


COMPARE THE MARKETS


SOURCES: SUSTAINABLE ENERGY — WITHOUT THE HOT AIR, DECC, PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY, NATIONAL GRID, ENERGY NETWORKS ASSOCIATION, EUREKA RESEARCH


What's watt


1 watt
= 1 joule per sec
1,000 watts
= 1 kilowatt
1,000 kW
= 1 megawatt
1,000 MW
= 1 gigawatt (GW)


Electrical usage

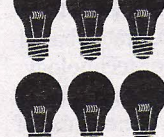
 = one kilowatt-hour per day (if left on for 24 hours) (1 kWh is one "unit" on an electricity bill)


 = 1 day of avg use (21 kWh)

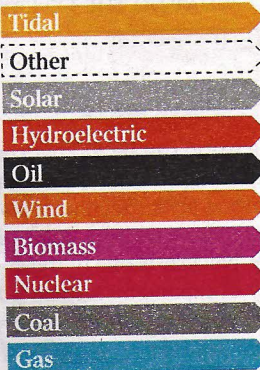






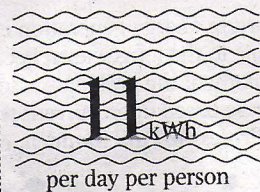




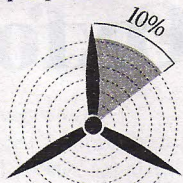


Renewable truths

If all of the UK's tidal shifts were harnessed, they could generate:



To generate 20 kWh per day per person

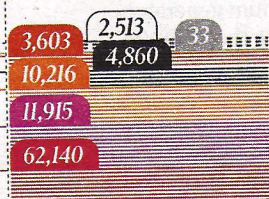


10 per cent of the UK would have to be covered in wind farms

75% of the UK's land devoted to biomass would produce an estimated 24 kWh per day per person

Total energy produced (GWh)

Where the total amount of electricity used in the UK in 2010 (384,003 GWh) came from. (Shortfall is imported)

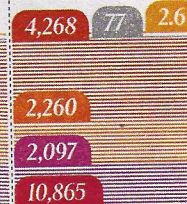


107,694

175,003

Capacity (MW)

The amount of electricity each source can produce at any one moment. Wind and hydro figures account for intermittency.



