

# Philippine National Standards on Petroleum

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Energy Consumers and Stakeholders Conference 2017

Theme: E-POWER MO!

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Davao



# Presentation Outline

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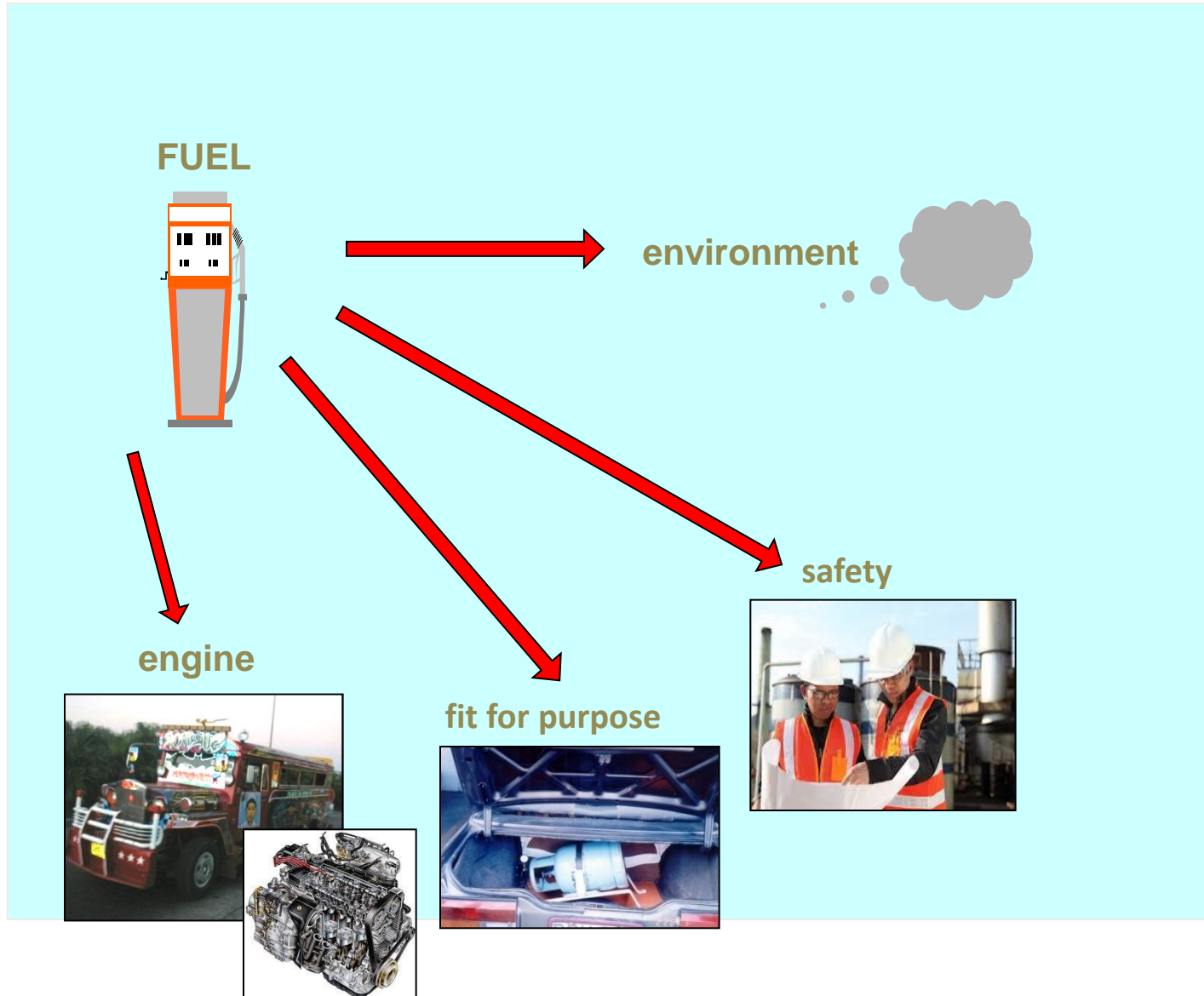
- I. Overview of the Downstream Oil Industry Fuel Supply Chain
- II. Mandate on Standard Setting
- III. Development of Standards
- IV. Enforcement of Standards
- V. Roadmap on Fuel Quality



