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The New NSPS For Combustion Turbines

What You Need to Know

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Agenda

01

Background and Rule Summary

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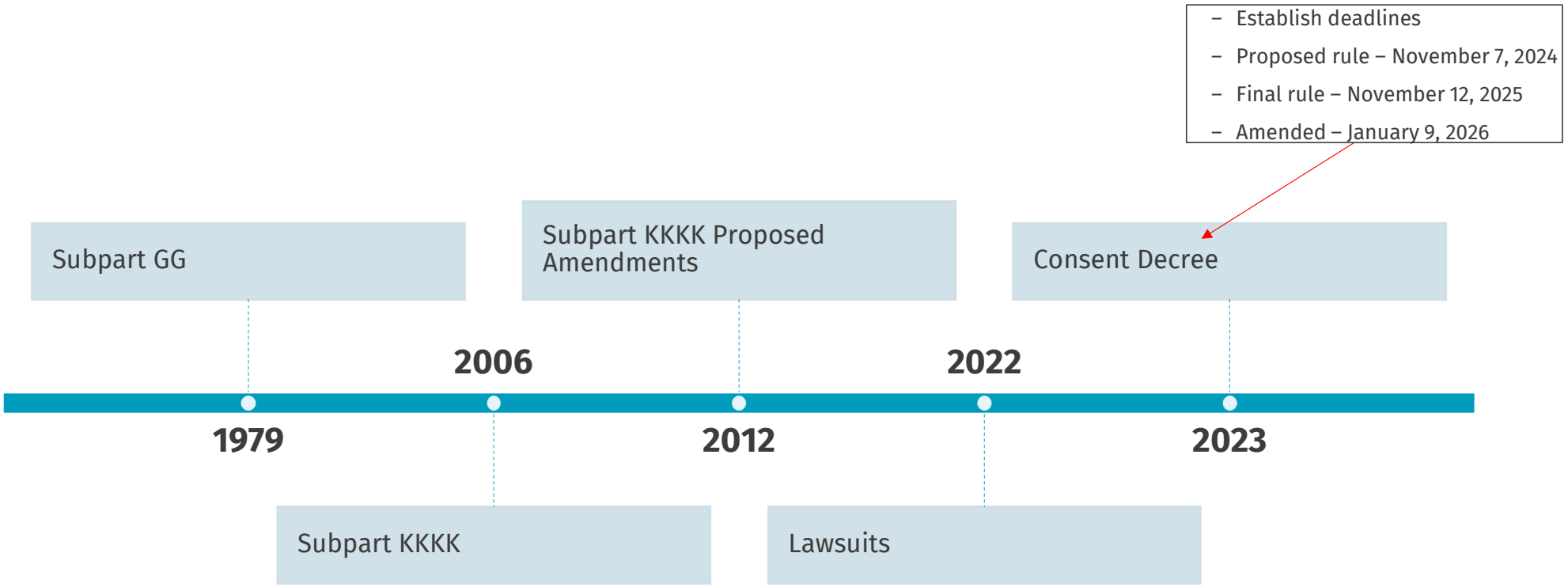
New Source Performance Standards

- CAA Section 111(b)
- Review and revise at least every 8 years, “if appropriate”
- Best system of emission reduction (BSER)
- Must consider:
  - Cost
  - Non-air quality health and environmental impacts
  - Energy requirements
- Must be “adequately demonstrated”
- Cannot prescribe a particular technology

Combustion Turbine NSPS History



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NSPS KKKKa Applicability

- Construction, modification, reconstruction after 12/13/2024
- Base load rating ≥10 MMBtu/hr
- Heat input from HRSG duct burners or fuel preheaters **NOT** used to determine applicability
  - Standards apply to HRSG exhaust

NSPS KKKKa Summary

- More stringent NO_X emission standards for some new large CTs
  - May require SCR (or equivalent)
- Equivalent or relaxed standards for modified and reconstructed CTs
- Subcategories similar to NSPS KKKK
  - New medium and large subcategories based on utilization rate
  - New large subcategories based on design efficiency
  - Lower partial operating load threshold from 75% to 70% of base load
- Input- or output-based standards, optional mass standards
- No separate standards for mechanical drive

