

'GREEN' ELECTRICITY:

A USEFUL TOOL FOR BUSINESSES?



November 2018

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Many businesses are purchasing **Renewable Energy Guarantees of Origin** as part of their climate strategies so that they can claim that the electricity they use is 'green'.

This study will attempt to answer the following two questions:

What are the actual links between Guarantees of Origin and the development of renewable electricity in France and indeed in Europe?

How can businesses use the Guarantees of Origin and some other mechanisms in their carbon reduction strategies ?

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Many businesses are purchasing Renewable Energy Guarantees of Origin as part of their climate strategies so that they can claim that the electricity they use is 'green'.

In addition to financial support for renewable energies (which we will come back to later in this article), Guarantees of Origin allow these businesses, in practice, to reduce their Scope 2 emissions to 0 when using guaranteed 'green' electricity.

Guarantees of Origin therefore represent a very effective financial tool for businesses when it comes to reducing (a sometimes significant) part of their greenhouse gas emissions.

That said, should we be settling for this magic potion when it comes to a 'low-carbon regime'?

This study will attempt to answer the following two questions:

- What are the actual links between Guarantees of Origin and the development of renewable electricity in France and indeed in Europe?
- How can businesses use the Guarantees of Origin and some other mechanisms in their carbon reduction strategies ?

Guarantees of Origin therefore represent a very effective financial tool for businesses when it comes to reducing part of their greenhouse gas emissions.

1

KEY POINTS TO REMEMBER

- A Guarantee of Origin is an electronic certificate that guarantees that a MWh of renewable electricity has been injected into the power grid for every MWh of electricity drawn off (by the party purchasing the guarantee).
- Guarantees of Origin in France are currently issued mainly by old hydraulic stations, **with only 1% of the Guarantees of Origin issued in France in 2017 concerning facilities built after 2015** and virtually all Guarantees concerning old hydraulic facilities. This is notably due to **French legislation, which prevents public aid (such as feed-in tariffs) from being combined with Guarantees of Origin.**
- Carbone 4 would recommend the following where businesses are concerned:
 - producing a greenhouse gas (GHG) emission reduction strategy that is in keeping with the **location-based method***, meaning that such a strategy is not based solely on Guarantees of Origin (regardless of who is issuing the guarantees);
 - considering **other existing mechanisms** for supporting the **development** of new **renewable electricity** production capacities.

**Location-based: a method for calculating CO₂ emissions linked to electricity consumption using emission factors linked to the average electricity mix in the country in which the business is located.*

Market-based: a method for calculating CO₂ emissions linked to electricity consumption using emission factors linked to the supplier from which the business buys its electricity.

2

WHAT IS A GUARANTEE OF ORIGIN?

DEFINITION

A Guarantee of Origin is an electronic certificate that guarantees that a MWh of renewable electricity has been injected into the power grid for every MWh of electricity drawn off (by the party purchasing the guarantee).

These certificates are issued by the owners of renewable electricity production facilities (to equal their production) and are then transferred in return for payment to an electricity supplier who will, in turn, sell them on to the end-consumer - in this particular case, a business.

Those electricity production methods considered to be renewable and therefore covered by the Guarantee of Origin scheme include hydraulic, wind, biogas and biomass, solar, aerothermal*, geothermal, hydrothermal** and co-generation.

When you are drawing electricity from the grid, of course, it is impossible to know whether or not it is coming from a renewable source. In practice, an electrical grid is like a river that is fed by hundreds of streams simultaneously and then feeds into a single channel from which everyone takes their water. In such a case, it is not physically possible to claim that your water comes exclusively from a particular stream. Similarly, each source of electricity production feeds into the national or European grid, in accordance

with terms determined based on criteria other than CO₂ or any other environmental aspect (marginal price, available power, frequency regulation, physical location, etc.).

In this case, with the exception of self-consumption, **it is physically impossible for an end-consumer to 'sort through' the electrons and to claim that their power has physically come from one source rather than another.**

That said, an end-consumer (whether private individual or business) may wish to state that they try to favour a renewable source, in which case they would need some sort of mechanism that eventually links the consumer to the producer, and this is the concept behind the Guarantee of Origin, which can be issued for each MWh of electricity produced by a renewable electricity source by the producer who owns the source.

*Aerothermal: energy generated using heat drawn from the air.

