Best Practice Policy Guidelines for Small Scale LNG; Truck Loading

Group of Experts on Gas

Luis. I Parada

22nd April 2016 - Geneva
Program Focus

1. New Uses of LNG, including small scale:
   - Bringing gas to remote areas (remote gas services)
   - Use of LNG as a transport fuel.

2. Regulatory needs:
   - Implement regulation to facilitate the use of natural gas and LNG.
   - Norms and standards for LNG

3. Advantages of gas and LNG in mitigating climate change.
Advantages of Natural Gas

1. Environmental benefits of natural gas
   - Reducing emissions (CO$_2$, NO$_x$, SO$_x$)
   - Reduce local pollution, air quality for citizens
   - Considered by EU as alternative fuel

2. Truckloading Services
   I. Distribution market – Remote areas not being connected to gas grid for both industrial and domestic usage;
   II. Transport sector – Parties considering using LNG
   III. Power generation & Industrial customers- small power plants used for peak shaving where these are still supplied with fuel oil or industrial customers who may consider this a more feasible option.
Truck Loading in the UN ECE

Truck loading Development from import terminals in the UNECE Region

Source: GIIGNL Annual Report, 2016 Edition

LNG Import Terminals offering Truck Loading
LNG Import Terminals not offering Truck Loading
## Truck loading in the EU + Turkey

### Source: GLE New LNG Services Inventory

<table>
<thead>
<tr>
<th>Country</th>
<th>Belgium</th>
<th>France</th>
<th>France</th>
<th>France</th>
<th>Greece</th>
<th>Italy</th>
<th>Italy</th>
<th>Italy</th>
<th>Lithuania</th>
<th>Netherlands</th>
<th>Poland</th>
<th>Portugal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company</strong></td>
<td>Fluxys</td>
<td>Dunkerque LNG</td>
<td>Elengy</td>
<td>Elengy</td>
<td>Fosmax LNG</td>
<td>DESFA</td>
<td>ADRIATIC LNG</td>
<td>GNL Italia</td>
<td>OLT Offshore</td>
<td>Klaipedos Nafta</td>
<td>Gasunie</td>
<td>GAZ-SYSTEM</td>
</tr>
<tr>
<td><strong>Facility</strong></td>
<td>Zeebrugge</td>
<td>Dunkerque LNG</td>
<td>Montoir de Bretagne</td>
<td>Fos Tonkin</td>
<td>Fos Cavaou</td>
<td>Revithoussa</td>
<td>Porto Levante</td>
<td>Panigaglia</td>
<td>Toscana</td>
<td>Independence</td>
<td>Gate terminal</td>
<td>Swinoujscie</td>
</tr>
<tr>
<td><strong>Truck loading</strong></td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Capacity: (LNG) m³/h</strong></td>
<td>75</td>
<td>but under study</td>
<td>1 x 100</td>
<td>1 x 100</td>
<td>3 x 100 under study</td>
<td>-</td>
<td>1 x 100 by end 2017</td>
<td>Feasibility study in progress; FID expected by</td>
<td>but available from 2017, EPC contract is signed</td>
<td>1 x 100</td>
<td>2 (+1) x 90</td>
<td>2 x 50, 1 x 75</td>
</tr>
<tr>
<td><strong>Comment</strong></td>
<td>3 x 100 under study</td>
<td>3 x 100 under study</td>
<td>through Fos Tonkin</td>
<td>3 x 100 under study</td>
<td>through Fos Tonkin</td>
<td>through Fos Tonkin</td>
<td>through Fos Tonkin</td>
<td>through Fos Tonkin</td>
<td>through Fos Tonkin</td>
<td>through Fos Tonkin</td>
<td>through Fos Tonkin</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Spain</th>
<th>Spain</th>
<th>Spain</th>
<th>Spain</th>
<th>Spain</th>
<th>Spain</th>
<th>UK</th>
<th>UK</th>
<th>UK</th>
<th>UK</th>
<th>Egypt</th>
<th>Turkey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company</strong></td>
<td>BBG</td>
<td>Enagas</td>
<td>Enagas</td>
<td>Enagas</td>
<td>Enagas</td>
<td>Reganosa</td>
<td>Saggas</td>
<td>Dragon LNG</td>
<td>Grain LNG</td>
<td>South Hook</td>
<td>Marmara Ereğlisi LNG Terminal</td>
<td>Aliaga Izmir LNG Terminal</td>
</tr>
<tr>
<td><strong>Facility</strong></td>
<td>Bilbao</td>
<td>Barcelona</td>
<td>Cartagena</td>
<td>Huelva</td>
<td>EL Musel</td>
<td>Mugardos</td>
<td>Sagunto</td>
<td>Milford Haven</td>
<td>Isle of Grain</td>
<td>Milford Haven</td>
<td>Marmara Ereğlisi</td>
<td>Aliaga</td>
</tr>
<tr>
<td><strong>Truck loading</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Capacity: (LNG) m³/h</strong></td>
<td>2 x 27</td>
<td>3 x 91</td>
<td>3 x 91</td>
<td>3 x 91</td>
<td>2 x 75</td>
<td>2 x 70</td>
<td>2 x 80</td>
<td>3 x 75</td>
<td>Not found</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>
The Spanish case

