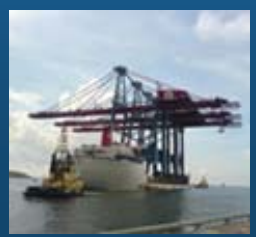
Shore-side electricity for ships!

EcoPorts Conference, Genoa, 14-15 December 2006
Session 6, Round 2, 14th December, 16,30 to 18,00.
Susann Dutt, Port of Göteborg, susann.dutt@portgot.se, www.portgot.se



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Shore-side electricity for ships

The presentation:

- What is the problem?
- What is shore-side electricity?
- Who are offering it today?
- Environmental benefits & constraints
- Costs for energy generation
- General comments & conclusions






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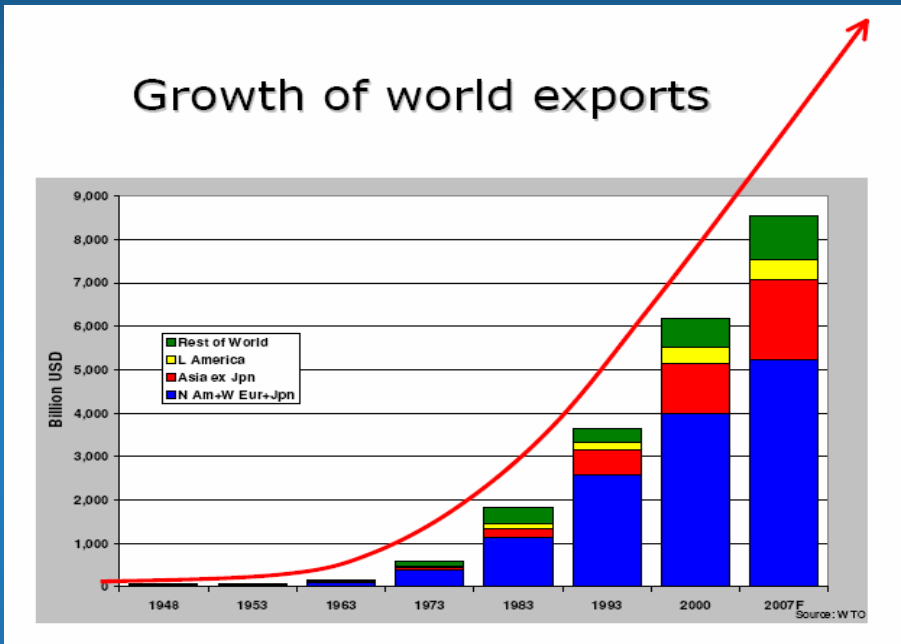
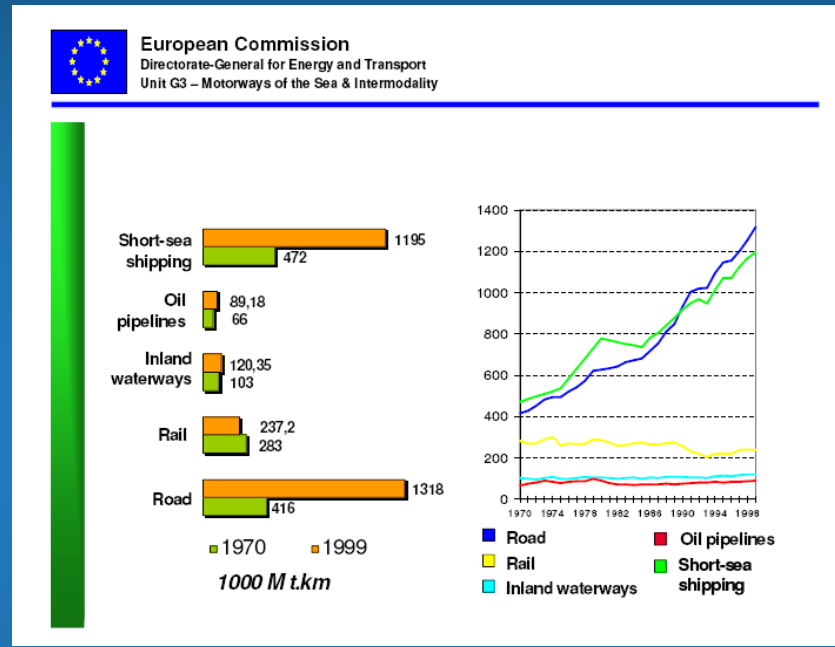
Steady growth in transport volumes





Decoupling - breaking the connection between the environmentally negative impacts from transport logistics and economic growth looks difficult to achieve!



