

“Neutrons from Wind” The Energy Inventory of European Spallation Source

Colin Carlile
on behalf of the ESS team



The Öresund - Innovation, Tradition and Innovation

Western Harbor Malmö



The University Town of Lund



The Biomedical Centre Lund



Malmö

Öresund bridge

Copenhagen

Lund

MAXIV
&
ESS

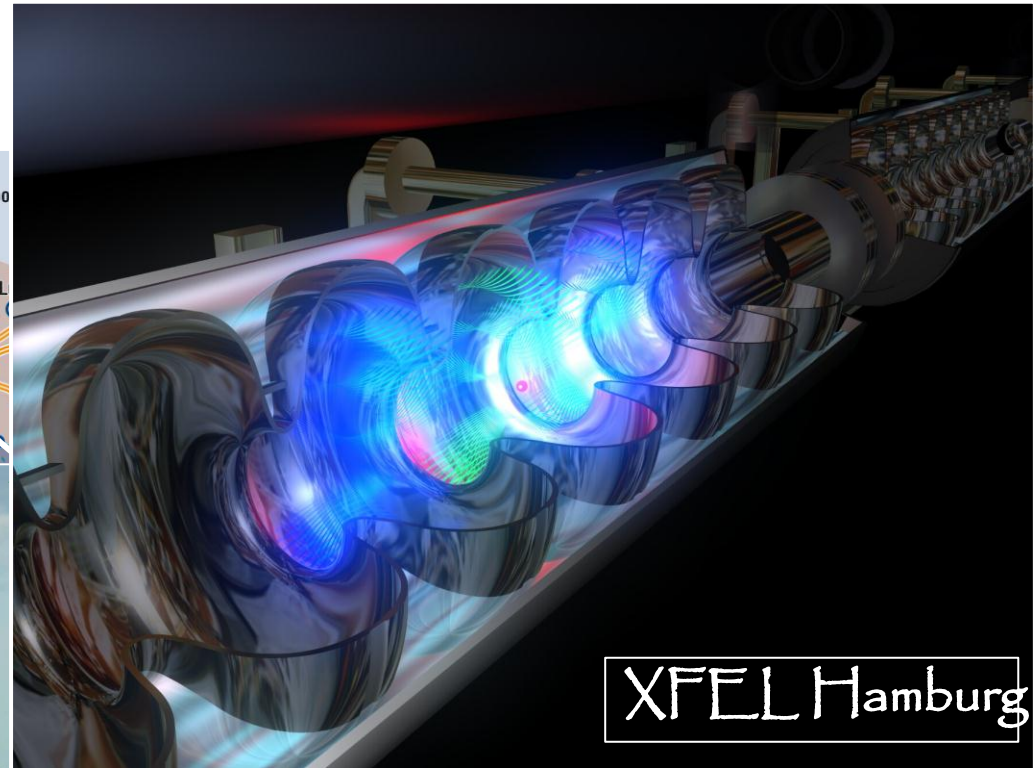
Fast forward
