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Energy Mixed More Fuels with Lower Carbon Contain and Renewable Energy Reduce Carbon Dioxide Emissions: A Review

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Abstract -The concentration of CO_2 in atmosphere is increase gradually, CO_2 as greenhouse gas has impact to the climate change. It's mostly CO_2 gas come from the burning of fossil fuels. Fossil fuels release more carbon dioxide compared to the renewable energy. The concentration of CO_2 in atmosphere nowadays is double to the concentration of CO_2 before the industrial age. Reducing the entering of CO_2 gas into atmosphere by substitution of fuel with low carbon contain and renewables energy are necessary. Energy mixed has been dominated with fossil energy, the CO_2 emissions are still high. Energy mixed with more renewable and less fossil fuels energy should be designed for the next scenario. Energy mixed formula is depend on the availability of energy source.

Key words: emission CO_2, fossil, renewable energy, mixed energy

I. Introduction

Since the middle of the 20th century, annual emissions from burning fossil fuels have increased every decade, from an average of 3 billion tons of carbon (11 billion tons of carbon dioxide) a year in the 1960s to 9.5 billion tons of carbon (35 tons of carbon dioxide) per year in the 2010s. The concentration of CO_2 in air has increased from 270 ppm before industrial ages to close to 405 ppm today.[1] Based on analysis from NOAA's Global Monitoring Lab, global average atmospheric carbon dioxide was 414.72 parts per million (ppm) in 2021.[2] In May 2022 the concentration CO_2 in atmosphere is 421 ppm.[3] The Intergovernmental Panel on Climate Change (IPCC) has forecast an increase in global temperature 1.8 ^oC by 2100, largely as a result of anthropogenic CO_2 emissions.[4] About half of these CO_2 emissions are from distributed sources such as transportation and power plants.[5]

Human have led to a massive increase in CO_2 emissions as a primary greenhouse gases that are contribution to climate change. The emission of CO_2, which is thought to contribute to global warming, is a by product of the combustion of fossil fuels. It will increases in extreme weather and global temperatures, research is developing into CO_2 capture to help reverse climate change. CO_2 is one of the main culprit molecules of global warming because of its ability to trap energy from infrared (IR) radiation in the atmosphere. Radiation reflecting off of the earth's surface within the IR spectra is easily absorbed by CO_2, causing vibrations within the molecule and trapping the energy.[6]

The annual global carbon budget projects fossil carbon dioxide (CO_2) emissions of 36.8 billion tonnes in 2023, up 1,1% from 2022. The Paris agreement target will overshoots the 1.5 to 2^oC.[7] The biggest CO_2 emissions were burning fossil fuels.[8]

The goal of reducing CO_2 is to make the concentration of CO_2 in atmosphere is reduce. The increasing of CO_2 concentration in atmosphere may cause the increasing of atmosphere temperature, it's may cause global warming and climate change. To avoid the global warming and climate change the concentration of CO_2 in atmosphere is not change drastically, the CO_2 input output into atmosphere should be in balance condition.

The carbon cycle is vital to life on Earth. Nature tends to keep carbon levels in balance, meaning that the amount of carbon naturally released from reservoirs is equal to the amount of naturally absorbed.

It is thought that limit atmospheric CO_2 to a concentration that would prevent most damaging climate change have focused on a goal of 500 ± 50 parts per million (ppm). The current CO_2 concentration is 375 ppm.[1] A stabilization wedge represents an activity that starts at zero reduction of emission in 2005 and increases linearly until it accounts for 1 GtC/year of reduction carbon emissions in 2055. Each wedge is represents a cumulative total of 25 GtC of reduced emissions over 50 years.[9] The current technology to provide a wedge is used fuel with low carbon contain. A total of seven wedges are required to stabilise emissions at 500 ppm CO_2 in fifty years.

It is said that the carbon positive from burning fossil fuel was higher than the carbon negative, therefore the concentration of CO_2 in atmosphere always increase. The current CO_2 concentration is 421 ppm.[3] It twice number compared the early of industrial age. Substitution fuel of rich carbon to less carbon is necessary to make balance of CO_2 emissions. Especially renewable energy of the main energy.

