THE CLUB OF ROME

INDIAN NATIONAL ASSOCIATION

Resource Efficiency and Jobs : Opportunities for Business and Policy

ANNUAL CONFERENCE REPORT 2018

A Report to the Club of Rome
Indian National Association

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FOREWORD

Policies in the areas of sustainable development and environment have remained neglected and therefore, it is crucial to initiate cross-sectoral collaboration among agencies to mainstream green growth.

The primary objective of the Club of Rome–India conferences is to initiate multi-stakeholder partnerships and platforms to address resource efficiency, job growth and equity for sustainable development. Some past efforts of the Club of Rome-India has led to policy initiatives such as a strategy paper in collaboration with the National Institution for Transforming India (Niti Aayog), Government of India, highlighting the need for resource efficiency. We are confident that the discussions and recommendations this year will also lead to other policy initiatives towards the goals and objectives of resource-efficiency and enhanced job opportunities in India.

We sincerely hope the recommendations from the conference will play a significant role in facilitating cross-sectorial collaboration across business and policy to achieve transformational change for sustainable growth in the job market.

Mr. S. Ramadorai
Chairman
The Club of Rome-India

Mr Ranjit Barthakur
Secretary General
The Club of Rome-India

MESSAGE FROM THE TRUSTEE

Use of global material resources –fossil fuels, metals and non-metallic minerals, biomass – reached some 90 billion tonnes in 2017, more than three times the amount used in 1970, according to an estimate in the International Resource Panel's Global Resource Outlook. If current trends continue, by 2050 resource use is expected to go up further, to 186 billion tonnes. The growing population, primarily in Asia and Africa, and high per capita material footprints, much of them in the industrialized regions of Europe, Americas and Australia are among the key drivers of the massive and growing resource use over the past century. Global production and consumption systems are reaching an unprecedented state of unsustainability, breaching the safe operating spaces of planetary boundaries.

In particular, the material intensity of the world economy has been rising rapidly over the past several decades. Massive increases in construction, infrastructure and transport facilities have created ever-greater demands for natural resources. Evolving consumption patterns have led to a huge demand for domestic appliances, recreational facilities and equipment which in turn need more and more metals and plastics. Although changes are taking place in public attitudes towards reducing resource use and generating wastes, much remains to be done.

Deep change is required in the current production and consumption systems in order to deliver higher material standards of living to more people with a lower overall material use and associated environmental impacts of waste flows, pollution, biodiversity loss and climate change. The level of human development needed in the poorest nations cannot be achieved with the same systems of production and consumption as have been practiced in the industrialized countries and will need substantially different technological, economic and behavioural solutions. Moreover, reducing the environmental impacts of resource use may also require systemic changes to reduce the per capita footprint of material consumption of the affluent, both across and within countries.

Much of the early emphasis on resource efficiency has been through better design, e.g. by extending the life of products, improving their durability and downsizing or miniaturizing them, as well as recycling products and their parts, all features of the "Circular Economy". More recently attempts are being made to share more products and economic activities, but the impacts are yet to reach a meaningful scale. At the same time, industrial and other production has been shifting from countries with high material efficiency to countries that have yet to achieve such efficiencies, resulting in the overall increase of material intensity in the global economy. All these factors have resulted in moderating somewhat the environmental pressures - in total, on a per capita basis and for a unit of economic activity.

Technology, automation and new business models determine the trajectories of production systems and the way markets will evolve towards resource efficiency and circular economy. Such evolutions and changes in the production systems, impact on the nature of jobs, employment and working conditions. Scenarios by a recent McKinsey Study suggest that by 2030, 75 million to 375 million workers (3 to 14 per cent of the global workforce) will need to switch occupational categories.

Apart from their formal systems and sectors, developing countries thrive on a very large informal economy that supports the poor segments of the society for their daily subsistence. The present report will explore the possible impacts of resource efficiency strategies on jobs and livelihoods, both in terms of the work opportunities newly created and inevitably lost and also to understand the implications for skill development policies, working hours and, indeed, the nature of work itself.

Ashok Khosla
Trustee,
The Club of Rome, India

ACKNOWLEDGEMENT

We thank experts and practitioners for the development of this report on behalf of the Club of Rome. We are thankful to all the dignitaries and leading business and policy leaders who took part in consultations and discussion. The Annual Conference of the Indian National Association for the Club of Rome on "Resource Efficiency and Jobs Opportunities for Business and Policy" conducted on 16-17 Nov 2018 achieved its stated objectives. The deliberations over two days addressed issues related to resource security and inclusivity, technological prescriptive for exploiting secondary raw materials for transitioning towards a circular economy. It also highlighted policy gaps and increased awareness in the younger generation. The success was because of the galaxy of luminaries that took out time to be with us to share their valuable inputs and the unstinted support of associated leading policy Think Tank organizations, Corporates, Institutions and NGOs. On behalf of the Governing Body of the Association may I place on record our gratitude to each and every one of them for their contribution and we shall continue to seek their support in our future endeavours. We thank Shri Ram Madhav, leading politician of Party in Power – Central Government, for accepting to be the Chief Guest and for a thought provoking opening address. We are indebted to Mr. Ashish Chauhan, Managing Director, CEO, Bombay Stock Exchange and his team for the venue and support rendered for the smooth conduct of the conference. We are also thankful to the thematic experts and communication staff from Development Alternatives, the Balipara Foundation, Tata Institute of Social Sciences and other academic institutions for their strong support at the conference. The contribution of Globally Managed Services India Pvt. Ltd. (GMS), Eco Ventures Pvt. Ltd. (EVPL) and Ardek Consultants is greatly appreciated. The effort of Ms. Indira Mansingh in composing and editing the conference report is highly appreciated. The members and the staff of the Club of Rome, namely, Dr Vishal Massey and Ms. Surabhi, were undoubtedly the backbone of the conference.

The Club of Rome acknowledges the prominent contribution of our sponsors, namely, Tata Steel, Tata Consultancy Services, Tata Chemicals, Tata Global Beverages, Standard Chartered Bank, Power Grid and Hindustan Unilever Limited. They not only supported the conference but also shared their weighted industry perspectives for enhancing the recommendations of the conference. I am confident that the deliberations and recommendations of the conference will in a humble way contribute towards a resource efficient Jobs in India.

Lt Gen Arun Kumar Sahni
PVSM, UYSM, SM, VSM Former General Officer Commanding in Chief, Indian Army
and Director General, Indian National Association for the Club of Rome

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EXECUTIVE SUMMARY

If one was to determine the overriding problem in India of today, it would be joblessness. Add to that, a galloping population with nearly 10 million entering the job market every year and the current systems and policies, which are unable to generate jobs at the scale required. The situation is grave and exacerbated by populations and consumption growing faster than technology can find alternative and renewable resources. By and large business in India is driven by profit and productivity and enhanced job priorities are not their focus. Moreover, the material and resource consumption for manufacturing and agriculture has been clearly mismanaged. Shrinking incomes in the agricultural sector, land fragmentation and a fragmentation of resources favouring urban markets had a detrimental impact on rural livelihoods.

The country no doubt, needs economic growth to deliver jobs. The role of Government in facilitating infrastructure, business, MSMEs and supporting development of skills required for employment is pivotal. Current economic and political thinking is slow to adapt to disruptive shifts in technology and innovation and the ecological and sustainability challenges posed by climate change and resource depletion. Unless there is urgent action where Government puts in place systems and policies for sustainable consumption and production, there will be irreversible damage to our living systems impacting our vulnerable segments even more disastrously. As things stand, we are currently consuming our future to fuel the present.

Over the last few years, there has been disquiet within the Club of Rome-India on the issues of sustainable growth – and it has sought to develop a consensus on development strategies appropriate to the ambitions and needs of the people of the country. Towards this, the Club is conducting a series of on issues such as Food, Water, Land, Soils and forests and resource resilience. The objective is to examine and analyse how India manages its key resources and recommend greater coherence and rationalisation of the policies and practices of the government.

In line with this approach, the thematic focus of the 5th Annual Conference was, on the opportunities for business and policy in the context of resource resilience and Job Growth. The conference was designed to address these issues and was held at the Bombay Stock Exchange (BSE), Mumbai from October 11th -12th, 2018, with the participation of distinguished experts from various fields.

What then can be the strategic vision and the interventions required to radically reduce unemployment? The two themes that emerged from the conference after intense discussions were: the need to move away from business As Usual to a Hybrid Alternate Scenario and two, an acknowledgement of the centrality of People as the greatest asset. The conference recognised the major role to be played by business and the policy support to facilitate active involvement in the development of a strategic vision. People are the assets whose lives everyone wants to improve. To that end education and skills and the requisite infrastructure have to be put in place by both Government and business.

If skilling India is the other prerequisite for these initiatives to succeed, there must be a system and network that connects institutions of learning, trainers, business and policy makers. In other words, if we want to see real change in the labour market, business and employers, the government and educational institutions must collaborate to restructure and rethink both the economy and education towards a systems design mode of thinking. The ethos of innovation needs to evolve in early school.

The key findings of the conference was that the Circular Economy approach is fundamental for this change as it can ensure the ability of citizens to create livelihoods in both rural and urban India, which can be restorative and regenerative. So also the rapid development of infrastructure and the MSME's. Both these have a powerful ability to generate millions of jobs. With circular thinking being the norm; they will ensure critically needed jobs through resource efficiency.

Policy shifts in finance are necessary to inspire innovation and support alternative funding and payment systems for MSMEs. Development should be focused on turning villages into sustainable entities and leveraging their existing ecosystems of entrepreneurship to advance rural livelihoods. The need to identify up cycling as a measure of disruptive innovation in manufacturing was cited as a potential industry to create jobs and livelihoods for thousands. Here too, business and policy makers have to act as a team to put in systems and energy efficient facilities in a sustainable manner while minimising impacts on the environment.

There were several recommendations, primary among them being that a major move towards a circular economy would open up avenues for business and generation of both rural and urban job; a transition towards understanding new and disruptive technologies as moments of opportunity; skilling and reskilling efforts and facilitating the vulnerable segments of India's population towards absorbing technologies to become creative innovators and entrepreneurs; both business and policy to drive the shift from the 3R model – Reduce, Reuse, Recycle – to the 6R model – Reduce, Reuse, Recycle, Repair, Refurbish and Remanufacture and policy shifts in finance to encourage innovation and support alternative funding and payment systems for MSMEs to encourage entrepreneurship in the manufacturing sector.

In conclusion, sustained population and consumption increase has put a lot of pressure on existing resources, making resource efficiency and better use of secondary raw materials more critical than before. The aggregate damage of the present destroys the future, therefore there is a need for rethinking the artificial divide between "society" and "economy" and a directed move towards grappling with inequality and making urgent lifestyle changes while realistically reconsidering sustainability through the profitability model.

INTRODUCTION

CLUB OF ROME – INDIA, Established in 2011, the Indian National Association for the Club of Rome is a non-profit organisation, which aims "to act as a Global catalyst for change through the identification and analysis of the crucial problems India is facing in the communication of such problems to the most important public and private decision makers as well as the general public". The broad objective of the national chapter, CoR-India, is to help design a coherent agenda for Governments, the business sector as well as civil society in India that could ensure a productive resource base and enable everybody in the country to live fuller lives in harmony with their surroundings by the centenary of the nation in 2047.

What will it take for India to design effective new solutions that are right for its people and for its natural endowment in a competitive world? To address this important question in 2014, the National Association for the Club of Rome-India initiated, a 5-year series of Annual Conferences to examine and analyse policies through which India manages its key resources.

The previous four Annual Conferences were accordingly devoted to resource security issues covering food in 2014, water in 2015, land, soils and forests in 2016 and resource resilience in 2017. The 2018 Annual Conference focussed on Jobs in the context of resource efficiency and the opportunities for business and policy.

India today is at the centre of major developmental shifts. Achieving these transitions requires negotiating multiple and, often conflicting socio-economic demands. Jobs and human resources are closely linked to the complexities of resource efficiency. As one of the world's most rapidly growing economies and home to the world's largest pool of young people looking for jobs within the urban trajectory, the challenges are immense. The demographic dividend, regretfully, does not automatically drive the nation to the top of the economic ladder.

Sweeping changes in policies, sectorial and economic, are required and the role of business becomes crucial. The policy challenge today lies in identifying appropriate pathways and institutional mechanisms to negotiate these transitions and set India on a path toward a sustainable, inclusive future. This implies that policies must be put in place to accelerate job creation, facilitate communities and incentivise business at all levels to deliver the goods and services needed. Business activity must also be closely linked to national development for human well-being, social justice and securing the long term productivity of our natural resources. Hence, the need for coherence and rationalisation of policies of state and central Governments to achieve these goals.

As one of the largest economies of the world and, for it to grow at an exponential rate, India needs to fulfil its infrastructure gap to sustain the growth. The task lies in creating meaningful employment to achieve our demographic dividend. Moreover, the advent of the fourth industrial revolution associated with new age technology and innovations such as artificial intelligence and block chains are a reflection of the business of tomorrow. This phase, as capitalised by many, needs rapid advancement of skills and qualifications for the jobs of tomorrow.

Rich in natural resources, with some of the largest resource reserves in the world, India's economic growth story can accelerate if it enhances its capacity to not only utilise these resources

effectively but, to also contribute to environmental and resource efficiency. This story must demonstrate India's commitment towards addressing the challenges of climate change and the inclusive and sustainable growth as it leapfrogs into its next phase of development.

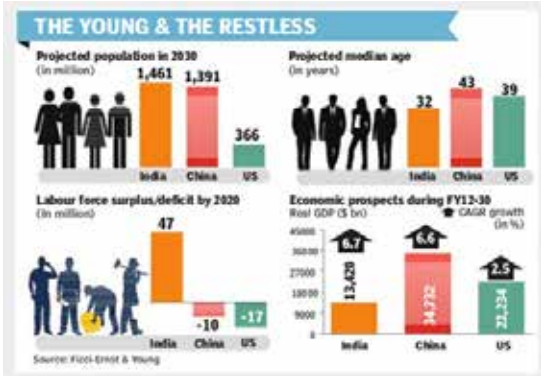
The multi-stakeholder dialogue across academia, Government ,non-profits and business is fifth in the series of Club of Rome Conferences and the aim is to provide a space for debate to develop policy proposals and steps to be taken to meet such challenges.

The Annual Conference was held at the Bombay Stock Exchange (BSE), Mumbai from October 11-12, 2018. The conference focussed on the twin issues of resource efficiency and job creation, with specific focus on rural livelihoods, the transition to a circular economy, employment opportunities in the infrastructure sector, changing skills in the emerging service sectors, reshaping the economy to accelerate jobs and the challenges facing MSMEs.

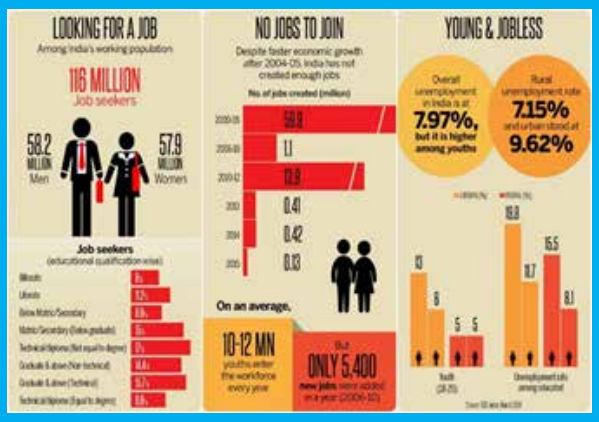
It was agreed that the conference would be structured around the following sessions:

- Enhancing Future Livelihoods in Rural India
- Employment Opportunities and Environmental Challenges in Infrastructure: Reshaping the Economy to Accelerate Jobs
- Circular Economy in Urban India
- Changing Skills in Emerging Services Sectors
- MSMEs: Key to India's Manufacturing Ambitions

Resource efficiency and innovation for less damaging resource substitutes, even though automation and mechanisation do not necessarily lead to loss of jobs. Indeed they have historically been seen to create more jobs, particularly requiring higher skills and better pay. India is today among the world's most rapidly growing economies. It is also home to one of the world's largest pool of young people looking for jobs. This combination of factors has led many to believe that the "demographic dividend" it produces will automatically drive our nation to the top of the Global economic ladder within a few decades. For this dividend not to become a "demographic disadvantage", let alone a "demographic disaster", several of our economic, sectorial and social policies will need radical change. Some of these changes are self-evident and generally recognised by government and business leaders; many of them introduced and evolving steadily since the grand liberalisation of 1991. Others are emerging, subsumed under the more recent concerns with raising the "ease of doing business". While several of these are important and necessary, however, it is less well-understood that they are not at all sufficient.



