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Carbon Capture and Storage: From Demonstration to Deployment

Obstacles and Bilateral Solutions

Cyril Loisel (IDDRI), Guillaume Calas (ENS), Sophie Galharret (IDDRI), with the support of Kate Hart (British Embassy, Paris)

CAPTAGE ET STOCKAGE DU CARBONE Cet article fait suite à un atelier organisé en fév. 2009 par l'Iddri et l'ambassade du R-U à Paris sur les obstacles majeurs à la démonstration et au déploiement du CSC, et sur les solutions appropriées.

FINANCEMENT Pour conserver son leadership et l'avantage du premier entrant, l'Europe doit rapidement établir un cadre global et les incitations financières nécessaires au développement des projets de démonstration de CSC (mécanismes de marché, de régulation, publics et industriels). L'adoption d'une position commune en vue de Copenhague pourrait y contribuer.

PAYS EMERGENTS La mise en place de partenariats public-privé pour la démonstration du CSC en Europe augmentera l'attractivité future des industries européennes dans le cadre de l'établissement de partenariats industriels et de R&D dans des pays tels que la Chine.

ACCEPTABILITE SOCIALE Le débat sur le CSC au niveau européen doit trouver sa légitimité dans le cadre plus global des questions énergie-climat et des options possibles. Il faut considérer le temps nécessaire à la résolution de ces questions, les mesures adoptées devant être adaptées à chaque pays.

ENJEU 2020 La mise en œuvre des conditions nécessaires au déploiement du CSC est exigeante vu l'ambition du calendrier européen. En parallèle de l'étape de démonstration, l'Europe doit préparer le déploiement d'une industrie du CSC cohérente : choix de production électrique, développement/régulation des infrastructures de transport et stockage, organisation industrielle et des compétences, obtention de l'acceptabilité, mise en place des incitations pour le passage à grande échelle...

FINANCING In order to maintain leadership and first mover competitive advantage, EU needs to quickly provide a global framework and financial incentives for the development of CCS demonstration projects (mix of market, regulatory, state and industry mechanisms). One way to help this would be a common EU view in the run-up to Copenhagen.

EMERGING COUNTRIES The implementation of well-designed public private partnerships for CCS demonstration in Europe should greatly enhance the future attractiveness of European industries in the context of setting up R&D and industrial partnerships in countries like China.

PUBLIC ACCEPTABILITY CCS debate and legitimacy should be structured by the consideration of broader EU-level energy and climate change issues and alternative design features. Time required to deal with such issues should not be underestimated and policies need to be tailored according to the country.

DEPLOYMENT BY 2020 The conditions that need first to be met to allow the widespread deployment of CCS are challenging given the ambitious European timeframe. With demonstration, Europe also has to overcome another huge challenge which is to kick-start the rationalization of a consistent CCS industry: power production choices, transport and storage regulation and planning, capacity building, industrial organisation, as well as tackling all larger scale-investment incentives and public acceptance issues.

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To take stock of major obstacles to accelerated international deployment of CCS, a workshop was hosted by the British Embassy in France and IDDRI on 5th February 2009. This note aims to summarize discussions, providing further background to and highlighting the main issues and conclusions.

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Introduction

Global energy-related carbon dioxide emissions, which are approximately 69% of all CO_2 emissions, will rise by 45% from 2008 to 2030 following current trends according to the International Energy Agency (IEA) reference scenario[1]. This means that a combination of consistent and optimised measures will be needed to mitigate climate change among which energy efficiency that proves key to curb demand, renewable energy and fossil-fuel based carbon abatement technologies, including carbon capture and storage (CCS). By geologically sequestrating carbon dioxide, CCS may contribute to the necessary emissions reduction. Its potential could reach up nearly one-fifth of the reductions needed by 2050 in the industrial and power sectors alone[2].

Past and current researches show that the different parts of the CCS chain (capture, transport and storage) are understood well enough to start early demonstration projects. Carbon dioxide capture and pressurisation requires additional energy, reducing overall efficiency[3]. There are three main technology pathways: post-combustion (CO_2 extraction from flue gases), pre-combustion (fuel conversion into gaseous components produces a gas made of CO_2 and hydrogen, kept apart from one another), oxy-fuel combustion (fuel combustion in a pure oxygen atmosphere generates only CO_2 and water). The first option, although expensive, is mature and could fit with existing power plants. The pre-combustion technologies like IGCC (integrated gasification combined cycle) lead to hydrogen co-production, which could be used as a fuel, but they are only applicable to new fossil fuel power plants because they require strong integration with the combustion process. The last option is characterized by producing an almost pure stream of CO_2 which can be stored directly, but it also requires producing pure oxygen which is still expensive.

Transport is inexpensive in comparison with capture, but questions hang over the siting, financing and operation of pipelines. According to IPCC, the fraction of CO_2 retained in storage is very likely to exceed 99% over 100 years, and is likely to exceed 99% over 1000 years. Storage in deep[4] geological formations – such as unminable coal beds, active or depleted oil and gas fields, or saline aquifers – is considered more promising. The first two options also allow respectively enhanced coal bed methane (ECBM) recovery and enhanced oil/gas recovery (EOR/EGR). Saline aquifers could constitute the main storage potential, but less is currently known about them. As expressed by participants during the conference, there is a need of additional EU-funds for more analysis of EU storage: initial studies show that we may not have enough space for the CO_2 we wish to capture, as depleted fields will provide only

1. From 28 Gt in 2006 to 41 Gt in 2030 (World Energy Outlook 2008, OECD/IEA).

2. CO2 Capture and Storage – A key carbon abatement option (OECD/IEA, 2008).

3. Varying with type of plant, the CCS process may require between 10% and 40% additional energy (The IPCC Special Report on Carbon dioxide Capture and Storage, 2006), which essentially comes from CO2 capture. Estimated between 6% and 12% (World Energy Outlook 2004, OECD/IEA), efficiency losses have been revised down to 4 percentage points in future IGCC designs (Carbon Capture and Storage: a WEC "interim Balance", World Energy Council, 2007).

4. Prior to injection, carbon dioxide is compressed to a dense fluid state (supercritical state). Depending on local geothermal gradient, carbon dioxide would remain in that state beyond 700-900 meters depth.

marginal storage capacities and the potential of saline aquifers remains uncertain.

Whereas CCS is considered as a key complementary option to tackle climate change, this technology has not yet been adequately demonstrated full-scale, despite calls supporting demonstration projects in international political fora such as the G8 or European Union (EU)[5]. These demonstration projects aim to validate the technology, bring down costs and build public acceptance and support for CCS. The European ambition is to make CCS fully operational and commercially viable[6] by 2020 in order to begin broad deployment. Even if the precise contribution of CCS will depend on its uptake, it is estimated that in the EU alone 7 million tonnes could be captured in 2020, rising to 160 million tonnes in 2030, which would represent around 15% of the carbon dioxide reduction required by 2030[7]. If CCS is implemented without delay, it might even reduce EU CO_2 emissions by 400 million tonnes by 2030[8].

Since the ratification of the Kyoto Protocol, the EU has taken on a leading role on curbing the effects of climate change and the United Kingdom (UK) and France are both particularly supportive of advancing (international) development of CCS technology. The bilateral seminar highlighted several key challenges to deployment which will need to be overcome if the full potential of CCS is to be achieved. Particularly:

- The key issue of financing near-term demonstration projects to facilitate early demonstrations, for which costs are high and uncertain. How were the first demonstration projects launched? What are the challenges to finance the EU demonstration programme? What kind of financial incentives have been developed to achieve EU CCS programme ambition? How could they be strengthened? How can we better coordinate European efforts? Is there other leadership emerging on the international scene?
- Emerging country involvement in CCS demonstration projects. What are the challenges to develop CCS in developing countries? What are their possible interest and involvement given the non-binding nature of their possible commitments within the UNFCCC? What is the current and possible future nature of collaborations between developed and developing countries? Are intellectual property rights a critical issue to this respect?
- The difficult question of public acceptability. In the range of "low carbon" technological options, CCS is considered less favourably than renewable energies or energy efficiency. What are the issues and the conditions necessary for a fair and transparent debate, properly linked to the decision-making process?
- The relevance of CCS deployment by 2020. Given the tight timeframe in Europe to demonstrate and deploy CCS, there is a significant risk that CCS will not be ready on time or underperform, in terms of cost or potential. What is the critical pathway to achieve the CCS deployment (industrial set up, financial and legal framework, public acceptability issues)? What are the possible consequences on European climate change objectives?

Participants also discussed possible solutions or concrete steps which could help address these challenges. These are highlighted at the end of the document.

Facilitating early demonstration projects

Even if capture, transport or storage facilities are already deployed for viable applications, there is hardly any experience of neither full chain nor full scale demonstration. Research indicates there is a high degree of uncertainty in assessing the overall costs for CCS and how they will develop with time. The energy sector is hard to predict given the variability of fuel costs and demand. Learning rates and scale benefits have also a wide possible range.

What is certain is that costs of CCS – including initial and ongoing expenditures – will be high

5. The G8 countries announced that twenty large-scale CCS demonstration projects should be engaged by 2010. Before, in 2006, the European Technology Platform for Zero-emission fossil fuels power plant (ZEP) called for early implementation of 10-12 integrated, large-scale CCS demonstration power plants projects in Europe.

6. For the technology to be competitive, beyond additional investment costs that will need to be financed, there will also be necessary to cover unitary production costs that are expected to be higher compared with traditional fossil-fuel fired plants.

7. Impact Assessment of the Directive on the geological storage of carbon dioxide

8. EU Demonstration Programme for CO2 Capture and Storage (CCS): ZEP's Proposal, ZEP, 2008.

at the beginning of both demonstration and wider roll-out phases. Costs would depend not only on the plant features, the capture system, the transport distance, and the type of storage, but also on variables such as location, financing, fuel, electricity costs, and not least the performance[9] of the pilot etc. Latest thinking suggests that most of the demonstration projects would cost between €60-90[10] per tonne of CO_2 abated, given their small scale and their objective to test unproven technologies. These costs should decline over time as a result of learning-by-doing and sustained R&D: €35-50 per tonne of CO_2 abated in 2020 and €30-45 per tonne in 2030[11]. According to McKinsey, the price range is roughly in line with expected carbon prices under the EU's Emissions Trading Scheme (ETS) for that period (€30-50 per tonne of CO_2). However, just as there are major uncertainties on future CCS costs, the expected EU allowances (EUAs) price evolution is also unclear[11]. So it is still uncertain how much financial incentive the carbon market will provide for CCS deployment projects.

So despite the existence of several significant operational or planned projects in Europe (cf. Annex I), financing CCS demonstration is still new and difficult.

In addition to carbon market incentives, other financial motivation for demonstration projects has come from industry itself – in order to enhance productivity or to turn towards a long-term strategy – or from regulation – e.g. a carbon tax. For instance, the Norwegian government introduced a CO_2 offshore tax in 1991 on CO_2 emissions from oil and gas activities on the continental shelf. The tax was in 1991 equivalent to US$50/t of CO_2 and the revenues from this tax have been used to finance CCS activities. As StatoilHydro needed to remove CO_2 from extracted natural gas in the Sleipner field[12], the company has decided to store it since 1996. The initial investment was about US$100 million and the cost of CO_2 storage was estimated to be close to US$15/t of CO_2[13]. This was the world's first demonstration CCS project and 20 million tonnes are planned to be stored; half of it has been stored so far. Another example of projects underway concerns EOR/EGR, which have been carried out for some decades, as they bring direct economic returns. Other examples, such as Schwarze Pump in Germany (30 MW, Vattenfall), or Lacq in France (30 MW, Total), are financed essentially by the companies (€70 and €60 million respectively). It is possible for industry to finance these small pilot projects without state funding, but this is not the case for demonstration projects which are expected to be ten times bigger (~300 MW) and would require CO_2 transport over longer distances. Hence the urgency is to establish real financing options to kick-start these larger demonstration projects.

In Europe, the estimated cost of building 10-12 demonstration projects is €7-12 billion[9], assuming an approximate cost for a single project between €600 million and €1.2 billion. As described above, and with the added financial constraints imposed by the economic downturn, industry cannot fund these additional costs. While this points to the need of public financing, some participants have stressed that this public support should only be considered on the condition that public financing support to energy efficiency and renewable energies is not adversely affected as a consequence.

The main financing mechanisms which could support EU demonstration CCS projects are:

- Allowances from the New Entrant Reserve (NER) of the EU ETS. Up to 300 million allowances will be set aside for 12 CCS demonstrations between 2013 and 2020[14]. Operators will not have to surrender allowances for emissions successfully stored and would

9. The impact of the performance of the pilot will be critical if the demonstration is expected to be a profitable investment rather than be considered as a "laboratory" to test the technology.

