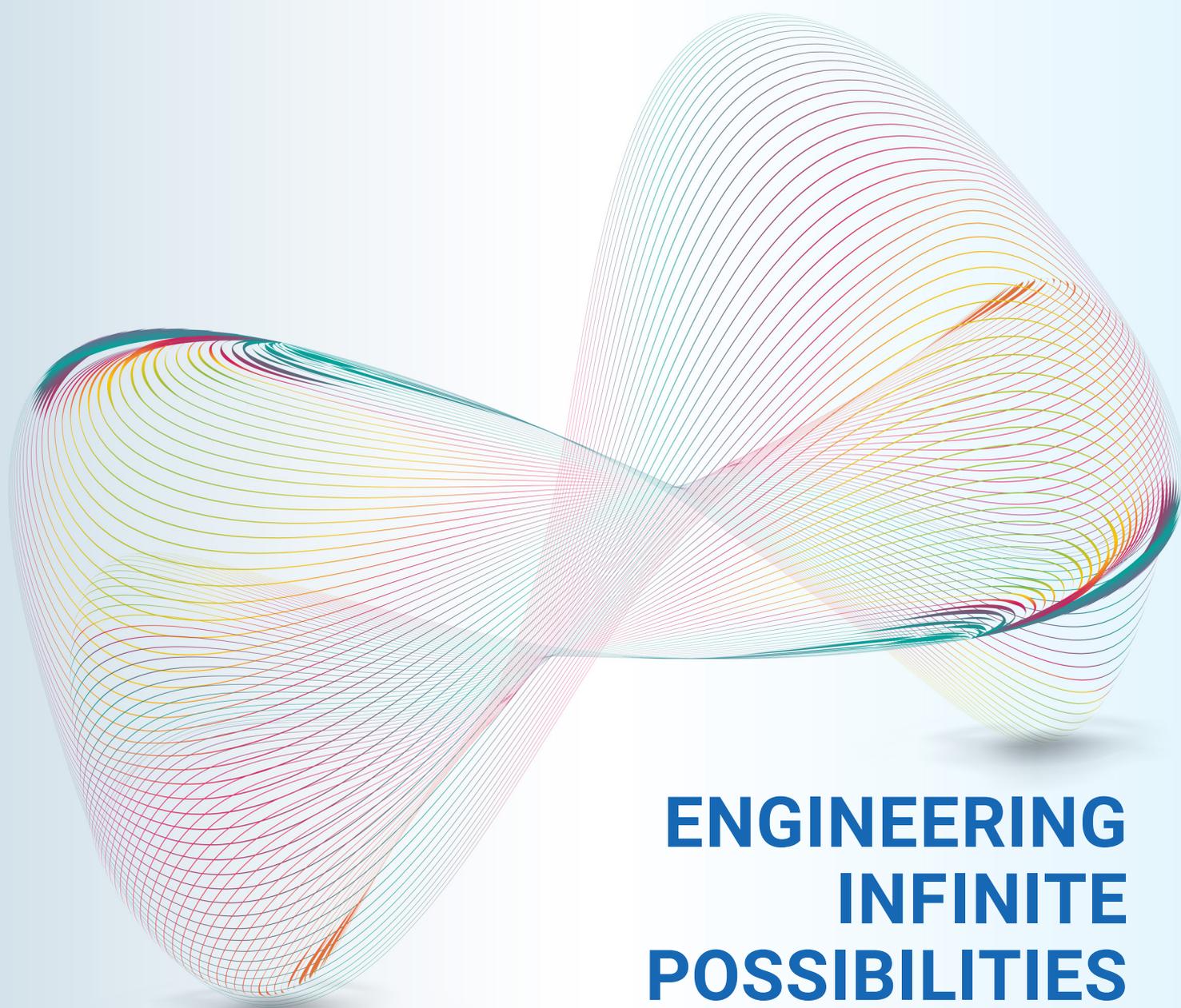




TATA CONSULTING ENGINEERS LIMITED

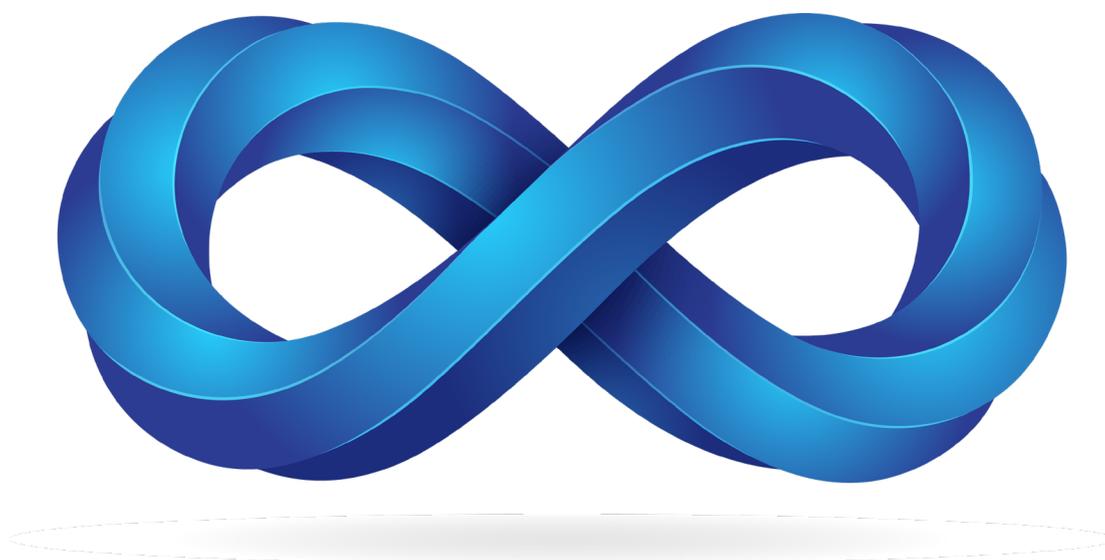
23rd ANNUAL REPORT 2021-22



**ENGINEERING
INFINITE
POSSIBILITIES**

ANNUAL REPORT

2021-2022



APPROACH TO REPORTING

The Annual Report is aimed at meeting the information requirements of all our Stakeholders, including Investors, Customers, Suppliers, Employees, Contractors, Competitors, Press, Analysts, the Government and others.

MATERIALITY

The Report includes information that our Senior Management believes is material to our Stakeholders and it presents an overview of our businesses and associated activities that help in short, medium and long-term Value Creation. We have presented information around our strategic approach, and the Report also discusses what different capitals mean for the Company.

SCOPE OF THE REPORT

We have presented the information on all our business units in a fair, balanced and understandable manner. The performance disclosure is reported for the period FY 2021-22.

FORWARD-LOOKING STATEMENT

This Annual Report and other statements – written and oral – that we periodically make contain forward-looking statements that set out anticipated results based on the Management's plans and assumptions. We have tried wherever possible to identify such statements using suitable words in connection with any discussion on future performance. We cannot guarantee that these forward-looking statements will be realised, although we believe we have been prudent in our assumptions.

The achievement of results is subject to risks, uncertainties and even inaccurate assumptions. Should known or unknown risks or uncertainties materialise, or should underlying assumptions prove inaccurate, actual results could vary materially from those anticipated, estimated or projected. We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise.

MANAGEMENT REVIEW

For optimal presentation of the information in the Report, the Strategic Framework, Governance Overview, Performance and Value Creation Model have all been perused by the Senior Management.

REPORTING PRINCIPLE

Through the Report, we are attempting to present our '*Integrated Thinking*' process by aligning our communication with the International Integrated Reporting (IR) Framework by the International Integrated Reporting Council (IIRC) and the Companies Act, 2013. The Report tries to communicate a clear, concise, integrated story that explains how all our resources create value for the business and its Stakeholders.

In Loving Memory of



Syamal Gupta

15 APRIL 1934 - 1 APRIL 2022

We are deeply saddened by the passing of Mr Syamal Gupta, the first Chairman of Tata Consulting Engineers Limited (TCE) post-incorporation, who played a key role in TCE's growth strategy.

Mr Syamal Gupta was a Fellow of the Imperial College of Science, Technology & Medicine, London, a Fellow of the Institute of Mechanical Engineers (London) FI Mech E, and a Foreign Member of the Royal Academy of Engineering, U.K. He also completed the Advanced Management Program at Harvard Business School.

In 1972, he was deputed to Singapore as the Managing Director of a greenfield project, the Tata Precision Industries Pte Limited. Subsequently, Mr Gupta returned to India to take over as the Managing Director of Tata International Limited (formerly Tata Exports) in 1982.

Mr Gupta was a Director on the Board of Tata Sons Ltd and many other Tata companies.

We will Miss You, Sir.



**YEARS OF ENGINEERING
INFINITE POSSIBILITIES**

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Engineering Infinite Possibilities

Established in 1962, Tata Consulting Engineers Limited (TCE) is India's Leading Integrated Engineering Consultant providing Concept to Commissioning services. With 10,000+ projects delivered in more than 63 countries over the last six decades, the Company has recorded a tremendous growth of 64% in new business acquisitions this year.

As TCE celebrates its Diamond Jubilee, the Company has truly lived the motto of Engineering Infinite Possibilities and holds the track record of delivering several one-of-its-kind projects backed by a solid knowledge base and technical expertise.

TCE, among the top 2 consultants in its core sectors - Power, Infrastructure and Resources is a well-diversified firm with equal distribution between Domestic and International projects. TCE continues to be a part of the Nation's Strategic Projects across Infrastructure, Transportation, Nuclear, Power, Defence, Space and Urbanisation.

The Company has multi-disciplinary engineering talent with capabilities to manage complex projects worldwide. TCE is among the few companies geared for the Industry 4.0 era, providing engineering solutions for the Industrial Internet of Things (IIoT).

Currently, TCE is executing projects (design, engineering and/or site services) at 130 sites across India and overseas. TCE has a dedicated talent pool with core engineering skills, thus serving as an integrated service model for its clients.

The Company's ability to manage complex projects, and experience in building cost-effective and environment friendly solutions, makes it one of the most sought after engineering solutions partner across the globe. TCE's Digital Engineering and 3D - 5D delivery models enable the Company to provide niche services tailored to client needs. This is underscored by several success stories in delivering client aspirations.

Corporate Snapshot

60 Years
of Technical Excellence

895 Cr
Total Consolidated
Income FY 2021-22

10000+
Projects Delivered

\$35 Bn
Worth Projects
under Management

in

63
Countries

2669
Average Employees
FY 2021-22

05
Patents

1948 Cr
Business Acquisition

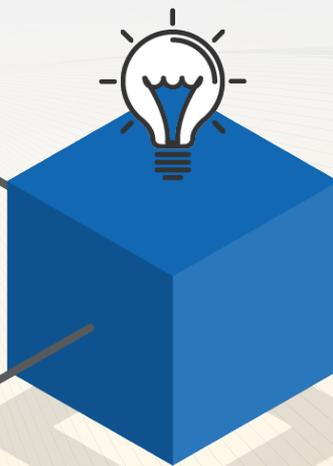
Our Pillars of Success

Vision

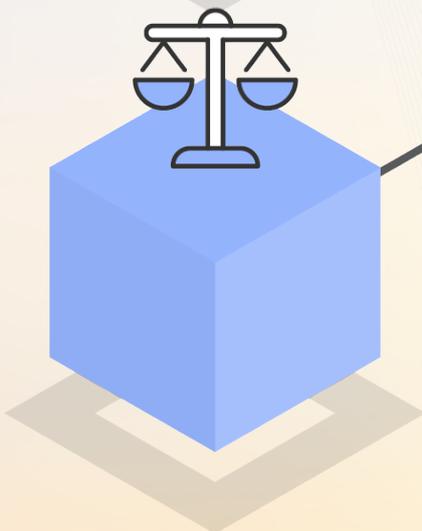


To be an Internationally Respected Engineering Consultant offering Comprehensive Solutions.

Mission



Provide Technically Excellent and Innovative Solutions for adding Value to all Stakeholders, and Operate Globally as Professional Consulting Engineers.



Values

- Customer Satisfaction & Loyalty
- Technical Excellence with Professional Ethics
- Responsibility to Society
- Employee Dignity & Self-respect
- Organisational & Individual Growth

Our Value Drivers

Customer Focus

At TCE staying alive to the needs of the customer is of paramount importance. Customer focus is a key parameter of employee goals, thus maximising customer loyalty and fostering a culture of customer first.

Innovation Culture

We encourage a creative mindset by motivating employees to participate in ePride and Tata Innovista contests. We also have a mechanism to capture value additions at the project level and share the learnings with other project teams.

Industry Expertise

Our deep domain expertise across various industry segments gives us a competitive advantage and helps design out-of-the-box technical solutions to save customer time and money.

Thought Leadership

As thought leaders in the industry, we hold the merit of shaping industry mindset, leading new domains, delivering complex & unique projects and value engineering.

World Class Talent

People are our most important asset and we believe in constantly upskilling our talent keeping pace with changing times. We are committed to ensuring an inclusive, innovative, meritocratic and people-centric culture.

System Mindset

Our system mindset ensures parity of experience and delivery to our customers. Applications such as SmartSite™ and Suraksha deliver seamless, paperless and real-time project management experience.

Tata Values

We are committed to integrity and adhere to the Tata Code of Conduct developed by the Tata Group. We have institutionalised well thought out stringent practices and processes to ensure high standard of Ethical Conduct and Compliance.





of Engineering Infinite Possibilities

FY 1963 TO FY 1972

1962 • 1963 • 1964 • 1965 • 1966 • 1967 • 1968 • 1969 • 1970 • 1971

- Est. in 1962 as Tata Ebasco Engineering
- In 1968 TCE became a division of Tata Sons
- First 150MW Trombay Thermal Project in India
- First Equatorially mounted cylindrical radio telescope at Ooty

FY 1973 TO FY 1982

1972 • 1973 • 1974 • 1975 • 1976 • 1977 • 1978 • 1979 • 1980 • 1981

- Asia's biggest water treatment plant of 2043 mld/day
- First 200MW thermal unit for India
- Pioneered seaborne coal handling systems in India, with a marine unloading facility

FY 1983 TO FY 1992

1982 • 1983 • 1984 • 1985 • 1986 • 1987 • 1988 • 1989 • 1990 • 1991

- First 500MW Thermal Power Unit
- Asia's biggest (2.3m dia) optical telescope
- The tallest 275m chimney in India
- India's first computer based Operator Training Simulator (OTS)



**FY 1993
TO
FY 2002**

1992 • 1993 • 1994 • 1995 • 1996 • 1997 • 1998 • 1999 • 2000 • 2001

- World's largest steerable radio telescope (GMRT) with 30 dishes, each of 45m Dia
- India's first marine outfall (undersea tunnel) of 1826mld
- 3.5km length sewage disposal system in Mumbai
- India's first 800kV, 405km long transmission line
- India's first Barge Mounted Combined Cycle Power Plant

**FY 2003
TO
FY 2012**

2002 • 2003 • 2004 • 2005 • 2006 • 2007 • 2008 • 2009 • 2010 • 2011

- India's first 300mld WTP with Pulsator and Aquazaur V Filters
- Asia's largest sewage pumping station of 1500mld peak capacity
- Highest Delta award for making a significant improvement in performance
- India's first creek tunnel of 3.6m dia
- Four tunnels of 3m dia using tunnel boring machine
- India's first 800MW supercritical thermal power station
- Serious Adoption recognition for crossing the first milestone in TBEM

**FY 2013
TO
FY 2022**

2012 • 2013 • 2014 • 2015 • 2016 • 2017 • 2018 • 2019 • 2020 • 2021

- 3 MTPA Expansion – Coke Oven and by Product Plant
- Digital technology adoption across the company
- Winner of Tata Group innovation award
- Winner of India's Top 25 Innovative firm award
- Opening of ME branches at Abu-Dhabi & Saudi Arabia
- Est. Dedicated Engineering Centers (DEC), offering 4D Construction simulation
- Awarded 14 Smart City & 55 AMRUT cities
- Partnered ISRO GSLV successful launch
- Engineering review of 182 meter tall Statue of Unity
- Assessed as 'Emerging Industry Leaders' for crossing to 551-650 band
- PMC for India's first High-Speed Rail from Ahmedabad to Mumbai
- Outstanding & Significant Supplier Contribution award by large Middle East customers

FY 2023



Our Sectors

PLANT ENGINEERING CLUSTER

29%

Share of Revenue

POWER SECTOR

Nuclear, Green Power (Solar, Wind, Hydro), Thermal, Transmission & Distribution, New Technologies – (Digital & Hydrogen)

33%

Share of Revenue

RESOURCES SECTOR

Hydrocarbons & Chemicals

Oil & Gas, Petrochemicals & Refineries, Food & Pharma, Specialty Chemicals

Mining & Metallurgy

Ferrous & Non-Ferrous, Geology & Mining, Beneficiation, Material Handling

INFRASTRUCTURE CLUSTER

38%

Share of Revenue

INFRASTRUCTURE SECTOR

Water, Wastewater & Swage, Buildings & Facilities, Environment & Sustainable Infrastructure, Industrial & Manufacturing Facilities, Master Planning & Urban Development, Ports & Transportation

ECOFIRST SERVICES LTD. (Subsidiary)

Sustainable Integrated Design of Buildings, Urban Design, Sustainable Engineered Services, Climate and Sustainability Services, Program Management, Digital & Modelling

Our Services

DESIGN & ENGINEERING SERVICE

- Project Concept Development
- Pre-feasibility & Feasibility Reports
- Detailed Project Reports
- Environmental Study Reports
- System Studies
- Frontend Engineering Design (FEED)
- OE Services
- Detailed Engineering

PROCUREMENT SERVICE

- Procurement Assistance
- Quality, Inspection & Equipment Management
- Vendor Quality Assessment
- Vendor Management
- Inquiry/Tender Preparation and Award

DIGITAL & ADVANCED TECHNOLOGIES SERVICE

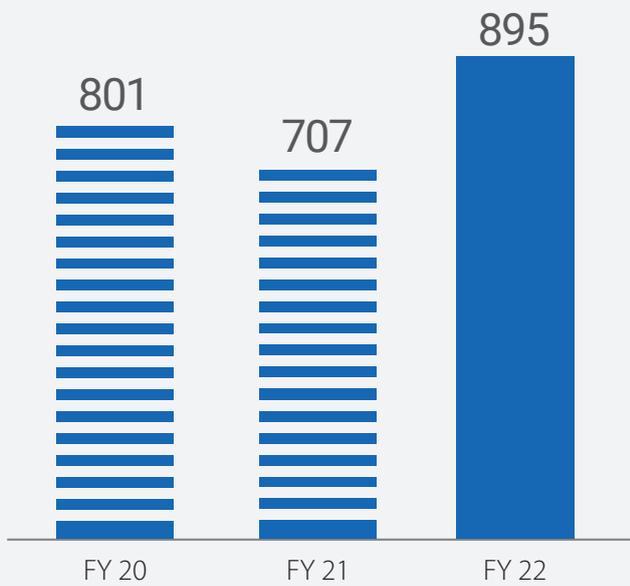
- Unified 3D Engineering, 4D, 5D Simulation
- Building Information Management
- Asset Digitisation & Asset Information Management
- Industry 4.0 & Asset Performance Management
- Product Engineering: Design and Analysis
- Turnkey Machine Development

PROJECT MANAGEMENT & SAFETY SERVICE

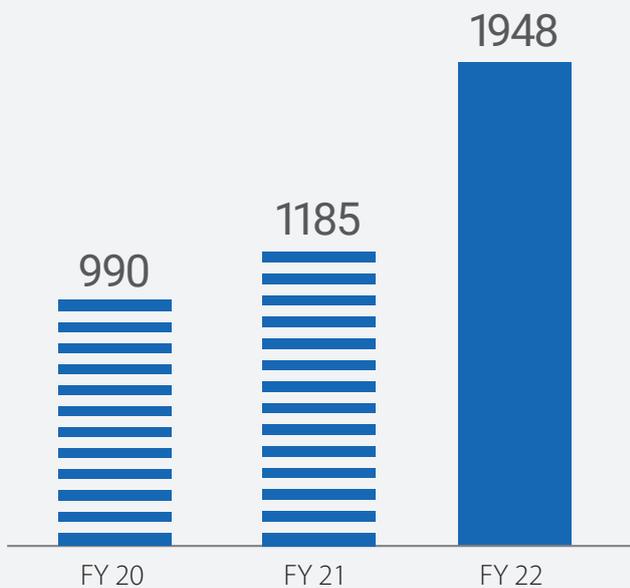
- Project Management
- Engineering & Constructability Review
- Construction Management / Supervision
- Program Management
- Interface Management
- Specialised Services
- Quality & Safety Audits
- Outage & Opex Management

Our Performance Highlights

TOTAL CONSOLIDATED INCOME



BUSINESS ACQUISITION

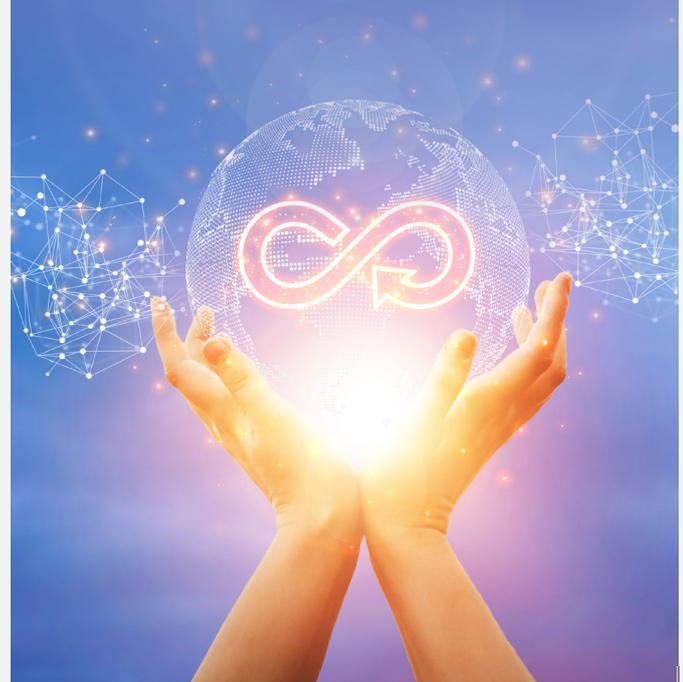


FY 2021-22 proved to be an exceptional year in the company's 60 year history. The year closed at Rs 895 Cr in total consolidated income and Rs 1948 Cr in order acquisition, highest ever.

895 Cr
Total Consolidated Income

1948 Cr
Business Acquisition

64%
Growth in Business Acquisition Over Previous Year



4529 kWh

Energy Consumption
by TCE Offices

NATURAL CAPITAL

Through our technology-enabled solutions, we also help our clients by engineering infinite possibilities to preserve natural resources and promote sustainability. Some of the projects that we undertake in water, waste management, smart cities, mining & metals, etc. are specifically addressed at natural capital enhancement for the environment as a whole.

82.5%

Utilisation of People

84%

Men Diversity

16%

Women

16

 Training Person
days per employee

HUMAN CAPITAL

People are at the heart of our business. Collective skills, knowledge and capabilities of our employees and contract staff help us engineer infinite possibilities.

MANUFACTURED CAPITAL

16

Project, Sales &
Branch Offices

Project design, engineering, construction, maintenance and management are the stages when we use materials, equipment, tools and technologies all form our manufactured capital.

INTELLECTUAL CAPITAL

Innovations around technologies for increasing project efficiency and creating knowledge continuously establish the company as a thought leader.

16 New Templatisation
Solutions

07 New Service
Offerings

25 Presentation at
Various Conferences

09 Whitepapers

76 on **63**
SMEs BIS Committees

390 Cr Value Addition
Benefits to Customers

28 Papers Published

25 Articles on Company
Website

02 New Patents Filed

05 Patents till Date

SOCIAL & RELATIONSHIP CAPITAL

Powered by our different flagship programmes, along with various volunteering initiatives, we are delivering on our social responsibility. Our Corporate Sustainability Policy framework offers the foundation to build our social well-being programmes by leveraging our core capabilities. Our primary focus areas are Sustainable Livelihood, Education, Infrastructure, Health and Hygiene, and Research and Development.

