

# CLEAN ENERGY

## Means of Stopping Devastation\*

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*“To truly transform our economy, protect our security and save our planet from the ravages of climate change, we need to ultimately make clean, renewable energy the profitable kind of energy”  
- Barack Obama, 2009*

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## INTRODUCTION

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Climate change has become the most important issue of our time. The world's climate has been unintentionally changed by a man by burning coal, oil, and wood which releases carbon dioxide into the atmosphere. According to Ban Ki-moon, who served as the eighth Secretary-General of the United Nations from January 2007 to December 2016 "climate change is coming much, much faster". Apart from the growing concern about climate change and global warming that is harming the environment, the other important issue of concern in today's time is the scenario is energy security. There has been a continuous growth in the world population and according to a 2016 World Population Data Sheet by Population Reference Bureau the world population will reach 9.9 billion in 2050. As the world population is increasing, it is becoming very important to think as to how we can secure energy for our future use. It is a known fact that most of the energy produced across the globe comes from the burning of coal, oil, and gas also known as fossil fuels. These are, however, finite sources of energy which means that they are slowly being depleted and also are major producers of greenhouse gases. Hence, it has become extremely important to diversify our energy mix.

The International Energy Agency which is a Paris-based autonomous intergovernmental organization believes that the world needs a clean energy revolution in order to break dependence on fossil fuels. Such a revolution would enhance a global energy security, promote enduring economic growth and take environmental challenges such as climate change. The Agency further points out that clean energy would break the longstanding link between economic growth and carbon dioxide emissions. According to the former US President, Barack Obama, who was an advocate of clean energy, considered clean energy as the energy of the future. He also repeated the argument that clean energy is a necessary prerequisite for saving the world from catastrophic global warming. Tony Hayward in his article "Energy security through diversity" argues that the world in which we live today needs access to a wide range of different energy sources. He further claims that in the 21<sup>st</sup> century, energy security has become a defining issue and in order to satisfy the increasing demands for energy a wide variety of energy sources are needed. In light of these factors, the concept of "clean energy" comes into the picture.

The world's energy map is transforming. In the past few years, there have been huge investments in the clean energy sector across the world. The cost of clean energy technology has been dropping year over year; making it pass the tipping point and become mainstream. According to Merran Smith who is the founder and executive director of Clean Energy Canada, Canada's leading climate and energy think tank on clean energy solutions, there is a momentum around clean energy and it is not going to stop in the near future. To sum things up, the world is shifting from the dependence on fossil fuels for energy towards clean and low-carbon energy sources. Clean energy has entered a global race.

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## CLEAN ENERGY

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To put in simple words, clean energy refers to any source of power that does not pollute or harm the environment. To elaborate the concept further, clean energy includes demand- and supply-side resources that meet energy demand with less pollution than that created by conventional, fossil-based generation. The clean energy sources which are solar power, geothermal, wind energy, biomass, ocean energy (tidal power), and hydropower do not emit greenhouse gases. One of the most important qualities of clean energy is that it is not concentrated in a limited number of countries unlike coal, oil, and gas. According to Greenpeace, a non-governmental environmental organization, as a source of power, clean energy has three great advantages: Firstly, it is abundant which means that it will never run out. Secondly, it is versatile which means that it can meet a broad spectrum of power demands. And thirdly, it is adaptable which means that the sheer range of clean technologies available to us means that one technology or another will be appropriate for almost every community and can be built close to where it is actually needed.

Although energy sources like coal, oil, and gas are still dominating global energy system, many states are investing largely in order to go clean. According to a resource document developed by Climate Protection Partnerships Division in Environment Protection Agency's Office of Atmospheric Programs, the notion of such a shift in the global energy system is that clean energy has various benefits. These include:

- a) Reduce demand for Energy from Fossil fuels- clean energy initiatives reduce energy consumption from fossil fuel generation in two ways:
  - Energy efficiency policies and programs lead to direct reductions in energy consumption, which in turn reduces energy requirements.
  - Renewable energy and clean distributed supplies resources increase the amount of energy from clean and efficient rather than conventional sources.
- b) Decrease stress on the energy system- clean energy initiative can reduce the overall cost of electric service on time in two important ways:
  - Avoided energy generation or wholesale energy purchases- Clean energy measures can energy, specifically electricity, generated from fossil fuels. Savings include avoided fossil fuel costs and reduced costs for purchased power or transmission service.
  - Avoided or reduced need for additional power plant capacity- Clean energy measures can delay or avoid the need to build or upgrade power plants or reduce the size of needed additions.