10. Including initial investments and ongoing operational expenditures of a new coal-fired power plant (McKinsey & Company, Carbon Capture & Storage: Assessing the Economics, 2008).

11. For example, EU allowances prices have fallen since the McKinsey study (from €25/t of CO2 to almost €8/t of CO2). The recession has indeed led to a dramatic fall in industrial production, which brought about industrial-related greenhouse gas emissions reductions.

12. CO_2 concentration is high (9%), well above the 2.5% limit imposed by European export specifications.

13. According to StatoilHydro and Petroleum Economist.

14. According to the European Parliament legislative resolution of 17 December 2008 so as to improve and extend the greenhouse gas emission allowance trading system of the Community. Knowledge generated in a project funded by NER allowances will have to be shared.

get extra allowances for free. Allowances allocated to a project cannot exceed 15% of the total (45 million EUAs). Therefore, to integrally finance a project which would receive the maximum of EUAs allowed, EUA price would have to be between €13 and €27/t of CO_2; this would have to be higher if the NER allowances are equally split between the projects (€20 and €48/t of CO_2). Participants have acknowledged the importance of this disposition but several uncertainties remain. Firstly, the risk of a low carbon price: assuming a price of EUAs around current level (e.g. €10/EUA), 300 million EUAs would amount to €3 billion and a maximum of €450 million would be available for a single project. NER allowances are yet not expected to finance the whole project and operators benefiting from these allowances must also have other financing sources. Secondly, NER allowances have been tagged for both CCS demonstration as well as for renewable projects, meaning that the exact amount available for CCS will be defined by autumn 2009 through a comitology process following input from Member States. Participants have requested that the Commission clarifies what is exactly available to industry.

- EU-ETS auctioning revenues are the most cost-effective instrument if used to facilitate the transition to a low carbon pathway. Under the Climate and Energy Package, Member States are encouraged – but not obliged – to use at least 50% of the EU-ETS revenues auction to mitigate climate change. There is a possibility that a part of these revenues could be ring-fenced for CCS projects.
- The European Economic Recovery Plan15 (EERP) was not addressed during the conference whereas it may answer the idea put forward by some participants to allocate significant public support to CCS. This plan is to reallocate €5 billion away from the Common Agricultural Policy unspent funds, notably to support CCS projects. Initially, the European Commission proposed that five Member States (Germany, the Netherlands, Poland, Spain, and the UK) would receive each €250 million to support a total of 11 CCS demonstrations16. This was however slightly revised by the EU's 27 nations which decided to decrease the sum allocated to each country to €180 million and added two other projects (cf. Annex II). All these projects have a capacity of at least 300 MW electrical output and promoters would have to share the generic knowledge generated. This proposal will be voted in plenary at the European Parliament in May 2009.

As expressed during the conference, these mechanisms may however not be enough to provide the necessary capital for demonstration projects in the EU. Participants have called for other (complementary) options, in particular direct public investment or financial support by governments or public investment banks. For instance, the European Investment Bank (EIB) has expressed willingness to participate in funding CCS demonstration projects and is currently analyzing the possibility of developing new products which would complete the joint instrument set up by the European Commission and the EIB – the risk sharing finance facility (RSFF). In addition, some national governments have allocated or are planning to directly provide funds for CCS. The UK government announced in 2007 a competition to support a CCS demonstration in the UK and indicated that it would fund up to 100% of the additional CCS costs. In France, the Environment and Energy Management Agency (Agence de l'Environnement et de la Maîtrise de l'Énergie, ADEME) has announced to create a €400 million fund to finance R&D for biofuels, electric and hybrid cars, and CCS. Member States' involvement is crucial for CCS technology development in Europe and the European Commission has declared itself tolerant towards state aids for CCS projects;

Besides these sources, a mechanism relying on a guaranteed CO_2 price for CCS has been put forward by participants. Such a mechanism could address the risk that carbon prices may be too low to invest in CCS. Policymakers could guarantee to buy back EUAs generated by CCS against a fixed price. However, governments

15. The amounts of the recovery plan will be drawn from national budgets, with EU countries asked to contribute €170 billion or 1.2% of the EU's GDP. The rest (around €30 billion or 0.3% of GDP) would come from the EU's own budget and the European Investment Bank (EIB).

16. Infrastructure projects agreed by the European Council as part of the European Economic Recovery Plan, Brussels, 19-20/03/2009.

would be dependent on cost information from industry when fixing this price which industry may overestimate.

In addition to these mechanisms, industry has also to play an important part in financing CCS projects as some of them will eventually be a major beneficiary: this is especially true for manufacturers keen to take advantage of new markets, as opposed to utilities may choose to be more or less proactive in the early stages of the technology. In a long-term perspective, it could be appropriate to legislate, such as requiring all new coal-fired power plants to be fitted with CCS (such as recently proposed by the UK Government[17])

Currently, there is a strong EU leadership, but the audience has enlightened that other countries are already moving, investing billions in concrete actions, e.g. the United States, Australia or Canada. CCS is indeed a critical component of the Canada's energy strategy and could provide up to 40% of emissions reductions by 2050[18]. Canadian federal[19] and provincial governments strongly support CCS, demonstrated by the government of Alberta announcement in 2008 to provide C$2 billion (around €1.3 billion) in order to support demonstration projects. The United States has recently become more and more involved in CCS RD&D, but there is still no full-chain CCS demonstration project in operation. The US Department of Energy (US DoE) launched in 1997 the US Carbon Sequestration Program[20] in order notably to speed CCS demonstration and deployment through initiatives, such as the US DoE's Regional Carbon Sequestration Partnerships[21] (RCSP) programme announced in 2003. This US-Canada programme is considered by the IEA as the most ambitious in the world[22]. The United States has also developed an extensive CO_2 pipelines network over its territory (almost 4,000 miles in 2009, i.e. 6,400 kilometres) as a result of its strong involvement in CO_2-EOR since 1972[23], although not initially designed for CO_2 storage. In addition, the FutureGen program, which consists in the building of a 275 MW IGCC demonstration plant with CCS and began in 2003, was cancelled in 2008 because of rising costs (from US$1 billion to US$1.8 billion). The Bush Administration proposed instead to provide funding to multiple plants to be operational by 2015. However, the Obama Administration may relaunch the project; funds might come from the recovery bill which includes US$3.4 billion to exclusively develop CCS. The US has recently agreed to cooperate on CCS with Australia and Canada.

In summary, the seminar has enlightened that a mix of market, regulatory, state and industry mechanisms are urgently needed to provide a global framework and financial incentives for the development of CCS demonstration projects. The examples above show that the EU needs to increase momentum to ensure it maintains leadership and "first mover" competitive advantage[24]. One way to help this would be better coordination of Member State' initiatives in CCS demonstration, perhaps leading to joint CCS demonstration projects which would be much easier to finance and to launch. The EU should also be clear on objectives and should work towards a common EU view in the run-up to Copenhagen, strengthening the EU Members States pro-CCS alliance, as it was mentioned during the conference.

17. See UK Department for Energy and Climate Change press release: http://www.decc.gov.uk/en/content/cms/news/pn050/pn050.aspx

18. Canada's Fossil Energy Future: The Way Forward on Carbon Capture and Storage, from the ecoENERGY Carbon Capture and Storage Task Force (Report to the Minister of Alberta Energy and the Minister of Natural Resources Canada), 2008.

19. In 2007, the Prime Minister Harper noted that CCS is "one of the most exciting" strategy to curb energy-related emissions (address at the United Nations Secretary-General's High-Level Event on Climate Change).

20 .The initial goal is to "develop by 2012, fossil fuel conversion systems that offer 90% CO_2 capture with 99% storage permanence at less than a 10% increase in the cost of energy services".

21. Among the seven partnerships, two involve the US and Canada. The US DoE announced awards of around US$65 million for each partnership to conduct each one large-scale field test (the total projects cost is roughly between US$80 million and US$140 million).

22. Expert Review of Regional Sequestration Partnerships Phase III: executive summary, IEA, 2008.

23. In 2006, EOR produced almost 13% of the total US production (Moritis, Guntis, CO_2 Injection Gains Momentum, Oil and gas Journal, v. 104, n°15, 2006).

24. More than US$20 billion will be spent on CCS projects in 2009, concentrated in Europe, the US, Canada and Australia. The EU leads all efforts with an investment of US$ 11.6 billion (Global Carbon Sequestration Markets & Strategies, 2009-2030, Emerging Energy Research, 2009).

Involvement of emerging countries within the CCS demonstration phase

Climate change is a global problem and all countries need to play their part in containing it, albeit in ways that depend on their specific circumstances. In accordance with Article 3.5 of the United Nations Framework Convention on Climate Change (UNFCCC), *"The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change (...)"*.

Individual nations have little direct self-interest in CCS technologies in absence of binding emission reduction commitments. For that matter, they might lack eagerness to carry the cost of CCS demonstration activities that would also reduce the overall energy efficiency of power plants. We observe however that many nations are getting involved as they view CCS as the unavoidable future of coal-fired industrial operations. In this context, early movers attempt to join into collaborative research and experimentations in order to get ready, avoid lock-in effects with outdated technologies and pre-empt their share of the new markets associated with CCS (nationally and abroad).

The IEA predicts that, following current trends, demand for coal will grow faster than any other energy source to account for about 40% of incremental global energy demand to 2030 in non-OECD countries[25], especially India and China.

CCS research, development and deployment (RD&D) is already taking place in some emerging countries. Despite this activity, it is unlikely that this technology will "achieve" large-scale application before 2030 for most emerging countries, whose potential to deploy CCS domestically varies according to the power growth prospects and the evolution of the energy mix. In this respect, the case of China is crucial. China became the world's biggest CO_2 emitter in 2007 and is a large coal user – 63% of total primary energy supply and 75% of electricity production in 2005[26]. It is also projected that China will account for as much as 46% of global coal demand by 2030[27]; in early 2009, two coal-fired power stations are constructed every week. This is comparable with Brazil, where 84% of power production came from hydro in 2005[28]. And yet even in Brazil, predicted energy mixes show a steep increase of the share of fossil fuels[29]. Some CCS potential projects on refineries or oil platforms are planned to be implemented until 2014, notably piloted by Petrobras (Campos, Miranga, Paraná and Potiguar), which are expected to avoid almost ten million tonnes of carbon dioxide emission per year.

There are several partnerships underway between developed and developing countries in order to validate CCS technology and bring down costs. As stressed during the seminar, whereas China is not officially taking a strong position in favour of CCS within the UNFCCC arena, the country is actively seeking cooperation opportunities with partners and is notably involved in a number of bilateral and multilateral CCS programs, such as the Carbon Sequestration Leadership Forum (CSLF)[30], where it is the only developing member country. Two CSLF projects in China have been endorsed: the "China Coalbed Methane Technology/CO_2 Sequestration Project" achieved in 2006 with Canada and the "Regional Opportunities for CCS in China" which is an ongoing partnership with the USA.

In addition, close cooperation has been developing with the EU on CCS through two parallel but complementary projects which are currently underway[31]:

- The research and development program

25. World Energy Outlook 2008: Implications for post-2012 climate scenarios (IEA).

26. World Energy Outlook 2007: Fact Sheet - China (IEA).

27. A Roadmap for U.S.-China Cooperation on Energy and Climate Change, Pew Center on Global Climate Change and Asia Society, 2009.

28. «Le Pétrole en 2030 : la transition nécessaire», La Recherche, Mars 2008, n°417, p.36

29. Carbon-constrained scenarios: what's at stake for heavy industries?, EpE-IDDRI, http://www.iddri.org/Publications/Rapports-and-briefing-papers/Joint-Research-Project-Carbon-constrained-scenarios-Full-and-final-report

30 .The CSLF is an international initiative on climate change focused on development of carbon separation, capture, transport and storage technologies. It has been in place since 2003.

31. During the EU-China Summit in September 2005 under the UK's presidency of the EU, two coordinated Memoranda of Understanding have been signed.

COACH32 (COoperation Action within CCS CHina-EU). This project involves European and Chinese partners, and aims to build the foundations for a CCS demonstration in China by 2015. The total budget is €2.6 million, including a €1.5 million European Commission (EC) contribution (from the FP6);

- The EU-China NZEC (Near Zero Emissions Coal) initiative, working closely with the COACH project, is planned in three phases following agreements signed by the EC, the Ministry of Science and Technology and the UK government. The latter is leading the first phase with a £3.5 million funding in order to evaluate several options for capture and explore storage potential in China and make CCS viable by 2020. Progress implementing the first phase is slow so far, whilst second and third phases details of funding have not yet been announced.

