

ENERGY IN SCOTLAND

GENERAL INFORMATION FOR ALL GROUPS

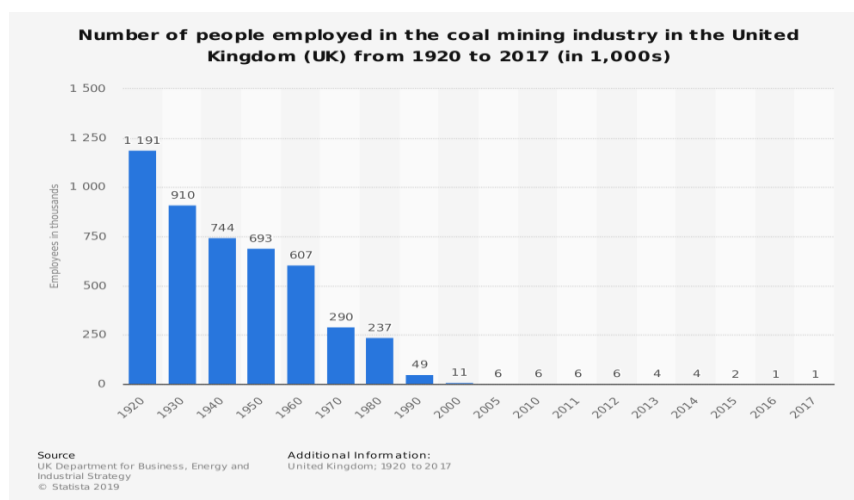
- List of all powerplants in Scotland:
 - https://en.wikipedia.org/wiki/List_of_power_stations_in_Scotland
 - This list is **very useful for all groups**. The list tells us the type, location, power capacity and other information for both active and closed power stations.
- General overview of all **renewable** energy in Scotland
 - https://en.wikipedia.org/wiki/Renewable_energy_in_Scotland

1. Non-renewables: fossil fuels

- Overview of non-renewables in Scotland from the Scottish Environmental Protection Agency:
<https://www.sepa.org.uk/environment/energy/non-renewable/>
- Up until the 1980s, **coal mining** was an important industry in Scotland and there were many mining towns.
 - However, due to **technological, political and environmental reasons**, there is no more coal mining in Scotland. In 1947 there were 225 active coal mines and **today there are zero.**
Reasons include:
 - coal mining is bad for the health of the miners and the local environment.
 - In the 1980s there was a conflict between miner's unions and the government.
 - The technological was no longer profitable in Scotland.
 - Link to an online map of all coal mines in Scotland:
<https://www.nmrs.org.uk/mines-map/coal-mining-in-the-british-isles/collieries-of-the-british-isles/coal-mines-scotland/>

