Leadership for India Inc: Practical Concepts and Constructs
Prof. C Bhaktavatsala Rao
Prof. Ajit Singhvi
Department of Management Studies
Indian Institute of Technology, Madras

Week – 03
Climate Leadership
Lecture – 12
Leadership for Sustainable Growth

Hi Friends, welcome to the NPTEL course Leadership for India Inc., Practical Concepts and Constructs. We are in week 3, covering Leadership for Sustainable Growth. In this lecture, we will cover Climate Leadership; in the previous lecture, we focused on technology leadership.

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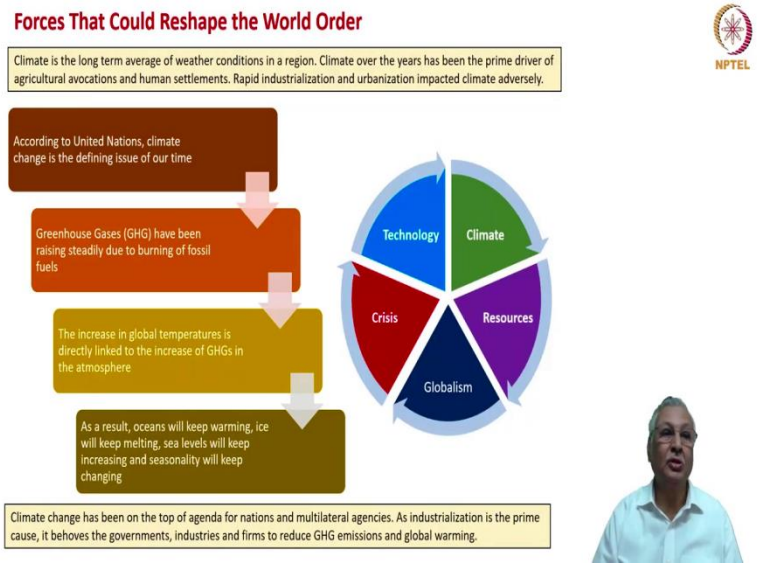

What is climate? Climate is the long term average of weather conditions in a region. Climate over the years has been the prime driver of agricultural avocations and human settlements. Rapid industrialization and infrastructure development as well as urbanization impacted climate adversely.

Amongst the five factors which are discussed here technology, climate, resources, globalism, and crisis; climate has until recently been the top of the agenda item, of course with the pandemic COVID19, crisis also has become one of the topmost concerns of the entire world.

According to United Nations, climate change is the defining issue of our time. Greenhouse Gases also called GHG have been rising steadily due to burning of fossil fuels. The increase in global temperatures is directly linked to the increase of GHG emissions to the atmosphere.

As a result, oceans will keep increasing in their temperature, ice will keep melting, sea levels will keep increasing, and seasonality will keep changing. Suddenly you would have more floods and at times you would have more droughts.

The non seasonal factors would undergo significant changes, which we are also experiencing. Climate change has been on the top of agenda for nations and multilateral agencies for these reasons. As industrialization is the prime cause; it behoves the governments, industries, and firms, and their leaders to reduce GHG emissions and control global warming.

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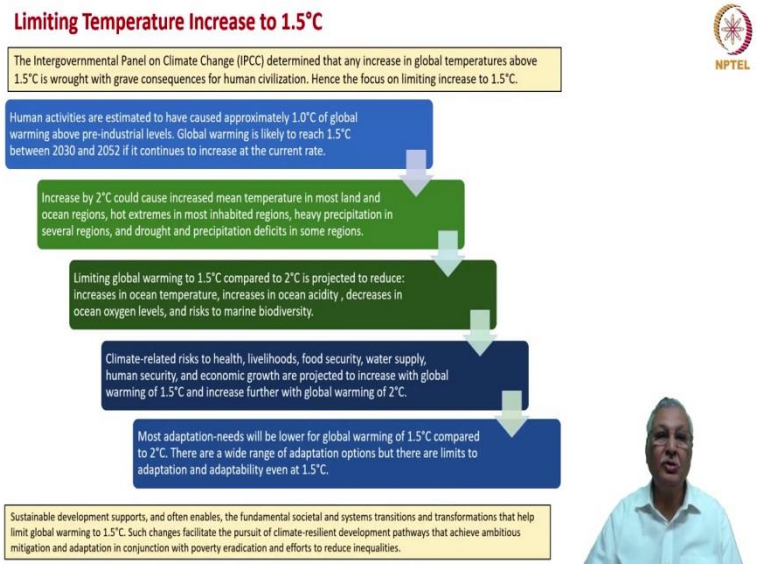

So, how do we define global warming? Limiting temperature increase to 1.5 degrees centigrade is the objective of global warming at present. There is an Intergovernmental Panel on Climate Change IPCC, which has determined that any increase in global temperatures above 1.5 degrees centigrade is wrought with grave consequences for human civilization.

Hence the focus on limiting the increase to 1.5 degree centigrade. Human activities thus far are estimated to have caused approximately 1 degree centigrade of global warming above pre industrial levels. It is also likely to reach 1.5 degrees centigrade between 2030 and 2052, if it continues to increase at the current rate.

Increase by 2 degrees centigrade on the other hand could cause even higher increases in mean temperature in most land and ocean regions, hot extremes in most inhabited regions, heavy precipitation in several regions and drought and precipitation deficits in some regions.

Therefore, limiting global warming to 1.5 degrees centigrade compared to 2 degree centigrade is projected to benefit or reduce the adverse impact of global warming. The increases in ocean temperature, increases in ocean acidity, decreases in ocean oxygen levels, and risks to marine diversity would be somewhat moderated to the benefit of the mankind.

Similarly, climate related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5 degrees centigrade; but would increase even higher with global warming of 2 degree centigrade. It is like accepting the lesser of the two evils. Most adaptation needs will be lower for global warming of 1.5 degree centigrade compared to 2 degrees centigrade.

There are a wide range of adaptation options, but there are limits to the levels we can adapt ourselves and adaptability can be severely stressed even at 1.5 degree centigrade. Sustainable development supports, and often enables, the fundamental social and systems transitions and transformations that help limit global warming to 1.5 degree centigrade.

But, we require sustainable changes in the development patterns of societies and nations and of course, the industries and economies. Such changes will facilitate climate resilient development pathways that achieve ambitious, mitigation and adaptation, in conjunction with poverty eradication and efforts to reduce inequalities.

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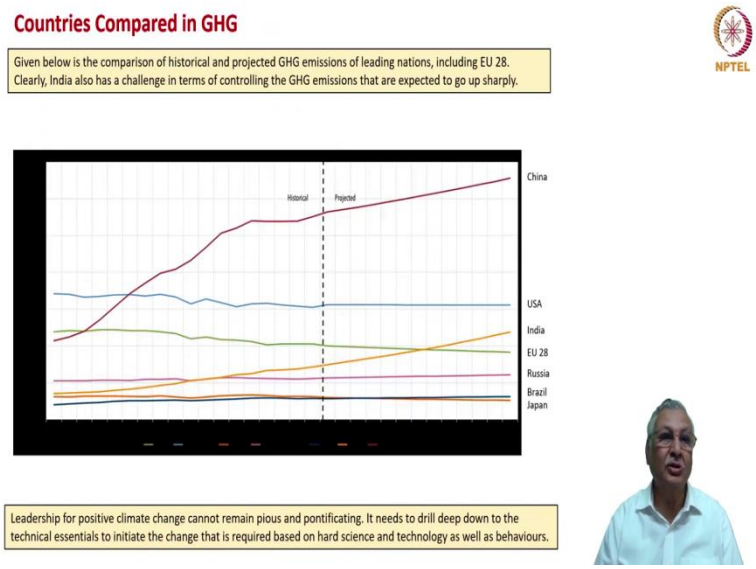

This is a graph which compares the GHG emissions of leading nations including EU 28. As you can see, as the nations' try to develop, the level of GHG emissions would increase. China is at the top of the table for greenhouse gas emissions, whereas India is also picking up the GHG emission levels. USA has always been at a high level, whereas certain other developing countries have been at lower level.

Japan although a developed nation, has been able to maintain the GHG emission levels at a reasonably low levels. So, this is the sum total of the picture on GHG emissions of various classes of nations.

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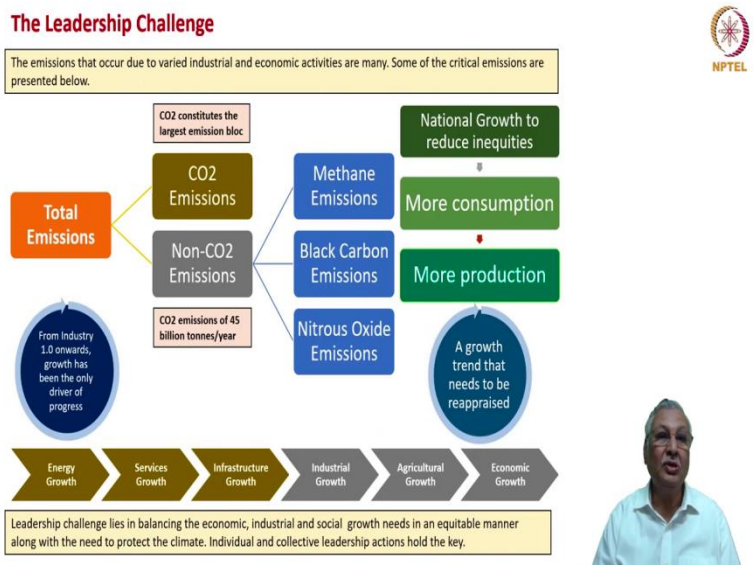

What is the leadership challenge? If you see the right side, we require continuous national growth to reduce inequities; we need higher GDP, which means that there should be higher industrial growth, higher infrastructural growth, higher service growth, higher economic growth has to happen. And this would happen only if you have more consumption.