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II. Fuel with High and Low Carbon Contain

Fuel with high carbon contain

Fossil fuels are the most predominantly used primary energy source globally until today. Oil, natural gas, and coal are the most widely used forms of energy among the various types of fossil fuel energy sources. However, the usage of fossil fuels has several demerits, including the evolution of noxious hydrocarbon gases and contributing to global warming.

There are hydrocarbon that in burning release of CO_2 gas. Fossil fuels used for transportation, electric generation and industrial purposes. Transportation take the major portion of CO_2 emission. Over 40% of energy-related carbon dioxide (CO_2) emissions are due to the burning of fossil fuels for electricity generation. Worldwide emissions of carbon dioxide (CO_2) from burning fossil fuels total about 34 billion tonnes (Gt) per year. About 45% of this is from coal, about 35% from oil and about 20% from gas.[10]

Fossil fuel consumption has increased significantly over the past half-century, around eight-fold since 1950 and roughly doubling since 1980. But the types of fuel we rely on have also shifted from solely coal towards a combination with oil and gas. Today, coal consumption is falling in many parts of the world. But oil and gas are still growing quickly.[11]

Fossil fuels have been powering economies for over 150 years, and currently supply about 80 percent of the world's energy. Fossil fuels formed millions of years ago from the carbon-rich remains of animals and plants, as they decomposed and were compressed and heated underground. When fossil fuels are burned, the stored carbon and other greenhouse gases are released into the atmosphere. An excess build up of greenhouse gases in the atmosphere has caused dramatic changes to Earth's climate a trend that will worsen as more fossil fuels are burned.[12] Fossil fuels such as coal, oil and gas are by far the largest contributor to global climate change. Accounting for over 75 % of global greenhouse gas emissions and nearly 90% of all carbon dioxide emissions.[13]

Fossil fuels

Fossil fuels include coal, petroleum, natural gas, oil shales, bitumens, tar sands, and heavy oils. All contain carbons were formed as a result of geologic processes acting on the remains of organic matter produced by photosynthesis, a process that began 4.0 billion to 2.5 billion years ago. Most carbonaceous material occurring before the Devonian Period 419.2 million to 358.9 million years ago was derived from algae and bacteria, whereas most carbonaceous material occurring during and after that interval was derived from plant.[10]

By the early 21st century, fossil fuels were providing roughly 80 percent of the world's energy. Given the increasing risk posed to Earth's climate by rising concentrations of greenhouse gases in the atmosphere, representatives from nearly 200 countries gathering in Dubai in 2023 at the 28th Conference of the Parties to the United Nations Framework Convention on Climate Change agreed to begin to transition the world's economies from fossil fuels to renewable energy. In order to achieve the goal of net-zero carbon emissions by 2050, which would do much to limit average warming worldwide to about 1.5 °C (2.7 °F) above preindustrial levels, the delegates urged countries to accelerate the build-out of solar, wind, and other renewable energy projects, with the objective of tripling renewable energy capacity by 2030.[10]

The major fossil fuel energy conversion technologies are discussed by Islam.[14] Heat engine, fuel chemical energy is converted into work by means of internal combustion (IC) engine. Gas turbines, jet engines, and most of the rocket engines are continuous combustion IC engines. Steam turbine, steam turbines release thermal energy of pressurized steam and perform mechanical work on a rotating shaft.[15] The efficiencies of steam turbine are comparatively higher than the gas turbines as well as IC engines. Besides, the reliability of the steam turbine is greater when high power output is required. Gas turbines are basically run by expanding hot flue gases produced by burning fuels. It is used not only in power generation but also aircraft propulsion systems such as turbojet. Today, coal consumption is falling in many parts of the world. But oil and gas are still growing quickly.[11]

Fuel with lower carbon contain

Low-carbon fuels refer to materials that, when they burned, provide thermal energy with fewer emissions than fossil fuels. This thermal energy is often used to generate electricity for industrial facilities, such as in combined heat and power systems.

