SCHOOL OF CLIMATE CHANGE
AAETI

A GSP Solar 30 workshop for teachers from Himachal Pradesh

# UNDERSTANDING AND USING RENEWABLE ENERGY IN A CLIMATE-STRESSED WORLD

OCTOBER 9-11, 2022

Anil Agarwal Environment Training Institute (AAETI), Nimli, Rajasthan

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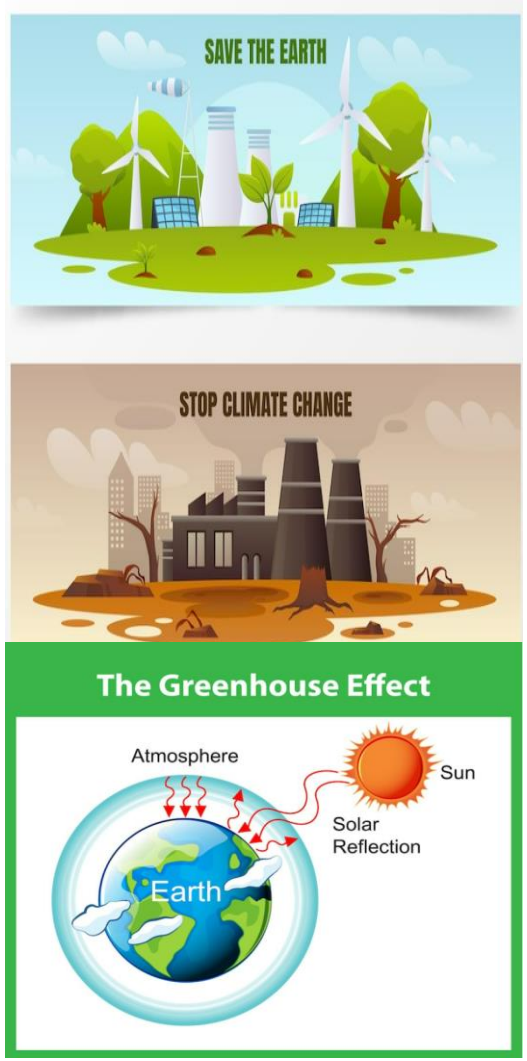
# Agenda

- Global Climate change scenario
- Why Renewable Energy
- Renewable Energy in Himachal Pradesh
- Operation & Maintenance of Solar plant
- Summary

# Pollution-threat to climate change

- Global warming is caused when a blanket of pollution traps heat around the earth.
- The pollution is caused by industries, vehicles, homes, and power plants that burn fossil fuels such as coal, oil, and natural gas.
- In the global warming phenomenon, heat is trapped around the Earth for the next 50-200 years after it has been emitted.
- Global warming needs to be reduced so that the next generation does not feel the effects of this phenomenon.

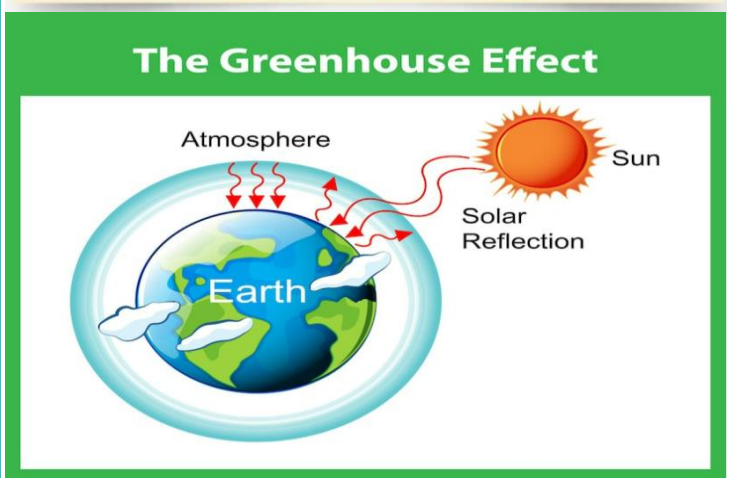
# What is climate change




- Climate is the average weather of a region over a long time and includes phenomena such as rain, snow, and wind.
- In the last 100 years human activities have brought changes to the climate.
- Emissions due to greenhouse gases from industries and other sectors cause changes in the climate.
- The main greenhouse gases are carbon dioxide, methane, nitrous oxide, and water vapor. More than 60% of the emissions are due to CO2.