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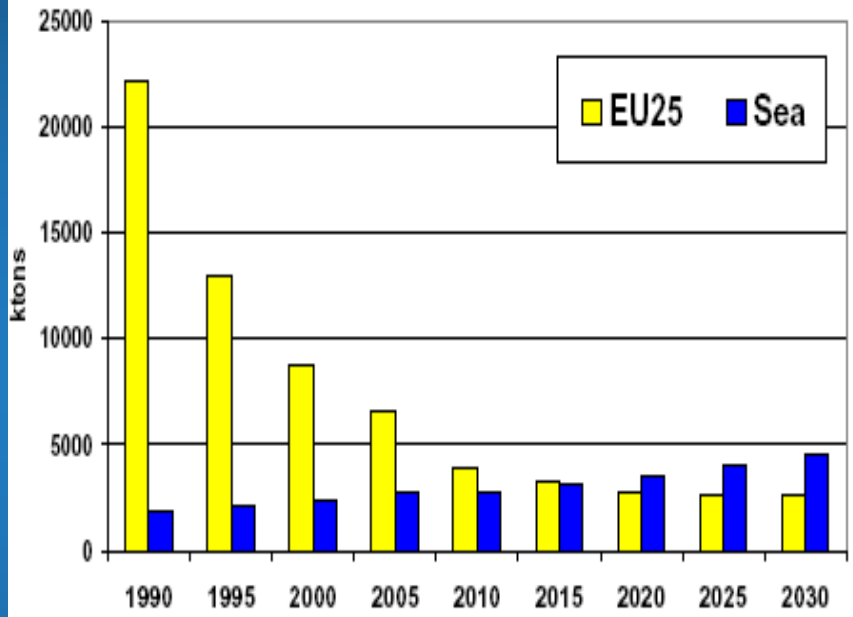
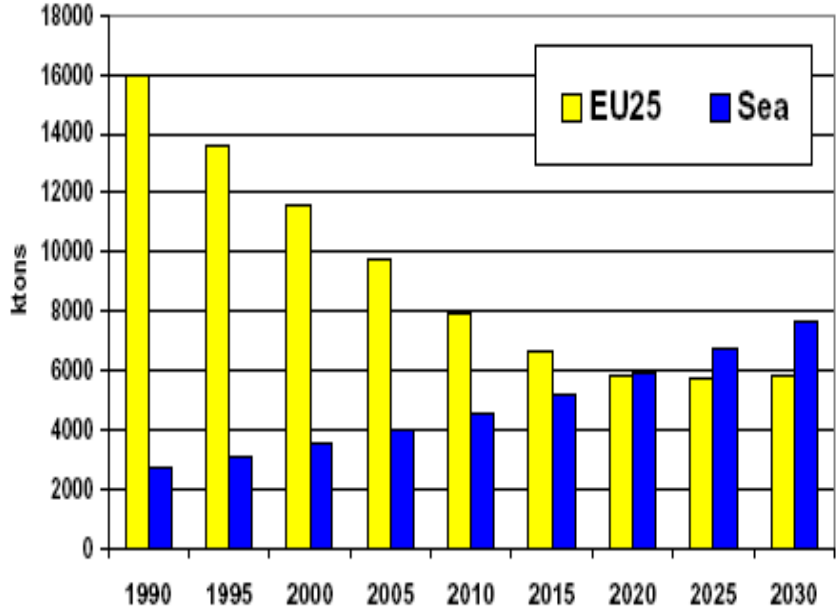
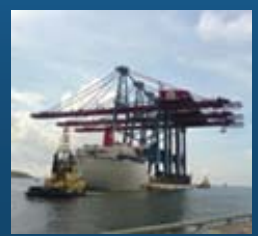
One of the problems!



Emission of SOx 1990-2030 (ktons)



Emission of NOx 1990-2030 (ktons)



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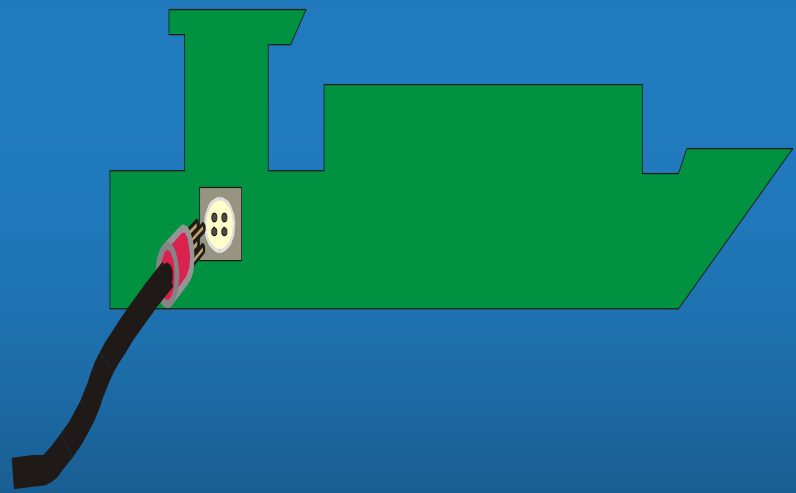
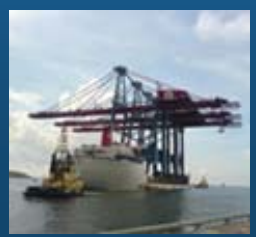
Shore-side electricity for ships

Electrical power needed for all functions on board is supplied from land, no auxiliary engine is used during port stop





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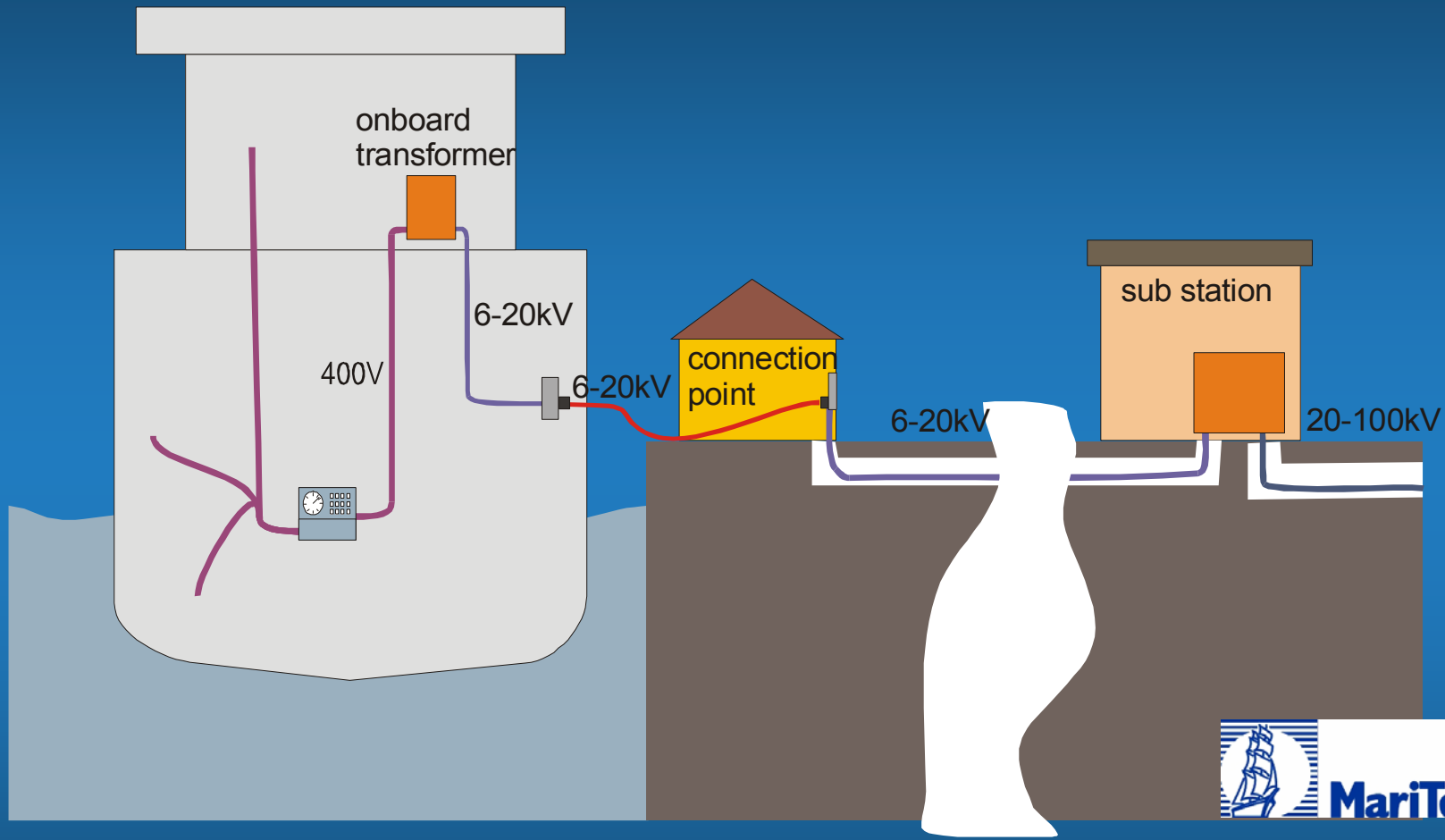
Connection principles in Göteborg





