Worldwide Engine Emissions Regulations For Greater than 560kW

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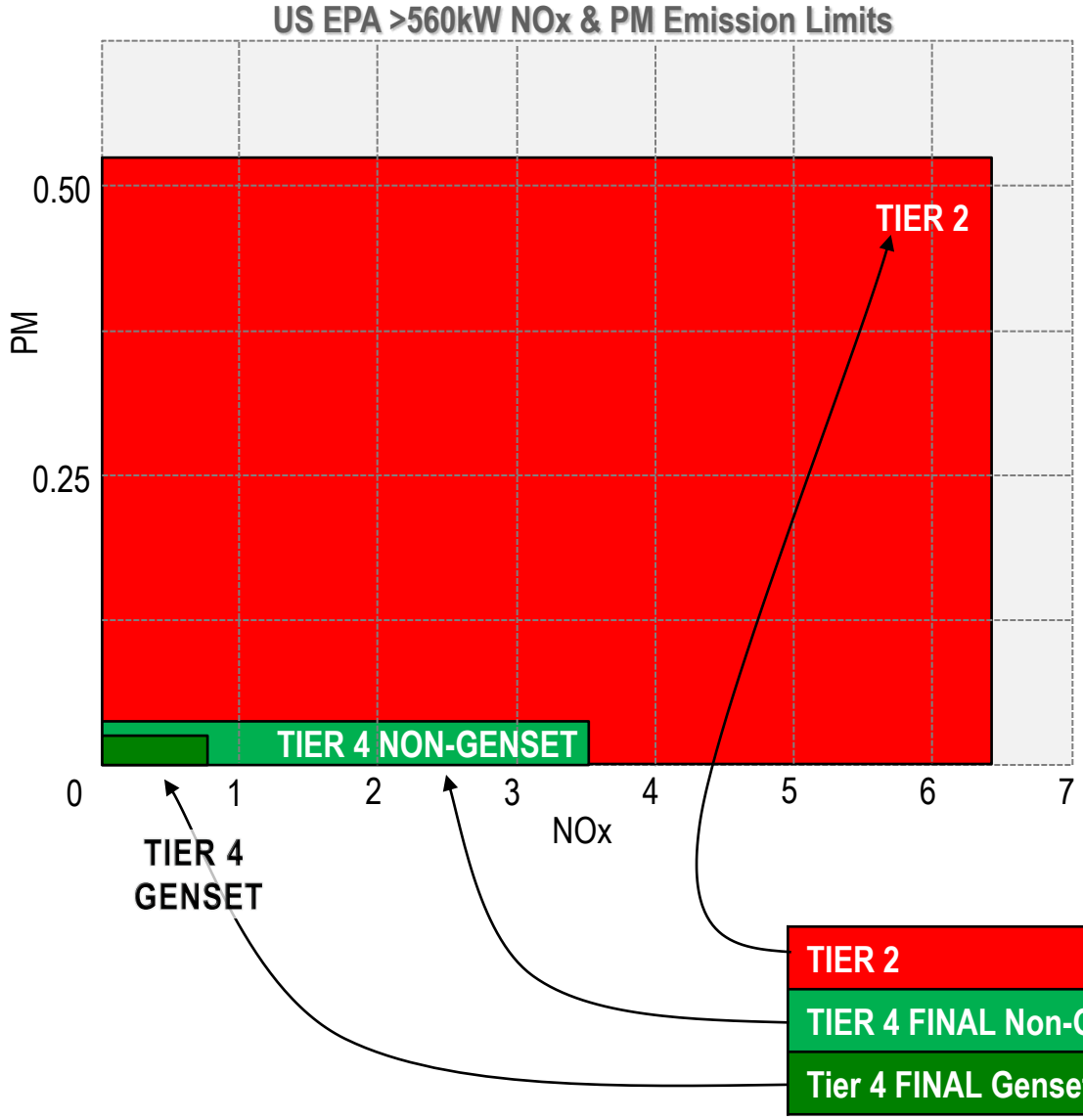
US EPA Emission Standards for Greater than 560kW



