Case study: Adoption of low-sulfur fuel standards in Peru

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1. Introduction
Peru is one of the fastest growing economies in South America with a GDP that has expanded at a rate of 6.4% on average from 2002 to 2012 (World Bank, 2014). This economic expansion has been accompanied by a strong trend towards urbanization, as elsewhere in the region. Whereas in 1950 only 41% of Peru’s population lived in urban areas, by 2010 this number had ascended to almost 77% (United Nations, Department of Economic and Social Affairs, Population Division, 2012). In recent years, rapid urbanization and per capita income growth have also led to an increase in automobile sales. Between 2002 and 2012, private vehicle sales have grown at an average annual rate of 32%, with an estimated 200,000 new vehicles entering the fleet in 2013 alone (BBVA, 2013). Despite this growth, the current motorization rate in Peru is estimated at only 73 vehicles per 1,000 people, still well below that of OECD countries (563 per 1,000) and that of its neighbor Chile (184 vehicles per 1,000) (International Road Federation, 2012). In terms of emissions, the current Peruvian fleet has improved since 2006 when the average emissions of CO₂ (grams/kilometer) were 206 gCO₂e/km to the most recent baseline of 185 gCO₂e/km (G. Lopez, 2014). However, in order to catch up to current industry benchmarks, further improvements in fuel quality and vehicle technology are required.

As a result of the fast growth experienced by the automotive sector over recent years, the Peruvian government, through its Ministry of Transport and Communications (MTC), has embarked on a number of regulatory reforms. These have not only included emissions standards for vehicles but also an elimination of subsidies for high-octane gasoline and the introduction of fuel quality requirements for diesel. The second of these includes a requirement for low sulfur (50ppm) diesel. Currently, this requirement cannot be met internally as Peru’s refineries are not equipped to produce high quality derivatives. Hence, Peru remains a net importer of both crude and refined products, bringing in around 39,000 bbl/day of diesel from the USA (EIA, 2013). For example in October of last year, the Peruvian state oil company—PetroPeru—bought three shipments including 290,000 barrels of ultra low sulfur diesel (15ppm) from Repsol and another 580,000 barrels of diesel with undisclosed (but higher) sulfur content from BB Energy (Peru21.pe, 2013 and Revista Gestion, 2013c). Nevertheless, imports only represent a fraction of the 172,000 bbl/d of petroleum products consumed in the country in 2012 (EIA, 2013). As a result of this, the country is exploring financing mechanisms through which to upgrade its refineries in time to meet with the regulatory requirements set forth by the MTC. The following case study will describe the country’s current efforts in meeting these requirements and obtaining financing for refinery upgrades.

2. Fuel quality regulations and history
As previously mentioned, the Peruvian government, through its Ministry of Transport and Communications (MTC), has embarked on a number of regulatory reforms to set emissions standards for passenger vehicles. The first of these was set in 2001, when emission limits were first established for existing light-duty vehicles (LDVs), new imported or domestically assembled vehicles and imported used vehicles (see Decreto Supremo Nº 047-2001-MTC). Since then, several amendments have been made to this regulation with the latest taking place in December of 2012. These amendments have included the following requirements for LDVs and heavy-duty vehicles (HDVs) (TransportPolicy.net, 2014a and 2014b):

- Starting in 2003, new LDVs are required to meet either US Tier 0 or Euro II emission standards and new HDVs are required to meet Euro II requirements.
• Starting in 2007, new LDVs must meet Euro III require-
ments, with US Tier 1 as an option, and new HDVs are
required to meet Euro III requirements.
• Starting in 2016, new LDVs must meet Euro IV require-
ments, with US Tier 2 as an option, and new HDVs are
required to meet Euro IV requirements.

