CLIMATE CHANGE IMPACTS ON GREEN ENERGY TECHNOLOGIES

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ABSTRACT:

Renewable energy is pollution free and environmentally friendly. In the power generation process, there are many types that do not produce greenhouse gases or toxic waste. Green energy is a reliable, long-term renewable energy source. Renewable energy is affordable and efficient. Biomass, wind, solar, hydropower and geothermal are examples of renewable energy sources that provide long-term energy sources based on the use of naturally available natural resources. Renewable energy sources have a significant impact on the environment and are a major contributor to climate change and global warming. Green energy is energy produced in a way that has less environmental impact. Examples of green energy sources are solar, wind, geothermal and hydro, which are being developed as alternatives to fossil fuels that have little or no impact on climate change. Renewable energy consumption will continue to grow in the coming decades due to the fact that fossil fuels account for 84% of the increase in global energy demand between 2005 and 2030. Green energy is a viable alternative to these conventional energy sources because it is pollution free. Recently, scientific study and the development of advanced technologies to solve global energy crises have led to innovative methods of resource utilization with long-term sustainability to increase energy production and consumption.

Keywords: Renewable energy, Green Energy, Solar Energy,Wind Energy, Global Warming, Climate Change

I. INTRODUCTION:

Energy produced from usual sources like daylight, wind, downpour, waves, plants, green growth, geothermal hotness, and so on can have no ecological effect or can be recovered. These energy sources are renewable, which implies they can be recharged normally. There are two sorts of energy sources on the planet: renewable energy sources and non-renewable energy sources. Renewable energy sources begin straightforwardly from nature like sun, downpour, wind and tides and are recovered depending on the situation. Renewable energy sources are ample and they are without a doubt the cleanest energy sources accessible on earth. Instances of renewable energy sources are sun based energy (solar energy), biomass energy, wind energy, wave energy, hydropower and geothermal energy. For instance, it is feasible to utilize sun based energy, which can be changed over into power. Geothermal energy, wind and flowing energy just as biomass energy from plants can be utilized in an assortment of ways. Earth's normal environment models are utilized to create air. Streaming waterways and repositories give hydropower. Daylight and its radiation give sunlight based energy. Geothermal energy is gotten from the hotness delivered by the world's covering. Air, sun, ocean and geothermal energy are for the most part plentiful and totally free, which is one of the advantages of renewable energy. Renewable energy sources don't radiate very little or no carbon dioxide, which makes them harmless to the ecosystem. Instances of oil, coal, flammable gas and atomic renewable energy sources. Renewable energy sources are promptly accessible, economical and simple to utilize. It altogether affects the climate and is a significant reason for environmental change and a worldwide temperature alteration. Renewable energy sources that are not harmless to the ecosystem contrarily affect human wellbeing.

Green energy is normal assets like daylight, wind, downpour, tides, plants, green growth and geothermal hotness. Green energy sources are renewable, which implies they can be recharged normally. Instances of sun oriented, sea, wind, hydro, bioenergy and geothermal renewable energy technologies.

Fig.2: Diagram of Green Energy

Green energy technologies are helpful for:

- Storing renewable energy
- Assessing renewable energy supplies
- Assisting in the productive exchange of created energy from renewable energy innovation to energy customers

II. CONCEPT:

Our ordinary energy sources, for example, petroleum products are adding to an Earth-wide temperature boost and environmental change, provoking us to foster a technique to resolve these issues by making the possibility of green energy. The primary motivation behind making green energy sources is to create power while limiting the natural effect of energy creation, while lessening waste and contamination. Defenders of green energy guarantee that by utilizing such assets, we can dial back the speed of climate change. With regards to points like cogeneration, warming and power, the possibility of green energy is profoundly respected. People or organizations can get these assets to advance an all the more harmless to the ecosystem way of life by limiting the contrary impacts of energy fabrication. Green energy implies clean energy.

III. THE NEED OF GREEN ENERGY:

Green energy is gotten from renewable sources and has minimal natural effect. Thus, to shield Mother Nature from contamination and guarantee a practical energy supply, we should start to involve green energy for modern and homegrown purposes. Green energy innovation is urgent in diminishing an Earth-wide temperature boost and ensuring biological systems by lessening carbon dioxide outflows through energy effectiveness and renewable energy. As temperatures rise, horticultural creation decreases, flood and tempest harm increments, (tropical) sicknesses become more normal, and the developing water supply stresses individuals. High temperatures straightforwardly and in a roundabout way annihilate the widely varied vegetation of the earth. Biological systems will vanish.

