Environment and Climate Change Canada

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Partnership for Clean Fuels and Vehicles

Centro Mario Molina

Investigación & desarrollo

GFEI: Jamaica National Project Overview

Cleaner and More Efficient Fuels and Vehicles for Jamaica
Kingston, December 4th, 2018

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Research + Development + Innovation Center - Mario Molina (Chile)

Calidad del aire y Cambio climático

Incluimos investigación avanzada sobre la formación de aerosoles y su distribución de fuentes, así como procesos externos e internos de contaminación del aire.

Temas tratados Caracterización aerosoles urbanos / Emisiones atmosféricas y toxicidad / Nuevos sistemas de monitoreo atmosférico.

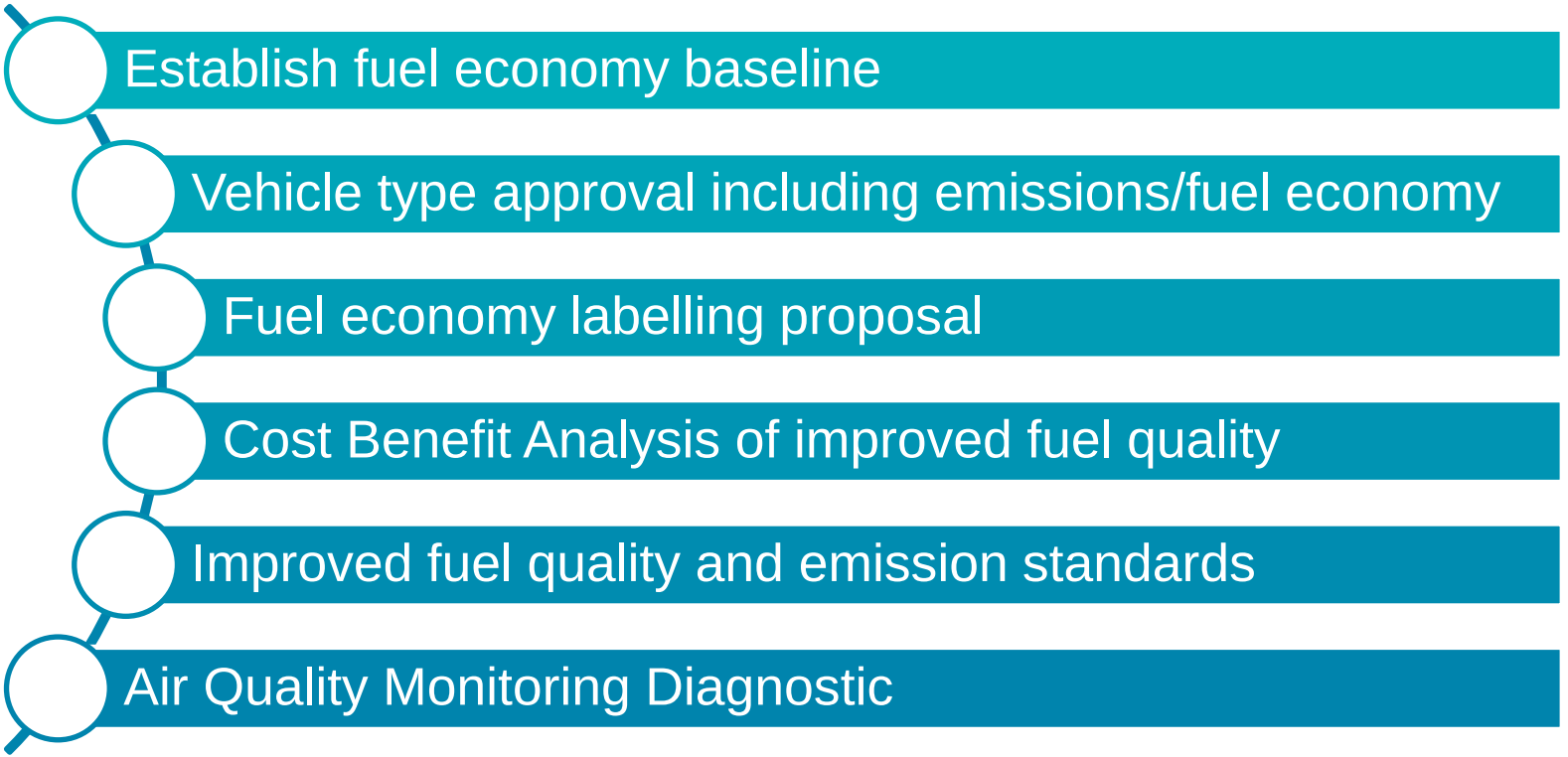
Energía y transporte

Incluimos investigaciones sobre tecnología eficiente en el transporte y sus ramificaciones, además de la maquinaria pesada. Además, trabajamos en la eficiencia energética.

Temas tratados Líneas de base / Inventarios de emisiones / Electromovilidad / Transporte público.

Our work is focused on Chile and LAC countries, developed with global partners

Developing a roadmap for clean vehicles and fuels in Jamaica: National Project Overview



