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# Green Energy and the Human Habitat (Indian Scenario)

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**ABSTRACT:** Human habitats before the 19<sup>th</sup> century and after the 19<sup>th</sup> century have a large impact on the use of energy in the residential sector. Before the 19<sup>th</sup> century we found green and clean energy is the basis for planning of any habitat as no industrial energy demand. Total energy requirement was for lighting and minor industrial work, and both are fulfilled by vegetable oil and man-made coal. Major light, cooling, and processed food or sun dried food was totally depending upon use of sun and wind direction. Macro to micro elements in the town were placed and oriented considering the availability of sources of green energy like, sun light, river water flow and wind direction. Hydropower, Wind power and solar energies are the energies which never have any end. On the other hand all non-renewable energies like oil, natural gas, coal, and nuclear energy are having some limitations. In the early 18<sup>th</sup> century renewable energy sources were replaced by non-renewable energy, after the discovery of fossil fuels. Biomass fuel was used for heating homes before the 18<sup>th</sup> century but having its limitations it was majorly used in rural areas. In 1927 wind turbines were popular in rural areas of US and this is first presence of man-made renewable energy use. For lighting in ancient India, clarified butter processed from Cows milk, Pancha deepam oil / mix of five oils for lamp (Cow ghee - 20%, Sesame oil or Coconut oil - 35%, Mahua oil - 20% , Neem oil - 10% and , Castor oil - 15% ), Sesame oil, Mustard oil, Coconut oil, Neem oil , Mahua oil , Castor oil , Jasmine oil etc. are used for lightening lamps. These are also blended with other oils for smooth use. Animal oils are not popular because of their religious backgrounds.

In today’s context, the main use of energy in human settlements are for street lighting, lighting use for residential and commercial buildings, Fossil gases for cooking, cooling of rooms and Industrial requirements and many more uses.

In ancient times the main and first source of energy was the sun; it provides light and heat in day time. Second source is dried wood for heating, cooking and basic industry operations. The Industrial Revolution in the 18<sup>th</sup> century need large energy in minimum time and for 24 hours for all 7 days, its necessity discovers electricity generation. James Watt is the

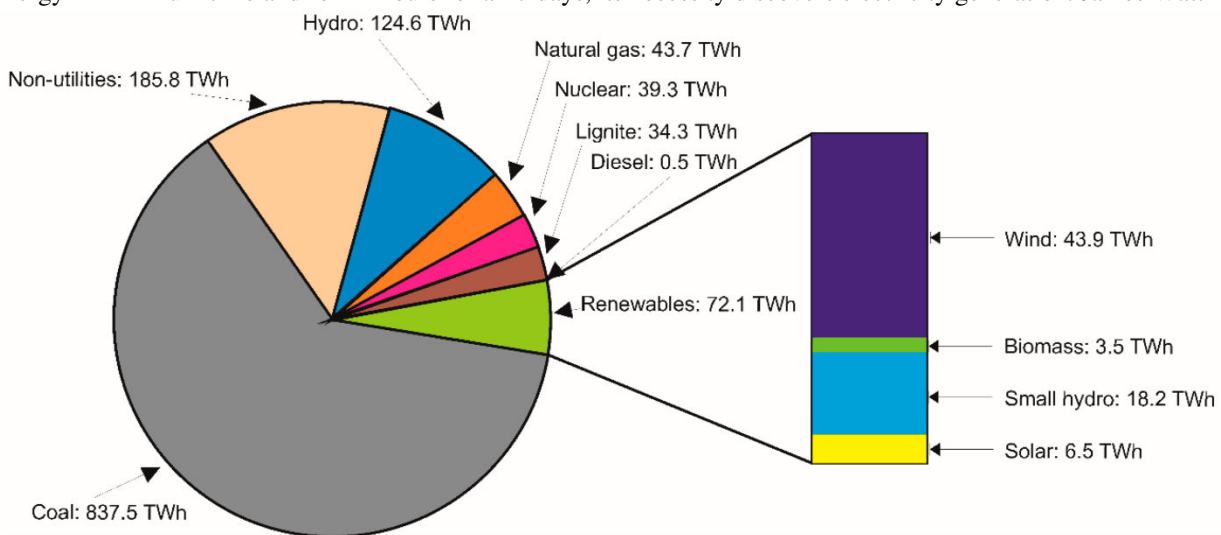


Figure 1 - Sources of Energy

first person who patented a coal powered steam engine and the rate of production has increased. In 1812 Fredrik Winsor thought about public gas distribution and created a company. This gas supply line provides light, heat and energy to millions of peoples and it changes the lifestyle of peoples and increases demand for goods required for status



