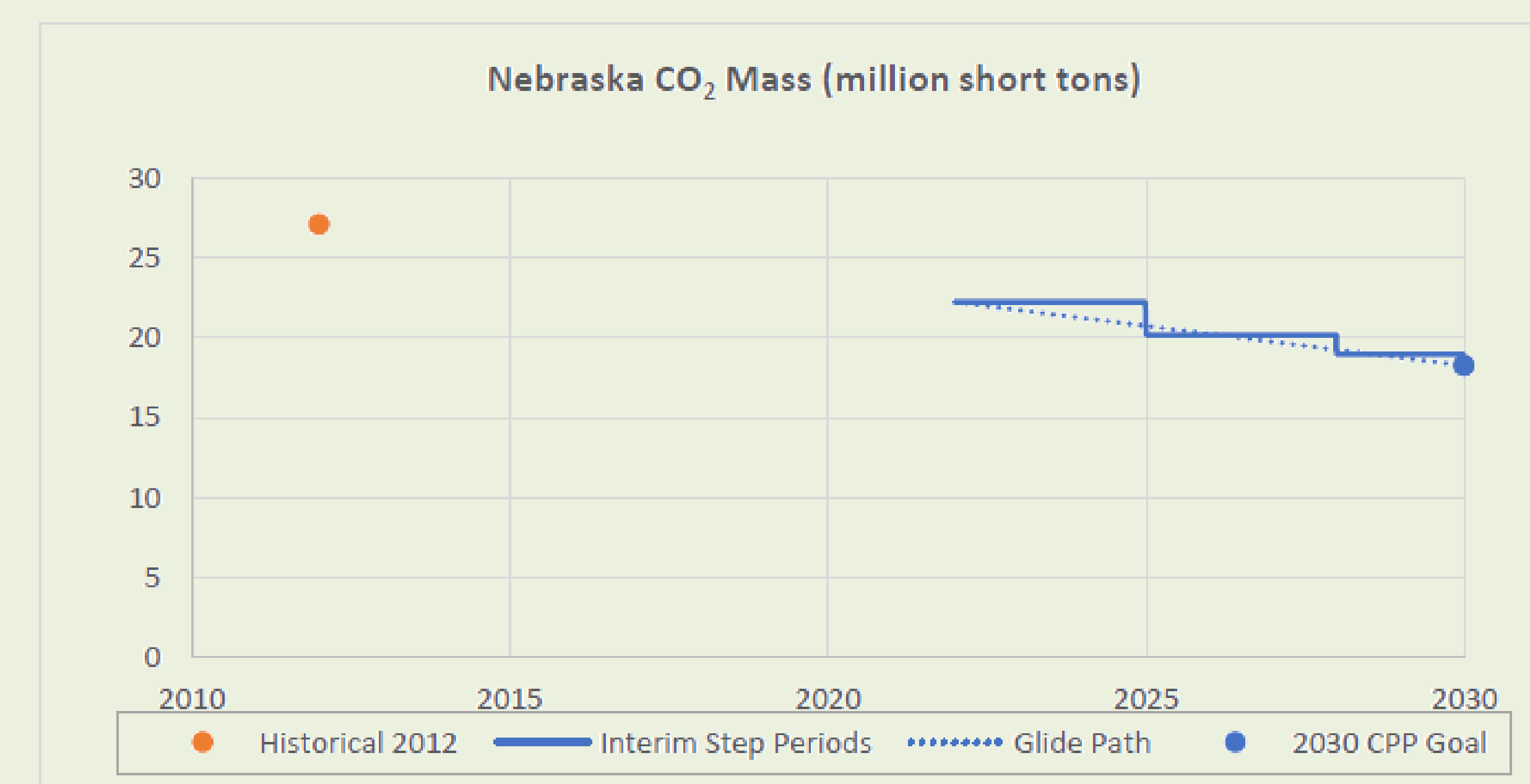
Under a state measures plan, requirements can be met by power plants and other entities (not just the plants).

Under this approach, a plan must include subcategory specific rate-based standards for power plants that will go into effect if the plan fails to achieve mass-based goals.



