

# ENERGY CRISIS & ITS POSSIBLE SOLUTIONS: INDIAN SCENARIO

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## Abstract

In this paper we will discuss the problems related to electricity. The problems associated with the generation of electricity, maintenance and energy related policies. A special focus is given on increasing the generation capacity through small scale power plants like Biogas, Bagasse, Municipal Solid Waste (MSW) generation, etc. Apart from this we have described how the lack of basic facilities can impact the power sector. We have described in detail the problems and challenges faced by the power sector in India. Along with the problems related to Energy Policies and suggestions for reforms. The solutions for problems like Energy security, power tariff and benefits of small scale plants are described in this paper. All the solutions are given keeping in mind the agricultural based economy of India. This paper also contains solutions for rural electrification and empowerment of farmers. The importance of Energy conservation and energy audit is discussed in this paper. Suggestions for India to enter the global market for solar manufacturing along with the need for research and innovation in solar products is also mentioned.

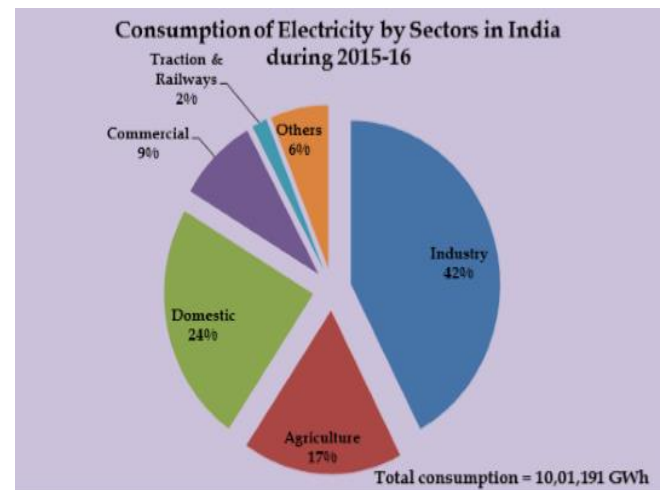
**Keywords:** Energy Crisis, Power Crisis, Climate Change, Pollution, Green Energy, Energy Conservation, Energy Challenges, Energy Policy, Energy statistics, Renewable Energy, Rural Electrification, Solar, Wind, Biogas

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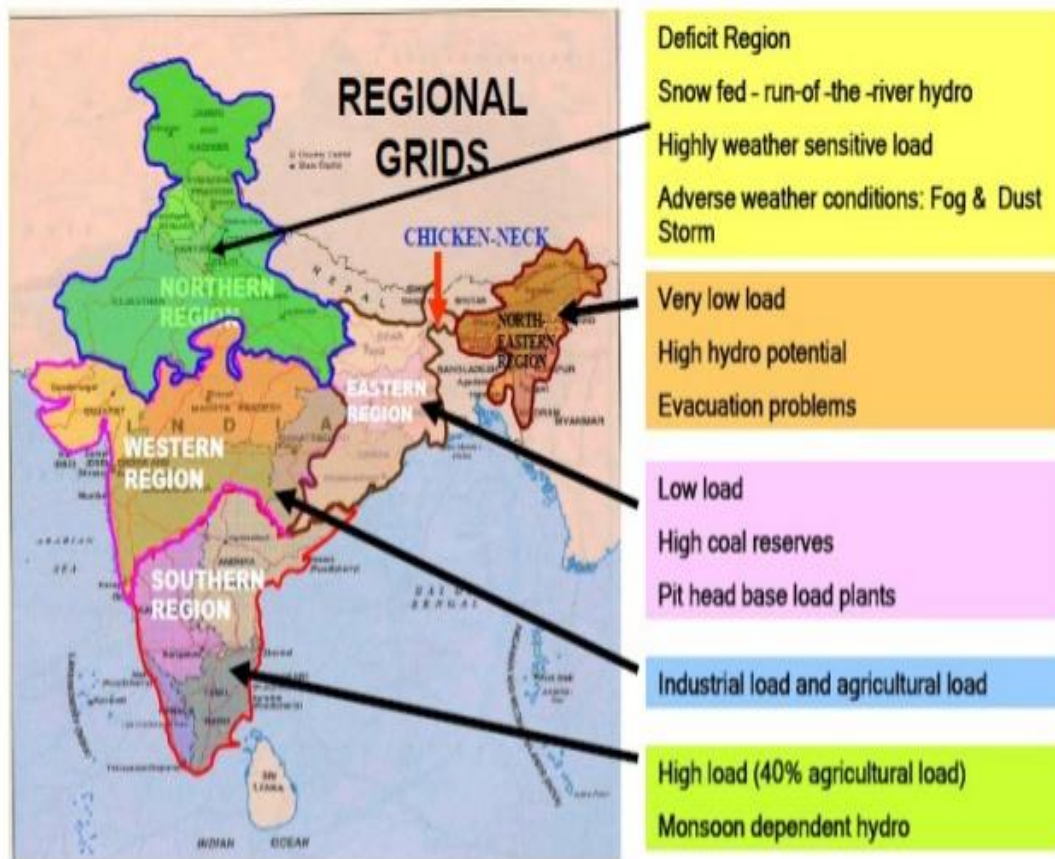
## 1. INTRODUCTION