And one of the most important energy system benefits that can result from clean energy programs is a better quality fuel and energy security.

- c) Mitigate climate change, environmental degradation, related human health concerns- Fossil fuel- based electricity generation is a major source of air pollutants and also a major source of greenhouse gases which contribute to global climate change. Various

states are turning towards clean energy sources to generate power. One of the most important reasons for them to do so is because clean energy reduces air pollutants and does not emit greenhouse gases. Thus leading towards a clean and healthy environment.

d) Economic Development- It can create broad and diverse economic benefits that vary considerably across economic sectors and over time. Some of the benefits are as follows:

- Clean energy initiatives can create both short term as well as long term jobs.
- Clean energy programs can increase economic output by stimulating new investments and spending within a state.
- Clean energy has the potential in increasing GSP (Gross state product)<sup>1</sup>.
- Due to increased employment or wages there can be a net increase in income associated with clean energy initiatives.

Renewable sources of energy come under the category of clean energy as they do not emit greenhouse gases while generating energy. Unlike fossil fuels that are finite, renewable sources of energy can be regenerated. The renewable sources of energy include biomass, hydropower, geothermal, wind, and solar. They are all clean sources of energy. Apart from renewable energy, nuclear energy is said to be technologically proven and a low carbon source of electricity. However, whether nuclear energy can be considered clean or not is a debatable topic and shall be dealt later on in this research paper.

According to Climate Council which is an Australian independent non-profit organization formed to provide independent, authoritative climate change information to the Australian public, there are eleven countries which are leading the charge on renewable energy as of February 2016. These countries are:

- a) Sweden- which is aiming to become the world's first fossil fuel free nation.
- b) Costa Rica- By the end of 2015, Costa Rica achieved 99% renewable energy. And now it aims to be entirely carbon-neutral by 2021.
- c) Nicaragua- the country has aimed to for 90% of renewable by 2020, with the majority of energy coming from the wind, solar, and geothermal sources.
- d) Scotland- is building the world's largest floating wind farm. In 2015, wind power produced the equivalent of 97% of the country's households electricity needs.
- e) Germany- In 2015, more than 25% of Germany's power came from renewable and it also leads the world in solar CV capacity.
- f) Uruguay- almost 95% of its electricity comes from clean energy.
- g) Denmark- it got 42% of its electricity from wind turbines in 2015. The country aims to be 100% fossil-fuel-free by 2050
- h) China- had promised to close down 1000 coal mines by 2016.

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<sup>1</sup> Gross state product is the sum of value added from all industries in the state, and is analogous to the national concept of GDP. *Assessing the Multiple benefits of Clean Energy: A Resource for States by United States Environmental Protection Agency (State and Local Climate and Energy Program)*

- i) Morocco- is building world's largest concentrated solar power plants. With its accompanying wind and hydro plants, the mega- project will provide half of Morocco's electricity by 2020.
- j) The USA- its solar industry now employs three times more workers than coal mining. It also has the second highest installed wind energy capacity in the world after China.
- k) Kenya- is looking forward to geothermal energy for its future and to reduce its dependence on electricity imports.

Apart from these nations who are leading the way towards going clean, countries like China and Japan are also extending their clean energy usage. According to a United Nations-backed report which was released on March 24<sup>th</sup> 2016, there are ten countries that have invested the most in renewable in 2015. They are:

- a) Chile- the country spent around \$3.4 billion.
- b) Mexico- it invested \$4 billion in clean energy.
- c) South Africa- invested \$4.5 billion.
- d) Brazil- \$7.1 billion.
- e) Germany- \$8.5 billion
- f) India- \$10.2 billion
- g) United Kingdom- \$22.2 billion
- h) Japan- \$36.2 billion
- i) United States- \$44.1 billion
- j) China- \$102.9 billion

According to a Bloomberg New Energy Finance<sup>2</sup> report, clean energy investment rose by 4% in 2015. And according to an end year report from Bloomberg New Energy Finance, investment in clean energy fell 18 % in 2016.

