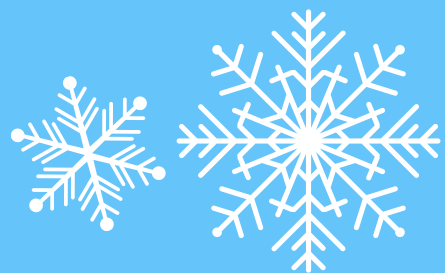




Winter Newsletter

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RECENT DEVELOPMENTS: HURRICANE IAN

By: Johnny Kuehnis, Alina Huang, Nathan Bao

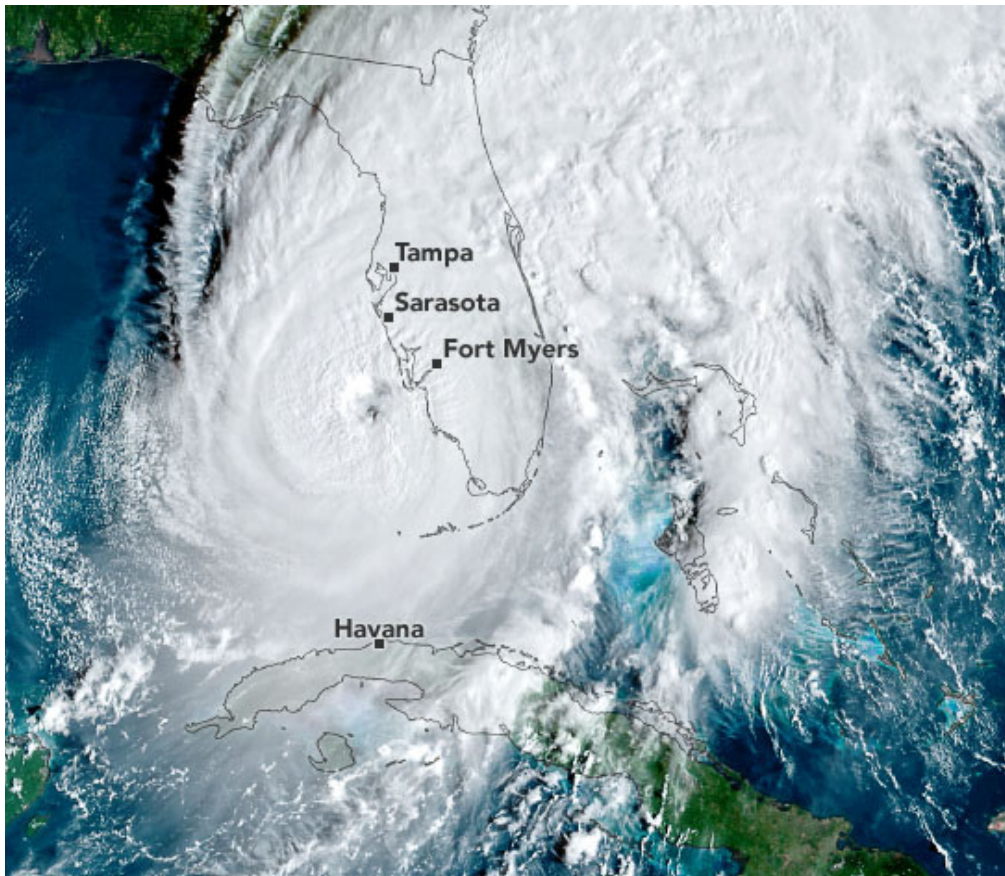
First, it's important to get a general idea of what a hurricane is and how they work. Essentially, they're large storms that spin around a center. Although they form over warm ocean waters, they can sometimes move toward land, and that's when they start to become really deadly. Huge ocean water walls, or storm surges, combine with heavy rains to cause severe flooding and high-speed winds (74-157 mph) that can lead to high levels of damage. [1]

Climate change has also been a major factor in the increase in massive storms. Even beyond the most recent hurricane, Hurricane Ian, all hurricanes that form in the Atlantic are much more likely to gain power quickly in recent years. For example, Hurricane Ida gained massive strength just before hitting Louisiana, and the same happened with Hurricane Harvey and Irma in 2017 as well as Hurricane Michael in 2018 and Hurricane Laura in 2020. [2] The extra heat has been warming the ocean's surface temperature to up to 85 degrees Fahrenheit in the Gulf of Mexico, adding extra fuel for all storms forming in the region. Furthermore, the warmer atmosphere's ability to hold more moisture has increased the catastrophic flooding and rainfall in said storms. [3]