Biomass is matter from living thing organisms which is used for bioenergy production. Examples include wood, wood residue, crops, agricultural residues including straw, and organic waste from industry and households.[8] Some of the leading feedstocks include switchgrass, coconut, cotton, jatropha, municipal solid waste (MSW), sunflowers, palm nuts, canola, wheat, sugar cane, wood and rice.[16] Wood can be used as a fuel directly or processed into pellet fuel or other form of fuels. Upgrading raw biomass to higher grade fuels can be achieved by different methods, broadly classified as thermal, chemical or biochemical.

Thermal conversion.

Thermal upgrading produces solid, liquid and gaseous fuels. The basic alternatives are torrefaction, hydrothermal liquefaction, pyrolysis, and gasification. The advancement of the chemical reactions is mainly controlled by how much oxygen is available, and the conversion temperature.

Torrefaction. Torrefaction is a mild form of pyrolysis where organic materials are heated to 200-300 ^oC in to low oxygen.[17] The heating process removes the parts of the biomass that has the lowest energy content, while the parts with the highest energy

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content remain. That is approximately 30% of the biomass is converted to gas during torrefaction process, while 70% remains in the form of compacted pellets or briquettes.

Pyrolysis. Pyrolysis entails heating organic materials to 400-500 °C in the near complete absence of oxygen. Biomass pyrolysis produces fuels such as bio-oil, charcoal, methane, and hydrogen. Hydrotreating is used to process bio-oil with hydrogen under elevated temperatures and pressures in the present of a catalyst to produce renewable diesel, gasoline, and jet fuel.[18]

Hydrothermal. Hydrothermal conversion is a thermo-chemical conversion technique which uses liquid in sub-critical water as a reaction medium for conversion of wet biomass and waste stream. For wet biomass processes which do not require water evaporation are desired. Hydrothermal processes can be classified into three categories depend on the temperature and pressure of processes.[19]

Hydrothermal carbonization (HTC). HTC is a thermochemical process that converts biomass into a coal-like material called HTC-coal by applying high temperature to biomass in a suspension with water under saturated pressure for several hours.[20] HTC temperature operation is on 180 to 250 °C. The dominant products are HTC-coal. Hydrothermal liquefaction (HTL) has temperature operation on the range of 250 – 374 °C, the HTL process the dominant product is the liquid phase.[21] Hydrothermal gasification (HTG) has temperature up to critical > 374 °C, the main products were gaseous fraction.

Biochemical conversion

Microorganisms are used to perform the conversion. The processes are called anaerobic digestion, fermentation, and composting.[22] Fermentation converts biomass into bioethanol, and anaerobic digestion converts biomass into renewable natural gas (biogas). Bioethanol is used as a vehicle fuel. Biogas uses the same as fuel natural gas. Fermentation of glucose resulted ethanol that used for transportation fuels.

Table 1a, b Carbon Dioxide Emissions Coefficients by Fuel [8]

Carbon Dioxide (CO_2) Factors:	Kilograms CO_2 Per Unit of Volume or mass	Kilograms CO_2 Per Million Btu
For homes and businesses		
Propane	5.75 gallon	62.88
Diesel and Home Heating Fuel (Distillate Fuel Oil)	10.19 gallon	74.14
Kerosene	9.88 gallon	73.19
Coal (All types)	1,764.83 short ton	95.92
Natural Gas	54.87 thousand cubic feet	52.91
Finished Motor Gasoline	8.10 gallon	67.39
Motor Gasoline	8.78 gallon	70.66
Residual Heating Fuel (Businesses only)	11.24 gallon	75.09
Other transportation fuels		
Jet Fuel	9.75 gallon	72.23
Aviation Gas	8.31 gallon	69.15
Industrial fuels and others not listed above Petroleum coke	14.920 gallon	102.12

(1b)[8]

