

Incentive mechanisms for Carbon Capture and Storage

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UK plans to decarbonise the economy while maintaining security of our electricity supplies

At the heart of our plan to decarbonise is the **EU Emissions Trading System** which sets a declining limit or 'cap' for emissions from electricity generation and heavy industry

Further action:

30% of electricity through
renewables in 2020

New nuclear power
stations under way by 2018

**Drive forward CCS and
the move to clean coal**

We want to keep the benefits of using coal: it's flexible, can **respond to changing supply and demand** and provide **diversity in the energy mix**, in particular providing an **alternative to gas**

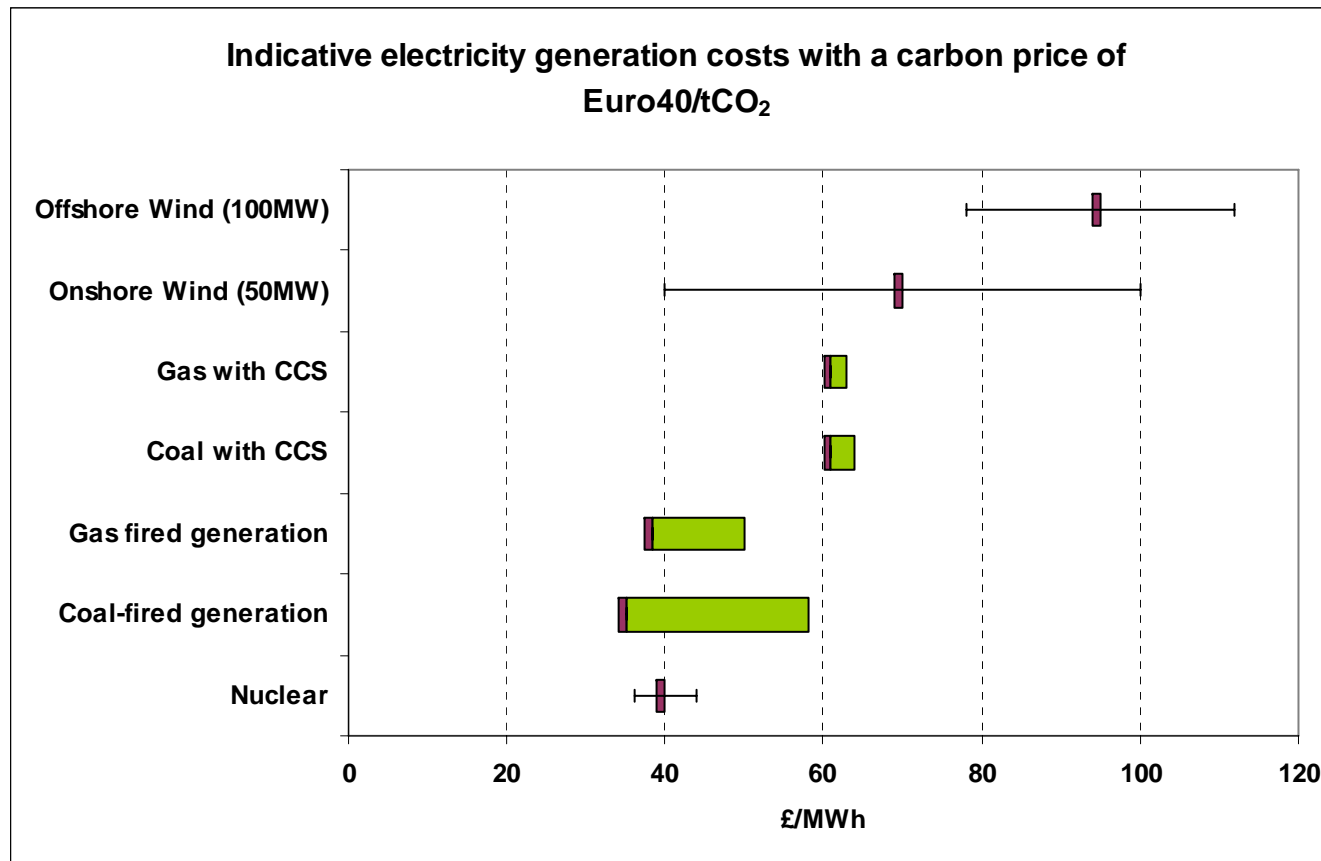
CCS would enable coal power stations to continue to play this role as we move to a low carbon energy mix