We also require more production to support more consumption, and we require more consumption from the people who do not have the ability to consume. The masses need to have more public goods, more items of necessity put in their hands for better lifestyle. So, if there is a growth trend line this, which is incumbent upon leaders of emerging markets, developing nations, countries which want to reach the top economic club.

So, these are the requirements; however, this growth trend needs to be reappraised. And how do we do the reappraisal? We can do the reappraisal looking at the way the growth is taking place and the way the growth is also leading to emissions. If you look at total emissions, we have two broad classes of emissions; CO2 emissions and non-CO2 emissions.

And within the emissions, CO2 constitutes the largest emission block; about 45 billion tons per year of CO2 emissions are discharged into the atmosphere. Non-CO2 emissions comprise methane emissions, black carbon emissions, nitrous oxide emissions. From industry 1.0 onwards, that is from the time industrial apparatus and devices and

equipment began to be produced and used, growth has been the only driver of progress and it still continues to be the only driver.

So, how would you reduce inequities, how would you expand the cake for the entire social spectrum and yet moderate the growth imperatives that, drive this kind of equitable economic growth, that is the challenge leaders have.

So, we have on one side energy growth, services growth, infrastructure growth, powering industrial growth, agricultural growth, and economic growth. So, how do we balance all of these 6 parameters of growth, that is the leadership challenge and that is a great intellectual and mind set challenge that leaders today face.

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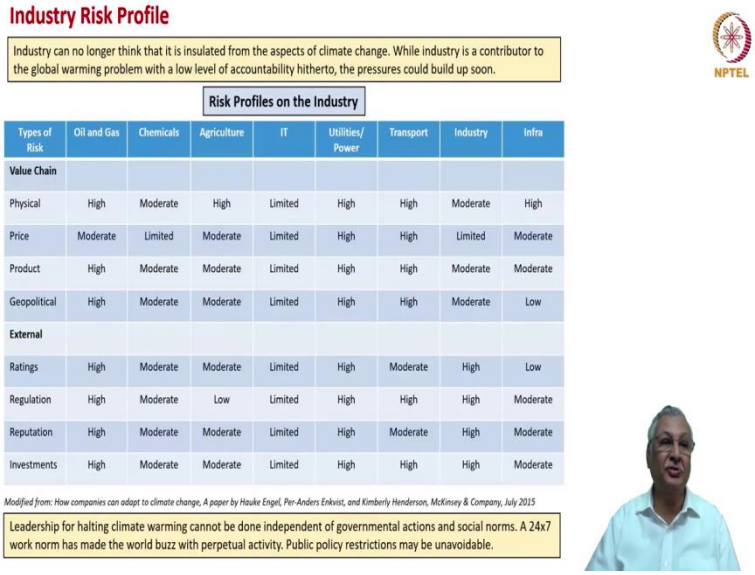

Industry can no longer think that it is insulated from the aspects of climate change; while industry is a contributor to the global warming problem with a low level of accountability hitherto, the pressures could build up very soon. The risk profiles on the industry are demonstrated here. If you see the value chain and the external view of an industry; the risks vary; very few industries if at all have low risk with reference to the climate change situation.

Most industries have moderate or high risk profiles, as a result of the climate change impact. Certain industries such as utilities and power, transport have got higher risk profiles, coming up due to the risk related to climate change. Similarly, the external

rating agencies, the regulators have got a view of certain industries and the view is that, those industries must be down regulated in terms of their emission impact on the atmosphere.

And investments will flow only to those industries, where there is good ESG record as I said earlier; that is environmental empathy amongst social responsibility and governance. So, it is important that industries look at the risk profile that is coming up due to the climate change factors.

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There are fourteen strategic industrial actions, which the companies and their leaders can take to ensure that they do their own bit in terms of climate leadership. These are strategic in nature, but some of them are also operational in execution.

We have to first of all dovetail with local emission goals. We need to review our HVAC systems, leadership must be closely involved in design of facilities, green mobility should be a prime responsibility of leadership drive, transportation has to be optimized, greenhouse gases must be reduced, renewables should be increased; there must be ownership and accountability for industrial actions, which could control emissions.

Behaviour changes must be demonstrated through felt leadership and role modelling. Agro food chain must be optimized; we also need to establish global coalitions. We require industrial leaders and business leaders working together with governmental

leaders to be able to take these kinds of industrial actions and when necessary incentivize such industrial actions as well.

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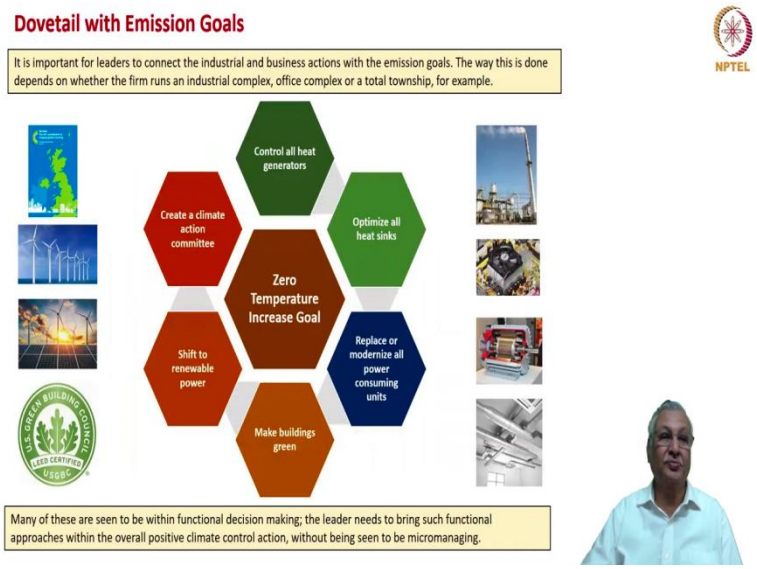

So, how do we dovetail with emission goals? We need to have a goal of zero temperature increase. And to be able to do that, industries must control all heat generators; we should optimize all our heat sinks, replace or modernize high power consuming units, make buildings green, we should shift to renewable power, and also create an action climate committee within each firm and within each industry coalition, that is extremely important.

These may be seem to be functional decision making activities delegated to let us say a project planning group or project engineering group or to facility administrator; but that is an erroneous view of these important aspects of controlling emission goals. Leaders need to be involved in setting a zero temperature increase goal and also demonstrating through their involvement as to how all of these heat minimization activities could be undertaken by a firm.

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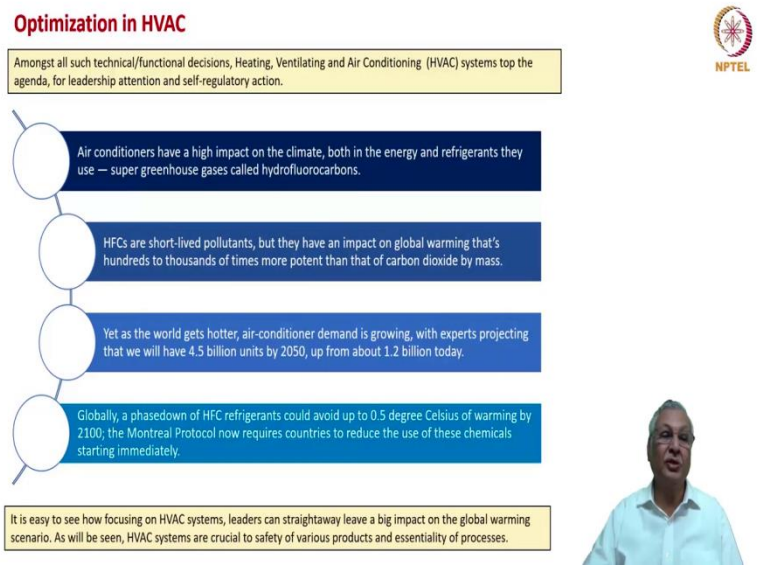

You can find several companies coming forward to offer their rooftops for generation of renewable power, that is a proactive decision by company leaderships to utilize the resource they have in terms of open terraces for renewable energy production. So, coalitions are possible across the energy producing and energy consumer groups for greater good.

Another such important activities HVAC, Heating Ventilating Air Conditioning systems. HVAC systems are a part and parcel of modern industrial functioning as well as modern home situations. These are a prime candidate for control of emissions; it has been established that air conditioners and other HVAC systems have a high impact on the climate, both in terms of the energy drawal as well as from the refrigerators they use.

