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Can "Vastu Shastra" (Vedic Architecture) help in the planning of "Green Energy Building?"

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***Abstract:** This paper aims to present the need of Vastu Shastra (Vedic Architecture) for Planning various buildings planning and construction work. With the help of Vastu Shastra principles, we can reduce water pollution, air pollution, sound pollution, and increasing temperature on earth. It is important to control various man-made energies. Vastu Shastra is based on various energies that come from the atmosphere like solar energy from the sun, cosmic energy, lunar energy, thermal energy, magnetic energy, light energy & wind energy. Vastu Shastra is an ancient building construction science and it also explains philosophy about the human settlement.* [19] *In the Indian context we found that Vastu Shastra is a science that was developed by various sages in the thousands of years. Vastu Shastra is also called the mother of sustainable architecture. The article has four main parts. At the start, it gives a brief about the importance of Vastu Shastra planning in today's life. And in the Second part, it shows the various environmental issues that can be reduced by Vastu Shastra. The third part explains the important role of Vastu Shastra in sustainable architecture. The last part is on Green Energy Building and Vastu Shastra.*

Objectives of Research Paper
Research & analyze the design principles of Vastu Shastra.
Study its use for designing "Green Energy Building".
Develop Architecture (sustainable) development of the society.

Vastu Shastra
Vastu Shastra (Vedic Architecture) is pure science and very close to nature. It depends upon sunlight, wind direction, magnetic fields, underground water and rainwater, and various building materials available in nature. It is based on principles of energies and radiations.
Its reference point is always the "East" direction, which is a true direction. Because of various myths, it is now psychological architecture.
Vastu Mandala (tabular format like a chess game) is a base for planning building as per Vastu Shastra. Various Deva's (Gods) and planets are owners of its squares. Related energies and principles of that respective Deva's (Gods) and planets is a format for planning. It gives the correct positioning of various living areas in a building as per their use. Vastu Mandala is used to absorbing various natural energies, store those energies, and control entries of various negative energies into the living areas.
Pancha Mhabhoota's (Five elements of the earth) like Pruthvi (Earth), Jal (Water), Agni (Sun), Vayu (Air), and Aakash (Space) are another important parts having the main role in planning and it's also known as the medium of Vastu Planning.
We know 8 directions but in Vedic Shastra, two extra directions are given one is "Urdva:" (Up) and another is "Adha:" (Down). These ten directions are playing their role in positioning and placing various openings.
Vastu Shastra provides main guidelines for optimizing benefits from the five elements (Panchmahabhuta) [1]***. Vastu Shastra developed by observations in nature and application in use for planning human habitats.*** [2] ***Vastu Shastra also gives details about color schemes for buildings to balance our mind and body and to stimulate our energy.*** [7]
Globally Acceptable climatological principles and Vastu Shastra principles are having scientific relations in between. [21] ***Climate, orientation, and magnetic field of earth and other planets are three variables that are considered in the Vastu Shastra.*** [12] ***Vastu Shastra (Vedic Architecture) believes in five elements (Panchmahaboota) and various energy fields to enhance the wealth, health, prosperity, and happiness of humans. Vastu Shastra is a combination of astrology and astrophysics which manages cosmic energy in the settlement of human habitat.*** [10] ***Various popular architects like LE Corbusier are also influenced by these five elements and their planning shows the influence of open spaces, orientation, use of natural light and ventilation, etc. Architects like Laurie Baker are famous for using building materials (Mud, wood, and bricks) suggested in Vastu Shastra. It is very interesting that all buildings are having the basis of the "Panchmahabhuta" relation.***

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The main aim of Green Energy Building and Vastu Shastra is the same. In both ways, we want to reduce the impact of the human habitat on human health and nature. These two ways are two sides of one coin. Vastu Shastra is developed for thousands of years and green energy building principles are in the primary stage compared to Vastu Shastra. Both ways are leading towards sustainable development.
Keywords: Vastu Shastra, Green Energy, Vastu Purush Mandala, Sustainable Architecture, Sustainable Development, Five Elements of Environment - Panchmahabhuta, Sustainability Green Building, Conventional Climate responsive buildings,

I. INTRODUCTION

A. General

Today's life is like a bullet train, Human settlement development is drastically changed within 200 years. It's mainly due to findings of the use of non-renewable energies like natural gas, oil & coal. If we collect data from all over the world, we will find that 86% of energy is generated by non-renewable sources (Oil, Natural gases, and coal) and it will vanish within a century. Economic growth and energy consumption both go parallel. More urbanization creates various serious problems of unfavourable changes in climate and causes natural disasters. Many times human settlements are inappropriate and the building materials used are aimless. This causes natural energy losses and creates pollution.

B. Need of Vastu Shastra

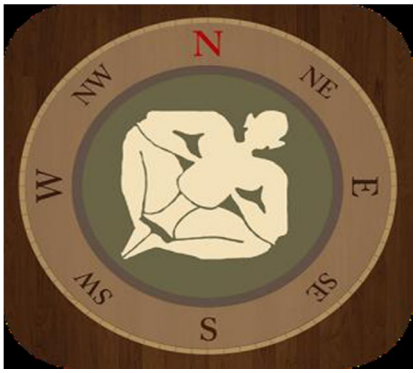
Vastu Shastra (Vedic Architecture) is an ancient Indian science for building planning and construction which was developed thousands of years ago by Indian sages. The sages listed various rules and regulations for the planning and construction of buildings and temples in the Indian subcontinent. [14] Vastu Shastra gives balance and harmony between nature and peoples. Peace, prosperity, health, and happiness are dependent upon living and working spaces. And Vastu Shastra gives directions to build and plan these living and working spaces.

