Frequently Asked Questions

Energy And Wind in Ireland

Friends of the Earth have compiled this list of questions in response to questions we commonly get asked by the media and members of the public.

References are included in the answers below.

1. Where does Ireland's energy come from?

In general we need energy for heating, electricity and transport. Roughly each category accounts for about a third each of total energy use.

Oil is the dominant source of energy in Ireland, representing 47%. The total share of renewables in primary energy is 6.8%.

Within transport, diesel consumption grew by 251% from 1990 to 2013, and renewables in transport currently accounts for between 2-4%

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Oil is the dominant fuel in heating (44%) and renewable heat contributes to 5.7%.

Most electricity is generated in gas power plants. Gas accounts for 45% of energy inputs, followed by coal (21%), and peat (13%). Electricity imports from the interconnector account for 4% of energy inputs. Renewable electricity, accounts for 15% of electricity imports of which 10% comes from wind. However because of the energy losses in transformation associated with fossil fuels, in terms of energy that is used, renewables account for a much higher percentage, closer to 23%.

The relative size of the useful final electricity consumption to the energy lost in transformation and transmission is striking. These losses represent 51% of the energy inputs and are primarily associated with the heat lost when burning fuel to generate electricity.

2. What is Ireland's Renewable Energy Policy?

Ireland has set a binding target to consume 16% of energy from renewable sources by 2020. This target is detailed in the National Renewable Energy Action Plan (NREAP) which was submitted to the EU in July 2010. The NREAP sets out the plan to achieve these targets.

The targets are part of an overall European target to have 20% of energy from renewable sources in the EU by 2020 which are detailed in Article 4 of Directive 2009/28/EC on renewable energy.

Irelands overall 16% target is made up of contributions from Renewable Electricity (RES-E; 40%), Renewable Heat (RES-H; 12%) and Renewable Transport (RES-T; 10%).

There was no Strategic Environmental Assessment undertaken of this plan.

3. How is Ireland progressing towards our EU Renewable Energy targets?

We are not doing great, and with only 5 years to go we have a lot to do. We are almost certainly not going to reach our overall 2020 emissions reductions targets. In terms of energy, the most progress to date has been within renewable electricity, but we are still only half way to the target with only 5 years to go. We are still very far behind when it comes to heat and transport, and looking at the current trend without a significant shift in policy, we are unlikely to meet the heat and transport targets for 2020.

Energy in Ireland 1990-2014, 2015 Report and Renewable Energy in Ireland 2013 detail Ireland's progress towards the 2020 EU targets.

2014 is the most recent year for which there is data.

In 2014;

- Renewable Energy accounted for 8.6% of final energy demand.
- The share of electricity from renewable electricity was 22.7%. Wind contributed 18.2 % of electricity and was the second biggest contributor to electricity following gas. The remainder of came from, Hydro (10%), Biomass (5%), Landfill gas (3%) and Biogas (<1%).
- Renewable energy contribution to thermal energy (RES-H) was 6.6%.
- Renewable energy in Transport (RES-T) accounted for 5.2%.
- Energy-related CO_2 emissions decreased by 1.2% in 2014 and now stand at 17% above 1990 levels. When compared with 2005 energy-related CO_2 emissions have fallen by 23%.

It is important to note that renewable energy targets refer to the amount of energy consumed, and not the amount of energy that is produced. When looking at electricity statistics, this is quite an important distinction as when electricity is generated from combustion, about 45% of it is lost in transformation. Transformation losses occur from combustible fuels, the most inefficient of which are coal and peat.

4. Where does our Renewable Energy come from?

Ireland's renewable energy comes almost entirely from wind (47%) and biomass (42%). The remaining 11% comes from a combination of hydro, geothermal and solar.

http://www.seai.ie/Publications/Statistics_Publications/Renewable_Energy_in_Ireland/Renewable-Energy-in-Ireland-2013-Update.pdf

Does renewable energy influence greenhouse gas emissions?

Yes. Burning fossil fuels release CO_2 into the atmosphere which contributes to climate change. Renewable energy generation displaces the need for fossil fuels and does not release greenhouse gases.

