→ Energy Policy is the scheme in which govt addresses issues related to Energy growth and usage including energy production, distribution and consumption.

(*) National Energy Policy of India: ↑ energy and ↓ energy poverty. Come up with alternative sources of Energy (nuclear, solar, wind, etc)

→ Energy resources are less according to population in India
Population is 17% but shares in gas, oil & coal reserves → 0.6, 0.4, 0.7%

→ Even at low level of EC, we need to import

→ Total Primary Energy consumption from coal, crude oil, natural gas, etc. in 2013 was 809.2 Mtoe (Million tons of equivalent).

→ 1 Mtoe = 4.1868 × 1016 Joules.

→ India is dependent on ~~exports~~ imports to meet its energy demands

→ By 2030, dependency on imports is expected to increase to 53% of the total energy consumption.

(*) NEP is last plan Periods.

4 key objectives of NEP

(a) Access of Energy at Affordable Prices: considering poverty?
Energy deprivation in India, Access of Energy at Affordable Price is of utmost importance. As promised, there should be electricity in every household by 2022 Supply of clean cooking oil to all Assist vulnerable sections with financial support.

(b) Improved security & Independence: Reduction in import dependence
India is heavily dependent on coal, oil & gas imports Security can be increased by ↑ domestic production & ↓ energy consumption

(c) Greater sustainability: View of threats on environment & effects of fossil fuel usage. Closely linked with security. Cutting fossil fuel consumption will promote goals of sustainability & security.

(d) Economic Growth: Growth in Energy sector will impact the overall growth in economy.

Energy security and sustainability are of utmost importance fossil fuels are cheaper, it conflicts Affordability & Sustainability.

Fiscal Policy → means by which govt. adjusts its spending levels and tax rates to monitor and influence nation's economy.

→ Strategy is encouragement of development of renewable sources of energy.
→ Abundance of solar & Hydroelectric energy. India is able to meet the requirements of peak population from renewable energy sources alone.
→ Measures to produce Energy Policy:
(*) Statement of national policy regarding Energy planning, generation, transmission & usage.
(*) Laws for commercial energy activities (trading, transport, storage, etc)
(*) Laws affecting energy use.
(*) Energy security and international policy measures.
(*) Propose actions on the ground:
→ Energy consumption by business, households, etc.
→ Energy Efficiency.
→ Distribution of coal.
→ Electricity generation.
→ Supply of oils & gas.
→ Installation, generation & distribution of renewable energy.
→ Policy: A protocol to guide decisions and achieve outcomes.

(*) Energy Goals:
→ Access to Energy (Clean Energy).
→ Affordable energy,
→ Energy security.
→ Energy sustainability
→ Reduce Environmental and Human Health Impact.
→ Improve Energy efficiency.
→ Upgrade technology for supplying energy to underdeveloped countries.

(*) India Policy Documents:

→ Five-Year-Plans First five year Plan (1951-1956), 12th 5 year plan (2012-2017), 13th → (2017-2022) No more formal plans are made for the economy, 5 year plans continue to be made

→ Integrated Energy Policy: Made in 2017 Addresses all aspects of Energy: Availability, Security, Sustainability, efficiency, etc.

→ National Action Plan on Climate Change launched in 2008 to mitigate and adapt to adverse impact of climate change.

→ Electricity Regulation Commission Act (1998) Act to provide establishment of Electricity Regulation commission.

→ Electricity Act (2003): Covers major issues (generation, transmission, trading)

→ INDC (2015) → Intended National Determined Contributions.

(*) ISO-50001

→ International Standard created by International Standard Organization (ISO)

→ Specifies the requirements in establishing, implementing, maintaining Energy Management System.

→ Helps organizations reduce their energy use. & Energy & greenhouse gas emissions.

→ Released in June 2011. Suitable for any organization, whatever size wherever located.

→ Second edition was released in August 2018

→ Helps organizations in efficient use of energy, fix targets and objectives to meet the policy; Make better decisions about energy use, Measure results, reviews and improve Energy Management.

(*) PDCA (Plan-do-check act or plan do check Adjust).

→ Iterative 4 step management method used in businesses.

→ Framework → same as ISO50001.

→ Plan → Establish objectives. → Do → Carry out objectives for prev. step

→ Check. Evaluate results → Act: Improve Process.