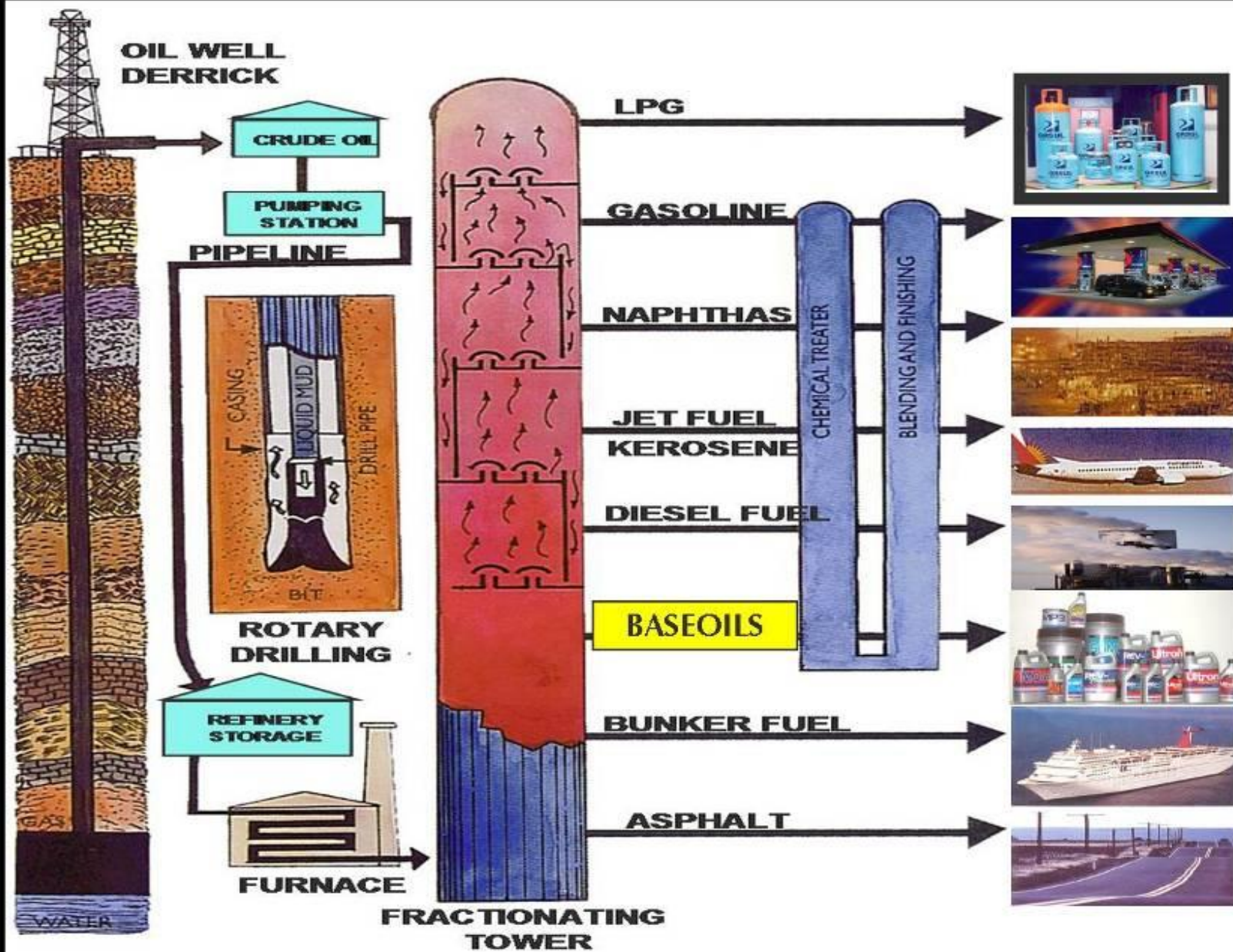
# ...Standards are more than just one means of regulating