In Ireland in 2013, renewable energy displaced 1.3 Mtoe of fossil fuels and avoided carbon emissions of 2.9 $MtCO_2$. Energy related CO_2 emissions peaked in the early 2000's and is now decreasing year on year, and in 2014 was half what it was in 1990. Transport related CO_2 emissions have doubled since 1990, and transport continues to be the main contributor to energy related CO_2, accounting for 35% of emissions.

Approximately €300 million was saved from using Irish renewable energy and not importing fossil fuels in 2013.

The most recent report from the United Nations Intergovernmental Panel on Climate Change (IPCC) argues that to contain global warming within the internationally politically agreed limit of 2°C, the majority of the known reserves of fossil fuels need to remain in the ground, and the contribution of renewable energy, nuclear energy and carbon capture needs to triple.

5. What is there to the argument that Wind Energy does not reduce carbon emissions?

Wind energy, and all renewable energy, reduces CO_2 emissions in the energy sector. Wind energy displaces fossil fuels in the energy system.

When CO_2 emissions from the electricity sector are compared with wind energy statistics, it is clear that on windy days when relatively more electricity comes from wind, CO_2 emissions from the energy sector are lower, and on calm days when relatively less energy comes from wind, CO_2 emissions are higher.

Historically December is the month when energy related CO_2 emissions are highest as this is when most energy is used in buildings. In December 2013, as a result of significant increases in wind in the system, energy related CO_2 emissions were lower than any previous year.

As a result of the significant losses of energy which occur during combustion, as renewable electricity is brought into the system relatively more units of fossil fuels are displaced. This is because each unit of output from fossil-fuel generators requires between 1.8 and 4 units of primary fossil-fuel input in steady-state operation due to the efficiency at which these units convert primary fossil-fuel energy to useful electricity output. As wind and hydro power technologies do not generate electricity through combustion, they do not experience these thermal efficiency losses.

Overall in 2012 on the All-Island system, wind energy generation displaced 1.88 units of fossil-fuel input for each unit of electricity produced by wind, whereas total renewable electricity generation displaces 1.53 units of fossil-fuel for each unit of electricity produced by renewable energy. The displacement ratio in the case of total renewable electricity is less than for the case of wind generation alone due to the efficiency losses associated with the combustion of biomass in the former case.

http://www.seai.ie/Publications/Statistics_Publications/Energy_Modelling_Group_Publications/Quantifying-Ireland%E2%80%99s-Fuel-and-CO2-Emissions-Savings-from-Renewable-Electricity-in-2012.pdf

