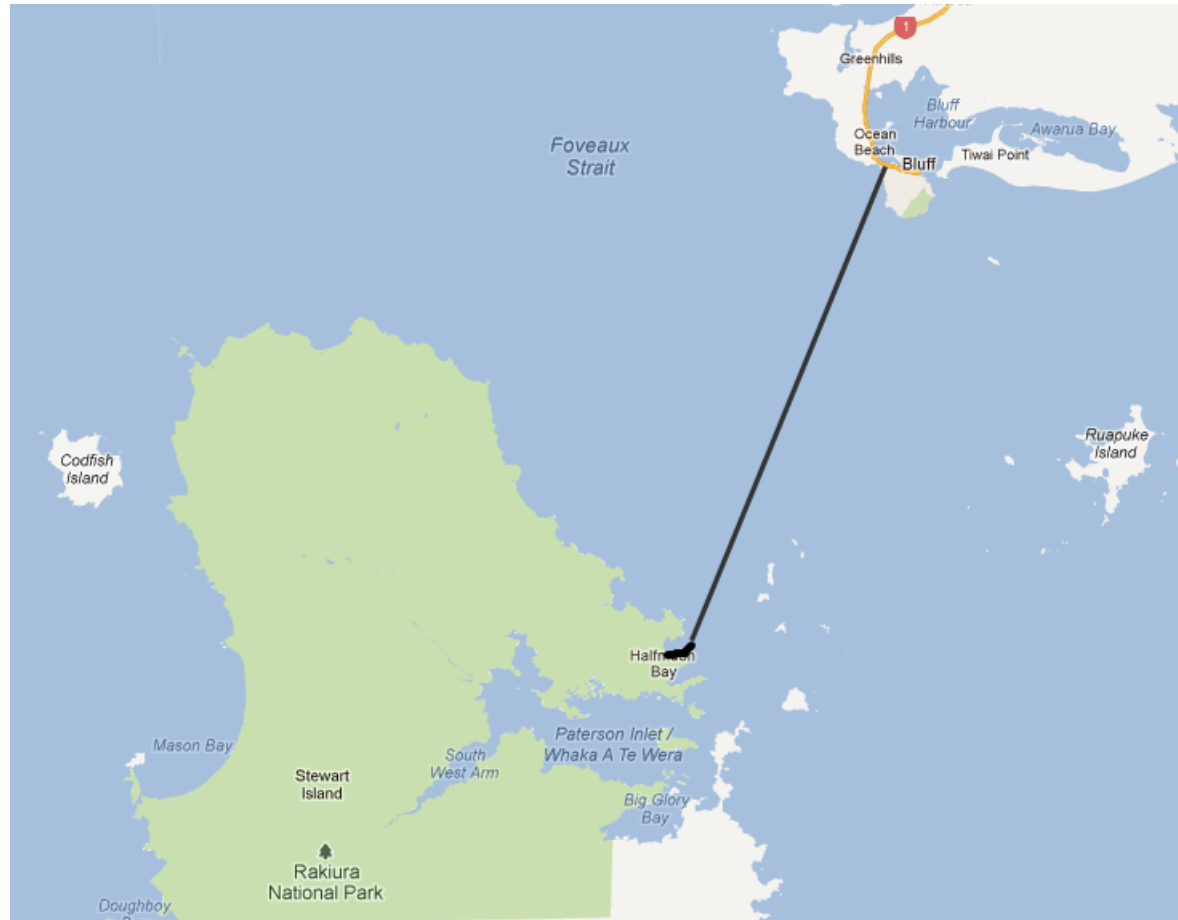
