Energy policy and climate change
Capturing carbon

I/V Lewis Gilles (BP)
Fossil Fuels will be here for many, many years to come.

I/V Nick Riley (British Geological Survey)
China's building a gigabyte a week of coal burning power plants.

I/V Germana Canzi (Friends of the Earth)
At the moment we are burning fossil fuels in power stations that are very inefficient.

V/O Nick Clark
Across the world, ever-increasing carbon emissions are forcing the pace of climate change. The main culprit, the wide scale combustion of fossil fuels. Now from nuclear power to renewables, there's intense pressure to find clean, sustainable alternatives. But while resources of oil, gas, and coal are finite, the hard truth is, fossil fuels are here for decades to come. This film will explore how carbon capture and storage, or CCS, could be a significant way forward in cutting global emissions.

I/V Nick Riley (British Geological Survey)
There's no way over the next few decades we can shift the whole of the planet's energy system in to non-fossil based energy. And we have to get to at least 60 percent reductions globally in CO2 emissions by the middle of this century. That means we have to deploy technologies such as carbon capture and storage urgently.

V/O Nick Clark
CCS involves capturing the carbon dioxide from fossil fuel combustion and storing it below the earth's surface in old oil wells, coalmines, or water bearing rock strata known as Saline Aquifers for tens of thousands of years.

I/V Riley (British Geological Survey)
There are two main technologies, one is to capture from the exhaust gases of burning fossil fuel for instances in a large power plant from the smoke stack, and you use solvents to capture the CO2 from that, and that's known as post-combustion capture. Pre-combustion capture is we remove the carbon from the fossil fuel before we use the fuel; a classic example is natural gas.

V/O Nick Clark
Pre-combustion capture, using natural gas, is the approach being developed by BP, in Scotland.

I/V Lewis Gilles (BP)
BP Animation
The Peterhead Project will take a stream of natural gas from the national transmissions system into a process that's called reforming. Where it will create a gas called syngas, which is made up of two components, hydrogen and carbon monoxide. We will then take it through another step, which will convert the carbon monoxide into carbon dioxide, which we can then capture and separate from the hydrogen. The Hydrogen is then used as feeder to the power system, where it generates 500 mega watts of electricity. And the CO2 stream is then moved through a pipe line to the Miller reservoir.

V/O Nick Clark
Injecting CO2 also forces extra oil from the well. This enhanced oil recovery should extend the life of the Miller oil field for many years. Good news for BP, but there are concerns.

I/V Germana Canzi (Friends of the Earth)
If we're hoping to reduce emissions through the use of Carbon Capture and Storage, we must take into account the fact that we are, at the same time, producing more oil. So we are reducing emissions somewhere but we are also going to be causing emissions when these fossil fuels, when the oil is burnt in cars, for example.

V/O Nick Clark
A million tons of coal awaits the furnaces of E.on's power station near Nottingham, which on full power eats 800 tons an hour. When burnt it will emit 2 and a half million tons of C02 into the atmosphere. E.ON is keen to reduce its carbon footprint.

I/V Dr Tim Hill (E.ON UK)
E.ON UK recognizes that there are several technologies that could be applied to coal fired power stations. In order to take clean coal forward then there will need to be some full scale, commercially operated, power plant with carbon capture and storage, and therefore it is looking very seriously at a project on the east coast of England.

V/O Nick Clark
E.on 'Cleaner Coal' Animation
If commissioned, E.ONS coal fired power station will be built at Killingholme in Lincolnshire. With its built-in post combustion capture facility, it will be one of the first of its type in the world. But there are hundreds of power stations across the globe that will need to be adapted and retro fitted with carbon capture technology.

I/V Riley (British Geological Society)
Ideally you want to build a plant without retro fitting, you want to build it right up from the start designed in capture that's the cheapest option. But we have this huge legacy of power plants, and even now as I speak China's building a giga watt a week of coal burning power plants. So we have to be able to get to this retrofit stage with the more modern power plant certainly. The really old power plants are probably best being abandoned and not retro fitted.

