# DOCUMENT TYPE: EXTERNAL

# GREENWASH IN THE ELECTRICITY MARKET

Updated autumn 2025

Author / Contact :
Fuad Al-Tawil
fuadaltawil@yahoo.co.uk
01626 87 2721

Contents

SECTION 1. IS THIS FOR ME? ....2
SECTION 2. A QUICK ANSWER ....2
SECTION 3. THE DETAILED EXPLANATION, CALCULATIONS AND OPTIONS ....3
3.1 How does the electricity network work? ....3
3.2 How much Carbon is emitted by electricity? ....4
3.3 Why bother buying 'green'? ....5
3.4 What about the Apps that tell me when the grid in my area is low-Carbon? 6
3.5 Should I invest in PV, Heat pumps and Electric Vehicle? ....7
SECTION 4. FURTHER INFORMATION AND REFERENCES ....8
4.1 Embodied GHG emissions ....8
4.2 Criteria other than GHG emissions ....8
4.3 The impact of regulation and industry practices ....8
4.4 Future developments ....9


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License

## Section 1. Is this for me?

If you are confused by all these offers of 'Green' energy, Apps to help you reduce you GHG emissions or simply curious about the term, then do read on.

The term "Greenwash" is widely used. It indicates that information is inaccurate, incomplete or misleading, usually about products/services to suggest these are more environmentally friendly than they really are.

Here the focus will be on how Greenwash is used in the UK electricity market. The following sections will explain some of the most common myths and misunderstandings in terms of their impact on actual Greenhouse Gas (**GHG**) emissions. There is also advice on what you can do about this to suit your circumstances.

It is probably useful to have a thorough appreciation of why GHG emissions is the only measure considered here. A starting point for the impact of GHG emissions can be found here. How electricity is generated/sold may well have other indirect environmental, economic and social impacts, these are not considered here.

## Section 2. A quick answer

If your aim is to minimise your GHG emissions from the electricity you consume, then here are the things you can currently do in descending order of how much reduction you can achieve, the first being the most effective:

1. **Consume less**. Start by measuring what you use and where. Then consider what is wasteful, what you can do less of and how to use the electricity more efficiently, as per Energy Hierarchy. You can get help on how to do this using the TECs Energy Assessment introduction (E-Pack). You can register for a free My Electricity session at your home or place of work to practice this.
2. **Generate your own electricity**. If you have exhausted your ability to reduce your consumption, or you prefer to spend money on reducing your emissions, explore what renewable generation/storage you can install in your building. You can get help on how to work this out from TECs, see also PV Systems and Residential Battery Systems.
3. **Invest directly in renewable generation**. If you have the spare capital, you can use this to fund new renewable generation. There are plenty of effective opportunities to this, some are community owned so deliver additional social/economic benefits locally.
4. **Buy 100% renewable electricity direct from generators**. There are only a few licensed electricity suppliers who buy direct or own 100% renewable generation, the largest of these are Good Energy and Ecotricity. Current regulation only allows you to buy direct from licensed suppliers, unless you can arrange for a private-wire supply from a nearby source.
5. **Buy some renewable electricity supplied indirectly from renewable generation**. You can find a list of licensed suppliers with their Carbon % of low-Carbon electricity here. The most popular being Octopus Energy. These suppliers tend to offer a lower unit price but actually only buy a smaller % direct from renewable generators. Instead, they purchase certificates to offset emissions. This will still have an impact on emission reduction, but not to the same extent or as quickly.
6. **Anything else you do will at best have little or no impact and at worst increase GHG emissions**. This includes changing the time you use electricity from the grid, especially in the SouthWest.

If you'd like to understand the reasons behind these, please read on.


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License

# Section 3. The detailed explanation, calculations and options

UK electricity supplied through the grid to the consumer is generated from a variety of primary Energy sources. These include low-Carbon sources such as wind, hydro, photo-voltaic (**PV**) and nuclear. There is currently no generation with Carbon Capture and Storage at scale. Other generation includes all types of fossil fuels such as coal, oil and gas in all their different forms/sources.