The Goal: commercially viable CCS by 2020

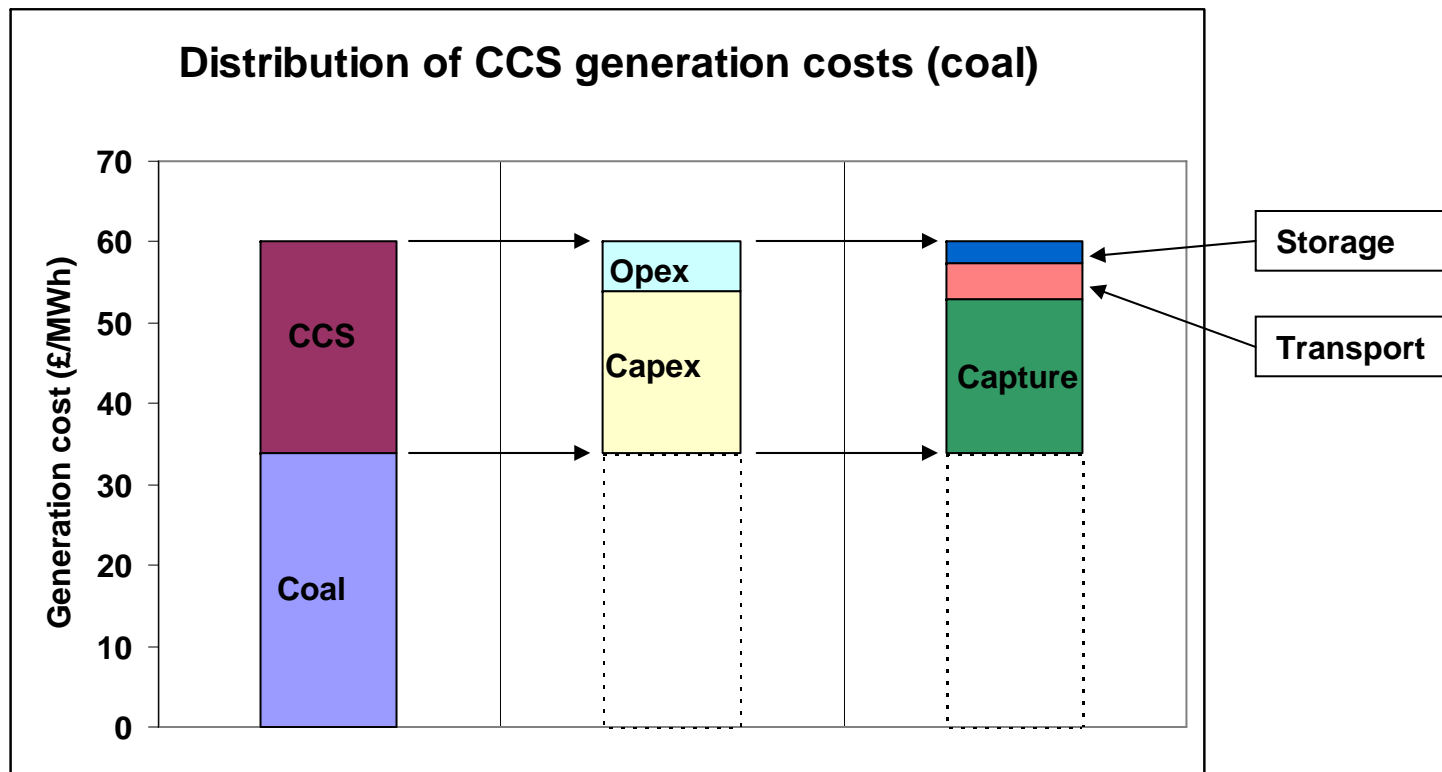
- For CCS to become a commercial option for investors:
 - Technology must be proven at scale and costs reduced through large-scale demonstration
 - There must be a way to incorporate the cost of CO₂ emissions e.g. carbon price
- For widespread deployment need:
 - Technology and infrastructure development
 - Skills and capacity building

How much will CCS cost?