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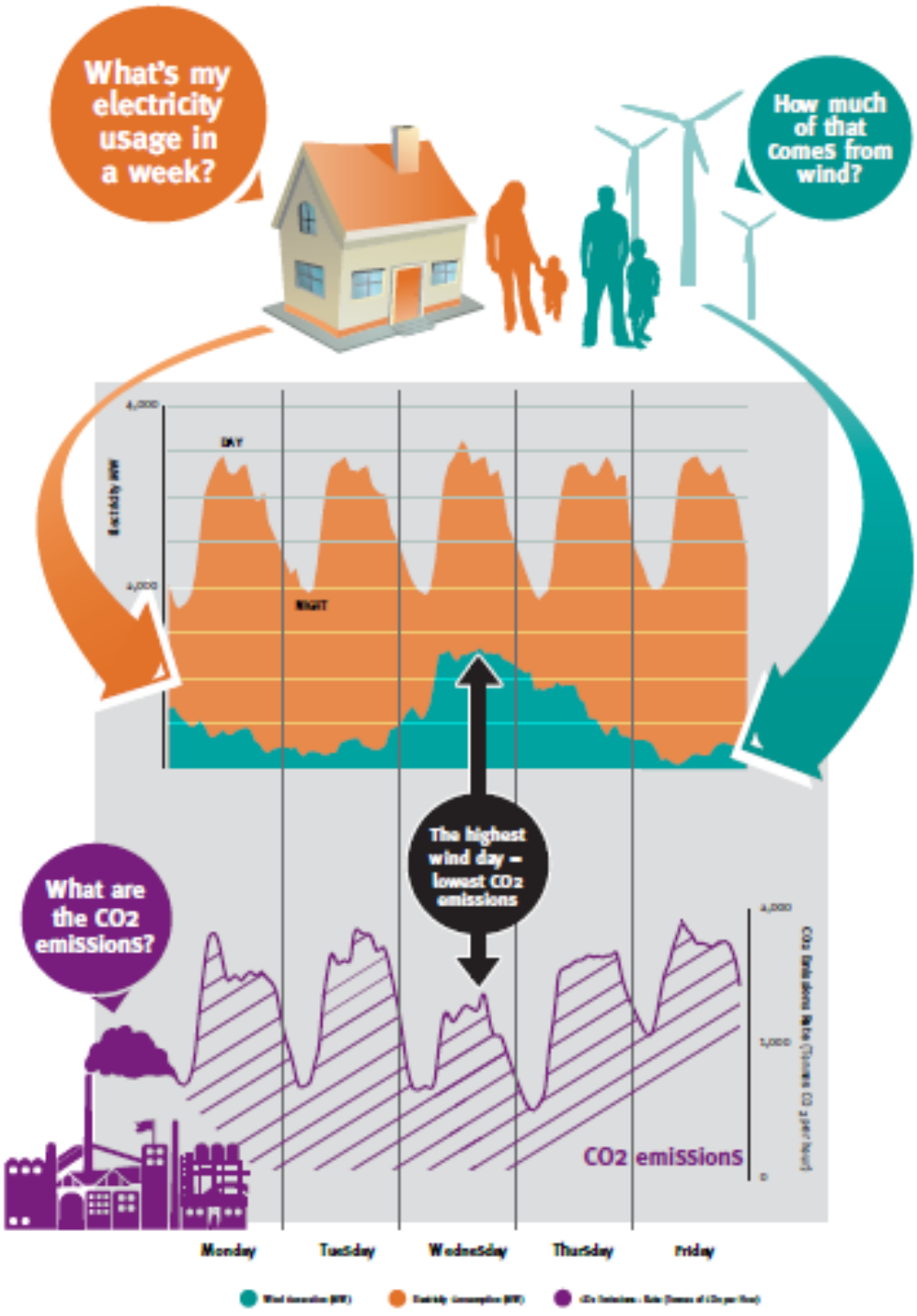
HOW DOES WIND ENERGY IMPACT CO2 EMISSIONS?



Typical Working Week: 26th March to 1st April, 2011

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6. What about building wind farms on peat bogs?

Healthy peatlands are the most important long term carbon store in the terrestrial biosphere, and are Ireland's equivalent of the Amazon, when it comes to carbon storage.

Disruption, excavation and drainage on peatlands has the potential to cause large scale carbon emissions when development proceeds on a healthy peatland without due cognisance of the natural environment. However, where sensitive design and management practices to minimise net carbon loss (i.e. undrained floating roads, habitat improvement and site restoration) are used, carbon pay back periods are in the region of months over the 25 year life of a wind farm.

As a result of decades of peat extraction from Irish bogs, there are vast tracks of degraded bog across the country. The construction of wind farms for generating electricity on degraded bogs makes a lot of sense, particularly when peat extraction ceases and the land is restored.

In order to maximise carbon savings, careful site selection, sensitive design and long term management plans are of utmost importance. In peatlands, minimising excavation and drainage and avoiding deep peat should be a fundamental design objective. The amount of net carbon gains (or losses) should be fully understood before development commences.

7. What is spinning reserve?

All forms of power generation require back up, this back up is known as spinning reserve, and is required regardless of the source of the power. Thus at any time, surplus energy is generated in case of a peak in demand, an unexpected outage or a break in transmission.

The term spinning reserve in no way refers to 'spinning' turbine blades.

Variations in the output from wind farms are barely noticeable over and above the normal fluctuation in supply and demand and at present there is no need for additional back-up because of wind energy.

Wind is given priority access onto the grid. Eirgrid forecast the amount of wind likely to be generated, and tailor back up reserve appropriately. The level of back up required would be generally the same with or without renewable energy in the system.

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8. How many wind farms are there in Ireland?

The Irish Wind Energy Association estimates that there are 228 wind farms on-line and operational in 27 counties in Ireland.

