

ACTION PLAN FOR ESTABLISHING CHINA'S NATIONAL EMISSION CONTROL AREA

ICCT **POLICY UPDATES**
 SUMMARIZE
 REGULATORY
 AND OTHER
 DEVELOPMENTS
 RELATED TO CLEAN
 TRANSPORTATION
 WORLDWIDE.

Emissions from international shipping were responsible for approximately 61,000 premature deaths in 2015 (Anenberg et al. 2019), more than one-third of those in China. In December 2015, China's Ministry of Transport (MOT) released an action plan for establishing three regional domestic emission control areas (DECAs) to control sulfur oxides (SO_x) and nitrogen oxides (NO_x) emissions from ships (Mao, 2016). The regional DECA plan established a review provision to be completed by the end of 2019 to determine if further actions are needed. Last December, almost 12 months ahead of schedule, MOT released an upgraded action plan for establishing a national DECA (China Ministry of Transport, 2018). This action plan marks China's ambition to keep pace with world-class environmental regulations. This policy update provides an overview of the national DECA plan and compares it to the regional DECA as well as its likely successor—International Maritime Organization's Emission Control Areas (IMO ECA).

GEOGRAPHIC COVERAGE

The national DECA expands the regional DECA's three key port cluster regions to the entire coastline. Given China's massive coastline, the national DECA removes regulatory differences between the regional emission control areas and potentially streamlines compliance and enforcement. The sea extent of the national DECA remains at 12 nautical miles (nm), which extends to China's territorial sea (Figure 1). Any further expansion of the emission control areas would be under the purview of the IMO and fall under the international ECA system. The North America ECA, for example, protects its coastal air quality out to as far as 200 nm from its coastline. The national DECA also includes two inland waterway systems—the Yangtze River and Pearl River—which are approximately 1800 miles and 500 miles in length, respectively.

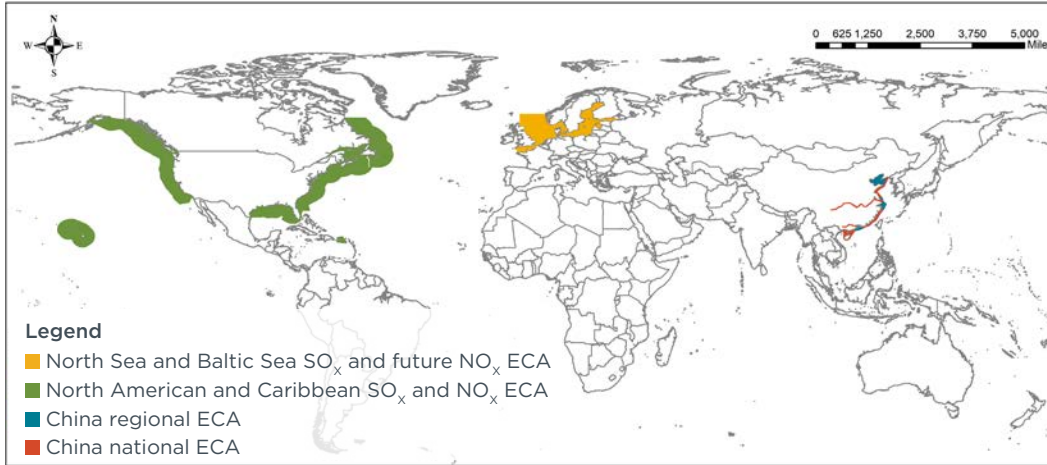


Figure 1. Geographical coverage of existing IMO ECAs, China’s regional DECA, and China’s national DECA

APPLICABILITY

The regional DECA has the narrowest applicability, while the national DECA expands and pilots IMO ECA-equivalent standards for larger ships, or those whose main engine power is greater than 130 kW, that are engaged solely in domestic navigation.¹ It also imposes requirements for the installation and use of shore power for multiple ship types. A comparison of the applicability of the regional DECA, national DECA, and IMO ECA is illustrated in Table 1.

¹ Domestic navigation refers to navigation within a country’s territorial waters. For China, the sea extent of the territorial waters is generally 12 nautical miles from its coastal baseline.