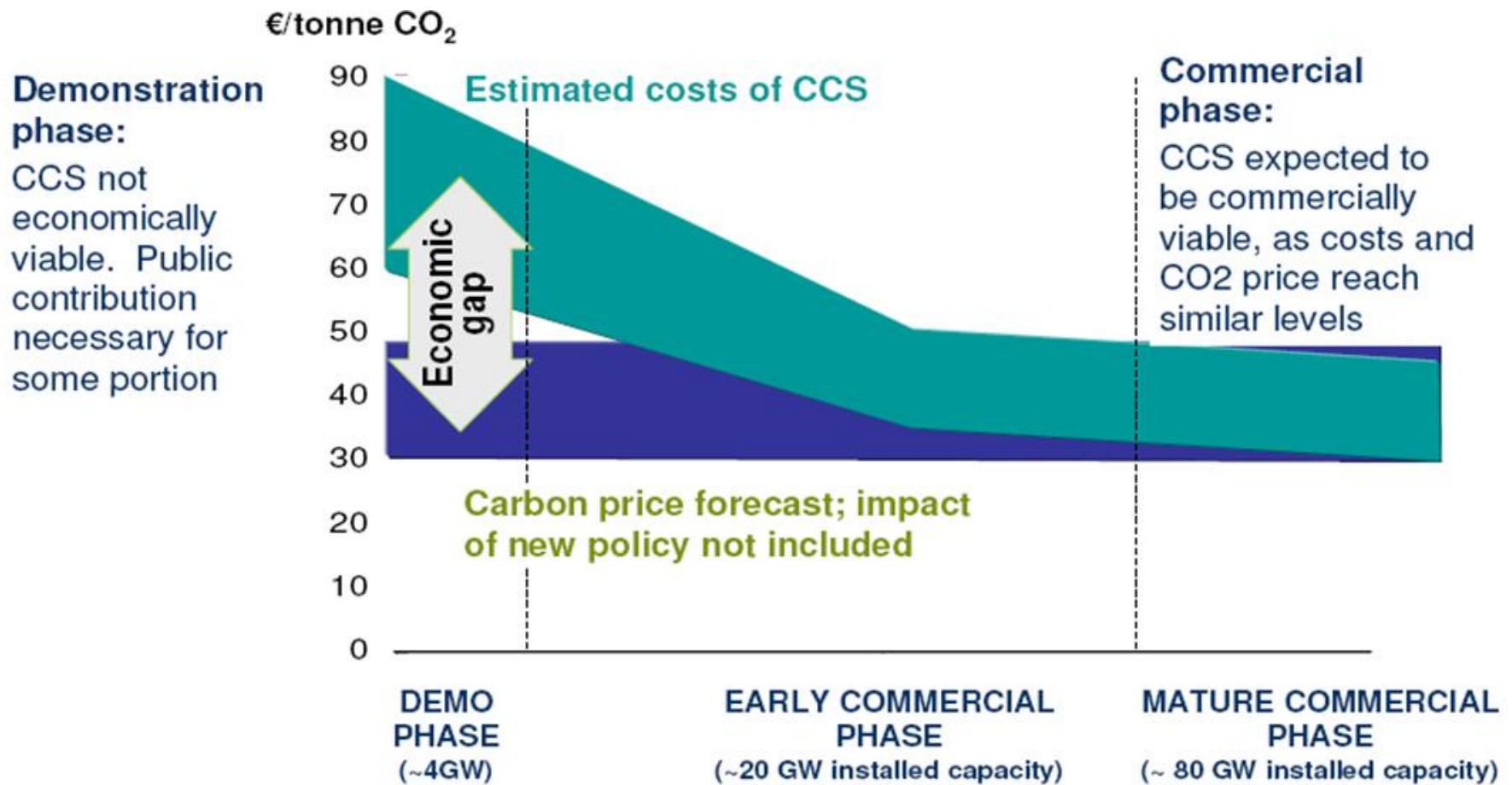
(Comparison at carbon price – €40/tCO₂)



Distribution of CCS costs (coal)