The grid is divided into two tiers, a Transmission and several distribution networks. Think of the grid as a network of roads where the transmission network is like the motorways and the distribution are progressively smaller roads down to the street you live on. Our Distribution Network Operator (**DNO**) is National Grid Electricity Distribution (**NGED**, formerly Western Power Distribution).

The government publishes annual statistics on the performance of the electricity grid. These include the GHG emissions from the primary Energy sources as well as network losses and inefficiencies.

## 3.1 How does the electricity network work?

Like water, electricity will only flow from the generator if something is switched on to consume it. It will 'flow' along the routes with least resistance, that is the largest cable (widest road in the that analogy) and/or the shortest distance.

If there is more generation than consumption, the voltage on the grid would rise to dangerous levels (a long traffic jam). To prevent this generation, plant is turned off until generation and consumption are matched. This is a complex undertaking, referred to as grid balancing, there are several other factors involved (e.g. maintaining the 50Hz frequency and dealing with the fluctuating nature of some generators such as renewables).

The size of the cable limits how much Power can be carried along the cable, the 'bigger' it is the more Power it can carry for a specific voltage (**V**). The unit of Energy (kWh) we consume is simply how much Power we draw through our electricity meter multiplied by how long we draw it for. Every time the capacity of the cable changes, there is a junction to transform the voltage to the appropriate level, it arrives at ~230V for the residential consumer (~400V for 3-phase). This is referred to as the Low Voltage (**LV**) part of the distribution network, up to 1,000 V.

The electricity network evolved over many decades, it was designed like our road network with large generators along the 'motorways' with small streets eventually leading to consumers at the periphery. Renewable plant, apart from large offshore wind farms, tend to be small generators mostly connected to the distribution network. Behind the electricity meter, PV systems are mostly connected to the smallest pipes, some to the LV pipes.

Although theoretically a typical single-phase residential consumer could draw 10-30 kW of Power through their meter (~ 240 – 720 kWh of Energy in a day), this is not possible in practice. The distribution network, cable and transformer capacities, are designed on the basis that not all consumer turn lots of appliances on at the same time, within certain exceptions referred to as Peak Periods. The total electricity generation currently supplying all consumers has some 'spare' generation, and more can be built over time. This fractional spare capacity, however, is nowhere near enough to generate or carry the additional energy needed to electrify our transport and heating. The grid would need to grow by ~4 fold. The government's current plans fall significantly short of that ambition.

The task of balancing supply/demand, dealing with sudden/gradual changes to this while maintaining voltage/frequency constraints and a high level of availability, is challenging. This is made even more difficult with renewable generation which is 'unpredictable' as the wind and the sun can change by the minute. One of the main tools available to network operators is to turn power generation on/off as demand fluctuates. While renewables can be turned off, the current economics make it difficult


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License

to have sufficient 'spare' direct or stored low-Carbon energy waiting to be turned on when needed. In contrast, gas powered electricity plant is relatively easy and cost effective to turn on/off.

Unfortunately, today there is no regulation that requires network operators to prioritise low-Carbon generation over other sources, the decision is based primarily on cost and convenience (i.e. maintaining existing practices). See question and reply re NESO latest balancing system here at 1:17:35 .

## 3.2 How much Carbon is emitted by electricity?

That depends on where the electricity comes from, the 'energy mix'. Strictly we should calculate the ongoing annual emissions from operating the network (i.e. primary fuel emissions, operations and maintenance as well as inefficiencies in generation/transmission). We should also include the amortised embodied emissions, that is the GHG emissions resulting from the mining/manufacture/construction of the generating plant/network divided by the number of years it is expected to operate.