The grid connected and operational installed wind capacity on the island of Ireland was 3,025 Megawatts (MW) in June 2015, of which 2,395 MW was installed in the Republic of Ireland.

It is estimated that 1MW of wind capacity can provide enough electricity to supply approximately 650 homes. Based on this figure, an installed capacity of 3,025MW can provide enough electricity to power over 1.97 million homes.

(Figures as per IWEA website correct on 07/06/2015).

http://www.iwea.com/windstatistics

9. Where are the Wind Farms in Ireland?

County Cork has the highest installed capacity of wind energy, 395.58MW over 26 wind farms.

County Kildare has the smallest installed capacity of wind energy, with only one 0.02 MW turbine.

Counties Longford, Westmeath and Meath have no wind farms.

The Irish Wind Energy Association website hosts a map which shows the location and installed capacity of wind energy in Ireland.

http://www.iwea.com/windfarmsinireland

10. Are wind farms subsidised?

Yes. Wind energy is supported through the Renewable Energy Feed in Tariff (REFIT 2).

The REFIT guarantees a minimum price for certain renewable energy technologies exported to the grid.

There is also a guaranteed minimum price offered to peat fired electricity plants and certain gas fired electricity plants.

This is paid for by the public service obligation (PSO), which is paid by every electricity customer.

The PSO in 2015/6 is €325.3 million. This year will be the first year that renewables receive more money than peat and gas.

The breakdown is as follows:

PSO 2015/16: €325.3 million

Renewables	€180.9 million
Peat	€121.9 million
Security of Supply (Gas)	€47.3 million
PSO CfDs	€9.3 million
Other	€15.5 million

PSO 2014/15: €327.7

Renewables	€87 million
Peat	€114 million
Security of supply (Gas)	€107 million
Other	€17.2 million

Unlike most of the rest of Europe, in Ireland there is no guaranteed price for solar electricity at present and this we see as a major omission and as the reason why solar electricity is almost non-existent in Ireland.

11. Do wind farms only produce energy 30% of the time?

Wind turbines produce electricity when the wind blows and the turbine blades spin. Modern turbines produce electricity about 90% of the time, but the amount of electricity varies depending on the strength of the wind. On average over a year a wind turbine will produce electricity that amounts to 30% of its theoretical maximum output. Of course, some operate at higher or lower rates than others depending on where they are located, the wind conditions at the site, and the wind conditions over the course of the year.

Unsurprisingly, the amount of electricity generated from wind is higher during the winter and lower during the summer. During the winter, wind can account for 50% of electricity on the system.

The record high for wind energy in Ireland was set in February 2015, when 1969 MW of electricity was produced by wind.

The amount of energy generated by any form of energy is known as the capacity factor. This is a ratio of the amount of energy that could be generated if a wind farm/power plant was operating at maximum capacity all the time, divided by the amount of energy that is actually generated over the course of a year.

By comparison a conventional power plant operates with a capacity factor of about 50%.

12. Are wind farms noisy?

When wind turbines are spinning and generating electricity, there is noise from the movement of the blades in the air.

The level of noise and the amount that is heard is dependent on the wind conditions, and the background noise. In general when it is windy, background noise levels are quite high and the noise from wind turbines are drowned out. When wind conditions are low, and hence background noise levels are lower there, noise from wind turbines is more noticeable.

In order to compare the levels of noise from a wind farm, it is useful to look at the levels of noise from other everyday activities.

In normal circumstances indoor noise levels are about 10 dB lower than outdoor levels. General noise levels in a quiet library environment are 30 dB, general rural background noise is 20-40 dB, the noise from a refrigerator is 40 dB, the noise from moderate rainfall is 50 dB, the noise from car travelling at approximately 60 km/hr 100 m away is 55 dB and the noise from a normal conversation or a dishwasher is 60 db. (http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/pps18/pps18_annex1/pps18_annex1_wind/pps18_annex1_planning/pps18_annex1_noise.htm)

Noise levels at the base of a wind turbine are approximately 50 dB and reduce with distance from the turbine, at 350m from a turbine noise levels are between 35-45 dB depending on the wind speed.