8513

**Corporate Volunteering
Person hours**

20005

Lives Touched

2.28 Cr

Invested in CSR projects

2426

Employees Volunteered



Company Awards

- **FIDIC Awards 2021**
Certificate of Merit for the Bangalore Water Supply and Sewerage Project (II)
- **13th CIDC Vishwakarma Awards 2022**
Safety, Health Environment in Construction
- **ACCE(I) - INSWAREB AWARD 2020**
Certificate of Merit for effective use of Pozzolana or blended cement
- **ICSI National Awards 2021**
Excellence in Corporate Governance
- **Asia's Best Employer Brand Awards 2021**
- **L&D Summit & Awards 2022**
Being conferred with the Evolution in L&D
- **Tata Innovista Finalist 2021**
- **CII Best Case Study 2021**
National Electrical Safety, Power Quality & Reliability Circle Competition
- **Global CSR Excellence Award 2022**
Rural Development / Upliftment
- **Best COVID19 Solution 2022**
Community Care
- **Finalist of CII Design Excellence Awards 2021**
Combating COVID19
- **The Institution of Engineers (India) 2021**
Innovative Industries Award for combating COVID19
- **SABIC Supplier Recognition Programme 2022**
Outstanding and Significant Contribution
- **Energy Leadership Award 2022**
Renewable Category
- **Energy Leadership Award 2022**
Non-renewable Category

People Awards

- **CEO of the Year by Indian Achievers Forum**
Amit Sharma

- **Forbes India enlistment in "Top GC-Powerlist 2021" in March 2022**
- **General Counsel of the Year 2021 at the 7th Edition India Legal Summit & Awards 2021**
- **Governance Professional of the Year award by the Institute of Company Secretaries of India in 2021**
Sachin Mishra

- **Woman Leader of the Organisation**
Nidhi Mehandiratta

- **CFO100 Roll of Honor for exceptional contribution to corporate finance**
Gurunandan Molahalliker

- **Safety Influencer Award by World of Safety Asia**
Josy Thopil

- **Consulting Leader of the Year: Women in New Energy (WINE) Awards**
D R Shanti

- **Technology Leader of the Year: Women in New Energy (WINE) Awards**
D Geethalakshmi

Our Presence

61%
Share of Total Revenue

INDIA

216 Cities



12% Share of International Revenue

MIDDLE EAST & AFRICA (MEA)

27% Share of International Revenue

REST OF WORLD (ROW)

NORTH AMERICA

- 1. Canada
- 2. Mexico
- 3. USA

SOUTH AMERICA

- 4. Brazil

EUROPE

- 5. France
- 6. Germany
- 7. Italy
- 8. Netherlands
- 9. Portugal
- 10. Spain
- 11. Switzerland
- 12. Turkey
- 13. UK
- 14. Ukraine

AFRICA

- 15. Algeria
- 16. Congo
- 17. Egypt
- 18. Ethiopia
- 19. Ghana
- 20. Kenya
- 21. Liberia
- 22. Libya
- 23. Malawi
- 24. Mauritius
- 25. Mozambique
- 26. Nigeria
- 27. Rwanda
- 28. Senegal
- 29. Seychelles
- 30. Sierra Leone
- 31. South Africa
- 32. Sudan
- 33. Tanzania
- 34. Uganda
- 35. Zambia

AUSTRALIA

- 36. Brisbane
- 37. Sydney

ASIA

- 38. Bahrain
- 39. Bangladesh
- 40. Bhutan
- 41. China
- 42. Fiji Islands
- 43. Indonesia
- 44. Japan
- 45. Jordan
- 46. Kuwait
- 47. Laos
- 48. Lebanon
- 49. Malaysia
- 50. Myanmar
- 51. Nepal
- 52. Oman
- 53. Philippines
- 54. Qatar
- 55. Saudi Arabia
- 56. Singapore
- 57. South Korea
- 58. Sri Lanka
- 59. Thailand
- 60. UAE
- 61. Uzbekistan
- 62. Vietnam
- 63. Yemen



Chairman's Statement

“

In its 60th (Diamond Jubilee) year, your company reported a stellar performance with the highest-ever order book of Rs 1948 Cr in FY 2021-22 compared to Rs 1185 Cr in FY 2020-21 and added new prestigious customers.

Your company also recorded many new milestones like zero debt since 2020, lowest locked working capital, highest billing & collection this year.

”

Ashok Sethi
Chairman



Dear Stakeholder,

As the effects of the COVID19 pandemic fade, and life and business get back to normal, I hope you and your family continue to be safe and healthy. Your company started the year FY 2021-22 amidst peaking of the second wave of COVID19. The employees continued to work from home, and the site workforce continued to work from the site. Over the year, with the help of solid leadership and IT-enabled working from home, the team offered exceptional performance. I am also happy to report that your company has achieved nearly 100% vaccination and all the employees are keeping well as they slowly return to work from the office.

In its 60th (Diamond Jubilee) year, your company has reported a stellar performance in FY 2021-22 with the highest-ever order book of Rs 1948 Cr compared to Rs 1185 Cr in FY 2020-21. Your company's total consolidated income also soared to the highest since inception to reach Rs 895 Cr, compared to Rs 707 Cr in FY 2020-21. Besides this, your company recorded many new milestones like zero debt since 2020, lowest locked working capital, highest billing and collection and many more.

Your Company ranked 118 in the ENR ranking of 'top 225 international engineering firms' in FY 2021-22. As the company continues to engineer infinite possibilities, I am sure soon your company will reach the milestone of ranking within the top 100. It also gives me immense pride to inform you that your Company has been awarded various national and international awards and recognitions by Industry bodies and your customers, further reinforcing the value engineering and customer-focused attributes of our delivery and operation. For the COVID19 efforts of TCE to enable oxygen availability on-site, the company won several awards including an innovation award by IEI, and Best COVID19 Solution for Community Care by World CSR Congress.

As we continue to deliver satisfactory performance on Pride of TCE projects like ITER in France, Copper Smelter in Indonesia, Brass Fertilizer in Nigeria, SABIC in Middle East and projects in India like Ram Janmbhoomi Temple, High-Speed Rail, CIDCO affordable housing, and other projects, we continuously

evolve and strengthen our processes to ensure safety on the sites and timely delivery on milestones.

TCE is organised as:

1. Infrastructure Cluster

Providing Engineering Services for Water & Environment, Urban Infrastructure, Buildings & Facilities, Ports, Transportation, Sustainability Services (via the wholly-owned subsidiary M/s Ecofirst) and Project Management Services across sectors.

In FY 2021-22, the Infrastructure Cluster acquired 65% of the total acquisition as compared to 63% in FY 2020-21 and secured 50% share in revenue as compared to 51% in FY 2020-21.

2. Plant Engineering and Design Cluster

Providing Engineering Services for Oil & Gas, Petrochemicals, Specialty Chemicals, Food and Pharma, Geology & Mining, Ore Beneficiation, Metal Extraction, Material Handling, Power Generation (Nuclear, Green Power (Solar, Wind, Hydro) and Thermal), Transmission & Distribution, New Technologies – (Digital & Hydrogen).

In FY 2021-22, the Plant Engineering and Design Cluster acquired 33% of the total acquisition as compared to 36% in FY 2020-21 and secured 48% share in revenue as compared to 47% in FY 2020-21.

3. Digital and Advanced Services continue to be an important focus area; strategy is being revised to give a momentum this year.

We are hopeful that it is safe to say that we now live in the post-pandemic world. We see the impact of COVID19 led evolution of newer business models, and we are keeping a keen eye on how this evolution can be leveraged to offer more services to our customers. Sustainability, Energy Transition, Hydrogen Economy and Digital are the key themes that we see emerging, and I am happy to report that with its strong domain expertise, your company is already working on a few large niche projects in India and internationally.

For the COVID19 efforts of TCE to enable oxygen availability on-site, the company won several awards including an innovation award by IEI, and Best COVID19 Solution for Community Care by World CSR Congress.

Your Company also focuses on offering sustainable design and services across industries. The company also aims to strengthen its asset lifecycle footprint in urban mass transport, low-cost housing, sustainable infrastructure, metal and mining process designs, clean energy, enemy transmission, ports, green chemicals, refining and digital services.

Satisfactory Financial Results with a Strong Order Book

TCE maintains its leadership position within the Consulting Industry by promoting excellence, creating value, seeking new and pioneering technologies, and engineering infinite possibilities for the clients, despite market and economic volatility. Your Company achieved total consolidated income of Rs 895 Cr for FY 2021-22, a 26% jump. The domestic component skewed by the high-speed rail project was at 73%, and the international was at 27%. As the global markets emerge from the COVID19 impact, we hope to get back on track with our 50:50 strategy.

The business acquisition for FY 2021-22 far exceeded the last year's milestone by more than 64% to reach Rs 1948 Cr. On its strong order book and credentials, I am optimistic that your Company will scale newer heights.

Governance & Systems

Your Company has always focused on good governance practices and established systems and processes to enforce the same. Anti-bribery & Anticorruption, Prevention of Sexual Harassment (POSH) at the workplace, adherence to the General Data Protection Regulation (GDPR), Whistle-Blower Framework and others have been institutionalised through policies and guidelines. IT systems have strengthened business processes, making for a transparent mechanism

to protect client IPR and build client confidence. The risk management process has been reinforced with a clear focus on addressing and mitigating your company's material risks. It is a matter of pride that systems and procedures led to no governance issues in the company.

I am happy to share that your company was adjudged Best Governed Company Unlisted Segment: Emerging Category by the Institute of Company Secretaries of India and the award was presented by honourable home minister Shri Amit Shah.

Corporate Social Responsibility

As a responsible corporate citizen, your company is working with the communities it serves to create sustainable livelihood opportunities including infrastructure development and healthcare and education. This FY 2021-22, your company reported 2426 volunteers investing 8513 person-hours and touching 25005 lives. I am proud to see the on-ground impact of the program which has resulted in increased income and reduced immigration by 49% in the beneficiary districts.

Your company won the Global CSR Excellence Award for Rural Development / Upliftment organised by the World CSR Congress.

Under the CSR strategy, this year your company has decided to focus on the following UN Sustainable Development Goals (SDGs):

- Quality Education
- Good Health and Well-being
- Industry, Innovation and Infrastructure
- Sustainable Cities and Communities



People

TCE is among the few organisations with a large engineering talent pool that forms the backbone of the Company's success. The immensely talented and passionate workforce has, time and again, helped deliver significant value to its customers. With the increased focus on people development, your company stressed on imparting key leadership and people management training to the employees. These programs will help employees deliver value to the customers and enhance the customer experience and project deliverables.

This FY 2021-22, your company invested 16 person-hours per employee on training, including training on digital engineering delivery mechanisms. Your company was awarded for HR Excellence in Training in Asia's Best Employer Brand Awards 2021 organised by World HRD Congress.

Attrition and succession planning continue to be the HR focus area for your company in the coming year as well.

Conclusion

Globally, the coming years will continue to see disruptions in redefining businesses in many ways. The post COVID19 bet will undoubtedly lead to an enhanced focus on digital and entire asset lifecycle management opportunities. As the world continues to fight climate change, sustainability will regain focus. Self-sustenance and self-preservation philosophies of nations around the globe will bring forward newer opportunities and challenges for us. I assure you that your company is poised to take up these opportunities and is adept at converting any challenges into newer service opportunities with the help of a relentless focus on value, innovation, and excellence.

It has been a historic year for your Company - my best wishes to all employees, customers and partners who have placed their trust in us. I also thank the Management and the Board members of TCE for their valuable contribution to the success of the Company.

I look forward to TCE delivering enhanced value for you in the year ahead and beyond. I want to convey my sincere appreciation to the Board of Directors for their guidance and express my heartiest gratitude to all stakeholders for their enduring faith in TCE.

**Sincerely yours,
Ashok Sethi**



Members of the Board

Tata Consulting Engineers Limited (TCE)



From right to left:
Ashok Sethi, Chairman | Sriram Kadiyala, Director | Anjali Kulkarni, Director | Amit Sharma, Managing Director & CEO

Management Team

Under the guidance of the Managing Director & CEO

BUSINESS FACING



S Vidyanand
Chief Operating Officer



Rajashekhar R Malur
Cluster Head - Plant Engineering & Design



B R Parthasarathy
Cluster Head - Infra, Sustainability & PMC



Rajat Kaushal
Head - International Mktg & Business Dev



Pravinchandra R Shahu
CIO & Head - Digital

BUSINESS ENABLING



Gurunandan Molahalliker
Chief Financial Officer (Till June 3, 2022)



Ms. Nidhi Mehandiratta
Head - HR, CSR & Ethics



Sachin Mishra
Head - Legal & Company Secretary



Atul Choudhari
Chief Technology Officer



Himanshu Joshi
Head - Strategy and M&A

SUBSIDIARIES

EcoFirst Services Ltd.



Chitrnanjan Kaushik
Chief Operating Officer, Ecofirst

Board of Directors

Amit Sharma
Chairman

S Vidyanand
Director

K Ramesh
Director

Tata Engineering Consultants Saudi Arabia



Ashwani Sadhu
General Manager

Managing Director's Statement



“ The year 2022 is a momentous year, the Diamond Jubilee of Tata Consulting Engineers (TCE) marking the completion of six decades of “Engineering a Better Tomorrow”. As we celebrate this significant milestone, we are also busy charting the pathway for engineering infinite possibilities and delivering exceptional performance to all our Stakeholders. ”

Amit Sharma
Managing Director & CEO

Engineering Infinite Possibilities

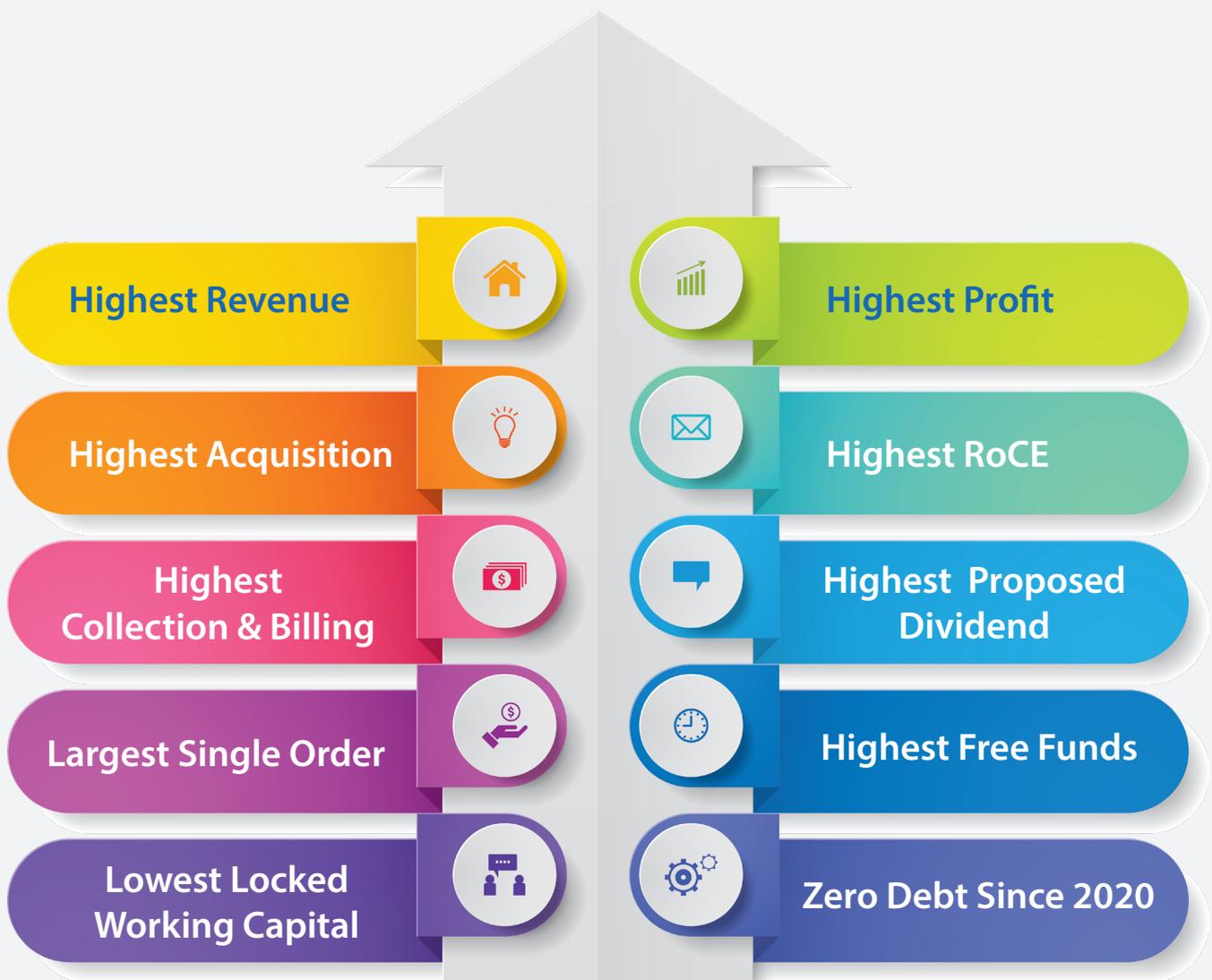
The year 2022 is a momentous year, the Diamond Jubilee of Tata Consulting Engineers Limited (TCE) marking the completion of six decades of “Engineering a Better Tomorrow”. As we celebrate this significant milestone, we are also busy charting the pathway for engineering infinite possibilities and delivering exceptional performance to all our Stakeholders.

FY 2021-22 continued to test the determination and resilience of humanity with the continuing onslaught of the pandemic and the resulting lockdown. Our business continuity plans and the mettle of our people in facing adversity were put to test. I am proud to say that we emerged victorious and more decisive. We continued to pursue operational and people excellence initiatives, while

we implemented our long-term strategy and future growth bets. FY 2021-22 has been a year of benchmarks, records and TCE scaling new heights and milestones, indeed a testament to its strong six decades of existence, strong foundation and an urge to excel and perform better each year.

Delivering Strong Financial Results

Our excellent financial performance in FY 2021-22 is an outcome of our concerted efforts and commitment to deliver value to all our stakeholders. TCE this year clocked the highest ever total consolidated income of Rs 895 Cr as against Rs 707 Cr for FY 2021-22. The business acquisition for FY 2021-22 (Consolidated) stood at Rs 1948 Cr, the highest ever annual order wins in the company’s history.



Expanding Possibilities

- TCE delivered the best-ever sales order acquisition in a financial year aided by the largest consulting order win by an Indian consulting company. The order for Project Management Consultancy (PMC) Civil for the Mumbai - Ahmedabad High-Speed Rail (MAHSR), totalling Rs 1111 Cr is a significant milestone in TCE's excellence journey and nation building efforts, and continues to add to our list of the many "First time projects in India".
 - This year, TCE's domestic order acquisitions moved to 73% compared to 59% in FY 2020-21. The Chemicals and Infrastructure business fared well. The infrastructure cluster was significantly augmented by the acquisition of the MAHSR (TCE as a 51% consortium partner), which contributed to this sizeable overall domestic order acquisition share percentage (without this, the domestic share is 60%)
 - TCE achieved a higher PBT with careful monitoring of productivity, efficient utilisation of all resources, and lower costs related to business overheads. These measures helped the company achieve a PBT of Rs 173 Cr in FY 2021-22 against the target of Rs 168 Cr (consolidated with Ecofirst). The overall operating margins also met the budget.
 - TCE EBITDA margin improved to 23% in FY 2021-22 compared to 16.5% in FY 2020-21, RoE was ~22% compared to 12.7% in FY 2020-21, and ROCE was 30.5% in FY 2021-22 compared to 17.3% in FY 2020-21.
 - The increase in revenue directly impacted the PBT, with revenue increasing by 27% YoY. This year saw a rise in international deployments in Europe and the Middle East. It was supported by a strong impetus on infra projects in the sectors of Metro, transportation for high-speed rail, water sector, mass housing etc.
 - TCE recorded the best-ever collection in FY 2021-22, resulting in reduced interest impact and locked capital. As a result of this collection, TCE remains a debt-free company.
- India's Infrastructure story continues to dominate the government spending. However, it will require selective bidding to ensure viability; hence, fully funded and managed projects are targeted.
- The strong impetus in the Union Budget on Infrastructure and announcement of programs like Gati Shakti, HSR, Metros, Mass Housing, Tier 2 cities, Airports, Water, etc., have also further boosted the Infra business potential. The Plant Engineering and Design cluster, remains buoyant, with investments in Metals, Chemicals, Power boosted by demand due to global supply chain realignment, India localisation to balance China dependence, commodities boom and a tangible shift in the Green and renewable energy focus by industries across multiple value chains.
 - The shift to Electrification provides exciting opportunities in emerging areas of Hydrogen, Methanol, Ammonia, Energy Storage, Bio-Chemicals, Rare earths, and Metals to name a few. Our investments in building solutions, thought leadership, industry & academia connects, and relationships has already showed promising outcomes and we hope to remain relevant and a key player shaping and creating the future with industry innovators.
 - People are at the heart of TCE, our true asset. With a solid well-diversified delivery pipeline, the main challenge will be to inspire, train, hire and more importantly to retain our talent, especially with the post-pandemic talent scarcity and movement being witnessed across the industry. I am confident that we will mitigate the risk of rising attrition and nurture our talent with our training, hiring, planning, leadership development, compensation and deployment strategies, and ensuring that TCE provides the best project experience across its sectors to motivate and provide an exciting workplace and work environment to our talents.
 - Our people strategy focused on employee training, growth opportunities, market aligned compensation approach, policies enabling growth and innovation along with overall development, and towards providing exciting opportunities across the firm via rotation, redeployment, and better leveraging skills across projects.

Focusing on Strategic Growth

- With the global supply chain realignment due to China and dynamics of Europe, India is poised to take on more opportunities in Chemicals, Commodities and Pharma.

FY 2022-23 and Beyond

COVID19, China effect coupled with the ongoing events unfolding in Europe has fundamentally altered the macro-economics, future energy dynamics and global supply chain dynamics. This is further impacted by the inflationary environment. India's economic activity is reaching closer to pre-COVID19 levels. USA, UK, France, Germany and Middle East have also opened up for business operations; however it is still early to predict if the global economy shifts to low-carbon, and how the related investment decisions pan out. It is clear that there will be a more decentralised approach to energy and commodities related investments and a more balanced and resilient goods and supply chain decisions, which will open up significant opportunities across Power, Metals, Chemicals, Nuclear, Renewables, both in new greenfield and brownfield arenas. Infrastructure investments in India will continue to be spearheaded by the

government as a key economy and growth driver, coupled with investments by global and leading India based firms in sectors such as semiconductors, battery technologies and defence and pharma/healthcare.

TCE is also focused on being a key player in the Hydrogen Infrastructure, IIoT and Digital Asset Management, Carbon-free electricity for e-mobility, Digital Plant offerings, Plant Safety & Security and global large deals in Metals, Chemicals, Nuclear and Digital arena.

Sincerely yours

Amit Sharma



Chief Operating Officer's Statement



“
Tata Consulting Engineers Limited (TCE) continued its focus on providing uninterrupted value-added services to its clientele despite most design engineers continuing to work from home due to the prevailing COVID19 situation.

