TCExpression

TATA CONSULTING ENGINEERS LIMITED

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The Internet of all things

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Editor's Note

A brand new year walks in with renewed hopes and aspirations. We at TCE are as hopeful
and buoyant as ever. We look far ahead and adapt to change and usher in the NEW – New
technologies, new ways of adding value, new value propositions and new ideas. The Internet
of things is no longer the new kid on the block. While the Internet of Things has already
touched our lives, we at TCE ae reaching out to help revolutionise industries with the
Industrial Internet of Things. This TCExpression covers the topic which is most talked
about now. We look forward to your thoughts and ideas on this.
Please do mail us at TCExpression@tce.co.in

Mallika Sriraman

Reflections

Dear Friends,

We are in the midst of the festive season and the air is charged with positivity and cheer. At Tata Consulting Engineers, this is a season of new beginnings. I am glad to announce that our corporate office in Mumbai has moved to a larger space with state-of-the-art infrastructure. This opens up new possibilities for TCE as we plan to scale our services and operations. The offering around global and virtual delivery platforms has truly fructified with our Dedicated Engineering Centres alongside our strengthened EPCM, Concept to Commissioning projects leveraging Design, Engineering and Project & Construction Management housed under one roof in our sprawling 90,000 sq ft Mumbai facility.

Just as the festive season is all about camaraderie and connections, we are increasingly moving to a collaborative environment and its heartening to see the WoW (our Way of Working process) with 3D/4D toolsets gradually but surely getting embedded on our projects. This edition of TCExpression brings to you a peek into the Industrial Internet of Things (IIoT). TCE now offers engineering services and consulting solutions for plants and facilities to transition to IIoT, the next generation of the industrial revolution. IIoT is all about collaboration, visualisation, data analytics and digitalisation and we have compiled the essence of Industry 4.0 in the Cover Story. In the domestic markets, we are creating credible footprints in the smart city arena. As our involvement in some of India's smartcities takes shape, we bring to you some key innovations that will redefine how people live and conduct themselves in these model towns of the future.

The common thread in all of this is sustainability and efficiency; renewable energies in smart cities and digitalisation for greater sustainability, the thought process has already set in. Keeping this in mind, let us pledge to come together and collaborate – to build a sustainable world.

Here's wishing all our readers a sustainable future from 2018 and beyond.

Amit Sharma
Managing Director

Contents

Business Brief

Project Patchwork

TCE Triumphs

Technovation

The Internet of all things

TCEndeavour

The Internet
of *all* things

Nothing has confounded human kind more than the new buzzwords in the industry – Industry 4.0 and Industrial Internet of Things (IIoT). There is 'smartness' all around us – smart grids, smart sensors, smart meters, smart cities and more. These are times when hardware and software converge, enabling machine to machine transfer of information. When every day appliances are talking and learning, should high-end industrial assets be left behind?

Have you ever realised that of late you are calling out to OK Google, Alexa or Siri more often than your spouse or kid's name? Can you still call your television an 'idiot box', especially when it is smartly collating data on your entertainment preferences and patterns – a key decision-making tool to television advertisers and content feeders? Google search is indeed a retail service that even your grandmother is now familiar with. Today there is a bot out there behind every online market place you visit, every page you view on the internet. While we may not be conscious of the machinations of cloud computing, artificial intelligence, etc., we are directly experiencing these in retail banking, financial services, online retail, etc. The machine learns your preferences when you shop and targets you with advertisements that are relevant. As soon as you land on a financial services website, there is an 'avtar' asking you what you are looking for and presenting to you all that you need. Simple day-to -day machines such as washing machines with fuzzy logic that 'knows' how much water to use and how many wash cycles to include based on pre-programed logic are very basic instances of smart machines. We have taken all these in our stride.

These are times when hardware and software converge, enabling machine to machine transfer of information. When every day appliances are talking and learning, should high-end industrial assets be left behind?
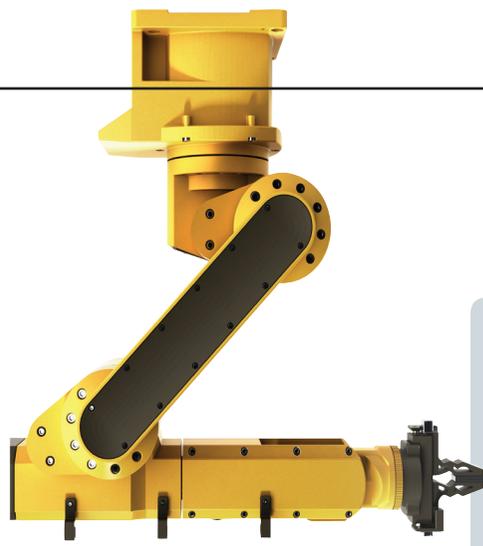
Jargons demystified

IoT (Internet of Things) is referred to connected network of things – (where things could be objects, appliances, handsets or even people).

Industry 4.0: Various industrial revolutions have brought about disruptive trends. Industry 1.0 caused disruption with mechanisation, steam power & hydro power; Industry 2.0 brought in electricity, mass production, assembly line etc; Industry 3.0 was all about automated and computerised systems; Industry 4.0 is bringing about disruption through cyber physical systems connected to the internet and using big data to bring about greater efficiencies.

The IIoT Bogey Man

Nothing has confounded human kind more than the new buzzwords in the industry – Industry 4.0 and Industrial Internet of Things (IIoT). There is 'smartness' all around us – smart grids, smart sensors, smart meters, smart cities and many more. Indeed the Internet of Things (IoT) has touched every aspect of our lives, including the industrial sector. IIoT is a reality today. With industrial automation, a large amount of data is generated from the operational process. Can the data be made to work to optimise production processes, enhance productivity, streamline logistics, predict events and asset management? Is it all about plugging in IT technologies and taking it to the cloud, and waiting for the operational benefits to kick in? Clearly; there is more to this than just IT application and process automation.

We stand on the threshold of Industry 4.0 when increasingly, machines are smart and embedded with artificial intelligence such that industrial assets are capable of proactively taking decisions based on pre-programed/ predictive events. This is happening due to the convergence of technologies in manufacturing/operations, persuasive network, big data analytics and cloud computing. The huge transformation arising from the marriage of Operational Technologies (OT) and IT infrastructure is the tipping point for industries to adopt IIoT. According to an Asian Development Bank Report, The Institute of Electrical and Electronics Engineers (IEEE) defines IoT as "a network that connects uniquely identifiable 'Things' to the Internet". The 'Things' have sensing/actuation and potential programmability capabilities. Through the exploitation of unique identification and sensing, information about the 'Thing' can be collected and the state of the 'Thing' can be changed from anywhere, anytime, by anything." A 'thing' or an asset can be made 'smart' with sensors and actuators that send out data and information. 'Things' can be connected to the internet or the cloud with its unique identity and data it emits. The data can be programed to perform certain tasks with respect to the performance of the 'thing'. In response, the 'thing' performs actions as per the algorithm to favourably impact the operation or process. In essence, Enterprise IT architecture has moved to an advanced stage to converge OT with the assistance of sensors and actuators, communication infrastructure, artificial intelligence and cloud computing.

Thus, the industrial revolution is now in the 4.0 stage where cyber physical systems converge to provide collaboration between machines and humans. An ADB report cites a McKinsey paper stating, 'The total IoT market size in 2015 was $900 billion and is projected to grow to $3.7 trillion in 2020. It also states that IoT is projected to have a potential economic impact of $3.9 to 11.1 trillion per year in 2025.'

Digitisation & Digitalisation – the means to the end

Consumer IoT got easily accepted as the transformation

directly impacts our daily lives. However, from an industry perspective, transformation and change is at a tipping point and poised precariously. The question arises – should legacy systems be trashed to adopt the new technologies? Is such capital expenditure necessary and where is the ROI coming from?

Over the decades, modernisation in operational assets have been slow. Companies have scaled operations with greenfield asset investments or inorganic acquisitions of other facilities. However, a holistic approach to adoption of new technologies, uniformly, across manufacturing facilities, has not really happened. As a result, assets may not be functioning at their optimal best. While the mindset for adopting IIoT has set in, the holistic transformation of man, machine and processes to IIoT is in its infancy.