Nebraska-Specific Goals

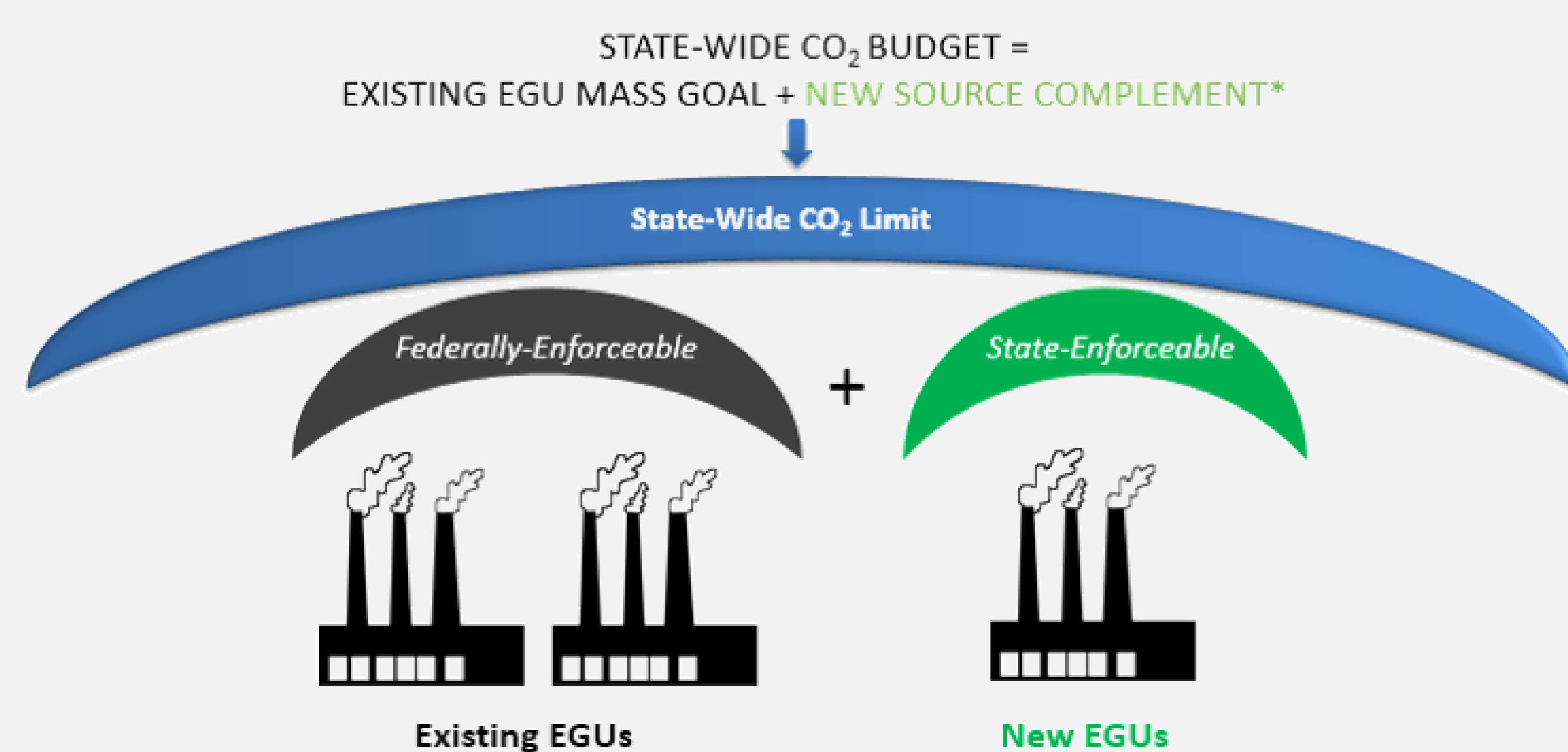
Decrease in CO₂ Emissions Over Time



For Nebraska, the interim and final mass-based goals are:

	2022-2024	2025-2027	2028-2029	Final (begin 2030)
Mass-Based Goals (annual average emissions)	22,246,365	20,192,820	18,987,285	18,272,739
Mass-Based Goals (Existing) & New Source Complement	22,335,063	20,492,045	19,269,996	18,463,444

Note: Units shown are in short tons of CO₂



* States can calculate their own "new source complement," subject to EPA approval