Vastu Shastra is an intangible part of Indian Architecture and found its base in local geology, geography, math, etc. It also has influences from various factors like a site, surrounding, topography, roads, sun, Earth's magnetic and energy field, cardinal directions, and various elements of nature. Vastu Purush Mandala is the best way to understand the rules and principles of Vastu Shastra. Vastu Purush Mandala is a schematic diagram like a chess game and all principles of Vastu planning are symbolically placed in it.

Everything is pre-designed in Vastu Shastra considering, sun energy, earth energy, magnetic energy, wind energy, light energy, thermal energy, and cosmic energy. Vastu Shastra can be used for every human settlement planning, residence, temple, industry, town, etc. In Vastu Shastra "East" direction is considered as a reference point for planning.

Vastu Shastra is written about 6500 years ago, which is the prehistoric
period of the world. It's first explained in "Rig-Veda" Vedic literature in
Hinduism. All fundamental thoughts of Hinduism are written in four Vedas (Vedic Literature in the Sanskrit language), which are Rig Veda, Yajur Veda, Sam Veda, and Atharva Veda. The simple meaning of Veda is "Knowledge" or "to Know" and it gives knowledge about spirituality, natural forces, philosophical theories, and much more.

Vastu Shastra is based upon various elements of nature. In the Vedic period it was divided into five elements (Panchmahabhuta) i.e. earth, fire, water, wind, and space. These all elements are placed in a grid (like a chess game) and the location of the element is as per its function in nature.



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1) *Vastu Principles*

a) *Orientation:* Orientation of a building gives maximum utilization of cosmic energy of the five elements.

b) *Site Planning:* Site planning is important to use maximum benefits from the site for day-to-day life.

c) *Proportion Measurement:* Proportion matters in the aesthetic of the building and a dead load of building for its strength. All length X breadth X widths are specified in Vastu Shastra.

d) *Building Material:* The building material suggested in Vastu Shastra is direct from nature and decomposable.

C. *Benefits of Vastu Shastra*

Vastu Shastra is based on five elements and various energies received from the universe. Planning as per Vastu Shastra gives a calm and cool effect in the living space. Vastu material is close to nature, hence it decomposes fast and it has less pollution.

Vastu Shastra planning is a tested method to bring positive energy to the living spaces. Vastu Shastra may not be essential to planning but it is better and healthier to living habitat. It's nothing but the science of the environment of living habitats. Many animals and birds also construct their living habitat as per natural resources and try to minimize struggle with nature.

Some benefits are as follows

1) *Comfort:* Vastu gives comfort inside and outside also, as it is nature-based science. It maximizes the use of natural resources and minimizes struggle with nature.

2) *Inner Realization:* Vastu planning is an art and it creates places where we can have a meditation and feel near to Bhagwan (God). Vastu gives a spiritual feeling in the living places, where we can look inside us. An inner realization is easy while living in a Vastu home.

3) *Strength:* Vastu talks about the structure. In Vastu Shastra, it is considered that buildings are also human beings and have Aatma (Soul) in it. Vastu (Building) reacts for happiness, dullness and it also cries. Vastu gives us inner strength as well as the physical strength of the building.

4) *Easy to Use:* Due to the maximum flow of positive energy, Vastu buildings are easy to use. Basic principles are the same so a new guest coming in Vastu is also familiar with the location of places. Vastu buildings are very familiar to use.

5) *Best use of Space:* Orientation and placing of various living spaces are predefined in Vastu Shastra; it helps people to create the best uses of spaces. All places are as per nature and its elements.

6) *Good Structuring:* When we construct a home as per our need it is called a good home. And for that, we need good ventilation, a lot of air, natural light and building material which is healthy for our body. In Vastu Shastra, all are above possible hence the Vastu building is good for structuring.

7) *Personality Development:* To develop our personality we need a good environment, good planning, and good structuring. In Vastu, buildings are good for relationships between person to person and with other living animals. It is spiritual and always on the donor's side. A person living in a Vastu building always wants to do something for society.

8) *Enhance Relationship with other People:* People around us are an important part of living style, Vastu creates good bonding and cooperative relationships between all the members of the home.

9) *Use this for Spiritual Knowledge:* In Vastu Shastra, all places of rooms are related to some Deva (God) so it's full of spirituality. People living in Vastu buildings always look inside them when they realize birth, the reason for their existence and death.

II. VASTU BASICS

A. *General*

Vastu Shastra is based upon the relationship of the science of buildings and humans residing in it. Vastu gives benefits to occupants and negligible losses or pollution to nature. Vastu gives balanced cosmic energy around us.

Vastu plays an important role in the construction of building as there are various principles regarding the volume of buildings or parts thereof. We can give value additions to the Vastu buildings by using various modern building materials and use of natural resources. In Sanskrit language and scripts, there are various proofs given about the principles of Vastu to build healthy houses.

In Vastu Shastra we found 3 different energy levels

1) *Cosmic Energies, (Mental):* Creativity, concentration ability, persuasiveness, harmony

2) *Global Energies, (Emotional):* Health, emotions, interpersonal relationship

3) *Telluric Energies, (Physical):* Stability, financial security, assertiveness

These three levels are balanced in the universe, our built environment and in our body. There are various mantras in Vedic books to balance these energies.The energies of the universe are related to astrology, energies of the built space are handled by Vastu Shastra and the energies of the body are balanced by various yogas[3].

