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Renewable Sources Vs Fossil Fuels

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ABSTRACT: Simply put, green energy comes from natural sources and is sustainably sourced (meaning there will be less negative impacts on the earth and won't run out), whereas fossil fuels can take millions of years to replenish and cause significant damage to our environment.

I. INTRODUCTION

At Hive we are on a mission to save the planet. Our belief is that renewable energy is the future, and we are investing in green energy projects across the globe. While we are fighting for the adoption of renewable energy, fossil fuel is still being utilised around the world.

DIFFERENCE BETWEEN GREEN ENERGY AND FOSSIL FUEL

Simply put, green energy comes from natural sources and is sustainably sourced (meaning there will be less negative impacts on the earth and won't run out), whereas fossil fuels can take millions of years to replenish and cause significant damage to our environment. Renewable energy can be solar, wind, hydro, geothermal, or biomass. On the other hand, fossil fuels can be natural gas, coal, and oil.

Fossil fuels also emit CO2 when burned, contributing to greenhouse gasses and ultimately climate change. This is where lines can blur between energy sources. Burning of natural materials, such as wood for biomass generation, can emit more CO2 than fossil fuels. So, while biomass is considered a renewable energy source, the process isn't always green.[1,2,3]

EMPLOYMENT

The fossil fuel industry is fortunately shrinking, but there are still a significant percentage of the population relying on it. Green energy jobs are expected to grow astronomically over the coming decades, but there are currently over 12 million people working in the fossil fuel sector. Jobs in fossil fuel are expected to fall, with oil, gas, and coal extraction being the most impacted areas in coming years.

On the other side, jobs in the renewables market are rapidly increasing. The industry is open to a huge variety of new roles and opportunities. Since jobs in coal and oil are decreasing so quickly, the equivalent roles in green energy are prosperous.

CONSUMPTION

Renewable energy is being used more frequently but there is still massive demand for fossil fuel. While green energy is growing significantly in line with global requirements for change, the global usage of green energy is still less than 40%. Around 10% of the worlds power originated from wind and solar sources in 2021, with a further 28% originating from alternative clean sources.

The good news is that renewable energy demand is growing quicker than fossil fuels! Specific technologies vary around the world according to the location and the most appropriate energy source.



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Solar PV is consistently the most common and adopted form of green energy generation around the world, followed by wind, and Bio Energy. However, despite solar being so highly adopted, wind power has interestingly had the most growth over recent years.

PRICE

It may be surprising to learn that renewables often cost less than fossil fuels. In the past decade costs of green energy have dropped significantly. Solar power alone is estimated to have dropped in price by over 80% in the past ten years, with wind dropping between 30 and 40%, depending on whether it is generated onshore or offshore. In line with the falling prices, experts predict that the cost of renewable energy will continue to drop in coming years, making renewables not only better for the environment, but also more affordable than fossil fuels.[4,5,6]

II. DISCUSSION

If you're like 77% of Americans, you may think that it's more important to develop infrastructure for renewable energy, rather than continue to find and extract fossil fuels. However, just because you know we need to develop alternative energy sources, you may not understand fully why, or which types will be the most sustainable.

Today, we're going to look at the differences between renewable energy sources and fossil fuels, why most people believe in a future fueled by renewable energy, and what that will actually mean for the world we live in.

Are renewable resources more expensive than fossil fuels?

Although renewable resources are initially expensive to install, renewable energy is generally cheap to use. Sources like solar and wind can produce energy "for free" for the duration of the panel or turbine's life. Fossil fuels build up constant costs because they have to be found, extracted, and transported to power plants to be used.

In fact, after construction, many solar energy projects can generate power at about half the cost of fossil fuels, and this is projected to get cheaper in the future as solar power becomes more common.

Cost of Renewable Energy vs Fossil Fuels

As we will outline below, government subsidies play a major part in how renewable energy sources will begin to grow, but let's look at the cost of renewable energy vs fossil fuels without subsidies first to get a real idea of the cost difference.

Based on global energy prices, coal prices have averaged around \$0.06 cents per kilowatt-hour (kWh), steam from fossil fuel prices have averaged around \$0.05 cents/kWh, and small-scale natural gas prices have dropped as low as \$0.03 cents/kWh, and until the last 10 years, renewable energy prices didn't come anywhere near as low as this.

This is why it came as such a surprise when, in 2016, a major commercial solar farm offered a particularly low price for photovoltaic energy at \$0.029 cents/kWh. This leveled out the cost between renewable energy and fossil fuels, so this can no longer be an excuse for why fossil fuels are still being used so widely.[7,8,9]

Fossil Fuel vs Renewable Energy Subsidies in the US

One of the reasons that renewable energy is now so affordable in the United States is due to the energy subsidies set out by the Government. They offer these subsidies to consumers and businesses to encourage them to use more sustainable power sources in the fight against climate change.