Carbon dioxide (CO_2) Factors:	Kilograms CO_2 Per Unit of Volume or Mass	Kilograms CO_2 Per Million Btu
Nonfuel uses		
Asphalt and Road Oil	11.91 gallon	75.35
Lubricants	10.70 gallon	74.07

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Naphthas for Petrochemical		
Feedstock Use	8.50 gallon	68.02
Other Oils for Petrochemical		
Feedstock Use	10.26 gallon	73.96
Special Naphthas (solvents)	9.04 gallon	72.38
Waxes	9.57 gallon	72.60
Coals by type		
Anthracite	2,601.67 short ton	103.69
Bituminous	2,169.77 short ton	93.24
Subbituminous	1,698.80 short ton	97.13
Lignite	1,274.52 short ton	98.27
Coke	3,258.37 short ton	113.67
Other fuels		
Geothermal (steam)	NA	11.81
Geothermal (binary cycle)	NA	0.00
Municipal solid waste	708.87 short ton	49.89
Tire-derived fuel	2,407.16 short ton	85.97
Waste oil	10.21 gallon	74.00

Greenhouse gas emission

Burning biomass releases about the same amount of carbon dioxide as burning fossil fuels. Fossil fuels release carbon dioxide captured by photosynthesis. Biomass on the other hand also releases carbon dioxide that is largely balanced by the carbon dioxide captured in its own growth. Biomass can be renewed periodic. No wonder if it could be the most effective alternative energy.

Plants use photosynthesis to capture carbon dioxide and than release haft of it into the atmosphere through respiration.[23] Fossil fuel when used by burning release a lot of carbon dioxide (CO_2) into atmosphere, and CO_2 will absorb by plants in photosynthetic activities. Biomass also release carbon dioxide when it burned. Typical carbon dioxide emission from fossil fuel as shown in Table 1.

III. Non Carbon Fuels / Renewable Fuels

Renewables offer a way out of import dependency, allowing countries to diversity their economies and protect them from the unpredictable price swings of fossil fuels, while driving inclusive economic growth, new jobs, and poverty alleviation. [24] Renewable is more advantages compared to unrenewable.

1. Renewable energy sources are all around us
2. Renewable energy is cheaper
3. Renewable energy is healthier
4. Renewable energy creates jobs
5. Renewable energy makes economic sense

Nuclear energy

Nuclear energy protects air quality by producing massive amounts of carbon-free electricity. Nuclear energy is a promising alternate and reliable energy resource for future electricity needs. However, there are numerous drawbacks to nuclear energy to consider, particularly its environmental impact in the future. Nuclear power plants are affordable to operate but are relatively expensive to construct.

Advantages

Nuclear energy tackles 3 of the greatest problems humanity has encountered in its struggle to get energy.

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a) Nuclear power plants don't require a lot of space.

b) lt doesn't pollute (it does, but in a very different way more about it further on.)

c) Nuclear energy is by far the most concentrated form of energy.

Disadvantages

- One of the main disadvantages of nuclear energy is that nuclear explosions produce radiation, this radiation harms the cells of the body which can make humans sick or even cause them death. Illness can appear or strike people years after they were exposed to nuclear radiation.
- A possible type of reactor disaster is known as a meltdown. In a meltdown, the fission reaction of an atom goes out of control, which leads to a nuclear explosion releasing great amounts of radiation.[25]
- Expensive to construct

Wind power

Renewable energy sources such as wind and solar, emit little to no greenhouse gases, are readily available and in most cases cheaper than coal, oil, and gas. Wind power is the use of wind energy to generate useful work. Historically, wind power was used by sails, windmills and wind pumps, but today it is mostly used to generate electricity. Wind farms have advantages and disadvantages.[26]

Advantages

1. Wind is a type of clean energy

How does wind energy work?. It start with a turbine that the wind turns as it blows. The wind's kinetic energy turns a generator in the structure that creates electricity. Modern wind turbines are extremely efficient at turning even light breezes into electricity. One of the advantages of wind energy is that it is clean energy, meaning that it doesn't emit greenhouse gasses when generating electricity. If you burn less fossil fuel for energy replacing it with clean, renewable energy like from wind you reduce your carbon.