China is also particularly active in the development of CCS with several demonstration projects planned or under construction, e.g. the GreenGen project in Tianjin – a multi-phase 400 MW IGCC power plant fitted with CCS[33]. Besides, several EOR projects have already been implemented in Chinese oil fields[34]. The seminar flagged China as being particularly dynamic in integrating CCS into national policy, e.g. through key R&D plans, such as the Medium- and Long-term Science and Technology Development Plan towards 2020 (in 2006), the Special Science and Technology Action in Response to Climate Change (in 2007) and the Climate Change Program (in 2007).

However, there still remain barriers to development of CCS technology in China. For instance, an important proportion of Chinese coal-fired power plant development is outside of central government control and local governments do not conform to stringent environmental and technical standards35. RD&D is also capital intensive and carries with it high risks and funding issues persist; the first Chinese IGCC demonstration project – the Yantai project – was to be built in 1999, but it has been delayed by several years due to a lack of finance. In the near future, the scope of Chinese CCS activities will mainly depend on funds and technologies from the international community.

A financing mechanism specifically adapted for projects in developing countries would be the inclusion of CCS in the Clean Development Mechanism (CDM) from the Kyoto Protocol and this was proposed during the conference. However, negotiations have not yet been able to find an agreement and are postponed until COP-15 at Copenhagen. The debates have polarised into discussion between proponents (several fossil-fuel-dependent-developing countries and developed countries) and opponents (environmental organizations, several developing countries such as Brazil, AOSIS, or Venezuela). It is not immediately clear how CCS would contribute to the host country's sustainable development. For the opponents of CCS inclusion in the CDM, CCS would displace adoption of renewable energy or energy efficiency projects. Several other challenges exist. Firstly, management of local health and environmental risks is outside the CDM governance framework; allowing CCS in the CDM may then come across as using developing countries to test a new and "risky" technology. Second, as expressed during the seminar, CCS is not commercially viable; therefore it is not yet suitable for a market-based mechanism, like the CDM where abatement costs are supposed to be below the expected emission reduction costs in developed countries. Third, there are questions about the long-term liability of the facility.

Another barrier to CCS deployment in emerging countries mentioned in the conference is the issue of Intellectual Property (IP) rights protection and technology transfer which have become more and more critical in climate change negotiations. The UNFCCC and the Kyoto Protocol require Parties to promote and cooperate in the development and diffusion of technologies that prevent or reduce green-

32. It is presently at the end of the first phase (2006-2009) dealing with benchmarking of technologies, feasibility, and recommendations for site selection and technologies. The third and last phase planned to start in 2012 is the implementation phase, after a short phase which should define and design a demonstration project.

33. The Chinese power industry has several projects focusing on coal gasification (Zhejiang, Langfang and Yantai). Carbon dioxide injection for GreenGen is planned to begin during the last phase (2015-2020).

34. Among these fields, there are Shengli, Zhongyan, Jilin, Daqin, Jiangsu, Songliao, Liaohe, etc. In 1998, China began its first CO2 storage project for CO2-EOR in the Liaohe oil field.

35. This would represent around 110,000 MW of China's existing coal-fired capacity (The Future of Coal: Option for a Carbon Constrained World. Boston, Massachusetts Institute of Technology, 2007).

house gas emissions[36]. During the Bali Action Plan, development and transfer were recognized as being critical for the implementation of the UNFCCC beyond 2012. A compromise is needed between an over-zealous IP protection which would hinder rather than facilitate technology transfer, and a lack of protection which would dissuade industry from investing in developing the technology – since technology transfer principally concerns the private sector. IP rights protection is indeed both an incentive by offering protection against a loss of control of information in technology-related transactions and an obstacle to the transfer of technology; patents may imply excessive high prices and trigger restrictions hampering the transfer of technologies[37].

There is currently no CCS-specific IP rights system being developed; for technology development, two options currently exist: development managed by governments and/or private organization and transfer of the technology in developing countries; co-development with a close collaboration between developed and developing countries.

These two alternatives need a constructive approach and a precise definition, particularly to clarify the difference between the IP brought by industry at the outset of a new project, and the IP developed during the project's lifetime. For example, with regard to the UK-NZEC project, the UK is willing to develop a system which respects existing IP rights protection and licensing arrangements for manufacturers, but which promotes the sharing of "show how" and expertise associated with the demonstration, e.g. plant integration and optimisation. For the public-private partnerships at Sleipner and at Snøvit, StatoilHydro is willing to release its knowledge to the public domain. However while the question of IP rights is not properly solved, investors are unlikely to commit themselves.

To conclude, there is no obvious reason for developing countries to invest in an expensive and immature technology such as CCS. And despite the market opportunities for "first movers", the absence of a carbon price internalisation in developing countries and the perceived political risk weaken developed countries' interest in supporting large and capital intensive investments. This said, several demonstration projects are underway in China and the IP rights issue could be solved through a cooperative approach: for instance as put forward by participants, China and the EU could consider requiring compulsory licensing as a precondition for public-sector assistance in deploying key climate technologies at scale. A condition for state funding of CCS could be a requirement to enter into issue licences or joint ventures in third countries that are party to EU "clean" coal agreements. Fostering a collaborative approach to develop this crucial technology may be the best way to ensure its broad deployment if the technology comes to validation. It could also solve the issue of technology transfer in those countries and be a more relevant solution than the CDM approach that is under discussion.

Public acceptability

The seminar discussion of public acceptability showed that perception may have a very significant effect upon projects involving new technologies and infrastructures[38], especially if these may bring about real or supposed changes or threats to citizens' local environments. The recent local opposition in France to windmill projects shows that public opinion on the necessity, safety and appearance of proposed projects can be a significant barrier. Therefore it is essential to provide citizens with access to comprehensive and understandable information as well as providing the opportunity for open and transparent public debates and developing a concertation framework as part of the decision-making process; it is notably the purpose of the Aarhus Convention to guar-

36. This is included e.g. in Article 4 of the UNFCCC and Article 10 of the Kyoto protocol. During the COP 7 in 2001, the Marrakesh Accords led to the establishment of an Expert Group on Technology Transfer (EGTT) which is undertaking work on financing of technology development and transfer, and on elaborating a long-term strategy on technology.

37. Hoekman B. M., Maskus K. and Saggi K., Transfer of Technology to Developing Countries: Unilateral and Multilateral Policy Options, World Bank Policy Research Working Paper 3332, Washington, D.C., 2004.

38. Such as nuclear industry, windmills, biofuels, landfill sites, genetically modified organisms, nanotechnologies, electromagnetic waves.

antee this in Europe[39]. During the seminar, Total clarified how they dealt with the public dialogue process for the Lacq project, one of the rare existing examples to date[40].

Public perception of CO_2 risks centres on transport (although risks associated with CO_2 pipeline transport could be lower than those of hydrocarbon pipelines already in operation) or long-term storage of CO_2; the capture process is not seen as a dangerous industrial activity. With regards to storage risks, the public is willing to accept that carbon dioxide is a non-explosive gas and that controlling gas pressure in the reservoir would avoid seismic risk when filling a porous geological formation. Hence the main risk is carbon leakage through geological formations above or around the expected reservoir. Though news of CO_2–related fatalities was brought about with volcanism events in the past[41], few people actually remember this. Moreover, carbon dioxide storage can be credibly dissociated from these natural events that occurred in specific landform settings. Two scenarios may happen: an abrupt or a diffuse leakage. Risks caused by an abrupt leakage through surface installations – injection well failure or leakage up an abandoned well – would have to be minimised with safety measures and a proper site selection (geological stability zone, impermeable caprocks, absence of leakage paths...). The second leakage scenario is gradual CO_2 diffusion toward surface through undetected fractures, faults, or wells. There may be then contamination of drinking water aquifers and effects on underground ecosystems by acidifying soil and fluids, by decreasing oxygen in these medium, and on land ecosystems in specific geographical and meteorological context[42]. The conference however highlighted that we know less about long-term storage security. In the long run, leakage of carbon dioxide particles to the atmosphere would be counter-effective regarding the climate change objective, as it would enhance the use of coal and strengthen greenhouse effect.

CCS is a new technology and it is unsurprising that public awareness is generally low. A survey carried out in March 2009 by French polling institute IFOP for the British Embassy of Paris on French public opinion on CCS (cf. Annex III) showed that 27% of people had already heard of CCS. This shows little difference with another public opinion poll carried out in France two years ago (34%)[43]. In the IFOP survey, quite surprisingly, most people are favourable to CCS (80%) and would accept projects in France (85%) or in their region (72%). However, acceptability falls to 44% for projects in local environments. In addition, 60% would refuse an increase in electricity prices.

Some comparison with the development of nuclear power in France is interesting and was discussed during the conference, where little public debate or consultation took place as part of the decision to build nuclear plants and even after. Although the specific risks associated to the nuclear option seem of a different order, and the debate is therefore much more polarized (between "pros-" and "antis-"), there are some lessons to draw from the nuclear experience; moreover, some parallel concerns could be identified on specific issues, e.g. relating to the framework or the long-term performance of geological disposal.

In order for CCS to become an acceptable energy choice for the French public, discussions and consultations should be wide and open. Representatives from industry, government, associations, scientists, non-governmental organizations should all be involved in discuss-

39. The Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters of the United Nations Economic Commission for Europe, usually known as the Aarhus Convention, was signed in 1998. The Aarhus Convention focuses on interactions between the public and public authorities. It grants rights to the public regarding access to information, public participation and access to justice, in governmental decision-making processes on matters concerning the local, national and transboundary environment.

40. Although the context of this project is specific. It allows for some activity to remain on the site just after the shutdown of the natural gas extraction, which might have largely outplayed any population concern regarding local risks.

41. Such as Nyos lake overturn (Cameroon, 1986), Tavurvur vent (Papua New Guinea, 1990), etc.

42. Denser than air, CO2 would remain at the surface, its concentration – hence toxicity – increasing. Exposure to CO2 concentrations from about 5-10% by volume in air would have effects on human health; this would be lethal beyond 20% (according to the Institut National de Recherche de Sécurité). In comparison, CO2 mean rate in the atmosphere in 2008 was about 0.039% by volume in air (Mauna Loa Observatory, Hawaii).

43. This survey was realized in 2007 by TNS SOFRES for the CIRED (Centre International de Recherche sur l'Environnement et le Développement).

ing the reasoning behind the technology choice and be able to voice concerns or questions. One would not then be inclined to criticize the messenger instead of the message. Firms or organizations acting unilaterally might be perceived to have vested interest in projects; a project fronted only by the government might be considered as being dictated at the central level. In addition, it should be noted that the public will generally not be willing to debate about the risks if some discussion is not allowed about the rationale of the project. Also, the fact that risks and benefits might be different from a local, national or multinational perspective implies that discussions must take place on each relevant level with appropriate links between them. In particular, CCS must be discussed on a broad scale, as part of other relevant political decisions (climate change, energy security, etc.) and possible alternative options.

Public trust in the operator is also particularly important, because the latter will be mainly responsible for the storage site. In the EU resolution on geological storage[44], liability transfer to a competent authority (namely the state) will take place after an agreed amount of time (not shorter than twenty years), after which the former operator would no longer be responsible except in case of negligence, concealment or fault. However, the operator would need before to justify that carbon dioxide storage is completely and permanently sequestrated.

Hence, CCS acceptability appears in reality to be a triple acceptability: socio-political acceptability (is CCS an acceptable option to mitigate climate change? Are risks acceptable?), local community acceptability (is the CCS project relevant and acceptable for local economy? Is general public ready to assume e.g. an increase in electricity prices?), and economic and market acceptability (Will CCS technology costs be acceptable?). These different topics would need to be discussed ahead of the deployment of the technology. There is currently a lack of coordinated EU or national Member State communication campaigns on CCS, as demonstrated by an EU research project in 2007[45] which showed that there have been insufficient resources for quality communication materials and no coordination between the various projects. Such communication would only be a first step, as providing the basis for counter analysis and concertation. The project identified risk estimation and environmental and socio-economic benefits to local communities – such as CO_2 emissions reduction, local economy development, or employment opportunities – are likely to be key components for a wider acceptability.

Dealing with public acceptability issues will be a cornerstone of the technology deployment. As there is a need to harmonise and coordinate efforts around the demonstration programme and the future industrial development, it is also necessary to plan ahead of deployment how to deal with acceptance issues and examine what are the conditions for a calm and transparent debate around economic, environmental and social impacts of CCS. Time required to deal with such issues should not be underestimated. In addition, as it was discussed at the conference, policies need to be tailored according to the country, because public acceptability is dependent on many variables: geographic location, historical references of past technology development, political context, associations' involvement, etc.); so, for example, policies suitable in France may not be the same as in the UK.