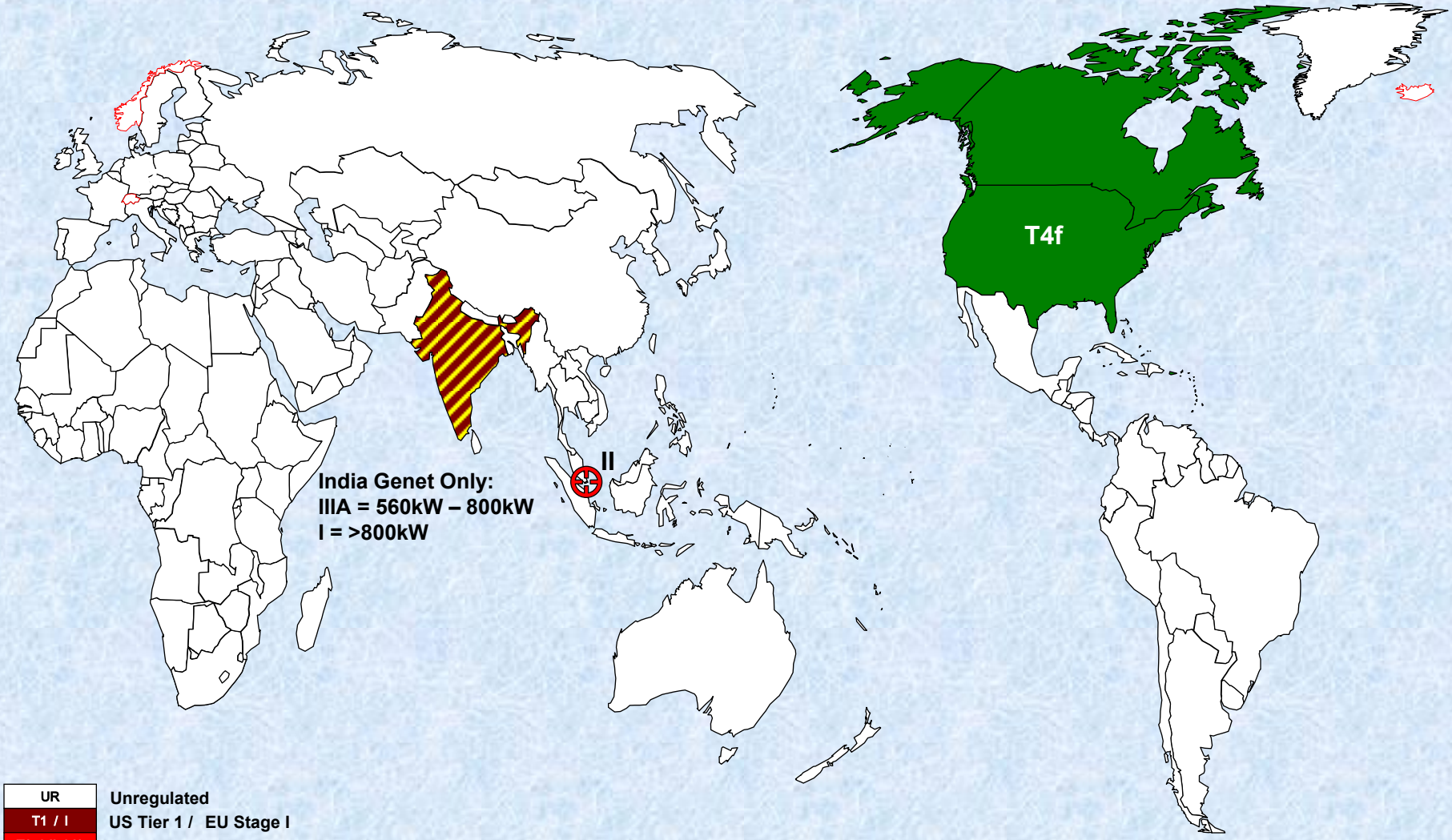
- Tier 2 started in 2006
- Tier 4 Final started in 2014 with transitional provisions expiring at the end of 2017.
- All US equipment models will need to be Tier 4 Final starting in 2018
- Gensets regulated more stringently than machines.