By 2030, India will be the most populous country with over 1.4 billion people surpassing China. More significant, the median age of an Indian will be 32 years in 2030, much younger than of the US with a median age of 39 years, UK (42), Japan (52), and even China (43) or Brazil (35). This means within a decade, India will have the worlds largest youth workforce. This demographic advantage can help propel India's GDP growth to rate faster than any large economy, including that China, according to most analysts such as Ernst & Young and IHS. Much of this young work force will be absorbed by the fast-growing service sector whose share in GDP is anticipated to grow from 57% in FY10 to 68% by FY30, India will still be exporting some 50 million surplus labourers who can migrate to other labour-deficit countries.



The national economy unquestionably needs to grow, and to grow rapidly. But its benefits have also to spread to all our citizens and be sustained for our children and future generations. The basic purpose of national development is, after all, achieving universal human wellbeing and social justice, now and in the future – which are the constitutionally-defined goals of our society: GDP growth is simply one of the means to that end, not more important than equity and social fairness, education and participation, nutrition and healthcare, and opportunities for fulfilment and a healthy environment.

Measures to facilitate business activity must, therefore, be complemented by measures that unequivocally raise the quality of life of the poorest half of the economic pyramid and improve the long-term productivity of our natural resource base.

This in turn means that economic policies must also be put in place to accelerate job-creation and facilitate the ability of communities and businesses at all levels – local, regional and national – to speed up regeneration of the environment, while producing the goods and services needed in the marketplace.

To ensure widespread sharing of the benefits of economic growth and maintaining the health of our resource base, without which the demographic advantage could become a heavy, long-term "demographic debt" burden on future generations, *the equity and environment underpinnings of sustainable development must receive equal support by policies and programmes to that received by the economy.* Otherwise, many in the present generation and most in future ones will pay a debilitating cost in declining human wellbeing and mounting resource scarcity.

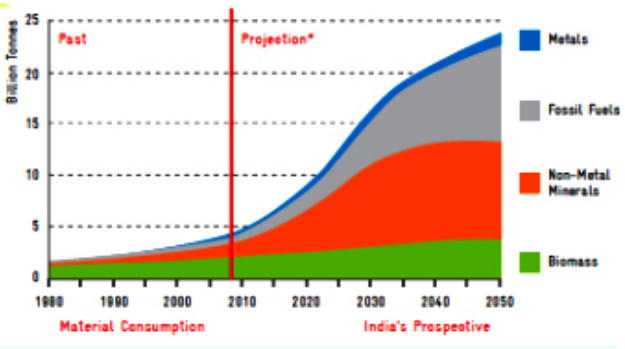
With less than 30% of India living in urban areas, we also currently have the largest agrarian population, large numbers of which will presumably want to move to the cities in the coming decades. Our job markets are experiencing deep macro-structural changes, taking increasing numbers from farming to other occupations. At the more micro-structural level, the drive for global competitiveness and higher productivity is revolutionising activity in all economic sectors such as manufacturing, construction, trade and transport and, even agriculture. The pursuit of "economic efficiency" is now forcing all sectors of the economy to adopt technologies that aim to raise productivity: mechanisation, automation, chemicalization, robotics, genetic manipulation, digitization, data analytics and artificial intelligence. But, these can also have a huge potential impact – often negative -- on both social goals, such as creation of jobs, identity and lifestyles, and environmental objectives such as the human health and productivity of land, water and air.

If not proactively and systemically dealt with, these factors will create a complex set of pressures on the types and quality of jobs and simultaneously a very large impact on the health and productivity of our human and natural resources. The overall consequences could in turn harm many and will certainly show up in slowing down the nation's economic progress into the future.

RESOURCE EFFICIENCY AND JOBS IN THE INDIAN CONTEXT

Resource Efficiency is a fundamental element of sustainable development and the key to implementing the global Agenda 2030. It is embedded in the 12th sustainable development Goal (SDG) –"Ensure sustainable consumption patterns and production systems". Achievement of eight other SDGs (2, 6, 7,8,9,11,14 and15) depend integrally on raising resource efficiency.

The wise use of resources - conservation and efficiency standards for economic, social and environmental sustainability is intrinsic to the interests of India and to the resilience of the nation's future economy. Since the last decade, the country has undergone an active step jump in economic growth, an expanding industrial and service related output, a rise in average income, a thriving middle class and rapid urbanisation. Resource efficiency and resource productivity are the ratios between the benefits gained and the natural resources consumed for obtaining them. While the term "resource efficiency" is predominantly used in business and engineering as a measure of material flow, "resource productivity" is a measure of the economic value of an intervention.



India's extraction and use of primary raw materials have increased by over four hundred percent in the past forty years, though it is lower than the Asian and world average. While the extraction of biotic materials only increased by a factor of 2.4, extraction of abiotic materials, especially of non-metallic minerals, have undergone exponential growth. In particular, extraction of non-metallic minerals, predominantly used for construction, has grown rapidly, reflecting the increasing demand of the construction sector during recent decades. With some 17% of the world's people, but just 2.3% of the world's land resources and 2% of its forests, the pressure on resources is and will continue to be intense/extreme.

India's economic reforms and the rise in per capita income and consumption levels, is creating a sizeable urban middle class. It is estimated that by 2025, the urban consumer market would increase by more than 50 per cent. While such development leads to increase in material demand for production and use of goods and services, the unsustainable extraction of natural capital, going beyond the ability of ecosystems to regenerate or produce it. The resulting shortages will impose significant environmental and economic costs in terms of loss of ecosystem services, habitat loss, biodiversity, increase in commodity prices and so forth - also impacting the sustainability of businesses and jobs.

Avoiding catastrophic mismatch between demand and supply of resources needs new, systems-based thinking that can bring the objectives of different sectors and the constraints of the resource base into a viable balance. It broadens perspectives and compels decision makers to look critically at the indicators of development beyond the traditional economic and growth measures. These are the fields that we must explore and put into effect to fulfil the mandate of Jobs for All.

Q1: What are the major shortcomings or omissions in the policy and its implementation relating to jobs and livelihoods for all and its impact on natural resources?

Q2: What structural changes are needed in governance of public and private bodies to ensure that policies in different sectors and domains are effective in creating jobs and livelihoods Q3: What are the knowledge gaps or other barriers that are evident in existing policy formulation for resource efficient jobs in India?

THE DEBATE NEEDED TODAY

The past four decades have witnessed deep, structural changes in the range of issues that policy makers are used to dealing with. Until the 1980s, the primary topics of concern in politics were: economics, international relations -- and war and peace. While these worries have not gone away, in recent decades, the corridors of power and the headlines of newspapers are increasingly being overtaken by problems that have virtually no precedents in history: local and global processes that threaten the every life support systems of our fragile planet. Much of the attention of world leaders, the media and the public is now increasingly being captured by such complex and possibly irreversible anthropogenic processes as climate change, biodiversity loss and species extinction, large-scale destruction of lands, forests and oceans.

Natural resources including renewable and non-renewable energy, metals and minerals, water, air, biomass and land, are key factors of production. Restoring and maintaining the health of these resources through resource efficiency is a critical element of sustainable development. It is fundamental to feed current and projected populations, and also to provide a better quality of life for future generations.

A better, more desirable future lies in reconciling the three strands of sustainable development- Environmental, Social and Economic -- a viable natural environment will then boost economic development in the long run.

Economic Benefits

By using primary resources more efficiently and utilizing secondary resources more actively, businesses can greatly improve competitiveness and viability. Numerous studies show that in many industries, material inputs form the biggest component of costs. By maximising resource productivity and minimizing dependence on virgin materials, an economy can be less vulnerable to price spikes and be more consistently profitable.

Social benefits - Human Wellbeing

The dominant growth paradigm is not capable of satisfying the legitimate needs of the poorest or maintaining the health and productivity of the planet. Resource Efficient approaches have enormous, yet under appreciated potential to decrease conflict and displacement and improve human wellbeing. This can increase affordability and access to resources, critical for removing

poverty and realising human potential. A strong economic argument for resource-efficiency is the significant prospect of improved competitiveness and job creation. Further, a responsible and efficient use of resources will contribute to higher social welfare by making available more for less; to human health through improved access to clean water and food and to quality of life through improved waste management.

Environmental Benefits

Resource-efficiency can make significant contributions towards achieving climate change targets for reducing greenhouse gas emissions, without necessarily having adverse effects on the economy. Lowering ecological degradation and other risks leads to opportunities for landscape restoration and regeneration of degraded areas.

Besides the positive economic, social and environmental advantages, the benefits of resource efficiency could be technical, monetary, aesthetic, cultural, etc.

Targets

- Enabling policies for sustainable growth in the job market
- Food and nutrition security of farming households
- Technological upgradation in agriculture sector to increase livelihoods
- Creating job opportunities for marginalised segments
- Effective implementation of zero defect, zero effect and the circular economy
- Facilitating a centralised system of data management- jobs and resources use
- Skill enhancement in MSMEs, maintaining gender balance, social securities, etc.

THEME 1: ENHANCING FUTURE LIVELIHOODS IN RURAL INDIA

India has some 1,300 million people living in 640,000 villages located in 676 districts which comprise 36 states and Union Territories. According to the 2011 census, rural India has about 69% of the country's population and the remaining 31% live in cities and towns. Some one-half of them are illiterate or semi-literate and half the workforce is unemployed or underemployed. To bring rural living standards and job opportunities closer to those in urban areas the government has introduced a wide variety of programmmes for enhancing the livelihood opportunities of rural people and also reducing their need to migrate to the cities.

Source: https://www.siliconindia.com

Agriculture and allied activities employ almost 52 % of the labour force and account for about 15.7 % of the nation's GDP. Although the share of employment and output produced by this sector has been declining since independence, the on-going shift in the composition of food is raising the value of its output – and the impact on the resource base. This shift, generally towards higher protein and nutritional foods, from basic cereals to dairy products, fruits and vegetables, meat and meat products, many of them processed, results from many factors, including rising incomes, urbanisation, trade liberalisation and communication. As the consumption of high-value agricultural products rises, the output of agriculture-food industry, which includes processing, wholesale, and retail, also expands. The rapid growth of this sector, the rising use of machines, energy and chemicals and the increasingly wasteful practices are causes for considerable concern in terms of their impacts on jobs, the environment and the resource base.

Low awareness, poor connectivity and policy neglect have had a catastrophic impact on the lives and livelihoods of farmers. The current agricultural practices are extremely inefficient, in terms of all factors – labour, land, materials and energy – becoming the prime reason for the poverty trap (and the occasional suicidal hole) in which farmers find themselves. To maintain food and nutrition security in rural communities, to earn a decent income and invest in improved productivity of land and water, resources should be the highest priorities for farming families, and given their numbers and national contribution, the very highest priority for policy makers and development practitioners.

This conference tried to review the means to create a better balance between land, labour, technology and material resources, and identify possible synergies among these so that future livelihoods of rural India would be more logical. The plenary session has addressed the following questions:

Q1: What are the existing policies for rural areas which need to be relooked -basic amenities and enhancing skill jobs for all?

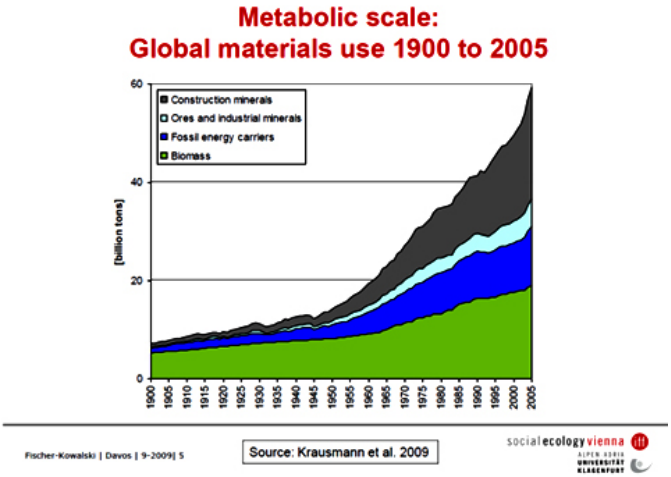
Q2: How to improve the supply chain, augment shelf life, value addition in agriculture production and increase local market opportunities instead of dependency on urban markets?

Q3: What improvements are needed for the proper execution of resource security in rural settings?

THEME 2: INFRASTRUCTURE FOR ENVIRONMENTAL QUALITY AND EMPLOYMENT OPPORTUNITIES

Rapid urbanisation and infrastructure deployment mean massive growth in the construction sector. After agriculture, construction is among the top users of labour, materials and energy and contributes 10% of GDP. With extensive use of natural resources – topsoil for bricks, iron for steel, limestone for cement, stone, timber, water and other non-renewables – and 23% of the country's GHG emissions, the environmental and resource footprint of the construction sector is very high. India will soon become the third largest global constructer, making its global impact on resources and climate - a cause for alarm.

With the ambitious and much needed schemes such as Housing for All and Make in India the resource scarcity implications will only worsen in the future if 'business as usual' for resource consumption by the sector continues. Some of the resources such as sand, topsoil, and water have already become critical in the industry. The Conference will address availability of these materials in future in a 'business as usual' and 'alternative coupled scenarios' with implications of each scenario on environment, society, economy and jobs prospects:

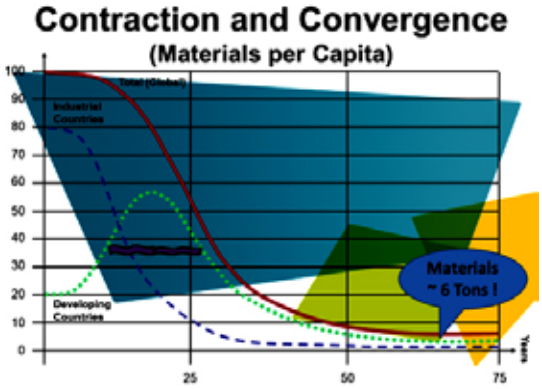


A- Business as Usual Scenario

The BAU scenario will look at the growth of the construction sector and resource consumption pattern in absence of any major changes in current practice. It will explore future availability of natural resources to meet the demands of the sector. The scenario will also assess the replenishment to extraction ratio of natural resources and the opportunities for recycling.

B- Alternative Hybrid Scenario

The Alternatives scenario, based on circular economy principles, will look at natural resource consumption by the sector coupled with alternative materials (such as fly ash, construction and demolition (C&D) waste, etc.). This scenario will aim to utilise the potential of unconventional resources to avoid the use of natural resources for construction while yet meeting the demand requirements. It will basically show the effect of supplementing natural resources with viable alternatives and decoupling the growth of this sector from environmental degradation.