B. Vastu Purush Mandala

A mythological story related to the "Vastu Purusha Mandala" is that Lord Shiva is in a war with the demon "Andhikasur" and during warlord, Shiva began to sweat and from his exertions, a man was born.

There is a mythological story behind the creation of the 'Vastu Purusha Mandala' which relates to Shiva who was in battle with a demon named "Andhikasur". During the battle, Shiva began to sweat, and from his exertions, a man was born.

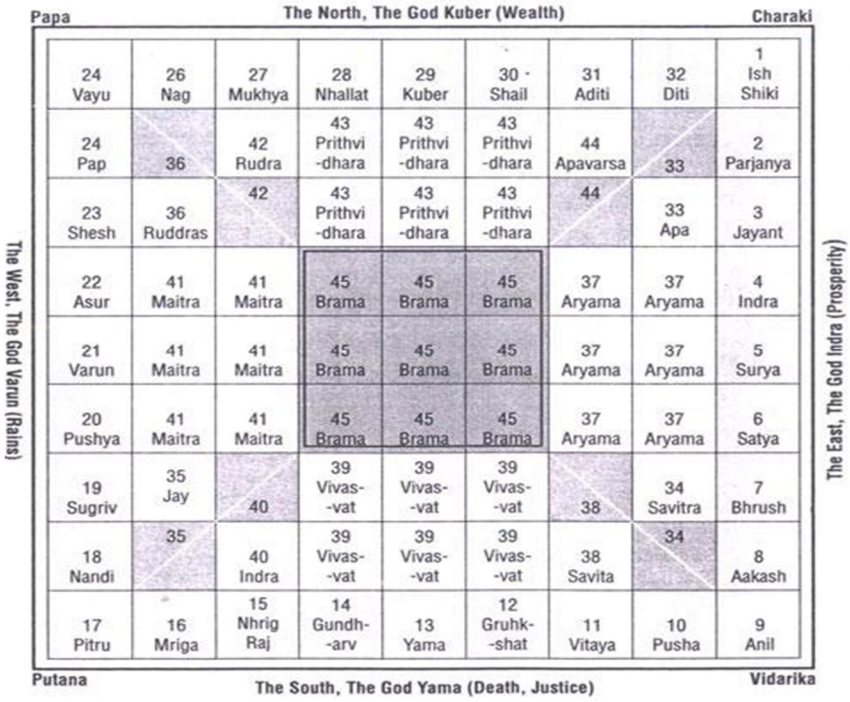
This newly born man worshiped Shiva for years and was granted a boon that he can eat all three worlds (Earth, Heaven, and Hell). All other gods & goddesses are terrified that this man will eat themselves also.

Then 45 deities pinned this man (Purusha) to the earth, by sitting on his back. Since this demon was created to eat the world, he had a very tremendous appetite. After surrendering to all these deities, the deities named him "Vastu Purusha" and gave him the freedom to eat or irritate those peoples who will not follow the norms of Vastu Shastra.

This story may be mythological but it shows the importance of 45 deities and the Vastu Purush Mandala. All the deities are nothing but the energies in nature. The force to use this Vastu Shastra in day-to-day life is related to using the natural energies in the living spaces.

Purusha refers to various energies, powers, souls, or cosmic man. "Pada" is a base for Vastu Shastra, and planning is called "Padvinyas". In fig 2.2.1 all 45 names of deities are given. Here numbering is given in each square, this numbering is called padvinyas. As per this padvinyas, we should start our planning.

If we study the Vastu Purush Mandala we find that there are 35 deities in the outer part and 13 deities in the inner side. All these 45 gods rule the human body as per their natural properties. By using these pandas it's possible to keep all deities happy, so we live happily in that home. In the Vastu building, we found that living persons in that Vastu are healthy, wealthy, and happy.



C. Pancha Mahabhutas (Five Elements of Universe) (Sanskrit: पञ्चभूत, पञ्चमहाभूत)

According to Hinduism, there are main five elements on which all universes is in existence and those are

1) Prithvi/Bhudevi (Sanskrit:पृथ्वी:,) - Earth

2) Apas/Varuna/Jal (Sanskrit: आप:,) - Water

3) Agni (Sanskrit:अग्नि,) - Fire

4) Vayu (Sanskrit: वायु:) - Air

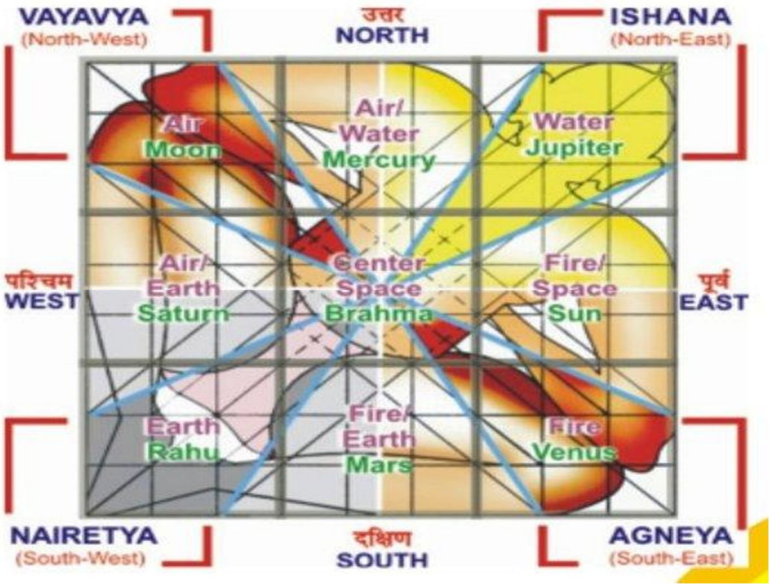
5) Akasha/Dyaus/Aether (Sanskrit: आकाश,) - Space