India is the third largest consumer & producer of electricity in the world. India is on its way to become a developed country. The rapid industrialization, ever growing population and huge network of railways need a lot of electricity. Indian Power crisis are increasing day by day. The main challenge is to fulfill those demands without harming the nature. India's recent commitment to the Paris Deal for climate change is worth appreciation. This has projected India to the leadership role in combatting climate change. India should use this opportunity to become one of the leading nations for green energy in the world.

In this paper we will see various challenges faced by the power industry in India. We shall also see the problems associated with the renewable energy sources and how to tackle them.



## Peculiarities of Regional Grids in India



## 2. POWER CRISIS

Power Crisis is defined as the problems associated with generation, transmission and distribution of electricity. Along with other problems like energy security, high demand and low supply, energy policies etc. The power crisis can be tackled by three ways:

- 1) Energy Generation
- 2) Energy related Policies
- 3) Energy conservation

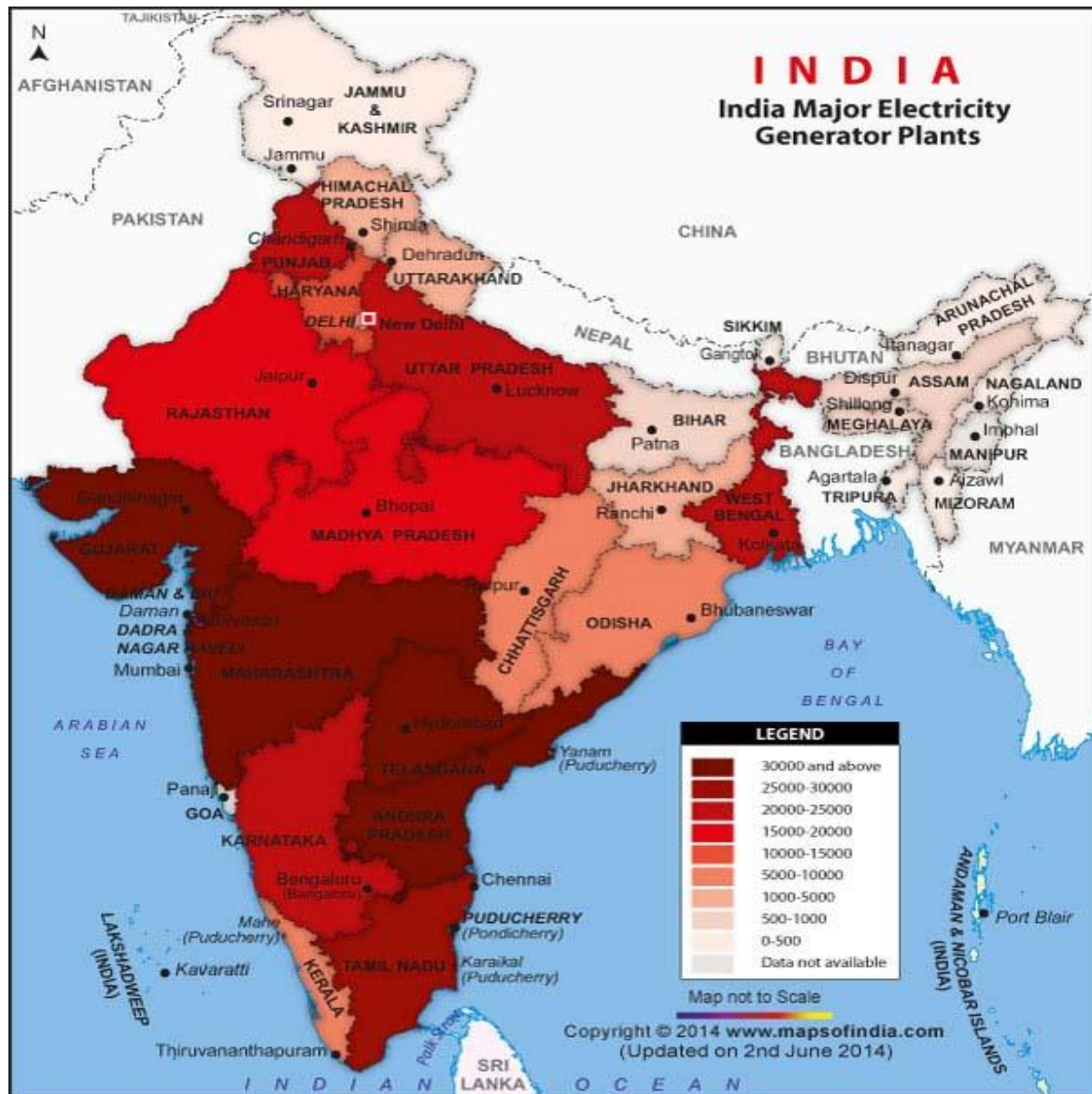
The simplest one is to just increase the generation capacity to meet the demands. The most important one is to adopting certain strict energy policies. Third one is one of the most neglected aspect of the energy sector. The energy conservation can play a significant role in reducing the energy demand. Which is a two-way benefit for consumer and supplier. We will now see each method in detail.