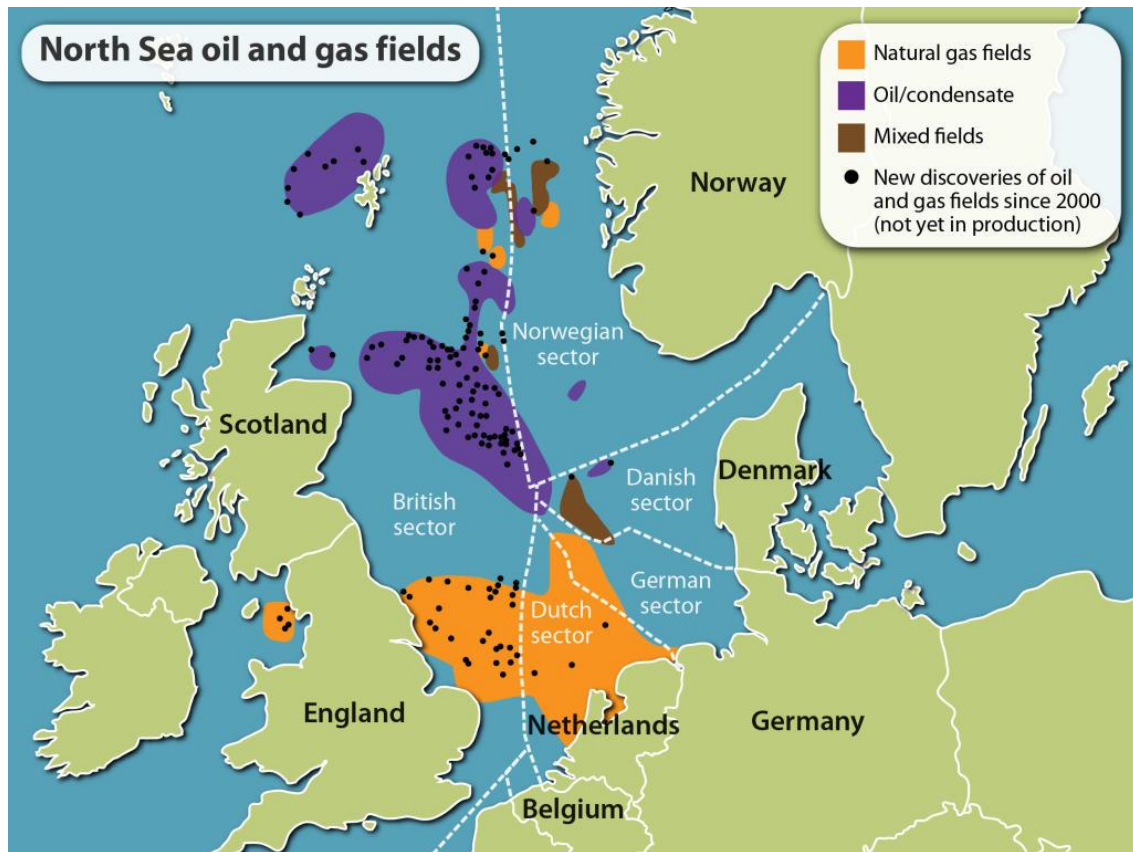


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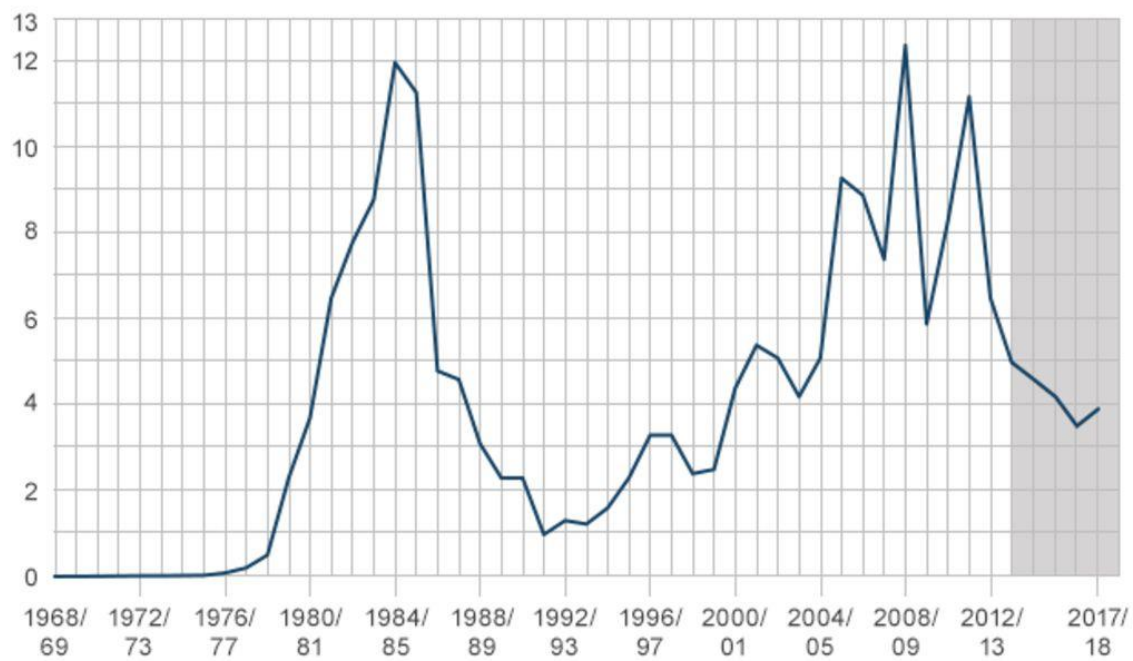
- Today, the **North Sea Oil Industry** is the most important non-renewable energy source in Scotland.
 - The oil is extracted from the sea bed by **oil rigs or oil platforms**: these are structures in the middle of the sea where the machines are operated by up to 200 workers.
 - **Workers** often work 12 hours 'on' and 12 hours 'off' for 2 or 3 weeks at a time, then return to the mainland for 3 to 4 weeks. The salary is very good because the work is hard and dangerous.
 - Link to BBC News article with 'facts and figures' on North Sea Oil Industry: <https://www.bbc.com/news/uk-scotland-scotland-politics-26326117>
 - Interactive Youtube video "Life on an Oilrig in Scotland": <https://www.youtube.com/watch?v=y05lcDJvd4Q>
 - Youtube video of an oilrig during a storm: <https://www.youtube.com/watch?v=D2dv57CpT-s>