Market-Based Approaches

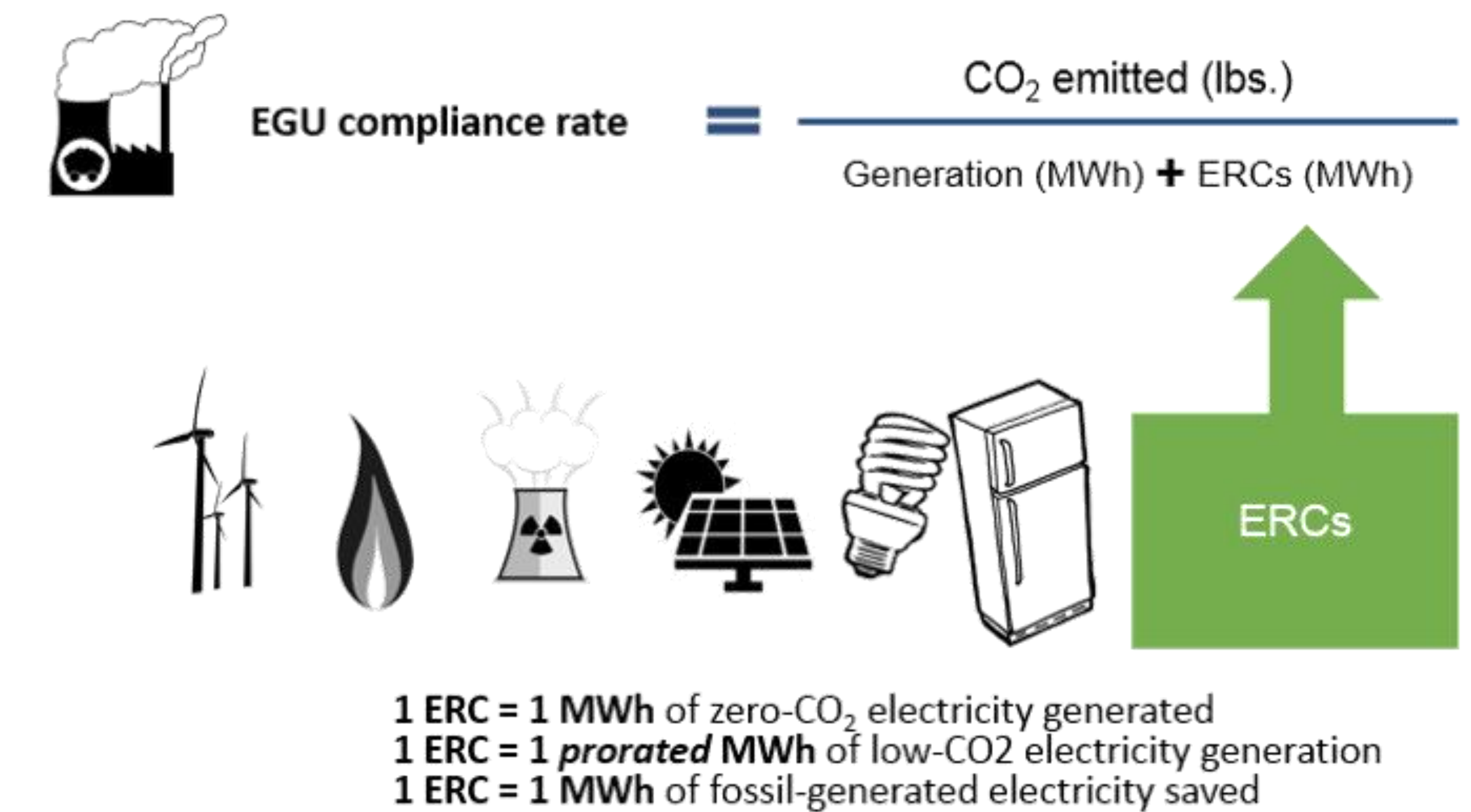


States can choose a plan.

The Clean Power Plan allows states to choose how they will comply. One of the primary choices a state needs to make is whether to meet a rate- or mass-based goal; plan approaches may then be determined. Any type of plan must result in carbon dioxide (CO₂) limits for coal and gas-fired plants in the state consistent with the rate- or mass-based goal assigned by EPA.

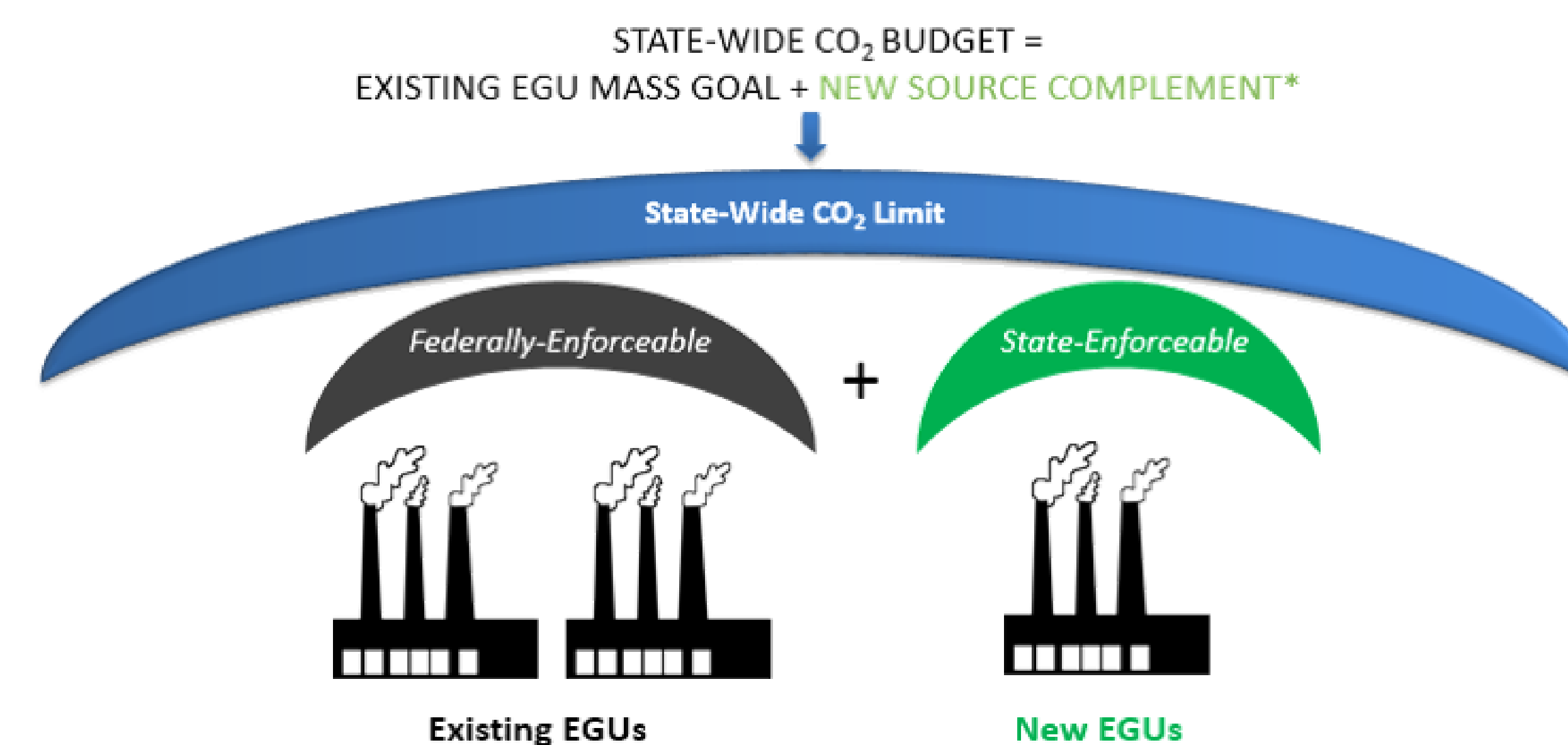
Major Features of Market-Based Approaches