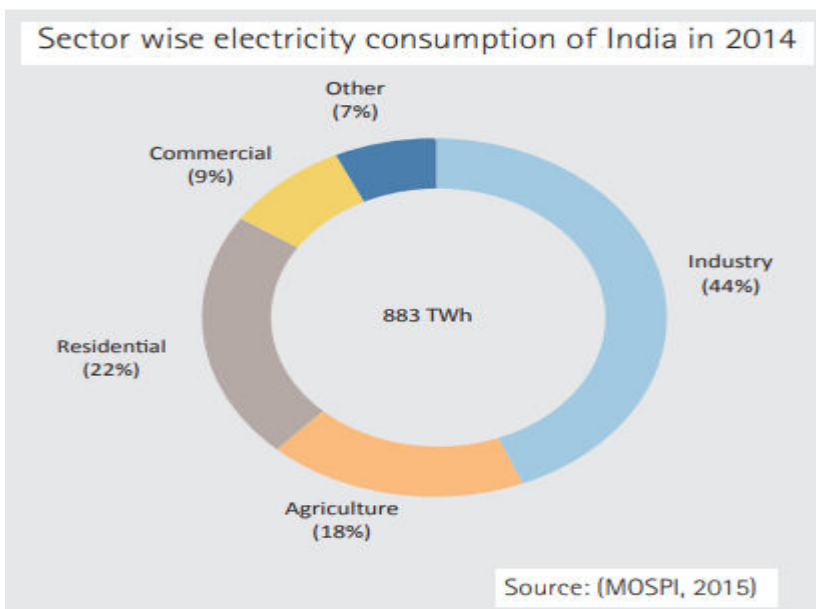
in society. After this discovery of use of non-renewable energy sources we lost more than 60 % non-renewable energy sources within 200 years. The prediction is that we have oil for 50 years, gas for 53 years and coal for 114 years. It's time for us to convert our energy sources toward renewable energy. In 1839 Eduard Becquerel studied photovoltaic energy and discovered solar power. But difficulties in production of photovoltaic energy units it's on the back foot and today also it's not popular. In 1878 first hydroelectric plant started in the UK and in 1888 first windmill started in Cleveland Ohio. Edison Electric Light Station in London was the first coal fired power station.

All non-renewable energy resources in the world are used to develop human habitats and improve the lifestyle of human beings. Excessive use of it is now creating hurdles in constant electricity supply and will change lifestyle after some years. Without renewable or non-renewable energy sources it is difficult to create human habitat.

**KEYWORDS:** Green Energy, Human Habitat, Renewable Energy, Non-renewable energy, Green Habitats, Energies and Vedic Architecture

### I. INTRODUCTION

Quality of life in any human habitat is depending upon availability of energy in that area. All oil importing countries are seriously affected by the high rise in cost of energy and fear that, what will happen after the end of this oil stock? Many countries' supply and demand is always reversed and it affects their national economy. Various energy factors are having a crucial impact on human habitat (Settlements) like, sudden increase in energy prices, changing energy situation, changing technologies, Technical and economic difficulties, etc. Energy availability factor also affects the changing pattern in human settlement as per supply of energy. In developed countries, energy supply is ample and the human settlements are well developed with various luxurious amenities. But in developing countries this human habitat is in basic form and struggling for 24 hours supply of energy. For concentration of population, growth in economy, high productivity and employment we need large expenditure on energy. Due to high demand of energy commercial fuel is used in residential use and its effects on production units in industrial areas. In today's scenario before planning any human settlement or town we have to think about supply of energy. It's important now to increase use of renewable energy in housing areas. In the coming years, energy production will be the most important asset of a country and the economy of that country will depend upon it. Settlement patterns of the neighbourhood will be changed and will be friendlier to renewable energy. Vedic architecture planning (Vastu Shastra) will be the base for planning as its planning concepts are based on natural energy sources. Human settlements are consuming more non-renewable energy compared to their needs. It is wastage of energy sources and will minimise the production activity. Figure 2 gives consumption of electricity in India.