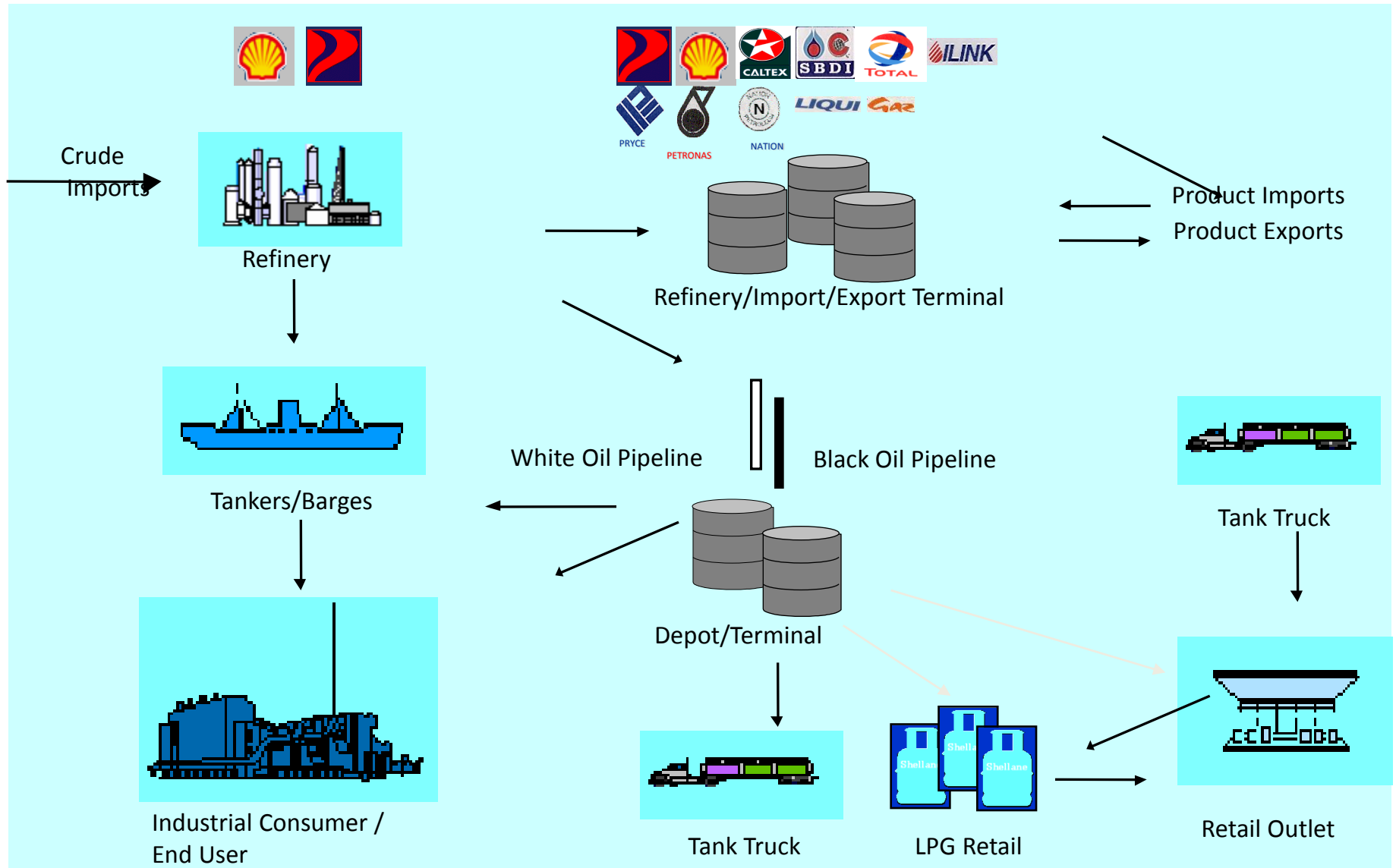
# Importance of Fuel Quality



# PETROLEUM REFINING



# Downstream Sector/ Local Supply Chain



# Standardization Mandate

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## ***I. RA 8479 - Downstream Oil Industry Deregulation Act***

- ensure a truly competitive market for petroleum products under a regime of fair price, adequate and continuous supply of environmentally, clean and high quality petroleum products
- Use of clean and safe (environment and worker-benign) technologies

## ***II. RA 8749 - Clean Air Act of 1999***

- set the specifications for all types of fuel and fuel-related products (Sec.26)
- set every two (2) years or thereafter or as the need arises, the specification of ULG and diesels shall be reviewed and revised (Sec. 26)

## ***III. RA 9367 - Biofuels Act of 2006***

- establish technical fuel quality standards for biofuels and biofuel-blended gasoline and diesel which comply with the PNS (Sec. 7c)



# Standardization Technical Committees

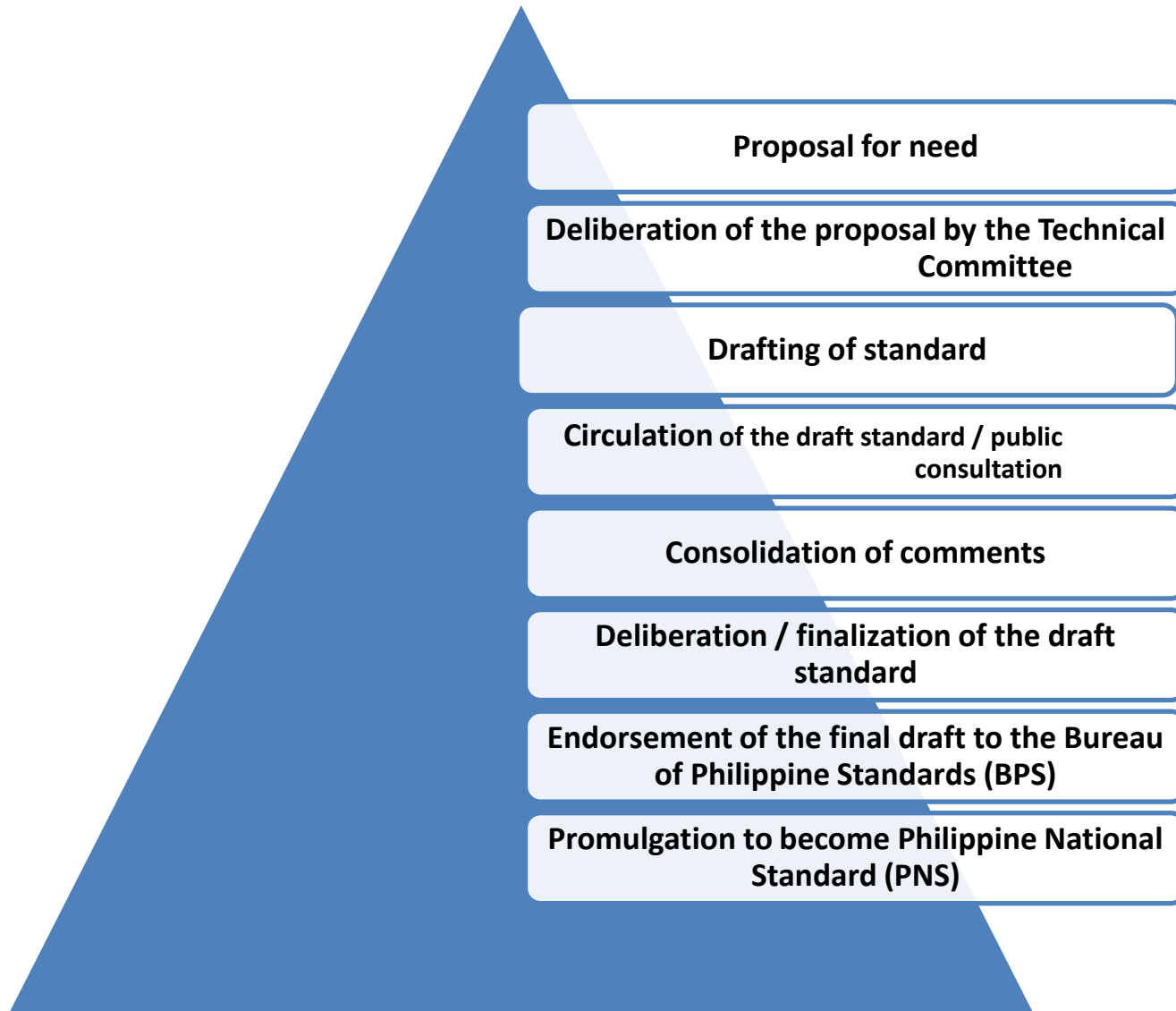
## 1. Technical Committee on Petroleum Products & Additives (TCPPA)