Truck Loading in Spain in 2015

Source: Spanish Gas System Report 2015

10,719 GWh/y
(-1.3% vs. 2014)

34,400 loaded trucks

Source: Spanish Gas System Report 2015
Truck Loading Capacity per Terminal

El Musel
- 8 GWh/d GNL
- 15 trucks/day

Bilbao
- 4.5 GWh/d GNL
- 50 trucks/day

Reganosa
- 10.5 GWh/d GNL
- 30 trucks/day

Barcelona
- 15 GWh/d GNL
- 50 trucks/day

Huelva
- 15 GWh/d GNL
- 50 trucks/day

Sagunto
- 10.5 GWh/d GNL
- 35 trucks/day

Cartagena
- 15 GWh/d GNL
- 50 trucks/day

El Musel
- 8 GWh/d GNL
- 15 trucks/day

Bilbao
- 4.5 GWh/d GNL
- 50 trucks/day

Reganosa
- 10.5 GWh/d GNL
- 30 trucks/day

Barcelona
- 15 GWh/d GNL
- 50 trucks/day

Huelva
- 15 GWh/d GNL
- 50 trucks/day

Sagunto
- 10.5 GWh/d GNL
- 35 trucks/day

Cartagena
- 15 GWh/d GNL
- 50 trucks/day

SEVERAL HUNDRED THOUSANDS IN THE LAST DECADES!!!

Yearly Truck Loading in Spain

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>36,000</td>
</tr>
<tr>
<td>2009</td>
<td>41,000</td>
</tr>
<tr>
<td>2010</td>
<td>40,000</td>
</tr>
<tr>
<td>2011</td>
<td>44,000</td>
</tr>
<tr>
<td>2012</td>
<td>46,000</td>
</tr>
<tr>
<td>2013</td>
<td>36,000</td>
</tr>
<tr>
<td>2014</td>
<td>34,800</td>
</tr>
<tr>
<td>2015</td>
<td>34,400</td>
</tr>
</tbody>
</table>
The Spanish case

Increase of 81 satellite destinations 2015 vs 2014

Increase of destinations outside Spain: 59 in 2015 and 35 in 2014,

Route of LNG trucks according to the LNG plant of origin

- 232 destinations from Barcelona LNG
- 217 destinations from Cartagena LNG
- 202 destinations from Huelva LNG
- 225 destinations from Sagunto LNG
- 140 destinations from Mugardos LNG
- 51 destinations from BBG LNG

Increases of destinations:

- 81 satellite destinations
- 26 destinations outside Spain
Conclusions

- There is great potential for truck loading services
  - LNG can reach long distances through truckloading services
  - Deliver LNG to remote areas through trucks and satellite plants
  - Truck loading together with satellite plants are a good opportunity to colonize areas where there is a lack of gas grid until the network reaches this place
- It is very important to highlight that only gas infrastructure allow the completion of market integration