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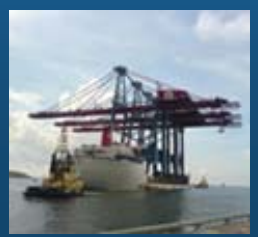
Who are offering shore-side electricity?

Göteborg, Helsingborg, Houston, Long Beach, Los Angeles, New York/New Jersey, Oakland, Philadelphia, Piteå, Richmond (Virginia),Seattle, Stockholm, Tacoma, Vancouver, Zeebrugge…



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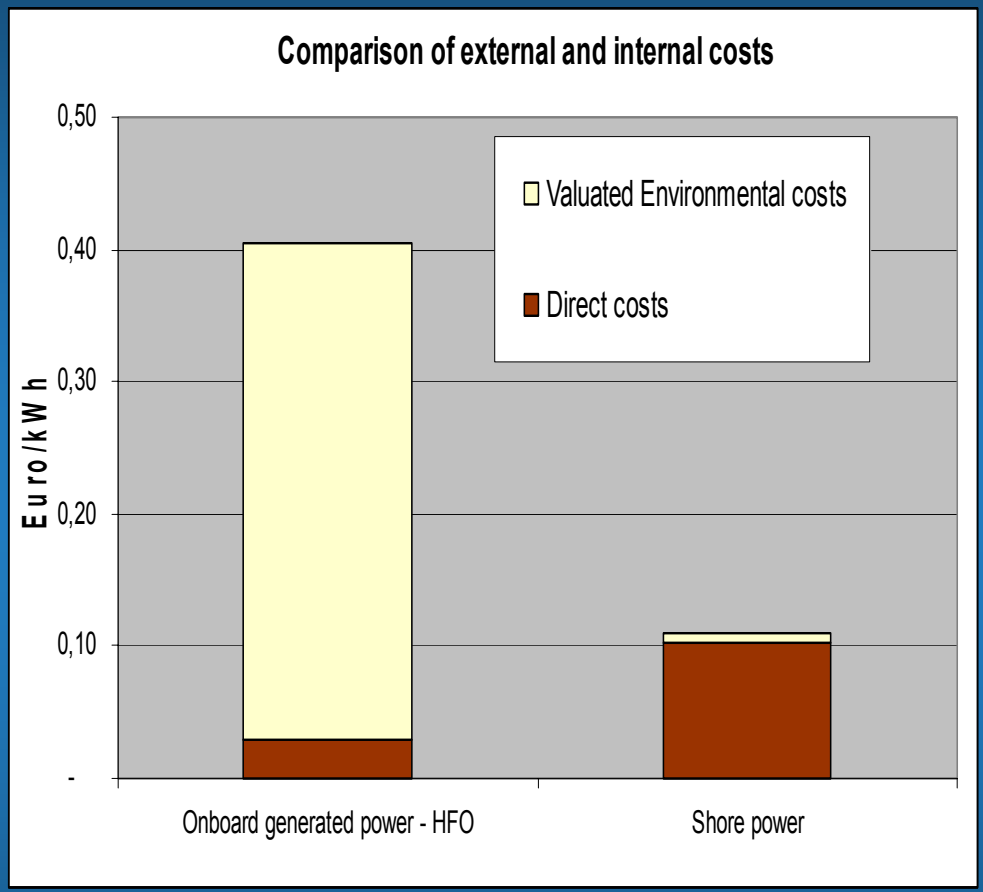
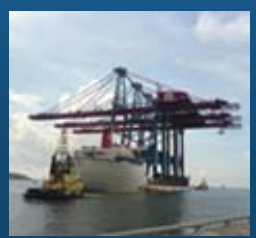
Environmental benefits/constraints



