



Draft RAP Model Rule for Water Heater NOx Emissions

**Presentation to NESCAUM Building
Electrification Workgroup**

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Topics

- Background
- Key Elements of the Draft Model Rule
 - Emission limits set by schedule or formula
 - Emission limits
 - Timing
- Q&A, Feedback and Discussion
- Next Steps

1 Background

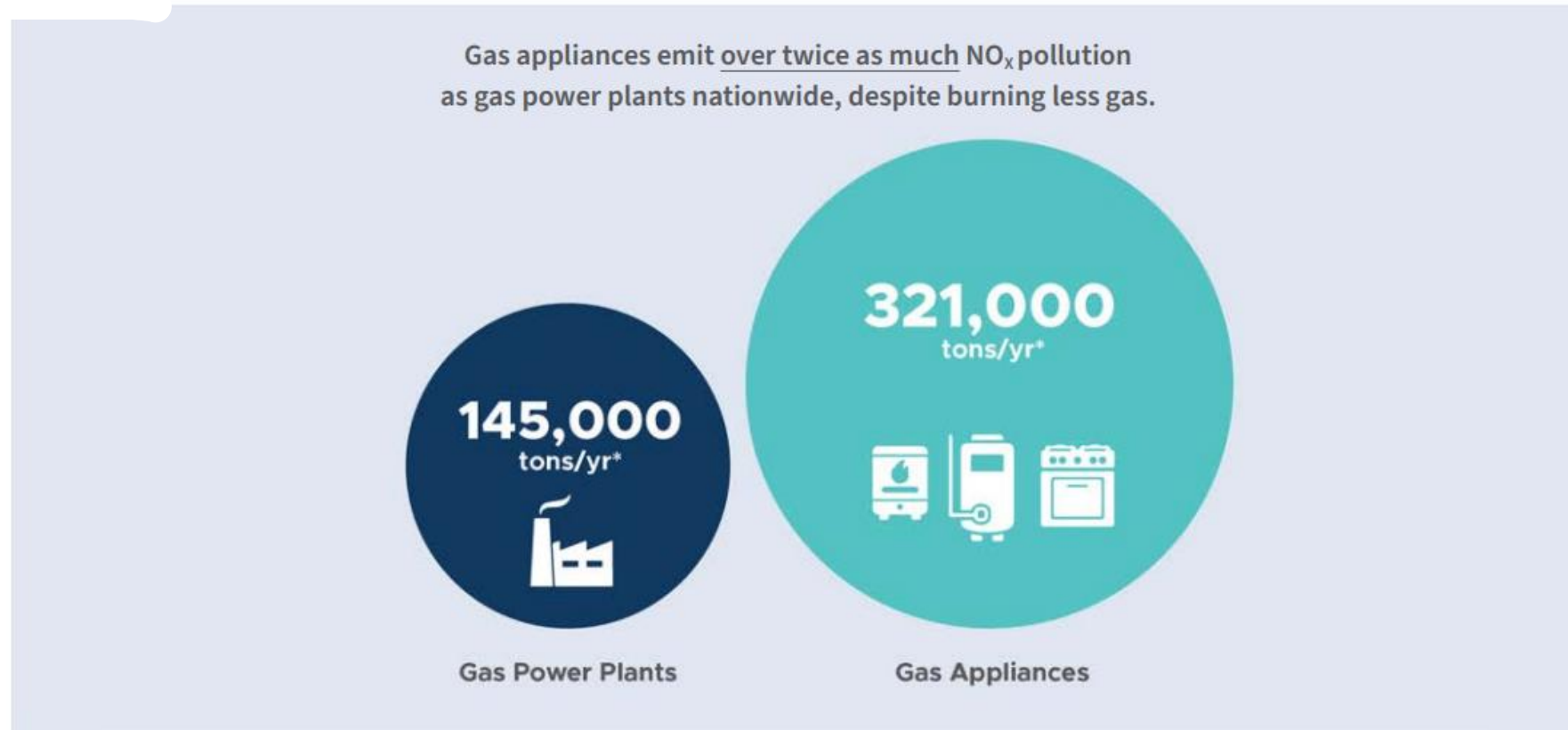
A wooden gavel with a brass head and a wooden handle rests on a wooden surface. To its right is a red book with the word 'REGULATIONS' written in gold capital letters on its spine. The background is a blurred bookshelf.

