**Fuels**

**Fossil fuels**: Fuels from the Earth’s crust that cannot be replenished at a sustainable rate.

 Add as much detail as you can in the template below

|  |  |  |  |
| --- | --- | --- | --- |
| **Coal** | Composition and reserves | Equations for combustion and emissions | How is electricity produced? |
| **Natural gas** | Sources | Equations for combustion and emissions. | How is electricity produced? |
| **Oil** | Composition and reserves | Processing methods. | Uses. |

**Renewable fuels:** Fuels that **can** be replenished at a sustainable rate.

 Add as much detail as you can in the template below

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Structure** | **Production** | **Use** |
| **Bioethanol** |  |  |  |
| **Biogas** |  |  |  |
| **Biodiesel** |  |  |  |

**Solutions**

**Fossil fuels**:

|  |  |  |  |
| --- | --- | --- | --- |
| **Coal** | Composition and reserves*Mainly carbon – formed over millions of years in crust from plant and animal remains. High reserves* | Equations for combustion and emissionsC(s) + O2(g) 🡪 CO2(g)S(s) + O2(g) 🡪 SO2(g)N2(s) + O2(g) 🡪 2NO(g)  | How is electricity produced?*Thermal energy converted to thermal energy steam to mechanical energy to electrical.**The steam turns a turbine in a magnetic field.* |
| **Natural gas** | Sources*Natural gas deposits**Petroleum deposits**Coal seam gas**Shale gas* | Equations for combustion and emissions.CH4(g) +2O2(g)🡪CO2(g)+ H2O(l)S(s) + O2(g) 🡪 SO2(g)N2(s) + O2(g) 🡪 2NO(g) | How is electricity produced?*Same as for electricity or the expansion of hot gases used to turn the turbine.* |
| **Oil** | Composition and reserves*Mixture of alkanes.**Reserves low.* | Processing methods.*Fractional distillation used to separate alkanes into useful fractions. Separated according to boiling points.* | Uses.*Transport fuels, manufacture of other chemicals* |

**Renewable fuels:** Fuels that **can** be replenished at a sustainable rate.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Structure** | **Production** | **Use** |
| **Bioethanol** |  | Carbohydrates hydrolysed to glucose. Glucose fermented by yeast. Sugar cane or wheat husks used. | Blended into petrol or fuel cells |
| **Biogas** | Approx: methane 70%CO2 25%, H2O 3%,other 2% | Anaerobic (no oxygen) decomposition of organic waste such as sewage. | Burnt in generators to produce electrical energy. |
| **Biodiesel** | Ester: methanol + fatty acid | Transesterification of fatty acids and glycerol. | Blended with diesel or used as a diesel fuel in a pure state. |