**Hydrothermal: energy generated using heat drawn from a body of water.

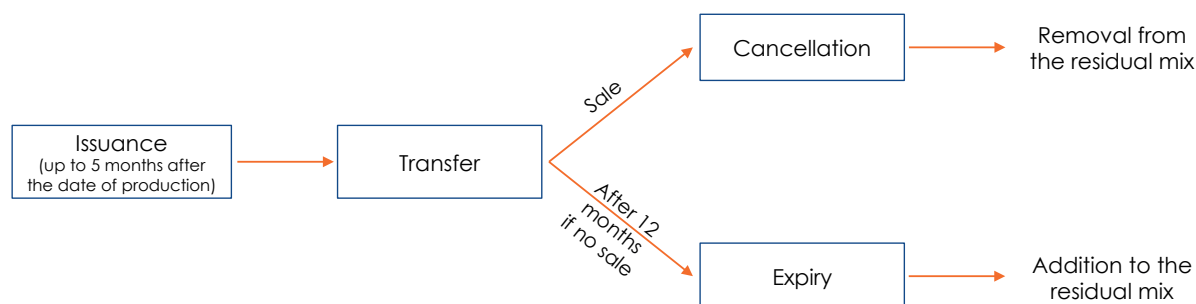
THE LIFE-CYCLE OF A GUARANTEE OF ORIGIN

A Guarantee of Origin is valid for 12 months after the corresponding electricity has been produced. The Guarantee of Origin is issued within 5 months of the electricity being produced and is then added to the national register, where it can be transferred to the relevant holder. The Guarantee of Origin is cancelled when it is sold.

If it is not sold within 12 months of being issued, the Guarantee expires and is then added to the residual mix.

If it is not sold within 12 months of being issued, the Guarantee expires.

The life-cycle of a Guarantee of Origin



The residual mix is the part of the electricity consumed that is not allocated to a particular consumer. Electricity used with a Guarantee of Origin is specifically allocated to its consumer, meaning that it cannot be considered part of the electricity in the residual mix, used by all other users who do not have any Guarantees of Origin.

GREEN ELECTRICITY SUPPLIERS

The majority of electricity suppliers are, in fact, distributors, who do not produce electricity from their own plants. When it comes to supplying 'green' electricity, they actually purchase Guarantees of Origin separately from 'green' electricity producers, on the one hand, and electricity at the best possible price from other 'general' producers, on the other hand, before contractually linking the Guarantees to the electricity to enable them

to sell 'green' electricity to their customers. End-consumers (both private individuals and businesses) are therefore purchasing electricity from the grid (which consists of all sources of production fed into it) and can claim that the equivalent of their consumption has been injected back into the grid (somewhere in France or Europe) in the form of renewable electricity. The link between the end-consumer and the renewable production source covered by the Guarantee of Origin is therefore contractual rather than physical.

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Enercoop, Énergie d' Ici and Ilek, however, are among those French 'green' electricity suppliers who purchase the electricity and Guarantees of Origin that they then sell on from the same (renewable) electricity

producer. In practice, these suppliers often purchase electricity at a price higher than the market price and make a long-term commitment, helping to guarantee a stable income for the producer.

THE COST OF A GUARANTEE OF ORIGIN

The cost of a Guarantee of Origin varies significantly according to demand, the wholesale electricity market price, the country in which it is produced, and both the type of production and how well-established it is. The cost of a Guarantee of Origin (= 1MWh) is estimated to be between €0.2 and €5 (in countries such as Switzerland or the Netherlands). That said, it is currently very difficult to verify this information¹. It would appear that the cheapest Guarantees are those relating to old hydraulic facilities.

The cost of a Guarantee of Origin (= 1MWh) is estimated to be between €0.2 and €5.

3

THE CURRENT SITUATION IN THE FRENCH AND EUROPEAN MARKET: WHAT TYPES OF RE DO THESE GUARANTEES OF ORIGIN COVER?

IN FRANCE

Powernext - the body responsible for Guarantees of Origin in France

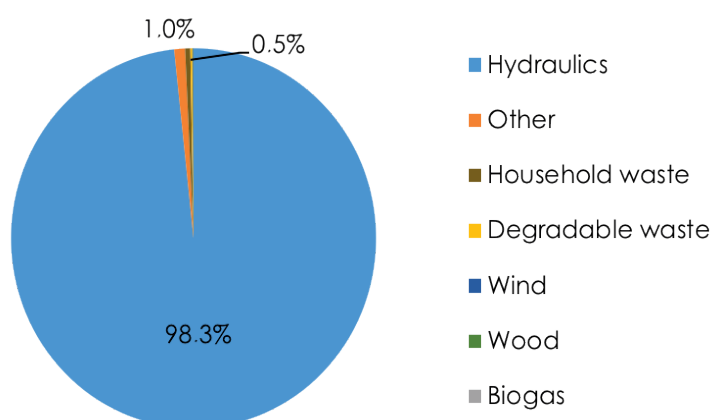
The Guarantee of Origin market is governed by an independent body that helps prevent fraud, notably by ensuring that a Guarantee is not sold twice.