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## NUCLEAR ENERGY

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For the proponents of nuclear energy such as Mark J. Perry who is concurrently a scholar at American Enterprise Institute, a U. S. based nonpartisan public policy research institute, nuclear energy is vital to ensuring a dependable supply of electricity which also helps to maintain a diverse energy mix that keeps electric rates as low as possible and ensures that consumers and businesses are not overly reliant on one or two sources of electricity. He argues that nuclear energy is a zero carbon source of energy and also the only zero-emissions energy source that has the capacity to produce large amounts of electricity. The Heritage foundation which is a Washington, D. C. based conservative think tank claims that nuclear power is a clean, safe, and affordable energy source. Bruno Comby, who is a French environmentalist, physicist and writer, a promoter of healthy lifestyles, Entomophagy and nuclear energy, contends that nuclear energy is safe, reliable, durable, and competitive.

And according to opponents like Michael Marriot who was a New York based leading opponent of nuclear power and an advocate for alternative, sustainable sources of energy, at

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<sup>2</sup>Bloomberg New Energy Finance is a research organization that helps energy professionals generates opportunities. It has been a pioneer in the clean energy community since 2004 <https://about.newenergyfinance.com/about/about/>.

Nuclear Information and Resource Services, it seemed that the nuclear power industry had aimed to somehow prove that nuclear energy was “clean” because nuclear reactors emitted little or no carbon dioxide in the atmosphere. He accuses that the fact that there are proposals being made to include nuclear energy under the umbrella of “clean energy”, has three basic problems:

- a) The first problem is the misconception that carbon dioxide is the only pollutant that matters when defining “clean energy”.
- b) The second is that the radiation that is exposed due to the nuclear reactors is invisible and odourless and it is not a toxic pollutant.
- c) The third is that the nuclear power is completely carbon free.

And all the above assertions are however not true.

If one compares the process of power generation through nuclear power plants from renewable like solar and wind energy, then the former seems a bit hazardous. Accidents like the Chernobyl Nuclear disaster (1986) and Fukushima, Japan (2011) are enough evidence to prove it. These accidents have had a long lasting impact on the people and its environment. Bruno Comby in his article “The Benefits of Nuclear Energy” claims that in the history of nuclear power generation there has been only two serious accidents: Three Mile Island in 1979 (in Pennsylvania, US) and Chernobyl in 1986 (in Ukraine when it was part of the Soviet Union).<sup>3</sup> He asserts that although the Three Mile Island incident was the worst possible accident that occurred in the history of nuclear power generation, no one was injured or killed. And as for the Chernobyl accident, according to Comby fewer than 32 people died within a few months of the accident and about 200 more people were severely injured but they survived. There have been around 4000 cases of thyroid cancers out of which only nine were fatal cases as thyroid cancer is not considered to be fatal. It is pretty much evident from his arguments that he somehow wants to prove that nuclear energy is clean and safe. The above accidents including the Fukushima Nuclear Disaster (2011) prove that the nuclear energy power plants are unreliable. It does not matter as to what number of people have died and how much of damage has it done, what matters is that it is perilous. Although the nuclear power plant does not contribute to the emission of greenhouse gases, it does harm the people and its environment if not managed properly or during some natural disasters like what happened in the case of Japan’s Fukushima nuclear power plant. Thus in any case and scenario, renewable seems to a much safer and cleaner source of energy than nuclear energy.

There are criticisms regarding solar and wind power as well. The most important one is that these sources of energy cannot provide energy continuously especially when there is no wind and sun. Many technological efforts are being made in this regard. In the current scenario, where we can see that large investments are being made by nations towards clean energy, we cannot however be sure about its expansion. As mentioned above that according to a year-end report from Bloomberg New Energy Finance, investments in clean energy fell by 18% globally in 2016 makes it uncertain for us to predict as to what scope does clean energy have in the future but we also cannot deny the fact that the world is becoming more and more aware about the risks that are involved with burning fossil fuels. The present President of US,

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<sup>3</sup>Note- The Author wrote this article in 2006 so there is no mention of the Fukushima Nuclear disaster.

