United Nations Sustainable Development Goals:
17 Goals to Transform Our World
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Module 15
SDG 7_ Affordable and Clean Energy Part 2

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So, in the continuation to that without electricity, women and girls have to spend hours fetching water, clinics cannot store vaccines we discussed before, many school children cannot do homework at night and people cannot run competitive businesses, slow progress towards clean cooking solutions, affecting both human health and environment and if we do not meet our goal by 2030 nearly a third of the world's population mostly women and children will continue to be exposed to harmful household air pollution.

This is also one of the most little known are discussed topics about IAQs Indoor Air Qualities. So, various regions if you see as simple as human has to run, long distances to fetch water, school children they cannot do homework at, night time businesses cannot run, industries cannot run, slow progress towards a cleaner solutions for the everyday cooking, the kitchen cooking and other things and then lastly, it mentions about, indoor air pollution.

So, that indoor air pollution if you see, if somebody is running, using firewood, for the kitchen things of course, there will be fumes of different types which are going to get accumulated in the hurt, in a small house, there may be a little opening or almost no opening or maybe only an entrance or something depending upon, that space.

Highly concentrated, amount of those, emissions, those gases are going to get, expose them, the householders for an extended period of hours and over a long period of time, that is going to cause, health issues to them. So, those are even in the, urban scenarios, when there is no ventilation, from outside if doors and windows everything is closed. So, that poses a very difficult situation, there is no fresh air change, and as long as there is no fresh air change, the inhabitants are exposed to their own, exhaust often there is a CO2 which is coming out of our nostrils.

So, and an extended, exposure to, that CO and CO2, it is going to cause, several short term as well as long term issues, from a health perspective. So, again energy and you see health how it is connected, directly connected. Well, what are the consequences to the lack of access to energy, lack of access to energy may hamper efforts to contain COVID-19 across many parts of the world energy services are key to preventing diseases and fighting pandemics from powering healthcare facilities and supplying clean water for essential hygiene, to enable communications and IT services that connect people while maintaining social distancing?

Well, what can be done to fix these? Countries can accelerate the transition to an affordable reliable and sustainable energy system transition. So, moving from, conventional this firewood based, solutions to the more cleaner format of energy systems, towards that a site by investing in renewable energy resources, prioritizing energy efficient practices, and adopting clean energy technologies and infrastructure.

Businesses can maintain and protect ecosystems and commit to sourcing 100 percent of operational electricity needs from renewable resources. Employers can reduce internal demand for transport by prioritizing telecommunication incentivize less energy intensive modes such as train travel over auto and here travel investors can invest more in sustainable energy services, bringing new technologies to the market quickly from a diverse supplier base.

You can save electricity by plugging appliances into a power strip and turning them off completely when not in use. So, this is also most simple solution at everyone's end that we can save energy, including your computer also because in the sleep mode also they keep on consuming some power. You can also do the same, while utilizing your own physical abilities you can walk for short distances instead of taking a vehicle or maybe take public transport instead of using personal vehicles, to reduce overall carbon emissions.

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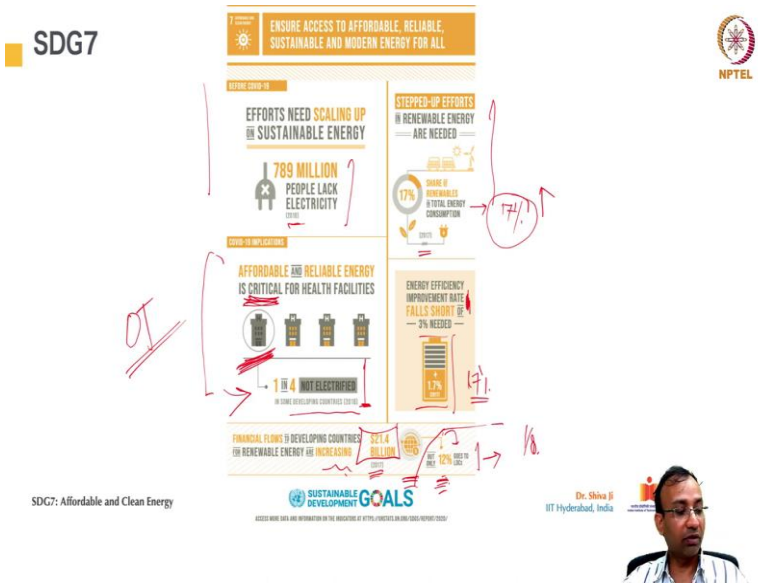

For more details, you see this website, some facts and figures. So, before pandemic efforts need scaling up sustainable energy 789 million people lack electricity as for 2018 and after COVID-19 implications if you see, affordable and reliable energy is critical for health facilities of course, very critical otherwise a lot of things cannot be done, oxygen supply, storage of vaccines, storage of several other types of a perishable medicines and vaccines, injections and stuff.

Plus, operation theatre activities cannot be actually undertaken without electricity and several such scanning and all of those things, and a medical tests and all the pathological tests and things they cannot be conducted without electricity. So, health facility healthcare facility are so much dependent on, healthcare, and the fact suggests that 1 in 4, such, health care facilities are not electrified in some developing countries as of 2018.

So, 25 percent one forth, speed of efforts in renewable energy are needed, 17 percent share of renewables in total energy consumption as per 2017. So, only 17 percent this must go higher, energy efficiency improvement rate falls short of 3 percent needed. So, 1.7 percent, energy efficiency improvement rate.

