Wedge Game Example UK Fact Sheet
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UK General Country Facts **(Data Source:** See http://en.wikipedia.org/wiki/Uk for footnotes and more information.)	
Capital	London, 51°30′N 0°7′W
Most populous conurbation	London
Official language(s) / **Currency**	None[5] / Pound sterling (£) (GBP)
Government	Constitutional monarchy
- Queen	HM Queen Elizabeth II
- Prime Minister	The Rt Hon Tony Blair MP
Establishment / **Accession to EU**	1 January 1801 [6] / 1 January 1973
Area Total/Water (%)	244,820 km² (79th) (94,526 sq mi) / 1.34%
Population 2005 est/2001 census - Density	60,209,500 [7] (21st) / 58,789,194 243/km² (48th) (629/sq mi)
GDP (PPP) - Total - Per capita	2005 estimate $1.833 trillion (6th) $30,470 (18th)
HDI (2003)	0.939 (15th) – high

Transport Trends (http://en.wikipedia.org/wiki/Transport_in_the_UK)

Since 1952 (the earliest date for which comparable figures are available), the UK has seen a dramatic shift away from the use of public transport and towards the use of private transport, for both passengers and freight. In 1952 just 27% of distance traveled was by car or taxi; with 42% being by bus or coach and 18% by rail. A further 11% was by bicycle and 3% by motorcycle. The distance traveled by air was negligible. By 2003 85% of distance traveled was by car or taxi; with just 6% being by bus and 6% by rail. Air, pedal cycle and motorcycle accounted for roughly 1% each. In terms of journeys, slightly over 1,000,000,000 are made per annum by main line rail, 1,100,000,000 by London Underground and other metro systems, 4,500,000,000 by bus, and 21,000,000 on domestic air flights. Approximately 95% of freight enters the UK by sea (75% by value).

Passenger transport miles have grown significantly in recent years. Figures from the DTI [1] show that total passenger travel inside the UK has risen from 403 billion passenger kilometres in 1970 to 797 billion in 2004.

Table 2.2: Passenger kilometres by bus, rail, air, motorcycle, pedal cycle, 1970 to 2004 ***(1)***

	Road					Rail *(4)*
	Cars, vans and taxis *(2)*	Buses and coaches *(3)*	Motor cycles *(2)*	Pedal cycles *(2)*	All road	
1970	297	60	4	4	365	36
1980	388	52	8	5	453	35
1990	588	46	6	5	645	40
2000	639	47	5	4	695	47
2004	679	48	6	4	736	51

Source: Department for Transport

Excluding water travel within the United Kingdom & Channel Islands

The volume of freight moved had almost trebled to 254,000,000,000 tonne kilometres since 1953, of which 7.5% was moved by rail, 26% by water, 4% by pipeline and 62% by road.

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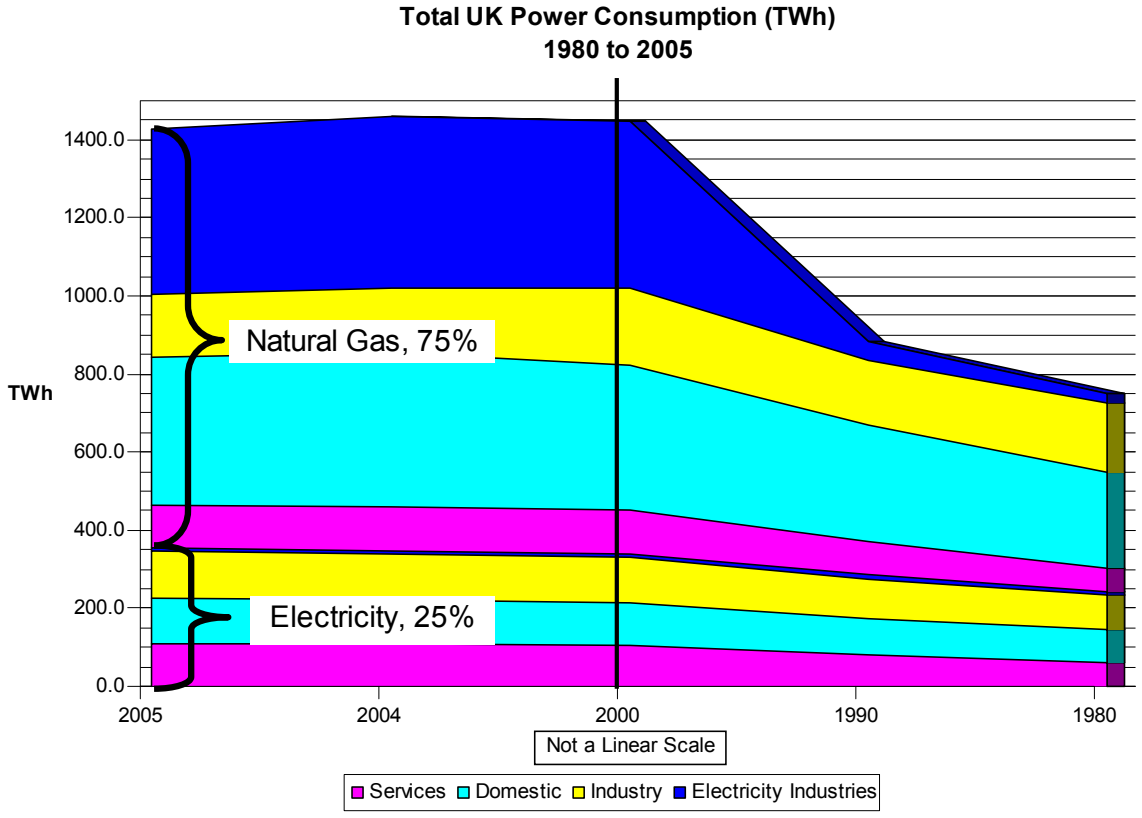
The rail network has halved from 31,336 km in 1950 to 16,116 km today, the motorway network, which today is 3476 km long, did not exist in 1950. It has also been caused by rising economic affluence, the move of the population away from city centres, and changes in industry.