The most recent major hurricane in the USA, Hurricane Ian, swept from Cuba to Tampa, Florida, and then to South Carolina, causing multiple casualties, deaths, and losses, especially in Florida. This Category 4 storm led to more than 20 inches of rain in Florida, and later caused landfall in South Carolina as a Category 1 hurricane. [4]



Source: Joe Raedle/Getty Images, WIRED



Source: NASA Earth Observatory

Evidently, a hurricane of this magnitude caused some pretty severe impacts. More than 100 people were killed by the storm in Florida only, many of whom were older than 60; the highest number of deaths was in Lee County, and many had died by drowning due to excessive rain and storms. Additionally, there were 2.5 million evacuation orders, and there was over \$60 billion lost in damages, mostly from wind damage. [4] This would overall make Hurricane Ian the second most costly hurricane in the state, with Hurricane Katrina being first. In addition to just economic impacts, this hurricane has also caused more longer-term environmental impacts, such as the pollution of Florida's waterways, which may remain polluted for a long period of time due to the large amount of untreated wastewater. [5]

So what's been done since the end of the hurricane's destruction to help those affected? For one, the IRS has announced tax relief for all victims of Hurricane Ian's wrath, as well as a tax extension to February 15th, 2023. [6] Florida has received more than \$1.6 billion in disaster relief, with people receiving compensation for hotel and motel costs as a result of fleeing the hurricane from FEMA. In addition, the opening of five Disaster Recovery Centers will "provide a one-stop shop for individuals or businesses that need help recovering from the storm." (The State of Florida) [7]

We recognize that it's been a while since Hurricane Ian was causing major headlines, but more can always be done to help aid in relief efforts for the hurricane and other natural disasters around the globe. Organizations like Red Cross, Salvation Army, and World Central Kitchen are all very well-known groups that help those in need. Donating to or even just spreading the word would be an excellent way to help support those who have been affected by natural disasters or just hard times in general.



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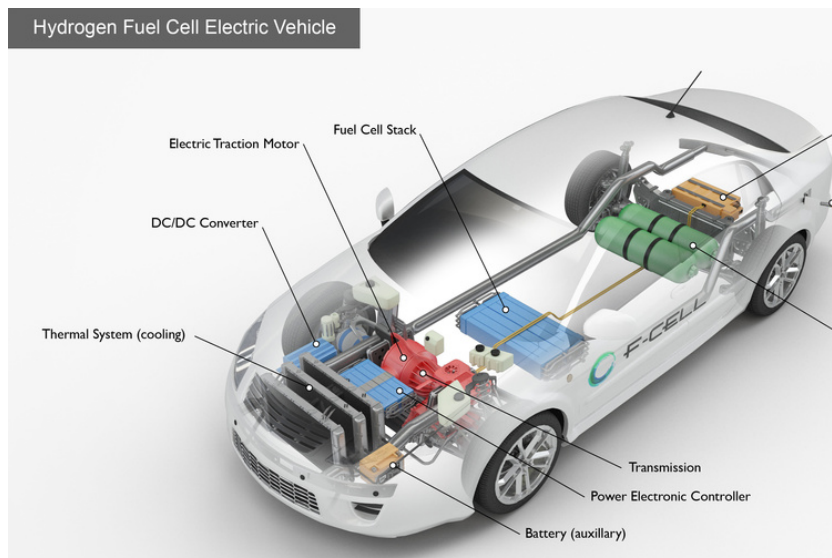
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Hydrogen Fuel Cells

By: Winston Li, William Chen, and Bill Huang

Hydrogen fuel cells utilize chemical energy sourced from hydrogen in order to efficiently produce electricity within a fuel cell and are considered an alternate fuel by the Energy Policy Act of 1992. At the time of writing, there are two widely utilized methods of procuring the element industrially. Steam reforming—a method that combines high-temperature steam and natural gas to extract hydrogen—accounts for the majority of the hydrogen produced in the United States. The process of electrolysis is an alternative method that can utilize renewable energy to prevent emissions despite being more energy intensive. Currently, major development and resources are being invested into this industry in order to help replace our current fossil fuel reliance with green energy [1].



