

## **How To Actually Make The Energy Grid Green**

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How do we make the energy grid green? That is one of the most pressing questions that humanity will have to face in the following years and it is a question of which we have seen polarized arguments spring up again and again. One on hand you have the environmental evangelists who refuse to hear criticisms towards the renewable agenda and on the other you have climate deniers who ignore the need to transition off of fossil fuels. So who's actually right? As climate change worsens, the debates and stakes will only get more intense so what is the correct course of action?

While it is possible to have a completely green energy grid based on renewables, there are a few issues. One concern often voiced by the deniers is intermittency which is the idea that because the sun is not always shining and the wind not always blowing, if we were to transition to renewables we would not have a constant supply of energy. While this is true in isolation, it begins to crumble once we bring it into context. The storage of renewable energy is a huge area of research and many solutions have already been found. However, it is still not cheap enough to generate 100% of our power at competitive prices just yet though with further investment it could be (Roberts).

So if we do not yet have the technology to get to 100% renewable energy and won't for at least a decade, is there no way to get to net-zero any sooner? Well, one way to attain net-zero is to simply reduce our expectations. Instead of aiming for 100%, a target like 60-65% would be more attainable taking into account intermittency, current storage capabilities and current investments (United Nations). Once we make this our expectation, we can fill in the gap with energy sources like biomass and nuclear, not necessarily emissions-free but net-neutral anyway.

Biomass power is a rapidly growing industry. At first it started with ethanol but over time has evolved into fuel made from perennial flowers and even algae. Creating biofuel is simply putting biomass through a process in which the stored energy is released, this can be done by burning. Burning wood for example is a form of using biomass energy (Shah et al.). Now, it is a fact that the burning of wood and other biofuels does emit greenhouse gasses but when we replenish the plants used in the fuel the carbon is then absorbed once again. This is done at a macro level with perennial plants and algae which only take a few seasons or even one season to grow. The production of biofuel also creates natural fertilizers and carbon capturing materials such as biochar (USDA) which is another positive leading many to believe that biomass power can serve as a sort of bridge to a completely renewable future.

A somewhat unpopular solution to fix the problems with renewables is nuclear energy, but it does have some issues of its own. Disasters like Chernobyl (Martin) and Fukushima (Acton and Hibbs) are pointed out by the environmental evangelists for reasons why nuclear power is not safe, but these were one off occurrences that happened due to occurrences not necessarily related to the generation of nuclear power. Another issue with nuclear energy is the

radioactive waste that is produced after the fission of atoms occurs which is a problem that is already being solved through storing the waste in a bunker underground. Obviously, creating bunkers where we throw waste is not the most sustainable option but through the use of materials like thorium which create more energy and produce less waste with a shorter lifespan we can drastically increase the sustainability of nuclear power to use as a way to combat the intermittency problem before storage techniques become up to date (Ting).

So how do we make the energy grid green? Well, the points above all point to one course of action. Continue investment in renewables, especially the storage and transportation technology while also using biomass and nuclear as tools to drive down the price of clean energy in the short term and make net-zero achievable and realistic. However, it is not actually that simple. While the solutions and course of action are easy to think about, they mean nothing if we do not implement them and the way these things are executed is mainly through political action and innovation. Political action includes subsidies and incentives to go green or invest in green technology which leads to innovation of certain technologies. The way *you* can help is by doing your best to make renewable energy and climate change a top priority in who you vote for. You can also look at things that can be improved and point them out or improve them yourself. At the end of the day, humanity as a whole needs to work together to come to a consensus around the facts and act on them so that this planet has a future.

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