> 66
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> The research firm Gartner predicts that by 2020 around 25 billion connected 'things' will be in use and their disruptive impact will be felt across all industries and all areas of society.
>
> McKinsey Global Institute predicts that the IoT will have a total economic impact of $3.9–11.1 trillion per year by 2025 (70% within business-to-business).
>
> Research by Cisco suggests that the "Internet of Everything" – the networked connections between people, data, processes and things – will create an economic opportunity of $14.4 trillion for companies and industries worldwide during the next decade.
>
> A recent joint study by the Global e-Sustainability Initiative and Boston Consulting Group estimates that IoT-enabled solutions – increasing the efficiency of the transmission, distribution and use of power – could reduce greenhouse gas emissions by 9.1 billion tonnes by 2020, representing 16.5% of the projected total in that year.
>
> **- World Economic Forum Report** 99

State of the matter– A checklist

✔ Disparate assets with varying capabilities resulting in sub-optimal operations excellence.

✔ Old assets following old operational techniques, co-exist with newer assets with automated process. Net result is a disparity in asset capability within various production facilities within a single organisation. This raises concerns on safe and optimal operations and rising cost of unscheduled downtime.

✔ There is an increasing onus arising from climate change concerns and the need to smarten legacy systems to function optimally as per newly established compliance standards throws up an impending need to upgrade current plant assets.

✔ Various production facilities within a single entity function as silos and best practices cannot be replicated across the plants due to lack of asset data analysis. Much of the data generated in the modern systems do not add up to business benefits.

✔ Automation, sensors and controls are either obsolete, require manual interpretation or are difficult to upgrade and modernise.

✔ Several original equipments are very old and historical data on the asset may not be available. Lack of centralised data and/or data analysis results in increased maintenance or unplanned downtimes which can prove expensive.

✔ Industry 3.0 brought about connectivity and automation, however, plant assets are still not optimal as adoption of 4.0 technologies have been slow. This results in sub-optimal performance of assets due to lack of accurate prediction of asset downtime and asset life cycle management.

✔ Some advanced industries such as the Oil & Gas industry, automobile sector, to name a few, do have upgraded technologies – both in hardware and automation systems. The question remains – have these sectors moved from predictive analysis of the data output to proactive and prescriptive analysis and algorithm - based decision-making? This is pertinent, since modern IIoT enables operational excellence through prescriptive decision - making tools that completely eliminate risk of human error and lead to operational excellence.

As in the consumer and retail business, in the industrial environment, the first step towards IIoT is the digitisation process, followed by the digitalisation of the processes. So, what is the difference?

According to Gartner, "Digitisation is the process of changing from analog to digital form. Digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business."

When various assets are digitised, data is created for the assets and is used as a reference point for the transformation process. For instance, facilities may have plant assets that are 40 years old. The engineering drawings of the facility or the technical data of large boilers, generators, etc., may not be available. With digitisation, information pertaining to these assets can be created and stored in digital form. This helps in creating and viewing the processes in a simulated environment, facilitating decision-making on the digital transformation process, virtually.

While digitisation may be the first step, the digitalisation process is a transformation towards a digital business, that requires a well-planned strategy. The transformation is enabled by the convergence of Engineering technology, Operations, Smart Asset Infrastructure, Information Architecture, Cloud computing architecture and IIoT. To facilitate the convergence of all such technologies,

expertise in process and industry will help realise the value in the digitalisation journey. This will lead to operational excellence from implementing IIoT.

4.0 full throttle – The digitalisation journey to IIoT

Moving towards cyber-physical systems and assisted decision-making calls for a re-imagining of things, the way they function and are optimised. The biggest challenge is the cost and the disruption. At the centre of IIoT is the asset. The re-thinking towards digitalisation begins here. Plant asset and its management is no longer about checking and maintenance till 'death do us apart'.

Where does the value come from

✔ Connected assets, connected facilities, optimised data analytics, managed with globally consistent systems.

✔ Centralised business and operations' data analytics for production excellence in geographically distributed production facilities; asset optimisation on 'fleet' basis.

✔ Smart sequencing of asset maintenance activity minimising production down-time; Precise prediction and proactive action for asset failure management.

✔ Availability of video and GPS data to collaborate with suppliers and OEMs across the production chain; generation of new service models with asset suppliers to optimise production/automation process will bring about efficiency in operations and overall value creation/cost reduction.

✔ Cloud-based analytics can provide key information for sharp decision-making, easily accessed on a mobile or tablet.

✔ New service models are being created, across the value chain, which calls for a transformation towards digitalisation because digital technologies underscore the need for a collaborative model. To be competitive in a digitised environment, holistic upgrade to

digitalisation is an imperative.

✔ A Capgemini research report indicates 4.7% of global CO_2 emissions from power generation can be saved annually with digital plants.

✔ A World Economic Forum white paper on the Electricity Industry & IIoT impact, covering generation, transmission and consumption projected the benefits as:

$387 billion in value through asset performance management – lower O & M cost, lower downtime, lower critical breakdowns

$438 billion in value through comprehensive customer services – digitisation of customer interactions, smart energy management

$445 billion in value – through operational optimisation and aggregation, real-time supply and demand platform, network controls, energy aggregation platform, and connected, inter-operable devices

The re-thinking towards digitalisation begins here. Plant asset and the asset life cycle management is a collaborative process between the supplier (OEM) and the customer.

Greenfield goals, Brownfield execution

1. Digitisation of plant/assets

‣ Plant digitisation using 3D laser to create digital twin of entire facility

‣ Assess legacy digital systems Evaluate digital maturity capabilities

4. IIoT aligned to operations architecture

‣ Build cloud architecture

‣ Mapping of asset data to IIoT systems

‣ Build applications with algorithms and machine learning tools

‣ Big data analytics aligned to OT

Digitalisation Framework

2. Blueprint for OT

‣ Create digitalisation strategy

‣ Create modular plan for process digitalisation, identify pilot assets for transformation

‣ Create asset life cycle platform across facility

‣ Identify retrofitting/transition plan

‣ Create business care

3. IT Infrastructure

‣ Identify hardware for asset modernisation

‣ Build IT architecture relevant to operations architecture, business processes & digital security requirements, identify pilot areas

‣ Create simulated environment

‣ Retrofit smart devices or upgrade to smart assets

‣ Build systems and applications to interface with assets

Plant asset and the asset life cycle management is a collaborative process between the supplier (OEM) and the customer. The possibilities arising from digitised assets is the game changer today.

For instance, digitised and connected 'smart' turbines and boilers can bring about efficiency in operations and fool-proof safety measures. Smart turbines and smart boilers can be made intelligent with machine learning. Predictive analysis and diagnostics will shift to proactive analysis and programmatic logic by the smart assets. Some of the possibilities are – fine-tuning of operational parameters by optimising combustion of fuel according to fuel quality, optimisation of cleaning cycles of boilers, real-time report on the life-span of assets, the accurate prediction of asset shut down, data-backed prediction of residual life of plants, decisive safety related interventions through the operations process, centralised data analytics of all assets across the production cycle and across geographically dispersed plant facilities, etc.

TCE has established working relationships with IT systems & hardware experts, cloud computing experts, big data analytics experts, etc.

Digitalisation reboot

Transforming to a digitalised environment and implementing IIoT is a strategic move and is the only option to prevent large assets from going obsolete. If cost of adoption of IIoT is a constraint, it must be weighed against the cost of facilities/operations processes being obsolete. Factoring the benefits of IIoT strengthens the business case. The good news is that digitisation enables virtual simulation. Before plunging into IIoT, informed and planned transformation is possible using a walkthrough or simulated environment. Taking a pilot approach or modularised fitment helps manage the cost and disruption.