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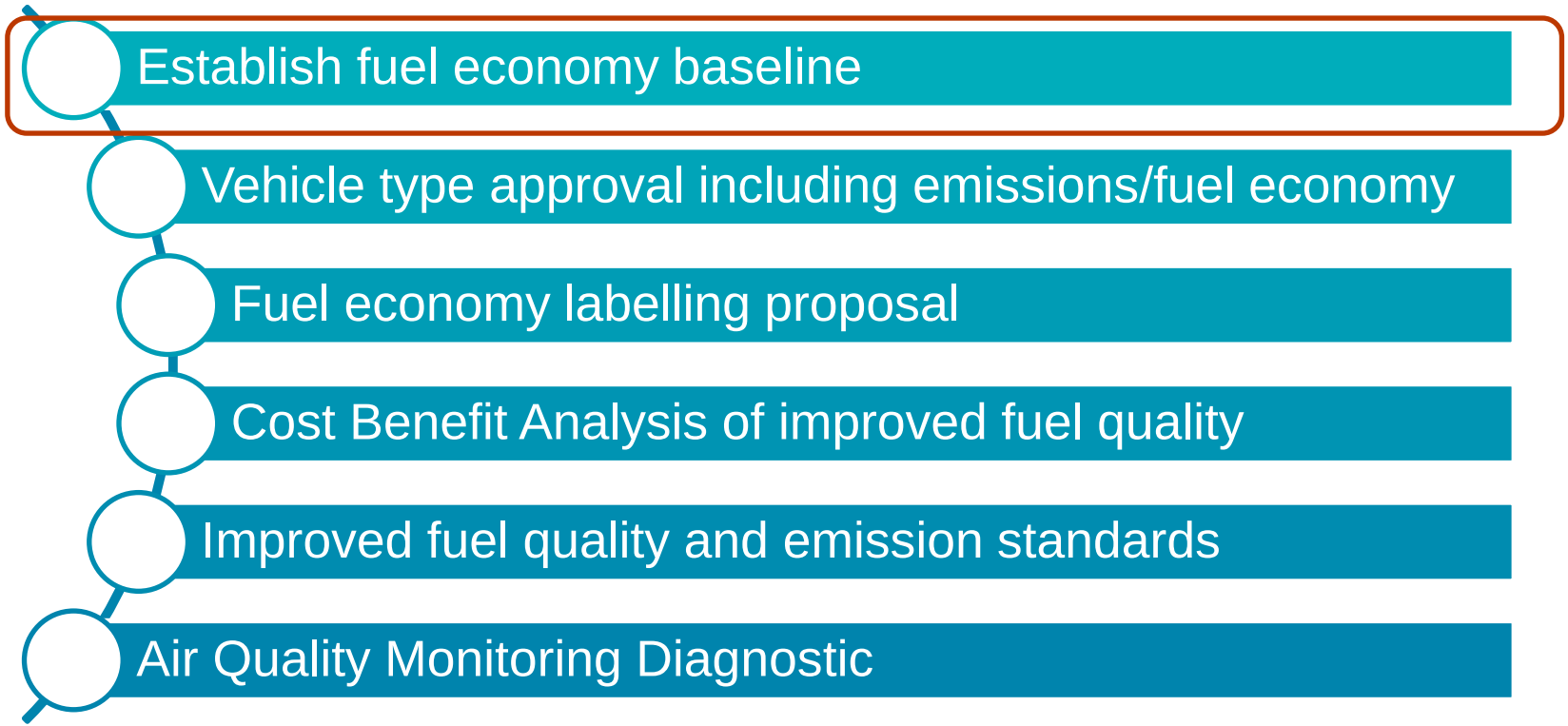
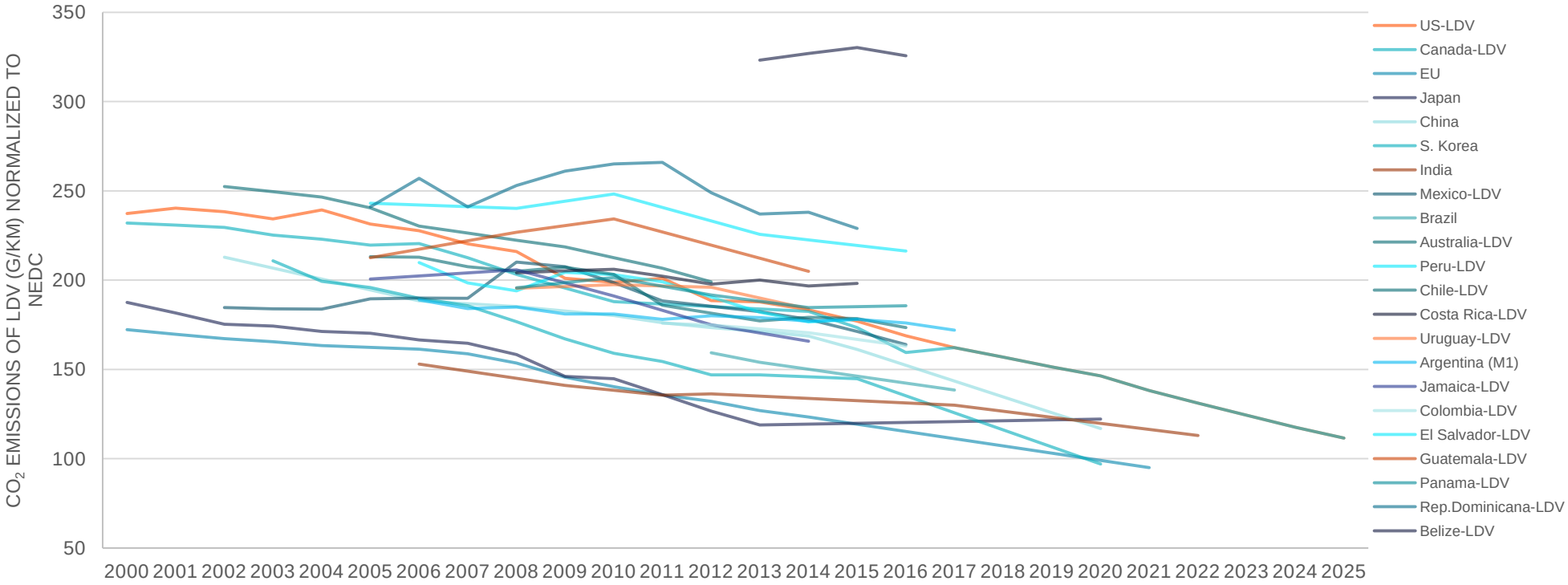
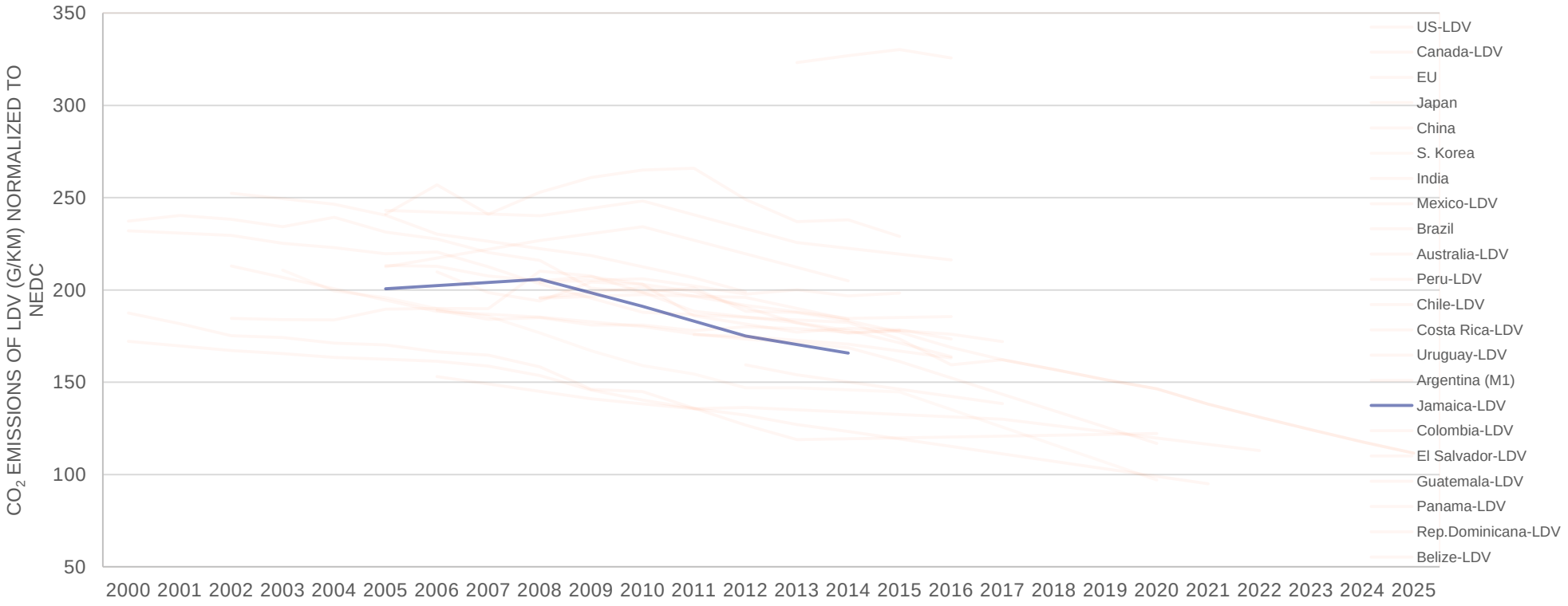