All these five Panch Mahabhoota have different properties and it is used in all Vedic sciences like Ayurveda (Medical), Pak Shastra (Food), Yoga, etc.

a) *Pruthvi (Earth):* Earth is having properties of gravitational forces and magnetic properties which affect the brain area of human beings. It has the property of heaviness and is related to various metals. In Vastu Purusha Mandala it is placed in the southwest direction.
b) *Aap (Water):* Water is essential for all living organisms on earth. It is the main energy source for living organisms. Jal Devta (Water Deities) are placed in the North-East direction.
c) *Vayu (Air):* Source of oxygen is air and it gives healthy life to human beings. It also carries bad odor from home into the environment. With this property, Vayu is placed on the North-west side in the Vastu Purusha Mandala.
d) *Agni (Fire/Sun):* Sun is a major source of energy that will never end. It is used for heating, lighting, and drying. Because of these properties, it is placed preferably on north, east, and south in Vastu Purusha Mandala.
e) *Aakash (Sky):* Various galaxies are part of the sky and one of them is our solar galaxy. As per Hinduism, there are seven earths in the universe. Sky shows emptiness and the origin of Agni and Vayu.

However, Cārvāka (also known Charvaka and Lokāyata, is an ancient school of Indian materialism.) did not accept Akash as a basic element as it is not tangible and according to him, there are only four basic elements. In East Asia, a similar type of theory is in existence but not identical. It may be a version of those local environmental practices.

On the earth or in the universe these basic five elements are taking an important role in the existence of that living organism. Fig 2.3.1 refers to Vastu Purusha Mandala & the Pancha Tatva relation. The table given below gives the relationship between the human body composition and these elements. Even, five fingers in human beings are also related to some basic elements. Hence, in Yog Shastra various “Hast Mudras' ' are developed to channel benefits of these basic elements to our body.



Bhoota (Element)	Human Body Component	Associated Finger	Associated consort
Akash/Dyaus (Space)	Astral body	Middle Finger	Dyaus/Akasha and Vishnu
Vayu (Air)	Air	Index Finger	Lehari
Agni (Fire)	Body Heat	Thumb	Swaha
Jal/Varuna (Water)	Water (incl. blood)	Little Finger	Varuni
Prithvi/Bhumi (Earth)	Flesh, bones & organs	Ring Finger	Bhumi/Prithvi

Table No 01 – Five Elements & Hand Mudras

Vastu Shastra gives importance to the location of these five elements in a specified direction which balance the structure. An ideal home is possible to construct with this correlation. To satisfy the Vayu/ Air in the North and East direction, it's said in Vastu Shastra that the South and West directions should be heavy. It gives ample space to Vayu/Air in the North and East of the plot which satisfies Akasha/Aether also. North-East direction is used for the main entrance for the home as it has maximum shadow areas as the sun path is always tilted towards the south. The kitchen is placed towards the south–east as the kitchen requires maximum natural light for preparation of food and sun rays kill various bacteria which develop in food preparation areas. It balances Aakash and Agni.

Bhoota	Associated Direction	Characteristics
Akasha/Dyaus	East	Expansion, enhancement
Vayu/Pavan	West	Movements, joy, happiness
Agni	South	Power, confidence, fame
Jal/Apas/Varuna	North	Spirituality, ideas, thoughts, healing
Prithvi/Bhumi	Center, Diagonal	Stability, peace and harmony

Table No 02 - Five Elements & Directions

D. Orientation / Direction of Building

Vastu Shastra is perfectly tuned to surroundings and environment and other nature's elements. Vastu Shastra developed thousands of years, after studying the path of the sun, moon, and other various planets and its effect on the earth. The ancient sages know that the sun path is always towards the south. They propose thick walls towards the south to minimize heat. They propose a more heightened part in the southwest to have a shaded portion on the roof to minimize heat transfer from the roof. Orientation of buildings is decided after studying various positive and negative impacts on the human body. Science of astrology and astronomy are having basic potential for Vastu Shastra.