2. Wind is a renewable energy source

Another advantages of wind energy is that it is renewable energy. It comes from wind, which is a naturally occurring resource that doesn't get used up. It does not produce greenhouse gasses.

3. Wind power has a low operating cost

Because wind power is a renewable energy source, there is no ongoing expense to acquire fuel. Once the wind turbine is installed, the only real cost is maintenance. Wind is a clean, renewable and low cost.

4. Wind turbines save space

Wind turbines can be spread across fields with enough space between them to be productive.

5. Wind power generation promotes domestic economic growth.

Wind power is economically beneficial beyond wind energy being inexpensive to produce.

Disadvantages of wind energy

1. Wind turbines can be dangerous to some wildlife
2. Wind turbines can be noisy
3. Wind power is limited by location

Hydroelectric power

Hydroelectric power, is a renewable source of energy that generates power by using a dam or diversion structure to alter the natural flow of a river or other body of water. Hydropower relies on the endless, constantly recharging system of the water cycle to produce electricity, using a fuel water that is not reduced or eliminated in the process. There are many types of hydropower facilities, though they are all powered by the kinetic energy of flowing water as it moves downstream. Hydropower utilizes turbines and generators to convert that kinetic energy into electricity, which is then fed into the electrical grid to power homes, businesses, and industries.

Hydroelectric energy, also called hydroelectric power or hydroelectricity, is a form of energy that harnesses the power of water in motion—such as water flowing over a waterfall—to generate electricity. People have used this force for millennia. Most hydroelectric power plants have a reservoir of water, a gate or valve to control how much water flows out of the reservoir, and an

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outlet or place where the water ends up after flowing downward. Water gains potential energy just before it spills over the top of a dam or flows down a hill. The potential energy is converted into kinetic energy as water flows downhill. The water can be used to turn the blades of a turbine to generate electricity, which is distributed to the power plant's customers.[27]

Hydropower, or hydroelectric power, is one of the oldest and largest sources of renewable energy, which uses the natural flow of moving water to generate electricity. Hydropower currently accounts for 28.7% of total U.S. renewable electricity generation and about 6.2% of total U.S. electricity generation.[12]

Geothermal

Indonesia is home to some 40 percent of the world's geothermal resources, and the sector will be key to the country's energy sustainability goals. Indonesia is one of the world's leading geothermal energy powers and has ambitions to further grow the sector as the country embraces renewable energy sources. Currently, Indonesia is the second largest producer of geothermal energy, trailing only the US, and has the world's largest geothermal energy potential. Home to about 40 percent of potential global geothermal resources, the Indonesian government has identified the sector as key to the country's energy sustainability goals. Geothermal energy is created by harnessing the heat produced by the earth, namely by using steam from underground reservoirs of hot water to power turbines that generate electricity. In most cases, energy developers access these underground reservoirs by drilling wells into the ground.[28]

Geothermal energy utilizes the accessible thermal energy from the Earth's interior. Heat is extracted from geothermal reservoirs using wells or other means. Reservoirs that are naturally sufficiently hot and permeable are called hydrothermal reservoirs, whereas reservoirs that are sufficiently hot but that are improved with hydraulic stimulation are called enhanced geothermal systems. Once at the surface, fluids of various temperatures can be used to generate electricity. The technology for electricity generation from hydrothermal reservoirs is mature and reliable, and has been operating for more than 100 years.[29]

Plant to develop geothermal energy

The Indonesian government is in the process of implementing ambitious plans to rapidly grow the geothermal energy sector. To date, progress towards reaching these goals has achieved mixed results. According to the General Plan for National Energy (RUEN), Indonesia plans to reach 7.24 gigawatts of geothermal power by 2025 – which government officials said would necessitate US$15 billion in investment – and 9.3 gigawatts by 2035. However, in June 2020, the geothermal director of the Energy and Mineral Resources Ministry (ESDM), said that Indonesia would achieve its goal of having about seven gigawatts of geothermal power production by 2030.[28]

Electricity Generation

Deep underground, the presence of hot rocks, fluid, and permeability (the ability for that fluid to move among the rocks) offer conditions from which electricity can be generated. Using natural or human-made permeability and fractures, the fluid flows through the hot rocks, absorbing heat from the rocks that can be drawn up through wells to Earth's surface. That heat energy is then converted to steam, which drives turbines that produce electricity.