- Reduction of airborne pollutants
- No noise
- Society is a winner

- Offer a fossil free alternative
- No benefit on the journey in between ports



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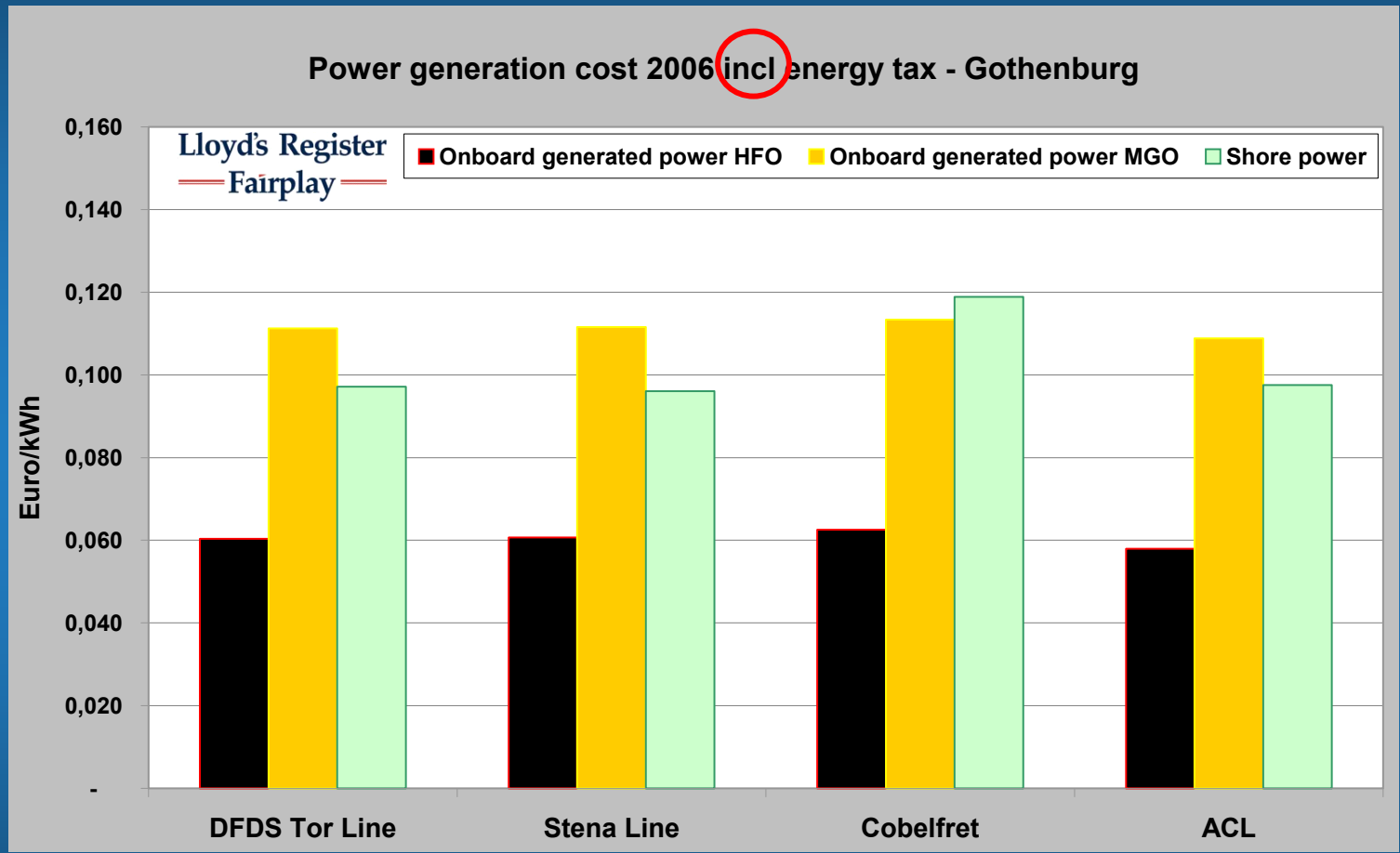
Cost for energy generation





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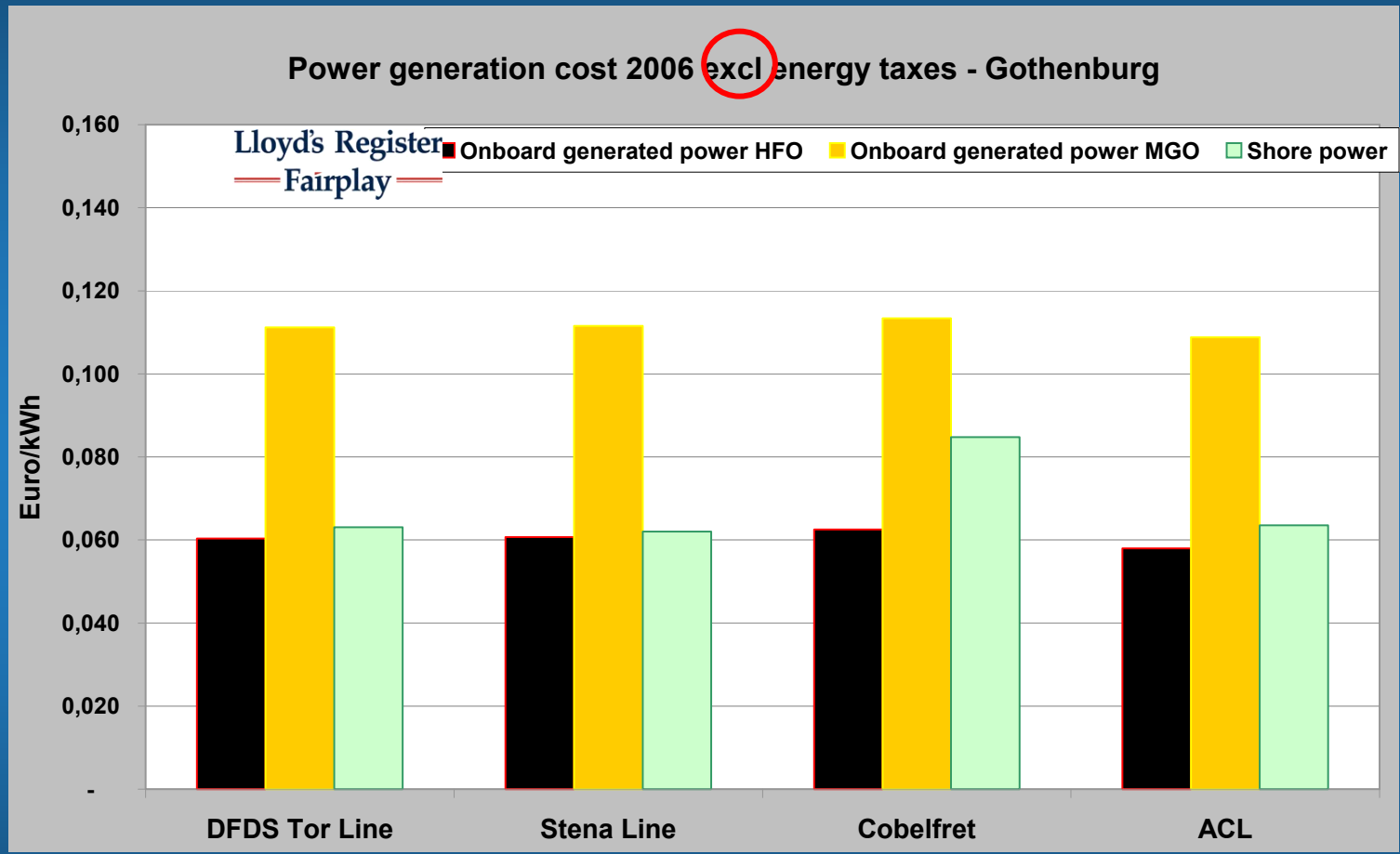
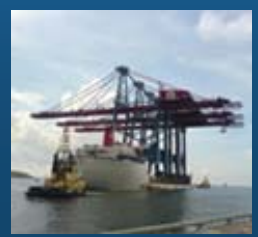
Cost for energy generation