Criticality

- Scarcity: Primary resource use versus its natural availability and replenishability.
- Cost: Cost of extraction and transit / carriage under the framework
- Environmental impact: Damage due to extraction and processing of resources
- Embodied energy: Energy consumed during extraction, production and transport of the resource
- Supply risk: Accessibility of the resource, legal restrictions and political risks
- Lack of recyclability: Secondary uses of a resource
- Conflict of use: Competing uses of a resource by other sectors, e.g., topsoil - brick manufacturing vs food production

India needs a sustainable construction approach in infrastructure development. This can be set as a dynamic between developers of novel solutions, investors, the construction industry, professional services, industry suppliers and other relevant parties towards achieving sustainable growth. It covers a number of aspects such as conception and management of buildings and constructed assets and alternatives. The Ministry of Urban Development has issued directives that call for the setting up of construction waste recycle units in every city with a population of over one million. These plants should be promoted and linked suitably to the supply chain of construction sector.

Although there is significant potential for eco-innovation in the infrastructure sector, yet a candid discussion about the benefits of renovation versus new construction, and the political frameworks which favour one over the other is needed. This discussion should happen today, to set the tone for the role of the infrastructure sector tomorrow. The conference, therefore, reflected on the following questions:

Q1: How can the criticality challenges of resource efficiency in Infrastructure be overcome?

Q2: How can government and the corporate sector set up methodologies and institutions for making informed decisions on renovation versus new construction- promoting both efficiency and jobs?

Q3: How to ensure an efficient labour force in the Alternative Hybrid Scenario?

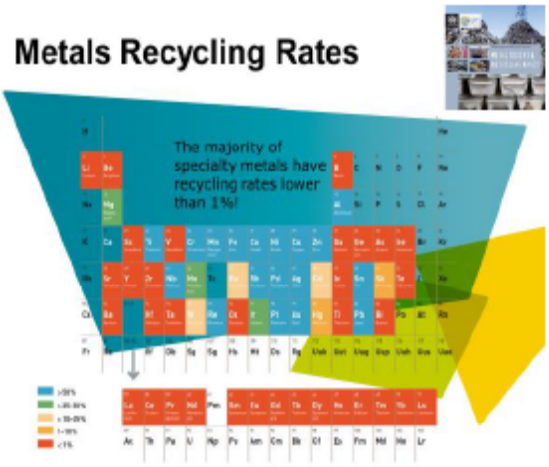
THEME 3: HARMONISING EMPLOYMENT AND QUALITY OF LIFE IN URBAN INDIA

India's rapid growth should enable it to overcome the challenges posed by the sluggish global economy. Sustaining such growth is a necessary, if not sufficient, condition to ensure that the living standards of hundreds of millions of people living in absolute poverty are improved. Today's economic systems are complex, rapidly changing and vulnerable to external perturbations of many kinds, ranging from natural disasters to hostile trade-related actions to changing fashions.

Many businesses that were iconic five decades ago no longer exist. Many businesses that did not exist five decades ago are among the largest corporations today. Every decade, a completely new business model becomes the dominant paradigm, only to be replaced by another, often after an unexpected and sometimes catastrophic collapse of the market.

Appropriate skills, knowledge and attitudes are essential for conducting a successful business in the modern economy. And because of the fluidity of business requirements, the ability to let go of old skills and quickly learn new ones becomes more important for retaining jobs than ever before.

Moreover, single-minded focus on the bottom line (or even top line) is no longer acceptable, given the broader landscape of stakeholders that today's businesses have to operate in. Sustainability issues dictate that the minimum number of bottom lines a business must pay attention to now is three – financial, social and environmental.



Fifty years ago, a professional with a freshly minted degree in a specific subject could spend an entire working life without any further need for study. Today, technology and markets are changing so rapidly that a professional may well change specialisations three or four times within his or her working life. In many cases, because of changing demand patterns, obsolescence, mechanisation or other reasons, jobs simply disappear and no new ones with similar skill requirements take their place. Often a country's development is correlated with rapid urbanisation. Besides changes in the core economic life, urban livelihood is closely linked to modernity that implies cultural civic values vastly different from rural interpretations. The challenges in urban settings are high, but they can be diverted towards economic growth along with job opportunities.

The World Bank estimates that 1% of the population in cities of the developing world are employed in recycling. However, the recycling rate of metals is lower than this percentage. It has been determined that while the urban poor get the least measure of waste, they survive in areas that have limited, or no waste handling facilities, as well as inadequate service delivery. Additionally, waste generally dumps on the fringes of the city where the poor also live. Almost

all of the recycling is through the informal sector, which comprises waste pickers, small buyers, a host of agents and finally, the recyclers. Indian policies and rules need to revisit this sector so that urban policy makers, and private companies, conduct solid waste management business with important safeguards and get recognition for informal sector recyclers and up cyclers.

The plenary had examined upcycling, recycling, the green economy; hospital waste management; municipal waste, plastic industry and more and try to address the issues.

Q1: What are the job-related challenges to policies that encourage resource efficiency in India?

Q2: How can a circular economy that upcycles and recycles, be scaled up without losing jobs?

Q3: How can secondary raw material usage be facilitate in the public and private sectors?

Q4: Should the following be given priority or do they require a change in course?

- More relaxation in taxes for upcycle, recycle, waste management businesses
- Separate public and private procurement policies
- Easy availability of finance and capital
- Inbuilt environment profit and loss in audit and more as cohort deems suitable

THEME 4: HARNESSING INDIA'S YOUTH DIVIDEND IN EMERGING SERVICE SECTORS -FINANCE, SERVICE INDUSTRY, RENEWABLE, IT AND TELECOM, WASTE MANAGEMENT, ETC

As elsewhere, the Service sector in India is growing rapidly. It has attracted substantial foreign investment flows, contributed significantly to exports as well as provided large-scale employment. It now contributes more than fifty percent of GDP and employs around 28% of the total population. Government incentives in health care, tourism, hospitality, education, engineering, communications, telecom, media- entertainment, transportation, information technology, real estate, banking, finance, insurance, management, etc. are significant, but studies, including from ILO, indicate a declining future for good quality of jobs in this sector.

India's distinctive competencies and competitive advantage formed by the knowledge-based services makes it unique emerging market in the world. Supported by several government initiatives, the services sector in India possesses the potential to unlock a multi-trillion-dollar opportunity which can create symbiotic growth for the whole nation.

Digitisation in service and knowledge enterprises to support mechanisation in agriculture, industry, and services and new businesses to build skills, create, manage, interpret big data analytics, cloud and cyber security services, service delivery automation, robotics, artificial intelligence, machine learning, and natural language processing, among many others -- are replacing current jobs at an accelerating pace. While they are also creating new job opportunities to replace the ones that are lost due to these very technologies, the skills and numbers required mean that other employment opportunities will also be needed. To reduce unemployment, much more effective systems will need to be set in place to improve the process of matching skills to opportunities, for which digital employment exchanges run by businesses are an excellent initiative.

The education and labour markets need to communicate much more on current and future skills needs, how these may be met and how future needs can be anticipated. The circular economy will create new jobs, both high-skilled and low-skilled. The goal is to create high quality jobs. Policymakers need to better integrate their environmental policies and skills policies. Services that promote and deliver resource efficiency as a business objective are among the most needed: energy efficiency, renewable energy appliance maintenance and repair and other circular economy enterprises. However, - it should be promoted by the business sector rather than a thrust from the Government.

Many employers have targets to reduce their environmental impact by a certain date. One notable example is Unilever, the fast-moving consumer goods (FMCG) company (Partial Sponsor- the 2018 Annual Conference, CoR-I), which aims to half its impact on the environment by 2030. In order to do so, it is taking a range of actions including introducing new recyclable packaging and sourcing goods from sustainable sources. Unilever CEO Paul Polman , London, United Kingdom, was awarded a Champion of the Earth Award by the United Nations to acknowledge the company's commitment to green issues. These kinds of initiatives need to push more in business and its related jobs- however, their nature and trends can differ in sectors based approaches.

In light of above, the conference had tried to capture following questions.

Q1: What are the existing means and policies available to integrate environment-skills- jobs in context of livelihoods for all? Do these policies need changes or revision?

Q2: How to make a balance of job losses and new skills enhancement with existing educational and skill development policies and their sonority?

Q3: What are the challenges to engage rural youth dividend in emerging service sectors? How to overcome them so that equality can be maintained in the service sector's growth?

THEME 5: NURTURING MSMES FOR JOB CREATION: FACILITATING INDIA'S ASPIRATION TO BE A MANUFACTURING PIVOT

With 110 million workers, MSMEs are major employers in India. They contribute almost 17% of the nation's GDP and produce more than 8,000 different products. As shown by the experience of USA, Germany and Japan – and more recently Korea and China – MSMEs will always be the backbone of industry, exports and even innovation.

Indian MSME statistics now need to show employment figures in addition to the existing focus on capital and turnover.

The majority of MSMEs operate in only six states in India. And only 7% of MSMEs are managed by women. This is a sector which could help in decreasing income, gender and regional disparities, but it faces many challenges such as lack of access to efficient technologies, poor infrastructure, deficient institutional credit and inadequate market linkages. MSMEs are often handicapped in this area for lack of capital and technical support.

A beginning has been made by Government, which has significantly raised public investment in roads, railways, rural facilities, power, telecom, housing, and the "soft" areas of health care and education, creating work opportunities for thousands of workers, at wages which are higher than for farm workers. Initiatives like Make in India, Start-up India, Digital India have been planned to up scaling the sector. In the past few years, more than 100,000 projects have been approved.

However, the demand for jobs in India is outstripping their supply and if MSMEs are to take up the slack, future, speedier, implementation will need better understanding of the natural resource constraints. Initiatives like 'Zero Defect and Zero Effect', 'Udyam Sangam' are critical for promoting resource efficiency in industry, but they need much more support capacity to promote and spread them and other ideas such as the circular economy, secondary resource use and the 3 R's among entrepreneurs.

Given the importance of MSMEs to the national economy, much more needs to be done to formalise the labour laws, environmental performance and resource efficiency expected of

them and to set up the support mechanisms – knowhow, technology access, financial support and skill development.

The conference had tried to capture the following questions:

Q1: What should be the more interconnected opportunity framework at different stages of development of MSMEs with reference to infrastructure, regulations, financial support and skill India?

Q2: How to enhance the partnering approach by the various stakeholders through incentives, rather than compliance- and encourage more environment friendly start-ups?

Q3: How can leading corporate houses, government and civil society organisations contribute jointly to enhance production led MSMEs where more resource efficient jobs can be developed in India?

HIGHLIGHTS OF THE 2018 ANNUAL CONFERENCE INAUGURAL SESSION - SETTING THE CONTEXT

How to make India resource resilient while creating better jobs and ensuring sustainable development for all was the overarching question addressed by the chief guest and other dignitaries at the inaugural session. It was pointed out that opportunities for business and policy underpinned the future of sustainability through the medium of resource efficiency with livelihoods at the centre of the issue.

The Keynote Address at the Inaugural Session was by Chief Guest, Shri Ram Madhav, National General Secretary, Bharatiya Janata Party followed by an address by Guest of Honour,

Mr Ashish Kumar Chauhan, MD and CEO, Bombay Stock Exchange; Introductory Remarks by Mr S Ramadorai, Chairman, Club of Rome-India; Presentation on setting the context by

Dr Ashok Khosla, Trustee, Club of Rome - India and closing remarks by Mr Ranjit Barthakur, Secretary General, Club of Rome – India.

The unique challenge in India today, highlighted by the speakers, was that for the first time we are looking to tackle poverty and environment together, within a given time frame. Economic development has not brought in equity and the benefits have not reached the last person. Moreover, the ecological dimension has been ignored. The measurement of resource efficiency is flawed as environmental resources are not factored in accounted for, leading to false accounting. Resource efficiency and sustainable development, must therefore, lie at the heart of India's transformation.

The speakers believed that growth cannot be seen as the only objective considering the widespread impact on natural resources, social values, democratic issues and most importantly, jobs. There were other serious consequences of the phenomenal growth the world has recently seen such as, loss of species and bio diversity, depletion of natural resources, climate change, environmental pollution and damage to agricultural systems through chemicals, overgrown and unplanned cities and millions of villages with people without basic amenities.

Serious concerns were raised regarding the vulnerability of the economy, inefficiencies in the agricultural sector and the staggering numbers of youth entering the job market. Added to this, are the problems of the rigidity of the labour market in the formal manufacturing sector that has created an informal labour market isolated from new trends in manufacturing. Rural livelihoods are at stake, especially in the Himalayas and the North East, where issues of environmental degradation are leading to severe problems while disrupting livelihoods. Three core livelihood related issues in India were identified: its young population, its small landholding farmers and the vulnerability of its informal sector. The challenges posed by these issues for the generation of jobs - Robotics, IT and mechanisation were seen as contributing to a further loss of jobs. The question posed was whether it was possible to adopt policies that can generate even better jobs in larger numbers.

Several steps were suggested that could move the country towards meeting the sustainable development Goals. These included policy coherence, ecologically sensitive resource consumption and a move towards a circular economy. Recommendations were made for growing entrepreneurship across the country and in skilling and reskilling young people in a dynamic way, with a focus on customers driving the formulation of new jobs and job skills.

Drawing inspiration from the innovative fearlessness of the Club of Rome's first publication, 'The Limits to Growth', it was proposed that these challenges be viewed instead as opportunities. Four propositions were outlined: infrastructure growth across the country; focusing on investing in and developing underdeveloped areas; utilising India's soft power and turning it into an industry and finally, a move towards job sharing in which several people can be employed in the same job for lesser time – thus providing options for people to engage in meaningful and measurable community work.

Rural futures through sustainable livelihood creation and the need to transition to a closed loop economy, with better waste management and reduced negative ecological and health impacts will help create sustainable and resource efficient jobs in the future.

The Indian economy can achieve a significant growth rate only if a strategic approach to sustainable development is adopted within this framework. This will require systemic approaches to raise efficiencies in the areas of financial, physical, natural and human capital. The biggest goal is to move India from a linear economy to a circular economy.

PLENARY SESSION 1:RESOURCE EFFICIENT LIVELIHOODS IN RURAL INDIA

This plenary focussed on resource efficiency and rural jobs and livelihoods while looking at opportunities for business and policy. The panellists debated the challenges facing livelihoods in rural India, particularly in the agricultural sector and the associated problem of resource sufficiency and efficiency and security in the rural context. Historically, such efficiencies have been achieved mainly through mechanisation and the extensive use of chemicals in agriculture and allied activities. This has led to not only to massive job losses but also increasingly desperate economic disparities. Growing scarcity of natural resources and environmental degradation

has further resulted in the earth overshooting its annual quota of natural resource consumption by a significant timeline. India's demographic dividend suddenly looks like a liability.

Moderator: Ashok Khosla, Trustee, Club of Rome - India and Chairman, Development Alternatives. Speakers: Ajoy Misra, Managing Director/CEO, Tata Global Leverages Ltd, Vijay Mahajan, Founder Chairman Basix and Director-CEO Pradan and Anirban Ghosh, Chief Sustainability Officer, Mahindra Group.

Recognising the importance of food for the entire nation, and increasing constraints on production due to changing economic structures, vulnerability to weather, climate change and macroeconomic shocks, the panellists sought to establish a better balance between labour, technology and material resources. They identified synergies among these to ensure future livelihoods in rural India.

The session addressed the following questions:

- What are the existing policies for rural areas, which need to be revisited?
- How to improve the supply chain, augment shelf life, add value in agriculture production and increase local market opportunities instead of dependency on urban markets?
- What improvements are needed for the resource efficiency and resource security in rural settings?

The discussions revealed that by 2050 India will be the only country in the world, which would still be more rural than urban. As rural populations expand, alternate income opportunities through a holistic development of economy and will be crucial to handling the job deficit. The panel sought to understand the tools and techniques for fostering inclusive and innovative development for rural India.

Highlighting the vulnerability of the economy and the impact of youth entering the market, the panellists observed that inefficiencies in the agricultural sector, land fragmentation and the disruption of livelihoods by technology and automation in rural areas were only adding to the complexity. Poor implementation of existing programmes aimed at boosting rural skills and livelihoods and the slow development of infrastructure were seen as critical impediments. The institutional mechanisms at the local level remained weak and limited and were unable to deliver the outcomes desired.