It is too complex to do this here, partly because not all the information is available. However, it is reasonable to focus on the ongoing emissions as in most cases these tend to be much higher than amortised embodied emissions. It is also reasonable to assume that whatever the primary energy source, renewable or otherwise, they will all use the same electricity network.

The amortised embodied emissions of the generation plant will vary. As a rule of thumb, the following values for renewables can be used over the expected life. This is expressed as a Carbon Intensity (**CI**), the amount of GHG emissions per delivered unit of energy (in kg or gm per KWh).:

- Wind and nuclear : 20-50 g CO2e/kWh
- PV : 50-300 g CO2e/kWh

Own generation (also referred to as behind the meter) does not use the grid if we consume it on-site. Ignoring the amortised embodied emissions, PV systems, even with batteries, can be considered to have zero operational CI, provided their embodied emissions have been accounted for elsewhere.

The most recent operational CI of the grid published for 2023 was ~250 g CO2e/kWh. This only covers operational emissions from primary fuels and generation/transmission inefficiencies (losses). This CI includes renewable generation, so includes excess generation from PV systems that get exported to the grid, deemed or metered. These can therefore not be included as a personal offset because they have already been included in the grid's CI.

The total emissions, for example in 2019, were 316 g CO2e/kWh * 294TWh = ~92.9 Mt of GHG emissions.

How we choose to allocate these can be debated, but the actual emissions remain the same. So, if those who pay a 100% green tariff, from any supplier, calculate their emissions from grid electricity as zero, the rest of the consumers would need to be allocated a higher CI. This is of course not the case.

The only official and accurate method of allocating ghg emissions to electricity consumption is the annual CI published by the government. It would be impractical and unequitable to calculate anything other than the average UK electricity CI when working out what our emissions from grid electricity are. It may be possible to develop systems that calculate and allocate grid electricity CI on a more granular level, eventually on a half hourly (**HH**) basis, but these do not currently officially exist.

Nevertheless, it is possible to reduce our emissions from grid electricity by adjusting our usage to when the grid in our area is likely to have a lower CI. Please refer to section 3.4 for more information on this type of greenwash.


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License

## 3.3 Why bother buying 'green'?

Licensed electricity suppliers are required to publish the mix of fuels used in the electricity they sell. What is actually delivered to our meter, however, is the same for everyone in a region/area in terms of its Carbon Intensity.

There are two ways a supplier can claim a % of their sold electricity is low-Carbon (i.e. "green").

- The first is they generate it themselves or buy it direct from a low-Carbon generator via a Power Purchase Agreement (**PPA**).
- The second is to buy Renewable Energy Guarantee of Origin (**REGO**) certificates that represent renewable generation in the year electricity was sold. REGOs are traded in the market and have a value set by market forces (i.e. supply/demand).

Because there is usually an oversupply of renewables compared to those buying 'green' electricity, there is oversupply of REGOs in the market. The wholesale price of a REGO (1 MWh) is typically ~£1-£5, compared to the wholesale price of electricity (any source) of ~£75/MWh and a retail price of ~£250/MWh. This makes it easy for any supplier to simply buy these cheap REGOs and claim they are supplying 'green' electricity without any additional renewable plant being built/installed. They can keep their retail price low as the additional cost of the REGO is insignificant.

Some 100% 'green' energy providers, buy their REGOs from outside the UK (known as GoOs), these may not be as well regulated as in the UK and therefore potentially open to double accounting. Luckly this practice has now been outlawed.

Moreover, REGOs are issued on net generation rather than what is exported to the grid. Therefore, consumption of those REGOs behind the meter, i.e. on site, can be traded as if they are contributing to grid low-Carbon electricity. Although the number of such 'notional' REGOs is relatively small, it is another loophole exploited by suppliers of electricity when claiming a 'green' tariff.

To stimulate the growth of renewables in the current market, the demand must exceed supply. That is, we should encourage everyone to buy 100% 'green' energy from any supplier. The only other stimulus would be if regulations prioritised renewables over fossil fuels. Unfortunately, the opposite is often the case as is the practice of lower unit pricing for higher energy consumers. That is the market still offers lower unit prices the more we consume.