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Comments & conclusions

- The technology for shore-side electricity is available at a reasonable cost
- The external costs are very high
- There is a lot going on worldwide!
- The standardization process has started
- EU and ESPO recommend the promotion of shore-side electricity
- 2010 shore-side electricity will be an alternative to 0,1% sulphur at berth
- Collaboration and clear economic incentives need to be further encouraged






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Cold ironing = hot topic

Åsa Wilske, Environmental Manager in the Port of Göteborg, argues that it is in everyone's interests to switch onto shore-side electricity for ships

'Cold ironing is not a universal measure: it is most effective for those vessels that call frequently at the same port, and for those that have rather long port stops'

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Göteborg is one of the most popular bunkering ports in Europe – both because of the steady flow of traffic to the Baltic and the supply of high-quality, low sulphur bunkers. But it is not just in the provision of low sulphur bunkers that Göteborg is leading the way on environmental issues. Göteborg was the first port in the world to offer high-voltage shore-side electricity for ships – or what in the US is referred to as 'cold ironing'.

Getting started

Stora Enso, one of the world's leading pulp and paper companies, was a prime mover in Göteborg's cold ironing. The company wanted to be environmentally-adjusted in all the links of its supply chain for its paper transports from Sweden to the rest of Europe.

Göteborg was one of the ports competing for Stora Enso's business, and it was determined to put together the greenest and environmentally-smartest offer. Per Lindeberg, the Port's chief electrical engineer, had already been looking at the feasibility of supplying vessels in the port with electricity from a land-based source, instead of running the ships' auxiliary engines. He reasoned that this would cut ships' emissions radically and also reduce the noise – which would benefit both the surrounding environment and also improve the working conditions at the port. Everyone was in favour of the idea – so the challenge was to find a solution that would work. A creative cooperation was developed between the shipowners, **Cobelfret** and **Wagenborg Shipping**, and the supplier of the electrical equipment, **ABB**. The Swedish government contributed with some funding.

The first ship was connected to the new high-voltage supply in January 2000 and it has become a major success. There have been hardly any problems and key benefits – no noise and no air emissions – are much appreciated by the ships' crews and port workers alike.

When it comes to the overall consequences for corporate environment, several independent studies have found that the societal benefits (notably a reduction in health costs and environmental damages) far outweigh the extra costs for the shipowner and the ports. The problem is that the costs are paid from different pockets.

That is why the Port of Göteborg together with one of its customers, **Stena Line**, raised the cold ironing issue with the **European Commission (EC)** and the Swedish government. They clearly met with a positive response, because the EC has recommended the **European Union (EU)** member states to encourage ports to provide electricity for ships at berth. In most cases, the environmental benefits of switching 'considerably exceed' the costs, according to the EC.

The EC recommendation also calls for the development of harmonised international standards and provides guidance on costs, benefits and practicalities of connecting ships to the electricity grid.

This is something that the people from the Port in Göteborg agree with. There have to be standards for voltage level, frequency, electrical outlets and plugs, capacity for the electrical outlets, safety functions, and cable location on board ships and on land. This has been taken up with the **International Maritime Organization (IMO)** and a standardisation process has now started with the **International Organization for Standardization (ISO)**. Stena Line will take the lead on the working group concerning ferries.

When the environmental ministers from North Sea countries met in Göteborg in the spring of 2006, they agreed to introduce economic incentives for the provision of shore-side electricity. The Swedish government took the lead by promising a tax exemption for the electricity delivered to ships using shore side electricity, something that the shipowners and the port are still anxiously waiting for.

The tax exemption makes the measure much more interesting because, according to a calculation made by **Lloyd's Register's** *Fairplay* for the Port of Göteborg in 2006, the total cost to the shipowner and the port for using shore side electricity was about the same as using solely bunker fuel – at least this held good for Swedish price conditions at that time.

It is even more interesting to speculate how the cost comparisons will change in three years' time, when ships will be required to burn either 0.1 % sulphur distillate fuel or use shore side electricity during their port stops. When this happens, there could be an

electrical rush in European ports. We have therefore recommended that all new quays at the port should be equipped to provide for shore-side electricity – and we would like to see other ports following a similar policy too.

National grid

Shore-side electricity means providing electricity to ships at berth in ports from the national grid – instead of ships producing electricity using their own auxiliary or main engines. This power is not just for lighting, but also the ships' heating, fans, pumps and so on, which demands quite a lot from the system. When no diesel engine is used there are no emissions and no noise from the diesel engine in the port.

If you compare the overall impact of cold ironing, the environmental effects producing the electricity should also be included and compared with production of the fuel. Several studies have shown that – regardless of what kind of electricity production is used – there is an overall benefit of using shore-side electricity. But to make sure that the project is as environmentally sound as possible, the Port of Göteborg is using a renewable energy source – wind power – for the shore-side electricity.

There are currently four quays in Göteborg that are equipped with shore side electricity; and there are eight ships equipped for – and regularly using – shore-side electricity, including Stena Line ferries. The up-take on cold ironing will continue grow, when the Stora Enso North European Transport Supply System will be fully extended and Port of Göteborg's role as a transport hub will be fully realised.

At the moment, the shore-side electricity in Göteborg is used for roll-on roll-off (roro) vessels and ferries. This is a logical place to start, because cold ironing is most effective when applied to ships making frequent calls to the same port.

Although there are only a few ports in the world currently offering shore-side electricity, the situation is changing fast.

Göteborg's Chief Electrical Engineer, Per Lindeberg, receives telephone calls and emails from ports across the globe, asking about the port's cold ironing operations. We believe that there will soon be quite a few ports ready to offer shore-side electricity. In the US, ports are offering facilities for cruise vessels, container ships and tankers (see *Bunkerspot*, October/November 2006, page 44).

What is the driving force?