”

S Vidyanand
Chief Operating Officer

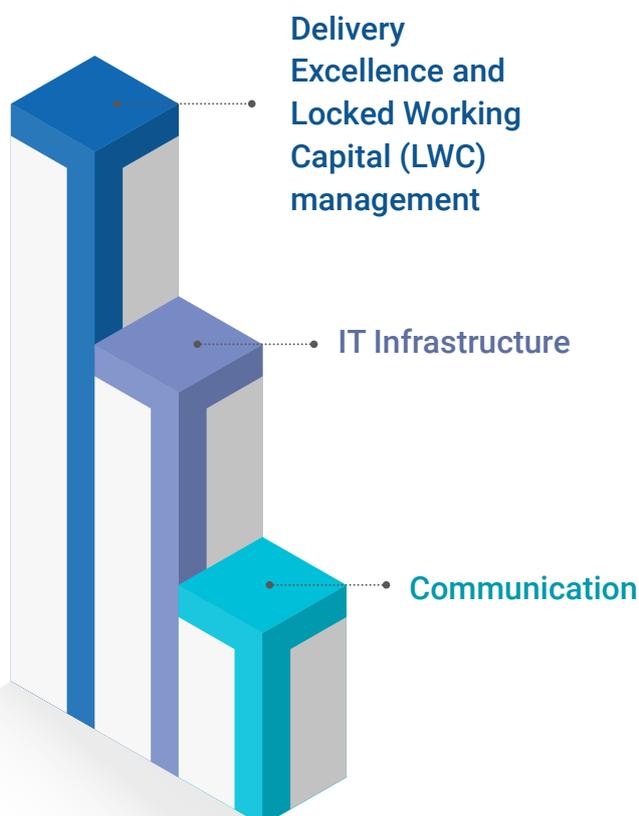
Operations Perspective

Tata Consulting Engineers Limited (TCE) with its six-decade strong engineering roots adopted the latest innovations in digital engineering and has effectively organised itself into sectors and services to be relevant to the exciting market opportunities and customer needs. The Rhythm initiative launched in FY 2012-13 has now matured and is aligned with key levers like Operations, Technology, People and Sales. TCE has further streamlined its operations which enabled record operating performance even as COVID19 Pandemic continued into FY 2021- 22, impacting the global business.

Operations Focus

TCE continued its focus on providing uninterrupted value-added services to its clientele despite most design engineers continuing to work from home due to the prevailing COVID19 situation. However, teams from the Project Management Cosultancy (PMC) business continued their work from project sites without any significant interruption, which ensured project timelines were not seriously impacted. Customers were delighted that TCE established a robust business continuity plan, and design and site management project activities were not affected.

Pillars of Success:



Delivery Excellence and Locked Working Capital (LWC) management

During FY 2021-22, we achieved significant improvements in all operational metrics compared to the previous year. The company reached an all-time high billing and collection, which improved the locked working capital management and better cash flow throughout the year. Due to focused efforts, a good portion of old dues were also collected, and there has been a significant reduction in unbilled revenue. This reflects the financial prudence exhibited by teams across BUs.

In terms of delivery excellence, projects have been seamlessly executed through Wrench with a higher level of implementation in all BUs, which has become the way of working. Customer appreciations and improved customer feedback index reflect our value-added services and on-time delivery in our projects. Deployment of the resource management module has helped the BUs forecast resource utilisation and plan for outsourcing and talent hiring. The entire hiring process and training programs were managed through virtual mode. The revenue utilisation of the billable employees has improved across various BUs due to better utilisation forecast and planning. Also, as part of delivery excellence, competency building to meet the new and emerging business requirements has been taken up.

IT Infrastructure

1. **Security:** While we moved away from the office ecosystem and continued performing our roles from the home office, the organisation needed to have visibility of its people, assets, and data. As we moved out of our corporate network's secured and protected environment to an open and unsecured internet, we needed to safeguard our systems and protect the data from external attacks, intruders, or leakage.

Enterprise Mobility Suite helped us extend Conditional Access wherein only authorised company assets could access the data and download it. This ensured avoiding Data Leak. In addition, we migrated our on-premise antivirus solution to AI/ML-based NextGen Antivirus and Endpoint Detection and Response (EDR) solutions on the cloud with more features and functionality. This ensured more visibility and control of end-user devices and better protection from cyber threats. We also enhanced our Data Security Layer by rolling out a Data Loss Prevention (DLP) solution for endpoints and strengthened our email security by moving to a cloud

platform with spam filtering, content filtering, anti-virus, anti-malware and advanced threat protection. We rolled out Zero Trust Base internet access across all devices the company owns. This has enabled protection for users working from anywhere against malicious content, viruses, worms, malware and advanced threats.

2. **Productivity**- We enabled our employees with secured access to the project data and ported the required software licenses to their systems in advance. Subsequently, we migrated most of our licenses to the cloud to ensure continuous availability, concurrency, and effective utilisation.
3. **Collaboration** - TCE uses tools like Microsoft Teams, SharePoint and Integrated Document Management System and has practised the collaborative work culture. This helped our employees get acquainted with the remote work culture faster. We further enhanced collaboration and document sharing using One Drive for Business.
4. **End-user Support and Awareness** - The IT Helpdesk team supported our employees around the clock over all communication channels to help this transition. We ensured that our task force got the necessary support from hardware vendors at their doorstep. IT Team engaged in frequent communications with all the employees to keep up their systems and advised them to follow standard security hygiene practices. Periodic emailers were sent out to our employees to reiterate the awareness of phishing, malware, ransomware and other online threats.
5. **Infrastructure, the Next Steps** - Being a future-focused organisation, we took proactive steps to address possible chances of network clogging that may arise in the future. Bandwidth was ramped up at all Internet gateways. Secondary communication links were introduced to avoid loss of productivity due to link failures. We are further strengthening our Network infrastructure by upgrading our network capacity multiple times.

Virtual Desktop Infrastructure was deployed to enable a smooth and enhanced remote work experience for 3D engineering application users. This solution could address the need for high graphic requirements, data availability, data security, and ease of access.

Communication

FY 2021-22 continued to be under the influence of COVID19 as the world witnessed the second and third waves; the communication challenge shifted from awareness about the pandemic to engaging employees and giving them creative breaks while they continued to work from home. We launched a series of communication campaigns to engage the employees actively. The campaigns centred around themes like innovation, ethics, TCE Values, New initiatives and programs launched this year, Problems worth Solving etc.

Our social media presence continued to grow with more than 220+ posts and 31 videos published on all TCE social media platforms LinkedIn, Facebook, Twitter, Instagram, and Youtube. TCE's LinkedIn page crossed more than 4.10 Lakhs followers end of March 2022.

We published nine web articles on Tata World and one case study on UN WEP Forum website. We also published twenty five papers, seven Technical Blogs, six project Case Studies and nine projects on TCE Website. 2 new sub-sectors (Hydro Power and Nuclear Power) were also launched on the website. The Search Engine Optimisation (SEO) was constantly reviewed, and keywords updated on an ongoing basis resulting in more than 56,000 visitors and 228 relevant business enquiries from the website.

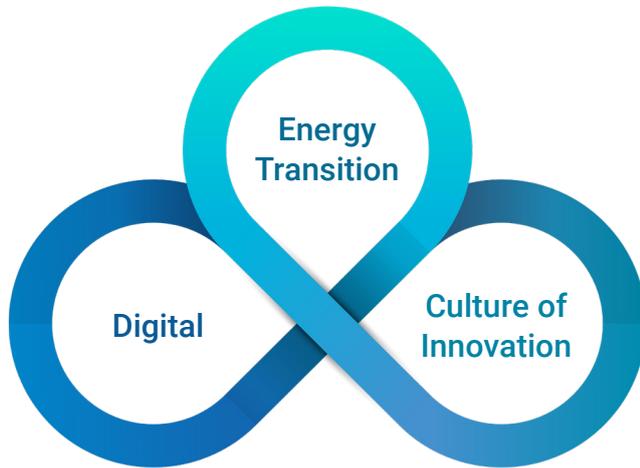
We also published two TCE Expressions, our customer-facing magazine centred on themes relevant to the customers with viewpoints and perspectives of our expert engineering talent.

The Managing Director used the digital platform TEAMS to address employees on several occasions like Annual Meets, Founders Day, Safety Day etc. More than ten employee messages were sent from the MD's desk with a letter from the MD on relevant and vital days/events. The Delivery Centers (DC) heads held DC Connects at regular intervals. The HR team held HR Connects at all locations monthly. Business Unit Heads also shared business & people results with employees in BU CoC meetings.

Senior management teams established virtual communication channels across the company like chai pe charcha and Gupshup to connect informally with the employees and understand their issues. Employee communication was more impactful with attractive mailers; more than 150 such mailers were sent out regularly. TCE also whole-heartedly and virtually participated in the Tata Group Level initiatives like Tata Sustainability Month, Tata

Volunteering Month, Tata Innovista, Tata World Contests, Young Expressions, Tata Review etc., showcasing the Company at the Group level.

Foundation for Sustainable Future



Energy Transition

In response to global warming and towards achieving the net-zero emission goal, energy transition is at the focal point of the industry. Post Paris Climate Accord 2015, the energy transition technologies are gaining momentum. TCE recognised the significance of this technological shift toward business sustainability, and our teams started developing appropriate technical solutions utilising greener pathways. The early breakthroughs in commercial engagement with many customers involving first-time engineering solutions using renewable feedstocks to produce Bioethanol, Green Hydrogen, Green Ammonia, and Green Methanol demonstrate our teams' capability to quickly adapt our domain expertise to provide new services and meet market expectations.

TCE has also taken the initiative to collaborate with Academia on select topics related to energy transition to develop innovative solutions which can be introduced to the market.

Digital

While TCE has been already utilising host of engineering tools for design and engineering services, we incubated Industry 4.0 services and have been playing the role of system integrator, leveraging our domain expertise and working with partners to provide optimal solutions to meet

the outcome expectations of customers. While we have achieved a breakthrough in digitisation services like Asset Information Management, it is still early for digitalisation services like Asset Performance Information Management. A breakthrough in Industry 4.0 Asset Performance Services is imminent, and the future looks good for TCE business in this area. We are also working on marketing our Digital Project Management Services aggressively.

Culture of Innovation

At TCE, a very focused effort is being made to promote a culture of innovation crucial for providing differentiated services to our customers and business sustainability.

The agile stage-gate innovation framework introduced in FY 2020-21 is used to source and process innovative ideas. TCE has regularly engaged the workforce in internal crowdsourcing of complex solutions, internal competitions for showcasing implemented value additions, internal newsletter publications, etc. Leveraging TCE's presence and experience in broad industrial sectors such as Hydrocarbon and Chemicals, Metals and Mining, Power, and Infrastructure, the knowledge-sharing sessions have resulted in the cross-pollination of ideas and the optimisation concepts implemented in a wide variety of projects across all sectors. Opportunities for innovation are systematically identified. Our innovation funnel consisting of an agile stage-gate process has resulted in filing two more patents in FY 2021-22.

Challenging market situations faced by customers made them expect significant contribution towards optimising project costs. TCE teams rose to the occasion by way of delivering differentiated value-added services. Our customers have collectively benefitted to the tune of Rs 380 Cr in terms of cost savings due to the innovative solutions presented by our engineers.

More than 60 Subject matter experts from TCE are currently representing various technical committees of BIS standards. TCE presented more than 28 papers in various forums and has published 50+ articles in multiple publications.

Overall, FY 2021-22 has been a highly successful year, and TCE is poised for accelerated growth in the coming year.

Yours Sincerely
S Vidyanand

Value Creation Model

At TCE, we are find infinite ways to deliver customer aspirations and ensure customer satisfaction. Providing best in class solutions using the latest technology and value engineering not only ensures timely delivery it also helps save costs for the customer, thus making us a partner of choice. Creating value for all the Stakeholders and taking actions aligned to our strategic focus areas helps us create sustainable long-term value.

Strategic Focus Areas

CUSTOMERS

- Offer cross business and integrated solutions across customer asset lifecycle
- Trusted advisor to marquee clients
- Customer engagement and customer satisfaction

FINANCIAL

- Focus on profitability with working capital optimisation
- Acquire business in new sectors; 50: 50 international domestic mix of orders
- Focus on large deals and work with consortiums and partnerships

PROCESSES

- Strengthening processes for operational, technology excellence
- Productivity improvement & cost optimisation

PEOPLE AND LEARNING

ATTRACT, RETAIN AND RETRAIN TALENT

RESPONSIBLE MEMBER OF SOCIETY



Resources and Relations



TECHNOLOGY & MANAGEMENT INSIGHTS

- Design Engineering
- Project Management
- Consultancy
- OPEX Optimisation
- Knowledge Management

FINANCING

- Equity
- Debt

EMPLOYEES

- For engineering solutions
- At project sites
- Shared services

RAW MATERIAL

SUPPLIERS AND VENDORS

MATERIALS, TOOLS & EQUIPMENT

- Design suite
- Application licenses
- Hardware



Outcomes

- **Total Consolidated Income of Rs 895 Cr ; New Order Acquisition highest ever at Rs 1948 Cr**
- **39% business from International markets**
- **14.5% of new business from Opex Services**
- **Consortium-based approach established:** TCE a leader in Smartcities and Water projects
TCE bagged High Speed Rail PMC Civil project
- **Bagged some significant pride of India Projects like Ayodhya Temple, Central Vista, CIDCO, High Speed Rail to name a few**

CUSTOMERS

- 15.8% of business orders through cross selling and offering Integrated Solutions
- 64.2% acquisition from larger deals
- 47% Sales Revenues from Key/ Strategic Accounts
- Customer feedback index at 72%

RESPONSIBLE MEMBER OF SOCIETY

- Infrastructure solutions for making tribal villages water positive was successful in the model village.
- Total CSR investment were at Rs 2.28 Cr
- Corporate volunteering clocked 8513 hours

Combating COVID19, the task force of TCE proposed innovative solutions which helped the country tide over the Oxygen Crisis. The details are available on <https://www.tce.co.in/tce-combating-covid/>

LEARNING/PEOPLE

- Focus was on reskilling and training. All-round training was at 16 person-days per employee & technology training was at 5 person-days per employee. Attrition of key talent was curtailed at 9.2%.
- Safety was a key focus on site and in offices. Safety index was 4.08 at sites. Given the Pandemic, remote employee engagement and safety and well being remained key focus areas.

PROCESSES

Processes were strengthened through several automation applications for technology (knowledge management), people process, sales & operations, streamlined deliveries and improved sales process along with long-term relationship with customers. Given the Pandemic and work from home situation, IT and Data Security was strengthened up with world class cloud solutions.

Strategic Framework

SUSTAIN

Optimise work
Processes & Promote
long term Sustainability

SPROUT

Identify and enter new
Growth areas to fuel
Future Growth & Profits

SCALE

Capacity & Capability to
Secure & Deliver Mega
Projects

STRENGTHEN

Bolster Talent Management &
Capability Development



**Stakeholder
Satisfaction**

**Business
Growth &
Profits**

**Stronger
Brand**

**Resilient
Organisation**

Embracing Change

TECHNOLOGY UPDATE



As a knowledge-driven organisation, it is essential for TCE to be ahead of the curve in terms of the engineering capabilities, tools, and techniques and to be a thought leader and an innovator in new and emerging domains.

We have established a unique team within TCE that constantly works on creating knowledge and making it readily available to the project teams. This team also works on new emerging concepts like energy transition, hydrogen, circular economy etc., writes whitepapers and is responsible for productising newer offerings of TCE.

The technology team is also responsible for driving and institutionalising the innovation culture within the company. The other initiatives led by the Technology team include:

1. Academia Collaboration: TCE partnered with India's leading academic Institutes with proven credence in Technology research and development. The geographical proximity of these Institutes to TCE's offices provided an additional advantage. Through this initiative, we have created many innovative solutions to sustainability challenges, from bringing a revolutionary innovation to life to driving innovation to the masses. Some of the important ongoing collaborative research projects are:

a. Development of construction & demolition waste-based concrete integrated with 3D printing technology:

The government of India has a target of 4 Cr rural houses in the next 2-3 years. To support this mission, we at TCE decided to design & develop sustainable, eco-friendly solutions with cutting-edge embedded technologies. This project undertaken with IIT Bombay aims to create suitable binder ink for 3D printing of low-cost housing using recycled construction waste materials. The objective is to develop a prototype for 3D printing of select types of buildings. 3D printing technology is ideal for making such units (modules) in less time and cost-effectively with almost no wastage.

b. Small-scale Waste Combustor Using Oxygen Enriched Air:

To address the burning issue faced by almost all the cities and hospitals in handling domestic and biowastes in India, TCE and IIT Bombay joined hands in developing a small-scale waste combustor. This combustor uses oxygen-enriched air to achieve complete combustion, helping reduce harmful emissions. The combustor is being designed to cater to domestic waste and is also being customised for treating bio-medical waste at the place of generation; This can be deployed in small to medium housing societies, malls, community centres, eateries and hospitals.

c. Enhancement of Resilience of Renewable Dominated Power Grids:

Power generation from renewable plants heavily depends on weather parameters. As a result, renewable plants are often severely affected

during extreme weather events. In addition, the intermittency of renewable generation often poses a significant challenge to the system owners and designers. TCE partnered with IISC Bangalore to develop a mathematical model for combined generation, expansion and energy storage planning to improve grid resiliency. It also aims to enhance the operational resilience of large scale renewable integrated power systems by efficient pre-disaster restoration planning by simulating different probable extreme weather events.

2. Innovation at TCE: In line with TCE's mission - "To provide Technically Excellent and Innovative Solutions for adding value for all stakeholders and operate globally as professional consulting engineers"; we continuously foster an innovation culture and develop innovative solutions that will help sustain organisational growth. Innovation processes are focused on creating and maximising value to the stakeholders.

Our IPR team has identified and filed two patents amongst several innovation proposals this year. Below are the briefs about these two patents pending technologies developed by TCE.

a. A Compact Tower Design for Transmission Lines:

Constructing a new transmission line faces challenges due to the limited corridor availability in the highly congested area. Further, there are situations where an increased number of circuits are to be accommodated within a fixed height where navigation channel and nearby airport-bound the lower and upper limits, respectively. These realities motivated our team to innovate and deliver a compact tower design. The invention brings a new kind of compact tower design to accommodate a greater number of circuits in a single corridor by keeping the structure heights within limits, thereby increasing the power transfer capacity of the line cost-effectively.

b. Determining Misalignment in Weighing Bin Using Load Cells:

Blast furnace in steel making process demands uninterrupted raw material charging from furnace top. The bin weighment data is utilised to distribute the material to the correct locations of the cross-section area in the blast furnace stock line. The weight of the material in the bin is measured with three load cells which are averaged to give

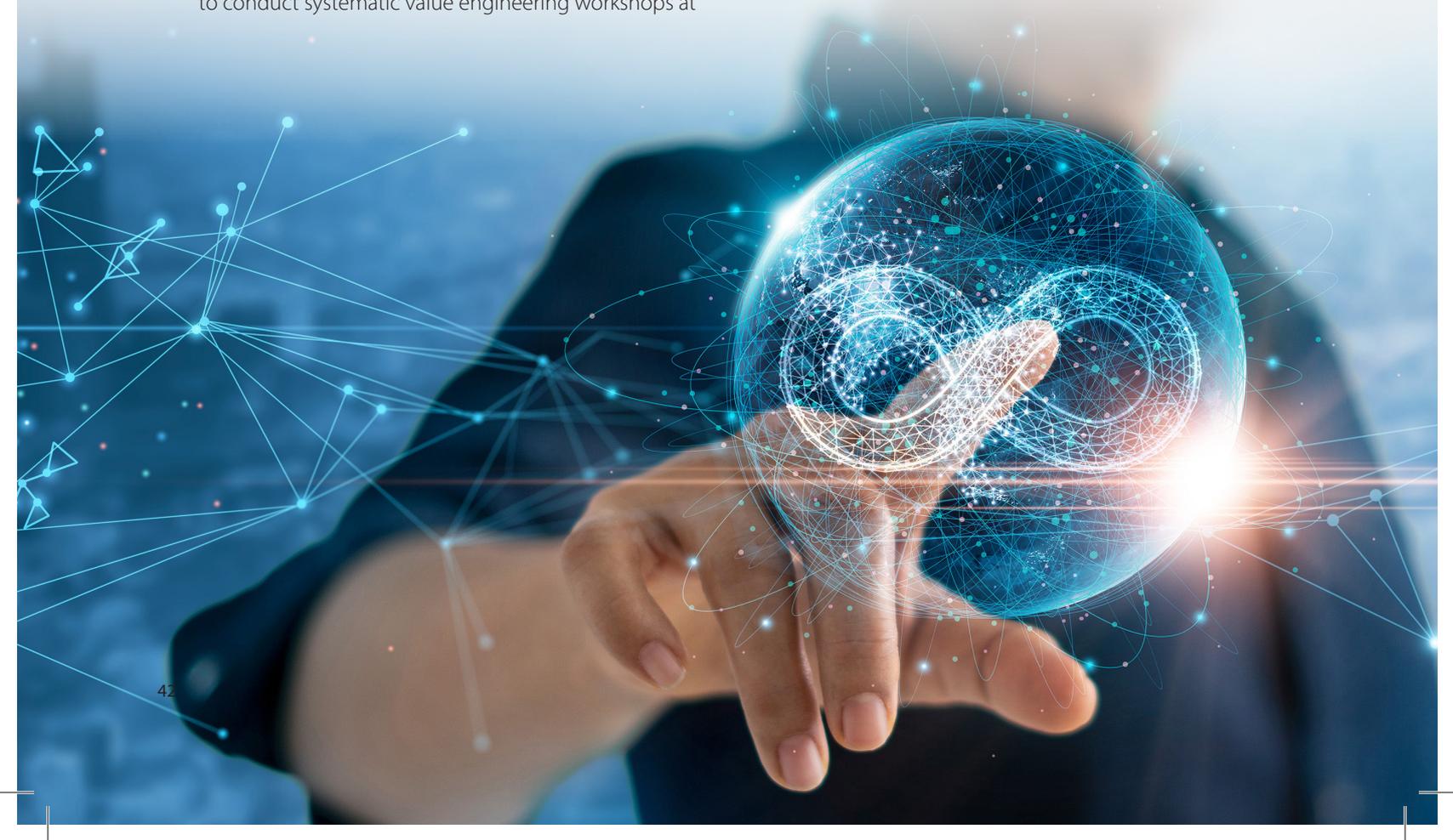
weightment data as the measured value. Due to repeated material fill and empty operations, the pressurised bins rotate or shift due to torque from connected pipes. Therefore, the bin misaligns and transfers its load to the corresponding lines, showing lesser weights and posing a risk of overflow. If dislocations continue, the probability of fall hazards increases.

TCE has developed a method to detect, monitor and correct misalignment in weighing bins by measuring weight, pressure and volumetric data in the form of voltage readings at a minimum of three load cells placed beneath the bins circumferentially. Readings of voltage are compared with the permissible threshold voltage. In the event of deviation of the voltage readings of load cells from the acceptable threshold voltage, a bin misalignment alarm is raised to indicate the misalignment or tendency of misalignment of the weighing bins; and a series of hydraulic jacking cylinders are pressed into service by an intelligent logic to restore the bin to the original position.

- 3. Zero Cost Consulting:** One business imperative is to enhance the culture of value additions in the organisation by providing innovative and value-added solutions to customers without compromising safety, security, and operability. It is a standard practice at TCE to conduct systematic value engineering workshops at

the beginning of the project to minimise any impact of value addition proposals on procurement and construction schedules. Value engineering workshops present a systematic approach to analysing systems, equipment, facilities, services, and supplies for achieving their essential functions at the lowest life cycle cost consistent with required performance, reliability, quality, and safety. Specialists and domain experts are assigned the special task of spearheading the drive to teach the value addition culture in the system. Participation of client teams in such value engineering workshops adds to the team's knowledge base. This year, these special efforts have resulted in cost-saving benefits to the tune of 390 Cr for our customers.

- 4. TCE on the Energy Transition Journey:** Scientific studies on climate change and global warming have unequivocally established the human interference factor in the natural environment as the prime contributor. Energy usage in industrial, domestic and transportation accounts for an overwhelming proportion of greenhouse gas emissions. In keeping step with this evolving energy transition scenario, we embarked on our transformational journey almost a decade ago. Having pioneered the country's traditional power industry engineering practice, we utilised the unique understanding of this industry and the emerging technologies. We combined the experience with research in the new fields to be at the forefront



of the transformation journey. The path to change was started through solar and wind power projects. TCE has been rendering design engineering services to multiple clients to set up ground-based and rooftop solar plants and onshore wind turbine installations. We also developed our patent-pending floating solar plants solution and have done extensive work for offshore wind farm-related designs that involve the design of subsea structures, foundations, and submarine cable-related designs.