Transport accounts for the largest end usage for energy produced in the UK. Transport dominates the UK's use of oil with 74% of supply used to power the cars, planes, buses, trains and lorries. This produces 42 million tonnes of carbon (MtC) per year or around 25% of all current UK emissions (DTI Energy Review, July 2006).

Energy Power Consumption and Security

UK energy data paints a picture of increasing energy consumption across sectors, rising fossil fuel prices, and growing reliance on natural gas and fossil fuels for power generation and transport. The UK has traditionally depended on natural gas for energy and space heating requirements, but since the 1990's natural gas reliance has substantially increased. The UK has recently become a net importer of natural gas. Total gas and electricity power consumption is depicted by sector in the figure below. The figure illustrates sharp increases in energy consumption between 1980 and 2000 and slightly decreasing total use between 2000 and 2005. Since 2000, total natural gas and electric energy consumption has slightly decreased from around 1450 to 1430 TWh per year. Over 75% of UK total power consumption is derived from natural gas sources. (DTI, "Energy in Brief", July 2005)



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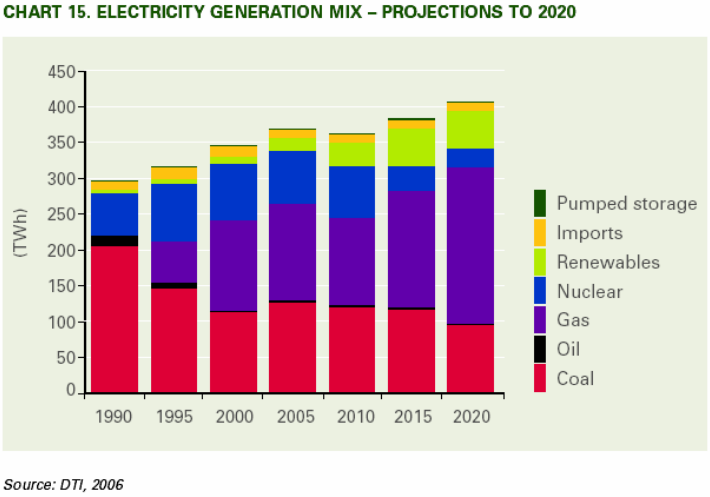
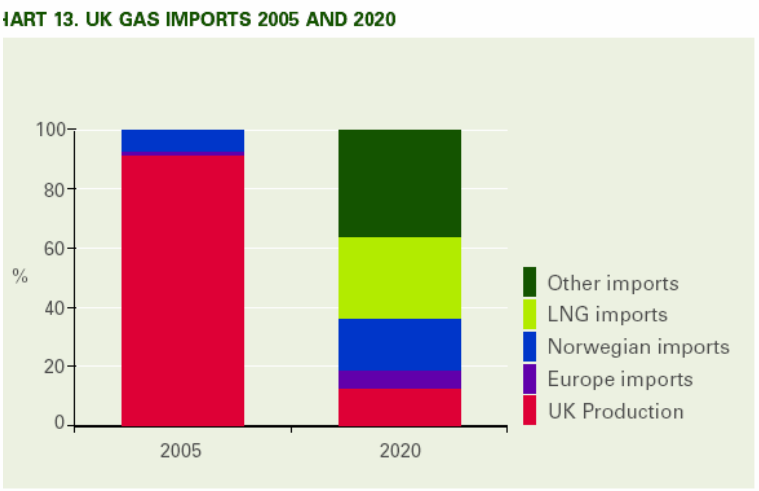
The UK's Electricity generation mix from 2000 to 2020 is shown in the Chart below. (DTI, "Energy Review", July 2006)