### 2.1 Energy Generation

Energy generation can be classified into fossil fuel and renewable energy sources. Fossil fuels includes generation by coal, gas, diesel, etc. The renewable sources include

generation by solar, wind, geothermal, tidal, hydroelectric etc. India has major electricity generation by coal. This is the most economical choice in India. The second most used is hydroelectric then followed by renewable sources.

The most expensive is nuclear energy and it would be best if further projects of nuclear are not undertaken, because of two reasons, first the fuel is hazardous and toxic, god forbid we don't want to repeat the horrific incidents of Chernobyl and fukishima. The second reason is the high cost.



So we can conclude that the best option is the renewable source. The second best is the coal and natural gas. The nuclear energy should be avoided as it is both expensive and hazardous. Now let us see the challenges faced by the generation sector

### Ageing of Power Plants

Every power plant has a specific life time generally it is about 50-60 years for coal based thermal power plants.

As mentioned above most of our country's power comes from coal. The current power plants have completed almost 45-55 years of age so we can predict that they will be expired within 5-8 years.

### Lack of Water

This is the biggest problems for coal and hydroelectric power plants. Lack of rainfall in some regions of India have forced shutdown of certain power plants. This increases power cuts and power instability. It is also seen that after

remaining closed for a long time the power plants have difficulties in starting again.

### Poor Maintenance

There is lack of anything like preventive maintenance. Maintenance is carried out only in the case of failure or breakdown. This is due to lack of fund, Negligence, inefficient workforce etc. Especially the distribution substations are having worst scenario.

### Improper & Faulty Design

The method of developing the substations, electric lines, installing of transformers etc. by private project developers and by giving contracts to the private companies have given rise to different designs, Corruption, Cheap equipment and even loss of government funds. In the end we get a system with different designs, and this gives rise to faults.

### Long Recovery Time

In case of a fault we have observed that a lot of time is 'wasted' just to locate the fault in the line. The utility workers have to travel 2-4 km along the line to locate the fault.

This is due to the old systems, due to the absence of automation technology and sensing elements like fault detector, voltage and current sensor etc.