Potential risks and barriers to uptake

This new technology has to face uncertainties such as commercial scale deployment in a short-term perspective and several risks still have to be addressed. Simultaneous challenges facing early movers and investors to succeed in demonstration and deployment in a very tight timeframe relate to:

- Technology validation. There are still several technical uncertainties that must be overcome to ensure CCS success. As mentioned above, capture and transport are relatively well-known technologies and have been assessed for several years. However, outputs

44. European Parliament legislative resolution of 17 December 2008 on the geological storage of carbon dioxide, which sets comprehensive provisions on site selection, operation of storage sites, monitoring and reporting, and closure and post closure.

45. This project, called Acceptance of CCS, Economics, Policy and Technology (ACCSEPT) was funded by the EC (FP6) aiming to assess EU social acceptance and to address gaps in socio-economic studies.

may be lower than expected or extra energy may be required to run integrated systems, reducing the overall efficiency. While extracting a fluid from substratum is technically overcome, injection and storage is a relatively new process that remains to be proven. Carbon dioxide utilization in pioneering applications was not primarily aiming at sequestration but at enhancing oil extraction; therefore leakage risks were of secondary interest. Thus as of today there is little certainty on the viability of the technology and also limited understanding of the impact of injected CO2 on rocks regarding potential dissolution, precipitation and fracturing. Moreover, while all the components of CCS are to be known and deployed at commercial scale, there is no return on experience with integrated systems.

- Reduction of costs and economical impacts. This would concern both industrials and general public. As CCS is an expensive and immature technology (cost of research, infrastructure, investments...), relevant financial dispositions are key to incentivise industrials to invest in demonstration. It is probable that CCS will increase electricity costs, which raises the issue of economic impacts on consumers of increased electricity prices. An issue raised during the conference relates to the future of inefficient or old coal-fired power plants, which show little economic interest in retrofitting with CO2 capture; retrofit is indeed only suitable for power plants with high efficiency3. Is there a risk in that case for operators to face stranded costs46 if the regulation on CCS evolves?
- Legal and regulatory framework to govern the use of CCS. The CCS legislative resolution proposed within the energy and climate package in 200846 is an attempt to set the basis for a regulatory framework on storage in the EU. It especially rules site selection, permitting and liability issues as regards the storage integrity (inspections, post closure obligations and responsibility transfer). It gives a framework to long-term responsibility, with liability transfer from operators to a competent authority in a certain extent (minimum period, efficiency of the storage...). It also addresses third party access to the storage. Nonetheless, strengthening the framework will be essential, especially to clarify transport (liability, third party access...) and trans-boundary issues (e.g. specifications). As it was mentioned during the conference, a regulatory authority examining the transport and the quality/quantity of CO2 would probably be necessary. This first legislative attempt and the national framework that are emerging in Europe[47] establish guarantees for investors, especially on the most sensitive points such as liability issues, to foster the kick-start of demonstration. It is likely that this young legislation will need to evolve and be completed in the light of a learning-by-doing process. These guarantees seem significant as an insurance-based financial services provider, Zurich Financial Services, has decided in 2009 to launch insurance products to cover inter alia pollutions and business interruptions generated by CCS failures.
- Environmental risks and correlated acceptability issues. Leakages may happen and generate pollutions affecting ecosystems and people; there is little visibility so far how to address adequately these risks in a public debate to target a widespread deployment of the technology in the mid-term.
- The licensing process to authorize the exploitation and the pipelines development is likely to be lengthy. This will also set conditions on the time required to ensure deployment.

All these conditions (validation of CCS technology, reasonable costs, financing and regulatory framework designs and public acceptability) need first to be met to allow widespread deployment. However, these conditions are especially challenging given the ambitious European timeframe. It seems therefore necessary to cope with the vision of the 2020 deadline to tackle all these challenges in parallel rather than to adopt a sequential approach. The latter would contain less risk: it would consist of a step-by step approach that would lead to first validate the technology before settling the

46. Costs that can not be recouped, e.g. an evolution of the regulation that triggers capacities decommissioning

47. The UK has for instance implemented national regulations for storage that will come into force in April 2009; they deal with transfer of liabilities to state, penalties for non-compliance, etc.

prerequisite for the industrial development and engaging larger financial investment both from the public and private sectors. But it will likely be much too slow and probably miss the 2020 objective. It seems therefore that, with demonstration, Europe also has to overcome another huge challenge which is to kick-start also the rationalization of a consistent CCS industry – in terms of power production choices, CO_2 transport and storage regulation and planning, capacity building (business consortiums, knowledge sharing...), industrial organisation to support the deployment (transport, supply chains), as well as tackling all larger scale-investment incentives and public acceptance issues in the meantime. However, adopting such a pathway does not preclude any risk:

- In case technical or economical failure of demonstration which would probably be observed only around 2015-2020, there will be very little time for Europe to readapt its domestic emission reduction strategy if it aims to fulfil tough goals in emission reduction on the longer term. There is a risk that the expectations on CCS trigger new investments in coal and possible additional "lock-in" in energy production and use patterns in the period to 2020 and that a radical change in the trajectory would be even more challenging afterwards.
- In case of success of the technology but major delay in Europe, the development of a EU leadership on CCS may be threatened. Australia (which has recently launched the new Global CCS Institute), the US and above all China are indeed intensively involved and may take the lead on CCS technology which could probably raise costs for Europe to widely implement such an option.

Recommendations

The seminar hosted by the British Embassy in France and IDDRI in February 2009 brought together four dozen experts to look into the outstanding issues facing the on-going development of the CCS industry in Europe and worldwide. Having heard in-depth substantive discussions at the seminar and following further analysis of the issues, we can now summarise the following opportunities for future (bilateral) work on CCS:

On finance, UK and France could consider joining efforts to:

- Request that the European Commission rapidly presents its vision of how, and how much, EU financing will be made available for demonstration activities. In particular, aim for a substantial share of the New Entrants Reserve (NER) to be earmarked for CCS, and ensure the future cash flows from NER auctions should be promptly allocated by Member States.
- Work out appropriate models for public private partnerships (PPP) that enable swift decision making while also favouring increased transparency and avoiding the promotion of national champions by individual Member States.
- Push for a unitary vision for CCS deployment in Europe (potentially including demonstration projects in China), leading to a rationalisation of project design and public support. This vision would promote a vibrant competitive European CCS industry and shield it against the natural tendency of individual Member States to promote their national champions.
- Make full use of the amounts set aside in the economic recovery packages to fund CCS demonstration project design, site exploration and public consultations. At present the European Parliament is of the view that only CCS projects that are in a position to progress substantially with project development in 2009 and 2010 should be supported[48].

Regarding the involvement of emerging economies with large CCS potential, France and UK could work together to increase support for technology co-development through international collaborative R&D platforms with appropriate contractual arrangements on intellectual property. As mentioned before, the implementation of well-designed PPPs for CCS demonstration in Europe should greatly enhance the future attractiveness of European industries in the context of setting up R&D and industrial partnerships in countries like China. France and UK should also ensure that enhanced CCS cooperation remains high on the agenda of the EU-China dialogue.

48 .Position of the European Parliament of 6 May 2009 Community financial assistance to projects in the field of energy in the context of economic recovery.

On public acceptability, France and the UK could lead the debate to anticipate the implications and the timeframe to set up a fair and transparent debate in the early stages of the CCS policy design, in accordance with the provisions of the Aarhus Convention. Debate should be structured by the consideration of broader EU-level energy and climate change issues and, as the legitimacy of CCS as part of the big picture becomes more consensual, more specific alternative design features can be discussed. Informed decision making should not be left to wait until local opposition for "not in my backyard" concerns emerges.

On the critical path towards full scale deployment of the technology, France and the UK could highlight the necessity for early identification of storage sites in the EU – a time-consuming process, including geological validation, in which could also, if appropriate, feed into the public consultation process mentioned above. ■

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ANNEXES

Annex 1 : Operational and Planned Projects in Europe

Annex 2 : CCS Projects Proposed to be financed by the EERP

Annex 3 : IFOP Survey. Les Français et le captage et stockage du carbone

IDDRI

SciencesPo.

FOUNDED IN PARIS IN 2001, the Institute for Sustainable Development and International Relations (IDDRI) is born from three assumptions: the global changes resulting from human activities are unsustainable over the long-term; a complete transformation of development models is needed; this is possible if coherent policies are soon implemented at the global level to bring about changes in lifestyles.

IDDRI is an independent institute which aims to bridge the gap between research and decision-making: it uses scientific research to shed light on political issues which have an impact on sustainable development and on key challenges to the transformation of development models. By coordinating dialogue between stakeholders whose interests are often at odds and mobilising teams of researchers through an extensive international network, IDDRI promotes a common understanding of concerns, while at the same time putting them into a global perspective.

IDDRI issues a range of own publications. With its Idées pour le débat collection, it quickly circulates texts which are the responsibility of their authors; Synthèses summarize the ideas of scientific debates or issues under discussion in international forums and examine controversies; Analyses go deeper into a specific topic. IDDRI also develops scientific and editorial partnerships, among others A Planet for Live. Sustainable Development in Action is the result of collaboration with the French Development Agency (AFD) and editorial partnership with Les Presses de Sciences Po.

To learn more on IDDRI publications and activities, visit www.iddri.org

Annex I: Operational and Planned Projects in Europe

Project Name	Location	Main Operator	Industry	Capture process	Capacity (MW)	CO_2 fate	Amount CO_2 handled (Mt/Yr)	Cost / Funding	Start of Operation
Maritsa	Bulgaria		Power	Pre	650		3.3		
Hodonin	Czech Republic	CEZ	Power	PC	105	Depleted oil and gas field	0.3		2015
Ledvice	Czech Republic		Power	PC	660	Saline Aquifer	0.9		2015
Kalundborg	Denmark	DONG Energy	Power (Coal)	PC	600	Saline Aquifer			2015
Aalborg (Nordjyllandsværket)	Denmark	Vattenfall	Power (Coal)	PC	310	Saline Aquifer	1.8		2013
Meri Pori	Finland	Fortum, TVO	Power (Coal)	Oxy-fuel or PC	565		3.2		2015
Lacq	France	Total, Alstom, Air Liquide	Power (Oil)	Oxy-fuel	30-35 (?)	Depleted Gas Reservoir	0.15 for two years		2009
Florange	France	ArcelorMittal	Steel	PC		Saline Aquifer			
Wilhelmshaven	Germany	E.ON CE	Power	PC	500 (100 captured)	Saline Aquifer	0.6		2015
Eisenhüttenstadt	Germany	ArcelorMittal	Steel	PC		Saline Aquifer			
Greifswald	Germany	DONG Energy	Power	PC	1600				Undecided
Goldenbergwerk	Germany	RWE	Power (Coal)	Pre	450		2.3	€2 billion	2014
Schwarze Pump	Germany	Vattenfall	Power (Coal)	Oxy-fuel	30	Gas field	0.1	€60 million	2008
Ketzin	Germany	CO2 Sink	Hydrogen Gas Production		-	Depleted Gas Field	0.03	€4 million	2008
Huerth	Germany	RWE	Power (Coal)	Pre	450	Saline Aquifer	2.8	€1.7 billion	2014
Jaenschwalde	Germany	Vattenfall	Power (Coal)	Oxy-fuel & PC	500	EGR	3.3	€ billion	2015
Enel CCS1	Italy	Enel	Power (Coal)	PC	660	Saline Aquifer	1.5		2014
Enel CCS2	Italy	Enel	Power (Coal)	Oxy-fuel	320	Saline Aquifer	2.1		2016
Saline Joniche	Italy	SEI	Power	PC	1320		3.7		Undecided
Porto Tolle	Italy	Enel	Power (Coal)	PC	660				
Barendrecht	Netherlands	Shell	Chemicals, Refinery	H2 Production		Depleted oil and gas field	0.4		2011
Eemshaven RWE	Netherlands	RWE	Power	PC	40	Depleted oil and gas field	0.2		2015
Rotterdam E.ON	Netherlands	E.ON	Power (Coal)	PC	1080	Depleted oil and gas field			Undecided
Rotterdam Eneco	Netherlands	Eneco	Power	PC	845				2011
Eemshaven Nuon	Netherlands	Nuon	Power (Coal)	Pre	1200	Depleted oil and gas field	2-2.5		2013
Rotterdam CGEN	Netherlands	CGEN NV	Power (Coal)	Pre	450	Depleted oil and gas field	2		2014
Rotterdam Essent	Netherlands	Essent	Power	Pre	1000	Depleted oil and gas field	4		2016
K12-B	Netherlands	GDF	Gas Extraction	Amine absorption	-	EGR	0.5		2004
Mongstad Statoil	Norway	StatoilHydro	CHP	PC	280 MW electricity & 350 MW heat	Saline Aquifer	2.5		2014
Hammerfest	Norway	Hammerfest Energi, Sargas	Power	PC	100	Saline Aquifer	0.6		2013
Husnes	Norway	Tinfos	Power (Coal)	PC	400	EOR	2.4	$700 million	2011
Kårstø	Norway	Aker	Power (Gas)	PC	420	Saline Aquifer and/ or EOR	1.2	$930 million	2012
Mongstad BKK	Norway	BKK	Power	PC or Pre	450	Saline Aquifer	1.05		2014
Haugesund	Norway	Haufaland Kraft	Power		400-800		2-2.5		2015
Sleipner	Norway	StatoilHydro	Gas Extraction	Amine absorption	-	Saline Aquifer	1		1996
Snøhvit	Norway	StatoilHydro	Gas Extraction	Amine absorption	-	Saline Aquifer	0.7		2008
Siekierki	Poland	Vattenfall	Power (Coal)	PC	480				2015+
Kedzierzyn	Poland	PKE/ZAK	Power, Chemical	Pre	500	Saline Aquifer	2.4		2014
Belchatow	Poland	PGE, ICPC, CMI, PGI	Power	PC	858	Saline Aquifer	1.7		2015
RECOPOL	Poland	International consortium			-	ECBM	760 t	€.5 million	Completed in 2005
Compostilla	Spain	Endesa	Power (Coal)	Oxy-fuel	500	Saline Aquifer	2.8		2015
Union Fenosa	Spain	Union Fenosa	Power	PC	800	Saline Aquifer	1.0		2016-2017
Kingsnorth	UK	E.ON	Power (Coal)	PC	800	Depleted gas field	2	£1 billion	2014
Scunthorpe	UK	Corus	Steel	PC	-	Depleted oil and gas field			
Longannet (with Cockenzie)	UK	ScottishPower	Power (Coal)	PC	3390	Saline Aquifer or ECBM			2014
Ferrybridge	UK	Scottish and Southern Energy	Power (Coal)	PC	500	Saline Aquifer	1.7	£350 million	2016
Tilbury	UK	RWE nPower	Power (Coal)	PC	1600	Saline Aquifer	9	£1 billion	2016
Killingholme	UK	E.ON	Power (Coal)	Pre	450	Depleted oil and gas field	2.5	£1 billion	Dormant
Hatfield	UK	Powerfuel Power Ltd	Power (Coal)	Pre	900	EOR	4.5	£1 billion	2014
Teeside	UK	Coastal Energy Ltd	Power	Pre	800	EOR	4.2		2012
Drym	UK	Valleys Energy Ltd	Power	Pre	450	Sedimentary Basin	2.5		Undecided
Aberthaw	UK	RWE nPower	Power (Coal)	PC	1 MW for demo, then 250 MW			£8.4 million (demo)	2010
Immingham	UK	ConocoPhilips	Power	Pre	1180	Depleted gas reservoir	7.5	£210 million	2009