A good measure of a supplier's contribution to the amount of renewable energy available is the proportion of energy generated either directly from renewables or via a UK PPA with a renewable generator. Although an Ofgem requirement, not all suppliers publish their data in a timely manner. Anything 100% or more of self-generation or direct PPA is good.

Good Energy and Ecotricity have a long-standing commitment to buy their electricity direct from renewable sources through a PPA. Octopus Energy, on the other hand, supplies the vast majority of its 'green' electricity by purchasing REGOs, historically half of these from outside the UK (see latest Ofgem published list of Guarantee of Origine, note list of other electricity suppliers that use this). Although purchasing electricity through a PPA is not a guarantee to immediately build new renewable plant as the plant may already be in operation, it will result in additional renewable generation happening more quickly. Only when there is more demand than supply, and therefore more expensive REGOs, will other green suppliers be encouraged to source additional renewable generation.

Further information on REGO certificates explains some of the greenwash that still happens. Also see this novel solution from 2019.


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License

## 3.4 What about the Apps that tell me when the grid in my area is low-Carbon?

There are only a few of these Apps remaining, e.g GridCarbon and GridWatch to monitor UK real-time generation mix and resulting emissions. These are interesting tools to help you understand what is happening on the grid.

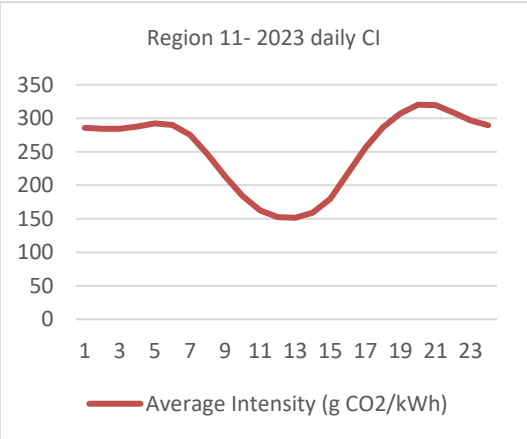
The message is to consume your electricity when the grid has low-GHG emissions. This can also be greenwash as the annual GHG emissions for the total network is not necessarily the same as for your region. Even if it were, the annual national CI is unlikely to decrease, see sections 3.2 and 3.3. In fact, the CI may even increase if a lot of people respond to this message by increasing their consumption at these times.

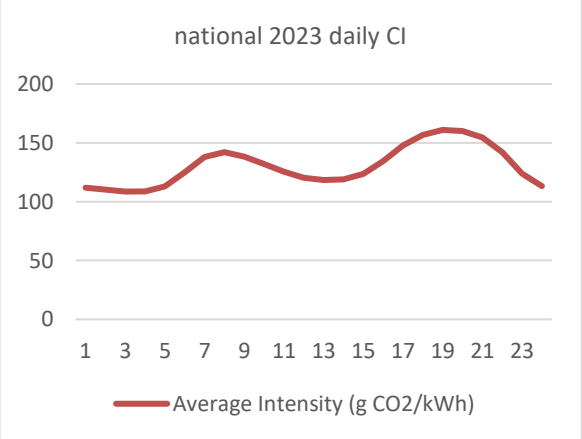
As discussed earlier, the complex structures/flows in the electricity network require operators to turn generation on/off. If there were a significant increase in consumption over a short period, the most likely response would be to turn on flexible Gas-powered generation nearby. Since it is unlikely that an operator can reliably turn on renewable generation during those periods, the most likely outcome is an increase in overall GHG emissions.

It seems reasonable to accept that Carbon Intensity at night tends to be low because the predominant supply comes from Nuclear and Wind. Similarly, there are periods during the day, mainly in the summer months, where the Carbon Intensity is also relatively low because of PV generation.