You might think that this shore-to-ship electricity feeding method was a result of the tough environmental legislation in Sweden, but this is not the case. It was really an initiative which came from within the shipping industry itself. Environmentally-concerned shipowners have taken up the cause, and it has been developed as a result of the expert technical knowledge of the people at the Port of Göteborg. Looking to the future, the argument for cold ironing could be compelling on both environmental and economic grounds, when the tax exemption on shore-side electricity could make it an cost-effective alternative to burning expensive marine diesel.

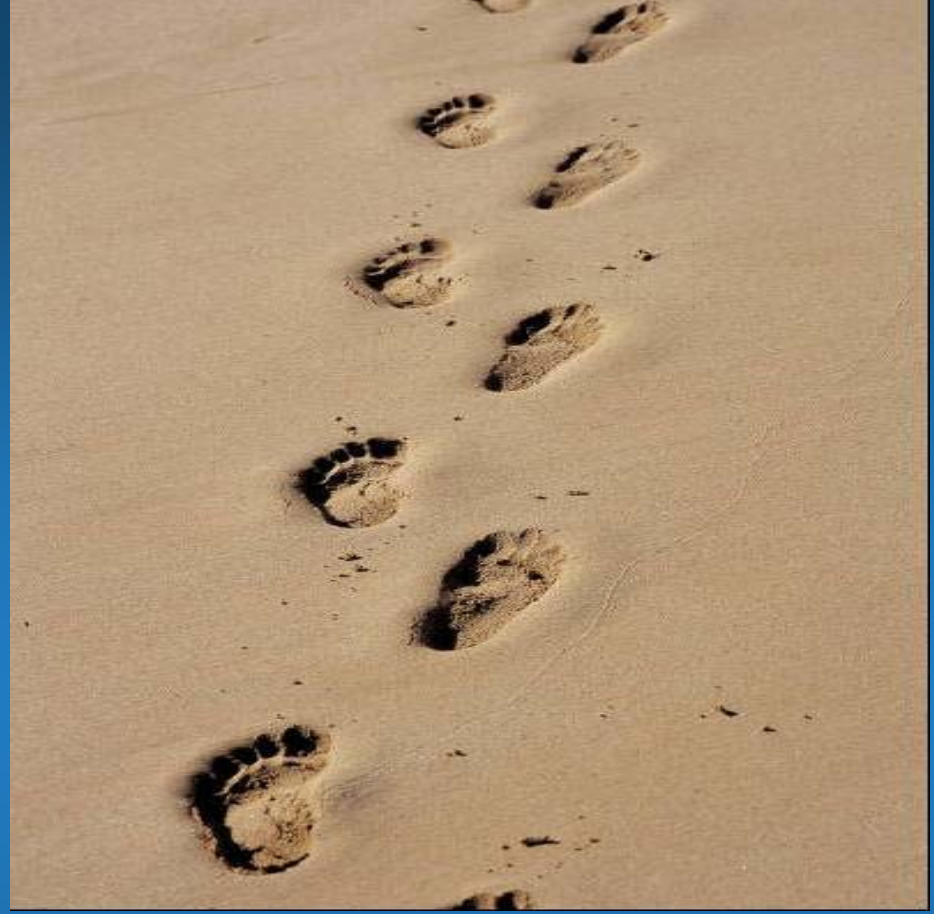
There is no doubt that we do have to take steps to curb emissions. If nothing is done, air pollutants emitted from ships in the EU will exceed all combined land-based sources by 2020. The level of air pollutants in many EU port areas exceeds the agreed limits – and ships' emissions have contributed to this. These facts will probably push up the demand even more for shore-to-ship electricity-feeding systems.

What about the future?

The Port of Göteborg is convinced that shore side electricity will be an important part of its plan to take a leading position in northern Europe. Ports' expansion and increasing production must be brought about in a sustainable way, and offering smart solutions for the shipowner is key to this development.

However, it is important to use and to develop cold ironing in the right way.

We must continue to set standards for the equipment in order to avoid a jungle of different kind of plugs, frequencies, safety regulations and so forth. Furthermore, it must be understood that cold ironing is not a universal measure: it is most effective for those vessels that call frequently at the same port, and for those that have rather long port stops. However, calculations for the port of Göteborg show that 1% of the vessels are responsible for more than 10% of the emissions. So it is clear that if cold ironing is applied appropriately it can make a significant contribution to improving air quality.



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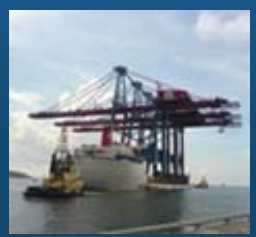



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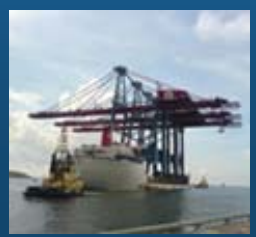
Cable connected to the vessel



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Connection point at the quay