The latest of these regulations (Ley No 28694 from
03/26/2006) is also the first to require low sulfur
diesel—the introduction of Euro IV standards includes
a sulfur limit of 50ppm at the national level by 2016
for diesel and 2017 for gasoline. In urban areas, in
particular in the Lima-Callao corridor (which houses a
third of the country’s population), diesel sulfur levels
have been limited to 50ppm since 2012 (UNEP, 2012).
However, there have been delays in the enforcement
of these regulations that have resulted in nationwide
sulfur levels remaining as high as 1,500ppm (EPA, 2012).
According to Ministerial decree No 139-2012-MEM-DM, it
became illegal to sell diesel with sulfur levels above
50ppm in Lima, Arequipa, Cusco, Puno y Madre de Dios
(Callao) 120 days after its signature on March 16th 2012
(OSINERGMI, 2012).

3. Refinery capacity overview
Peru currently has crude oil reserves estimated at
632,906,000 barrels (bbl), but crude oil production
has steadily declined from its peak in 1982 (195k bbl/
day) to its current level of approximately 66,500 bbl/d
(2012) (OGJ, 2013 and EIA, 2013). Since the early 1990s,
the country has been a net importer of crude oil, which
it primarily sources from its neighbor Ecuador. At the
same time, Peru, which has natural gas reserves of 15,376
billion cubic feet (bcf) (second largest in the region
behind Venezuela), has increased output of natural gas
(and natural gas liquids) to the extent that since the early
2000s the country has become a net exporter. Regarding
consumption of petroleum derivatives, diesel accounts
for the largest share of fuel consumption (47 percent—of
which about half is imported low sulfur diesel) followed
by liquefied petroleum gas (LPG) (19 percent), with the
share of the latter expected to double over the next
10 to 15 years as Peru seeks to tap its vast natural gas
reserves (IMF, 2013). There are already several projects
being explored to supply liquefied petroleum gas through
pipeline to large urban areas outside of Lima but these
are to be completed in the next five years. This includes
the Gas Natural Fenosa project to develop a gas duct to
four major cities in the south of the country, including
Arequipa (Gas Natural Fenosa, 2013). In terms of biodiesel,
since 2005 the Ley No 28054 regarding biofuel markets
and supreme decrees (N°013-2005 EM and N° 021-2007
EM) have established that gasoline must contain 7.8
percent of ethanol and diesel must have 5 percent of
biodiesel (USDA, 2013). Most of the biofuels entering
the market are imported from Brazil and Argentina as
Peruvian suppliers are not yet price competitive.

In terms of refining, Peru has a capacity of around
200,000 bbl/d served by six refineries. Two of these,
Talara and Pampilla, account for 85% of total capacity.
The Talara refinery is the largest state owned facility
and the subject of a recently passed law that mandates
its modernization. It has been in operation for close to
a century with upgrades taking place in 1954 (addition
of primary distillation unit), 1965 (capacity extended
to 62,000 bbl/d), 1974 (installation of catalytic cracking
complex) and 1995 (installation of liquid cargo berth
used to load products and receive tankers up to 35
Million Deadweight Tonnes) (PetroPeru, 2014). The
largest refinery in the country, La Pampilla, is currently
owned and operated by Spanish oil and gas company
Repsol. This refinery is also being upgraded and is
currently looking for ways to help finance this work.
Nonetheless, in order to meet its fuel consumption needs,
Peru continues to import refined products primarily from
the USA for a total of 39,000 bbl/d (EIA, 2013).

Figures 1 & 2. Natural gas and oil production & Oil consumption
and refinery capacity in Peru (EIA, 2013)
Table 1. Peruvian Refineries (OGJ, 2012)