Improvements in fuel economy reduce reliance on fossil fuels, reduce emissions + drive new technologies



Jamaica Fuel Economy baseline has now been conducted for 2005-2016



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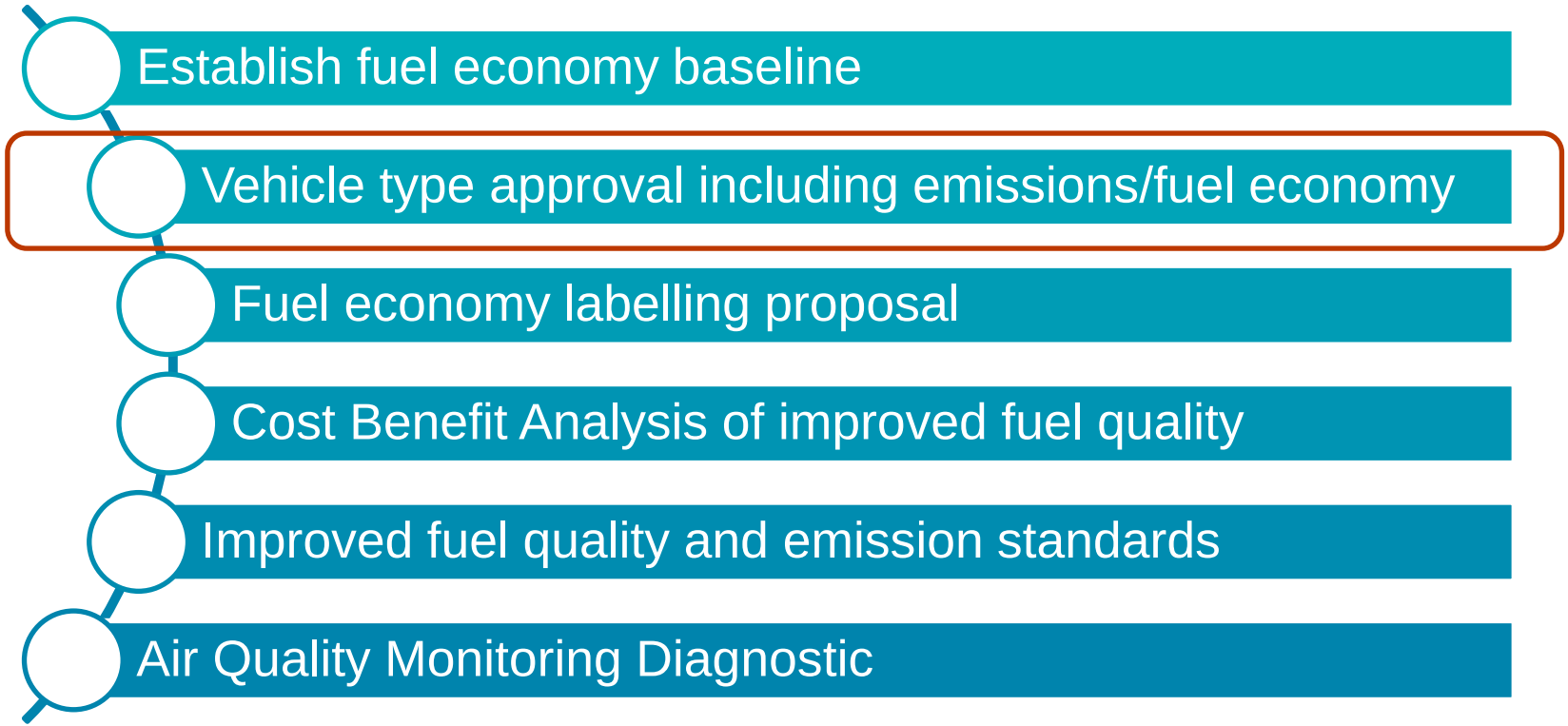

Vehicle type approval to include emissions and fuel consumption information in national inventory

- Type approval refers to the process applied by national authorities to certify that a model of a vehicle meets all relevant safety, environmental and conformity of production requirements before authorizing it to be placed on the market.
- The type approval has three main stages (New Zealand Transport Agency):
- (i) Definition of standards, (ii) Provision of evidence of compliance with standards, (iii) Preparation and import of the vehicle.
- For the type approval process, vehicle manufacturers (importers in the case of Jamaica) need to present all of the defined documentation to support that their prototype vehicle is in compliance with the legislation in place
- The documentation shall prove that the vehicle set for import complies with emissions, safety, and production standards
- When it comes to fuel economy, there are three different driving cycles which are widely used to report the values: the Federal Test Procedure 75, the New European Driving Cycle (NEDC), and the Worldwide Harmonized Light Vehicles Test Procedure (WLTP).