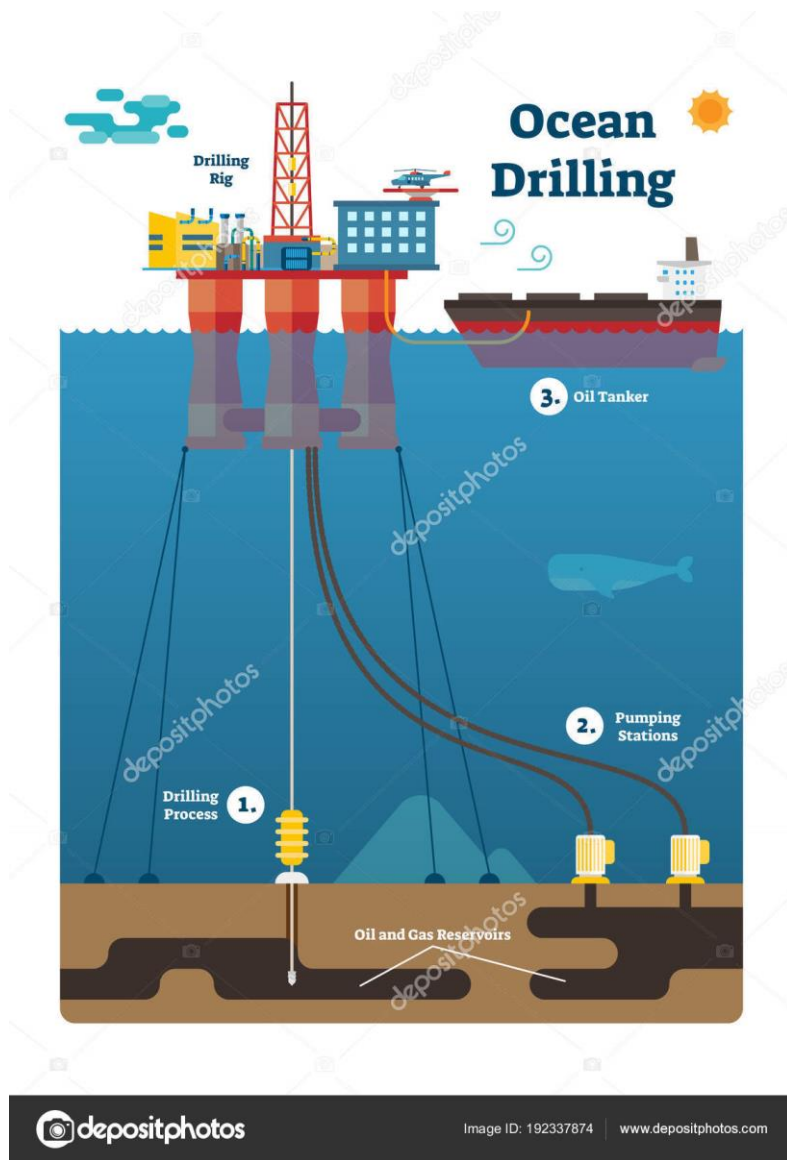
Oil and gas revenue

£bn

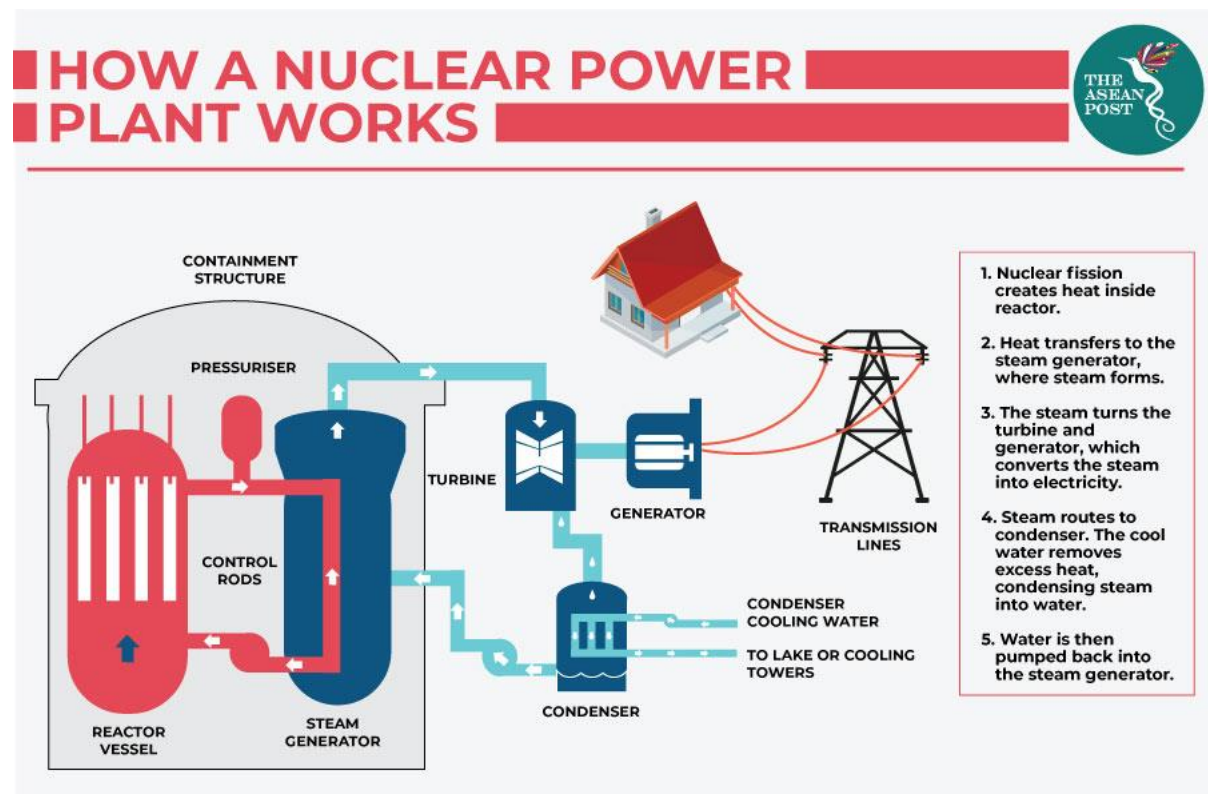
■ Forecast figures



Source: HMRC/ OBR



2. Non-renewable energy: nuclear



Link to an excellent and simple guide on the pros and cons of nuclear energy:

- <https://energyinformative.org/nuclear-energy-pros-and-cons/>

Nuclear Energy in Scotland

- There is only one nuclear power plant currently active in Scotland at a place called **Torness**, 50km east of Edinburgh.
 - There is another nuclear powerplant at a place called **Hunterston** but it has been temporarily shutdown due to safety concerns: https://en.wikipedia.org/wiki/Hunterston_B_nuclear_power_station
- The current Scottish government has promised to build no new nuclear power plants. Due to several high-profile disasters (e.g. Fukushima, Japan), nuclear energy is seen as dangerous and many people do not want any more nuclear energy.
- However, some experts suggest nuclear energy should be used to combat climate change:
- <https://www.theguardian.com/uk-news/2019/jun/17/scotland-urged-to-invest-in-nuclear-to-hit-climate-goals>

- Link to Scottish Government policy on nuclear energy:
- <https://www.gov.scot/policies/nuclear-energy/>

3. Renewables: hydraulic and marine energy

(a) Hydroelectric

- List of hydroelectric powerplants in Scotland:
 - https://en.wikipedia.org/wiki/Category:Hydroelectric_power_stations_in_Scotland
- **Scotland holds 85% of the UK's hydroelectric power resources.** The wet climate with high rainfall and the mountainous landscape are perfect for this type of power – especially the **Highlands region**.



- Youtube video of Cruachan power station, Scotland:
 - <https://www.youtube.com/watch?v=OVdMYnMarfY>
- Article on the history of hydroelectric power in Scotland:
 - <https://www.drax.com/energy-policy/a-brief-history-of-scottish-hydropower/>