Discussions took place on the contentious issue of measuring efficiency. Current practices include false accounting and do not take into account the costs of environmental degeneration and the long-term effects on the community at large. The focus therefore, must be on resource regeneration and restoration of the ecosystem as an important paradigm in the process of increasing rural livelihoods. Turning the natural resources regeneration into an investible proposition could lead to untapped job potential and a prospective new economic structure for rural India.

The solutions associated with regeneration capacity are easy to learn and implement. Several pilots have been tried and tested across the country but there is a need to understand and identify opportunities for business and policy to implement these solutions at scale. nature Economics and nature capital is the key to skills and employment. The farmer has the DNA

to work with the soil and the environment because the farm is his natural habitat. Keeping the naturally skilled farmer at the centre is vital to this resource regeneration movement. The panellists stated that there was scope and potential for resource restoration and infrastructure development while fostering inclusive development activities at the local level.

The need to make India the solar capital of the world was highlighted during the discussion. India's energy requirements are generated mainly from fossil fuels. Hence it is imperative that the country progresses towards a cleaner path of generating power.

This can also be a great enabler for creating resource efficient jobs. Rural India does not rely exclusively on agriculture as its sole source of income. Income in rural areas is primarily generated from non-agricultural activities and most have multiple sources of income. Even though agricultural production and productivity has increased, the proportion of income from rural activities represents a declining trend. The future of rural livelihoods no longer remains solely dependent on agricultural activities.

There has been talk about smart cities, but the focus has to be on smart villages as the nesting ground for creativity. It is necessary to have collective coherence amongst different stakeholders at the local level in order to facilitate creativity and innovation along with respect for ecosystems and the community. Redefining the context of urban and rural as well as the need to create a better framework for last mile delivery of public schemes was also emphasised.

Some of the experts questioned the method of segregation of urban and rural areas and pointed out that inclusive growth and development must be seen as collateral requirements to successful policy implementation.

Rural India exemplifies some of practices of circular economy, but needs to adopt them more. Reinforcing income resilience in rural India by supporting the already occurring diversification of incomes in the area and providing opportunities for recycling would help provide alternate sources of incomes.

The discussion also highlighted initiatives associated with ethical business practices such as **trust tea,** the world's largest sustainability code for a single commodity in a single geography. More businesses should look at this model was the consensus.

The following core ideas emerged during the discussion, as prototype pathways that would strengthen rural India's future without shifting to urban patterns of consumption and development:

- Regularised funding and efficient implementation of already existing rural initiatives and skill development centred on financial literacy and management skills were put high on the agenda.
- The panel called on the corporate sector to reframe its perspectives on business practice in rural areas. Efforts must be made to place the communities at the centre their production facilities and introduce sustainable and socially responsible practices that benefit them.

Considering that about 60 percent of the population will be living urban lives, it is clear that urbanisation will spread to villages and the number of small towns will increase. The road-map

should aim at connecting rural towns and making them the hubs of economic opportunities of the future. Small towns should be designed and developed to manage the increased population and to provide sustainable jobs.

An appeal was made to aim at turning around conventional challenges such as the high population growth, excessive unemployment and diversity of cultures into opportunities for the country's benefit. India's rich culture can drive a soft power economy by capitalising on sectors such as Indian cuisine, culture and spirituality for creating job opportunities.

Investments in resource regeneration - water, soil, grazing land and forest land must be incentivised. It is critical that institutional mechanisms enable profitable investments in order to create millions of jobs, thus unleashing productivity in the long run. Micro-irrigation for example, will reduce the requirement for water, increase crop productivity and create more jobs.

PLENARY SESSION 2: EMPLOYMENTOPPORTUNITIES ININFRASTRUCTUREANDENVIRONMENTALCHALLENGES

The infrastructure and construction sector is the second largest sector in the Indian economy, holding 11% of the GDP. It is also one of the most wasteful industries with a high environmental and resource footprint. India, therefore, needs a sustainable construction approach to infrastructure development that significantly provides large-scale jobs and livelihoods, while ensuring safety, productivity and human dignity.

Infrastructure is the also second largest employer. After agriculture, construction is among the top users of labour (44 million), and therefore, remains significant for jobs and livelihood creation. Given the need and advances of infrastructure in India, the demand is going to escalate dramatically.

The session was moderated by Perses Bilimoria, Founder & CEO - Earthsoul India Private Limited and the speakers were: Shankar Venkateshwaran, Former Chief, Tata Sustainability Group; Jessica Cheam, ME, Eco-Business, Singapore and Indrani Malkani, Chairperson, V Citizens Action Network (VCAN).

In this session, the speakers turned their attention to the question of turning the infrastructure economy into a circular economy where wastage is minimised. They highlighted the need to address the challenge of technological innovation, while strengthening jobs in the sector. This, they believed, could be achieved by dynamic collaboration among different stakeholders such as developers of novel solutions, professional services, the investors, the construction industry, and industry suppliers.

The conference reflected on the following questions:

- How can the critical challenges of resource efficiency in infrastructure be overcome?
- How can the government and the corporate sector set up methodologies and institutions for making informed decisions on renovation versus new construction - promoting both efficiency and jobs?
- How to ensure an efficient labour force in the Alternative Hybrid Scenario?

The panel drew attention to the rigidity of the labour market in the formal manufacturing sector which has led to an informal secondary labour market. The organic nature of construction employment, from brick kilns to building was linked to lack of regulation in current supply chains. There was also an absence of due diligence in dealing with the environment and its preservation on the part of corporate and Government bodies, noted the panel. Poor awareness and poor implementation of already existing regulations is leading to severe environmental degradation posed by the sand mining and the cement industry.

Current demands for infrastructure creation in India are huge and hence the infrastructure is expected to grow at a rapid pace. The panellists stressed that innovation techniques and models are needed, especially with the involvement of the private sector for implementing responsible resource management.

The panellists proposed a shift of mind-set to a new green paradigm. They suggested that identifying potential trillion dollar businesses associated with carbon sequestration and renewables is possible through initiatives such as soil remediation and afforestation. The use of IT in natural resource management and recognising local and indigenous models for the development of villages and local communities were also important.

The panellists expressed their concerns about mitigating the risks of climate change associated with large-scale infrastructure development. The creation of green infrastructure was highlighted with a cautionary note on the high cost and expertise required for the design and implementation of these technologies. This is relevant not only for remote areas but even more so in the context of urban transformation. Given that the CoR Conference was taking place in Mumbai, the urban context largely presented itself as a pilot for transformation.

Sustainable practices should be adopted by the creation of sustainability codes across the value chain. The panel strongly considered cleaner energy in the manufacturing of materials and unexplored alternatives such as the use of plastic and construction and demolition waste. Research must invest in alternative construction material and increase the use of plastic waste in road construction.

Some of the resources used in infrastructure are already facing shortages. The Conference contrasted the future availability of materials such as sand, topsoil resources like water in a ‘business as usual’ and ‘alternative coupled scenarios’ with implications of each scenario on environment, society, economy and jobs prospects.

The Alternative Hybrid Scenario based on the circular Economy principles was highlighted. Natural resource consumption supplemented by alternative materials (such as fly ash, construction and demolition (C&D) waste, etc.) pointed to the potential of unconventional resources to meet the growing demand. The panellists asserted that circular thinking must become the norm.

The need to harness and implement a wide number of technologies such as waterless cement, aero-ponics and green steel was highlighted during the discussion. The discussion then measured possible solutions to sustainable infrastructure development with the circular economy. This was particularly relevant to refurbishing and up-cycling of products. The use of construction and demolition waste should be encouraged. One recommendation was that

design must factor in circularity for quick and easy dismantling to enable material recovery and reuse of components in infrastructure. A move needs to be initiated towards "deconstruction" over demolition, which will facilitate the recycling of materials such as steel etc. up to nearly 90% of the resources used in building, must be initiated.

The infrastructure sector has 94 percent of informal labour. The panel called for human and environmental safety and productivity issues to be considered to address human rights violations. The creation of infrastructure and the need to meet the gap must be coupled with human dignity. The focus should not only be on creation of large-scale infrastructure but also on appropriate working conditions. A human-centric approach on site and in the supply chain was a prerequisite to the development of responsible infrastructure. Mechanisation must be accompanied by skilling of workers. Superior safety training and supply of protective equipment and improved conditions for workers on site has to be established. Consolidation of supply chains and awareness should be generated to prevent worker abuse down the supply and construction development chain.

The discussion touched upon how major trends are generating new risks for investors. Mitigating risks associated with climate change, the impact of new and emerging technologies, global sustainability trends and challenges allied with infrastructure development were demanding a new set of expectations from business. However, the adoption of the 2030 agenda for development highlights opportunities for businesses to work towards a more sustained and advanced future. The need for development banks to foster and create development initiatives focussing primarily on global practices in infrastructure that can be adopted in the Indian context was underlined.

Green bonds as a tool to facilitate corporate engagement in the context of project finance activities were mentioned during the discussion. A unique initiative of the Bombay Stock Exchange, described as the first of its kind in Asia, is the listing of CarbonX and GreenX indices measuring sustainability and opportunities. More companies should opt for Stock Market Indices that provide avenues for investors to opt for green investments. GDP must be redefined as green development Index. In the given scenario, the need to understand and facilitate optimal resource management activities was enumerated.Tangible targets should be set and action plans developed around localised solutions and coalitions. Better and faster permissions processes are required and land must be given for production plants where alternative building materials such as bricks made from recycled waste can be developed. Coordinated thinking is called for, across the board, from local and state government as well as private developers and corporates to implement these alternative construction materials and solutions.

PLENARY SESSION 3: RESHAPING THE ECONOMY TO ACCELERATE JOBS

Every year, over 10 million Indians join the job market, mostly youth who have migrated from villages seeking employment in metros and smaller cities. In this session, panellists discussed the future of the economy and whether or not sustainability and job creation should be continued through cosmetic changes, or through an entire paradigm and structural shift to truly prepare the Indian economy and people for the future.

In spite of various schemes like MNREGA, National Skill Development Scheme, the Mudra Scheme, Make in India, Stand up India etc. there is almost 6.9 % joblessness in rural and urban areas. The number of people looking for jobs has risen to nearly 30 million by October 2018. (Centre for Monitoring Indian Economy (CMIE), Mumbai). The panellists observed that jobs are not sprinkled onto an economy; rather they grow out of an eco-system. The, focus was therefore, on different aspects of the challenges: ecological, technological, educational and on structural inequalities in job structures. Together, they presented a synthesised path forward, incorporating complex elements to build a future economy with a robust job creation scenario, especially for India's youth. They called for the mobilisation of masses by showing a vision and drawing on the spirit of young India, its creativity and its innovative spirit.

Moderator - Anish Andheria, President and CEO, Wildlife Conservation Trust; Speakers: Arun Maira, Former Member, Planning Commission of India; Manish Kumar, Managing Director and CEO, National Skill Development Corporation, and Vasant Manohar, former Director-in-Charge and CEO, Tata Consulting Engineers.

The biggest challenge identified by the panel was creating systemic solutions for securing sustainable livelihoods at scale. Changing the current mind-set to seek new job creation opportunities was the next objective. Small is perceived as weak associated with insufficient access to resources and markets. Besides, there is a mismatch between skills and work in the dynamic job environment of today. The assembly lines for skilling only chase numbers. Presently, skill development has a less than 30% success rate in rural areas. Other concerns raised by the panel pertained to the employment market, which listed millions of potential job seekers. The work ethos of hire and fire has led to a lack of mutual commitment and loyalty. The market approach is short term and high productivity as also long-term productivity tends to be low.

Furthermore, India has an economy of snakes and ladders in the informal sector, where income is spent as it is earned. It is difficult to accumulate savings which could be invested in enterprise, as workers have no stable employment or financial security and the wages are insufficient to insulate them against the worst financial effects of crises. Rapid urbanisation coupled with rural neglect adds to the yawning gap, as high capital investment is directed towards developing urban areas, while little is done for rural spaces. The panel observed that there are differing job difficulties faced by India's diverse economic demographics.

Then there is a design challenge, because of the mismatch between employee capabilities, expectations, work requirements and the realities of the job market. New technology is transforming the way we think, operate and function in our environments. Opportunities for business and policy are just not about jobs, but resource efficient jobs. A combination of openness and risk-taking by all stakeholders supported by effective policies can lead to sustainable jobs.

If the number of jobs has to be accelerated, the economy must address the centre of the issue, which are the people. People who think differently will lead the job market through an innovative ecosystem as the cycle of innovation is moving towards entrepreneurship. The current job structure does not allow for sustainable jobs for youth, and therefore it is important to encourage local innovation and futuristic thinking.

Moving away from certain core assumptions, we need to build on the resources available and grow incomes from the bottom up. The old assumptions of demography: that we have the people so let us grow their skills are obsolete. People are the only asset that can be aggregated. Providing social security will create confidence and the effort should be towards creating aggregations via clusters and platforms.

Adaptation to alternative educational models, for example Sweden and Finland, which encourage modular learning, that is, learning just in time, not just in case, would be useful. Such skill training must also be accessible, affordable and acceptable. It must inculcate a culture of team work that can address skill needs.

This calls for a new regulatory policy approach, which adapts quickly to the changes on the ground. It should embrace the idea of creative disruption and unleash India's entrepreneurial spirit. The approach needs to include better access to resources, especially for rural areas. Further, there should be decentralised and grassroots solutions that take into account rural India's latent entrepreneurial spirit, rather than moving them into other disruptive and mismatched fields with already declining jobs, as is the case with many skill development schemes across the country.

Investment in village development and industries should take through the promotion of local produce, the establishment of cooperatives, development of artisanal occupations and exploring the potential of outsourced work for kick-starting village development. Referring to the fear of jobs due to automation and new technologies, the panel felt that artificial intelligence cannot supersede human intellect and creativity. Creation of new streams of jobs can be accelerated through new technologies.

The panel was confident that the rise of entrepreneurship in India will result in job growth in the future. The jobs of the future will have a merged and fused character and new start-ups and enterprises can create new age jobs. For example, a person interested in music and health can become a music therapist for children. The business community can adopt novel approaches to reduce unemployment such as two people being hired for the job of one, with shorter work periods, and the remaining period being used for community service or other socially constructive activities. Further, the business sector could profit and get tax benefits from working out measurable outputs as their contribution to society. Thus, instead of theorising on jobs for today, skill-based programmes must be designed keeping in mind the requirements for tomorrow.

PLENARY SESSION 4: CIRCULAR ECONOMY IN URBAN INDIA: HARMONISING EMPLOYMENT AND QUALITY OF LIFE

The Indian economy currently follows a linear model in which extracted resources are turned into consumable items and the waste created during production, distribution and consumption is discarded. In this panel, the speakers discussed the challenges of transitioning the Indian economy into a circular economy, in which waste is reused in production processes to close the economic loop and ensure maximum resource efficiency. The panellists debated both the issues of lifestyle change to facilitate this transition, as well as larger, structural economic shifts that will be required to facilitate the change.

Moderator - Prasad Modak, Executive President, Environmental Management Centre ; Special Address by Praveen Pardeshi, ACS, Government of Maharashtra; Sanjay Bhatia, Chairman, Mumbai Port Trust; Speakers: Ms Shailaja Rangarajan, Founder and CEO – Rimagined, start up on upcycling waste and Sanjay Jha, Director, Dale Carnegie and President AIPC Maharashtra and Pankaj Kumar Satija, Chief Regulatory Affairs, Tata Steel Limited.