to this in 2019



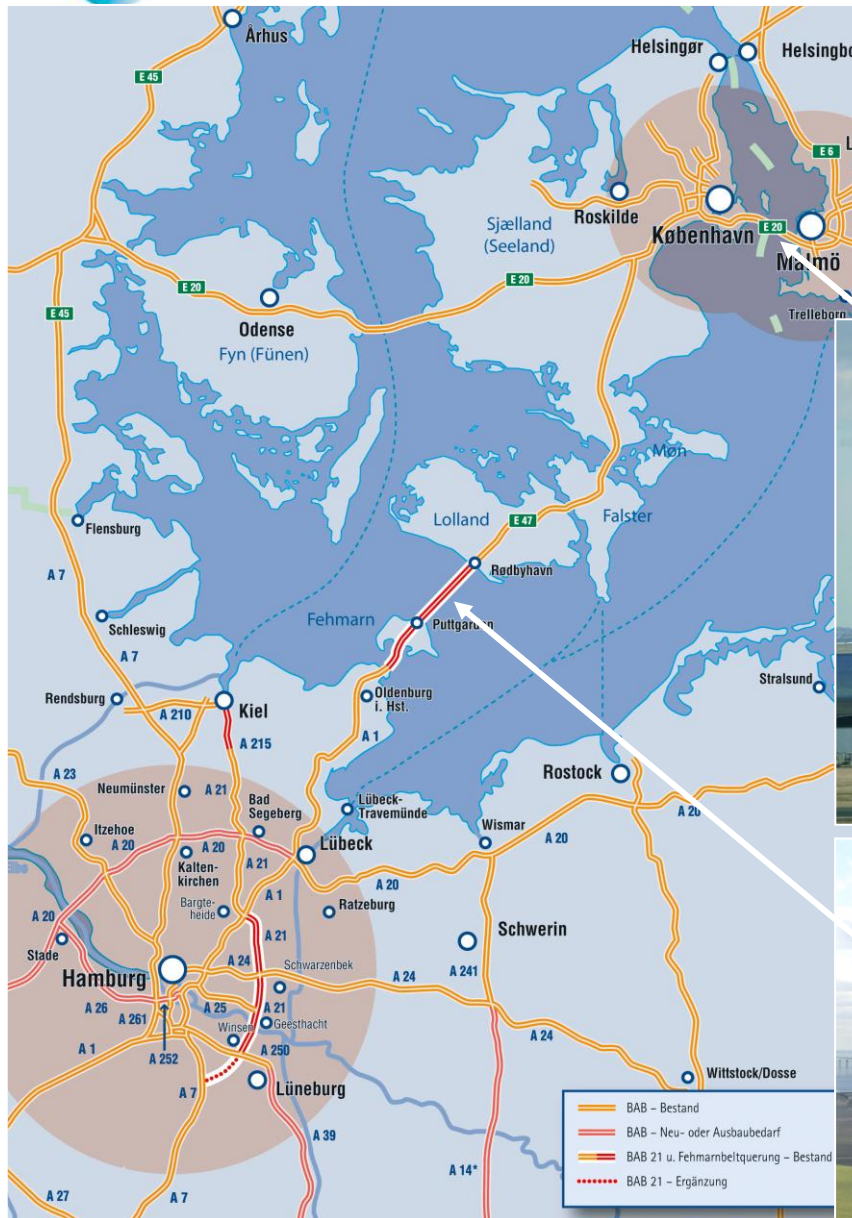


EUROPEAN
SPALLATION
SOURCE

Bridging ESS to XFEL

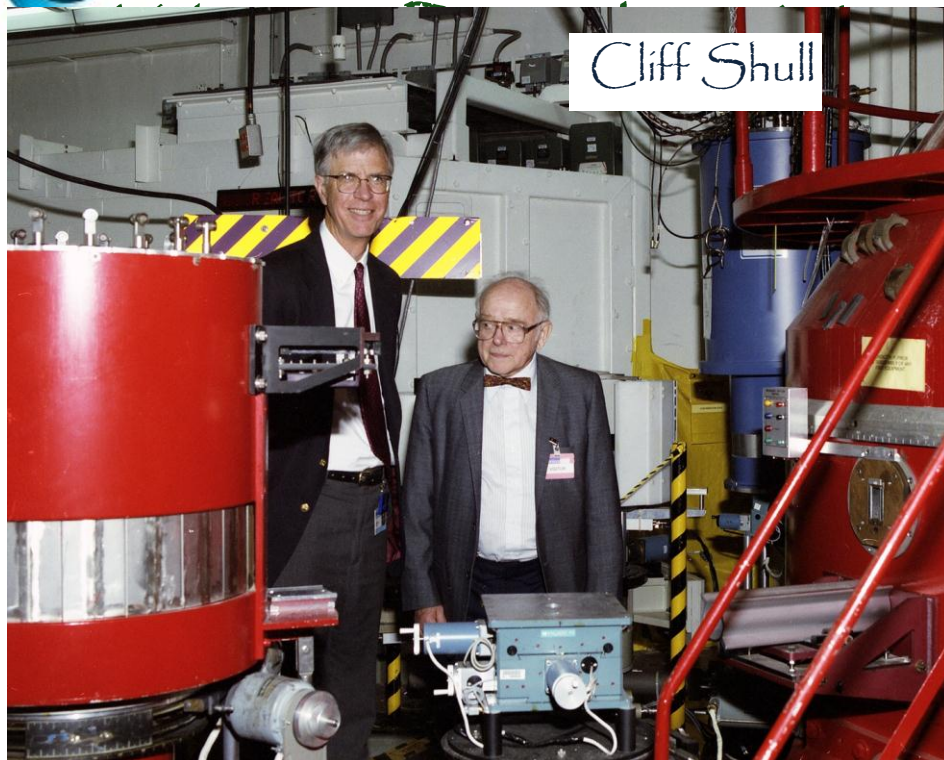


The Fehmarn Tunnel 2018



Neutrons are beautiful !

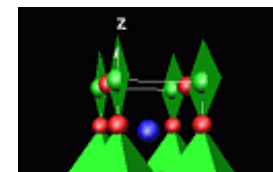
Cliff Shull



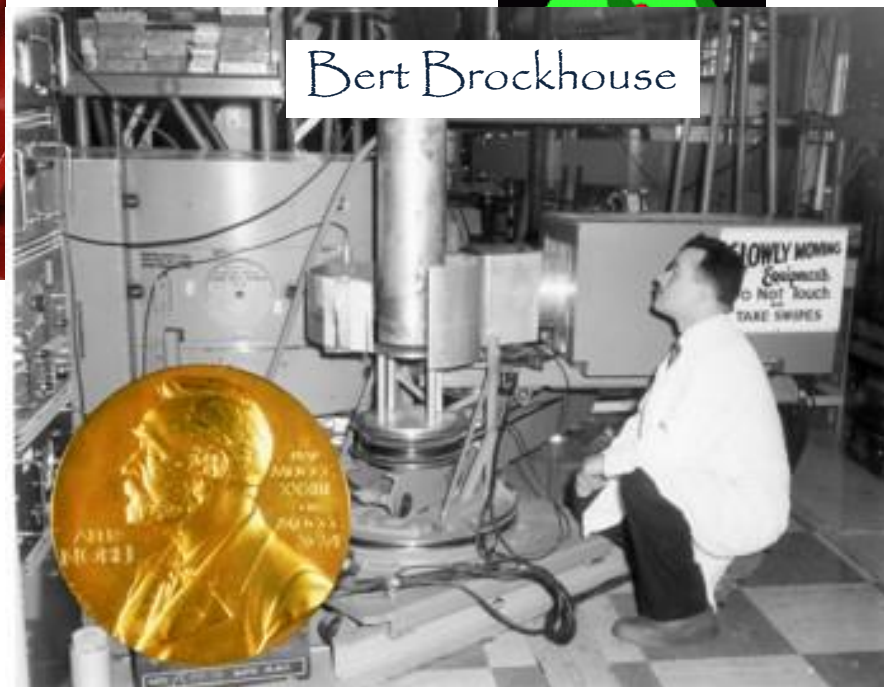
Spectrometers - Measure dynamics
- What atoms and molecules do