Renewable energy subsidies are financial incentives that reduce the cost of using renewable energy sources in the hope that more industries, and energy consumers in general, will make the switch from fossil fuels to alternative energies.

Although initial installation costs are relatively high, as the subsidies come in the form of tax breaks or as direct payments, the Government is effectively paying for these initial costs so switching to the use of renewable energy sources will be cheaper in the long run.



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In terms of better for the planet, most definitely. Renewable energy sources are much cleaner than fossil fuels and, in some cases, like solar and wind power, they are totally clean sources of energy.

When burnt, fossil fuels emit huge concentrations of CO_2 into the atmosphere – the main cause of global warming – causing often irreversible damage to the environment, wildlife, and humans.[10]

As well as this, fossil fuels are depleting at a steady rate and so it is estimated that in about 200 years fossil fuels will cease to exist. Renewable energy, on the other hand, comes from natural, unlimited sources, such as the sun, wind, and water, and can all be harnessed in a way that is almost completely harmless to the environment.

Renewable energy is the step we must take toward a happier, sustained planet.

III. RESULTS

Energy is at the heart of the climate challenge – and key to the solution.

A large chunk of the greenhouse gases that blanket the Earth and trap the sun's heat are generated through energy production, by burning fossil fuels to generate electricity and heat.

Fossil fuels, such as coal, oil and gas, are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions.

The science is clear: to avoid the worst impacts of climate change, emissions need to be reduced by almost half by 2030 and reach net-zero by 2050.

To achieve this, we need to end our reliance on fossil fuels and invest in alternative sources of energy that are clean, accessible, affordable, sustainable, and reliable.

Renewable energy sources – which are available in abundance all around us, provided by the sun, wind, water, waste, and heat from the Earth – are replenished by nature and emit little to no greenhouse gases or pollutants into the air.

Fossil fuels still account for more than 80 percent of global energy production, but cleaner sources of energy are gaining ground. About 29 percent of electricity currently comes from renewable sources.[11,12,13]

Here are five reasons why accelerating the transition to clean energy is the pathway to a healthy, livable planet today and for generations to come.

1. Renewable energy sources are all around us

About 80 percent of the global population lives in countries that are net-importers of fossil fuels -- that's about 6 billion people who are dependent on fossil fuels from other countries, which makes them vulnerable to geopolitical shocks and crises.

In contrast, renewable energy sources are available in all countries, and their potential is yet to be fully harnessed. The International Renewable Energy Agency (IRENA) estimates that 90 percent of the world's electricity can and should come from renewable energy by 2050.

Renewables offer a way out of import dependency, allowing countries to diversify their economies and protect them from the unpredictable price swings of fossil fuels, while driving inclusive economic growth, new jobs, and poverty alleviation.



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2. Renewable energy is cheaper

Renewable energy actually is the cheapest power option in most parts of the world today. Prices for renewable energy technologies are dropping rapidly. The cost of electricity from solar power fell by 85 percent between 2010 and 2020. Costs of onshore and offshore wind energy fell by 56 percent and 48 percent respectively.

Falling prices make renewable energy more attractive all around – including to low- and middle-income countries, where most of the additional demand for new electricity will come from. With falling costs, there is a real opportunity for much of the new power supply over the coming years to be provided by low-carbon sources.

Cheap electricity from renewable sources could provide 65 percent of the world's total electricity supply by 2030. It could decarbonize 90 percent of the power sector by 2050, massively cutting carbon emissions and helping to mitigate climate change.

Although solar and wind power costs are expected to remain higher in 2022 and 2023 then pre-pandemic levels due to general elevated commodity and freight prices, their competitiveness actually improves due to much sharper increases in gas and coal prices, says the International Energy Agency (IEA).

3. Renewable energy is healthier

According to the World Health Organization (WHO), about 99 percent of people in the world breathe air that exceeds air quality limits and threatens their health, and more than 13 million deaths around the world each year are due to avoidable environmental causes, including air pollution.

The unhealthy levels of fine particulate matter and nitrogen dioxide originate mainly from the burning of fossil fuels. In 2018, air pollution from fossil fuels caused \$2.9 trillion in health and economic costs, about \$8 billion a day.

Switching to clean sources of energy, such as wind and solar, thus helps address not only climate change but also air pollution and health.

4. Renewable energy creates jobs

Every dollar of investment in renewables creates three times more jobs than in the fossil fuel industry. The IEA estimates that the transition towards net-zero emissions will lead to an overall increase in energy sector jobs: while about 5 million jobs in fossil fuel production could be lost by 2030, an estimated 14 million new jobs would be created in clean energy, resulting in a net gain of 9 million jobs.[14,15,16]

In addition, energy-related industries would require a further 16 million workers, for instance to take on new roles in manufacturing of electric vehicles and hyper-efficient appliances or in innovative technologies such as hydrogen. This means that a total of more than 30 million jobs could be created in clean energy, efficiency, and low-emissions technologies by 2030.