Powernext has been responsible for managing the French national registry of Guarantees of Origin for electricity and the issuance thereof since May 2013.

Guarantees of Origin in France: to which renewable production methods do they apply?

According to Powernext, 35TWh of electricity was covered by Guarantees of Origin issued in France in 2017 (that is 7% of the country's net production and 40% of its net renewable production²). **Over 98% of these 35TWh was produced by hydraulic facilities.**

Distribution of Guarantees of Origin issued in France in 2017 by electricity source type (as a %)



More specifically, 65% of the Guarantees of Origin issued in France in 2017 related to electricity produced by hydraulic facilities built in the 1950s to 1970s. (see graph below).

Only 1% of Guarantees of Origin concern facilities built after 2015.

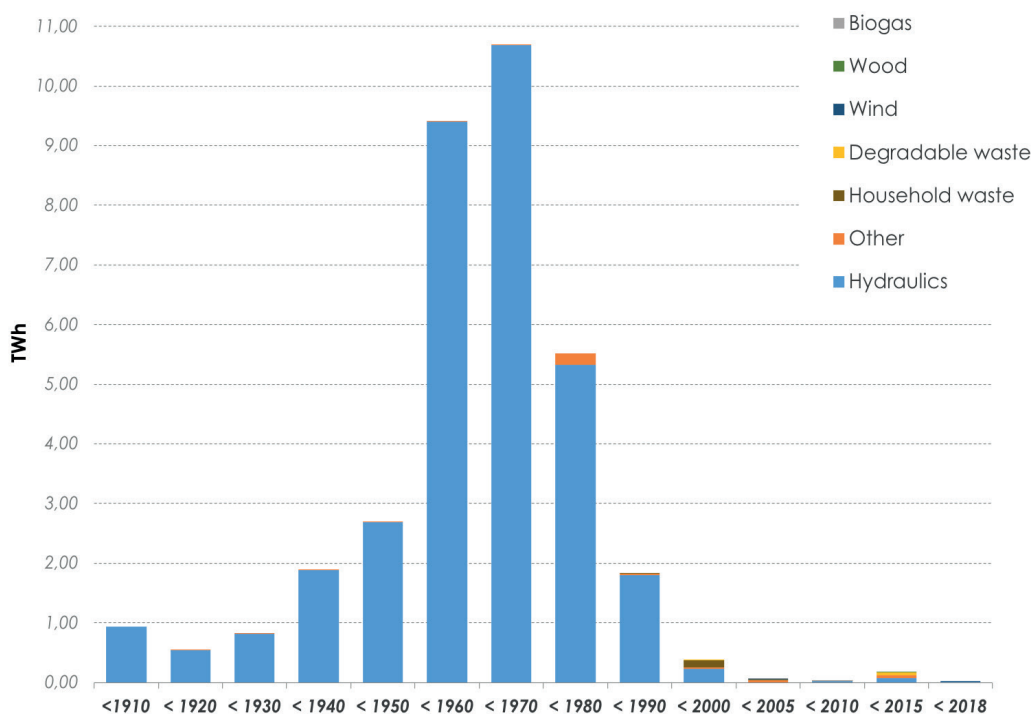
This is notably due to the fact that Article L.314-14 of the French Energy Code prohibits the issuing of Guarantees of Origin for producers benefiting from feed-in tariffs, additional remuneration or subsidised contracts. Since the costs of Guarantees of Origin are significantly lower per MWh than other forms of aid available, projects currently under development tend to focus more on public aid, which is why the Guarantees only benefit older facilities that have already paid for themselves.

An additional mechanism will be introduced in 2019 whereby Guarantees of Origin issued by producers in receipt of public aid will still be issued but will be auctioned to benefit the French State, which will help to fund public aid for electric renewables energies, just like the TICPE (a tax on electricity, natural gas, fuel oil and fuels).