A survey on energy access and consumption patterns in India by IRES (India Residential Energy Survey) 2020 shows the pattern of use of energy in household areas. The survey was carried over 21 most populous states, 152 districts and 14850 households. The consumption pattern in India is shown in figure 02.

Figure 2 - Sector wise electricity consumption

Electricity supplied by the government is more used in urban areas and dung cake, firewood chips are used in rural areas. Use of government supplied electricity in urban areas is for lighting, heating, air-conditioning and industrial use. In rural areas the use is only for lighting and for agriculture use if electricity is available. Proper utilisation of energy will balance the supply of energy and pollution by non-renewable energy. Green energy is a perfect solution for supply of electricity and other energy sources and it is possible through land use planning, building planning, and appropriate transportation systems. Innovative approaches, adoption of new techniques, increasing awareness about use of renewable energy, small scale renewable energy production units will fulfil basic needs of energy supply in urban and rural India. To reduce electricity consumption, traditional planning concepts like Vastu Mandala or Vastu Shastra principles should be adopted.

**Energy Scenario in India and use in Indian Households**

India is in 3<sup>rd</sup> position for consumption of energy and it denotes the improvement of standards of living. Energy use has

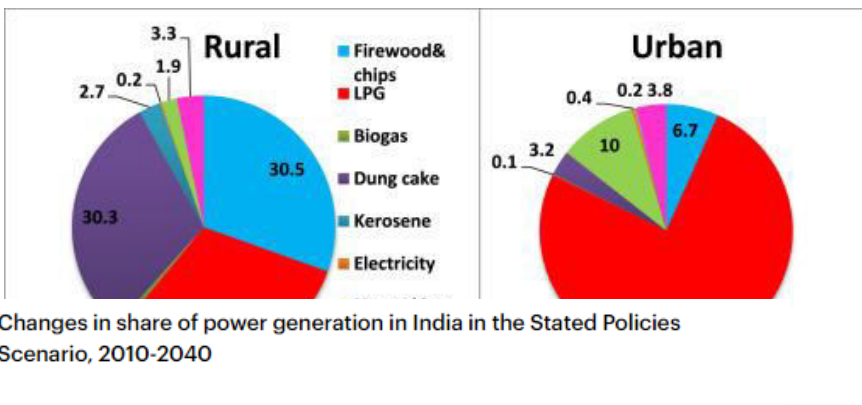


Figure 3 - Consumption Pattern in India

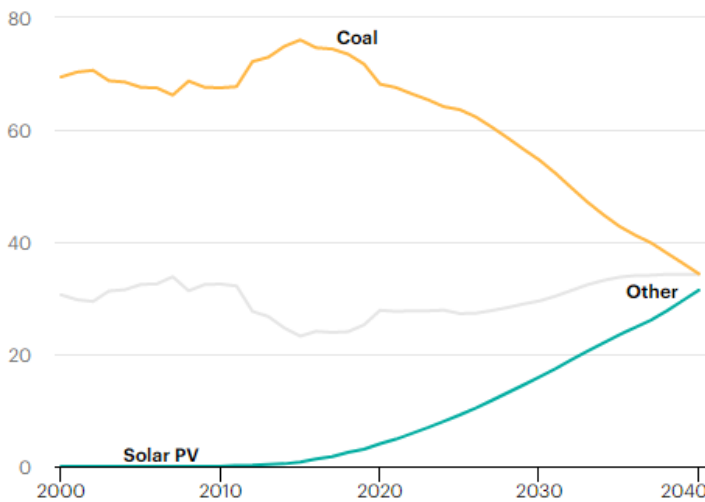


Figure 4 - Coal and Solar Energy Production

nearly doubled in the last two decades with 80% support by non-renewable energy and 20% support by renewable energy. India will be the most populous country in the world within a few years and demand of electricity will increase proportionality. Solar energy and wind energy will be the alternate sources and the government is targeting to replace coal by solar up to 2050.

British Petroleum conducted a survey about energy consumption in the Indian Market in 2020 and found the following statistical data.

(Facts are written as it is)

- 1.Primary energy consumption in India decreased from 33.9 to 32.0 EJ, a reduction of -5.9%, in contrast to the 10-year average of +4.7%.
- 2.The combined share of energy consumption from oil, gas and coal fell from 90.6 to 89.7% and for renewables increased from 3.9 to 4.5%.
- 3.Indian coal consumption declined by 6.0% in 2020. At a global level, India accounted for 17% of the total decline in coal consumption.
- 4.The share of coal in India’s primary energy mix in 2020 was 55%, compared to 27% at a global level and India still accounts for 11.6% of global coal consumption.