Unfortunately, this major loophole is widely used by those exploiting our desire to reduce emissions, greenwashing certain supply periods has become widespread. The electricity grid's CI varies hour by hour, but it's normally not measured at the sub-station we are connected to. It is only measured accurately at major nodes in the network. Electricity Info now provide easy access to regional CI, just enter your postcode. The regional CI is based on NESO's grid Carbon Intensities data, the 'official' source for all grid CI used in the UK.

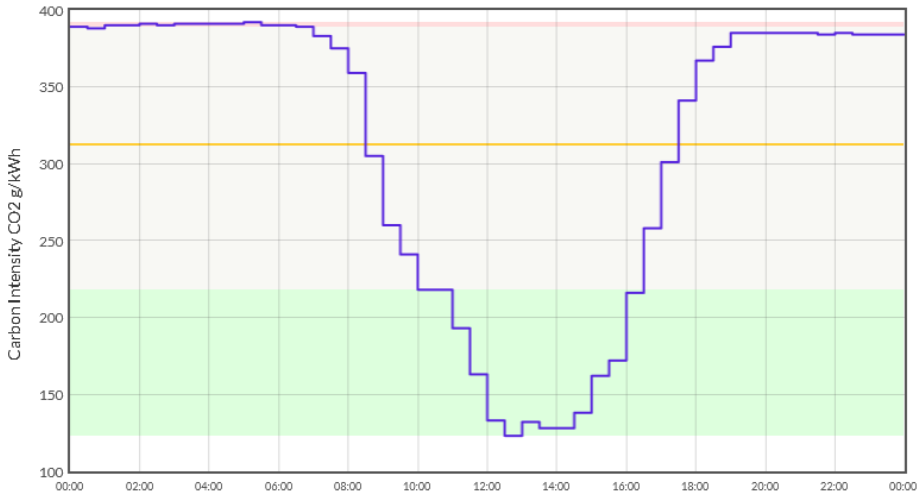
Although all apps and portals use the same source data, only the last two provide regional data. Because this is so different from the national picture used by many, especially those in our SouthWest region, we are being misled. The problem is that electricity suppliers ignore this and claim the national CI applies to our region. So when we think we are using low-Carbon during overnight low tariff periods , on average we're more than doubling our GHG emissions.





Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License




Above is an example daily SoutWest forecast from Oct 2026, note these do not represent the full GHG emissions associated with consuming this grid electricity.

There is already over 860MW of battery storage on the network, fulfilling specific functions such as frequency response. Only 0.1% of balancing services (to match supply and demand) are currently provided by batteries charged from low-Carbon sources, this is because technical and regulatory barriers still need to be overcome for this to be viable.

It remains the case, the only official/correct way to measure actual emissions is to use the annual Carbon Intensity for every unit of Energy we consume from the grid. Nevertheless, responding to these apps or prompts from suppliers to encourage demand shifting to off-peak times has its benefits. These are mainly financial (certainly for the supplier and sometimes for the consumer) but also help the electricity grid operators balance the network more easily. There may or may not be a Carbon reduction benefit, so it is essential to check this for your area.

The GHG emission argument is very different if you have your own renewable/battery technology. Here, balancing electricity generation/consumption is well worth doing, either manually or automatically. This is because the more on-site renewable energy consumed, the less you need to import from the grid. So, every low-carbon kWh generated/used on-site reduces your emissions by whatever the grid CI is at the time of use.

## 3.5 Should I invest in PV, Heat pumps and Electric Vehicle?

It is certainly worth considering but the easiest and cheapest way to cut GHG emissions is to reduce energy consumption. Whether you decide to invest in technology or change behaviour, it always makes sense to measure your actual consumption first.

Only when you know how much energy you are using, where and when, can you make an informed decision on how to reduce your emissions. You can start with the quick Carbon Footprint Calculator and move to the E-Pack to help you do this. ACT's My Electricity sessions are a tailored spinoff from the E-Pack.