- Within rate-based and mass-based plans, states have the option to take a market-based approach.
- A market-based approach allows savings of carbon emissions from one facility to be transferred to another (including, under the right approach, facilities in other states), which helps facilities stay in compliance and may help states meet their goals.
- Some plan options are already trading ready, others are not. Trading ready means the facilities in states using these plans can trade carbon dioxide savings between themselves and facilities in other states with similar plan approaches.
- To be trading ready, minimum requirements must be met. For example, states must use the EPA-administered tracking system or one that is interoperable to track the trading.



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Rate-based plans	Mass-based plans
<p>If a state chooses to apply subcategory-specific rate-based limits, then their plan is trading ready.</p> <p>If a state chooses to apply the state carbon dioxide goal rate to all existing units, then the state can engage in trading within the state, and also between other states in an approved multi-state plan.</p> <p>If a state chooses to apply different rates to different plants, then trading can only occur within the state.</p>	<p>If a state chooses to apply EPA mass goals to existing and new units, or to existing units only, then the plan is trading ready.</p> <p>If a state chooses to apply the mass-based goals at the state level through a state measures plan, the plan can be made trading ready.</p>
<p>In rate-based plans, the units used in a market-based approach are called Emission Rate Credits (ERCs).</p> <p>If a facility exceeds its assigned emission rate goal, it can comply by taking actions that earn emission rate credits (ERCs).</p> <p>These credits can be earned by:</p> <ul style="list-style-type: none"> • investing in renewable energy – for example, wind and solar energy • making demand-side improvements – for example by reducing demand for energy by increasing energy efficiency • trading with other units that are under their assigned emission rate <p>ERCs can NOT be earned by new, modified or reconstructed units and measures that reduce carbon dioxide emissions outside of the energy sector.</p>	<p>In mass-based plans, the units used in a market-based approach are called allowances. One allowance represents one short ton of CO₂ emissions.</p> <p>Each state will have an emissions budget of allowances equal to its mass-based goal. Each facility must surrender allowances equal in number to its quantity of emissions during a compliance period.</p> <p>Transfer of allowances:</p> <ul style="list-style-type: none"> • Much like rate-based trading, units that emit fewer than their total allocation of allowances will have allowances they can trade/sell to other units needing to obtain allowances to cover emissions higher than their limit. <p>Much like rate-based trading, allowances can NOT be earned by new, modified or reconstructed units and measures that reduce carbon dioxide emissions outside of the energy sector.</p>



* States can calculate their own "new source complement," subject to EPA approval

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Clean Energy Incentive Program (CEIP)

The EPA proposes a Clean Energy Incentive Program to encourage early action toward compliance with the Clean Power Plan.

- Under this program, EPA will match ERCs and allowances issued by states. For each ERC or allowance that the state issues under this program, EPA will issue another one. So those facilities that implement early action that's covered by this program will get twice the credit for doing it.
- The amount that can be matched is determined on a state-by-state basis with a national total of 300 million short tons of carbon dioxide equivalent. Nebraska's estimated share is around 1 million short tons' worth of ERCs/allowances. However, this isn't a final number and will depend on how many and which other states participate.
- ERCs and allowances can be earned by renewable energy projects (wind and solar) and demand-side energy efficiency projects in low-income communities that put carbon-free power on the grid or avoid generation from affected units in the 2020 and 2021 time-frame.

Electricity Generation in Nebraska



COAL



- Gerald Gentleman (NPPD)
Sutherland
1,365 MW
- Lon D. Wright Power Plant
Fremont
130 MW
- Nebraska City Stations 1 & 2 (OPPD)
Nebraska City
1,339 MW
- North Omaha (OPPD)
Omaha
648 MW
- Platte Generating Station
Grand Island
110 MW
- Sheldon Station (NPPD)
Hallam
225 MW
- Whelan Energy Center
Hastings
309 MW

NATURAL GAS



- Beatrice Power Station (NPPD)
Beatrice
250 MW
- Cass County Station (OPPD)
Cass County
324 MW
- Sarpy County Station (OPPD)
Omaha
315 MW
- North Omaha Station (OPPD)
Omaha
641 MW
- Canaday Station (NPPD)
Lexington
119 MW
- Rokeby Generating Station (LES)
Rokeby
255 MW
- CW Burdick
Grand Island
187 MW
- Terry Bundy
Lincoln
167 MW

SOLAR



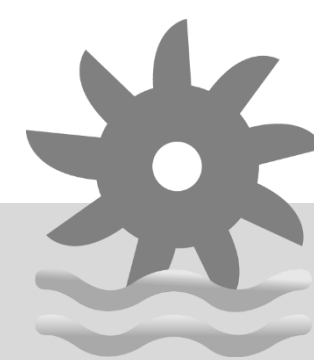
- Central City Solar Farm
Central City
1 MW

