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When the going gets... Green

Department of Information Technology & Electronics Govt. of West Bengal

Information Technologies & Electronics

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A program to develop an ecosystem for fostering start-ups

- To encourage and inspire the youth of West Bengal to consider startups as good career prospects
- To provide infrastructural support required for startups
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- Students would be provided certifications which will be valid for lifetime to seek employment in IT/ITeS sectors

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A capability where all relevant government entities can register and share digitally verified documents with citizens, without the need of their physical presence.

- Digitization of documents leading to better management of important government documents
- Enable document sharing with citizens through online system
- Making document validation process for government and private entities easier
- Authentication of documents through digital signature
- Bringing authentic citizens under one umbrella through proper registration and verification

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The first ever rail based system to claim carbon credits

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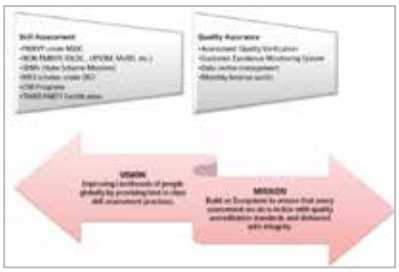

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Ajit Kumar Sinha
713, 3BA - Tower No. - 4, River Heights,
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Suite No. 271, F2 Upper Ground Floor, Sector-4
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Let's Go Green...

A new common vision has emerged that promises the ultimate reconciliation of environmental and economic concerns. In this new world, both business and the environment can win. Being green is no longer a cost of doing business; it is a catalyst for innovation, new market opportunity, and wealth creation. Thus going green is a win-win situation for all the entities without putting much at stake.

Green energy is not just good for the environment but great for the economy. The increasing use of different types of green energy, such as solar, wind, hydroelectric, and geothermal energy, creates jobs, stimulates the local economy and lowers health care costs, just to name a few benefits. Green energy initiatives not only help to improve the environment, but also strengthen the economy.

The pursuit of "green jobs" - employment that contributes to protecting the environment and reducing humanity's carbon footprint is quickly becoming a key economic driver of the 21st century. Green economy – the colour proofing has not only involved large-scale investments in new technologies, equipment, buildings, and infrastructure, etc., but also provided a major stimulus for much-needed new employment and an opportunity for retaining and transforming existing jobs.

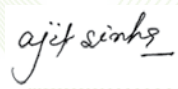
All around the world, falling prices for green energy technologies have driven the creation of more jobs in both renewable energy operation and maintenance. One type of green energy in particular — solar energy — is the largest renewable energy employer on the planet, with 2,500,000 jobs worldwide. Wind energy is also creating more new jobs than ever before, with 1,000,000 people employed worldwide.

According to an estimate, the Union of Concerned Scientists found that a 25% renewable energy standard by 2025 will create three times the number of jobs as generating an equivalent amount of electricity from fossil fuels. That's a whopping 202,000 new jobs by 2025.

It is true that economic forces at work in industry are making it more difficult to integrate environmental excellence into a business strategy. Yet it is pertinent to treat this challenge, and the lack of a framework for managers to address it, as somehow different from other business challenges that result from changes in the business environment, such as the quickening global economy, a shrinking labour pool, or changing technology.

The Skill Council for Green Jobs under the National Skill Development Corporation has taken upon the responsibility to put forth farsighted green occupation programmes, innovations, creative solutions and forward-looking approach. Governance Today takes pride to acknowledge the green steps of SCGJ and dedicates this edition to the green future of the country.

Best regards



Ajit Sinha
Editor-in-Chief

You Think Green Jobs Can't Grow?

8.1 Million Workers Think You're Wrong

Overall worldwide job growth may be sputtering, but one industry just keeps churning out new jobs – renewable energy. The renewable energy sector employed 8.1 million people, directly or indirectly, in 2015. In addition, large Hydropower accounted for another 1.3 million direct jobs in 2015, according to the International Renewable Energy Agency's (IRENA) Renewable Energy and Jobs – Annual Review 2016. Several major trends have been outlined. An ever-expanding amount of green jobs across the globe, a clear shift toward developing economies, the chilling impact policy uncertainty has on green growth, and a looming shortage of skilled workers in many renewable energy technologies. Countries with the highest number of renewable energy jobs are China, Brazil, the United States, INDIA, Japan and Germany. Jobs continue to shift towards Asia and the share of the continent in global employment increases to 60%...

Renewable energy markets and employment continued to be shaped by favourable policy frameworks in several countries, regional shifts in deployment and increased labour productivity. Enabling policy frameworks remained, indeed, a key driver of employment. In India, for example, national and state level auctions put ambitious solar targets into action and created jobs. Wind energy auctions in Brazil, coupled with financing rules to encourage local content, created job opportunities throughout the value chain. In the United States, federal investment tax credits, working in tandem with state level net metering and renewable portfolio standards, helped sustain the growth of jobs in the solar industry.

Driven by favourable policies and declining technology costs, rising deployment of renewables in Asian markets kept driving the regional shifts in job numbers from Europe. Increased demand in Asian markets created employment opportunities in the installation segment of the value chain, and fostered domestic equipment manufacturing in some countries. Production of solar PV equipment, in particular, continued to be concentrated in manufacturing hubs such as China and Japan, mainly as a response to rising demand.Increasing labour productivity and production overcapacities continued to influence job creation in 2015. Mechanisation in biofuel feedstock production, for instance, further decreased labour requirements in Brazil.

Similarly, Chinese solar PV and wind manufacturers introduced greater automation. Leftover stocks of PV panels from 2014 exacerbated the job-loss trend. While growth in employment slowed compared to previous years, the total number of jobs in renewable worldwide continued to rise, in stark contrast with depressed labour markets in the broader energy sector. In

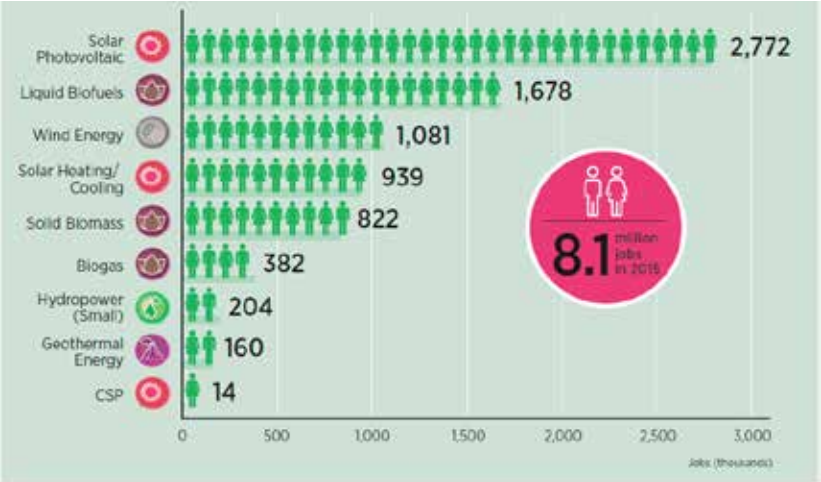


FIGURE 1: RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY

the United States, for example, renewable energy jobs increased by around 6%, while employment in oil and gas extraction (and support activities) contracted by 18% (Saha and Muro, 2016). In China, renewable energy employed around 3.5 million people, exceeding the 2.6 million employed in the country's oil and gas sector.

The third edition of Renewable Energy and Jobs –Annual Review discusses the trends in employment and provides the latest update on job numbers, both by technology (Figure 1) and in selected countries (Figure 3).

RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY

SOLAR PHOTOVOLTAICS

Further cost decreases in solar PV have been driving deployment both at the utility and distributed levels, enhancing job creation. Globally, solar PV installations in 2015 were 20% larger than in the previous year, with China, Japan, and the United States in the lead. Consequently, solar PV was again the largest renewable energy employer with 2.8 million jobs in 2015, an 11% increase over the previous year.

China was the dominant solar PV employer, with 1.7 million jobs in 2015, due to its undisputed lead in both manufacturing and installations. Japan's solar PV employment surged 28% to reach 377,100 jobs in 2014, the most recent year available, partly as a consequence of attractive feed-in tariffs (JPEA, 2016). In the United States, high rates of deployment brought job creation to record levels. In contrast, solar PV employment in the European Union (EU) has fallen by 13% in 2014, mainly due to a decrease in manufacturing (EY, 2015). Several Asian countries, other than China and Japan, have also taken promising strides in solar PV employment.

India, for instance, emerged as a major market at both large and small-scale. The region witnessed job growth in solar PV manufacturing in Malaysia and the Republic of Korea, and in solar PV installation in Pakistan. While supportive deployment policies had a significant impact on solar PV jobs, trade policies continued to affect manufacturing employment in different countries. India, for instance, supported its local solar PV manufacturing industry through local content requirements, which should increase employment in the coming years. The United States and the EU have both levied duties on panel imports from China. The Chinese module suppliers have reacted by locating their new facilities in a number of other countries such as Malaysia, Thailand, the Republic of Korea, India, Brazil and the United States. Overall, employment in solar PV

- IRENA estimates that global renewable energy employment increased by 5% in 2015 to reach 8.1 million. An additional 1.3 million people are employed in large hydropower.
- While the growth in jobs slowed down compared to previous years, the total number of jobs in renewables worldwide continued to rise, in stark contrast with depressed labour markets in the broader energy sector.
- Countries with the highest number of renewable energy jobs were China, Brazil, the United States, India, Japan and Germany. Jobs continued to shift towards Asia and the share of the continent in global employment increased to 60%.
- Solar PV was the largest renewable energy employer with 2.8 million jobs worldwide, an 11% increase over 2014. Solar PV employment grew in Japan and the United States, stabilised in China, and continued decreasing in the European Union.
- Wind power witnessed a record growth year. Strong installation rates in China, the United States and Germany resulted in a 5% increase in global employment, to reach 1.1 million jobs.
- Bioenergy is a key employer, with liquid biofuels accounting for 1.7 million, biomass 822,000 and biogas 382,000 jobs. Biofuel employment declined by 6% due to mechanisation in some countries and low biofuel production in others.
- Jobs in solar water heating and cooling declined to reach 940,000, as markets in China, Brazil and the European Union contracted.
- Direct jobs in large hydropower fell to 1.3 million due to a drop in new installations. Most of the jobs were in operation and maintenance, and China, Brazil and India were key employers.
- IRENA's early research indicates that the renewable energy features more gender parity than the broader energy sector.

manufacturing continued to shift to Asian countries.

Distributed solar PV increasingly offers a promising solution for energy access. Different parts of the value chain (e.g., assembly, distribution, after sales service) can easily be localised to create jobs as illustrated by countries like Bangladesh, India and Kenya (Box 1).

LIQUID BIOFUELS

Employment in liquid biofuels declined by 6% in 2015 to reach 1.7 million. This was mainly due to continued mechanisation in countries such as the United States and Brazil and falling production in others like Indonesia. Jobs increased in the EU, Malaysia and Thailand. With 821,000 jobs, Brazil continues to have the largest liquid biofuel workforce by far. Reductions of about 45,000 jobs in the country's ethanol industry (due to the ongoing mechanisation of sugarcane harvesting, even as production rose) were only partially offset by job growth in biodiesel. Other important biofuel job markets in Latin America include Colombia and Argentina. Similarly, employment declined in the United States by 2% despite an increase in the production of ethanol and biodiesel. Biofuel employment in the EU increased by 8% in 2014 as production rose. Continued growth in production in 2015 most probably resulted in further job creation.

Indonesia's palm oil-based biofuel industry grew dramatically since 2006, until exports collapsed in 2015. Biodiesel production dropped by more than half and the utilisation rate of biorefinery

BOX 1: EMPLOYMENT OPPORTUNITIES IN OFF-GRID SOLAR PV

Jobs in off-grid solar PV can result from different applications, ranging from stand-alone installations (e.g. solar lanterns and solar home systems) to mini-grids. In general, stand-alone applications create more local jobs in installation and equipment distribution, while mini-grids require more employees in operations and maintenance (e.g. to collect tariffs). Given limited information for employment in solar PV based mini-girds, this box focuses on jobs in stand-alone applications.

Countries such as Bangladesh, India and Kenya, used stand-alone solar PV systems to provide electricity access and create jobs. In 2015, Bangladesh, added an estimated 700,000 solar home systems (SHS), raising the total cumulative installations in the country to 4.5 million (Shahan, 2016). IRENA estimates that the workforce in the stand-alone solar PV sector in the country has increased by 13% to reach 127,000 jobs, a quarter of which are in manufacturing, with the remaining spread across distribution, installation and after-sales services. India has also been successful in creating employment opportunities along the off-grid solar PV value chain, which accounts for 73,000 jobs according to the last available estimates (MNRE and CII, 2010). Companies that build, install and maintain stand-alone systems are rapidly scaling up operations and creating jobs along the value chain. D.Light, which manufactures and retails solar lanterns and SHSs, has sold over 10 million solar products, employing over 400 staff (D.Light, 2016). MKOPA has sold over 300,000 SHSs in Kenya, Uganda, and the United Republic of Tanzania and created more than 700 full-time jobs along with 1,500 sales representatives. Similarly, several other companies (see Table 1) are serving vast populations and creating jobs in Sub-Saharan Africa and South East Asia.

capacity fell to 24% (USDA-FAS, 2015a). IRENA estimates Indonesia's biofuel employment in 2015 at 94,800 jobs, down from 223,000 the previous year. Elsewhere in South East Asia, jobs in biofuel continued to increase.

Biofuel employment in Thailand, Malaysia and the Philippines reached 76,900, 31,800 and 9,700 jobs, respectively.

WIND

Wind witnessed a record year with strong installations growth in China, the United States and Germany, resulting in 5% increase in global employment, to reach 1.1 million. China leads the way with close to half the jobs. Germany, where offshore wind is also picking up, and the United States are also top players, followed by Brazil and India. China's position as a leading employer is underlined by the strong showing of Chinese wind companies. Goldwind, for example, now ranks as the world's largest wind energy company in terms of new capacity commissioned, ahead of Denmark's Vestas and GE of the United States, the two closest rivals. Five out of the top 10 wind companies in terms of new commissioned capacity in 2015 are Chinese (BNEF, 2016).

Wind employment in the United States rose by 20% to 88,000 jobs, as new capacity additions grew by two-thirds over 2014 (AWEA, 2016). Brazil saw strong gains, with an estimated 41,000 wind jobs in 2015, up 14%. The EU added about 10,000 wind jobs during 2014 (up about 4%).

FIGURE 2: EMPLOYMENT IN LARGE HYDROPOWER BY COUNTRY

SOLAR HEATING & COOLING

China kept the lead in solar heating but suffered job losses for the second year running, due to a slowing housing market and the removal of subsidies in 2013. India, Brazil, Turkey and the United States are other major employers. A review of the literature suggests a rough global employment figure of 940,000 jobs. The Chinese solar water heating market accounts for the vast majority (80%) of global installations and employment, but employment fell to 743,000 jobs in 2015. The EU accounts for 6.5% of global installed capacity and 36,000 jobs. Other available estimates include India (75,000 jobs), Brazil (41,000 jobs), and the United States (10,400 jobs). Turkey, an emerging solar heating market, has 90 manufacturers, 700-800 retailers, and more than 3,000 system installers, who all together provide 20,000 direct and indirect jobs. Tunisia, through the PROSOL programme, has generated more than 1,500 jobs in the solar water heating sector.

HYDROPOWER

Estimating small hydropower employment is challenging since certain activities of the supply chain are shared with large hydropower and a significant share of the jobs are informal. IRENA finds that employment in this technology has decreased by 13% to reach 200,000 in 2015. This is largely due to job losses in China, where installed capacity has recently fallen by around 10%. China accounts for half of the estimated jobs in small hydropower, followed by

BOX 2: LARGE HYDROPOWER

The available information on employment for this technology is especially sparse. For the second year running, IRENA has conducted the global employment factor-based estimation to fill the data gap. The results reveal approximately 1.3 million direct jobs in 2015, down 13% from last year.

The estimates allow for a better understanding of the dynamics along the segments of the value chain. In 2013, several new projects were coming online and the construction and installation segment was the largest employer, with 52% of the jobs. In 2015, new capacity additions have declined by around 40% and jobs in the construction and installation segment have decreased to 43% of the total. The operations and maintenance segment is now the largest, with 51% of the jobs.

The results show that China's dominance of large hydropower employment has somewhat declined from 42% in 2013 to 34% in 2015, primarily due to a slowdown in new installations and a leaner project pipeline. Brazil is the second largest employer with 15% of the total large hydropower jobs, followed by India, Iran, the Russian Federation and Viet Nam (Figure 2). Other relevant employers are Turkey, Canada, the United States and Paraguay.

BOX 3: **OFF-GRID RENEWABLES FOR COOKING AND MOTIVE POWER**

Several renewable energy sources can be used to provide heat for cooking (mainly biomass and biogas) or motive power for agro-processing or other uses (mainly small watermills) in rural areas.

Traditional biomass dominates with around 9% of global final energy consumption. It supports the livelihoods of around 3 billion people and creates millions of jobs. The Food and Agriculture Organization of the United Nations (FAO) estimates that 41 million people work worldwide in commercial fuelwood and charcoal production, including 19 million in Africa, 11 million in Asia and 11 million in the Americas, mostly South America (FAO, 2014).

Improved cookstoves, which constitute a crucial upgrade for sustainable bioenergy use, are also source of employment. The partners of the Global Alliance for Clean Cookstoves, for instance, manufactured almost 10 million cookstoves, employing 76,000 people in 2012, of which 54% were women. In addition to the job opportunities, women benefited from reduced exposure to smoke and time saved in fuelwood collection (Global Alliance for Clean Cookstoves, 2013).

Biogas, often used for cooking and heating applications in rural settings, also support jobs. The SNV Biogas programme in Viet Nam, for instance, has installed over 150,000 digesters since 2003, creating around 4 jobs per installation during the construction phase (IRENA, 2016 forthcoming).

Small watermills can be used to produce electricity or harness motive power for agricultural or industrial processes. An improved watermills programme in Nepal, for example, created an estimated 8,500 jobs in operation and maintenance alone, feeding electricity into mini-grids to supply almost 900 households while also providing motive power for agro-processing (IRENA, 2016 forthcoming).

Overall, renewable energy offers a key solution for the provision of universal access to modern energy sources, in line with the United Nation's Sustainable Development Goal 7. In addition to the development benefits, providing access represents a vast potential market for job creation. The market for renewable applications for cooking and motive power has been picking up in rural areas in several countries, but further policy action is needed to accelerate deployment and to maximise the socio-economic benefits.