Ensuring a just transition, placing the needs and rights of people at the heart of the energy transition, will be paramount to make sure no one is left behind.

5. Renewable energy makes economic sense

About \$7 trillion was spent on subsidizing the fossil fuel industry in 2022, including through explicit subsidies, tax breaks, and health and environmental damages that were not priced into the cost of fossil fuels.

In comparison, about \$4 trillion a year needs to be invested in renewable energy until 2030 – including investments in technology and infrastructure – to allow us to reach net-zero emissions by 2050.



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The upfront cost can be daunting for many countries with limited resources, and many will need financial and technical support to make the transition. But investments in renewable energy will pay off. The reduction of pollution and climate impacts alone could save the world up to \$4.2 trillion per year by 2030.

Moreover, efficient, reliable renewable technologies can create a system less prone to market shocks and improve resilience and energy security by diversifying power supply options.[17,18,19]

IV. CONCLUSION

Producing energy to power our societies and help them develop sustainably is essential, but it also has impacts on the natural world.

Burning fossil fuels is irrevocably destabilising our climate, changing our oceans, degrading ecosystems and driving species towards extinction.

Extracting coal, oil, and natural gas has wide-ranging impacts - it destroys habitats, disturbs migration and feeding grounds, affects livelihoods like fishery and tourism, and pollutes our air, water, and land.

But the cleaner alternatives, such as renewable energy, have impacts as well.

Investment in clean energy technologies is significantly outpacing spending on fossil fuels as affordability and security concerns triggered by the global energy crisis strengthen the momentum behind more sustainable options, according to a new IEA report.

About USD 2.8 trillion is set to be invested globally in energy in 2023, of which more than USD 1.7 trillion is expected to go to clean technologies – including renewables, electric vehicles, nuclear power, grids, storage, low-emissions fuels, efficiency improvements and heat pumps – according to the IEA's latest World Energy Investment report. The remainder, slightly more than USD 1 trillion, is going to coal, gas and oil.

Annual clean energy investment is expected to rise by 24% between 2021 and 2023, driven by renewables and electric vehicles, compared with a 15% rise in fossil fuel investment over the same period. But more than 90% of this increase comes from advanced economies and China, presenting a serious risk of new dividing lines in global energy if clean energy transitions don't pick up elsewhere.

"Clean energy is moving fast – faster than many people realise. This is clear in the investment trends, where clean technologies are pulling away from fossil fuels," said IEA Executive Director Fatih Birol. "For every dollar invested in fossil fuels, about 1.7 dollars are now going into clean energy. Five years ago, this ratio was one-to-one. One shining example is investment in solar, which is set to overtake the amount of investment going into oil production for the first time."

Led by solar, low-emissions electricity technologies are expected to account for almost 90% of investment in power generation. Consumers are also investing in more electrified end-uses. Global heat pump sales have seen double-digit annual growth since 2021. Electric vehicle sales are expected to leap by a third this year after already surging in 2022.

Clean energy investments have been boosted by a variety of factors in recent years, including periods of strong economic growth and volatile fossil fuel prices that raised concerns about energy security, especially following Russia's invasion of Ukraine. Enhanced policy support through major actions like the US Inflation Reduction Act and initiatives in Europe, Japan, China and elsewhere have also played a role.

Spending on upstream oil and gas is expected to rise by 7% in 2023, taking it back to 2019 levels. The few oil companies that are investing more than before the Covid-19 pandemic are mostly large national oil companies in the Middle East. Many fossil fuel producers made record profits last year because of higher fuel prices, but the majority of this cash flow has gone to dividends, share buybacks and debt repayment – rather than back into traditional supply.

Nonetheless, the expected rebound in fossil fuel investment means it is set to rise in 2023 to more than double the levels needed in 2030 in the IEA's Net Zero Emissions by 2050 Scenario. Global coal demand reached an all-time high

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in 2022, and coal investment this year is on course to reach nearly six times the levels envisaged in 2030 in the Net Zero Scenario.

The oil and gas industry's capital spending on low-emissions alternatives such as clean electricity, clean fuels and carbon capture technologies was less than 5% of its upstream spending in 2022. That level was little changed from last year – though the share is higher for some of the larger European companies.

The biggest shortfalls in clean energy investment are in emerging and developing economies. There are some bright spots, such as dynamic investments in solar in India and in renewables in Brazil and parts of the Middle East. However, investment in many countries is being held back by factors including higher interest rates, unclear policy frameworks and market designs, weak grid infrastructure, financially strained utilities, and a high cost of capital. Much more needs to be done by the international community, especially to drive investment in lower-income economies, where the private sector has been reluctant to venture.

To help address this, the IEA and the IFC will on 22 June release a new special report on Scaling Up Private Finance for Clean Energy in Emerging and Developing Economies.[20]

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