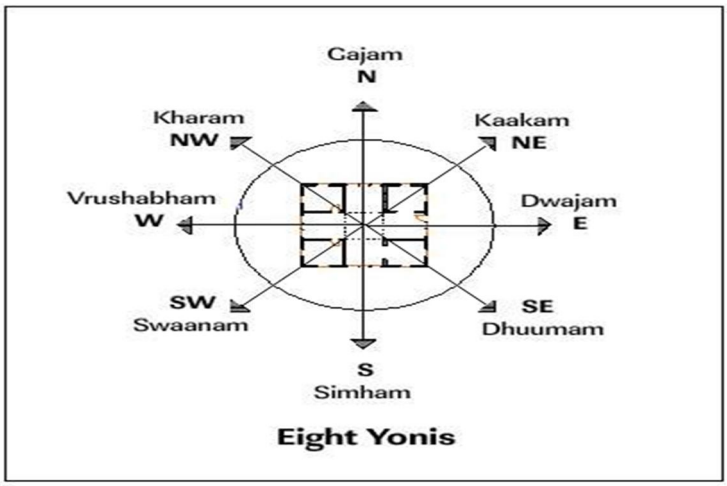
In Vastu Shastra is having 8 Yonis (directions) or life-energy lines which are referred for orientation of buildings

1) East- Dwajam (flagstaff),
2) Southeast- Dhoomam (smoke),
3) South- Simham (lion),
4) Southwest– Swaanam (dog),
5) West– Vrushabham (bull),
6) Northwest– Kharam (donkey),
7) North– Gajam (elephant),
8) Northeast– Kaakam (crow).

While preparing plans for any building these yonies (Directions) are expressed and honored in layout. These are having their properties as per the properties of animals. There are no such directions in existence in space. Sun is the only reference point, hence east is important in Vastu Shastra and symbolized as Dwajam (Permanent Spiritual and symbol of victory Stand Post). South West is for the kitchen where we found a smoke zone. The South has properties like lions, it is the strongest portion of any building. Southwest is identified as the security guard of home; hence a head person of home or office is having his room here. West is like a bull, he is strong as well as growing food for the family. The donkey is a strong willed and rough-tough animal and can be sustained on low calories food. With these properties, the North West direction is used for children's beds, guest beds, and grocery stores. North is symbolized as an elephant, strong, calm and cool, intelligent. This direction is used for the main living room and the most common space in the house. North East is used as per properties of crow. Crows are very smart, intelligent, creative, and perfect focus vision on the target. Hence the pooja (worship) room is located here. The study room, living room, discussion room are also preferred to locate here.

Buildings orienting diagonal directions (Southeast, Southwest, Northwest, and Northeast) are not allowed in Vastu Shastra as it disturbs natural energies benefits and has a more negative atmosphere inside and outside the house.

The universe phenomenon is to expand and for the universe, there are no East, West, North, and South directions.
The same concept is adopted in the Vastu Shastra as central space i.e.
"Brahma" is considered as the center of the home and all other rooms are placed into the expanding directions of the house (Similar to the expansion of the Universe). The Vedic sages give a directional angle to this and it is called "Purva Disha" (East Direction) which is always referred to with the sun, so it will never change although we will in the solar system.
Orientation of buildings is important as per Vastu Shastra. A simple example of radio will clear ideas about it, as we tune radio if the voice clarity is not there. If the tuning is perfect we have a clear voice or vice versa. The same thing is with Vastu, if it matches frequency tuning by earth it gives good results and if it disturbs then the structure is not good for living. In Vastu Shastra, this rotation is allowed 2 to 10 %. There are three types of orientations considered in Vastu Shastra as per direction, Suddha Prachee (Perfect East to West), Esa Prachee (Inclined towards Northeast), and Agni Prachee (Southeast or deflection more than 10%). The Vastu is having its advantages and disadvantages as per this orientation which is related to Earth's magnetic field, Sun direction, and various gravitational forces by planets in the universe.
While designing a Vastu Purusha Mandala, rushi-munies (Sages) designed it for macro and microhabitat. Hence Vastu Purusha Mandala is unique in properties for Earth and for a small dwelling unit. The gravitational impact of planets on earth is considered for small dwelling units.
In Vastu Purusha Mandala we found that Vastu Purush is diagonally tilted in position. This is because the earth's axis is tilted and for better effects in Vastu the Earth's axis and building axis should be parallel.
Vastu Shastra also explains various advantages and disadvantages of buildings as per their facing. East facing Vastu gives mental peace and physical comfort. West facing is for prosperity and material growth. North facing Vastu is for wealth and related to economic growth. South facing Vastu is related to salvation and going towards spirituality.
For the common man, East, West, and North direction facing tenements are good. South-facing is good for spiritual persons.



Eight Yonis

E. Material Used as per Vastu-Shastra

Our surroundings are affecting our physical and psychological levels. The same is happening with our house. The various energies coming from nature and surroundings should have a good receiver in our homes. Hence in Vastu Shastra, it is said that we should utilize a building material that is easily available in nature. Natural material is always a good receiver for various energies in nature and it has natural properties to fight with nature. Clay bricks, wood, natural quarry stone, bamboo, and a very little percentage of metals like iron and lead.
Old building material is not allowed in Vastu Shastra as it has already lost its strength and life. Man-made materials are not allowed in Vastu Shastra as they are not good for cosmic energy.

The following are the basic guidelines about the use of Vastu construction material:-

1) New building materials like clay bricks, wood, natural quarry stones, etc.
2) Artificial marble, plastic, asbestos, etc. (Man-Made material) is not as they are not good conductors for cosmic energies.
3) Material from a scrap of old buildings is not allowed as it already lost its strength and may have termite in it.
4) Use of good quality soil (White soil) which has properties like cement.