India, Germany and Brazil. Large hydropower employed more than 1.3 million people, with the majority in the operation and maintenance segment of the value chain (Box 2).

OTHER TECHNOLOGIES

There is considerably less information available for other renewable energy technologies, such as biogas, biomass, geothermal and ocean energy, which can potentially lead to an underestimation of global employment. Countrylevel employment information is especially scarce in applications that address the demand for cooking and motive power in rural areas. However, anecdotal evidence from the literature suggests significant potential for job creation (Box 3).

RENEWABLE ENERGY EMPLOYMENT IN SELECTED COUNTRIES

For the second year in a row, the global top-ten in job creation includes four countries in Asia. The continent's share of total renewable energy employment reached 60% in 2015, up from 51% in 2013. African countries also witnessed an increase, with a conservative estimate of 61,0007 jobs in 2015 as new projects came online. The leading employers are in China, Brazil, the United States, India, Japan and Germany (Figure 3). With more than a third of the global renewable energy capacity additions in 2015, China led employment with 3.5 million jobs, a minor reduction of 2% over previous year. Gains in solar PV and wind were offset by losses in the solar heating and cooling and small hydropower sectors.

Even though annual solar PV installations increased to a record 15 GW (up from 9.5 GW in 2014), employment edged up by just 1%, to 1.65 million jobs. The slow growth can be attributed to: 1) automation in the solar PV manufacturing sector; 2) use of leftover stocks of solar PV panels from 2014; and 3) consolidation of market shares in favour of large suppliers/manufacturers, resulting in economies of scale. Of the total, 1.3 million jobs were in manufacturing, 330,000 in installations, and a comparatively small 22,000 in operations and maintenance. Similarly, wind employment in China grew marginally (1%) to reach 507,000 jobs in 2015.

Despite strong growth in deployment, factors such as overproduction in 2014 and market consolidation played a key role in decelerating growth in jobs (CNREC, 2016). For the second year in a row, employment in the Chinese solar water heating industry fell (by 9%) as sales declined (down 17%) due to a slowdown in the real estate market and removal of subsidies back in 2013. Employment in small hydropower facilities declined by 26,000 jobs, reflecting a reduced pace of new installations.

In Brazil, most renewables employment is found in bioenergy and large hydropower. Jobs in the wind sector are growing, as a result of increasing deployment and local manufacturing. Employment in biofuels declined (by 3%) as jobs in bioethanol dropped by 46,000 due to growing mechanisation. Brazil's biodiesel production, mainly soy-based, rose to a record 3.9 billion litres in 2015. IRENA estimates that biodiesel employment

FIGURE 3: RENEWABLE ENERGY EMPLOYMENT IN SELECTED COUNTRIES AND REGIONS

BOX 4: **WOMEN IN MODERN RENEWABLE ENERGY JOBS**

Gender-disaggregated data in the renewable energy sector is scarce. As a first step to close this gap, IRENA conducted an online survey among private companies working in the sector. Nearly 90 companies from more than 40 countries participated, representing the entire value chain of the sector (including, manufacturing, installation, operations and maintenance, consulting and policy making).

Among the companies that responded, women represent an average 35% of the workforce. This is a significant finding, considering women only account for 20 - 25% of the workforce in the overall energy industry. (Stevens *et al.*, 2009). This may reflect greater interest among women in sustainability-related fields. Yet the percentage remains lower than women's economy-wide share in employment, which is 40 - 50% for most OECD countries (World Bank, 2016).

35%

Average share of women working at 90 renewable energy companies surveyed

The survey results are generally in line with numbers submitted in the annual reports of large companies. At Trina Solar and REC Group, for example, women represent 42% and 35% of the workforce, respectively (REC Solar ASA, 2015, Trina Solar, 2014)[14].

The survey also provides insight on the roles women fulfill in the sector. On average, women represent 46% of the administrative workforce, 28% of the technical workforce, and 32% of management roles. The latter is a marked increase from the estimated 25% of senior-level management positions held by women in Fortune 500 companies in 2015. Indeed, as a new and fast-growing sector, renewables could give women opportunities to gain commensurate representation in higher management.

While the survey provides some company-level insights, it does not yet reveal the evolution of gender roles within the sector. Country-specific literature points to a positive trend of greater participation of women. The solar industry in the United States, for example, reports an increase in women's employment from 19% in 2013 to 24% in 2015.

The entry of more women into the renewable energy job market could enrich the fast-growing sector with a wider pool of skills. IRENA will continue to gather primary data from the different actors in the sector to monitor women's evolving participation in the renewable energy workforce.

increased by 15% to reach 162,600 jobs in 2015.

Wind industry grew rapidly in 2015 with 2.8 GW of new installations primarily driven by wind energy auctions. In tandem, financing rules to encourage local content resulted in the strengthening of the Brazilian wind equipment manufacturing and service industry. Correspondingly, Brazil's wind employment increased to 41,000, up from 35,800 in 2014. While jobs in the installation segment remain dominant, manufacturing jobs also increased with the opening of a number of factories along the entire supply chain.

New installations in Brazil's solar heating market declined by 3% in 2015 due to delays in implementation of the social housing programme Minha Casa Minha Vida as well as an overall reduction in purchasing power and investments. Total employment in 2015 is estimated at about 41,000 jobs, including 30,000 in manufacturing and the rest in installation. To date, Brazil has manufactured and installed PV equipment only on a small-scale.

Employment in solar PV is estimated at 4,000 jobs, but is expected to rise with greater deployment in the future. Indeed, several manufacturers have indicated interest in setting up solar PV manufacturing facilities. Driven by growth in wind and solar, renewable energy employment in the United States increased by 6% in 2015 to reach 769,000 jobs. Solar employment continued its rapid expansion – growing by almost 22% to reach 209,000 in 2015. Jobs in the solar industry grew 12 times as fast as overall job creation in the U.S. economy, and surpassed those in oil and gas extraction (187,200) or coal mining (67,929). Most solar jobs (194,200) are in solar PV, with relatively few in solar heating/cooling (10,400) and CSP (4,200).

The installation sector accounts for 57% of these jobs, with manufacturing representing less

than 15% Almost two thirds of all solar jobs in 2015 were in the residential market, 22% in the utility-scale segment, and 15% in commercial installations. Given the U.S. Congress' extension of the federal Investment Tax Credit through 2021, continued fast growth is expected. Much of it is likely to occur in the utility-scale market, which is less labour intensive than rooftop (Solar Foundation, 2016). Noteworthy in the U.S. solar market is the growing share of women in the workforce. They accounted for 24% of the total 209,000 jobs, up from 19% in 2013. This is more than in the conventional energy industry, but still well below the 47% share in the economy as a whole. The share of women in the U.S. solar workforce is comparable to Germany and Spain, with 24% and 26%, respectively (see Box 4).

Employment in the United States wind industry registered a 21% gain to reach 88,000 jobs, as annual installations rose by 77% to reach 8.6 GW in 2015. The growth was driven by the Production Tax Credit (PTC) as developers sought to ensure project completion by the end of 2016 - the expected end of the qualification period (BNEF and BCSE, 2016). The subsequent extension of the PTC until January 2020 should ensure continued growth of the wind energy industry in the next 5 years. Manufacturing factories employed 21,000 people; construction, project development and transportation accounted for 38,000 jobs, and operation and maintenance for 29,000 jobs.

Following a high yield of corn crops and falling feedstock prices, ethanol production in the United States rose 3.7% to a record of 56 billion litres in 2015 (Peterka, 2015). Despite the growth in output, ethanol employment declined by 2% to reach 227,600 due to decreasing labour intensity (Urbanchuk, 2016). Meanwhile, biodiesel production (4.8 billion litres) and employment (49,500 jobs) remained virtually unchanged

> "doubling the share of renewables in the global energy mix would result in more than 24 million jobs worldwide by 2030

in 2015 from the previous year. In 2014, for the fourth year in a row, member states of the European Union witnessed a decline in renewable energy employment.

As in previous years, economic crises and adverse policy conditions led to reduced investments. The total number of jobs fell by 3% to reach 1.17 million in 2014. The wind industry accounted for most of these jobs, led by Germany, the United Kingdom, Denmark, Sweden, Greece and Austria, while a few other countries saw some progress. The United Kingdom, Germany, and Denmark were the global leaders in offshore wind employment. A third of Denmark's 30,000 wind jobs, for instance, depend on offshore projects. Employment in the European solar PV industry is now just one third of its 2011 peak, largely due to a reduction in manufacturing. The United Kingdom became the continent's largest PV installation market (2.6 GW in 2014), and the second-largest employer with 35,000 people. However, cuts in feed-in tariffs for residential rooftop in the United Kingdom could result in a loss of 4,500 to 8,700 solar jobs.

For the biofuels sector, conservative estimates indicate 105,000 jobs across the EU in 2014 (an 8% increase). Employment in the next largest sectors, biogas and geothermal energy (including heat pumps), stayed unchanged. Small hydropower and solar thermal technologies saw small reductions.

Despite a 4% decline in employment in 2014, Germany remains the European country with the highest number of jobs by far – almost as much as France, the United Kingdom, and Italy combined. The decrease in employment mirrors trends in investments in new renewable energy projects - down almost a third from their peak in 2010. The drop in domestic consumption was partly compensated by increasing exports, which support about a quarter of all German renewables jobs. The German wind equipment manufacturing industry, which holds a 20% share of the global market, exported two-thirds of its production in 2015.

Onshore wind registered job gains of about 10% in 2014. Even though job estimates for 2015 are not available yet, Germany installed more new wind capacity last year than in 2014. However, changes from binding expansion targets to annually-variable auctioned quantities in 2016 may introduce uncertainties Germany's solar PV industry fared poorly, suffering a 38% decline in sales in 2014. Employment decreased by 32%, reaching 38,300 jobs, reflecting the third consecutive decrease in domestic installations and a reduction in manufacturing amid an ongoing shift to Asia. The German CSP sector was marked by insolvencies and companies exiting the market.

France remained the second largest renewable energy employer in the EU, but employment fell by 4%, to reach 170,000 people in 2014. The country lost jobs in solar PV, biomass, geothermal heat pumps and solar thermal. Biofuels, geothermal energy and small hydropower added jobs.

Spain, once a leader in renewable energy, continues to fade, with exports being the only lifeline. Employment in 2014 declined to 76,300 jobs, about half the peak in 2008. Adverse policies in the electricity sector continue to drive the decline in wind, solar and biomass power.

In India, the solar and wind markets have seen substantial activity, as the ambitious renewable energy targets are translated into concrete policy frameworks. Central and state auctions for solar PV, for instance, have resulted in the installation of 1.9 GW in 2015 and an impressive pipeline of 23 GW. Solar PV employs an estimated 103,000 people in grid-connected (31,000 jobs) and off-grid applications (72,000 jobs).

The Indian government's push for 100 GW of cumulative PV installations by 2022 is generating momentum. With increasing domestic demand, local companies are utilizing their production capabilities and several foreign companies are interested in investing. Irrespective of further developments in manufacturing, reaching the government's goal of 100 GW PV by 2022 could generate 1.1 million jobs in construction, project commissioning and design, business development, and operations and maintenance. However, meeting skills requirements (30% of these jobs would be highly skilled) requires stepping up training and educational initiatives. The Indian wind energy industry has also had a fruitful year with the installation of more than 2.5 GW. Employment has remained steady at 48,000 jobs.

Japan experienced impressive gains in solar PV in recent years, resulting in a 28% increase in employment in 2014. A strong domestic market in 2015 likely supported further job growth in both construction and manufacturing, especially since 60% of panels were supplied by domestic companies. However, latest policy developments, specifically with feed-in-tariffs, may change the trend. The tariffs were cut twice during 2015, with analysts warning that new installations may decline starting in 2017. Challenges pertaining to grid connection, available land and financing may further limit installations and thus dampen employment prospects.

Several other Asian countries are also showing signs of progress in solar PV. Malaysia was home to 19,000 direct solar PV jobs in 2015. Given the limited number of domestic installations, around 60% of these jobs are in solar PV manufacturing plants that have been set up to cater to foreign markets. The Republic of Korea supports more than 8,200 jobs in solar PV manufacturing and distribution. Pakistan created jobs primarily through small-scale installations in residential and commercial sectors. The solar industry in the country imported and installed an estimated 800 MW of PV modules in 2015, creating jobs for around 20,000 people.

Africa has a significant untapped potential for renewable energy deployment, and has witnessed a number of interesting developments, leading to job creation. In North Africa, Egypt and Morocco are not only deploying wind farms, but also a manufacturing base. In northeastern Egypt, Siemens has announced plans to set up a rotor blade factory in 2017, creating 1,000 jobs. Egypt also has a budding PV sector that currently employs an estimated 3,000 people, but is expected to add many more jobs in 2016. Morocco's 160 MW Noor I CSP plant started operations in early 2016. It created 1,800 jobs during construction along with 250 permanent operations jobs. For Noor II, AFDB projects 2,000 to 2,500 construction jobs and 400 to 500 operations jobs (AFDB, 2014). Following construction, which employed 700 people, Morocco's 300 MW Tarfaya wind farm became fully operational in late 2014, with about 50 operations jobs. As part of a winning consortium under a 850 MW government tender, a Siemens factory in Tangier is scheduled to start producing blades for the domestic and export markets in the spring of 2017, with a workforce of up to 700.

In Kenya, wind development is generating jobs in construction, and operation and maintenance. Construction for the 310 MW Lake Turkana wind farm, Sub-Saharan Africa's largest, began in late 2014, due to be completed in April 2017 (LTWP, 2015) The project may create 2,500 jobs spread over the course of the construction period and up to 200 full time jobs during its operation. Since 2011, South Africa has carried out four bidding rounds under its Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), with a fifth to be unveiled in 2016. Estimates indicate that close to 20,000 jobs have been created in the solar industry alone (Warner, 2014).

As distributed solar PV becomes more affordable, it offers opportunities for alleviating energy poverty, reducing reliance on polluting fuels and creating jobs. Several parts of the solar PV value chain (e.g., distribution, sales, operations, and after sales service) are easy to localize. As discussed earlier in Box 1, a number of companies and initiatives are beginning to scale up in several Sub-Saharan African countries.

THE WAY FORWARD

As the ongoing energy transition accelerates, renewable energy employment will remain strong. While growth is likely to slow down with a maturing industry and rising labour productivity, IRENA's estimates that doubling the share of renewables in the global energy mix would result in more than 24 million jobs worldwide by 2030. Meeting the increasing labour requirements of the renewable energy sector will require stable and predictable policy frameworks that encourage deployment, stimulate investments in local industries, strengthen firm-level capabilities and promote education and training.

Dr Praveen Saxena
CEO, Skill Council for Green Jobs

Green Jobs for Future: Towards Skill India Goal 2030

Skill Council for Green Jobs (SCGJ) has completed one year of its operation. In the first year of SCGJ, the council has focused on understanding short term and long term skill needs of the sector, kind of skill sets required to fulfill the goal of 2030 and create an ecosystem for delivering quality training The council has about 200 affiliated training centers, pan India, about 500 certified trainers and 10 Assessment Agencies with over 120 certified assessors. SCGJ has already rolled out trainings on a mass scale in solar and wind domains. Understanding current and future Industry needs of skilled manpower in Green Business sectors and sub-sectors has been achieved by our in-house research, interacting with industry and with studies carried out by Ernst and Young and KPMG…

The Skill Council for Green Jobs has been created as part of Skill India Mission by National Skill Development Corporation to address the skill needs of the Green Business Industry. The Council is promoted by the Ministry of New and Renewable Energy and Confederation of Indian Industry. SCGJ is managed by an industry led Governing Council. SCGJ acts as a bridge between the Government of India, State Governments and industry for developing strategy & implementing programmes for Skills Development, correlated to Industry needs and also aligned to best International practices.

The SCGJ scope covers the entire gamut of "Green Businesses", viz Renewable Energy, Energy Storage Clean cooking, Green Construction, Green Transport, Carbon Sinks, Solid Waste Management, Water Management & e-Waste Management, hence would have pan India impact.

