

Interior Design
Prof. Smriti Saraswat
Department of Architecture and Technology,
Indian Institute of Technology Roorkee

Lecture - 24

Interior Design: Green Interiors: Policies and Incentives; Materials and Finishes

Namaste, hello everyone. Welcome again to my NPTEL course on interior design. We are at lecture number 24 today, and we are still talking about green interiors. We are going to focus today on policies and incentives. Also, we will discuss materials, finishes, and some credits related to these. So, we are going to talk about recycled content when we focus on materials and finishes within green interiors, policies, and incentives.

We are also going to talk a bit about the Sustainable Development Goals (SDGs). And we will talk about renewable materials. We'll see water savings. What are some other criteria that contribute to designating an interior design project as green interiors, and what are the policies related to that?

And we will, of course, see some references. So, when we talk about policies and incentives, sources involved in drafting the policies say green buildings will be incentivized based on benchmarks prescribed by green building certification systems. And we did talk about these certification systems at the beginning of this module on green interiors, which we are focusing on this week. So, there is LEED, there is LEED Commercial Interiors, which we have been particularly focusing on. Of course, IGBC, GRIHA, and there is also Excellence in Design for Greater Efficiencies.

So, these kinds of certification systems are already there and they do set up some benchmarks and accordingly, you know, the incentivization of a green building or a recognized project is done. So green buildings having a five star or platinum rating would get a 10% discount in property tax for three years. Now, these are the kinds of incentives that have been put forth so that people take this, you know, importance about green buildings and environmental concerns very seriously. Similarly, it will be 7.5% for buildings with four star or gold rating. And 5% for 3 star or silver rated properties.

So these are the kinds of caps that have been put up. The incentive will continue after 3 years if the structure follows the green building rating or certification. So there is

further incentivization. And it does create, you know, an opportunity and eagerness and keenness amongst the users as well as the designers, you know, to get their projects rated in terms of the certification, also be responsible towards environment and then get some kinds of tech benefits and other kinds of incentivization. The stamp duty will also be reduced by 1% on purchase of apartments in green certified projects.

So that's another incentive. The government will further reduce taxes and charges on purchase of green buildings. Environmental clearances for such structures will also be fast-tracked. So, these are all very interesting aspects when we talk about green buildings, policies, incentivization by the government, how the entire system and all the benefits work, focusing on green interior design projects, green interior architecture projects. Then there are some sustainable development goals.

And within that, some of them are very key and relevant to architects, especially designers, interior designers, and construction companies. So there are 17 SDGs in all when we talk about a global level. And if we talk also, you know, at a local level, let's say for Uttarakhand, there is a set of SDGs and there is a vision document. So we are definitely talking about global concerns, but it's also our responsibility to look at regional and local concerns. So there are some key SDGs which are relevant to our profession, and, you know, we can really be responsible and take care of these through our designs.

So starting with SDG 7, which says, Ensure access to affordable, reliable, sustainable, and modern energy for all. This goal emphasizes the importance of designing energy-efficient buildings and incorporating renewable energy sources such as solar panels or wind turbines. Then there is SDG 9, and it focuses on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. So this is the focus of this sustainable development goal.

This goal highlights the need for innovative building materials and construction techniques that are of relevance and importance to us, you know, as professionals and learners of this course and this profession. That minimize environmental impacts and enhance resilience to climate change and other shocks. There is SDG 11. Make cities and human settlements inclusive, safe, resilient, and sustainable. Very important keywords that I have highlighted here.

This goal focuses on the role of architects, interior designers and construction companies in creating sustainable urban environments and promote well-being, equity and environmental quality. So this is an important goal. There is SDG 12, ensure sustainable consumption and production patterns. This goal emphasizes the importance of selecting sustainable materials, reducing waste and minimizing the environmental impact of construction processes. So very, very relevant for us and very crucial, you know, to focus on this and learn how we could achieve this through our design sensibilities.