- |                                       |   |   |
|---------------------------------------|---|---|
| Chairs                                | : | <b>DOE and DENR</b>                       |
| Members                               |   |   |
| ➤ Government                          | : | <b>DOE, DENR, BPS-DTI, ITDI-DOST</b>      |
| ➤ Fuel Sector                         | : | <b>Petron, Shell, Chevron, PIP, IPPCA</b> |
| ➤ Engine Suppliers /<br>Manufacturers | : | <b>CAMPI, AMMDA, MDPPA</b>                |
| ➤ Consumer Sector /<br>NGO            | : | <b>FilCar Foundation, AWMA</b>            |
| ➤ Academe                             | : | <b>UP-NCTS, AIPSI</b>                     |





# Standard Development Process



# Elements of PNS Development

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- **Minimum requirement**
- **Local condition**
- **Reference based**
- **Technically based**
- **Multi-sectoral**
- **Consultative**
- **Dynamic**
- **Regulatory**



# Fuel Quality Standard Development

Who we work with

What we work for

Why we work to

How we work by

CAA

Biofuels Act of 2006

Clean Fuel Initiatives (WWFC)

Fuel Quality Regional Harmonization (WP 29 & Vehicle Harmonization)

Alternative Fuels / Energy Security & Sufficiency

Review & Formulate Standards

Technical Committee on Petroleum Products & Additives (TCPPA)

Monitoring:

Sampling & Testing

Int'l Fuel Quality Standards

Emission Stds/ Regulations

Field/On-site testing

R & D on Fuel Specification

Vehicle Technology Dev't.

Laboratory testing

Dev't in Fuel Additives

IRR for Standards

Local Supply and Demand

Multi-lateral  
bodies: ERIA,  
JAMA, JPEC etc.

Inter-agency Cooperation:  
DOE, DTI, BPS, DENR-EMB, DOTC  
DOF, BIR, BOC, TC, DOST, etc.

Others:  
Industry – Oil/Car  
NGO's, Academe



# Fuel Quality Standards Development (Gasoline)

PROPERTY	GASOLINE (E0)					E-GASOLINE (E10)			
	CLEAN AIR ACT			POST CLEAN AIR ACT		BIOFUELS ACT			
	2000	2001 <sup>a</sup>	2003	2005	2009	2006	2009	E10	EURO 4-PH
Distillation temperature, 0C at:									
10% recovered, max	70	70	70	70	70	70	70	70	70
50% recovered	75-121	75-121	75-121	75-121	75-121	70-110	70-110	70-110	70-110
90% recovered, max	180	180	180	180	180	180	180	180	180
End point, max	221	221	221	221	221	215	215	215	215
Residue, % vol., max.	2	2	2	2	2	2	2	2	2
Hydrocarbons:									
Alcohols (C <sub>2</sub> to C <sub>4</sub> ), % vol., max. <sup>b</sup>	10	10	10	10	0.4	9.5-10	9.0-10	9.0-10	9.0-10
Aromatics, % vol., max.	45	45	35	35	35	35	35	35	35
Benzene, % vol., max.	4	4	2	2	2	2	2	2	2
Ethers (e.g. MTBE), % vol., max.	10	10	10	2 <sup>c</sup>	2 <sup>c</sup>			2 <sup>c</sup>	2 <sup>c</sup>
Lead Content, g/L, max.	0.013	0.013	0.013	0.005	0.005	0.005	0.005	0.005	0.005
Octane rating, min.									
Research Octane Number (RON)	93	81/87/ 93/95	81/87/ 93/95	81/93/ 95	81/93/ 95	93	93/95	91/95/ 97	91/95/97
Anti-Knock Index (AKI)	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Vapor Pressure, @ 37.80C, kPa, max.	62	85/62	85/62	85/62	85/62	62	62	68/62	68/62
Sulfur, % mass, max.	0.10	0.2/0.1	0.2/0.1	0.05	0.05	0.5	0.05	0.05	0.005

<sup>a</sup> multi-grade gasoline <sup>b</sup> ethanol <sup>c</sup> allowable contamination tolerance only. Intentional addition not permitted for both imported and locally-produced gasoline

Note: E10 standards also provide minimum reference specifications for base gasoline.



