

Coal

Status: Non-renewable

How was it formed?

Most coal deposits were formed around 300 million years ago during the Carboniferous period. The world was covered in tropical forest then. In some swampy places, plants died and fell into water and mud where there was not much oxygen. This meant the bacteria that would normally rot the vegetation away could not do so. Instead, over millions of years the wood and other plant matter physically and chemically changed into coal.

How is it used to generate electricity?

Coal is burned to heat water. This produces steam which pushes against the blades of turbines, causing them to spin. The turbines are connected to generators, which create electricity.

Where can you find it?

Wales, Scotland, northern England. China, USA, India, South Africa, Australia, Russia, Poland, Columbia and the Ukraine are the major producers.

Advantages and disadvantages of using coal to generate electricity

Advantages

- Burning coal is one of the cheapest ways to generate power at the moment
- Coal power stations can be built anywhere where there are good transport links and where there is a plentiful supply of cooling water
- The world has many coal reserves

Disadvantages

- Burning coal produces carbon dioxide, which contributes to the greenhouse effect. It also produces sulphur dioxide, a gas found in acid rain
- Coal is not renewable. There are limited supplies which will run out one day
- Coal-fired power stations need huge amounts of fuel and nobody wants to live near them
- Extracting coal damages the surrounding environment

How many power stations in the UK?

17 (100MW and above)

How much it cost to produce?

2.5p to 3p/kWh

What is the carbon cost?

700kg/mWh

The future?

Coal reserves should last until the end of the 22nd century. The existing coal-fired power stations are all quite old and most will need to close or fit new emission control equipment in the next 8-10 years.

Where is coal found





Open cast coal mine



Underground Coal Miners



Modern day machinery for coal mining underground.



Landscaped slag heaps



Trees and vegetation similar to that, which made coal millions of years ago.



Trees and plants similar to those that would have formed coal millions of years ago

Oil

Status: Non-renewable

How was it formed?

Scientists suggest it formed millions of years ago, in places where dead organic material built up on the bottom of oceans, riverbeds or swamps, and was mixed with mud and sand. Over time, more sediment piled on top, and the resulting heat and pressure changed the organic layer into crude oil.

How is it used to generate electricity?

Oil is burned to heat water. This produces steam which pushes against the blades of turbines, causing them to spin. The turbines are connected to generators, which create electricity.

Where can you find it?

North Sea, Saudi Arabia, Canada, Iraq, Kuwait, Russia, Nigeria, Iran, Libya, Venezuela, United Arab Emirates

Advantages and disadvantages of using oil to generate electricity

Advantages

- Oil is easy to transport by pipeline or ship
- Oil-fired power stations can be built anywhere where there are good transport links and where there is a plentiful supply of cooling water
- A large amount of electricity can be generated from one power station quickly

Disadvantages

- Burning oil produces carbon dioxide, which contributes to the greenhouse effect
- It also produces other emissions eg sulphur dioxide
- Oil is not renewable. The world's supply of oil is running out quickly
- Using oil is very expensive compared to coal and gas
- Extracting it is costly
- Transporting it has caused massive oil spills detrimental to the environment
- It is the cause of Wars

How many power stations in the UK?

The UK has two oil-fired power stations producing 100MW or more each. That means that each power station produces enough electricity to supply around 1,800,000 homes. Together these power stations supply 1.2 % of the UK's energy needs.

How much does it cost to produce?