<table>
<thead>
<tr>
<th>REFINERY</th>
<th>OWNERSHIP</th>
<th>CAPACITY (BBL/D)</th>
<th>% OF TOTAL REFINING CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pucallpa</td>
<td>Maple Gas Corp.</td>
<td>3,250</td>
<td>2%</td>
</tr>
<tr>
<td>Conchan</td>
<td>PetroPeru SA</td>
<td>13,500</td>
<td>7%</td>
</tr>
<tr>
<td>Iquitos</td>
<td>PetroPeru SA</td>
<td>10,500</td>
<td>5%</td>
</tr>
<tr>
<td>El Milagro</td>
<td>PetroPeru SA</td>
<td>1,700</td>
<td>1%</td>
</tr>
<tr>
<td>Talara</td>
<td>PetroPeru SA</td>
<td>62,000</td>
<td>31%</td>
</tr>
<tr>
<td>La Pampilla</td>
<td>Repsol YPF SA</td>
<td>108,000</td>
<td>54%</td>
</tr>
</tbody>
</table>

4. Refinery project overview

Current limitations in refining capacity, particularly to produce low sulfur fuel, have led the country to explore ways to finance upgrades to its existing refineries. The most recent development is Law No 30130 passed by Congress on the 18th of December 2013. This law declares the modernization of the Talara refinery a priority of national and public interest to preserve the air quality and public health of the country (El Peruano, 2013). The law gives the state oil company the mandate to take any necessary measures to execute the modernization of the refinery in order to meet with fuel quality standards (50ppm sulfur) by 2016. The law also opens the state oil company, PetroPeru SA, to private participation not exceeding 49% of its share capital. In essence, this allows for private companies to finance oil and gas projects currently operated/owned by the state and sets the stage for potential refinery upgrades.

The modernization objectives for the Talara refinery include: (i) an expansion of its total capacity from its current 62,000 bbl/d to 95,000 bbl/d—of which 41,000 bbl/day will be low sulfur diesel; (ii) capability to process heavy crudes with APIs as low as 18° (currently at 30°); (iii) reconfiguration of the current refinery to produce less residual fuels and increase production of diesel; and, (iv) improvement of the quality of both gasoline and diesel to 50ppm sulfur content or less (PetroPeru, 2008 and Revista Gestion, 2013b). The current state of proposed additions is highlighted in Figure 3, which shows that the refinery will be reconfigured to handle heavy crudes in an attempt to maintain operational margins at similar levels as before the current set of investments. In addition, PetroPeru has developed an innovative financing concept whereby they have in practice privatized certain refinery units to be owned and operated by private investors. These in turn provide services to the refinery until the investments are fully paid off. The most recent news is that the contract for the new refinery upgrades has been awarded to Tecnicas Reunidas—a Spanish contractor—for a total of US $2.4 billion (Tecnicas Reunidas, 2014). Given the timeline for financing and construction, it is likely
that this project will not be complete until after (2019)
the current deadline set by Ministry of Transport and
Communication regulations.

In addition to the Talara refinery, the government has
showed strong interest to upgrade La Pampilla refinery,
which is the largest in the country and is currently owned
and operated by Repsol. According to an environmental
impact study conducted by the firm, upgrading aimed
at meeting low sulfur standards would cost around US
$800 million. It would make the refinery compliant with
sulfur restrictions and introduce six new processing units
and new storage tanks for oil, diesel and petrol (gasoline)
(SeeNews Energy, 2013). In a recent presentation, repre-
sentatives from Repsol announced that the refinery will
be upgraded with a total investment of US $857 million
to reconfigure the refinery to handle heavy crudes and
produce low sulfur diesel with an expected completion
date of late 2017.

5. Refinery financing

According to several estimates, the total cost of upgrading
the Talara refinery is expected to reach $3.5 billion.
PetroPeru has secured public investment for a total of
$2.7 billion (77%) while the remaining investment ($815
million) will come from several other private firms. In order
to obtain this capital, PetroPeru plans to raise $1.3 billion
through bonds and loans in international markets while
the remaining $1.4 billion will come from local sources
(Reuters, 2013). In addition, it will operate long term
concession contracts with private investors for certain
refinery units. It remains unclear what international and
local sources have been identified for this investment
capital, and whether financing from multilateral institutions
has been considered. Last year it was announced that a
five-year loan for $500 million had been secured from
French investment bank Société Générale, who had been
hired to provide financial structuring services by PetroPeru
for the Talara project (Revista Gestion, 2013b). The loan
has been confirmed by the Ministry of Finance and Ministry
of Energy and Mines while Société Générale has remained
as a financial partner for the project. In addition to this, it
is expected that the partial privatization of PetroPeru will
attract new capital to this and other oil and gas projects
in Peru. The same law also gives PetroPeru government
guarantees for up to $1 billion for any financial obligations
related to the modernization of the refinery.