Donald Trump, has a very different take on climate change. According to him climate change is nothing but a hoax and had threatened to pull U.S. out from the Paris Accord. On June 1 2017, he announced that the United States would withdraw from the Paris Climate Accord.

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### CLEAN ENERGY IN ASIA, EUROPE AND NORTH AMERICA

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Zachary Keck, a researcher at the Belter Centre for Science and International Affairs where he works on nuclear weapons, U.S. defence policy, and U.S. - China relations specifies that according to Pew Charitable Trusts,<sup>4</sup> Asian countries are emerging to be the epicentre of the world's race for clean energy investment. In its 2013 annual report on global investment in clean energy, Pew Charitable Trust writes, "The competition among countries for clean energy leadership is resulting in a reshuffling of the old order. In 2012, China advanced its position as the epicentre of clean energy finance, attracting \$65.1 billion in investment, 20% more than in 2011." In an article written in the Diplomat by Anthony Kleven, he mentions that after the famous Paris Accord of 2015, Asian countries like China and India have increasingly been turning to renewable to power their economies. India has aimed to install 275 GW of renewable energy by 2027. The present Prime Minister of India, Narendra Modi, had described the Paris Agreement of 2015 as the victory of "climate justice" and said that there were no winners or losers in the outcome. He was one of the loudest voices for the creation of the "climate justice" fund, a \$100 billion a year commitment from 2020 onwards. Other than this, India signed a deal with Japan's Softbank which has pledged to \$20 billion into its renewable sector.

China on the other hand is already the world's leader in wind-generated power and aims to triple its solar capacity by 2020. According to Kleven, China has turned its renewable energy investments into a centralized national project. In 2016, the Chinese government announced its intent to invest around \$315 billion into power grid development and has also outstripped U.S., U.K., and Japan combined in renewable energy investment.

Countries like Thailand and Philippines are also playing an important role in the sector of clean energy.

According to the EU's Renewable Energy Directive, the Union should fulfil a binding target of 20% of final energy consumption from renewable sources by 2020. In order to fulfil this target, all European Union countries have adopted a National Renewable Energy Action Plan showing what actions do they intend to take to meet their renewable targets. A new target for 2030 has also been set up and it portrays that renewable energy will continue to play a key role in helping EU meet its energy needs beyond 2020. On 30 November 2016, the European Union Commission published a proposal for a revised Renewable Energy Directive to make the EU a global leader in renewable energy. The 2017 renewable energy progress report published by the European Union Commission states that the EU as a whole achieved a 16% share renewable energy in 2014 and around 16.4% share in 2015. This shows that most of the EU countries are in right pace to fulfil the 2020 target. The European Conference for

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<sup>4</sup>The Pew Charitable Trusts is an independent non-profit, non-governmental organization (NGO), founded in 1948. With over US \$5 billion in assets, its stated mission is to serve the public interest by "improving public policy, informing the public, and stimulating the civic life." [https://en.wikipedia.org/wiki/The\\_Pew\\_Charitable\\_Trusts](https://en.wikipedia.org/wiki/The_Pew_Charitable_Trusts).



Renewable Energy which took place in Berlin\* in 2004 did set the goals for European Union for its future renewable energy usage. The conclusion of this conference was that by 2020, the Union would seek to obtain 20% of energy requirements from the renewable sources of energy.

The former President of U.S. Barack Obama has always been an advocate of clean energy. During his entire second term, he focussed on issues like climate change and how the leaders of the world should come together and fight against it. Prime Minister Justin Trudeau of Canada has often talked about as to how building the economy and protecting the environment must go hand in hand. During the Canadian Prime Minister's trip to Washington, D.C., in March 2016 the former president of U.S. Barack Obama had agreed to work together on a number of environmental goals. On 29 June 2016, the leaders of three North American countries USA, Canada, and Mexico met in Ottawa, Canada for the North American Leaders Summit where they announced for The North American Climate, Energy, and Environment Partnership Action Plan. According to a press release by the Office of the Press Secretary, The White House, this Plan lays out deliverables which are to be achieved and also activities that is to be pursued by the three countries as a part of enduring this partnership. They are as follows:

- a) Advancing clean and secure energy – which includes
  - Advance clean energy and integration of energy resources, including renewable
  - Improve energy efficiency
  - Accelerate clean energy innovation and advance cooperation on energy information
  - Strengthen the reliability, resilience, and security of the North American Electricity Grid
- b) Driving down short lived climate pollutants- which includes
  - Reduce methane emission in oil and gas sector
  - Develop national methane strategies with a focus on key sectors
  - Reduce black carbon (soot)
  - Reduce hydrofluorocarbons
- c) Promoting clean and efficient transportation- which includes
  - Reduce energy consumption and greenhouse gas and air pollutant emissions from motor vehicles
  - Support the implementation of green freight best practices
  - Reduce maritime shipping emissions
  - Reduce international aviation through emissions through the ICAO (International Civil Aviation Organization)
- d) Protecting nature and advancing science- which includes
  - Foster incorporation of traditional knowledge and gender responsiveness
  - Mainstream conservation and sustainable use of biodiversity
  - Conserve the monarch butterfly and its habitat
  - Protect migratory birds and their habitat
  - Protect land and sea migratory species and their habitat

- Strengthen cooperation on invasive alien species
  - Strengthen conservation of key species and combat wildlife trafficking
  - Enhance cooperation on ocean movement
- e) Showing global leadership in addressing climate change- which includes
- Support implementation of the Paris Agreement
  - Enhance domestic adaptation efforts and resilience to climate change
  - Encourage robust action by the G-20
  - Adopt a Montreal Protocol hydrofluorocarbons (HFC) phase-down amendment
  - Promote a more secure, affordable, accessible, and clean energy future regionally and globally
  - Promote a just transition to a clean energy economy

Although all the three continents are doing great work to transform and diversify their energy sector, countries like China in Asia are way ahead in achieving a carbon-free economy. The future of North America in terms clean energy is quite uncertain as the current President of U.S. Donald Trump considers climate change as a hoax. Most of the European countries like Sweden and Denmark have already achieved a lot in the field of clean energy. Most of the EU countries have already set targets to use renewable sources of energy in the future. The clean energy sector is most likely to expand in Asia in the future. Population of Asian countries is growing at an unprecedented rate and will grow more in the future, hence putting pressure on the energy system. This will definitely lead the Asian countries, especially India and China, to diversify their energy mix.

Thus I would like to quote what Zachary Keck argued in his article called “Asia’s Clean Energy Future” about the future of clean energy in the three mentioned continents. He says that “It’s reasonable to assume that Asia will continue to dominate clean energy investment in the years ahead although China’s role in this could decline. One reason that Asia is likely to have a bright future in clean energy is simply because of its voracious energy demand and comparable limited energy resources. Another factor that will work in Asia’s benefit is that investment in North America’s clean energy sector is unlikely to grow very much in the near future as most investors remain cautious as they monitor how the shale gas and oil revolutions will affect demand for clean energies on the continent. Moreover, given the EU’s economic difficulties its energy demand is likely to remain stable or decline, reducing the incentives governments and private investors have for investing in clean energy.”

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### CHINA AND U.S.

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According to a 2014 Report from the PEW Charitable Trust most of the future increase in energy demand will occur in the global south as developing nations seek to meet international goals to reduce energy poverty and keep pace with population growth. Because of this rising demand, developing nations will need to significantly increase their energy supplies. Thus in view of its economic, security, and environmental advantages, clean energy is likely to play a major role in meeting the energy needs of the developing countries.

There is no doubt about the fact that China has become one of the leading nations to invest in clean energy. According to an article written by Jaeger *et al*, China is leaving behind the U.S.

on clean energy investment to become the most important player in the global energy market. In 2016, China increased its foreign investment in renewable by 60% to reach a record of \$32 billion according to a new report from the Institute for Energy Economics and Financial Analysis. In order to promote clean energy, the Chinese government has also implemented new laws and policies. They are as follows:

