

A pilot study for the establishment of LNG terminals and satellites in the north



FRAMTIDEN

BACKGROUND

- The interest in LNG as an alternative energy carrier has increased during the last few years due to a number of reasons.
- Two important driving factors in the Nordic countries has been the restriction on sulphur emissions for sea transportation as well as the more strict environmental requirements that the licensing authority impose on industries regarding the renewal of environmental permits.
- Increasing demands for fewer emissions in road traffic is another factor that has increased demand.
- The interest among various potential users has increased accordingly with the renowned resources of natural gas has increased on the world market as a result of the extraction of shale gas. The increase in resources has meant a considerable reduction of the price of natural gas on the world market.

THERE ARE LARGE AMOUNTS OF NATURAL GAS!

Natural gas lasts long

- If the expectation 10 years ago was that the resources would last for 30 years, we know today that there are deposits equivalent to 60 years of consumption.
- The largest deposits that are connected to the European Natural Gas Network exist in Russia, Iran, Algeria and in the North Sea. Russian natural gas accounts for 40 per cent of the world's accumulated natural gas resource.
- The pipe-bound natural gas that we use in Sweden comes from the Danish North Sea. Further north, in the Norwegian North Sea field, there are large reserves of natural gas. Today, the Russian deposits are calculated to be 25 times larger than the Norwegian deposits.
- The world's accumulated natural gas and oil resources are estimated to last for approximately 60 and 40 years respectively.