IIoT = Collaboration

In the final analysis, an IT partner cannot 'fit' assets with an IIoT system. A process consultant in the energy sector alone may not be in a position to ' IIoT-ise' production facilities. A big-data analyst cannot wave the analytics magic wand to provide the critical alert that can make or break a plant's existence. IIoT calls

for the collaborative efforts of all such experts to bring about the IIoT transformation, cost effectively.

Tata Consulting Engineers (TCE) is among the pioneering consultants who bring to the table all the expertise, to handhold manufacturing facilities through the IIoT transformation journey. TCE has established working relationships with IT systems and hardware experts, cloud computing experts, big data analytics experts, etc. TCE adds to this team, its vast experience in managing multiple partners and specialist engineering capabilities that is the backbone for the IIoT transformation. For, IT infrastructure and big data makes sense only with the strong backing of the domain expertise in plant and process which are specific to each industry. This specialisation combined with digital engineering is the value addition that makes the IIoT transformation a modularised process, taken one milestone at a time.

Smart ideas at #TCE-Smart Cities

Smart cities in India is every Indian's dream. We all would like to live in fancy cities, travel in hyperloops, zip through traffic, breathe fresh clean air and live in environment-friendly townships. While we want all this, we would still like to maintain our cultural heritage, retain our colourful diversity and preserve the essence of an Indian city. Living in a smart city calls for a transformation in our behaviour. The challenges we face today in our cities are many. The economic status of an average Indian in an Indian city is vastly different from an average citizen of a developed country. Hence sustainability and cost efficiency go together. How then do we smarten our cities which are steeped in culture and history?

Tata Consulting Engineers (TCE) is currently involved in several Greenfield Smart Cities and AMRUT city projects. The strategy being followed is an Area Based Development (ABD) approach wherein a marked area will be made 'super smart' with elements that are state-of-the-art and practised in advanced nations. This will then be replicated in other areas. Some projects are designed for the ABD and some are being implemented pan-city. The primary focus will be on reducing pollution and making cities healthier and cleaner. Some of the technically savvy projects being implemented in the smart cities where TCE is involved is explained here.

*G.I.F.T - Gujarat International Financial Tech-City*

Health & Hygiene

Litter free zones with Automated Solid Waste Collection System (ASWCS)

This system ensures the smart zone being developed is completely free of garbage piled up on the roadside and residential areas. In several cities, garbage collection is done manually and dumped at pick up points. The local municipal bodies collect the garbage for further waste treatment and processing. In some cases there is no treatment or processing. The Automated Solid Waste Collection System will ensure collection of garbage from the source and transited through underground pipes to the central waste handling facility. With minimal manual intervention, the waste will be segregated and automatically sent to waste treatment facilities. TCE has tied up with a partner for installing such systems in the Gujarat International Financial Tech City, Delhi-Mumbai Industrial Corridor-Dholera, Bhopal Smart City, Hubli Dharwad and many more cities. The Bhopal smartcity ASWCS is based on a vacuum suction system. The waste


Waste segregation at source
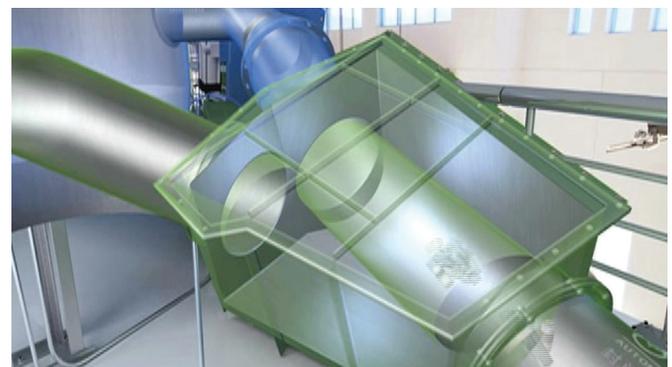
Underground utilities for waste collection

is segregated at source and the central waste handling facility will automatically get alerts from the collection bins for periodic vacuum suctioning of the waste. This system has been implemented and is running successfully at 700 installations in over 30 countries. It is a self- sustaining mechanism as the option to create energy from waste is possible. The system also ensures harmful and toxic waste is not manually handled by humans and health hazards are prevented.

The biggest challenge is a change in behaviour of citizens to ensure dry and wet waste is segregated and people take responsibility for disposing dry and wet waste efficiently.

Underground conduits for automated waste collection system
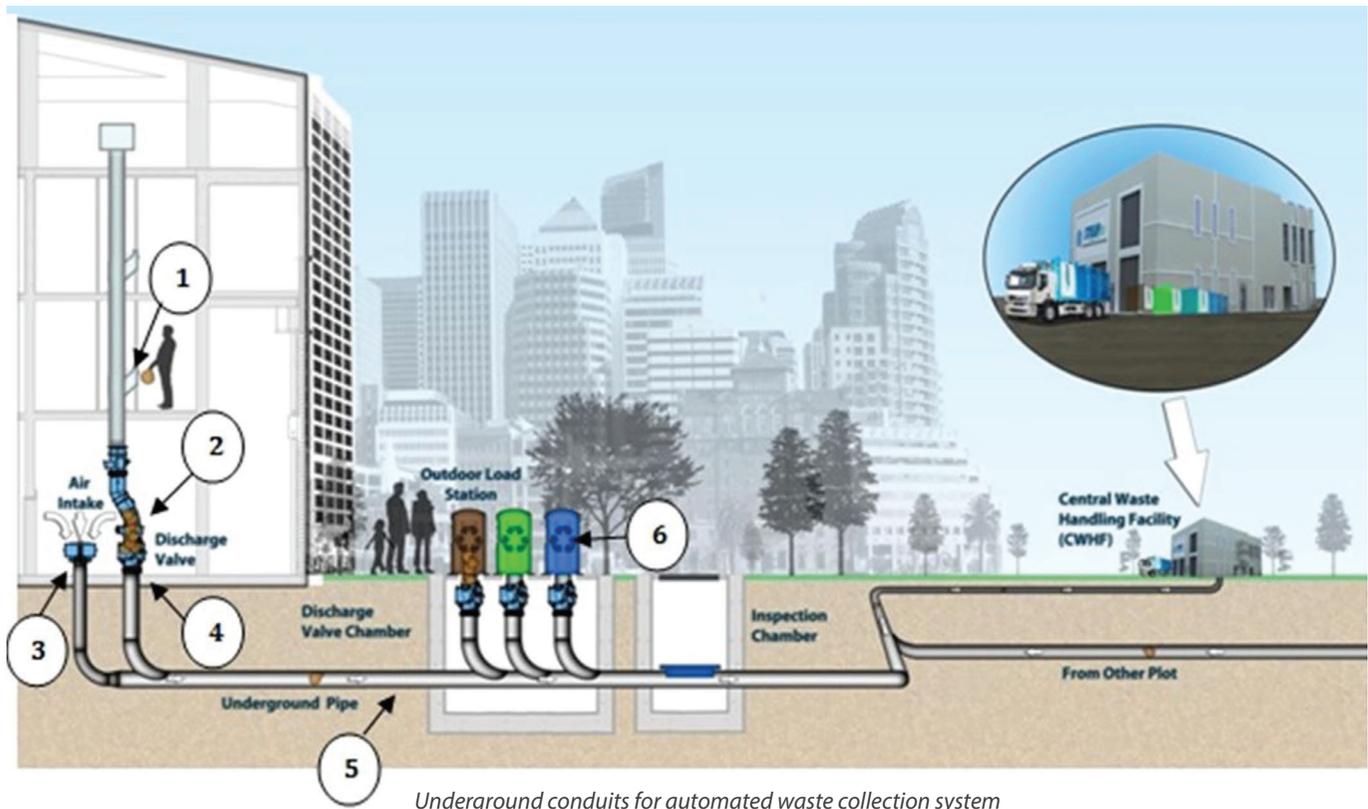
Bio Toilets

The smart city of Guwahati plans to introduce Bio Toilets that are fully automated, complete with bio-digester. They are pre-fabricated, environment - friendly toilets with automatic user operation, with coin-based operation and a remote monitoring system. The bio-toilet's, innovative technology manages waste in an eco-friendly manner. The pre-fabricated material is made of cold rolled steel to make it amenable to the Guwahati weather. The automated system comes with coin validator, pre flush, auto flush, automatic platform cleaning mechanism to clean the toilet before and after usage, LED light indicator to show when occupied, voice guidance and display board, GPRS connectivity to indicate health/hygiene status, disable-friendly facility etc. The connected bio-digester will ensure environment-friendly waste management and the 300 ltr tank will provide water.