The Skill Council for Green Jobs is focusing on understanding and capturing the skill needs for both service users and service providers within the sector and will work on a road-map for a nation-wide, industry led collaborative skills initiative. The key activity drivers of SCGJ are

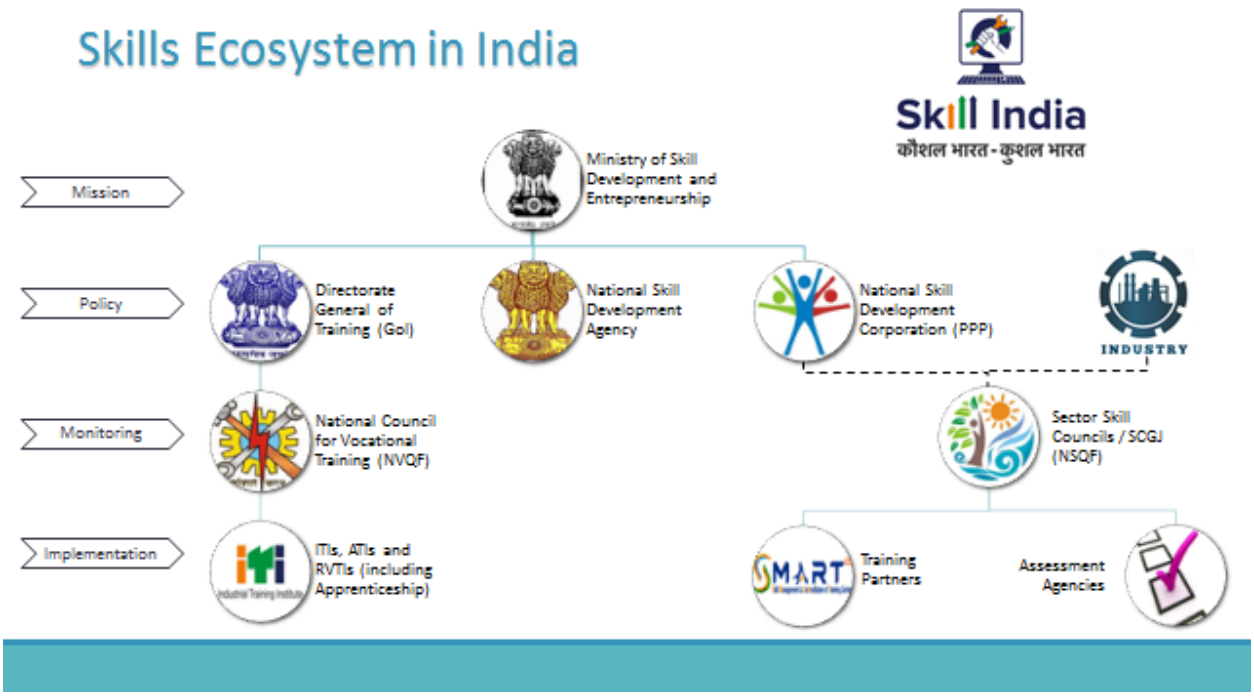
- Skill India Mission
- India's Intended National Determined Contribution (INDC)
- National Solar Mission
- Swachh Bharat Mission
- Green India Mission
- Smart City

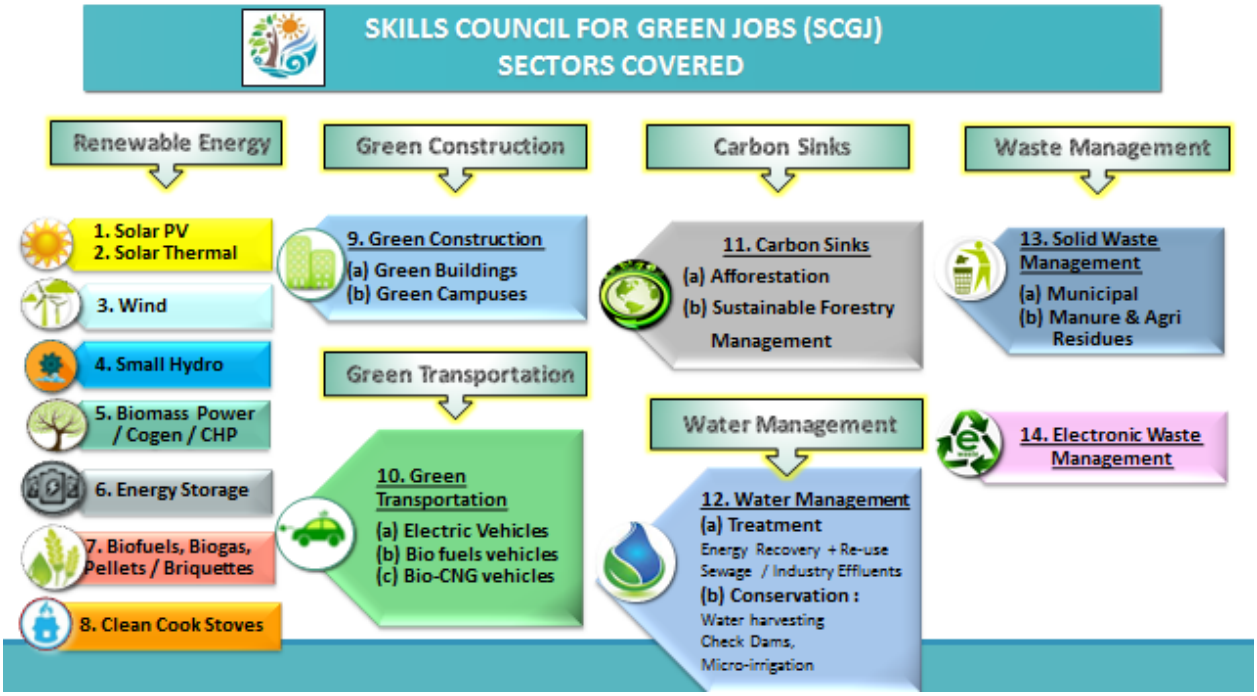
It would develop sector-specific competencies /skills, quality assurance of the skills acquired by trainees, curriculum development, qualification framework and setting of standards and benchmarks, recruitment and placement of trained and skilled workforce, as well as a data collection, management and provider to the industry.The key activities include:

- Skill development plan and an occupational map for all the sub-sectors
- Develop & Set National Occupational Standards for Job Roles.
- Evolve career paths and skill competency standards for upgrading
- Put in place an Assessment & Certification mechanism for Accreditation
- To help the member organizations across market value chain, sharpen their business focus, updating on the emerging market trends and development.
- Ensure delivery of training programs by accredited organizations
- Put in place an effective Labour Market Intelligence System (LMIS)

SCGJ is continuing to develop strong industry linkage in all sub-sectors. The Governing council has representation of large and medium industry from solar, wind, Bio mass, Bio-fuel and water industry. SCGJ has established direct contact with about 150 industries to get its qualification packs validated. The strategy is to focus on the areas where projects are being implemented or in the location of manufacturing hubs. The focus of SCGJ is to have strong industry connect, including contractors and sub-contractors, in all its areas of work. Talk to large industry to understand the manpower requirement and establish long term contacts to improve employability of trained and skilled manpower.

The SCGJ proposes to skill about 10,60,000 people by





2025 in the domain of Green Jobs. SCGJ proposes to extend its activities through its regional centres and training partners. It is proposed to set up Centers of Excellence, Standalone centers. It has already affiliated about 200 Training Centers spread in 25 states of the country.

The Year 2017-18 to see corporate sourcing of renewables

In the pie of 316 GW for total installed capacity for power generation in India, Renewables contribute 51.36 GW, over 16%. The year 2016-17 has been another year of success for renewable energy technologies. The confidence that RE technologies can be mainstreamed is strengthening every year. This year, a capacity addition of about 5415 MW has been achieved. The highlight of the year has been increasing confidence of corporates in renewable energy technologies both grid connected as well as off grid. This is opening a large scope and demand of skilled manpower.

India had pushed for inclusion of sustainable lifestyle with minimum carbon footprint and a clear cut mention of flow of funds in the political proclamation of COP22. The International Solar Alliance (ISA), moved to a next level when more than 20 countries, including India, France and Brazil, signed its framework agreement on the first day of COP22. Government has formulated an Integrated Energy Policy (IEP) document gives a roadmap to develop energy supply options and increased exploitation of renewable energy sources. For promotion of Renewable Energy, Government had amended the National Tariff Policy for electricity.

Given that over 50% of electricity demand in our country is from businesses, the sector has the opportunity to shape India's transition to a low carbon energy future. Companies can provide technologically sound, financially feasible and professionally managed energy solutions in return for policy support. From tax relief for generators to energy security and protection against cost inflation for consumers, there are clear benefits for businesses switching their electricity supply to renewables. Renewable energy offers an increasingly affordable solution for businesses. It is widely available without the risk of fuel inflation.

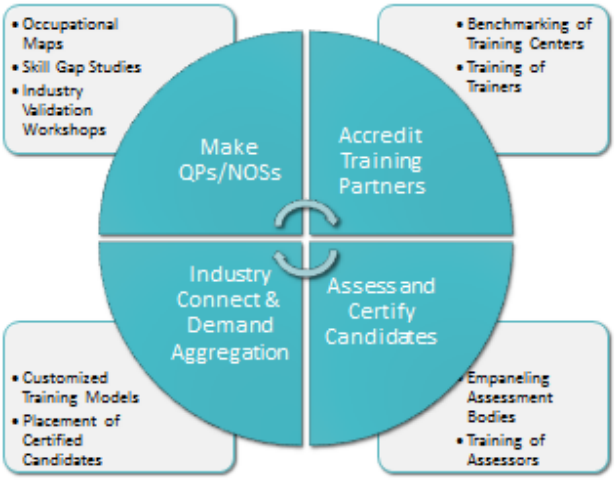
As renewable energy has become more and more cost effective and companies are setting more ambitious goals to buy it, large companies are increasingly looking for ways to contract directly for renewable energy to protect against future energy price increases and meet their climate and renewable energy goals. To meet the scale of their goals, these companies need access to more renewable energy in more places.Companies have stepped forward to join the Buyers' Principles because the Principles fit their corporate energy strategy and describe the sorts of products they hope the marketplace will offer them.

With an increasing number of companies committing to ambitious sustainable energy goals to reduce their carbon footprint, corporate electricity strategies can play an important role in accelerating renewable energy deployment and progress towards global climate objectives. The Stage is set to achieve at least 10,000 MW during 2017-18 and 15,000 in the year 2018-19 and now a leapfrog could be

Key Activities

SCGJ | SKILL COUNCIL FOR GREEN JOBS

- SCGJ enables development of Skilled Manpower aligned to National Skills Qualification Framework
- This is achieved through benchmarking training standards
- To meet specialized industry requirement, customized Training Delivery can be organized



throughcompanies committing to ambitious sustainable energy goals to reduce their carbon footprint. This is opening an unprecedented opportunity for jobs and quality skilling activities.

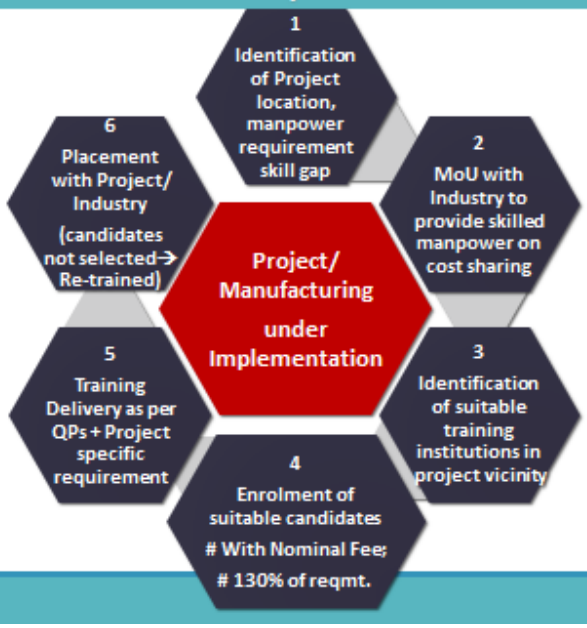
Two years of Skill India Mission

The Skill India Mission of Government of India is now approaching towards completing two years in July, 2017. Marking the first anniversary of the "Skill India" initiative in July, 2016, Ministry of Skill Development and Entrepreneurship (MSDE) had announced the launch of five major initiatives reinforcing Ministry's commitment to the youth of India. These initiatives are PradhanMantriKaushalVikasYojana 2.0, India International Skill Centres, India Skills Online, a Labour Management Information System (LMIS) and Apprenticeship ProtsahanYojana.

Skill India is seeing great traction and is all geared to meet its philosophy of speed, scale and standards ensuring there is opportunity to get skilled for all. The PradhanMantriKaushalVikasYojana

SCGJ's Industry Connect Strategy

SCGJ | SKILL COUNCIL FOR GREEN JOBS

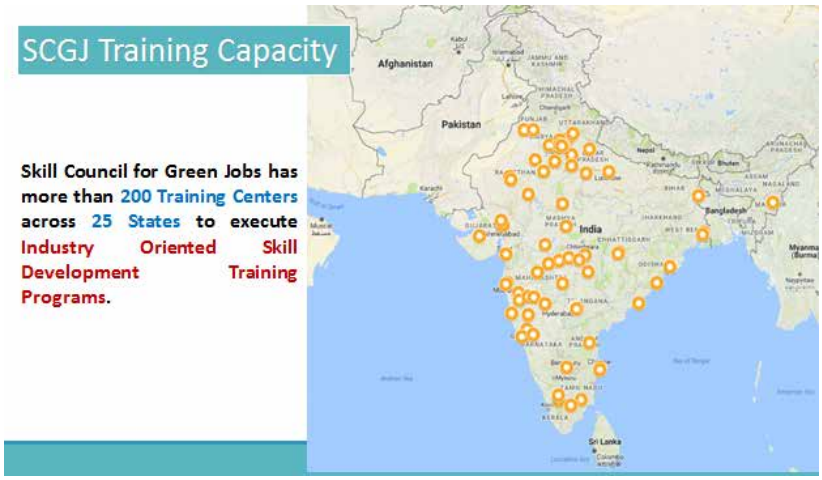


SCGJ would be working in Project/Manufacturing location specific mode:

- MoU with Industry for recruitment
- Pre-selection of candidates suitable for the job
- Industry to pay for certified manpower
- Candidate to pay nominal fee
- Training as per QP + Industry specific requirement
- Unsuccessful candidates to be re-trained.

(PMKVY), has secured an approval from the Government for its 2.0 version to train a total of 1 crore youths over the 4 years (April 2016 to March 2020). This is an endeavour to scale up the reach of PMKVY and at the same time strengthen the system and make these trainings more effective with robust monitoring and outcome.

The Government has also launched a single window platform to aggregate supply and demand trends in the Indian skill development ecosystem. This is known as the National Labour Market Information System (LMIS). This is an integrated set of institutional arrangements, procedures, mechanisms and data systems designed to produce labour market information as per global standards and best practices. The system would bring together quantitative and qualitative information concerning labour market actors and their environment and generate key analysis and reports which can be used for various policy interventions by different government stakeholders, as well as by the industry at large. The core function of the LMIS is convergence of information such as data of Training Providers, Training Centers, Employers, Certified candidates,



Candidates seeking Training, etc. across Ministries/Departments/ Geographies and Sectors.

The Ministry of Skill Development and Entrepreneurship is moving to leveraging technology to reach millions of skill seekers, is the India Skills Online (www.indiaskillsonline.com), an online platform for learning skills of choice. With the introduction of Online Skill-learning environment, the whole nation potentially becomes a classroom. The audio-video graphical illustrations format will help internalize the concepts for the skill-seekers, faster and longer. Online, the hard skills are supported by soft skill learning opportunities that help candidates become more confident, presentable, professionals. Skill India resolves to bridge the digital divide by providing basic digital literacy opportunities to all skill-seekers. Thus enabling them to become more aware and better suited for the work environment of the day.

India's youth has a huge potential to make the country a clear leader in human resource worldwide. A base for skill development has been set. There is no doubt that this is a big step for our country. The support from the industry is paramount in making the scheme success. This is not just a scheme of Government but is a path changer for the country and youth should reap maximum benefit.

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GOVERNANCE TODAY

GEN-NEXT IT

Destination West Bengal 2017

12th&13th May 2017, Kolkata

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Hon'ble Minister In-Charge,
Dept. of IT & Electronics
Government of West Bengal

Programme Convenor

Dr. Krishna Gupta
Principal Secretary, Dept.
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- Marketing professionals, influencers of enterprise strategies, Industry Influencers
- Marketing and Financial analysts, strategy and technology analysts
- Academia

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250+ Delegates **40+** Speakers **15+** Exhibitors **5** Sessions

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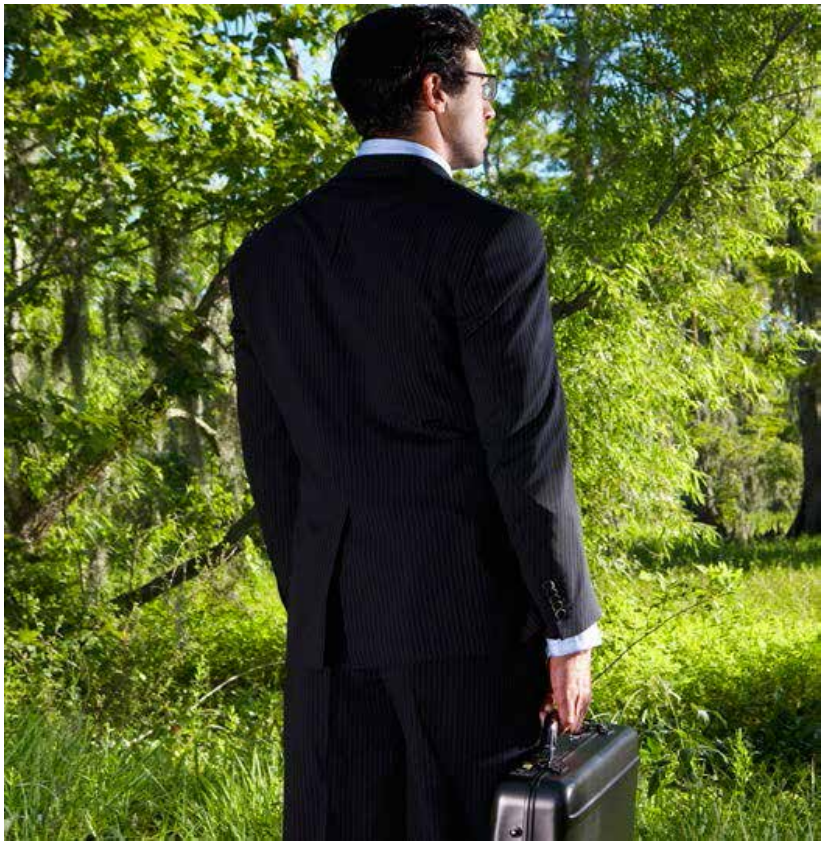
Green Jobs

Challenges and Prospects in India

Growing interest in protecting the environment and combating climate change coupled with the challenge to provide employment to a burgeoning working age population has resulted in the creation of green jobs. Green jobs span a wide array of occupational profiles, of skills and of educational backgrounds. Some constitute entirely new types of jobs, but most build on traditional professions and occupations, albeit with more or less modified job contents and competencies. This is true for direct green jobs as well as for indirect ones in upstream supplier industries. Even in the case of new industries and technologies, such as wind energy and solar power generation, the supply chains consist largely of traditional industries like iron and steel and the manufacture of machine parts. In India, the demand for environment-friendly practices and the growth in renewable energy sector, solid waste management, clean transportation and sustainable construction activities among others has led to a wide scope for green jobs, also known as green collar jobs. Several initiatives of the government, private sector and NGOs are providing a push for green jobs.

There is evidence of the viability and potential for green jobs across the entire workforce, from manual labourers through skilled workers, craftsmen and entrepreneurs to highly qualified technicians, engineers and managers. Green jobs currently exist and can develop further in many economic



sectors both in urban and rural economies. As green jobs become much sought after, there has also been an explosion in the number of courses devoted to green technology. The wind energy giant Suzlon Group had earlier joined up with The Energy and Resources Institute (TERI) University, based in New Delhi to introduce a Masters in Renewable Energy Engineering and Management. A lot of other renowned educational stalwarts like Delhi University, Pune University, Tata Institute of Social Sciences (TISS) in Mumbai and the Indian Institution of Technology (IIT) have all incorporated 'green' courses at the Bachelors, Masters and even PhD level. As the need evolves, green jobs will become more specialised, which will then open up specialised training courses, predict the job market observers.

With the aim of providing a greener economy and creating environmental-friendly employment opportunities, the government is also providing an impetus for green jobs as part of restructured growth strategies under its 'Make in India' vision. In India around ten to 11 million people join the job market every year and creating green jobs is an ideal way to meet that demand.

According to experts emerging economies such as India will have higher net job creation of green jobs because there will be less substitution of high-carbon infrastructure and jobs.

Key Factors of Green Jobs in India

Estimates suggest that India needs approximately 70 million new jobs by 2017 to maintain a relatively low unemployment rate in the country. Thus, the rise in green jobs could aid in keeping unemployment in check as well as provide livelihood opportunities to a vast segment of the population.