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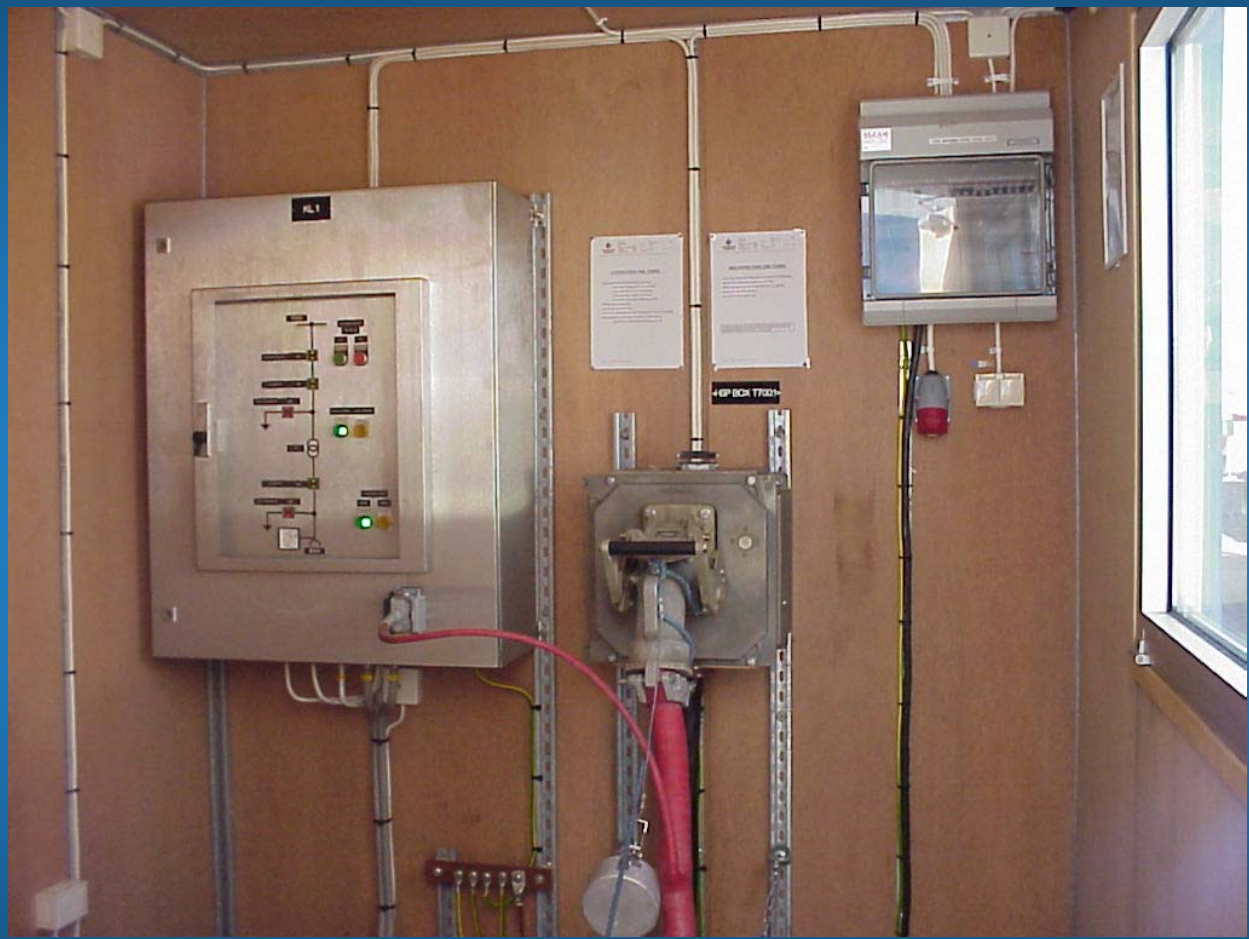
Outlet at the quay, connection point



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The former Environmental Minister Lena Sommestad

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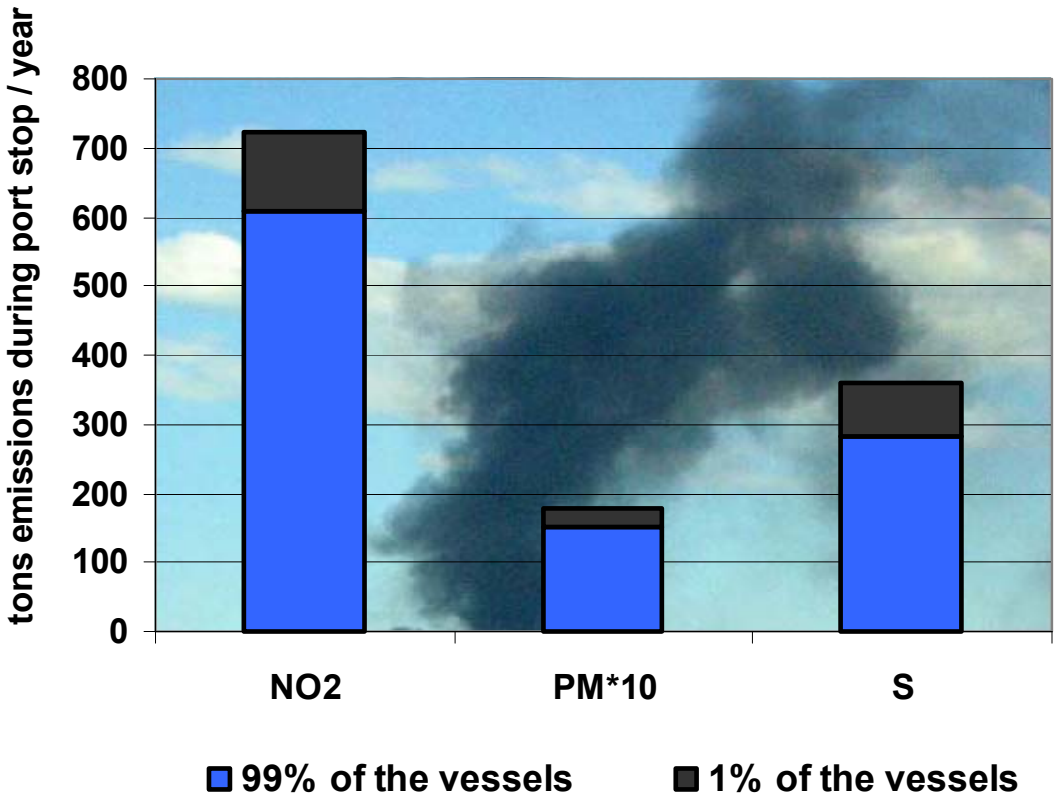
Vessels calling Port of Göteborg