NUCLEAR



- Cooper Nuclear Station (NPPD)
Brownville
810 MW
- Fort Calhoun Station (OPPD)
Fort Calhoun
479 MW

HYDROPOWER

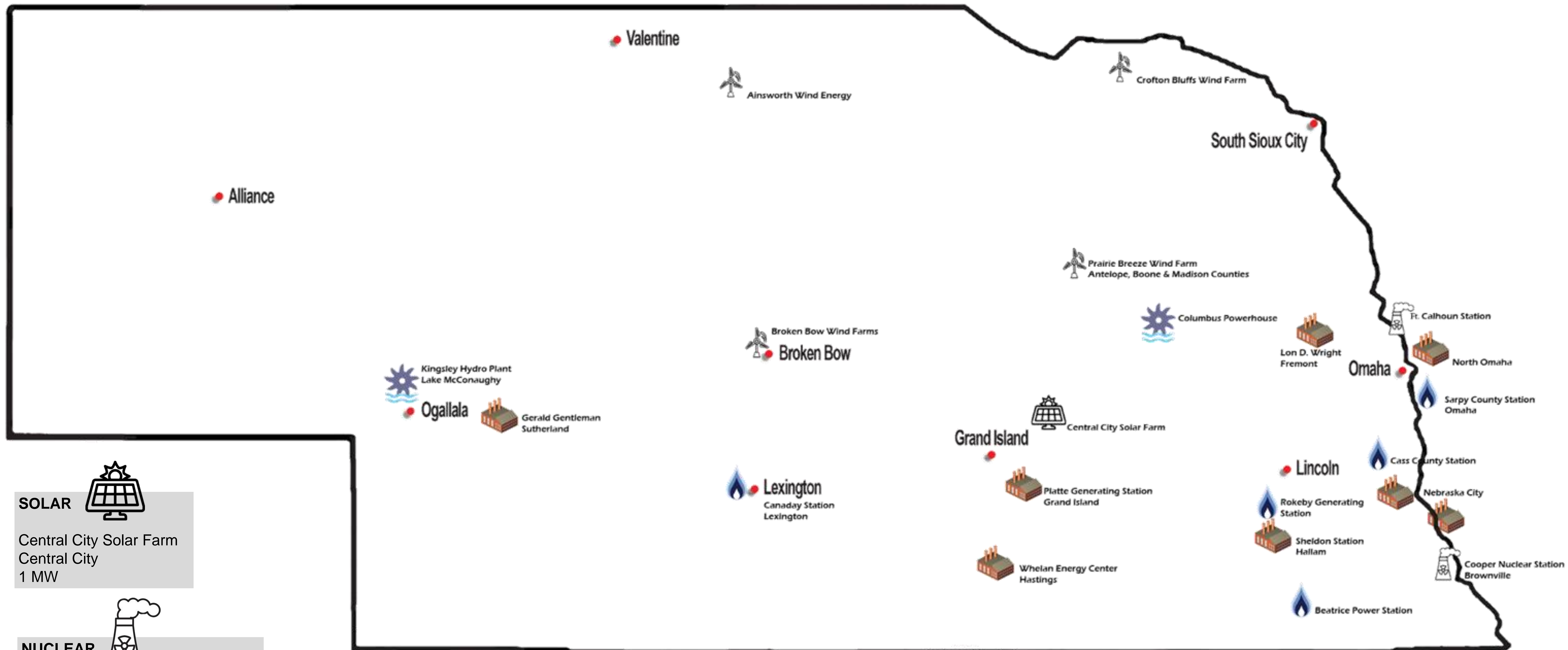


- Kingsley Hydro Plant (Central Nebraska PPID)
Lake McConaughy
50 MW
- Columbus Powerhouse (Loup Power District)
Columbus
46 MW
- North Platte Hydro, 24 MW
- Johnson Number 1, 20 MW
- Johnson Number 2, 23 MW
- Jeffrey Hydro, 20 MW
- Monroe, 8 MW
- Spencer Hydro, 6 MW
- Kearney Hydro, 1.5 MW

