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Managing Uncertainties in CCS: Patterns and/of Finance

IEA International CCS Regulatory Network

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Summary

CCS ‘uncertainties’, Mark Hanna and financial viability

Graphical comparisons

Models of finance

Failure of C markets; validation of state support; or ongoing experimentation (“too soon to say”)?

little evidence to justify going beyond the carbon market” (Delbeke, 2010)



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Uncertainties



Uncertainties, Interlinked

Markusson N and others,

'A Socio-Technical Framework for Assessing the Viability of Carbon Capture and Storage Technology'

(2012) 79 Technological Forecasting and Social Change 903

regulatory, technical, economic, political, societal and financial are **interlinked**

political, policy and regulatory decisions about policy support, carbon prices, carbon reduction goals, liability rules...etc. massively impact on the economic and financial viability and their associated risks. (911)



Finance and Regulation

Regulation - one of few CCS 'success stories':

- encourage or stymie finance
- create mechanisms for finance, i.e. EU ETS/NER 300
- manage risk - investment cost, electricity price, fuel price, operational etc - i.e. CfD
- provide state subvention, i.e. hypothecation

How has it *actually* done so?



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Mapping

Global CCS Map:

<http://www.sccs.org.uk/expertise/map.html>



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- ☒ World
- ☐ North America
- ☐ Europe
- ☐ Africa
- ☐ South America
- ☐ Australia
- ☐ Asia

- ☒ Status
- ☐ Fuel
- ☐ Storage
- ☐ Source
- ☐ Capture
- ☐ Injection

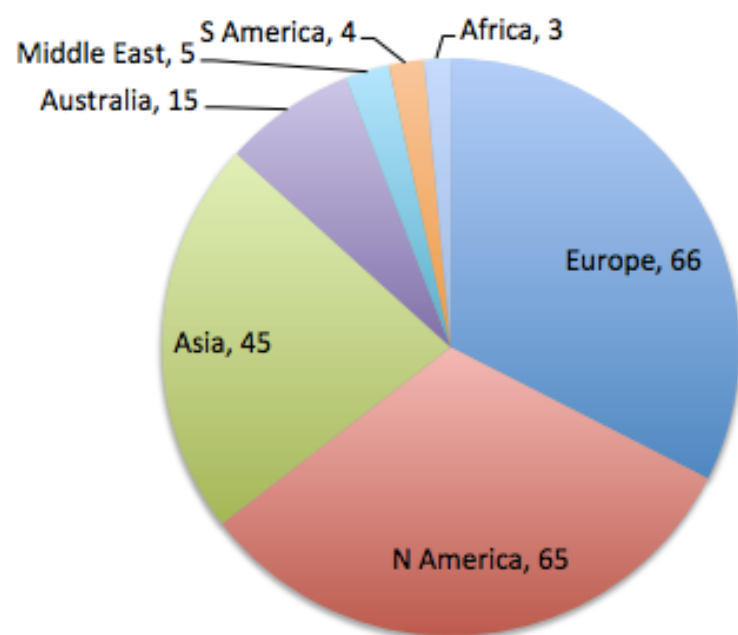
- ☒ In Planning
- ☐ Cancelled or Dormant
- ☐ Pilot
- ☒ Operational
- ☐ Finished