1 ~ 80 meV

Magnetic moment Neutral



Bert Brockhouse



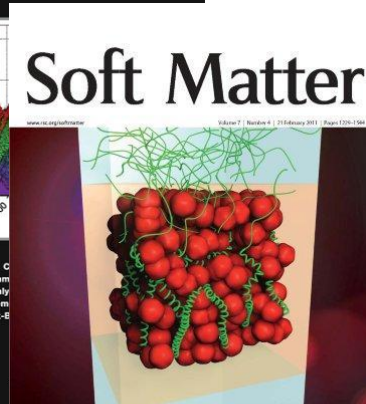
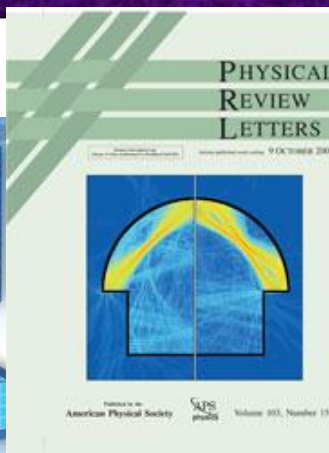
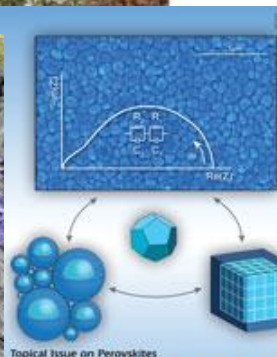
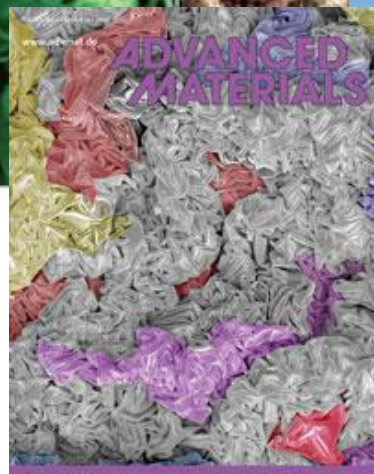
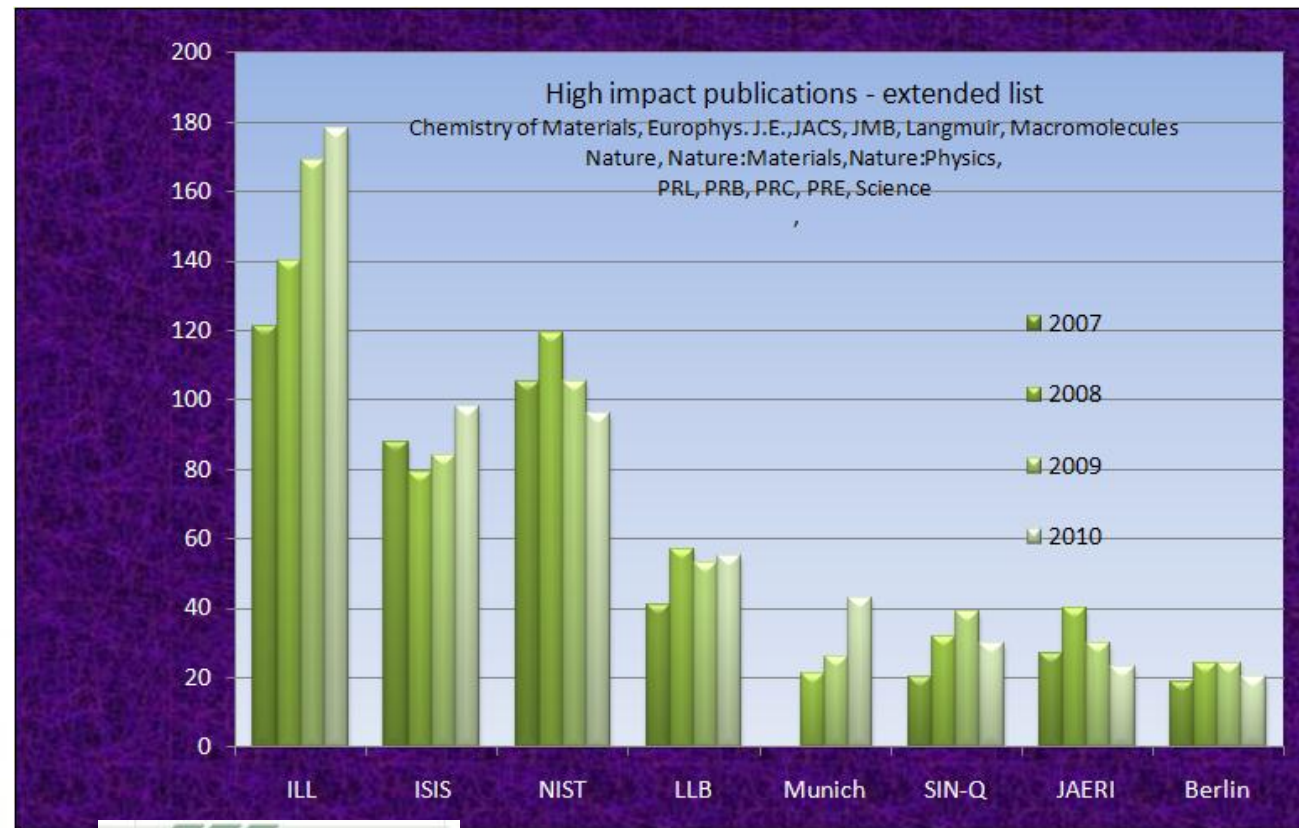
Neutrons are the Swiss Army Knife of Analytic techniques



Thanks to Dimitri Argyriou

This is our
primary
product

“Small science at big facilities”