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5) Wood is not recommended from thorny trees as it is not having proper strength. Metals are used only if needed.
6) Wood is very familiar with the earth's energy and it gives a good effect on the home.
7) Cane wood is used for making furniture; it gives the natural flow of energy in the home.
8) Material representing "Panchmahabhuta " is the base of building material in Vastu shastra. Earth element - various natural stones and crystals used in interior work. Wind Element - Various sound instruments, bells, etc. Water Element - Fish ponds, water bodies, etc. Fire Element - Wood, Bamboo, etc. Sky Element - Opening in BrahmaSthana (center of the house)

III. GREEN ENERGY BUILDING

A. General

Day by day pollution is increasing and various natural calamities are occurring. Every nation is working on reducing pollution. It is seen that major pollution is due to building construction and the Industrial sector. Building construction pollution starts from the manufacturing of building materials, transportation of building materials, during construction of the building, wastage after construction, and lastly, after 50 years 30% of material is nondegradable and dumped in the cultivated farmyard or in the ocean.

To minimize this "Green Energy Building Concept" is now popular. Green building is nothing but above said various pollutions are avoided or minimized during the start to end procedure of construction. Various natural resources are preserved and balanced. Nonconventional energies are used and 100 % water utilization is preferred. Better planning and designing is worked out to have good health for the living persons in it. Green building material is used to avoid various cancers and other diseases. Environmental health is also considered while designing and within the total life period of a building. "Net-zero energy" and "net-zero carbon" are the basis for planning. Green energy building is also defined by, Environmental responsiveness, resource efficiency, community, and cultural sensitivity. The new term "sustainable Architecture" is used parallel with the "Green Building Energy" concept. Various green systems like radiant floors, grey water recycling, solar power, wind power, geothermal systems, and energy-efficient window systems, are used in building construction. These systems are useful to reduce the requirement of water and energy and also reduce utility bills.

The history of this concept starts in 1960 when American "Architect Paul Soleri' worked on "Ecological Architecture". A huge energy crisis occurred in 1970 and experts are thinking about various energy-saving techniques like solar, wind, and geothermal energies. From 1980 World Conservation Organisation started working on "sustainable development" and in 1987 "United Nations Environmental Program" published a report on "Our Common Future". The world's first green building standards were released in 1990 in the UK. From 1990 various nations like the US, Canada, Singapore, China, and India formed their green building standards. Latest in 2021 world's first low-cost and sustainable 3D printed building is completed with the use of clay mixture.

B. General Building Concept & Architectural Planning

If we consider standard and normal buildings, we found that Green Buildings create very low wastage and consume less energy, water, and other natural resources. Clean Environment is the motto of Green Buildings. The local economy is also supported by Green Buildings as it requires local building materials and manpower. If we study the above sentences in-depth, we found that our traditional architecture was the best solution for Green Buildings. This traditional architecture may vary from place to place or nation to nation. The oldest traditional architecture is from India and it is "Vastu Shastra".

This is why sustainable architecture is parallel to traditional architecture

In India "Vastu Shastra" is traditional architecture.

More than 40% of available energy is used in various construction activities, manufacturing of various building materials, and lighting and air conditioning of buildings. This consumption of energy ratio is the main target of Green Energy buildings. Developed countries require more energy than developing countries. This is a time when developing countries should go on the Green Energy Building path. Minimum consumption of energy will give maximum sustainability.

The Green Energy Building concept is based on

1) The Optimum use of energies.
2) Water conservation.
3) Solid and wastewater management, treatment, and reuse.
4) Energy-efficient transport systems.
5) Energy-efficient Building System Planning.

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Indian Green Energy Building Organisation TERI says "If all Buildings in urban areas were made to adopt green Building concepts, India could save more than 8400 MW of power which is enough to light half of Delhi or 5.5 lakh homes a year."

Aim of Designing Green Energy Building

a)	Health	Should good for occupant's health
		Should good for Environment health
		Should good for its (buildings own) health
b)	Energy	Maximum use of available energy
		Should require minimum energy
		Should produce renewable energy
		Zero energy buildings.
c)	Water	Should require minimum water
		A perfect water utilization system.
		Water harvesting, treatment, and reuse system.
d)	Material	Should utilize energy-efficient material
		Material direct from natural resources
		Local Material
e)	Performance	Maximum productivity of employees.
		Minimum maintenance cost.
		The satisfying and quality environment inside.
f)	Reduction	Wastage
		Pollution
		Environmental degradation

Green building planning system is teamwork of architects, landscape designers, electrical, air conditioning, plumbing, and energy consultants. Architects and planners are now merging architecture with nature and a new stream of architecture is emerging as "Vegitecture".

In developing countries, after 25-30 years the most economical building material will be mud, grass, stone, and wood. It's time to wake them to plant trees for building construction. The use of natural sunlight and wind flow by using the best possible orientation of the building is a base for Green Building. The use of waste material is accepted in Green Building construction but it reduces the life of buildings and is expensive for transportation.

C. Main elements Of Green Energy Building

Main elements for Green Energy are

1) Indoor and outdoor environment quality of building
2) Sustainable site design for the green energy campus
3) Materials and conservation of resources available.
4) Conservation and quality of water required.
5) Environment and energy efficiency of the building.

D. Smart Growth of cities and Sustainable Development

Today we need smart growth of cities and it depends upon transportation methods, compact planning, mixed-use of neighborhoods within the existing urban settlements. Walkable distance neighborhood is a product of smart growth. Cycle tracks will be a focal point for planning city roads in the coming years.

Open spaces will be preserved and will be an oxygen hub for urban areas. New Urbanisation and smart growth are two different concepts. New Urbanisation is closer to the function and ethics of the construction environment while smart growth is closer to planning aspects.

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IV. COMPARISON OF VASTU SHASTRA & GREEN ENERGY BUILDINGS

After studying as per above a chart of comparison of Vastu Shastra & Green Energy Building is prepared.