NSPS KKKKa Summary - Continued

- New subcategories
  - Tuning
  - Temporary (24-month)
  - Heat recovery bypass
  - Byproduct fuels
- New averaging periods
  - 4-hr roll for combined cycle units (input-based standard) vs. 30-day in KKKK
- Grid system emergency exclusion
- No change from NSPS KKKK SO_2 standards

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Emission Standards

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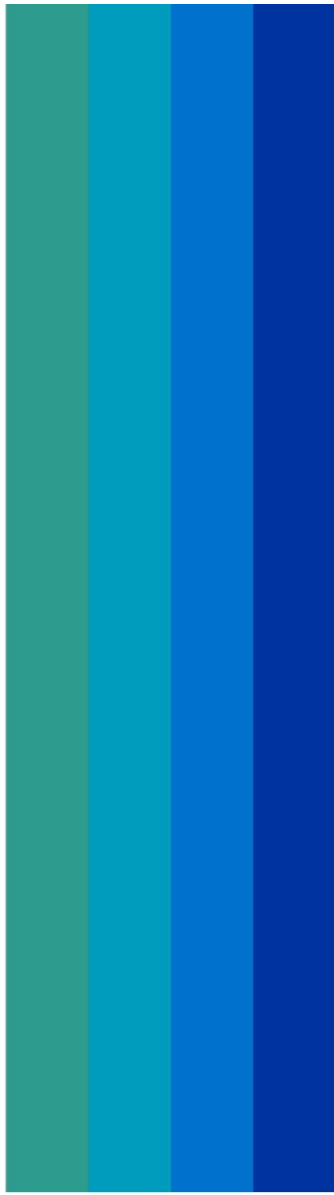

NSPS KKKKa Emission Standards – Large CT

Combustion Turbine Type	Combustion Turbine Base Load Rated Heat Input (HHV)	NO_X Emission Standard (ppmvd @ 15% O_2)	Input-Based NO_X Emission Standard (lb/MMBtu)	Optional Output-Based NO_X Emission Standard (lb/MWh)
New Natural gas Utilization rate > 45%	> 850 MMBtu/hr	5	0.018	0.12 (gross) 0.12 (net)
New Natural gas Utilization rate ≤ 45% Design efficiency ≥ 38%	> 850 MMBtu/hr	25	0.092	0.83 (gross) 0.85 (net)
New Natural gas with Utilization rate ≤ 45% Design efficiency < 38%	> 850 MMBtu/hr	9	0.035	0.37 (gross) 0.38 (net)
New, modified, or reconstructed Non-natural gas	> 850 MMBtu/hr	42	0.16	1.0 (gross) 1.0 (net)
Modified or reconstructed Natural gas All utilization rates Design efficiency ≥ 38%	> 850 MMBtu/hr	25	0.092	0.83 (gross) 0.85 (net)
Modified or reconstructed Natural gas All utilization rates Design efficiency < 38%	> 850 MMBtu/hr	15	0.055	0.62 (gross) 0.30 (net)

NSPS KKKK: 15 ppm

NSPS KKKK: 15 ppm

NSPS KKKKa Emission Standards – Medium CT

Combustion Turbine Type	**Combustion Turbine Base Load Rated Heat Input** (HHV)	**NO_X Emission Standard** (ppmvd @ 15% O_2)	**Input-Based NO_X Emission Standard** (lb/MMBtu)	**Optional Output-Based NO_X Emission Standard** (lb/MWh)
New Natural gas Utilization rate > 45%	> 50 and ≤ 850 MMBtu/hr	15	0.055	0.43 (gross) 0.44 (net)
New Natural gas Utilization rate ≤ 45%	> 50 and ≤ 850 MMBtu/hr	25	0.092	1.2 (gross) 1.2 (net)
Modified or reconstructed Natural gas All utilization rates	> 20 and ≤ 850 MMBtu/hr	42	0.015	2.0 (gross) 2.0 (net)
New Non-natural gas All utilization rates	> 50 and ≤ 850 MMBtu/hr	74	0.29	3.6 (gross) 3.7 (net)
Modified or reconstructed Non-natural gas All utilization rates	> 20 and ≤ 850 MMBtu/hr	96	0.37	4.7 (gross) 4.8 (net)