- a.** We have been involved in studying and analysing the grid instability related aspects due to the introduction of variable output from renewables. We have acquired the capability to redesign the grid systems. This has also led to studies on energy storage systems. One of the most promising fields of pumped storage is already in the advanced project phase at multiple levels of project studies and detailed engineering.
- b.** TCE engineers are involved in the detailed study of electric vehicle and charging infrastructure technologies and have developed detailed white papers on these topics. Further studies in this area also included assessments of the mining infrastructure and resource availability of the battery metals with special relevance to the needs of the EV economy for the country.
- c.** Hydrogen is an important energy vector and is touted to play a stellar role in the energy transition pathway. TCE has taken the opportunity to develop its understanding of the technologies around hydrogen economy for power, process, and transportation sectors. The work has progressed beyond desktop studies and policy framework document development to real-world engineering projects. A first of its kind, state of the art international facility to produce green ammonia facility is being executed by TCE. Domestically, we are actively involved in several project implementation stages, such as a few bio-methanol projects, a green methanol pilot project by implementing green hydrogen and CO₂ capture technologies and setting up a hydrogen fuel station in hilly terrain. We are also actively involved in advocacy for cement plant energy transitions.
- d.** TCE has already established itself as the premier engineering agency for nuclear projects, which are slowly gaining prominence as a source of unbounded clean power. Apart from all nuclear power projects in the country, TCE has the unique distinction of providing engineering services to the prestigious ITER project through its onsite team in France.

Infrastructure Cluster



Infrastructure Business Review

- Urban Development
- Water and Wastewater
- Environment
- Urban Transport
- Ports & Harbours
- Industrial Facilities
- Buildings

Project Management Business Review

- Engineering Review
- Construction Management/Supervision
- Program Management
- Interface Management
- Specialised Services
- Quality & Safety Audits
- Outage Management

EcoFirst Services Ltd. Business Review

- Sustainable Integrated Design of Buildings
- Urban Design
- Sustainable Engineered Services
- Climate and Sustainability Services
- Program Management
- Digital & Modelling

Infrastructure Business

The infrastructure business unit of Tata Consulting Engineers Limited (TCE) is engaged in a sector that propels the overall growth of any economy. This sector also enjoys immense support from the government of India, with various policies being announced to enable the time-bound development of world-class infrastructure in the country. To ensure sustainable development, India plans to spend US\$1.4 trillion on infrastructure between 2019 to 2023 and has suggested investment of Rs 5,000,000 Cr (US\$750 billion) for railway infrastructure between 2018 to 2030.

TCE continues to extensively work with the government on various initiatives like smart cities, AMRUT cities, water and wastewater management, transportation, sustainable townships etc. We have successfully designed and executed complex engineering projects across various sub-sectors, securing outstanding excellence in engineering large-scale infrastructure.

KEY AREAS OF EXPERTISE

Water & Environment

- Engineering solutions in water, wastewater management, desalination, stormwater drainage, irrigation projects, and partnering with water conservation and leakage management authorities
- Solid waste management, Waste to Energy Projects, EIA, and EMP
- Underground tunnels for water supply and wastewater conveyance
- Improvement of Water Distribution for reducing Non- Revenue Water
- Water & Energy Audit
- Managing and improvising environment ventures such as heritage conservation, rainwater harvesting, pollution control, and biodiversity conservation

Built Environment

- Building a city with complete infrastructure planning, design, and commissioning offerings
- Providing engineering solutions for large capacity industrial units and manufacturing facilities
- Leveraging the 3D platform for Engineering models of complex buildings
- Developing nationwide institutional infrastructure
- Infrastructure development for Projects of National importance
- Green Buildings solutions

30000 MLD

Water & Wastewater
Treatment Plants

30000 MLD

Desalination Plants

1 DDC

For Agra Metro

23 Million Sq. Ft

of Logistics Parks &
Warehouses

44 KM

Underground Tunnel
for Water Conveyance

1

Container Terminal
Project in Bangladesh

1620

Bed Hospital Facility

13.36 Million Sq. Ft

Training Institutes

- Development and commissioning support in connecting tech cities and large SEZ spaces.
- By proposing infrastructure spends of over Rs Ten lakh Cr in the Budget of 2022-23, the government of India has reinforced its commitment to using infrastructure as a force multiplier for sustained economic growth.
- The trends seen in increased spend on the development of healthcare infrastructure in the previous year are expected to continue for a while.
- Global chip shortage will result in significant investments in setting up semiconductor manufacturing plants in India.
- Manufacturing also looks good in the sectors of defence, electric vehicles, and batteries.

Transportation

- Designing standalone urban transport infrastructure, including airports, rail systems and ports.
- Comprehensive industrial development under National Industrial Corridors will open opportunities to leverage multimodal transport and other enabling infrastructure.
- With a focus on integrated planning and coordinated implementation of infrastructure connectivity projects, Digital technology, including GIS, will form the backbone of Gati Shakti.
- Continued upward swing in rapid urbanisation shall increase the demand for sustainable infrastructure and innovation in construction methods.
- Transportation is likely to remain the fastest-growing area of India's infrastructure sector. The demand is rising for well-developed roads and highways, a widespread railway network, high-speed rail, metros, aviation, ports, shipping, and inland waterways infrastructure.

KEY ACHIEVEMENTS

- TCE was awarded a Certificate of Merit for the Bangalore Water Supply and Sewerage Project (II) at the FIDIC Awards 2021.
- The project of Robotics Gallery in Ahmedabad was completed & Inaugurated by Hon. Prime Minister in July 2021.
- Got selected as Design and Supervision Consultants (DSC) for ADB funded Uttarakhand Sector Development Investment Programme Phase II for Uttarakhand Urban Sector Development Agency (UUSDA).
- Agreement finalisation for UUSDA
- BU is diversifying in desalination and irrigation sectors to strengthen the water business.



A PROJECT REGIONAL SCIENCE MUSEUM AT PATAN

Regional Science Museum at Patan, Gujarat, is an innovative hub for science learning and an excellent platform for engaging, educating, and empowering young learners to experience science concepts in a different way. The museum has five types of galleries:

1. Dinosaur Gallery - Life-size dinosaurs with animated behaviour can be seen scattered around the museum building welcoming all visitors.
2. Human Science Gallery – displays the development and evolution of humans and other animals. It also displays genetic information and additional helpful information about the species.
3. Hydroponic Gallery - Agriculture's latest technique and its science are displayed here.
4. Nobel Gallery - displays the inspiring contributions made to chemistry and science by Noble laureates.
5. Optics Gallery – gives details on the science of Light and its various equipment.

TCE provided the Master Planning, Design and Project Management Services to develop this state-of-the-art Science Museum.





A PROJECT
DESIGN AND CONSTRUCTION SUPERVISION CONSULTANT FOR
MADHYA PRADESH GLOBAL SKILL PARK DEVELOPMENT PROJECT

The Global Skill Park is based on ITEES Singapore's principle of Authentic Learning with hostels, staff housing, a convention block and an auditorium.

The Centre for Occupational Skills Acquisition (COSA) will focus on training for technology-based priority manufacturing and service sectors in Madhya Pradesh.

The Centre for Advanced Agricultural Training (CAAT) will focus on smart farming technologies to train a skilled workforce needed to grow the state's agriculture sector.

Counselling, Research, and Innovation Centre shall contain an Industry-based training cell, a Job placement and counselling cell, learning content and resource development centre, a skills development applied research centre (SDARC), a lifelong learning and future skills academy (LLFSA), a technology incubation Lab (TIL), entrepreneurship incubation centre (EIC), productivity and innovation centre (PIC)

TCE's scope of work includes campus master planning, designing individual buildings, preparing bid documents and contractor selection, detailed engineering design, and construction management.



Project Management Consultancy Business

Tata Consulting Engineers Limited (TCE) is famed for Designing and Managing Complex, Innovative and Iconic projects. Our Project Management Consultancy (PMC) services combine our six-decade experience with dedicated Project Management capability and established systems, procedures, and tools. We leverage our structured, digital SmartSite™ Project Excellence tool to deliver a transparent, timely and value-added service experience to our clients. As experts in delivering complete projects, we ensure the project is managed seamlessly from initial concept to commissioning. As Digital and Advanced Technology leaders, we put our 4D and 5D expertise to use and ensure the projects run error-free, on schedule and remove unnecessary wastage.

Safety is of paramount importance to us, and we have the experience of millions of safe working hours on all our projects. Our Tata value system helps ensure high ethical practices and International Safety and Quality standards are interwoven in all our processes and deliveries.

GROWTH

In FY 2021-22, PMC business celebrated the highest ever acquisition since its inception of Rs 900 Cr and the highest ever revenue of Rs 249 Cr. This was possible through a structured approach focused on order booking, revenue, and profit growth. We ensured that the business remained agile and proactively ready for the changing market scenarios. We kept our keen focus on exploring new paradigms and offerings while staying cost-competitive, helping us attract a more significant customer wallet share. Enhanced revenue measures, optimised resource utilisation, work on role ratios, improved revenue realisation, and focus on Cash flow enabled our success.

The Weekly Leadership calls on Compliance, and Financial ABCD (Accrual, Billing, Collections & Debtor outstanding) supported the overall improvement hugely. These collective and determined efforts helped achieve record numbers in FY 2021-22.

The BU strengthened its workforce to 1,234 billable engineers across India and abroad, with 75 certified project managers. Induction into TCE work systems and competency enhancements in sync with the industry standards using a focused training program and digital delivery models is a continuous process supporting our project delivery. TCE SmartSite™ is emerging as a practice across all sites, leading to robust, transparent and data-driven decision-making.

900 Cr
Highest ever
Order-booking

09 New Logos
Added

80% Growth from
FY 2020-21

249 Cr
22% growth than
pre-COVID19 (FY 2019-20)

280.50 Cr
Record collection
in a single year

63%
Orders won in New
Service Area / Sector

72.5%
Orders won through
Partnerships

75%
Acquisition from
Large Deals aligned to
Cluster's aspirations

8.8 Days
Technical Training per
Employee per Annum

Our team of engineers are supported by a strong squad of Regional Managers and PMOs at Pune and a Technical Excellence team of SMEs strengthening their delivery excellence. We continue to excel in our aspirations to join the global leaders in ensuring the adoption of digital systems for improving productivity, making the industry more data-driven, evolving systems for efficient tracking and intermediate planning of Projects, etc.

KEY TRENDS SHAPING THE INDUSTRY

- Policy support from the government of India by allocating Rs 13,750 Cr for an initiative such as housing for all and the smart cities mission will drive the infrastructure development projects. The government has set up National Bank for Financing Infrastructure and Development (NaBFID) to fund these infrastructure projects.
- The Prime Minister announced a Rs 100 lakh Cr master plan for multi-modal connectivity in October 2021 to develop infrastructure to lower logistics cost and improve the economy. With a continued focus on Atmanirbhar Bharat, we see many investments across sectors and industries that we cater to. Increasing investments will drive the infrastructural development and the demand for PMC services.
- We continue to focus on increasing market penetration in the domestic core areas of Water, Buildings and PMC services of Process Plants. In FY 2021-22, we took a significant leap into entering new domestic sectors of Transportation and Inspection through Mumbai-Ahmedabad High-Speed Rail and AAKANSHA Quality Assurance projects. We will continue exploring and enhancing our share in these sectors through advocacy and partnerships. We also focus on thrust areas in the International market through EPCs and owners' assignments in Africa, ME and SEA and are aggressively working towards increasing our global footprint.

A PROJECT PMC FOR CAMPUS DEVELOPMENT

The client is a leading software development company in India that is expanding its business footprint in various cities by developing new IT Parks & also expanding a few existing IT parks. TCE is associated with the client for the past 2 decades and is currently involved in 10 Projects on a PAN India basis for PMC & Engineering services. The proposed campus in Bangalore is spread over 48 acres and is notified as an SEZ. The campus shall be developed in 3 phases with a development potential to house 60,000 seats. The first phase of development consists of a 4.34 Million Sq. ft of Built-up area to house 25,069 seats, a Data Centre along with basement parking on 3 levels and connected amenities.

TCE's scope as a PMC includes maintaining Safety, Quality and Timelines for all activities such as Civil works comprising of both RCC Structure, Civil Finishes, MEP, HVAC, Electrical, Interior Finishes, Modular Furniture Work, Infrastructure Work like Road, Utility Trenches, Landscape & Hardscape work including assisting LEAD Certification Platinum Rating, Statutory Approval and Handover.

The project has been awarded for 39 Million+ Safe Working hours and has received several accolades from the customer.

TCE introduced various value additions while executing the project. Some of the key value adds include:

- Introduction of SS wire rope hanging system to prevent falling hazards of facade terracotta tiles during the design phase.
- Precast sill wall & mullion elements weight reduction by creating hollowness using lightweight beads.
- CLSM filling was introduced in place of plum concrete filling areas which helped save Rs 22+ lakhs.
- Hardscape flooring thickness changed from 40mm to 20mm after reviewing the design resulting in a savings of Rs 15+ lakhs.
- Rainwater recharge pit introduced all along with drainage system and lake buffer pond as a water harvesting measure.
- Emphasised heavy cost implication of developing sports arena in the architect's proposed location & changed the location to reduce cost of Rs 1.2+ Cr.

A PROJECT MUMBAI AHMEDABAD HIGH-SPEED RAIL (MAHSR)

India's first high-speed rail is one of the most iconic in the nation. The route will cover 508 km with 12 stations from the heart of Gujarat in Ahmedabad to Mumbai in just two hours instead of the current travel time of eight hours. NHRCL has divided the entire project into 27 functional packages. MAHSR project will engage in constructing the country's most gigantic 13.2 m single tube tunnel that will have a length of around 21 km to avoid disturbing the flamingo sanctuary and nearby mangroves. A stretch of 7 km tunnel will be under the seabed at the Thane creek. Approximately 92% of the high-speed railway track will be elevated through viaducts and bridges. Out of 508 KMs distance, 460.3 KMs (90.5%) will be viaducts, 9.22 KMs (1.8%) on bridges, and 25.87 KMs tunnels (including 7 KM long undersea tunnel), and 12.9 KMs (2.5%) will be on embankment/Cutting.

TCE is the lead consortium member and partnered with two domestic and one Japanese consulting firm, known as TCAP. We are proud to have emerged the winners of this keenly contested bid for PMC Civil Works covering consultancy for Design Review, Integrated System Interface, Contract Administration,

Project Management and Construction Supervision, Quality Assurance, Environmental Health and Safety.

Currently, TCAP has 640+ engineers, including Expats from Korea and UK, working on-ground to coordinate multidisciplinary services to carry out progress monitoring, cost control of the project and related technical processes for ensuring that the project is on time, within the overall budget and required quality designed, structured, planned and executed in accordance with Project/Client objectives and requirements.

TCAP will be looked high to take up the challenges in reviewing designs and planning the erection of long-span steel bridges within busy existing railway stations at Vadodara, Ahmedabad and Sabarmati.

TCAP has also deployed SmartSite™ App to enhance the quality and productivity of PMC resources and provide robust reporting to NHRCL. This also has a unique built-in feature for attendance and geo-tagging of all the staff on this linear project that tracks the entire team during work hours, enabling locating staff for any communication.





A PROJECT SHRI RAMJANMABHOOMI PROJECT

The Ram Janmabhoomi Teerth Kshetra Trust has been entrusted with constructing Shree Ram Janmabhoomi Teerth Kshetra Temple at Ayodhya, Uttar Pradesh. Tata Consulting Engineers Limited (TCE) is the Project Management Consultant. The proposed temple area is situated on the banks of River Sarayu (Approximately 1 km from the riverbank).

The main temple consists of Garbhagriha, and the temple elevated platform consists of Gudhmandap, Rang Mandap, Nrutya Mandap, Pradakshina, and Chowky. The temple is designed by a specialist Architect Consultant, as a Traditional structure, in a Nagara style of temple architecture.

The Parkota around the boundary of the temple will have temples of other Gods and Goddesses. The Temple structure shall be integrated with the Ram Janmabhoomi Complex Master plan.



The temple structure will be constructed using a traditional stone structure made up of sandstone. The structural elements are joined together by tongue and groove joints. Its dimensions are approx. 380x250 feet. The main dome over Garbhagriha is 161 feet high.



A PROJECT PREMIER EDUCATION INSTITUTE HYDERABAD

Project Management Consultancy (PMC) for a state-of-the-art, well-planned campus with terrific architecture, design and construction designed aesthetically for a safe and comfortable education experience befitting the status of a premier institute.

Planned as a residential campus, the institute is built on an area of 576 acres. Phase 1 of the construction started in 2008 and the Phase 2 of campus development started in March 2019. Funded by Japan International Cooperation Agency (JICA), the campus enjoys a very special relationship with Japanese universities and industries for academics and research collaborations.

TCE as the PMC is responsible for Pre-construction Activities, Contract Administration, Variation Management, Time Management, Construction Supervision, Safety & Quality Management, and Post-Construction Activities during the defect liability period.

Creating efficient ways for reduced energy consumption and avoiding conventional methods to save cost and increase performance were the key challenges.

The various value additions by the TCE team include:

- Use of BLDC fans, widely available in the market with good performance review resulted in a cost-saving on fan cost by ~ Rs 12.26 Lakhs. This will also help save on electricity bills to the tune of ~ Rs 6.07 Lakhs per month.
- Introduction of safety platforms on the inclined surface for the execution of folded plate roof slab.
- During the pandemic-induced lockdown, TCE used digital construction tools like SmatSite™ to enable touchless, paperless project management resulting in reduced paperwork and providing real-time construction status and updates. The tools ensured adherence to COVID19 safety protocols.

EcoFirst Services Ltd.

At Ecofirst, we provide comprehensive and holistic Integrated Design solutions across the project lifecycle. Sustainable by Design is our supreme motto, and sustainability for us is not only about taking care of the environment and social concerns but also about meeting financial goals of capital and operational excellence, reflected through our design philosophy.

We specialise in creating sustainable designs and responsible development solutions through seamless integration of Architecture, Engineering & Environmental technology. Our work in Retail, Townships, High Rise, IT Parks & warehousing industries are across the globe. We strive to provide our associations with expertise in conceiving and developing performative, operative and feasible solutions.

16%

CAGR Revenue

70+

People Resources

400+

Projects

AREAS OF EXPERTISE

Sustainable Integrated Design of Buildings

- Master Planning
- Architecture
- Landscape Design
- Facade Design
- Structure Deigns
- Building Engineering (MEP)
- Site Engineering (Infrastructure)

Urban Design

- City & Street Planning
- Urban Design
- Urban Planning

Sustainable Engineeconomics

- Building Engineering (MEP)
- Land Development and Wet Infrastructure
- BIM 7D/Digital Twin
- Flood Modelling and Stormwater management
- Vertical Transport and crowd mobility
- Technical Due Diligence

Climate and Sustainability Services

- Zero Carbon Development
- Climate Change Vulnerability Assessment, Flood Modelling
- Life Cycle Assessment
- SDG implementation handholding
- Design Enhancement
- Sustainability Audits
- Green Building certification
- Sustainability Monitoring (Post Occupancy Evaluation)
- Testing & Commissioning

Program Management

- Self – Redevelopment Programs
- Heritage Buildings
- Special Buildings
- Sports Infrastructure

Digital & Modelling

- Energy & Light Modelling
- Flood Modelling
- Vertical Transport
- Traffic Simulations
- Crowd Modelling
- BIM 3D-7D/Revit
- Digital Twin



KEY ACHIEVEMENTS & DIFFERENTIATORS

- Successfully launched Society Self-Redevelopment Services and have won 2 Mandates totalling Rs 12 Cr approximately and the third mandate of Rs 11 Cr. The pipeline appears strong, and we hope to sign another three projects in the new Financial Year
- Successful completion of Fort House Project for Tata Digital with final handing over in progress
- Pushed Sustainable Integrated Designs (SID) further and critical assignments for realty, chemicals, and Oil & Gas clients added this year. TMTC Project at Pune for Tata Sons has been re-initiated
- New initiatives of CSR Projects under Mini EPC have been successfully started with three new clients.
- Hospitality mandates have been won comprehensively for 3 large well-known brands.
- Strengthened climate change adaptation services (flood modelling solutions) for multiple mandates and also worked extensively with LEH/ LADAKH/KARGIL UT for multiple mandates
- International assignments with partners like three large accounts bagged this year, including municipality initiatives

KEY TRENDS SHAPING THE INDUSTRY

- Increasing awareness for sustainability, ESG, climate change impact and Net-zero
- Aggressive pricing by all Consultants/competitors.
- Reduced willingness to pay for quality/comprehensive work
- Tendency towards EPC mode
- Smaller consultants coming together to provide single point services
- Longer validity period due to uncertainty on project completion timelines

KEY INITIATIVES THAT HELPED PROVIDE BENCHMARK RESULTS

- Push for comprehensive services for Self redevelopment helped cross the acquisition target and has opened up further possibilities.
- Initiative for Climate change risk assessment (flood modelling) has helped to create credentials and has helped to achieve the results

A PROJECT PREPARATION OF DETAILED PROJECT REPORT (DRP) FOR COMPREHENSIVE SEWERAGE SYSTEM & STP DESIGN

A safe sanitation system is an essential requirement for all. However, it is challenging to provide such a sanitation system in cold climatic regions and hilly areas like Ladakh. Presently, Kargil town has a septic tank and soak pit arrangement to manage grey and black water, and there is no active sewer network in the city. With increased tourism in the region and large migration from nearby villages, the town is rapidly growing into an urban hub. The absence of proper sewerage collection, treatment, and disposal facilities has resulted in groundwater pollution, making it unfit for drinking purposes. Moreover, untreated sewer is disposed of in the Suru river, polluting the surface water body. Thus, it is crucial to comprehensively design a contextual sewerage system for the town for its sustainable development.

For this, the Directorate of Urban Local Bodies (DULB) has set up a weather-resistant sewerage scheme for the town. Ecofirst Services Limited was appointed as the DPR consultant for the project. As the consultant, the team designed the sewerage collection network and pumping stations and sewage treatment plants. The team also proposed the disposal and reuse strategy for the treated wastewater in line with Central Public Health and Environmental Engineering Organisation (CPHEEO) Manual and global best industry practices from regions with similar climatic conditions.

KEY CHALLENGES:

- Undulating topology of the region posed several challenges for 100% coverage through the sewerage network.
- Designing the network and sewage treatment plant for icy weather conditions prevalent in the region during winter.