Table 1. Comparison of applicability of China's regional DECA, China's national DECA and IMO ECA

Regulation	Pollutant	Applicability
China's regional DECA	SO _x	All ships within region except fishing vessels, sporting vessels, and naval ships.
	NO _x	Not regulated.
China's national DECA	SO _x	All ships within region.
	NO _x	<p>Each marine diesel engine with a power output of more than 130 kW²:</p> <ul style="list-style-type: none"> Installed on an oceangoing ship or engine rebuilding was done on or after 1/1/2000 needs to comply with IMO Tier I; Installed on an oceangoing ship or engine rebuilding was done on or after 1/1/2011 needs to comply with IMO Tier II; Installed on a Chinese domestic ship or engine rebuilding was done on or after 3/1/2015 needs to comply with IMO Tier II. <p>Each marine diesel engine with displacement more than 30L:</p> <ul style="list-style-type: none"> Installed on a Chinese domestic ship on or after 1/1/2022 when entering DECA inland region and 12 nm around Hainan Island needs to comply with IMO Tier III.
IMO ECA	SO _x	All ships within region.
	NO _x	<p>Each marine diesel engine with a power output of more than 130 kW:</p> <ul style="list-style-type: none"> Installed on an oceangoing ship or engine rebuilding was done on or after 1/1/2016 needs to comply with IMO Tier III. <p>Ships used for emergency purposes, or ships solely used for domestic navigation and subject to alternative domestic regulations are exempt.</p>

Note: Engine rebuilding is defined as “overhaul an engine or to otherwise perform extensive service on the engine (or on a portion of the engine or engine system).” This definition refers to the definition in EPA marine engine regulation (U.S. EPA, 40 C.F.R. § 94.11).

REQUIREMENTS

SULFUR OXIDES

As international shipping transitions to lower sulfur fuels, China is signaling its intention to tighten requirements above and beyond the minimum global standards. Sulfur requirements differ for ships depending on their dominant navigational areas. Figure 2 summarizes the fuel sulfur requirements for oceangoing ships³. Like with the regional DECA, the national DECA confirms the early adoption of the IMO's global sulfur cap of 0.5% m/m, which will be effective in 2020 globally. The national DECA also pilots a 0.1% m/m sulfur requirement for all ships in the Yangtze and Pearl Rivers and for 12 nm around Hainan Island with different effective dates (Figure 2). In addition, it includes a revision provision that will likely expand the more stringent sulfur requirement to the entire national DECA coverage area starting in 2025.

For other ships, the fuel sulfur requirements are consistent with those outlined in the domestic marine engine standards which can be summarized as follows:

² It is our understanding that the action plan refers to marine Category 3 engines whenever the “greater than 130 kW” condition is added. The China marine engine standards (GB15097-2016) defines Category 3 engines as per-cylinder displacement greater than 5 liters.

³ In China's context, this term refers to ships engaged in international shipping and domestic coastal shipping.

- » For larger river vessels⁴ and river-sea vessels, the current GB/T17411-2015 marine fuel standards apply, which is equivalent to the current ISO 8217 fuel standard. This standard is anticipated to be updated soon.
- » For other smaller river vessels, the China VI automobile diesel fuel standards apply, which require ultra-low-sulfur diesel fuel (<10 ppm).