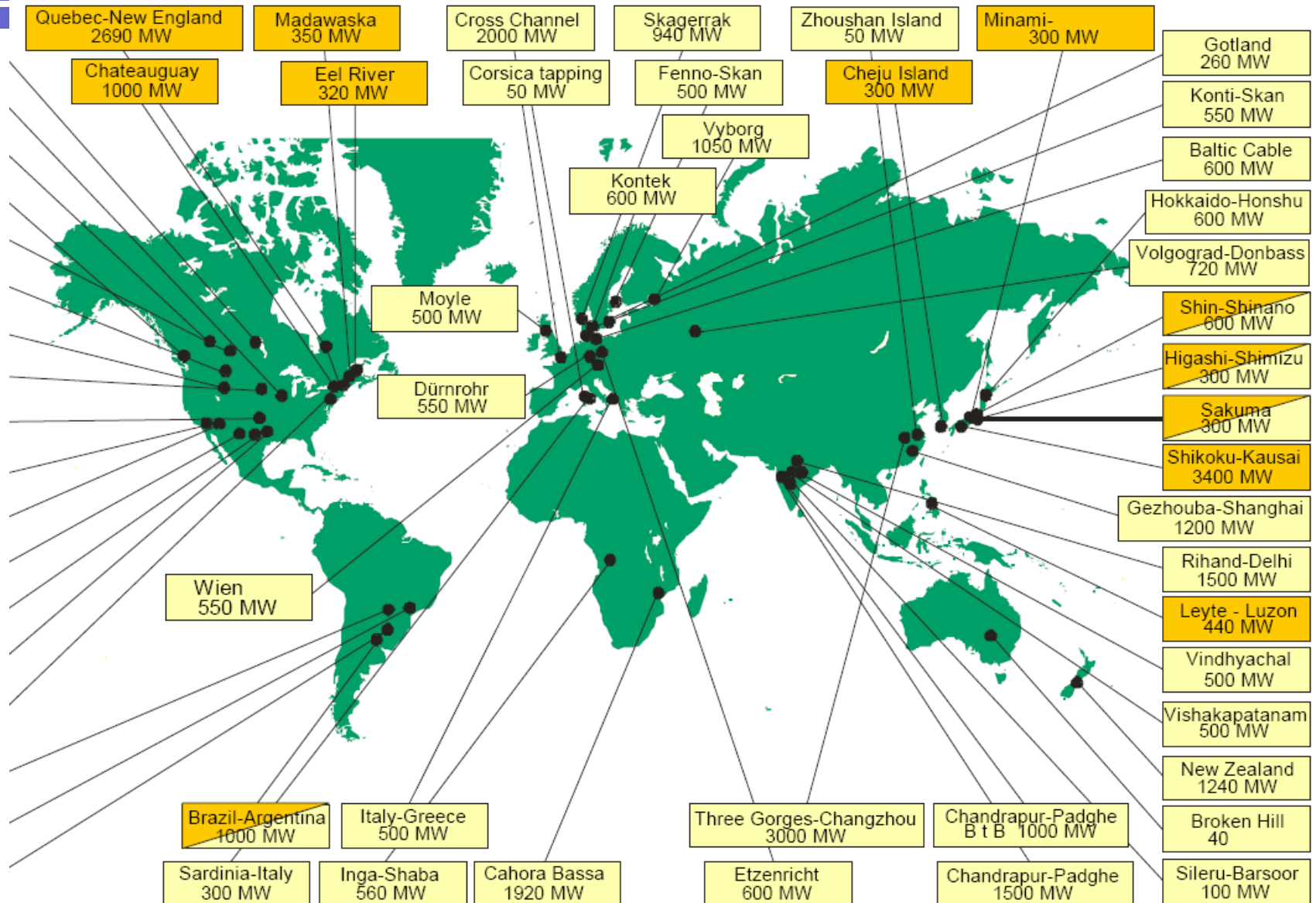