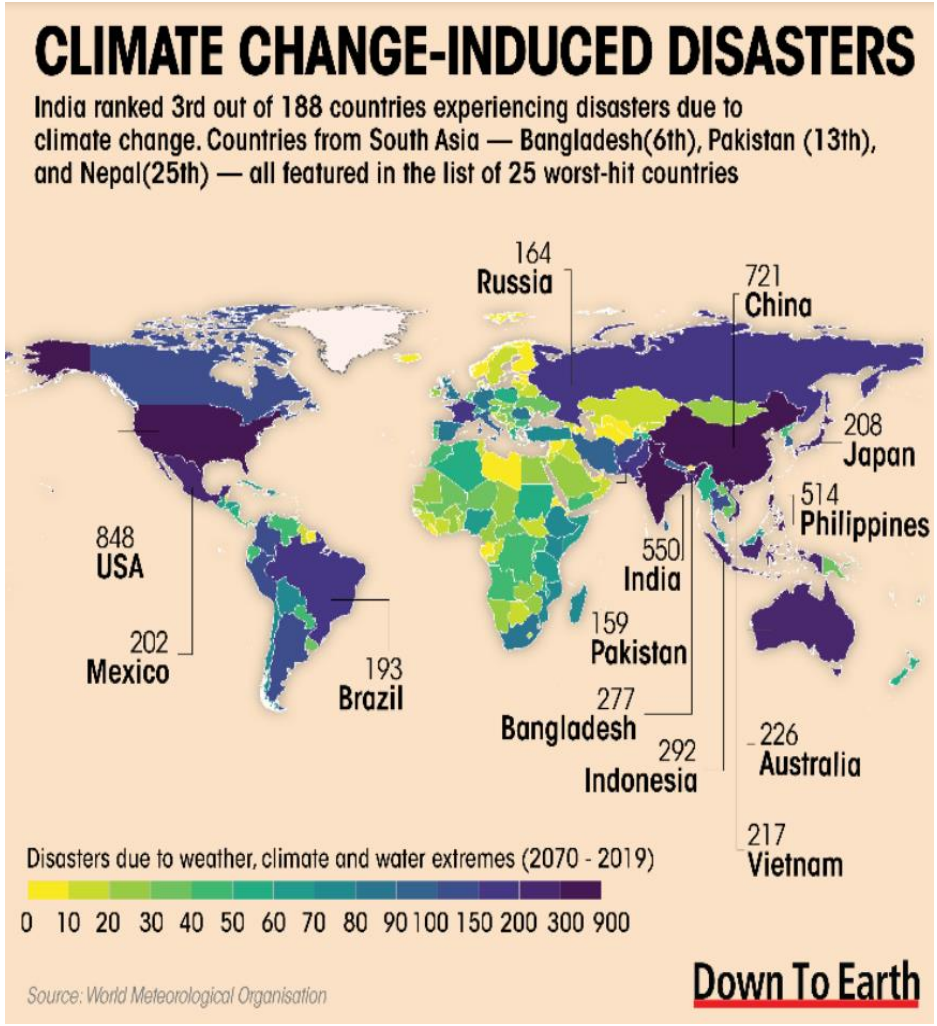
# What is climate change (cont..)