13. What noise limits should be in place to protect people's homes?

We don't think that the use of an absolute noise limit is the best way to protect people or the environment as is proposed in the draft wind energy guidelines.

The approach to noise limits, and the task of assessing appropriate noise impacts from developments should be consistent regardless of the nature of the development i.e. there should be no difference between the amount of noise that is considered appropriate at a house or sensitive location as a result of a road (currently 60 dBL_{den}), than as a result of a wind farm or from a factory development.

We suggest that a model similar to that adopted in Germany is applied in Ireland. In Germany wind farm specific noise limits do not apply, rather legislative noise limits for general noise sources are applied between 35 - 50 dB(A) at night and 45 - 70 dB(A) during the day depending on whether the noise sensitive receptor is located in a spa/hospital, residential, village, commercial or industrial area.

An absolute noise limit, as proposed in the Draft Wind Energy Guidelines of 40 dB (A) is inappropriate because of the following:

- a wind farm development in an already noisy area may be forced to curtail turbines to achieve 40 dB(A) in instances where pre-existing noise levels are above, and potentially, significantly above 40 dB(A). In practice this would curtail electricity production for no real increase in protection of residential amenity.
- Residential amenity in low noise areas will be significantly affected by allowing noise to increase over by 10 db.
- This limit is not in line with limits placed on road development. Noise levels from road developments at sensitive receptors are permitted to be approximately 20 dB louder, resulting in a perceived increase in loudness by 4 times.

14. Are Set Back distances a good idea?

We do not consider set-back distances as the most appropriate way to guide development. When terrain, landscape and the existing environment are not considered, this can lead to inappropriate development in certain locations, or restrictive conditions on development in other locations.

In an industrial or urban area, sensitive receptors within 500 m of a wind turbine may be considered appropriate, while the opposite may be true in other areas. Rather set back distances should be based on impacts such as noise, or shadow flicker, not simply on how it looks.

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15. What is shadow flicker and is it dangerous?

Shadow flicker occurs when a wind turbine casts a shadow and the sun is seen from behind the spinning blades. When this happens a flicker effect occurs, which can appear as if a light is being turned on and off.

This can happen at certain times of the day, at different times throughout the year depending on the location of the sun in the sky. If a shadow flicker event happens, it lasts for a few minutes a day.

Shadow flicker happens within about 10 rotor diameters of a wind turbine.

There is no evidence that shadow flicker results in health problems, disease or seizures.

16. Do wind farms have an impact on health?

Concerns over impacts on health from wind farms are usually raised in relation to noise, shadow flicker, infrasound or vibration. In general, the evidence suggests that there are no direct health impacts from wind turbines, however what is recognised is that annoyance causes health impacts and wind farms or the threat of wind farms can cause annoyance, most often when people do not like wind farms.

In response to a Parliamentary Question in May 2014, the European Commission stated '*The Commission keeps a continuous watch on the possible impacts of wind turbines on health and well-being, taking into account the results from on-going projects and other sources. So far there has been no scientific evidence of lasting impacts, but there is recognition, also in industry, of public perception of impacts and nuisance.*' (http://www.europarl.europa.eu/sides/getAllAnswers.do?reference=E-2014-004125&language=EN)

The Commission refers to a study undertaken by the Massachusetts Department of Environmental Protection and the Massachusetts Department of Public Health (January 2012) (http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf). The study was undertaken by a number of independent experts in the field including representatives from Harvard University, Boston University and the University of New England.

The study concludes that noise from wind turbines does not directly cause health problems, disease, stress or sleep disruption. Similarly the study showed that shadow flicker and vibration from turbines do not result in health impacts, nor does shadow flicker lead to seizures.