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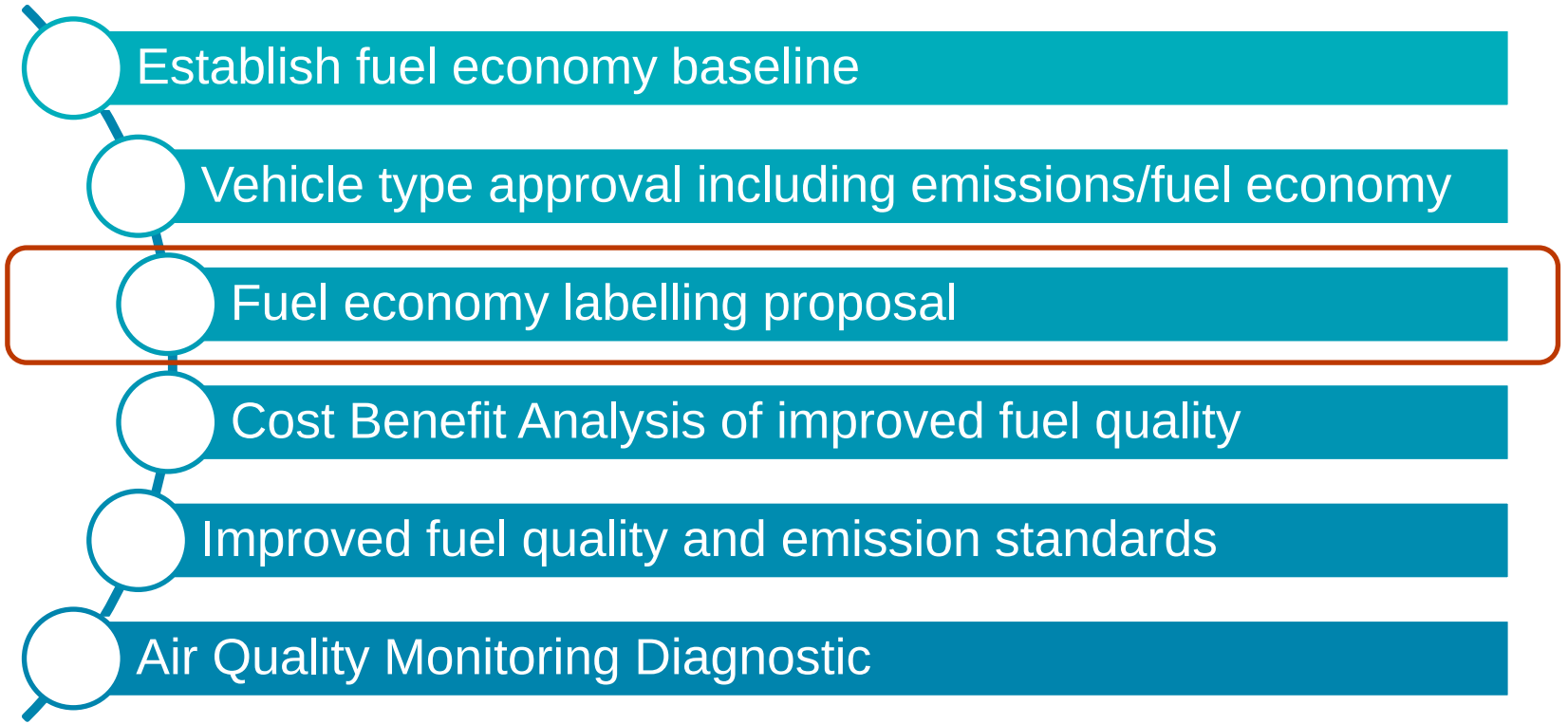
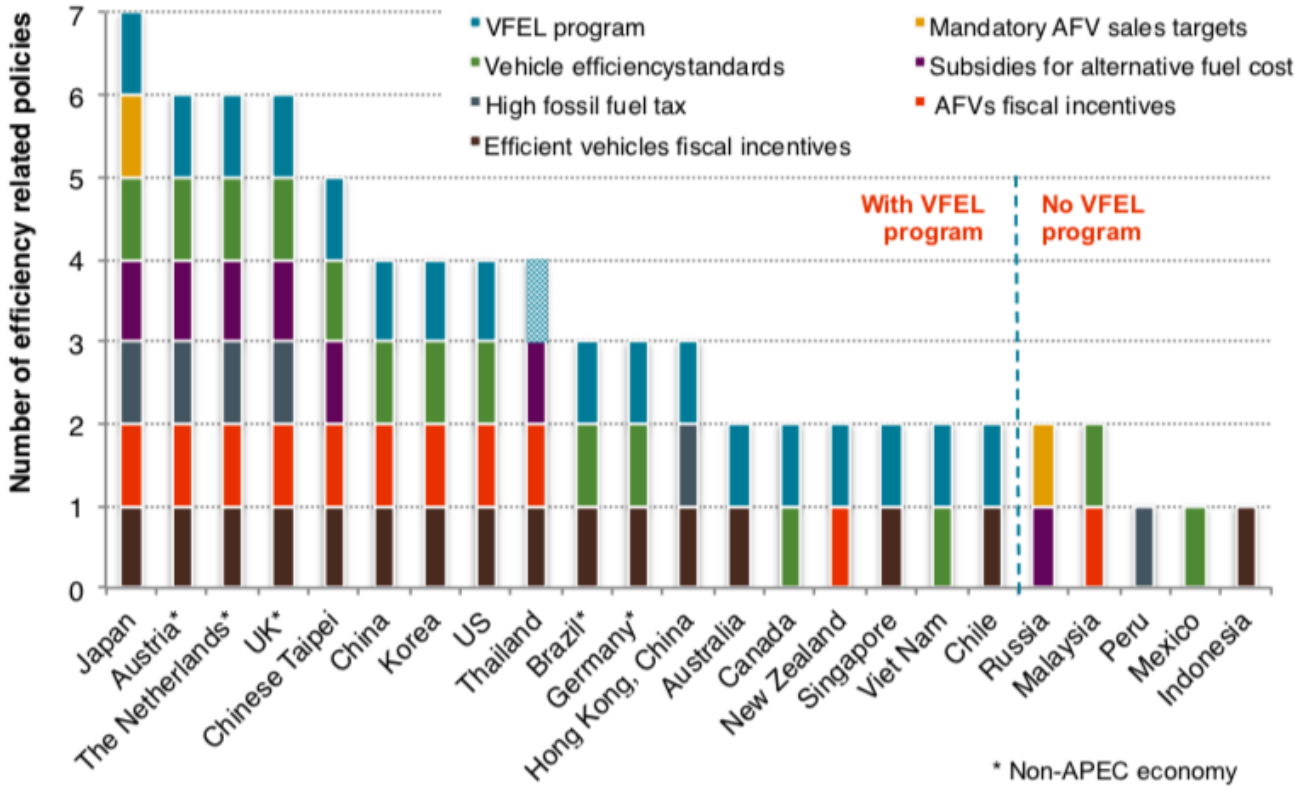


There are a range of policies to promote fuel economy – from fiscal measures to consumer awareness