CJ Carlife



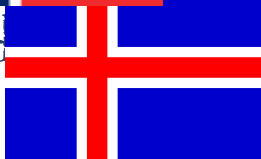
ESS has got the Partners

Sweden, Denmark and Norway
50% of construction costs ~ 1479 M

17 Partners
today



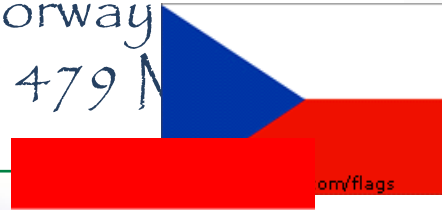
Spain,
Poland



ICRI, Copenhagen, 22nd March 2012

C J Carlile

g 50%



Czech Republic,
Slovakia, Iceland & UK

“The stone Age didn’t end for lack of stone”



2012

Ahmed Zaki Yamani

my phone, my email, my notebook, my calculator, my atlas, my weather,
my camera, my star map, my music, my calendar, my address book...
& my training routine for Lundaloppet !

Packed with new materials !

We have to build the best facilities
with the best instruments
if we are to develop, understand, and harness
New Materials



1995

2030 ?



ESS will be different

- Harness Innovations
- Environmental friendliness
- People-centred
- Energy inventory
- CO₂ neutral

One evening last July ... Our green field site

Issues we face today

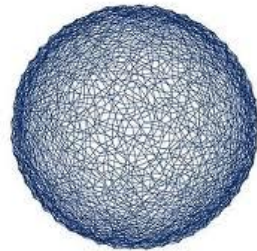
Health & Ageing

aka "The Population Explosion"

Sustainability

Climate Change!

Energy supply & use
Can RIs set an example?



COP15
COPENHAGEN
UN CLIMATE CHANGE CONFERENCE 2009



Cost of solar heater RMB 5,000

Cost of electric heater RMB 2,000

Extra cost for solar heater

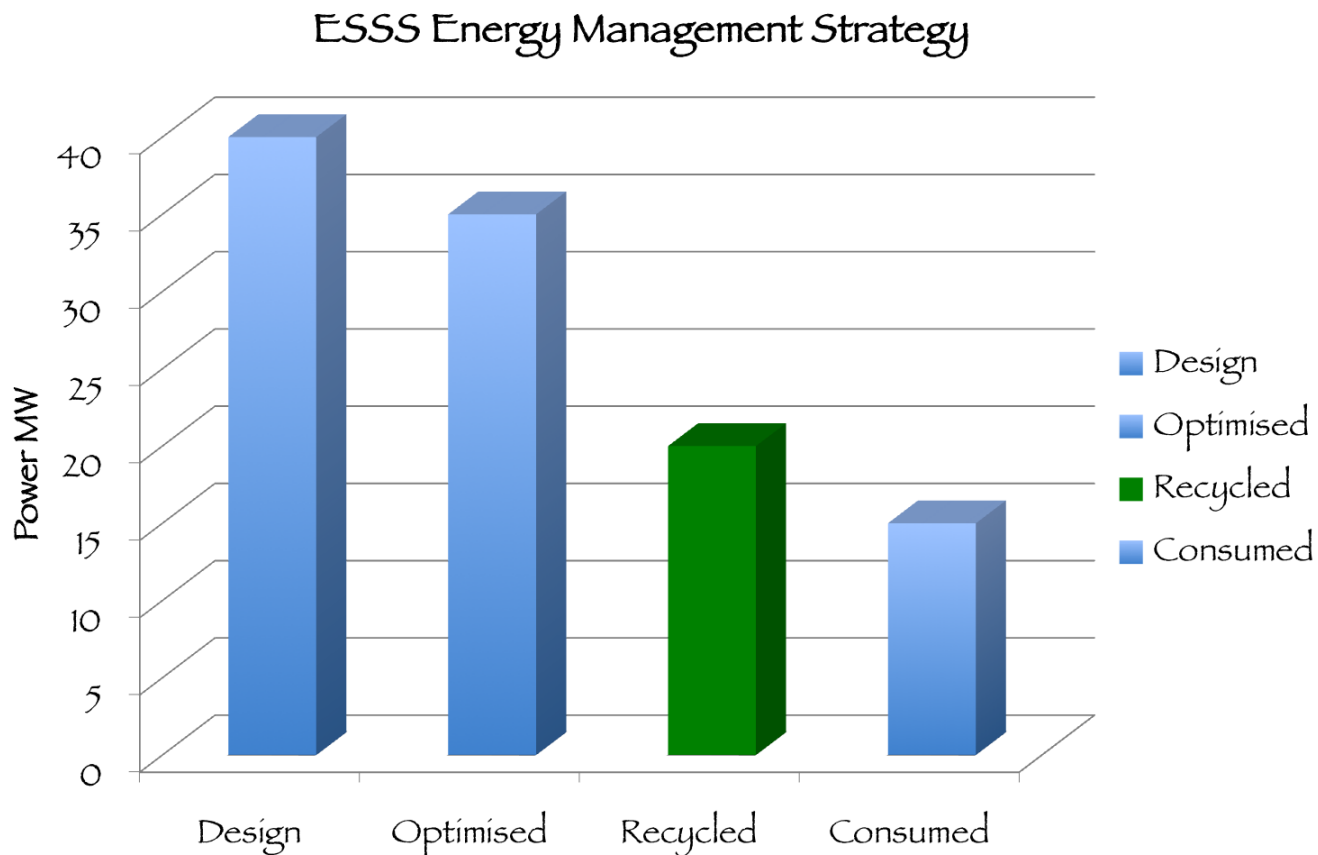
RMB 3,000 yuan

For a house with three people showering and using
full 180 litre tank in one day:
costs about RMB1.5

One year $365 \times 1.5 = \text{RMB } 547.5$

So it takes about 5.5 years to get back extra cost
and then heating costs you nothing! ☺

ESS Energy Management Strategy



Aim to reduce operations costs by ~9 M€ p.a.