Global CCS Projects: Snapshot

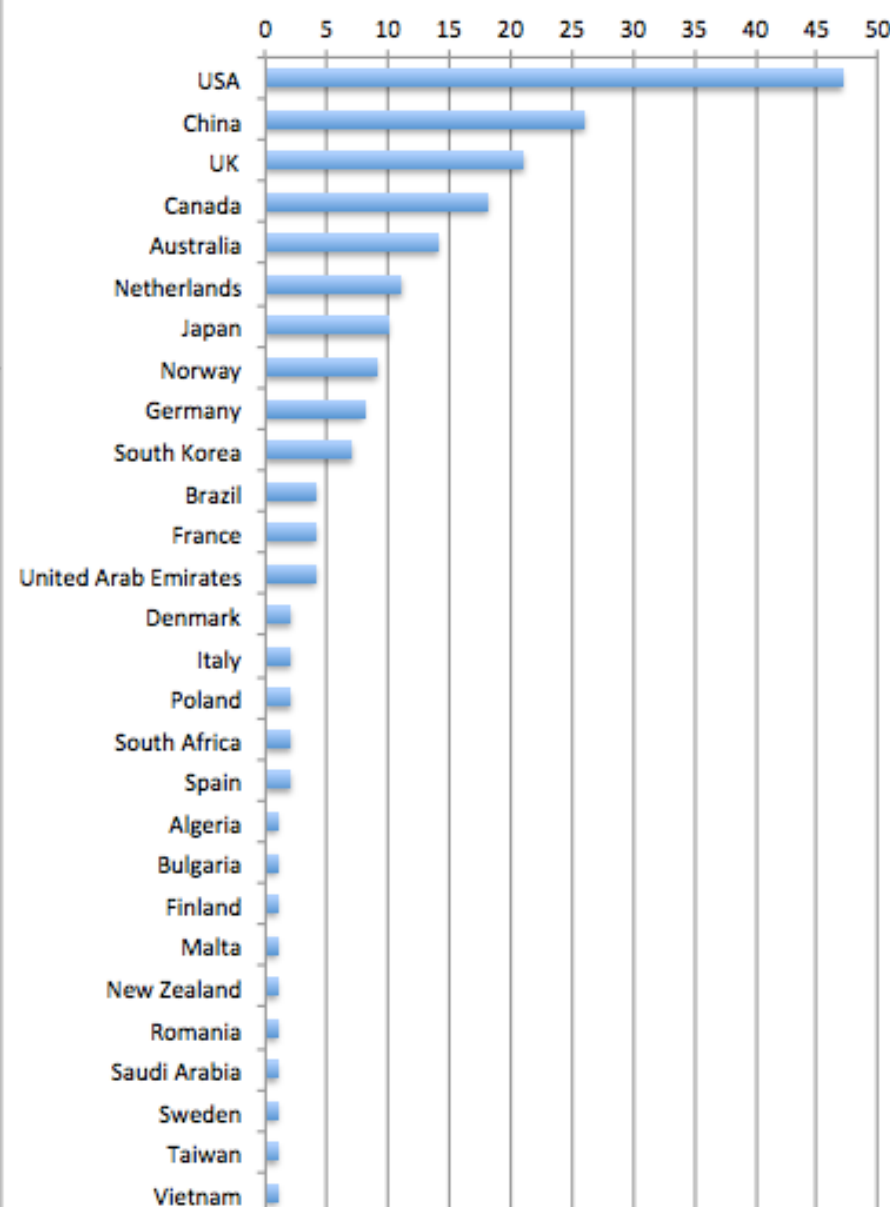
- Database analysed at end March 2014
- Total 203 entries