Super greenhouse gases are generated called hydrofluorocarbons. While HFCs are short lived pollutants, they do have a strong impact on global warming, which is hundreds to thousands of times more potent than that of carbon dioxide by mass. You all must have heard about the ozone hole; why did it happen, because of refrigeration going up exponentially and HFCs getting released also exponentially.

So, the issue is very clear. At the same time, climate change is causing the world to become warmer; so there would be more necessity for air conditioning. So, it is a kind of non virtuous negative cycle. We are expected to believe that there would be 4.5 billion

units of air conditioning systems by 2050 in this world, up about three times from the existing 1.2 billion today.

Globally a phasedown of HFC refrigerants could avoid up to 0.5 degrees Celsius of warming by 2100; the Montreal Protocol now requires countries to reduce the use of these chemicals starting immediately. It is important to realize that, HVAC systems offer a great scope in terms of appropriate facility design and control of emissions.

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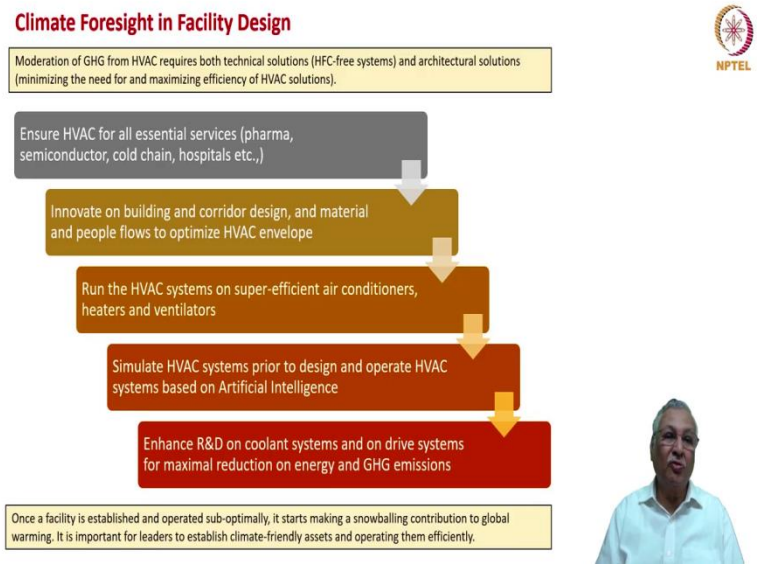

Many industries such as pharmaceuticals, semiconductors, cold chains, hospitals require HVAC as an essential component of their service and product lines. But how do we control the emissions that arise out of these HVAC systems? By designing the corridors in a manner, that is minimal and also functional; no point in having huge atriums, wide corridors and high roof heights.

By ensuring that material and people flow is optimized the overall HVAC envelop along with the corridor and atrium designs can be controlled. Similarly, run the HVAC systems super efficiently with appropriate air conditioners, heaters and ventilators. Simulate HVAC systems prior to design and operate HVAC systems based on artificial intelligence, so that every temperature increase that can be controlled; can be controlled.

Enhance R&D on coolant systems and on drive systems for maximal reduction in energy and GHG emissions. Once a facility is established and operated sub optimally, it starts

making a snowballing contribution to global emission control. It is important for leaders to establish climate friendly assets and operate them efficiently.

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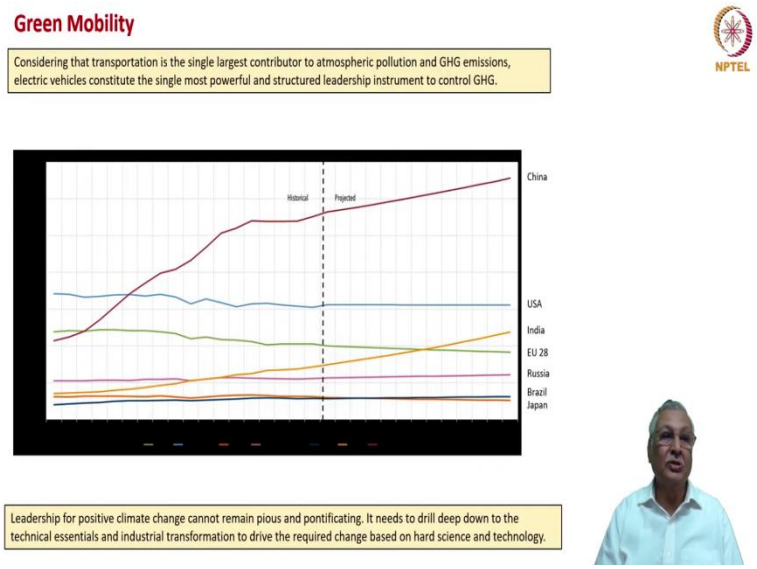

Green mobility, this is another very important aspect. Transportation is the single largest contributor to atmospheric pollution and GHG emissions. We have seen in our cities, how a vehicle transportation leads to decline in the quality of air causing numerous health problems for it is citizens; quite apart from the impact on visibility and also hazy atmosphere and other deleterious aspects of overall climate.

Even here if you see, China is highest in terms of the GHG emissions related to green mobility, and India is moving up. Therefore, leadership for positive climate change cannot happen with only pious pontificatory statements. We need to drill deep down to the technical essentials and industrial transformation to drive the required change based on hard science and technology.

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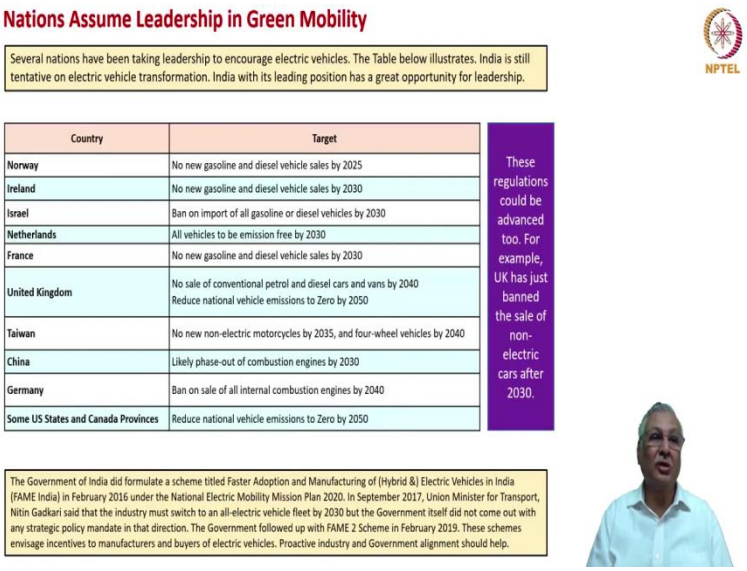

Nations have begun assuming leadership in green mobility. The table below shows certain nations who have started applying legislative instruments for control of IC engine driven vehicles and for encouragement of electric vehicles.

In this United Kingdom for example said that, we have to have certain national vehicle emissions reduced to zero by 2050; it also said that there should not be any sale of conventional petrol and diesel cars and vans by 2040.

But just now, we have the regulation from United Kingdom that, there cannot be any sale of non-electric cars after 2030; therefore, many of these countries could advance their stipulations on introduction of electric vehicles and phasing out of IC engine based vehicles. The Government of India itself started taking many proactive steps to encourage electric mobility and also focus the attention of industry as well as the consumers on the need to take on electric vehicles as a national mission.

In February 2016, the first FAME policy was formulated and then it was updated in 2020. The Union Minister for transportation did say that, India would like to phase out the IC engine vehicles and start electrifying the automobile industry in a big way from 2030. However, there have been some kind of slow movements in these electrification initiatives and it behoves our industry as well as our governments to collaborate and develop a proactive policy.

We have to bear in mind that, India is the fourth largest in terms of automobile production. So, we have a great opportunity, not just a challenge; we have a great opportunity to be a leader in electric vehicle production by adopting appropriate electric vehicle policies.

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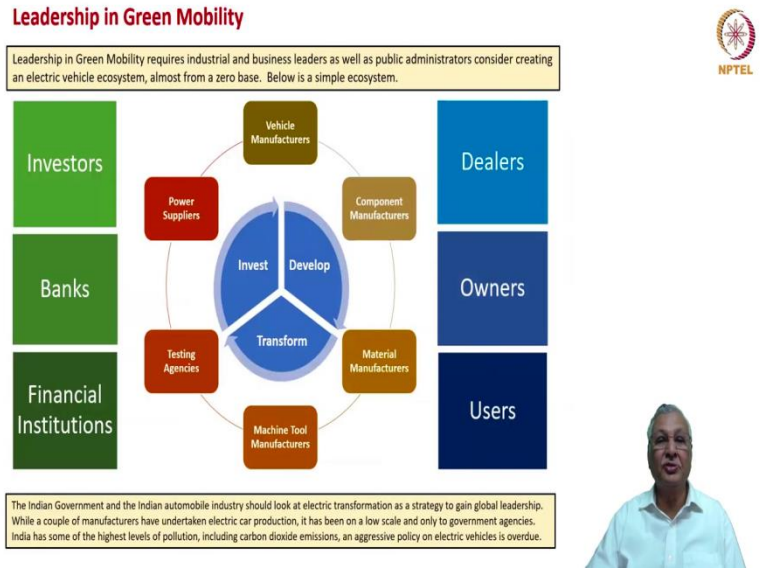

We have discussed in the previous lecture in great depth; how the entire ecosystem has to change, if we have to bring electric vehicles in a big way into the country. There are three aspects; we have to develop electric vehicles, we have to invest in electric vehicle movement, and then transform the industry. In this, vehicle manufacturers, component manufacturers, material manufacturers, machine tool manufacturers, testing agencies, and power suppliers need to be closely involved.