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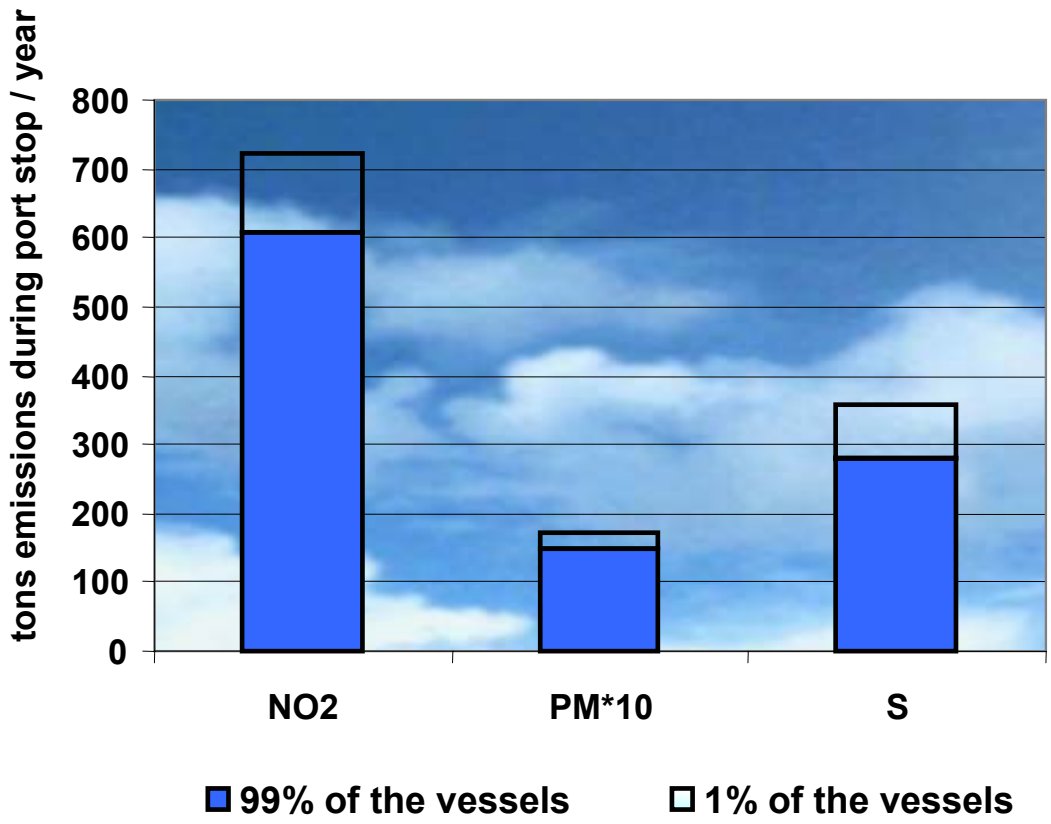
Vessels calling Port of Göteborg





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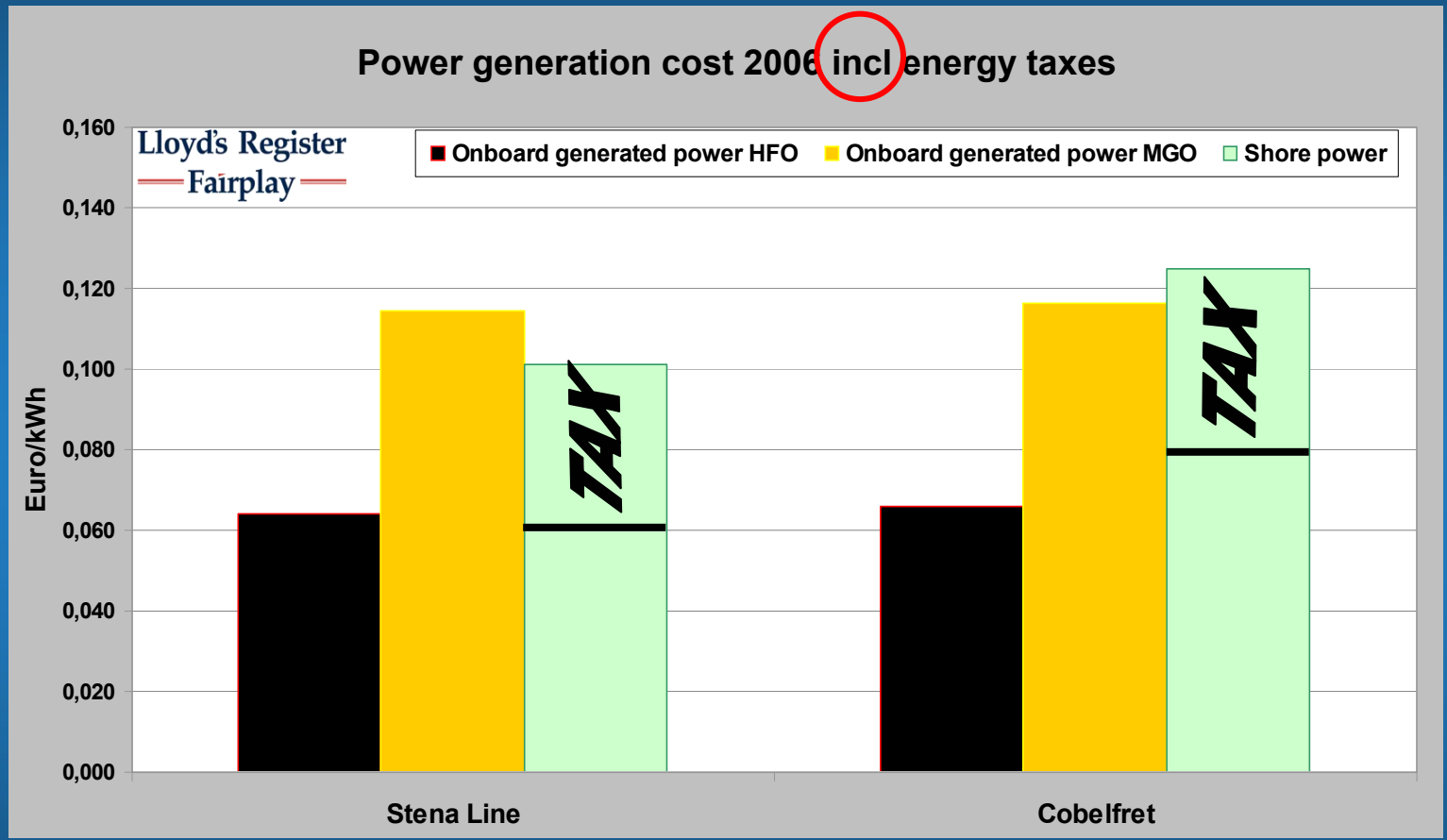
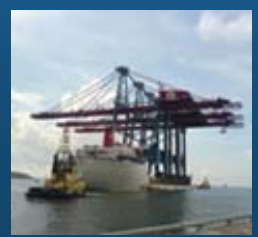
Cost for energy generation





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Elements for standardization

1. Voltage level
2. Frequency
3. Electrical outlets and plugs
4. Capacity for the electrical outlets?
5. Safety functions (relay safety, personal safety, weather protections, etc.)
6. The cable location (on board and/or on land)
7. Connection point on board
8. Connection point at the quay






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Experiences so far

- First equipment for high voltage was installed in year 2000
- No functional problems at all
- No extra personnel
- Noise reduction appreciated by the personnel on board and in the port
- No restrictions when bunkering






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