So, that has also fallen short, as expected financial flows to developing countries for renewable energy are increasing 21.4 billion US dollars, as per 2017 were given for, these purposes goes to LDCs Low Developing Countries, but only 12 percent goes to the LDCs, remaining at other places. So, that is also difference, out of this, big budget 21.4 US billion dollars, only 12 percent, almost one eight, little less than one eight, it goes to the low development countries.

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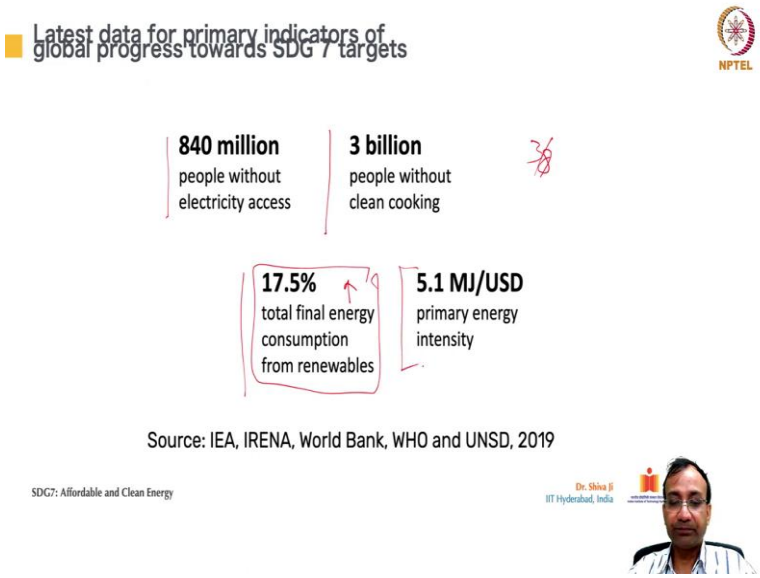

Some more latest data for primary indicators of global progress towards SDG7 targets, 814 million people without electricity access, 3 billion people without clean cooking. 3 billion out of 8 billion, 17.5 percent total final energy consumption for renewables, this must go up 5.1 mega joules per US dollar primary energy intensity.

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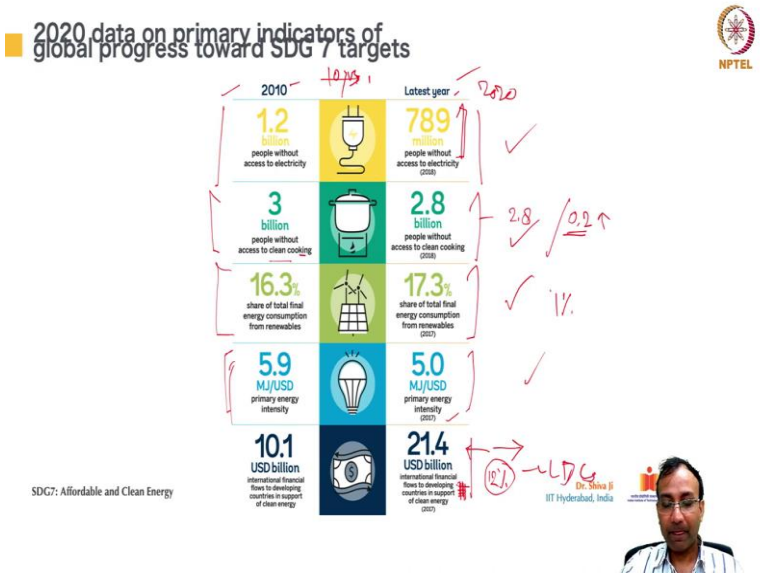

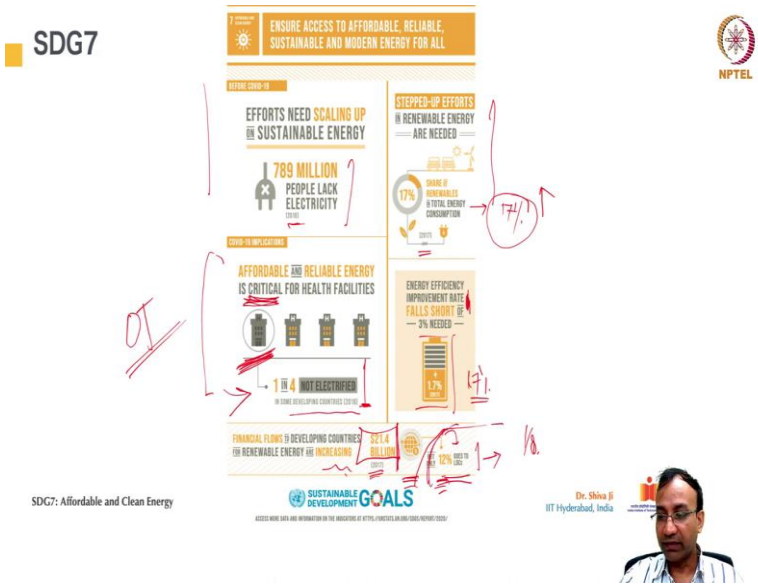

2020 data on primary indicators of global progress towards SDG seven targets. So, as per 2010, and latest year 2020, so in a span of 10 years, let us see 1.2 billion people without access to electricity, and here this has reduced to 789 million people without access to electricity. So, in a span of 20 years, there is a significant improvement, but still a huge figure 789 million, 3 billion people without access to clean cooking in 2010 and 2020, this has reduced slightly to 2.8, so 0.2 billion, people have been provided with the clean cooking solutions.