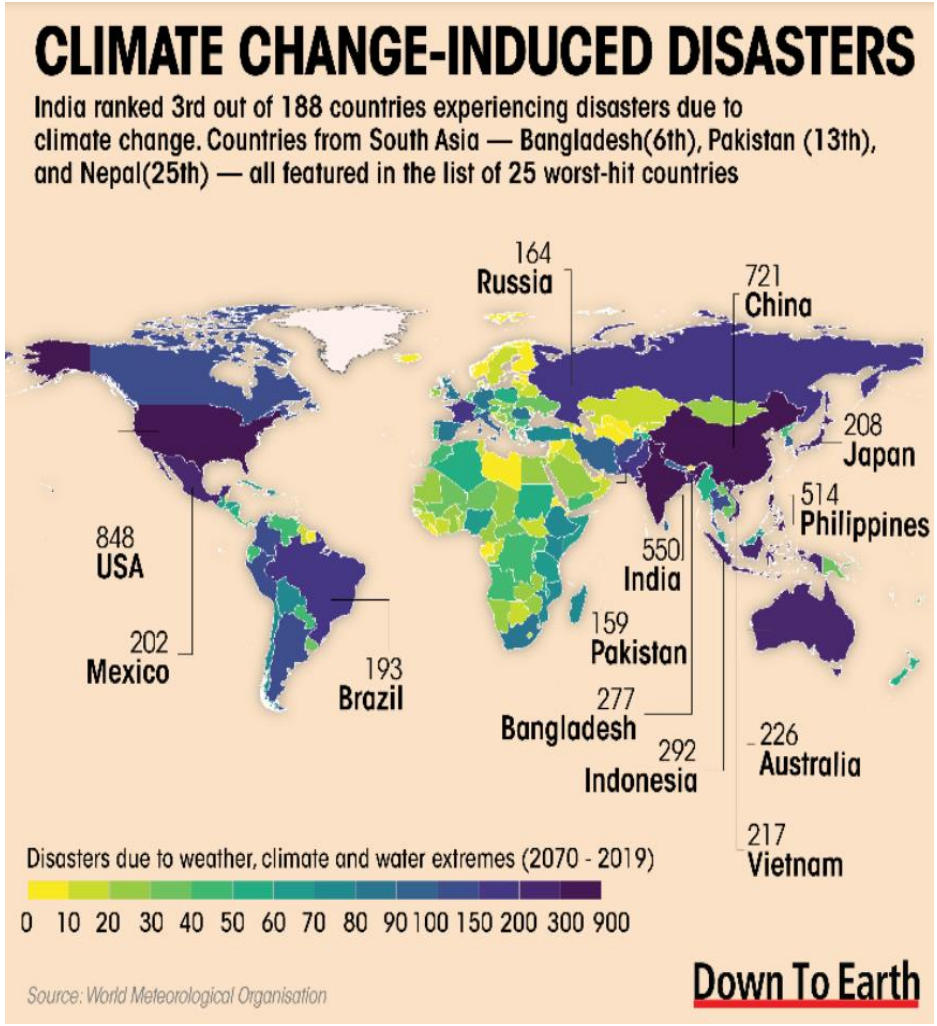

- Carbon dioxide is a long-living greenhouse gas and traps the heat in the atmosphere.
- This has caused the Earth to heat up by 1.09 degree Celsius since pre-industrial times (IPCC AR6).
- The CO2 emissions of India in 2021 were 2.88 Gt. According to an analysis by the Centre for Science and Environment, India's emissions by 2030 would be 3.48 Gt.

# Impacts of climate change




- Changes in seasonal events such as extreme weather conditions like heat waves and cyclones
- Slow onset changes like sea level rise, ocean acidification, and droughts
- Extreme rainfall events leading up to floods, flash floods, and landslides
- Dust, hail, and thunderstorms with lightning
- Cold waves and cold days with ground frost
- Heat waves with forest/wildfires and possible drought conditions

# Impacts of climate change (cont.…)




- Cases of extreme weather conditions
- The most unlikely impact was in the mountains of Himachal Pradesh, Jammu, and Uttarakhand where they became a cause for glaciers melting.
- Devastating monsoons with catastrophic floods in northeast India, especially Assam and Meghalaya, and other adjoining countries such as Bangladesh.
- Himachal Pradesh was the worst affected among states with 320 deaths due to frequent cloud bursts, flash floods, and landslides
- Madhya Pradesh was affected with 280 deaths, 159 due to lightning

# Impacts of climate change in Himachal Pradesh

- In April 2022, around 20 acres of ready-to-harvest wheat crop caught fire in a devastating fire at Jawali in Kangra.
- Over 9,200 hectares of forests were reduced to ashes in 900 cases of forest fires.
- Blossoms in a third of the state's apple orchards perished before full bloom
- Shimla underwent stifling water rationing with supply restricted to every alternate day.