Demonstration phase brings down CCS costs over time



UK CCS competition

- 300MW post-combustion capture project on a coal-fired power station, with CO₂ stored offshore
- Ambition to be operational by 2014
- Handled via competitive process
- 4 consortia successfully pre-qualified
- 2 consortia have submitted bids to the next stage:
 - EON
 - Scottish Power

EU incentives for CCS demonstration projects

- CCS recognised in EU Emissions Trading Scheme (EU ETS) – rising carbon price to drive deployment
- In December 2008 agreed an EU funding mechanism – 300m free emissions allowances (worth €bns) to co-fund up to 12 large scale CCS projects
- EU Economic Recovery Plan included €1.05 bn to part-fund up to 7 CCS projects (Hatfield in the UK has reached the shortlist and could receive €180m)
- EC has secured €60m funding for EU-China NZEC initiative to demonstrate CCS in China, and proposed a funding mechanism to blend funding from other sources (e.g. EU member states)

Where are the incentives globally?

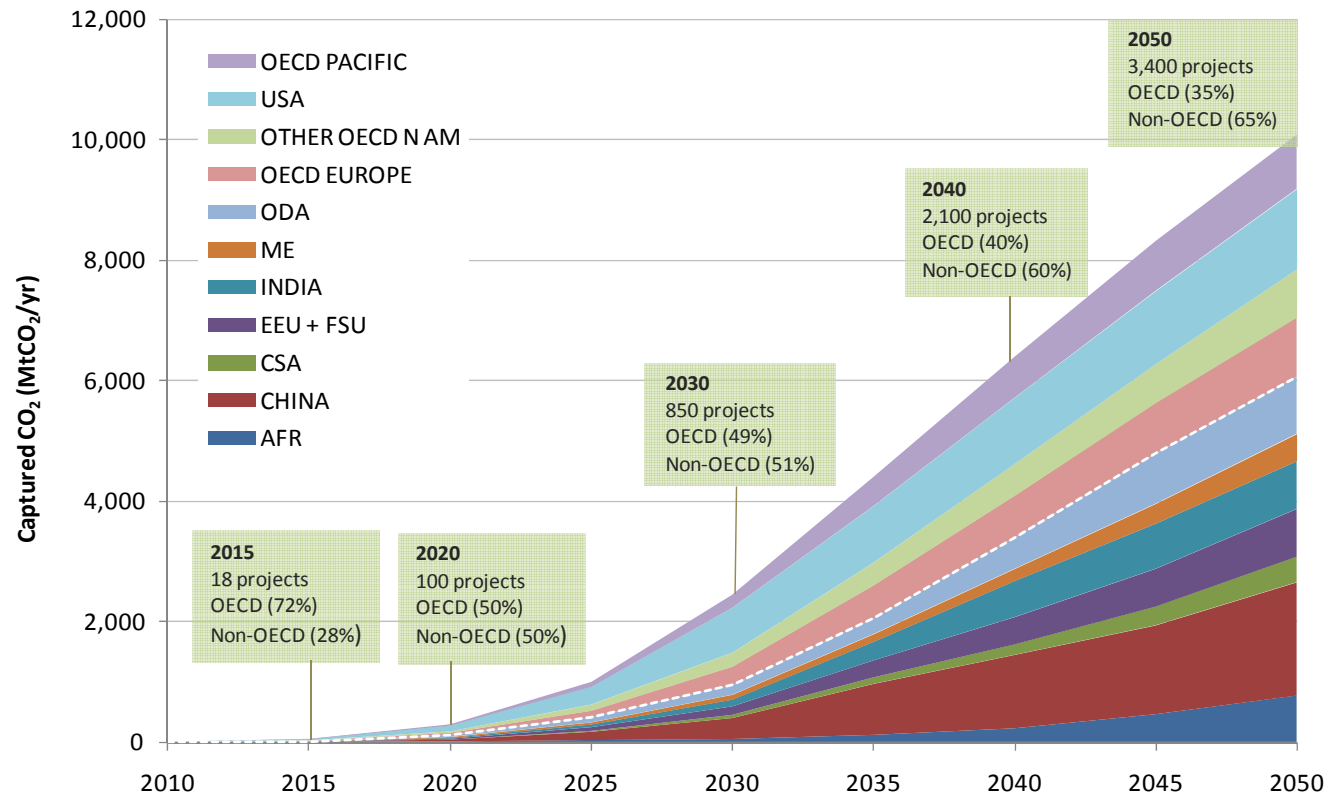
- G8 Leaders agreed to “launch 20 commercial scale CCS demonstration projects by 2010, with a view to deployment by 2020”
- Australia: AUD\$2 billion
- Canada: CAD\$3.5 billion
- European Union: €1 billion plus 300 million EUAs
- United States: USD\$3.4 billion

Where is the need globally?