It is easy to make the mistake of opting for a technology solution because it feels like the right thing to do. This can often be quite expensive for minimal or no reduction in GHG emissions. Remember Energy has to come from somewhere. Knowing how much you need and what its Carbon Intensity is, will be essential to make sure there is enough of the right type.


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License

# Section 4. Further information and references

As this is a complex subject, not everyone has the background/experience/time to delve into the various details and nuances. The following additional material is included for those with further questions. Please contact TECs' Dr Watt or Professor Joules for any other questions.

## 4.1 Embodied GHG emissions

The simplified assumption to largely ignore embodied GHG emissions is appropriate for comparative reasons. It is, however, misleading in terms of actual emissions. GHG emissions are of course the only thing that directly impacts Climate Change.

To avoid perpetuating greenwash here, we should account for embodied emissions. TECs has published a Carbon Footprint Calculator to help include all our GHG emissions, embodied and on-going. It is important to establish both because embodied emissions often make up half the total.

Although it is difficult to apportion all embodied emissions accurately, it is possible to assign these on the basis of our capital expenditure. The TECs Carbon Calculator does this on an individual basis for goods we buy (e.g. insulation, a PV system or an EV) and on a pro-rata basis for services (e.g. supply of electricity including new embodied emissions and operational emissions for the grid).

## 4.2 Criteria other than GHG emissions

Throughout, the focus has been on GHG emissions, real or greenwashed. As stated in the introduction, there are other criteria when making a choice on how we use and where we get our electricity. Cost is certainly relevant to those on a tight budget but so is the service we receive and wider social implications.

Some suppliers are running trials where things like charging electric cars are managed by the network. This could provide a means of the network signalling to the consumer. Taking part in suitably set up trials could lead to knowledge that improves the use of renewables in the grid.

It is therefore worth highlighting that there are several local/regional electricity service providers who may not offer 100% direct generation (via PPA or ownership) but offer other social and longer-term emission reduction benefits.

Community-owned Energy organisations are a case in point. As these are relatively new to the electricity market, we have not listed them in the earlier sections. We believe the mission of many of these organisations should be supported as they provide wider benefits to their communities than GHG emission reduction alone. Today, in Teignbridge, TECs is the organisation that meets these criteria. Others, operating in Devon, can be found here.

## 4.3 The impact of regulation and industry practices

Regulation remains the most effective way to incentivise low-Carbon electricity generation and consumption. If done, greenwash would no longer be used as the objective becomes a 'greener' grid. The lack of consistent regulation to meet the UK's commitment to stay below 1.5$^{O}$C needs to be highlighted at every opportunity. In 2016 TECs published its views on government policy in this area, unfortunately little has changed since.

The current government has made improved commitments to decarbonising transport and heating through electrification. Whether these can be realised in time is unclear. This makes it even more urgent that we all play our part by reducing GHG emissions we have direct control over, while we also lobby government to deliver appropriate regulation.


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License

The practices employed by major players, including Ofgem, in how electricity costs/payments are settled is complex. Regen, the industry representative for low-Carbon energy, has representatives involved with the bodies that discuss/regulate these matters. Please contact TECs if you'd like more information on this.

## 4.4 Future developments

Many of the constraints slowing the progress to decarbonising Energy can be solved with technology. However, there is a lack of political, institutional, and personal will to make the transition to a low Carbon economy at the pace necessary to avoid runaway Climate Change. This results in a lack of confidence by operators to invest in low-Carbon storage, or to implement greater Local Balancing.

As TECs members, we can all do our best to overcome the reluctance to change. We can start by understanding our own behaviour (TECs E-Pack) on Energy use. We can also support and lobby for this change through organisations such as ACT.


Copyright © Oct-26 Teign Energy Communities. All Right Reserved Creative Commons Attribution-NonCommercial 3.0 Unported License