- 5.The decrease in coal consumption was accompanied by minimal (0.4%) increase in domestic production. India was the third largest producer of coal in the world in 2020 (behind China and Indonesia)
- 6.Natural gas consumption increased slightly to 60 bcm (0.3% increase). The share of natural gas consumption in India’s primary energy mix increased to 6.7% in 2020, compared to 6.3% in 2019 and 8.2% in 2009.
- 7.Total electricity generation declined from 1,604 to 1,561 TWh, a decline of 2.9%, in contrast to the 10-year average of +6.2%. Coal’s share in power generation declined marginally from 74% in 2019 to 72% in 2020. Renewables generation increased from 139 TWh to 151 TWh.



8. Indian natural gas production decreased 11.9%, the largest fall since 2013 and compared to 10-year average decline of 3% p.a.

9. Indian biofuels production decreased from 21.5 to 19.7 kboe/d. (thousand barrels of oil equivalent per day; natural gas volumes are converted into oil equivalent using a factor of 5,800 standard cubic feet per barrel.) A reduction of 8.1% in contrast to the 10 years average of +26.2%.

10. CO<sub>2</sub> emissions from energy use decreased by 7.1%, compared to the 10-year average increase of 4.5%.

Studying all above points it is clear that Indian energy production should be diverted towards green energy. Renewable energy is a perfect solution to fulfil the energy requirement of an Indian household.

India is in 3<sup>rd</sup> position in consumption of electricity and production of renewable energy with 38% energy capacity installed in the year 2020. Commonly solar energy is used in Indian households by installing small solar panels and small charging batteries. Currently the central government of India introduced a scheme of “Net Metering” in which a producer can directly feed the produced energy to the national electricity grid so his battery expenses can be reduced and he has no limit to produce the solar electricity. Indian homes are using tripled energy consumption as compared to 2000 as the central government announced a scheme of “Electricity to each household”. Same with LPG use it to 62% in 2016 to 94% in 2019. Average household consumption in India is 5.7 KWH/day and which is less than predicted value (7.3 KWH/day).