PC = Post-combustion ; Pre = Pre-combustion ; EOR = Enhanced Oil Recovery ; ECBM = Enhanced Caol-Bed Methane recovery ; CHP = Combined heat and power

Projects underway

Projects proposed to be financed in the EERP

* Please note that this list is not exhaustive * In addition, there might be some imprecisions, because sources were sometimes contradictory

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Annex II: CCS projects proposed to be financed by the EERP

Financial envelop in March 2009: € 1.050 billion

CCS projects in the power sector

Project Name	Location	Operator	Envisaged EU Contribution (EUR million)	Fuel	Capacity	Capture Technique	Storage Concept
Huerth	Germany	RWE	180	Coal	450 MW	IGCC	Saline Aquifer
Jaenschwalde		Vattenfall		Coal	500 MW	Oxyfuel & PC	EGR
Eemshaven	The Netherlands	Nuon	180	Coal	1200 MW	IGCC	Oil/gas fields
Rotterdam		E.ON		Coal	1080 MW	PC	Oil/gas fields
Rotterdam		?		Coal	800 MW	PC	Oil/gas fields
Belchatow	Poland	PGE, ICPC, CMI, PGI	180	Coal	858 MW	PC	Saline Aquifer
Compostilla	Spain	Endesa	180	Coal	500 MW	Oxyfuel	Saline Aquifer
Kingsnorth	The United Kingdom	E.ON	180	Coal	800 MW	PC	Oil/gas fields
Longannet		ScottishPower		Coal	3390 MW	PC	Saline Aquifer
Tilbury		RWE nPower		Coal	1600 MW	PC	Oil/gas fields
Hatfield		Powerfuel		Coal	900 MW	IGCC	Oil/gas fields
Porto Tolle	Italy	Enel	100	Coal	660 MW	PC	

Industrial carbon capture project

Project Name	Location	Operator	Envisaged EU Contribution (EUR million)	Industry	Capacity	Capture Technique	Storage Concept
Florange	France	ArcelorMittal	50	Steel	-	PC	Saline Aquifer

PC: Post-combustion

IGCC: integrated Gasification Combined Cycle

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pour

Les Français et le Captage et Stockage du Carbone

Résultats détaillés
Le 26 mars 2009

Sommaire

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La méthodologie

Méthodologie

Ce document présente les résultats d'une étude réalisée par l'Ifop. Elle respecte fidèlement les principes scientifiques et déontologiques de l'enquête par sondage. Les enseignements qu'elle indique reflètent un état de l'opinion à l'instant de sa réalisation et non pas une prédiction.

Aucune publication totale ou partielle ne peut être faite sans l'accord exprès de l'Ifop.

Etude réalisée par l'Ifop pour :	**Ambassade de Grande-Bretagne**
Echantillon	Echantillon de **1003** personnes, représentatif de la population française âgée de 18 ans et plus. La représentativité de l'échantillon a été assurée par la méthode des quotas (sexe, âge, profession du chef de famille) après stratification par région et catégorie d'agglomération.
Mode de recueil	Les interviews ont eu lieu par questionnaire auto-administré en ligne (CAWI - Computer Assisted Web Interviewing).
Dates de terrain	Du 24 au 25 mars 2009

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Les résultats de l’étude

- *A* -

La connaissance du procédé

La connaissance préalable du procédé de Captage et Stockage du Carbone

Question : Afin de lutter contre les changements climatiques et contribuer à réduire les émissions excessives de CO2 dans l'atmosphère par la combustion du charbon, du gaz ou du pétrole, un nouveau procédé appelé Captage et Stockage du Carbone (CCS) est en train d'être développé. Avez-vous déjà entendu parler de ce procédé ?

	Ensemble (%)
• Oui	27
• Non	73
TOTAL	100

La connaissance préalable du procédé de Captage et Stockage du Carbone

	Oui (%)	Non (%)
ENSEMBLE	**27**	**73**
SEXE DE L'INTERVIEWE(E)		
Homme	37	63
Femme	18	82
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**18**	**82**
18 à 24 ans	19	81
25 à 34 ans	17	83
35 ans et plus	**31**	**69**
35 à 49 ans	23	77
50 à 64 ans	31	69
65 ans et plus	42	58
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	29	71
Profession libérale, cadre supérieur	25	75
Profession intermédiaire	26	74
Employé	22	78
Ouvrier	11	89
Retraité	39	61
Autre inactif	30	70
REGION		
Région parisienne	29	71
Nord est	28	72
Nord ouest	27	73
Sud ouest	29	71
Sud est	25	75
CATEGORIE D'AGGLOMERATION		
Communes rurales	27	73
Communes urbaines de province	28	72
Agglomération parisienne	28	72
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**29**	**71**
Tout à fait favorable	36	64
Plutôt favorable	25	75
Opposé	**34**	**66**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

Le degré de connaissance du procédé de Captage et Stockage du Carbone

Question : Diriez-vous que ... ?

Base : Question posée uniquement aux personnes ayant déjà entendu parler du procédé de CCS, soit 27% de l'échantillon.	Ensemble (%)
• Vous savez très bien de quoi il s'agit	11
• Vous savez à peu près de quoi il s'agit	53
• Vous en avez juste entendu parler	36
TOTAL	100

Le degré de connaissance du procédé de Captage et Stockage du Carbone

	Vous savez très bien de quoi il s'agit (%)	Vous savez à peu près de quoi il s'agit (%)	Vous en avez juste entendu parler (%)
ENSEMBLE	**11**	**53**	**36**
SEXE DE L'INTERVIEWE(E)			
Homme	11	56	33
Femme	10	49	41
AGE DE L'INTERVIEWE(E)			
Moins de 35 ans	**19**	**45**	**36**
18 à 24 ans	10	47	43
25 à 34 ans	25	44	31
35 ans et plus	**9**	**55**	**36**
35 à 49 ans	8	46	46
50 à 64 ans	7	54	39
65 ans et plus	11	62	27
PROFESSION DU CHEF DE FAMILLE			
Artisan ou commerçant	14	65	21
Profession libérale, cadre supérieur	12	51	37
Profession intermédiaire	7	41	52
Employé	12	37	51
Ouvrier	14	47	39
Retraité	9	59	32
Autre inactif	23	57	20
REGION			
Région parisienne	15	48	37
Nord est	13	49	38
Nord ouest	10	63	27
Sud ouest	-	59	41
Sud est	12	48	40
CATEGORIE D'AGGLOMERATION			
Communes rurales	12	47	41
Communes urbaines de province	10	57	33
Agglomération parisienne	11	50	39
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS			
Favorable	**10**	**56**	**34**
Tout à fait favorable	15	57	28
Plutôt favorable	7	54	39
Opposé	**10**	**47**	**43**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

- B -

Opinion sur les centrales électriques, le CCS et les pipelines

L'adhésion au développement de cette méthode par les gouvernements

Remise à niveau illustrée par un schéma
Le CO2 est un gaz naturel, présent dans l'atmosphère, que nous rejetons en respirant. Cependant, l'excès de CO2 contribue au réchauffement de la planète et aux changements climatiques.
En raison des procédés industriels et de l'utilisation de charbon ou d'hydrocarbures notamment pour produire de l'électricité, le niveau de CO2 dans l'atmosphère a augmenté de 30% en un siècle.
Le procédé de captage et stockage du carbone consiste à capturer le CO2 d'une installation avant qu'il ne soit rejeté dans l'atmosphère. Le CO2 est ensuite transporté dans des pipelines (c'est-à-dire des conduites enterrées) jusqu'à des sites de stockage comme des mines de charbon ou des gisements de gaz désaffectés ou encore d'anciennes nappes phréatiques. Ces sites peuvent être soit sous terre (onshore) soit sous la mer (offshore). Le CO2 peut alors y être stocké pour plusieurs milliers d'années, comme d'autres gaz le sont déjà naturellement. Pendant ce temps, on pourra développer de nouvelles solutions pour ralentir le réchauffement climatique comme les énergies renouvelables ou les énergies faiblement émettrices de CO2.
Certains scientifiques pensent que la technique de captage et stockage du carbone pourrait amener à réduire jusqu'à 90% des émissions industrielles de CO2.

Question : D'après ce que vous savez du captage et stockage du carbone, êtes-vous favorable ou opposé à ce que les gouvernements développent davantage cette méthode pour réduire les changements climatiques ?

	Ensemble (%)
TOTAL Favorable	**80**
• Tout à fait favorable	27
• Plutôt favorable	53
TOTAL Opposé	**11**
• Plutôt opposé	9
• Tout à fait opposé	2
- Ne se prononcent pas	9
TOTAL	100

L'adhésion au développement de cette méthode par les gouvernements

	TOTAL Favorable (%)	Tout à fait favorable (%)	Plutôt favorable (%)	**TOTAL Opposé** (%)	Plutôt opposé (%)	Tout à fait opposé (%)	Nsp (%)
ENSEMBLE	**80**	**27**	**53**	**11**	**9**	**2**	**9**
SEXE DE L'INTERVIEWE(E)							
Homme	**87**	33	54	**8**	6	2	5
Femme	**74**	22	52	**13**	11	2	13
AGE DE L'INTERVIEWE(E)							
Moins de 35 ans	**78**	**19**	**59**	**12**	**11**	**1**	**10**
18 à 24 ans	**81**	24	57	**10**	9	1	9
25 à 34 ans	**78**	16	62	**11**	11	-	11
35 ans et plus	**81**	**31**	**50**	**10**	**8**	**2**	**9**
35 à 49 ans	**78**	27	51	**10**	9	1	12
50 à 64 ans	**78**	28	50	**12**	8	4	10
65 ans et plus	**87**	38	49	**8**	6	2	5
PROFESSION DU CHEF DE FAMILLE							
Artisan ou commerçant	**82**	35	47	**13**	11	2	5
Profession libérale, cadre supérieur	**79**	20	59	**10**	8	2	11
Profession intermédiaire	**71**	16	55	**19**	18	1	10
Employé	**80**	22	58	**9**	7	2	11
Ouvrier	**80**	23	57	**7**	7	-	13
Retraité	**84**	34	50	**9**	6	3	7
Autre inactif	**87**	45	42	**6**	6	-	7
REGION							
Région parisienne	**80**	22	58	**11**	7	4	9
Nord est	**77**	28	49	**10**	9	1	13
Nord ouest	**85**	27	58	**8**	7	1	7
Sud ouest	**73**	22	51	**12**	10	2	15
Sud est	**81**	33	48	**13**	10	3	6
CATEGORIE D'AGGLOMERATION							
Communes rurales	**78**	26	52	**11**	9	2	11
Communes urbaines de province	**81**	29	52	**10**	8	2	9
Agglomération parisienne	**81**	22	59	**11**	8	3	8
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE							
Oui	**84**	**36**	**48**	**13**	**10**	**3**	**3**
Très bien, à peu près	**86**	40	46	**12**	10	2	2
Juste entendu parler	**81**	28	53	**15**	11	4	4
Non	**78**	**24**	**54**	**10**	**8**	**2**	**12**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

L'opinion sur les centrales électriques fonctionnant au charbon, au pétrole ou au gaz

Question : Le captage et le stockage de carbone concernerait principalement les centrales électriques qui fonctionnent au charbon, au pétrole ou au gaz.
Laquelle de ces propositions se rapprochent le plus de votre opinion sur ces centrales électriques qui fonctionnent au charbon, au pétrole ou au gaz ?