Number of CCS projects by continent



Number of Projects by Country





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'Status' Europe



- ☐ World
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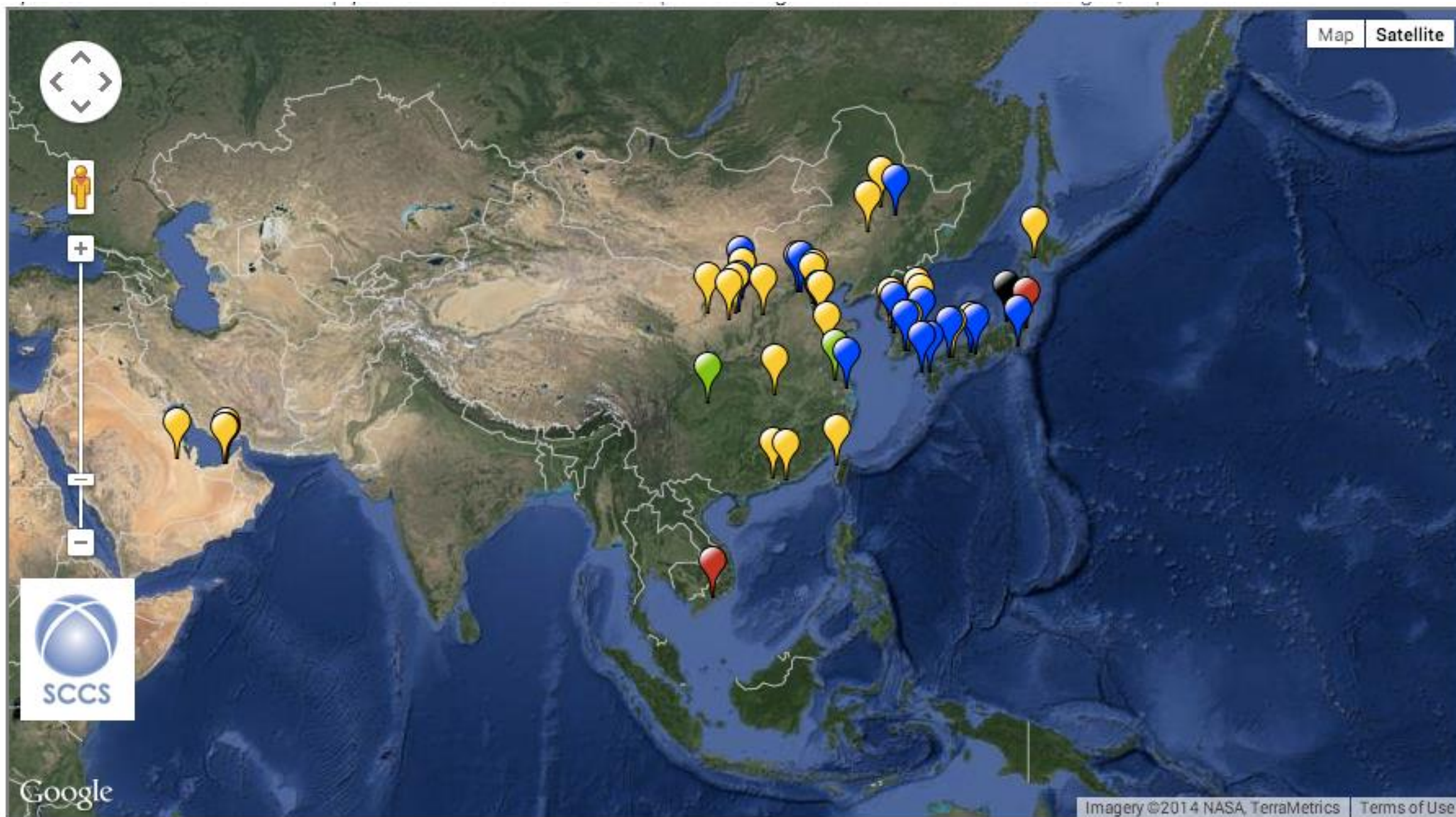
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'Status' (NE) Asia