IV. USES OF GREEN ENERGY:

Renewable energy can be utilized in numerous ways at home and at work. The most well-known wellspring of renewable energy is daylight, in some cases alluded to as sun based energy. Sun powered chargers can be put in private and business settings where there is a lot of daylight. Wind turbines can be underlying different regions where wind is high to create economical power. The power acquired can be utilized to siphon water or to charge the boat's batteries. Biomass is one more significant wellspring of renewable energy. It is utilized for power age just as transport fuel. Bioenergy is the term used to depict biomass as a renewable energy source. Geothermal energy, then again, involves the world's inner hotness for some, reasons, including building cooling and warming just as producing electrical energy. One more significant wellspring of renewable energy is marine energy. It starts from many sources, including flowing strength and power from sea waves impacted by the two tides and winds.

V. TYPES OF GREEN ENERGIES:

1. Solar Energy: Sun oriented energy is the most plentiful and limitless wellspring of energy on the planet, and it is accessible in direct (sunlight based radiation) and backhanded (air, biomass, hydro, sea, and so forth) structures. Sunlight based energy, otherwise called hotness and light, can be utilized in two ways: the warm technique involves water for warming, cooking, drying, water refinement, energy creation and different purposes; The electrical strategy involves light for power age and different applications. The photovoltaic technique changes over daylight into power that can be utilized for an assortment of purposes in far off regions, including lighting, siphons, correspondences and power conveyance. Sun powered energy is a renewable energy source that is free and will keep going forever. Outside the Earth's environment, sun oriented radiation is estimated at 1367 W/m2.

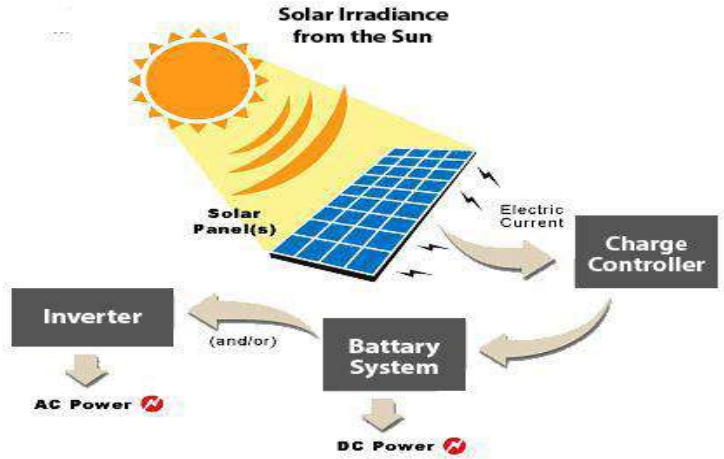


Fig.1. Schematic Diagram of Solar Energy Source

With a geographical area of 3.287 million square kilometers, India receives an average of 200 MW / km of radiation. This equates to 657.4 million megawatts of solar energy. Eighty-five percent of the land is for agriculture and afforestation, 6.7 percent for households, and 5.8 percent for unproductive, snow-covered or unusable human habitation. Solar power plant installations can occupy 12.8 percent or 4.413 million square feet of total surface area.

Sectors	International Level	National Level	State Level
Industry	51.7%	29%	25%
Transport	26.6%	30%	0.6%
Domestic	13.9%	27%	49%
Commercial	7.8%	9%	17%
Others	0	5%	8.4%

Fig.2. Charts portraying the energy utilization example and area insightful situations of India.

Sun powered energy is the quickest developing business in India. It has turned into an appealing sun based objective because of the great populace thickness and high daylight of India. As of June 30, 2018, the nation's introduced sun oriented limit has surpassed 23 GW. India's sun oriented creation limit has expanded eightfold from 2,650 MW on May 26, 2014 to in excess of 20 GW on January 31, 2018. The 20 GW limit was initially expected for 2022, yet the public authority missed the four-year cutoff time. In 2015-2016, the normal limit of sun powered energy in the nation dropped to 3 GW, 5 GW in 2016-2017, and in excess of 10 GW in 2017-2018, 18% not as much as coal-based power.