So, that is encouraging, 16.3 percent share of total final energy consumption from renewables that has increased to 17.3. So, at least 1 percent increase in 10 years. 5.9 mega joules per US dollars to 5 mega joules per US dollars. So, this is the primary energy intensity there is also, like this figure and then we have lastly 10.1 US dollars, 10.1 billion US dollars international financing flows to developing country in support to clean energy and that has increased to 21.4 to developing countries in support of clean energy. And the previous slide suggested 21.4 billion out of this only 12 percent goes to the LDCs, so in this one, when it says, flows to developing countries, but the previous slides suggest only 12 percent of this figure reaches to, LDCs.

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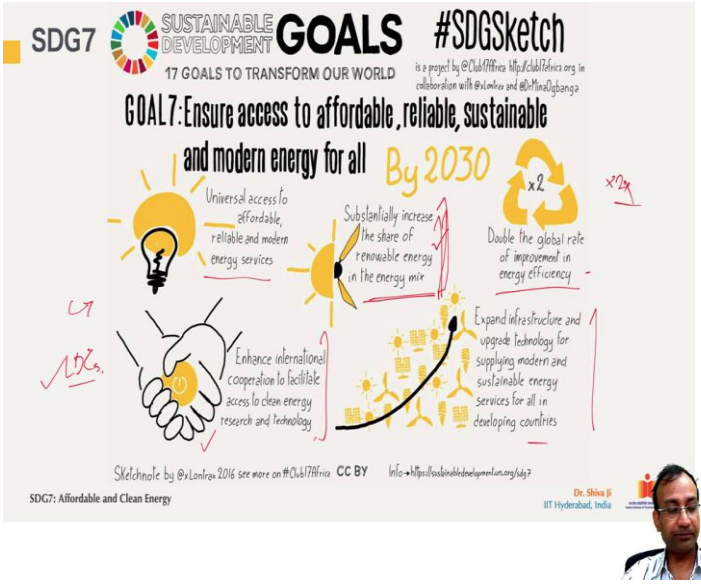

Some targets under Goal 7, universal access to affordable reliable and modern energy services, sustainability substantially increased the share of renewable energy in the energy mix. So, conventional energy mix and renewable energy mix, so in that one in a considerable share should increase from the sector, renewable energy sector, double the global rate of improvement in energy efficiency 2x rate of improvement twice, enhance international cooperation to facilitate access to clean energy research and technology.

So, this is also an essential factor for example, lot of these technologies are patented and they are, intellectual rights and commercial rights are reserved and… So, that also opposes, some form of a difficulty and then a higher, pricing for this to reach, to the LDCs. So, there should be some mechanism to, escape or moreover around that and make this technology, clean energy technology available to LDCs. Expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries.

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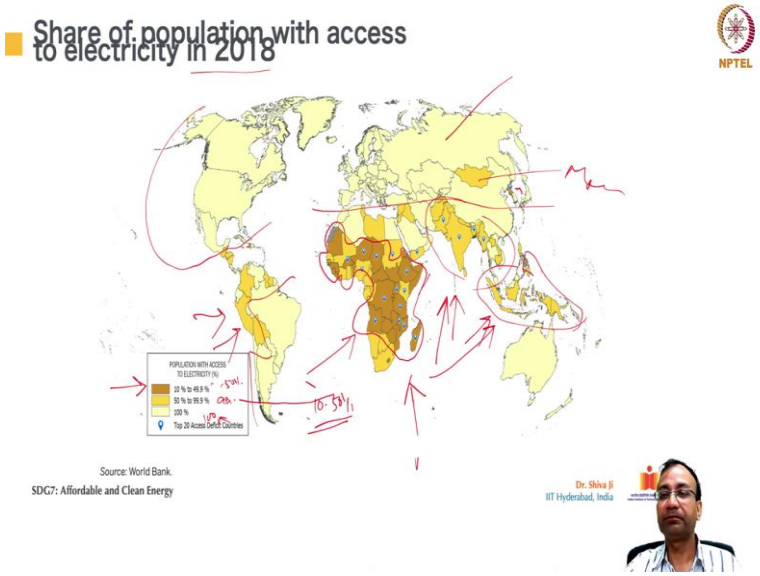

So, you can see in this slide, the share of population with access to electricity in 2018 is given, so, here with this dark, this burns we have, 10 to 50 percent up to and here 50 percent to 99.9 percent population with access to electricity and then light yellow is the 100 percent one, so light yellows, I think this North America, then in Southern America, we have Brazil, and Chile, etc then this I think most of the countries in the Northern, hemisphere, except here Mongolia.

And North Korea, North Korea, it seems is in the lesser half one. And this Mongolia is in the central one 50 to 99 percent, India also falls under the same category 50 to 99 percent. And most of these, African nations, if you see including Madagascar, they are under, 10 to 50 percent range. And South Asian, countries mostly Southeast Asian countries, Asian, this is all under, middle range and some from Latin. So, this is this distribution. So, we know where to intervene majorly into which regions.