(*) PAT Scheme (Perform Achieve & Trade)
→ Most Imp. & Prioritized concern for an organization.
→ Accelerate improvement in Energy Efficiency in Energy Intensive fields.
→ Energy savings achieved is converted into tradable instruments called Energy Saving Certificates (ESCerts).

(*) BEE and State Development Agencies & EESL Programme
→ BEE stands for Bureau of Energy Efficiency.
→ Set up on 1st march 2002.
→ Mission is to assist in developing policies & strategies with Primary objective of reducing energy & Intensity of Indian Economy
→ Coordinates with organizations and recognize, Identify & utilize the existing resources & infrastructure.
→ Promotional functions of BEE:
(*) Create Awareness on Energy efficiency & conservation
(*) Arrange training in techniques for efficient use of energy &
(*) Promote research & development.
(*) Promote testing facilities.
(*) Promote use of Energy efficient Processes.
(*) Promote financing for energy efficient projects.
(*) Implements programmes related to efficient use of energy.

(*) State Development Agencies (SDAs)
→ Assign additional responsibilities for energy efficiency.
→ Examples: Maharashtra Energy Development Agency (MEDA)
Punjab " " (PEDA)
→ Total 36 SDAs are operating in India.
→ Undertaking energy efficiency activities at State level.
→ Provides financial Assistance to State Designated Agencies.
→ Contribution to State Energy Conservation Fund (SECF)
→ Organizing workshops

EESL → Energy Efficiency Services Limited.

(*). Municipal and Agricultural DSM (Demand Side Management) Initiatives:

→ DSM has been recognized as one of major intervention to achieve reduction in energy demands while ensuring development

→ DSM has become integral part of all central and state missions.

→ Have helped utilities to reduce Electricity demands.

Agriculture DSM:

→ ↓ overall power consumption, improving efficiencies of ground water extraction, investment in power plants, etc.

→ 70% households depend on agriculture contribute to 17% of GSP and provide employment to over 60% of population.

→ Create awareness for Energy efficient pumpsets.

Municipal DSM:

→ Growing demands for public utilities bec. of ↑ in population & improved standards of living. ↑ energy demands.

→ Municipality sector consumes electricity for street lighting, water pumping etc.

→ Rising peaks in morning hours due to water pumping & evening hours due to street lighting.

→ MuDSM can improve the overall efficiency of Urban local Bodies.

→ MuDSM was initiated b/c there is immense energy saving potential in Municipal Sector.

(*). Energy Use and Energy Supply:

→ Energy is essential for wide range of human activities.

→ The diversity of ways in which energy is supplied and used provides ample opportunities to reduce energy related emmissions.

→ Reduction can be difficult keeping in mind human behaviour & preferences.

(*) Standards and labelling Programme:

→ Objective is to provide customer informed choice about energy and cost saving potential of marketted product.

→ Targets display of Energy performance labels on high energy end use equipments.

→ Star labelled Appliances.

(*) Air Conditioners	(*) LED lamps	(*) Computers
(*) Geysers	(*) Motors	(*) Printers
(*) Refrigerators	(*) Ceiling fans	(*) Scanners
(*) Color TV	(*) Stoves	(*) Microwave Oven
(*) Inverters	(*) Washing Machines	(*) Laptops

(*) Excellence Enhancement Center (EEC):

→ Set up in India to promote energy efficiency & security.

→ Aims to create awareness in Indian Power sectors by exchanging ideas and experience, providing examples, etc.

→ long term goal → establish more efficient power plants

→ EEC Membership is open to Power sector companies, research & development organizations.

Member Benefits:

→ free expert technical advices.

→ Access to discounted purchase of EEC's technical studies.

→ Preference in study/ Expert committee.

→ Organizing conferences, knowledge Exchange, etc.

(*) Input/output Analysis:

→ Input Output model is a quantitative economic model that represents interdependencies b/w different sectors of national Economy.

→ Economic multipliers measuring total change in sales, income & employment.

→ depict the monetary flow of goods & services.

→ All sectors purchase goods from one another and use them in the production of final product.

→ Mathematically expressed as:

→ Wassily Leontief developed this type of analysis. (Nobel Prize in Economics)

$$x_{11} + x_{12} + \cdots + x_{1n} + y_1 = X_1$$
$$x_{21} + x_{22} + \cdots + x_{2n} + y_2 = X_2$$
$$\vdots$$
$$x_{n1} + x_{n2} + \cdots + x_{nn} + y_n = X_n$$

x_{ij} = sales from sector i to j

y_i = final demand of product

X_i = total output of sector i.