4.8p to 6p per kilowatt hour

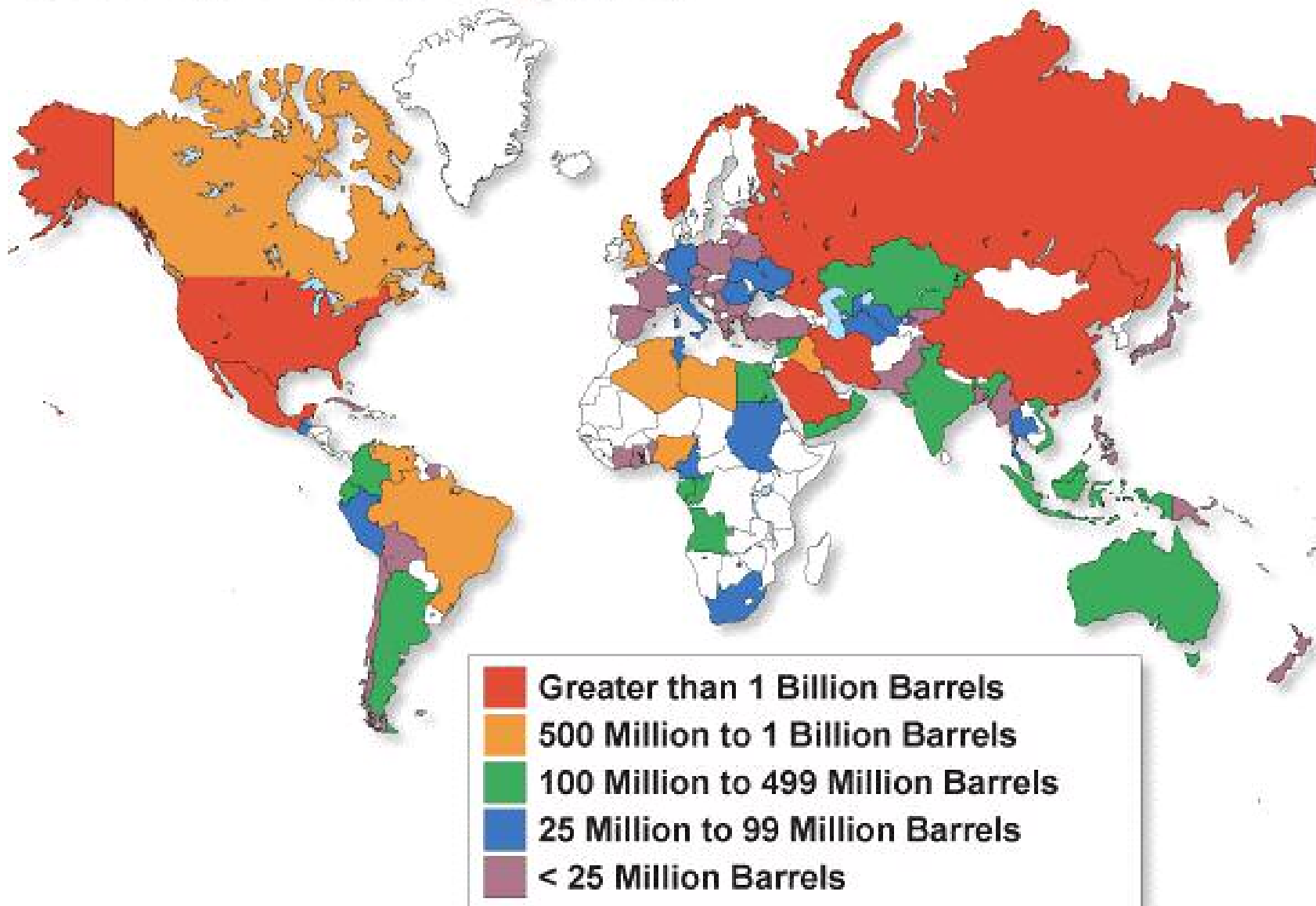
What is the carbon cost?

580kg/mWh

The future?

Oil reserves should last until the middle of the 21st century.

World Oil Production, 2002



Source: U.S. Energy Information Administration, International Energy Annual, March 2004



Oil Rigs in the North Sea.



Oil spill washed up on a beach.



Diatoms the sort of sea creatures that became oil and gas millions of years ago (magnified) in the Welsh Valleys.



Oil pipeline



Oil Tanker



Oil drilling on Land

Gas

Status: Non-renewable

How was it formed?

Scientists are still unsure about the source of gas. It is usually found with oil deposits and the leading theory suggests that they both formed millions of years ago in places where dead organic material built up on the bottom of oceans, riverbeds or swamps, and got mixed with mud and sand. Over time, more sediment piled on top, and the resulting heat and pressure changed the organic layer into a dark and waxy substance known as kerogen.

How is it used to generate electricity?

Gas is burned in a turbine, like a jet engine on a plane, but bigger. This turns a generator, producing electricity. The hot exhausts gases are then used to heat water to make high pressure steam, which is fed into a steam turbine, which turns another generator, making even more electricity. It is very efficient! Sometimes, the steam from the back end of a turbine can be used to provide heat to houses or offices.

Where can you find it?

North Sea and Irish Sea. It is also found in Russia, Eastern Europe, Norway, the Middle East and Africa.