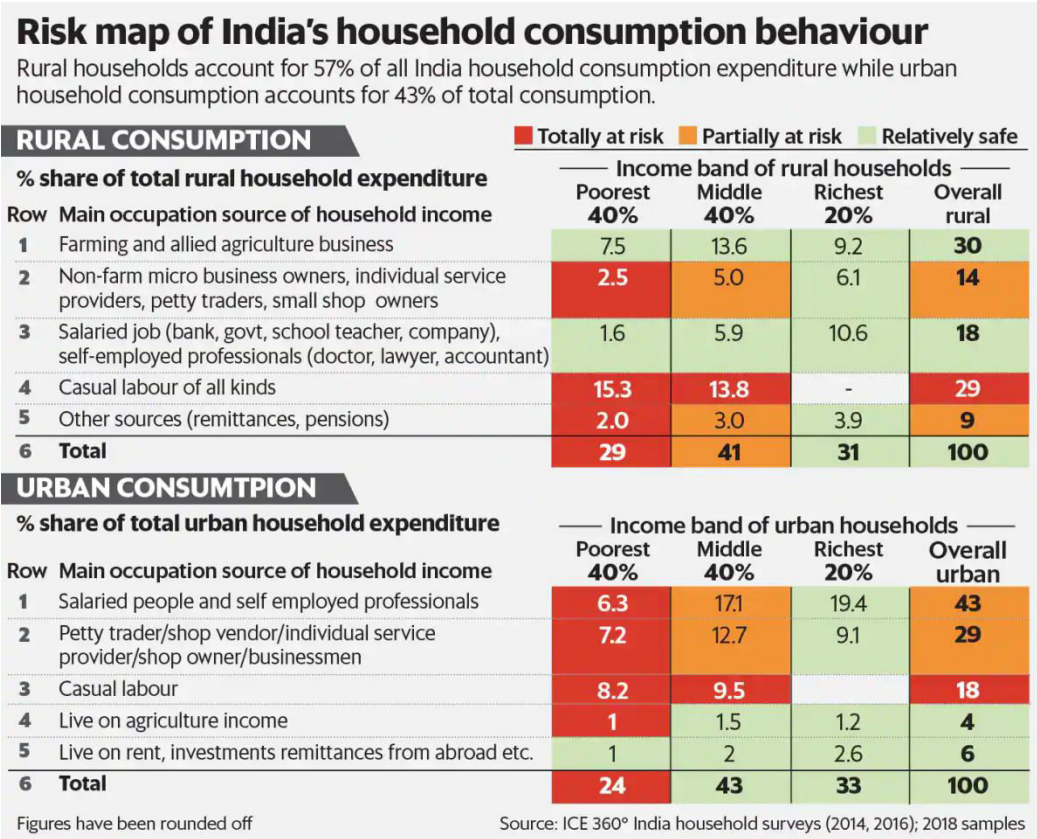


Figure 5 - Risk Map of Energy Consumption

tops are now popular to save electric bills. Diesel generators are also a second alternative to continuous power supply or any interruption in the national electricity grid. These alternative energy sources are also considered in REC, but solar water heaters are not considered as an electricity source hence solar water heater is not included in REC. Electric vehicles are also part of REC and it is projected that in 2030, 30% vehicles will be electricity operated. REC is about 25% of total electricity consumption and expected to increase in future due to technology development, increasing income, affordable prices of various appliances and rapid electrification in the country. REC will be more beneficial in three ways. With better energy conservation and efficiency programs, better planning for consumption and better adoption to new technologies and business models.

Census and various surveys like NSSO (National Sample Survey Office) and IHDS (Indiana House Democratic Caucus) provide various observations on REC.

1. All households are not electrified.

Residential electricity consumption (REC) used by Indians has main purposes as cooking, cooling rooms, refrigerating, water lifting, television and majorly for lighting. Combination of energy sources is also common in India like, use of stove with electricity or biomass or kerosene or solar power. People may use electric water heaters or solar water heaters, but REC is considered for only electric use. Mostly electricity supply is provided by state or central

governments, private solar roof

2.Many electrified houses are not using electricity as it is expensive or not reliable.  
3.90% of urban households use electricity as their primary source of lighting.  
4.60% of rural households use electricity as the primary source of lighting.  
5.Unauthorised connections are more in rural areas.  
6.20% households use less than 30 units (uses are one tube light, one ceiling fan and one incandescent bulb), 80% use less than 100 units (uses are four tube lights, two CFLs, a TV, four fans, small refrigerator and small kitchen appliances).  
The above energy calculations are for non-renewable energy sources. India is having its target of producing 500 GW as renewable energy sources by 2030. Energy saving is as equal as energy production. Architects and urban planners can contribute to this energy savings by planning green buildings, ancient Vedic architecture or Vastu Shastra are having various methods to use natural energy sources. Deep study of these traditional sciences and use of it in micro level households will be beneficial to energy savings.

## II. ENERGIES AND VEDIC ARCHITECTURE

Vedic architecture is also called “Vastu Shastra” and its meaning is science of architecture. Vastu word deals with pure, subtle and energy embodied in the materials. Various treatises like Mayamata, Manasara, Samarangana Sutradhara, Brihat Samhita, and Raja Vallabha Mandanam are giving details about how to use these energies in human settlements. Vedic Architecture is considered as a core of the sustainability architecture ideas. Vedic Architecture deals with four main topics, namely: Bhoomi (Earth), Prasada (Buildings), Yana (transport mode), and Sayana (Furniture). All the treatises have instructions and building codes related to the process of developing the built environment and uses of natural energies in the building and for the urban design. All codes and principles in Vedic Architecture are physically verified and presented in religious language. Vedic Architecture utilises the sun rays, the geopathic zones, the concentric zones, and the magnetic poles. The concept of ten dimensions in Vedic Architecture is based on the climatic considerations of each direction. The Rishi – Munis (Scientists and researchers in ancient India) had various research and developments in this science and found that there are various effects of all directions in the human system and proper orientation of built space with energy grids is useful to human health and the optimum use of natural energies. New concept of Green Energy Building also says the same thoughts in today’s scientific language. Vedic Architecture allows buildings to absorb energies emitted by sun, moon, stars and earth. They also found that all energies are poured through the directional lines into the centres of houses and it is called “Yonies’ “. That’s why the orientation in cordial direction is more important in Vedic Architecture.