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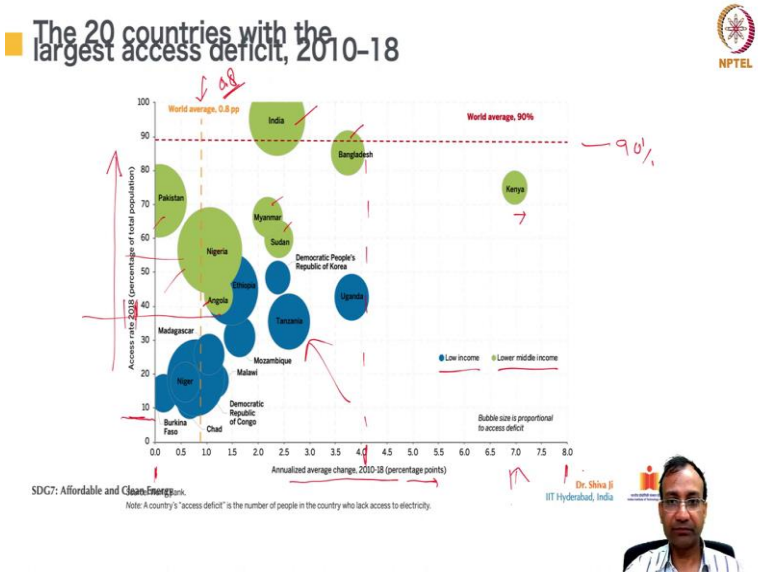

The 20 countries with the largest excess deficit 2010 to 18. So, in this one, we will see here we have in excess rate in percentage, percentage of the total population as per 2018. And on this side, we have analysed every change 2010 to 18 percentage point, up to eight, this is here. So, this is the world average at 0.8 percentage points and this is one average here at 90 percent for excess rate, and in this one, if we see countries like India it is here in this range Bangladesh, Pakistan, Myanmar, Sudan, Nigeria, Angola, and then these blue ones, these lower middle-income countries are depicted in green and low-income countries are in blue.

So, if you see their distribution is towards, lower side, so, these are in the range of from almost 10 to 50-55 and lower middle-income countries it begins, close to 40 it goes up to 100 percent. And on this side, also, this distribution, is largely from 0 to mostly making a 4 typically, if I take this, Kenya is here close to 7 on this site. So, this shows, largest exists deficit.

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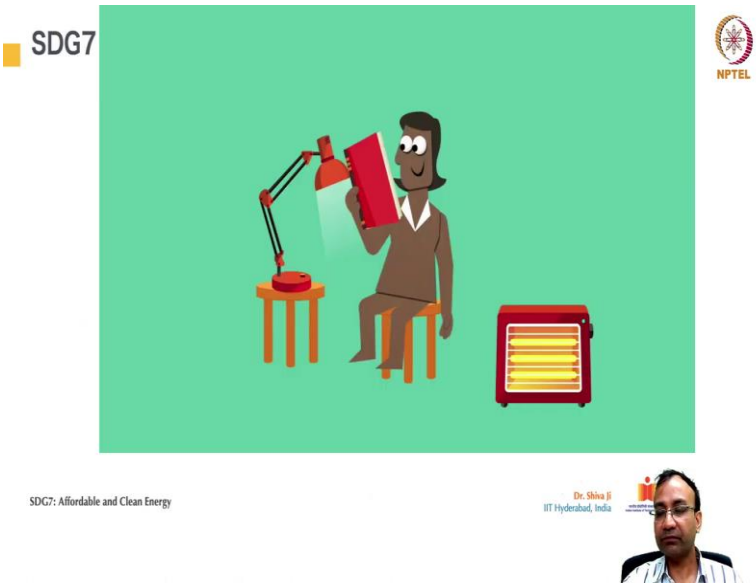

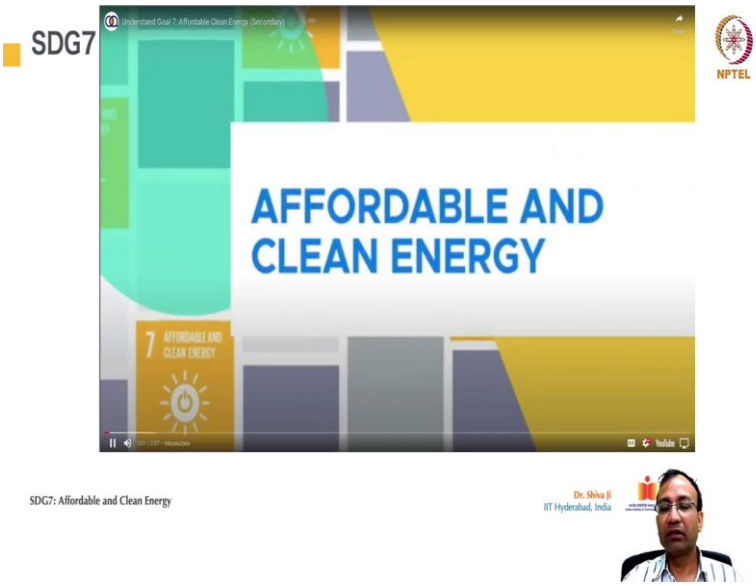

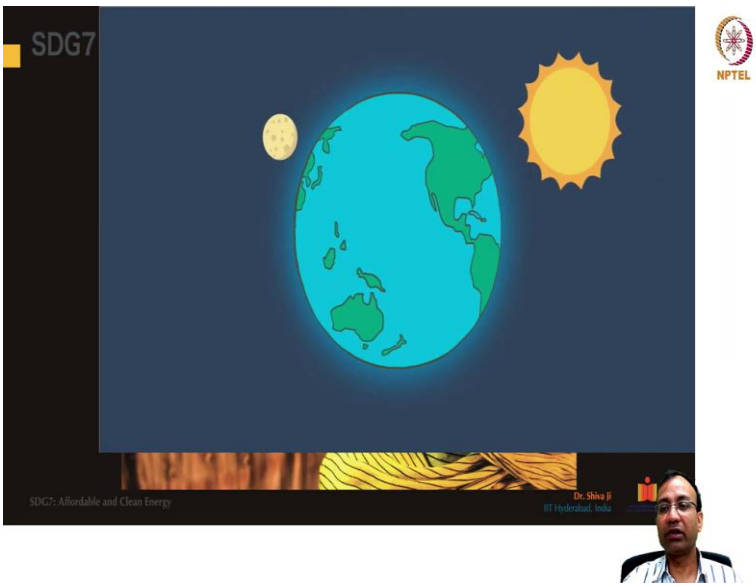

So, I would recommend for you to watch this video, you can see the link in the description, you can watch it, this picture I found in one of the UN's documents, and you see the expression on the Grand lady over here, she is so amused and pleased well the incident is that, for the first time in her life, she has received, this electricity connection and this bulb has actually glow in her household for the first time in her life. So, you can see, that glow coming on her face also how pleased and how happy she is. So, definitely, we would to see many more, such faces and I hope very soon, this target, we are able to achieve.