REGULATIONS

Why Electrification Matters for Air Quality

Exhibit 1

2017 NO_x Emissions from Gas Power Plants and Gas Appliances

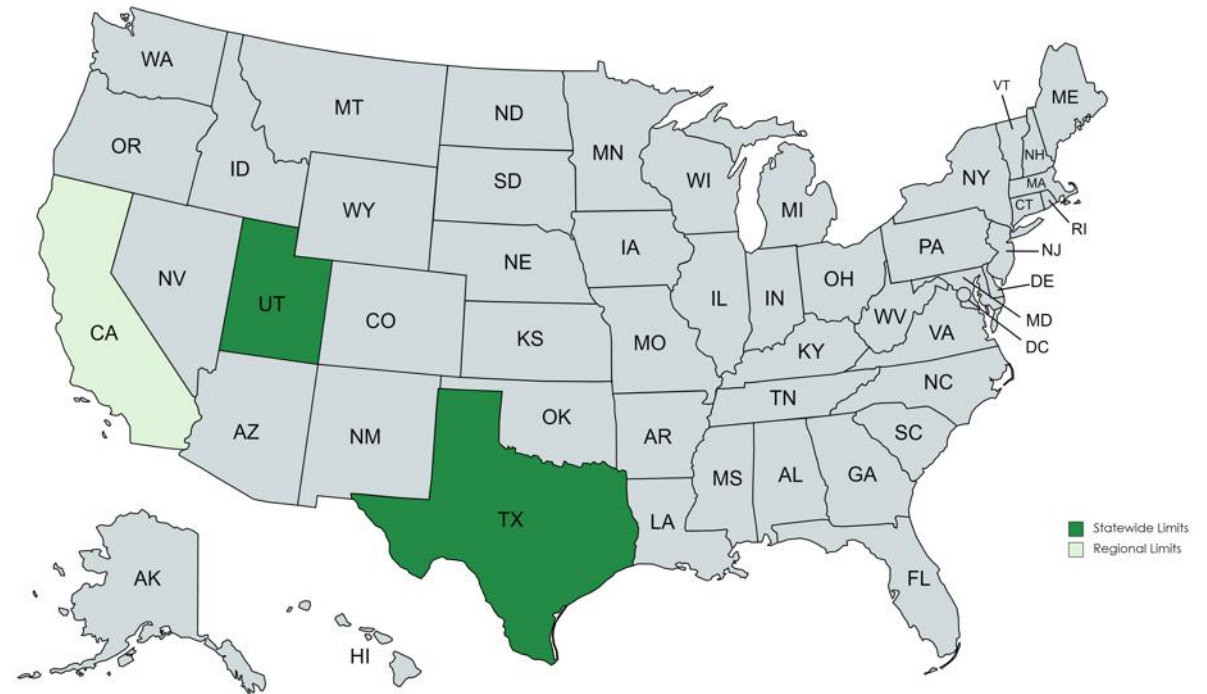


**Values rounded to the nearest thousand tons.*

Source: RMI analysis of EPA 2017 National Emissions Inventory

Existing NOx Emissions Limits for Natural-Gas Fired Water Heaters

- Texas
- Utah
- Bay Area AQMD (CA)
- South Coast AQMD (CA)
- San Joaquin Valley APCD (CA)
- Ventura County APCD (CA)



Existing Standards Vary by Type of Water Heater and/or Size

Types:

- Storage
- Tankless/instantaneous
- Specialty (mobile, pool, spa)



Sizes:

- $\leq 75,000$ BTU/hr
- 75,000 – 400,000 BTU/hr
- 400,000 – 2,000,000 BTU/hr

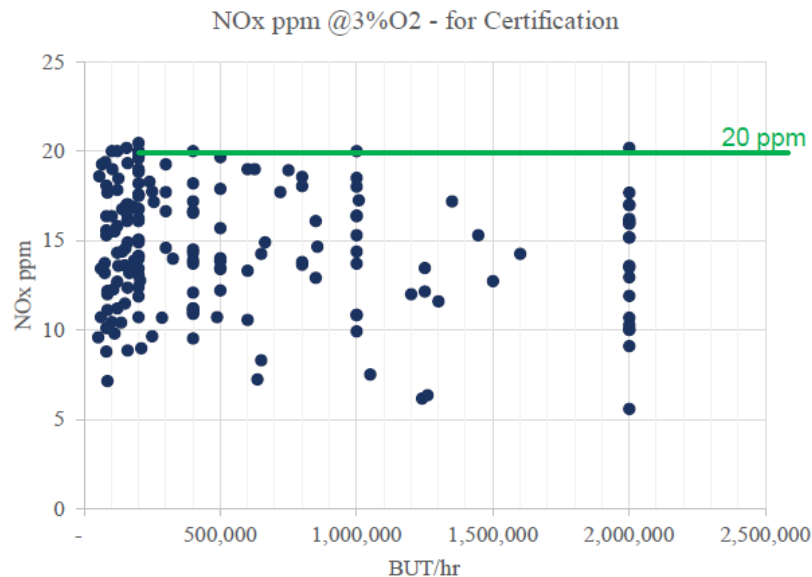
Limits expressed in different units:

- 10-40 ng/J heat output
- 15-55 ppmv at 3% O₂



Actual NOx Emissions Data

CURRENT TECHNOLOGY



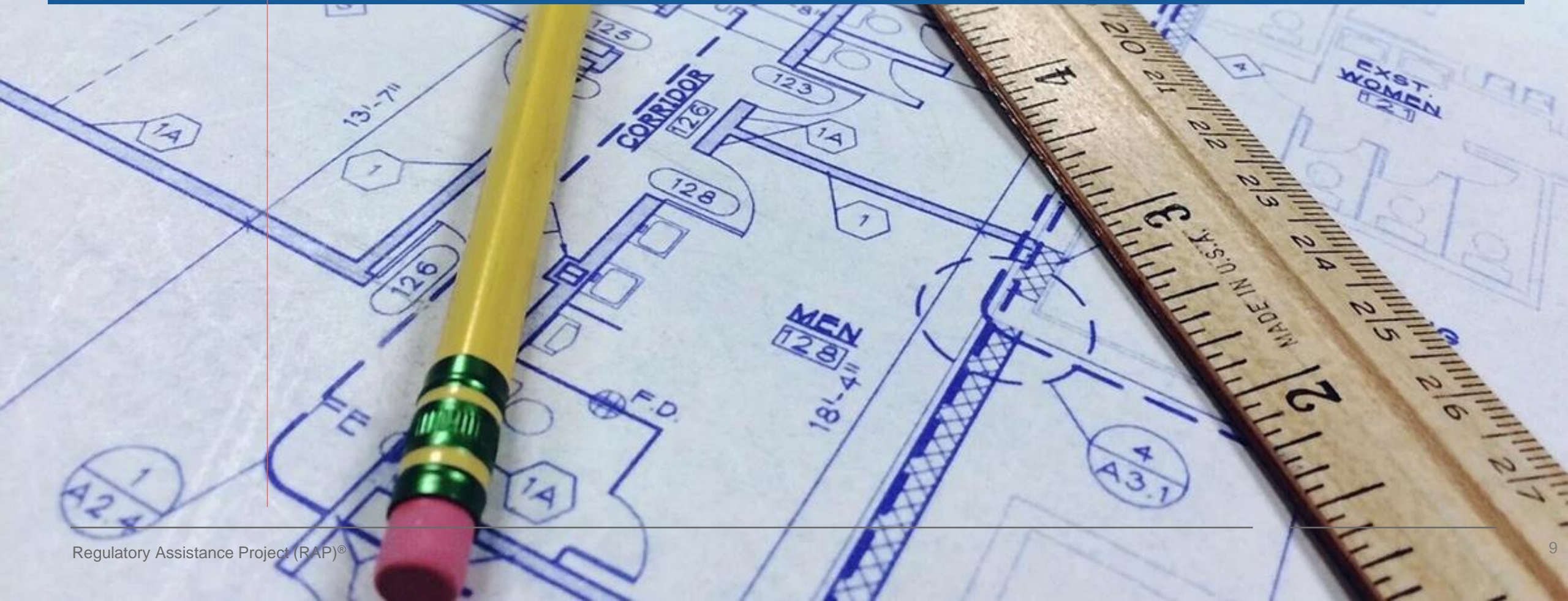
- There are two general designs of natural gas combustion systems that are used to meet current 20 ppm NOx emission limit
 - Atmospheric burners (e.g., in-shot burners)
 - Fuel air premix
- Staff reviewed 181 source tests conducted in 2017 - 2021 for models certified at 20 ppm for NOx emissions
 - 50 models were tested <12 ppm
 - 25 models were tested <10 ppm

Source: SCAQMD

Equitable Solutions Required



2 Key Elements of the Draft Model Rule



How does the model rule work?