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'Status' N America

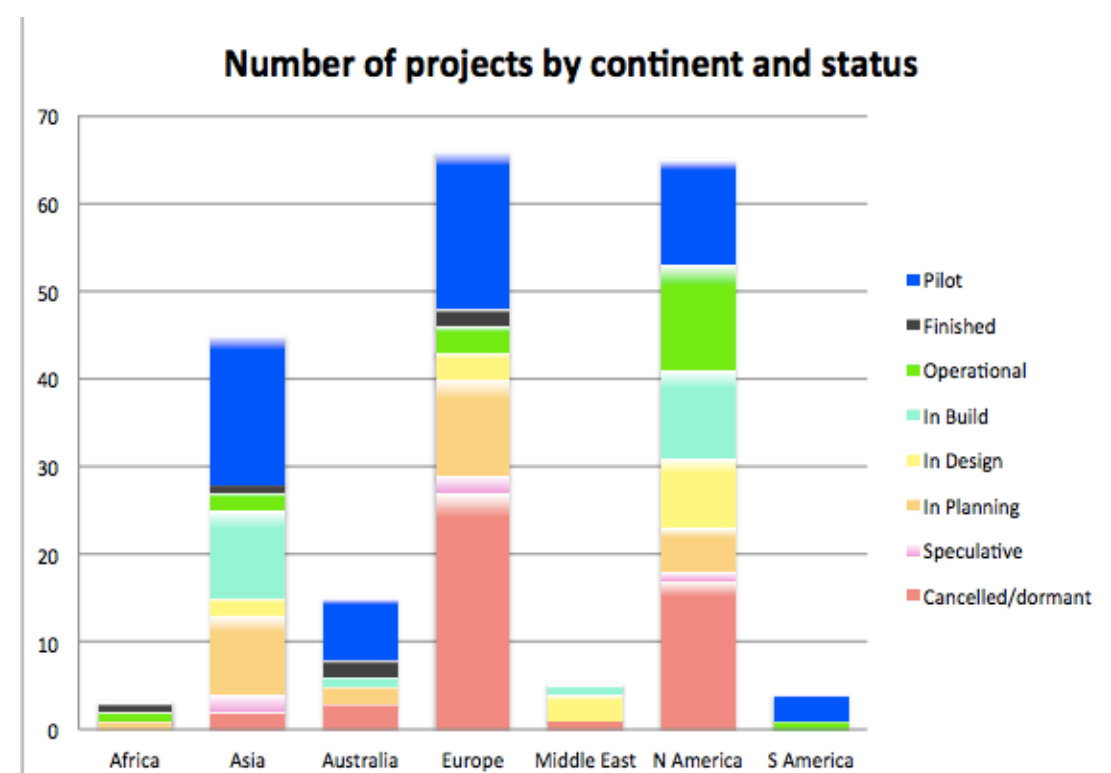
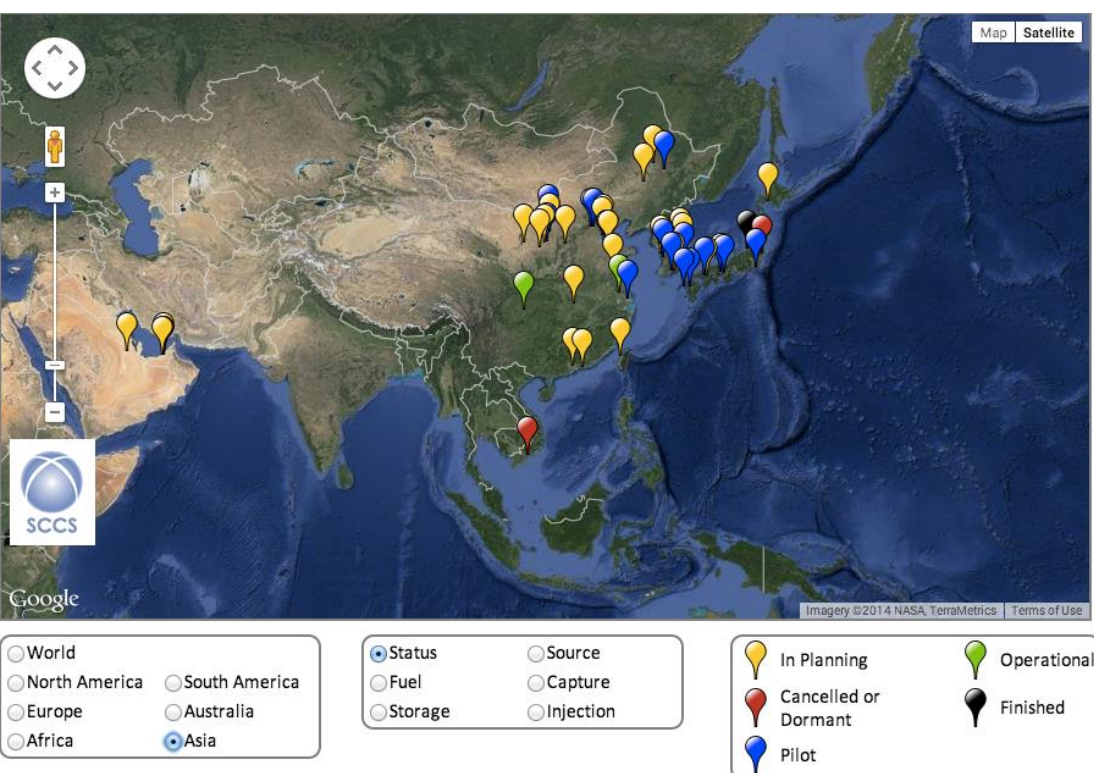