The previous lecture pointed out that, many more agencies and many more industrial entities as well as service entities are involved in this transformation of automobile industry into an electric vehicle industry.

At the same time, we also have other stakeholders' investors, banks, financial institutions on one side; dealers, owners, users on the other side. So, we need to look at electric transformation of the automobile industry from a national perspective and come up with solutions which could be time effective, cost effective and also supporting green mobility to the hilt.

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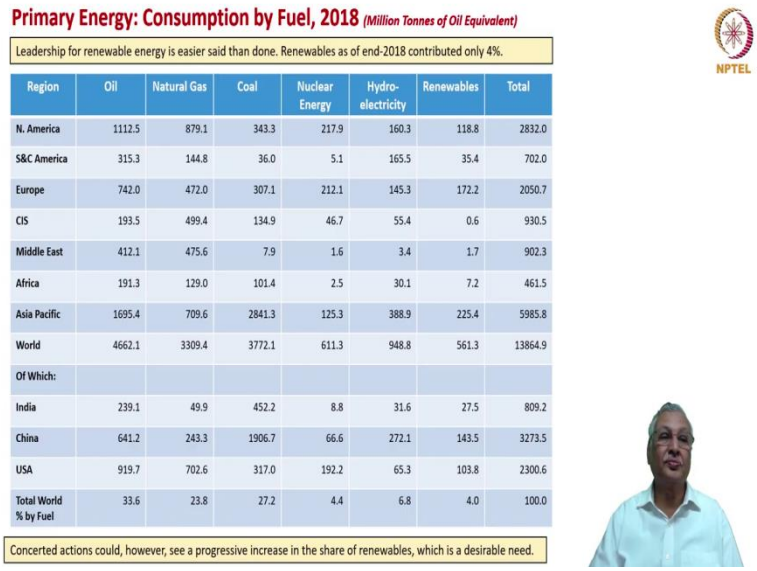

This table provides lot of data on the primary energy consumption by fuel 2018. It is destructive that even today, renewables contribute only 4 percent; there is therefore, lot of ground that could be covered in substituting emission bearing fossil fuels by renewable energies.

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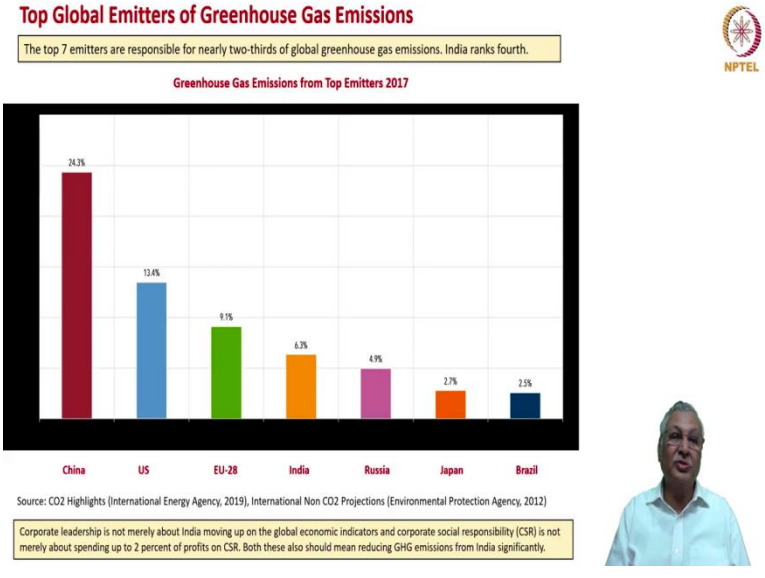

These are the greenhouse gas emissions from top emitters as per the 2017 statistics; you will again find that China is topping the list followed by US EU-28 and India is ranked

fourth. And the difference between of course, the top ranker and India is four time 4 x difference.

We can also look at the fact that, there are certain other developing countries or members of the BRICS bloc who are yet to reach the high states. There is therefore, a potential that the greenhouse gas emissions would in fact increase in future days, unless nation stake determined steps to control greenhouse gas emissions.

And it cannot just be public policy; it has to be industrial policy, and a mission of the industry leaders to reduce greenhouse gas emissions. We have to take you from Japan, which has developed itself to world class level; but has been able to control greenhouse gas emissions admirably well.

So, many multilateral agencies, Indian governmental agencies and organizations such as OECD have published several reports on the climate change and the control of gaseous and non-gaseous emissions. Leaders should sensitize themselves as well as their teams to the challenges of climate change and bring in climate change control as part of their industrial missions.

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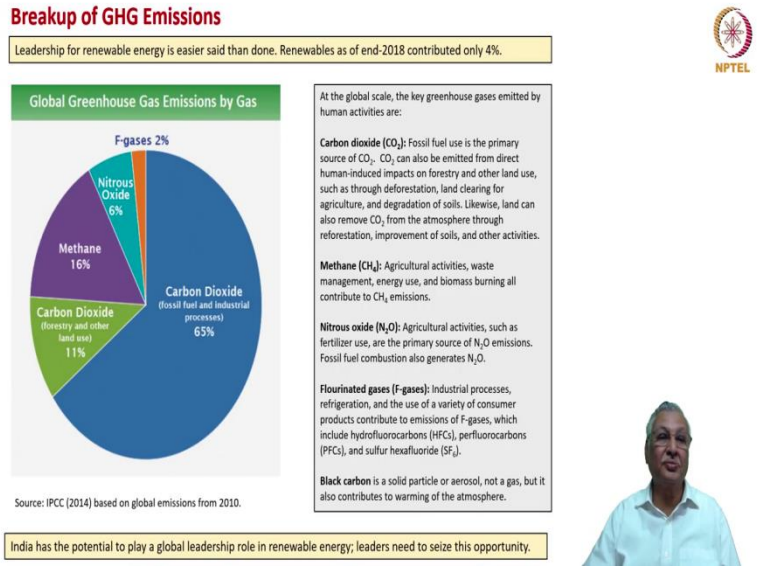

If you break up the GHG emissions, you will find that carbon dioxide as I said earlier this is the most important block of emissions; but there are other emission contributors as

well. This slide has got a lot of information, which you could probably go through at your leisure.

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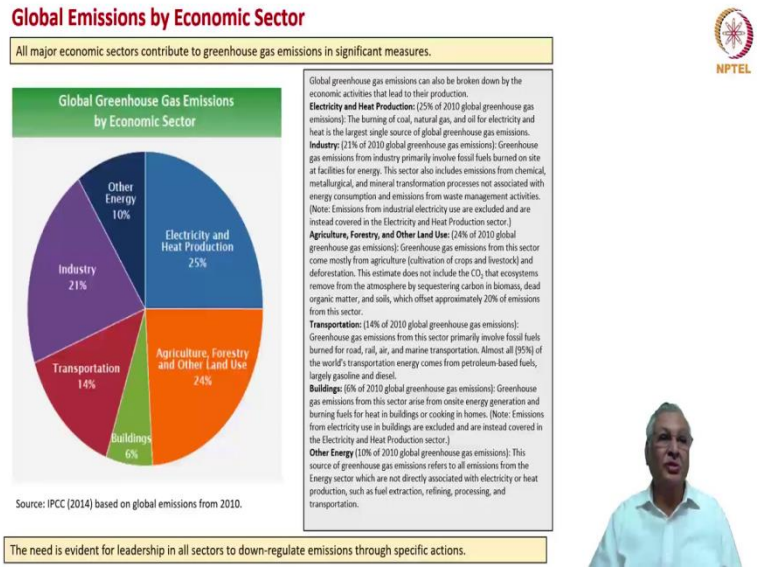

Similarly, when you look at by economic sector, electricity and heat production constitutes one of the biggest contributors to the greenhouse gas emissions followed by agriculture, forestry and other land use. Buildings constitute 6 percent of contribution, transportation 14 percent, industry 21 percent and other energy sources and developers 10 percent.

There is again a kind of distributed potential of different industrial sectors including agriculture sector to control global emissions as we go forward. This is based on IPCC data which is a little dated; but one would believe that this kind of pie chart remains relevant even today. Therefore, the need is very clear for leaders from different sectors to collaborate to down regulate the emission situation of various units they control.

