

# Newsletter 2014 - 7

2014-12-24

## Magnetic-train Scandinavia



### News

Welcome to the only inter-Nordic newsletter about magnetic-trains.

#### Sweden

Change of plans and increasing uncertainty surrounding the "västlänken". Also increasing questioning how Copenhagen to Oslo train will traverse the tunnel. [Link](#)

#### Denmark

IC4 assessments by Prose the report is very important in the Danish press. More and more aspects shows weaknesses and errors that were not expected of a so new train is identified. The DK IC4 report given several politicians and DK industry significant worries ([link 1](#) and [2](#))

"Togfonden" (the train foundation) in DK which would update large parts of the rail network – suffering due to that financing predicted oil price of \$131. A new railway bridge "Velje fjord" is also meeting significant public resistance.



#### International

The EU has made a major new growth plan. The schedule listed [Linked](#).

A large first initial list of potential EU support projects have been prepared, and magnetic train group has initiated dialogue with the parties involved in this process.

The list contains many railway and highway projects are now focusing on getting supplied with analysis and feasibility study projects on, including maglev-train system. Initially supplying with a list of possible project and technologies to analyze.

The initial work is characterized by that not many in the sector knows about maglev-technology and the benefits it can provide for the Nordic countries and the EU.

### Rio de Janeiro University maglev demonstration track



*Series – Magnetic trains around the globe*  
The track was demonstrated on the world maglev conformance earlier this year to great success [Link](#). The trains consist of very short module, only about 2 meters a piece. Several modules have been made and tested in different configurations. This track is very similar to the ambitious Chinese long term demonstrator for very high speed maglev, around 3000km/h. But the Cobra system is a lot more mature and its almost ready for real life use. When Brazil started the preparation for the **Olympic Games 2016** it was obvious that more public transport was needed, one concept that was put forward was a maglev link linking the southern large cities. A permanent magnet test-track was developed in 2012 named the cobra. To the maglev conference in Rio 2014 was expanded to a full scale demonstration track.



Image source: [magnetbahnforum](#). The demonstration-track in Rio de Janeiro University.

The track is only a few 100meter long, but fully functional complete with a selection of short trains. Top speed is limited by the short distance, but the system designed for 70-100km/h top speed. A larger system with intercity top speeds is under development. [Link](#) [Link2](#)

### Maglev in the future

2015-2035 development  
We are rapidly approaching a new year. With a new year there is expectations and anticipation of new technology.

New technology could make new opportunity for industry producing components. There is a lot of heavy industry in Scandinavia that produces component that might be suitable for maglev train system, hightech as well as lowtech components.

What secondary advantages can we expect from a maglev network.

#### New DC power-grid

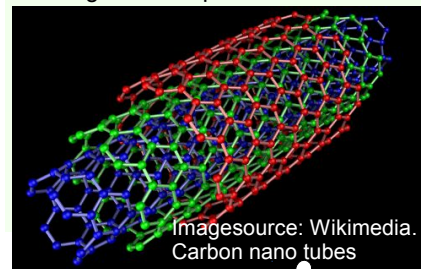
With a advance high voltage cable channel a DC grid can be added for low extra cost. With no extra digging or corridor cost DC power can be added for basicly just the cost of the cable.

The availability of high power DC/DC and DC/AC converter may be the install boast to make a DC grid more available and affordable. Once built it will be almost maintenance free. This give the region a future huge advantages in grid stability and availability

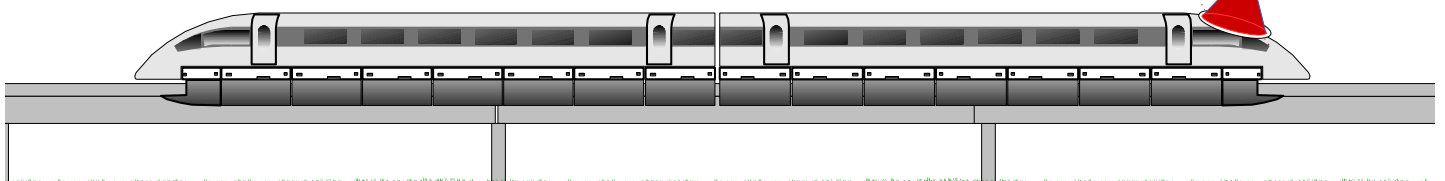
#### Nano-tubes and Grafen

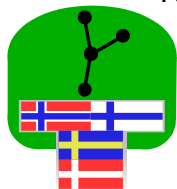
Carbon Nano-tubes is currently being developed for industrial use, Grafen is flowing right behind. With either or both technology's weight can be reduces, carry capacity can be increase and power consumption can be reduced.

