Philippine National Standards on Petroleum

Carmela C. Manocan

Energy Consumers and Stakeholders Conference 2017
Theme: E-POWER MO!
03 October 2017
Davao
Presentation Outline

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 that just one means of regulating
Importance of Fuel Quality

FUEL

environment

engine

safety

fit for purpose

Department of Energy
Empowering the Filipino
Downstream Sector/Local Supply Chain

- Crude Imports
- Refinery
  - Refinery/Import/Export Terminal
  - White Oil Pipeline
  - Black Oil Pipeline
  - Depot/Terminal
  - Tank Truck
  - LPG Retail
- Tankers/Barges
- Industrial Consumer/End User
- Retail Outlet
- Product Imports/Exports

Department of Energy
Empowering the Filipino
**Standardization Mandate**

**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 : DOE and DENR

Members
- Government : DOE, DENR, BPS-DTI, ITDI-DOST
- Fuel Sector : Petron, Shell, Chevron, PIP, IPPCA
- Engine Suppliers / Manufacturers : CAMPI, AMMDA, MDPPA
- Consumer Sector / NGO : FilCar Foundation, AWMA
- Academe : UP-NCTS, AIPSI
Standard Development Process

1. Proposal for need
2. Deliberation of the proposal by the Technical Committee
3. Drafting of standard
4. Circulation of the draft standard / public consultation
5. Consolidation of comments
6. Deliberation / finalization of the draft standard
7. Endorsement of the final draft to the Bureau of Philippine Standards (BPS)
8. Promulgation to become Philippine National Standard (PNS)
Elements of PNS Development

- 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)

Int’l Fuel Quality Standards

Emission Stds/ Regulations

R & D on Fuel Specification

Vehicle Technology Dev’t.

Dev’t in Fuel Additives

IRR for Standards

Monitoring:

Sampling & Testing

Field/On-site testing

Laboratory testing

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

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# Fuel Quality Standards Development (Gasoline)

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>CLEAN AIR ACT</th>
<th>POST CLEAN AIR ACT</th>
<th>BIOFUELS ACT</th>
<th>E10</th>
<th>EURO 4-PH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2001</td>
<td>2003</td>
<td>2005</td>
<td>2006</td>
</tr>
<tr>
<td>Distillation temperature, 0°C at:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10% recovered, max</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>50% recovered</td>
<td>75-121</td>
<td>75-121</td>
<td>75-121</td>
<td>70-110</td>
<td>70-110</td>
</tr>
<tr>
<td>90% recovered, max</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>End point, max</td>
<td>221</td>
<td>221</td>
<td>221</td>
<td>215</td>
<td>215</td>
</tr>
<tr>
<td>Residue, % vol., max.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hydrocarbons:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohols (C₂ to C₄), % vol., max. b</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0.4</td>
<td>9.5-10</td>
</tr>
<tr>
<td>Aromatics, % vol., max.</td>
<td>45</td>
<td>45</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Benzene, % vol., max.</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Ethers (e.g. MTBE), % vol., max.</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>2 c</td>
<td>2 c</td>
</tr>
<tr>
<td>Lead Content, g/L, max.</td>
<td>0.013</td>
<td>0.013</td>
<td>0.013</td>
<td>0.005</td>
<td>0.005</td>
</tr>
<tr>
<td>Octane rating, min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Octane Number (RON)</td>
<td>93</td>
<td>81/87/93/95</td>
<td>81/87/93/95</td>
<td>93</td>
<td>93/95</td>
</tr>
<tr>
<td>Anti-Knock Index (AKI)</td>
<td>87.5</td>
<td>87.5</td>
<td>87.5</td>
<td>87.5</td>
<td>87.5</td>
</tr>
<tr>
<td>Vapor Pressure, @ 37.80°C, kPa, max.</td>
<td>62</td>
<td>85/62</td>
<td>85/62</td>
<td>85/62</td>
<td>68/62</td>
</tr>
<tr>
<td>Sulfur, % mass, max.</td>
<td>0.10</td>
<td>0.2/0.1</td>
<td>0.2/0.1</td>
<td>0.05</td>
<td>0.05</td>
</tr>
</tbody>
</table>