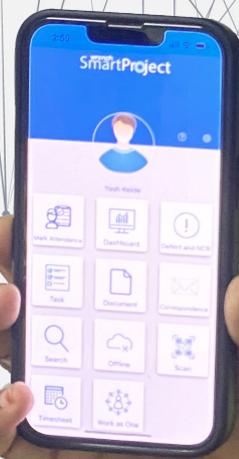


SALIENT FEATURES:

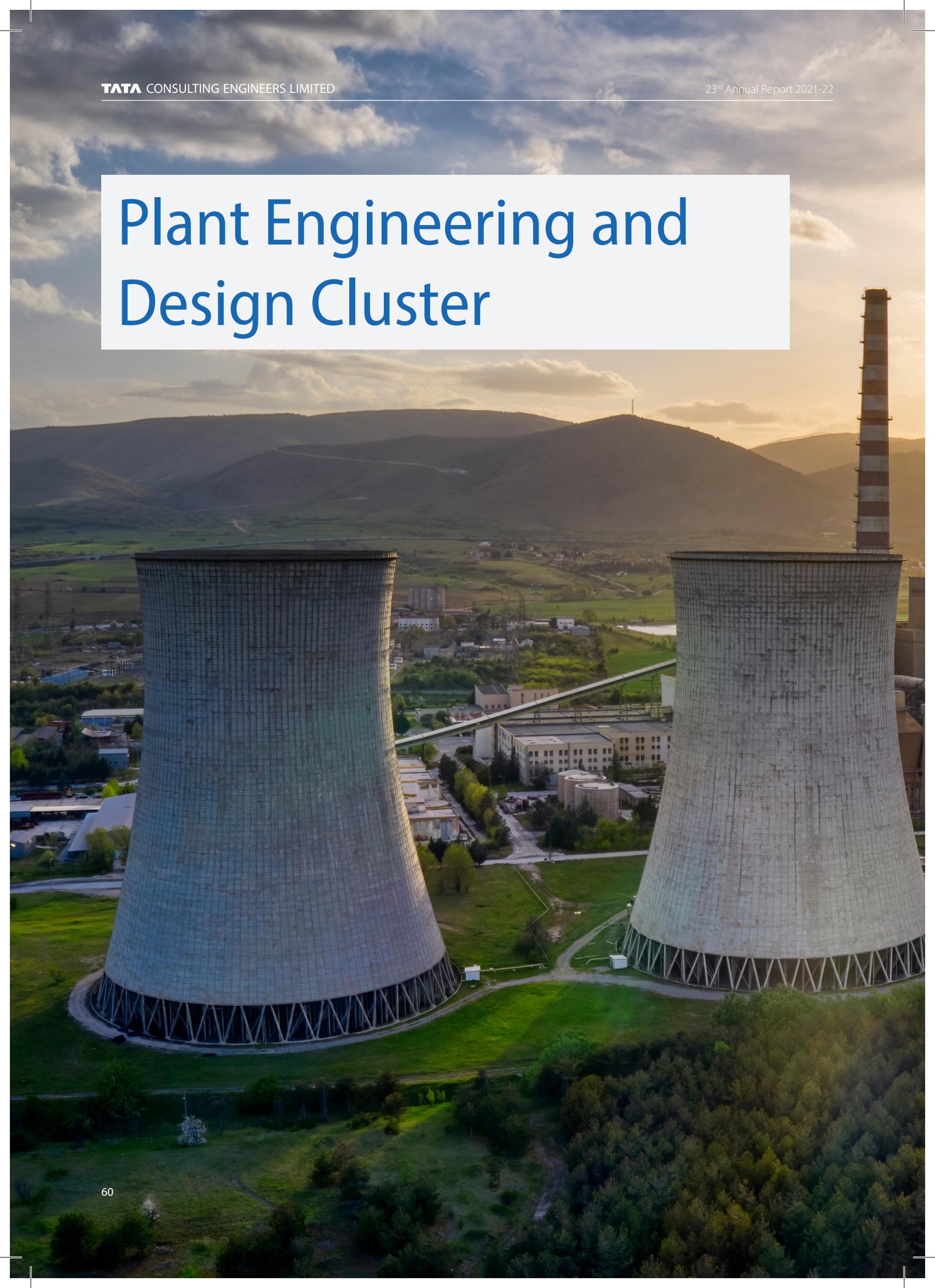
- A collaborative and participatory approach was adopted for the project. Detailed engagement with stakeholders and residents was conducted to create a GIS map of the town based on existing ward boundaries and proposed future expansion.
- Semi-centralised approach in different zones was undertaken to reduce network size considering narrow road and lane widths in the town. Thus, a sustainable and cost-effective solution was devised.
- The network and the sewage treatment plant were designed considering cold climate conditions prevalent in the region during the winter months. Design strategies included the provision of necessary insulation for pipelines and heavy-duty precast maintenance holes to prevent cold air and snow entry.
- The operation and maintenance cost for the project was reduced as far as possible by tapping solar energy potential by Integrating solar pumps, etc.
- Precast maintenance holes were recommended to speed up the construction and installation process of the sewerage network.

This project will act as a benchmark for the Ladakh region. It is one of a kind in the country, considering the challenges of the remote location, rugged terrain and cold climate.

TCE SmartSite™ App supports Digital Collaboration and Mobility, identified as one of the key trends to help construction players in their Digital Transformation. The app is the unison of 60 years of experience in TCE and agility brought by real-time information sharing. The app users have easy access to all the standard processes, checklists and way of working developed by TCE with the experience gained while working across various sectors and geographies, right on their mobile phone.



Plant Engineering and Design Cluster



Power

Business Review

- Nuclear
- Green Power (Solar, Wind, Hydro)
- Thermal
- Transmission & Distribution
- New Technologies (Digital, Hydrogen)

Resources

Business Review

HYDROCARBONS & CHEMICALS

- Oil and Gas Refineries
- Petrochemicals
- Fertilisers
- Chemicals & Specialty Chemicals
- Food & Pharmaceuticals
- Glass, Rubber, Cement and Allied Process Industries

MINING & METALLURGY

- Iron & Steel
- Mining & Beneficiation of Ferrous & Non-ferrous Ores
- Smelting and Processing
- Geology and Mine Planning
- Mineral Processing and Beneficiation
- Material Handling

Power Business

With 60 years of engineering excellence, Tata Consulting Engineers is the leading engineering company in the power sector serving thermal, nuclear, hydro, renewables, and transmission and distribution sectors. We support our customers in the entire asset lifecycle management of power plants, from feasibility studies, conceptual design, basic and detailed engineering, procurement assistance, project management, and field engineering & commissioning support during the project development phase and asset sustenance projects during plant operational phase.

Our multidisciplinary team of engineers and experts are working globally, delivering a full range of services to both public and private clients in the power sector. TCE takes pride in having designed 85% of India's nuclear power & related infrastructure facilities and is actively working on supporting the 'Mission 500GW' plan of India to ensure the country can realise its dream of generating 500 GW of renewable energy by the year 2030.

AREAS OF EXPERTISE

Thermal

Geotechnical, Civil, Architectural, Structural, Thermal Process, Water & Wastewater, Mechanical, Electrical and Instrumentation & Controls having 3D integrated plant engineering capability, Procurement, Field Engineering, Inspection, Testing, and Commissioning.

Hydro

Planning, designing, and implementing comprehensive engineering from concept to commissioning of various facets of hydropower projects involving, Dams, Tunnels, Low / High-Pressure Steel Penstocks, Power Houses, Turbine-generator units & Power evacuation. Strengthening and Rehabilitation of old dams, including safety reviews. Experience in renovation and upgrade of hydropower stations.

Transmission & Distribution

Substation & Transmission lines, Conventional & specialised electrical system studies for Industries and Grid, Substation Automation and Digitalisation, and Distribution system loss reduction and Optimisation.

Renewable

Wind Resource Assessment (WRA), Wind farm layout and design, Foundations for wind turbines, Solar energy yield estimation, Large ground-mounted solar parks, Floating solar farms, Rooftop solar, Battery Energy Storage System (BESS), renewable integration to the grid.

Nuclear

Comprehensive Engineering, Procurement, and Construction / Program management of Nuclear Island except for the core Nuclear Process systems, Conventional Island, and Balance of Plant including all aspects of Plant Engineering, Procurement Assistance, and Construction / Program management.

Digital

Digital point solutions for better operability and performance improvement of power & process plants and reliability improvement through reliability-centric maintenance (RCM) approach.

150 GW

Thermal &
Combined Cycle
Power Plants

20+ GW

Hydro Power

20+ GW

Solar Power

5+ GW

Wind Power

85%

of India's
Nuclear Power

KEY ACHIEVEMENTS

• Thermal

Riau 275MW combined cycle power plant, Indonesia, engineered by us, has been successfully commissioned. This plant was designed in a compact layout with various constraints and challenges and completed the entire project engineering by working remotely due to the pandemic situation.

TCE has undertaken an assessment of a large coal 2x668MW coal-fired supercritical power plant in the Philippines by witnessing and evaluating the performance of the power plant, viz., power output, efficiency, emissions and so on.

In addition, we had taken up a study along with IISc, Bangalore, to come up with a solution for Concentrated Solar Power integrated supercritical Carbon dioxide (CO₂) power plant at the pilot plant level; and develop a road map for indigenisation and implementation at commercial scale, in future.

We are also engaged in developing the world's most significant Green Hydrogen & Ammonia plant to be set up in the Middle East.

TCE is one of the few empanelled consultants of the Central Electricity Regulatory Commission (CERC).

• Hydro

Primarily involved in Planning and Design of Pumped Storage Hydro-Electric Projects in India of about 7 GW capacity. Variable Speed Pump Turbine Generating units are proposed to cater to the variability of power from renewable sources.

• Transmission & Distribution

TCE won the regional round and participated in the finals in Tata Innovista 2021 for the project, "220 kV D/C Compact Towers". A patent has been filed for "Compact Tower for Transmission Lines".

TCE also won the following National awards for the project, 220 kV D/C Compact Towers:

1. Quality Innovation Award 2021 organised by the Indian Society for Quality (ISQ)
2. First Runner-up in National Electrical Safety, Power Quality & Reliability Circle Competition 2021 organised by Confederation of Indian Industry (CII).

We have started working on large-scale Grid-connected Battery Energy Storage Projects. We have secured for the first time a large-scale distribution project, which involves complete engineering services for the entire Power Distribution network in Mali.

We have started working on a PMC project from M/s GAIL involving services for pre-award and post-award and complete project management services for grid connectivity to supply 125MW of power through a 220kV transmission line.

We have completed a smart metering project for a middle east customer to implement smart metering in Yanbu Industrial-City for Residential & Commercial Consumers.

• Renewable

- Developed design of Solar PV power plant of ~ 4 GW.
- Studies for 600 MW Floating Solar PV projects carried out.
- Studies for Hybrid plants (Wind, Solar and BESS) of around 1 GW capacity performed.
- Completed Wind assessment totalling 12 GW from potential sites in Kazakhstan.
- Wind projects in new geographies like Azerbaijan and Uzbekistan were carried out.

• Nuclear

TCE has deployed 60+ experts as IPAs (ITER Project Assistants) in France, handling various roles across ITER projects.

We are also securing continuous off-shore engineering assignments from ITER-France, including technology-intensive tasks like High Energy Line Break (HELB), design of complex platforms at various levels of Tokamak complex, and qualification of critical piping and its supports inside the Port cell area.

We also emerged as a successful bidder for the 2x700 MW Kaiga Atomic Power Plant, the largest single consultancy project in the sector.

• Digital

The digital team developed digital point solutions for a few complex equipment /systems using in-house competency. These digital solutions are presently under discussion with many customers for possible deployment. More details about these digital solutions are available at <https://www.tce.co.in/digital-point-solutions>.

Industry Outlook

Thermal

- Sustainable Development Goals are generating interest toward Energy Transition across sectors focusing on clean and green energy globally.
- Interest in producing Green Hydrogen/ Ammonia and use across power generation, chemical, refinery & steel plants, mobility sectors, etc., are getting traction in India and overseas.
- Coal-fired power plants in India are undergoing emission retrofits to limit the release of pollutants viz., SO₂ & NO_x to the atmosphere.
- New build opportunities are emerging in CIS countries and the Asia Pacific regions.
- New Investments in coal-based power plants are limited to replacing existing/ retiring lower efficiency units with larger Supercritical plants with higher efficiency units. It is presently confined to Govt. Utility Plants.

Hydro

- Pumped Storage Hydro-Electric Plants (PSHEPs), the world's 'Hydro battery', account for over 94 per cent of installed global energy storage capacity and retain several advantages such as lifetime cost and sustainability. Further, PSHEPs support power grid stability, reducing overall system costs and carbon emissions.
- PSHEPs operations and technology adapt to the changing power system requirements experienced by variable renewable energy sources. Variable-Speed Pump Turbine Generating units allow for faster and broader operating ranges, providing additional flexibility and penetrations of renewable energy sources at lower system costs.
- Driven by the increasing penetration of solar and wind, reduced dispatchable generation, and the need for greater grid flexibility, an additional 78,000 MW PSHEPs capacity is expected to be commissioned globally in the next 10-15 years.

Transmission & Distribution

- As per IEA, Work energy Outlook 2021, T & D sector is expected to attract investment to the tune of around \$370 billion average per year over the next ten years, with at least 60% of investments to 2050 in emerging markets and developing economies, where millions of new customers continue to be connected to the network and end-uses are increasingly electrified. In advanced economies, investments primarily focus on ensuring network reliability throughout the transition to a decarbonised power sector facing higher demand.
- Investment in Transmission is expected to marginally increase in the coming years, while significant investments are expected in the Distribution sector.
- Focus on lowering AT & C losses through PPP in DISCOMS and reformation in the power sector by providing open access in distribution, tariff revision, and extensive metering are the key areas as per National Infrastructure Pipeline.
- Green Energy corridors are planned in India to evacuate power from Renewable forms of generation and

interconnect them with the rest of the conventional power stations.

- Energy Transition is driving the T&D Sector to adopt new technologies to cope with large-scale renewable integration, distributed power generation, Battery Energy Storage systems (BESS), and Electric Vehicles (EVs).
- Energy Transition is impacting the power flow pattern in the grid, which necessitates a new approach for:
 - Grid Planning and Optimisation
 - Smart Grid
 - Substation Automation and Digitalisation
 - Distribution system loss reduction and Optimisation

Renewable

- As the world is undergoing an energy transition, renewable generation has gained prominence in recent years. Different countries and corporates are planning massive investments as they pledge their climate change combat goals. As per NIP (National Infrastructure Pipeline), Rs. 9.3 lakh Cr investment is envisaged between 2020 and 2025.
- Ministry of New and Renewable Energy (MNRE) has set a target to set up renewable energy capacities to 500GW capacity addition and meet 50 per cent of its energy requirements through renewable energy by 2030 as committed in COP26.
- As per CEA, renewable share to increase from 18% to 50% of installed capacity by 2029-30.
- As per the announcement in COP26, the Renewable energy target has been increased to 500 GW, of which 70-100 GW is from Hydro and 450 GW from Solar and Wind. GW scale Solar/Wind Hybrid parks are being proposed in India. Floating solar PV projects are gaining momentum. Offshore wind is developing some traction. Green Hydrogen projects are also coming up.

Nuclear

- Energy transition from fossil fuels to clean and green energy is today's centre stage for sustainable development. India has made great strides in renewable energy over the last few years and has a clear roadmap

for clean energy implementation through the nuclear power program.

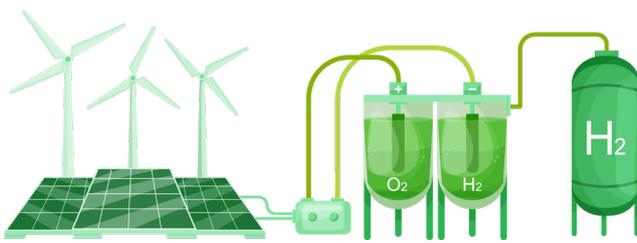
- India has recognised Nuclear power in the proposed mix of clean energy sources to meet net-zero targets. The Indian government is committed to developing its nuclear power capacity from current levels of 6790 MW to 22480 MW by 2031.
- In addition to its vast experience in Pressurised Heavy Water Reactors (PHWR), India has been implementing Light Water Reactors (VVER). It has solid plans for PHWRs in fleet mode and technology import of EPRs and APRs.
 - **PHWRs:** A target of 22480 MW is planned to be achieved through reactors under construction, and ten additional indigenous PHWRs (700 MW) are designed to be set up in fleet mode progressively by 2031.
 - **Fast Breeder Reactor (FBR):** India is pursuing a three-stage nuclear program to utilise thorium as a long-term fuel source. Commissioning of 500 MW Prototype Fast Breeder Reactor (PFBR) is expected to be completed, and pre-activities are already on for the twin Commercial-Fast Breeder Reactors.
 - **LWRs:** India has imported Light Water Reactors (VVER) from Russia, with units 1&2 already commissioned, units 3&4 under construction, and work has started for units 5&6. Discussions are on for constructing the world's largest 6x1650 MW plant at Jaitapur using French EPR technology.
- It is expected that the large fleet of existing nuclear plants will require ageing management and periodic safety assessment to continue contributing to the grid. This will require a lot of work to be carried out for the existing plants.
- Infrastructure development for additional capacity to process/store spent waste and recycle as required is also developed parallel to support the growing nuclear industry.

Digital

- Power sector is going through significant changes due to energy transition and technological advancements. Digital and advanced technologies are making inroads into all the areas of the power sector, and the energy transition is accelerating the adoption of digitalisation.

- Digitalisation would accelerate each change step by making them more efficient, flexible, and reliable. Industry 4.0 technologies, Internet of Things (IoT) and Artificial Intelligence (AI) /Machine Learning (ML) can improve the efficiency of plants/industries and reduce fossil fuel consumption.
- The massive influx of renewable energy is posing challenges to grid stability. The best use of data from the grid-connected assets is crucial to arrive at quick, effective, & accurate countermeasures to ensure a stable power grid.
- The use of digital technologies in terms of Asset Digitalisation, Asset Performance Management, Real-time Location Tracking Systems, Digital worker, Digital Wearables, Reliability Centric Maintenance, AR/VR assisted operation & maintenance are trending in the industry & are expected to change the conventional way of O&M in the plants.
- Flexibilisation of baseload at thermal power stations is also becoming necessary to ensure a stable power grid.

Green Hydrogen



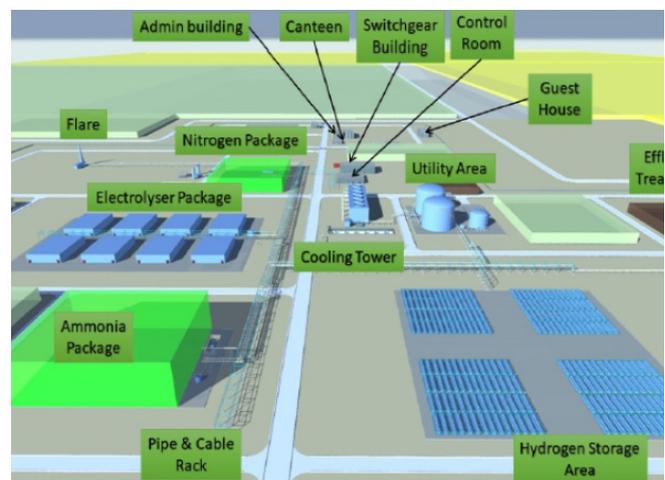
A PROJECT HYDROGEN FUELLING STATION FOR GREEN HYDROGEN MOBILITY

The client intends to set up a green hydrogen fuelling station at Leh (Ladakh). It is intended to generate 80kg of hydrogen daily, so that 5 intracity Fuel Cell Electric Vehicle (FCEV) buses will have the requisite fuel. The hydrogen fuelling station will include the generation and dispensing unit and is entirely powered by a dedicated 1.7 MW solar power station adjacent to the fuelling station.

The major equipment in the facility consists of a bi-polar type electrolysis-based hydrogen generation system, hydrogen compressors, high- & low-pressure storage system for hydrogen, hydrogen coolers and a hydrogen dispensing unit. The fuelling station will be equipped with various other auxiliary systems to facilitate safe and uninterrupted generation and supply of hydrogen.

TCE has been retained as Engineering Consultant to carry out the Detail Engineering Services for this project.

The completion of facilities, including commissioning, of the hydrogen station is planned to be completed within 11 months from the date of award placement.



A PROJECT DETAIL ENGINEERING SERVICES FOR 300 MTPD GREEN AMMONIA

The client through its Special Project Vehicle (SPV) is developing a 'Green Ammonia Production facility' at a Special Economic Zone in Middle East.

They intend to utilise Renewable Energy (Solar) to generate electricity to power the Electrolyser to produce Green Hydrogen. This and Nitrogen (N₂) will be used to make Green Ammonia using the Ammonia Synthesis process (Ammonia Process Unit). The Planned Total Installed Capacity for The Green Ammonia Project shall be 3300 MTPD.

TCE has been retained as an engineering consultant for the Detail engineering services of Phase-I: 300 MTPD Green NH₃ project. This project will be executed on fast track mode with an aggressive schedule of 18 months to COD.



A PROJECT
500 MW THERMONUCLEAR FUSION REACTOR

ITER nuclear fusion research and engineering megaproject is the world's largest magnetic confinement plasma physics experiment. TCE has been involved in the project since inception.

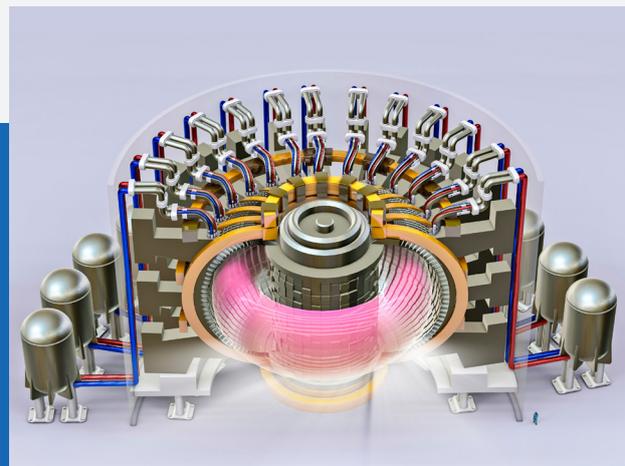
The current projects being delivered by TCE include:

Mechanical Engineering Services for CWS Piping
 Review the 3D models (E3D), and the relevant documents of the CWS systems, perform mechanical calculations for the piping and supports, prepare 3D models and issue 2D drawings and BOMs for the construction.

ITER Project Associates (IPA)
 Deployed more than 63 expert engineers from various disciplines as associates with the ITER project.

Mechanical Engineering Services for TCC 1 and 2 in B11
 Review the 3D models (E3D), the relevant documents of the CWS systems, perform mechanical calculations for the piping and supports, prepare 3D models and issue 2D drawings and BOMs for the construction

Design Update and Completion for Tokamak Complex Platforms
 Update and develop 3D models in E3D adapting interfaces with other systems, develop GA drawings,



perform structural calculations meeting stipulated safety and quality requirements, pre-assessment of EPs, generate local floor spectra for interface Plant Breakdown Structure (PBS) system design, generate general assembly and manufacturing drawings with BOMs, provide site support to resolve design-related queries.

Engineering Services for High Energy Line Break (HELB) Assessment and Design Activities
 Update and develop the 3D model in E3D/Catia for HELB lines, piping qualification, support design, generation of construction drawings and BOM.

The seven levels of the Tokamak Building house all kinds of equipment, piping, electrical cables, and feed lines for the plant systems of the ITER machine. TCE involvement is across all levels under various onsite and offshore assignments.

Resources Business

TCE's Resources sector has a proven track record of providing comprehensive engineering services for the entire asset lifecycle from concept to commissioning and beyond. We hold the merit of consistently delivering smart engineering solutions for our customers and exceeding their expectations. The Resources business has two sub-sectors, namely: Hydrocarbons & Chemicals and Mining & Metallurgy.

TCE is among the leading players in this industry segment, providing one-stop solutions for its valued customers, from mines to metal manufacturing and processing. TCE's vast experience in the mining sector serves as a closed-loop solutions outfit, including Metals Processing, Ancillary Infrastructure and Raw Material Management, right from Exploration Planning.

Safety in Design and operations is critical in the Hydrogen and Chemical Industry; hence, the HCBU workforce is oriented toward the Safety Instrumented System (SIS), one of the essential layers of protection against accidents and hazards of the industry.