Earth has an inclination of 23.5° in its vertical axis; therefore northeast is the first direction which receives the sun rays. Same happens with the west direction and maximum sun rays are available in the southwest zone. For daylight use southwest direction is useful and for minimum use of daylight or cool effect north east is preferred. Kitchen required light throughout the day hence its location is in the Southeast corner as it receives sun rays from morning to evening. Sun rays are having infrared and ultraviolet rays: morning infrared rays are having various beneficial effects on the human body and purifying effects. Hence underground water storage suggested in northeast and overhead water storage is suggested in southwest to kill bacteria by using sun rays heat. To protect excess heat it is suggested that southwest should be heavier i.e. wall should be thicker and minimum openings. This N-W to S-E path divides the building in hot and cold zones. Meditation, study, administration, library are placed in cold zones and other activities are placed in hot zones with taking care to enclose the southwest totally. Which part of the building is used at night only like bedrooms, was located in the south direction or in the hot zone.

## III. THE PRINCIPLES OF MAGNETIC POLES

Magnetic needle always shows the north-south direction of the earth’s magnetic energy field. Earth’s inner core is metallic and has temperature equal to the sun’s surface temperature. Rotation of earth with this liquid state metallic core creates dynamo effect and it converts the earth into a geo dynamo. Earth’s magnetic field is strong due to existence of metallic element which is capable to carry generated electricity and compressed hydrogen element. All this activity makes earth’s magnetic energy field stronger and we call it “Earth’s Aura”. This earth’s aura is protecting the occupants on earth from radiation of the sun by deflecting the solar flares. The magnetic field is always travelling from north to south and it makes north direction with antibiotic properties. Energy received by south direction and it makes south direction more warmth, north direction is energy relieving and is more calm and cool. North part of the plot is always energy positive and south part is full off negative energy. These fundamentals are used in Vastu Shastra for auspiciousness of directions and its appropriate functions. The cosmic energy is received by the north-east direction and

released towards the southwest, and it's become weaker in this flow towards southwest. Therefore in Vastu Shastra, northeast section is suggested as lighter and lower level compared to southwest. The plot slope is also towards north is considered as good, because of this flow of magnetic energy and effects of cosmic energy.

#### IV. THE PRINCIPLES OF GEOPATHIC ZONES

Geo-biology is a study of the interrelation of energy fields, earth and living organisms on it. Earth is nothing but an energy grid and influenced by electricity, magnetism, light, colour, heat, sound and matter. The earth's energy pattern works in a particular geometric pattern and creates various positive points as we used in acupuncture theories in the human energy body. Grid network of energies from northeast to southwest and from southeast to northwest is called a Bio Electro Magnetic (BIM) grid and helpful to the growth of cells. The crossing points in this grid are having various positive and negative impacts on the human body. Dr. Manfred Curry linked these points with various diseases and said that sleeping on negative energy charged points will create inflammatory diseases and sleeping on positive energy charged points will create cancer. Sleeping within the grid lines will keep you healthy. Dr. Hartmann gives the theory of "Hartmann lines" and these are flowing from north to south and east to west and beneficial for the formation of bones in the human body. These lines are cardinal lines and have concepts similar to Yin and Yang. Yin (north-south) lines are related to cold energy fields which act slowly and are responsible for cramps, arthritis and humidity in the human body. Yang (east-west) generates hot energy fields and gives quick effects and is responsible for all inflammatory diseases. Vastu Purush Mandala is a concept of Vedic architecture and gives the same grid and point format. Space within each grid as per its directional location is related to positive or negative impact on the human body. Ancient Vedic civilization is more advanced about these planetary grids and creates a grid of 9 X 9 rows creating 81 blocks. These 81 blocks are related to 45 Devas (God) and give effects as per its energy levels and types. Geopathic stress creates imbalances in energy fields and is responsible for "sick building syndrome".

Sick building syndrome (SBS) is due to improper building planning and use of materials, that's why people are again going towards traditional architectural methods. SBS is common now and mostly found in modern houses, over glazed buildings, under daylight houses, extremely used synthetic materials buildings which cause electromagnetic confusion and high rise buildings. All these buildings are detached from nature and totally non-renewable energy dependent and unhealthy. Vedic architecture is having solutions for how to relate or attach buildings to nature, taking benefits of natural power and energy reductions in buildings.