	Aspect	As per Vastu Shastra	As per Green Energy Building
0	Site selection	Location - On the bank of rivers. Orientation - East and North directions are having more importance Shape - Mainly square but military bases can be circular Slope - With natural slopes. Soil - Hard rock for the foundation.	Location - Near water body Assessing renewable energy like wind and solar. Orientation - East and North directions are having more importance Shape - Shape is not a criterion. Slope - With natural slopes. Soil - Hard rock for the foundation. But not having such importance as building construction methods are developed but costly.
0	Planning	Based on Panchamahabhuta (Five elements of Universe) 1. Pruthvi (Earth) - Proper Land to Build Building. It is for stability, peace, and harmony. 2. Aap (Water) - Should have proper water resources and protection from heavy rainfall. It is related to spirituality, ideas, thoughts, and healing. 3. Agni (Fire) - Keeping buildings warm and lighted with the help of sunlight. It shows power (Energy), confidence, and fame. 4. Vayu (Air) - Proper ventilation inside the building. The odor should pass out from buildings or settlements. It is related to movement, joy, and happiness. 5. Aakash (Space) - Keeping central space open for family communication and ventilation. It also planned for the future expansion of the building. It is related to expansion and enhancement.	Based on Environmentally responsible and resource-efficient method. Elements considered while planning. 1. Foundation with hard natural base (Pruthvi) 2. Water (Aap) 3. Energy (Agni) 4. Pollution and waste reduction methods (Vayu) 5. Good indoor quality (Aakash) 6. Health (Vayu)
0	Building Material	• Sustainable materials. • No man-made material is mentioned in Vastu Shastra. • No recycled material is mentioned. • Wood, Bamboo, Clay, Stone, and organic fabric are mentioned. • Material having properties as per Panchmahabhuta (Five elements of Universe) • Local Materials as available • Planning and placement of rooms are first priority. The use of the material is the second priority. It assumed that material will be available locally.	• Low impact building materials. • Packed Gravels. • Permeable concrete. • Sustainable materials. • Self-healing (Bio) concrete. • Recycled Industrial goods. • Alternative natural materials. • Strawbale & brown architecture. • Use of materials that are non-toxic, ethical, and sustainable.
0	Life of Building	In wood it is considered for 100 - 150 years. In stone, it is considered for thousands of years.	No modern building material claims more than 100 years of life.
0	Use	Temples Institutional Palaces Residential	Residential Institutional Commercial And others
0	Environmental Conservation	More environ friendly	Less environ friendly than Vastu Shastra

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0	Organisations working	1. Maharishi Vastu Architecture (MVA), Fairfield County, U.S. 2. Vedic Heritage (Govt Of India), Delhi 3. Vaastu Vedic Trust, Mahabalipuram, Tamilnadu State. 4. Vaastu Vedic Research Foundation, Chennai, Tamilnadu State.	1. World Green Building Council, London, UK 2. International Renewable Energy Agency (IRENA), Abu Dhabi, UAE 3. American Council on Renewable Energy, Washington DC, U.S. 4. World Resource Institute, Washington DC, U.S. 5. Agency for Non-conventional Energy and Rural Technology (ANERT), Kerala, India 6. The Energy & Resources Institute, Delhi, India

V. CONCLUSION

In present days the most critical issue is our environment and how we can contribute to a healthy environment. As far as structures are concerned, the need for a healthy environment leads us to the 'Green Structure'. As per previous chapters, this is very much clear that the green building concept is aiming for sustainable development. Along with this "Vastu Shastra " is a Hindu tradition for planning and construction of various types of buildings. As per the concept of Vastu Shastra the designs are intended to integrate architecture with nature. The Vastu Shastra principles are not just mythological but also based on the various scientific reasons which affect the planning and construction of various structures. In this study, I have tried to find a correlation between the above-mentioned concepts. There are many Green Building criteria prescribed by IGBC which are similar to the concept of Vastu Shastra.[20]

Vastu-Shastra has over time become more pragmatically oriented and this has caused it to also become more empirical. It is clear that many of the principles and themes found within Vastu-Shastra resonant with those of many well-known contemporary philosophers of technology.[4/11]

A. Future Scope of Work

All construction projects are planned and executed with the intention of finishing and with due consideration of its use, utility, indoor and outdoor furniture, long period use, comfort, a good environment for happiness, and peace of mind. Increasing population demands for infrastructure are also increasing and its directly related to the fast demand for building material. Now it's a trend to complete the building within a few days, therefore factory-made building material is the easiest way to fulfill the requirement. This huge use of building material has its limitations for raw material and it is dependent upon nature. Now the trend is changing all over the world to use building material directly from a source that is from nature. At the time planning methods are also changing the world and going close to nature and its renewable energies.

"Vastu Shastra" is a popular method of planning a building and use of building material in India and in other countries also. A large population is using this method for better living conditions. Various experts are studying the usefulness of Vastu Shastra for planning cities and residences at the international level. Various scientific analysis is available on arrangements of rooms, the position of openings, water bodies locations, etc. as per Vastu Shastra with respect to sun path, wind direction, and earth's magnetic forces.[8] Vastu as a scientific tool for planning any building is a proven technology and buildings planned accordingly to Vastu Shastra are found more environmentally friendly and required less energy or it may be zero energy building.