# Smoke from a forest fire in Taradevi, Shimla in April 2022

Source: Outlook Magazine

# Cloudburst in Kullu in July 2022

- A phenomenon linked to climate change that has been observed in Himachal Pradesh is the shifting of the apple crop from lower and mid-elevations to higher altitudes.
- The shift is based on the non-fulfillment of certain weather parameters like temperature, rainfall, snowfall, humidity, and evaporation which has threatened the future of the apple sector in the state.

Source: Outlook India

# Why Renewable Energy is required

- The National Electricity plan by the Ministry of Power has developed a 10-year detailed plan to ensure that power is supplied to the citizens of the country efficiently and economically.
- The Intended Nationally Determined Contributions (INDC) has been submitted to United Nations Framework Convention on Climate Change (UNFCCC) and according to the Paris Agreement, the rise in global temperature has to be limited to well below 2°C. India is the only country among the G20 country which is on track to achieve the targets under the Paris Agreement.
- According to the World Energy Council prediction, global electricity demand would peak in 2030.
- India is one of the largest coal consumers globally and imports costly fossil fuels. Around 215.25 million tonnes of coal was imported by the country in 2020-21.

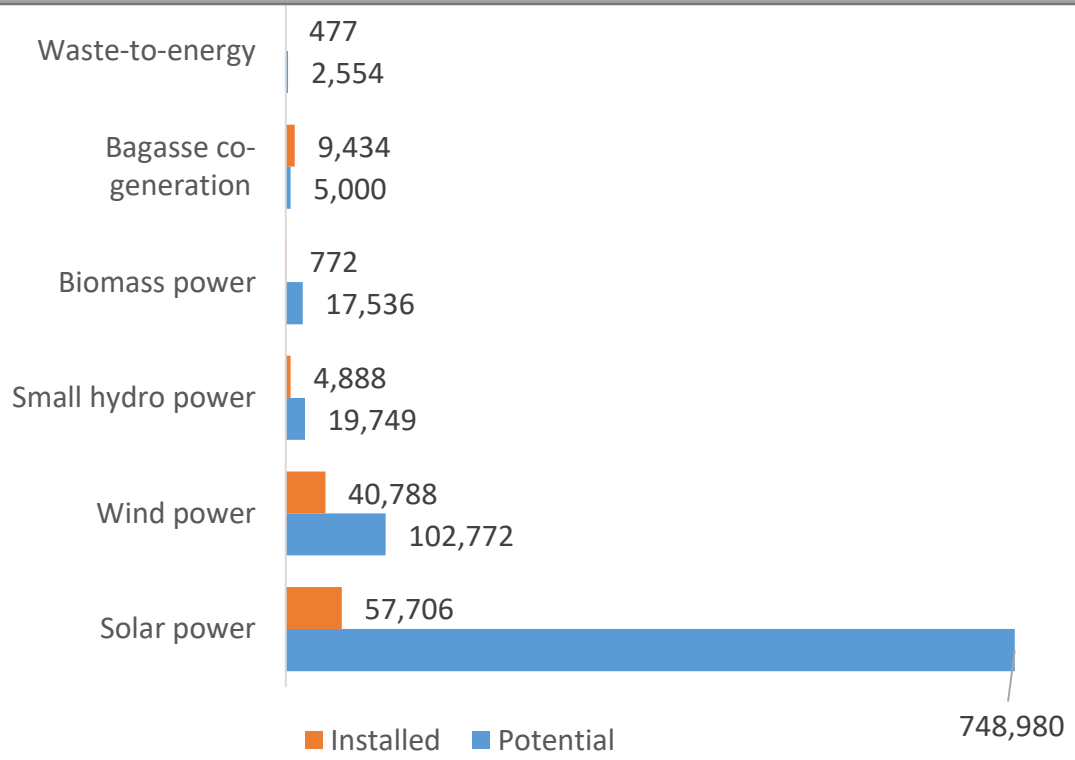
# Why Renewable Energy is required(cont.…)

- Around 75% of the energy demand is being met by fossil fuels.
- Hence there is an urgent requirement to find alternate sources of energy.