NSPS KKKKa Emission Standards – Small CT

Combustion Turbine Type	**Combustion Turbine Base Load Rated Heat Input** (HHV)	**NO_X Emission Standard** (ppmvd @ 15% O_2)	**Input-Based NO_X Emission Standard** (lb/MMBtu)	**Optional Output-Based NO_X Emission Standard** (lb/MWh)
New Natural gas All utilization rates	≤ 50 MMBtu/hr	25	0.092	1.4 (gross) 1.4 (net)
New Non-natural gas All utilization rates	≤ 50 MMBtu/hr	96	0.37	5.3 (gross) 5.4 (net)
Modified or reconstructed All fuels All utilization rates	≤ 20 MMBtu/hr	150	0.55	8.7 (gross) 8.9 (net)

NSPS KKKKa Emission Standards – Other

Combustion Turbine Type	Combustion Turbine Base Load Rated Heat Input (HHV)	NO_X Emission Standard (ppmvd @ 15% O_2)	Input-Based NO_X Emission Standard (lb/MMBtu)	Optional Output-Based NO_X Emission Standard (lb/MWh)
New Natural gas Off-shore Heat recovery bypass Temporary	> 50 MMBtu/hr	25	0.092	N/A
North of Arctic Circle Ambient temperatures < 0°F Modified or reconstructed Off-shore Tuning Byproduct fuels < 70% base load rating	≤ 300 MMBtu/hr	150	0.55	N/A
	> 300 MMBtu/hr	96	0.35	N/A
Heat recovery independent of combustion turbine	All	54	0.20	N/A

03

Key Concepts

Temporary Turbines

System Emergencies

Design Efficiency

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Temporary Turbines

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New Subcategory! Temporary Combustion Turbines

A **Temporary Combustion Turbine** means a combustion turbine that is intended to and remains at a single stationary source (or group of stationary sources located within a contiguous area and under common control) for 24 consecutive months or less.

But Read Further – Limitations Exist!

- Must be small or medium sized (base load rating </=850MMBtu/hr)
- Single location (stationary source or group of stationary sources) for up to 24 consecutive months
  - Within contiguous area and under common control
- Total period of residence begins when turbine commences operation, regardless of whether the turbine operates continuously
- Relocation/replacement of a temporary CT within same source while performing same/similar function does not restart the clock

Key Takeaway

- Streamlined compliance approach –
  - Manufacturer's Guarantee that full load NO_x emissions are below standard
  - Performance test once every 5 years
- Stationary temporary combustion turbines remain subject to NO_x and SO_2 emissions standards under this NSPS (Subparts KKKK and KKKKa). They are not exempted from these standards; rather, the compliance assurance requirements for this subcategory are intentionally and appropriately streamlined.

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System Emergencies

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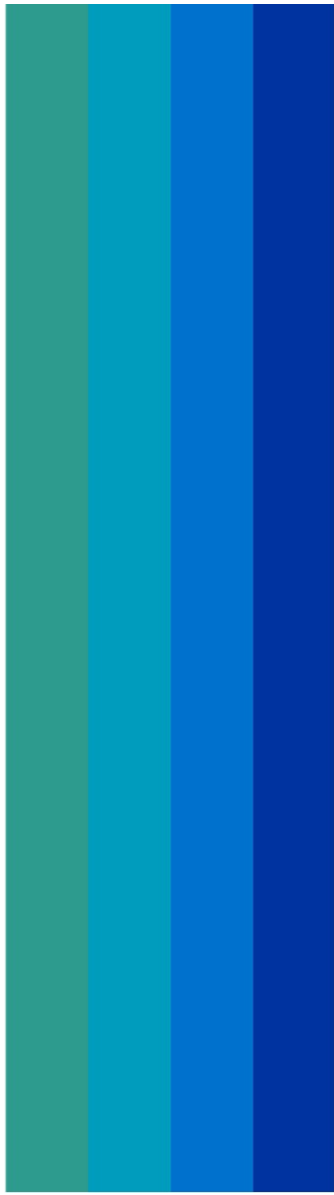