Fuel economy labelling for light duty vehicles – Proposal for voluntary scheme

- Improve vehicle fuel economy (LDV/MDV)
- Improve consumer information disclosure
- Reduce GHG/CO2 emissions from vehicles
- Reduce petroleum consumption and improve energy security
- Improve recognition of clean/efficient vehicles
- Increase market take up of alternative combustion vehicles

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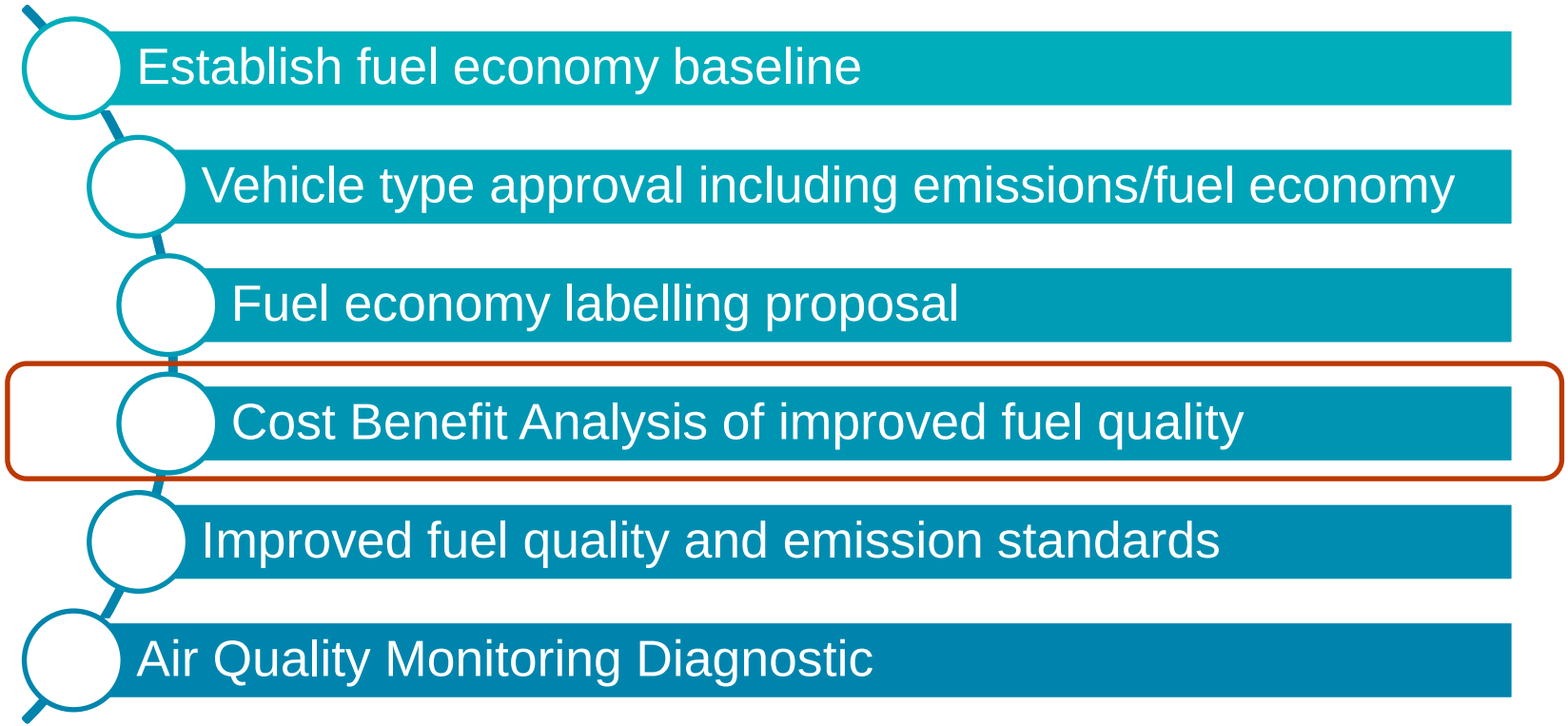
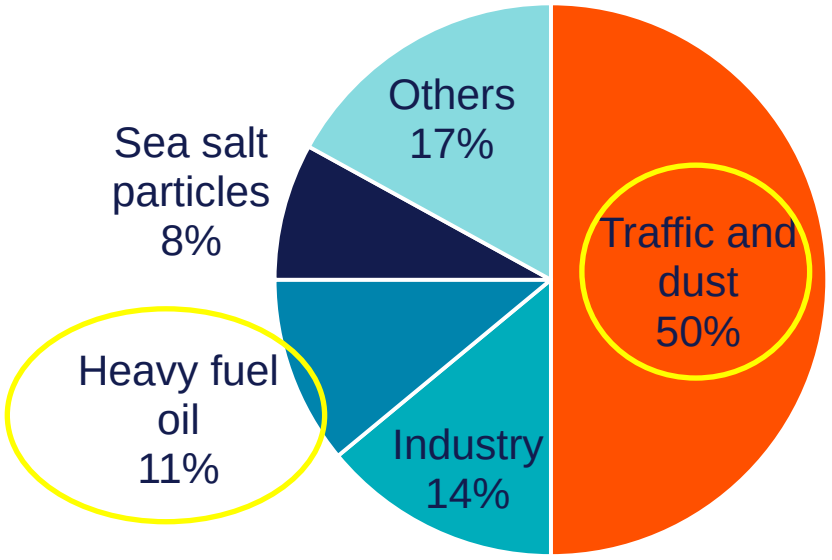


Jamaica continues to lag in the adoption of improved fuel quality and concurrent LDV/HDV emissions standards

Jamaica has an important lag in terms of fuel quality. Currently there are two types of gasoline: 87 and 90 octane, both with **1,100 ppm of sulphur**; and two types of diesel, one with **5,000 ppm** and other ultra low sulphur (**15 ppm**).

Source: UNEP. Diesel fuel sulfur levels: Latin America and Caribbean Region.

Air quality problems are increasing in urban areas: characterization of Particulate Air Pollution in Kingston, Jamaica



Black Carbon (BC), the main particulate pollutant generated by diesel combustion, reached 7.0 ± 2.3 µg/m3 as average concentration.