Vastu Shastra planning is a very easy tool and requires no additional amount for its use. If we follow the "Vastu Purusha Mandala" chart, planning will be within some minutes. There are various limitations according to orientation approach and size of the plot. These problems require specialist experience, but more of these problems are solved by using modern technology. It's time to have a fusion copy of "Vastu Shastra and Modern technology". As of today, the world is seeing the power of "Yoga" in our healthy life and enjoying "Yoga Day". There will be one day when "Vishwakarma Day" (Creator of Universe) will be observed by the world.

VI. SUGGESTIONS

A. More efforts are necessary to include Vastu Shastra technology into the academic part and some national policy for the betterment of people should be present for Vastu Shastra.

B. Governments from various countries should develop "Vastu Shastra Universities".

C. In the education course of architecture, Vastu Shastra should have a 50 % syllabus, as it is having all other subjects included in the modern architecture college syllabus.

D. A detailed study may be carried out on existing buildings which are designed as per Vastu Shastra to establish a relation between Vastu Shastra and Green Building.

E. A comparison study may be carried out on existing green buildings and a building that is designed as per Vastu Shastra.

F. Various education systems should adopt this Vastu Shastra stream in their education pattern in the present situation to make a comfortable living.[6]

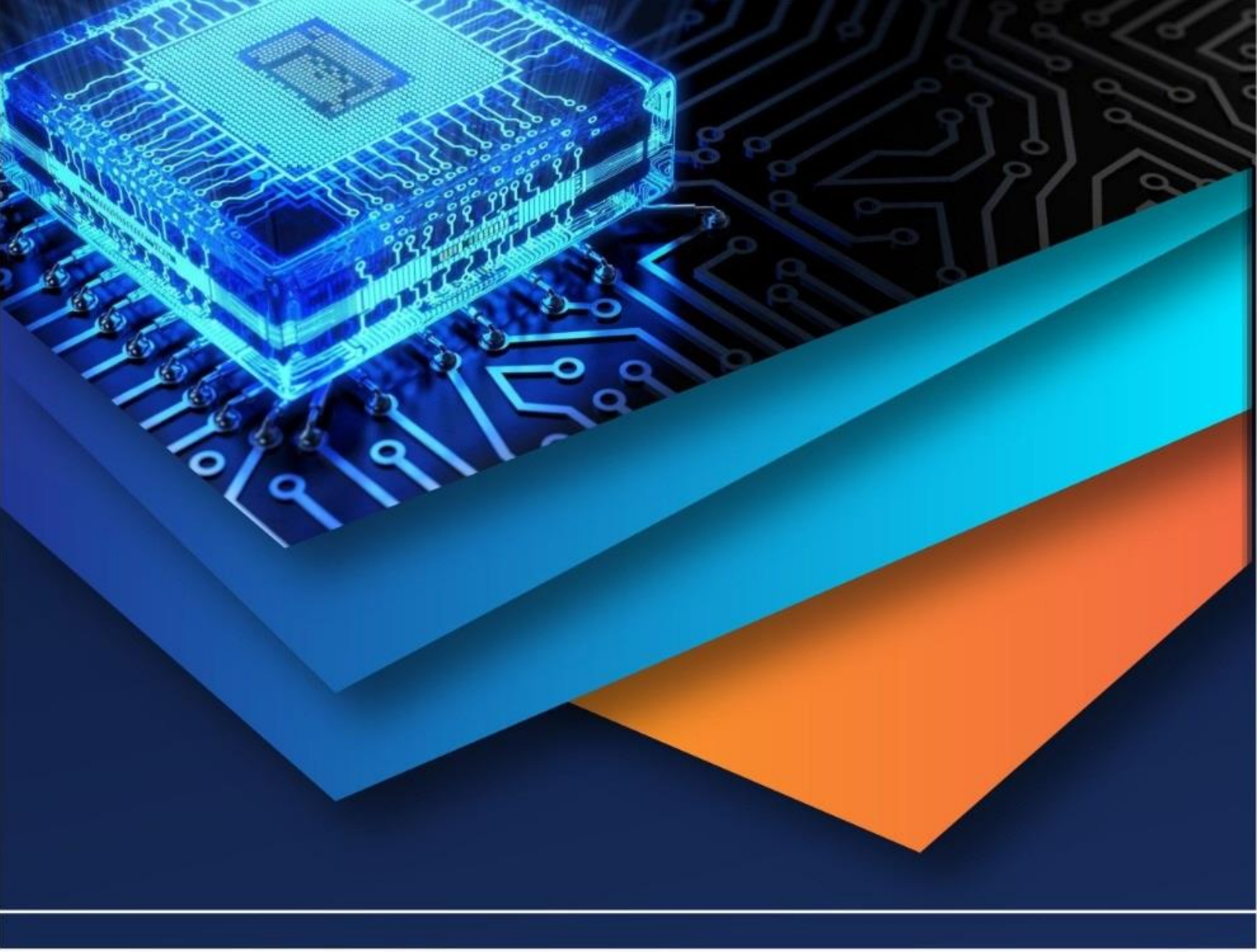
G. A concept of "Brahma Sthan " (Provision of open space in the center of the building) should be studied for safety, family communication, earthquake stability, and ventilation of the building.

H. The People should consider this art for its scientific backings and must not take it for sentimental and emotional (or) unnecessary desires which will be advantaged by some fake Vastu consultants and will ultimately spoil this natural art in existence which is still prevailing in villages throughout this country.[6]

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