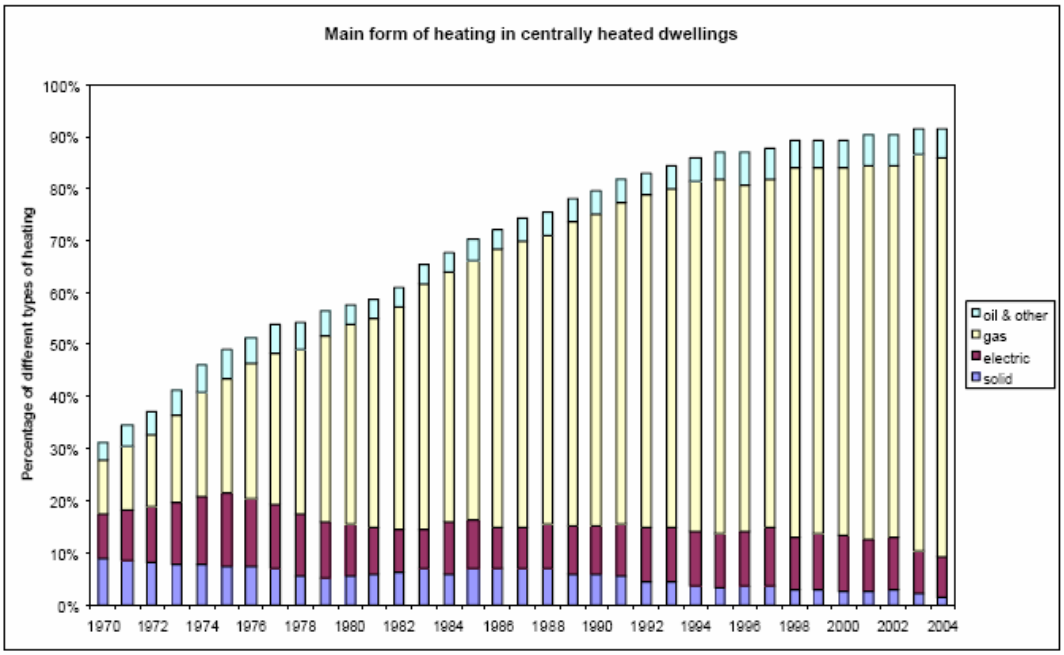




Source: DTI Energy Review, July 2006

Heating Trends

UK central heating increases have been in gas heaters as shown in the figure below. This has risen by 10% to 77% of home central heating by gas from 1970 to 2004. Solid fuel central heating has dropped to 1% in 2004. Oil and electric central heating have remained relatively constant. (BRE Tenure Fact File 2006).



Source: BRE Tenure Fact File 2006

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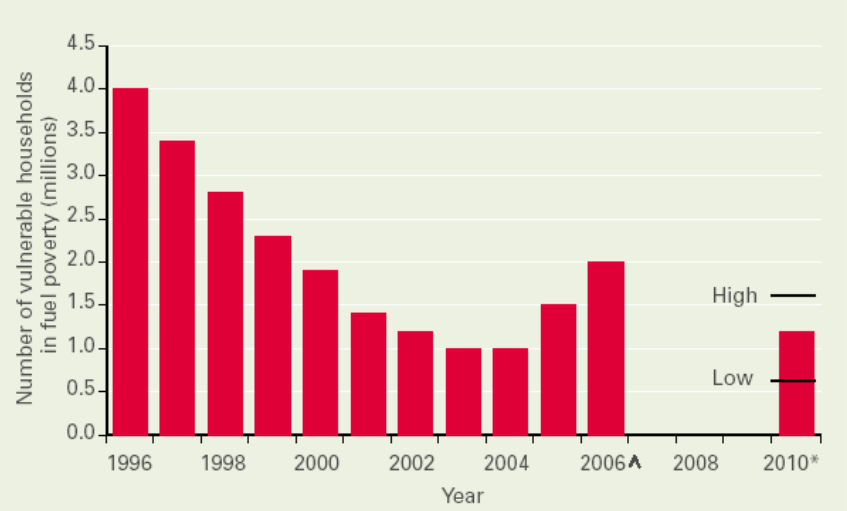
Domestic space heating accounted for 53% of CO_2 emission in 2005 (see table below).