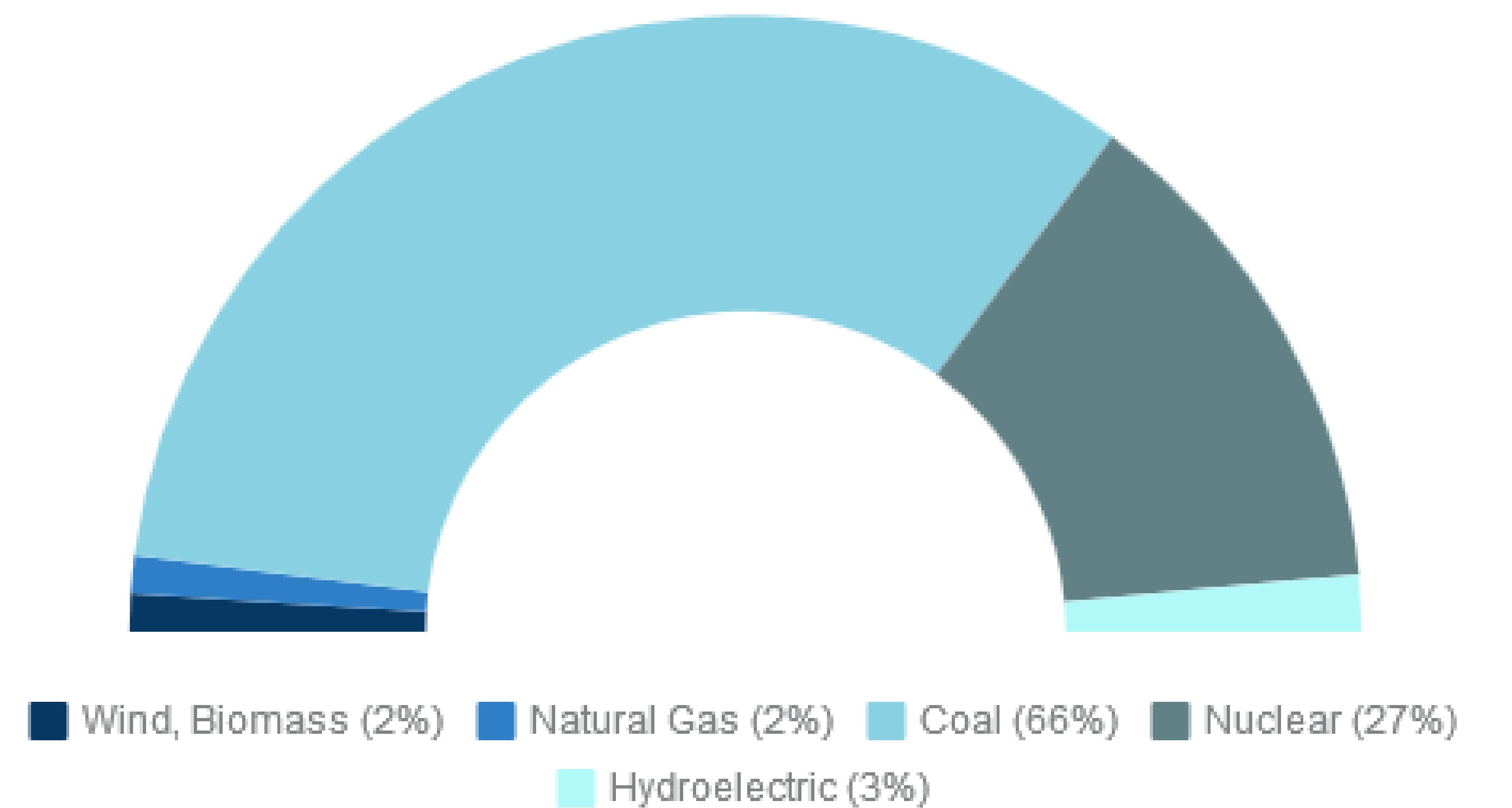
WIND



- Broken Bow Wind Farms
Broken Bow
80 MW and 75 MW
- Prairie Breeze Wind Farm
Antelope, Boone and Madison counties
200 MW
- Steele Flats Wind Farm between Steele City and Odell, 75 MW
- Petersburg Wind Farm, 41 MW
- Crofton Bluffs Wind Farm southwest of Crofton, 42 MW
- Flat Water Wind Farm near Humboldt, 60 MW
- Laredo Ridge Wind Farm near Petersburg, 81 MW
- Elkhorn Ridge Wind Farm at Bloomfield, 81 MW
- Ainsworth Wind Energy Facility, near Ainsworth, 60 MW