### Lack of Fuels and Resources

The poor conditions of roads in India have slowed the transportation. A smooth network of roads and railways can speed up the economy by seven folds. It is seen that the coal is not delivered to the plant on its date and time due to lack of railway tracks and roads. The mining operation of coal mines is also very slow. The growing demand of power needs more and more coal. But the supply is not constant. There is a need to boost up the mining operation.

## 2.2 Possible Solutions for Generation Sector

1) New Plants should be set up preferably **solar, wind, Natural gas, and diesel**. These type of plant require very **less time** to set up and start generation. This will reduce our dependency on the water and coal resources.

2) In case of solar panels the best option is to install them at the rooftops of houses rather than wasting precious land for them. India is an agriculture based country we should try not to waste land and water resources.

3) For Rural Electrification the best option is to use **waste to energy policy**. Using waste like bagasse, biogas, biomass and off-grid solutions. Spending crores of rupees just to install transmission line to reach a few consumers in rural places is absolute useless and waste of resources. Instead stand-alone systems or off-grid solutions like bagasse cogeneration, diesel generation etc. is the best option.

4) Proper maintenance need to be carried out. This can be achieved by providing proper guidelines to the workers and arrangement of funds. The standard of substations, lines, plants etc. Should be closely monitored and made compatible with the international standards.

5) The projects of power sector should be given to a **PSU or semi govt. based organization or big private companies** like Tata, reliance power, adani power etc. This will ensure that the design remains same and unlike private companies the tendency to install cheap equipment's will stop. Further if this is not possible certain standards should be set up and made to follow strictly.

6) The old system should be replaced by new ones particularly the **protection systems and monitoring systems**. Use of voltage, current sensors, power meters, fault detectors etc. This will help to reduce the time to overcome a fault. The idea of smart-grid can also be used.

7) More focus should be on the **waste to energy policy** in the urban areas like **MSW** (municipal solid waste) generation, Biogas, biofuels etc.

8) **Bio gas production** from animal waste should be done at rural level. This will satisfy the **methane gas demand** at local level itself and will also generate **electricity** and **fertilizer** for farmers. This should be encouraged as it will empower the farmers and help India eradicate poverty.

9) In urban and metro cities, the people should be encouraged to install **solar panels on rooftops**. Solar panels can be given on **rent basis** as they are very costly. Also vice versa is possible.

10) Large commercial buildings like offices, shopping malls, hospitals, banks, airports etc. should be made to install solar panels as they can afford it rather than the common people. This will reduce the energy demand by three folds.

11) The coal mining operation can be **partially privatized** in order to meet the demand. Also there is need to build infrastructure for transport sector. **Good network of roads and railways** can **increase the mobility** of the **goods** and services giving boost to our economy. **Timely delivery** of fuels for power plant is very **important** to keep the **plant running**.

## 2.3 Energy Related Policies

Energy policies play a very important role in tackling energy crisis. Recent example of china's policy regarding electric cars only, have created a golden opportunity for electric car manufacturers. On the other hand, traditional car manufacturers have suffered a lot. This shows how important the policies are. Now let us see the policy related problems

### High Cost of Electricity by the Private Companies

A lot of power is generated by the private sector. The tariff imposed on the consumers is high. There is no such policy to punish the defaulters who charge more than the standard price.

### Corruption and Losses

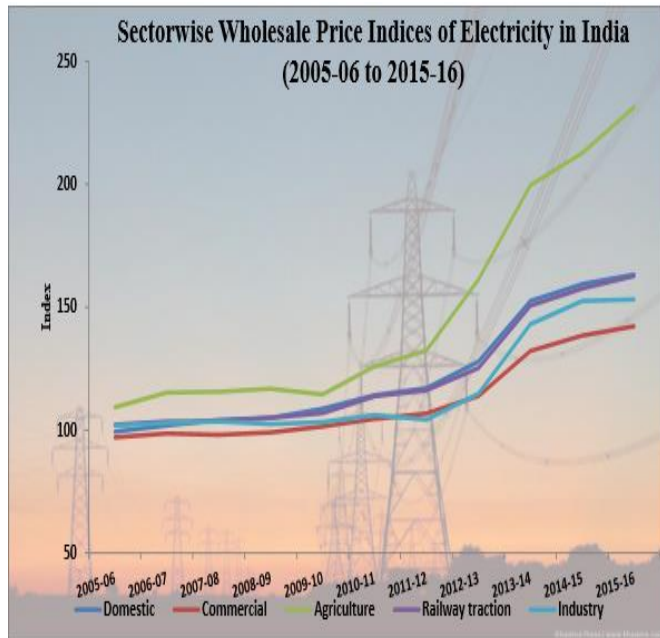
The high level of corruption in the utility services increases the smooth functioning of the system. Lack of funds for the repairs, maintenance, increases the faults and reduces the efficiency of the complete system. There is no such policy for punishment of corrupt employees of utility services. Which in turn encourages them.