23,085

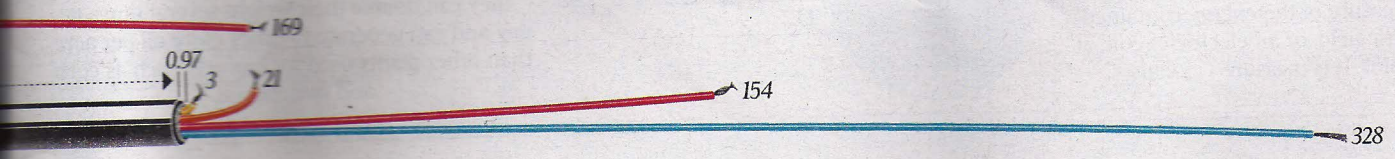
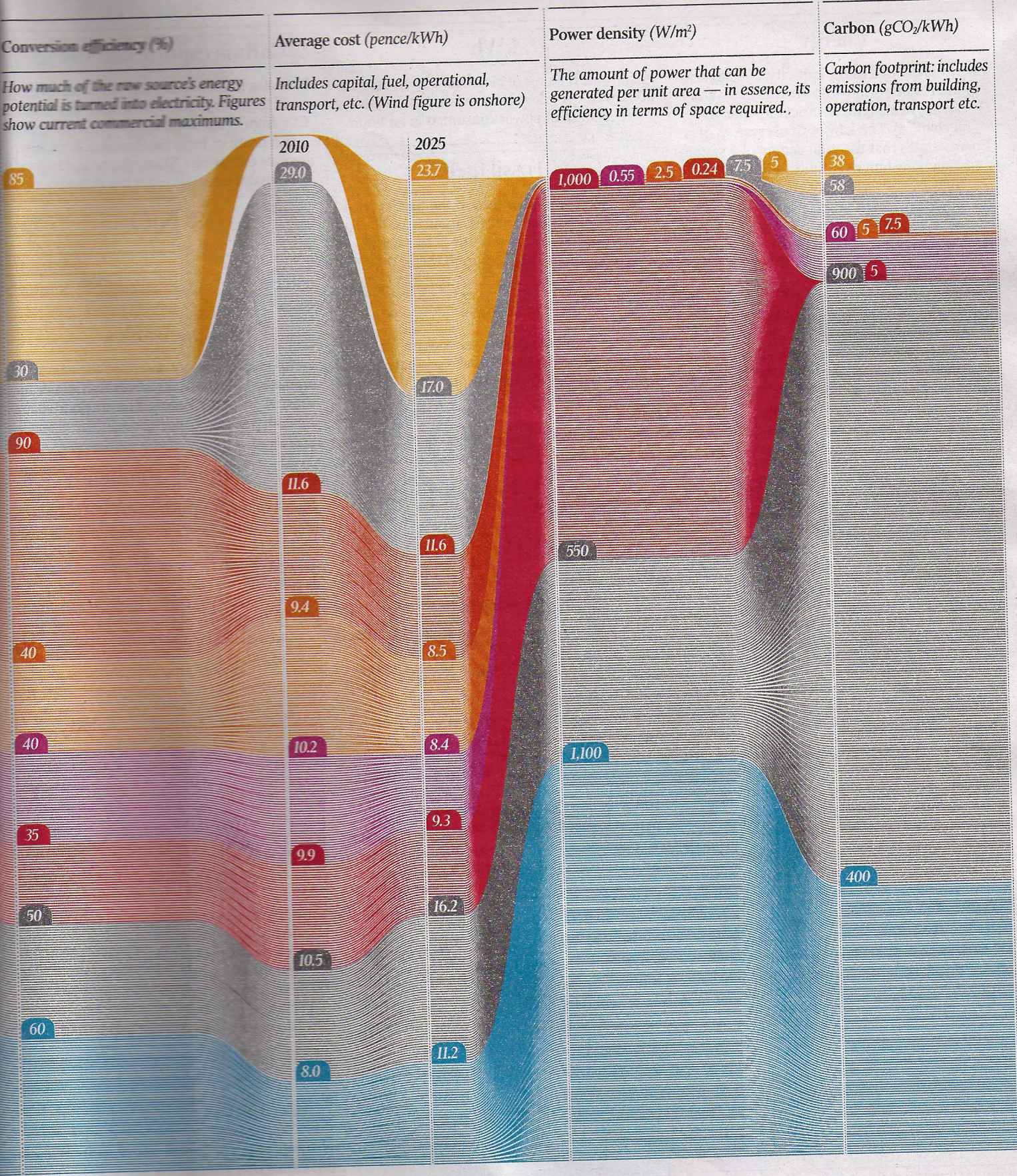
34,099

How does electricity get to where it's needed?

● National Grid (000s of km)
● 132 kilovolt lines ● High voltage lines
● Extra high voltage lines ● Low voltage lines

Overground cables 283

Underground cables 506



Energy

Energy is defined as the capacity of a physical system to perform work. It exists in several forms: heat, light, electrical, kinetic or mechanical. The Law of Conservation of Energy states that the total energy of a system remains constant over time, though energy may be converted into another form.

Joule

The joule is a derived unit of energy or work in the International System of Units (SI), where one joule = the energy expended (or work done) in applying a force of one newton through a distance of one metre, or in passing an electric current of one ampere through a resistance of one ohm for one second.

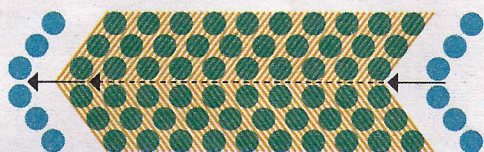
*The average person at rest releases about:
75 joules
of energy as heat every second.
This is called the basal metabolic rate.*

Electricity

Electricity is a general term used to describe the behaviour of electrons and protons. Electrons have a negative charge and protons a positive one, resulting in forces between them. This allows electrons (charge carriers) to flow between atoms — and, therefore, along cables.