- Prohibits sale or installation of water heaters that don't meet an emissions limit
- Establishes the emissions limit using either:
 - a ***schedule*** of limits for future years, or
 - a ***formula*** through which emissions limits are updated over time
- Manufacturers required to submit 3rd party emissions testing of their water heaters and apply for certification of makes/models

Applicability

- Water heaters with a rated heat input capacity of ≤ 2 MMBTU/hour
 - Exemptions:
 - Water heaters designed for use in “recreational vehicles”
 - Water heaters manufactured or sold for use in other jurisdictions
- Category 1 Water Heaters: fossil gas-fueled
- Category 2 Water Heaters: propane- or oil-fueled

3 Q&A, Feedback and Discussion



Priorities for Feedback

- Equity/Affordability – complementary policies?
- Applicability/Exemptions/Categories – esp. covered fuels
- Coordination with Codes and Standards, energy efficiency programs



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Visit model homes in your community during National Home Week.
Make your house a Model home and live better electrically.

What's next?

- Additional research/outreach: USEPA, NEEP, manufacturers, electrification experts
- 2nd draft of model rule
- Final round of external peer review
- Publish model rule - Summer 2022



About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org



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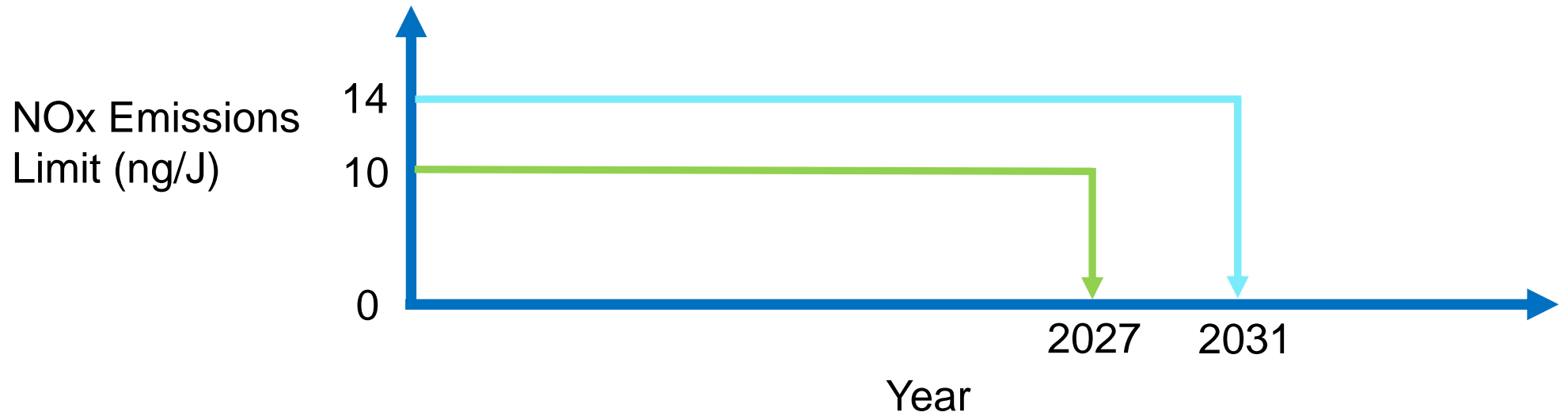
Research and Outreach Since January

- Conversations – Utah, Bay Area, South Coast
 - Emission limits, Timing, Outreach
- Presentation - WESTAR
- Research – South Coast test data, AP-42, E-Grid
- Other

BAAQMD Proposed Zero Emissions Rule

Gas-Fired Water Heater Phaseout:

- **1/1/2027** => 0 ng/J for water heaters $\leq 75,000$ BTU/hr
- **1/1/2031** => 0 ng/J for water heaters 75,001 - 2,000,000 BTU/hr



Standards: Schedule Option

Year	Category 1 emissions limit (ng/J heat output)	Category 2 emissions limit (ng/J heat output)
2 years after rule promulgation	14	28
2030	8	17
2035	1	1

The years and emissions limits in the model rule will be **[bracketed]** to indicate that jurisdictions can insert different values if they desire, without having to write a new rule from scratch