- **Ambitious target for Renewable Energy in COP 26**
- In Nov 2021 COP 26 held in Glasgow, Prime Minister Narendra Modi made a pledge to increase India's Renewable Energy Generation Capacity to 500 GW by 2030 and meet 50% of the country's energy needs from non-fossil sources by 2030

# Renewable Energy Potential of India and its NDC

## Renewable Energy Potential and the Installed capacity (MW)of India

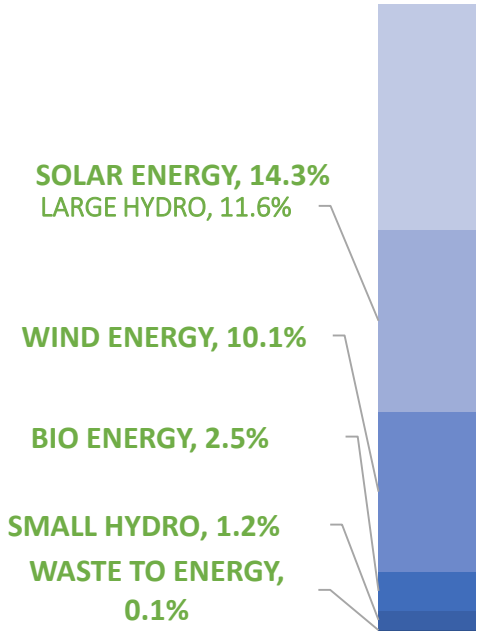


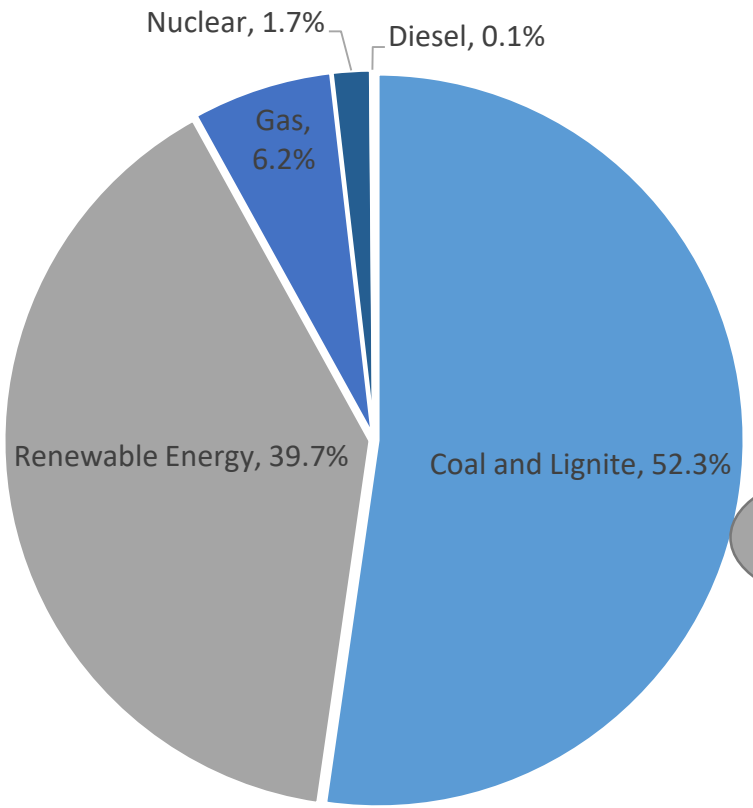

Source: MNRE

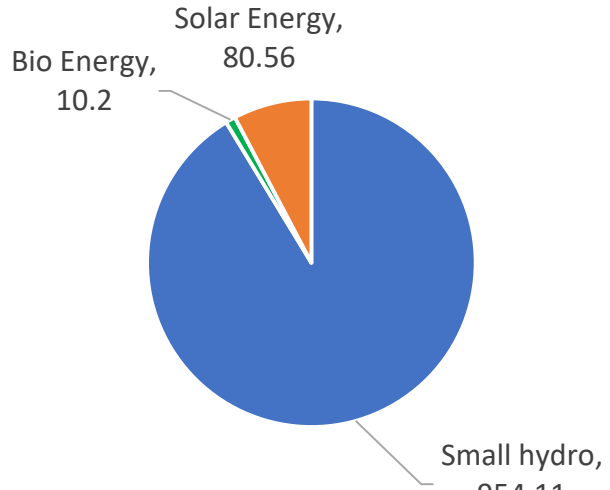
## India's Nationally Determined Contribution (NDC)

According to the updated Nationally Determined Contributions, India has to achieve 50% of its cumulative electric power installed capacity from non-fossil fuel based energy sources by 2030.