2. Wind Energy:

Since wind energy is a free and renewable sourse, the inventory will be steady later on, regardless of how much is utilized today. Wind energy is additionally a wellspring of contamination free energy. Not at all like customary power establishes that cause air contamination and greenhouse gases, it is a perfect energy source. Power establishes that consume non-renewable energy sources, like coal or petroleum gas, contaminate and radiate toxins like particles, nitrogen oxides and sulfur dioxide that cause human medical issues and monetary damage and don't dirty the air.

It is a harmless to the ecosystem energy source and doesn't contaminate the air. Wind turbines don't emanate toxins into the air that cause corrosive downpour or greenhouse gas discharges. Considered a low-cost renewable energy source, the land around the wind turbine can be used for other purposes such as agriculture. Can be used with solar energy to produce sustainable and sustainable energy..

Fig.3. Schematic Diagrams of Wind Energy Electricity Generation and Wind forms

Wind energy is being explored in the industrial world for environmental concerns and it is gaining traction in developing countries because it can be easily placed in areas where there is an urgent need for energy. If fossil fuel resources are not readily available, this can be a costly alternative in most cases. Wind power has a wide range in remote areas around the world to increase diesel power or to provide private farms, residences and other amenities..

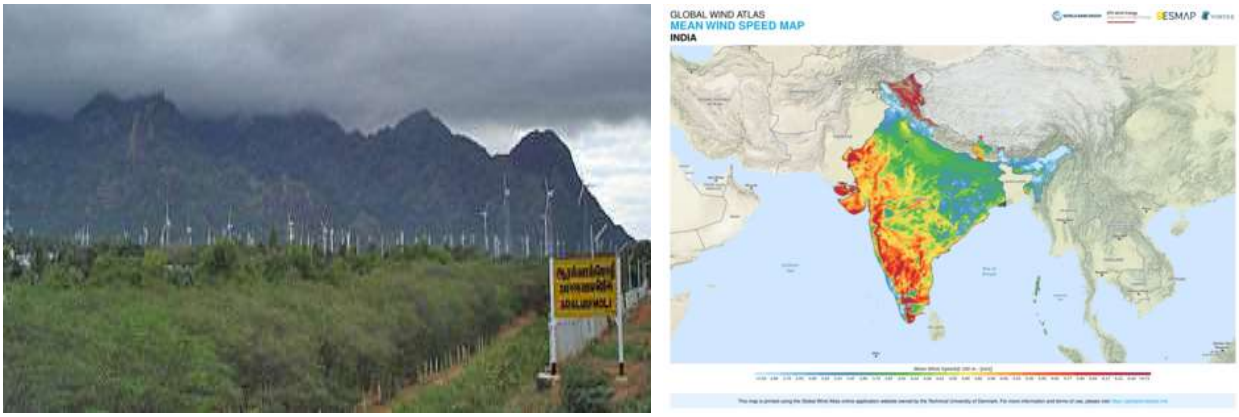


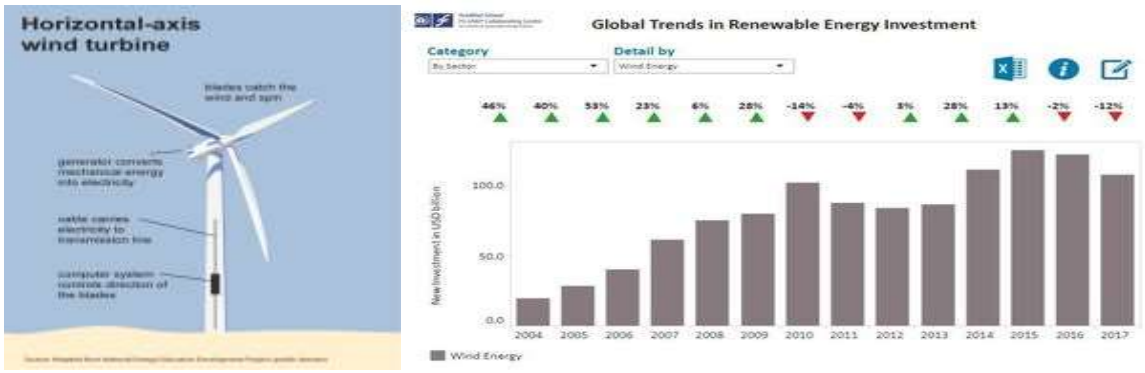
Fig.4 Schemes describing the largest wind field in India at Mobandal and Tamil Nadu and the average wind speed in India