BC concentration determined in Spanish Town Road (southwest of Kingston) was higher than the average concentration found in megacities, such as Shanghai, China (~ 4-5 µg/m3)

Source: Johan Boman, Samuel M. Gaita, 2015

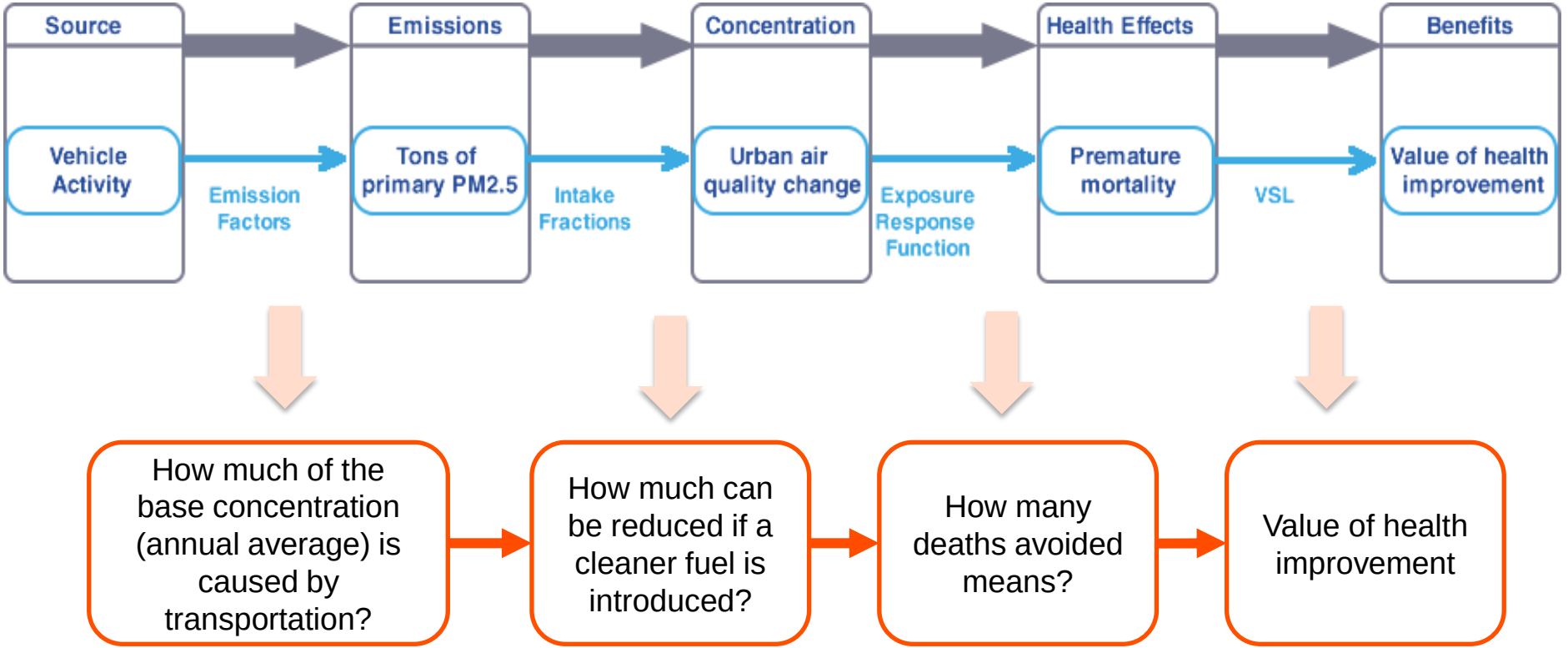
Adoption of soot free technologies could avoid 300-700 thousand premature deaths in 2030

The transportation sector is a major contributor to black carbon emissions and was responsible for 19% of global black carbon emissions in 2000, contributing to 3.2 million deaths per year.

Global adoption of Euro VI standards could avoid 300 - 700 thousand premature deaths in 2030 by reducing particulates and co-pollutants emitted by on and off-road vehicles.

The CCAC Soot-Free Urban Bus Fleets project works towards soot-free engine technologies in 20 major cities, home to a combined 234 million people, in order to prevent 3,700 early deaths and up to 6.6 MMT CO2e by 2030.

Estimating the health impacts of improved fuel quality and emission standards in Jamaica



Source methodology: Global Sulphur Strategy and ICCT “Cleaning up the global On-Road Diesel Fleet”

Adoption of soot free technologies is cost effective and can avoid premature deaths – The Case of Jamaica

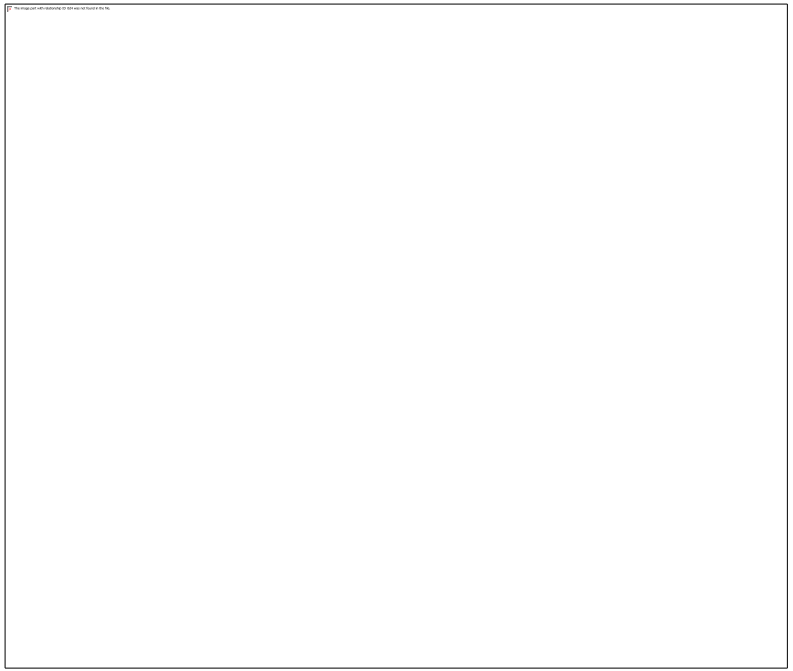
Preliminary results of adopting 50ppm sulfur diesel:

Source of pollutants	Avoided Deaths	Health Costs (USD)
Air pollution	514	$ 474,956,142
Transport related	424	$ 391,792,615
Diesel combustion	229	$ 211,604,974

Health impacts considered:

- Stroke
- Tracheal, bronchus, and lung cancer
- Ischemic heart disease
- Lower respiratory infections
- Chronic obstructive pulmonary disease