Electricity Generation in Nebraska

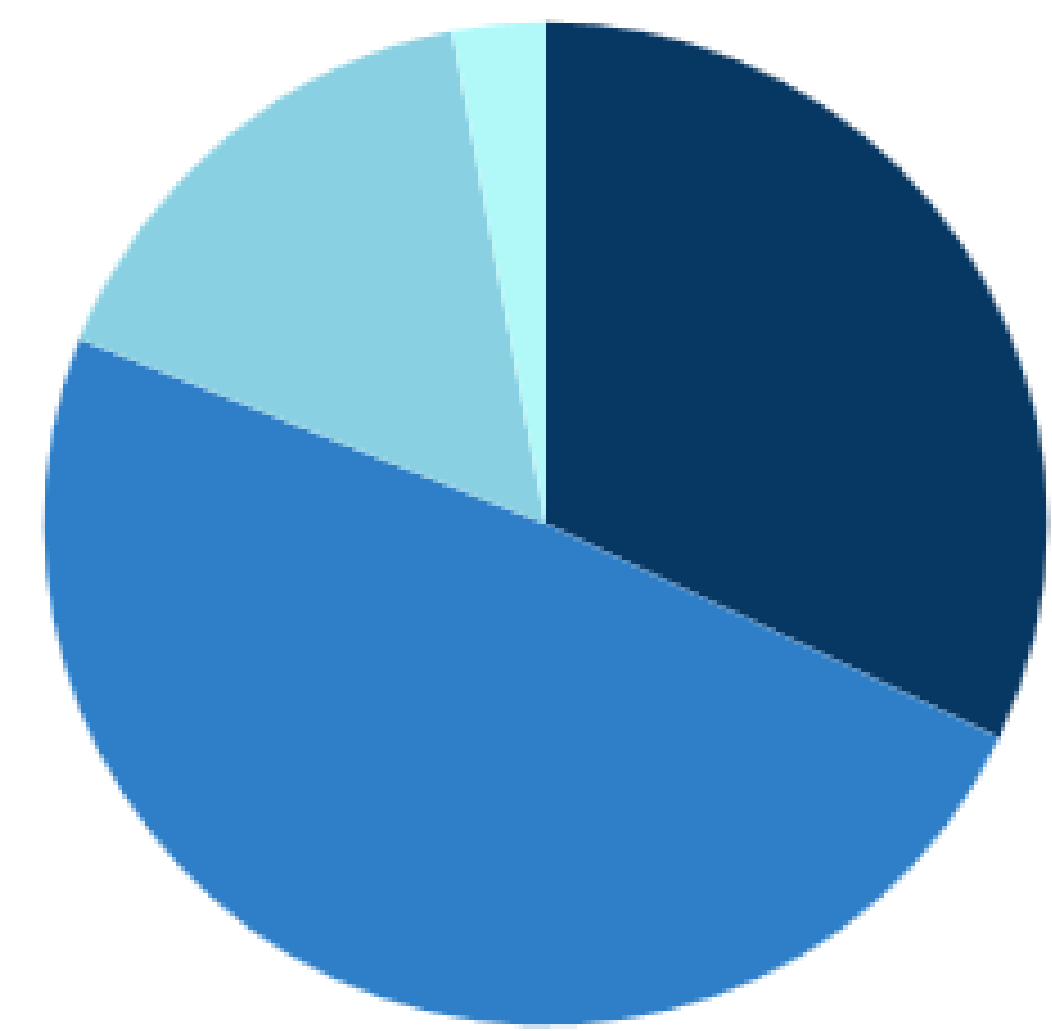


Energy Survey Results



- Results indicate that **municipalities and industries** are in support of a state or regionally developed plan.
- The numbers show a willingness to pay more on their electricity bills for electricity from renewable energy.
- Opinions favor moving toward renewable and lower-emitting sources and away from coal.

Amount More per Month Company is Willing to Spend to Have Electricity Come from Renewable Sources (Municipality)



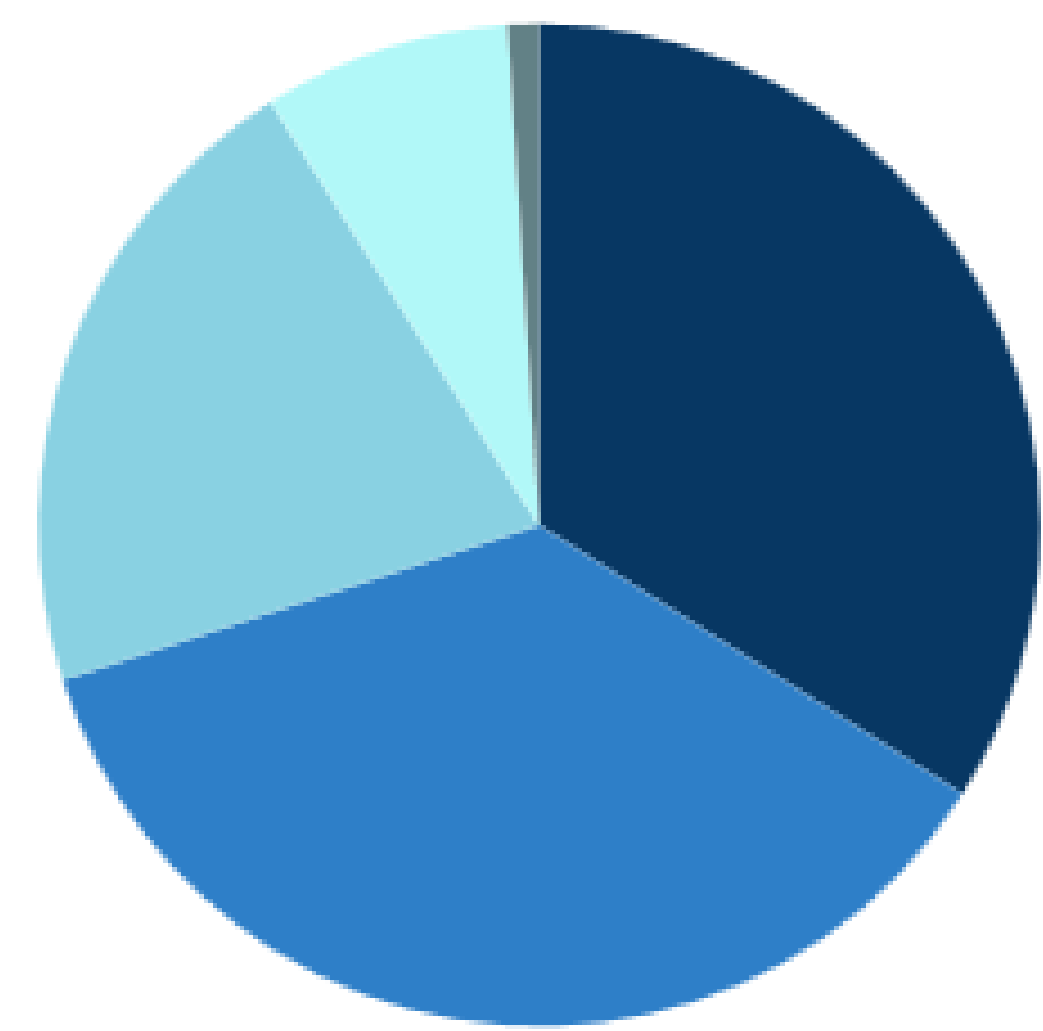
■ 0% (32%) ■ 1-5% (49%) ■ 6-10% (16%) ■ 11-20% (3%) ■ 21% + (0%)