This session examined the challenges and the best practices in the implementation of a circular economy. The panel observed that though there was awareness on the methods to mitigate climate change, there was not much evidence of action. Behavioural changes need to be brought about through the levers of policy and business. The panel underlined reduced material consumption and finding ways to do more with less. The focus, they emphasised, must be on moving to a circular economy from a linear one. A circular economy seeks to rebuild capital, whether it is financial, industrial, human, social or natural. This ensures enhanced flows of goods and services. It is a closed loop system involving circular supply, resource recovery and a shared economy that creates both high and low skilled jobs. For example, using "deconstruction" over demolition would facilitate the recycling of materials such as steel etc. up to nearly 90% of the resources used in building.

Over the course of their discussion, the panellists endeavoured to answer these questions:

1) What are the job-related challenges to policies that encourage resource efficiency in India?

2) How can a circular economy that upcycles and recycles, be scaled up without losing jobs?

3) How can secondary raw material usage be facilitated in the public and private sectors?

4) Should the following be given priority or do they require a change in course?

- More relaxation in taxes for upcycle, recycle and waste management businesses
- Separate public and private procurement policies
- Easy availability of finance and capital
- Inbuilt environment profit and loss in audit and more.

It might not be enough to prevent environmental degradation or foster the move to a circular economy unless there is a mind-set change. Sustainability, employability and equitability in skill training were the key pivots of this transformation. The panel observed that the argument for balancing economic needs with the environment is rooted in the concerns on resource exhaustion. Recent technological advancements and price signals have somehow reduced that anxiety. The current experience of climate change has fortunately, brought the focus back on ensuring sustainable living and consumption. According to the panel, lifestyle change is a key element in the drive towards sustainability.

Other issues pertain to the in-built paradox between growth vs equity and sustainability vs profitability. Turning agriculture into an energy efficient and sustainable sector remains the most important mission. Thereafter, sustainable public infrastructure growth, especially in urban areas is a looming problem in India. Further, unlike developed economies, India's major infrastructure is yet to be built, which implies that India still has the opportunity to adopt clean energy and environmental techniques to fulfil its future infrastructure needs.

It was pointed out that reliance on subsidised or cheaper energy from coal has led to 87% of the agrarian society being dependent on coal energy for their daily needs. Substituting with solar grids will not only make energy available on demand at no cost for the farmers, but also reduce the loss of power in transmission. One of the panellists proposed a case study of the Maharashtra Government, which has made significant policy changes. Maharashtra is currently on track to achieve the sustainable development goals within the Paris Agreement. The major thrust has been on creating green infrastructure.

The state has proposed five major policy shifts to be implemented that includes urban infrastructure development, bio-diversity conservation, water harvesting, clean energy and tracking implementation and consultations with the government. A move towards more efficient public transport in urban areas and areas being urbanised has been a switch from road transport to metro, which is predicted to lead to reduction in CO2 levels equivalent to that by 19 - 25 million trees per year. For large scale highway projects, an MoU has been signed with The Wildlife Trust, in order to ensure minimal disturbance to wildlife in bio-sensitive areas during construction.

A shift from large dams to decentralised water harvesting structures focusing on watershed development not only reduces GHG emissions, but also helps villages become drought free and self-reliant. Cross subsidy of solar plants by levying charges on thermal energy can also be a policy option. Another successful example of livelihood generation balancing economic and environmental interests is the Sagar Mala national initiative focused on revitalising India's ports to their full potential. Through it four components - port modernisation, connectivity enhancement, port linked industrialisation and community development - the ports and consequently, the cities are being reimagined as business activity centres.

The panel went on to suggest that even though per capita consumption is the accepted measure of consumption, aggregate demand must also be looked at to ascertain the magnitude of problems in a consumerist economy. It will enable those at the top of the pyramid to make lifestyle changes and reconsider the current model of living. 'Reduce' must be the first mantra to be adopted. Another simple substitute for recycling, according to the panel, was the emerging trend known as 'Upcycling' within 'Refurbish'. While recycling involved major resources to change the form of the product to a completely new product, upcycling does not change the material of the waste but remoulds it into a new item. This will be meaningful only when applied at scale. Aggregation of consumer waste at scale is a cumbersome and time-consuming process. Thus, policies must be designed to promote this at the pre-consumer level.

It is critical that standards and regulations relating to markets for upcycled products are developed. The panel believed that depreciation and decay in the lifespan of recycled materials has also to be factored in. Policies are also required for improved and more rigorous standards for upcycling industries, especially in evaluating the fitness of products for consumption. Thus, from a governance perspective, policies regarding risk profiling of upcycled products; the taxation of such products; market development for them; and mechanisms for sourcing of waste need to be embedded in the system. The employment creation potential of this industry should also be considered seriously as developing it can lead to innovation and sustainability while creating huge employment opportunities.

Better connections between the cities and the interiors of India, whether in terms of knowledge exchange, understanding the context or spatial closeness need to be established. Rethinking the artificial divide between "society" and "economy" and a directed move towards grappling with inequality and making urgent lifestyle changes can bring about improved equity. The major recommendation emerging from this analysis was that there must be an urgent move towards a circular economy, thus opening up avenues for business to convert waste into a reusable and productive form. This has to be supported by better implementation and enforcement of policies on sustainability and ecologically sensitive resource consumption.

Enhanced resource mapping efforts is required to understand rural and urban resource consumption patterns in India that will, in turn, help pinpoint areas of resource utilisation that require targeted efforts to achieve sustainability. This must be accompanied by exploration of new resource streams. Large and unsustainable infrastructure projects in rural areas should give way to renewable energy-based projects that leverage natural resources like solar energy to facilitate distribution of energy and water in rural regions.

Investment in redesigning infrastructure in rural and urban areas, ecosystem services, clean energy, decentralised water harvesting methods, and systematic waste management systems can address resource leakages and design recycling streams. Bio mimicry to shape technology and our economic landscape, especially in developing technologies that can simulate and replicate nature's efficient use and reuse of resources, can very often achieve the same results instead of intense resource consumption in human-created technologies. An evolution towards understanding new and disruptive technologies must also be seen as moments of opportunity and assistance given to the most vulnerable segments of India's population in absorbing these technologies. They can become creative innovators and entrepreneurs driving the country's future.

Transitioning away from the 3R model – Reduce, Reuse, Recycle – to the 6R model – Reduce, Reuse, Recycle, Repair, Refurbish and Remanufacture –needs to be driven by both business and government. Relaxed taxation structures and policies concerning upcycled products will allow meaningful penetration into markets. Careful green management techniques and improved sourcing of waste for upcycling and recycling purposes, at a pre-consumer level (i.e. at industrial source) rather than down the line at the post-consumer stage have to be put into play. Repair and upcycling businesses can provide opportunities for new jobs, both in preparing waste for re-entering the economy and in selling knowledge to third parties.

Modular skill training developed with specific targets in mind, made accessible and available to all and not just the youth is also essential. For example, targeting young mothers is crucial; if a mother is trained and then employed, there is a positive cascading effect on other members of her family.

PLENARY SESSION 5: CHANGING SKILLS IN EMERGING SERVICE SECTORS: FINANCE, SERVICE INDUSTRY, RENEWABLES, IT AND TELECOM

As the service sector expands and jobs in the Indian market move into newer areas, the demand for new skills and capabilities among the young begins to rise. These challenges will be compounded as new technologies and shifts towards sustainability will shape the type of jobs that emerge, especially in the service sector. The panellists in this session discussed the challenges and opportunities presented by these shifts, especially for young people entering the job market. They centred, in particular, on the problem of transitioning India into an innovating and job creating market, where entrepreneurship plays a central role in the economy.

Moderator - Arun Nathan, Director, IDFC Foundation; Speakers: Ramanathan Ramanan, Director, Atal Innovation Mission - Niti Aayog; Nidhi Raina, Global Head, Personal Excellence and Cultural Transformation, TCS; Arun Joshi, Director PSPC India, Former Head, National Livelihood Centre-GVT; Anjali Bansal, Non- Executive Chairperson Dena Bank, and Founder Avaana Capital and Bittu Sahgal.

Aligned with global trends, the Service Sector in India is growing rapidly. It now contributes more than fifty percent of GDP, employing around 28% of the total population. It has drawn substantial foreign investment and contributed significantly to exports while also providing large-scale employment.

The Indian service sector covers several areas such as trade, hotel and restaurants, transport, storage and communication, financing, insurance, real estate, business services, community, social and personal services, and services associated with construction. While they are also creating new job opportunities to replace those that are lost due to digitisation, mechanisation in agriculture, industry and service these technologies need skills and numbers. Furthermore, services that promote and deliver resource efficiency as a business objective and other circular economy enterprises will be the most needed.

The circular economy will create new jobs, both high-skilled and low-skilled but policymakers need to integrate them better through their environment and skill policies.

Over the course of their discussion, the panel attempted to pose answers to these key questions:

1) What are the existing means and policies available to integrate environment-skills-jobs in the context of Livelihoods for all? Do these policies need change or revision?

2) How to balance job losses and new skills enhancement with existing educational and skill development policies?

3) What are the issues in engaging the rural youth in emerging service sectors?

4) How can equality be maintained in the service sector's growth?

Some of the major challenges identified by the panel pertained to infrastructure development and expansion without a holistic view of the future. It spurred a form of colonisation in which the prospects of the upcoming generations are devoured to fuel the present. The panel felt

strongly about the existing economic structure that permitted the consumption of "human resources" in exploitative and unsustainable ways. It produced attributes that fit the exigencies of industrialisation to create profit and wealth, without much thought given to people as individuals. The current ecosystems of support are skewed and remain disconnected from the realities on the ground.

The discussion dwelt on the need for changing skills in the emerging sector and identified the job-hunting exercise as a major crisis in India. There was a need to focus on finding meaningful employment for educated as well as non-literate people. The panel accepted that innovation and entrepreneurship are the driving factors for establishing the workforce of the future.

The panel observed that the macro-economic indicators suggest the need to advance employment generation at a faster pace commensurate to the growing workforce. Even at 10 percent growth in GDP, the employment growth is not likely to be even one percent. The disparity between rural and urban areas with respect to employment opportunities was cited during the discussion, as adding to increased migration to urban areas.

As the numbers suggest, India has the largest youth population of the world. The challenge for successive governments is not only to provide meaningful employment but to ensure that the youth is trained for the jobs of the future. This mission is pitted against the unknowns of automation, robotics, artificial intelligence and the internet; all essential components of the jobs of the future. To remain relevant in the job market one needs to constantly focus on developing new age skills and rigorous thinking to stay ahead of the curve. The discussants reviewed the recent work done by the government in the areas of promoting self-employment and skill development for the youth.

The examples of activities undertaken by the Atal Innovation Mission provided examples of industry-academia collaboration not only at the higher education level but also with children at school level. Many of these partnerships have developed innovative ideas and techniques, showcased at international arenas. They are indigenous in their thinking, addressing varied issues globally and credited towards resolving local challenges.

The panel also looked at entrepreneurial activities from a gender-segregated lens. To ensure young girls and women are brought into such mainstream activities it was important that concerns of gender equity are addressed in areas of innovation and technology. During the audience interaction, it was observed that equal and successful participation of young girls and women in entrepreneurial activities effectively countered the skewed gender ratio. The debate touched upon possible activities for engaging young entrepreneurs. This could be initiated by the incorporation and incubation of the enterprises appropriate to the stage of the business. In addition to creating funding avenues, the discussion emphasised the need for mentorship and training by industry experts for these entrepreneurs to convert their ideas into successful businesses.

Recent initiatives in skill development for rural and semi-rural youth, largely borrowed from the European model of apprenticeship were suggested as a possible head way. The major shortcoming associated with skill development was the limited employment opportunities available post training. The deployment of youth in avenues associated with skill development

was mentioned as a way to mainstream skill development activities. Industry collaboration to enhance skill development and meaningful opportunities was a possible solution. The success of skill development was dependent on consistent industry collaboration providing gainful employment in rural and semi-urban areas.

Job opportunities are insufficient because of the structure of the system that is in place. The panel underlined the need to understand the current system of jobs and redesign the system to produce the results desired. The design challenge is to match capabilities to work requirements. If wages are not sufficient, it was pointed out the policies will have to be more regulatory, as wages reflect the value of the person in the economy.

An interesting presentation during the discussion emphasised personal well-being as an important element of the changing nature of the work-force. An increasing level of stress and anxiety at workplace was cited as a common occurrence, particularly among the young generation. Meditation, personal care, fitness and recreation were listed as equally important parameters to remain productive at work and there was a need to ensure appropriate work-life balance while meeting professional obligations.

The panellists made several recommendations that included the triggering of an ecosystem of innovation across the country, with a focus on preparing young people for the jobs of tomorrow as well as becoming the job creators for tomorrow:

- The setting up of incubation centres with the state of the art machinery to create hubs for support and linkages for growth, disruptive technology and futuristic innovations.
- Facilitating a win-win scenario for public-private collaboration as an advancement mechanism towards resource efficiency and job creation at scale.
- Introducing standards for upcycling industries, especially in risk profiling products as also for governance and policy with regard to market creation and the taxation of upcycled products.

PLENARYSESSION 6 : MSMES: KEY TO INDIA'S MANUFACTURING AMBITIONS

Micro, Small and Medium Enterprises (MSMEs) are significant for employment creation and economic growth. They have immense potential to create the jobs of the future and for the future. Their vast reach and numbers make MSMEs a potent vehicle for driving bottom up sustainability by focusing on clean tech and green markets. The challenge lies in generating resource efficient employment by the corporate sector and MSMES.

India is home to ~ 46 million MSMEs, of which 26 million are Small and Medium Enterprises (SMEs). These constitute numerous sectors in the remotest parts of the country. With close to 110 million workers, MSMEs are major employers in India. Together they contribute almost 17% of the nation's GDP and produce more than 8,000 different products. Several millions of these are micro enterprises that are not officially accounted for, and the assumption is that they alone contribute 8-9% of the GDP.

Moderator: Siddharth Mukherjee, Chief Advisor, TARAlife Sustainability Solutions ; Speakers: Prof Binu Paul, School of Research Methodology, TISS Mumbai, Shilpi Kapur, The Energy and Resources Institute, Mumbai; Prabhakar Dalal, Former ED & Former Senior Advisor, Export-Import Bank of India; Ravi Prakash, Professor & Coordinator NBA, Motilal Nehru National Institute of Technology and Mahesh Krishnamurti, Managing Director, Resources Global Professionals (I) Pvt. Ltd. (RGP).

As the international economy transitions into a highly technological and digitalised form, MSMEs in India are posed with new challenges to cope with the disruptions brought in by each new technological wave. The panellists in this session considered technical as well as other policy and infrastructure- based issues MSMEs face; particularly the question of financing and financial structures and of cheaper, sustainable energy that could bring down their operating costs.

Over the course of the session, the panellists attempted to tackle these key questions:

1) What should be the interconnected opportunity framework at different stages of development of MSMEs with reference to infrastructure, regulations, financial support and skills in India?

2) How to enhance the partnering approach by the various stakeholders through incentives, rather than compliance - and encourage more environment friendly start-ups?

3) How can leading corporate houses, government and civil society organisations contribute jointly to enhance productive MSMEs where more resource efficient jobs can be developed in India?

The panel acknowledged that MSMEs face multiple challenges like international competition, pressure on resources, limited cooperation between different stakeholders and lack of thrust on innovation. However, with India's demographic dividend, there is an abundance of ideas that need incubation. Resource efficiency was one of the focal points of discussion, especially green innovations to establish sustainable practices in the sector. The potential of alternate forms of production and MSME structuring was also in focus.

One of the major issues raised by the panel was whether the technology boom is making a meaningful difference in terms of wages and productivity to the working class. Another question was: what does it mean to distribute the benefits of the technology boom equitably? The panel observed that finance remains the biggest question mark. It is essential that the education and labour sectors coordinate effectively on current and future skill needs. The circular economy will create new jobs, both high-skilled and low-skilled. The goal is to create more high-quality jobs. Services that promote and deliver resource efficiency need to integrate better with their environment and the skill policies of the government.