Heating and Cooling

Geothermal resources such as naturally occurring underground reservoirs of hot water or the stable temperature of the subsurface can be used to heat and cool buildings. Geothermal heat pumps provide heating and cooling using the ground as a heat sink, absorbing excess heat when the aboveground temperatures are warmer, and as a heat source when aboveground temperatures are cooler. District heating and cooling systems use one or more types of geothermal systems, such as a series of geothermal heat pumps, in order to heat and cool groups of buildings, campuses, and even entire communities. Learn more about geothermal heating and cooling.[30]

U.S. Geothermal Growth Potential

The 2019 Geo Vision analysis indicates potential for up to 60 gigawatts of electricity generating capacity, more than 17,000 district heating systems, and up to 28 million geothermal heat pumps by 2050. If we realize those maximum projections across sectors, it would be the emissions reduction equivalent of taking 26 million cars off U.S. roads every year. In 2022, the Enhanced Geothermal Sho analysis confirmed the potential for even more geothermal electricity-generating capacity—90 gigawatts by 2050—if we can achieve aggressive cost reductions in enhanced geothermal systems. Next-Generation Geothermal Power report even identified the potential for up to 300 GW of next-generation geothermal electricity generation, depending on the development of storage capabilities and other emerging technologies.[30]

Hydrogen

Hydrogen is essentially the key to our future as it will become a decisive factor for ensuring a steady energy supply. It can replace fossil fuels across the board, including energy-intensive industries. Hydrogen is produced in electrolyzers. They use electricity to break down water into hydrogen and oxygen. Combustion occurs in reverse order: Oxygen and hydrogen react to release energy. All that remains is water. This technology thus provides answers to pressing issues in the struggle against climate change from decarbonization through to safe guarding our power supply by means of green energy.[31]

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Hydrogen is still too expensive for the mass market. Nevertheless, innovative pilot projects are being carried out in various areas to test its operational range. For example, hydrogen-powered trucks are already proving their worth in the daily transport of goods across hundreds of kilometers. In another example, a hospital is testing how energy-efficient fuel cell systems can reliably power critical infrastructures. Further research and innovation is needed to establish hydrogen as a comprehensive solution over the long term. The objective is to increase the efficiency of hydrogen production and reduce costs. In this topic, you will learn more about the current state of the art and what steps are necessary for this promising technology to reach its full potential.[32]

This is how we drive the hydrogen economy forward. With our expertise and innovation in the field of hydrogen, we support our customers in their development towards the use of this promising energy source. Hydrogen is the most abundant chemical element on the planet; it is present in 75 % of matter. However, we never find it alone, but in the company of other chemical elements such as oxygen forming water or carbon forming organic compounds.

Humanity has long used it as a raw material in the chemical industry or metallurgy and as a fuel, but because it cannot be taken directly from nature in its pure state, it needs to manufacture it. And it is the very method that we use to obtain hydrogen that determines whether that hydrogen is a clean, sustainable fuel or not.[33]

When it is produced using renewable energy or processes, hydrogen is an emissions free fuel and becomes a way of storing renewable energy for use when it is needed. Hydrogen energy can be stored as a gas and even delivered through existing natural gas pipelines. When converted to a liquid or utilised to produce another suitable material such as ammonia or alumina, hydrogen can also be transported on trucks and in ships. This means hydrogen can also be exported overseas, effectively making it a tradable energy commodity.