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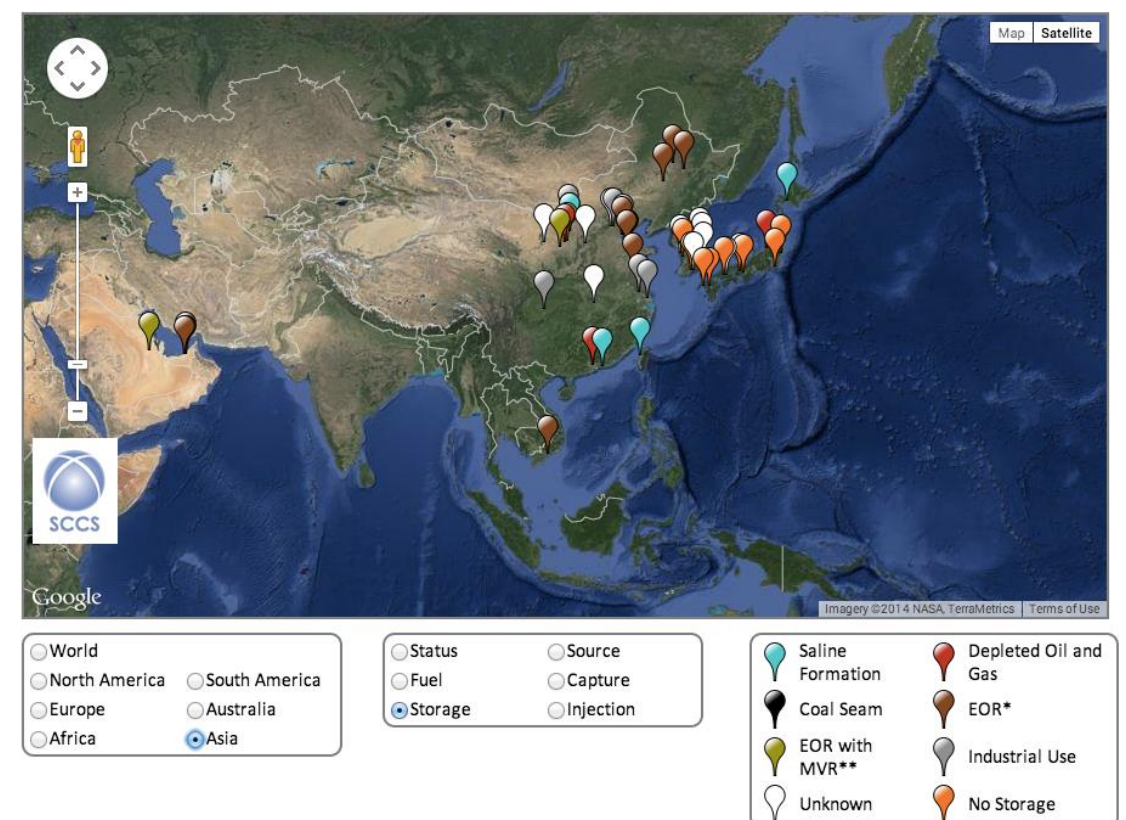
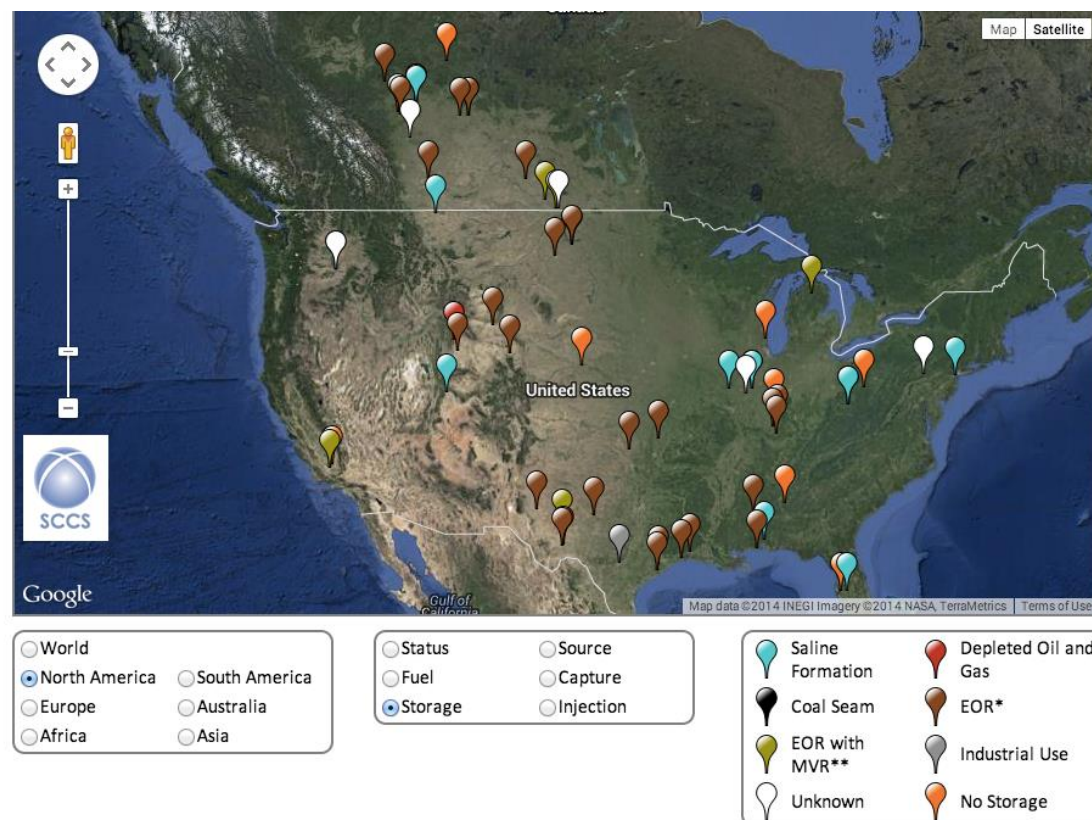