	Ensemble (%)
• Nous devrions progressivement arrêter de construire des centrales électriques qui fonctionnent au charbon, au pétrole ou au gaz	48
• Nous devons continuer à construire ce type de centrales électriques afin de garantir la sécurité énergétique du pays, mais également investir dans les énergies renouvelables et faiblement émettrices de carbone	25
• Nous devrions interdire de construire de nouvelles centrales de ce type	20
- Ne se prononcent pas	7
TOTAL	100

L'opinion sur les centrales électriques fonctionnant au charbon, au pétrole ou au gaz

	Nous devrions progressivement arrêter de construire des centrales électriques qui fonctionnent au charbon, au pétrole ou au gaz (%)	Nous devons continuer à construire ce type de centrales électriques afin de garantir la sécurité énergétique du pays, mais également investir dans les énergies renouvelables et faiblement émettrices de carbone (%)	Nous devrions interdire de construire de nouvelles centrales de ce type (%)	Nsp (%)
ENSEMBLE	**48**	**25**	**20**	**7**
SEXE DE L'INTERVIEWE(E)				
Homme	50	24	23	3
Femme	47	26	16	11
AGE DE L'INTERVIEWE(E)				
Moins de 35 ans	**52**	**22**	**22**	**4**
18 à 24 ans	56	18	22	4
25 à 34 ans	48	25	22	5
35 ans et plus	**47**	**26**	**19**	**8**
35 à 49 ans	44	25	20	11
50 à 64 ans	44	29	18	9
65 ans et plus	53	24	20	3
PROFESSION DU CHEF DE FAMILLE				
Artisan ou commerçant	48	19	28	5
Profession libérale, cadre supérieur	49	25	18	8
Profession intermédiaire	49	20	27	4
Employé	51	28	12	9
Ouvrier	41	28	22	9
Retraité	49	27	19	5
Autre inactif	55	19	15	11
REGION				
Région parisienne	52	23	18	7
Nord est	48	24	21	7
Nord ouest	49	30	16	5
Sud ouest	41	25	22	12
Sud est	48	23	23	6
CATEGORIE D'AGGLOMERATION				
Communes rurales	47	26	19	8
Communes urbaines de province	47	26	21	6
Agglomération parisienne	53	22	17	8
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE				
Oui	**48**	**28**	**21**	**3**
Très bien, à peu près	50	28	21	1
Juste entendu parler	43	29	22	6
Non	**48**	**24**	**19**	**9**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS				
Favorable	**51**	**27**	**18**	**4**
Tout à fait favorable	41	36	20	3
Plutôt favorable	55	23	17	5
Opposé	**40**	**14**	**42**	**4**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un site de démonstration selon sa proximité géographique

Question : Il existe actuellement en France, au Royaume-Uni, en Norvège, en Allemagne, aux Etats-Unis et en Chine, des sites (neufs ou en projet) de démonstration du procédé de Captage et Stockage du Carbone.
Vous personnellement, seriez-vous prêt à accepter la construction d'un site de démonstration de Captage et Stockage du Carbone ?

	Oui (%)	Non (%)	TOTAL (%)
• En France	**85**	15	100
• A l'étranger	**81**	19	100
• Dans votre région	**72**	28	100
• Dans votre commune	44	**56**	100

La propension à accepter la construction d'un site de démonstration selon sa proximité géographique

En France

	Oui (%)	Non (%)
ENSEMBLE	**85**	**15**
SEXE DE L'INTERVIEWE(E)		
Homme	90	10
Femme	80	20
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**85**	**15**
18 à 24 ans	87	13
25 à 34 ans	84	16
35 ans et plus	**84**	**16**
35 à 49 ans	79	21
50 à 64 ans	85	15
65 ans et plus	90	10
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	82	18
Profession libérale, cadre supérieur	88	12
Profession intermédiaire	81	19
Employé	85	15
Ouvrier	76	24
Retraité	88	12
Autre inactif	93	7
REGION		
Région parisienne	85	15
Nord est	86	14
Nord ouest	85	15
Sud ouest	80	20
Sud est	85	15
CATEGORIE D'AGGLOMERATION		
Communes rurales	85	15
Communes urbaines de province	84	16
Agglomération parisienne	86	14
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**89**	**11**
Très bien, à peu près	89	11
Juste entendu parler	88	12
Non	**83**	**17**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**94**	**6**
Tout à fait favorable	97	3
Plutôt favorable	93	7
Opposé	**30**	**70**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un site de démonstration selon sa proximité géographique

A l'étranger

	Oui (%)	Non (%)
ENSEMBLE	**81**	**19**
SEXE DE L'INTERVIEWE(E)		
Homme	85	15
Femme	78	22
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**82**	**18**
18 à 24 ans	83	17
25 à 34 ans	81	19
35 ans et plus	**81**	**19**
35 à 49 ans	77	23
50 à 64 ans	80	20
65 ans et plus	86	14
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	80	20
Profession libérale, cadre supérieur	83	17
Profession intermédiaire	83	17
Employé	80	20
Ouvrier	71	29
Retraité	85	15
Autre inactif	88	12
REGION		
Région parisienne	80	20
Nord est	82	18
Nord ouest	85	15
Sud ouest	77	23
Sud est	80	20
CATEGORIE D'AGGLOMERATION		
Communes rurales	83	17
Communes urbaines de province	80	20
Agglomération parisienne	81	19
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**87**	**13**
Très bien, à peu près	86	14
Juste entendu parler	89	11
Non	**79**	**21**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**89**	**11**
Tout à fait favorable	89	11
Plutôt favorable	89	11
Opposé	**32**	**68**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un site de démonstration selon sa proximité géographique

Dans votre région

	Oui (%)	Non (%)
ENSEMBLE	**72**	**28**
SEXE DE L'INTERVIEWE(E)		
Homme	83	17
Femme	62	38
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**70**	**30**
18 à 24 ans	74	26
25 à 34 ans	68	32
35 ans et plus	**73**	**27**
35 à 49 ans	66	34
50 à 64 ans	70	30
65 ans et plus	84	16
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	71	29
Profession libérale, cadre supérieur	71	29
Profession intermédiaire	71	29
Employé	66	34
Ouvrier	61	39
Retraité	80	20
Autre inactif	73	27
REGION		
Région parisienne	70	30
Nord est	70	30
Nord ouest	75	25
Sud ouest	68	32
Sud est	74	26
CATEGORIE D'AGGLOMERATION		
Communes rurales	73	27
Communes urbaines de province	72	28
Agglomération parisienne	71	29
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**82**	**18**
Très bien, à peu près	86	14
Juste entendu parler	77	23
Non	**68**	**32**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**82**	**18**
Tout à fait favorable	86	14
Plutôt favorable	80	20
Opposé	**22**	**78**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un site de démonstration selon sa proximité géographique

Dans votre commune

	Oui (%)	Non (%)
ENSEMBLE	**44**	**56**
SEXE DE L'INTERVIEWE(E)		
Homme	57	43
Femme	31	69
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**37**	**63**
18 à 24 ans	34	66
25 à 34 ans	39	61
35 ans et plus	**46**	**54**
35 à 49 ans	41	59
50 à 64 ans	42	58
65 ans et plus	59	41
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	54	46
Profession libérale, cadre supérieur	46	54
Profession intermédiaire	38	62
Employé	33	67
Ouvrier	37	63
Retraité	51	49
Autre inactif	41	59
REGION		
Région parisienne	39	61
Nord est	45	55
Nord ouest	43	57
Sud ouest	39	61
Sud est	49	51
CATEGORIE D'AGGLOMERATION		
Communes rurales	41	59
Communes urbaines de province	46	54
Agglomération parisienne	37	63
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**57**	**43**
Très bien, à peu près	64	36
Juste entendu parler	45	55
Non	**39**	**61**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**51**	**49**
Tout à fait favorable	62	38
Plutôt favorable	46	54
Opposé	**11**	**89**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un pipeline de démonstration selon sa proximité géographique

Question : Et seriez-vous prêt à accepter la construction d'un pipeline (conduite enterrée) transportant du CO2 ?

	Oui (%)	Non (%)	TOTAL (%)
• En France	**83**	17	100
• A l'étranger	**82**	18	100
• Dans votre région	**74**	26	100
• Près de votre commune	**61**	39	100

La propension à accepter la construction d'un pipeline de démonstration selon sa proximité géographique

En France

	Oui (%)	Non (%)
ENSEMBLE	**83**	**17**
SEXE DE L'INTERVIEWE(E)		
Homme	89	11
Femme	77	23
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**82**	**18**
18 à 24 ans	81	19
25 à 34 ans	83	17
35 ans et plus	**83**	**17**
35 à 49 ans	75	25
50 à 64 ans	83	17
65 ans et plus	92	8
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	80	20
Profession libérale, cadre supérieur	88	12
Profession intermédiaire	78	22
Employé	78	22
Ouvrier	72	28
Retraité	90	10
Autre inactif	81	19
REGION		
Région parisienne	79	21
Nord est	83	17
Nord ouest	84	16
Sud ouest	81	19
Sud est	84	16
CATEGORIE D'AGGLOMERATION		
Communes rurales	85	15
Communes urbaines de province	83	17
Agglomération parisienne	79	21
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**88**	**12**
Très bien, à peu près	89	11
Juste entendu parler	87	13
Non	**81**	**19**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**92**	**8**
Tout à fait favorable	95	5
Plutôt favorable	91	9
Opposé	**29**	**71**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un pipeline de démonstration selon sa proximité géographique

A l'étranger

	Oui (%)	Non (%)
ENSEMBLE	**82**	**18**
SEXE DE L'INTERVIEWE(E)		
Homme	86	14
Femme	77	23
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**82**	**18**
18 à 24 ans	80	20
25 à 34 ans	83	17
35 ans et plus	**82**	**18**
35 à 49 ans	76	24
50 à 64 ans	83	17
65 ans et plus	88	12
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	76	24
Profession libérale, cadre supérieur	87	13
Profession intermédiaire	82	18
Employé	81	19
Ouvrier	71	29
Retraité	87	13
Autre inactif	78	22
REGION		
Région parisienne	78	22
Nord est	82	18
Nord ouest	85	15
Sud ouest	79	21
Sud est	82	18
CATEGORIE D'AGGLOMERATION		
Communes rurales	83	17
Communes urbaines de province	82	18
Agglomération parisienne	79	21
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**89**	**11**
Très bien, à peu près	88	12
Juste entendu parler	91	9
Non	**79**	**21**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**90**	**10**
Tout à fait favorable	91	9
Plutôt favorable	90	10
Opposé	**34**	**66**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un pipeline de démonstration selon sa proximité géographique

Dans votre région

	Oui (%)	Non (%)
ENSEMBLE	**74**	**26**
SEXE DE L'INTERVIEWE(E)		
Homme	86	14
Femme	63	37
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**71**	**29**
18 à 24 ans	69	31
25 à 34 ans	72	28
35 ans et plus	**75**	**25**
35 à 49 ans	67	33
50 à 64 ans	73	27
65 ans et plus	87	13
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	72	28
Profession libérale, cadre supérieur	74	26
Profession intermédiaire	70	30
Employé	67	33
Ouvrier	65	35
Retraité	82	18
Autre inactif	73	27
REGION		
Région parisienne	70	30
Nord est	74	26
Nord ouest	77	23
Sud ouest	73	27
Sud est	73	27
CATEGORIE D'AGGLOMERATION		
Communes rurales	76	24
Communes urbaines de province	74	26
Agglomération parisienne	70	30
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**85**	**15**
Très bien, à peu près	87	13
Juste entendu parler	82	18
Non	**70**	**30**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**84**	**16**
Tout à fait favorable	90	10
Plutôt favorable	81	19
Opposé	**24**	**76**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