Hydrogen can be produced through low-carbon pathways using diverse, domestic resources—including fossil fuels, such as natural gas and coal, coupled with carbon capture and storage; through splitting of water using nuclear energy and renewable energy sources, such as wind, solar, geothermal, and hydro-electric power; and from biomass through biological processes.[34] A kilogram of hydrogen holds 39.4 kWh of energy, but typically costs around 52.5 kWh of energy to create via current commercial electrolyzers. Australian company Hysata says its new capillary-fed electrolyzer cell slashes that energy cost to 41.5 kWh, smashing efficiency records while also being cheaper to install and run. The company promises green hydrogen at around US$1.50 per kilogram within just a few years.[35]

Ocean wave/Tidal

Wave energy, which harnesses the power of ocean waves to generate electricity, is a promising renewable energy source yet to be fully exploited. With an estimated global potential of 1.8 terawatts (TW) exploitable wave capacity, 500GW easily exploitable, wave energy could significantly influence the global energy transition. Wave energy has the potential to cover 10-20% of the future global electricity demand. Wave energy offers several advantages in combination with other renewable energy sources. Due It has a more consistent and predictable production profile, wave can provide electrons to the grid when wind and solar cannot, making it a valuable addition to the renewable energy mix by reducing volatility and peak capacity in the system. Apart for densely populated coastal regions, wave energy can be a beneficial option for remote locations and islands that rely on expensive Diesel generators for power generation. Despite its potential, wave energy has faced numerous challenges, including storm survivability, poor device efficiency, corrosion etc. Innovative solutions, like those developed by Power Ocean, are needed to overcome these challenges, and unlock the full potential of wave energy.[36]

Tides, waves and currents can be used to produce electricity. Although still at the research and development stage and not yet commercially available, promising ocean technologies include: Wave energy, whereby converters capture the energy contained in ocean waves and use it to generate electricity. Converters include oscillating water columns that trap air pockets to drive a turbine; oscillating body converters that use wave motion; and overtopping converters that make use of height differences. Tidal energy, produced either by tidal-range technologies using a barrage (a dam or other barrier) to harvest power between high and low tide; tidal-current or tidal-stream technologies; or hybrid applications.[37]

Sea water has the property of never running out, so its potential to be used as an energy source over a long period of time is very large. Energy from the sea can be obtained through sea waves, namely the rising and falling movement of the sea surface due to factors such as wind and seismic movements, which then form a curve. Sea wave energy itself is basically a natural transfer of energy from wind to waves that occurs when the wind blows over sea water. The power produced from this process is called wave energy flux.[38]

Solar energy

Solar energy is the most abundant of all energy resources and can even be harnessed in cloudy weather. The rate at which solar energy is intercepted by the Earth is about 10,000 times.[39] Solar energy is a kind of renewable energy. It is rich in resources, free, non- transportation, and no pollution to the environment. Solar energy creates a new lifestyle for mankind, and takes society and human into an era of energy conservation to reduce pollution. Solar thermal conversion device industry makes solar energy technology fulfill its potential in the construction area, including hot water, heating, and air conditioning. Solar thermal conversion industry is studying solar water heating systems and building integration with the construction industry, and there

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have been some demonstrations. Solar air conditioning has been included in the science and technology research, and there is a large-scale demonstration plant whose economy has yet to be assessed.[40]

Solar energy is a highly beneficial and practical source that is typically used in taking advantage of its two main forms: heat and light. We use solar energy to charge vehicles, to generate power with photovoltaic (PV) cells and to heat water.

The seven most common applications of where and how we can use solar energy in our lives.

1. Generation of solar power
2. Water heating
3. Drying of agricultural and animal products
4. Solar heating
5. Solar energy lighting Welcome to E-Green
6. Solar pumping water for irrigation
7. Solar energy water distillation

Wind turbines and solar photovoltaic cells convert solar energy flows into electricity, the process much more efficient than burning biomass. Costs for wind and solar photovoltaic have been dropping rapidly and they are now mainstream, cost-effective technologies. The existing forms of generating electricity, mainly nuclear and hydroelectricity, also don't result in CO_2 emissions. Combining new renewables with these existing sources represents an opportunity to decarbonise or eliminate CO_2 emissions from electricity sector.[41]

Electricity

Electricity is one of three components that make up total energy production. The other two are transport and heating. Breakdown of sources- coal, oil, gas (fossil), nuclear and renewables. Over 40% of energy-related carbon dioxide (CO_2) emissions are due to the burning of fossil fuels for electricity generation. Electricity generation produced from renewables, nuclear, coal and natural gas energy.[42] Electricity can be generated from renewable energy such as solar, hydropower, wind, geothermal, tidal, hydrogen and nuclear energies. Energy electricity is most practice in application, especially in electronic devises.