Unlike the IT sector boom in the country which saw a rapid growth in white collar jobs, a steadily growing green economy has the potential to create medium and low-skilled jobs in sectors like waste management and recycling, mechanics in clean technology industries, energy, transport and workers in the construction and maintenance of green building projects. Thus, by catering to the bottom of the pyramid population, green jobs could also help to reduce poverty in the long-term.

Green Policy: In 2006, the government of India came out with a new environment policy called the National Environment Policy (NEP). The main objectives of this policy are conserving critical environment resources, livelihood security for the poor, integration of environmental concerns in economic and social development and maintaining efficiency in environment resource use.

Green Education and Training: In 2010, the Ministry of New and Renewable Energy (MNRE) started working on a plan to launch several short-term diplomas and technical training courses in the renewable and clean energy sector to prepare a technically skilled workforce for the coming years. In addition, academic and research institutes have started courses and programmes for teaching green skills all across the country.

Green Sectors: India's low-carbon technology market is estimated to reach USD 135 billion by 2020, making the country one of the most lucrative destinations for investment. Growth in the renewable energy sector has been significant over the past few years and with abundant renewable resources available in India, the growth is expected to continue in the future.

Tremendous Potential for Future Green Jobs

It is estimated that the demand for green professionals and workers could grow by 55-60 per cent in the coming years in India. Creating skilled manpower for green jobs will thus be the main priority of the government and private sector in the future. The

government will need new policy measures on wage rate, working conditions, employee benefits etc. to foster green job growth and to create enabling environment for green workers. Also, India will require a separate department to implement and execute polices related to green jobs as well as cater to green professionals. In addition, emerging green occupations call for the need of new training programs and upgrading the skills of workers in response to adoption of new technologies. To increase the accessibility of training and skill development, foundations and NGOs can introduce programmes for women, marginalised groups and rural communities in remote villages of the country.

Encouragingly, the business case for greening both the economy and the job market has been growing increasingly powerful. Energy and commodity prices are surging and customers and policy makers are exerting growing pressure on businesses to adopt greener practices and production methods in order to avert dangerous climate change. The greening of the economy presents a major opportunity to start new businesses, develop new markets and lower energy costs. Last but not least it can strengthen a business' licence to operate, generating positive attitudes of both the activities and investments of firms among customers and local communities alike.

Observed trends in markets and investments confirm this assessment. The global market for environmental products and services is projected to double from USD 1, 370 billion per year at present to USD 2,740 billion by 2020, according to Roland-Berger Strategy Consultants. Half of this market is based in energy efficiency and the balance in sustainable transport, water supply, sanitation and waste management. In Germany, for example environmental technology is to grow fourfold to 16 per cent of industrial output by 2030, with employment in this sector surpassing that of the country's major industries in the machine tools and automotive sectors. Investments in improved energy efficiency in buildings could generate an additional 2–3.5 million green jobs in Europe and the United States alone. The potential is much higher in developing countries like India and China.

Given the population growth rate, India needs to create 10 million new jobs every year. Analysis carried out by the Council on Energy, Environment and Water (CEEW) and the Natural Resources Defense Council (NRDC) estimates that more than 1 million full-time equivalent jobs would be created by the solar deployment industry alone, between now and 2022. These would include over 210,000 skilled plant design and site engineering jobs, 18,000 highly skilled jobs in business development and over 80,000 annual jobs for performance data monitoring.

Analysis based on survey responses from 40 solar companies in India highlights the current unavailability of appropriately skilled manpower for construction and commissioning of solar units as a significant challenge to the solar industry. Similarly, wind sector respondents suggested that the current skilling programmes needed to be made more relevant and accessible, such that companies are assured of the high quality of training. This is where the ambitious renewable energy target of the country interlinks with the Skill India initiative, which aims to skill 400 million people by 2022. It will be crucial to develop standardized training programmes that can be implemented through institutes around the country, with training institutes being set up in areas with the most renewable energy potential and upcoming capacity.

In Transport sector the pace of job creation is slow and patchy, but in view of increasing demand of retro-fitting and use of CNG fuel, hybrid electrical buses, trucks and passenger cars, so there is huge requirement of mechanical and related jobs. Only in Delhi, the Delhi Transport Corporation (DTC) urgently requires over 17,000 jobs. Public transport contributes to green growth and jobs in many different ways: it is a source of a diverse range of green and local jobs; if offers good training and qualifications (notably for drivers); it provides new opportunities for specialist suppliers; and it encourages better connectivity within cities. UITP's strategy for the public transport sector sets out the aim to double the market share of public transport worldwide by 2025. Achieving this aim would further develop employment in the public transport sector-it would for instance double the number of jobs at public transport operating companies-and would support the healthy development of cities.

If one were to see the market potential for green buildings in India, green construction don't even account for 5 per cent of the current stock. Hence, there is a huge potential. According to Dodge Data & Analytics World Green Building Trends-SmartMarket Report, by 2018 the green building industry in India will grow 20 per cent driven largely by environmental regulations and demand for healthier neighbourhoods. Findings in the report point out that new, high-rise residential communities and mixed-use development are expected to be the top three sectors for green building growth in India that would fuel the demand of skilled and semi-skilled jobs in this segment. Since 75 per cent of the buildings that will exist in 2030 are yet to be built, this will provide increased job opportunities in the green buildings segment.

In another study by the United Nations Environment Programme, a proposed project on community-level waste segregation has the

Who are sustainability professionals?

Sustainability professionals seek to improve an organi¬zation's environmental, social, and economic impact. Some have specific titles such as sustainability manager and director of corporate responsibility. Sustainability professionals in other roles may have had experience as industrial managers, logistics (transportation, storage, and distribution) managers, environmental scientists, civil engineers, or recycling coordinators, among others. Many of these workers are dedicated to sustainability, but some may have sustainability responsibilities, in ad¬dition to their primary job duties. These workers might implement corporate recycling programs, install equip¬ment to increase efficiency, and monitor processes to ensure their proper function.

Management Occupations

Sustainability managers come from diverse backgrounds, have different job titles, and perform a broad range of duties. Sustainability managers are responsible for devel¬oping and implementing an organization's sustainability plans and presenting these plans to senior staff. They might also be responsible for ensuring that an organiza¬tion is in compliance with environmental, health, and safety regulations. Many sustainability managers rely on their public relations and communications skills to work with concerned citizens in local communities.

Chief executives include high-level positions, such as chief sustainability officer, environmental vice president, and director of corporate responsibility. These executives develop and direct sustainability strategies.

General and operations managers work to ensure that sustainability strategies are implemented in day-to-day operations and that any sustainability measures are in¬corporated into the production process.

Industrial production managers plan, direct, and coordi¬nate the production activities required to produce a vast array of manufactured goods. These managers may also be responsible for improving the industrial production process and to find ways to reduce waste and improve efficiency, while remaining in budget.

Transportation, storage, and distribution managers are vital to finding ways to reduce waste and make move¬ment of goods more sustainable, because transportation, storage, and distribution are very energy-intensive and require many resources.

Science Occupations

Scientists who work in sustainability devise techni¬cal solutions for reducing waste and cutting costs. They assist in the development of strategies to increase safety and to reduce the risk of illness and injury for a company's employees. Many sustainability scientists also serve as consultants, working as technical experts at firms that specialize in providing sustainability services to com¬panies that do not have their own sustainability staff, or those who need specialized knowledge to implement sustainability strategies.

Occupations in scientific research and development have become increasingly interdisciplinary, and as a result, it is common for biological scientists, chemists, materials scientists, and engineers to work together as part of a team.

Atmospheric scientists study the effects of air pollution and the effects of a company's operations on the overall environment.

Biochemists and biophysicists study the chemical makeup of organisms. They may also study the effects of pollution on these organisms and determine ways to reduce the impact of pollution, as well as ways to reduce its effects.

Chemists and materials scientists develop new chemi¬cals or materials that have a lower environmental impact than materials used in current operations.

Conservation scientists manage the use and develop¬ment of natural resources. They advise landowners on the use and management of their land and may design and implement programs that make the land healthier and more productive. Some will work to conserve and restore public and private lands.

Environmental scientists use their knowledge of the nat¬ural sciences to protect the environment by identifying problems and finding solutions that minimize hazards to the health of the environment and the population.

Microbiologists study microscopic organisms, such as bacteria and viruses. Many bacteria or other microscopic organisms can be used to clean up pollution, or using bacteria, yeast, or other microbes to develop new bio-fu¬els, the need to use fossil fuels can be reduced.

Natural sciences managers are both managers and lead scientists. They oversee the efforts of scientists working on sustainability issues. For example, if there are mul¬tiple scientists, such as a chemist, atmospheric scientist, and an environmental scientist working on a large proj¬ect, the science manager will oversee and coordinate the efforts of the other scientists.

Soil and plant scientists study local plants and the soil that supports them. They look for diseases or chemicals present in the plants and soil that results from pollutants and study ways to remove these pollutants and to prevent further pollution.

Engineering Occupations

Engineers who work in sustainability devise technical solutions for reducing waste and cutting costs. They also might be responsible for developing methods to increase safety and to reduce the risk of illness and injury for a company's employees.

Chemical engineers work to minimize the environmental impact of chemicals used by a company in production processes. These engineers may focus on using renew¬able resources to produce chemicals that are not derived from fossil fuels, or on developing chemicals that are biodegradable and do not result in pollution of the envi-ronment.

Civil engineers are involved in green building and designing structures that will operate efficiently, reduce pollution, and decrease carbon output. They also design water supply and sewage treatment facilities.

Environmental engineers use the principles of biology and chemistry to develop solutions to environmental problems. They are involved in water and air pollution control, recycling, waste disposal, and public health is¬sues.

Health and safety engineers strive to prevent harm to people, property, and the environment by applying their knowledge of systems engineering and workplace health and safety factors. Using this specialized knowledge, they identify and measure potential hazards, such as the risk of fires and the dangers involved in handling toxic chemicals.

Other sustainability occupations

In addition to managers, scientists, and engineers, many other occupations are involved in the sustainability field. These include accountants and auditors, business opera¬tions specialists, and compliance officers.

Accountants and auditors measure the impacts of sus¬tainability programs. They determine the monetary sav¬ings and costs associated with these programs and may measure non-monetary aspects, such as environmental performance and the amount of waste reduction.

Business operations specialist is a broad category that includes recycling coordinators and energy auditors.

Recycling coordinators coordinate recycling programs for governments and private firms. Firms recycle many of the materials used in production and operations, such as excess packaging, office paper, used chemicals, and scrap metal. Energy auditors, also known as energy raters or energy consultants, help prevent energy waste by inspecting buildings to find areas of air leakage and advising customers on how to fix and prevent leaks.

Compliance officers examine, evaluate, and investigate eligibility for or conformity with laws and regulations. They ensure that organizations are in compliance with environmental, health, and safety regulations and may prepare reports or recommendations as to how a compa¬ny can comply with proposed regulations or meet higher standards than regulations require.

Cost estimators accurately forecast the cost, size, and duration of sustainability projects. They develop the cost information that business owners and managers need to decide on the profitability of sustainability projects.

Human resources specialists are responsible for the workforce needs of an organization. They may keep track of how workers are complying with sustainability practices. They may be responsible for producing train¬ing programs on corporate sustainability.

Logisticians analyze and coordinate an organization's supply chain–the system that moves a product from sup¬plier to consumer. They find ways to reduce the amount of waste in the process of storing and transporting goods. Increased efficiency in these areas will reduce waste, emissions, and costs.

Occupational health and safety specialists and tech¬nicians help prevent harm to workers, property, the environment, and the general public. They may design safe work spaces, inspect machines, and test air qual¬ity. In addition, they may look for chemical, physical, radiological, and biological hazards. They communicate frequently with management about the status of health, safety, and environmental programs. Occupational health and safety specialists typically have more responsibil¬ity than technicians. Technicians may be responsible for small aspects of occupational safety and health, or they may assist specialists with their duties.

potential to provide 2,500 jobs to rag pickers with an average earning of USD 75 per month.

Urban Land Use and Density Green Sector and Growth

With the rapid and steady growth of the urban population, the demand for land resource has increased as well. This is creating both horizontal and vertical pressure on all urban land uses. Considering that the Indian urban population is expected to increase up to 590 million by 2030, the per capita income is projected to grow four times and that land is a limited resource, the negative consequences of maintaining the current unsystematic approach could be tremendous for local environment and society: a Green Growth approach thus becomes imperative for urban planning.

Green Growth Visions

The two visions below present an ideal scenario of how the Urban Land Use and Density sector would appear in the future, had the city fulfilled or even exceeded all its development objectives. These visions, achieved either through a gradual, incremental process (efficient) or a more radical paradigm shift (transformative) become the ultimate Urban Land Use and Density 'target' that cities should aim for.

Efficient Green Growth Vision

A vibrant and livable city that has integrated land use with minimum conflict between green spaces and built up areas, to satisfy all the social needs of the community. Statutory Master Plans minimize urban sprawl and guide desirable peri-urban development. Enforcement agencies use existing underutilised or unused land and promote transfer of development rights to retain traditional quarters and other conserved precincts. High density is encouraged through increase in floor space index in all areas with open land converted to community open spaces accessible for all. Organised agriculture is allowed as one of the urban functions to reduce land distortion from over predicted real estate demand, while involving communities in the planning process.

Transformative Green Growth Vision

A compact city with reduced travel time and optimal utilization of local resources, with land use allocated for various uses that is self-sufficient for future generations without demand for additional land resources. Transit oriented mixed land use approach is in place with reliable public transport to eliminate private vehicle dependency. The Master Plan is mandatorily revised every 3 years with all the maps available on a GIS platform. Heritage and ecologically fragile areas development is regulated by clear guidelines, low rise development along transit corridors is discouraged and urban sprawl is reduced. Clear development guidelines exist and the private sector is actively engaged to help implement development in line with the Master Plan. The city has urban green spaces and forests to protect local biodiversity and a green economy policy that guides the city's economy.

Options and Opportunities

By recognising planning and development control regulations as key requisites for a sustainable future and keeping in view the consequences of unplanned development, the High Powered Expert Committee and the McKinsey Global Institute have recommended several initiatives to be taken up for effective land use planning, such as upgrading planning technology (GIS maps and economic projections, transportation, and affordable housing, etc.) and preparation of effective 20 year Master Plans with integrated content; the Government of India is currently addressing this.

- Few metropolitan cities such as Delhi and Bangalore are in the process of developing their transit oriented policies and plans for the city to promote mixed land use and increase densification in the cities. The URDPFI guidelines, currently being revised, recommend the same approach; other cities should learn from these examples.
- Emphasis should be increased on local development regulations and densification of land uses through ongoing efforts on Transit oriented development.
- Cities can utilize central government funding for the preparation of plans and the prioritization of long term infrastructure improvement; e.g. the Ministry of Urban Development provides funds under the National Urban Information Systems program to develop Master Plans on a GIS platform.
- Application of GIS in Master Planning processes can be used to record plot by plot data on land use, transportation, storm water system and solid waste management etc.
- The Union government's announcement of 100 Smart

Cities programme can be tapped as an opportunity for all cities to leverage innovative approaches for industrial development.

Barriers

Evaluating the current and future trends of the Urban Land Use and Density sector led to the identification of barriers that already are or could in the future hinder or even prevent cities from seizing the opportunities aforesaid, thus precluding a transition to Green Growth. These barriers are:

- Limited technical capacities of local agencies that prevent Transferable Development Rights, PPPs and town planning schemes from being properly utilized as land management practices.
- Lack of monitoring of Master Plan violations, non-coordination of an excessive number of agencies involved, political interference etc.
- Non-functioning of Metropolitan Planning Committees and District Planning Committees, which have a major decision making role as per the 74th constitutional amendment. The non-implementation of the act is one of the major barriers for cities to take coordinated decisions for longer term development.

Policy recommendations: pathways to a sustainable future

Turning the vision of a sustainable economy and the green jobs that it would provide into a reality will require a strong, coherent and stable policy framework and government leadership. According to an ILO report that finds many encouraging trends and examples but green economies and jobs are by no means a foregone conclusion. There is a need to speed up the attainment of gains in energy efficiency and in the share of sustainable source of energy.

It is clearly essential to correct market failures and to ensure that prices are right, in particular that of carbon, but also that of other externalised environmental and social costs. Market signals and the parameters for investments need to be clear and stable. This imperative notwithstanding, purely market-driven processes will not deliver at the scale and the speed required.

The report finds that markets have thrived and transformation has advanced most where there has been strong and consistent political support. Policies designed to ensure effective support for and to drive the private sector include targets, penalties and incentives such as feed-in laws and efficiency standards for buildings and appliances, as well as proactive research and development. Stable political resolve will depend on a transformation that is equitable between and within countries, where benefits are shared broadly and fairly and where those losing out in the transformation are supported in finding alternative, more sustainable livelihoods.

Way Ahead

India is at a crucial cusp of breaking into the path to the 'being a developed' country. The journey to this path is not going to be smooth as the rapid growth brings in its own set of challenges. One of the biggest challenges is to maintain the environment according to international commitments, bringing down the fossil fuel based consumption and substantially increasing the non-conventional (green) energy consumption. Though India is a signatory to the United Nations Framework Convention on Climate Change (UNFCC), it is not required to contain its GHG (greenhouse gas) emissions. India's policies for sustainable development, by way of promotion of energy efficiency, renewable energy, changing the fuel mix to cleaner sources, energy pricing, pollution abatement, a forestation, mass transport, besides differentially higher growth rates of less energy intensive services sectors as compared to manufacturing, results in a relatively GHG benign growth path. This would mean creation of millions of 'Green Jobs' in the coming 10 to 15 years.

Yet, it is India's green overhaul that is getting global economies interested. Businesses in the EU are being attracted by India's attention to green growth and expansion of environment friendly industries. There is already a European Business and Technology Centre (EBTC) that has been established in India to facilitate trade between India and Europe. India was one of the few countries who managed to largely stave off the recession by wisely boosting domestic consumption and guaranteeing jobs. Now, it might well be on its way to leveraging the clean environment effort into an employment boon. Government mandates to encourage wind energy and solar energy have allowed talent growth in pure green businesses. This has helped emerging segments in the green sector draw talent from related sectors, as professionals in the latter upgrade and adapt to new businesses.