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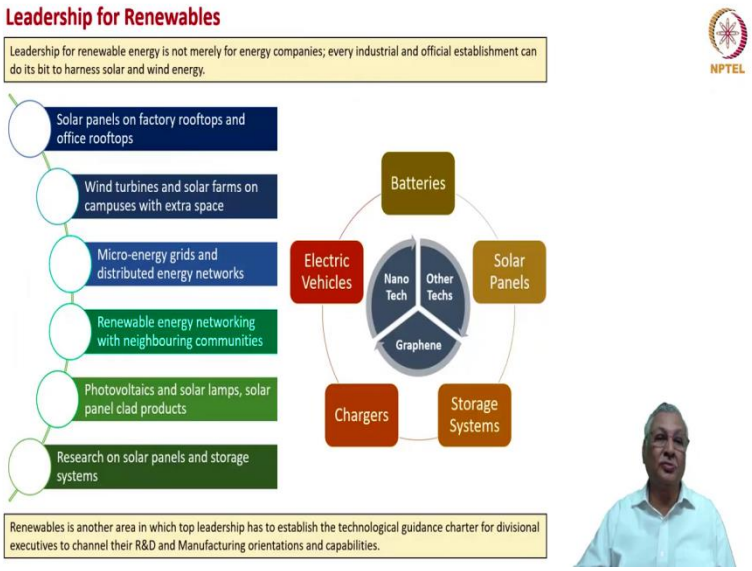

So, how do we get leadership for renewables? We can use newer technologies such as nanotechnology, grapheme, other technologies in products which support renewable energy. Those products being electric vehicles, batteries, solar panels, storage systems, chargers that is one part; that is the very products which assure in the renewable or electric revolution, the clean energy revolution.

They themselves need to be upgraded in such a manner that, their consumption of non-renewable resources is minimized. At the same time, we can have several operating techniques to make sure that, every bit of the land is utilized to generate renewable energy.

Solar panels on factory rooftops and office roof tops; wind turbines and solar farms on campuses which have extra space; micro energy grids and distributed energy networks; renewable energy networking with neighbouring communities; photovoltaics and solar lamps, solar panel clad products.

On all measures which may look small; but together like trickles make a river and rivers make an ocean, such initiatives would lead to a huge renewables energy revolution. And we also need to supplement that with the research on solar panels and storage systems. Solar panels have certain issues; they need to be maintained in a clean state. The more atmospheric pollution you have, the efficacy of the solar panels will be reduced to a greater degree.

So, how do we have solar panels which combat the current level of pollution, which is still existent in terms of the atmospheric condition? So, dedicated research on renewable energy generators is important.

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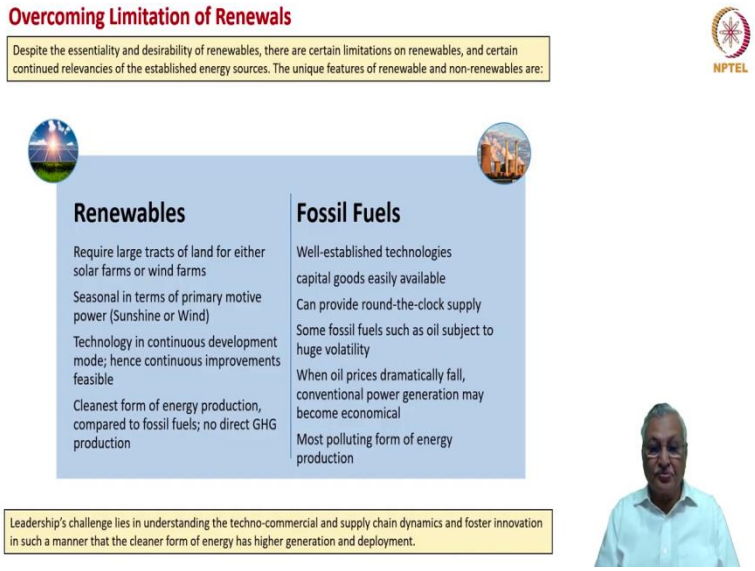

Renewables and non-renewables of course have their place; renewables require large tracts of land for either solar farms or wind farms, they are also seasonal, sunshine or wind. Technology is in a continuous mode. So, industries tend to dither a bit in getting into renewables field; because once upon a time, the panels were considered extremely costly.

Today the panels cost has come down significantly; but those firms which have established their industries and their renewable firms based on the previous cost structures are at a disadvantage. So, how do we make renewables a continuously incentivized and continuously feasible and viable option, that is the challenge.

And certainly this being the cleanest form of energy production; we all must find out ways of incentivizing or moderating the renewables cost of production, so that the society as a whole is benefited. Fossil fuels being well established technologies; they compete on the grounds of being easily available, both in terms of production technologies also from the point of view of capital goods for fossil fuel utilization, which are easily available.

They can provide round the clock supply without any seasonality. And in some cases when the oil prices come down sharply, as it happened when the industrial output was drastically curtailed due to the pandemic; they could also be very economical. However, it is very clear that they are the most polluting form of energy and they need to be phased out sooner than later.

So, leaders must understand the techno-commercial and supply chain dynamics and foster innovation, so that the cleaner form of energy has got higher generation and deployment. Many industries use forklift trucks for example, there used to be diesel in forklift truck usage; today forklift trucks can be operated through electric sources.

In fact, industries should take vow that there cannot be any diesel operated or fuel operated forklift truck anyway. Similarly, small level generators sets should stop using diesel generators and go in for solar energy or other types of renewable power. All the techniques as used in the car of having a hybrid system, that also could be adopted. Similarly, cogeneration of energy could be considered in industries which generate lot of heat.

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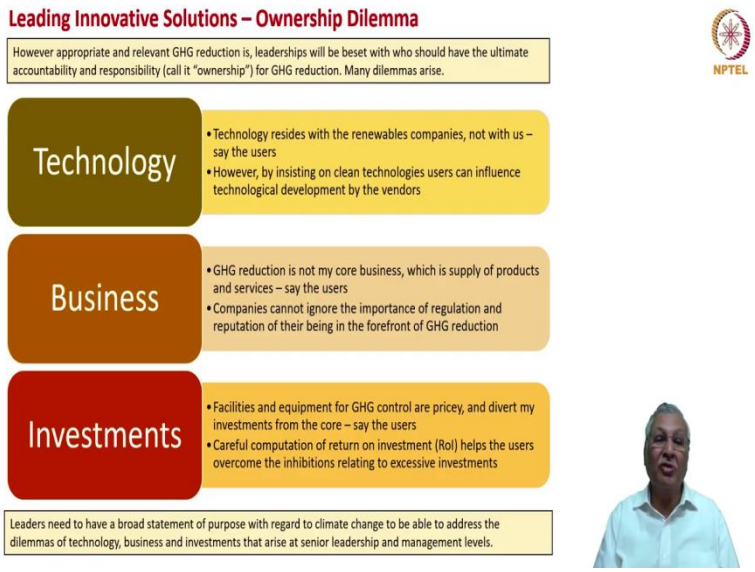

So, when you are trying to lead innovative solutions, there is always a dilemma as to who owns these innovative solutions and who is responsible and accountable to bring these changes. So, let us look at the technology aspect. Technology typically resides in the renewable energy companies. So, the users may say that, what can I do about this;

because the renewable energies hold the aces in terms of providing appropriate technology.

However, by insisting on clean technology as parts of their RFQs and as part of their strategic intention to source; they can influence technological developments by the vendors.

The other viewpoint could be that, reduction of GHG emissions is not my core business; my core business is to produce smart devices, computers, laptops and various other means, therefore I cannot distract myself from the business objective that I have. However, companies cannot ignore the importance of having regulation, self-regulation particularly to reduce the GHG emissions.

And also the advantages of having higher reputation that is accruing through better emission control. And to be able to do that, again lot of climates sensitivity is required on the part of leaderships and their teams. And the third ownership question relates to investments. The facilities and equipment for GHG control are very pricey and they divert investments from the core.

However, we may also consider that certain such diversions are already there; typically, in an industry, about 80 percent of the investment takes place in manufacturing equipment and only 20 percent in utilities. But if you look at a pharmaceutical industry, particularly the bulk drug plants or the API plants; you will find that the investments in utilities are as much as 60 to 70 percent of the total capital costs.

Therefore, there is already a departure from what we think is the normative behaviour of investments in manufacturing certain products. Why not make the other next step saying that, out of these levels of investments; a particular portion must go into investments, which bring down the emissions or which increase the environmental compliance.

It is a mind-set change, where the leaders must say that return on investment will also be combined with the return of reputation, so that the firms can find a balance between investment viability and reputation advantage in making investments for renewables in their facilities and in their operations.

Therefore, requirement is for a broad statement of purpose with reference to climate change, so that the industries and the leaders as well as the teams can address the dilemmas that exist; because of the huge implications of technology and business and investments, the pricey green mobility, greenhouse control and other aspects of climate change initiatives require.