How much CCS on coal-fired power can we expect to see?

- **29 GW** by 2020
- **743 GW** by 2050

Source:
IEA CCS
Roadmap




Global incentives for CCS?

- CCS projects remain unapproved in the Clean Development Mechanism
- Carbon markets / sectoral crediting and trading essential for driving the deployment of CCS in the medium-longer term
- Technology incentives required in the short term to bring down the cost and build capacity in institutions and industry

Key messages from Carbon Sequestration Leadership Forum Ministerial Meeting

20 industrial-scale demo projects endorsed by G8 are **vital**
➤ more could be required in **developed & developing countries** by 2020

CCS as a key mitigation technology should be appropriately recognised in appropriate international frameworks, including the United Nations Framework Convention on Climate Change

 Developed countries to **assist developing countries** achieve the level of CCS required.

Support for a CSLF Capacity Building Program

USD\$3m
donation so far

New UK framework for development of clean coal comprises two parts...

In developing our policy, we have considered the advice of the CCC in their first annual report and reflected on the wide range of views given in the responses the consultation

(1) No new coal without CCS

(2) Long term transition to clean coal

- **Up to 4 commercial-scale** CCS demonstrations funded by a new **CCS incentive**
- Any new coal power station to demonstrate **full CCS chain** at commercial scale

- Ambition to see CCS ready for **wider deployment from 2020**
- Expect demonstration plant will **retrofit CCS to full capacity by 2025**

- A **rolling review** process to **report by 2018** on CCS status
- Possible measures to manage emissions **if CCS is not viable**

Our programme of up to 4 demonstrations projects represents a substantial contribution to the global efforts to develop CCS technology

(1) No clean coal without CCS: our new policy is supported by financial and regulatory measures

Requirement for any new coal power station in England and Wales to incorporate a commercial scale CCS demonstration covering the full CCS chain (capture, transport and storage) with immediate effect

Financial measures:

- Will seek to demonstrate pre- and post-combustion capture (could include oxyfuel), with maximum of 2 post-combustion projects
- Ofgem will take on the role of managing agent for delivery of the **CCS incentive**
- “Assistance Schemes” will provide the vehicle for funding and monitoring CCS demonstration projects
- We hope that at least one or two UK CCS projects will qualify for EU support



No immediate impact on bills; by 2020 average annual impact is expected to be 2-3% increase