Delhi Metro

The first ever rail based system to claim carbon credits

Anuj Dayal
Executive Director, Corporate Communication,
Delhi Metro Rail Corporation

India's first modern metropolitan rail transport system, Delhi Metro, not only has helped commuters in Delhi saving 66 minutes commute time per day, but also has become the first rail based methodology to garner 90000 voluntary carbon credits for improving the energy efficiency. To top it up, it has not only created a large number of jobs for engineers, drivers, station attendants, signal staff, ticketing, construction workers, maintenance, etc., but also resulted in greening existing occupations and created new occupations as well. In an interaction with Kritinath Jha, Governance Today, Anuj Dayal, Executive Director, Corporate Communication, Delhi Metro Rail Corporation speaks more on the green growth and sustainability...

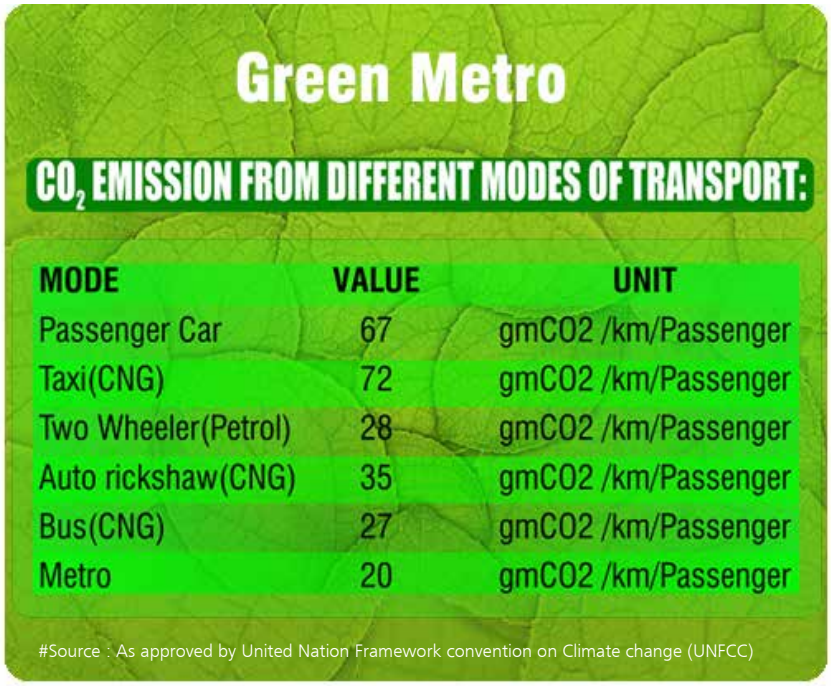
> DMRC also plans to install solar power facilities worth 50 MW by the year 2021

Delhi Metro is known for its green initiative drive, particularly in Phase-III of its construction works and it is likely to continue in the next phases. So, how do you view the growth of green jobs in such context?

Generation of additional jobs is certainly one of the benefits of the efforts to use green technologies in our functioning. For example, in Delhi Metro, we have a separate department called 'Environment' which is headed by an officer of the rank of a general manager. Many young environmental engineers are working in the department for bringing in more green technologies to DMRC. In addition, as part of our solar initiatives, we have engaged with a lot of firms engaged in the commissioning of solar power projects.

Do you think the environmental initiatives of DMRC have given a new work culture in the Country and Delhi Metro is among the cleanest of all Metro Rail network across the world?

Adoption and use of green technologies is an integral part of our work culture. Our corporate office as well as all stations of ongoing Phase 3 has been designed as green buildings. In addition, we are setting up solar power plants at all possible locations such as stations, depots, parking lots, residential areas and so on. While, I can't confirm whether we are the cleanest Metro rail network or not but I can surely say that Delhi Metrro will be



one of the most non-polluting and green Metro services in the world.

By adopting clean development mechanism, water management, use of renewable energy, waste management, tree preservation & plantation, green buildings initiatives are some of the great benefits of Delhi Metro. Do you think these activities have opened multiple channels of job opportunities in your organisation?

As mentioned earlier, there is a dedicated environment department in DMRC. There is a cell to supervise the installation of solar power plants as well. In addition, we are working with various private parties for our solar power projects. Therefore, our green initiatives have certainly helped in generating more employment opportunities within the organization.

The lead taken by DMRC in spearheading a metro revolution in India has resulted in metro systems being planned and executed in major Indian cities positively effecting the mitigation of the Green House Gases too and it has been even recognised by the United Nations. Your comment on this achievement!

Right from the beginning of Delhi Metro's construction work, a decision was taken to adopt eco friendly work practices in all spheres of our functioning. Delhi Metro was the first ever rail based system to claim carbon credits. The UNFCCC has already registered Delhi Metro in two categories for promoting Clean Development Mechanism and earn carbon credits: Regenerative Braking and Modal Shift'. Recently, our initiative to install roof top solar power plants at its premises has become the first ever Clean Development Mechanism (CDM) Project to be registered with the United Nations Framework Convention on Climate Change (UNFCCC) for any Metro or Railway system in the world. These are undoubtedly stupendous achievements and we are happy that we are setting a positive example for the other Metro systems which are coming up in the country. DMRC also plans to install solar power facilities worth 50 MW by the year 2021.

"There is a dedicated environment department in DMRC. There is a cell to supervise the installation of solar power plants as well. In addition, we are working with various private parties for our solar power projects. Our green initiatives have certainly helped in generating more employment opportunities within the organization.

How the DMRC's recycled and reuse waste paper from the offices of the Delhi Metro is working? Do you think it would motivate other government organisations to adopt in a similar fashion?

Delhi Metro's corporate office at Barakhamba Road has been designed as a green building. All the stations of the ongoing Phase 3 as well as the new Receiving Sub Stations have also been designed as green buildings. Therefore, all eco-friendly features such as recycling of paper, use of natural light, rain water harvesting, etc are present in these buildings. Why only government, all future buildings should be constructed with such features for a better tomorrow.

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Who to Attend

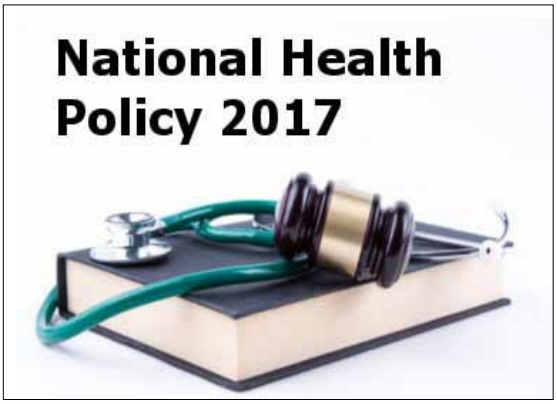
The summit will attract an extremely broad range of people.

Organizations and individuals to represent will include government departments, public sector enterprises, consultants, universities, industry, associations, HR professionals, and companies across domains, training institutes, State Skill Missions, Other Sector Skill Councils, skill universities, skill academies, individual professionals, students and more

The key feature will be the broad cross-section of information providers, aggregators, indexers, experts and end-users.

http://management-skillindia.govtoday.in

Cabinet approves National Health Policy, 2017 to provide Universal access to good quality health care services



The Union Cabinet chaired by the Prime Minister Shri Narendra Modi has approved the National Health Policy, 2017 (NHP, 2017). The Policy seeks to reach everyone in a comprehensive integrated way to move towards wellness. It aims at achieving universal health coverage and delivering quality health care services to all at affordable cost.

The primary aim of the National Health Policy, 2017, is to inform, clarify, strengthen and prioritize the role of the Government in shaping health systems in all its dimensions- investment in health, organization and financing of healthcare services, prevention of diseases and promotion of good health through cross sectoral action, access to technologies, developing human resources, encouraging medical pluralism, building the knowledge base required for better health, financial protection strategies and regulation and progressive assurance for health. The policy emphasizes reorienting and strengthening the Public Health Institutions across the country, so as to provide universal access to free drugs, diagnostics and other essential healthcare.

Cabinet approves four GST Bills

The Union Cabinet has approved the following four GST related bills:

- The Central Goods and Services Tax Bill 2017 (The CGST Bill)
- The Integrated Goods and Services Tax Bill 2017 (The IGST Bill)
- The Union Territory Goods and Services Tax Bill 2017 (The UTGST Bill)
- The Goods and Services Tax (Compensation to the States) Bill 2017 (The Compensation Bill)

The CGST Bill makes provisions for levy and collection of tax on intra-state supply of goods or services for both by the Central Government. On the other hand, IGST Bill makes provisions for levy and collection of tax on inter-state supply of goods or services or both by the Central Government.

730 million Internet users are anticipated in the country by 2020

Government has said that due to fast adoption of digital technology, it is expected that number of internet users will increase in the country. Minister of Communications Shri Manoj Sinha in a written reply to the Rajya Sabha said that as per information received from Telecom Regulatory Authority of India (TRAI), there were 391.50 million Internet subscribers as on December 31, 2016.

The National Telecom Policy-2012 envisages 600 million broadband connections by the year 2020 at minimum 2 Mbps download speed. Further, as per National Association of Software & Services Companies (NASSCOM) –Akamai report launched on August 17, 2016 regarding "The Future of Internet in India", 730 million Internet users are anticipated in the country by 2020.

India and ADB Sign USD 350 Million Loan for Upgrading 1,500 kms of District Roads in Madhya Pradesh

The Asian Development Bank (ADB) and the Government of India signed USD 350 million loan for improving about 1,500 kilometers of major district roads in Madhya Pradesh in line with the State's Road Development Plan. This project agreement would bring about seamless road connectivity across the State by linking State Highways and Rural roads through District roads. It would provide an easier access to basic services and markets to people. The Project will involve upgrading roads with concrete pavements, strengthening culverts and bridges, and maintaining the improved road assets for a period of five years after construction, on a performance based payment format. The Project will also develop and introduce a cashless accident victim treatment facility in the state, and improve the accident response system.

Government to focus on two important areas including building infrastructure on war footing & substantial expenditure on development of rural India

The Union Minister of Finance, Defence and Corporate Affairs Shri Arun Jaitley said that the Government would focus on two important areas including building infrastructure on war footing and substantial expenditure on development of rural India. The Finance Minister said that India is having the largest infrastructure creating programme in the world which include constructing 10,000 kms of road every year or 30 km a day, connecting every village with a regular road by 2019, to ensure that every village is electrified by 2018 and addition of 40-50 Regional Airports besides modernizing the Railway System among others. Shri Jaitley was addressing the 23rd Conference of Auditors' General of Commonwealth Countries and British Overseas Territories in Delhi.The Finance Minister highlighted the various schemes and programmes launched by the present Government for the development of rural areas, including construction of roads, electrification of villages, cleanliness campaign by providing every rural household with a toilet system, implementing scheme 'Housing for all' in rural areas by 2022 and high expenditure on rural irrigation, animal husbandry and dairy farming among others.

Take the pledge to save every drop of water, on World Water Day

The Prime Minister, Shri Narendra Modi has urged people to take the pledge to save every drop of water, on World Water Day. "On World Water Day let's pledge to save every drop of water. When Jan Shakti has made up their mind, we can successfully preserve Jal Shakti. This year, UN has chosen a valid theme- wastewater. It will help further awareness on water recycling and why it is essential for our planet", the Prime Minister said.

Target of tripling Nuclear Power Capacity

The Government, in July 2014, had announced tripling of the then existing capacity of 4780 MW in the next ten years. With the commencement of commercial operation of Kudankulam Nuclear Power Project (KKNPP), Unit-1 (1000 MW) in December 2014, the installed nuclear power capacity in the country has reached 5780 MW. In addition, KKNPP, Unit-2 (1000 MW) has been connected to the grid for the first time in August-2016 and is presently generating infirm power. On commencement of commercial operation of KKNPP-2, the installed nuclear power capacity in the country will reach to 6780 MW. Further, four reactors with a total capacity of 2800 MW are under construction and four more reactors with a total capacity of 3400 MW have been accorded sanction by the Government. Bharatiya Nabhikiya Vidyut Nigam Limited (BHAVINI), a public sector company under Department of Atomic Energy (DAE), is building one 500 MWe capacity Prototype Fast Breeder Reactor (PFBR) at Kalpakkam, Tamil Nadu. PFBR is expected to be functional by October 2017. On progressive completion of these projects, the installed nuclear capacity will reach 13480 MW. More reactors based on both indigenous technologies and with foreign technical cooperation are also planned in future. The present share of nuclear energy in the country is about 3.2% in the current financial year 2016-17 (up to Feb-2017). The nuclear power plants in the country are presently operating close to their rated capacity.

Cabinet approves MoU between India and France on Technical Cooperation in Civil Aviation

The Union Cabinet chaired by the Prime Minister Narendra Modi has given its approval to the MoU between the Airports Authority of India (AAI) and its French counterpart, Civil Aviation Authority (DGAC), France to implement Technical Cooperation Program in civil aviation sector. The Technical Cooperation Program will be beneficial for enhancement of skills and expertise of AAI's officers. This MoU is also beneficial for imparting training of engineers, technicians, managers etc.

Record Capacity Addition of Wind Power of 5400MW in Last Fiscal

Ministry of New and Renewable Energy (MNRE) has set another record in the wind power capacity addition by adding over 5400 MW in 2016-17 against the target of 4000 MW. This year's achievement surpassed the previous higher capacity addition of 3.423 MW achieved in the previous year.

The leading States in the wind power capacity addition during 2016-17 are Andhra Pradesh 2190 MW, followed by Gujarat 1275 MW and Karnataka 882 MW. In addition Madhya Pradesh, Rajasthan, Tamil Nadu, Maharashtra ,Telangana and Kerala have reported 357 MW, 288 MW, 262 MW, 118 MW , 23 MW and 8 MW wind power capacity addition respectively during 2016-17. These figures are tentative.

India Signs Financing Agreement with World Bank for USD 100 Million for Uttarakhand Health Systems Development Project

A financing agreement for IDA credit of USD 100 Million for the "Uttarakhand Health Systems Development Project" was signed here with the World Bank. The objective of the project is to improve access to quality health services, particularly in the hilly districts of the State, and to expand health financial risk protection for residents of the State. The project will benefit the residents of hilly districts in particular. The project has two main components, (i) Innovations of engaging the private sector; and (ii) Stewardship and system improvement. Out of the total project size of USD 125 million, USD 25 million will be the counterpart contribution of the State Government. The Financing Agreement was signed by Raj Kumar, Joint Secretary, Department of Economic Affairs on behalf of Government of India and Hisham Abdo, Acting Country Director, World Bank (India) on behalf of the World Bank. A Project Agreement was also signed by Dr Neeraj Kharwal, Additional Secretary (Health), Government of Uttarakhand and Mr Abdo.

Emission of Greenhouse Gases

As per the Biennial Update Report submitted by India, the quantum of India's total green house gas (GHG) emissions (excluding LULUCF) in 2010 was 2.136 billion tonnes Carbon dioxide equivalent (CO2eq). In 2010, the year for which comparable figures are available, India's emissions are lower than GHG emissions of China (11.183 billion tonnes CO2eq), USA (6.713 billion tonnes CO2eq), European Union (4.834 billion tonnes CO2eq) and Brazil (2.902 billion tonnes CO2eq).

The Ministry has notified the revised standards for thermal power plants (TPPs) for parameters such as Particulate Matter(PM), SOX, NOX, mercury, etc. and no amendment of the notified norms has been made.

Indo - Mongolian Joint Exercise : Nomadic Elephant

Twelfth iteration of Indo - Mongolian Joint Military Exercise Nomadic Elephant held at Vairengte Mongolian Army is represented by nine officers and 36 soldiers of the elite 084 Special Forces Task Battalion while Indian Army is represented by a contingent comprising of three officers, four JCOs and 39 soldiers of the Jammu & Kashmir Rifles. Nomadic Elephant is aimed at training the troops in Counter Insurgency & Counter Terrorism Operations under the United Nations mandate. The joint training will also lay emphasis on conducting operations by a joint subunit, comprising of troops from both the armies, in adverse operational conditions aimed at enhancing the interoperability between the two armies.

Transportation Infrastructure for North Eastern States

Ministry of Road Transport and Highways has formulated the Special Accelerated Road Development Programme for North East (SARDP-NE). 20 major railway projects consisting of 13 new lines, 2 gauge conversions and 5 doublings having aggregate length of 2624 kms have been taken up.

SARDP-NE Phase 'A' covering 4099 kms and Arunachal Pradesh Package of Roads and Highways covering 2319 kms, is presently under implementation. In addition, improvement of roads in the States of Assam and Meghalaya has been taken up. Construction of Greenfield Airport at Pakyong (PDC-Sept.2017) and operationalising the non-operational airport at Tezu (Ministry of Development of North Eastern Region recently sanctioned the project proposal for protection of Majuli Island from flood and erosion of river Brahmaputra under Non-Lapsable Central Pool of Resources – Central (NLCPR-Central). PDC-Sept.2018) have been taken.

'Air Sewa' Web Portal for Air Passengers

The 'Air Sewa' Web Portal and a Mobile App has been launched by the Government for convenience of air passengers. It provides an integrated common platform on which air passengers can lodge their grievances against all major stakeholders in aviation sector including airlines. A total of 1,788 grievances have been registered on Air Sewa Web Portal/Mobile App as on 21st March,2017 out of which 1,148 pertain to Airlines and 446 to Airports and the rest pertain to other stakeholders.

All complaints related to air services including flight delays; baggage loss and unusually long periods for refund besides long queues at airports can be registered using Air Sewa Web Portal/Mobile App. The complaints can be registered under specific category/sub categories such as Ticketing, Fares & Refunds, Flight Delays, Baggage, Check-in & Boarding etc. or against general category "Others".

CCRAS undertakes several projects to develop medicines for chronic and lifestyle diseases

The technology related to the drug developed by Central Council for Research in Ayurvedic Sciences (CCRAS), namely, AYUSH-82 has been given to eight manufacturing firms through National Research Development Corporation (NRDC), Dept. of Scientific & Industrial Research, Ministry of Science & Technology, Government of India. The scientific study on AYUSH-82 carried out by CCRAS has shown encouraging results. CCRAS has developed medicine for other chronic diseases like arthritis and cancer. CCRAS has developed AYUSH-SG (Sunthi Guggulu) for Arthritis and the technology has been transferred to five firms through NRDC and is available in the market. Projects on AYUSH –QOL2C for improving quality of life in cancer patients and AYUSH-Manas in Mental Retardation have been recently concluded. Further, CCRAS has undertaken work for developing AYUSH-SL for Lymphatic Filariasis, AYUSH-D for Diabetes Mellitus, Carctol-S for Ovarian Cancer and AYUSH M-3 for Migraine.