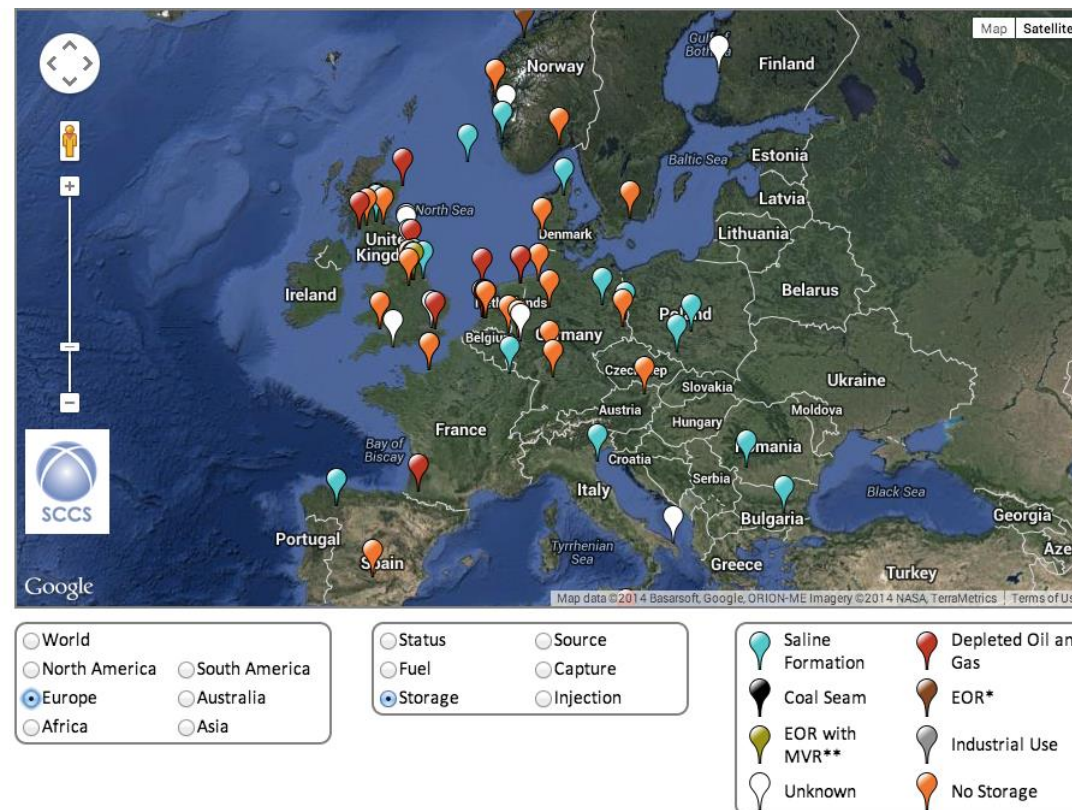
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Comparison: 'Status'