Source; EON, Sweden

LNG –A GLOBAL FUEL



Svensk gasmarknad i utveckling



2014-11-25

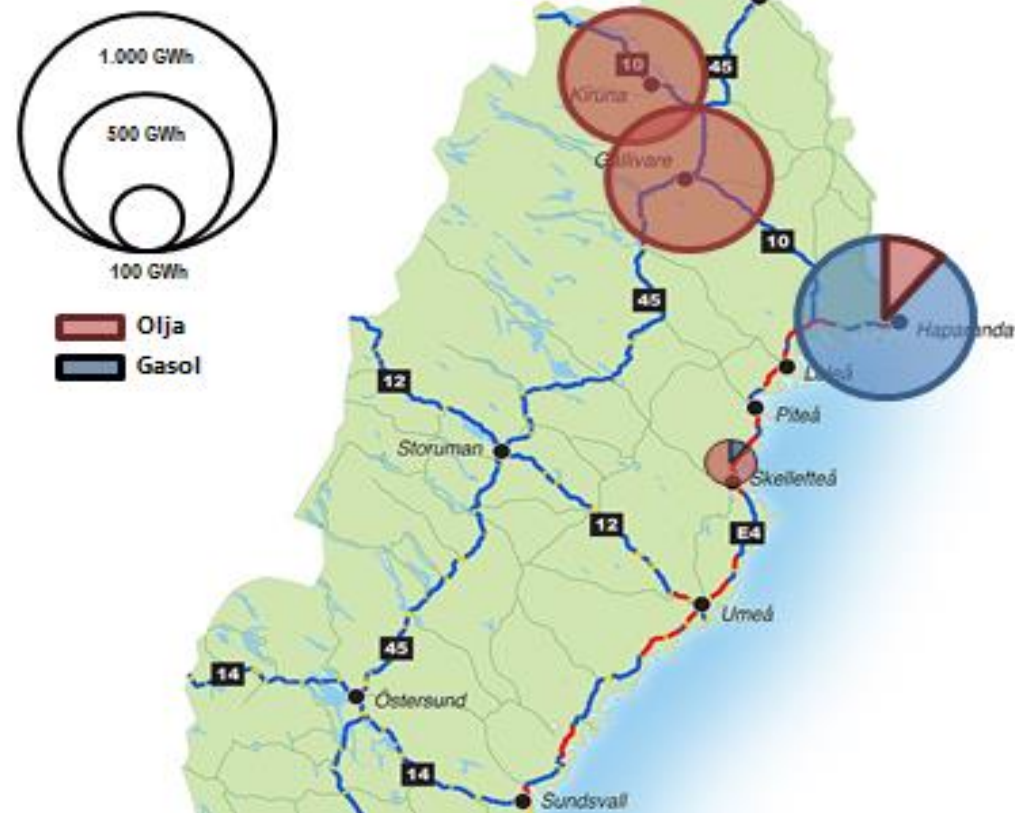
swede
gas

2015-09-30

POTENTIAL IN THE REGION

Energi intensiv industri i norra Sverige

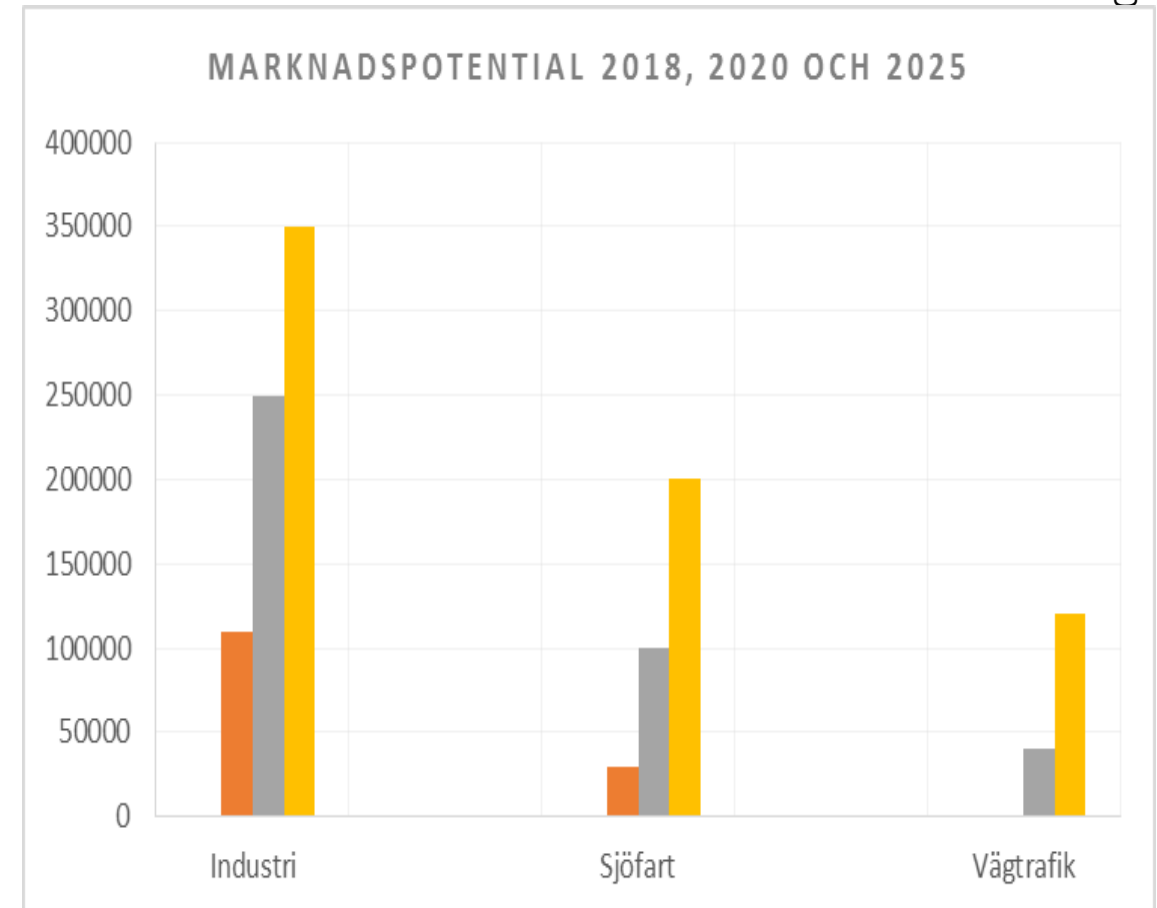
Olje och gasol användning



2015-09-30

POTENTIAL IN THE REGION

- The market potential in Norrbotten and Västerbotten county is between 670,000 and 720,000 m³ LNG/year in the 10 years since LNG has been available.
- In the long term, the potential increase to approximately 960,000 m³ LNG/year.



VÄSTERBOTTEN

INDUSTRY



Industry

- The potential from the availability of LNG is approx. 110,000 m³, 2020 approx. 250,000 m³, 2025 approx. 350,000 to 400,000 m³. In the long term, from 15 to 20 years, with approx. a further 240,000 m³ LNG.

Shipping

- The potential from LNG being obtainable is approx. 31,500 m³, 2020 approximately 100,000 m³, 2025 approx. 200,000 m³.

Road traffic

- Initially the LNG is modest, approx. 600 m³, 2020 approximately 40,000 m³, 2025 approx. 120,000 m³

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AN LNG TERMINAL

- Access to harbour
 - Nautical conditions
 - Access to tugboat or pilot
- Access to public roads as well as railways
- Distance to market
- Use of land within the area
- Adjacent use of land
- Cost of transport
- Cost of investment