# Fuel Quality Standards Development (Automotive Diesel)

PROPERTY	CLEAN AIR ACT				BIOFUELS ACT						
	DIESEL OILS				FAME BLENDED DIESEL OIL						
	2000		2003		2007 (B1)		2009 (B2)		2012 (B2)		
	ADO	IDO	ADO	IDO	ADO	IDO	ADO	IDO	ADO	IDO	EURO 4-PH
Calculated cetane index min. Or	48		50		50	50	50	50			
Cetane number, min. Or	48										
Derived cetane number, min .											
Carbon residue on 10% Distillation residue, % mass, max.	0.15	0.35	0.15	0.35	0.15	0.35	0.15	0.35	0.15	0.35	.015
Color, ASTM			2.5 max.	5.0 min.	2.5 max.	5.0 min.	2.5 max.	5.0 min.	2.5 max.	5.0 min.	2.5 max.
Copper strip corrosion, 3h at 50 °C, max.			No. 1	No, 1	No. 1	No. 1	No. 1	No. 1	No. 1	No. 1	No. 1
Density at 15 °C, kg/L	0.86 50	0.880	0.860 0	0.880 0	0.820- 0.860	0.880 max.	0.820- 0.860	0.880 max.	0.820- 0.860	0.880 max.	0.820- 0.860
Distillation, 90% recovered, °C, max	375	Report	370	Report	370	Report	370	Report	370	Report	370
<b>FAME <sup>a</sup>, content, % volume.</b>					<b>0.7-1.2</b>	<b>0.7-1.2</b>	<b>1.7-2.2</b>	<b>1.7-2.2</b>	<b>1.7-2.2</b>	<b>1.7-2.2</b>	<b>1.7-2.2</b>
Flash point, Pensky-Martens, °C, min.	52.0	52.0	55.0	55.0	55	55	55	55	55	55	55
Kinematic viscosity, mm <sup>2</sup> /s at 40°C	2.0- 4.5	2.0- 4.5	2.0- 4.5	1.7- 5.5	2.0-4.5	1.7-5.5	2.0-4.5	1.7-5.5	2.0-4.5	1.7-5.5	2.0-4.5
Lubricity, (HRFF), wear scar dia. @ 60 °C, micron, max.			460		460		460		460		460
<b>Methyl Laurate (C12 ME), % mass, min</b>					<b>0.4</b>	<b>0.4</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>
Sulfur, % mass, max.			0.05	0.03	0.05	0.30	0.05	0.30	0.05	0.30	<b>0.005</b>
Water, % volume, max. <sup>b</sup>					0.05		0.05		0.05		0.05
Water and sediment, % volume, max.	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10

Note: FAME blended diesel oils also provide minimum reference specifications for base diesel



# Fuel Quality Standards Developed

## A. Biofuels & Blends:

- PNS/DOE QS 008:2012 - E-Gasoline (E10)
- PNS/DOE QS 004:2012 (B2) - FAME-Blended Diesel Oils
- PNS/DOE QS 007:2014 Bioethanol Fuel (E100 E98) - Anhydrous Bioethanol &
- PNS/DOE QS 002:2015 (B100) - Coconut Methyl Ester
- PNS/DOE QS 010:2015 Oils (B5) - High FAME-Blended Diesel

## B. Conventional Petroleum , etc.

- PNS/DOE QS 001:2009 - Unleaded Motor Gasoline
- PNS/DOE QS 003:2003 Oils - Two-stroke (2T) Lubricating
- PNS/DOE QS 005:2016 - LPG as Non-Motor Fuel
- PNS/DOE QS 012:2016 - LPG as Motor Fuel
- PNS/DOE QS 006:2005 - Fuel Oils (Bunker)
- PNS/DOE QS 009:2007 - Kerosene
- PNS/DOE ASTM D 910:2010 - AvGas Grade 100