La propension à accepter la construction d'un pipeline de démonstration selon sa proximité géographique

Près de votre commune

	Oui (%)	Non (%)
ENSEMBLE	**61**	**39**
SEXE DE L'INTERVIEWE(E)		
Homme	75	25
Femme	47	53
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**52**	**48**
18 à 24 ans	52	48
25 à 34 ans	51	49
35 ans et plus	**64**	**36**
35 à 49 ans	57	43
50 à 64 ans	62	38
65 ans et plus	76	24
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	63	37
Profession libérale, cadre supérieur	60	40
Profession intermédiaire	53	47
Employé	53	47
Ouvrier	48	52
Retraité	72	28
Autre inactif	56	44
REGION		
Région parisienne	58	42
Nord est	60	40
Nord ouest	58	42
Sud ouest	61	39
Sud est	66	34
CATEGORIE D'AGGLOMERATION		
Communes rurales	62	38
Communes urbaines de province	61	39
Agglomération parisienne	57	43
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**76**	**24**
Très bien, à peu près	78	22
Juste entendu parler	72	28
Non	**55**	**45**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**69**	**31**
Tout à fait favorable	77	23
Plutôt favorable	65	35
Opposé	**20**	**80**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

- C -

Opinion sur les risques, les coûts et les campagnes d'information

Le sentiment sur l'opportunité de la poursuite des projets de démonstration de Captage et Stockage du Carbone

Le Captage et Stockage du Carbone est une nouvelle technologie et les scientifiques effectuent toujours des recherches ; entre autre pour connaître la compatibilité géologique des sites de stockage existants, pour savoir comment le CO2 va réagir une fois sous terre, ou encore pour savoir s'il existent des risques de fuite du CO2, et quelles seraient les conséquences d'une fuite souterraine de longue ou de courte durée.
C'est pourquoi l'application de cette technologie exige la mise en place d'une surveillance continue et d'un cadre réglementaire et juridique approprié. Des études ont cependant suggéré que le risque de fuite est très faible.

Question : En gardant ces informations à l'esprit, pensez-vous que ... ?

	Ensemble (%)
• Nous pourrons évaluer et gérer les effets potentiels sur le long terme, mais **nous devrions attendre d'avoir fait plus de recherches** avant de continuer les projets de démonstration	50
• Nous pourrons évaluer et gérer les effets potentiels sur le long terme de telle sorte qu'ils ne puissent pas causer de risque majeur ; **nous devrions poursuivre les projets de démonstration**	29
• **Les effets potentiels sur le long terme sont trop graves** pour utiliser cette technologie, même dans le cadre de projets de démonstration	10
- Ne se prononcent pas	11
TOTAL	100

Le sentiment sur l'opportunité de la poursuite des projets de démonstration de Captage et Stockage du Carbone

	Nous pourrons évaluer et gérer Les effets potentiels sur le long terme, mais nous devrions attendre d'avoir fait plus de recherches avant de continuer les projets de démonstration (%)	Nous pourrons évaluer et gérer Les effets potentiels sur le long terme de telle sorte qu'ils ne puissent pas causer de risque majeur ; nous devrions poursuivre les projets de démonstration (%)
ENSEMBLE	**50**	**29**
SEXE DE L'INTERVIEWE(E)		
Homme	47	41
Femme	52	19
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**50**	**27**
18 à 24 ans	60	20
25 à 34 ans	45	32
35 ans et plus	**49**	**30**
35 à 49 ans	48	24
50 à 64 ans	50	28
65 ans et plus	48	40
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	51	28
Profession libérale, cadre supérieur	44	32
Profession intermédiaire	50	25
Employé	52	19
Ouvrier	47	25
Retraité	50	35
Autre inactif	51	35
REGION		
Région parisienne	50	27
Nord est	48	29
Nord ouest	50	30
Sud ouest	49	26
Sud est	50	33
CATEGORIE D'AGGLOMERATION		
Communes rurales	50	30
Communes urbaines de province	49	29
Agglomération parisienne	49	27
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**44**	**42**
Très bien, à peu près	41	48
Juste entendu parler	49	31
Non	**52**	**25**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**54**	**35**
Tout à fait favorable	45	49
Plutôt favorable	58	28
Opposé	**33**	**4**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

Le sentiment sur l'opportunité de la poursuite des projets de démonstration de Captage et Stockage du Carbone

	Les effets potentiels sur le long terme sont trop graves pour utiliser cette technologie, même dans le cadre de projets de démonstration (%)	Nsp (%)
ENSEMBLE	**10**	**11**
SEXE DE L'INTERVIEWE(E)		
Homme	6	6
Femme	14	15
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**13**	**10**
18 à 24 ans	14	6
25 à 34 ans	11	12
35 ans et plus	**10**	**11**
35 à 49 ans	11	17
50 à 64 ans	11	11
65 ans et plus	6	6
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	9	12
Profession libérale, cadre supérieur	14	10
Profession intermédiaire	14	11
Employé	14	15
Ouvrier	10	18
Retraité	8	7
Autre inactif	7	7
REGION		
Région parisienne	11	12
Nord est	12	11
Nord ouest	8	12
Sud ouest	9	16
Sud est	11	6
CATEGORIE D'AGGLOMERATION		
Communes rurales	10	10
Communes urbaines de province	11	11
Agglomération parisienne	11	13
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**10**	**4**
Très bien, à peu près	8	3
Juste entendu parler	14	6
Non	**10**	**13**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**4**	**7**
Tout à fait favorable	3	3
Plutôt favorable	5	9
Opposé	**58**	**5**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

Le sentiment sur l'opportunité d'intégrer cette technologie dans la construction des futurs sites industriels

Certains gouvernements réfléchissent à l'idée de s'assurer qu'après la construction d'un site industriel fonctionnant au charbon, au pétrole ou au gaz, on puisse y installer à terme le procédé de Captage et Stockage du Carbone, une fois que celui-ci aura été maîtrisé.
D'autres estiment que l'on devrait arrêter de construire de tels sites industriels jusqu'à ce que l'on prouve que le procédé fonctionne. Après quoi l'installation du système Captage et Stockage du Carbone serait alors intégrée au moment de la construction du site.

Question : Vous personnellement, pensez-vous que ... ?

	Ensemble (%)
• Nous devrions construire des sites industriels mais en s'assurant qu'ils puissent à terme accueillir un dispositif de Captage et Stockage du Carbone	57
• Nous devrions uniquement construire des sites industriels intégrant déjà la technologie de Captage et Stockage du Carbone	24
• Nous devrions continuer de construire des sites industriels de la même façon qu'ils sont construits actuellement	6
- Ne se prononcent pas	13
TOTAL	100

Le sentiment sur l'opportunité d'intégrer cette technologie dans la construction des futurs sites industriels

	Nous devrions construire des sites industriels mais en s'assurant qu'ils puissent à terme accueillir un dispositif de Captage et Stockage du Carbone (%)	Nous devrions uniquement construire des sites industriels intégrant déjà la technologie de Captage et Stockage du Carbone (%)
ENSEMBLE	**57**	**24**
SEXE DE L'INTERVIEWE(E)		
Homme	61	26
Femme	53	22
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**58**	**21**
18 à 24 ans	64	20
25 à 34 ans	53	21
35 ans et plus	**56**	**25**
35 à 49 ans	51	22
50 à 64 ans	56	26
65 ans et plus	63	28
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	61	14
Profession libérale, cadre supérieur	55	24
Profession intermédiaire	55	22
Employé	54	23
Ouvrier	50	22
Retraité	61	28
Autre inactif	62	20
REGION		
Région parisienne	63	18
Nord est	54	24
Nord ouest	54	26
Sud ouest	54	23
Sud est	59	26
CATEGORIE D'AGGLOMERATION		
Communes rurales	54	26
Communes urbaines de province	56	25
Agglomération parisienne	62	18
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**59**	**26**
Très bien, à peu près	59	26
Juste entendu parler	58	26
Non	**56**	**23**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**61**	**26**
Tout à fait favorable	57	32
Plutôt favorable	64	23
Opposé	**39**	**22**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

Le sentiment sur l'opportunité d'intégrer cette technologie dans la construction des futurs sites industriels

	Nous devrions continuer de construire des sites industriels de la même façon qu'ils sont construits actuellement (%)	Nsp (%)
ENSEMBLE	**6**	**13**
SEXE DE L'INTERVIEWE(E)		
Homme	6	7
Femme	6	19
AGE DE L'INTERVIEWE(E)		
Moins de 35 ans	**9**	**12**
18 à 24 ans	8	8
25 à 34 ans	11	15
35 ans et plus	**5**	**14**
35 à 49 ans	7	20
50 à 64 ans	4	14
65 ans et plus	2	7
PROFESSION DU CHEF DE FAMILLE		
Artisan ou commerçant	9	16
Profession libérale, cadre supérieur	11	10
Profession intermédiaire	7	16
Employé	8	15
Ouvrier	8	20
Retraité	2	9
Autre inactif	6	12
REGION		
Région parisienne	7	12
Nord est	8	14
Nord ouest	6	14
Sud ouest	6	17
Sud est	4	11
CATEGORIE D'AGGLOMERATION		
Communes rurales	6	14
Communes urbaines de province	6	13
Agglomération parisienne	7	13
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE		
Oui	**9**	**6**
Très bien, à peu près	10	5
Juste entendu parler	8	8
Non	**5**	**16**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS		
Favorable	**6**	**7**
Tout à fait favorable	8	3
Plutôt favorable	4	9
Opposé	**12**	**27**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

L'adhésion à l'octroi de fonds de l'UE à la Chine pour le développement du CCS

Question : La Chine et l'Inde sont également de gros émetteurs de CO2. L'Union Européenne travaille avec le gouvernement chinois à la construction d'un site de démonstration d'ici 2015.
Etes-vous favorable à ce que l'Union Européenne fournisse des fonds pour le développement du Captage et stockage du Carbone en Chine ?

	Ensemble (%)
TOTAL Oui	**75**
• Oui	12
• Oui, mais seulement à condition que la Chine s'engage à réduire ses émissions de CO2	63
• **Non .....**	**19**
- Ne se prononcent pas	6
TOTAL	100

L'adhésion à l'octroi de fonds de l'UE à la Chine pour le développement du CCS

	TOTAL Oui (%)	Oui (%)	Oui, mais seulement à condition que la Chine s'engage à réduire ses émissions de CO2 (%)	Non (%)	Nsp (%)
ENSEMBLE	**75**	**12**	**63**	**19**	**6**
SEXE DE L'INTERVIEWE(E)					
Homme	**80**	15	65	**18**	2
Femme	**71**	10	61	**19**	10
AGE DE L'INTERVIEWE(E)					
Moins de 35 ans	**75**	**10**	**65**	**19**	**6**
18 à 24 ans	**75**	12	63	**19**	6
25 à 34 ans	**75**	8	67	**19**	6
35 ans et plus	**75**	**13**	**62**	**19**	**6**
35 à 49 ans	**68**	11	57	**23**	9
50 à 64 ans	**76**	10	66	**19**	5
65 ans et plus	**84**	19	65	**12**	4
PROFESSION DU CHEF DE FAMILLE					
Artisan ou commerçant	**63**	6	57	**27**	10
Profession libérale, cadre supérieur	**78**	13	65	**20**	2
Profession intermédiaire	**72**	9	63	**22**	6
Employé	**76**	13	63	**17**	7
Ouvrier	**66**	7	59	**23**	11
Retraité	**80**	15	65	**16**	4
Autre inactif	**81**	21	60	**12**	7
REGION					
Région parisienne	**78**	11	67	**18**	4
Nord est	**74**	15	59	**19**	7
Nord ouest	**74**	9	65	**19**	7
Sud ouest	**72**	15	57	**19**	9
Sud est	**77**	12	65	**18**	5
CATEGORIE D'AGGLOMERATION					
Communes rurales	**76**	10	66	**18**	6
Communes urbaines de province	**74**	13	61	**19**	7
Agglomération parisienne	**78**	12	66	**19**	3
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE					
Oui	**79**	**18**	**61**	**19**	**2**
Très bien, à peu près	**80**	22	58	**17**	3
Juste entendu parler	**79**	12	67	**21**	-
Non	**73**	**10**	**63**	**19**	**8**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS					
Favorable	**82**	**15**	**67**	**14**	**4**
Tout à fait favorable	**89**	17	72	**10**	1
Plutôt favorable	**78**	13	65	**16**	6
Opposé	**52**	**1**	**51**	**43**	**5**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

Le degré de prise en charge par le gouvernement des coûts engendrés par les projets de démonstration

Question : Installer en Europe un dispositif de démonstration de captage et de stockage de carbone sur un site industriel nouveau ou déjà existant reviendrait selon les estimations entre 0.5 et 1 milliard d'euros. Les industriels ont déclaré ne pas avoir les moyens de supporter tous ces coûts additionnels.
Afin de soutenir les premiers projets de démonstration, pensez-vous que le gouvernement français devrait prendre en charge ?