# Energy mix




**Installed Renewable Energy Capacity (in MW) in Himachal Pradesh, 2022**

- As of Jan 2022, the installed capacity of Renewable Energy for India stood at around 152 GW(which includes hydropower). This represents 39% of the overall installed power capacity.

Source: MNRE, June 2022

# Benefits of Renewable Energy

Renewable energy is a clean source of energy. They do not emit Greenhouse gas during the generation of electricity.

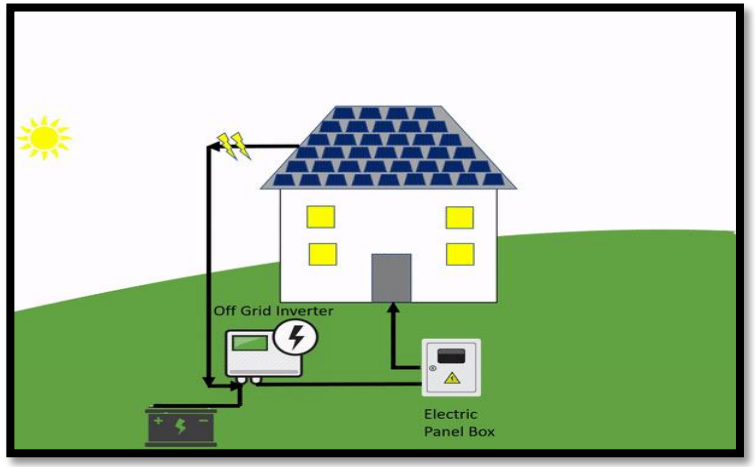
Renewable energy contributes to economic development of India, improving energy security, improving energy access, and helps in mitigating the effects of climate change

Renewable energy is an inexhaustible source of energy, they improve the health and well-being of locals and have a constant energy price

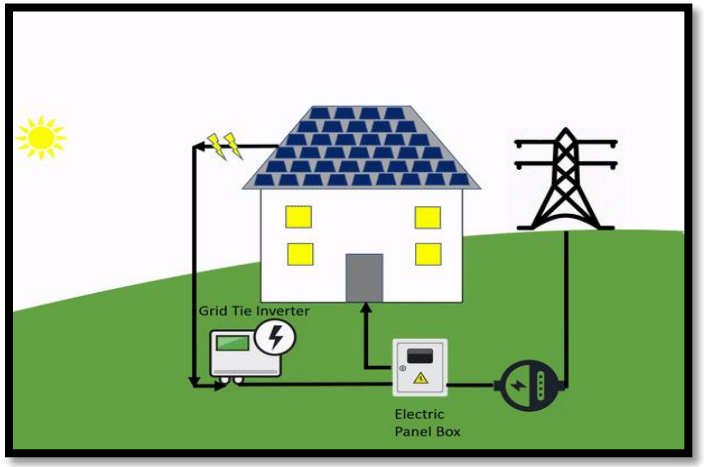
“In every twenty-four hours, sunlight that reaches the earth is enough to provide energy for the entire planet for 24 years”