Comparison: 'Storage'





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Support Mechanisms

EU - Carbon Pricing

Carbon Price/EU ETS

- CEP principles: 20/20/20 on basis of cost-effectiveness, flex., competition, subsidiarity, equity
- investment subsidy rejected (“the impact on positive externalities may not match the level of deployment subsidy”),
- but, co-financing of demonstrators (“R&D subsidy is a different matter”)

NER 300

- C price too low/volatile (€5 instead of €39)
- 2014 - €9/t by 2020 (Point Carbon)
- First Call - €zero to CCS
- Second Call - diminished pot; stricken C price



CCS Competition - UK

Launched in 2007

- aimed to deliver 1st CCS project in 2014 (£1bn)
- 2011, £ to come from general taxation, not CCS levy
- Pulled in 2011. “5 wasted years” - E3G

Relaunched in 2012

- aiming to deliver in 2016-20 (Peterhead, White Rose)
- Support from CfD, inc FIT CfD for low carbon electricity



N America

USA

American Recovery and Reinvestment Act 09 (\$3.4bn) for CCS programs; Clean Coal Power Initiative (phased since 2002; \$3.18bn in 2009); loan guarantees.

Canada

Saskatchewan, BC C taxes; Alberta Specified Gas Emitters Regulation (SGER)

Fed govt energy perf standards for coal fired power stations

Company partnerships with large provincial funding, some federal - grants and loan guarantees

Both

OER reduces cost of demonstrators by \$15-30/t



12 FYP (2011-15)

Increased CCS support; 2009 Stimulus Package

April 2013, next 5YP provincial planning for CCS

Guandong - pilot low carbon province (2010). Largest ETS pilot (105m population, \$1tn; 90GW peak electricity DD). CCS in Guandong started (surveys in 2005) in 2010

EOR since 2006

Bilateral support; MDBs



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Conclusions



Ongoing process of experimentation

1st mover or 2nd mouse?

Volatile markets vs more stable state subvention (“little evidence to justify going beyond the carbon market”)

broader role for C taxes, CfD?

what justification for direct support? (cf EU CBA)

EOR, supported by tax relief?

Completeness and adequacy?



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Thank you.