Renewable energy for pollution-free environment

India is committed to reducing carbon emissions and this promise takes effect in the smart cities' development project. A minimum 10% of energy requirement of the city will come from renewable energy sources and a major source will be roof-top solar panels. The introduction of electric vehicles is a first measure towards keeping this promise. The new smart cities will adopt electrical vehicles and legislation is currently being introduced in several ABD cities where areas are demarcated for electric/solar powered vehicles only. This calls for new infrastructure. Walking and cycling are also being encouraged with bicycle rental points and earmarked bicycle tracks.

Solar powered vehicles

TCE has initiated the introduction of electric vehicles in Raipur and has proposed a subsidy of 60% under FAME - (Faster Adoption and Manufacturing of Hybrid and Electric) vehicles scheme such that incentives are given to users of electric vehicles (EV).

As a pan city initiative in Raipur, EV buses will ply across the city. The electric vehicles will be public transport buses and autorickshaws to begin with. The EVs will reduce carbon footprint and improve ambient air quality. The running cost of such vehicles will be lower than a fuel powered vehicle. With the FAME subsidy, EVs are a cost efficient option to ease pollution afflicted cities.

Necessary infrastructure such as charging points for the EVs are also being planned. In the planning stage are 'Battery charging and swiping stations' where electric vehicles such as cars, autorickshaws and scooters can be charged or exhausted batteries may be exchanged with fully-charged units.

Solar powered bus stops

Plans are underway in Gandhinagar and other smart cities for solar powered bus stops which will have multi-purpose features. These bus stops, will have solar panels to generate solar power and connected to the grid. This location will also provide wifi-hotspots, passenger information systems, mobile charging points, etc.
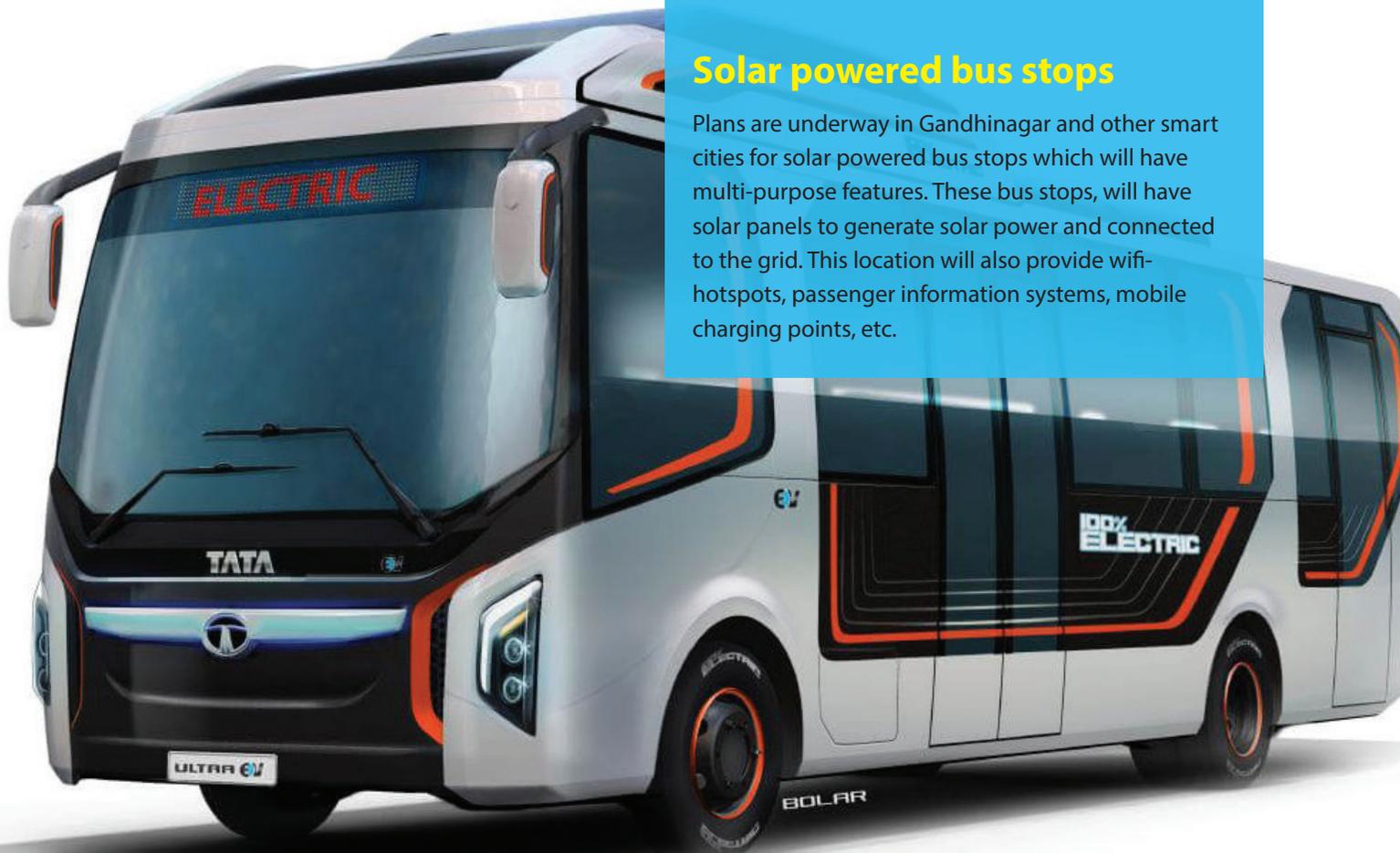
Electric vehicles as public transport to ensure at least 10% energy consumption from renewable sources

Smart parking

The smart parking system has been proposed for Guwahati, Shimoga and Gandhinagar smart cities. Each parking lot will be installed with a wireless occupancy sensor which will send alerts on availability of parking slots. A connected LED display will project this information in real time. The connected mobile app will alert the user on the nearest available parking slots.

Smart classrooms

Rourkela smart city is scheduled to have smart classrooms to bring quality education to remote areas in the city. The classrooms are equipped with video-conferencing facilities, projecting remote lessons and content.

The smart classrooms will come equipped with supporting infrastructure such as LED panels, Wifi connectivity, projectors, content, etc.

Smart transit hub

Inter-modal hub is designed for Ahmedabad smart city. The transit hub will link up rail, bus and short distance electric vehicles like e-autorickshaws, providing last mile connectivity. The multi-level car park will enable park-and-ride facility to encourage greater use of public transport and thereby reduce congestion in the city.

The smart transit hub consists of connectivity to BRT System, multi-level car parking, metro train station, charging points and electric vehicles, public bike share and commercial establishments/malls.

Solar trees & Smart lighting

In India's smart cities, even trees are getting smart. The waterfront development in Guwahati and many other cities will have solar trees. The 'leaves' of the trees are solar PV panels. A standard 'tree' can be on-grid or off-grid with power generation capacity of 5 kw. The solar trees are multi-functional, serving as lighting in parks, wifi-zones, mobile phone charging spots, etc.

Bringing in energy efficiency to everyday life, all smart cities will have smart lighting. Street lights will be fitted with an astronomical timer that will detect ambient light and switch on or switch off based on the light requirement. It is also equipped with an energy management system that will provide real-time data on the health and efficiency of the lights, bringing about greater efficiency in maintenance. With LED lights and due to the smart management of the lighting, more than 60% reduction in energy consumption can be achieved. Smart lighting is being implemented in almost all smart cities.