and by taking proper decisions on and off site, concentrating on interior design projects. There is SDG 13, take urgent action to combat climate change and its impacts. This goal underscores the urgent need for the design and construction industries to adopt climate responsive strategies, such as energy efficiency, passive design, low carbon materials. These strategies help to reduce greenhouse gas emissions and increase resilience to climate change impacts. There is SDG 15, Protect, Restore and Promote Sustainable Use of Terrestrial Ecosystems, Sustainably Manage Forests,

combat desertification, and halt and reverse land degradation and biodiversity loss. It's a very, very elaborate, comprehensive, and crucial SDG. This goal highlights the importance of preserving and enhancing biodiversity and natural ecosystems in the built environment. This goal can be achieved through thoughtful site selection, landscape design and the use of native plants and materials. So we have been talking about all of these aspects in one or the other lecture and looking through the lens of sustainability, circularity and responsible consumption, we can try to integrate and incorporate all of these aspects through our designs.

By focusing on these critical SDGs, architects, interior designers, and construction companies can make a meaningful contribution to global sustainability efforts. While creating built environments that are healthy, resilient, and adaptable to changing conditions. So these are surely policy-level decisions at a global level, but small steps at local, regional, national, and global levels—in different capacities—can really help in achieving great results. So these are like ripple effects, and they contribute to a larger picture. Design for energy efficiency.

Architects and interior designers can do a lot to improve a building's energy efficiency, mainly by reducing the amount of energy needed for heating, lighting, and running

appliances, and by providing renewable, non-carbon-based energy to the building. Now, this is very, very crucial. We must try to reduce the amount of energy needed for heating, lighting, running appliances—all of that. So heating and lighting are the two most crucial factors interior designers have influence over.

Since most of a building's heat escapes through windows, it is important that the installed windows are of high quality and provide good insulation. So, you know, in the previous lecture, we did talk about VLT, SHGC, and U-value. So, all that understanding—you know, daylight and daylight factor, etc. That can be applied when we design and talk about these kinds of important aspects related to heating and lighting. Curtains and drapes keep both cold air and the sun's heat outside.

Window coverings, blinds, and shades enable residents to control the building's temperature in an energy-efficient way by opening and closing them as needed. So these are all very important rules and parameters that, especially interior designers, can follow and bring to the table while designing projects and spaces. Carpets are excellent thermal insulators. According to estimates, a carpet retains as much as 10% of a room's heat. So we have been talking about fabrics and furnishings, and they are not merely for decor but serve several other important functions.

Installing home automation and green gadgets makes it possible to control heating and lighting systems remotely as well. So the technology is already there to help us. To save energy spent on lighting, much can be done just by choosing the right colors. And we have talked about the interrelationship between colors, light, and lighting.

Lighter colors reflect more light, while rooms with darker walls and furnishings require more artificial lighting. Using reflective surfaces increases the amount of light in a room by bouncing it around, reducing dependence on artificial lighting. So these are all very important aspects that are also emphasized in various policy-related documents and directly contribute to getting your project designated as green and certified. This also helps residents and occupants use the building's energy more efficiently and economically. Now, designing for low environmental impact is very important, and many policy documents, as well as our own understanding as designers, guide us to follow this direction.

From a sustainability perspective, it is very important to pick materials and products with the lowest environmental impact. Organic materials, you know, they seem the obvious choice, but we must not forget that natural resources need to be treated responsibly. Choose materials that are quickly renewable, such as fast growing bamboo, and are extracted in an environmentally responsible way. So we have been talking about, Ecologically growing trees, fast growing trees, fast growing, you know, replenishable materials and which are organic, which have low chemicals and toxic material and toxic chemicals.

So we can put all that understanding and knowledge to use when we are designing. There are labels, standards and certifications that give credible information about the product's origin and help in identifying eco-friendly products. So we already have a lot of benchmarks and a lot of standards and agencies and policy documents and market-established standards that can help us identify whether a product is eco-friendly or not, organic or not, less harmful to the environment or not. Designing for waste reduction.

Interior designers have a lot of power in their hands when it comes to waste reduction and at the same time a big responsibility to act sustainably. The planet's resources are limited, so the mentality of discarding products and replacing them with those that are currently trendy is no longer justifiable. We must try to use the materials and resources very judiciously. Design for Longevity and Flexibility To prevent materials and products getting discarded too often, interior designers should consider the lifespan of any materials they plan to use, especially for those elements that experience wear and tear, such as flooring.