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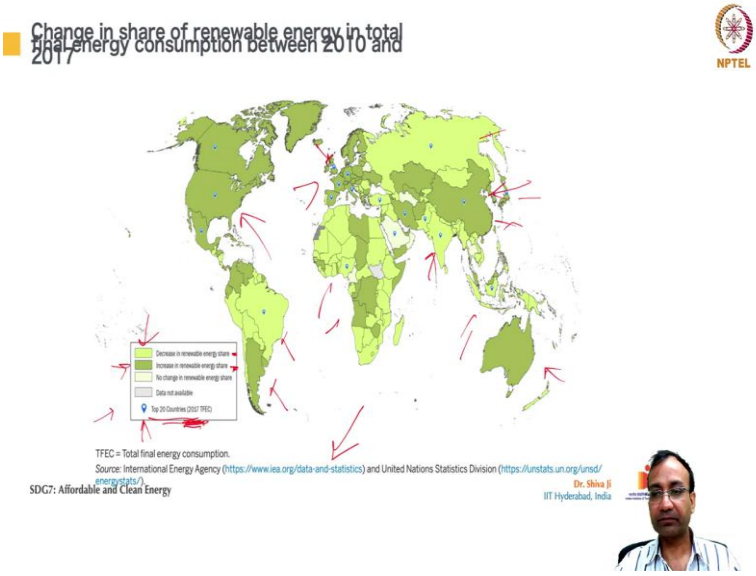

So, coming down again change in share of renewable energy in total final energy consumption between 2010 and 2017. So, it is depicted over here Grace no data available very few countries. Well, top 20 countries are depicted by, this marker you can see that blue

marker I think here India is also there North American, Brazil and many in Europe and China, Russia, Japan and one here. So, this light green talks about decrease in renewable energy share these dark green talks about increase in renewable energy share.

So, if you see India has fallen into the decrease into renewable energy share, category as per even this report, this is from 2017 maybe you can visit, this link this website and check for the, the latest data in the recent years because 2017 is still 5-6 years, before so, I am sure there may have been some improvement. And increase, the North Americans and here European mostly China this side Australia.

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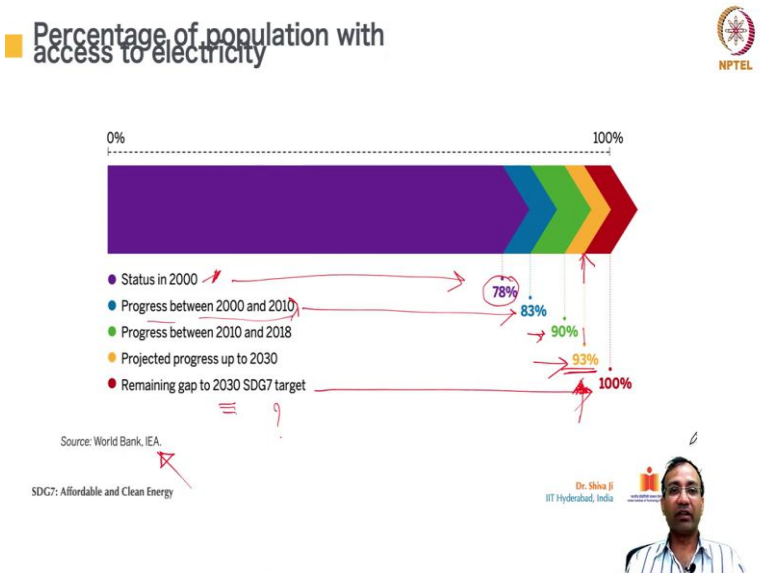

Percentage of population with access to electricity. So, if you see status in 20, 2000, in year 2000, this was at 78 percent with access to electricity, progress between 2000 to 2010 and this has reached to 83 percent. Next, it reach to 90 percent by 2030, it is projected that 93 percent of the population will have electricity connection access and remaining 100 percent, let us see by when, it happens, but definitely I think it is on the fast progress I think, if it reaches, here by end of the 2030 I am sure that will be a very good achievement in terms of progressing because, if you see this number of households, which are short of such facilities is running in millions. So, it is a huge task and where all of that fund and the resources are going to come to facilitate that is a big, challenge. So, you should refer, World Banks and IEA website, for latest, data.