During the year 2017-18, wind power produced 52.67 TWh or practically 3% of the complete power age, which is 10% of the absolute introduced power age limit of India. In the 2017-2018 monetary year, the proficiency use factor was practically 16%. (19.62% in year 2016-2017 and 14% in the year 2015-2016). 70% of wind creation happens during the five months from May to September, which harmonizes with the southwest monsoon season. Sun based energy supplements wind power in India as it is generally delivered during the vacation day season. The introduced limit of wind power in India as on June 30, 2018 was 4,293 Mega Watts, the greater part of which are in Tamil Nadu (7,269.50 Mega Watts), Maharashtra (4100.40 Mega Watts), Gujarat (3,454.30 Mega Watts), Rajasthan (2,784.90 Mega Watts), Karnataka (2,318 Mega Watts), Andhra Pradesh (746.20 Mega Watts) and Madhya Pradesh (423.40 Mega Watts), India has set an objective of creating 60,000 Mega Watts of wind power by year 2022.

Table.1. Some of India's largest wind farms are:

Largest wind farms in India[33]				
No.	**Wind farm**	**Producer**	**State**	**Current capacity (MW)**
1	Muppandal wind farm	Muppandal Wind	Tamil Nadu	1,500
2	Jaisalmer Wind Park	Suzlon Energy	Rajasthan	1,275
3	Brahmanvel windfarm	Parakh Agro Industries	Maharashtra	528
4	Dhalgaon windfarm	Gadre Marine Exports	Maharashtra	278
5	Chakala windfarm	Suzlon Energy	Maharashtra	217
6	Vankusawade Wind Park	Suzlon Energy	Maharashtra	189
7	Vaspet Windfarm	ReNew Power	Maharashtra	144

Wind power is the energy generated by wind turbines using wind motion. It is a renewable energy source that can be used as an alternative to fossil fuels. Wind energy is a clean energy source that does not pollute the environment or release harmful substances such as greenhouse gases. As a result, it is considered one of the greenest energy sources. Wind is a type of solar energy created by the heating of the Sun's atmosphere, the rotation of the Earth, and defects on its surface. Wind turbines are often found in large fields. As of December 2014, wind power capacity has increased to 369,553 MW and total wind power generation has increased to almost 4% of total electricity demand. In general, all large wind turbines have the same structure, with a horizontal axis wind turbine with a three-blade rotor upwind.



A: The wind rotates the blades of the turbine, which rotates the magnets and wires inside the nozzle to generate electricity.

B. is the main cause of wind energy production.

3. Hydropower : Hydropower is a sustainable source of energy that converts the potential or kinetic energy of water into mechanical or electrical energy in the form of water mills, textiles and other equipment (i.e. hydropower generation). It is the energy generated by water (e.g., the flow of rain into rivers). The most widely used renewable energy source for power generation is hydropower. Of the 150,000 MW of hydropower capacity, only about 17% has been used so far..

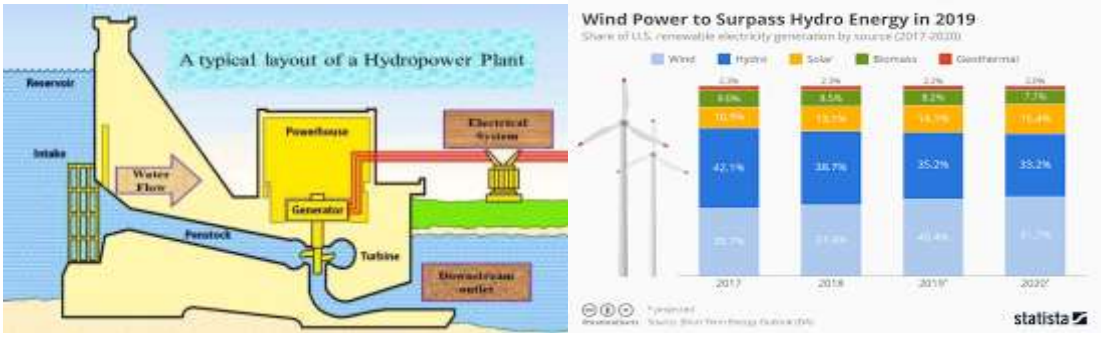


Fig.5. Hydropower age and hydropower in the 2019 arrangement

Also, little hydropower projects are bound to arise for the accompanying reasons:

1. Huge scope ventures can produce many megawatts and require the development of huge dams to give adequate head to turbines; 2-Small scope projects have low limit and in this manner require little dams with low natural effect; 3. Limited scope plans produce power in the scope of kilowatts and are utilized in little towns and individual families.