	Ensemble (%)
• Tous les coûts additionnels	11
• Une partie seulement des coûts additionnels	64
• Aucun des coûts additionnels	17
- Ne se prononcent pas	8
TOTAL	100

Le degré de prise en charge par le gouvernement des coûts engendrés par les projets de démonstration

	Tous les coûts additionnels (%)	Une partie seulement des coûts additionnels (%)	Aucun des coûts additionnels (%)	Nsp (%)
ENSEMBLE	**11**	**64**	**17**	**8**
SEXE DE L'INTERVIEWE(E)				
Homme	9	70	17	4
Femme	12	59	18	11
AGE DE L'INTERVIEWE(E)				
Moins de 35 ans	**12**	**65**	**16**	**7**
18 à 24 ans	8	73	14	5
25 à 34 ans	14	60	18	8
35 ans et plus	**10**	**64**	**18**	**8**
35 à 49 ans	11	58	20	11
50 à 64 ans	9	63	19	9
65 ans et plus	10	72	14	4
PROFESSION DU CHEF DE FAMILLE				
Artisan ou commerçant	11	67	15	7
Profession libérale, cadre supérieur	10	68	18	4
Profession intermédiaire	11	63	21	5
Employé	11	60	18	11
Ouvrier	13	53	18	16
Retraité	9	69	17	5
Autre inactif	10	69	12	9
REGION				
Région parisienne	5	72	15	8
Nord est	15	59	17	9
Nord ouest	12	68	13	7
Sud ouest	6	59	26	9
Sud est	11	62	21	6
CATEGORIE D'AGGLOMERATION				
Communes rurales	13	65	14	8
Communes urbaines de province	11	62	19	8
Agglomération parisienne	6	70	16	8
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE				
Oui	**10**	**70**	**17**	**3**
Très bien, à peu près	10	73	14	3
Juste entendu parler	12	65	21	2
Non	**11**	**62**	**18**	**9**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS				
Favorable	**12**	**71**	**12**	**5**
Tout à fait favorable	13	74	11	2
Plutôt favorable	12	68	13	7
Opposé	**3**	**42**	**49**	**6**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

L’adhésion au développement supplémentaire de cette méthode par les gouvernements

Question : Tout bien considéré, êtes-vous favorable ou opposé à ce que les gouvernements développent davantage cette méthode pour réduire les changements climatiques ?

	Rappel début de sondage (%)	Ensemble (%)	*Ecart*
TOTAL Favorable	**80**	**81**	***+1***
• Tout à fait favorable	27	23	*-4*
• Plutôt favorable	53	58	*+5*
TOTAL Opposé	**11**	**12**	***+1***
• Plutôt opposé	9	9	*=*
• Tout à fait opposé	2	3	*+1*
- Ne se prononcent pas	9	7	***-2***
TOTAL	100	100	

L'adhésion au développement supplémentaire de cette méthode par les gouvernements

	TOTAL Favorable (%)	Tout à fait favorable (%)	Plutôt favorable (%)	TOTAL Opposé (%)	Plutôt opposé (%)	Tout à fait opposé (%)	Nsp (%)
ENSEMBLE	**81**	**23**	**58**	**12**	**9**	**3**	**7**
SEXE DE L'INTERVIEWE(E)							
Homme	**88**	29	59	**9**	6	3	3
Femme	**74**	18	56	**15**	12	3	11
AGE DE L'INTERVIEWE(E)							
Moins de 35 ans	**79**	**18**	**61**	**14**	**13**	**1**	**7**
18 à 24 ans	**81**	20	61	**15**	14	1	4
25 à 34 ans	**77**	17	60	**14**	13	1	9
35 ans et plus	**82**	**26**	**56**	**11**	**8**	**3**	**7**
35 à 49 ans	**78**	22	56	**12**	9	3	10
50 à 64 ans	**79**	24	55	**13**	8	5	8
65 ans et plus	**90**	32	58	**9**	7	2	1
PROFESSION DU CHEF DE FAMILLE							
Artisan ou commerçant	**76**	24	52	**13**	11	2	11
Profession libérale, cadre supérieur	**82**	24	58	**14**	9	5	4
Profession intermédiaire	**76**	13	63	**16**	13	3	8
Employé	**75**	19	56	**16**	15	1	9
Ouvrier	**76**	20	56	**12**	10	2	12
Retraité	**86**	29	57	**10**	7	3	4
Autre inactif	**91**	29	62	**7**	7	-	2
REGION							
Région parisienne	**82**	20	62	**11**	7	4	7
Nord est	**82**	24	58	**12**	10	2	6
Nord ouest	**84**	22	62	**9**	8	1	7
Sud ouest	**73**	18	55	**16**	14	2	11
Sud est	**81**	29	52	**13**	10	3	6
CATEGORIE D'AGGLOMERATION							
Communes rurales	**82**	23	59	**11**	10	1	7
Communes urbaines de province	**80**	24	56	**13**	10	3	7
Agglomération parisienne	**83**	21	62	**10**	7	3	7
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE							
Oui	**86**	**33**	**53**	**12**	**9**	**3**	**2**
Très bien, à peu près	**86**	38	48	**12**	10	2	2
Juste entendu parler	**84**	24	60	**14**	9	5	2
Non	**80**	**20**	**60**	**11**	**9**	**2**	**9**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS							
Favorable	**94**	**28**	**66**	**2**	**2**	**-**	**4**
Tout à fait favorable	**96**	59	37	**2**	2	-	2
Plutôt favorable	**93**	13	80	**3**	2	1	4
Opposé	**19**	**2**	**17**	**73**	**53**	**20**	**8**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

L'augmentation acceptée du prix de l'électricité pour compenser les coûts du CCS

Question : Déployée à **grande échelle**, la technologie de Captage et de Stockage du Carbone pourrait éviter le rejet de grandes quantités de CO2 dans l'atmosphère mais cela aurait également un coût.
Afin de couvrir les coûts engendrés par le Captage et de Stockage du Carbone, seriez-vous prêt à payer votre électricité ?

	Ensemble (%)
Total oui.....	**38**
• 10% - 20% plus cher	34
• 20% - 30% plus cher	3
• 30% - 40% plus cher	1
• Plus de 40% plus cher	-
Non, je ne serais pas prêt à payer mon électricité plus cher	**56**
- Ne se prononcent pas	6
TOTAL.....	100

L'augmentation acceptée du prix de l'électricité pour compenser les coûts du CCS

	Total Oui (%)	10% - 20% plus cher (%)	20% - 30% plus cher (%)	30% - 40% plus cher (%)	Plus de 40% plus cher (%)	Non, je ne serais pas prêt à payer mon électricité plus cher (%)	Nsp (%)
ENSEMBLE	**38**	**34**	**3**	**1**	**-**	**56**	**6**
SEXE DE L'INTERVIEWE(E)							
Homme	**46**	40	5	1	-	**51**	3
Femme	**32**	29	2	1	-	**60**	8
AGE DE L'INTERVIEWE(E)							
Moins de 35 ans	**38**	**34**	**3**	**1**	**-**	**56**	**6**
18 à 24 ans	**43**	40	1	1	1	**53**	4
25 à 34 ans	**35**	29	5	1	-	**58**	7
35 ans et plus	**39**	**35**	**3**	**1**	**-**	**55**	**6**
35 à 49 ans	**32**	24	5	2	1	**62**	6
50 à 64 ans	**36**	34	2	-	-	**58**	6
65 ans et plus	**52**	48	4	-	-	**43**	5
PROFESSION DU CHEF DE FAMILLE							
Artisan ou commerçant	**41**	28	8	5	-	**53**	6
Profession libérale, cadre supérieur	**45**	39	5	-	1	**52**	3
Profession intermédiaire	**42**	38	3	1	-	**55**	3
Employé	**32**	26	4	1	1	**58**	10
Ouvrier	**23**	19	2	1	1	**70**	7
Retraité	**44**	41	3	-	-	**51**	5
Autre inactif	**52**	45	2	5	-	**44**	4
REGION							
Région parisienne	**39**	34	3	2	-	**53**	8
Nord est	**41**	35	5	-	1	**54**	5
Nord ouest	**38**	35	2	1	-	**58**	4
Sud ouest	**34**	33	-	1	-	**59**	7
Sud est	**39**	33	5	1	-	**56**	5
CATEGORIE D'AGGLOMERATION							
Communes rurales	**40**	36	3	1	-	**55**	5
Communes urbaines de province	**40**	35	4	1	-	**55**	5
Agglomération parisienne	**36**	30	4	2	-	**56**	8
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE							
Oui	**54**	**48**	**5**	**1**	**-**	**43**	**3**
Très bien, à peu près	**61**	52	6	2	1	**35**	4
Juste entendu parler	**44**	40	4	-	-	**54**	2
Non	**33**	**29**	**3**	**1**	**-**	**61**	**6**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS							
Favorable	**45**	**40**	**4**	**1**	**-**	**51**	**4**
Tout à fait favorable	**54**	48	5	-	1	**43**	3
Plutôt favorable	**41**	36	4	1	-	**54**	5
Opposé	**17**	**14**	**1**	**2**	**-**	**79**	**4**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs

Le type de campagne le plus utile pour en apprendre plus sur cette technologie

Question : Finalement, quelle sorte de campagne d'informations de la part du gouvernement serait pour vous la plus utile pour en apprendre plus sur cette technologie ?

	Ensemble (%)
• Une campagne à la télévision, à la radio	67
• Des articles dans la presse	54
• Des sites Internet	43
• Des débats publics	41
• De l'information dans les écoles	36
- Ne se prononcent pas	4
TOTAL	(*)

(*) Total supérieur à 100, les interviewés ayant pu donner plusieurs réponses

Le type de campagne le plus utile pour en apprendre plus sur cette technologie

	Une campagne à la télévision, à la radio (%)	Des articles dans la presse (%)	Des sites Internet (%)	Des débats publics (%)	De l'information dans les écoles (%)	Nsp (%)
ENSEMBLE	**67**	**54**	**43**	**41**	**36**	**4**
SEXE DE L'INTERVIEWE(E)						
Homme	67	57	50	44	39	3
Femme	67	51	37	39	32	5
AGE DE L'INTERVIEWE(E)						
Moins de 35 ans	**73**	**59**	**43**	**41**	**36**	**4**
18 à 24 ans	74	65	45	46	47	1
25 à 34 ans	72	54	42	38	28	7
35 ans et plus	**65**	**52**	**43**	**41**	**36**	**4**
35 à 49 ans	59	46	40	37	34	4
50 à 64 ans	64	52	44	45	30	7
65 ans et plus	72	58	47	44	43	2
PROFESSION DU CHEF DE FAMILLE						
Artisan ou commerçant	65	41	33	33	28	4
Profession libérale, cadre supérieur	64	58	49	48	34	4
Profession intermédiaire	67	56	39	45	36	4
Employé	66	50	44	40	29	8
Ouvrier	67	44	39	36	33	6
Retraité	70	57	47	44	38	4
Autre inactif	63	68	52	33	48	2
REGION						
Région parisienne	66	56	39	42	31	5
Nord est	68	54	39	41	35	6
Nord ouest	70	54	45	40	30	4
Sud ouest	68	52	39	41	44	2
Sud est	65	53	52	43	41	4
CATEGORIE D'AGGLOMERATION						
Communes rurales	62	51	45	45	39	4
Communes urbaines de province	70	55	44	40	35	4
Agglomération parisienne	64	56	39	41	31	4
CONNAISSANCE PREALABLE DU PROCEDE DE CAPTAGE ET STOCKAGE DU CARBONE						
Oui	**64**	**62**	**53**	**47**	**41**	**2**
Très bien, à peu près	63	64	56	46	43	3
Juste entendu parler	66	58	49	49	37	2
Non	**68**	**51**	**40**	**39**	**34**	**5**
ADHESION AU DEVELOPPEMENT DE CETTE METHODE PAR LES GOUVERNEMENTS						
Favorable	**72**	**56**	**45**	**42**	**38**	**2**
Tout à fait favorable	76	58	51	43	43	1
Plutôt favorable	69	55	43	42	36	3
Opposé	**41**	**42**	**34**	**47**	**18**	**11**

(*) Effectifs inférieurs à 40 individus : ces résultats sont à interpréter avec prudence en raison de la faiblesse des effectifs