The goal of designing for longevity is to design durable and timeless spaces and suppress the urge to change the whole design every couple of years. Now, as far as interior design industry is concerned, of course, the designers are sought and their ideas are sought to have changing designs, to have a change of mood and space every few years. And there is a client base who would ask you to do that. So, of course, it's an individual's choice. It's a clientele's demand.

But we must, you know, as a collective group or community who is focusing on sustainability and responsible designs, we should try to suppress this urge of, you know, changing the design every two years or every single year. And just for the heck of having something sustainable. So we have to take a decision based on actually what is

the requirement on the site and if there is some kind of maintenance required or some kind of real repairs required. The best way to achieve timelessness is to choose quality over quantity, classics over some temporary fads and simplicity functionality over only embellishments. Innovation has brought many options for achieving flexible designs and we are going to talk about portability, modularity, circularity, DIY and lots of concepts which are related to achieving flexibility through designs.

And we can make them, you know, important tools and media for achieving interesting designs, which are innovative, sustainable and which put less burden on, you know, the space and different resources associated while designing that space. Walls that can be modified to create more spaces. So that's one example of flexibility in design. Adjustable and mobile furniture that can be reassembled to fit the needs of the flexible modern workplaces. Modular flooring that allows personalization, easy replacement of individual pieces and much more.

So there are a lot of innovations which could aid in providing flexibility in space and, you know, cater to adjustments and multifunctionality. Design for healthy environments. People spend most of their time indoors—in offices, schools, and at home. This is very important, and I always make this point, you know, during my classes and discussions: why we need to focus on interiors and indoor spaces, and why we need to also talk at a micro level and not only at a macro level, such as urban design, because we spend most of our time indoors, and it's very important that we design our interiors and indoor spaces keeping in mind the health and well-being of the users.

Considering the health of an environment—and, you know, we have talked about indoor air quality, indoor environment quality, and we are going to talk more about it in subsequent lectures—should be at the top of the interior designer's priority list. There are several factors to keep in mind when trying to design healthy spaces, such as the quality of the air, heating, ventilation, lighting, and acoustics. So all of these are important not only for sensory experiences and psychological reasons but very much for well-being, functionality-related aspects, and, you know, as a feel-good factor also. According to the US Environmental Protection Agency, indoor air pollution is one of the five biggest environmental threats to public health. Indoor air pollution is the result of products and materials with high levels of toxic emissions.

Furniture or equipment that has been treated with harmful chemicals releases dangerous toxins into the air. So it is very important that we design responsibly, pick and choose materials responsibly, and focus on less harm to the environment and on the well-being of the users. Designers should look for materials with low emissions of VOCs (volatile organic compounds) and other air pollutants. Now, talking about materials and sustainability. So these are very, very important areas of focus when we talk about policy-level decisions, and the policies and the documents reflect, you know, the important concentration on materials and how they directly, you know, contribute to achieving sustainability.

So there is this credit that focuses on recycled content, and the intent behind this is to minimize the use of raw materials. Materials with recycled content should comprise at least 10% of the total material cost. And, of course, there are extra points for 20%, 30%, and more. There are two types of recycled content, broadly speaking. There is post-industrial—or is it pre-consumer?

Same thing. Process waste from an industry, for example, fly ash. That is an example of post-industrial. And the other one is post-consumer. Waste from households, for example, plastic bottles, aluminum cans.

Now, when we talk about pre-consumer versus post-consumer recycled content, there is this interesting illustration that helps us understand these aspects, especially focusing on the case of scrap steel. So, the steel sheets are processed for door manufacturing. Scrap is generated. Now, at this stage, the pre-consumer recycling process, Scrap steel is sold to a hand tool manufacturer.

Hand tool manufacturer generates steel scrap again. Which joins this cycle later. And here when we are talking about steel sheets. You know they are processed for door manufacturing. And then this steel door is installed at a building site.