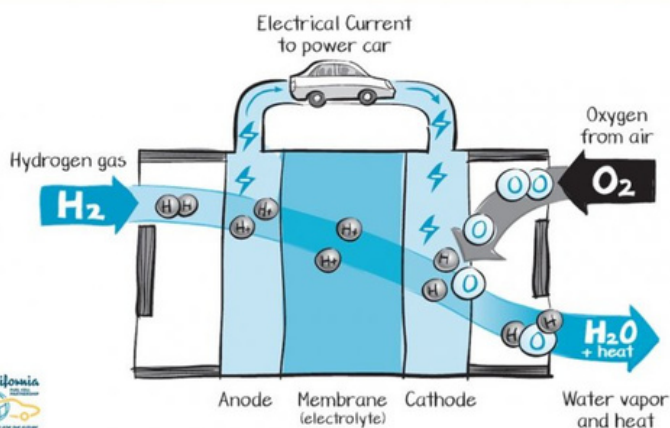
Source: Alternative Fuels Data Center

A primary use of Hydrogen Fuel Cells is in vehicles, according to the U.S. Energy Information Administration [2]. The reason why many are so interested in the use of hydrogen as an alternative transportation fuel stems from its ability to power cars with no net emissions. As an added bonus, hydrogen fuel cells have high efficiency and give a good amount of miles per gallon. However, hydrogen fuel cells are extremely expensive which have caused there to be limited availability. Another reason why hydrogen fuel cells are not as practical as one may think is because hydrogen refueling stations are hard to construct and are not easily accessible. In the United States, there are only 48 hydrogen refueling stations—on average, that is less than one per state! Hopefully, in the near future hydrogen fuel cells will become cheaper allowing them to be more practical.

What is a fuel cell?

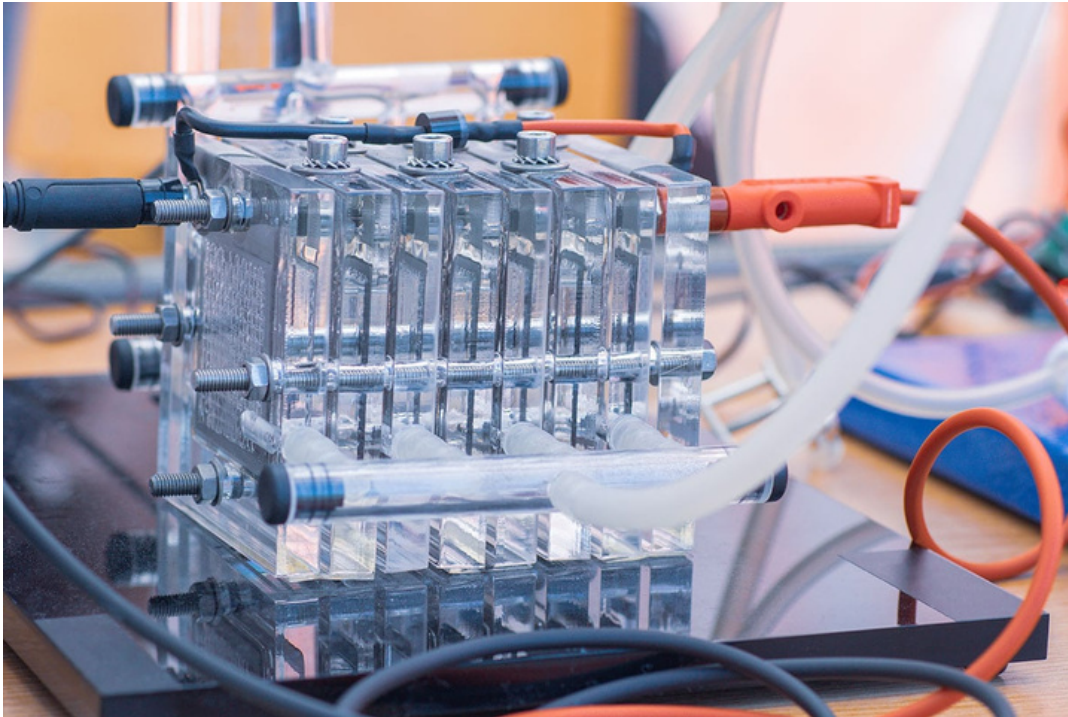


Takes hydrogen in and puts electricity and water vapor out



Source: Fuel Cells Technology Office

Currently, hydrogen is a valuable clean energy source being used, with 2.2 pounds of hydrogen producing roughly the same amount of energy as 6.2 pounds of gasoline [1]. This type of fuel has many merits that are quite attractive compared to other fuel sources. Unlike oil and other fossil fuels, hydrogen fuel cells generate energy with little to no harmful gas, allowing for clean generation of energy without carbon dioxide byproducts [3]. Additionally, as mentioned previously, hydrogen fuel holds “larger amounts of energy per unit volume than other large-scale energy storage options being considered” while also demonstrating reliability through “day/night and seasonal variations” [4].