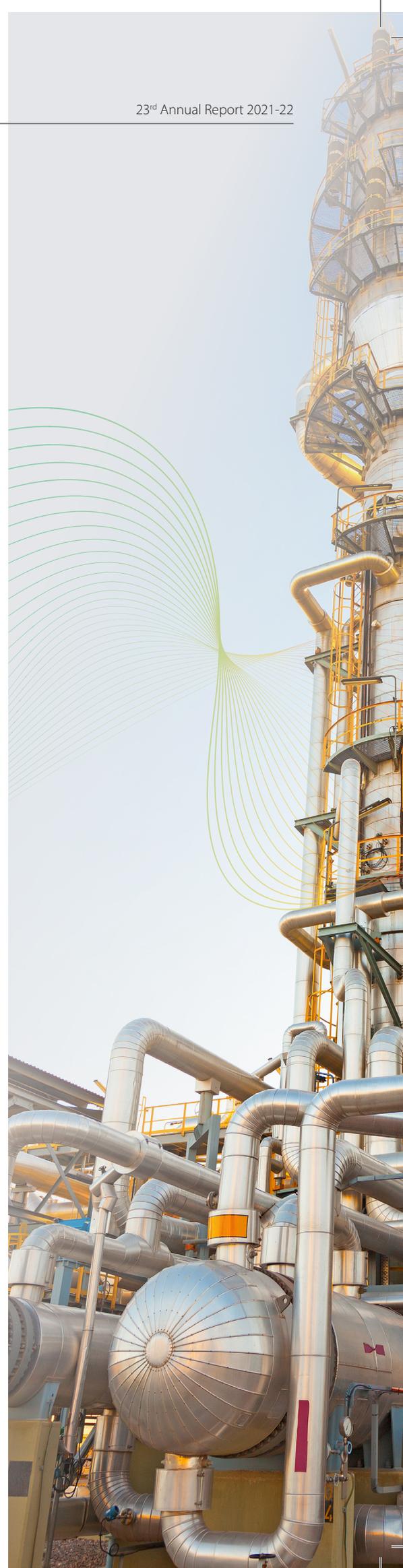
Hydrocarbons and Chemicals Business

AREAS OF EXPERTISE

The business unit has qualifications needed for chemicals, petrochemicals, speciality chemicals, utilities and offsites, depots and terminals, and retail outlets in the hydrocarbon midstream and downstream refinery sector. The company also has unique expertise in process engineering across oil & gas, speciality chemicals, paints, fertilisers, food and pharma industries, and multi-disciplinary engineering and design capabilities from the conceptual stage to lifecycle management across chemical, mechanical, civil, instrumentation and control, and electrical engineering. The business has vast experience in domestic and international markets and is associated with some of the marquee names in the industry. Further, the team possesses program management experience in managing large annuity accounts.

KEY ACHIEVEMENTS

- The highest ever Acquisition, Accrual, PBT, Billing and Collection; the lowest LWC on an annual basis
- A preferred engineering alliance partner for a large customer in the Middle East – graduated from site project activities to registration for Megaprojects
- Won 'Engineering Alliance Partner Award' for 2021. The only engineering consulting firm to win such an award by a large chemical firm globally.
- Highest ever eight applications for Innovista, with one reaching the final stage



- Commercial projects in the areas of Green Ammonia, Green Hydrogen, and Bioethanol – to cement a place in the new energy business
- A preferred engineering design partner for 'Reliance British Petroleum Mobility Limited (RBML). Delivered more than 150 stations so far. Another 800 are in the pipeline.

KEY TRENDS SHAPING THE INDUSTRY

India is poised for growth in the chemicals and petrochemicals industry with over 100+ Bn USD investment already announced. This investment will essentially help bridge the supply-demand gap and capture the global market with the policy support by the Government. The sector is expected to grow to 250+B USD by 2025, growing at 6+% CAGR. The investment will also cater to feedstocks for speciality chemicals and add capacity to polyethylene, polypropylene, polyvinyl chloride, glycol, PTA, elastomers, etc.

The state-owned refineries that cater to the demand from transportation and cooking fuels have mega-plans of entering the refinery integrated petrochemical industry to meet the growing demand from plastics to paints and adhesives. For a growing economy like India, the consumption of petrochemicals is one-fourth of the average global consumption; of this, only fifty per cent is produced domestically. The country is expected to have 15 large scale petrochemical assets by 2035, contributing to more than 10% global growth.

Several private players have planned multi-fold capacity expansions. In addition, international players have announced investments and partnerships in petrochemical manufacturing in India. All these developments are expected to change India's petrochemicals industry landscape significantly.

Post-COVID19 international developments to de-risk and diversify manufacturing bases and investments from any one country have also boosted this industry. Further recent developments in the Ukraine crisis have had an indirect impact, and India's diesel exports are seeing a considerable increase, with all refineries stepping up their exports.

These developments are expected to bring in opportunities for Hydrocarbons and Chemicals business in the refinery sector, downstream depots and terminals, speciality chemicals, bulk chemicals etc. The Asia-Pacific region is considered a favourable destination for manufacturers to boost the market growth.

Energy Transition and digitalisation have added impetus to this growth potential. Green fuels such as Green Hydrogen, Ammonia, Methanol, Bioethanol, and Biogas also witness significant investments. With the business unit closely working with the technology team on the world's first certified green hydrogen and ammonia project and several ongoing discussions with customers, the business unit is upbeat on converting opportunities and growing in the green fuels and chemicals sector.

KEY INITIATIVES THAT HELPED PROVIDE BENCHMARK RESULTS

a. Focus on Large Deals, Key Accounts and Energy Transition:

- New MSA for mega-deal (CAPEX Project) signed off in addition to existing OPEX MSA to enhance Dedicate Engineering Centre (DEC) business
- Large deal signed with RBML for Retail outlets, which provide business continuity
- Secured order worth Rs 39 Cr for a Bioethanol Plant. This has high growth potential due to the GoI initiative for import substitution of crude oil
- Secured order for World's First Certified Green Hydrogen and Ammonia Project
- Pilot project from Tata Steel on Methanol from Blast Furnace Gases.
- An exclusivity agreement with a leading paints company for all their future projects

b. Growth initiatives in Delivery

- Empanelment of industry experts with more than 35 years of individual experience to build processes and help prepare the talent pool to serve growing business needs

- Leveraging Accelerated Delivery Centre (ADC) for Detail Engineering – Implementation of learning from earlier retail outlet projects in the ongoing retail outlet project through a 'factory model' where 80% of efforts are coming from ADC
- Learning & Development in new areas, including but not limited to green energy, hydrogen, AI/ML, Python etc.
- Development and adoption of e-tendering software for procurement activities.
- Collaboration with CTO teams – from proposal preparation and identification of value engineering opportunities to critical design reviews
- Weekly tasks look ahead schedules shared with each team member and daily monitoring of business A, B, and C (Accrual, Billing, Collections)

c. Branding and Advocacy:

- 4 Publication in CEAI journal over last year
- 2 Articles in TCExpressions
- One publication in peer-reviewed Scopus listed journal

A PROJECT

A LEADING FERTILIZER MANUFACTURING COMPANY

TCE is providing project management consulting services for the gas processing complex (2 x 500 MMscf/day), methanol complex (2x5000 MTPD), export facility, ISBL and entire infrastructure – more specifically, to review, validate and provide value additions on the concept, approach, engineering documentation and cost estimation for the project in Africa. This project involves commendable efforts in communication, managing interfaces, and integrating multiple stakeholders across the globe, including customers in Africa, Process licensor Air Liquide from Germany, EPC contractor TCC from China, Survey agencies in Africa, and other stakeholders in the UK and the USA. The customer is delighted and has provided excellent feedback on the services offered.





A PROJECT **AN INDIAN PETROLEUM LIMITED**

A Government of India (GoI) enterprise, a Forbes 2000, and a Global Fortune 500 company. The company intends to install a lignocellulosic second generation (2G) Bioethanol plant with a capacity of 100 KL per day and 1G bioethanol with a capacity of 100 KL per day Project. The GoI is encouraging cellulosic ethanol production from agricultural residues to provide additional sources of remuneration to farmers, address the growing environmental concerns, and support the Ethanol Blended Petrol (EBP) program. The main reasons for the enhanced development of Bioethanol are its use as a favourable and near carbon-neutral renewable fuel, thus reducing CO₂ emissions and associated climate change.

TCE Services include Project Management (In EPCM mode of execution), Residual Detailed engineering/design to completion, Procurement & Expediting services, Tendering & Award, Construction management & Supervision and assistance in Start-Up, Commissioning & Performance Test Runs, including planning/scheduling, project monitoring, cost control, quality assurance. EPCM's scope of services also includes OSBL requirements.

Mining & Metals Business

The Mining & Metals business unit (MMBU) has built its strength in Capex and Opex areas for the Iron & Steel Industry by providing services in building some of the largest plants in Iron & Steel making and finishing areas and rebuilding the existing world in close coordination with the world's reputed technology suppliers. For the last five years, the diversification has also resulted in customer orientation in providing services related to productivity improvement, operational assistance, and asset integrity management throughout the life cycle of the assets.

In the non-ferrous area, the sector strategy has resulted in innovative solutions to the reputed customers in the green metal entire value chain. The experiences gained in the Opex services have now been expanded to the non-ferrous areas to meet the present business objective. A dedicated team is working on identified initiatives like Energy Transition, Clean technology, High-value product differentiation, and Digital point solutions to identified Industrial problems and partners. The sector approach will be towards reskilling the entire workforce to orient to the changing industry needs and the drivers enforcing the changes; we are working on re- envisioning talent management in the digital age.

AREAS OF EXPERTISE

The mining and metals sector continues to deliver creative solutions to customers worldwide across the value chain of:

- Iron & Steel
- Mining & Beneficiation of Ferrous & Non-ferrous
- Smelting and Processing
- Extractive Metallurgy
(Ferrous & Non-Ferrous – Al, Zn, Cu, Pb etc.)

The focus areas in the mining sector are:

- Geology and Mine Planning
- Mineral Processing and beneficiation
- Material Handling

Our areas of expertise include:

- Concept to Commissioning Services with interface management
- Portfolio Management Services
- Process Engineering & Interface Management
- Layout & Logistics
- Sustainability & Environmental Engineering
- Waste Management
- Asset Integrity Management



KEY ACHIEVEMENTS

- Entry into green steel production project (major capital expansion project for a significant Steel Plant through the DRI-EAF route).
- Master Service Agreement (MSA) with Global Mining Major – First of its kind international mining company in the Mining & Non-Ferrous Sector.
- Participation in value-added products development projects.
- Secured jobs for the world's largest single stream Copper Smelter project in India.
- Business adjacency & new service offering in terms of Specialised technical advisory for operational excellence, with active support from technology partners for operational excellence.
- New Iron making technology development in a Pilot Plant Project at TSL, Jamshedpur.
- First of its kind greenfield Copper Smelter Project in Southeast Asia.

KEY TRENDS SHAPING THE INDUSTRY

The Mining & Metals (M&M) industry is facing new challenges. In the past, the mining sector had to plan its production based on the "highest volumes at the lowest production cost". Today, they must be profitable, productive, and sustainable under new & upcoming regulations. The Mining and Metals (M&M) sector is returning to growth, but companies face a transformed competitive and operating landscape.

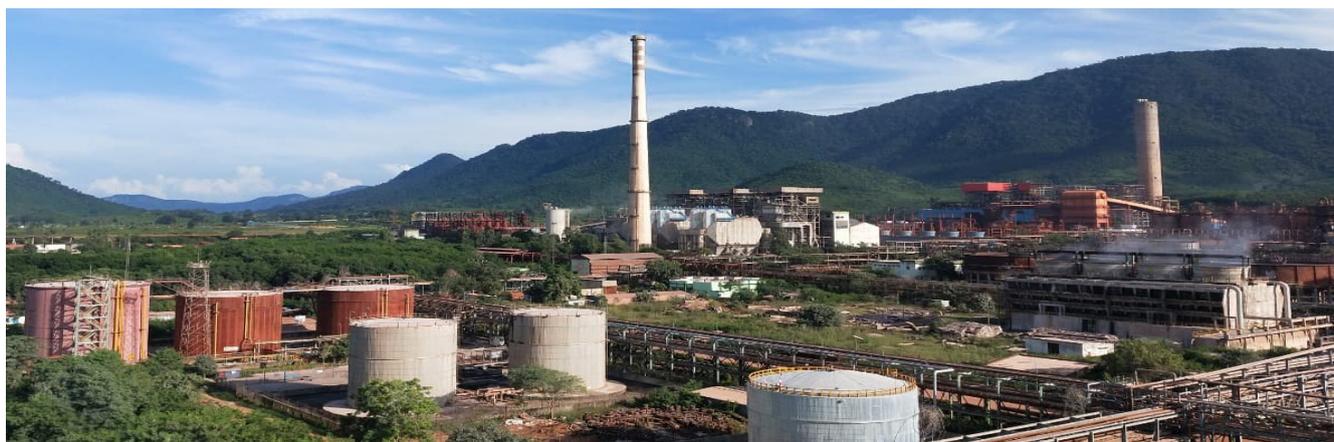
Key drivers for the next decade for this sector are the following:

- Import substitution strategy (Resource Security) with redefined globalisation
- Climate change and environmental sustainability without compromising competitiveness
- Energy transition and Net-Zero based redesign approach
- Adopting Controlled-Tower methodology in new normal conditions
- Innovate and integrate various functions to bring greater capital efficiency
- Adoption of Industry 4.0/5.0, digitalisation and remote-controlled centre for plant operation

The Metals and Mining sector in India is expected to witness a significant reform in the next few years, owing to reforms such as the Make in India Campaign, Smart Cities, Rural Electrification, and a focus on building renewable energy projects under the National Electricity Policy as well as the rise in infrastructure development. The key drivers in this sector are the following:

- Smelting & Downstream facilities for Aluminium, Copper & Zinc.
- Low-Grade Ore beneficiation.
- IIoT - Plant Process analytics and optimisation, smart mine.
- Process changes in Iron & Steel making and Carbon-Capture, New Technology in the steel making sector.

- Renovation & Modernisation, Retrofits & upgrades, GAP Analysis.
 - Asset Integrity Management.
 - Air Quality Improvement services for fugitive emissions in steel & other metallurgical industries.
 - Benchmarking and O&M excellence offerings.
 - Business adjacency - Tailing Management System as per "Global Industry Standard on Tailing Management 2020".
 - Watch list – Lithium, Cobalt, Rare Earth, Precious Metal(s)
- KEY INITIATIVES THAT HELPED PROVIDE BENCHMARK RESULTS**
- Execution of projects for key clients with substantial margins
 - Tie up with process industry experts on as & when required basis for critical deliveries
 - Multiple level connectivity with Clients, including apex level
 - Right partnering strategy
- Put up strong credentials with partners aligning to the Client's stringent PQ criteria
 - Enterprise level engagement with choice of appropriate partner
 - Leveraging the Client's confidence based on previous work done & engagements
 - Repository of niche companies with appropriate process engineering skillset to improve the technical score
 - Strategic MOU with a partner for knowledge complementation
 - Partnership with engineering consultancy firm having manufacturing unit
 - Showcasing quantum increment in commodity and sectorial base and replicating such models in new geographies
 - Past success references, green initiatives, 3D engineering, Digital story
 - One publication in peer-reviewed scopus indexed journal



A PROJECT 5 MTPA CAPACITY ALUMINA REFINERY

The customer is expanding the refinery capacity to become World's second-largest alumina refinery. A 2 MTPA alumina refinery is in operation and a 3 MTPA refinery along with a 210 MW (3x50 MW + 2x30 MW) power plant are in various stages of construction.

TCE has been appointed as Owner's Engineer to provide services for BOQ Preparation, Cost Estimation & Procurement Assistance and Review & Detailed Engineering, Construction Supervision, HAZOP etc.

TCE is tasked to review all study reports, drawings/ documents, technical specifications, contracts with

technology providers and available health assessment reports to facilitate the assessment of engineering completeness. TCE is also responsible for the review of drawings/ documents, Identification of interface areas and necessary engineering requirements and physical verification of construction progress and major equipment/ facilities availability at the site with respect to the drawings.

We have prepared a detailed schedule and ensure all stakeholders abide by the same. We also appoint relevant experts on a need basis and ensure all protocols are followed.



A PROJECT **COPPER SMELTER**

TCE is providing Owner's Engineering Services for the Copper Smelter Project which includes gap analysis, optimisation, procurement services, construction supervision, commissioning, ramp up and hand over.

The key value additions provided by TCE are Site preparation optimisation, concentrate storage optimisation, removal of slag concentrator and iron sand facilities, Effluent Treatment Plant (ETP) simplification,

gypsum and disposal cake shelter, removal of fluorine tower from Gas Cleaning Plant (GCP), Copper Electro Refinery Optimisation, Precious Metal Refinery (PMR) optimisation, Air Separation Unit (ASU) off-the-fence supply, Sea water cooling circuit redesigned, Optimisation in power sourcing and distribution etc.

The value additions have resulted in a saving of USD 300+ million

Digital & Advanced Technologies Business

Digital technologies are altering all industries, redefining business models, and creating new opportunities for preemptive, pioneering, and agile organisations. The rules of the engagement have changed. An assortment of digital & advanced technologies – from the internet of things to artificial intelligence – are reinventing how organisations create and deliver value. Business model changes will soon become one of the critical factors driving the sustainability of many businesses in the future. We today need to position ourselves as a cutting-edge advanced technology service provider. We are not only competing with technology giants but also IT service providers and start-ups. Our real differentiator is not only our six decades of engineering infinite possibilities but also our in-house pool of thousands of talented engineers.

KEY TRENDS SHAPING THE INDUSTRY

1. Remote Monitoring and Operation

The key benefit of the process- and performance-monitoring sensors is that the data and insights that they provide can be accessed from anywhere, at any time. This enables around-the-clock monitoring and decision-making based on real-time data, no matter where personnel are. Post-COVID19, this remains relevant as more and more operations will be driven remotely and securely.

2. Data-Driven Predictive Technologies

Unexpected downtime is, as always, one of the biggest wastes of resources for a manufacturer, cutting into the bottom line, threatening deadlines, and adversely affecting equipment life span and output quality. With advanced sensors and communications developments that bring monitoring closer to real-time than ever before, predictive technology will dominate the owner's mindspace over the next few years.

3. Digital Twins

Remote access will remain a common thread post-COVID19 and in the future in the IIoT world. One of the most significant advances in remote manufacturing operations is digital twin technology, a digital representation of a physical

component or machine in a factory. The digital twin will constantly update to reflect the physical piece's actual condition, status, and performance through sensors and connectivity.

4. Health and Safety

Worker health and safety took on a new meaning in the COVID19 era, with the need to keep employees distanced whenever possible and the ongoing concern over the health of those working in the same area. The principles underlying monitoring technologies used for machines will also apply in this area, with the ability to monitor employee locations on the facility floor, track close contacts, and even quickly and efficiently take and record employee temperatures. Innovative ways of using IIoT technology to keep workers healthy and provide benefits for employees will remain on top of everyone's mind.

5. The Smart Factory

With IIoT technology increasingly being incorporated and adopted, 5G communications are becoming more commonplace. With the above trends taking hold, the era of the smart factory is truly upon us. 2023 may be when the smart factory becomes more of a norm.

KEYS AREAS OF EXPERTISE

1. Unified 3D Engineering, 4D, 5D Simulation

Providing end-to-end integration of discipline wise data into a detailed design environment with intelligent P&ID, Integrated 3D models & master tags helping multi-discipline teams to collaborate in real-time & increase engineering efficiency.

2. Building Information Management

Creating an intelligent 3D model-based process that provides architecture, engineering, and construction (AEC) professionals with insights and tools to plan efficiently, design, construct and manage buildings and infrastructure.

3. Asset Digitisation & Asset Information Management

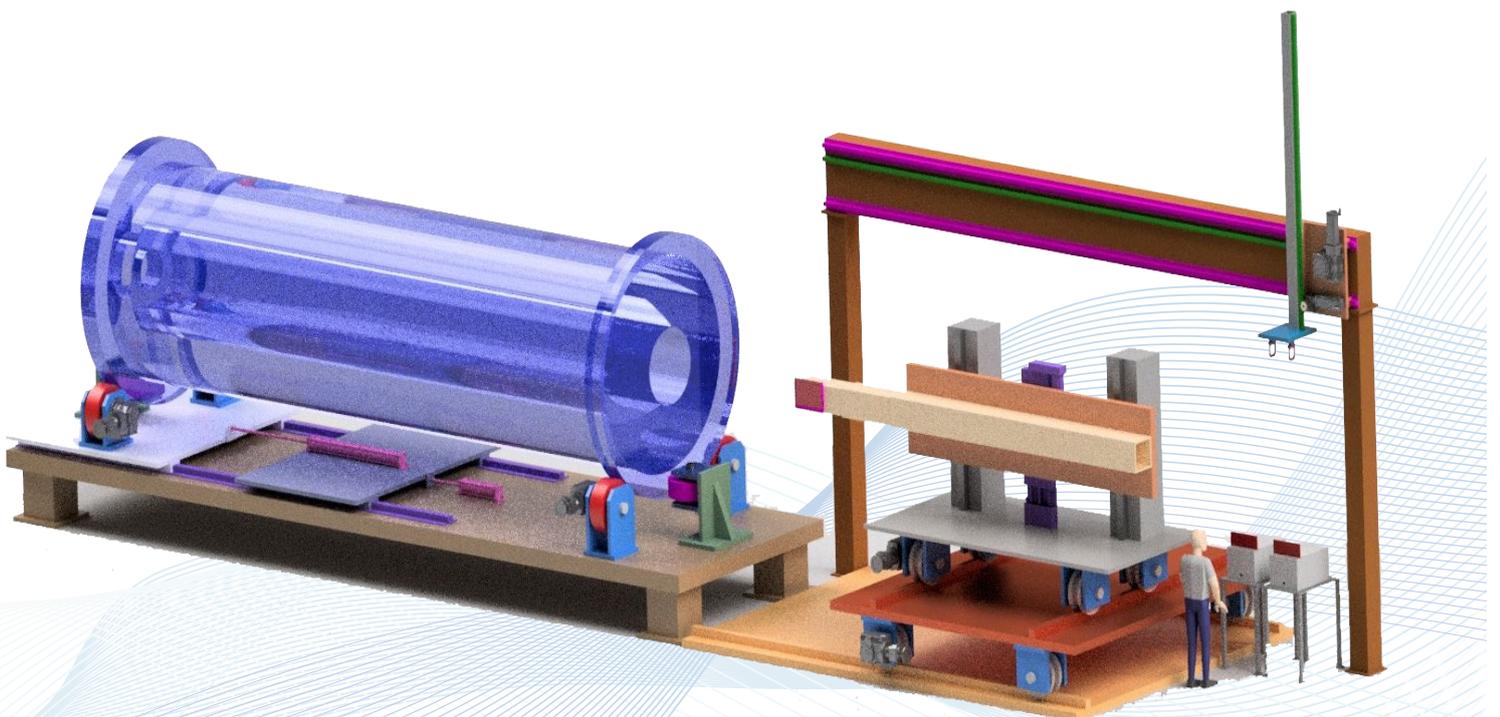
Enabling digital transformation of plants using industry-leading solutions (AVEVA, SIEMENS, HEXAGON) to assist owners and operators in digitising their engineering & plant information with a single version of the truth.

4. Industry 4.0 & Asset Performance Management (APM)

Driving measurable and immediate results with trusted APM solutions, advancing the enterprise, and enhancing asset availability with comprehensive APM solutions - Predictive Analytics, RCM, Unified Visualisation, and Digital Workforce.

