India's Policy on Co-Firing Biomass

This editorial is based on **"Time to rake in more biomass in thermal plants"** which was published in the Hindu Business Line on 31/03/2023. It discusses the challenges India's biomass co-firing policy is facing and the need for a robust regulatory framework.

For Prelims: Biomass and its Benefits, Decarbonization, Green House Gas, Renewable Energy, Biomass Co-firing, Micro, Small and Medium Enterprises, Stubble Burning, National Mission on use of Biomass in Coal Based Thermal Power Plants, Carbon Capture and Storage, Coal Beneficiation,

For Mains: Biomass Co-Firing, Significance and Challenges, India's Policy on Co-Firing Biomass and related issues

India has **set ambitious targets for** renewable energy **and reducing** greenhouse gas emissions from the power sector, and the **Biomass Co-firing Policy** is a critical step towards achieving these goals.

However, the **policy has not yet been widely accepted, despite the fact that using biomass is still a cheaper option than importing coal** and offers an economically viable alternative for all thermal power plants.

The slow progress of State Generating Companies and Electricity Regulatory Commissions in using biomass in their power plants has **prompted the Ministry of Power to consider suitable provisions that will encourage thermal power plants to use biomass along with coal as fuel.**

The **Revised Biomass Co-firing Policy** of the Ministry of Power in 2021, is expected to have a significant impact on various sectors such as power, coal, agriculture, **Micro, Small and Medium Enterprises (MSME)** and the environment.

So, the **issues with the India's biomass co-firing policy needs to be addressed** to achieve the ambitious targets for renewable energy.

What is Biomass Co-firing and what are its Significance?

- **About:**
  - Biomass co-firing is the practice of substituting a part of the fuel with biomass at **coal thermal plants.**
    - Coal and biomass are combusted together in boilers that have been designed to burn coal. For this purpose, the existing coal power plant has to be partly reconstructed and retrofitted.
    - Co-firing is an option to convert biomass to electricity, in an efficient and clean way, and to reduce **GHG (Green house Gases) emissions** of the power plant.

    - Biomass co-firing is a globally accepted cost-effective method for **decarbonising** a coal fleets.
    - India is a country where biomass is usually burnt on the field which reflects apathy towards resolving the problem of clean coal using a very simple solution that is readily available.
- **Significance:**
    - Biomass co-firing is an **effective way to curb emissions from open burning of crop residue**, it also decarbonised the process of electricity generation using coal.
        - Substituting 5-7 % of coal with biomass in coal-based power plants can save 38 million tonnes of carbon dioxide emissions.
    - It can **help cut emissions from combustion of fossil fuels, address India's burgeoning problem of farm** stubble burning to some extent, reduce waste burden while also creating jobs in rural areas.
    - India has large biomass availability as well as rapid growth in coal-fired capacity.

What are the Challenges related to the Biomass Co-firing?

- **Availability:**
    - The availability and quality of biomass vary across regions in India.
    - While **some regions have an abundance of biomass, others face a shortage.**
    - Moreover, the quality of biomass also varies, which can affect its combustion efficiency and emissions.
        - **Biomass pellets are difficult to store at plant locations for extended periods of time** because they quickly collect moisture from the air, making them unusable for co-firing.
        - **Only pellets with a moisture content of less than 13-14% typically** can be burned alongside coal.
- **Infrastructure and Logistics:**
    - The transport and storage of biomass can be challenging, especially in areas where infrastructure is inadequate. This requires **specialised equipment and facilities, which can increase the cost of biomass co-firing.**
    - Also, **Biomass co-firing requires specialised equipment,** such as biomass grinders, conveyors, and storage systems.
    - Additionally, power plants need to be retrofitted to enable biomass co-firing.
- **Combustion Characteristics:**
    - Biomass has **different combustion characteristics than** fossil fuels, which can create challenges for power plant operators.
    - For example, **biomass may have higher moisture content,** lower energy density, and higher ash content than coal, which can impact combustion efficiency and emissions.
- **Emissions:**
    - Co-firing **can reduce emissions of greenhouse gases and other pollutants,** but it can also introduce new emissions challenges.
    - For example, **biomass combustion can produce emissions of particulate matter,** nitrogen oxides, and sulfur dioxide, which can impact air quality and human health.
- **Cost:**
    - **Biomass co-firing can be more expensive than traditional fossil fuel-based power generation,** especially if significant modifications to the power plant are required.
    - This can make it challenging for biomass co-firing to compete economically with other renewable energy sources such as wind and solar.

What are the Related Initiatives?

- **National Mission on use of Biomass in Coal Based Thermal Power Plants**
- **Carbon Capture and Storage**
- **Coal Beneficiation**

What Should be the Way Forward?

- **Ensuring a Steady Supply of Biomass to Power Plants:**
    - **Steady supply of biomass to power plants** can be ensured by developing a reliable supply chain that can transport biomass from source to plant.
        - This **could involve partnering with farmers, forestry companies, or other biomass suppliers** to secure a steady supply of biomass.
    - Another way to ensure a **steady supply of biomass is to focus on surplus biomass,** which is biomass that is not being used for other purposes.
        - This could include agricultural residues, such as straw or corn stover, or forestry residues, such as branches or sawdust.
    - By using surplus biomass, **we can avoid competing with other uses of biomass,** such as food production or the manufacture of paper products.
- **Building Infrastructure and Logistics**:
    - Developing the necessary infrastructure and logistics to transport, store, and process biomass is critical to the success of biomass co-firing.
    - This could **involve building new storage facilities, upgrading transportation networks, or investing in new processing technologies.**
- **Robust Regulatory Framework:**
    - The Biomass Co-firing Policy **needs to be backed by a strong policy and regulatory framework** that provides incentives and support for biomass co-firing.
    - Also, there **needs to be a clear, competitive market for biomass** to make sure that prices and distribution are fair.
- **Developing and Deploying the Necessary Technology and Equipment:**
    - Developing and deploying technology and equipment is crucial for the success of biomass co-firing.
    - This includes **developing specialized boilers, burners, and control systems that can handle the unique characteristics of biomass,** as well as retrofitting existing equipment to accommodate biomass co-firing.

Drishti Mains Question

What are the major challenges associated with the co-firing of biomass in conventional coal-fired power plants, and how can they be effectively addressed to promote the wider adoption of this renewable energy technology?

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Consider the following: (2019)

1. Carbon monoxide
2. Methane
3. Ozone
4. Sulphur dioxide

Which of the above are released into atmosphere due to the burning of crop/biomass residue?

(a) 1 and 2 only
(b) 2, 3 and 4 only
(c) 1 and 4 only
(d) 1, 2, 3 and 4

Ans: (d)

Exp:

- Biomass is organic material that comes from plants and animals, and it is a renewable source of energy. Biomass contains stored energy from the Sun. Plants absorb the Sun's energy in a process called photosynthesis. When biomass is burned, the chemical energy in biomass is released as heat.
- Crop residue and biomass burning (forest fires) is considered as a major source of Carbon Dioxide (CO_2), Carbon Monoxide (CO), Methane (CH_4), volatile organic compounds (VOC), and Nitrogen Oxides (NOX). Burning of rice crop residue releases Suspended Particulate Matter, SO_2, NO_2 and O_3 in the atmosphere.
- Therefore, option (d) is the correct answer.