Safety & Disaster Management

City-wide video surveillance systems

Guwahati is a city that is prone to disasters due to flooding. City wide video surveillance systems are being installed to ensure safety and security, to reduce crime rates, serve as an efficient disaster management tool, assist in efficient traffic management, etc. This system was designed keeping in mind the existing infrastructure constraints.

Flood management system

Guwahati is nestled in the cradle of the Himalayas, rain water collected from Meghalaya and fed into the mighty Brahmaputra river. Heavy rains in the surrounding hills causes flooding every year during the monsoons bringing life to a standstill.

The flood management system in Guwahati will monitor rainfall data in catchment areas, water levels in major flood-prone areas and rivers such as the Brahmaputra, will be monitored through sensors. Rain gauges will be installed in various centres and information from the meteorological department will be collated to create a structured flood warning system.

Early warning systems and alerts through various platforms will be centrally collated at the Command & Control Centre. The information will be provided as alerts to the citizens through social media channels, SMS, radio, local cable networks etc. Call centres and disaster assistance desks will be available for citizen assistance and managed by the dedicated disaster management teams.

Smart roads

Raipur and Surat smart cities are planned to have clutter free roads with organised pedestrian walks and sign boards. A utility corridor is being created underground, freeing up road space for smart features. This will enable visual improvement, better signage for greater safety, bicycle path to encourage pollution-free commute and introduce thematic market spaces which is the essence of small cities such as Raipur and Surat.

Smart hawker zone

Bhopal smart city and Shimoga smart city have a legacy of hawker encroachment that crowd and clutter the pathways. Smart hawker zones will provide designated areas and thematic shopping experience housing the hawking units.

As new cities are being added to the list, new ideas are being devised based on the unique requirement in each of the cities. While smart features certainly take the liveability index several notches higher, the fundamental need of the hour is to take responsibility for our cities, change our behaviour to help keep our cities not just smart but clean.

BUSINESS Brief
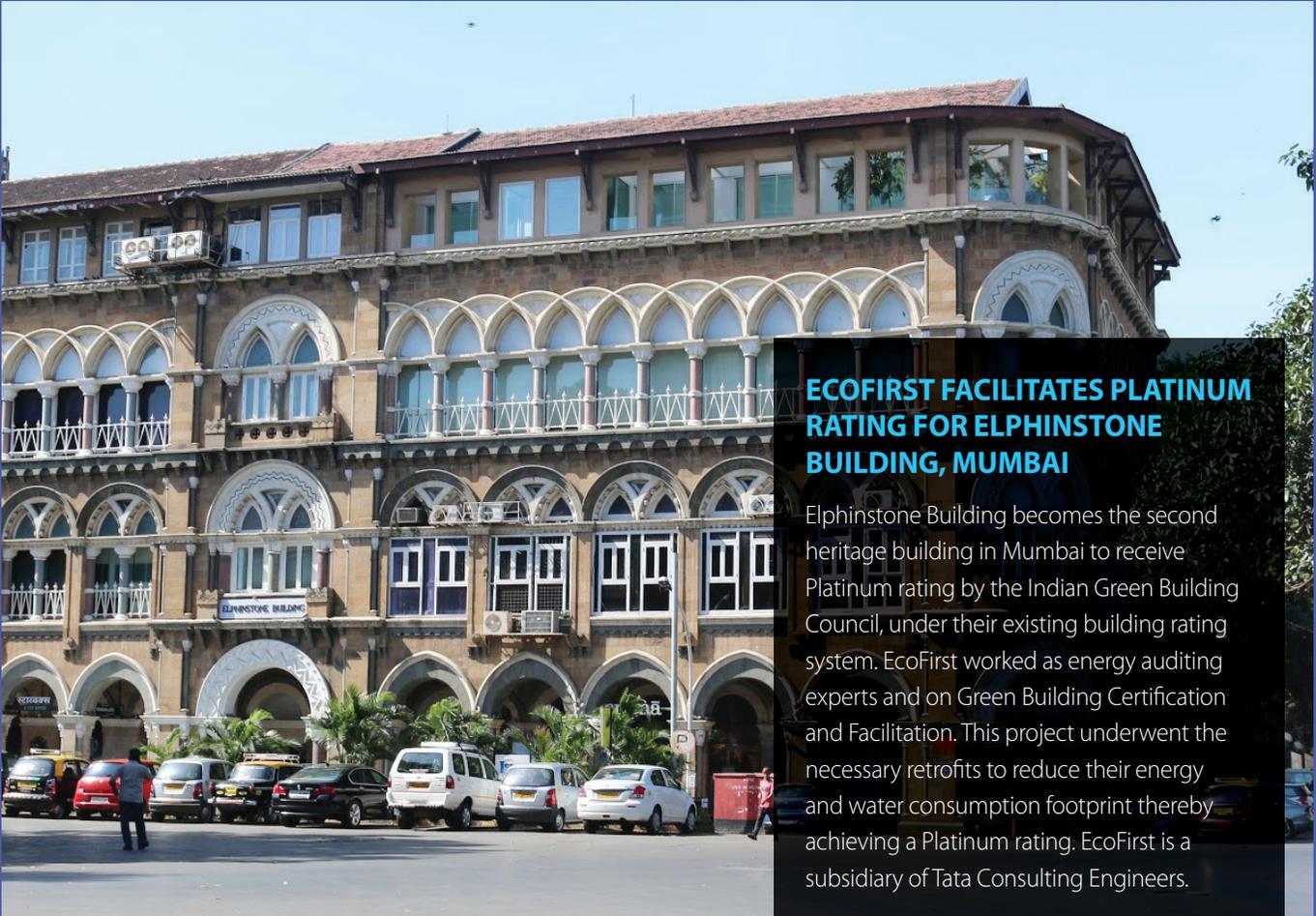
ECOFIRST FACILITATES PLATINUM RATING FOR ELPHINSTONE BUILDING, MUMBAI

Elphinstone Building becomes the second heritage building in Mumbai to receive Platinum rating by the Indian Green Building Council, under their existing building rating system. EcoFirst worked as energy auditing experts and on Green Building Certification and Facilitation. This project underwent the necessary retrofits to reduce their energy and water consumption footprint thereby achieving a Platinum rating. EcoFirst is a subsidiary of Tata Consulting Engineers.

MD speaks at Delhi Business and Climate Summit 2017

TCE MD, Mr. Amit Sharma was a speaker at the session on Urban Environment & Cities: Built Environment and Spatial Planning, at the Delhi Business and Climate Summit 2017, held in New Delhi. Speaking from the point of view of the of engineering business he highlighted TCE's roadmap towards engineering a better tomorrow that is sustainable and equitable.

PROMPT - PMI certified project management certification program for TCE

In the project management universe there are many certification options available. It is also true that these standard program though robust, do not fit all.

Diverse organisations such as TCE require Project Managers to be certified to manage projects in the most complex environments. It was also important for TCE to create ambassadors for driving a project management culture within TCE.

TCE established delivery processes through WoW or Way of Working, an iterative re-engineering process. It was important to imbibe the defined WoW processes into project management to show a clear-cut pathway in the project management journey specially tailored for TCE. PROMPT is TCE's unique internal project management certification program with three layers. It starts with extract of PMBoK (Project Management Body of Knowledge).

PROMPT is delivered through videos and online content which mandates participants to go through 35 Professional Development Units (PDUs) to formally acquire the PMP certification. The program has a 3-month pathway and consists of a structured four-day training program, compulsory e-learning that qualifies for PDUs, followed by three mock tests and a final qualifying test.

The PROMPT course-ware is aligned with the Project Management Institute (PMI®). Progressive certification modules include Certified Associate Project Manager (CAPM®) or the Project Management Professional (PMP®). The CAPM® and the PMP® are global certifications which are offered through PMI® and recognised world-wide.

The Journey so far...

TCE launched PROMPT in February 2017 with the creation of program framework, content and getting the course work certified from PMI. The first program was launched in Mumbai by the MD and Head HR in the month of July. TCE has delivered two successful programs in Mumbai and Bengaluru with participation from 45 TCE-ites with plans to do two more programs in FY 18. Currently, there are 33 Internal Certified Project Managers in TCE from various Business Units and many more to follow. . .