As previously stated, the government had considered
investing in an acquisition and upgrading of La Pampilla
refinery, currently owned and operated by Repsol. The
Spanish company had recently placed the refinery on sale
as part of a divestment effort of its assets in Latin America
and elsewhere. It is estimated that the total cost of buying,
upgrading and modernizing the refinery would be approxi-
ately $3 billion. However, during the course of 2013, the
government faced stiff criticism from several constituenc-
ies that among other things accused the government of
meddling in fuel prices and of interventionist state policies
(La Prensa, 2013). As a result of this added pressure, the
government decided to concentrate on the financing of
the Talara refinery in order to reduce any potential loss
in business/investor confidence from buying the foreign
controlled Pampilla refinery. Subsequently, Repsol decided
not to sell the refinery after it failed to receive offers
under the terms it required (WSJ, 2013). Given the current
mandates for fuel quality, Repsol has since stepped in to
refinance and upgrade their refinery as stated above. Given
that the investments will only be for desulfurization and
total capacity will remain the same, the project is expected
to come online before Talara.

6. Barriers to/opportunities for low
sulfur fuel adoption

In Peru, the main barriers to low sulfur fuel adoption
remain financial. Whereas many countries in the region
lack both vehicle and fuel standards, Peru has committed
to a stringent set of norms and is actively looking for
investments to ensure these are achieved. It remains
unclear how this investment capital will be secured and
what the economic viability is of the planned investments
in the Talara refinery. Further information is needed to
better understand some of the other economic barriers to
this project. That said, the project is now backed by both
the executive and legislative branches of government
which gives a strong signal to consumers, oil industry and
vehicle manufacturers/importers that the government
will continue to enforce vehicle and fuel standards.

Notwithstanding the efforts made by the Peruvian
government, there is an opportunity to further reduce
the environmental impacts of the transportation sector
by upgrading the Talara refinery to produce ultra low
sulfur fuel—10 or 15ppm sulfur content. It is unclear what
the required additional investments would be but there is
a clear opportunity to further reduce impacts on public
health and air quality. It is clear from discussions with
interested parties that the main roadblock to establishing
these stricter regulations is fuel availability, with particular
opposition expressed on the part of the refiners. The
investment requirements for the new upgrades are
deemed restrictive and it is argued that additional costs
for sulfur reduction would make these unviable. Given
that Peru has been proactive in its adoption of fuel quality
requirements, it is foreseeable that this discussion will
continue. If so, it will be important to understand why
the government has decided to upgrade its refineries to
satisfy only 50ppm sulfur requirements.
7. Conclusions and lessons learned

Few countries in Latin America and the Caribbean have adopted vehicle and fuel standards, and in this sense, the actions of the Peruvian government are commendable. It remains a considerable feat that both the government and private actors have come together to secure investments in excess of $4 billion to upgrade their refineries to produce low sulfur fuel. As a result, in the next couple of years, the majority of Peruvians will have access to quality fuels and the impacts of these on climate and health will be reduced. That said, there remains concerns regarding the timely delivery of the projects by the contractors involved while the refining capacity available in the Peru will remain insufficient to satisfy national demand in the coming years, meaning that low sulfur diesel imports will maintain their importance in the local economy. Peru still lags behind others in the region (notably Chile) and it is unclear why the country is making investment in refinery upgrades that could lead to outdated policies in the near future. With countries in the region already moving to 10-15ppm sulfur requirements, Peruvian standards may remain outdated despite the considerable investment being made now to satisfy 50ppm sulfur requirements.

8. References