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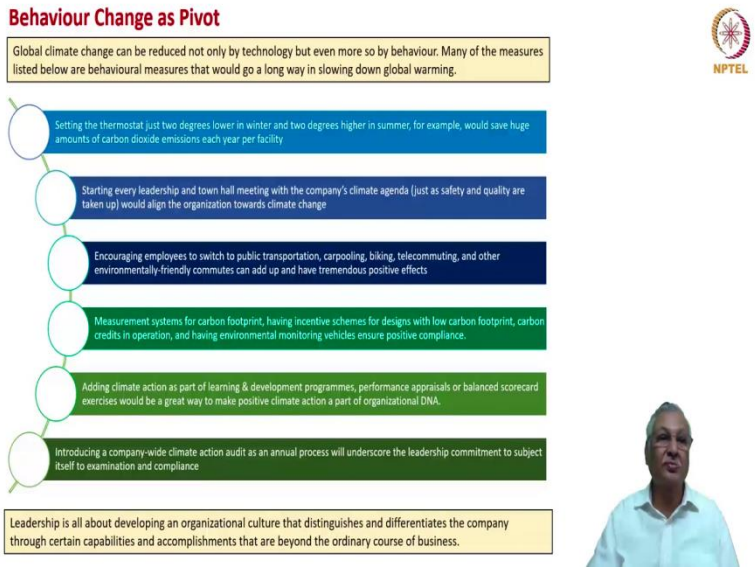

The behaviour change as the pivot of green movement. If you set the thermostat just two degrees lower in winter and two degrees higher in summer; there would be huge amounts of carbon dioxide emissions that would be saved per facility, this has been proven. And Japan as a country has always been the leader in setting higher temperatures during the summer times and lower temperatures during the winter times.

If you go to a hotel room, particularly the multi stared hotel room; you will find that the temperature is set at 18 degrees centigrade, so that people feel it cool and comfortable when they enter as guests. This is obviously a complete mis-utilization of HVAC systems. And by such practices, we are simply wasting the energy and also causing emissions.

This happens, because such decisions are left to people at the ground level, who do not have the total appreciation of the climate change paradigm. That is why leaders, whether it is a hotel general manager or the leader of the entire corporation, must take personal

interest even in these small behavioural changes, so that there is a continuous cascading and spread of the green movement throughout the organization.

The second behavioural change or the mind-set change is to start every leadership or town hall meeting with a reference to climate change and the initiatives being taken by the organization to control the emissions and the levels of pollution. The climate agenda must be same as the safety or quality agenda as far as the meetings go. Thirdly, employees must be encouraged to switch to public transportation and pooled vehicle movements as much as possible.

In pandemic times, we all recognize that personal vehicles are the favoured vehicles; but you cannot imagine, millions of people all transporting themselves by individual vehicles, simply there would be chaos on the roads, apart from adding up to the pollution levels. Work from home or work from anywhere has reduced the level of transportation and provided a temporary relief; but when things get back to normal, again we need to think of how to optimize.

We have to again think of optimizing the pollution levels from transportation by having appropriate methods of pooled transportation and public transportation. Measurement systems for carbon footprint, having incentive schemes for designs with low carbon footprint, carbon credits in operation and having environmental monitoring vehicles around our facilities, so that we understand what we are doing in terms of carbon control.

Adding climate action as part of our learning and development programs in organizations is also another great way to change the mind sets towards climate control as part of our development actions.

Performance appraisals or promotions could also be linked to the environmental empathy demonstrated by the leaders and their teams. So, organizational DNA must be developed in such a manner that, along with environment, health, safety, specific emphasis on environmental empathy is embedded as part of the regular thinking and act execution process.

Just as we have quality audits, we should also have environmental climate action audits on a continuing basis in organizations. This would ensure greater sensitivity to environment, greater awareness, and greater compliance to the environmental goals of

the company. Leadership as we have discussed earlier is all about developing an organizational culture that, distinguishes and differentiates one company through certain capabilities and accomplishments compared to another company.

So, these things, these differentiators have to be well beyond the ordinary course of business, such as higher revenues, or higher profits, or higher market share. These have to be demonstrably the reputation factors; the ESG factors, which may not be seen to be adding to revenue or top line or profit or the bottom line immediately, but they certainly will have a great impact on the company's performance and company's attractiveness over a medium and long term.

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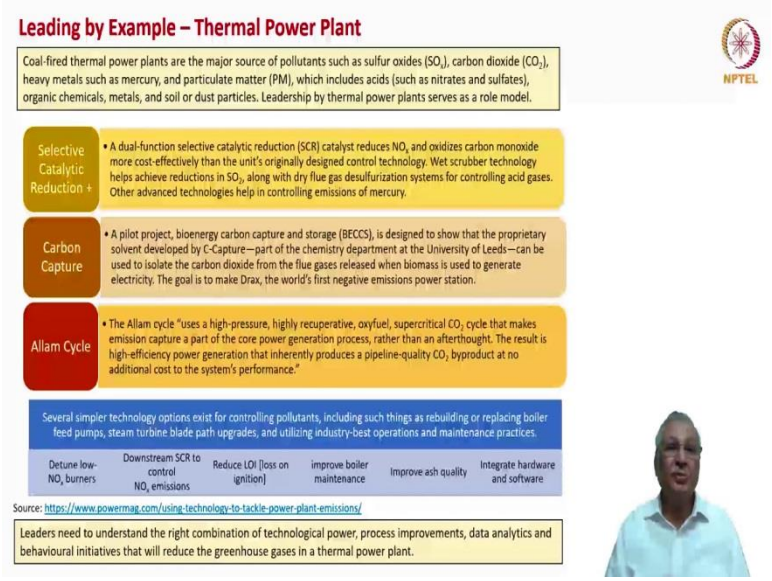

So, I have given here some examples of how individual companies or individual facilities, operating in different domains could lead by example. If you take a thermal power plant, which by definition is in the business of generating energy, unfortunately with pollutants. There is lot of scope to reducing the pollution levels.

You can use techniques such as selective catalytic reduction, carbon capture, allam cycle to reduce the emissions from the thermal power plant operation. Similarly, there are several simpler technology options for controlling pollutants, including rebuilding or replacing boiler feed pumps, steam turbine blade upgrades, utilizing industry based operations and practices, and ensuring very good preventive and corrective maintenance practices in the power plant.

Some of these are detuning low NO x burners, down streaming SCR to control NO x emissions, reducing loss on ignition, improving boiler performance, improving ash quality, integrating hardware and software, several examples are there. So, we need to understand the right combination of technological power, process improvements, data analytics and also behavioural initiatives that will reduce the greenhouse gases in a thermal power plant.

We need to use the power of artificial intelligence to collect data; we need to utilize the power of sensors to understand how the pollution levels are increasing to be able to have very optimized operational paradigm for businesses or industries, which unfortunately have some integral part as generation of pollutants.

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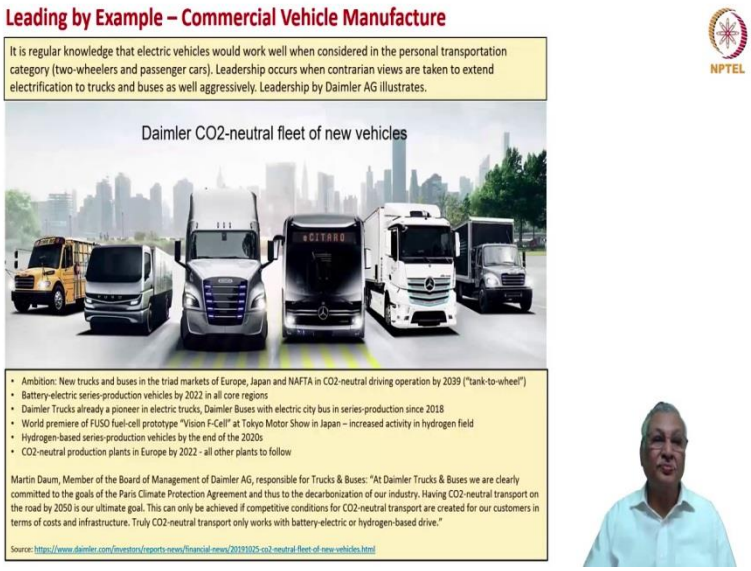

We have another example, commercial vehicles. Generally, we understand that personal transportation vehicles that is passenger cars or small vehicles or ideal for electrification. If you take a contrarian view and say that even the most heavy vehicles shall be made electric; then you are contributing significantly to emission control. Daimler Benz has come up with a global policy of CO2 neutral fleet of new vehicles.

It started saying that, every vehicle they will make for the developed markets will be having CO2 neutral driving operation by 2039, it's called tank to wheel. Battery electric series production vehicles by 2022 in all core regions has already been planned. They have premiered Fuso brand of fuel cell prototype "vision F cell" at the Tokyo Motor

Show in Japan. And they have started having increased activity in the hydrogen field as far as the electrification of vehicles is concerned.

They also have the goal of having CO2 neutral production plants in Europe by 2022 with all other plants to follow. Martin Daum, Member of the Board of Management of Daimler AG, responsible for trucks and buses has said, as Daimler trucks and buses we are clearly committed to the goals of the Paris Climate Protection Agreement and thus to decarbonisation of our industry.