Advantages and disadvantages of using gas to generate electricity

Advantages

- Gas is light and easy to transport by pipeline
- Large amounts of electricity can be generated from one gas-fired power station

Disadvantages

- Burning gas produces carbon dioxide, which contributes to the greenhouse effect
- Gas is not renewable. There is a limited supply, which will eventually be used up
- The UK is importing most of its gas. This means that our energy supplies may become quite costly if prices rise

How many power stations in the UK?

36 (100MW and above)

How much does it cost to produce?

2p to 3p/kWh

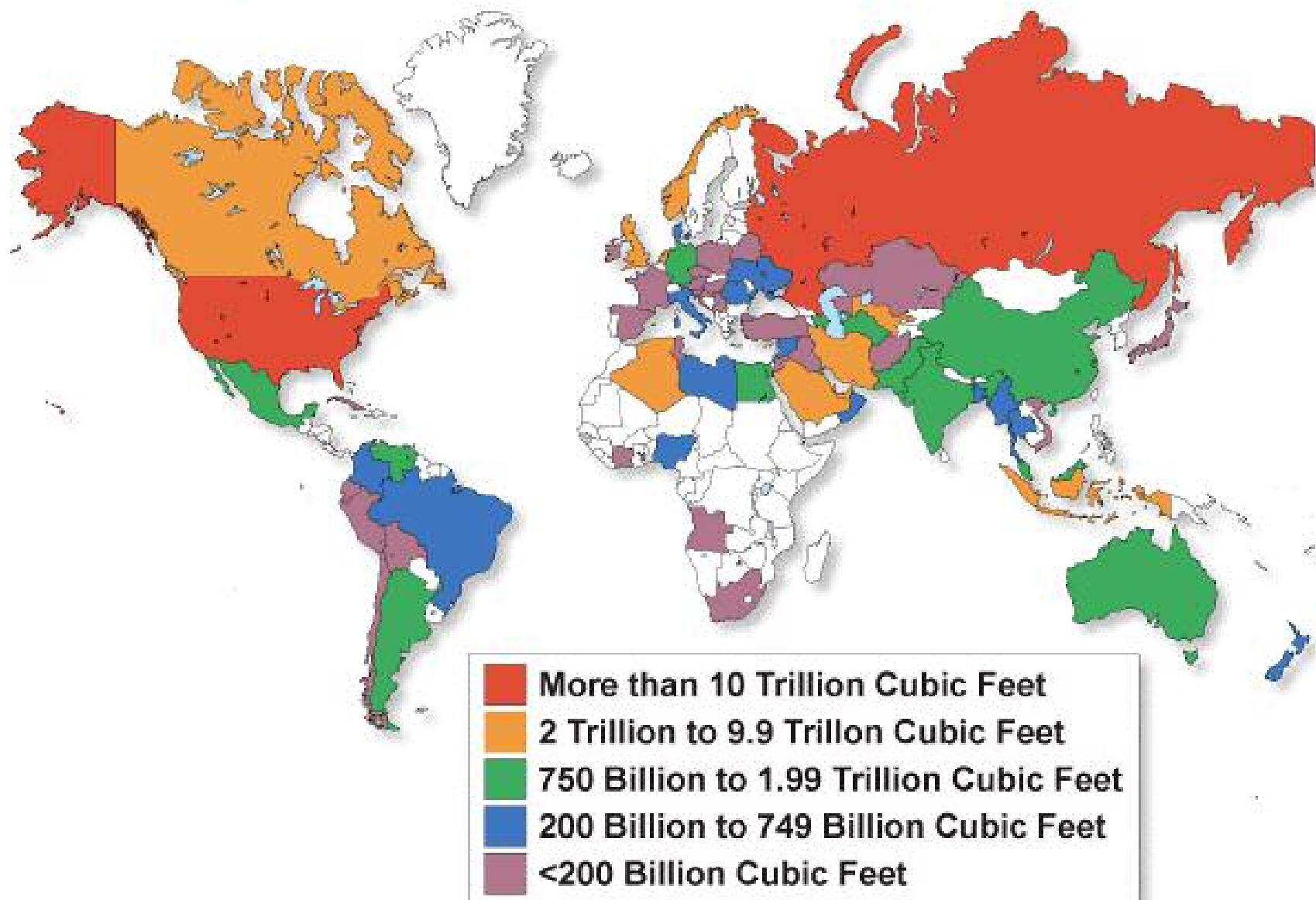
What is the carbon cost?