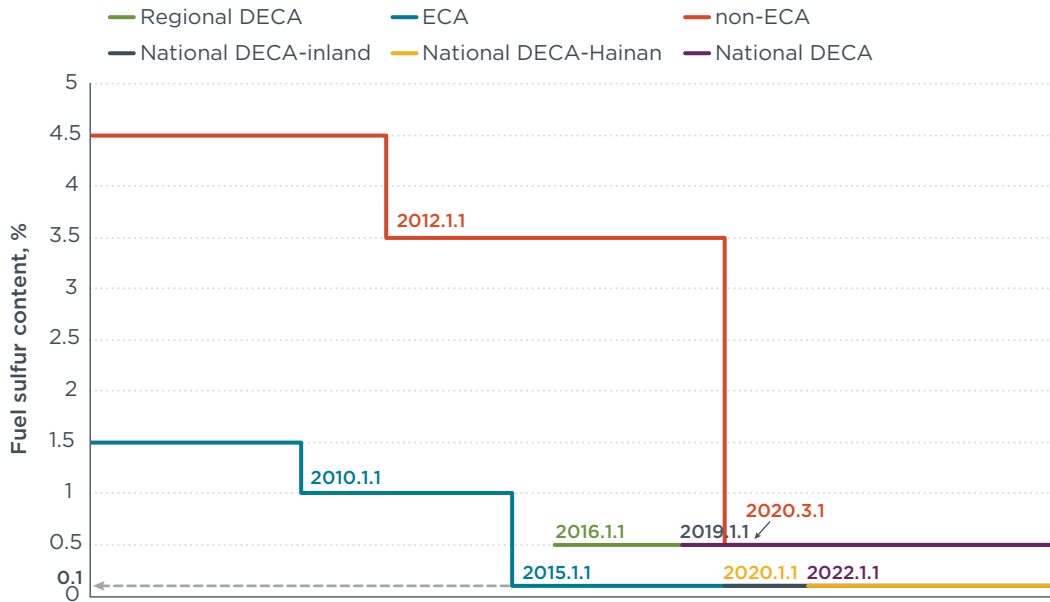


Figure 2. Comparison of SO_x requirements of the regional DECA, national DECA, IMO ECA and non-ECA for oceangoing ships only

Note: The regional DECA, lowering fuel sulfur content requirement to 0.5% m/m since 2016, only enforced the limits for ships at berth until the end of 2018.

NITROGEN OXIDES

The regional DECA does not impose NO_x requirements. The national DECA is a significant improvement in that it not only adds a NO_x requirement, but also compels larger vessels engaged solely in domestic navigation to comply with IMO Tier III requirements (Table 2 and Figure 3). In 2015, merchant vessels contributed about 14% of all NO_x emissions in the coastal region that extends 100 nautical miles (nm) from China’s baseline (Mao & Rutherford, 2018). This provision in the national DECA demonstrates that the country is taking significant efforts reduce NO_x emissions from ships.

4 The size of the ships is not the determinant for fuel quality compliance. Ships that need to burn marine fuel oil should use compliant fuel according to GB/T17411-2015; ships that used to burn regular diesel should use compliant fuel according to China VI automobile diesel fuel standards.

Table 2. Comparison of NO_x requirements in ECAs, China's national DECA and non-ECA regions

	Build Year												
	2000-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
ECA, North America and Caribbean Sea	Tier I	Tier II					Tier III						
ECA, North Sea and Baltic Sea	Tier I	Tier II									Tier III		
China national DECA, ships for domestic navigation	N/A					Tier II						Tier III	
China national DECA, other ships	Tier I	Tier II											
non-ECA	Tier I	Tier II											