2005 UK Total Domestic Electricity Consumption			
	KWh	Consumption %	CO_2 %
Cooking	24	6%	5%
Lighting & Appliances	253	63%	22%
Water	62	16%	20%
Space Heating	63	16%	53%
	402	100%	100%

Source: Derived from DUKES 2005 statistics and DTI Energy Review.

The UK had shown progress until 2004 at reducing the number of households in fuel poverty, defined as the need to spend more than 10% of income on fuel to maintain a satisfactory heating regime. Rising energy prices reversed the downward trend. Although, the trend is expected to decrease by 2010, there will still be over 1 million households in fuel poverty. (DTI Energy Review, July 2006).

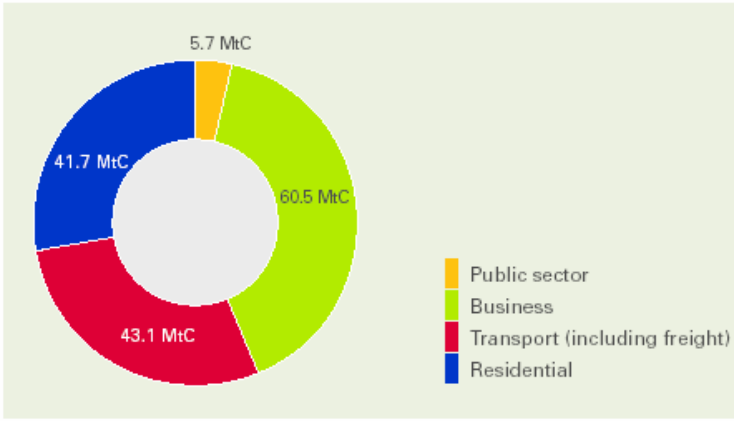
CHART 7. HISTORIC AND PROJECTED NUMBERS OF VULNERABLE HOUSEHOLDS IN FUEL POVERTY IN ENGLAND AFTER ECONOMIC EFFECTS (MILLIONS)



Greenhouse Gas Trends

Approximately 70% of UK greenhouse gas emissions come from production and use of energy. Chart 4 breaks down UK carbon dioxide emissions by end user. (DTI Energy Review 2006)

CHART 4. CARBON DIOXIDE EMISSIONS BY END USER IN THE UK, 2004 (MILLION TONNES OF CARBON)



Source: DTI, 2005

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Strategy	Use Electricity (E), Transport (T), Heat (H)	Description	Size of a Wedge	UK Potential	Cost	Challenges
CCS Electricty (Coal and NG)	E	CO2 from fossil fuel power plants stored and captured (700 GW of coal or 1400 GW of natural gas)	1 wedge will require injecting a volume of CO2 every year equal to the volume of oil extracted	Over 50% of winter electricity generation comes from coal. Potential for algae CC, turn into biofuel.	$$	CO2 leakage !
Efficiency--Transport	T	Increase automobile fuel efficiency (2 billion cars projected in 2050)	1 wedge would require doubling the efficiency of all the world's cars from 30 to 60 mpg	UK produces around 42 MtC per year (2006).	$	Car size & power, consumer preference, urban design !
Efficiency--Electricity	E	Increase efficiency of lighting, motors, power generation	1/4 wedge would require replacing ~500 million incandescent bulbs with compact fluorescents annually	By 2020, current energy efficiency proposals could save 18-21 MtC	$	Increased stand-by power use, personal effort !
Efficiency--Heat	H	Increase insulation, furnace efficiency	1 wedge could be achieved by using best available technology in all new and existing buildings	By 2020, current energy efficiency proposals could save 25 MtC	$	House size, House design, personal effort !
Wind Electricity	E	Wind diplaces coal (50 x current capacity)	1 wedge will require an area equal to ~3% of US land area	UK has large on-shore and off-shore wind potential.	$$	Grid Challenges, NIMBY !
Solar Electricity	E	Solar PV displaces coal (700 x current capacity)	1 wedge will require the equivalent of a 100 x 200 m PV array	30% of all building energy could come from Solar roofs	$$$	PV cell materials, intermittency !
Biofuels	T	Biomass fuels from plantations replace petroleum fuels	1 wedge requires scaling up world ethanol production by a factor of 50	UK produces around 42 MtC per year (2006).	$$	Biodiversity, competing land-use !!