TCE-ites present papers on Smart Cities

Mr Vijay Barve from Technology Organisation Pune, Ms Priyanka Swain from PBU, Bengaluru, and Mr. Rijesh Akkanusery from PBU, Mumbai, presented papers at the IEEE international symposium for smart cities (TENSYMP 2017), held at Kochi in July earlier this year. The symposium was organised by IEEE region 10, and hosted by the IEEE Kerala section. The event was inaugurated by the Chief Guest Dr K T Jaleel, Minister for Local Self Governance, with a keynote address by Prof U B Desai, Director IIT Hyderabad. The papers presented covered topics from smart lighting for smart cities, integration of renewable sources of energy into power grid to performance analysis of smart device – STATCOM for grid application. These innovative ideas emphasised the core concept of Smartness in conserving the limited natural resources with the use of modern technology and to invent viable alternative technologies to leave a better planet for the future generations.

TCE MUMBAI MOVES TO NEW OFFICE COMPLEX
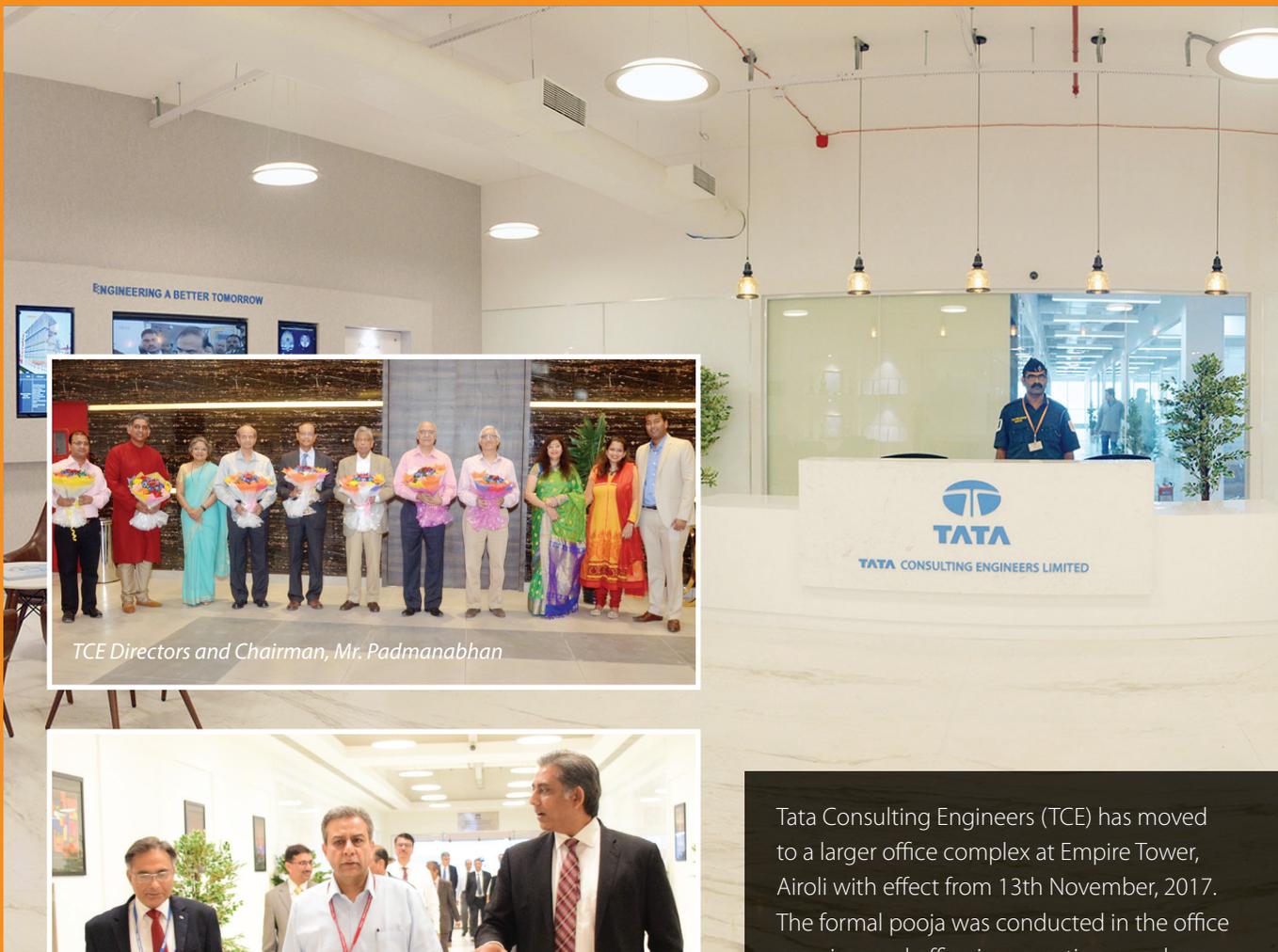
TCE Directors and Chairman, Mr. Padmanabhan

Mr. Banmali Agarwala, Tata Sons (centre) visits the premises

Tata Consulting Engineers (TCE) has moved to a larger office complex at Empire Tower, Airoli with effect from 13th November, 2017. The formal pooja was conducted in the office premises and office inauguration was done by TCE's Chairman Mr Padmanabhan. The inauguration was marked by the lighting of the lamp by Mr F N Subhedhar, Mr A P Mull, Mr Shyamal Gupta, Ms Hema Ravichander (Independent Director), Mr P K Ghose (Independent Director) and Mr Amit Sharma (Managing Director). The office has a seating capacity of about 1000 seats spread over a sprawling 90,000 sq ft. The office is designed with an open concept with minimal false ceiling and enclosed spaces giving it an open, transparent feel.

PROJECT Patchwork

JAMSHEDPUR

Basic engineering and PDP phase cost estimate

The PDP phase of project scope undertaken for Tata Steel, IJmuiden BV (TSIJ) comprises basic engineering, preparation of BOQs, technical specifications, evaluation of furnace offers, selection of contractors, finalisation of schedules, estimation of cost, preparation and submission of PDP report to enable TSIJ to review and take the investment decision.

Preparation of basic engineering for PDP report and 3D model for the installation of New Turbo Blower – 26

The scope of work for PDP Phase for installation of New Wind Machine-WM 26 comprises of the following scope to enable Tata Steel, IJmuiden BV (TSIJ) to take the decision for further investment:

• Completion of Basic Engineering for Installation of New Wind Machine-WM 26;

• Preparation of 3D Model (up to the extent to PDP) for Installation of New Wind Machine-WM 26;

• Submission of PDP Phase BOQ along with cost

PUNE

Project management services including construction supervision for the water supply & sewerage project of Gujarat state

The project comprises of PMC work of underground drainage & Water Supply Projects for GWSSB. The main responsibilities of TCE is to support the Board in the efficient preparation and implementation of the rehabilitation and expansion works in water supply, wastewater, solid waste management and storm water drainage sectors by carrying out detailed surveys & investigation works, analysis of problems and improvements required in the existing systems and to design and prepare technical specifications, preparation/ review of DPR, bid process management, evaluation of bids and assisting client in finalisation of contract, supervise construction of works in all sectors like WTP, STP, Intake, ESR, Pumping Station, Sump, GSR, pipelines, crossings, etc. Additionally, the scope also includes quality control,

measurements of works, inspection of machineries, equipment and materials, assist in commissioning activities, verification of contractor claims, services during defect liability period and finalisation of works under the project.

CHENNAI

Seismic Margin Assessment of Narora Atomic Power Plant (NAPS1&2), Uttar Pradesh, safety related piping systems and supports

TCE is executing a project for Seismic Margin Assessment of all safety related piping systems and supports for Narora Atomic Power Plant, Uttar Pradesh including CLASS-I systems. In the aftermath of the Fukushima catastrophe, there are stringent regulatory requirements imposed on

the nuclear industry. TCE's expertise in this area is sought for similar on-going nuclear installations in India. The project required the team to be stationed at Narora site to digitise extensive data involving almost 1300 as-built Piping drawings (approximately 150 models for 19 systems involving Safety Class 1, 2 & 3) which were originally done 35 years ago, processing of huge data-base for performing and reporting Seismic Margin Assessment. TCE is working with the Atomic Energy Regulatory Board which clears the project methodology etc. The project is expected to be completed by March 2018.