# Fuel Quality Standards Developed

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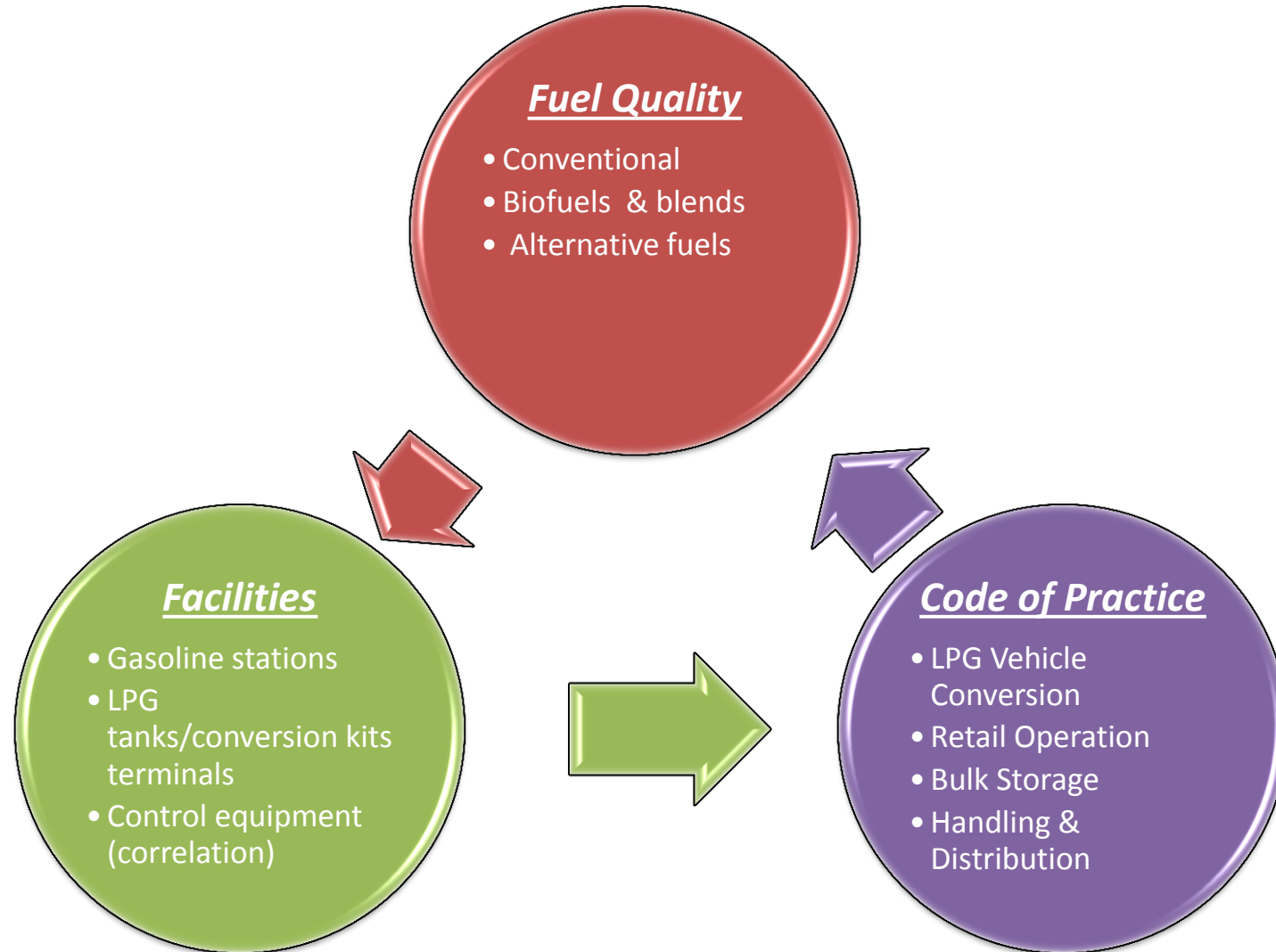
## A. Test Methods

- PNS/DOE TM 01 :2015 (update 2009) - Determination of Ester and Lauric Acid Content in Fatty Acid Methyl Esters (FAME) by Gas Chromatography
- PNS/DOE TM 02 :2009 - Separation of Fatty Acid Methyl Esters (FAME) from FAME- Blended Diesel Oils by Liquid Adsorption Chromatography and Characterization by Gas Chromatography



# Standards Harmonization in Downstream Petroleum Industry

## Cleaner Fuels and Safer Technologies





# Standardization Technical Committees

## 2. Technical Committee on Petroleum Facilities and Processes (TCPPF)

<b>Chair</b>	:	<b>DOE</b>
<b>Members</b>		
• <b>Government</b>	:	<b>DTI-BPS, DENR-EMB, DILG-BFP DOLE (BWC,OSHC)</b>
• <b>Testing</b>	:	<b>DOST-MIRDC, UP</b>
• <b>Industry</b>	:	<b>Petron, Chevron, Shell, Total, IPPCA (Seaoil, TWA)</b>
• <b>Prof. Assoc.</b>	:	<b>SOPI</b>



# Facilities/Practice – Liquid Fuels

## Prohibited Acts



## Informational/Safety Signs



OCTANE RATING MINIMUM 91

## For your safety

- Caution: Highly flammable
- No smoking
- No open flame
- No mobile phone
- No refueling while refueling
- No refueling while refueling



# Facilities/Practice- Auto LPG



illegal  
practice



correct  
practice



# Facilities Standards Developed

- **PNS/DOE FS 1-4 :2005 - Retail Outlets**
  - ✓ PNS/DOE FS 1-1: 2005 - Health, Safety and Environment
  - ✓ PNS/DOE FS 1-2:2005 - Under ground Storage Tank
  - ✓ PNS/DOE FS 1-3:2005 - Piping System
  - ✓ PNS/DOE FS 1-4:2005 - Dispensing Pumps
- **PNS/DOE FS 2:2006 - LPG Refiling Plant - General Requirement**
- **PNS/DOE FS 3:2013 - Auto-LPG Dispensing Station (update/review)**
  - ✓ PNS/DOE FS 3:2006 - Auto-LPG Dispensing Stations
- **PNS/DOE FS 4:2007 - Liquid Petroleum Product (LPP) Depot**
- **PNS/DOE FS 5:2009 - Storing and Handling of CME and CME- Blends Petroleum in LPP Depot**
- **PNS/DOE FS 6:2011 - Storing and Handling of E-Gasoline in Retail Outlet**
- **PNS/DOE FS 7:2011 - Storing and Handling of B5 in Retail Outlet**
- **PNS/DOE FS 8:2009 - Transportation of Petroleum Product by Pipeline (on-going)**
- **PNS/DOE FS 9:2015 - Code of Safety Practice in Auto-LPG Dispensing Station**