Then there are post consumer recycling involved here. Steel is collected from a demolition site and diverted from a landfill. Now next, in this cycle, the steel is sold to a recycling plant. The steel is melted in furnace and rolled into sheets to be sold for new products. A company purchases the steel to make steel doors and so on.

So this cycle continues and there are pre-consumer recycling involved here and post-consumer recycling. And here at this pre-consumer recycling stage where this hand tool

manufacturer generates steel scrap, it again is sold to a recycling plant. So there are plugins at different stages and there is this whole cycle where we have the stages of pre-consumer recycling and post-consumer recycling. The important part here is this. Products made from material reclaimed from the same manufacturing process do not qualify as pre-consumer recycled content.

So these are some important aspects to understand and remember while we are talking about recycled content. And I'll give you an example from the carpet industry, showing how it helps contribute to achieving green interiors and why it is an important consideration when we talk about policy-level decisions, standards, and documents. How to calculate recycled content? The breakdown is usually given in the material specifications, and that is for our benefit and convenience.

And there is a simple formula that is typically applied. So this is for reference. I do not expect all of us to be very well-versed with equations and formulae or to learn everything by heart. But yes, this is for reference, and you could definitely use it as and when required. So this is calculating recycled content.

And here is this example of the carpet. If we look at this product specification, we will get the information that will be handy in helping us calculate this recycled content. So we see here the MR credit for recycled content, and this is the specification. 41% pre-consumer or post-industrial, as we saw, and 25-27% post-consumer. And these are the details, this is the carpet, and this is how you calculate the recycled content.

So when we apply this formula, this is the calculation. Now there is some percentage of recycled content here, and accordingly, one would get credits and consideration while getting their project designated as green-certified—responsible and less harmful to the environment. There are some materials which we know popularly, and they have recycled content. So there is plywood, gypsum, aluminum, carpet—the example we just saw—steel, and also the modular furniture, which is used quite extensively in interior design projects. So recycled content is important to understand as a concept and also to understand

how we actually do the breakdown and calculations. So what kind of ways does steel usually have? Post-industrial, post-consumer. And we saw one cycle in one example.

We can calculate this entire recycled content for a project, have this sort of inventory, and put in an order for the product—whether it's carpet or aluminum frames.

And what is the percentage of post-consumer or pre-consumer? We calculate the recycled content, and then there is also the calculation of recycled content value out of the total product cost. So if we try to put statistics like this in front of clients and make them aware of the incentives, it definitely helps. It also clears a lot of concepts for the client, who may or may not be aware of these technical aspects or have any orientation or awareness toward green interiors. So these kinds of calculations and numbers definitely help present a strong case.

Then there is credit 5 and it focuses on regional materials. This is actually very encouraging that there is some value and some kind of consideration for materials which can be procured at a regional level. So the intent, use locally sourced material to encourage local economy and reduce environmental impact due to transportation. So we also know, you know, this aspect about embodied energy and why we should try to minimize transporting materials and we should get it from a certain radius. And we talked about that radius, how many kilometers it should be in the previous lecture.

They use so materials and products that are manufactured within 800 kilometer radius. So we have it here also. And it's considered to be, you know, a sort of a sustainability radius if we are able to procure materials and products within this radius. Regionally manufactured materials should be at least 20% of the total material cost. Typically, civil materials such as bricks, cement blocks, fly ash blocks, cement are available locally.

Other materials include aluminium frames, plywood, laminates, gypsum, which may or may not be available locally. So, we have to see within the regional materials, you know, some which are available locally and some are procured from nearby. Then there is credit number six, rapidly renewable materials and the intent, reduce the use of finite raw materials. Rapidly renewable materials should comprise of at least 5% of the total material cost. So these are all policy level decisions and standards which are now sort of used as benchmarks for achieving different credits.

Rapidly renewable plants are harvested within a 10-year or shorter cycle. This is important. We have to keep this in mind. And there are so many laws related to, you know, procuring timber and related to trees because there are trees which take hundreds

of years to grow, and when they are cut, it disrupts the entire, you know, nature and cycle. So we have to keep in mind the rapidly renewable plants, as they are less harmful to the environment.