How fast is electricity?

When you switch on a light, the speed of the electric current in the cable is only 8.4cm/hour.



It comes on almost instantaneously as the electrons move in the cable as one — in a domino effect.

Current

Electrical current is a measure of the amount of electrical charge — electrons or ions flowing through a conductive material — transferred per unit time, measured in amperes.

Watt

Named after the Scottish engineer James Watt, it is an SI unit measuring power (rate of energy conversion), equal to one joule per second.

Voltage

Voltage is a measure of the energy contained within an electric field, or an electric circuit, at a given point. It is measured in volts.

kWh

A kilowatt is a unit of electrical power, equal to 1,000 watts. A kilowatt hour is a unit measuring the amount of power consumed in an hour.

Fossil fuel

Any energy source formed in the Earth's crust from decayed organic material, such as oil, coal and natural gas. Two thirds of the world's electricity comes from them.

Shale

A fine-grained sedimentary rock, in which significant reservoirs of oil and gas have been found (see fracking).

ENERGY: THE TERMS & CONDITIONS

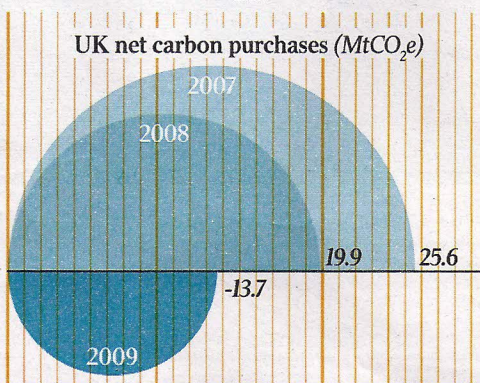
*Joules, fracking,
jatropha... Here's our
guide to what it all means*

Fracking

Fracking is the process by which natural gas (or petroleum, or coal seam gas) is retrieved from within rock or shale. It involves fracturing the rock using a pressurised cocktail of water, chemicals and sand, in the process of which volumes of methane are released.

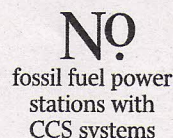
Carbon emissions trading

Various financial trading systems have been set up to enable the bigger carbon emitters to buy portions of the (unused) emissions allowances of lesser emitters. Their efficiency and ability to cut global carbon emissions is yet to be proven.



Carbon capture and storage

CCS, also known as sequestration, involves the use of technology to prevent large quantities of CO₂ from being released into the atmosphere as a result of fossil fuel burning. It usually involves capturing CO₂ at source and storing it so that it does not enter the atmosphere.



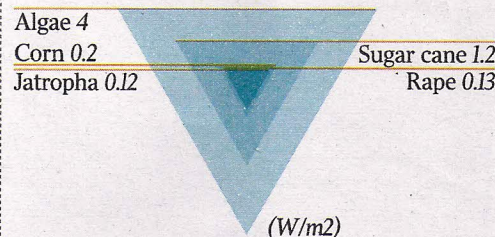
Renewables

Renewable energy describes the energy produced by natural resources that can renew or replenish themselves. They include solar, wind, wave, tide and hydroelectric power.

Biomass-biofuel

Biomass/fuel is organic matter that is used to produce energy. It could either be natural, from plants, or derived indirectly from industrial, commercial, domestic or agricultural products. Biofuels may be classed as "carbon neutral", as the CO₂ released during the generation of energy from some types may be equal to that absorbed by the plant during its growth.

Energy crop efficiency



Jatropha

An oleaginous plant thought to be a feasible biofuel since it flourishes on marginal lands (which wouldn't otherwise be used for food production) and yields a substantial amount of oil — up to four times the amount of fuel per hectare as soya bean. However, efforts to domesticate it have not borne fruit.

Algae

Algae is another potential biofuel being investigated and tested by companies and governments. They are single or multicellular organisms that produce energy — in the form of oils — from CO₂ and sunlight by photosynthesis. Some types are so efficient that they can double their weight several times a day and can generate 15 times more oil per acre than other plants used for biofuels, such as corn and switchgrass.