A record 47,350 kms of PMGSY road constructed in 2016-17

A record 47,350 kms of PMGSY road was constructed during 2016-17. This is the highest construction of PMGSY roads in a single year, in the last 7 years. While, 25,316 kms of PMGSY roads were constructed in 2013-14, road construction in 2014-15 was 36,337 kms and in 2015-16, it was 36,449 kms. During the period 2011-14, the average rate of construction of PMGSY roads was 73 kms. per day, which increased to 100 km per day during 2014-15 and 2015-16. For the year 2016-17, a record of 130 kms per day has been achieved, which is the highest average annual construction rate, in the last 7 years. With a view to reduce the "carbon footprint" of rural roads, reduce environmental pollution, increase the working season and bring cost effectiveness, PMGSY is aggressively encouraging use of "Green Technologies" and non-conventional materials like waste plastic, cold mix, geo-textiles, fly-ash, iron and copper slag etc. in rural roads. 4,113.13 kms of PMGSY roads were constructed using "Green" technologies, in 2016-17. This is substantially higher than 2,634.02 kms achieved during 2014-2016 and 806.93 kms achieved during 2000-2014.

Cabinet approves MoU between India and Australia on cooperation in the field of Health and Medicine

The Union Cabinet has approved the MoU between India and Australia on cooperation in the field of Health and Medicine. The main areas of cooperation include the following:

- Communicable diseases such as Malaria and TB;
- Mental Health and Non-Communicable Diseases;
- Anti-Microbial Resistance and responding to public health emergencies;
- Regulation of Pharmaceuticals,vaccines & medical devices;
- Digital Health;
- Tobacco Control; and
- Any other area of cooperation decided mutually between the two countries.

Extreme Changes in Climate

According to the Indian Meteorological Department (IMD), in line with rising temperatures across the globe, all India mean temperatures have risen nearly 0.60 C over the last 110 years. Further IMD studies have highlighted that extreme events like heat waves have risen in the last 30 years. Similarly, trends in extreme rainfall events in last century showed significant positive trend over the west coast and north western parts of peninsula.

The Government has launched the National Action Plan on Climate Change (NAPCC) in June 2008 to deal with the climate change and related issues. NAPCC comprises of eight Missions in specific areas of solar energy, enhanced energy efficiency, habitat, water, sustaining Himalayan ecosystems, forestry, agriculture and strategic knowledge for climate change, which addresses the issues relating to mitigation of greenhouse gases and adaptation to the adverse impacts of climate change on environment, forests, habitat, water resources and agriculture. All States and Union Territories (UTs) have also been requested to prepare State Action Plan on Climate Change (SAPCC) in line with the objectives of the NAPCC highlighting state specific issues relating to climate change.

Eco-Sanitation is Surely a Way of Life...

Bindeshwar Pathak
founder of Sulabh International

The celebrated novelist, E.M. Forster, the author of "A Passage to India" wrote the preface to the book 'Untouchable' by Dr. Mulk Raj Anand. A passage from the preface:

"No God is needed to rescue the Untouchables, no vows in self-sacrifice and abnegation on the part of more fortunate Indians but simply and solely – the flush system. Introduce water-closets and main-drainage throughout India, and all the wicked rubbish about untouchablility will disappear".

Bindeshwar Pathak, the founder of Sulabh International and the Brand Ambassador of Swachh Rail Mission of Indian Railways, in an interaction with Kriti Nath Jha, talks more about human rights, environmental sanitation, non-conventional sources of energy, waste management and many such social reforms...

You have spent four decades working to improve sanitation in a country where half of the population still relieve themselves in the open air. Your charity, Sulabh International, has developed cheap, eco-friendly toilets and the Prime Minister, Narendra Modi's 'Swacch Bharat Abihiyan' has enthused your mission to take it further. How do you view while walking down memory lane?

I am thankful to you for giving me this opportunity to remember the sanitation situation in India before fifty years ago. I did finish my graduation in the year 1964, became a school teacher, and did small jobs for a while. Finally, I decided to take admission in M.Sc. in Criminology in Sagar University, Madhya Pradesh. I boarded the train at Mehnar railway station, got down at Hazipur Railway junction platform to have a cup of tea. I met two of my known friends there and after having a little conversation they took out my luggage forcibly from the train and brought me to Patna to join a society – Bihar Gandhi Centenary Celebration Committee which was formed to celebrate the birth centenary of Mahatma Gandhi. To cut the story short, the centenary committee, I was asked by my General Secretary to work for stopping defecation in the open and to rescue the untouchables from the demeaning practice of cleaning night soil, which was one of the dreams of Mahatma Gandhi. I lived in the village for 18 years and in that village we have to go outside for defecation in the open. My mother, sisters, aunt, grandmother, all used to go outside for defecation as the house had no toilet.

Also there were bucket toilets used by a Zamindaar in neighbouring village which were cleaned by women manual scavenges. They are 'untouchables'. In those days toilet was a subject of taboo and nobody would like to talk about toilets and untouchables. The women had to suffer the most. They would expose to all sorts of dangers like snake bites and even animal attacks. In urban areas 85% houses used to be cleaned by untouchables. There was no public toilet and if there was any, it was like a hell on the earth. Nobody will go inside the toilet. That was the sanitation scenario in India. Only 14 towns in urban areas had sewerage system facilities and that too partially. I never knew that a time will come that I will be engaged in solving these problems.

> "Sulabh technologies have been featured as one of the five unique inventions of the world by BBC Horizon. UN-Habitat declared Sulabh technologies as one of the best practices and UNDP recommended using Sulabh Shauchalaya for replacing the bucket toilets or having a new flush toilet.

As you have rightly said, I have been working for about five decades to rescue the untouchables from the demeaning practice of cleaning night soil, to restore their human rights, dignity and to bring them on a par with others in the mainstream of society to fulfil the dreams of Mahatma Gandhi. Defecation in the open got cultural sanction in Puranic teachings, which said not to defecate near human habitation and to go at distance, dig a small pit, put some grass and leaves, then defecate. Therefore, no house even the palatial buildings of Kings and Emperors had no provision of the toilets. British rulers introduced the sewerage system for the first time in the year 1870. That technology was very costly in construction and maintenance, and also required enormous quantity of water to flush. Therefore, the system was extended to 160 towns/ cities out of 7935 (the Government notified towns/ cities are 4041). In last 146 years, there were 270 Sewage Treatment Plants (STP) established in about 1500 towns, where the pipes were laid, but there is no appropriate treatment plant for the treatment of human waste.

Mahatma Gandhi in 1915 suggested Indians to use trench latrines and the practice he suggested became popular by 'tatti pe mitti' (soil on the human excreta).

The million dollar question was still seeking answer on how to stop defecation in the open and how to end the practice of manual cleaning of night soil by the untouchables. I got a chance to go through a small booklet by Rajendra Lal Das and a book by WHO. I invented, innovated and developed the technology of two pit pour flush ecological compost toilet popularly known as Sulabh Shauchalaya. That has made the difference in the lives of untouchables and changed the sanitation scenario of India.

Sulabh technologies have been featured as one of the five unique inventions of the world by BBC Horizon. UN-Habitat declared Sulabh technologies as one of the best practices and UNDP recommended using Sulabh Shauchalaya for replacing the bucket toilets or having a new

flush toilet.

I also introduced the system of maintenance of public toilets, the technologies and methodologies for the implementation and maintenance and follow up of Sulabh technologies have brought a great impact and changed the sanitation scenario not only in India but in Afghanistan, African countries, China, Bangladesh, Vietnam etc. These technologies of Sulabh can help to achieve the target of MDG where 2.4 billion people have access to safe and hygienic toilets.

Sulabh has built 1.5 million household toilets, both in urban and rural areas and also public toilets at 8500 public places. Recently, Sulabh has built the largest public toilet complex in Pandharpur, Maharashtra. We have so far constructed eight toilet complexes consisting of 1,417 toilet units at Pandharpur. About 1.5 lakh people are using the toilets every day. In coming days, altogether 23 splendid toilet complexes consisting of 2,858 toilet units will be constructed with provisions for lavatories, bath cubicles and urinals. There will be special toilets for physically challenged people, besides 397 toilets for VIPs.

Sulabh has constructed and maintained second largest toilet in India ie., Shirdi, Maharashtra, which has 148 toilets with dressing, baby sitting, breast feeding facilities and 108 bathrooms, 2300 lockers for keeping the belongings of pilgrims. The complex is lit by electricity produced from the human excreta generated biogas plant. Approximately 50000 persons can use these facilities daily.

Under Swachh Bharat Abhiyan, there are plans to get constructed individual household toilets both in urban and rural areas, public toilets in urban and rural areas as far as possible, so that nobody should go outside for defecation. Open Defecation Free (ODF) India is the dream project of Hon'ble Prime Minister of India by 2019

"

Sulabh technologies have brought a great impact and changed the sanitation scenario not only in India but in Afghanistan, African countries, China, Bangladesh, Vietnam etc. These technologies of Sulabh can help to achieve the target of MDG where 2.4 billion people have access to safe and hygienic toilets.

and it is best tribute to pay in respect of Mahatma Gandhi on his 150th birth anniversary.

Hon'ble Shri Narendra Modi has ignited the minds of the Indians to make India clean. As the first major initiative, all 4,50,000 schools now have toilets because of the intervention of the Prime Minister of India. Public sector undertakings took up the challenge and completed it in one year. Secondly, government officials at the district level have become enthusiastic, and they are trying to achieve the target of getting toilets built for the urban districts, so that nobody should go outside.

Some individuals also have taken up initiatives like selling ornaments, cattle, and buffalo, etc in order to get the toilets built. These are really encouraging and inspiring stories.

Like in schools, the target has to be given to all the companies, who have profits more than five crores, to adopt one district, and to provide toilets in all the houses by 2019, so that the dream of Hon'ble Prime Minister of India can be achieved.

Sulabh has also harnessed "bio-gas" produced from human waste, which is used to generate electricity to power the charity's offices. The gas has also been bottled for use as fuel for cooking. Is there any plan to sell it on commercial basis?

In 1977 I got this idea that the biogas can be obtained from human excreta like cow dung and can be used for various purposes like burning lamp, cooking food, warming body and to generate electricity, etc. The percentage of biogas generated from human excreta and cow dung by and large is the same. Human excreta based biogas plant contains 65-66% methane, 32-34% carbon dioxide and rest is the hydrogen sulphide and other gases in traces. Methane is only combustible constituent in biogas that is utilized for electricity generation. Earlier to produce electricity, the proportion of diesel was 20% and biogas was 80% in dual fuel engine, but now we have replaced dual fuel engine to biogas alone and the engine is run on 100% biogas. Under this system ignition of biogas is done through battery operated spark system. The idea of generation of biogas from human excreta is an alternative source of energy. We have constructed 200 such biogas plants in India and 5 plants in Kabul, Afghanistan. In Kabul, when the temperature went down to -30°C the biogas plant functioned very well and is still functioning.

The idea behind this is, we have no sewerage system in 7935 cities and towns. Biogas plants should be used instead of septic tank where there is no sewerage system in housing

colonies, high-rise buildings, schools, colleges, hospitals, etc for disposal of human waste. The effluent discharged from biogas plant is treated through Sulabh Effluent Treatment Technology. This technology is based on aeration, sedimentation and filtration of effluent through sand and activated charcoal followed by exposure of ultra-violet rays (UV rays). After treatment the BOD is less then 10mg/l. This water can be safely discharged into any water body or can be used for horticulture, agriculture purposes or cleaning the floor of public toilets or even can be reused for flushing of toilets in drought prone area. So, human excreta based biogas plant has multiple advantages, such as improved sanitation, availability of energy and bio-fertilizer, etc.

Wherever there is a public toilet, the biogas plant can be used for selling the biogas on commercial basis, but will require more R&D.

Do you think the green initiatives of many institutions of both private and public sectors have come up with huge potential of green jobs opportunities? How Sulabh has moved to generate more such jobs in its entities?

Sulabh is giving training on a large scale to the youths whom we call the "Missionaries of Sanitation" who take forward the Sulabh Sanitation Movement and also to the masons who will construct the toilets. The amount for training will come from the Government, corporate houses, international agencies, etc. Sulabh flush compost toilet is eco-friendly, technically appropriate, socio-culturally acceptable and economically affordable. It is indigenous technology and the toilet can easily be constructed by masons, youngsters, local labourers, and materials.

Some measures have to be taken by the Government of India and the State Governments and implement them on a large scale. We have to train youths – both boys and girls as motivators to motivate, educate and train people and also to implement, maintain and follow-up the programme. Masons have also to be trained on a large scale for construction of toilets.

You have favoured Alwar and Tonk model for building toilets all across the country. How is it feasible to adopt these models to be replicated and which organization or agency should own the responsibility of the funding?

Way back in 1968, I joined the Bihar Gandhi Centenary Celebration Committee and there I invented the technology of Sulabh flush compost toilet (known popularly as Sulabh Shauchalaya). This simple invention proved to be momentous - an effective solution to the massive problem of open defecation (that was much worse at that time than it is now) as well as the liberating tool to free the suffering manual scavengers called 'untouchables' from the subhuman and health-hazardous occupation of cleaning excreta manually. Gandhiji, as many of you may be aware, was so concerned about the plight of the untouchables that he wished that he should be reborn in a family of untouchables so that he could relieve them from the sub-human occupation. I decided to fulfil his dream when I was quite young and since then this mission has became my splendid obsession.

Alongside freeing the scavengers from the sub-human work, I developed a holistic plan to restore their human rights and rehabilitate them in the social mainstream. First, I got the scavengers relieved from the work of cleaning excreta by getting the bucket toilets (cleaned by scavengers) converted into Sulabh flush toilets. The owners

of the bucket toilets did not raise objections because they got the better option of Sulabh flush toilets. Next, I set up the centres to educate the illiterate scavengers, giving them vocational training in making eatables like papad, noodles, pickles and skilled them in market-oriented trades likes tailoring, embroidery, fashion-designing, beauty-care, etc. Vocational training enabled them to earn their livelihood, freeing them from economic problems.

Our other move was to attack the caste concept of 'high' and 'low' that separates the twice-born castes from the rest of society. We helped the scavengers to perform the rituals and ceremonies of the upper castes. Initially, there was stiff resistance from the privileged castes who would not even allow the untouchables' entry into temples. Here we may recall a memorable incident: after learning that the outcastes or untouchables were denied entry into the temple at Nathdwara (Rajasthan), the then President Shri R. Venkataraman resolved in October 1988 to lead them to enter the temple. On knowing this, I decided to lead a group of outcastes to enter the Nathdwara temple. We were met with resistance. But instead of fighting them, I tried to gently persuade them and was able to lead the untouchables to enter the temple. When we returned to Delhi, the then Prime Minister Shri Rajiv Gandhi and President Shri R. Venkataraman congratulated us for the good work.

I also took lead to enable the 'untouchables' to enter the temple in Alwar, Rajasthan. Initially there was opposition from the Brahmin families, but after our intervention they relented and allowed entry of the untouchables into the temple. We also helped the erstwhile untouchables to perform prayers and observe rituals of the privileged castes. We took them to Varanasi to take a dip in the sacred Ganga after which they offered prayers to Lord Shiva at the Vishwanath temple. After that 200 Brahmin families had meals with them. This had never happened before. Subsequently, we also took them to the holy shrine of Ajmer Sharif and the sacred Cathedral Church, New Delhi. They also visited a Gurudwara in Delhi. Thus, the people of different faiths and castes accepted the former untouchables. We took them to the temple, the mosque, the church and the gurudwara so that they can socially integrate with others.

Through these measures we succeeded in emancipating the scavengers as well as making two towns of Rajasthan—Alwar and Tonk—scavenging-free. The scavengers now freely mingle with the privileged-caste families, including those that had earlier employed them to clean and dispose night soil. Now they sit together for tea and breakfast. The scavenger women do the facials and beauty-care work for the upper-caste women. They are no longer discriminated against in the marketplace while shopping or buying fruits and vegetables. This shows a significant change in the people's attitude. Alwar and Tonk are now free of untouchability. We have brought the untouchables into the social mainstream. We have fulfilled the dream of Gandhi, following his model of leadership through service.

If the Government of India/ state government or any other agency want that manual scavengers should be relieved from their sub-human occupation, rehabilitated and brought into the mainstream of the society then they can follow Alwar & Tonk model.

Do you think the PPP model in solid waste management would yield desired result and a more sustainable environment could be achieved without jeopardising the environmental fabric?

Solid Waste Management is a problem in this country. From more than 3-4 decades, several attempts were made to generate biogas, and to convert it into energy, and also to maintain fertilizer out of the waste material. It has succeeded to some extent, but not on large scale. In some states like Chennai, it has also got constructed roads for few miles from the waste materials. Although R&D is being done, but at present lands can be filled up, fertilizer can be manufactured but no definite and conclusive technology has been evolved in India for solid waste management. It may be the Government of India or the State Governments or any other national or international agencies can develop full proof knowledge about this technology. Although all are trying to find out the solution, but success rate is not very encouraging.

Empowering Girls, Empowering India

Prayas JAC Society is a national level non profit organization registered in 1988 under Society Registration Act 1860 is working towards the rights and protections of children, youth and women. Touching millions lives through education, nutrition, health services, vocational training, life skill program, family counselling services, rape crises intervention centre, skill building, rescue and rehabilitation of children from child labour, human trafficking, social and economic empowerment. Presently, working in Delhi, Bihar, Assam, Arunachal Pradesh, Andaman & Nicobar Islands, Rajasthan, Gujarat, Haryana and Jharkhand

Support us to touch lives. Contribution can be made from abroad through FCRA Account
State Bank of India, Jahangirpuri New Delhi-110033, Account No: 10666744245, Swift Code: SBININBB544
All support will be exempt from Tax under Section 80 G and Section 35 AC.

Prayas JAC Society, 59 Tughlakabad Institutional Area, New Delhi-110062
Telephone: 011-29956244, 29955505, Website: www.prayaschildren.org
Email: info@prayaschildren.org, vishwajeetghoshal@gmail.com, Twitter: @ PrayasNGO
Facebook: Prayas-An Endeavour to make Difference

Vehicle & Fuel Technologies for Sustainable Mobility

Dr Praveen Gedam
Transport Commissioner,
Government of Maharashtra

Smart Mobility is an integrated transport activity through technology with various sustainable and safe transport options. Dr Praveen Gedam, Transport Commissioner, Government of Maharashtra shares more in an interaction with Swati Sharma, Governance Today…

What are the favourable and challenging factors for smart mobility in Maharashtra?

Travelling from point to point and reducing the need of travel are the more important factors.