Hydropower projects in India with a limit of up to 25 MW are named Small Hydropower (SHP). India has a CSP age limit of north of 15,000 MW, of which just 11% has been utilized up until this point. India's introduced utility-scale hydropower limit as of March 31, 2020 was 45,699 MW, which is 12.35 percent of the nation's complete utilization age limit. Little hydropower plants were additionally worked with a complete limit of 4,380 MW (1.3 percent of the nation's absolute power age limit).

4. Geothermal Energy

The name "geothermal" comes from the Greek words "geo" (signifying "earth") and "thermo" (signifying "hot"). As it enters further into the Earth, the temperature ascends towards the planet's center and the nuclear power is moved as compacted heat in a consistent progress movement from the focal point of the planet to the surface. The steam and hotness produced can be utilized to warm structures straightforwardly or by implication to create power.

A large portion of the business scale geothermal energy is put away in nearby "geothermal frameworks" where the hotness stream is sufficiently close to the surface that the boiling water or steam ascends to the surface or to boring access profundities..

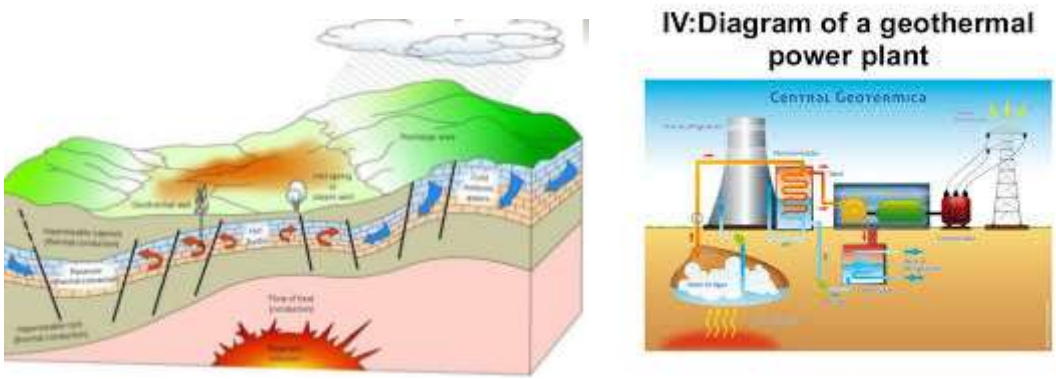


Fig7. Schematic Diagram of Geothermal System

Geothermal energy is created by gathering heat ingested from the beginning from heat put away in the earth. Profoundly, mantle and outside make and store a lot of nuclear power. Geothermal energy presently supplies 10,000 MW worldwide and India's restricted assets might assist with expanding this offer. Assets are presently underutilized, however the public authority has a strong arrangement to significantly increase the introduced creation limit.

Direct utilization, energy creation and geothermal warming and cooling are the three essential uses of geothermal energy. Aside from direct utilization, geothermal energy can likewise be utilized to create power (like sunlight based and wind). Profound stores of geothermal energy, regardless of whether steam or high temp water, are separated and fueled consecutively in turbines that produce power in geothermal power plants.

5. Tidal power:

• Tidal energy is a type of hydroelectric energy that converts energy captured by waves into usable forms, mostly electricity.

• Unlike wind and sun, tides can be expected.

• Among renewable energy sources, tidal power has historically limited its overall availability due to high costs and the scarcity of sites with large enough tidal ranges or flow velocities..

Fig.8. Diagram of Tidal power generation

6. Biomass Energy:

- Biomass is a natural matter got from plants and creatures that is the wellspring of renewable energy.
- Biomass contains energy put away in the sun. Photosynthesis is the cycle by which plants assimilate the sun's energy. The compound energy in the biomass is released hot when ignited..