# On-going Standards Development (DPNS)

## Fuel Quality Standards

- A. E10 & B2 update/review of 2012 spec\*
  - DPNS/DOE QS 008:2017 - E-Gasoline specification (E10)
  - DPNS/DOE QS 004:2017 – CME-Blended Automotive Diesel Oil (ADO)
  - DPNS/DOE QS 013:2017 – CME-Blended Industrial Diesel Oil (IDO)

## Facilities Standards

- A. PNS/DOE FS 10 :2017 - Code of Safety Practices for LPP in Retail Outlet (new)  
*\*(endorsed to BPS and awaiting for adoption and promulgation as PNS)*
- B. Code of Safety Practices for an LPG Refilling Plant (new)
  - Part 1 – Tank Truck & Lorry Entry Procedure
  - Part 2 – Cylinder Refilling Procedure
  - Part 3 – LPG Cylinders Housekeeping and Preventive Maintenance
  - Part 4 – Fire Drill & Marshalls
  - Part 5 – Personnel Training
  - *(Part 1, 2 & 3 – endorsed to office of the Secretary / Part 4 & 5 on-going deliberation)*
- C. DPNS/FS 2:2017: LPG Refilling Plant (review/update of 2006)



# Implementation of PNS

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- **Most PNS for fuel that is promulgated is being implemented through the issuance of a corresponding policy regulation in the form of Department Circular (DC).**
  - **mandatory compliance by concerned industry players**
- **PNS for facilities at the moment is not mandatory, hence no DC is issued**

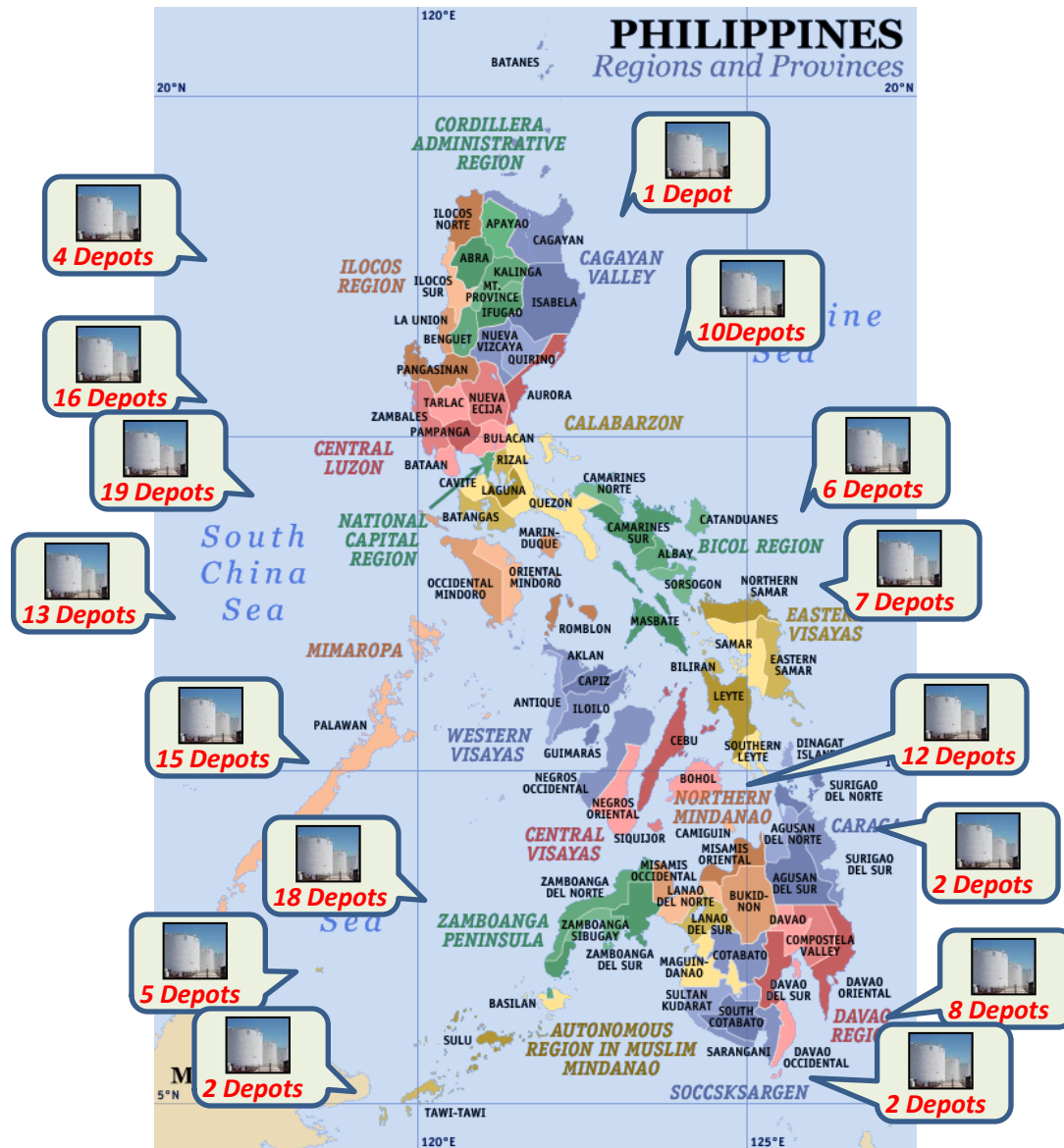


# Enforcement of PNS

- **Product sampling and facility check**
  - *oil refineries*
  - *import terminals / bulk plants*
  - *gas stations*
  - *biofuel plants*
- **Sampling**
  - *frequency – at least once a year inspected for major facilities nationwide*
- **Testing for PNS compliance**
  - *laboratory*
  - *Mobile lab*
- **Inter-lab correlation**
- **Administrative actions**
  - *Fines and penalties for violations*
  - *Feedback to companies*
    - ❖ *With violations - require corrective measures and reports*
    - ❖ *W/o violations - issue “Clean Bill of Health”*