Having CO2 neutral transport on the road by 2050s our ultimate goal. This can be achieved only if we have competitive conditions on one side and incentive conditions on the other side. This is extremely important and both industry and government need to take note of the possibility of assuring in and across the board change towards electrification with appropriate sets of policies.

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So, if you want to lead the innovation solutions, what can facility developers do? One of the ways in which large numbers of facility developers are boarded into positive action is to demand certification. LEED certified buildings, energy star buildings, net zero energy buildings certification these are all tools to control emissions through building up of reputation related to such certifications.

So, a green building is one which has efficiency in the site as well as in this structure, which has energy efficiency in its operations, which has water efficiency, which has materials efficiency, maintenance efficiency, and waste reduction. As a result of that, there would be regulatory compliance, which will be easy to apply and be satisfied for such buildings.

They also ensure good indoor air quality; they ensure that the buildings are protected when earthquakes occur, so unnecessary loss is avoided. And trees are planted for life in the campuses. Many leaders do not recognize that, their decisions on site location and facility design are themselves could be causes of increasing levels of pollution.

Per contra by focusing on appropriate location decisions and involving themselves in facility design, campus creation; leaders can contribute a lot to enhancing green building movement in the country. Infosys for example, has already achieved its targets for environmental friendly buildings and campuses far ahead of the timeline it has stipulated for itself.

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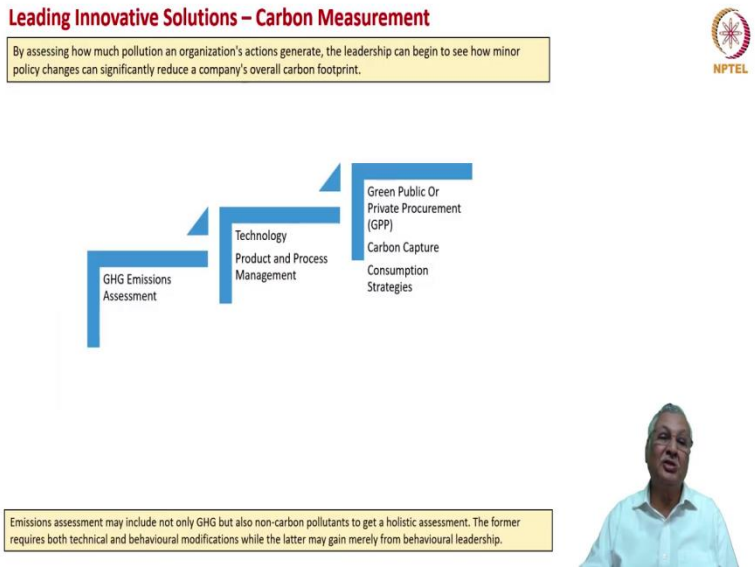

So, to be able to do that, carbon measurement is the core of that policy. We should be able to achieve GHG emissions as our primary goal; which means that the company should have the ability to measure and assess the operations which are giving GHG emissions on an on-going basis.

We should deploy technology and also product and process management styles that would help carbon measurement. Green public or private procurement, carbon capture, consumption strategies these are other collateral supportive measures, so that carbon measurement can be optimized.

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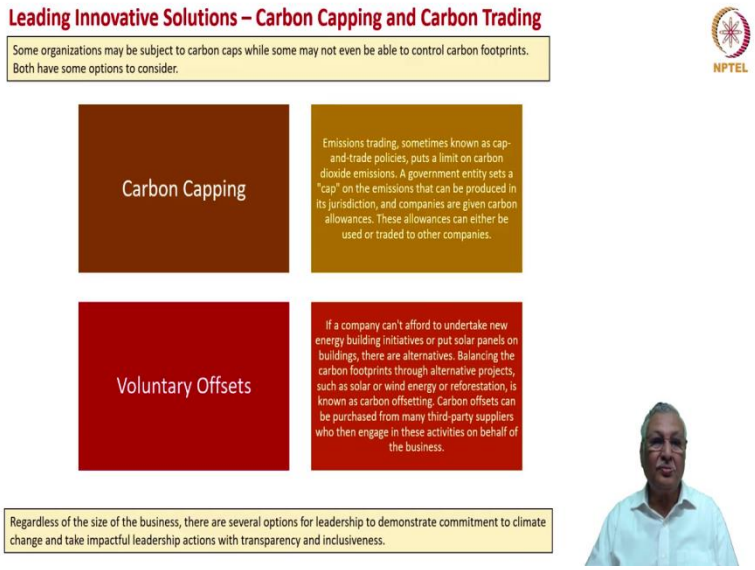

There are innovative solutions such as carbon capping and voluntary offsets; when a company cannot do carbon limits by itself, therefore a government entity sets a carbon cap on the emissions that can be produced and companies are given carbon allowances.

These allowances can be either used or traded to other companies; in case those companies are not able to meet the carbon cap requirements. Similarly, if a company cannot afford to undertake new energy building initiatives or put solar panels on buildings, there are alternatives.

Balancing the carbon footprints through alternative projects, such as solar or wind energy or reforestation is known as carbon offsetting. Carbon offsets can be purchased from many third party suppliers, who then engage in these activities on behalf of the business. So, there is a way in which you can use your financial resources and networking flexibility to make sure that, you meet the goals of carbon capping and carbon control indirectly.

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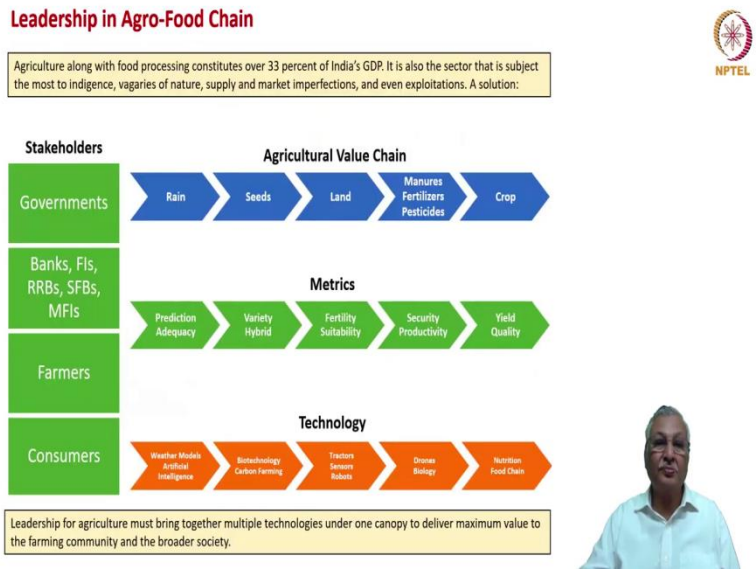

Every value chain, whether it is an agricultural value chain or industrial value chain has got specific parameters for control of emissions. When you look at agricultural value chain, which is least distanced in terms of analysis of climate goals; you will be interested to find that we have rains, we have seeds, we have land, we have manures, fertilizers, pesticides and crop going together as one integrated agricultural value chain. And for each of these things, we have a metric.

If you are able to predict rainfall accurately and proactively; if you are able to get seed varieties, which are hybrid and safe, which if we are able to ensure adequate fertility on an on-going basis for the agricultural land; if we ensure use of fertilizers, pesticides and manures at as low a level as possible, while also assuring productivity; if we are able to get the best possible yield from a crop; the inputs that are required to produce the crops would automatically be reduced.

And if the inputs are reduced automatically, the emissions will be reduced. If a motor to pump out water, runs for half the time; the consumption of energy is reduced and also generation of emissions is reduced.

If you are able to use technology to be able to do that, that is seeing to what extent the land is watered at different corners through appropriate sensor technologies or when the crop stops requiring additional water through the sensor technology; you are contributing technologically to these metrics and value chain optimization.

So, the mantra cannot be more water, more fertility, more fertilizers, more fertility; this cannot be the goals or the metrics anymore. How to reduce everything, while ensuring that the greater output; that should be the new mantra for any field and that by itself will reduce the generation of energy consuming sources, generation of energy itself and also the release of emissions into the atmosphere.

For these kinds of processes, because technology which has investment implication; whether it is weather models or artificial intelligence, biotechnology or carbon farming, tractors, sensors, robots, drones' biology, nutrition food chain these are all technological activities, which are both consumption drivers as well as supply side drivers. All of these things need to be provided for the agricultural value chain to use less resources and generate more output.

And the stakeholders such as the governments, banks, financial institutions, farmers, consumers they need to be involved in optimizing a value chain for climate protection. Therefore, leadership for agriculture is just not crop production technology; leadership for agriculture must bring together multiple technologies under one category to deliver maximum value to the farming community and also to the society at large.