Maglev railway is a very high value customer and will probably stimulate development in the area as well as act as a high volume high payoff first large and medium scale customer. Initially high value components on board the train, i.e. induction receivers may be implemented, secondly high value and larger volume lifting-magnets, and finally medium value and high volume long-stator driving magnets may be the first high volume product.



Imagesource: Wikimedia. Carbon nano tubes





**New factory in Scandinavia**

With a future network expansion and aging of the system the trains will need to be replaced and the performance may be increased. Maglev trains is considered very high value but relatively low volume. A maglev-car is about 3-4 time the value of a high speed one, but does 3-4 the amount of work. This makes it harder for Asian high volume producers to compete with high quality and value Scandinavian producers, giving local companies a future possible edge.

**Expanding job market**

With shorter travel time and lower traveling cost expand the job market. This not only makes it easier to find job and housing, but also makes it easier for medium and small city companies to find high skill-level employers that have a possibility to commute. Business traveler that use to take half a week may only take half a day, decreasing allowance for business travelers and increasing productivity. Low cost per square meter may also make it possible for traveler to work in first class to do classified work securely and safely with low risk of espionage.

**New, green, frequent and high speed travel**

With low cost and high speed there may be a large scale switch from air travel to rail travel leisure travelers This may decrease the amount of energy needed quite significantly. The energy need is slashed by a order of magnitude compared to best case air travel. Inner city environment may also be significantly improved due to direct intercity connection making connecting by taxi obsolete

**High strength concrete**

Future maglev building will push the envelope of whats possible, spawning new building technologies due to high value infrastructure. This is only possible due to maglev because small maintenance cost makes more funds available to new projects. This combined with ultra-quiete community traffic allows for a complete rethink of intercity urban areas with dens planing and fast accessible travel.

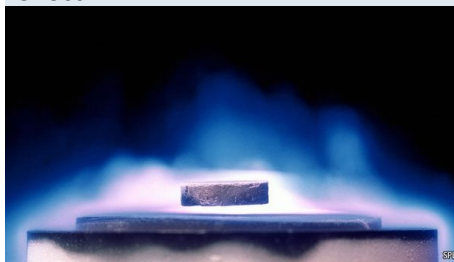
**New power electronics**

Maglev technology will further boost innovation the development of high voltage high amperage power electronics. Even a small saving in power consumption frees up large amount of funds for new and better components. Every new generation will free up further amount of funds to develop the next one. The main loss in a maglev system is located in the power electronics The upside to this inefficiency is that there is a huge margin for improvement in the power electronics. Making the system even more power efficient than today and in the process supporting our local industries.

**Technology explained**

**How does maglev Cobra works**

Maglev Cobra is the system developed in Brazil. The system is technically a permanent magnet super conducting static suspension train. In contrast to Japanese SC-maglev, the Cobra just uses the superconducting material as a block taking advantages of the Meissner effect.



Meisner effect in action. A permanent magnet floating over a superconductor

Similar to the SC-maglev the superconductor is onboard the train reducing the amount of cooling needed.

The superconductor is embedded in efficient thermal isolation reducing the amount of cooling needed.



Image source: Rio de Janero Federal University. Cross section of the Cobra system

The track uses several rows of permanent magnets. The magnets is organized in a pattern called Halbach array focusing the magnetic field, in turn nearly half the need of expensive permanent magnets, reducing the cost significantly. Because the track uses permanent magnets and the train uses superconductors no power is needed for the track or the train, they are both totally passive, making the levitation system very efficient, using not power what so ever. The down side is that there is no propulsion system. So a secondary system, a normal LIM-system, is installed to propel the train. Because of the train uses only passive technology its really light, reducing the need for high power to propel the train. Square meter by square meter a fully functioning Cobra train is calculated to be about 1/3 of the weight of a high speed maglev train and about 1/5 of a conventional high speed train. The payload can be as high as 50% of the total mass of the vehicle. The cobra could be a efficient fast ultra-quiete and relatively cost efficient alternative to trams in most of Europe.

Welcome 2015

<https://www.facebook.com/MagnettagGotaland>  
<http://ing.dk/debat/magnettog-i-norden-159595>

Contact Denmark and Norway: Ole Rasmussen

Contact Sweden: Mattias Svederberg