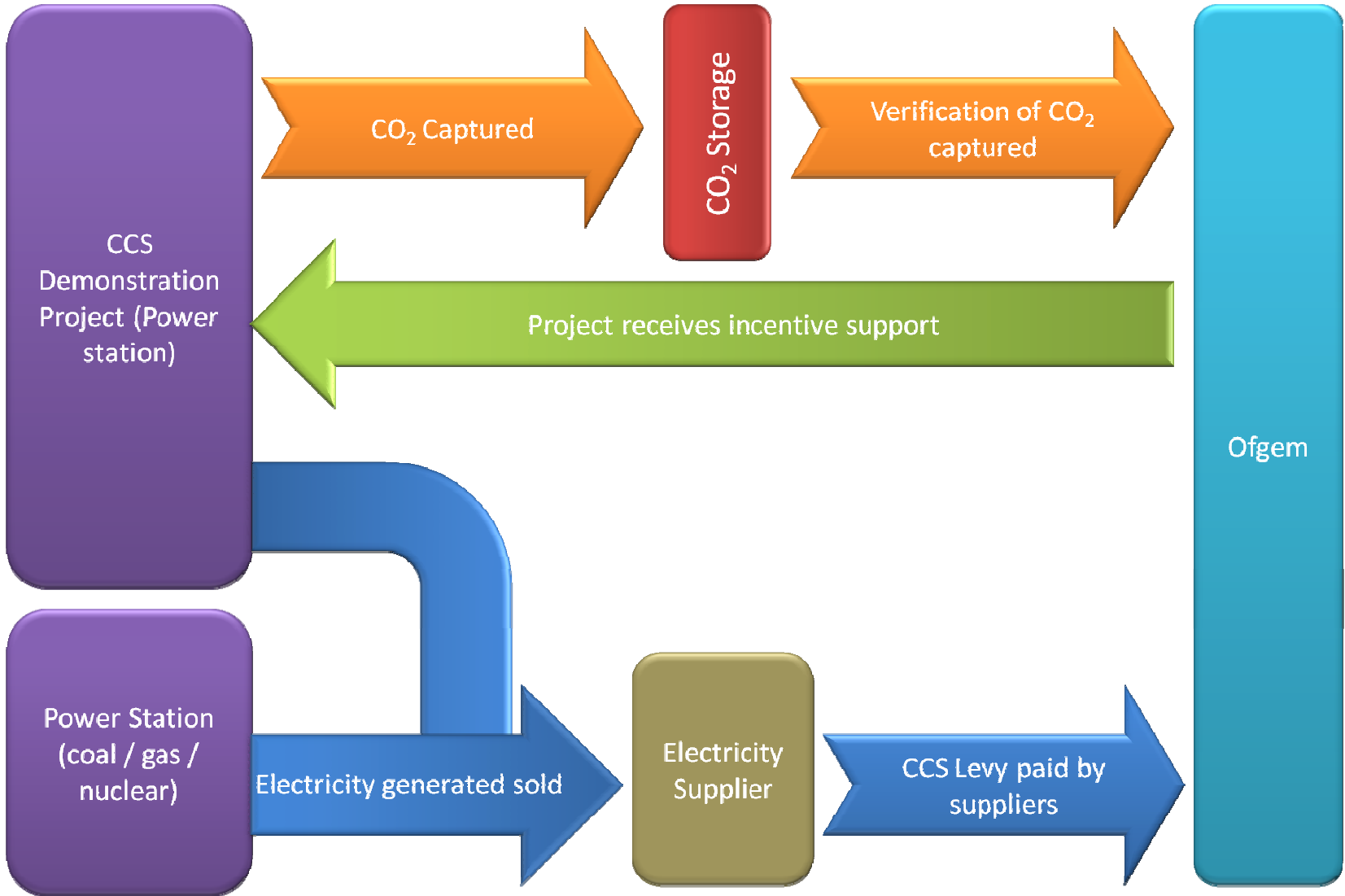
Regulatory measures:

- Applications for new plant will have to include plans to capture CO₂ from at least 300MW net (400MW gross)
- Existing power stations that upgrade to supercritical will have to meet same conditions
- Developer to have evidence of technically feasible CCS plans, Environmental Permit and consents, and permits for full CCS chain
- Environment Agency will have new powers to monitor the performance of CCS demonstrations