Martha Maeda

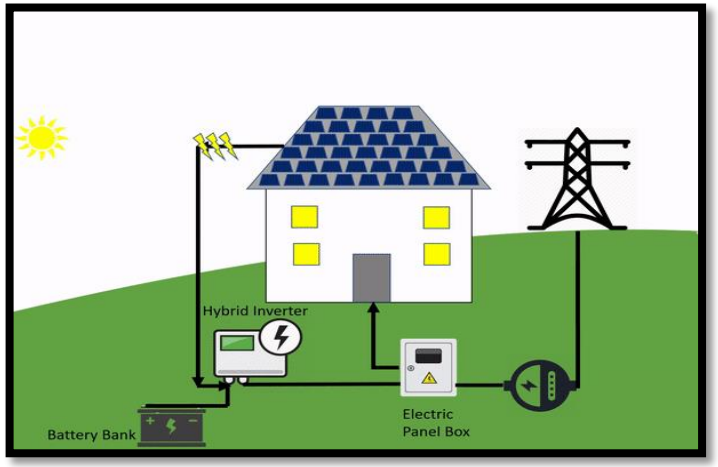
# Rooftop solar plant




Off grid PV plant




On-grid PV plant




Hybrid PV plant

# Initiatives for solar rooftop

In July 2021, to encourage rooftop solar (RTS) installations throughout the country, the Ministry of New and Renewable Energy undertook the Rooftop Solar Programme Phase II, which aims to install an RTS capacity of 4,000 MW in the residential sector by 2022 with benefits of subsidy.

This year, the state government has proposed to increase the subsidy from Rs 4,000 to Rs 6,000 / kWp to encourage domestic consumers to set up roof-top solar power plants

The rates for roof-top solar power plants have been fixed at

Rs 50,000 / kw for 1 - 3 kWp

Rs 48,600 for 3-10 kWp

# Areas of focus in RE by Himachal Pradesh government

**Rooftop Solar pv**

- Based on the national solar target of achieving 100 GW of solar installations, HP is chasing a target of 220 MW of solar installations by end of 2022.

**Ground mounted Solar pv**

- These projects can be installed on the ground by any investor/individual on their own/leased land.
- Allotment of projects up to 5 MW capacity.

- 250 Wp solar system was provided by Himurja for each of the 168 households in the Bara Bhangal village in Chamba in Himachal Pradesh.

# Operation & Maintenance of solar plant

**Benefits of Operation & Maintenance**

- It helps in eliminating the breakdown of the system
- It leads to a long life for the plant
- It increases the revenue of the plant
- It increases the energy/electricity generation of the plant
- It involves low maintenance costs
- It helps in improving the safety of the plant

**Operation & Maintenance of solar power plant**

- Regular inspection and cleaning of the solar panels
- Inverter pads should be clean and free of debris
- Ensure that roof drains are not clogged and there is no water pooling near the array
- Inspection for ground erosion near the footings of a ground mount system
- Electrical enclosures should be only accessible to authorized personnel
- Inspection of all the electrical equipment for earthing
- Inspection of enclosures and the racking system for corrosion
- Inspection for loose hanging wires in the array or any loose connection
- Ensure the battery is fully charged, which can be measured with a voltmeter

# Summary

- Around 70% of the electricity generation in the country is through fossil fuels i.e. coal, and oil.
- Coal is limited and the demand for energy generation is increasing each day.
- There is a need to change the pattern for energy generation.
- Invest in Renewable Energy for sustainable growth as well as to mitigate the harmful effects of climate change due to emissions from fossil fuels.
- India has huge potential for Renewable Energy. Over the past few years, due to the various schemes and initiatives of the government, there is a sudden growth in Renewable Energy deployment in the country.
- MNRE provides a subsidy for rooftop solar installations called Central Financial Assistance.
- Renewable Energy Certification (REC) is a mechanism for the sale of Renewable Energy.
- According to the REC scheme, a grid-connected renewable system sells power to the local grid at conventional rates and the rest of the amount can be recovered through the sale of RECs.

# Quiz time

1. Name the Greenhouse gases responsible for climate change

2. What are the types of rooftop solar power systems?

3. Which Renewable energy can be used daily by residential owners to cover their needs?

# THANK YOU

# Have a good day!

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**https://www.cseindia.org/page/renewable-energy**