System Emergency

- EPA is finalizing a definition of “system emergency” that is based on Energy Emergency Alert level 1, 2, or 3 as defined by NERC Reliability Standard EOP-011-2 or its successor, or equivalent. The EPA is not finalizing additional relief related to other emergency orders.
- An Energy Emergency Alert (EEA) may be initiated only by a Reliability Coordinator at 1) the Reliability Coordinator’s own request, or 2) upon the request of an energy deficient Balancing Authority

System Emergency – what this means

- During System Emergencies, operation is **NOT** included when determining subcategorization
- If electing to comply with the mass-based standards, do **NOT** include emissions during system emergencies in 12-calendar-month calculations
- EPA's goal – to provide flexibility, maintain system reliability, and minimize overall costs

System Emergency

EEA 1	EEA 2	EEA 3
All available generation resources in use.	Load management procedures in effect.	Firm Load interruption is imminent or in progress.

Difference between System Emergency and Emergency Turbines

- Both KKKKa and KKKK have a definition and exemption for "emergency turbines" from NO_x standards. This is different than a "system emergency".
- Emergency turbines are restricted to use during emergency situations, which includes when utility power is interrupted and maintenance and readiness testing, but not during energy emergency alerts.
- Note the use of the term "system emergency" is adopted from grid planning and operational protocols

Design Efficiency

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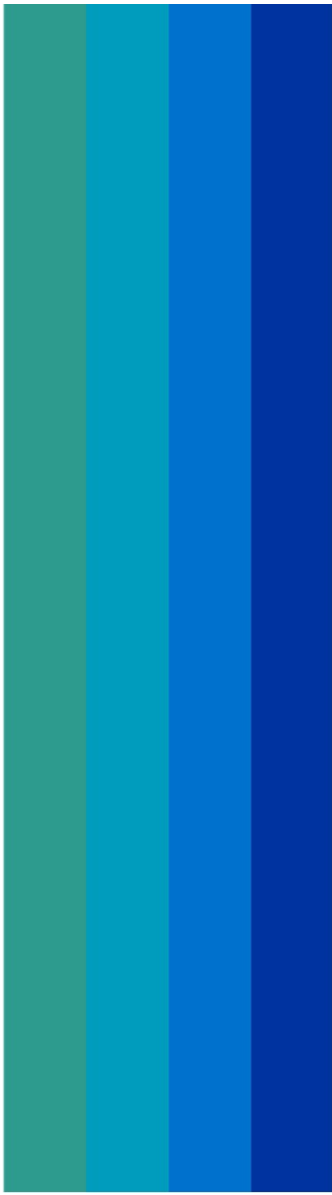

Design Efficiency – Definition

- Emission Standards (for CTs >850MMBtu/hr firing natural gas):
  - <45% Utilization, DE>38% = 25 ppm
  - <45% Utilization, DE<38% = 9 ppm

  If modified/reconstructed (all utilization levels)
  - DE>38% = 25 ppm
  - DE<38% = 15 ppm
- How is this determined after upgrade?

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Design Efficiency – Examples

- Simple cycle CTs

Manufacturer	Model	Type	Design Efficiency (HHV)
Siemens	SGT-400	Frame	31%
Solar	Titan 130	Frame	32%
GE	LM6000 PF	Aero	37%
GE	7F.05	Frame	35%
GE	7HA.02	Frame	39%
Mitsubishi	M501JAC	Frame	40%