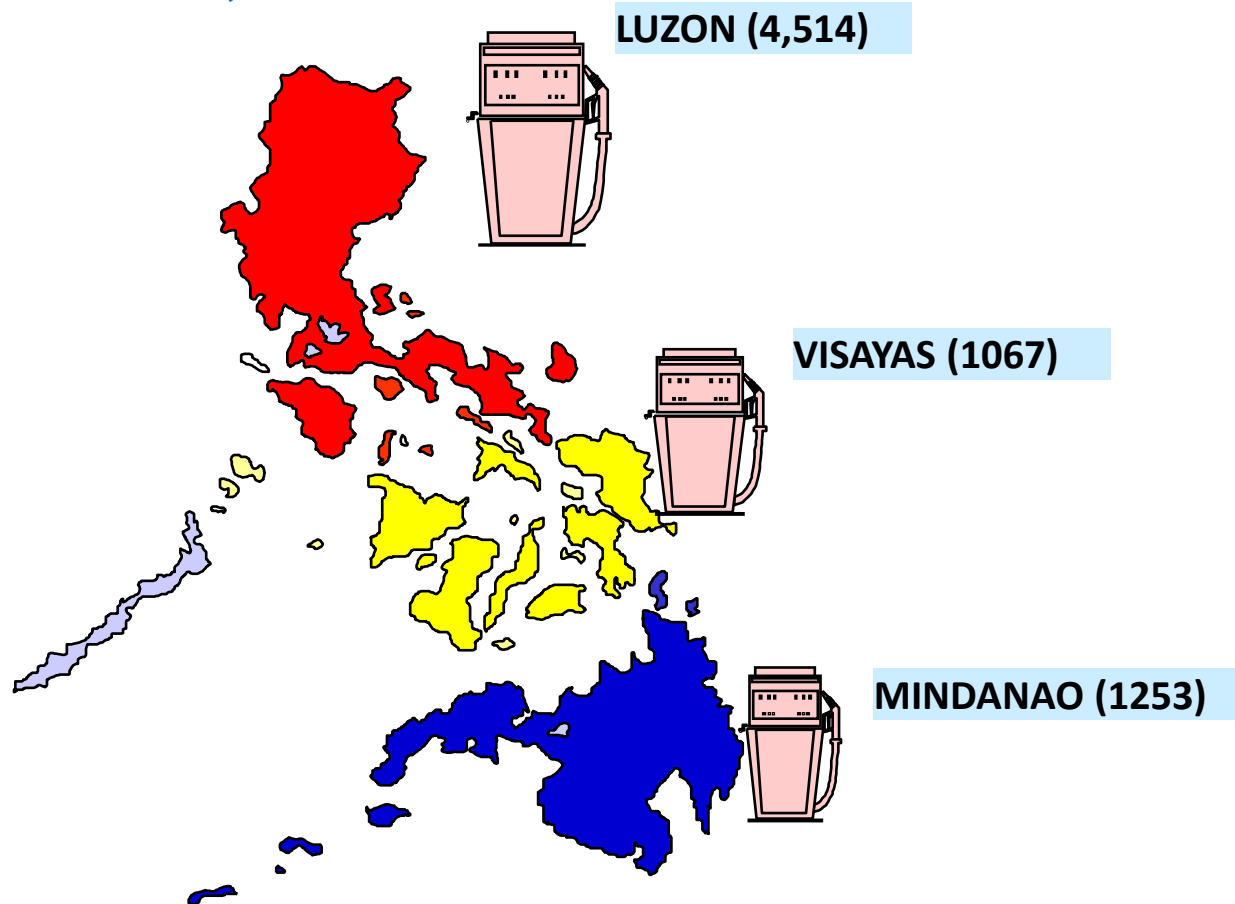
# Regional Distribution of Oil Downstream Facilities (Depots/Refineries)





# Number of Gas Stations 2016

Total Gas Stations = 6,834



# Based on issued COC



# Fuel Quality Roadmap

**Short-Term  
(2016-2017)**

**Medium-Term  
(2018-2020)**

**Long-Term  
(2021-2030)**

**STANDARD  
DEVELOPMENT**



- Sulfur reduction from 500ppm to 50ppm
- Application of modern emulsion
- Introduction of higher biodiesel level (B5)

- Olefin & aromatic content limits
- Additional composition controls
- Prohibition of more metallic additives
- Introduction of non-coconut biodiesel feedstocks

- Further Benzene reduction
- Introduction of hydrolyzed fuel and higher bioethanol level (E20)
- Introduction of ultra-low sulfur
- Low carbon fuel standard

**Improved policy governing the oil downstream sector to ensure a vibrant industry ; Control emissions of traditional air pollutants; and Energy security & CO<sub>2</sub> reduction**



# Thank You!



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