Source: Elmelin Marketing

However, Hydrogen has a lot of issues such as being unsafe or expensive. First, there are a lot of concerns. Hydrogen Cells are highly flammable, potentially causing dangerous explosions and fires without proper handling or care; additionally, hydrogen is odorless and colorless, making detection of leaks difficult [5]. The cost of hydrogen cells is incredibly high which is partly caused by the difficult extraction. The raw materials required also contribute to the high cost, as the catalysts are expensive. It is also difficult to store the hydrogen fuel cells. Currently, the fossil fuel market already has a strong framework which took a large amount of effort and time to build, making the switch to hydrogen fuel quite difficult.

Despite these flaws, hydrogen is growing as a clean alternative in research and industry. According to Huyen N. Dinh of the National Renewable Energy Laboratory, the age of hydrogen fuel is coming in the near future, bringing along environmental and economic benefits [6]. Currently, the DOE plans to funnel 9.5 billion dollars into hydrogen fuel development, aiming to lower the expensive costs of \$5 per kilo down to only \$1. Hopefully, sooner than later, we will be able to see this development of the technology translate into tangible effects that will influence our environment and society.



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The U.K. and Climate

By: Jason Lin and Kevin Yang



Source: Committee on Climate Change

With the political changes occurring in the U.K. recently, more focus should be placed on the climate policies and goals of the European country. Passed in 2008, the Climate Change Act serves as a crucial guideline for how the U.K. plans to tackle the pressing issue of climate change over the decades [1]. Through this act, a path has been paved for the U.K. government in working towards reducing climate emissions in addition to the Committee on Climate Change being set up.

Since then, the nation has taken various different measures regarding the climate. In 2015, the ambitious global Paris Agreement was signed by 196 parties, including the U.K. In 2020, the U.K. stopped support for overseas coal and recently in 2021, support for overseas fossil fuels in general screeched to a halt [2]. While these actions are monumental for the environmental community, the U.K. has more plans all working towards net zero by 2050.

With the Queen of England's death on September 8, 2022, King Charles' succession into power has signaled the transition of the UK into a new era. With regards to environmentalism, King Charles's historical environmental views are complex: He is both an environmentalist who champions preservation, and a traditionalist who recognizes the importance of fossil fuels for UK industry [3]. Ultimately, he represents a man of considerable wealth and a significant carbon footprint speaking out against global warming [4].

As a Prince, Charles wielded little political power however had publicity equivalent to a president's bully pulpit. As a result much of his rhetoric on Climate Change was behavioral, representing a model for the average UK citizen's climate action. The Washington Post reports, a house he purchased in Scotland has been turned into a kind of environmentalist classroom, where children learn about soil health. His country home boasts an organic farm that Charles started in 1985. And in a head-spinning detail that has been repeated in the news media many times, Charles has apparently retrofitted his Aston Martin to run on leftover wine and cheese [5].

Yet despite his eco-friendly lifestyle, King Charles represents a group with the highest carbon footprint and considerable environmental impact. The richest people in the world, including the royal family, live in ways difficult to square with a rapidly warming planet. According to one study, the wealthiest 1 percent of the world's population produce double the carbon emissions of the poorest 50 percent [6].

Based on this assessment, as well as the pressure of becoming King, King Charles will likely not be a savior for the UK's climate policy. However for the conservative nation, he may provide an essential voice for climate change reduction and environmentalism.



Source: Anadolu Agency, Getty Images

King Charles refused to attend the COP27 meeting by world leaders as an overseas trip as sovereign, having sought government advice about the summit. The administration of Lis Truss warned against such action [7].

"King Charles is the most experienced and best climate diplomat the UK has ... To pull him out of the COP27 summit can only undermine its chances of success." said Ed Matthew, campaigns director of think-tank E3G [7].

King Charles has already encouraged private-sector investment in climate action, and for the value of nature to be internalized into company spreadsheets. However, caught between the formalities of the King and his mother's legacy of political absence, there seems to be little the King is able to do to break with tradition.

Nevertheless, England remains a leader within climate action on the world stage despite its conservative track record. Remarkably, the new prime minister of England, Rishi Sunak stated he will be attending COP27 and working towards climate reduction.



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