SBS has various diseases like headaches, learning disability, irritability, fatigue, asthma, dermatitis, various flues, bronchia, throats problems, and eyes problems. In Vedic architecture all these health issues are explained in symbolically or coded languages and without deep study and code language, common man considers this as myths. Excess use of mobile phones also creates similar types of diseases in the human body and modern science techniques prove it. Negative energy in houses makes clouds and it is well known as "Stress Clouds". Stress clouds form because of various reasons such as death of a person, social and economic losses and this is trapped in building parts, figures and forms. There are no answers to the sudden increase in pulse rates, increase in home ants and termites, hotness or coldness of specific room or floor, dogs barking at night while looking towards south or southwest, frequenting of cats in house, uncommon accidents in a specific room, SBS experts says all these only because of unhealthy planning of building. Stress clouds may harm or affect individual response for bio electromagnetic levels. Vedic architecture or Vastu Shastra proves its importance while planning of building or designing towns by using the various methods of nullifying the effects of stress clouds. Scientists have not yet discovered the thoughts behind the Vastu Shastra principles.

#### V. THE PRINCIPLES OF CONCENTRIC ZONES

Square grid planning is the most popular in the world, as it establishes a potent, energetic and healthy environment. Many cultures from America, Egypt, Europe and India are having examples of concentric forms of squares used by architects and artists symbolically showing the centre of the universe. Temples, Pagodas and step Pyramids are good examples of use of squares and ending it into the centre point at the top most level of the structure. In Indian culture "Lord Brahma" is considered as creator, "Lord Vishnu" is survivor, and "Lord Shiva" is destroyer. Brahma has the top most position, everything starts from him and everything ends with him. In planning this concentric form is found. Vedic architecture planning starts from the centre part of the building and that place is called "BrahmaSthana". This is the focal or centre point of planning. Symbolically; Bindu (Center Point) is the navel of the universe and everything takes birth from this point, its sacred concept of Hinduism. Two points are concepts of duality,



Shiva-Parvati in Hinduism and Yin-Yang in Chinese culture are concepts of origin or source of presence of the physical world. These two points are male and female in our physical world. Three points or triangles are called the mother or process of creation from the two abstract geometrical shapes. Four is the final product of; Bindu's (Single point), two points and three points. This philosophy gives birth to rectangular dwelling units. Advantages of rectangular units are; perfect geometrical shape, structurally strong, economically viable, require less quantity of building materials comparing useful available inner space to other geometrical forms. Considering these, Vedic teachings say that square is a perfect harmony with human proportions. The birth of "Vastu Purusha " in Vedic architecture is related to these proportions and energy earnings from various planets from the universe and nature.

Maximum natural energy use or energy savings are symbolically quoted in Vedic Architecture principles. The concept is of four concentric circles; the inner circle is called as "BrahmaSthana" which is highly charged, second from inner side is "Devika Pada", third from inner side is "Manushya Pada", and fourth outer is "Paisachika Pada". Inner two zones should be open or minimum walls, third zone should be constructed for security and privacy and fourth last one should have strong walls for security for the outer side. Inner two are for gods and the third is for humans and the last is for demons. Humans are breathing from the nose and the skin, the nose is breathing inside while skin is breathing from outside. This concept is also applicable for building planning, inside should have a courtyard with window openings and outer walls with window openings. This philosophical concept to utilise natural energy or protection from it is a base of Vedic Architecture.

## VI. CONCLUSION

Human habitats are very familiar to green energies from ancient times. After the industrial revolution energy requirements suddenly increased and various sources of non-renewable energy were discovered. In just 200 years we consumed more than 90 % of non-renewable energy. Expert's opinion is that in the next 50 to 100 years we will lose all non-renewable energy sources. After digging or pumping the sources below from ground level, there were big cavities underground and that would also create sudden collapse of grounds, farms, hills, and cities in those cavities. Earth planets will also have major changes in its rotation or axis of tilt. Many principles in Vedic Architecture are developed considering environmental and climatological factors. Observations of nature and its impact on living organisms and human health are the basis of principles of Vastu Shastra. Today also many practising architects believe that design based on nature is good and they are implementing it on their design. Renewable energy is the future for human habitat and growth in the industrial sector. Proper use of architectural forms, proportions and patterns will lead towards sustainable design and it will decrease the rate of energy consumptions. These designs will also create a micro climate for a healthy environment required for humans. All texts related to Vedic Architecture or Vastu Shastra is old but they advocate the sustainable design procedure. This ancient science of architecture extracts ideas of social, economic and environmental sustainability.