MUMBAI

Sub soil investigation, design, analysis, engineering and preparation of tender document of Primary Coolant Pump Test Facility (PCPTF) building

Primary Coolant Pump Test Facility (PCPTF) is proposed to be set up at R&D Center, Tarapur NPCIL, for testing and qualification of PCP Pumps. Steel structure building houses equipment for carrying out PCP qualification and its associated subsystems. For the first time, 3D modelling of the structure is done in Revit to minimise the actual engineering man hours. All GA DWGS, concrete detailed drawings, steel structure DWGS are extracted from Revit. In the result of the same the project is in 30% gross profit. Wrench has been used to ensure quality of deliverables, to track the input data from client, for the correspondence, the status of deliverables and percentage progress of the project.

DELHI

Regional Science Museum at Patan

TCE is working with DST through GUJCOST to establish five Regional Science Museums ("RSMs") at Rajkot, Patan, Bhavnagar, Vadodara and Bhuj. The galleries, activities and exhibits are carefully designed and selected to:

- Promote innovative and experimental activities through hands-on activities
- Develop a scientific temper
- Nurture and stimulate scientific faculties
- Showcase breakthrough in science and technology

The concept for exhibit planning is derived from the idea of the gallery being a knowledge hub in various sectors of science and its application.

BENGALURU

Ute Porto de Sergipe I (Combined Cycle Power Plant & HV Systems)

A project with state-of-the-art technology H class machine in 3 on 1 configuration (3 Gas turbine + 3 HRSG + 1 steam turbine) with generation capacity of 1516MW, is being setup at Sergipe in Brazil.

TCE is providing detailed engineering services for the project which includes engineering of modular units such as pipe rack module and CW system module and non-modular units such as fuel gas, feed water, GT lube oil and lift oil systems, water supply, waste water and main condensate systems. Deliverables include piping BOQs, supports, isometrics and GA drawings. Electrical and instrumentation scope include cable and interconnecting schedule, earthing and cable earthing layout, grouping of instrumentation taps. 3D integrated engineering is being performed on a global workshare model.
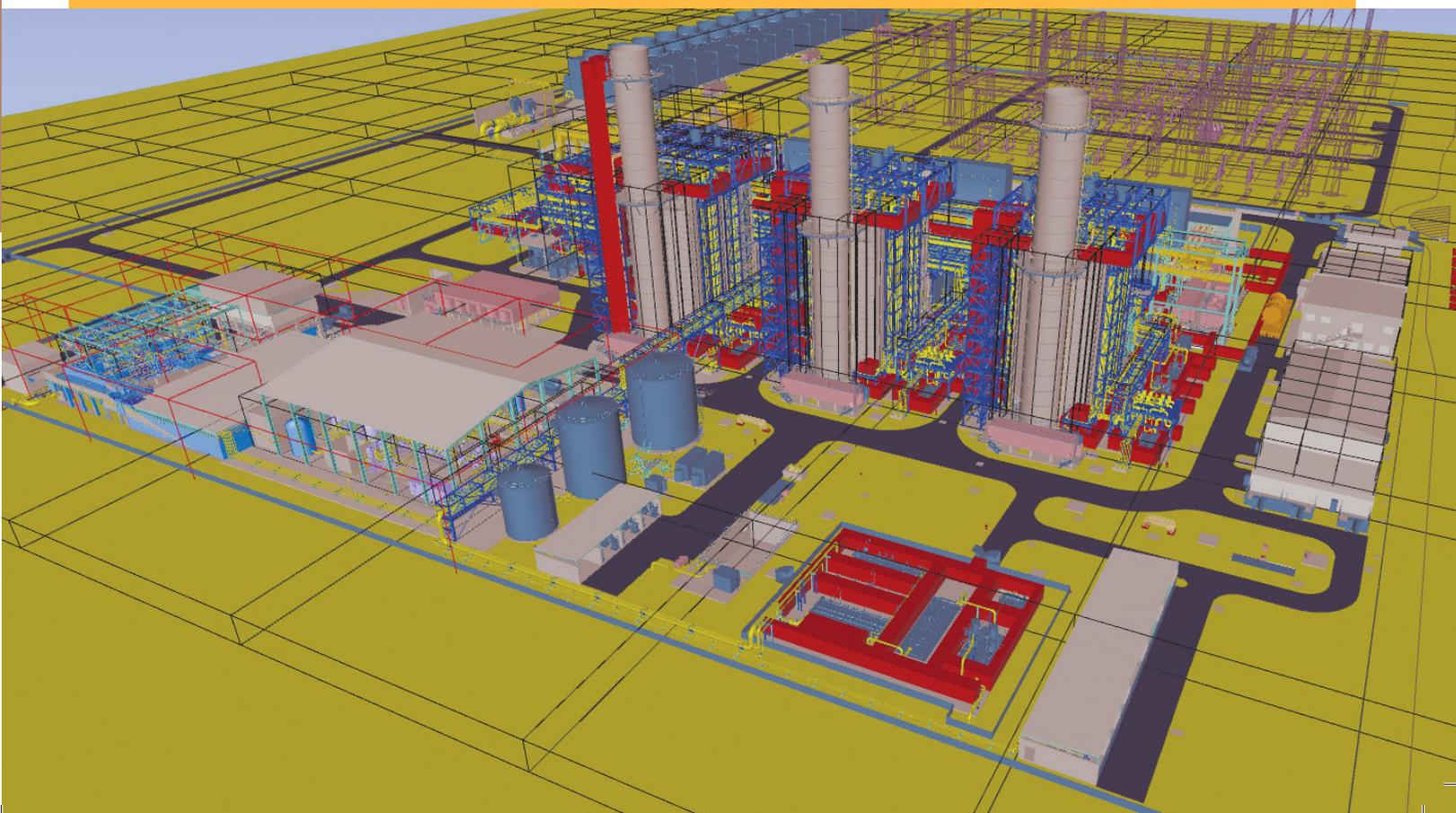
TCE Triumphs

GNFC applauds TCE's contribution to Swacch Bharat Mission

TCE received a Certificate of Appreciation from Gujarat Narmada Valley Fertilizers & Chemicals Limited (GNFC) for accomplishing construction of 2581 toilets under GNFC's CSR initiative of Toilet project. These toilets are spread across 25 villages of Bharuch District of Gujarat State aimed at social uplifting of underprivileged section of the society. Congratulations to Mr. J.D. Patel and team for successfully completing this project successfully.
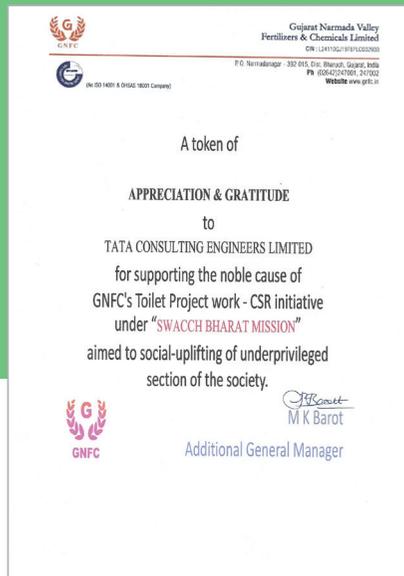
TCE CSR initiatives get appreciation from BCCI

At the Bombay Chamber of Commerce and Industry Civic & Good Corporate Citizen Awards-2017, TCE's CSR initiatives received an Appreciation Certificate. The certificate was awarded under the 'Social Development' category of BCCI's Civic awards.

Khoripada – the story so far

*Floriculture – **49** families, Tree farming – **53** families*

I n the second year of the sustainable livelihood project undertaken in Khoripada, Jawhar, there have been several positive developments. At the start of the project, the village was in dire need of water and water retention capabilities to fulfil their basic needs. The lack of water was affecting these families in every walk of their life. Through our CSR initiatives, the villagers are now looking towards better living and earning opportunities.