Type of Plan Preferable for Nebraska (Municipality)



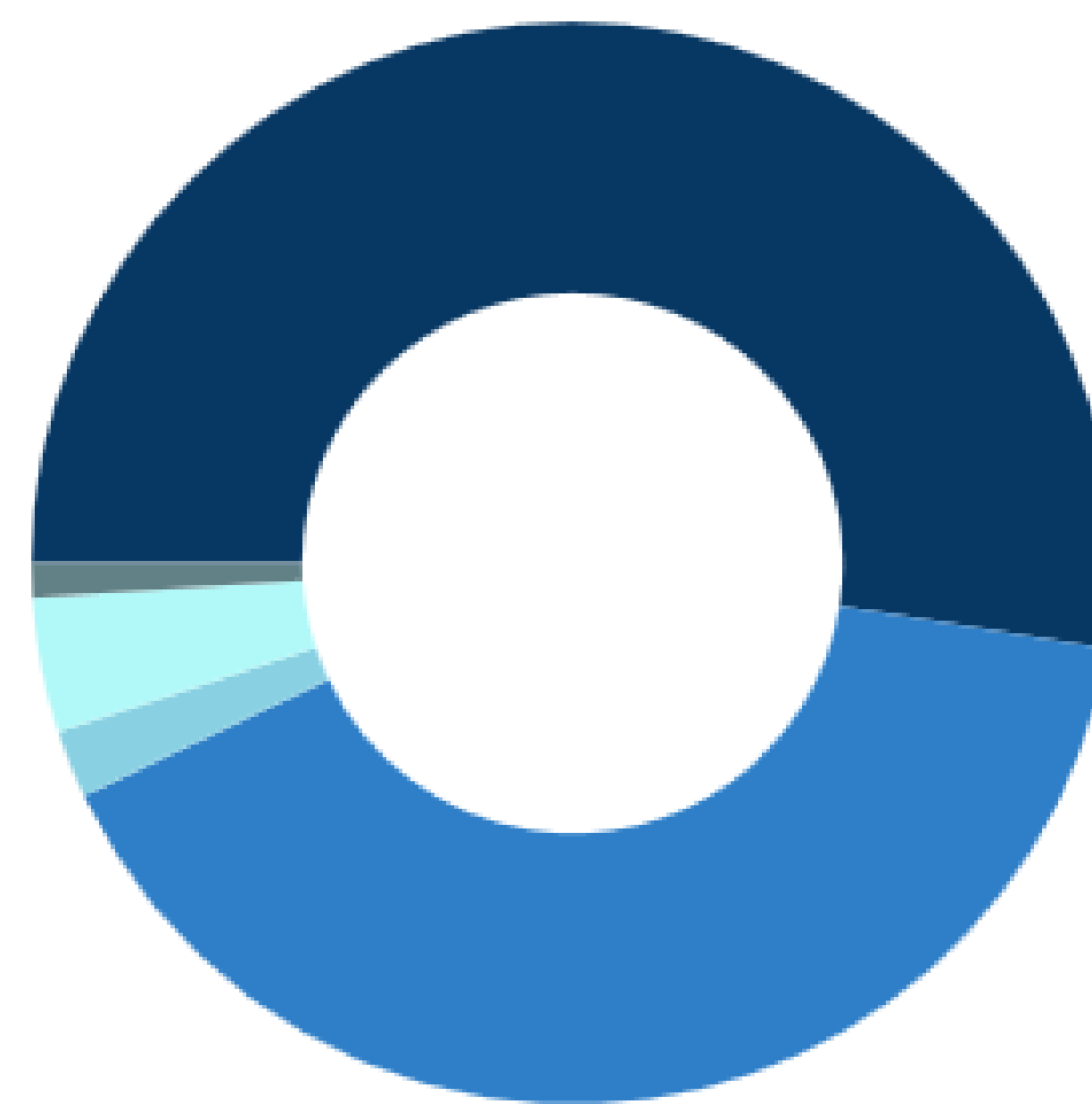
■ State Developed Plan (55%) ■ Regionally Developed Plan (24%)
■ Federally Issued Plan (1%) ■ Not Sure (13%) ■ Other (7%)

Amount More per Month Company is Willing to Spend to Have Electricity Come from Renewable Sources (Industry)



■ 0% (34%) ■ 1-5% (36%) ■ 6-10% (21%) ■ 11-20% (8%) ■ 21% + (1%)

Type of Plan Preferable for Nebraska (Industry)



■ State Developed Plan (53%) ■ Regionally Developed Plan (40%)
■ Federally Issued Plan (2%) ■ Not Sure (4%) ■ Other (1%)

HOUSEHOLD

Information from household report summary will go in this spot.....along with charts and graphs.