5. Product Engineering

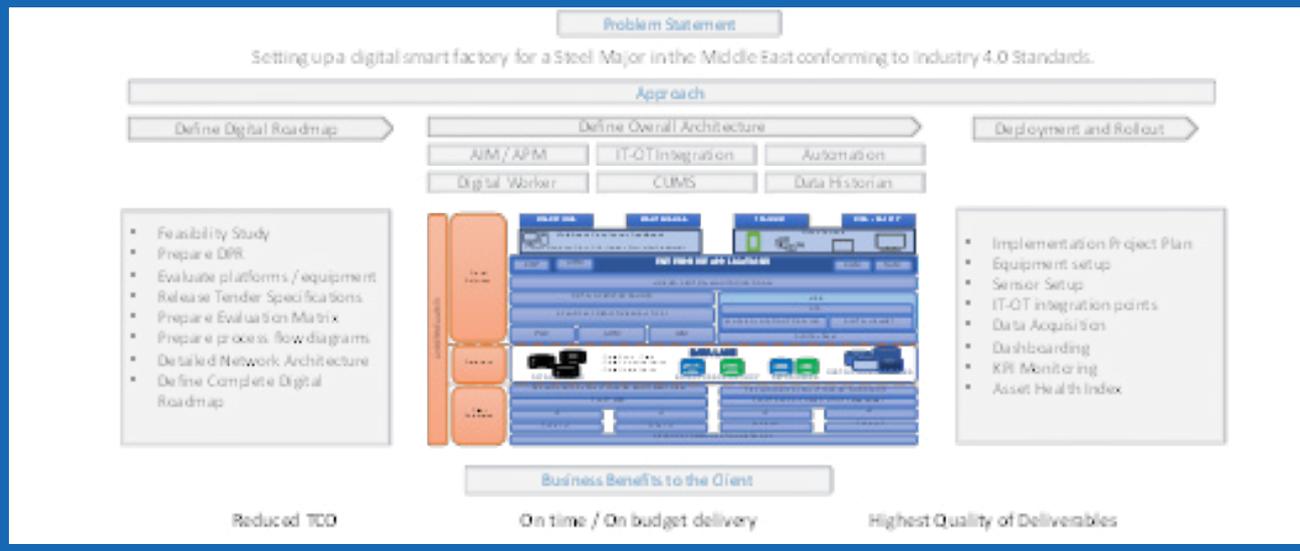
Designing and Analysing products backed by strong knowledge of design validation (Strength Analysis, Reliability Analysis) of Electro-Mechanical Products as per applicable codes and standards, providing suggestions on design modifications for code compliance.



A PROJECT STEEL INDUSTRY GIANT

We are creating a digital smart factory roadmap for a Steel Major in the Middle East conforming to Industry 4.0 Standards. The steps involved creating a detailed feasibility report, platform identification, process flow

diagrams, detailed network architecture, releasing the tender specifications, and preparing evaluation matrices to achieve the complete digital roadmap.

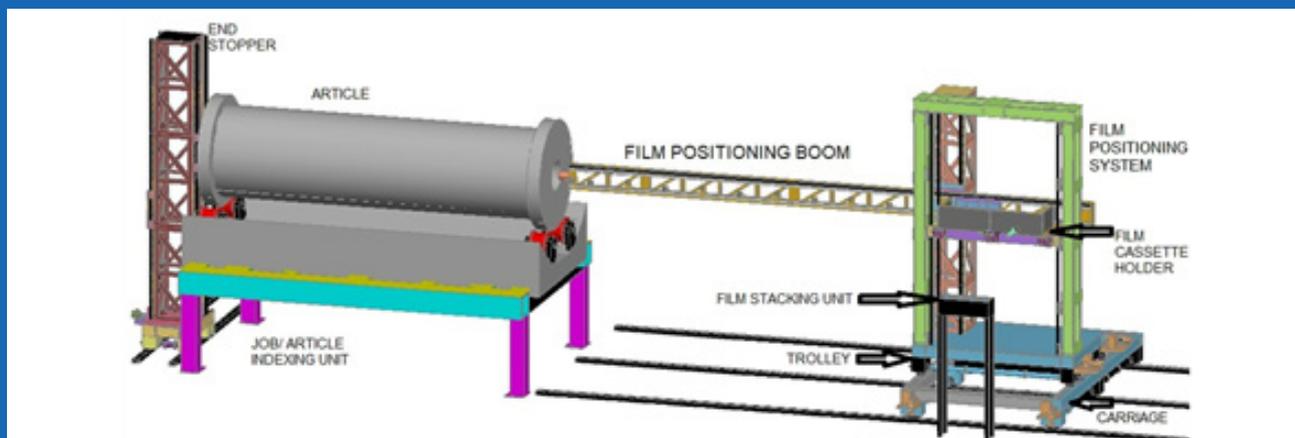


A PROJECT AUTOMATED FILM LOADING AND STACKING SYSTEM (AFLASS)

A Complex Defence Project

The customer has the largest Strategic fuel complex located in India. The project's objective is to automate the conventional radiography system presently used to increase the output of radiography testing, reduce human radiation exposure, and enable radiography of longer articles with lengths up to 8500 mm.

TCE prepared the Conceptual Design of AFLASS, the Concept Note and Concept Drawings of AFLASS, including design calculations/finite element analysis for critical components and detailed fabrication drawings for various parts of AFLASS. TCE was also responsible for QAP & Testing and Commissioning plan, Fabrication/Functional Testing/Installation/Commissioning by TCE's approved manufacturer through a Project Management Agency.





A PROJECT

ASSET INFORMATION MANAGEMENT SYSTEM FOR A REFINERY

A diversified, integrated energy major with a presence in almost all the streams of oil, gas, petrochemicals and alternative energy sources entrusted TCE with developing and supplying a turnkey Electronic Asset Information Management System (AIMS) for ten sites of its Refineries Division.

The scope of the AIMS included Solution design and implementation, Data preparation, cleaning & uploading, Interface configuration & management, 1 million documents in phase one and 6 million documents in phase two, 3D modelling, P&ID, layouts, manuals & documents, 100K tags, Hardware & software supply, Implementation & solution configuration, Data collection & segregation of data, Validation & data processing and Interlinking & dashboarding.

The project came with a unique set of challenges like Digitising old engineering drawings & documents, Handling a high volume of unstructured & non-standard documentation, Project governance & collaboration between multiple stakeholders at ten client sites, Missing/incomplete metadata from old refinery sites, and Obtaining and processing the “right” data to meet project objectives and customer expectations, Creating project awareness and interests amongst multiple client teams etc.

TCE successfully delivered yet another first-of-its-kind project in the country with the following client benefits:

- Successful generation of management reports for seamless reviews and enhanced regulatory compliance.
- Single point access to 98% of engineering documents throughout the project and asset lifecycle.
- Reduced ~60-80% time for searching and indexing documents using process automation.
- Establishing a standardised mechanism for all future operations & digital project handovers for projects worth over 25000 CR (INR)

The salient features of the project are:

- One touch data accessibility
- Single point access to 98% of engineering data
- Information integrity throughout project and asset lifecycle
- 60-80% reduction in man-hours searching for information



A PROJECT **A STEEL GIANT IN UNITED KINGDOM**

Tata Consulting Engineers Limited (TCE) signed up with the largest steel producer in the UK to mitigate the health, safety and environmental challenges of its ageing assets, some of which are more than a hundred years old.

TCE supported the implementation of Asset Integrity Management (ISO 55000) through the creation of Framework and Road Maps, to identify risks through Risk Based Inspections (RBI) followed by redressal of risks through Front-End Engineering Design (FEED) using the Onsite-Offshore Delivery Model.

Addressing the compliance to environmental and regulatory norms requires the implementation of a

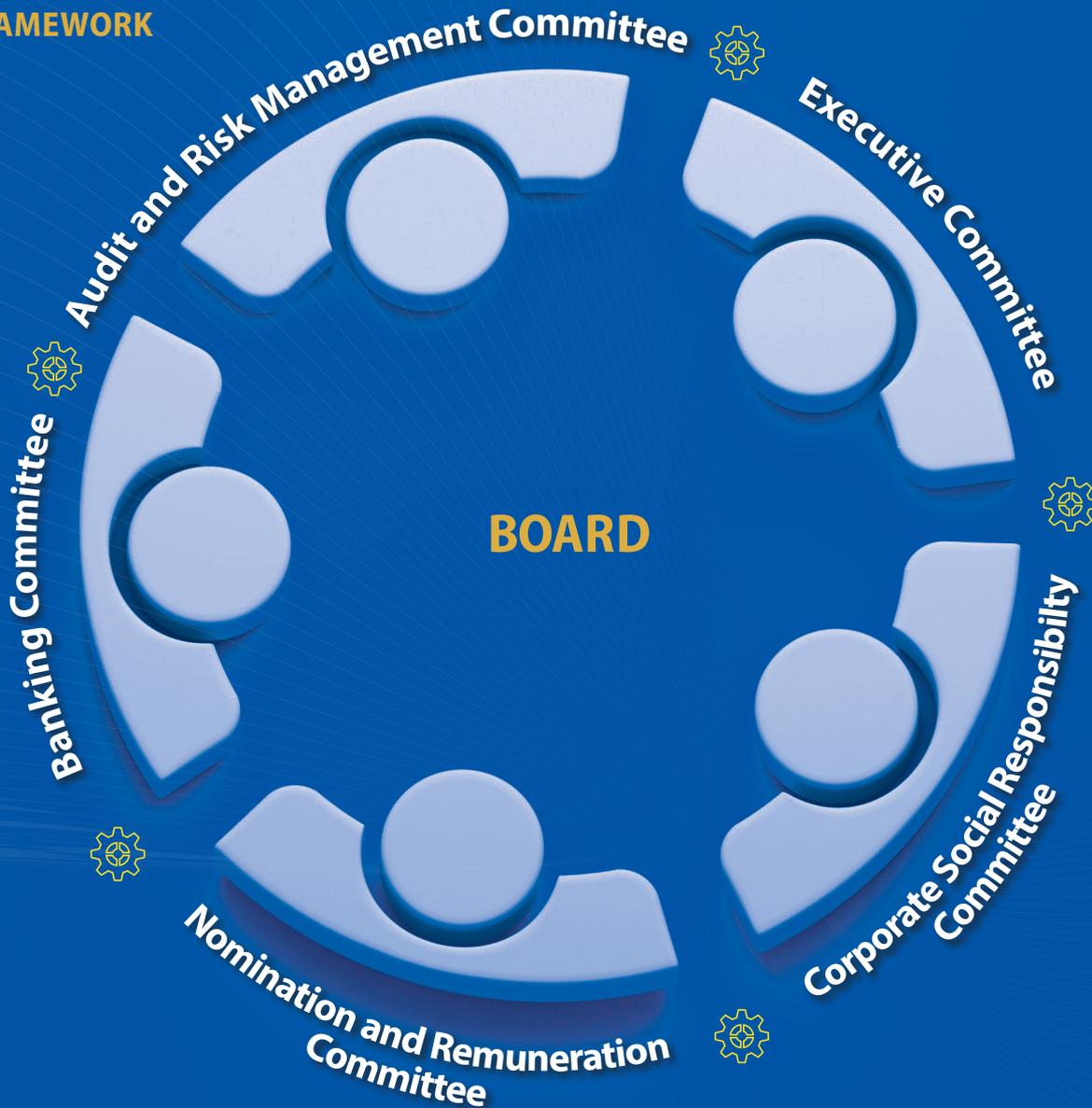
multi-functional Environmental Program to prioritise and redress the environmental risks through a road map for the sustainability of the environmental asset integrity management initiative. One of the landmark projects was to improve the de-dusting efficiency from about 64% to 95% which has been commissioned and initial trials are encouraging.

TCE has been working with the customer since 2017 and the collaborative efforts have been successful in providing safe, compressive and cost-effective engineering solutions.

Corporate Governance

Tata Consulting Engineers Limited (TCE) has a strong legacy of following fair, transparent, and ethical governance practices. Our Board of Directors and Management Committee comprising enlightened leaders, work together to drive the core values that form TCE's guiding philosophy. We believe that good governance is an essential element of business and it helps us fulfil our responsibilities to all the stakeholders. Ethical business conduct, and commitment to values and integrity, which enhance and retain stakeholders' trust, are TCE's Corporate Governance traits. The Management Committee takes business decisions in consultation with the Board.

OUR GOVERNANCE FRAMEWORK



Company's Philosophy on Corporate Governance

Good Governance practices stem from our culture and the mindset of the organisation. Your Company considers fair and transparent corporate governance as one of its core management tenets.

TCE follows the best governance practices with the highest integrity, transparency and accountability. Strong leadership and effective corporate governance practices have been the Company's hallmark inherited from the Tata culture and ethos.

The Company has a strong legacy of fair, transparent and ethical governance practices. The Company has adopted a Code of Conduct for its employees, including the Managing Director. In addition, the Company has adopted a Code of Conduct for its Non-Executive Directors.

As per Section 149 of the Companies Act 2013, the Company doesn't fall under the requirement of having an Independent Director on the Board or the Committees the like Audit & Risk Management Committee and Nomination & Remuneration Committee. Hence, the Code of Conduct for Independent Directors does not apply to the Company. However, the Company follows the Tata Board and Committee/s Governance Charter 2015. The Committees, i.e. Audit & Risk Management Committee, Nomination and Remuneration Committee, Corporate Social Responsibility Committee and Executive Committee are functional in TCE as a good corporate governance practice.

The company's corporate governance philosophy has been further strengthened through the Tata Business Excellence Model.

Board of Directors

As of March 31, 2022, the Company has 4 Directors of which 3 (i. e. 75%) are Non-Executive Directors. The profile of the Directors is available on the Company's website (<https://www.tce.co.in/our-leadership/>). The Composition of the Board

conforms with Section 149 of the Act. None of the Directors on the Board hold Directorship in more than ten public companies.

6 Board Meetings were held during the year, and the gap between the two meetings did not exceed one hundred and twenty days. The dates on which the said meetings were held are given below:

Date of Board Meetings	Number of Directors present at the Board Meeting	Total Number of Directors	Attendance (%)
April 30, 2021	3	4	75
July 05, 2021	4	4	100
August 13, 2021	4	4	100
October 12, 2021	4	4	100
December 17, 2021	4	4	100
March 30, 2022	4	4	100

The necessary quorum was present for all the meetings.

- The Directors have made necessary disclosures regarding Committee positions in other public companies as of March 31, 2022. None of the Directors are related to each other.
- The names and categories of the Directors on the Board, their attendance at the Board Meetings held during the year under review and at the last Annual General Meeting ("AGM"), and names of other listed entities/ public companies in which the Director is a Director and the number of Directorships and Committee Chairmanships / Memberships held by them in other Public Limited Companies as of March 31, 2022, are given hereinbelow. Other Directorships do not include Directorships of private limited companies, foreign companies and companies registered under Section 8 of the Act. Further, none of them is a member of more than ten committees or Chairman of more than five committees across all the Public Companies in which they are a Director.

Name of the Director (DIN)	Category	Number of Board Meetings attended during FY 2021-22	Whether attended last AGM held on 04 th June 2021 (Yes/No)	Number of Directorships in other Public Companies		Number of Committee positions held in other Public Companies		Directorship in other Listed Entity (Category of Directorship)
				Chairman	Member	Chairman	Member	
Mr Ashok Sethi (Chairman) (DIN 01741911)	Non-Independent, Non- Executive	6	Yes	0	3	-	6	-
Mr Amit Sharma (Managing Director & CEO)(DIN 03212568)	Non-Independent, Executive	6	Yes	1	1	-	-	-
Ms Anjali Kulkarni (DIN 06993867)	Non-Independent, Non- Executive	5	Yes	-	7	-	7	-
Mr Sriram Kadiyala (DIN 08449772)	Non-Independent, Non- Executive	6	Yes	-	-	-	-	-

- iii. The Board periodically reviews the compliance reports of all the laws as applicable to the Company.
- iv. Details of equity shares of the Company held by the Directors as of March 31, 2022, are given below: **Not Applicable**
- v. The Board has identified the following skills/expertise/competencies fundamental for the effective functioning of the Company, which are currently available with the Board:

Global Business	Understanding global business dynamics across various geographical markets, industry verticals and regulatory jurisdictions.
Strategy and Planning	Appreciation of long-term trends, strategic choices and experience in guiding and leading management teams to make decisions in uncertain environments.
Governance	Experience in developing governance practices, serving the best interests of all Stakeholders, maintaining Board and Management Accountability, building long-term effective Stakeholder engagements and driving Corporate Ethics and Values.

Committees of the Board

The details of various Board Committees as of March 31, 2022, which comprises the Statutory Committees as well, are as follows:

Name of the Committee	Extract of Terms of Reference	Category and Composition	Other Details
Corporate Social Responsibility Committee	<p>The Committee is constituted in line with Section 135 of the Act.</p> <ul style="list-style-type: none"> Formulate and recommend to the Board a CSR Policy and CSR Annual Action Plan indicating the activities to be undertaken by the Company as specified in Schedule VII of the Act. Recommend the amount of the expenditure to be incurred on the activities mentioned in the CSR Policy. 	<p>Ms Anjali Kulkarni, Member Chairman</p> <p>Mr Ashok Sethi, Member Director</p> <p>Mr Amit Sharma, Member Director</p>	The Company held 3 Corporate Social Responsibility Committee Meetings during the year.
Nomination & Remuneration Committee	<p>The Committee is constituted in line with Section 178 of the Act.</p> <ul style="list-style-type: none"> Recommend to the Board the setup and composition of the Board and its committees. Recommend the appointment/re-appointment of Directors and Key Managerial Personnel to the board. Support the Board and Independent Directors in evaluating the performance of the Board, its Committees and Individual Directors. Recommend the Remuneration Policy for Directors, Executive Team or Key Managerial Personnel, and the rest of the employees to the board. Oversee familiarisation programs for the Directors. 	<p>Mr Ashok Sethi, Member Chairman</p> <p>Ms Anjali Kulkarni, Member Director</p> <p>Mr Sriram Kadiyala, Member Director</p>	The Company held 9 Nomination and Remuneration Committee meetings as a good corporate governance practice during the year.
Audit & Risk Management Committee	<p>The Committee is constituted in line with Section 177 of the Act.</p> <ul style="list-style-type: none"> Oversight of financial reporting process. Reviewing with the management the Annual Financial Statements and Auditors' report thereon before submission to the Board for approval. Evaluation of internal financial controls and Risk Management systems Recommendation for appointment, remuneration and terms of appointment of auditors of the Company. Approve policies about the implementation of the Related Party Transactions. To consider matters concerning the Tata Code of Conduct, Anti-Bribery and Anti-Corruption Policy and Gift Policy. 	<p>Mr Sriram Kadiyala, Member Chairman</p> <p>Mr Ashok Sethi, Member Director</p>	The Company held 5 Audit & Risk Management Committee Meetings as a Good Corporate Governance Practice during the year.
Executive Committee	<p>The Executive Committee oversees the operational review and strategic planning implementation review at the Business & Cluster Level.</p> <p>Review and Achievements of Annual Business Plan.</p> <p>Review of Key Commercial Bidding Strategy.</p>	<p>Mr Ashok Sethi, Member Chairman</p> <p>Mr Amit Sharma, Member Director</p>	The Company held 6 Executive Committee meetings during the year.

Nomination and Remuneration Committee - Other Details

- Remuneration Policy

The Remuneration Policy of the Company is designed to create a high-performance culture. It enables the Company to attract, retain and motivate employees to achieve results. Our business model promotes customer centricity and requires employee mobility to address project needs. The Remuneration Policy supports such mobility through pay models compliant with local regulations. In each country where the Company operates, the Remuneration structure is tailored to the rules, practices and benchmarks prevalent in the industry.

The Company pays remuneration by way of salary, benefits, perquisites and allowances (fixed component) and commission (variable component) to its Managing Director and employees. Annual increments are recommended by the Nomination and Remuneration committee within the salary scale approved by the Board and members and are effective from April 1, each year.

The Board of Directors, on the recommendation of the Nomination and Remuneration Committee, decides the

commission payable to the Managing Director and the Non-Executive Directors out of the profits for the financial year and within the ceilings prescribed under the Act, based on the Board evaluation process considering the criteria such as the performance of the Company as well as that of the Managing Director and each Non- Executive Director.

The Company also determines to pay commission to the Non-Executive Directors within the ceiling of 1 per cent of the Company's net profits as computed under the Act's applicable provisions, with the members' approval. The said commission is decided each year by the Board of Directors, on the recommendation of the Nomination and Remuneration Committee and distributed amongst the Non-Executive Directors based on the Board evaluation process, considering criteria such as their attendance and contribution at the Board and Committee meetings, as well as the time spent on operational matters other than at meetings.

Number of Board & Committee Meetings Held and Attendance Record

Name of the Committee	Audit & Risk Management Committee	Nomination and Remuneration Committee	Board	Corporate Social Responsibility Committee	Executive Committee
No. of Meetings held	5	9	6	3	6
Date of Meetings	April 30, 2021 July 02, 2021 August 13, 2021 October 12, 2021 December 16, 2021	April 29, 2021 June 09, 2021 June 16, 2021 June 28, 2021 July 19, 2021 August 30, 2021 December 17, 2021 March 21, 2022 March 28, 2022	April 30, 2021 July 05, 2021 August 13, 2021 October 12, 2021 December 17, 2021 March 30, 2022	April 29, 2021 July 05, 2021 March 29, 2022	August 04, 2021 August 31, 2021 December 09, 2021 December 10, 2021 January 17, 2022 March 17, 2022
No. of Meetings Attended					
Mr Ashok Sethi	5	9	6	3	6
Mr Sriram Kadiyala	5	9	6	-	-
Ms Anjali Kulkarni	-	9	5	3	-
Mr Amit Sharma	-	-	6	3	6
Whether quorum was present for all the Meetings			The necessary quorum was present for all the above Board & Committee Meetings		

General Body Meetings

I. General Meeting

a. Annual General Meeting (AGM)

Financial Year	Date	Time	Venue
2018-2019	July 08, 2019	11.30 AM	Tata Sons Limited. Meeting Room No 301, 3rd Floor, Bombay House, 24 Homi Mody Street, Fort, Mumbai 400001
2019-2020	September 24, 2020	11.00 AM	Through Video Conferencing ("VC") / Other Audio-Visual Means ("OAVM"). Deemed Venue: - Bombay House, 24 Homi Mody Street, Fort, Mumbai 400 001
2020-2021	June 04, 2021	11.30 AM	Through Video Conferencing ("VC") / Other Audio-Visual Means ("OAVM"). Deemed venue - Registered office, i.e. Matulya Centre 'A', 249, Senapati Bapat Marg, Lower Parel (West), Mumbai 400 013

b. Extraordinary General Meeting:

No Extraordinary General Meeting of the members was held during FY 2021-22.

A certificate has been received from M/s Robert Pavrey & Associates, Practicing Company Secretaries, that none of the Directors on the Board of the Company has been debarred or disqualified from being appointed or continuing as Directors of companies by the Ministry of Corporate Affairs or any such statutory authority and Compliance of the relevant laws under the Companies Act 2013.

The Statutory Auditors M/s. B S R & Co. LLP Chartered Accountants, FRN 101248W/W- 100022, have completed the five-year tenure as per their terms of appointment as approved in the 18th AGM, i.e. for five years tenure starting from FY 2017-18 till FY 2021-22. The Board recommends the appointment of M/s. B S R & Co. LLP (Registration No. 101248W/W-100022), Chartered Accountants as Statutory Auditors to audit the accounts of the Company for the period of 5 years tenure starting from the FY 2022-23.

Other Disclosures

Particulars	Regulations	Details	Website Link for details/policy
Related Party Transactions	As defined under the Act	The details of the Related Party Transactions are provided in the Boards' Report forming part of the Statutory Section. Transactions entered into with related parties during the financial year were in the ordinary course of business and at arms' length basis and were approved by the Audit and Risk Management Committee. The Board's approved policy for Related Party Transactions is uploaded on the website of the Company.	https://www.tce.co.in/ethics-and-compliance/
Whistle Blower Policy and Vigil Mechanism	As defined under the Act	The Company has a Whistle Blower Policy and has established the necessary Vigil Mechanism for Directors and employees to report unethical behaviour concerns. No person has been denied access to the Chairman of the Audit & Risk Management Committee. The said policy has been uploaded on the website of the Company.	https://www.tce.co.in/ethics-and-compliance/
Disclosure under the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2018	As defined under the Act	The details have been disclosed in the Board's Report forming part of the Statutory Section of Annual Report.	

