Increased Conversion to Natural Gas Vehicles in Asia

Global Alternative Fuels

Webinar | March 17, 2016
Agenda

Overview

Background

Regional Snapshot of Natural Gas Use in Asian Transportation Sector

NGVs Developments in Selected Countries in Asia

Summary

Q&A
Overview
Overview

Switching to natural gas to reduce traditional air pollution

• Consumption of natural gas grew at 6% annually in 2004-2014, driven by China
• China and Japan are the biggest consumers of natural gas in Asia
• The transportation sector accounted for 4% of total natural gas consumption in Asia in 2014
• Compressed natural gas is the most commonly used gaseous fuel in light-duty vehicles
• Liquefied natural gas has started being used in medium- and heavy-duty vehicles, especially for long haul range vehicles
• Asia is home to five countries in the top ten countries in the world having natural gas vehicles fleets
• The trend to convert gasoline/diesel vehicles to run on natural gas is increasing in China and India, plateauing in Thailand and decreasing in Bangladesh and Pakistan
Background

Increased usage of natural gas in Asia
Production and Consumption

More natural gas consumed in Asia

- Japan and China accounted for 44% of Asia’s consumption in 2014
- Consumption increased by 6% annually in 2004-2014
- Production increased by 4% annually
- Imports increased by 16% annually

Production and Consumption of Natural Gas in Asia

Consumption by Sector

The transportation sector accounted for only 4% of total natural gas consumption.

*Consumption by Sector in 2014*

- Power Generation: 54%
- Industry: 29%
- Transportation: 13%
- Household: 4%

*Source: Stratas Advisors, February 2016*
Natural Gas in the Asian Transportation Sector

Promoted to reduce air pollution in major cities
Shifting to Natural Gas Vehicles

Many ways to promote natural gas vehicles

Type of Promotions

Economics
- Price Subsidies
- Tax reductions
- Fuel taxation

Direct consumers approach
- Education
- Standards and guidelines
- New vehicles model

Regulatory
- Emissions targets
- Fuel efficiency targets
- Vehicle standards

Organizational
- Infrastructure
- Usage incentives
Fiscal Policies for Natural Gas Vehicles

Many countries offer tax reductions or tax exemptions

Source: Stratas Advisors, February 2016
Global Country Ranking of NGVs

China and Iran are neck to neck with about 4 million NGVs on the road at the end of 2015

Top Ten Countries with Largest NGVs Population

<table>
<thead>
<tr>
<th>Country</th>
<th>Million Vehicles</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>4.55</td>
<td>11.6%</td>
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<tr>
<td>Iran</td>
<td>3.97</td>
<td>32%</td>
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<tr>
<td>Pakistan</td>
<td>3.49</td>
<td>77%</td>
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<tr>
<td>India</td>
<td>1.43</td>
<td>12%</td>
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<tr>
<td>Argentina</td>
<td>1.41</td>
<td>20%</td>
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<tr>
<td>Brazil</td>
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<td>Italy</td>
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<td>Thailand</td>
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<td>0.11</td>
<td>45.8%</td>
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<tr>
<td>Bolivia</td>
<td>0.04</td>
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</tr>
</tbody>
</table>

Source: Stratas Advisors, February 2016
NGVs in Asia

Very small share of the total vehicle population

Source: Stratas Advisors, February 2016
Development of NGVs in Selected Countries

Policies have been set but infrastructure cost is a major hindrance
Bangladesh

NGVs accounted for 23% of total light-, medium- and heavy-duty vehicles

Challenges

- Lack of natural gas supply, but Bangladesh not willing to import
- Proposal to stop NGVs promotion measures
- Aim to reduce dependency on natural gas (i.e. increase renewable energy usage)

Source: Stratas Advisors, February 2016
China

At 1.6% China has a small share of NGVs in total vehicles

The Way Forward

- More focus on utilizing LNG in heavy-duty vehicles rather than in CNG market
- More provinces set targets to build CNG and LNG refueling infrastructure up to 2020
India

More states turn to CNG to reduce air pollution

The Way Forward

- The National Green Tribune mandates diesel phase-out, to be replaced with CNG mainly for public transportation sector.
- Non-fiscal incentives for light-duty and passenger vehicles run on CNG including exemption of odd-even day in Delhi.

Source: Stratas Advisors, February 2016
Pakistan

Lack of natural gas supply has resulted in closure of CNG refueling stations

**Challenges & The Way Forward**
- Lack of natural gas supply results in closure of CNG refueling stations and shift back to gasoline-powered vehicles
- Agreement with Qatar to import LNG to increase supply for industry and CNG (transportation sector).

**Source:** Stratas Advisors, February 2016
Thailand

PTT ended its monopoly in CNG refueling stations, open up the market to private players

Challenges & The Way Forward

- CNG price was regulated by the government – PTT experienced losses
- PTT limits its CNG refueling stations to a max of 500 – the market is now open for private players
- The government started de-regulating CNG prices

Source: Stratas Advisors, February 2016
Summary

Infrastructure is the major hindrance

• Development of natural gas vehicles is facing hindrances:
  – High capital investments to build charging infrastructure
  – Higher retail price of CNG vehicles compared to gasoline/diesel vehicles of the same class

• Gasoline and diesel will still be used but alternative transportation fuels are also developed to secure energy supply, reduce gasoline/diesel usage, reduce CO₂ emissions and improve air quality.

• Increase usage of LNG to reduce pollution from the heavy-duty vehicles running on long haul routes.

• Governments promote the use of natural gas vehicles by:
  – Preferential tax schemes
  – Mandate to be implemented by the State Road Transport Corporations
  – Incentives for establishing charging infrastructure
  – Incentives for buyers to buy NGVs
  – Incentives in the form of easy access into the cities i.e. Delhi’s government exempted NGVs from even/odd vehicles days.
Q & A

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