Create an energy culture

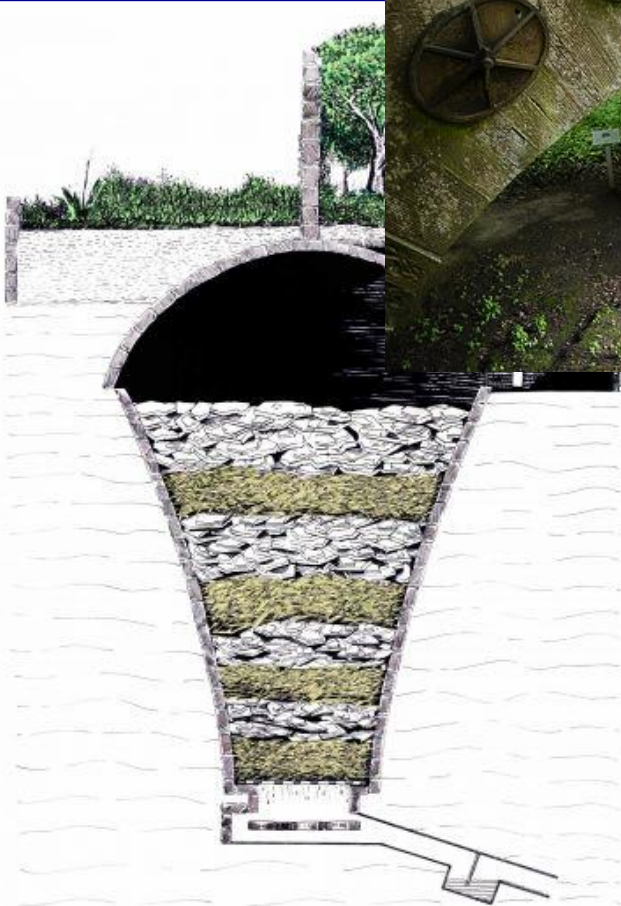
Japanese Restaurant in Kyoto IPAC 10





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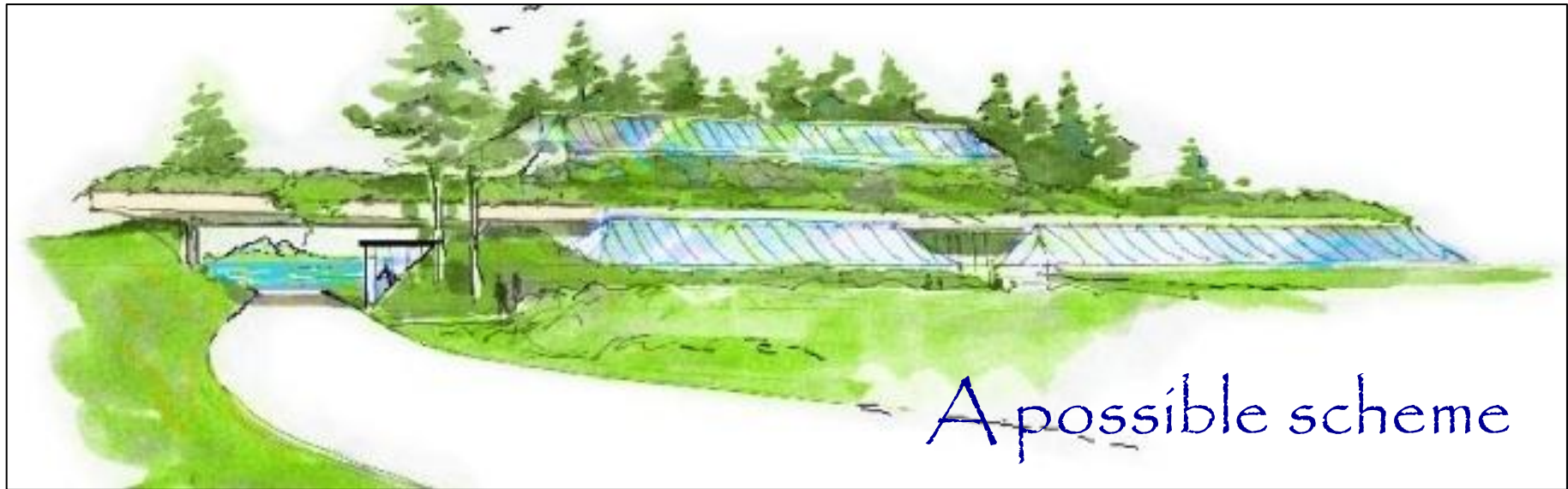
Where do ideas come from?





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Green Roofing



A possible scheme

This is how it is usually done

Electricity consumption:

350 GWhr/year

Electrical Supply

Carbon Dioxide:
150,000 tonne/year

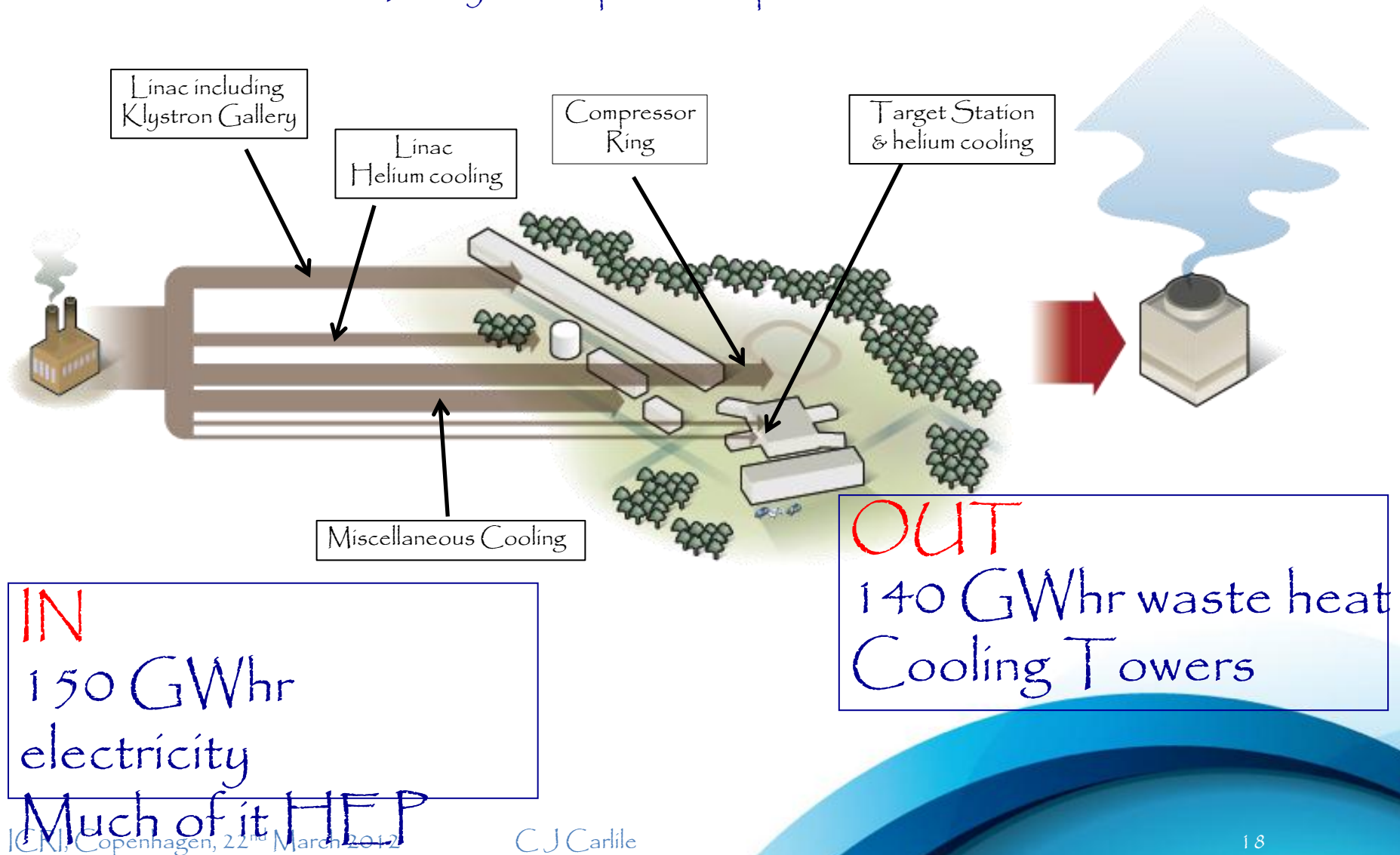
Heating Supply

Carbon Dioxide:
15,000 tonne/year



SNS Energy flow

Today's most powerful spallation source



This is how ESS will do it in 2020

Link to the grid



The diagram illustrates the ESS facility's role in 2020. At the top, a double-headed blue arrow labeled 'Link to the grid' connects the facility to a series of power lines. On the left, a cluster of wind turbines is shown. In the center, a large circular structure represents the ESS facility. To its right, a cityscape with various buildings, a train, and a bus is depicted. On the bottom left, a port area with a ship and a lighthouse is shown. On the bottom right, a large industrial building with a chimney is depicted. Colored arrows (red, orange, blue) indicate the flow of energy and carbon dioxide between these different sectors.