a multi-grade gasoline  b ethanol  c 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.
<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>CLEAN AIR ACT</th>
<th>BIOFUELS ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DIESEL OILS</td>
<td>FAME BLENDED DIESEL OIL</td>
</tr>
<tr>
<td></td>
<td>2000 2003 2007 (B1) 2009 (B2) 2012 (B2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADO  IDO  ADO  IDO  ADO  IDO  ADO  IDO  ADO  IDO</td>
<td>EURO 4-PH</td>
</tr>
<tr>
<td>Calculated cetane index min. Or</td>
<td>48  50  50  50  50  50  50  50  50  50  50  50</td>
<td>48  50  50  50  50  50  50  50  50  50  50  50</td>
</tr>
<tr>
<td>Cetane number, min. Or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derived cetane number, min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon residue on 10%</td>
<td>0.15 0.35 0.15 0.35 0.15 0.35 0.15 0.35 0.15 0.35</td>
<td>0.15 0.35</td>
</tr>
<tr>
<td>Distillation residue, % mass, max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color, ASTM</td>
<td>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.</td>
<td>2.5 max. 5.0 min. 2.5 max. 5.0 min. 2.5 max. 5.0 min. 2.5 max.</td>
</tr>
<tr>
<td>Copper strip corrosion, 3h at 50 °C, max.</td>
<td>No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1</td>
<td>No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1</td>
</tr>
<tr>
<td>Density at 15 °C, kg/L</td>
<td>0.86 50 0.860 0.880 0.820-0.860 0.880 max. 0.820-0.860 0.880 max. 0.820-0.860 0.880 max.</td>
<td>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 0.880 max.</td>
</tr>
<tr>
<td>FAME a, content, % volume.</td>
<td></td>
<td>0.7-1.2 0.7-1.2 1.7-2.2 1.7-2.2 1.7-2.2 1.7-2.2 1.7-2.2 1.7-2.2 1.7-2.2 1.7-2.2</td>
</tr>
<tr>
<td>Flash point, Pensky-Martens, °C, min.</td>
<td>52.0 52.0 55.0 55.0 55 55 55 55 55 55 55</td>
<td>55 55 55 55 55 55 55 55 55 55 55</td>
</tr>
<tr>
<td>Kinematic viscosity, mm²/s at 40°C</td>
<td>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</td>
<td>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</td>
</tr>
<tr>
<td>Lubricity, (HRFF), wear scar dia. @ 60 °C,</td>
<td>460 460 460 460 460 460 460 460 460 460 460</td>
<td>460 460 460 460 460 460 460 460 460 460 460</td>
</tr>
<tr>
<td>micron, max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl Laurate (C12 ME), % mass, min</td>
<td>0.4 0.4 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8</td>
<td>0.4 0.4 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8 0.8</td>
</tr>
<tr>
<td>Sulfur, % mass, max.</td>
<td>0.05 0.03 0.05 0.30 0.05 0.30 0.05 0.30 0.05 0.30 0.005</td>
<td>0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05</td>
</tr>
<tr>
<td>Water, % volume, max. b</td>
<td>0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05</td>
<td>0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05</td>
</tr>
<tr>
<td>Water and sediment, % volume, max.</td>
<td>0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10</td>
<td>0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10 0.10</td>
</tr>
</tbody>
</table>

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** - Anhydrous Bioethanol & Bioethanol Fuel (E100 E98)
- **PNS/DOE QS 002:2015 (B100)** - Coconut Methyl Ester
- **PNS/DOE QS 010:2015** - High FAME-Blended Diesel Oils (B5)

### B. Conventional Petroleum, etc.
- **PNS/DOE QS 001:2009** - Unleaded Motor Gasoline
- **PNS/DOE QS 003:2003** - Two-stroke (2T) Lubricating Oils
- **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
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

**Fuel Quality**
- Conventional
- Biofuels & blends
- Alternative fuels

**Facilities**
- Gasoline stations
- LPG tanks/conversion kits terminals
- Control equipment (correlation)

**Code of Practice**
- LPG Vehicle Conversion
- Retail Operation
- Bulk Storage
- Handling & Distribution
Standardization Technical Committees

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

Chair : DOE

Members

- Government : DTI-BPS, DENR-EMB, DILG-BFP
  DOLE (BWC, OSHC)
- Testing : DOST-MIRDC, UP
- Industry : Petron, Chevron, Shell, Total,
  IPPCA (Seaoil, TWA)
- Prof. Assoc. : SOPI
Facilities/Practice – Liquid Fuels

Informational/Safety Signs

Prohibited Acts

OCTANE RATING MINIMUM 91

For your safety:
- Do not open filler caps
- No smoking
- Switch off mobile phones
- No dining while refueling

Department of Energy
Empowering the Filipino
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 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)*

Implementation of PNS

- 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)
Total Gas Stations = 6,834

- LUZON (4,514)
- VISAYAS (1067)
- MINDANAO (1253)

# Based on issued COC
Fuel Quality Roadmap

**Short-Term (2016-2017)**
- Sulfur reduction from 500ppm to 50ppm
- Application of modern emulsion
- Introduction of higher biodiesel level (B5)

**Medium-Term (2018-2020)**
- Olefin & aromatic content limits
- Additional composition controls
- Prohibition of more metallic additives
- Introduction of non-coconut biodiesel feedstocks

**Long-Term (2021-2030)**
- 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 & CO₂ reduction.
Thank You!

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