With this in mind, it will soon be less unusual to find a Guarantee of Origin issued by a new facility.

Only 1% of Guarantees of Origin concern facilities built after 2015.

Distribution of Guarantees of Origin issued in France in 2017 by year in which the electricity source was built (in TWh)



Source: <https://www.powernext.com/registry-data>



In the case of France, a Guarantee of Origin (corresponding to 1MWh of electricity) currently fetches producers between €0.2 and €2 whereas the wholesale energy price in 2018 stood at around €60 per MWh³. Guarantees of Origin therefore account for a tiny part (less than 3%) of the revenue of renewable electricity producers. But they do help to estimate the willingness (however great or poor) on the part of businesses to pay a price supplement to allow them to state that they use renewable electricity. A saturated market indicates a high level of willingness, which could potentially encourage the development of new renewable production facilities.

The French Guarantee of Origin market is not currently saturated (although demand in France did increase by 30% between 2016 and 2017¹, leading to an increase in the cost of these Guarantees (although this is admittedly still very reasonable)). According to the AIB (Association of Issuing Bodies), only 50%⁴ of the Guarantees of Origin issued in France in 2017 were used by French suppliers, the rest having been exported (see below) or expired.

In financial terms, electric renewable energies are supported primarily by government subsidies in the form of feed-in tariffs and additional remuneration.

These subsidies come from a specially earmarked part of the State budget, which is itself funded almost entirely by domestic consumption tax on energy products (TICPE)^{5 and 6}.

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IN EUROPE

The AIB - the association responsible for Guarantees of Origin in Europe

Guarantees of Origin issued in Europe are standardised and can be sold by one country to another.

Each European country has its own organisation that ensures that the Guarantee of Origin system works as it should (e.g. Powernext in France, GSE in Italy, HROTE in Croatia, etc.), and the whole scheme is governed at European level by the AIB

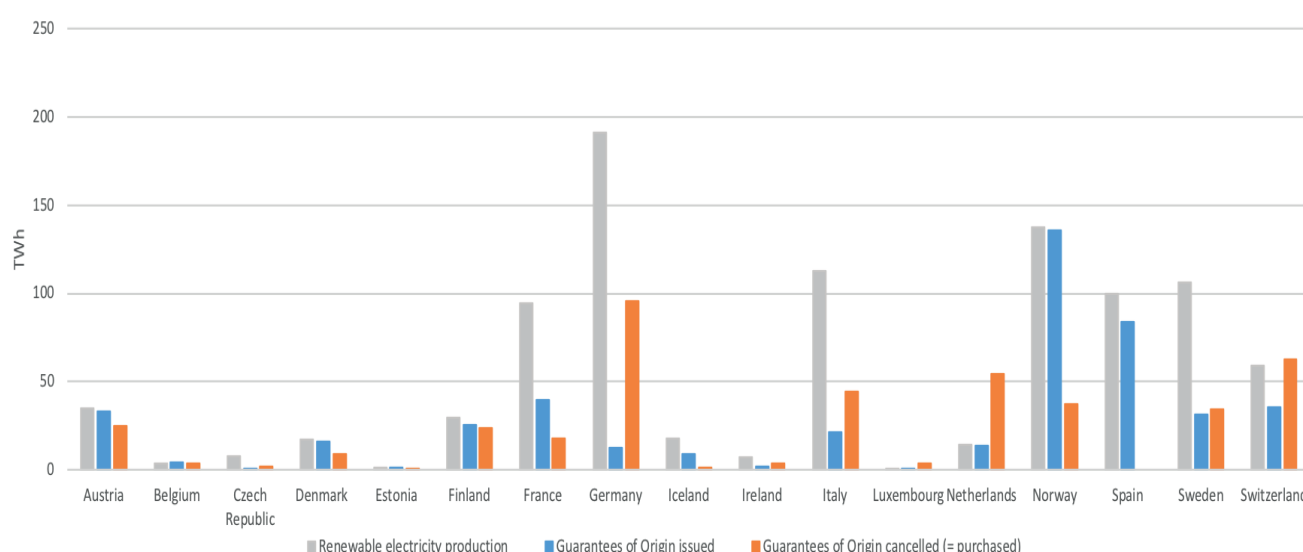
(Association of Issuing Bodies), which unites all of the entities responsible for the scheme in the various European countries and currently has 20 member countries.