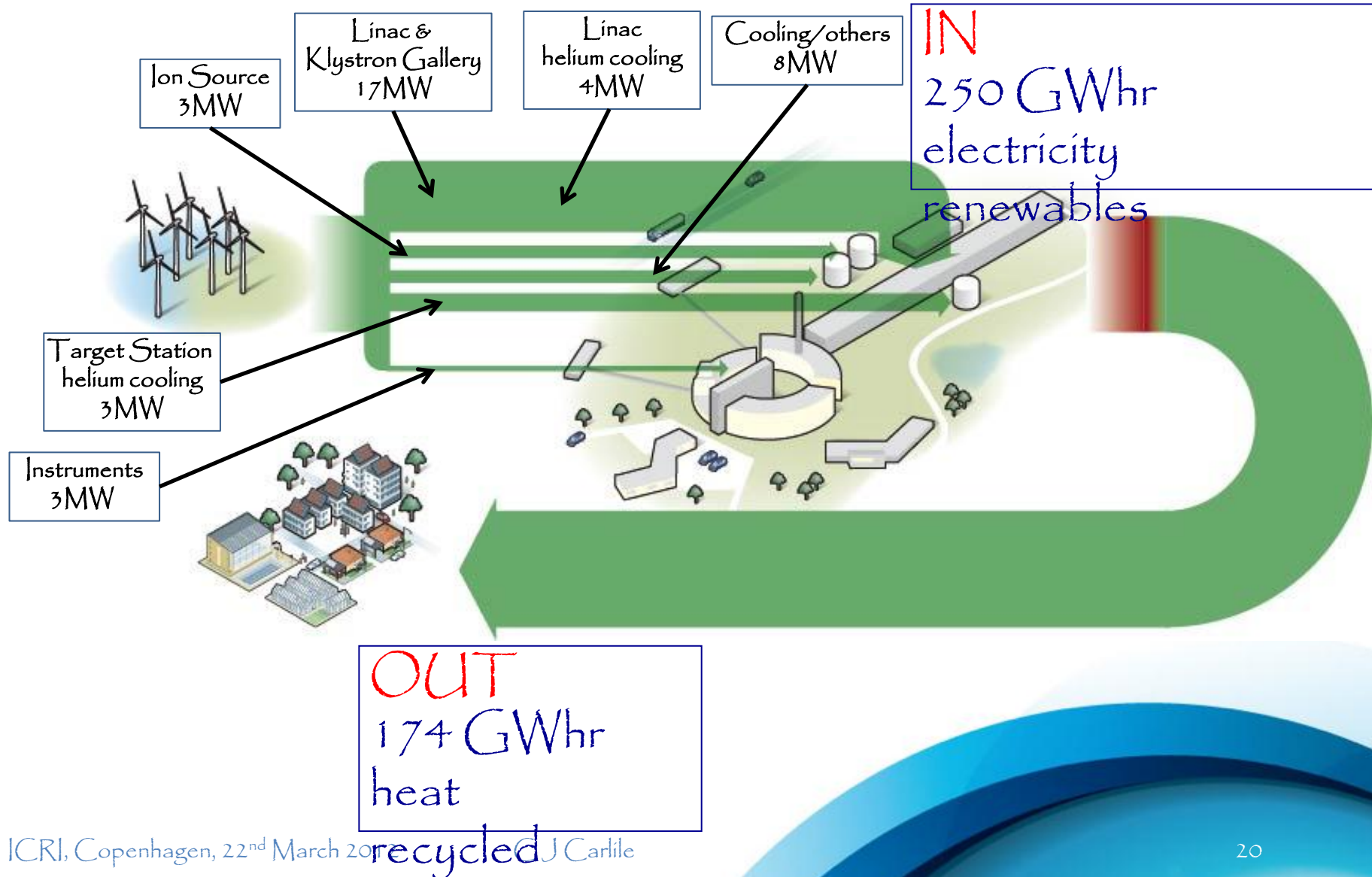
Renewable
Carbon Dioxide:
120,000 tonnes/year
saved

Responsible
Carbon Dioxide
30,000 tonnes/year
saved

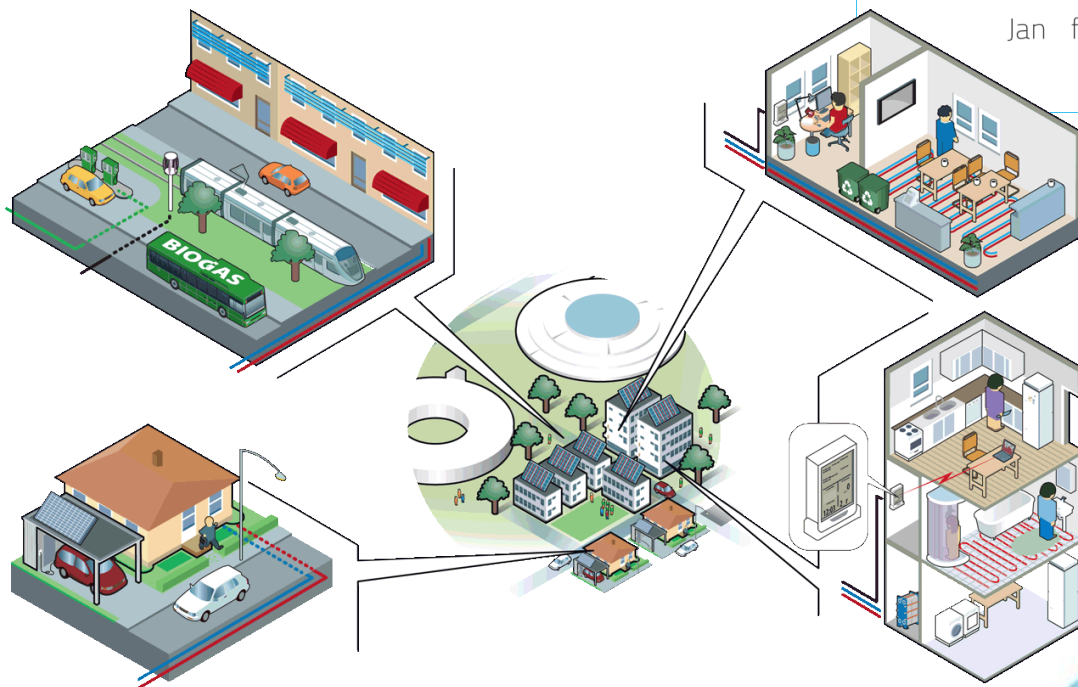
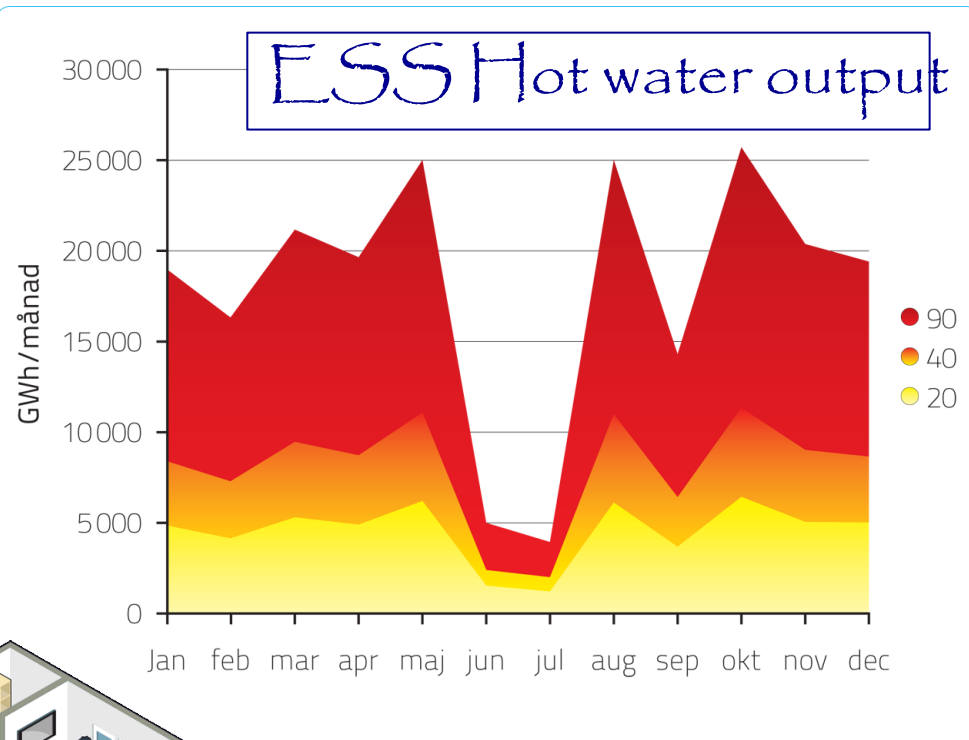
Recyclable
Carbon Dioxide:
15,000 tonnes/year
saved