### Absence of Official Independent Body

There is no such policy for energy security, nor there an independent body for electricity. There is no such thing as the national electric program.

## Lot of Regulatory Bodies

There are many regulatory bodies like CERC, PNGRB, NEP, IEX etc. This creates overlapping powers and sometimes conflicts. This reduces efficient mechanism of regulatory board.



## Possible Solutions to Energy Policy Related Problems

- 1) First of all a single independent body should be commissioned to look after the problems related to electricity like energy security, rural electrification, etc. The body should be kept accountable.
- 2) There should be decommissioning of all regulatory boards and a single board should be commissioned. Issues like the Tariff regulation subsidies for rural areas etc. can be handled much more efficiently and smoothly if there is one body.
- 3) There should be transparency in the system, this can be achieved by online bill collection system.
- 4) There should be policies regarding corrupt employees of utility system. The defaulters must not go unpunished.

## Energy Conservation & its Importance

Energy conservation is one of the most neglected aspect of power crisis. Energy conservation is the reduction of the usage of energy by using cost effective & energy saving equipment's. Energy conservation reduces the demand of power. This helps us to reduce the demand supply gap. Energy.

India has done more than expected in the field of energy conservation. Bodies like B.E.E have proven to work well.

But still conservation has to be stepped up in commercial sectors.

A policy should be made making it mandatory for all the commercial building to carry out energy audit once every 3-5 years. Buildings like shopping malls, hospitals, offices etc. are large consumers and demand can be reduced if energy audit and conservation is done.

The products which consume huge chunks of power should be banned. Banning of Neon lights, Incandescent bulbs, etc. can bring out significant change. Even today incandescent bulbs are used in rural areas because they are very cheap as compared to CFT or LED. But power consumption of Incandescent is 5-7 times more than conventional LED or CFL.