Some examples of rapidly renewable materials include cork, bamboo, rubber, linoleum, wheat straw, and eucalyptus. Softwoods like eucalyptus can be harvested easily again. This is one chart that helps us understand this aspect of rapidly renewable materials. So traditional growth cycle, rapidly renewable resources, harvest cycle. And here we see this line over here, which is the LEED definition of rapidly renewable.

And it is here at 10 years. So that's ideally 10. Benchmarked according to LEED, and here we see different examples: this is cork, this is bamboo, natural rubber—all the examples that we just saw, including linoleum. And if we look at, you know, the pine wood, the fir, and the forest, it is at least 30 years, which is way beyond this line according to the LEED definition. So we have to keep in mind all these important aspects because we are facing a huge crisis. You know, there is climate change, and there are lots of issues we are facing.

So if we develop an understanding of these important concepts and we understand the existing standards and policy-level decisions, I'm sure this can help us make responsible decisions, informed decisions, which cause less harm to the environment. There is also a credit that focuses on using certified wood. The intent is to promote environmentally responsible forest management. 50% of all new wood used in the project should consist of certified wood. So there is this clear rule over here.

And this helps in earning credits and green certification. Third-party certification, such as FSC, is required. So that's another important aspect. Now, water savings are also important parameters when we talk about green interiors. Water use reduction intent.

Increase water efficiency to reduce the burden on municipal water supply and wastewater systems. Reduce building water use by 20% from the baseline. This is very crucial. There is, anyway, a shortage and scarcity of water, and there is a crisis that we all are facing. So these kinds of important parameters, policy-level decisions, and standards again help us make informed and responsible decisions.

Then, you know, there is this credit which focuses on reducing building water use by 30%, 35%, or even greater than 40%. Whatever we are able to achieve, but at least this

much. Now, if we try to understand, you know, some popular fixtures because we are talking about water savings. And you know, there is the use of water when we talk about WCs, urinals, showerheads, and kitchen sinks. There is this baseline flow rate that we see over here.

Liters per flush or liters per minute are the units you see over here. So these are some baseline rates that are mentioned over here. And we can try to reduce them. By selecting proper fixtures which are quite innovative and which keep in mind the water-saving aspect as crucial. And through design interventions, the conventional fixtures have anyway been changed these days.

So we can try to do that. So if we see over here, the design flow rate, which is of course lower than the baseline flow rate, and this is because of the, you know, concern for water saving. So this is the kind of reduction over here we see in numbers, from 6 to 4, 9.5 to 6.4, and so on. So this is the percentage of water savings. Which can be achieved.

So, it's very important to concentrate on water savings, and we can see in a few places it is significant here, like 73% water savings when we focus on urinals. We try to reduce the baseline flow rate to a low flow rate with the help of proper design interventions and innovative designs. Regarding indoor water reduction, according to LEED, one prerequisite is to have 20% savings compared to the baseline. So, these are again very important statistics that help us put things in perspective and concentrate on savings, reducing the burden on resources and the environment. Regarding the water budget, use alternative water, rainwater, or treated grey water.

Reduce the use of potable water. Then there are other criteria—some factors that have not been discussed so far. So here, we can talk about acoustic requirements, which are very important for indoor spaces and interior design projects. And the thumb rule is the ABC of acoustic design. Absorb, block, cover.

So, we try to create an acoustic space or environment that has less disturbance, less noise, and appropriate decibel levels. No disturbance to fellow users and many other criteria. For absorbing, for example, by using ceiling tiles. For blocking, for example, by using cubicle partitions, and for covering, for example, by sound masking. So here is an example of 'A'—using ceiling tiles or any treatment on the ceiling.

Blocking through the cubicle partitions here, if there are two users and there is a cubicle partition, and we are trying to, you know, create less disturbance and create an acoustic environment which is favorable to both users. Then, there is some kind of sound masking, so that creates a conducive environment. Then, there is a credit for construction waste management. Ensure waste materials are diverted from the landfill, and they can be reused or recycled. So, divert 50% from the landfill. That is one way to achieve credits.