ESS Energy concept 2011

The world's first sustainable large-scale research facility ?



- ESS's Cooling water
becomes someone else's
Heating water



ESS will provide
20% of Lund's
Heating needs

We are seeking more staff

qualified. M. L. Barker. 1408 Cha
man Blde.

MEN WANTED

for hazardous journey, small wages,
long months of complete
constant danger, safe re-
cess.
honor and recognition
4 Burlington st.

appearing young men of
sonality. between 20 and 30
to work

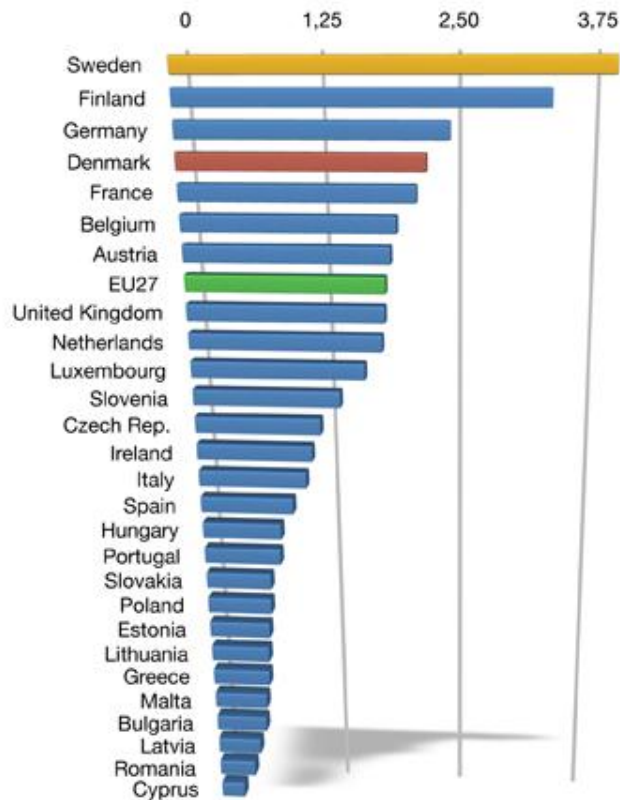
ns avsikt med platsannonsen var att rekrytera personer
ot Sydpolen 1908.



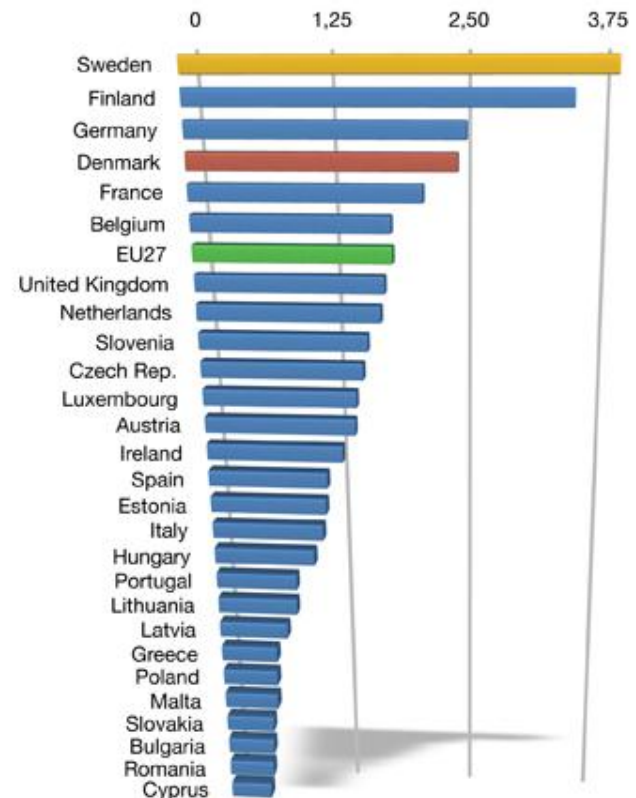
Setting clear goals ?

“Europe will be the world’s leading knowledge-based economy by 2010”, Lisbon 2000. “3% of GDP on R&D by 2010”, Barcelona 2002

2000 1.86%



2006 1.84%



T

ge

It's not th at matters



It's the scoring of them

Ask Lionel Messi





Välkomna!

Bengt Holgersson, styrelseordförande i Lundamark AB



GAMLA STATIONSHUSET LUND C 28/3-18/4 2012 MÅN-FRE 10-17