370kg/mWh

The future?

Gas reserves will last until late in the 21st century.

World Dry Natural Gas Production, 2002



Source: U.S. Energy Information Administration, International Energy Annual, March 2004



Gas drilling Rig



Gas flame used for domestic cooking.



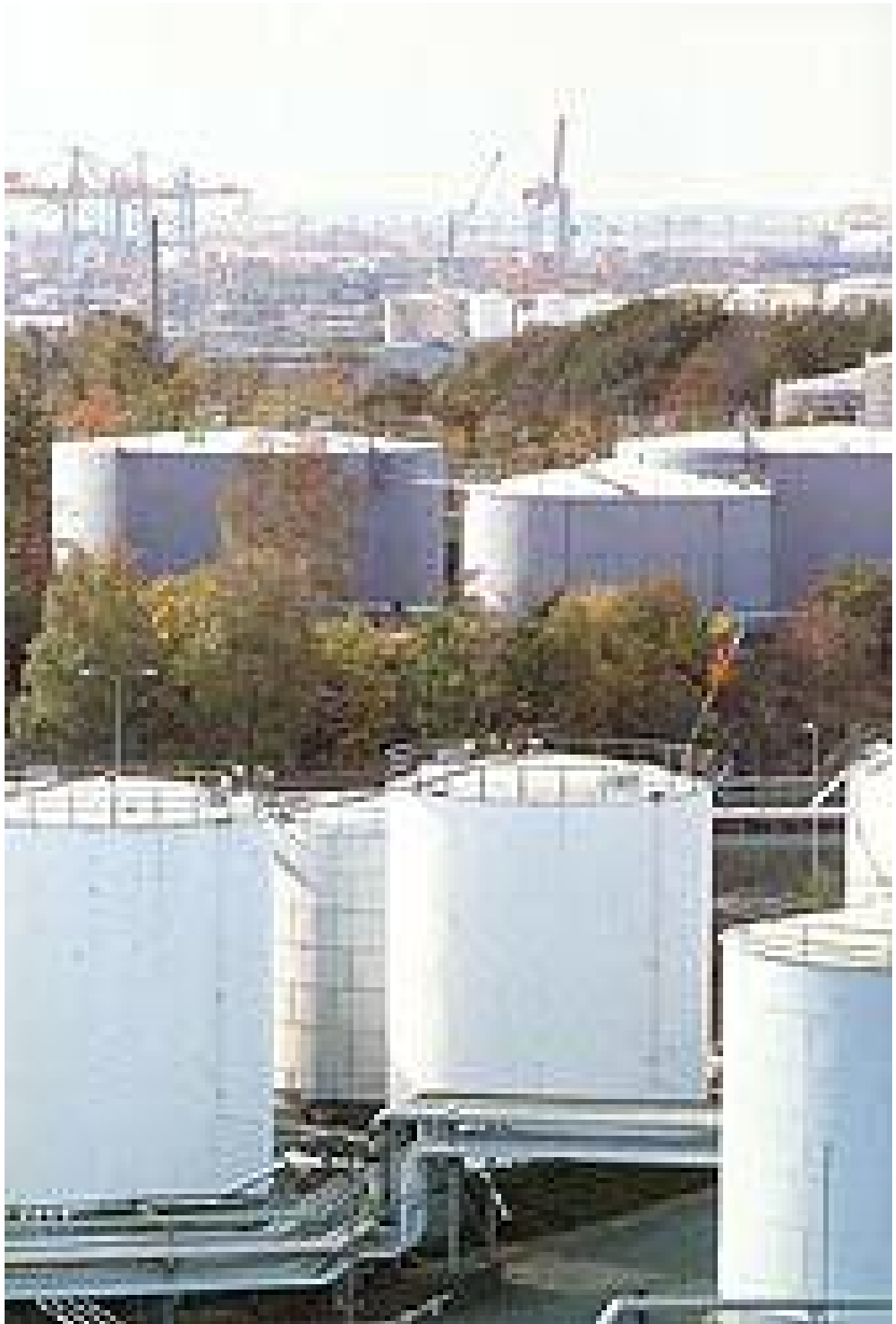
Gas Terminal and pipes.



Diatoms the sort of sea creatures that became oil and gas millions of years ago (magnified)



Domestic gas tank used for household central heating



Industrial gas storage tanks