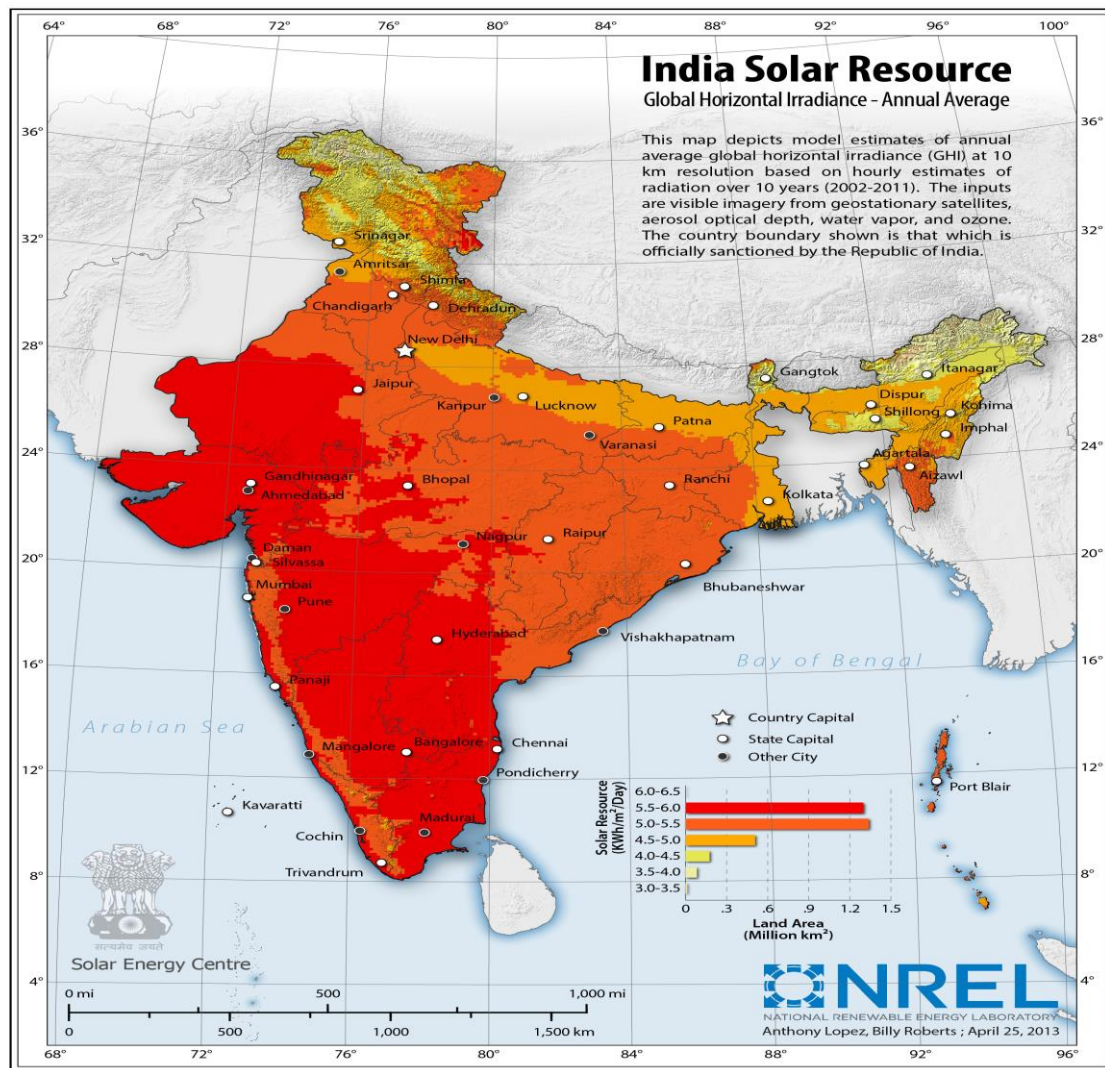
There should be a policy regarding the design of air conditioner, refrigerator, water heater etc. which allows them to consume less energy. This would enhance the competency among the manufacturers.

## Problems Related to Energy Sources & Its Solutions

### Solar Energy

Today solar energy is the best option. but since it is costly. Further India is an agriculture based economy wasting large chunks of land for installing the solar arrays is not fair.

The best option is to install them at rooftops of buildings and houses. Another problem is the high cost of maintenance of the solar plant. This is due to the storage problems for electricity. Recent innovations like Flywheel energy storage could be used to reduce the cost.



### Solar Manufacturing Industry

Today world is rapidly opting for solar energy. This has created a huge demand for the industry. India should use this opportunity to enter the global market. To enter the market, the industry should bring innovations in solar products. India should put more resources to make itself competent in the growing solar industry. A special focus should be on developing solar panels which generate more energy per sq. meter. This could reduce the area required for solar panels.

### 3. CONCLUSION

After studying the problems and solutions we can see that India needs to invest more and more in renewable energy sector particularly solar energy. This is the perfect opportunity for India to enter the global market of solar manufacturing. India has done a lot in climate change protection and more such activities could push India to leadership role in combating climate change.

India should invest heavily in research and development of innovative solar products. Rural electrification should be done by off-grid stand-alone systems like biogas, bagasse, MSW, biomass etc. This will empower the rural community.

An independent electricity body should be commissioned to look after energy related problems. A single regulatory board should be established. Further research is needed to solve the problem of energy storage in solar energy sources.

Nuclear energy should be avoided as they are expensive and toxic. Coal based power plants need to be connected to coal mines effectively. The system of executing the projects by using private partnership has given rise to corruption, faulty design and even lack of funds. So a PSU, semi-govt., govt. based body should be created to execute such projects. This will reduce the Faulty design network and standardize the power system.

## ACKNOWLEDGEMENT

The statistical data used in this paper belongs to their respective owners. They are represented here for educational purpose only.

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