	NOx	HC	PM	CO
	g/(kW*hr)			
TIER 2	6.4 (NOx+HC)		0.54	3.5
TIER 4 FINAL Non-Genset (Machines)	3.5	0.19	0.04	3.5
Tier 4 FINAL Gensets	0.67	0.19	0.03	3.5

Worldwide Emissions Standards for > 560kW Nonroad Mobile Applications - 2014

- We expect all equipment manufacturers to conclude their US transition program (a.k.a. “Flex”) by the end of 2017. All new equipment >130kW should be Tier 4 Final starting in 2018.
- India has genset requirements affecting both mobile and stationary engines. Emission requirements are approximately Stage IIIA for less than 800kW, and Stage I for greater than 800kW
- Singapore requires Tier 2 level emissions.

2014 Worldwide Regulations for Nonroad Mobile >560kW

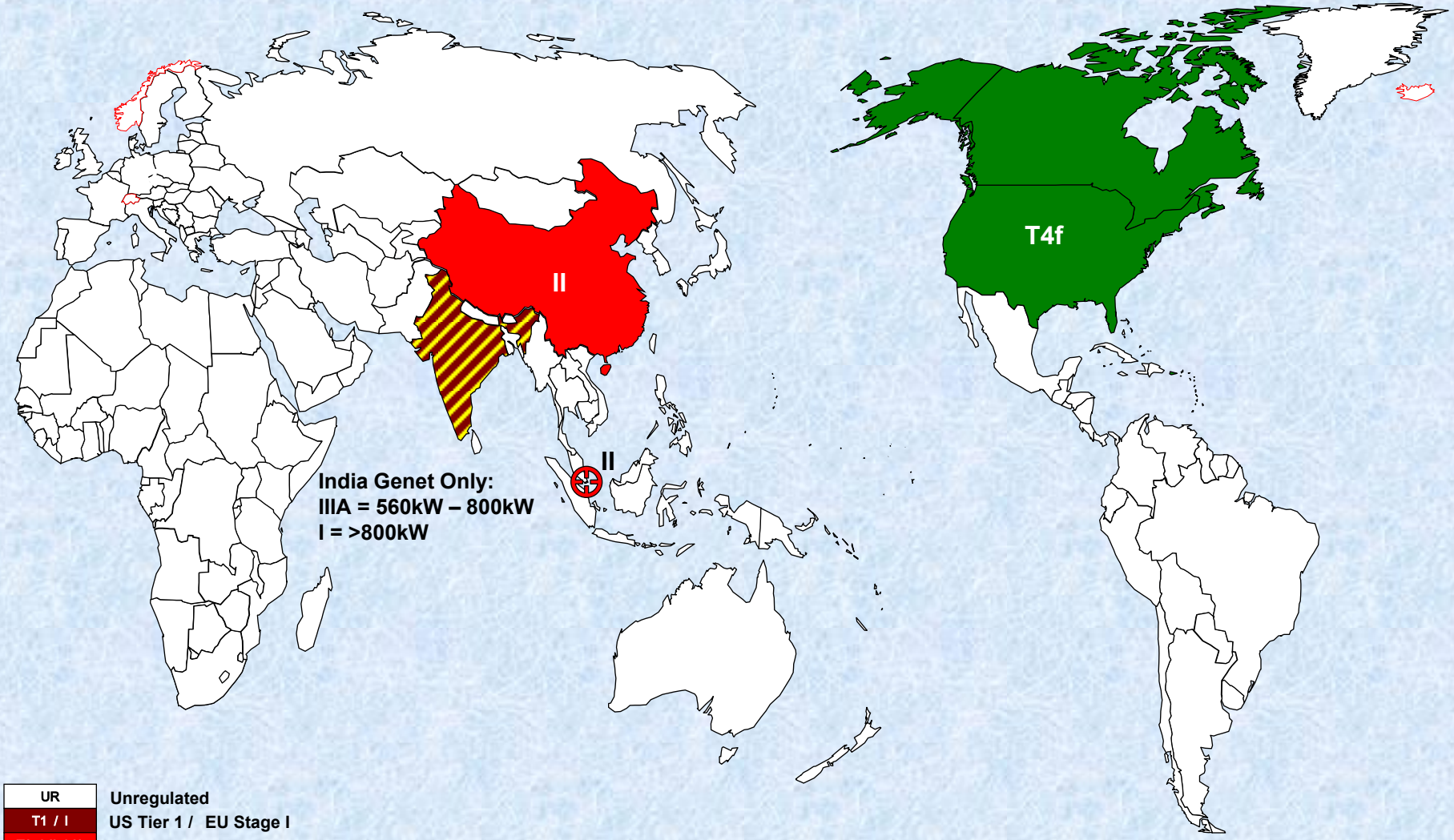


UR	Unregulated
T1 / I	US Tier 1 / EU Stage I
T2 / II / J2	US Tier 2 / EU Stage II / Japan 2001
T3 / IIIA / J3	US Tier 3 / EU Stage IIIA / Japan 2006
T4i / IIIB / J4i	US Tier 4i / EU Stage IIIB / Japan 2011
T4f / IV / J4f	US Tier 4f / EU Stage IV / Japan 2014
V	EU Stage V

Worldwide Emissions Standards for > 560kW Nonroad Mobile Applications - 2017

- China begins regulating >560kW engines in 2014
  - Transitional provisions will expire by April 2016.

2017 Worldwide Regulations for Nonroad Mobile >560kW



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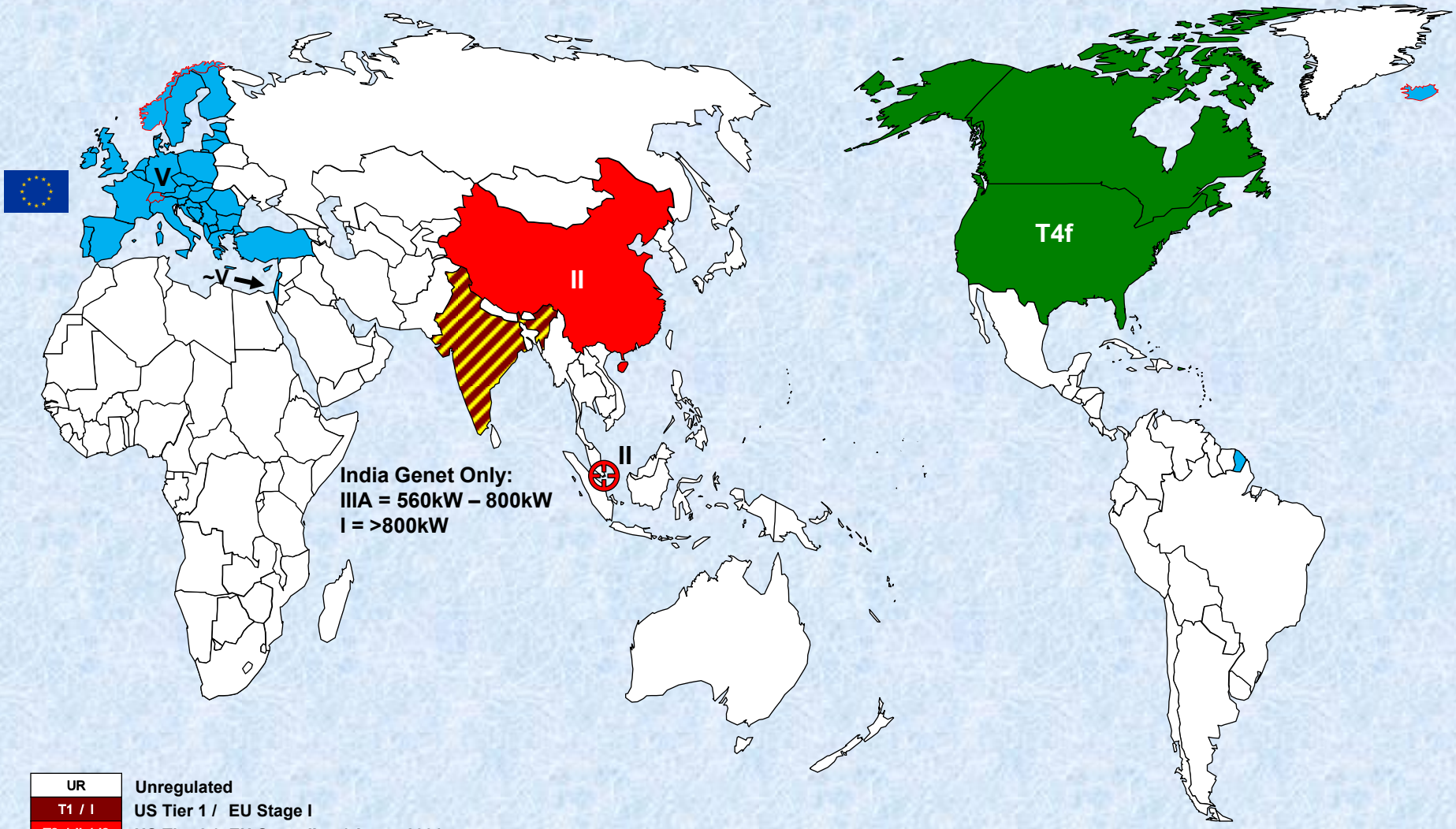
V	EU Stage V