- a) Renewable Energy Law of the People’s Republic of China (2013) - this law was adopted at the 14<sup>th</sup> Meeting of the Standing Committee of the Tenth National People’s Congress on February 28<sup>th</sup> 2005. Renewable Energy World which is the single most recognized and trusted source for renewable energy news and information on internet published an article on China’s Renewable Energy law in 2005. According to this article, this law requires power grid operators to purchase resources from registered renewable energy producers. It also offers financial incentives such as a national fund to foster renewable energy development, and discounted lending and tax preferences for renewable energy projects. This law is designed to help protect the environment, prevent energy shortages, and reduce dependence on imported energy. The article further elaborates that this law sets the stage for widespread use of renewables, particularly for commercial scale renewable generating facilities. Through this legislation, the State officially encourages the construction of renewable energy power facilities. The law also includes specific penalties for non-compliance with the law. The Department of Environment and Water Resources, Australian, has described China’s this move as a significant milestone not only for China but for renewable energy industries in countries around the world. It also states that the Chinese government is also interested in developing other mechanisms around renewable energy law. Article 1 of the Renewable Energy law states that:

*This law is enacted for the purpose of promoting the development and utilization of renewable energy, increasing the supply of energy, improving the structure of energy, safeguarding the safety of energy, protecting the environment, and realizing a sustainable economic and social development.*

Article 2 of the law states that:

*For the purpose of this law “renewable energy refers to non-fossil energies, such as wind energy, solar energy, hydro energy, bio energy, geothermal energy and ocean energy, etc.*

- b) The Revised Air Law (2015) - requires that the “clean energy be given priority in electricity dispatch” (Article 42 of Document 625<sup>5</sup>).
- c) The U.S.-China Joint Presidential Statement on Climate Change (September 2015, reaffirmed in March 2016)- includes a commitment by the Chinese people for “giving priorities to renewable power generation.
- d) A February 2016 “Notice” from the National Energy Administration briefly lists nine approaches for dealing with renewable energy challenges.

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<sup>5</sup>China’s National Development and Reform Commission released Document 625 which for the first time calls for curtailed or wasted renewable energy to be compensated for. This is a major step forward for renewable energy in China. <http://www.paulsoninstitute.org/paulson-blog/2016/04/22/a-new-opening-for-clean-energy-in-china/>

Thus according to Dupuy and Xuang (2016), the new Document 625 can be seen as another indication of concern by high level policy makers about curtailment and renewable energy integration.

U.S. - Elliot (2013) argues that the former President of U.S. Barack Obama in his 2011 State of the Union address made moving to a clean energy economy one of the signature aspects of his presidency. According to Shorgen (2017), President Obama's work on climate change started slowly and gradually. He came out with his Climate Action Plan in June 2013. Its main agenda's were:

- To reduce greenhouse gas emissions from power plants
- Reduce methane emissions from oil and gas productions
- Cut Federal Government's carbon pollution

Shorgen further adds that the plan also made recommendations for preparing communities for bigger storms, rising seas, and fiercer wildfires.

Before this, there has been a long series of plans, one of the most important one being the 1977 law that created the Federal U.S. Department of Energy (DOE).

China is a country with a future in the clean energy sector. With its growing population and increasing energy demand it has no other choice but to diversify its energy sector. The future of clean energy in the U.S. seems to have come to a halt as President Trump announced on June 1 2017, that the United States would withdraw from the Paris Climate Accord. According to an article written by Michael D. Shear for the *New York Times*, the President said that the landmark 2015 pact imposed wildly unfair environmental standards on American businesses and workers. He described the Accord as a "draconian" international deal. Mr President said that he wanted to negotiate to re-enter either the Paris Accord or an entirely new transaction on terms that are fair to the United States. This idea was however rebuked by the world leaders such as British Prime Minister Theresa May, Canadian Prime Minister Justin Trudeau, French President Emmanuel Macron, German Chancellor Angela Merkel, and Italian Premier Paolo Gentiloni, among many others heads of state expressed their refusal to return to the negotiating board. In the President's view, the Paris Accord represents an attack on the sovereignty of the United States.