India will require more energy to develop fast and being leading nation in world. To save foreign currency required for purchase of oil, gas and coal will be the priority of India. This is the important factor where India required increasing production of renewable energy. Energy saving is as similar as energy production; here architects and urban designers have an important role to design buildings which will require less energy and utilisation of maximum natural energy. "Zero Energy" houses is a future of India and the world. Today we are near to achieving high technology required for wind power generations. But we are not in race for solar energy production and water mill energy production.



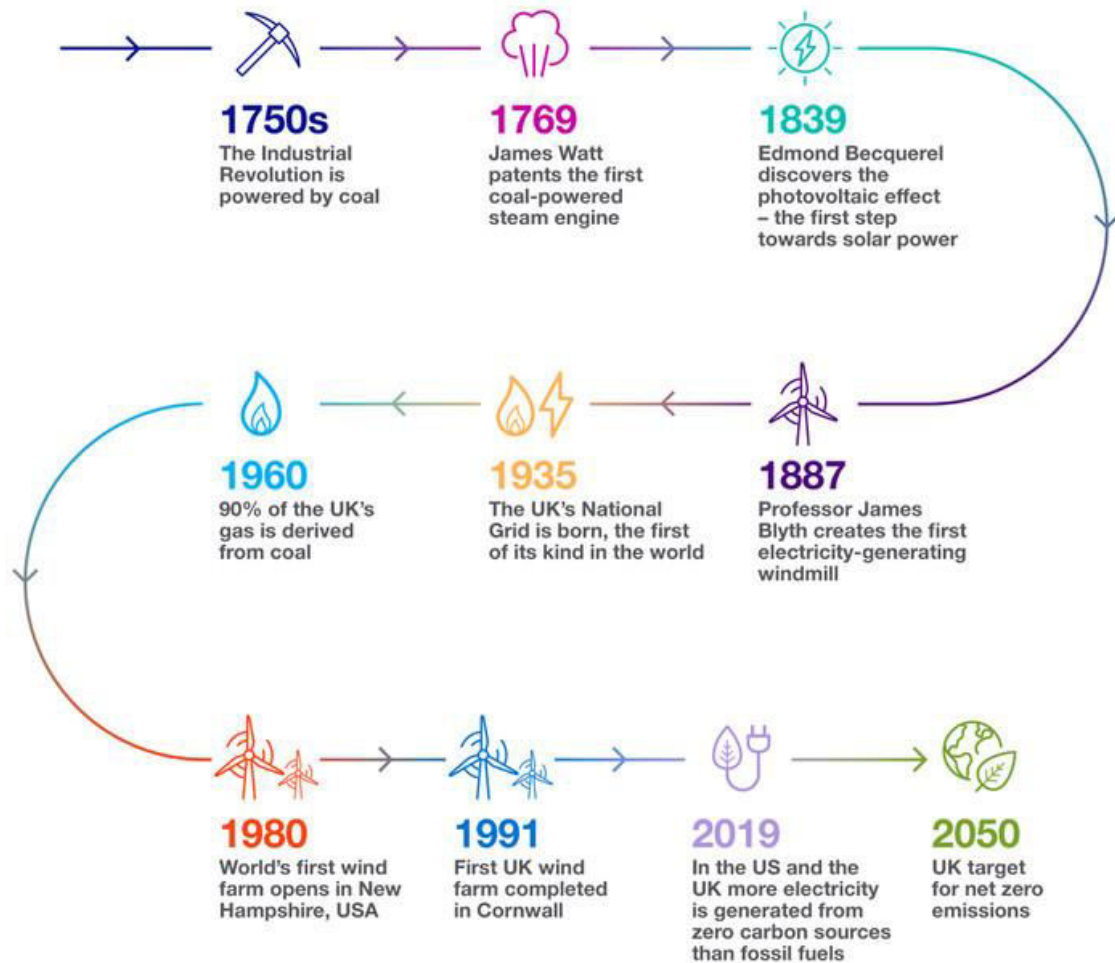


Figure 6 - History Map of Energy

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