The major modes of Transportations are rail based mass transport, metro; bus based mass transport and road transport. Though most of the movements in Mumbai are in North-South direction in the morning and South-North in the evening and are well connected by Rail transport, hence the East-West connection is mostly available by buses or private vehicles.

Smart Mobility is an integrated transport activity through technology with various sustainable and safe transport options. With the increase in population of Mumbai, the transportation systems is impacted, resulting into increasing congestion, delaying commuters, burning up fuel, and harming the environment. The smart Mobility solutions are for integrated city management by improving mobility for citizens through operational efficiency and smart information. So, various modes of transport should be integrated, including change in mixed land use and promoting public transportation.

What are the various initiatives of Transport department of Maharashtra that make transportation green, efficient and inclusive?

My department is concerned with licensing and registration of vehicles and gives permits to taxi and auto-rickshaws. The other agencies are local city government and police (Traffic Police). There are two operational aspects in this corporation; one, that takes care of infrastructure like roads and bridges and the other that looks after metro and city buses. Our role is to ensure regulations for mass mobility like keeping the transportation in order by using clean fuel.

“The smart Mobility solutions are for integrated city management by improving mobility for citizens through operational efficiency and smart information. So, various modes of transport should be integrated, including change in mixed land use and promoting public transportation.

What best ways has the department adopted to decarbonize Transportation?

Our aim is to make public transportation based on clean fuel. First of all, all buses run on clean fuel. So also, all taxis and auto-rickshaws ply on clean fuel. The transportation on all weather roads is to be used by vehicles that use clean fuel. We are encouraging citizens by giving them various incentives to use clean fuel rather than polluted fuel.

What are the e-governance initiatives undertaken by your department?

Our database is huge and we are making it available online. There are fifty offices of transport-related work that are functioning in Delhi. 24 of them related to vehicles registration have been made online and 13 offices related to driving licensing are now online. Rest of them will also be made online, once back-end data is made available to us.

The country is now talking of the 4th industrial revolution. What are the main convergence point of a Digital Maharashtra, new technology paradigm and the industry engagement?

We have set up call centres and launched citizen centric web based App. At the moment, we are providing 100 services. Technology is not a problem; rather it takes care of the magnitude of work. The various data available is still on paper. Vaahan and the Saarti systems, where in, basically computerized databases of all vehicles and all drivers need to be scanned and uploaded. What policies we have regarding those should be properly rolled out.

There are around three crore driving licenses and around 2.75 crore registered vehicles. This will grow further.

How can investments in this sector improve access across the regions rather than looking solely at potential time savings through smart transport?

The different modes of transportation are run by different agencies like BEST (Brihanmumbai Electric Supply and transport), MRVC (Mumbai Rail Vikas Corporation), MSRDC (Maharashtra State Road Development Corporation), MCGM (Municipal Corporation of Greater Mumbai), MMRDA (Mumbai Metropolitan Region Development Authority), Integrated Public Transport system (IPTS). They construct roads and bridges and also collect toll tax on EPC or PPP basis with huge investment involved in various projects undertaken by these agencies. So, once projects related to them get completed, it will naturally be beneficial for commuters.

What are your expectations to engage stakeholders including logistics industry and others, if any?

It is in terms of frequency, number and comfort level of vehicles. It is common expectation that commuters avail best of services from various fleet owners in the transport sector, whether it is private or public.

ZEBRA

REINVENTING RETAIL

With an aim to provide solutions and services that give enterprises real-time visibility into their operations, Zebra Technology Corporation revealed the results of its Retail Vision Study for 2017. The research study analyses the technology trends shaping the future of the global retail industry and enhancing the shopping experience. It further brings out the current challenges and untapped opportunities for retailers, and reveals the industry's plan to adopt more Internet of Things (IoT), Artificial Intelligence (AI) and online platforms in Asia Pacific (APAC). While releasing the report, Zebra also announced the availability of its new TCS series touch mobile computers and the DS2200 and DS8100 series handheld 2D scanners in India. The retailers in India may also expect increased visibility and productivity by using these new mobile computing technologies:

- It offers to ensure seamless integration, increased productivity and secure operations; the TC5 Series is supported by Mobility DNA, the industry's most comprehensive suite of application security, development tools and mobile end-user apps.
- Enterprise functionality and durability of the TCS series that would ensure that it can withstand the rigors of field mobility duties. It also provides the operational ease of support for a better total cost of ownership (TCO), as well as the fastest, most dependable wireless connections inside or out on the field.
- The DS8100 enables retailers to increase productivity of cashiers to shorten queues at checkout, as its superior scanning range enables cashiers to easily scan items in customers' shopping carts without leaving the register.
- Small- and medium-sized enterprises can benefit from upgrading to the latest 2D scanning technology with the cost-effective DS2200 series scanners.

While briefing on the Zebra' Retail vision, Deep Agarwal, Regional Sales Director – India, Zebra Technologies APAC said, "The retail industry is experiencing a convergence of the physical and online worlds – which we call 'phygital'. Shoppers today are technology-savvy and have high expectations for a digital and connected shopping experience, creating both challenges and opportunities for retailers vying for sales on all platforms. As the omni-channel approach picks up steam, implementing the right visibility technologies from the warehouse to the storefront is instrumental in fulfilling orders, scheduling for fast deliveries, and personalizing the experience for different shoppers. Zebra is committed to helping customers strive in the dynamic retail landscape by bringing to them technology that facilitates a successful omni-channel transition and offers increased visibility into their operations, associates, inventory, and shipments."

The continued rise of online shopping will further build the

momentum for an omni-channel retail format, challenging retailers to provide unprecedented levels of convenience to drive customer loyalty. In Asia Pacific, 88 percent of retailers expect to support buy online, pick-up in store within the next four years to further increase omni-channel shopping. Retailers that incorporate data analytics into their business operations are poised to generate an estimated 5 percent productivity gain than their counterparts. Sophisticated analytics platforms can translate market-basket data into executable insights for retailers who can then adjust their merchandising strategies.

- By 2021, nearly 76 percent of retailers in APAC will be able to customise the store visit for customers as a majority of them will know when a specific customer is in the store. This will be enabled through technology such as micro-locationing retailers to capture more data, accuracy and customer insights.
- Retailers are looking to create a seamless shopper experience with 76 percent of APAC respondents reporting that it is important or business-critical to integrate e-commerce and in-store experiences.
- To speed up checkout lines, retailers are planning to invest in mobile devices, kiosks and tablets to increase payment options. In APAC, 86 percent of retailers will deploy mobile point-of-sale (MPOS) devices by 2021, enabling them to scan and accept credit or debit payments anywhere in the store.
- eventy-two percent of retailers in APAC rate managing big data as important or business-critical to their operations. Many of them anticipate investing in predictive analytics, software analytics for loss prevention and price optimization, and cameras and video analytics for operational purposes and the customer experience.

According to the survey, the top sources of shopper dissatisfaction include inconsistent pricing between stores and the inability to find a desired item, whether it's out of stock or misplaced within a store. 73 percent of retailers plan to fix these issues by reinventing their supply chains with real-time visibility enabled by automation, sensors and analytics. Retailers are investing heavily in revamping the supply chain, with a laser-beam focus on tracking the status of items n their way to customers. They are also adopting enhanced visibility in the form of RFID technology into their supply chains and cut cost in a long run. RFID can increase inventory accuracy from 65 percent to as high as 95 percent, while reduce out-of stocks by 60 percent to 80 percent. Item- level RFID also generates hikes in the number sale items per transaction by as much as 19 percent, and a rise in the number of transaction by 6 percent.

Zebra's 2017 Asia Pacific Retail Vision Study reveals a high-tech makeover of retail operations to simplify, enliven and customize the shopper experience to meet the demands of today's savvy, empowered customers.

TECHNOLOGY TRENDS

% OF RESPONDENTS PLANNING INVESTMENTS BY 2021

2021 **68%**
INTERNET OF THINGS

2021 **65%**
MACHINE LEARNING / COGNITIVE COMPUTING

2021 **57%**
AUTOMATION

73%
of retailers plan to reinvent their supply chain with real-time visibility enabled by automation, sensors and analytics.

Stores are banking on the shift to phygital – the digitization of the in-store experience – to improve the customer journey.

68%
of retailers plan to Invest in smart sensing for inventory management.

72%
of retailers rate managing big data as important/ business critical.

BY 2021:
76%
of stores will know when specific customers are in the store, and be able to customize the visit.

88%
of retailers will implement buy online, pickup in store by 2021.

76%
of retailers rate integrating e-commerce and in-store experiences as important/ business critical.

EMPOWERING FRONT LINE WORKERS

% OF RESPONDENTS PLANNING INVESTMENTS BY 2021

86%
MOBILE POINT-OF-SALE DEVICES

84%
MOBILE COMPUTERS WITH SCANNERS

86%
TABLETS

77%
KIOSKS

ZEBRA

FOR MORE INFORMATION, VISIT WWW.ZEBRA.COM/RETAIL

India Skills Towards

Skill Assessment

- PMKVY under NSDC
- NON PMKVY(RSLDC , UPSDM, MoRD, etc.)
- SDMs (State Scheme Missions)
- MES scheme under DGT
- CSR Programs
- THIRD PARTY Certification

Quality Assurance

- Assessment Quality Verification
- Customer Excellence Monitoring System
- Data centre management
- Monthly Internal audits

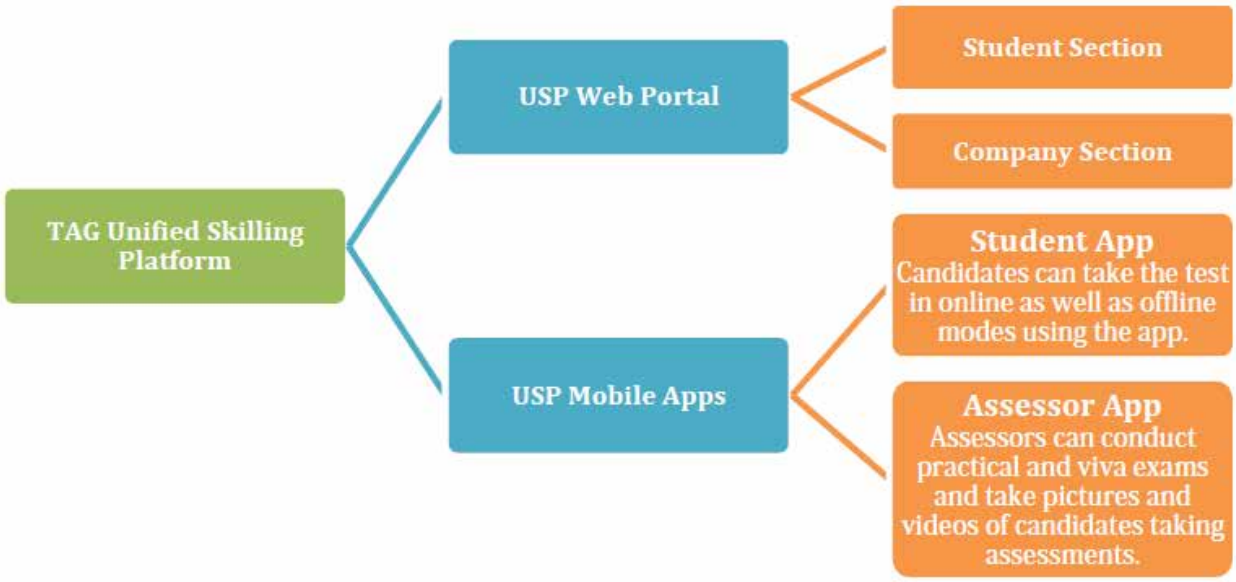
VISION
Improving Livelihoods of people globally by providing best in class skill assessment practices.

MISSION
Build an Ecosystem to ensure that every assessment we do is in-line with quality accreditation standards and delivered with integrity.

IndiaSkills

Working Towards Building National Skills

Skilling India Goals



INDIA SKILLS PVT. LTD

India Skills Pvt Ltd (ISPL) is one of the leading PAN INDIA Assessing Bodies for all the sectors, accredited by Directorate General of Employment and Training, Ministry of Skill Development & Entrepreneurship for conducting skills assessments under Modular Employable Scheme (MES), other Central & State Government Schemes to create a reliable and proficient INDIA. ISPL conducts evaluations for the skilled, semi-skilled and unskilled workforce in all businesses/sectors and has spanned more than 400,000+ lives (majorly in the semi-skilled sector) through skills assessments. ISPL also works jointly with National Skills Development Corporation (NSDC) of India and various Sector Skill Councils (SSC) supporting the Ministry of Skill Entrepreneurship and Development. Assessors and Subject Matter Experts are selected from topmost Institutes and Organizations of India. ISPL majorly concentrates on Skill Assessments and Quality monitoring system with a focused concept.

ISPL consists of an actively committed team with a proper structure for handling the center validation of Training partners to conclude if the centers comply as per the specifications organized by Sector Skill Councils (SSCs). We also operate towards assuring that the trainees are to given the quality training needed, as per distinct job roles at the center. Moreover we develop a Rating Metrics System to incorporate the Centers.

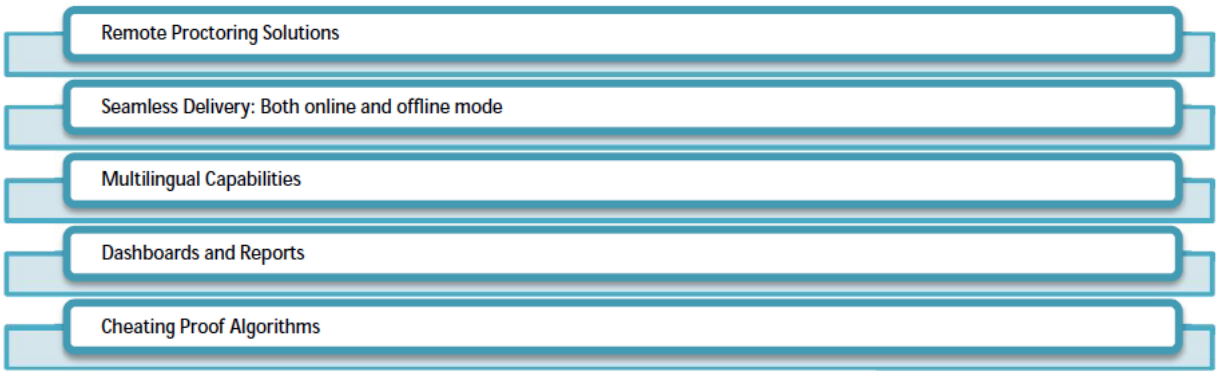
TAG SCORES-TECHNOLOGY PLATFORM

TAG Scores is the technology platform of India Skills Pvt Ltd providing top of the line, cutting edge technologies that enable e-assessments in multiple settings. We have built a visionary platform that incorporates several new to market features in order to tackle the multiple challenges and obstacles faced by organizations while implementing their skill assessment initiatives such as authentication of candidates, preventing cheating, addressing language needs, verification of assessors, ensuring seamless assessments in areas of poor internet connectivity and providing deep insightful analytical reports.

Platform Architecture

TAG USP Portal (Unified Skilling Platform): The web portal has two sections, one for organizations and second for candidates. Organizations can manage their

Salient Features



profile, purchase standardized tests or request for customized assessment solutions for their existing and new employees, schedule their tests, get skill gap analysis reports and view proctoring details, analytical reports and statistics. Individuals can manage their profile, view our test repository, add tests to their cart, take exams ,view past results and identify areas of improvement. The candidates can take assessments on a web portal or a mobile app. There is also a mobile app for Assessors who would be able to authenticate the students using it.

India Skills towards Skilling India Goals

Skill development is significant for achieving accelerated, sustainable and inclusive growth on the one hand and for fulfilling enough employment opportunities to the growing young population on the other.

India Skills Pvt Ltd, appreciate various initiatives and efforts for "Green Jobs for Future: Towards Skilling India Goals 2030" which will make a positive impact. However, there is a need to further development and empowerment of human capital to ensure the nation's global competitiveness.

SCGJ have focused on understanding short term and long term skill needs of the sector, kind of skill sets required to fulfill the goal of 2030 and create an ecosystem for delivering quality training.

Skill development is critical for achieving faster, sustainable and inclusive growth on the one hand and for providing decent employment opportunities to the growing young population on the other.

Government has also planned to set up Indian Skill Development Services (ISDS) which has been created for the Training Directorate of the Ministry of Skill Development and Entrepreneurship. However, there is a need to further develop and empower the human capital to ensure the nation's global competiveness. Against this backdrop SCGJ highlights the key issues for the sector and the need for favorable regulatory support and farsighted intervention to help realize its growth potential.

According to the International Labour Organization, "Skill development is of crucial influence in inciting a sustainable growing method and can make a contribution in facilitating the transition from an informal to the formal economy. It is also imperative to discuss the possibilities and difficulties to match new demands of growing economies and distinct technologies in the connection of globalization."

Skill development is a critical ingredient for achieving faster, sustainable and inclusive economic growth.In a globalized and multicultural world, skill development supports to generate a workforce enabled with imperative skills, knowledge and globally recognized certifications to obtain access to quality

"We want to go for the capacity building of such young people. My brothers and sisters, having taken a resolve to enhance the skill development at a highly rapid pace, I want to accomplish this."

-Hon'ble Prime Minister of India, Shri Narendra Modi Independence Day 2014 Speech

employment and guarantee competitiveness in the global market. It also points at enhancing the productivity and employability of the workforce and enhancing its inclination to accommodate to improving technologies and labor market demands.

India is blessed with the second largest working population in the world after China. It is estimated that by 2022, 63 percent of our population will be in the working age group. This translates into an enormous number in absolute terms. We are also one of the few countries where the working age population will be far more than those reliant on them, for at least 3 decades till 2040, as per the World Bank. It would be a possible source of strength for our economy provided we can impart and continuously enhance the skills of our community. In this circumstances, mentoring, skilling and implementing productive employment to our teeming millions, especially the youth, becomes a matter of highest priority to reap the advantages of the 'demographic dividend' and also to develop as the skill capital of the world.

As the Indian economy continues to evolve, large-scale sectoral variations in the employed society are determined, particularly from agriculture to manufacturing and services sectors. These areas, nevertheless, demand significantly diverse and frequently specialist skill sets, which need training and skill development. It is this skill gap which also requires being spoken through extensive efforts, at various levels, including schools. The initiative of organizing the Summit on "Green Jobs for Future: Towards Skilling India Goals 2030" is an excellent one, as it provides all stakeholders a robust platform to discuss and deliberate on issues of mutual concern and interest.