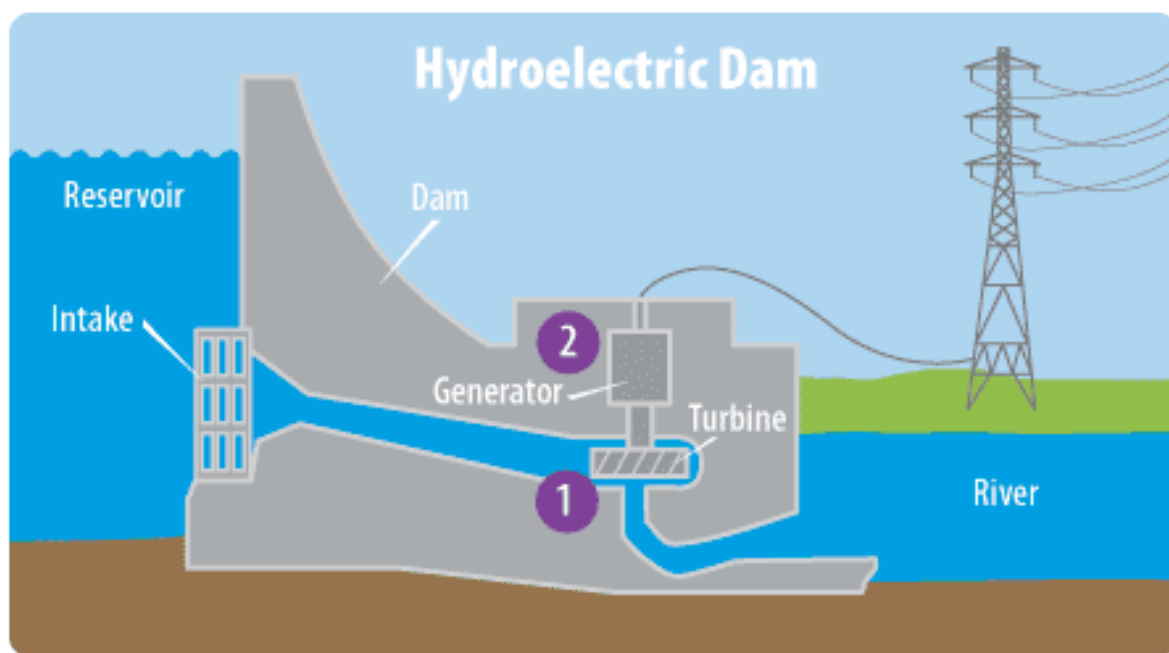
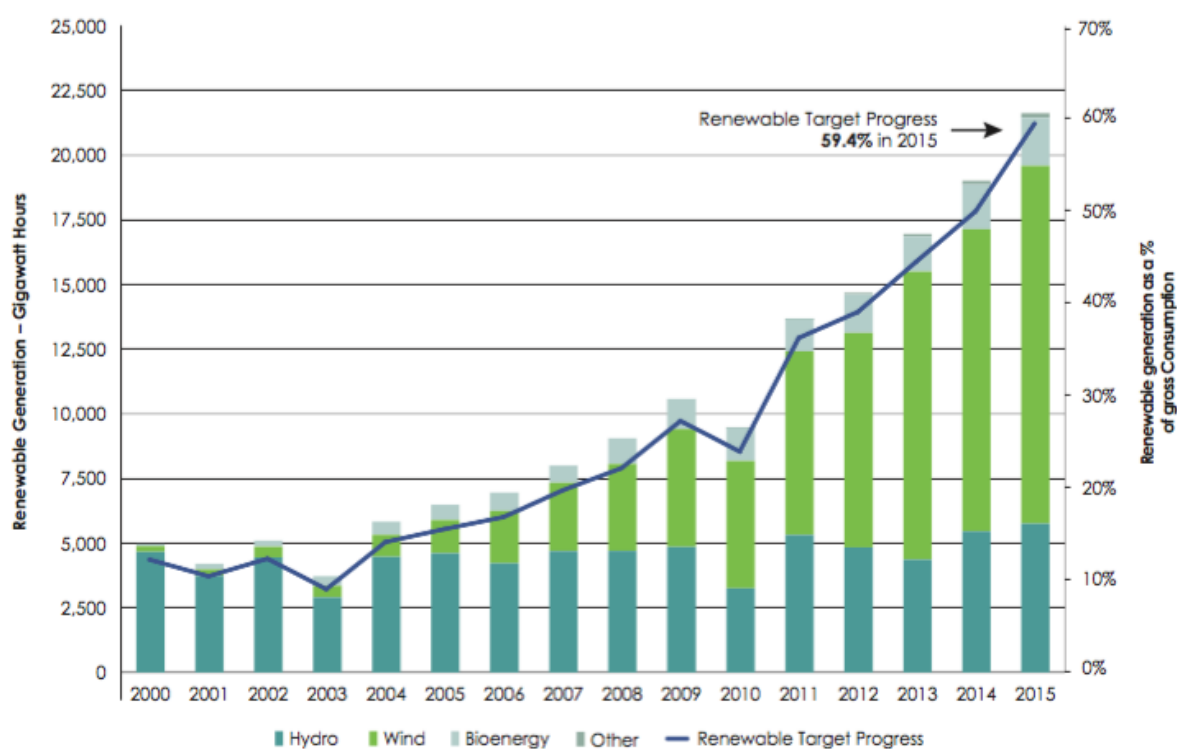
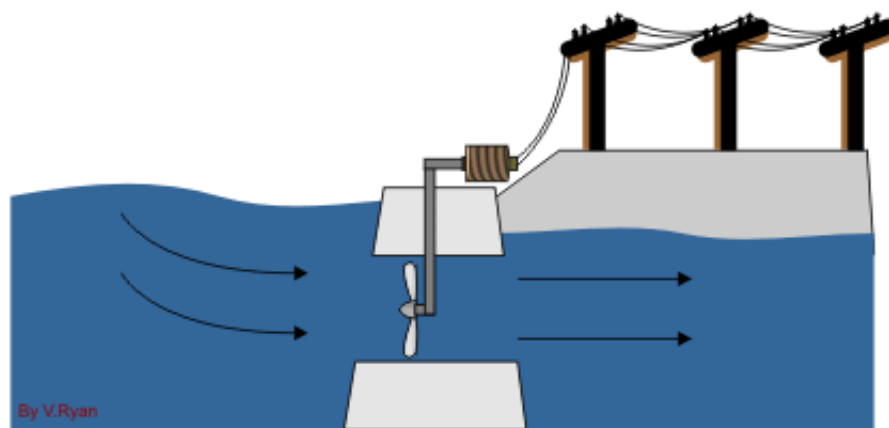


Diagram 4: Electricity generated (GWh) from renewable sources, Scotland, 2000-2015



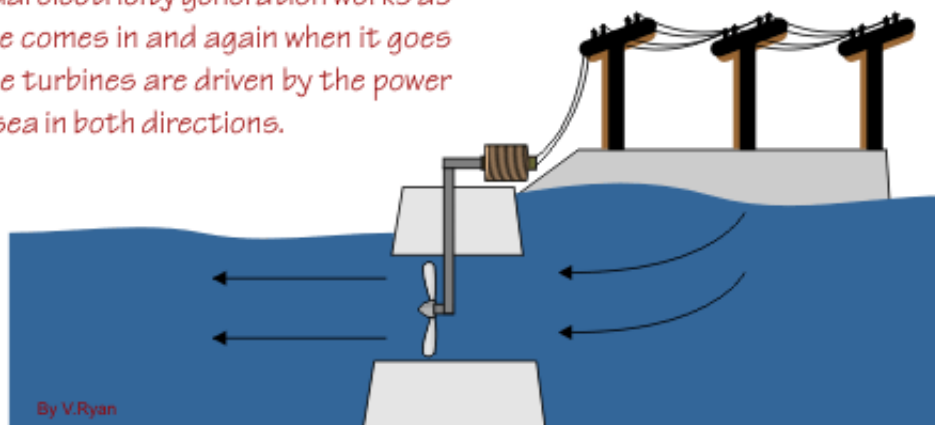
(b) Marine energy: wave and tidal Energy