According to Robert N. Stavins, who is the Albert Pratt Professor of Business and Government, John F. Kennedy School of Government, Harvard University, the potential damages that are going to follow U.S. withdrawal from the Paris Accord is going to be immense, particularly to U.S. influence. It will lose its ability to pressure other countries, such as China and India, to do more. He further adds that the worst possible outcome would be the unravelling of the Paris Coalition altogether; however countries like China, India, EU and other key parties have indicated they will continue to maintain their targets. Jason Silverstein, a national breaking news reporter at Daily News, writes that the withdrawal will weaken the entire goal of the Agreement. He argues that the U.S. is the second biggest polluting country in the world, contributing 16% of global greenhouse gas emissions in 2015 which is half of the amount from every other nation in the world combined except for China, Russia, Japan, India, and the EU countries. So even if every other nation in Paris Accord

banded together, the whole plan holds less impact without the United States involved. All this said and done, one can only wait and watch as to what the future unfolds for the world to go 'clean' and 'green'.

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## **SIGNIFICANT INTERNATIONAL TREATIES RELATING TO CLEAN ENERGY**

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There are three significant Conventions and Agreements that have created history in the field of clean energy. They are discussed in detail below:

### **1. UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE**

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The United Nations Framework Convention on Climate Change which was adopted on 5 June 1992 recognized that there was a serious problem which was remarkable for its time. The Convention entered into force in 1994 and at that time there was less scientific evidence to prove that something was wrong with the climate then it is now. This Convention is said to have borrowed an important concept from the Montreal Protocol of 1987 which is that the member states should act in the interest of human history, even in the face of scientific safety. There are mainly two objectives of this Convention. Which are:

- To stabilize Greenhouse Gas concentrations “at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system”.
- Such a level should be achieved within a time framework so that the ecosystems will have time to adapt naturally to climate change in order for the livelihood to continue in a smooth manner.

One of the most striking features of this convention is that, it puts responsibility on the developed countries to lead the way since they are the source of the past and present emissions of GHG emissions. They are expected to do the most to reduce the emissions by implementing measures to mitigate climate change. As far as the developing countries are concerned, the Convention establishes a financial mechanism to provide them with financial assistance so that these countries can assist in mitigating climate change.

### **2. THE KYOTO PROTOCOL**

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The Kyoto Protocol was adopted on 7 December 1997 in Kyoto, Japan and came into force on 16 February 2005. Currently there are 192 parties to the Kyoto Protocol. It is an International Agreement which is linked to the UNFCCC. It consists of the following features:

- The Kyoto Protocol makes the UNFCCC function by making the industrialized countries to commit to limit and reduce GHG emissions.
- It is based on the principles and provisions of the UNFCCC and follows its annex-based structure.
- It binds the developed countries, and places a heavier burden on them under the principle of “common and differentiated responsibility and respective capacities”, as it recognizes that these countries are the most responsible for the current level of Greenhouse Gases emissions in the atmosphere.

There are two essential elements for the Kyoto Protocol:

- The first element was the binding emission reduction commitments for the developed country Parties. This meant the space to pollute was limited. And what is scarce essentially commanded a price. Greenhouse gases especially carbon dioxide became a new commodity.
- The second element is the establishment of the free market mechanisms, which are based on trade emissions permit. The Parties to this protocol are bound a certain target are required to meet them largely through domestic policies, but they can also meet their targets through a three market-based mechanism that encourages GHG reduction to start where it is most cost-effective. This leads to two major benefits such as it stimulates green investments in developing countries and it also makes the possibility of skipping the use of older, dirtier technologies for new, cleaner infrastructure and systems.

The Kyoto Protocol also established a rigorous monitoring, review and verification system as well as a compliance system to ensure transparency and hold Parties to account.

### **3. THE U.N. CLIMATE CHANGE PARIS AGREEMENT**

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At the 2015 Paris Climate Conference (COP 21), Parties to the UNFCCC reached a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a low carbon future. There are two main aims of this Agreement, they are as follows:

- Its central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degree Celsius.
- The Agreement aims to strengthen the ability of countries to deal with the impacts of climate change.