Electrical energy is the energy derived from electric potential energy or kinetic energy of the charged particles. Electrical energy as the energy generated by the movement of electrons from one point to another. The movement of charged particles along / through a medium (wire) constitute current or electricity.[43]

Globally, more than a third of our electricity comes from low-carbon sources. However, the majority is still generated from fossil fuels, predominantly coal and gas. This is more than double the share in the total energy mix, where nuclear and renewables account for only about one-fifth.[11]

Tabel 2. Carbon dioxide emission of fuel low carbon content and electricity.[44]

Fuel	Net CV	Carbon content	Approx. life cycle CO_2 emissions		Annual total CO_2 emissions to heat a typical house (20 M p.a.)	
	MJ/kg	%	kg/GJ	kg/MWh	kg	kg saved c.f. oil
-LPG	46	82	72	230	5,600	600
-Electricity (UK grid – 2019)	-	-	54	193	3,860	1,340
-Electricity (large scale woodchip combustion)	-	-	16	58	1,160	5,120
-Electricity (large scale woodchip gasification)	-	-	7	25	500	5,780
-Woodchips (25% MC) fuel only	14	37.5	2	7	140	6,140
-Woodchips (25% MC) inc. boiler	14	37.5	5	18	360	5,920
-Wood pellets (10% MC starting from dry wood waste) See note 3 boiler See note 3	17	45	4	15	300	5,980
-Wood pellets (10% MC	17	45	25	91	1,820	4,460

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drying from gree wood using gas) inc. boiler						
-Grasses/straw (15% MC)	14.5	38	1.5 to 4	5.4 to 15	108 to 300	5,920 to6,172

IV. Carbon Dioxide Emission

Fuel release a carbon dioxide when they used. Fossil fuel release more carbon dioxide. The Intergovernmental Panel on Climate Change (IPCC) has found that emissions from fossil fuels are the dominant cause of global warming. In 2018, 89% of global CO_2 emissions came from fossil fuels and industry. The world's emissions of carbon dioxide will exceed 40 billion tons in 2023, including nearly 37 billion tons from fossil fuels.[45]

Emissions in 2023 are projected to increase in India (8.2%) and China (4.0%), and decline in the EU (-7.4%), the USA (-3.0%) and the rest of the world (-0.4%). Global emissions from coal (1.1%), oil (1.5%) and gas (0.5%) are all projected to increase. Atmospheric CO_2 level are projected to average 419.3 parts per million in 2023, 51% above pre-industrial levels.[7] We needs reducing of CO_2 emissions to atmosphere to slowdown the increase of CO_2 concentration in atmosphere. The stabilization wedges concept targets for CO_2 emissions is less than double the pre-industrial concentration of 280 ppm. [46]Renewable energy decreases CO_2 emissions both in short- and long-run. In contrast fossil fuel consumption leads to an increase in CO_2 emissions. Carbon dioxide emissions from fuels with low carbon content and electricity as shown in Tabel 2.

V. Conclusion

Reducing of greenhouse gasses is an International commitment that every country much reduce the greenhouse gas emission. Each country take action with their ability its self, such as doing more plantation, reduce coal application, and use renewable energy. By using of fuel with low carbon content and renewables are said it's a good idea. Renewables energy such as wind, solar, nuclear, hydropower, geothermal, wind energies don't emit greenhouse gasses. Therefore concentration CO_2 in atmosphere will decrease. Energy mixed formula should be designed with more renewable energy content.

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