- Scotland has excellent natural resources for wave and tidal energy because it has a long coastline.
- Tide and wave power are consistent resources but the technology is new and is still being developed. For this reason, there is not a lot of wave and tidal energy in Scotland.
- Youtube video on how a wave power station works:
 - <https://www.youtube.com/watch?v=gcStpg3i5V8>
- Youtube video on tidal power in Scotland:
 - <https://www.youtube.com/watch?v=rIYKkH4W-0Y>

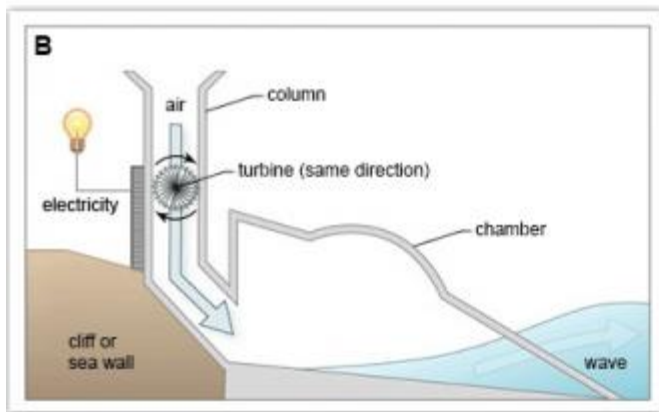
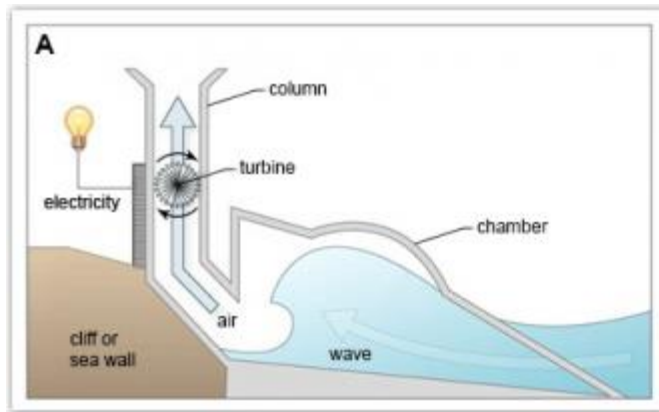


TIDE COMING IN

This tidal electricity generation works as the tide comes in and again when it goes out. The turbines are driven by the power of the sea in both directions.

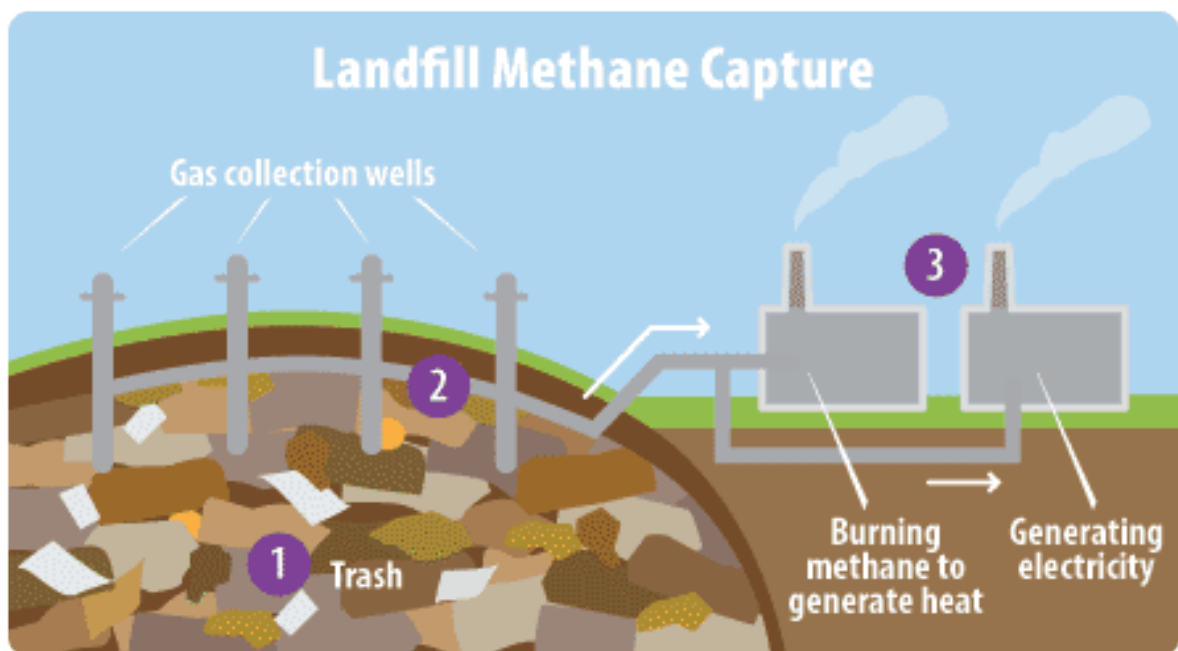
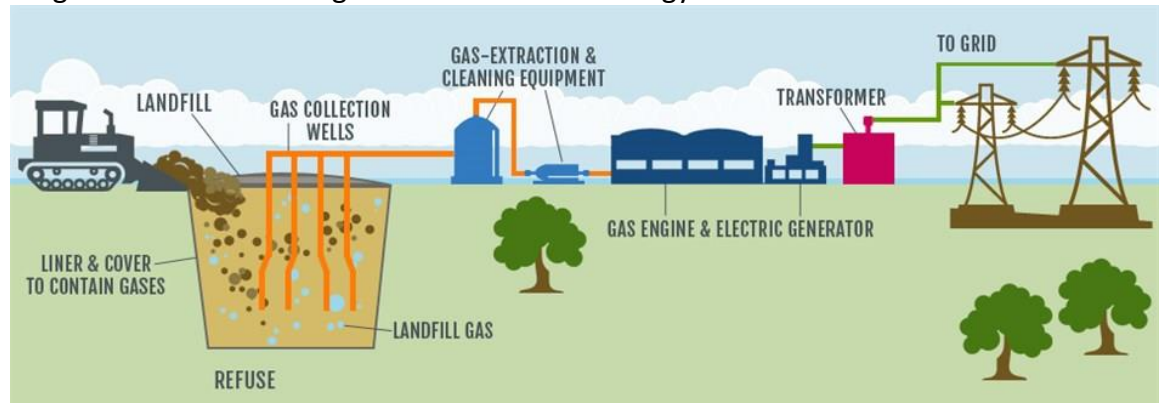