The Paris Agreement addresses crucial areas necessary to combat climate change. Some of important articles of the agreement in this regard are listed below:

- Article 2 - The Paris Agreement, in seeking to strengthen the global response to climate change, reaffirms the goal of limiting global temperature increase to well below 2 degrees Celsius, while pursuing efforts to limit the increase to 1.5 degrees.
- Article 4- to achieve this temperature goal, Parties aim to global peaking of GHG emissions as soon as possible, recognizing peaking will take longer for the developing country Parties, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of GHGs in the second half of the century.
- Article 7- The Paris Agreement establishes a global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reduction on vulnerability to climate change.
- Article 8- The Paris Agreement significantly enhances the Warsaw International Mechanism on Loss and Damage, which will develop approaches to help vulnerable

countries cope with the adverse effects of climate change, including extreme weather conditions and sea level rise.

- Article 9, 10, and 11- The Paris Agreement reaffirms the obligations of developed countries to support the efforts developing country Parties to build clean, climate-resilient futures. In addition to reporting on finance already provided, developed country Parties commit to submit indicative information on future support every two years, including projected levels of public finance. The Agreement also provides that the Financial Mechanism of the Convention, including the Green Climate Fund (GCF), shall serve the Agreement.
- Article 12- Climate change education, training public awareness, public participation and public access to information is also to be enhanced under the Agreement.

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## CONCLUSION

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The introduction of this neoteric concept called “clean energy” is generally viewed as a solution to one of the most pressing issues of our time which is climate change. When one assays the concept far and beyond, apart from hydropower plants which does have some negative environmental and socio-economic implications, the other sources of clean energy like wind, solar, geothermal, bio mass, and ocean energy have zero negative implications. This novel concept has now basically become a necessity in order to save humanity, to save our civilization. The individuality of clean energy is that they can be produced in any country, which makes them less dependent on other countries for energy. The international community has become increasingly aware about the dangers of climate change and how a shift towards generating energy in a clean way seems the only solution. The 2015 Paris Agreement can be said to be a historical movement in this regard. According to a documentary movie made by vpro backlight documentary this historical move in the field of world energy is nothing but a political victory. It is interesting to see how different countries, especially the developing countries are moving towards making the environment clean.

According to Sultan Ahmad Al Jaber<sup>6</sup> the clean energy solutions are reliable, efficient, and commercially competitive. He further adds that sustainable and clean energy technology is ramping across all geographic industries and also at the most unusual places. However, with the ongoing scenario, where the U.S. has already decided pull out from the Paris Agreement, it seems quite uncertain as to what the future hold for clean energy. On one hand countries like China are moving forward to expand its energy sector by investing more and more in clean energy, the U.S. under Donald Trump might go back to use “dirty energy” sources for energy generation. Region wise, Asia seems to have been dominating the new energy system and in the coming ten years will continue to do so.

Climate change is an issue that involves everyone inhabiting this planet. It does not just concern one country, one region, or one continent. If some day there is a massive nuclear disaster, it is going to affect the whole world. Glaciers’ melting thus leading to a sea level rise

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<sup>6</sup>Sultan Ahmad Al Jaber is the Minister of State in the United Arab Emirates, the Director-General and CEO of the Abu Dhabi National Oil Company (ADNOC), the chairman of Masdar, and the chairman of Abu Dhabi Ports in addition to sitting on numerous corporate boards. He is also a prominent advocate of alternate energy and sustainable development. [https://en.wikipedia.org/wiki/Sultan\\_Ahmed\\_Al\\_Jaber](https://en.wikipedia.org/wiki/Sultan_Ahmed_Al_Jaber).

is going to affect the entire world. We all have to come together to fight against this global issue instead of pulling back and joining again. It took 20 years of negotiation for the historic Paris Climate Agreement to come into being and if anything happens now we do not have the time to spend next 20 years in mere negotiation. Climate change is not just an issue for China which in today's date and time is the largest investor in the field of renewables. Today if the U. S. pulls back from the Agreement and goes back to using coal, oil and gas than what will be the point of spending so much of money in order to make the environment clean. Countries like India and China are experiencing unusual heat that is leading to various health problems. Common people like us can feel that the climate is changing; it's not like how it used to be. So it's bizarre to think that some of the top world leaders are calling it a hoax. What needs to be done is that all the states have to come and work together to fight against climate change. We need to spread more awareness regarding the clean energy sources especially solar power. Keeping the environment clean should not just be the responsibility of the government; every individual should work towards making the environment clean. If such steps are taken then one day we can attain a clean, safe and a happy world.



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