Fig.6. Kinds of biomass energy and biomass schematic charts

In view of bio-asset solidness, natural insurance and monetary contemplations, energy creation from food waste or food handling waste, particularly squander consumable oils, looks alluring. In India, biomass power age has a yearly speculation of Rs. 600 crore, producing in excess of 5,000 million units of energy and saving in excess of 10 million days of work in rustic regions.

By 2018, India means to create 15 million tons (62 million cubic meters each day) of biogas/CNG by setting up 5,000 huge scope business biogas plants, each capable of producing 12.5 tonnes of bio-CNG per day. 3.98 million small household biogas systems installed.

VI. EFFECT OF GLOBAL WARMING AND CLIMATE CHANGE:

1. Global Warming Effect:

Global warming is a current problem affecting the entire planet. Governments and a number of organizations in rich and developing countries are working to reduce this . A dangerous atmospheric devation addresses an incredibly quick expansion in the normal surface temperature of the Earth in the course of the last century, for the most part because of the greenhouse gases transmitted by people consuming petroleum derivatives. In the course of recent years, the normal worldwide surface temperature has expanded from 0.6 to 1.0 C. This is due to the greenhouse effect. About 30% of the solar radiation entering space is reflected from the planet's outer atmosphere, with the remaining 70% penetrating into the atmosphere. The earth absorbs a portion of this radiation and radiates this absorbed energy in the form of heat, i.e. infrared radiation. Carbon dioxide, nitrogen oxides, methane, fluorinated gases and water vapor are all greenhouse gases that collect heat from infrared radiation and prevent it from escaping the atmosphere. As a result, infrared radiation stays in the Earth's atmosphere for a long time, which raises the temperature of the Earth's surface. Global warming is largely caused by carbon dioxide emissions. According to many estimates, the average global surface temperature could rise between 2° C and 5 ° C by the end of the twenty-first century..

2. Climate Change Effect:

Climate change brought about by greenhouse gases, generally carbon dioxide from the burning of petroleum derivatives, has caused critical changes in biological systems, bringing about 150,000 extra passings every year. This expansion is generally because of the unreasonable utilization of petroleum derivatives and changes in land use.

The creation of greenhouse gases because of energy utilization is a significant reason for Climate change. Somewhere in the range of 1850 and 1899 and from 2001 to 2005 the normal global surface temperature raised by 0.76°C (0.57° C to 0.95° C) and the warming pattern expanded essentially throughout the most recent 50 years. To forestall a worldwide temperature alteration, the transition to renewable energy must take place rapidly, not only in power generation but also in heating, construction and transportation. By 2050, renewable energy sources could provide up to four-fifths of global energy, helping to significantly reduce carbon emissions and mitigate climate change.

VII. FUTURE SCOPE:

Green energy has a brilliant future in pretty much every field of human undertaking, including modern, farming, clinical and family. Researchers have as of now found a wide group of green energy, for example, solar, wind and hydro and are at present dealing with new energy structures, for example, radiation and biomass to quickly diminish the utilization of renewable energy sources. Declining. Sunlight based chargers will turn out to be more proficient before very long and will actually want to work even in shady climate, as specialists as of now work on it. Another blend of sun oriented/wind cross breeds, sunlight based and hydro is additionally coming. Technologies that were recently made or introduced as thoughts and are as of now being created. These advancements will empower us to make a completely renewable and harmless to the ecosystem climate.

VIII. CONCLUSIONS:

Energy is essential in our daily lives to advance human development and increase economic growth and productivity. Renewable energy advancements are an extraordinary method for moderating environmental change, yet they should be practical so people in the future can meet their energy needs. Renewable technologies are perfect energy sources, their legitimate use limiting natural effects, prompting less auxiliary waste and being reasonable as far as current and future financial and social requirements. By supplanting renewable energy sources with renewable energy sources, renewable energy advancements give a novel chance to lessen greenhouse gas discharges and a worldwide temperature alteration. As green energy is liberated from contamination, it is a helpful option in contrast to these renewable energy sources. At long last, renewable energy advancements offer various advantages and contribute altogether to the public energy blend in with lower monetary, natural and social expenses, with the potential for a higher extent of renewable energy in total production capacity in the future.

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