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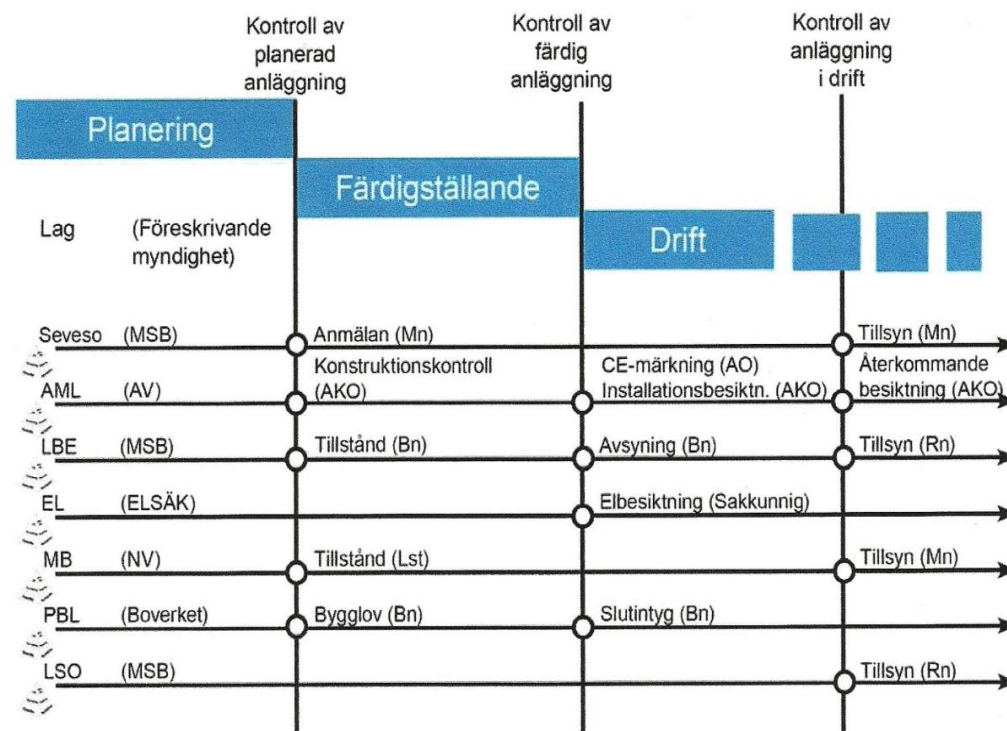
REGIONAL SUPPLY

- Located close to port.
Filling station for boats
Backup for biogas.



TIDPLAN

- Schedule for building LNG terminal is about 2-4 years from the investment decision and permit application to commissioning of the facility.
- The schedule is dependent on how quickly all the permits can be obtained.



The above picture shows the permit procedure for a LNG terminal as well as for customer and satellite facilities.

EKONOMISK ANALYS FÖR INVESTERING

- For a LNG terminal to be profitable it requires a relatively high stock turnover every year.
- According to cost estimates of previous LNG terminals in Sweden, they all point towards a necessary flow through exceeding 180,000 m³/year.
- The contribution margin per m³ supplied from a plant is dependent on the volume to the customer.

THE EFFECT ON THE LOCAL AND REGIONAL ENVIRONMENT

If the whole estimated market potential would be converted into natural gas this would mean that:

CO₂ emissions would decrease by 300,000 tonnes/ year, which is about 11% of the industry's CO₂.

SO_x emissions would decrease by 1,420 tonnes/ year, which is about 7% of the industry's SO_x.

- NO_x emissions would decrease by 10 800 tonnes/ year, which is about 15% of the industry's SO_x
- In addition to this, particle emissions in Norrbotten and Västerbotten county would decrease by about 8,000 tonnes/year.
- The high emissions in Norrbotten county is due to the use of coal at SSAB in Luleå as well as LKAB in Kiruna and Svappavaara. About 70% of Sweden's imports of coal are used at these locations, a total of about 2 million tonnes.

ANTICIPATED DEVELOPMENT

- Price trends in the USA and Europe followed one another up to 2010.
- Increased production of shale gas has meant that the price trend between the USA and Europe has been more separated.
- Increased extraction of shale gas means that the USA will export LNG to the European market and in all likelihood decreasing LNG prices in Europe.

The price in the Nordic market is dependent on volume and frequency of delivery.

At present, Sweden has two import terminals operating, in Nynäshamn and Lysekil.

CONCLUSIONS

- The LNG market was launched on the Swedish market after the summer of 2011 and during these three years it has grown from 0 to almost 1 million m³ during 2015
- There are several strong arguments for the establishment of an import terminal for LNG in the region.
- The prospect of obtaining an acceptable turnover and profit can be assessed as good.
- Future identified market potential close to 1 million m³ LNG is reassuring considering all the stable consumers in the industry.
- LKAB, one of the largest consumers of energy in the Norrbotten region have far-reaching plans to replace their present fuels, currently oil and coal, with natural gas. The total future potential from 3 to 20 years goes from 440,000 to 500,000 m³/ year.
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