TIDE GOING OUT

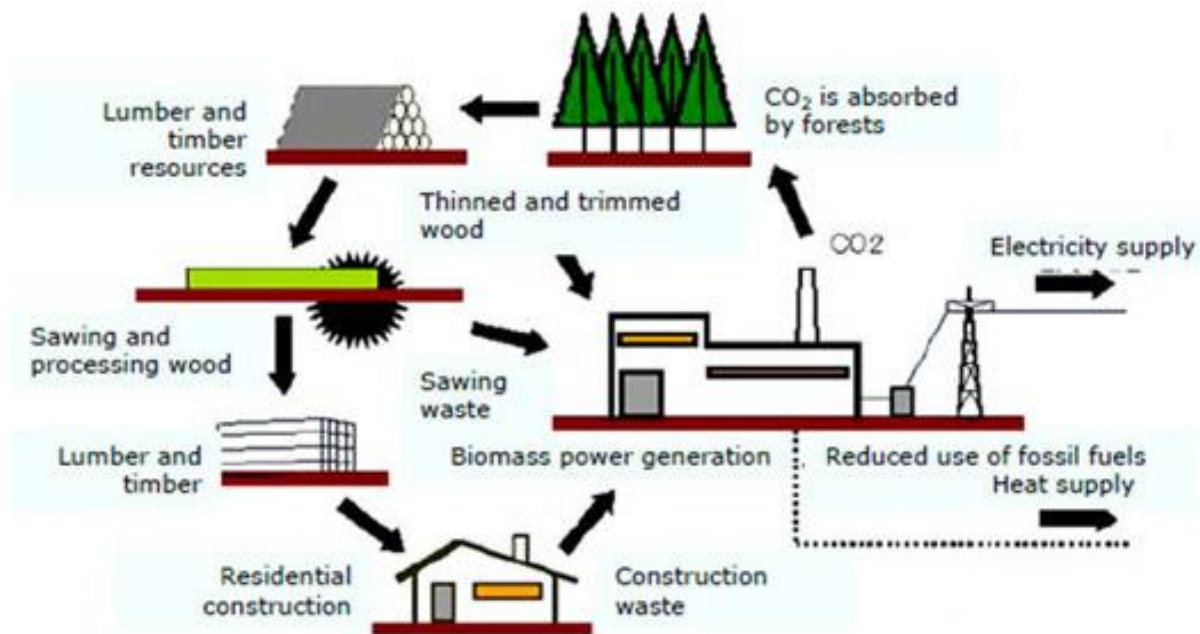


4. Biomass

- Useful link to online article giving an overview of biomass energy in Scotland and useful information:
 - <https://www.scotsrenewables.com/biomassinfo.html>
- There is a powerplant located at **Greengairs, Scotland's largest landfill site**. This site uses landfill gas collection systems to generate electricity.
- Diagrams of how landfill gas collection creates energy:



- There are plans to build a new £350m energy waste plant at the existing Greengairs site:
 - <https://www.dailyrecord.co.uk/news/local-news/plans-submitted-construction-huge-energy-16177275>
- There is also a biomass plant at town called **Markinch**:
 - <https://www.group.rwe/en/our-portfolio/our-sites/markinch-chp-biomass-plant>
 - This plant uses timber to generate electricity, not landfill gas.