V/O Nick Clark
This 3D visualization shows the UK's carbon storage potential beneath its landmass off shore. But before this can be exploited, environmental agencies are seeking assurances about the long-term integrity of the process.

I/V Germana Canzi (Friends of the Earth)
Friends of the Earth and other environmental groups used to have some very serious concerns about carbon capture and storage. We feared that it would divert technology and it would divert resources away from renewable energy and energy conservation. We still believe that renewables and energy efficiency should be the priority for all governments. Carbon capture and storage would have a role to play potentially in the future under certain conditions and these conditions are that we really get come guarantees that the gasses that are stored underground really do stay there for thousands of years. If they start to leak out, obviously that will not be very good for the climate.

V/O Nick Clark
Norwegian company Statoil has been injecting C02, into a Saline Aquifer in the Sleipner field in the north sea since 1996. Geologists are confident it will stay put.

I/V Nick Riley (British Geological Society)
Here we have a visualization of the Sleipner C02 storage project. We are looking through the water column, through the sea bed, through about 800 meters of rock, and as we start to move the visualisation around, you'll see the plume of layers of blue and yellow this is the plume of carbon dioxide that's been injected into the sandstone interval, the base of which is about a kilometre beneath the sea bed. And the C02's injected in the base of the formation as a dense liquid face C02. C02's got to the very top of the sandstone layer and not got any further and this is exactly what we expect because the clay layer above that is hundreds of

meters thick and impossible for the C02 to get through. So this is a very secure project for storing C02.

V/O Nick Clark
Scientists at the British Geological Survey are continually monitoring and testing rock samples from sites like the Sleipner and Miller Fields.

I/V Nick Riley (British Geological Society)
The samples we are working on in the laboratory are real field situations, these are real rocks. We have to know what's happening with the real rocks where we are likely to store C02.

V/O Nick Clark
Whilst scientist and engineers are pushing this technology forward, they'll inevitably add to the cost of producing energy. So a programme of support for carbon capture and storage is essential to build industry capacity. Companies like E.on and BP are calling on the government to provide financial incentives.

I/V Lewis Gilles (BP)
Governments just need to make their choices and make it clear to companies who are prepared to invest that they're prepared to support that technology.

I/V Nick Riley (British Geological Survey)
The ball is very much in the court of society, are they prepared to pay for it? And the politicians are they prepared to negotiate and enable these technologies through proper regulation and permitting etc of fiscal incentives.

V/O Nick Clark
Its recognized that carbon capture and storage should be used as a bridging technology, a means of reducing emissions whiles clean and sustainable energy is developed.

I/V Nick Riley (British Geological Survey)
There's a very short amount of time now for us to harness the existing north sea infrastructure. Uh, the UK oil and gas production peaked in 1999, and its going to drop away very dramatically, regardless of the price of oil and gas, simply because there's a limit to how much oil and gas you can get out as geology that limits things eventually and we're going to see a major decommissioning of that north sea info structure; pipelines, platforms, fields, all of which could form the info structure for storing, distributing and storing C02 out in the north sea. So, things have to happen very quickly over the next 15, 20 years I think, if we are really going to maximise our opportunity of storing a lot of C02 under the north sea. And there's a lot of capacity under the north sea to store C02 from all the large C02 sources around the rim of the north sea.

I/V Germana Canzi (Friends of the Earth)
Carbon capture and storage leads to a number of really crucial long term issues. Who is going to be monitoring the storage sights for thousands and thousands of years? The companies that are now proposing projects really wont be able to do that, they wont be around for that long. Governments could be around for that long, maybe not. So we clearly need better frame works, to help us to decide whose going to be liable. And in addition I would say that the problem really reinforces the fact that energy conservation and renewable energy are the real long-term solution because carbon capture and storage may have a role to play but also raises a number of very complicated ethical issues.