A business approach has to ensure energy efficiency, renewable energy, maintenance and repair and other circular economy enterprises. However, it should be promoted by the business sector rather than be a thrust from the government, suggested the panel.MSMEs must be facilitated and recognised as powerhouses for employment creation. Much more support capacity and effort is needed to promote and spread ideas such as the circular economy, secondary resource use, and the 3 Rs among entrepreneurs. Given the importance of MSMEs to the national

economy, even more needs to be done to formalise the labour laws, environmental performance and resource efficiency expected of them.

Most importantly, a shift in mind-set is essential for understanding disruptive technologies and trimmer manufacturing processes that reduce and eliminate waste. Leaner manufacturing processes reduce their carbon and waste footprints; while technological innovations such as 3D printing and lithium operated battery solutions are already making this a reality. Support at the academic, technical and especially, policy level can help spearhead the same.

At present, multiple government policies like Clean India, Make in India and Zero Effect, Zero Defect exist to promote a balance between MSME's potential for employment creation and sustainability. Zero Effect, Zero Defect in particular, can optimise the use of resources, minimise waste and enhance efficiency through use of environmental management tools and intensive auditing processes. The government can provide additional support along two main pillars - finance and incubation support. Emerging MSMEs are known to face issues like lower capitalisation and heavy dependence on credit. This asymmetry between the credit needs of MSMEs and funding can be solved by providing access to institutional mechanisms, which can deliver timely finance and avoid a working capital crunch.

The government has recently developed financial incentive systems for start-ups such as collateral-free loans, zero tax for the initial three years, larger recovery period on NPA declaration, etc. The panel suggested that it would be useful to study other best practices like Switzerland's policy of 'competence instead of collateral' or South Korea's seed fund sharing for start-ups.Incubation is central to the growth of entrepreneurship. The government has schemes that provide seed capital to start-ups under the above-mentioned schemes. However, apart from financial support, linkages through innovation centres with state-of-the-art machinery built for initial prototyping can also spur growth, while bringing in disruptive technology and futuristic innovations. Further, adopting practices that plan for scale, such as clustering similar MSMEs, will allow for greater reach and mobility, enabling them to collectively meet common costs with less pressure on their finances.

An example of best practice is that of Israel, where the government has a fund which takes partial ownership of the start-ups and encourages investment by the citizens. Israel's clusters comprising similar business that share best practices and resources that can help achieve scale. Countries like South Korea and Malaysia too have innovative R&D support programmes for MSMEs, ranging from certification and partial funding programmes by government to partnerships with MNCs for R&D capacity building.

An underlying thread for policy support must be the creation of requisite infrastructure that enables smooth linkages and support for moves towards greener business models. This can pave the way for sustainable business models across all manufacturing industries.

Academia can play the role of a catalyst for MSMEs by conducting research and finding strategies to develop sustainable practices for energy consumption. Higher academic - industry collaboration can help solve MSME problems and establish networks of likeminded and motivated individuals. Institutes of higher learning can encourage self-employment projects among motivated youth while integrating the welfare of surrounding communities.

Incubation-centric growth which builds on the strengths of digital India, such as empowerment of creative and independent thinking among the young and exposure to next generation technologies can foster innovative entrepreneurship, along with early development and prototype support.

The role of business, emphasised the panel, should go beyond encouraging these projects to providing the necessary seed capital, capacity building, mentorship, and industry and give market linkage support system to help them scale into full-fledged MSMEs.

MSME employment creation must consider resource efficiency and the Sustainable Development Goals to meet long term employment and development targets. When discussing resource efficient production processes, a huge challenge is the need for better utilities, especially of sustainably powered and run utilities in MSMEs. This is critical to encourage and raise occupancy rates and improve energy consumption in industrial estates. Such energy consumption would span lighting, cooling, waste, water and connectivity systems.

Adopting stringent regulations along international standards and liaising with relevant organisations can help in achieving the balance between the two. For example, capacity development for MSMEs on issues like waste recycling can help integrate the informal with the formal sector and create more sustainable livelihoods by creating "wealth from waste". Identification of upcycling opportunities is essential for disruptive innovation in manufacturing so as to create jobs and livelihoods for thousands, through MSMEs.

Other recommendations included the need for a shift from imposing the notions of modernity and urban on rural India. The panel called for and understanding of and working with the challenges and issues faced in rural areas. There must be a move away from urban bias, especially in terms of trade, which is weighted heavily against rural areas, towards equitable trade and resource and value development in rural India that will put it on par with urban India. Human resources are the only appreciating resources. Investment in constant skilling and re-skilling even on the job, improved work conditions at the site and social care visibility across all tiers of the supply chain can lead to people being the greatest asset to India in the future.

VALEDICTORY SESSION

Conclusions and Suggestions for Further Action

Guest of Honour: Shekhar Dutt, Former Governor of the State of Chhattisgarh, India

Speakers: Ashok Khosla, Trustee, CoR-I, Chairman Development Alternatives and Lt Gen Arun Sahni, PVSM, UYSM,SM,VSM, Former Army Commander Indian Army and Director General- CoR-I.

After an extensive in-depth look into the questions posed over the two days, the conference concluded with a recap of the proposals for the near future and key action plans that could begin the transition into an innovating, sustainable and circular economy. While the core action plans focused on large scale structural changes that require cross-collaboration between corporate entities, Government bodies and communities, a few personal, lifestyle based changes were proposed for people to make the mind-set shift necessary to adapt to a future, sustainable economy.

Summing up the discussions over two days, Mr Barthakur captured the essence of the discussions where he pointed out that the prime objective established was how the Club of Rome–India can help in enabling policies for growth in the job market in India.

For achieving job opportunities for the marginalised segments, the first policy objective would be effective implementation of the circular economy with Zero Defect and Zero Effect.

Thereafter policy should position itself to recognise that MSMEs are a powerful creator of jobs. Support must be given by both policy and business for facilities for innovation and incubation and supplementary start-ups. Business should facilitate the growth of MSMES, the manufacturing sector and the spirit of entrepreneurship. The responsibility of skill enhancement lies equally with business and government, while maintaining gender balance, social securities and wage equity.

Both policy and business should invest in the technological up gradation in agriculture, forestry, animal husbandry and fisheries sectors to enhance livelihoods and ensure the food and security nutrition of rural, tribal and coastal households.

Making a passionate appeal for the management of waste from the ecological and health hazard point of view, Mr Barthakur underlined the economic trade-offs of recycling if proper systems and measures are put in place. For India, recycling has the possibility to generate almost six times more jobs. New ideas, innovation and harnessing the potential of youth are urgently needed to accelerate the growth of jobs and ensure sustainable development for all.

RECOMMENDATIONS

The focus of the conference was on job enhancement while raising the quality of life for the poorest half of India and improving the productivity of its natural resource base. The major recommendations that emerged were in the following categories:

- Measures that business should follow for resource efficient and accelerated job creation
  - o The role of the circular economy in rural and urban India in facilitating communities and business to speed up regeneration of the environment
  - o What needs to be done to enhance infrastructure, assist MSMEs and develop new skills in the service sector
- Economic and Policy changes required to fast-track job growth

Opportunities for business and policy are not just about jobs, but resource efficient jobs. A combination of openness and risk-taking by all stakeholders along with effective policies can lead to sustainable jobs. Drawing inspiration from the innovative fearlessness of the Club of Rome's first publication, Limits to Growth, it was proposed that these challenges be viewed as opportunities through the following ideas:

Measures that business must adopt for resource efficient job growth

- Turning around conventional challenges such as the high population rate, excessive unemployment and diverse cultures into opportunities for the country's benefit.

- Investing in and developing underdeveloped areas
- A shift away from imposing the notions of modernity and urban culture on rural India and understanding the challenges in rural areas
- Centring the communities in areas where business has production facilities and incorporating sustainable and socially responsible practices that benefit the communities.
- Utilising India's soft power and turning it into an industry. Driving a soft power economy by capitalising on areas such as Indian cuisine, culture, and spirituality for creating job opportunities
- Skilling and reskilling young people in a dynamic way, with a focus on customers driving the formulation of new jobs and job skills.
- Moving towards job sharing in which several people can be employed in the same job for lesser time, thereby freeing people to engage in meaningful and measurable community work
- Develop innovation techniques and models to encourage responsible resource management
- Ecologically sensitive resource and material consumption
- Exploration of new resource streams and using biomimicry to shape technology

Infrastructure and Construction:

- Investing in infrastructure growth
- Inspire and support innovation in the construction industry
- Alternative construction material to be researched
- Move towards upcycling and management of waste at the pre-consumer stage.
- Initiate the norm of "deconstruction" over demolition, which will facilitate the recycling of materials such as steel etc. up to nearly 90% of the resources used in buildings.
- Innovative design in circularity for quick and easy dismantling to enable material recovery for reuse in infrastructure
- 'Upcycling within Refurbish'. While recycling involves resources to change the form of the product to a completely new product, upcycling does not change the material of the waste but repurposes it into a new item
- The business sector could benefit from working out measurable outputs as their contribution to society and receive tax benefits
- The creation of infrastructure must be coupled with human dignity. The focus should not only be on large-scale infrastructure but also on appropriate working conditions. A human-centric approach on site and in the supply chain is a prerequisite to the development of infrastructure.

- Better safety training and supply of protective equipment and improved conditions for workers. Consolidation and awareness of supply chains so as to prevent worker abuses down the supply and construction development chain.
- Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows the levers being: regenerate, virtualise, exchange
- Optimise resource yields by circulating products, components and materials, in use of the highest utility at all times in both technical and biological cycles with the levers: regenerate, optimise, share, loop

Economic and Policy changes required for policy coherence to bring about synergies

- Redefine GDP as Green Development Index
- Infrastructure growth to be the prime vehicle for development and job growth
- Designing policies to grow entrepreneurship across the country to establish different manufacturing hubs and enhance jobs
- Rural futures and rural livelihoods to be envisaged through sustainable livelihood creation
- Reviewing artificial segregation of urban and rural areas for successful policy implementation
- Investing in and developing underdeveloped areas for preventing dislocation of rural youth
- Systematic planning and development of new, especially rural areas for encouraging sustainability
- Reinforcing income resilience in rural India by supporting the already occurring diversification of incomes in the area
- Providing opportunities for income diversification through the holistic development of the rural economy.
- Regularised funding and efficient implementation of current rural initiatives and skill development centred on financial literacy and management
- A focus on connecting rural towns and making them the hubs of economic opportunities of the future.
- Small towns should be designed and developed to manage increased populations and to provide sustainable jobs
- Development should be focused on turning villages into sustainable entities and leveraging the existing ecosystems of entrepreneurship to develop rural livelihoods away from dependency on agriculture.
- Rethink the concept of smart cities to first encourage smart villages.
- Attention to be given to the yet untapped trillion dollar industry in renewables, through

initiatives such as soil remediation and afforestation initiatives and the use of IT in natural resource management.

- Making India the solar energy capital of the world for new jobs and energy support for MSMES
- Measures to enable and expedite the practices of circular economy
- Investments in bio mimicry research and new resource streams.
- Better resource mapping to understand mass city and country scale resource consumption patterns in India that will, in turn, help pinpoint areas of resource utilisation that require targeted efforts to achieve sustainability
- Move from resource efficiency, to the concept of resource regeneration. The process of regeneration will create a sustainable yet economically viable market.
- Investments in resource regeneration - water, soil, grazing land and forest land must be made attractive
- Institutional mechanisms to ensure profitable investments, which can create millions of jobs. For example, Micro-irrigation will reduce the demand for water, create more jobs and increase crop productivity.
- Mechanisation must be accompanied by skilling of workers. Flexible skilling and reskilling, with a focus on modular learning that is both affordable and accessible
- Better waste management systems to reduce negative ecological and health impacts and create new streams of jobs in recycling
- Rethink and restructure the conventional ways of looking at education and move towards a system design mode of thinking and the incubation of innovation at school level.
- Equitable access to technology so the productivity dividends of technology can benefit all
- Awareness must be generated on these issues across demographics, whether via educational means or by social media conversations.

Infrastructure and Construction:

- A mind set shift to a new green paradigm is required and a major campaign launched for circular thinking to become the norm
- Cleaner energy in the manufacturing of materials
- Development banks to foster and create development initiatives focussing primarily on global practices in infrastructure that can be adopted in the Indian context
- Coordinated thinking across the board from local and state government as well as private developers and corporates to implement alternative construction materials and solutions
- Using construction and demolition waste should be encouraged and increasing use of

plastic waste in road construction

- Aggregation of consumer waste at scale is a cumbersome and time-consuming process. Thus, policies must be designed to promote this at the pre-consumer level.
- Better and faster permissions processes and land for production plants where alternative building materials can be developed.
- Tangible targets should be set and action plans developed around localised solutions and coalitions formed to achieve these targets.
- Creation of sustainability codes across the value chain
- Sustainable practices publicised so that they can be adopted
- Consolidation and awareness of supply chains to prevent worker abuse down the supply and construction chain.

The Circular Economy

- There must be a major move towards a circular economy from a linear economy, thereby opening up avenues for business and convert waste into a reusable and productive form.
- 'Reduce' must be the first mantra to be adopted.
- Identify upcycling as a measure of disruptive innovation in manufacturing and a potential industry to create jobs and livelihoods for thousands.
- Measures to encourage 'Upcycling within Refurbish' as it is meaningful only when applied at scale.
- From a governance perspective, policies are required for improved and rigorous standards for upcycling industries, especially in evaluating the fitness of products for consumption, taxation of such products, and market creation for them and mechanisms for sourcing of waste need to be embedded in the system.
- A transition towards understanding new and disruptive technologies as moments of opportunity.
- Skilling and reskilling efforts and facilitating the vulnerable segments of India's population towards absorbing these technologies to become creative innovators and entrepreneurs
- Both business and policy to drive the transition from the 3R model – Reduce, Reuse, Recycle – to the 6R model – Reduce, Reuse, Recycle, Repair, Refurbish and Remanufacture
- Relaxed taxation structures and policies concerning upcycled products will allow meaningful penetration into markets.
- Introduce standards for upcycling industries, especially in risk profiling products and ascertaining their fitness for consumption, as well as for governance and policy.
- Large and unsustainable infrastructure projects in rural areas should be converted to renewable energy-based projects that leverage natural resources such as solar energy.

Changing Skills

- The recommendations included triggering of an ecosystem of innovation across the country,
- Focus on preparing young people for the jobs of tomorrow as well as becoming the job creators of tomorrow.
- Innovation incubators and other forms of support are needed to encourage entrepreneurship among the young.
- Need to provide required support and linkages through incubation centres with state of the art machinery to create centre points for growth, disruptive technology and futuristic innovations.
- Modular skill training developed with a specific targets in mind, to be made accessible and available to all and not just youthful demographics. For example, targeting young mothers is crucial; if a mother is trained and then employed, there is a positive cascading effect on other members of her family.
- Human resources are the only appreciating resources. Care for their social well-being will lead to people being the greatest asset to India in the future
- Continuous skill upgradation even on the job, improved work conditions at the site and visibility across all tiers of the supply chain.
- Facilitate a win-win scenario for public-private collaboration as an advancement mechanism towards resource efficiency and job creation at scale.

MSME's

- MSMEs to be facilitated and recognised as powerhouses for employment creation.
- Develop capacities of MSMEs on issues like waste recycling to integrate the informal sector with the formal sector and create more sustainable livelihoods by fostering "wealth from waste".
- Recognise Waste as an alternate industry with tremendous potential to create jobs and livelihoods for thousands.
- Encourage practices that plan for scale, such as clustering similar MSMEs and allow for greater reach and mobility
- Policy shifts in finance to encourage innovation and support alternative funding and payment systems for MSMEs to encourage entrepreneurship in the manufacturing sector
- Equitable distribution of technology access so the productivity dividends of technology can benefit all, not merely be concentrated in capital investing structures
- A new approach to move away from an urban bias, especially in terms of trade, which is weighted heavily against rural areas, towards equitable trade and resource and value development in rural India that will put it at par with urban India.