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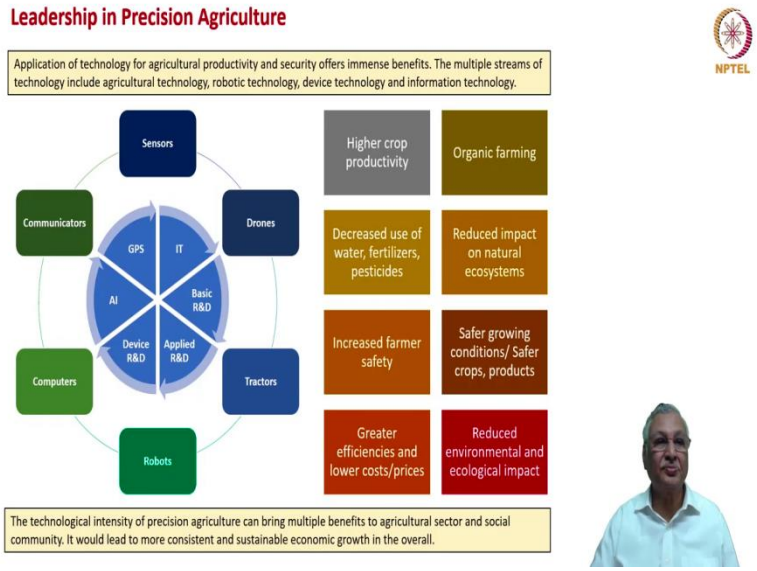

Similarly, as I said briefly in the previous slide, the sensor technologies, the communicators, the drones, tractors, robots and computers; the new generational digital equipment and devices can provide benefits of GPS, IT, different types of R&D and

artificial intelligence for agricultural activities. They will lead to better crop productivity, decreased use of all the inputs, and increased farmer productivity as well as farmer safety.

So, we can get greater efficiency at lower costs and prices with reduced environmental and ecological impact. So, agricultural value chain itself is an important value chain that we must concentrate on. For that we need to get into the rural hinterland and work with the farmers to be able to generate that level of climate protecting productivity and optimality in the agricultural sector.

Agriculture still contributes over 25 percent to our GDP. And it is important that, we maintain agriculture at high levels of climate control through precision agriculture as discussed in this slide. And the benefits would be multiple, not merely to the agricultural sector; but for the social community and also the industrial units which supplied these kinds of newer age diagnostic aids for agriculture.

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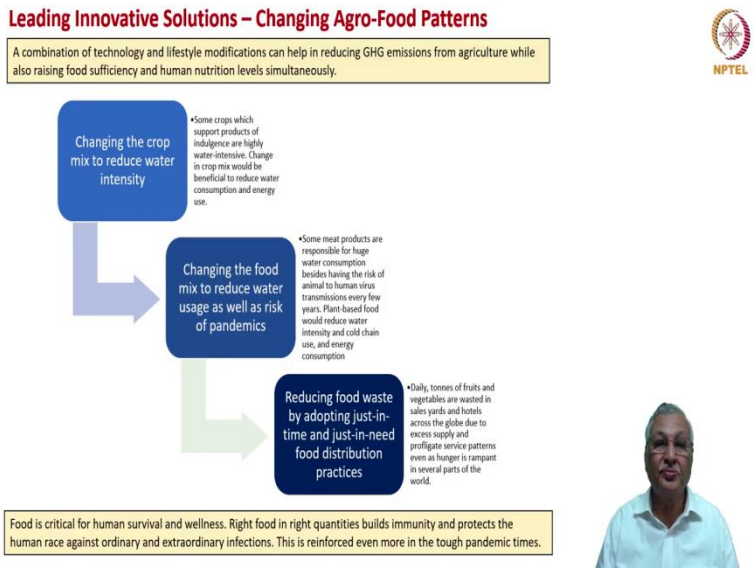

Similarly, we need to change the agro food patterns themselves; changing the crop mix to reduce water intensity that is one strategy; changing the food mix to reduce water usage as well as risk of pandemics that is another, moving from meat based food habits to plant based food habits; probably it would reduce not merely the water usage; but also the risk of animal to human transmission of viruses and the like.

Similarly, reducing food waste by adopting just-in-time and just-in-need food distribution practices and also having very effective cold chains; these could reduce the energy consumption, water consumption and emission increases in the agro food industry. Food is critical for human survival and wellness.

Right food in right quantities with right quality can build immunity and protect the human race against ordinary and extraordinary infections and this is reinforced even more in the tough pandemic times. It is time that we got a behavioural mind set change in respect of the food items and also in respect of technologies that could be used in the agricultural sector productively.

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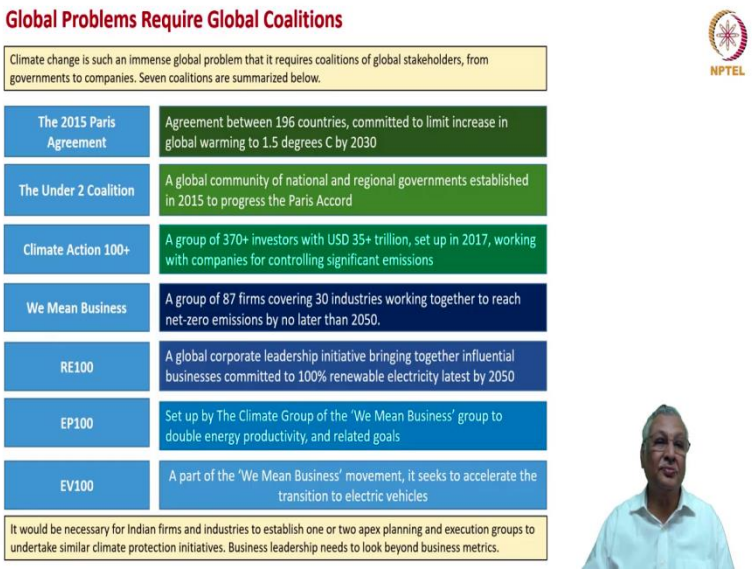

Obviously a problem, such as climate change requires global coalition; it cannot be done just by one industry, one economy or one nation. And it is for this reason that we have many coalitions which are operating in the global system, that focus on climate control. Seven coalitions are summarized below; 2015 Paris agreement is the leading coalition.

The under 2 coalition, climate action 100 plus, we mean business, RE100, EP100, EV100 which are offshoots of we mean business coalition. These are all addressing the global problem of climate warming in a very significant manner. Of this obviously, the 2015 Paris agreement is the umbrella agreement which sets partnership, ownership and goals to different countries.

It would be necessary for Indian firms and industries to establish one or two apex planning and execution groups within the industrial management of that company, so that there could be similar climate protection initiatives.

If business leadership starts taking up climate control seriously at unit level, the benefits would only cascade up, move up to the overall industrial community and also to the economy itself. And for that we need to have sound business metrics, which measure various aspects of emission as well as the emission control.

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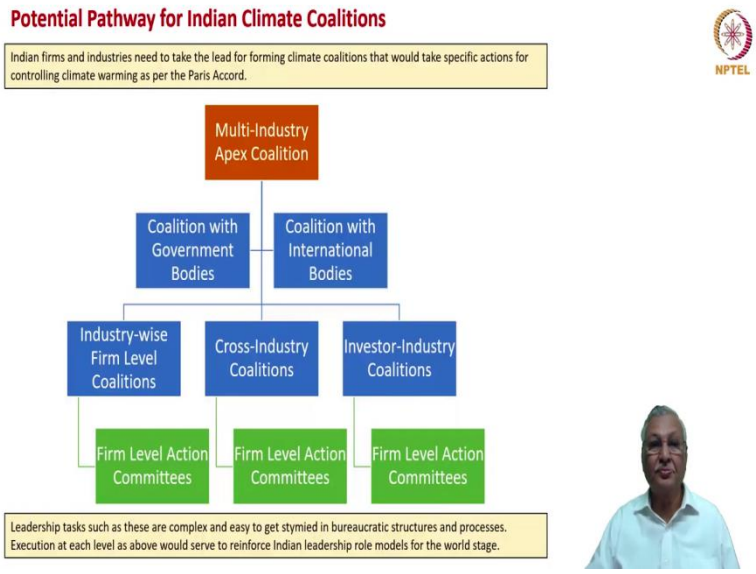

There is a potential pathway, I would suggest for Indian climate coalitions; one, we should have a multi-industry apex coalition, because climate warming cannot be controlled by one industry as we saw. We require a multi-industry coalition to be able to reduce global warming and also national warming and control pollution. And that requires on one side cooperation with government bodies and on the other side coalition with international bodies.

And with this kind of apex management of the climate control paradigm, we will have industry wise firm level coalitions, cross industry coalitions, and investor industry coalitions.

All these three coalitions are important; one to ensure that there is an industry level specialization, the second to ensure that an industry multi industry level collaboration is

available, and third finally, investors understand what is being done at the industry level and support such initiatives through their investments. All of these things can percolate further down to firm level action committees in each of these areas.

Leadership tasks such as these are very complex and they could easily get stymied in the bureaucratic structures and processes and also distracted by the day to day revenue and profit goals which leaders must have. However, leaders must look beyond those kinds of goals to ensure that, climate control is part of their agenda, global warming is part of their agenda.

To be able to do that awareness and sensitivity towards environmental changes and environmental empathy must be part of the DNA. And institutional mechanisms must be embedded in the firm's organizational structure and in the firm's organizational processes, so that the activity goes on continuously as smoothly and as seamlessly as day to day production or marketing or development of products happens in a company. This is the essence of leadership for climate improvement.

Thank you.