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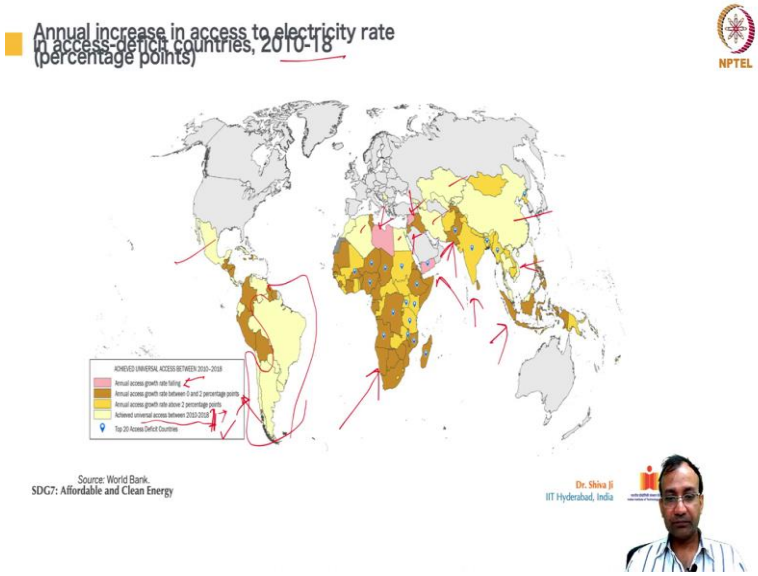

And other, picture if you see annual increase in access to electricity rate in excess deficit countries 2010 to 18 percentage points wise. So, annual progress, annual excess growth rate falling that is in pink. So, very few countries. And then we have annual access growth rate between 0 to 2 percentage points. This (())(19:18) mostly African countries, Pakistan and Indonesia also. Annual access growth rate above 2 percentage points is the yellow one, including India, and achieved universal access between 2010 to 2018 if you see is the success story. So, many from this, South America, Mexico, few in Africa, only few, I think three I see here. And then China and a few more like Iran, and I see Vietnam here they have achieved.

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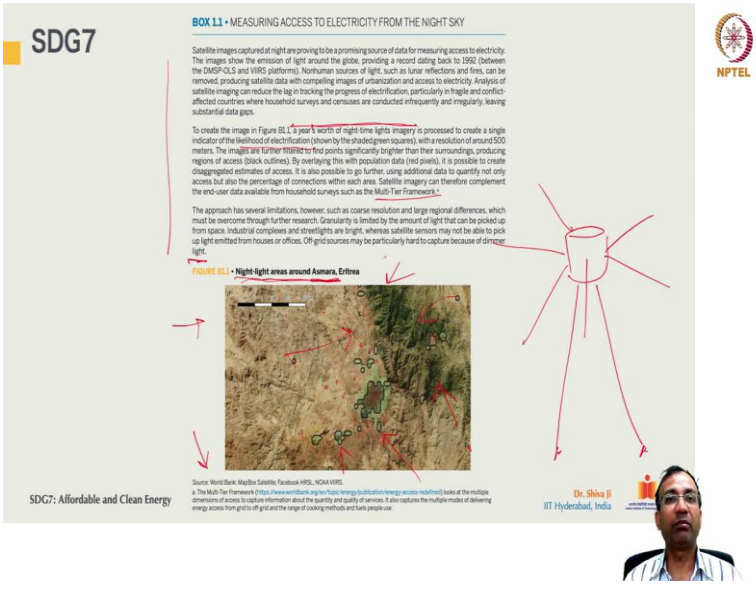

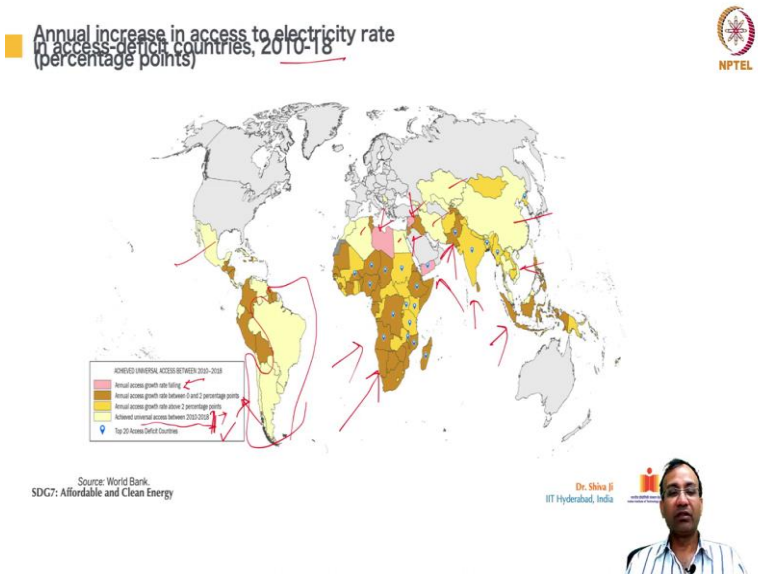

So, how to measure this thing? Like there may be a question how do you measure, how much of electrification has been done, and this in detail and with the accuracy well a technology had come to the rescue of, such kind of situations, to figure out, quite reliable, data to validate this, because all of these projections and things, will go haywire if, the data is inaccurate.

So, validated data a proven, data set is also essential in order to carry out, credible, efforts, either targeted locations. So, if you see this slide, it suggests, about how do they and measure it, so this picture, if you see this is from Eritrea, around Asmara, is that thing a place is a nightlight area around Asmara. So, well there are a lot of people us satellites, hovering in the, space above our heads and a few 100 kilometres above, the Earth's surface.

And they do, this job of, using remote sensing and all, off a collecting gathering in data from such remote places, because practically it is very difficult or next to impossible to access such a difficulty terrains for an accurate data. So, this where a technology has come to the rescue I will just read. Satellite images captured at night are proving to be a promising source of data for measuring access to electricity.