The study does recognise that annoyance causes health impacts, and this can cause higher levels of stress and sleep disruption. However, the study notes that '*There is insufficient epidemiologic evidence to determine whether there is an association between noise from wind turbines and annoyance independent from the effects of seeing a wind turbine and vice versa.'*

In conclusion, the study found that '*Effective public participation in and direct benefits from wind energy projects (such as receiving electricity from the neighbouring wind turbines) have been shown to result in less annoyance in general and better public acceptance overall'*

An additional study reported in the Journal of Occupational and Environmental Medicine (http://journals.lww.com/joem/Abstract/2014/11000/Wind_Turbines_and_Health__A_Critical_Review_of_the.9.aspx) concludes that '*Components of wind turbine sound, including infrasound and low frequency sound, have not been shown to present unique health risks to people living near wind turbines.'* But that, '*Annoyance associated with living near wind turbines is a complex phenomenon related to personal factors. Noise from turbines plays a minor role in comparison with other factors in leading people to report annoyance in the context of wind turbines.'*

17. What about converting Moneypoint to Biomass?

Unfortunately the transformation of our energy system is not straight forward, and there will be no quick fixes. While we absolutely agree that burning coal at Moneypoint for electricity should stop. We caution that replacing coal with biomass will not prove a sustainable alternative, and here's why.

- It is not efficient - Burning biomass for electricity is not the most efficient use of biomass. Biomass is an excellent heat source, but for electricity too much energy is lost in the transformation and transmission (using biomass for heat is about twice as efficient as for electricity). Biomass material is far better used in domestic and industrial heating, or as part of combined heat and power installations.
- We don't have enough biomass - We do not have enough land in Ireland to grow enough fuel to power Moneypoint (We would need about 300,000 ha of land to grow biomass to burn at Moneypoint, this has been estimated as representing the size of Wexford and Carlow combined). Biomass would need to be imported for this proposal to work. Thus we would remain reliant on importing fuels with no control over the price of those fuels into the future, and no control over the sustainability of those materials, most of which would be likely to come from the hardwood mature forests of North America. We already import 85% of the fuel we

need in this country from unsustainable sources, we need to reduce that percentage not maintain or increase it.

- It would be very expensive - Drax coal power plant in the UK has been converted to Biomass in recent years. The plant has agreed a guaranteed price with the UK Government of 0.13/ kwhr (compared to 7c/kwhr for wind energy in Ireland). Without this high Feed in Tariff Drax Power would not be in a position to run.

18. For comparison, what is the United Kingdom doing about Renewable energy?

The United Kingdom's EU renewable energy target is 15%.

In 2014, 7% of energy came from renewable sources. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/450298/DUKES_2015_Chapter_6.pdf

In 2014 there was 24.6 GW of renewable electricity installed in this UK, this accounted for 19% of all electricity.

Onshore wind accounted for the largest share of renewable electricity, and accounts for approximately 30% of renewable electricity. Offshore wind accounts for approximately 20%, hydro for 7%, biomass and bioenergy for 20% and solar for 22%.

Onshore wind had 34 per cent of renewables capacity at the end of 2014, with offshore wind having an 18 per cent share. Large and small-scale hydro represented 7.0 per cent of renewables capacity, while plant biomass had a 9.1 per cent share. Bio-energy (including wastes) as a whole had a 18 per cent share. Solar photovoltaics' share of capacity increased from 14 per cent to 22 per cent.

https://www.gov.uk/government/statistics/energy-trends-section-6-renewables

The amount of solar electricity in the UK almost doubled in 2014. As of the end of September 2015, overall UK solar PV capacity stood at 8,185 MW across 772,696 installations. https://www.gov.uk/government/statistics/solar-photovoltaics-deployment

19. A country similar to ours, what is Scotland doing?

The Scottish Government has set a target to generate 100% of its electricity from renewable sources by 2020.

In 2014 there was 5,131 MW of wind energy installed in Scotland (Most of which was onshore, with only 197 MW offshore).

In 2014 just less than 50% of Scotland's Electricity came from renewable sources.

http://www.gov.scot/Resource/0048/00487230.pdf

The Scottish Government also set a target to have 500 MW of renewable energy owned locally and by communities. This target will be reached this year (2015), 5 years ahead of schedule.

20. Units of Energy explained

A (toe) is the conventional standardised unit of energy and is defined on the basis of a tonne of oil having a net calorific value of 41686 kJ/kg.

Often, Mtoe is used to express units of fossil fuels displaced. This refers to a Mega (10^6) of oil equivalent, and is often used to express the amount of oil not needed as a result of the use of renewable energy.