- **Very useful** links to articles on advantages and disadvantages of biomass energy:
 - <https://www.syntechbioenergy.com/blog/biomass-advantages-disadvantages>
 - <https://www.renewableresourcescoalition.org/biomass-energy-advantages-disadvantages/>

5. Solar and geothermal

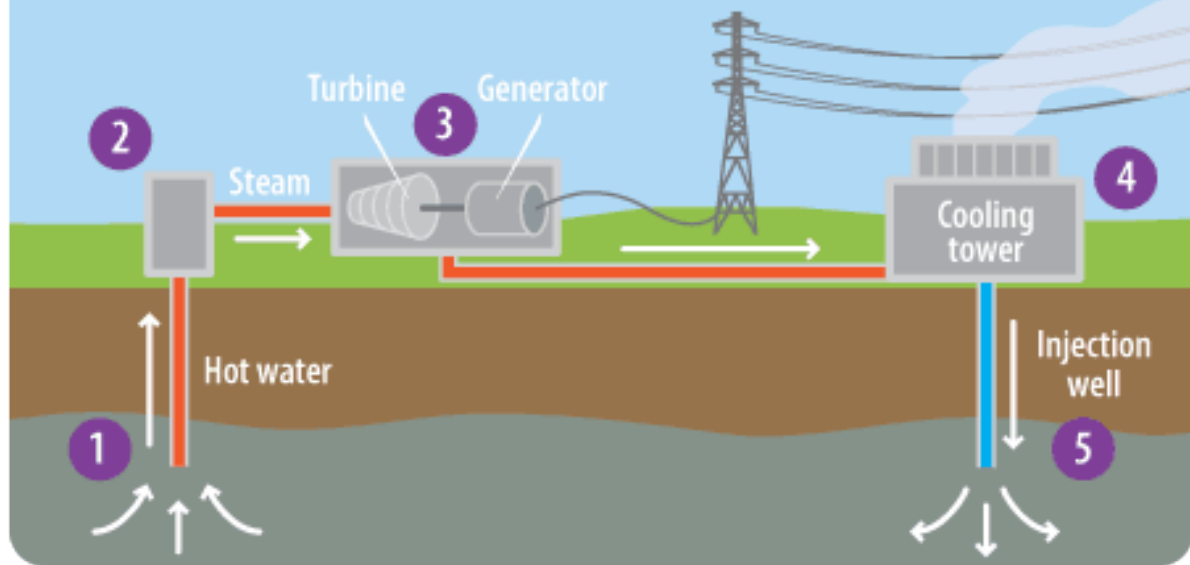
Solar

- Despite the lack of sunshine, solar panels can still work in Scotland.
- Link to the Scottish Institute of Solar Energy Website:
 - <https://www.siser.ac.uk/solar-in-scotland>
- Article says Scotland is set for a “boom” (meaning a rapid growth) of solar energy:
 - <https://www.edinburghnews.scotsman.com/news/scotland-set-solar-power-boom-over-next-five-years-543983>
- Article on Scotland’s largest “solar farm”:
 - https://www.solarpowerportal.co.uk/news/scotlands_largest_solar_farm_approved_with_more_to_follow_from_elgin

Geothermal

- Useful links on **geothermal energy** in Scotland:
 - Scottish Government Policy on geothermal energy:
<https://www.gov.scot/policies/renewable-and-low-carbon-energy/geothermal-energy/>
 - Article on the geological potential for geothermal energy in Scotland:
<http://www.bgs.ac.uk/research/highlights/2013/scotlandGeothermalPotential.html>
 - Link to website of the first geothermal energy company in Scotland: <http://townrockenergy.com/?LMCL=Zsl82Z>
- Links on pros and cons of geothermal:
 - <https://energyinformative.org/geothermal-energy-pros-and-cons/>
 - <https://www.renewableresourcescoalition.org/geothermal-energy-pros-cons/>

Geothermal Power Plant



6. Wind energy

- Wind energy is now the **fastest growing and largest renewable energy resource in Scotland**.
- Scotland has a windy climate, especially around the coasts, so there is a lot of potential for wind energy.
- Many experts think the oil industry is being replaced by wind energy.
- Links to articles from this year showing “**record high**” wind energy output in Scotland and describing a “**wind power revolution**”:
 - <https://www.bbc.com/news/uk-scotland-scotland-business-48981626>
 - <https://www.sciencealert.com/scotland-s-wind-turbines-are-now-generating-double-what-its-residents-need>
- Youtube video on wind energy on the Orkney Islands off the coast of Scotland:
 - <https://www.youtube.com/watch?v=QDLszpu89qw>



Diagram 4: Electricity generated (GWh) from renewable sources, Scotland, 2000-2015