Finance and Regulation

- Finance is an important aspect of CCS rollout
 - non-commercial
 - nor likely in short/medium term
 - ‘cost appraisal optimism’

'Injection' / quantum



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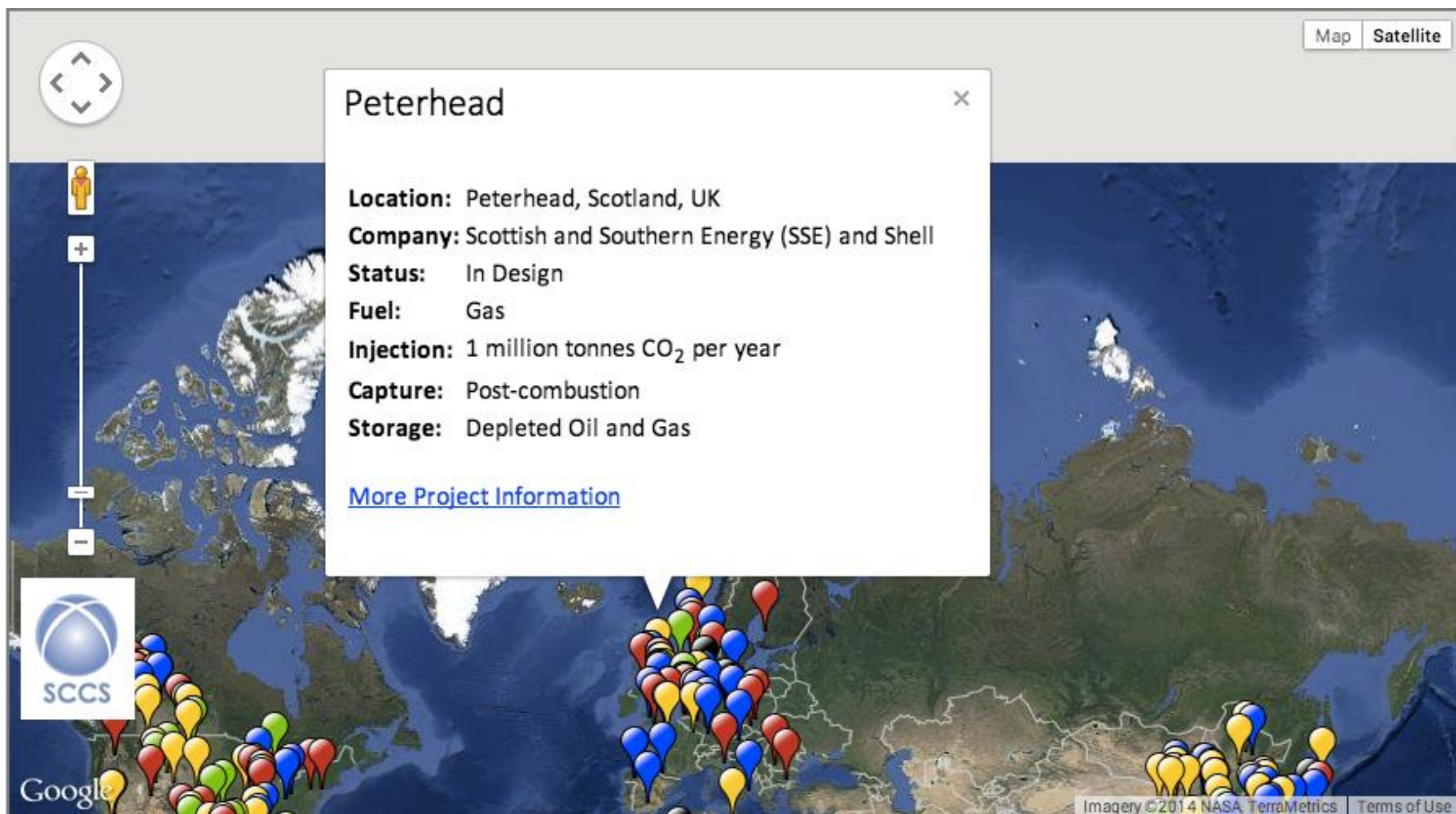
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- ☒ 0 or not specified
- ☐ up to 1.0 Mt CO₂/yr
- ☐ 1.0 - 2.5 Mt CO₂/yr
- ☐ 2.5 - 3.5 Mt CO₂/yr
- ☐ > 3.5 Mt CO₂/yr



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