Funding sources of renewable electricity production via Guarantees of Origin in Europe

Within Europe, the Guarantee of Origin market varies enormously from one country to another, and whilst the use of such Guarantees has become very widespread in

some countries, others (such as Ireland, the Czech Republic, etc.) use them rarely. This is notably due to legislation and levels of market maturity that vary greatly from one country to another.

Graph showing the issuance and use of Guarantees of Origin by country and their renewable energy production levels (in TWh):



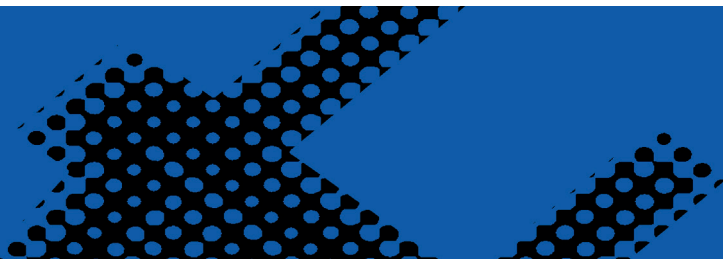
Source: AIB Annual Report (2016)⁴

The Netherlands was one of the first countries to adopt the Guarantee of Origin system. According to the AIB, Guarantees of Origin are now issued for over 90%⁴ of its renewable energy production and the cost of a Guarantee there is believed to be €5 per MWh¹. According to the Grexel report, around 40% of the country's electricity consumption is covered by a Guarantee of Origin certificate, whereas only around 16% of the country's electricity production is renewable. The Netherlands is therefore one of the European Union's largest importers of Guarantees.

Indications show that Europe's main issuers of Guarantees of Origin are primarily those that produce electricity by hydraulic means (Norway, Switzerland, Sweden and the

Nordic countries), but as an exception to this rule, Spain, where the wind energy sector has developed significantly, has also put itself on the map.

Some countries, such as France (*cf.* previous section), Germany, Ireland and Italy, exercise their right to ban a producer from issuing a Guarantee of Origin if they are in receipt of public aid (public funding, feed-in tariff, etc.) (Directive n°2009/28/EC of 23rd April 2009⁸). The only facilities that can then benefit from Guarantees of Origin are hydraulic production sites and solar and wind production facilities that have reached the end of their public funding period. As stated above, the value of public aid (several tens of euros per MWh) is much higher than the sale value of the



certificate, and producers naturally choose the system that will make them the most money. These countries are then issuing fewer Guarantees than the corresponding amount of renewable electricity they are producing and may need to import Guarantees from countries such as Norway in order to meet buyer demand.

It is important to remember that Guarantees of Origin are now something of a financial bonus where renewable electricity producers, who are already making a profit and selling their electricity at the wholesale price, are concerned.

Although the Guarantee of Origin market is not currently saturated (according to the AIB⁴, 10% of the Guarantees issued in Europe in 2016 expired before they were sold), it is rapidly expanding (6.3% more Guarantees issued annually between 2013 and 2016, according to the Grexel report⁷) and constantly changing, with Spain, for example, also recently joining the scheme.

4

WHAT ROLE DO GUARANTEES OF ORIGIN PLAY IN STRATEGIES FOR REDUCING GHG EMISSIONS?

Many businesses are now purchasing Guarantees of Origin as part of their climate strategies, but what impact does this have on their declared greenhouse gas emissions, and their Scope 2 in particular? Can this system be used with the aim of effectively reducing greenhouse gas emissions?

WHAT DO THE REGULATIONS SAY?

REMINDER: Greenhouse gas emissions linked to a business's electricity consumption (which is covered by Scope 2 where combustion is concerned and Scope 3 upstream (construction of facilities, transport, etc.)) are assessed using two different reporting methods explained by the GHG Protocol:

- **Location-based:** Using the country's average emission factor.
- **Market-based:** Using the emission factor of the supplier the electricity is being purchased from.

With the market-based method, when a business purchases Guarantees of Origins, it can declare **zero** combustion emissions for the part of the electricity covered by the Guarantees.*

With the location-based method, however, the purchasing of Guarantees of Origin does not affect the calculation, which is still made using the average emission factor of the country in which the electricity is used. With this method, only a reduction in electricity consumption or a reduction in the country's overall emission factor (via the development of RE or nuclear energy to the detriment of fossil energy, or switching from coal to gas) leads to a reduction in this item.

In both cases, the business can still enter emissions generated 'upstream' of production and emissions linked to the construction and maintenance of electricity sources in its Scope 3 submission, as suggested on p.33 of the ISO 14069 technical report.