Expected Regulated Emission Levels. Subject to Change.

Worldwide Emissions Standards for > 560kW Nonroad Mobile Applications - 2020

- EU is expected to implement Stage V standards.
  - We expect the regulation will be generally aligned with the US emission limits although some differences may still occur.

2020 Worldwide Regulations for Nonroad Mobile >560kW



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Expected Regulated Emission Levels. Subject to Change.

Emissions Regulations - Principles

Lessons Learned / Best Practices

- Alignment of regulations is a “win-win”. Benefits environment/customer/manufacturer
  - Manufacturer: leverage existing designs, tooling, and experience.
  - Customer: lower cost, increased reliability & durability
  - Environment: likelihood of compliance improved with proven product
- Sufficient “lead time” is critical for successful regulatory programs
  - Provide 3 years for equipment already in production to allow manufacturers to adjust manufacturing capacity and train service network.
  - For new technologies, dialog with engine manufacturers is recommended to establish suitable lead time. e.g. US Tier 4 nonroad had almost 20 years of lead time between the initial draft of the regulations to the expiration of the transitional provisions.
  - Engine Flexibility and Sell-Off are difficult to implement for regulators and should not be used if proper “lead time” has been provided.

Emissions Regulations - Principles

Lessons Learned / Best Practices

- Concept of Regional Implementation is problematic.
- Must have proper infrastructure. For example, Tier 4 Final requires Ultra Low Sulfur Diesel Fuel, Low Ash Oil, and some engines also require urea.
- Apply regulations to new machines only. Existing machines may continue to be used without impact.
    - Tier 4 adaptation will naturally occur based on machine wearout and/or business expansion.
- Nonroad equipment redesign is typically required to adopt lower emitting engines.
    - Equipment manufacturers that simultaneously improve machine productivity and efficiency with the redesign to Tier 4 also improve the uptake of their Tier 4 products.

Caterpillar Tier 4 Products

All Power Categories

- 119,000+ Tier 4 products in the field with aftertreatment
- 72M+ total machine & engine production hours