Water Resource Management

T he single source of water in the village of Khoripada was the community well, which was insufficient to meet the needs of the families. The other source was a meagre stream a few kilometres away, a long walk to carry water back home everyday. To help ease the situation, a new group well has been planned to be constructed.

The main purpose of the well would be to provide water for the plantations. A solar based drip irrigation system is being put in place to pump out water for drip irrigation purposes. Apart from the jalkunds formed to capture and store rain water, soil conversation methods of continuous contour trenches and farm bunds are made to harvest rain water.

Farm ponds

Solar powered drip irrigation

Livelihood interventions

With little to no income generation opportunities, the villagers were migrating to the city to earn their living. In the last year, these families were provided income generating on support. Families with their own lands were engaged in floriculture and wadi (tree based) farming. With TCE's support the villagers have jasmine and mango plantations, which would give them both long term and short term income. They are regularly given training to maintain and care for the plantation. For the landless farmers, alternative earnings are facilitated through backyard poultry and dry fish selling venture. The entire village hopes to generate sustainable income to support them through the year.

Poultry, Dry Fish sale –
5 families

Governance and Community Building

In addition to these major interventions, it is important build capacity of the villagers to adapt to these rapid changes and interventions. A village planning committee for farmers, women's SHG and youth SHG have been formed. They are given the necessary training to build a community mindset that works towards the village development.

Training and Awareness

Regular training and exposure visits help the villagers in crop yield, farming and governance of SHG.

Uttarakhand – Blueprint for Disaster Management

## TCE serves as a reliable technical partner

The dreadful floods that washed out the very fabric of life in Uttarakhand in 2013 left behind deep scars and huge debris. Four years since, Tata Trusts and Tata Group Companies continue to play a lead role in the relief and rehabilitation of the regions. Representatives from several Group companies visited the region on a learning mission to understand the programs that have been initiated and the impact on the afflicted people.

RELIEF IMMEDIATELY AFTER THE DISASTER

- Relief and medical assistance extended to around **11,000** beneficiaries across **210** villages in **5** districts

- **80** Tata Companies, **6** local NGOs, Army, Paramilitary and Ex Servicemen Network participated in the relief operations

63 villages spread across **5** clusters in **3** worst affected districts

Uttarkashi, Rudraprayag & Pithoragarh were selected for rehabilitation

KALIMATH

DIDSARI

MUNSYARI

CHANDRAPURI

DHARCHULA

Uttarkashi
Dehradun
Rudraprayag
Chamoli
Tehri Garhwal
Haridwar
Pauri Garhwal
Bageshwar
Pithoragarh
Almora
Nainital
Champawat
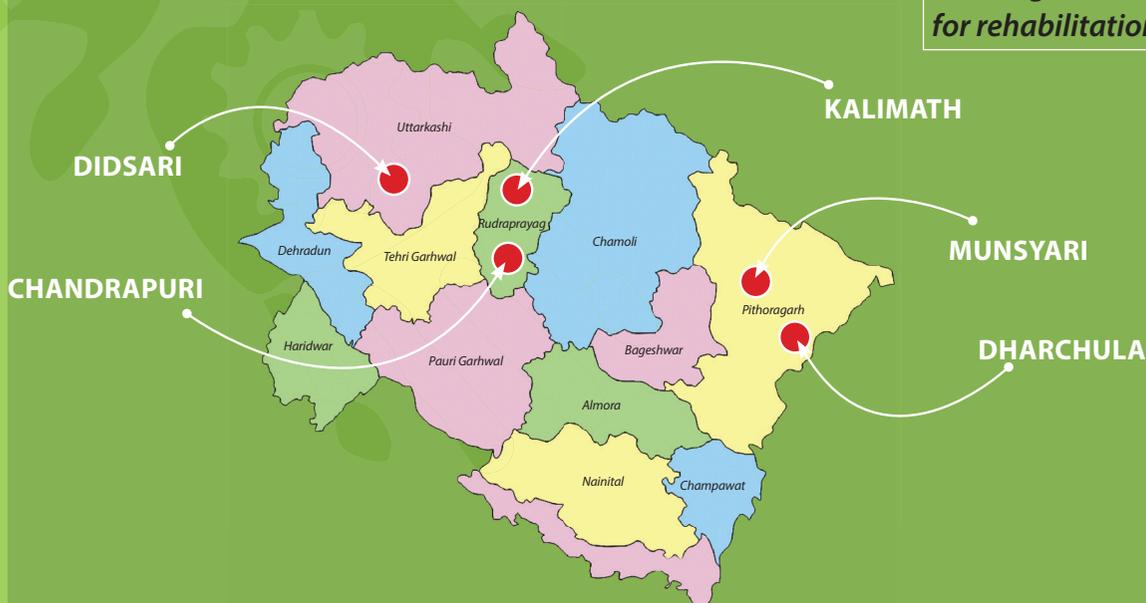
Target Groups for Rehabilitation

- Pre-School, School Group, Youth, Adult Communities & women

Interventions

Reconstruction of ICDS centres, Early Childhood Care & Education Centres, Reconstruction of schools, skill building for employability, micro entrepreneurship, livelihood programs, SHGs, water & sanitation, disaster preparedness & other women oriented programs.

63 VILLAGES

5,935 HOUSEHOLDS

26,744 PEOPLE

Livelihood programs and other women oriented programs for sustained income. Dairy products, cattle rearing, etc., are now a source of income.

Cattle rearing at Jaal Malla, Rudraprayag

Goat rearing at Kyunja, Rudraprayag

Inauguration of water & sanitation initiatives at Daula, Rudraprayag – The NGO Himmothan Society is a partner in most initiatives.

Women leaders of the Self Help Group with Tata Trust representative and Amitava, TCE engineer (far right) who is engaged in construction management at the learning centre.

A pre-school class in progress at an ICDS centre at Dengur Semla, Ukhimat. The centre was built using Nest-in structures. TCE provided project management services. 14 such structures have been established in Pithoragarh & Rudraprayag districts, benefitting 500 children.

In Lamgaundi and nearby village clusters, 74 women lost their bread-winners. **Mandakni Mahila Bunker Samiti, Lamgaundi (MMBS),** has trained women in this cluster to make a living from weaving wool and engaging them in the weaving value chain. 229 women from 7 villages have a livelihood means through woolen weaves. The rehabilitation programs is providing this organisation a regular weaving centre to replace the existing tin shelter. TCE is providing design engineering and construction supervision services to the MMBS centre.

The Government Inter College at Daira village in Rudraprayag supports 396 students from 9 villages in the area. Post the floods, the building complex needed rehabilitation. Tata Relief Committee, with the help of Tata donor companies and SEED, the local NGO partner, is rebuilding the school complex. TCE serves as a design engineering and construction management partner.

Tata Strive and other partner companies have also been providing skill building programs to help the youth in the region be gainfully employed. TCE has been working with the Tata Relief Committee (TRC) since 2013, to help manage the disaster and continues to provide support as a technical service provider in design engineering and project management. This is invaluable support to the Uttarakhand people and to TRC, as a primary aspect of the rehabilitation programs comprises engineering and construction activities.

TATA
enga **e**
be the change

Cleanliness Drive – Jamshedpur

Visit to Science City Exhibition – Kolkata

Tree Plantation Drive – Kolkata

Blood Donation Drive – Kolkata

Visit to Universal Smile – Kolkata

Serving food to underprivileged people – Chennai

Career counselling by senior management – Mumbai

Career counselling by senior management – Mumbai

TATA VOLUNTEERING WEEK 8

Computer Literacy Program – Delhi

School Wall Painting – Mumbai

Mentoring session – Mumbai

Story telling session – Mumbai

Beach Cleaning Drive – Mumbai

Riverfront Cleaning Drive – Pune

TATA CONSULTING ENGINEERS LIMITED

TCE Corporate Communications

Engineering A Better Tomorrow