- Identification of upcycling opportunities as a measure of disruptive innovation in manufacturing to create jobs and livelihoods
- Higher academic and industry collaboration to solve MSME problems and establish networks of like-minded and motivated individuals. Best practices from developed economies such as Switzerland's approach of 'competence instead of collateral' or South Korea's seed fund sharing for start-ups, Malaysia's certification programme for start-ups and linkages between MNCs and SMEs for capacity building to be adopted.
- Policy coherence and better implementation and enforcement of policies on sustainability and ecologically sensitive resource consumption
- The Human Development Index indicators, protection of the human essence and the tapping of inner strength to be seen as prospective approaches for respecting people both at work and in society. This could move the world in the right direction towards meeting the Sustainable Development Goals.

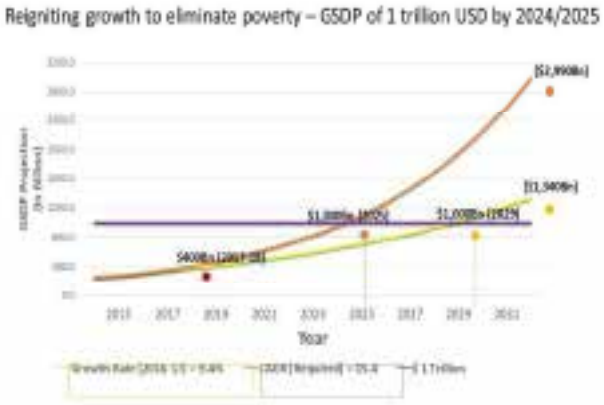
ABBREVIATIONS

SDG	:	Sustainable Development Goals
IRP	:	International Resource Panel
MSME	:	Micro Small and Medium Enterprises
CSR	:	Corporate Social Responsibility
SME	:	Small and Medium Enterprises
CoR	:	Club of Rome
CoR-I	:	Club of Rome-India

ANNEXURE PRESENTATIONS

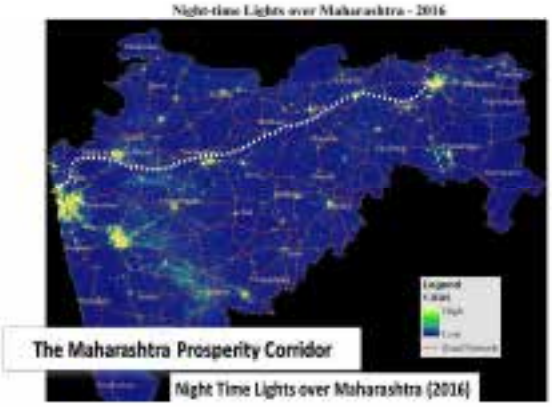
Plenary Session 4:

Maharashtra: Circular economy via Sustainable Infrastructure



Metro Projects in Mumbai: shift to mass public transport low CO2 intensity

Unlocking potential in Agriculture and Rural Maharashtra by connecting it to Mumbai and the Ports



Mitigation measures to facilitate animal movement

Climate Change : Instability in Agriculture
Investing in Climate resilient agriculture

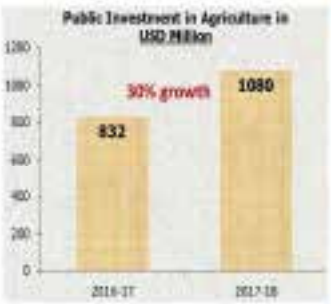
From Large Dams to micro water harvesting

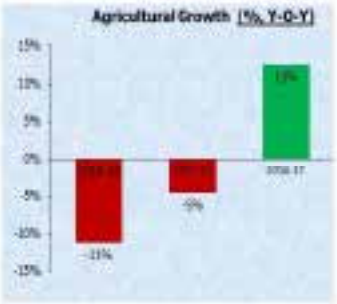
Doubling Farmer Income : Water Security, eliminating hunger, universal access to potable water

- **Jalyukt Shivar – Integrated Watershed Management**
- 11,493 villages made drought-free in two years (2015-17)
- **65,888 farm ponds on demand created**
- **1/3rd cost of irrigation compared to large dams**
- $ 107 Mn contribution by citizens
- World Bank thumbs up to the Project on Climate Resilient Agriculture by 600 million USD

Investment-led Agricultural Growth vs. Doles: 2016-17

Maharashtra placed 1st in India for Agricultural Reforms as per NITI Aayog rankings





SDG of Clean Energy to Agriculture

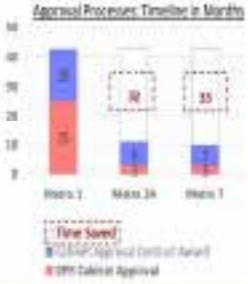
- Maharashtra supplies energy to almost 42 Million Agriculture Pumps, which consumes **30,000 Mus** of Electricity per annum.
- 87% of this energy i.e. 26,100 Mus is generated through Coal based thermal plants.
- Almost 17% of the 26,000 Mus, i.e. 4,580 Mus is lost in the Transmission and Distribution network as grid losses.
- Generating 26,000 Mus generation **releases 26 Million Tonne** of CO2 every year
- For sustainable development to reduce CO2 foot prints, Maharashtra plans to harness Solar energy through solarisation of Grid and using Solar Agriculture Pumps.
- 10 paise cess on every unit of thermal energy to fund solarisation of Agriculture

Sustainable Energy to Agriculture

- Improving technology, reduced Solar prices has enabled to contract about 1000 MW Solar Energy at around Rs. 3.00 per unit at distribution side.
- 2 Million Solar Agriculture pump (off Grid and Grid Connected both).
- Farmers can become Net Producer of Solar energy earning some income too.
- In 5 years, convert agriculture to solar power

Announcements vs Execution : Chief Minister's War Room

Policy Reforms → Spotlight on Issues and their Quick Resolution → Un-blocking constraints through Inter-Departmental co-ordination → Execution



Expedited approvals and sustained follow up has saved significant time lost to 'avoidable delays' in the past

Land Acquisition proceedings that would take 3-4 years can now be completed within 2-3 months

Land Acquisition for public projects via consensus, negotiated purchase – No judicial disputes

Circular economy : GHG footprint of Pune City

GHG Footprint	Mitigation
• Transportation : growing private vehicles	• Additional Buses on hire already 450 added, BRT & Metro – 200,000 tons/year GHG reduction
• Solid WM – Waste unsegregated & unprocessed dumping	• Segregation compulsory, tax rebate, rag pickers notified, house to house collection, Biomethanation – 1 Million ton reduction
• Sewage – 150 MLD raw sewage in river untreated	• Expected Treatment resulting in reduction of 1.7 million tons
• Individual Lifestyle changes	• 1 Million Tons/year expected reduction through tax incentives, eco housing norms
Growing, energy inefficient housing	

Transportation Footprint

- Registered vehicles – **14,45,384**
- Public transport serves only 22% passenger trips
- Since 1965, Population increased 8 times, Roads increased 5 times, personal motorised vehicles 105 times, while public transport use has decreased 60%
- Increase in private vehicle – **1.1 vehicles per family**
- Registration per day- **600 to 800 vehicles**
- Every litre of vehicle (4W) produces 0.25 and 2W produces 0.028 tons of CO_2
- Vehicle kms travelled in Pune – **18,847,367** /day
- GHG emissions –

857,681 tons/year

- GHG addition per day –

Mitigating Transport GHG footprint : Public Transport

- To incentives modal Shift to and non motorized and public transport to
- Develop 200 Kms BRT & Plans for Metro
- 200 Kms Cycle track
- Pedestrian walkways
- Pay & Park Policy
- E vehicle policy
- Diesel Retrofitment Project

leading 2 lakh tons/year reduction

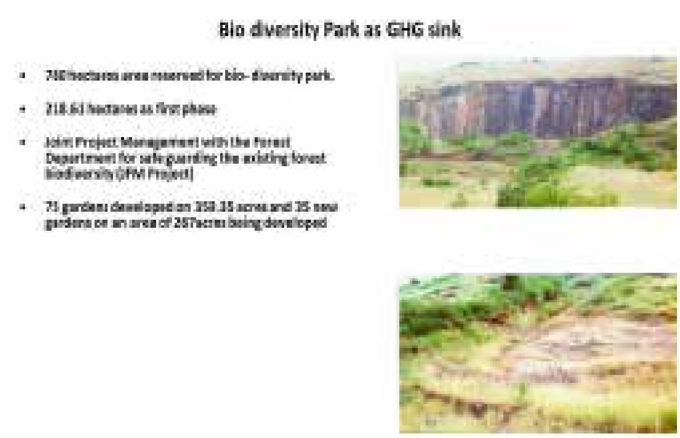

Solid Waste GHG Footprint :
• 1000 tons of waste generated per day, dumped unprocessed
• Segregation – issue at individual and disposal level
• GHG emissions from Solid waste – 6,580,000tons/year
• CH_4 capture potential from landfill site – 1 Million tons (Only 40% managed Landfill)


Circular economy for Waste :Mitigating SW GHG footprint
• Rag picker co-operative society
• 6000rag pickers at work


GHG footprint of Sewage
• 650 MLD wastewater generated
• 150 MLD of raw sewage in river
• COD load of the sewage – 1,80,000 tons/day
• Compulsory reuse of treated water for thermal power
• Potential GHG emissions from sewage sector – 68,98,500* tons of CH_4
• : Solapur


Minimizing Sewage GHG
• 150 MLD sewage treatment on way
• Expected to reduce 17,24,625 Tons/year GHG
• including navigation projects
• Waste to Energy project at STP – Bhairoba


The urbanization Footprint


Bio diversity Park as GHG sink
• 218.61 hectares as first phase
• Joint Project Management with the Forest Department for safeguarding the existing forest biodiversity (JPM Project)

Eco Housing – Construction of Green Buildings

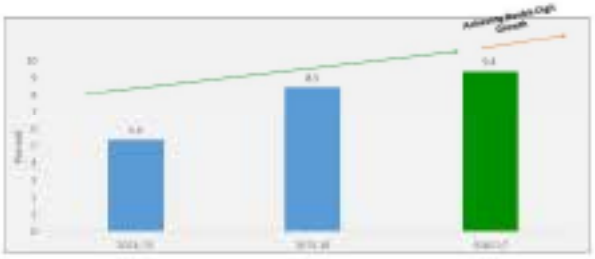
PMC has developed following criteria for developing Green Buildings : 50% write-off in development charges premia

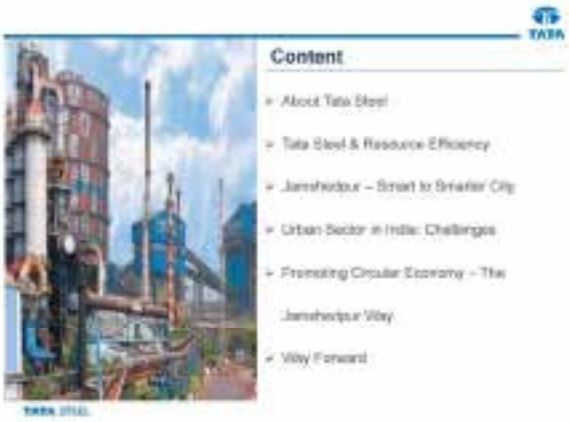
Focus areas	Points
Site planning	200
Environment Architecture	80
Efficient Building Materials	200
Energy efficient lighting	80
Solar water heater	90
Water conservation	200
Segregation of waste	80
Other innovative technologies	80
Total Number of Points	1000

Club of Rome to promote Citizens Initiatives

- ALERT – citizens forum for creating awareness and building capacity
- **Principles of motivation and involvement**
- Lifestyle changes – through **ownership**
- Moderate living and high thinking
- Expected reductions from lifestyle changes in Pune – **10 Lakh tons / year**
- Accounting for Green GDP

Maharashtra's growth is accelerating despite the shift to lower Carbon intensity in Infrastructure

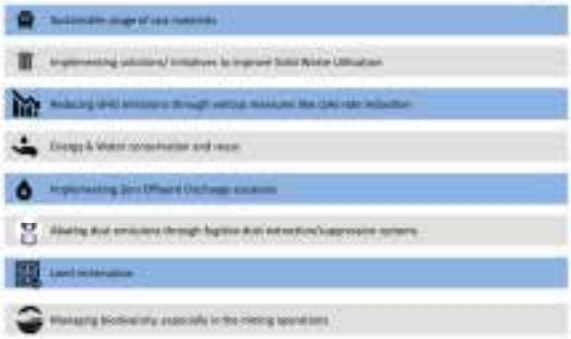




Tata Steel endeavours to be industry benchmark in Resource Efficiency

Steel Making Process- Utilisation of by-products

Tata Steel Group's key strategic pillars to achieve sustainable resource efficiency



Jamshedpur- Tata Steel's Smart City

Core Elements of Smart City as per the MoUD, GoI *

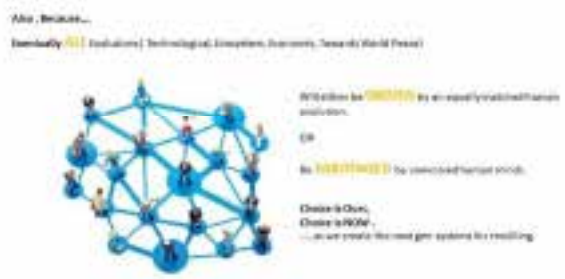
Sr. No.	Core Elements	TSL / JSCD Administration	Government Administration
1	Adequate water supply	✓	
2	Assured electricity supply	✓	
3	Solid waste management	✓	
4	Efficient urban mobility and public transport		✓
5	Infrastructure (housing, city road network)	✓	
6	Robust IT connectivity and digitalization	✓	
7	e-Governance and citizen participation	✓	
8	Sustainable environment	✓	
9	Law & order		✓
10	Health and education	✓	

* MoUD, GoI - Ministry of Urban Development, Government of India

Secondary Resources from Urban Centers

Urban Waste Stream Trends in India

Waste Stream	Current Generation	Projection	% Diverted/recycled
Municipal Solid Waste[1]	68 million tons/year	> 300 million tons by 2040	Less than 10% (of collected waste)
C&D waste[2]	10-15 million tons/year	5x by 2030?	10-30% (often for illegal/harmful uses)
E-waste[3]	1.8 million tons/year	5.2 million tons/year by 2030	3%
End-of-Life Vehicles[4]	8.7 million	21.8 million by 2025	Less than 30%



Thank You.

EU-REI
Creating a Resource
Efficient India

INDIAN NATIONAL ASSOCIATION

Academia and MSMEs : Fostering a partnership

Ravi Prakash
Motilal Nehru National Institute of Technology
Allahabad

Significance of MSME sector for Indian Economy

MSME Categories

Enterprises	Manufacturing Sector (Agro and Food Processing, Textiles, Furniture, Chemicals and Plastics etc.) (Investment in plant & machinery)	Service Sector (Tourism and Hospitality, Education and Training, E-Commerce & Retail, Wellness & Holistic healing etc.) (Investment in equipment)
Micro Enterprises	Does not exceed 25 lakh rupees	Does not exceed 10 lakh rupees
Small Enterprises	More than 25 lakh rupees but does not exceed 5 crore rupees	More than 10 lakh rupees but does not exceed 2 crore rupees
Medium Enterprises	More than 5 crore rupees but does not exceed 10 crore rupees	More than 2 crore rupees but does not exceed 5 crore rupees

How can academia support in the growth of the MSME sector?