The images show the emission of light around the globe, providing a record dating back to 1992 between the DMSP OLS and VIRS platforms, non-human sources of light such as lunar reflections and fires can be removed, producing satellite data with compelling images of organization access to electricity. analysis of satellite imaging can reduce the lag in tracking the province of electrification, particularly in fragile and conflict affected countries where household surveys and sensors have conducted infrequently and irregularly leaving substantial data gaps.

To create the image in figure B1.1 this one, year's worth of night-time light imagery, if you see is processed to create a single indicator of likelihood of electrification, shown by the shaded green squares, you see them these shaded green squares with the resolution of around 500 meters. The images are further filtered to find points significantly brighter than their surrounding producing regions of excess, black outlines by overlaying this and population data, red pixels it is possible to create these aggregated estimates of access, it is also possible to go further using additional data to quantify not only access but also the percentage of connections within each area.

Satellite imagery can therefore complement the end user data available from household surveys such as the multi-tier framework, the approach has several limitations. However, as coarse resolution and large regional differences which must be overcome through further research, granularity is limited by the amount of light that can be picked up from space, industrial complexes and street lights are bright, whereas satellite sensors may not be able to pick up light emitted from houses or offices, off grid sources may be particularly hard to capture because of dimmer light, you can refer, this source for more details. So, this is how actually a such data are gathered, collated and then presented for a policy decisions or action plans.

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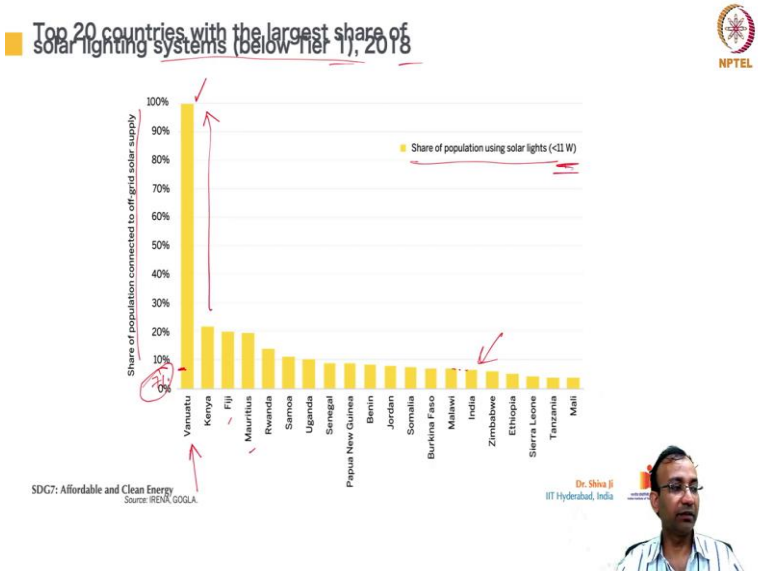

Top 20 countries with the largest share of solar lighting systems, below tier 1 2018. So, if you see this country, Vanuatu, this is almost 100 percent dependent on a solar power. Share a population connected to off grid solar light supply, almost 100 percent, it is a small, Island nation where, because of its geographic, challenge and limitation, there are limitations in

terms of energy generation and plants also what they can establish, so this is the one of the most feasible and practical solution in that country.

That is why this has the, tremendously high ranking compared to the next, second one in this range tier one. Second comes Kenya, Fiji, Mauritius, Rwanda, Samoa, Uganda, Senegal, Papua New Guinea, Benin, Jordan, Somalia, Burkina Faso, Malawi, India, Zimbabwe, Ethiopia Sierra Leone, Tanzania, Mali. So, India also if you see is here, this is close to, around 7 percent. So, the share of population using solar lights less than 11 Watts, capacity in that range.

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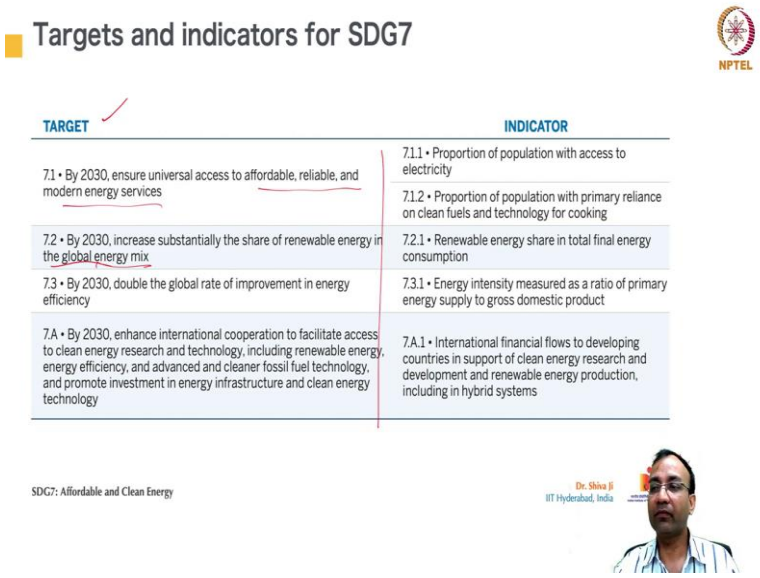

Targets and indicators for SDG 7. So, let us see what are the targets? By 2030 ensure universal access to affordable reliable and modern energy services with 30 increase substantially the share of renewable energy in the global energy mix by 2030 double the global rate of improvement in energy efficiency by 2030 enhance international cooperation to facilitate access to clean energy research and technology including renewable energy, energy efficiency and advanced and cleaner fossil fuel technology and promote investment in energy infrastructure and clean energy technology, indicators.