Source: Prepared by author with *Global Burden of Disease* data, 2016



Estimated benefits to ten years outweigh costs by a factor of around 7

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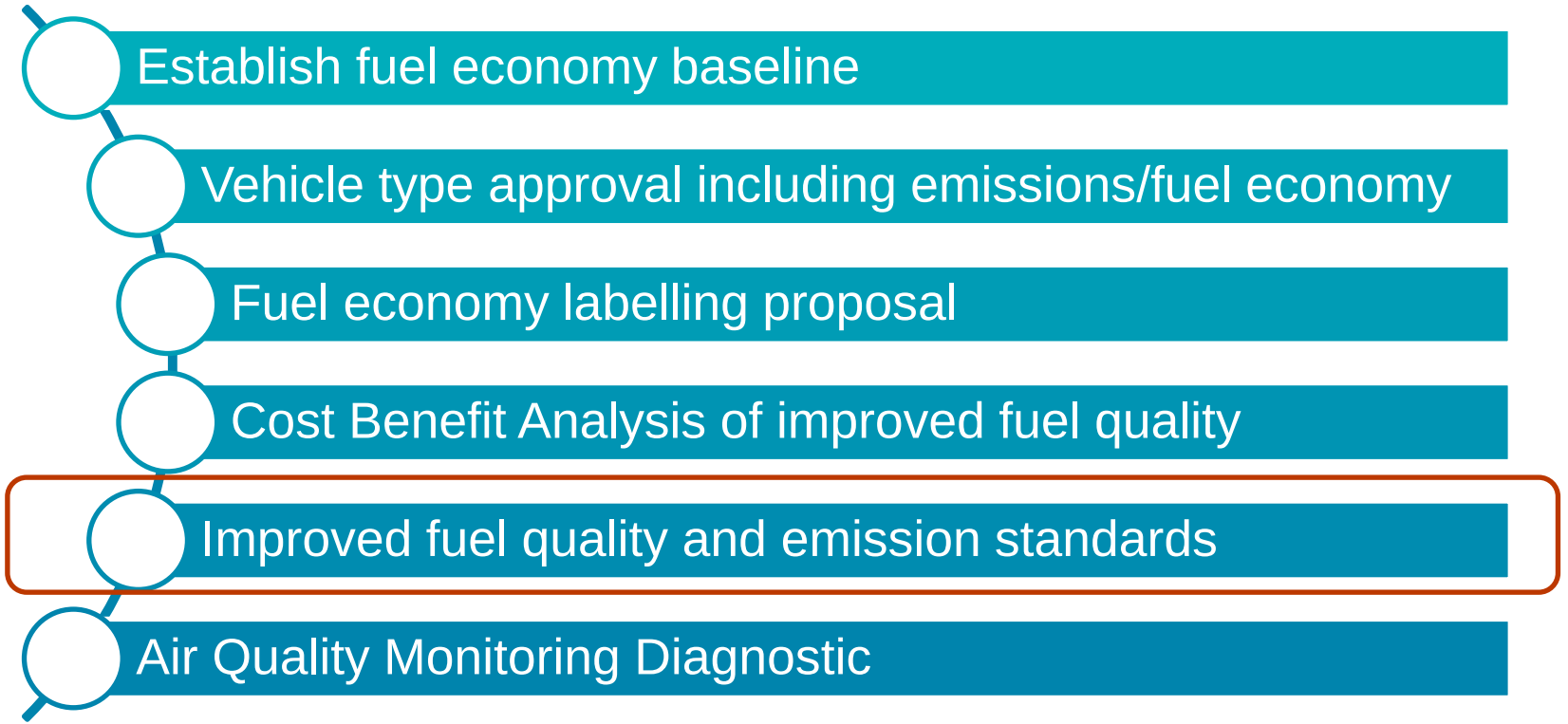

Fuel Quality, Emission Standards and Regulating Used Vehicle Imports (heavy duty and buses)

- Set time frame for elimination of used vehicle imports
- Reduce age of used vehicle HDV imports – particularly trucks and urban buses
- Promote voluntary fuel consumption reporting for private truck fleets to increase information from the sector and pursue future efficiency improvements
- Adopt mandatory emissions standards for urban buses concurrent to the best fuel quality available in the country – 15ppm = Euro VI/US EPA 2010
- Set time frame for improved fuel quality – gasoline/diesel
- Raise awareness regarding costs and benefits of improving fuel quality and improved emission standards for transport fleet

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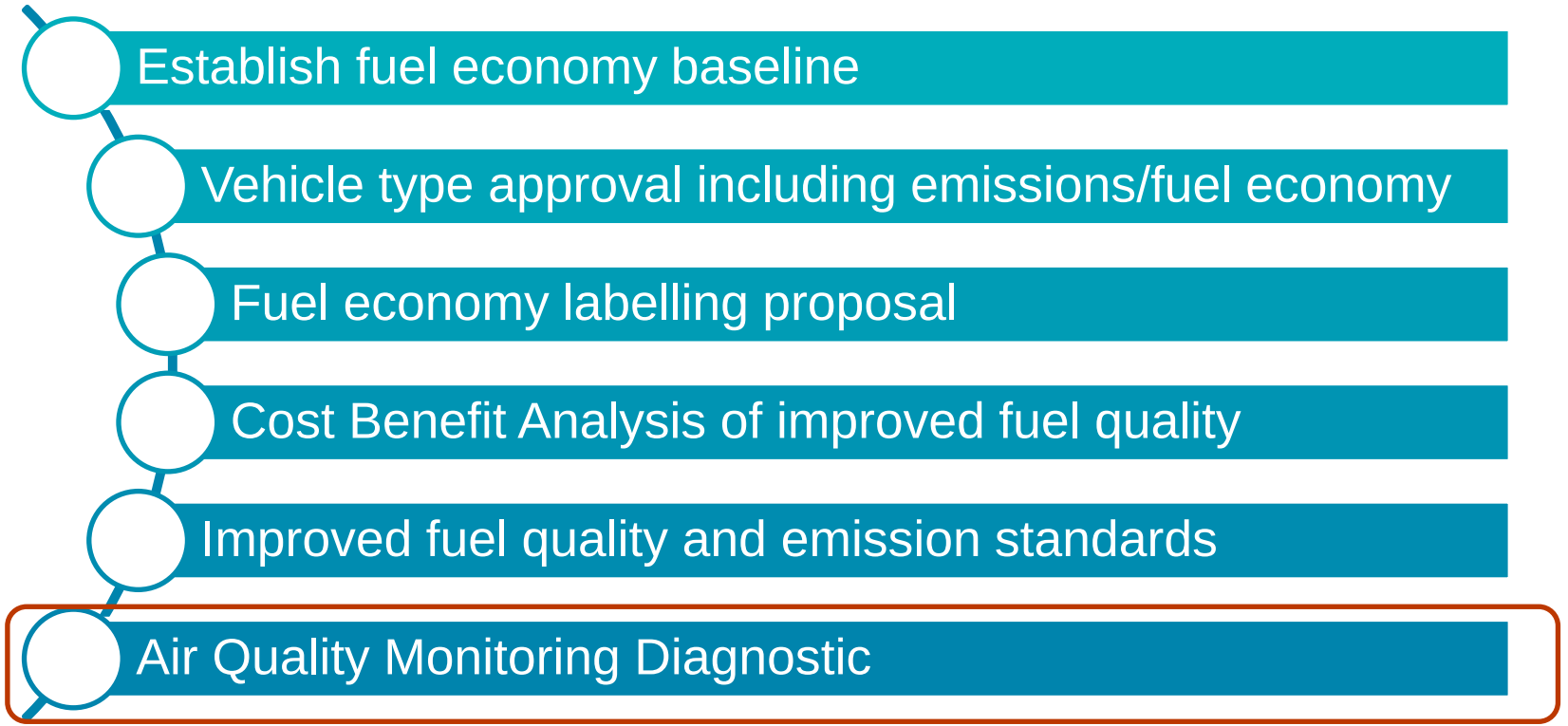