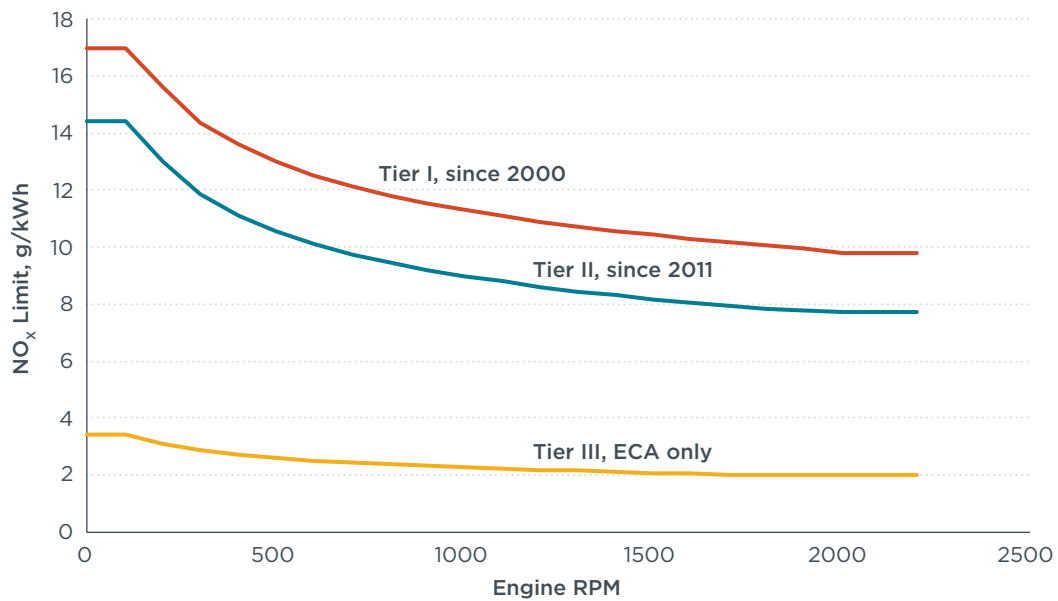


Figure 3. Comparison of IMO NO_x requirements by engine tier

SHOREPOWER

Unlike IMO’s ECA regulations, the national DECA includes a set of progressive mandates on shore power application to control ship emissions at berth. In design, it is similar to at-berth regulations enforced by California Air Resources Board (CARB), only less prescriptive. This special requirement highlights the country’s desire to promote shore power and the general trend of electrification in ports, but it’s not yet clear how enforceable the regulations are at this stage. For example, CARB also enforces limits on hours of operation without plugging into shore power for ships berthing at regulated ports. But feedback received during regulatory review stated that this limit was hard to enforce (CARB, 2017). The mandates are described in more detail in Table 3.

Table 3. Summary of the shore power requirements under the national DECA

Flag and ship use	Ship age	Effective date	Ship/engine types	Requirement
China-flagged ships, domestic navigation	Newbuild	Built after 1/1/2019	Applicable ship types: <ul style="list-style-type: none"> • Government vessels • River vessels (except for liquid cargo carriers) • River-sea vessels 	Need to install shore power
		Built after 1/1/2020	Applicable ship types: <ul style="list-style-type: none"> • Container ships • Cruise ships • Roll-on/roll-off passenger ships • Passenger ships >3000 gt • Bulk carriers >50000 gt 	
	Existing fleet equipped with shore power	Effective 7/1/2019	Applicable ship types: All except for liquid cargo carriers	Need to use shore power while berthing over three hours in coastal ports (or two hours in river ports) where shore power is available unless equivalent measures ^b are used
	Existing fleet without shore power	Effective 1/1/2022	Applicable ship types ^a : <ul style="list-style-type: none"> • Government vessels • River vessels (except for liquid cargo carriers) • River-sea vessels • Container ships • Cruise ships • Roll-on/roll-off passenger ships • Passenger ships >3000 gt • Bulk carriers >50000 gt 	Need to install and use shore power while berthing over three hours in coastal ports (or two hours in river ports) where shore power is available unless equivalent measures ^b are used
All ships berthing at Chinese ports	New build	Built after 1/1/2021	Applicable ship types: Cruise ships	Need to install and use shore power while berthing over three hours in ports where shore power is available unless equivalent measures ^b are used
	Existing ships without shore power	Effective 1/1/2021		
	Existing fleet equipped with shore power	Effective 7/1/2019	Applicable ship types: All except for liquid cargo carriers	Need to use shore power while berthing over three hours in coastal ports where shore power is available unless equivalent measures ^b are used

^a Only applicable when these ships have >130 kW engines that fail to meet with IMO Tier II regulations

^b The official document lists suggestive measures, including using clean or new energy sources, onboard batteries, and auxiliary engine shutdown. However, it offers no guidance to demonstrate equivalency.

CONCLUSIONS

The national DECA makes meaningful upgrades to the regional DECA and builds in mechanisms for a potential upgrade to an IMO ECA in the next five years. In the Action Plan for Diesel Truck Pollution Control (China Ministry of Ecology and Environment, 2019) released in January 2019, research was requested on the delineation and potential control measures of an “International Emission Control Area” equivalent to an IMO ECA. Evaluation and monitoring of the existing measures, as well as feasibility studies of potential next steps, are needed to boost internal confidence and to demonstrate the country’s determination and capability to the international community. To inform future upgrades of the national DECA, the ICCT will soon publish an analysis of the cost-effectiveness of a potential Chinese ECA in the Greater Pearl River Delta region.

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