And then, of course, diverting 75% from the landfill. That's, of course, even better. There is also a very, very important role of materials. There is also a crucial role played by all stakeholders. So, when we talk about architects, predominantly at the design stage, but of course, there are other overlaps and interactions also at the construction stage and occupancy stage.

The contractor is predominantly at the construction stage, but yes, there are more interrelationships when we talk about this matrix. And the owner, predominantly at the occupancy stage, but of course, there are other overlaps as well. So, when we talk about the design stage, it's very, very important to concentrate on material selection, material specification, and, you know, the overall cost implication, depending on what the selection criteria are. Executing as per the specifications and requirements, material management, and construction waste management. So, very important aspects when we talk about material selection.

Synergy with environmental factors. So if we see here, energy and atmosphere have certain points which are allotted to this. And there are many important parameters within this. Minimum energy performance depends on building facade materials. Optimize energy performance and lighting power.

So daylight, LPD, all of that we saw in lecture number 23. So there are points assigned for that. Also, you know, lighting controls and HVAC. So there are so many points which cumulatively apply. They create a certain tally, especially when we are talking about energy and atmosphere.

Then there is IEQ; we have been emphasizing its importance and the possible points. So daylight and views, and within that, what is the glass specification, what kind of glass is being used, what is the percentage of views that is facilitated, and all of those

important aspects have certain credits and points assigned to them. And it's not only about just picking a few things to You know, match the number tally and get certain points.

It's also the fundamentals of design. You know, why would you pick a certain material? Why would you design something like that? How do you achieve a certain orientation for the building? And all of these, hand in hand, you know, along with technical specifications, help us achieve certain credits, which demonstrate a very sensible, sensitive, and responsible design that is, you know, less harmful to the environment.

Then, of course, materials and resources. Within that, we have building reuse, material reuse, furniture and furnishings, and there are certain points credited against this. Synergy with operations. Storage and collection of recyclables also have certain points. Synergy with construction management.

Construction waste management—a very important topic of discussion, you know, right now in the current scenario. And there are possible points which are assigned to it. Continuing with this, I would also like to focus on the importance of the environmental assessment matrix. I'm not discussing this in detail. It needs another elaborate discussion altogether.

But it's very important to practice this calculation and development of this matrix for our own understanding as designers when we are working on projects, and also for the you know, benefit of the clientele and for a larger base, especially when we are talking about procuring green certification. So this kind of matrix really helps, whether it's lighting, wood, flooring, furniture, partitions, or other kinds of important materials and systems that are being used. What is the energy saving, water saving? How much is the recycled content?

How much is the regional energy? material. And then, how much have you reduced on the volatile organic compounds, the IEQ, the thermal comfort, all of that, and also in terms of costing. So this kind of matrix does help in, you know, assessing the impact of what we design on the environment, on our surroundings, and you know, how much is the burden on the resources and how much are we able to actually reduce it. So it's a very healthy, promising, and recommended practice to work with matrices like this.

So all materials have some benefits and some limitations. Understanding a material in its entirety is very, very important at the beginning of the project itself. Developing a sustainability roadmap is helpful to select materials. This is very important. I encourage all the young designers and audiences who are listening to me and who are a part of this course to

To give this a lot of importance, prepare a sustainability roadmap for your initiatives and projects. And, you know, sustainability radius, aesthetic sustainability, social sustainability, material sustainability, environmental sustainability. What is your big picture? What is the vision? For whom are you making?

What is the life cycle of that project? How can you ensure more returns on investment and reduce burden on resources and so on? Always remember the function and context of the building. Not all green materials are expensive. So that could be a sort of a myth and something that discourages us from already beginning to incorporate these important aspects in our designs.

Right decision taken at the right time can save cost. So I would like to say, present Joshua Becker's quote, the most environmentally friendly product is the one you didn't buy. And it is very, very deep what is written over here. So lesser the burden on the resources, lesser the burden on the environment, the more sustainable and more responsible we can aspire and showcase to be, demonstrate to be. I will take the summary of this entire week next time and some of the references that could be useful.

This is a very important source that I have put on many slides that I showed you, and there are also websites. Thank you so much. See you next time.