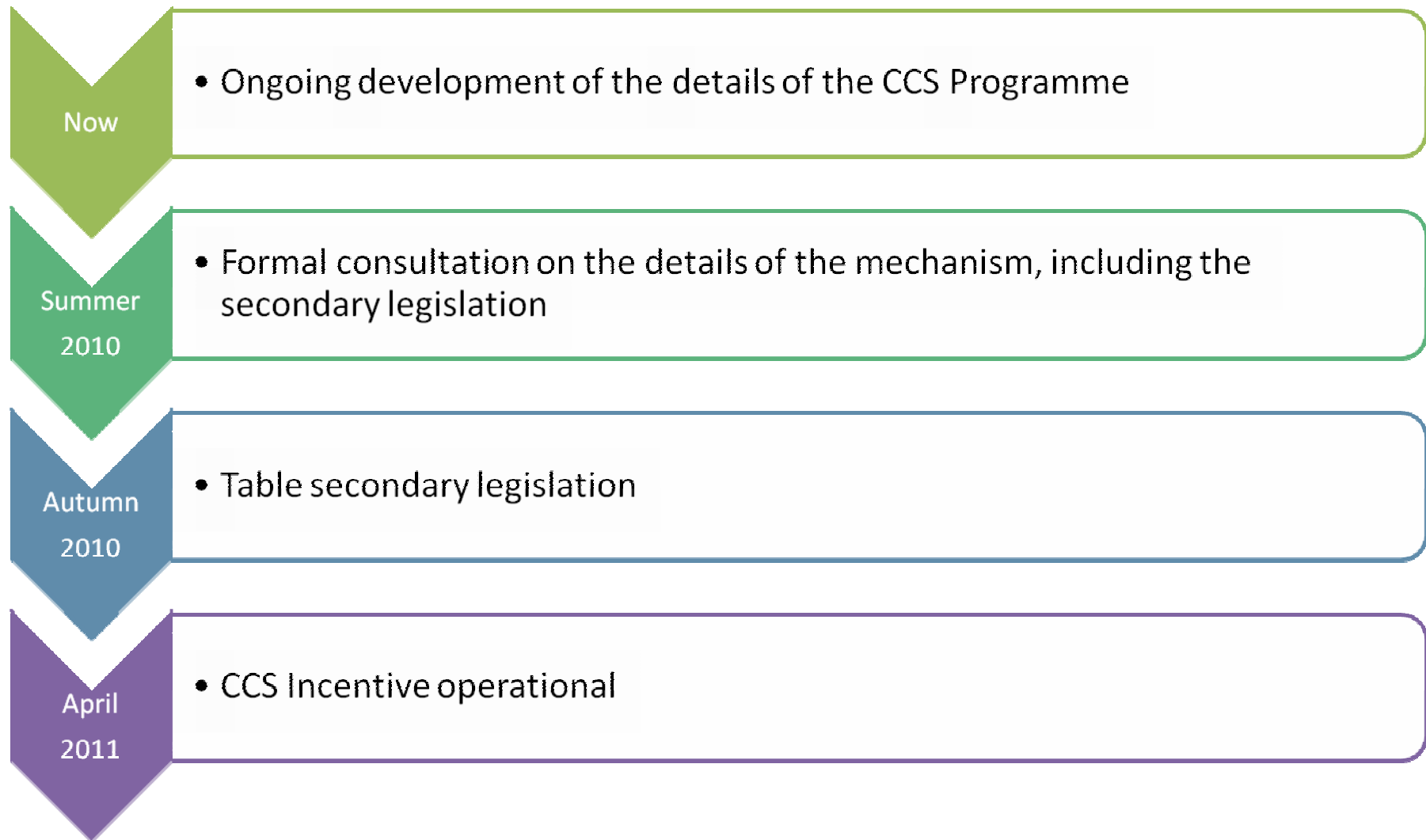


300MW net capture unit would be expected to store 20 million tonnes of CO₂ over 10-15 years

1a) A NEW CCS INCENTIVE



1b) Selection of CCS Projects



(2) A longer term transition to clean coal

- We will maintain a rolling review of progress with CCS technologies in the UK, EU and globally
- By 2018 the Government plans to publish a report – drawing on advice from EA, CCC and others – that will consider:
 - the technical, economic, environmental and safety status of CCS
 - the question of retrofit to demonstration projects
 - what additional measures (consistent with EU ETS and any other market interventions) are necessary – e.g. emissions performance standard by way of a plant level cap
- We are planning on the basis that CCS will be ready for wider deployment by 2020
- Expect new conventional coal power stations will retrofit CCS to their full capacity by 2025 (the new CCS incentive will be able to support retrofit)

We must also look beyond our CCS demo programme and lay the ground for a long term framework that is in line with pathways towards our 2050 goals

Next steps to deliver UK framework

Next Steps

- **CCS industrial strategy** to be published (early 2010)
- **Energy Bill** to establish CCS Incentive (2009/10) and secondary legislation (summer 2010)
- Award **FEED** contracts for 1st competition (early 2010)
- Run competition for **other CCS projects** (2010-2011)
- Consultation on new planning guidance will close (Feb 2010) and proposals for **EA's new powers** (early 2010)
- We are working on a wider **roadmap to 2050** (spring 2010)

These measures will feed into our long term timetable for CCS demonstration and deployment