Most of the countries integrating the Caribbean lack air quality monitoring networks

Of the countries that make up the Caribbean:

- Jamaica and Puerto Rico have the most developed network of stations
- Dominican Republic has an incipient monitoring network
- There is no information indicating the existence of monitoring networks in Cuba, Haiti and other Caribbean islands

Riojas-Rodríguez H, Soares da Silva A, Texcalac-Sangrador JL, Moreno-Banda GL. Air pollution management and control in Latin America and the Caribbean: implications for climate change. Rev Panam Salud Publica. 2016;40(3):150–59.

Several countries in the region currently have no particulate matter standards

Standards by country	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)		O^3 (µg/m³)		NO_2 (µg/m³)		SO_2 (µg/m³)		CO_2 (ppm)
	24hr[a]	Annual	24hr	Annual	8hr	1hr	1hr	Annual	24hr	Annual	8hr
WHO	50	20	25	10	100		200	40	20	—	—
EPA	150		35	12	160	240		100	372	80	9
Antigua and Barbuda	WL[c]	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Argentina	150	50	65	15	157	235	—	100	365	80	10
Bahamas	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Barbados	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Belice	—	—	—	—	—	—	—	—	—	—	—
Bolivia	150	50	25	10	100	236	400	100	365	80	10
Brazil	150	50	—	—	—	160	320	100	365	80	9
Chile	150	50	50	20	120	—	400	100	250	80	8.6
Colombia	100	50	50	25	80	120	200	100	250	80	8.8
Costa Rica	150	150	—	—	—	160	400	100	365	80	10
Cuba	—	—	—	—	—	—	—	—	—	—	—
Dominica	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Dominican Republic	150	50	65	15	160	250	400	100	150	100	10
Ecuador	100	50	50	15	100	160	—	40	125	60	10
El Salvador	150	50	65	15	120	—	—	100	365	80	10
Grenada	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Guatemala	50	20	25	10	—	—	—	40	20	—	—
Guyana	—	—	—	—	—	—	—	—	—	—	—
Haiti	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Honduras	—	—	—	—	—	—	—	—	—	—	—
Jamaica	150	50	65	15	—	235	100	—	365	80	10
Mexico	75	40	45	12	70	95	395	100	288	66	11
Nicaragua	150	50	—	—	160	235	400	100	365	80	10
Panama	150	50	—	—	157	235	—	100	365	80	10
Paraguay	—	—	30	15	—	—	—	—	—	—	—
Peru	150	50	25	15	120	—	200	100	20	80	8.7
Saint Lucia	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
St. Kitts and Nevis	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
St. Vincent and Grenadines	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Suriname	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL	WL
Trinidad and Tobago	75	50	65	15	120	—	200	40	125	50	10
Uruguay	150	50	—	—	120	—	320	75	125	60	10
Venezuela	150	50	—	—	160	200	367	100	365	80	10

[a] Hour.
[b] No data.
[c] Without legislation.

Countries without PM standards:

Antigua and Barbuda
Aruba
Bahamas (only gases)
Barbados
Grenada
Haiti
Saint Kitts and Nevis
Saint Lucia

Countries with PM standards:

Dominica[1]
Dominican Republic
Jamaica
Trinidad and Tobago
Cuba[2]

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Belice	—	—	—	—	—	—	—	—	—	—	—
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Honduras	—	—	—	—	—	—	—	—	—	—	—
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Countries with PM standards:

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Dominican Republic
Jamaica
Trinidad and Tobago
Cuba[2]

Based on the World Bank estimates, the Dominican Republic and Haiti have the highest levels of $PM_{2.5}$

Country	$PM_{2.5}$ ($\mu g/m^3$) in 2016
República Dominicana	23,7
Haití	23,5
Granada	18,5
Barbados	18,4
Santa Lucía	17,3
Trinidad y Tobago	16,8
Cuba	16,6
Antigua y Barbuda	15,7
Jamaica	15,1
Bahamas	12,8
Bermudas	10,5
Aruba	-
Islas Caimán	-
Saint Kitts y Nevis	-

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Trinidad y Tobago	16,8
Cuba	16,6
Antigua y Barbuda	15,7
Jamaica	15,1
Bahamas	12,8
Bermudas	10,5
Aruba	-
Islas Caimán	-
Saint Kitts y Nevis	-

Case study: Challenges in air quality monitoring in Jamaica

- Air quality policies dates back to the mid-1990s.
- The first pollutant standards were set in 1996
- In 2015, there were 77 active monitoring stations, 9% managed by the environmental public agency
- A source apportionment study indicated that traffic account for 50% of $PM_{2.5}$ mass in Kingston, followed by industrial activities (14%), heavy oil combustion (11%) and marine aerosols (8%)[3]
- In the metropolitan area of Kingston, stations with average levels of PM2.5 that exceed the standard are reported
- Modernize the current monitoring stations by continuous measurement systems and infrastructure that follow QA / QC guidelines

3. Johan Boman, Samuel M. Gaita. Mass, black carbon and elemental composition of PM2.5 at an industrial site in Kingston, Jamaica. Nuclear Instruments and Methods in Physics Research B. 2015; 363:131-134.

Next Steps in promoting clean vehicles and fuels in Jamaica

- We have been working since 2015 in Jamaica
- A lot of progress in understanding the emission profiles of the LDV fleet in Jamaica
- We now need to move into action:

1. Set a timeline for 50ppm and 15ppm sulfur fuels nationally (focused on diesel)
2. Develop type approval process based on document review (2019-2020)
3. Develop national inventory of vehicle emission certificates (2019-2020)
4. Develop fuel economy labelling (voluntary and mandatory) (2019-2020)
5. Improve air quality monitoring system
6. Create awareness regarding benefits of clean fuel and vehicles to a wider audience

Thank You!

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