**With regard to Guarantees concerning the production of electricity from biomass, the GHG Protocol nevertheless advises including the associated methane (CH₄) and nitrous oxide (N₂O) emissions in the Scope 2 submission.*

WHAT IS THE BEST APPROACH TO TAKE?

The abovementioned conventions naturally involve a great temptation for a business to 'eliminate' all of the emissions declared in its Scope 2 submission (for electricity). This can be achieved simply by purchasing Guarantees of Origin whilst at the same time using the market-based method, without affecting electricity consumption in any way. In France, where the mix involves little in the way of carbon, businesses do not have a huge amount to gain in terms of reducing their Scope 2 footprints, but applying this strategy across all locations within countries with primarily fossil electricity significantly reduces the overall carbon footprint without any efforts to effectively reduce emissions.

It is, of course, important to point out that such a strategy does not now help to change the overall electricity system, since the money from certificates primarily fuels existing facilities and even those that have already paid for themselves.

Such a strategy does not now help to change the overall electricity system.

What is the best approach to take?

Reducing the demand for energy through energy efficiency and sobriety is one of the central factors in achieving the objectives of the Paris Agreement and the 2°C trajectory,

which is why the market-based method alone could not form the basis of a reliable climate performance strategy.

Reducing the demand for energy through energy efficiency and sobriety is one of the central factors in achieving the objectives of the Paris Agreement and the 2°C trajectory.

Furthermore, Guarantees of Origin have certain limitations: **purchasing a Guarantee of Origin does not guarantee that the corresponding amount of renewable electricity will be produced at the same time that the business is actually using the electricity.** In physical terms, if the business is using energy at a time when there is not sufficient renewable and nuclear electricity to meet demand, the electricity will be produced using fossil production methods, even though the business has purchased Guarantees of Origin. The market-based vision of the carbon balance masks the use of fossil energy sources on which the business continues to depend, which is why the location-based vision would appear to more accurately represent the business's actual dependence on greenhouse gas emissions.

5

CONCLUSION

Nowadays, both in France and elsewhere in Europe, Guarantees of Origin guarantee neither the development of new sources of renewable electricity nor any actual reduction in a business's CO₂ emissions.

There are other things that a business can do if it wishes to actively contribute to the development of renewable electrical energy (even though, in France, this is not necessarily an indication of a reduction in CO₂ emissions). The IKEA group, for example, has started producing its own renewable electricity in order to meet its own needs and actively contribute to the development of electric renewables energies, whilst Google has chosen to introduce PPAs (Power Purchase Agreements) when it comes to obtaining renewable electricity by means of a direct long-term contract with a producer, at a rate that is beneficial to the producer and allows them to develop their activity¹⁰. Google is even attempting to take things further by taking account of the times at which the electricity is actually used and the times at which the corresponding renewable electricity is produced.

(For further information on what measures can be taken, see the CDP, RE100 and Climate

Group report⁹)(For information on Google's policy for supplying its sites with renewable electricity 24/7 see the Google report¹⁰)

If CO₂ emissions are actually to be reduced, it is important to reduce the business's consumption and improve its energy efficiency, particularly in countries where carbon features in the electricity mix. **It is also important then to calculate emissions using the location-based framework in order to obtain a more accurate representation of the emissions on which the business and its activity depend.**

SOURCES

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² <https://www.powernext.com/fr/le-mix-national>

³ Interview with energy experts

⁴ <https://lc.cx/Q962>

⁵ <https://www.energystream-wavestone.com/2016/01/financement-energies-renouvelables-montages-mutation/>

⁶ <https://www.hellowatt.fr/blog/consommer-de-lenergie-renouvelable-electricite-verte/>

⁷ Development of the Guarantees of Origin Market, Grexel

⁸ <https://eur-lex.europa.eu/legal-content/FR/TXT/?uri=CELEX:32009L0028>

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To compare the different suppliers by source of electricity production: https://www.lemonde.fr/energies/article/2018/09/28/greenpeace-devoile-son-classement-des-fournisseurs-d-electricite-verte_5361424_1653054.html



Founded in 2007 by Alain Grandjean and Jean-Marc Jancovici, who were joined by senior business manager Laurent Morel in 2017, Carbone 4 is an independent consultancy firm and leader in climate strategy, the energy transition and climate change.

Our team assists businesses in their transition to a low-carbon and climate resilient economy.

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