India has witnessed rapid growth in recent years driven by the increase in newage industries. The increase in purchasing power has resulted in the demand for

> "We all have to come together to Make in India and Skill India mission successful."

a new level of quality of service. However, there is a growing deficit of skilled labor in the nation. In the earliest stage of the growing financial conditions, it is imperative to focus on instilling and developing the skill sets of the young population of the country. Today, the world and India need a skilled workforce. If we have to promote the development of our country then our mission has to be 'Skill Development' and 'Skilled India'. Millions and Millions of Indian youth should acquire the skills which could contribute towards making India a modern country

India has constantly emerged as a knowledge-based economy due to the plenty of proficient, flexible and qualified human capital. However, there is a need to develop further and empower the human capital to ensure the country's global competitiveness. Notwithstanding the emphatic stress laid on education and training in this country, there is still a shortage of skilled workforce to discuss the mounting requirements and interests of the economy. As an instantaneous demand that has primarily derived from the current scenario, the government is dedicatedly endeavoring to begin and accomplish. formal/ informal skill development of the working population via education/ vocational training/skill training and other upcoming learning methods.

Conclusion

Presently India is facing some challenges in skill development. The major challenges are Participation, Infrastructure, Awareness and Implementation.

India has a large industrial base across sectors ranging from pin manufacturing to automobile which requires large no of skilled people. A Boston Consulting Group study for PHD Chamber of Commerce & Industry has estimated that by 2020 the world will have shortage of 47 million working people but India will have a surplus of 56 million people. In order to reap the benefits of demographic dividend India will therefore have to equip this manpower to meet the requirement of skill talent across geographies. India has a large population base of 1.25 billion with a demographic shift in favor of working age group (15-59 years). While the overall population is projected to grow at 1.4% over the next five years the working age is expected to grow at 2.15%.

India's skill development initiatives of skilling approximately 500 million people will not only benefit India but also make India the 'global manpower hub'. Among the developing countries of the world, India has the highest potential to meet the skill gap with its large, young, English speaking population. The world shortage of skilled manpower will stand at approximately 56.5 million by 2020.

With a target of skilling 500mn by 2020, India can not only fulfill its own requirements but can also cater to the labour shortages in other countries such as the U.S., France and Germany. Presently 80% of the workforce in India (both rural and urban) does not possess any identifiable or marketable skills.

Therefore, bridging this gap (through the various skill development initiatives) could make India the global hub for skilled manpower, and also result in a surplus of skilled manpower of approximately 47 million by 2020.

MITCON: Developing skilled manpower for future

MITCON Consultancy & Engineering Services Limited, listed on SME Platform (Emerge) of having an experience of over three decades in providing consultancy and engineering services. It is headquartered at Pune (Maharashtra) and has presence across the country through its regional offices at Mumbai, New Delhi, Ahmedabad, Chennai, Bangalore, Nanded and Nagpur.

Incorporated in April 1982, MITCON`s key shareholders includes SIDBI, SICOM Ltd. and nationalized banks, financial institutions and state government development corporations. Over the last three decades, the Company has gained proficiency in providing corporate solutions in power, energy efficiency, renewable energy, climate change and environmental management sectors and it has also diversified into providing services to banking, infrastructure and biotechnology sectors.

MITCON is registered as training partner of NSDC for developing skilled manpower. We regularly gets support for conducting Skill and Entrepreneurship Development Programmes from Ministries of Central and State Government Departments / Agencies including NABARD, Ministry of Food Processing Industry, Department of Science and Technology, Govt. of India, New Delhi, Ministry of Heavy Industries & Public Enterprises, Govt. of India, New Delhi, National Institute for Micro, Small & Medium Enterprises, Ministry of MSME (NI-MSME), Hyderabad, etc.

MITCON provides solutions to its clients depending on their requirements inter alia including Feasibility Studies, Detailed Project Reports, Techno Economic Feasibility Report, Financial Syndication, Lenders Engineer Services, Environment Impact Assessment (EIA), Basic and Detailed Engineering, Bid Process Management, Project Management, Cluster Development, Technical/ Financial Restructuring, Energy Audits, Corporate Debt Restructuring, Due Diligence, Qualitative and Market Research, Assets/ Business Valuation and Consultation Services in wind power project. MITCON also conducts IT based training courses and skill based training programs. The Company owns a wind power plant at Idukki, Kerala with installed capacity of 0.75 MW.

It provides Consultancy and Engineering Services

to various sectors through business divisions such as Power, Energy and Carbon Services, Environment Management and Engineering, Infrastructure Consulting Group, Banking and Financial Solutions, Agri Infra & Food Consulting, Bureau of Market Research, Clusters-Infra & Textiles Cell, Securitization and Financial Restructuring, Biotechnology and Pharmaceutical Centre, and conduct IT based IT training programs through Entrepreneurship & Vocational Training, Multi Skills Development and MITCON e-school.

MITCON has so far conducted large number of micro enterprise development programmes all over the State particularly in rural areas. MITCON has got more than 50 Entrepreneur Facilitators working in the State of Maharashtra with having well equipped offices at district headquarters. MITCON has a very good network with NGOs engaged in micro credit activities. Apart from in-house pool of facilitators and consultants we closely work with developmental agencies, management experts, technology-providing institutions, financial institutions and NGOs engaged in micro credit/ micro enterprise activities.

It also has established Technology Business Incubator (TBI) with the help of Department of Science & Technology, Govt. of India and APCCT New Delhi. MITCON TBI is recognized by DSIR, Govt. of India. Here we are providing facility for incubation to various entrepreneurs those who want to set up their enterprise. Under different schemes of MSME, we are supporting innovative ideas from conceptual stage to prototype development. We are developing trained manpower in the sector of Clinical Research, Industrial Biotechnology and Medical Coding Billing.

It is also a resource organisation and a nodal agency to impart training under various schemes promoted by the Government throughout the State of Maharashtra. We are developing skilled manpower & providing wage/self-employment opportunities in the sector of Solar Energy. These programmes are sponsored by National Institute of Solar Energy (NISE), in Maharashtra, Madhya Pradesh, Rajasthan, Jharkhand & Chhattisgarh.

MITCON is Hand Holding Agency for implementing Stand Up India Scheme at National Level, implementing Special Project for developing skilled manpower sponsored by Jharkhand Skill Development Mission at Ranchi.

Harvesting Talent to meet the demand

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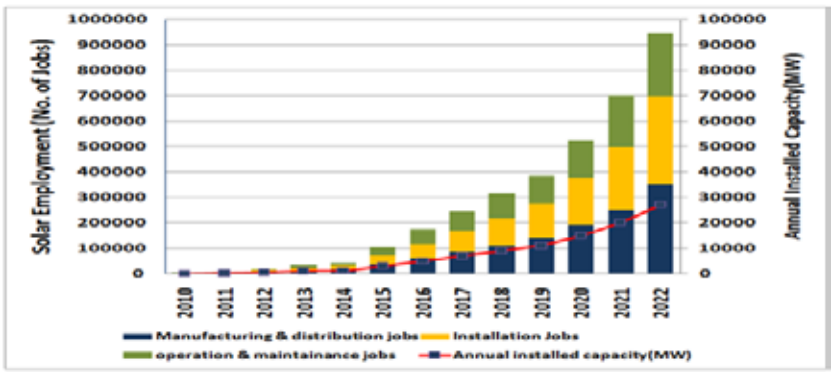
We are a unique source for all Solar PV Technology professionals. Our exhaustive data bank has professionals for all your needs including Design, Manufacturing, Installation, Commissioning, O&M, Projects Management, Business Development and System Integration. With ethics as our hall-mark, we source the right candidates using our proprietary search mechanism. Our specialty is in renewable energy. The active profiles in our data base range are across all levels, that is: Project Head, EPC Head, Project Directors, Manager Projects, Purchase Manager, Engineer, Procurement Manager, Supervisors, Technicians and Operation & Maintenance professionals etc.

We provide professionals who are ready to deliver their services from Day 1, and, therefore, you need not spend your time and money to train them. We also work in a scenario, wherein our customers can opt for temporary work-force without creating a perpetual liability for themselves.



In this context we also provide Freelance Qualified Professionals, which are of particular need for start-ups, therefore, creating a win-win situation for both employers and job-seekers. We ensure that you have the right resources when you need.

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Highly skilled and dedicated I & C team at Solar Energy Workforce ensures completion of each solar power generation plant from concept to commissioning including its operation and maintenance for the complete lifecycle of the plant.

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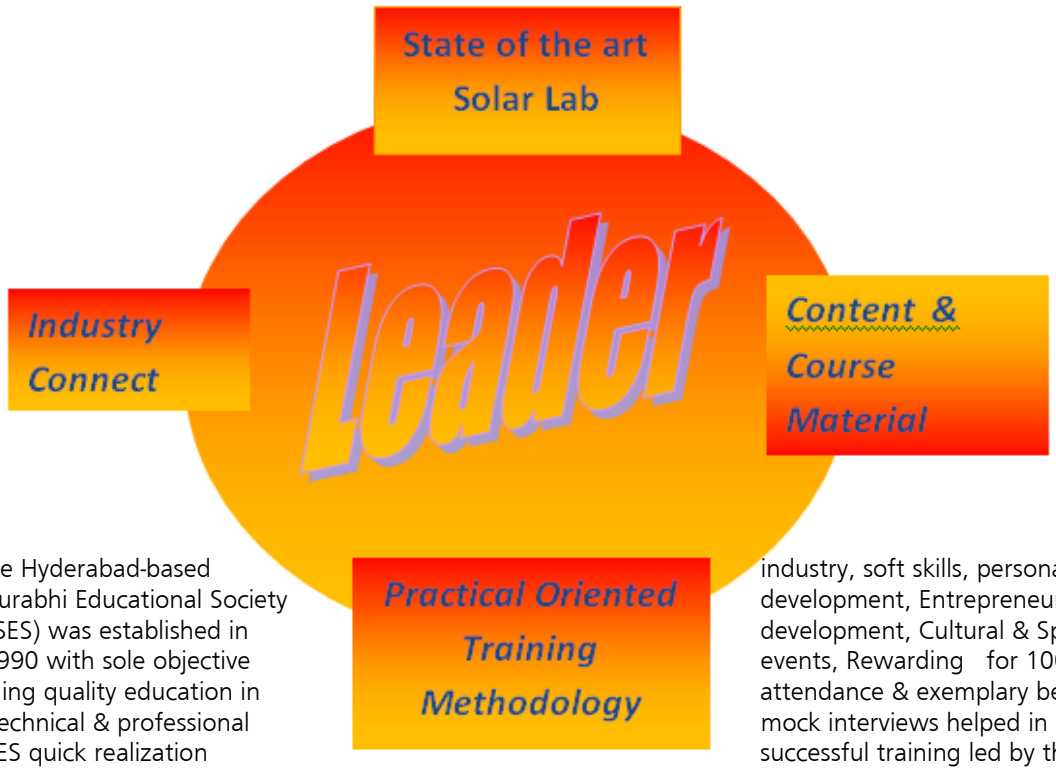
Solar Energy Workforce offers and provides a comprehensive O & M service with the highest quality, tailored to the client's needs for solar PV generation. We under-take Maintenance contract for Operation& Maintenance of Rooftop/Grid Utility Solar power plant

Training for SPV Professionals

The following graph shows the projected requirement of demand for various professionals in solar industry as a function of growing solar installations. In this context, we enable professionals to acquire adequate hands-on experience to enhance their "Employability".

Surabhi: Setting Goal to achieve its target in RWE Industry



The Hyderabad-based Surabhi Educational Society (SES) was established in 1990 with sole objective of providing quality education in various technical & professional fields. SES quick realization regarding the skill gap in the renewable energy sector that resulted in laying the foundation of Surabhi Institute of Renewable energy (SIRE) in October-2014. SIRE started practical orientation courses such as Suryamitra, Solar PV Engineers & Solar Entrepreneur's to address the skill gap.

It had developed state-of-the-art solar lab with live working models such as 3KW Fixed Axis, 250W Trackers, 1KW Dual Axis System, 3HP Solar Water pump with VFD, Solar Street lighting, Solar Home lighting Systems, lab equipment & tools, Safety equipment etc.

Experts from the solar industry were also roped in for creation of the content and syllabus based upon the guidelines from NISE and requirement of the industry in a bid to ensure seamless transformation of the trainees.

Practical oriented Training methodology such as daily recaps, working on live models, weekly tests, exposure to real world industry, soft skills, personality development, Entrepreneurship development, Cultural & Sports events, Rewarding for 100% attendance & exemplary behaviour, mock interviews helped in successful training led by the Institute's expert faculty, and it is proud to say that it had achieved 98% results in the assessment conducted by Skill Council for Green Jobs(SCGJ)

In fact, practical oriented training methodology came handy in filling the gap needed in the industry through Industry Connect program. Surabhi claims to produce 500 (360 Suryamitra's + 140 Solar PV Engineers) more than 70% of them are placed in MNC's, Solar Roof-top companies, Module manufacturing etc.

Solar Power for Micro Entrepreneurship

Institute of Solar Power Technologies & Vocational Training (ISPTVT)

C Vamsi Krishna, CEO

Few entrepreneurs find themselves in the position of C Vamsi Krishna, CEO of the Institute of Solar Power Technologies & Vocational Training and also of Solar Home Solutions in Hyderabad. When Vamsi Krishna left IIT Chennai in 2008, he knew as an entrepreneur that a vast market would be available for his passion.

Vamsi Krishna's passion is solar power. In a time of climate change and precarious resources of oil, coal and water, he is convinced solar power can be the most widely used form of energy in India. On ground research gave him the grounds on which to establish his business: vocational training for rural micro solar entrepreneurs- people who would install and maintain solar power equipment.

In his estimate, at least one million people could benefit from formal vocational training in solar power. Although he had a poor response when he began, but training was always his primary objective. He faced lot of challenges as they were the first entrants to this field. Because there had never been any training in this field, there was no training content available. With some other constraints and on ground challenges, the training process was slow in the initial years. However, in 2014-15, he trained 180 people under the MNRE patronage, which marked the start of his success.

ISPTVT also works with National Skills Development Corporation. Subsequently, it became a professional training associate of the Khadi & Village Industries Commission. Ministry of Skill Development & Entrepreneurship also promotes its scheme to trainee students who aspire to become entrepreneurs.

'We are happy to learn the formation of Skill Council for Green Jobs in 2015 to give renewed focus to skill development training in the solar energy domain. Ever since ISPTVT has been working closely with SCGJ as a training partner', Vamsi Krishna says.

Most recently, ISPTVT has introduced an e-Learning module in collaboration with SCGJ on its website.

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For Query Contact to:

Ms. Swati Sharma
swati@governancetoday.co.in, Mobile: 7835038419.
Ms. Vaishali Gupta
vaishali@governancetoday.co.in, Mobile: 7840086705.
Mr. Siddharth Verma
siddharth@governancetoday.co.in, Mobile: 9811561645.

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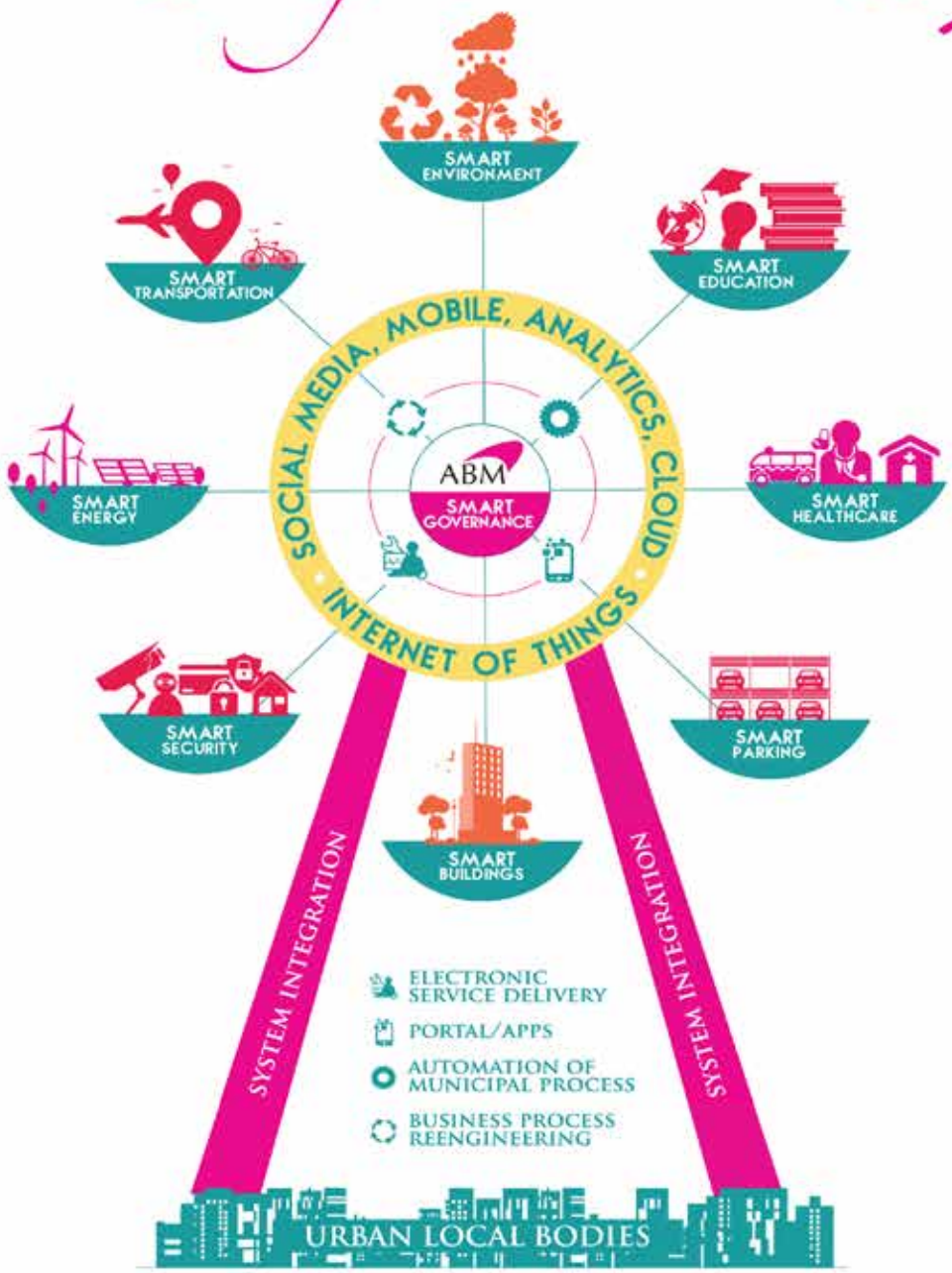

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