04

Compliance

Stack Testing

Monitoring

Recordkeeping and Reporting

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Stack Testing

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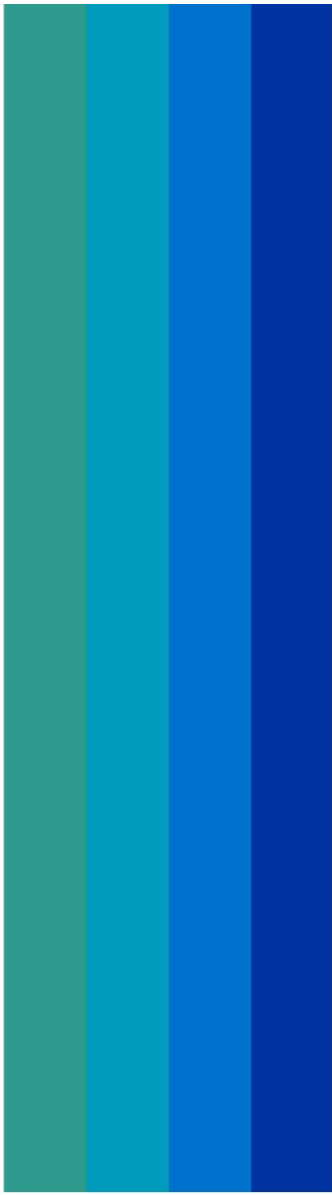

NO_X Stack Testing Requirements

- Similar to NSPS KKKK:
  - Initial stack testing required for all fuels
  - Annual stack testing unless continuous monitoring option
  - Reduced biennial (26-month) stack testing frequency if ≤75% of standard
  - ≥75% of peak load (or highest achievable)
  - Duct burners in operation

NO_X Stack Testing Requirements – Continued

- **NEW** for both KKKKa **and** KKKK:
  - If not operated for >60 days, then 45-calendar day/10-op day grace period
  - If ≤168 operating hours since last test, 45-day grace period
    - Not automatic, extension must be approved by EPA Region
    - 30-day advance notice
  - Up to 5 identical CTs may request custom 5-year test schedule
    - At least one test on each CT every 5 years and ≤75% of standard
    - Must be approved by state agency
  - Initial stack testing required for exchanged CT engines (i.e., overhaul)
  - Duct burner must operate at ≥75% of peak load

Monitoring

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Post-Combustion Control

- **CEMS required if control required**
- Can choose to comply with mass-based limits
- Only subcategories that would likely require SCR:
  - New, NG-fired, large CTs (>850 MMBtu/hr) with >45% utilization (5 ppm)
  - New, NG-fired, large CTs with ≤45% utilization and <38% efficiency (9 ppm)

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Sulfur Dioxide

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SO_2 Monitoring Requirements

- Fuel analyses
  - Part 75 Appendix D -*or*-
  - Custom schedule approved by delegated authority
- If no intermediate bulk storage, sample gaseous fuel once per operating day
- Reduced frequency available after sampling either
  - 30 consecutive operating days –*or*-
  - 720-hours per Part 75 Appendix D
- Part 75 Appendix D fuel sampling to qualify as pipeline natural gas or natural gas
- Contract or tariff records
- CEMS

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Recordkeeping and Reporting

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Electronic Reporting

- **NOW** applies to NSPS GG, KKKK, and KKKKa
- Electronic Reporting Tool (ERT) required for stack tests and CEMS RATAs (60-day)
  - Beginning on March 16, 2026, for NSPS GG and KKKK
- Semiannual compliance reports via CEDRI starting January 15, 2027, or when template available, whichever later
  - Template already in rule docket
- Due 30 days after end of semiannual period
- Excess emissions and downtime

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NSPS KKKKa – Notifications

- Initial and subsequent stack test – 30-day advance notice
- Inoperable for 60 days prior to stack test – 15 days after recommencing operation
- Less than 168 operating hours since last stack test – 15 days after operating more than 168 hours

Key Takeaways

- Only some new large CTs (>850 MMBtu/hr) must have SCR
- NO_X CEMS required when SCR needed
  - Averaging periods and calculations different than NSPS KKKK
- Optional mass-based standards if NO_X CEMS or Appendix E
  - Most useful for large CTs close to 45% utilization
- 24-month temporary CT standard
- Minor source TV permit exemption (if allowed by state)
- Useful stack testing updates to NSPS KKKK/KKKKa
- CEDRI and ERT now required for NSPS GG/KKKK/KKKKa

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