- Coming from academia, I would like to present an example of how we are humbly trying to contribute to the energy efficiency and cost reduction in MSME sector through the application of green technologies?
- *One of the major constraints why the available industrial estate infrastructure is not being used completely (occupancy being only 50%) is the lack of utilities and services required to set up MSMEs.*
- We tried to contribute in this direction by initiating some studies and projects.
- Let me point out that these efforts are purely on a voluntary basis, and there is no formal collaboration of local MSMEs with an academic institution such as ours.

Industrial Estates

- Industrial Complexes/Estates are a tract of land at a distance from city centre that is designed for a cluster of businesses and factories.
- The main targets of Industrial Complexes/Estates are the high value adding small and medium scale industries, which do not have the wherewithal to invest in developing their own basic infrastructure facilities, but have the capacity to pay for the services provided to them.

Principal Objectives of Industrial Estates

- To minimize congestion of industries in the cities.
- To disperse industries in different regions in order to eliminate regional imbalances.
- To encourage small entrepreneurs to establish their industries in specified areas by offering various incentives and other facilities.
- To create a favorable atmosphere for the healthy growth of MSMEs
- To accelerate employment opportunities.

About MNNIT Industrial Estate

- Location – Allahabad (U.P.), India
- Number of Sheds: 68
- Area of each Plot – 5000 to 6000 square feet

In the year 1972, the MNNIT Allahabad initiated a self employment project and established an industrial estate with 68 sheds with the following objectives :

- **Encouraging entrepreneurship among the graduate engineers.**
- **Development of small enterprises based on new products and technologies.**
- **Self reliance and employment generation (in place of seeking jobs).**

MNNIT Industrial Estate Phase II

Results from Survey of the Industrial Estate Phase II

Total number of sheds ~ 21

Total number of active sheds ~ 15

Monthly Consumption/Load	
Energy (Litres of Diesel)	425
Electricity Consumption (kWh)	17,312
Cooling Load (tons)	22
Water Consumption (Litres)	45,850
Roof Area (m²)	3175
Total Manpower	87

Technical support desired for the growth of MSMEs

Various Requirements of an Industrial Complex

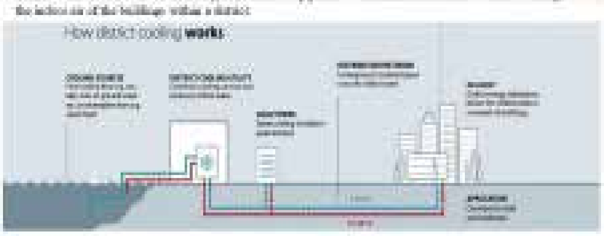
Recommended: Rooftop Solar PV System for Industrial Estate

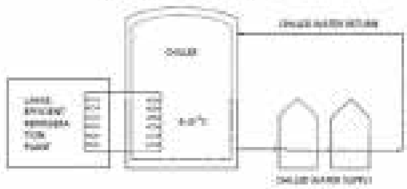
Following results were obtained on analyzing the technical and economic feasibility & emission reduction using RETScreen software:

- Type : Fixed Rooftop Solar PV System
- Effective roof area available ~ 1700 m²
- Number of solar panels (320 W, efficiency 16.49%) ~ 912
- Total Capacity ~ 291 kW
- Total electricity that can be generated (considering the solar radiation intensity in Allahabad region throughout the year) ~ 335 MWh / yr
- Total initial cost of the system ~ Rs 2,00,00,000
- Total annual savings and revenue ~ Rs 17,11,878
- Gross annual GHG emission reduction ~ 181.3 tCO₂ / yr
- Payback period calculated ~ 6.5 years
- Life of the Solar PV system ~ 20 years

Recommended: Centralised Cooling System (District Cooling)

- District cooling means the centralized production and distribution of cooling energy.
- Chilled water is delivered via an underground insulated pipeline to office, industrial and residential buildings to cool the indoor air of the buildings within a district.





District Cooling System as a replacement for Window/Split Air Conditioners (may use much of the daytime solar power)

Rainwater Harvesting: Recommended as a common facility

- Harvesting water refers to the storing of rain water in such a way that it can be used throughout the year to meet water needs.
- It underscores the principle of collecting and using precipitate matter through roof top and surface runoff catchments.

Advantages

- arrests ground water decline and augments water table
- benefits water quality in aquifers
- conserves surface water run off during monsoon
- combats environmental changes

Lighting Standards for different activities

Activity	Illumination (lux, lumens/m²)
Public areas with dark surroundings	20 - 30
Simple orientation for short visits	50 - 100
Working areas where visual tasks are only occasionally performed	100 - 150
Warehouses, Homes, Theatres, Archives	150
Easy Office Work, Classes	250
Normal Office Work, PC Work, Study Library, Groceries, Show Rooms, Assembly	300
Supermarkets, Mechanical Workshops, Office Landscapes	500
Normal Drawing Work, Detailed Mechanical Workshops, Operation Theatres	1,000
Detailed Drawing Work, Very Detailed Mechanical Work	2,000 - 5000
Performances of visual tasks of low contrast and very small size for prolonged periods of time	5000 - 10000
Performance of very exacting visual tasks	10000 - 20000
Performance of very special visual tasks of extremely low contrast and small size	20000 - 50000

The sample data shows that the lighting in the factories was way below the standard.

Sample lighting condition data as fixed from a civil consultancy & testing lab in the Industrial Estate

Recommended: Solar Tubes for Natural Day Lighting

- Light tubes are physical structures used for distributing the sun's light for the purpose of illumination by using like optical guideways.
- They offer better heat insulation properties, better flexibility to use in many areas and lower exposure to external environment.

Recommended: Turbo Ventilators replacing exhaust fans

- Turbo ventilators powered by the wind to create effective ventilation for different industries.
- The fast air inside the shed tends to rise up. When the turbines rotate, they suck the warm air out through the vent, thereby, bringing in a drop in temperature in the shed and allow supply of fresh air through doors and windows.

Comparison of wind ventilators with electric ventilators

Electric Powered Exhaust Fans	Wind Powered Turbine Ventilators
Runs on electric power hence high running power cost	Runs on free wind power hence zero running power cost
Can be installed only where electric power is available	Can be installed anywhere as it runs on wind power
Will nonetheless prevent outdoor ventilation	Rooftop installation ensures uniform ventilation

Recommended common facility:
Broadband Connectivity and IT Infrastructure

- Broadband and IT infrastructure are today's most important utility.
- An industry may require these facilities for different purposes such as:
  - ➢Online business expansion
  - ➢Online procurement of equipment
  - ➢Business Communication

Case Study of a Food Processing Industry

Products being manufactured

- Variety of pickles
- Jams
- Marmalade
- Honey
- Peanut butter

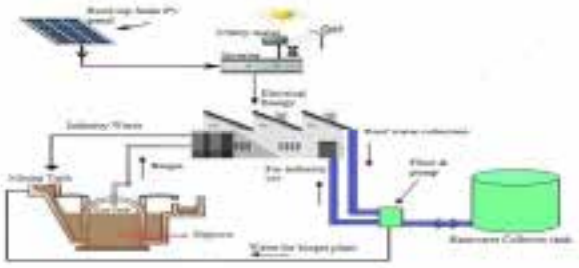
Energy and Water Requirements of the company

- Electricity consumed per annum – 3,06,000 kWh
- LPG requirement per annum – 7820 kg
- Water requirement per annum – 3,40,000 litres

The above requirements can be easily met through decentralized, eco friendly and cost effective systems by the installation of:

- ➢Grid-connected roof-top solar PV systems,
- ➢Biogas generation from industrial food waste
- ➢Rainwater harvesting.

Recommended utility system for Merry Foods



Specifications of the Recommended System

ROOF-TOP SPV SYSTEM

- Roof area available - 1350 m^2
- Capacity of the system – 133 kW
- Energy needs met– 78 %
- Capital cost of the proposed system – Rs. 9 million
- Annual revenue – Rs. 2 million
- Payback period - 4.5 years

RAINWATER HARVESTING SYSTEM

- Catchment area available - 1350 m^2
- Capacity of the tank – 300 cubic meters
- Water needs met – 100%
- Capital cost – Rs. 2,50,000

BIOGAS PLANT DESIGN

FIXED DOME TYPE

- Industrial food waste generated - 240 tonnes
- Capacity of the system – 4.8 cubic meters
- LPG needs met– 100 %
- Capital cost of the proposed system – Rs. 1,50,000
- Monthly savings on LPG – Rs. 50,000
- Payback period – 3 months

Thus, practically all the energy and water requirements of the indust can be fulfilled efficiently by such green technology systems.

SURVEY OF ILLUMINATION LEVELS & Recommendations

❖Since the illumination levels were lower than the recommended values, the industry planned to install LED bulbs.

❖However, the installation of solar light tubes has been suggested in view of the day-time operations of the industry.

Policy Recommendations

- With our own positive experience, we definitely foresee a very constructive role o higher academic (particularly engineering) institutions for the growth of MSMEs.
- MSMEs lack the R&D and other technical support to make them viable and competitive, unlike the large-scale industries which have either their own R&D centers or can afford to outsource it to other agencies.
- Such institutions can easily provide technical support to MSMEs in the form of new product design and development, cost reduction, energy efficiency and productivity improvement through collaborative under-graduate and post-graduate projects.
- Further, the engineering graduates having project work experience with MSMEs are likely to feel inspired and motivated to start their own MSMEs.
- Thus a collaboration of engineering institutes with MSMEs can provide a nursery of entrepreneurs, who are job providers and not the job seekers.
- It is therefore strongly recommended that the Ministry of Human Resource Development fosters such institute-industry collaboration, particularly involving the local and regional MSMEs for mutual benefit.
- **The academic institutions need to act as 'engines of regional development', rather than as 'ivory towers' only involved in teaching and research which is sometimes of dubious practical value and relevance!!!**
- The academic institutions particularly in developing countries need t embrace the spirit of what Schumacher said way back in 1973 in hi path-breaking book "Small is Beautiful":

  "Is education to be a 'passport to privilege' or is it somethin which people take upon themselves almost like a monastic vow, sacred obligation to serve the people?"
- A pro-active role of academic institutions in the area of sustainabilit is the need of the hour.
- The academic institutions should act as role models for surroundin communities and also as catalysts in the process of sustainabl development.

MEDIA COVERAGE

FINANCIAL EXPRESS

HOME ELECTIONS 2019 MARKETS STOCKS ECONOMY AUTO INDUSTRY MONEY INDIA WORLD OPINION

MSMEs, entrepreneurs engines of growth; have key role to play, says chairman of Club of Rome-India

By: Shubhra Tandon | New Delhi | Published: October 12, 2018 2:54:00 AM

With limited resources and rising global population, the debate has to be centred around the efficient utilisation of these while providing employment opportunities and quality life.

S Ramadorai who is chairman of Club of Rome-India

The scare of job losses is affecting people across sectors. With limited resources and rising global population, the debate has to be centred around the efficient utilisation of these while providing employment opportunities and quality life. The 2018 annual conference of the Indian National Association for the Club of Rome focuses on this aspect. Former TCS vice-chairman S Ramadorai who is chairman of Club of Rome-India, speaks to FE's Shubhra Tandon on the future job market.

We are talking about efficiencies and sustainability, but given the kind of job losses numbers we read and hear in textiles, telecom, manufacturing, etc, what is your sense of how will all these play out?

There are a lot of adjacency. For example, if you take textiles, the whole question is how do textiles and technology come together? With the design capability through the iPad, a designer in any part of the world can specify the design and visualise it completely, instead of physically doing anything. So, what a weaver could do in about three months can now be done in one or two days and produced with best of silk or hand loom. Their children too get involved with technology-based intervention into weaving. Then they can also migrate to other sectors because technology and design are picked up by them. What stops them from doing an interior design or become an architect or becoming temple builders or restoring temples? The same is true with agriculture too, where technology is helping farmers to match output with demand and aiding sustainable agriculture. So, there might be job losses, but there is a number of MSMEs we can create with the world class quality and automatically the demand will be more.

What about people who have been in the same industry for 10-12 years or may be **more? When they make the move to another industry it is not necessary that they will get to do things where they specialise.**

Today a 30-35-year-old individual cannot assume she/he is going to do the same thing for the next 20 years. One has to look for opportunities to learn new things. One needs to keep the intellectual capacity very active and then keep shifting.

What about remuneration?

Not every issue has to be judged by revenue or remuneration. Whatever job you want to define for yourself, so long you know how to market it, you have an opportunity. Nobody is going to say this job means you are going to get more money. You can disrupt anybody's job by a different thinking. Also, one of the things of sustainability is that the disparity between the wealthiest guy and the downtrodden is so terrible now that if 7% of India's population grabs 85% of all consumption or money, this is not an equitable society. The thing we are trying to address is how we are going to bring in equilibrium. It is going to take time, but I think younger people can adapt to this and should be able to shift gears faster.

What is the role of MSMEs in job creation? With credit offtake by the segment all but stopped, how do you look at gainful employment there?

These are cycles. There is going to be distress, then there will be plenty, there will be sustained effort to create employment and then there will be underemployment. However, delivery of jobs has become easy through technology. You do not have to be physically in that location. If you are part of an MSME, you can do the work in your small area or district and supply it so long the road infrastructure and logistics are good.

MSME and entrepreneurs are the engines of growth and their role is the most important. Supply chain of MSMEs is going to be the critical component of our growth.

What do you think are jobs of the future that youth should train themselves in?

Anything to do with sustainability will be important. Affordable medicine is going to be a great revelation, affordable devices for affordable healthcare will be in great demand. Similarly, in agriculture, sustainable agriculture, nutrition and organic farming will be the key.

2018 annual conference indian national association for the club of rome resource efficiency and jobs: opportunities for business and policy

Resource Efficiency and Jobs
Opportunities for Business and Policy

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HOME ELECTIONS 2019 MARKETS STOCKS ECONOMY AUTO INDUSTRY MONEY INDIA INFRA OPINION

Lack of job opportunities blamed on flawed system

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Job opportunities are insufficient because of the structure of the system that is currently in place in India and the system needs redesigning to produce the desired results, the 2018 annual conference of the Indian National Association of the Club of Rome (CoR) has recommended.

While India, like many other nations globally, is dealing with the job loss scare given the slow or lack of growth in many sectors such as telecommunications, textiles, manufacturing etc, deliberations at the conference focused on the fact that there could be several more jobs created if concerted efforts from policy makers and businesses are made by leveraging technology and innovation.

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S Ramandorai, former TCS vice-chairman and chairman of Club of Rome-India, said: "Jobs and skills of the future will have a merged and fused character. New start-ups and enterprises can create new age jobs, where for example, a person interested in music and health can be a music therapist for children."

Ashok Khosla, trustee of Club of Rome–India, highlighted that the broad goal of the national chapter, CoR-India, is to help design a coherent and synergistic agenda for governments, the business sector as well as citizens' organisations that could ensure a productive resource base and enable everybody to live fuller lives in harmony with their surroundings by 2047.

The topics covered during the two-day conference included enhancing future livelihoods in rural India and resource efficiency, employment opportunities in infrastructure and environment challenges, reshaping the economy to accelerate jobs, changing skills in the emerging services sector, circular economy in urban India and MSMEs' role in India's manufacturing ambitions.

Touching upon the rural livelihood issue, Anirban Ghosh, chief sustainability officer, Mahindra Group, said India at present is "facing a unique challenge" where for the first time the country is looking to tackle both poverty and environment challenges together, and there is a timeline to it.

Vijay Mahajan, founder of livelihood promotion institution Basix and CEO & director at the Rajiv Gandhi Foundation, pointed out that the framework needed for institutional money to flow into the rural economy is missing.

Prasad Modak, executive president of Environmental Management Centre emphasised the need for encouraging repair and refurbish industry, which can be a large employment generator.

Shailaja Rangarajan, founder and CEO of Rimagined, a start-up on upcycling waste, highlighted the need for creating a market for upcycled products.

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