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Direct relation if you see from renewable energy this SDG. So, it is directly connected to several economy growth, upliftment, poverty, hunger overall climate change and water related things water and sanitation so, direct connection.

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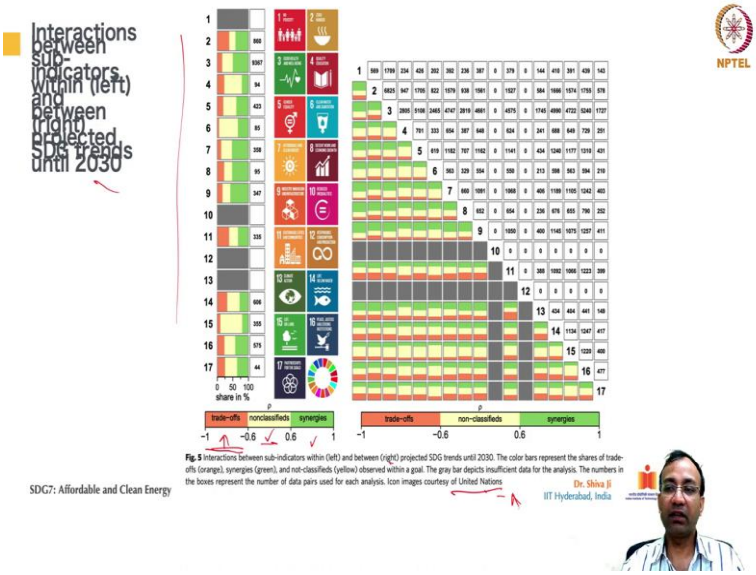

Here in this slide, you can see some interactions between sub indicators, within on the left side and between right, protected SDGs trends until 2030. So, while 17 are listed on this side, and you can see trade-offs, indicated in red colour, so, ranging between minus 1 to minus 0.6 non-classified so, minus 0.62 plus 0.6 this range, and then synergy is 0.621 is in represented by green.

So, in this one, you can see over here interactions between sub indicators within left and between projected SDG trend until 2030, the colour bar represents the share of trade-offs orange, synergies green and non-classified CRO observed within a goal, the grey bar depicts insufficient data for the analysis. The number in boxes represent the number of data pairs used for each analysis and this is so strong even you can see the numbers.

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Again, mapping if you see, compared to other, SDGs. So, you can see direct annual influences, no poverty, decent work, economy growth, industry innovation infrastructure, system or cities and communities, climate change, life on land, partnerships for the goals and then from there it is connected to many others also hunger it is connected here. This one is connected to no poverty and again 0 hunger and good health.

Well, this one industry innovation will help a responsible consumption fighting climate change and partnerships, in sustainable cities is about partnerships in good health, then climate change overall, it is about health, water, life below water, life on land and everything. So, this is how it is touching the other SDGs.

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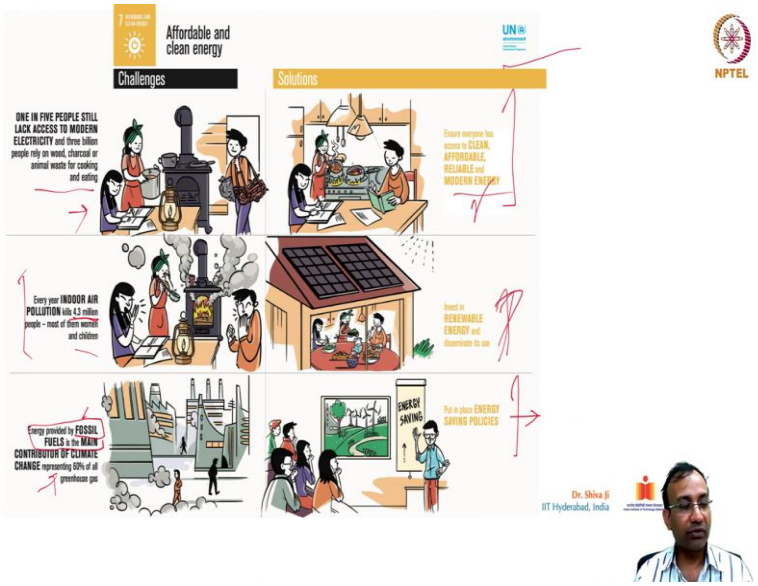

With this, we have come to the end slide where we will be seeing UN environments shortlisting of some challenges and solutions. So, let us see the first one, one in five people still lack access to modern electricity and 3 billion people rely on wood charcoal or animal waste for cooking and eating, previously we saw which have I think a lot of difficulties, for the householders for the people even kids, they cannot study in night easily, if there is no electricity they cannot actually store their food stuff, there would not be any refrigeration facility and so on. And in health we saw, safety of vaccines and medicines other stuff. What can be done, ensure everyone gets, access to clean, affordable, reliable, modern energy. So, this mechanism actually should be distributed, should be actually connected to the know last person then only we can say, yes the target is achieved.

Secondly, every year indoor air pollution kills 4.3 millions people most of them women and children, 4.3 millions people 43 lack people. Invest in renewable energy and disseminate it uses, so that everybody gets to know what it is. Energy provided by fossil fuels in the main contribute of climate change, representing 60 percent of all green house gases.

Fossil fuels, hydrocarbons the direct culprit the major culprit, well what to do? Put in place energy saving policies and slowly and gradually get rid of hydrocarbons. So, I think we have understood under this SDG like affordable and clean energy is important to move for it, it connects all of us every member, every section of the society, hence it is very relevant. So, with this we have come to the end of this lecture, thank you all for joining, see you in the next one.