HVDC options

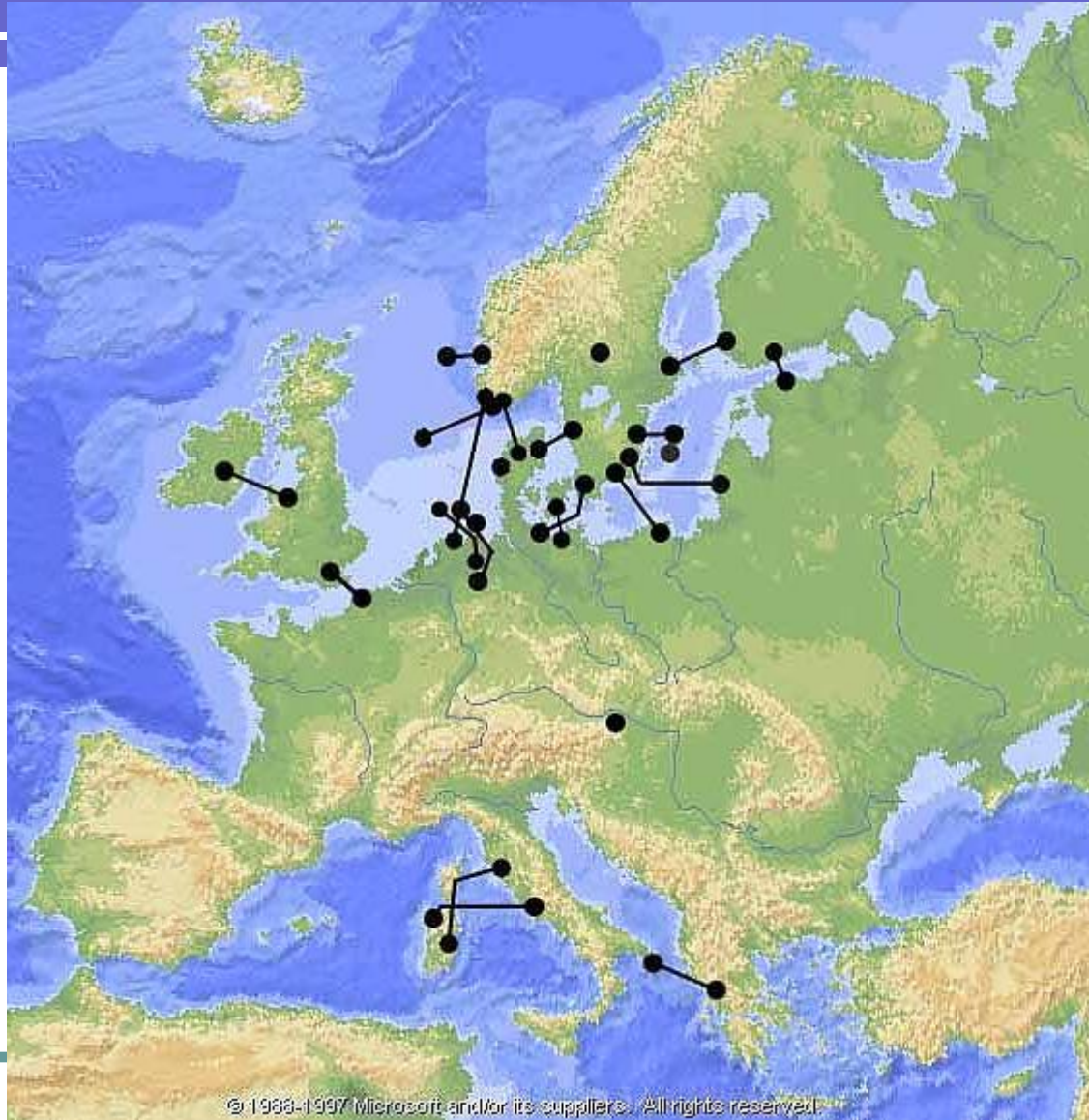


- Strait 35-40 meters deep
- 20km of cable undersea

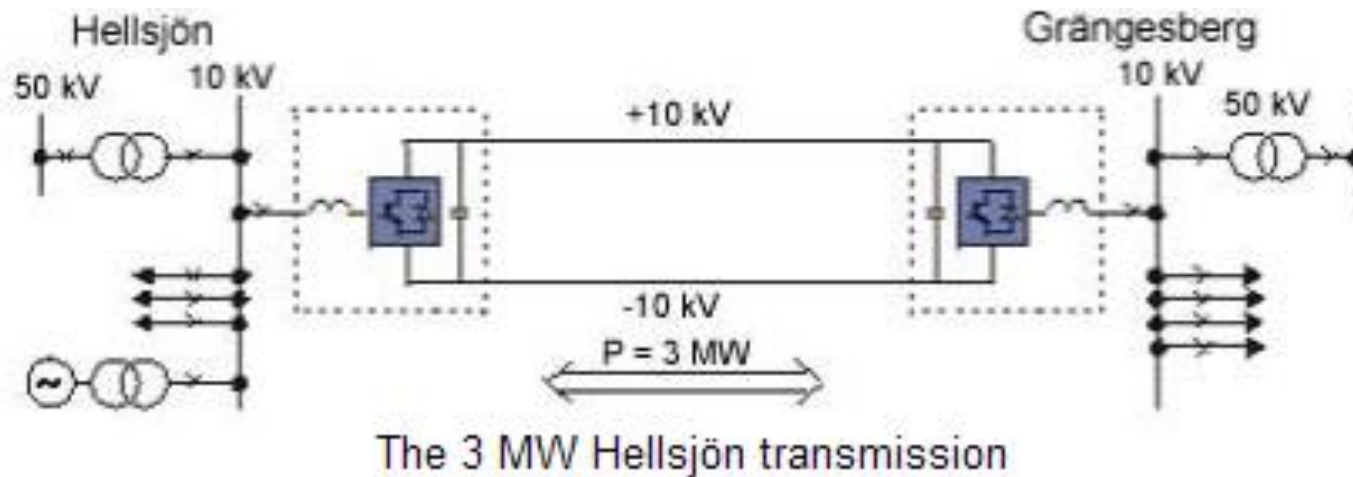
HVDC World



HVDC Europe



Smallest HVDC in world



- 20km
- 10kV
- 3MW



Main data

Commissioning year:	1997
Power rating:	3 MW
No. of poles:	1
AC voltage:	10 kV (both ends)
DC voltage:	± 10 kV
Length of DC overhead line:	10 km
Main reason for choosing HVDC Light:	Test transmission

Troll Platform

- Shore station
- 70km link
- 50MW
- 150kV



Troll Platform

- Offshore end



Grid Stability

- More than one type of generator in a network some distance apart.
- Or AC cable connection to mainland
- Or more than 15% wind generation
- Will have grid stability problems to overcome



Grid Stability

- Voltage falls
- Frequency varies
- Motors burn out
- Lights go out
- Power is unreliable
- Solution is in analysis and design of the system



HVDC Interconnection

- AC to DC converter at Bluff
- DC to AC converter at Half Moon Bay
- Cable under water and buried in sea floor
- Two wires in cable.
- One piece cable – no joins.
- Absolute no dredge zone around cable in Foveaux Strait
- No voltage rise issue
- Fixes grid stability
- Comparable cost to AC connection
- But 5 to 8 year wait for vendors ABB, Siemens
- And Stewart Island load is smaller than previous links



Is AC Cable connection better?

- Substation at Bluff
- Substation at Half Moon Bay
- Cable under water and buried in sea floor
- Three wires
- Cable increases island end voltage at low load
– need to control this with extra equipment or generator on island
- Absolute no dredge zone around cable in Foveaux Strait

Conclusions

- HVDC for marine supplies is mature
- Vendors ABB, Siemens, Rongxin
- AC and DC connection similar costs
- Grid stability will need to be sorted with more than one source of generation
- Absolute no dredge zone around cable in Foveaux Strait