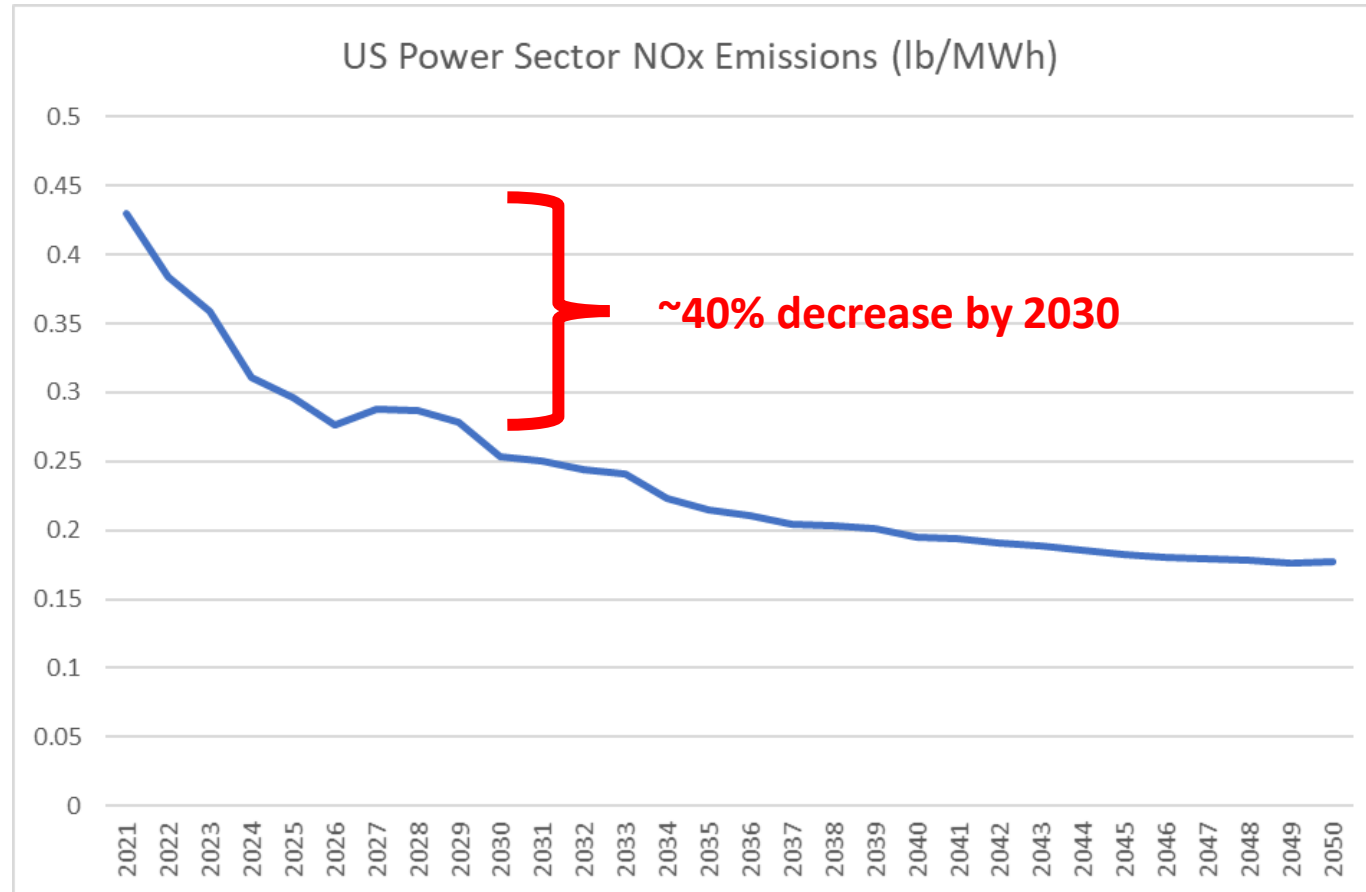
Standards: Formula Option

- Year 1 emissions limits same as Schedule Option for all categories
- Future (Year X) emissions limits calculated by a formula:

$$EL_{\text{category,yearx}} = EL_{\text{category,[year1]}} * \frac{EF_{\text{yearx}}}{EF_{\text{[year1]}}}$$

- EL = Emissions limit
- EF = Annual average NOx emissions rate for electric power

Projected Values for “EF_{yearx}”



Source: US Energy Information Administration, Annual Energy Outlook 2022, <https://www.eia.gov/outlooks/aeo/>