Risk Management Overview

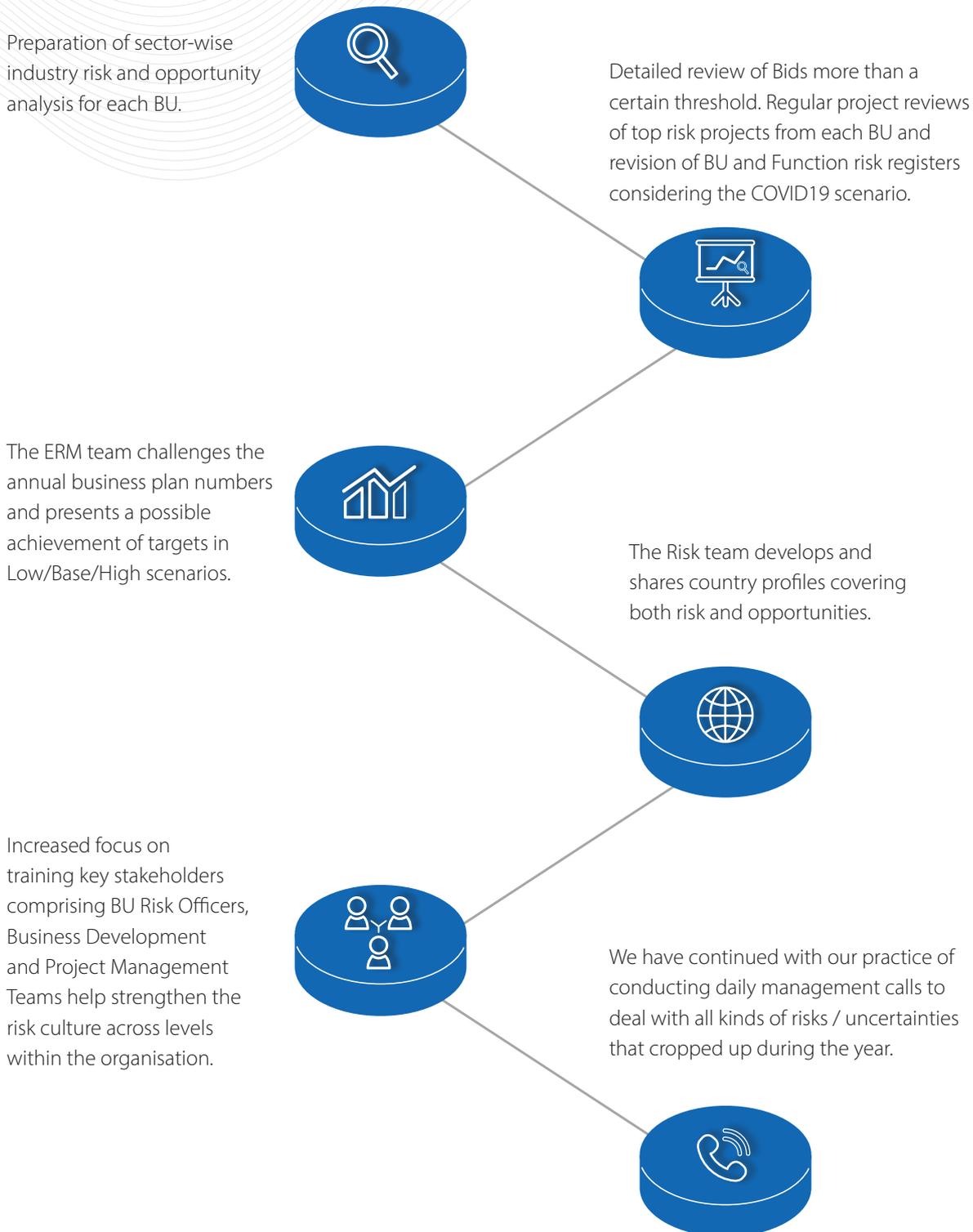
In a complex and interconnected world, any event happening around the globe impacts most economies and organisations positively or negatively. Organisations must identify and mitigate the risks they are exposed to. It may not be possible to eliminate the threats but what matters is whether risks are treated well to ensure that the risk levels are within the risk appetite for achieving organisational objectives.

TCE has developed the Enterprise Risk Management (ERM) Framework and process in line with the Business

Value Chain of the Company and best practice recommendations of Standards like ISO 31000 and the COSO framework. The company's Risk Management procedure captures and evaluates risks throughout the project's lifecycle, i.e., from the bid stage to the closure of the project. Risk Management System captures and shares the risk data for bids and projects through dashboards and reports to support risk reviews, mitigation and monitoring, risk reporting, etc.



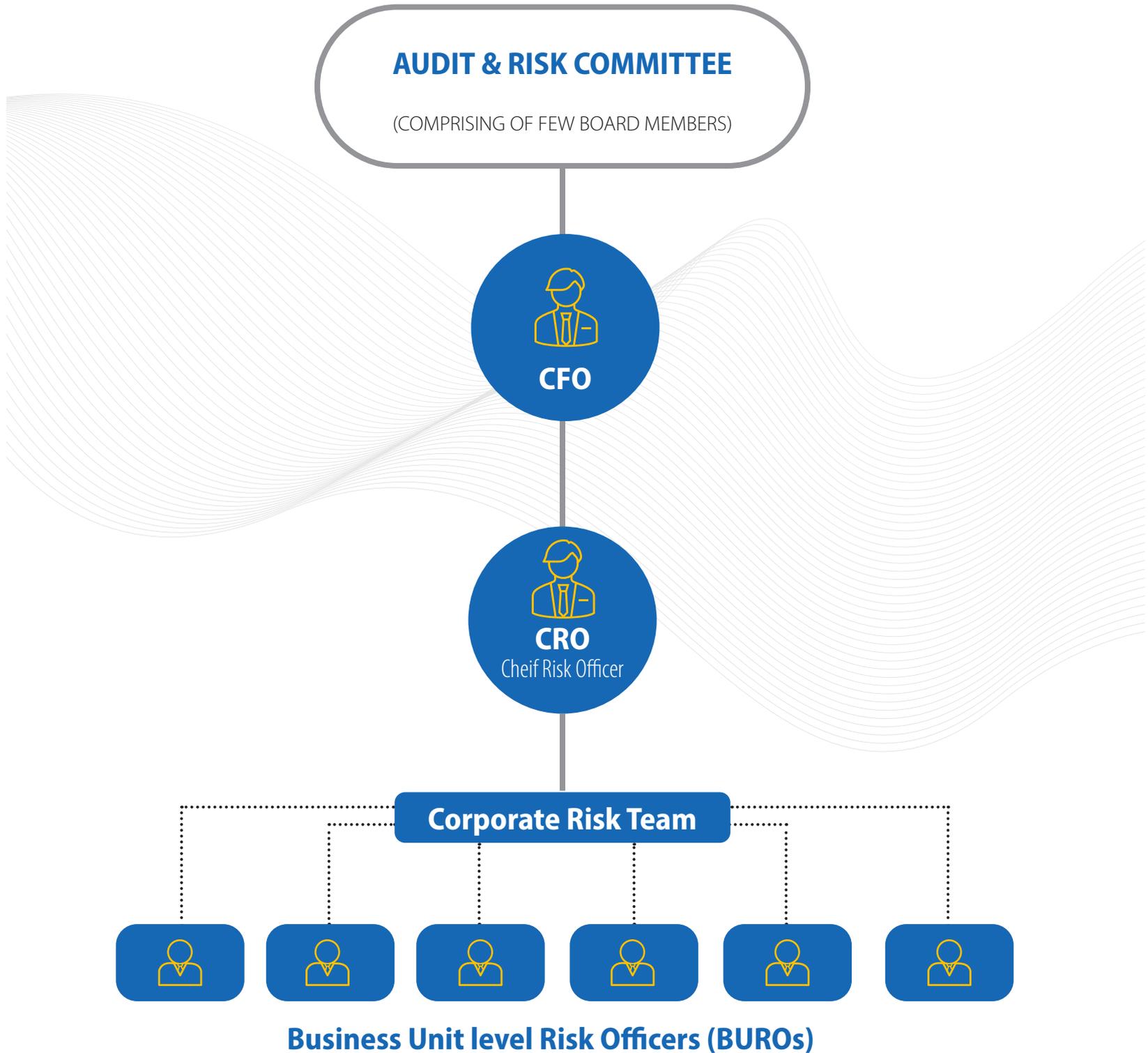
Steps taken by the Company to deal with risks in these highly uncertain times are as shown in the figure below:



All the above steps have helped to strengthen our Governance and Risk processes to aid decision making. The Enterprise Risk Management (ERM) team also regularly presents to the Corporate Management Committee (CMC) and the Audit & Risk Management Committee of the board on the risk assessment and mitigation procedures adopted to enhance the effectiveness of the risk management process.

The TCE Risk Management Team have begun offering risk management services to external clients for a fee. Currently the risk management services are being packaged alongwith our Engineering Consultancy and Project management services to existing TCE clients.

Risk Management Organisation: The Risk Function at the central level is primarily driven by Chief Risk Officer with guidance from the MD, CFO, and the Board. Business Unit level Risk Officers (BUROs) assist the Corporate Risk Team in deploying Risk frameworks within the business units.



Key Risks and How We Mitigate Them

KEY RISK AREAS	Economic Risk	Business Acquisition & Revenue Flow	Human Resources
MITIGATION STRATEGIES	<ul style="list-style-type: none"> TCE has multiple Business Units (BUs) across sectors making it less dependent on any single industry and enabling us to capture new opportunities. Proper due diligence of clients, ensuring projects viability, funding tie-up etc. are in place. 	<ul style="list-style-type: none"> Identify areas / geographies / business models for growth. Develop new key accounts & enter new areas through partnerships, etc. Deepen customer connect. 	<ul style="list-style-type: none"> Enhancing employee engagement practices. Developing specific learning and re-skilling programs by providing adequate training. Proactive strategies to attract suitable talent from various sources. Focus on providing a safe environment and ensuring employee's well-being.
AREAS IMPACTED	<ul style="list-style-type: none"> Ability to generate new business, Accrual targets, generate revenue from existing business and make collections for current and past dues, project delays leading to cost increase, etc. 	<ul style="list-style-type: none"> Reduced jobs in hand Revenues, cashflows and profits. 	<ul style="list-style-type: none"> Delay in deliverables/projects. Reduction in revenue and profits. Increased workforce costs in case of any immediate hiring required for critical positions.

Key Risks and How We Mitigate Them

KEY RISK AREAS

Locked Working Capital & Cashflow

- Many of our contracts have milestone-based payment terms, due to which high costs may be incurred before actual billing and collection.
- Cash flows from projects can fluctuate significantly over the execution period depending on the delays, contingencies, etc.

Loss of confidential Information / Data Violation / Breach

- Our work involves exchange of project data, inputs as well as deliverables by project teams spread across different geographies. Besides certain bid specific, critical financial and employee data are also being shared through physical and computer networks. Hence there are risks associated with loss of client confidential, intellectual property and personal data.

Concentration Risk

- Specific dependencies on certain key clients, types of business models, geographies or sectors may hurt our revenues.
- Despite good relationships and performance by TCE, such client(s) may have to reduce, delay, or cancel their contracts due to changed business scenario.

MITIGATION STRATEGIES

- Enhanced focus on contract & claims management to ensure project delivery with profitability.
- Due diligence and factoring in locked capital or cash flow impact our bid pricing.

- Processes are being followed to correctly identify confidential information and prevent leakage. Training and sensitisation of employees.
- Obtaining specific NDAs / Confidentiality agreements from employees/partners.
- Tightening of IT security measures.

- Conscious efforts to reduce dependence or concentration on any single client, geography, or sector.
- Develop newer key or large accounts.
- Strengthen business relationships with clients at all levels.

AREAS IMPACTED

- Impact on working capital & higher cost of financing.
- Negative cashflow

- Loss of sensitive information.
- Negative impact on reputation and brand value.
- Loss of business

- Volatility or fluctuations in business performance.
- Inability to achieve acquisition and revenue targets.

Key Risks and How We Mitigate Them

	Cost Overrun	Liabilities	Intellectual Property (IP)
KEY RISK AREAS	<ul style="list-style-type: none"> Costs may increase in projects due to various reasons like: <ul style="list-style-type: none"> ◇ A higher quantum of resources required ◇ Schedule delays ◇ Resources being unoccupied while being deployed on the project 	<ul style="list-style-type: none"> Our project execution activities may result in liability as per Contract conditions. Force Majeure conditions being activated. We could be exposed to significant monetary damages, claims or reputation risks due to deficiencies in service, any catastrophic event at our project sites, etc. 	<ul style="list-style-type: none"> Although we protect our intellectual property through contractual arrangements, registration, licensing, NDAs, etc., we may not be able to prevent infringement of our IPs completely. Our employees could inadvertently or purposely cause an infringement of clients' or third parties' IP rights. Litigation to determine the scope of IP rights, even if ultimately successful, could prove to be costly.
MITIGATION STRATEGIES	<ul style="list-style-type: none"> Ensuring vital bid stage contractual review and study of primary/secondary data to identify issues/risks, quantify the same and factor into the prices. Follow project and contract management best practices to avoid cost overruns. 	<ul style="list-style-type: none"> Adequate professional liability insurance at the organisation level. Proper due diligence at bid time to avoid taking up significant liabilities, adhering to contract requirements and professional best practices to prevent the imposition of penalties or liabilities. 	<ul style="list-style-type: none"> Strengthen process, contracts & other mechanisms to safeguard our IP, confidential information & trade secrets. Provide training to employees on the importance of respecting the IPs of our company and those of other stakeholders and the high price that we might become liable to pay in case of IP infringements.
AREAS IMPACTED	<ul style="list-style-type: none"> Lower profitability Disputes with client 	<ul style="list-style-type: none"> Unexpected costs to correct deficiencies. Negative impact on profitability. Increased litigations / legal disputes. 	<ul style="list-style-type: none"> Unexpected and huge costs. Consumption of a significant amount of senior management's attention and time. Negative impact on reputation and brand value.

Key Risks and How We Mitigate Them

Joint Ventures (JVs) / Partnerships

International Operations

KEY RISK AREAS

- We perform specific contracts as a member of JV, in partnership, and in similar arrangements. There is a risk that our partners may not fulfil their contractual obligations to us or our clients.
- We would have limited ability to control the actions of our JV partners, including non-performance, default, bankruptcy, or legal compliance.

- Our international operations are exposed to additional risks and uncertainties, including unfavourable political developments and weak economies. E.g., unexpected changes in govt. policies, geopolitical issues, potential non-compliance with regulations and evolving industry standards, renegotiation or nullification of our existing contracts, social, political, and economic instability, currency fluctuations, etc.

MITIGATION STRATEGIES

- Proper due diligence of JV partner during pre-bid/ bid stage, esp. on financial ability, experience, and track record.
- Strong back-to-back contractual arrangement to pass on liabilities and penalties to JV commensurate with their share in the partnership.

- Perform and maintain country risk analysis on an ongoing basis for clearly identifying new geographies as Go / No-go.
- Proper due diligence during bid time regarding country or location risk. Avoid excessively risky, unsafe, economically unstable, or weak countries or geographies.
- Have systems and processes to ensure compliance with all critical regulatory, govt. and contractual submissions, standards, laws, etc.

AREAS IMPACTED

- Impact on time and quality of project deliverables.
- Loss of revenue and profit.
- Increased litigations and hence loss of reputation.

- Loss of business
- Safety and security risk of personnel
- Impact on revenue and profits
- Impact on strategic targets of improving our global footprint.

Talent Management



“
Talent wins games, but
teamwork and intelligence
wins championships

Michael Jordan

”

82.5% Utilisation of People

9.2% Attrition of Key Talent

84% Men Diversity

16% Women

16 Training Person-days
per employee

Talent Management

Our Human Capital

As the world grappled with the COVID19 pandemic for the second year in a row, we at TCE realised that resilience and unity outshined as the two traits that enabled us to face these unprecedented circumstances.

At TCE, our people are instrumental in driving our innovative strategies and long-term growth. Our people strategy is anchored on equipping our employees with a diverse set of skills and providing myriad growth opportunities that foster innovation and creativity and allow them to thrive today and be poised for growth in the future.

Through the tremendous efforts of our people, we were able to continue healthy business operations while being safe and agile. We scaled up new ways of working to ensure we were ready to take on any uncertainty the year would offer.

Attracting Talent and Strengthening our Employer Brand

TCE is committed in creating an equal opportunity workplace which promotes openness and diversity. We focus on attracting, motivating, and retaining the best talent, which resonates with our cultural ethos and Tata Code of Conduct. We have a strong employee value proposition that focuses on providing unique project opportunities and thought-provoking work that matters. Hiring and retaining the right people, focusing on talent and leadership development, differentiated rewards to drive exceptional performance, and community engagement are some of the enablers that help drive the employee-centric culture.

Given our build-from-within strategy and our focus on our core campus programs, we continue to attract top talent. Special efforts have been put into hiring and creating infrastructure for a diverse workforce and retaining and developing women leaders. Our overall workforce planning strategy, processes, and policies continuously link to changing business needs and environment. Over the last year, in line with the growing business pipeline, we added a significant number to our workforce, making it more diverse and multigenerational.

Our robust digital talent acquisition process through our in-house application TalBoard, integrates sourcing, candidate relationship management, candidate screening, interview management analytics and pre and post joining formalities and is used synchronously with our digital Competency Management System, Project Management Portal. These digital platforms bring agility to the talent acquisition and onboarding process.

One of the focus areas for TCE is to increase its international footprint. To meet this objective, we strengthened our International HR processes. Several existing policies and procedures were revisited to ensure that current industry practices are followed for international travel and deputation. With the help of benchmarking tools like Mercer, a structure has been put in place to formulate policies, especially for the international workforce. To ensure seamless onboarding of employees across geographies, the global HR team and Business HR teams orient employees through a country-specific Induction Kit and detailed cultural sensitisation training.

Our campus selection and hiring numbers were achieved with Aon Hewitt's comprehensive assessment tool CoCubes and language proficiency test resulting in cost-saving and reduced Turn Around Time (TAT). **295 Fresh Post-graduates and Graduate engineers were hired this year as a part of the Young Engineers Development Program (YEDP).**

While we continued to work in a remote setup to make the incoming batch of trainees well equipped and ready to take on accurate business simulations from the first day on the field, we digitised our flagship YEDP training program. In the erstwhile classroom-based program, the same training was conducted over seven months, which has now been optimised to 3 months, while enhancing the efficacy of the training and retaining the experiential methodology.

The digital learning pathway of the trainees encompasses the learning tracks as shown in Figure 1.

In line with our commitment to provide unhindered access to comprehensive learning solutions to our project team across geographies, these learning tracks were delivered through cloud-based platforms, enabling trainees to access the programs remotely.

The YEDP program was also recognised as a Promising Practice by Tata Business Excellence Group in 2021.

Bolstering our Inclusive Culture

TCE has a culture that provides our team members with a strong sense of empowerment, where they can contribute and share their ideas without holding back. Sourcing for suitable candidates is done from across the globe, bringing in a diversity of ideas, cultures, and experiences. We have empanelled several strategic partners for various strategic and critical hiring. We extensively leverage social media for job opportunity sharing, aimed at attracting Gen "Z" and optimising the process turn-around-time.

Employees are encouraged to dream big, think out of the box, bring value addition to work, and innovate new solutions; this is facilitated and promoted through various ideation forums such as Innovista, e-PRIDE, Problems Worth Solving, Reflexions etc.

Listening to forums and feedback from employees through Employee Engagement Survey (EES) study are potent methods through which we strengthen our Equity & Inclusion Quotient.

TCE aims to create a gender-neutral workplace. We are aware of the challenges women constantly struggle with to retain jobs while balancing personal commitments of being the

primary caregivers for their families and children at home. The onset of the pandemic in 2020 further exacerbated this issue across the globe. To bridge this gender gap in the workforce and promote greater inclusion and diversity, TCE launched the Reignite-Second Careers program to empower and help women return to the workforce. We believe that women re-joining after garnering life experiences that bring genuine cognitive diversity to their jobs - is a decisive competitive edge.

At TCE, we believe mentors are critical in helping aspiring women leaders gain the perspective and connections to take on more prominent roles and advance their careers. To further our commitment in this regard, we encouraged our women employees to partake in the SHINE Mentorship journey in partnership with Tata Group HR. Presently, 20 female employees across TCE are undergoing the SHINE mentorship journey and have been assigned mentors from across group companies to help them navigate their professional challenges and grow in their careers.

We focus on attracting, motivating, and retaining the best talent, which resonates with our cultural ethos and Tata Code of Conduct. We have a strong employee value proposition that focuses on providing unique project opportunities and thought-provoking work that matters.

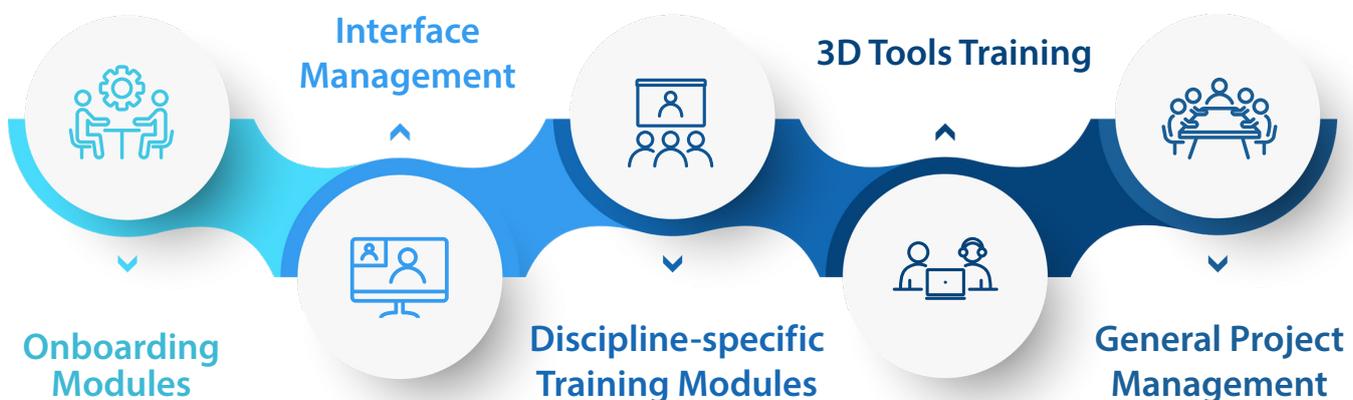


Figure 1

Connecting, Engaging and Fostering a Culture of Openness

At TCE, we endeavour to enhance our culture of openness and trust through continuous listening and communicating with our employees. While we continued to work across the distributed team considering the pandemic, we accelerated our efforts to communicate effectively with our employees across formal and informal forums.

We tied employee connections across TCE through diverse virtual communication channels such as annual Town Hall by Managing Director, Quarterly Cluster Reviews, Business Unit Head Connects and Delivery Center Head communication calls; monthly HR connects, Team lead connects, along with more informal forums such as Virtual Happy Hours and celebrations.

We are empathetic towards and regard our employees who are working parents as they were precariously trying to find a balance between work priorities and spending meaningful time with their children while working from home. To allow our employees to engage their children in learning pursuits amidst their busy schedules, we launched a month-long virtual **Little Champ Summer Camp** for children of our employees in the age group 5-12 years. Through the month-long summer camp, we leveraged the talents of TCEites and external facilitators and engaged the young minds in meaningful activities related to mindfulness & creativity. Over 650 children and parents were delighted through various workshops conducted during the month, such as Lil' Scientist (Science Experiments Workshop), Little Dancing Stars (Dancing Workshop), Lil' Chef (Baking workshop), Tiny Tales (Story Telling workshop) and so forth.

Here to Listen

This year, with an increased thrust on active listening, we conducted our Employee Engagement Survey, which garnered participation from 91% of our employees. The overall engagement significantly improved over the previous study, with the score at 80%, showcasing improvements across the dimensions while higher than industry benchmark scores in most drivers. 83% of our employees have acknowledged TCE's efforts towards effective COVID19 management vis-à-vis an industry benchmark of 82%. 85% of our employees have endorsed TCE's culture of Safety, making it the highest-scoring driver against 80% in the industry. Further, 84% of our employees have appreciated our culture of Customer Focus, the culture of Diversity & Inclusion and Team and Co-worker relations at TCE. Our employees' voice through these good scores is testimony

Employees are encouraged to dream big, think out of the box, bring value additions to work, and innovate new solutions



to our endeavours and how our employees experience our culture at work every day.

In line with our commitment to give a voice to our employees, we have several listening posts such as the Annual Internal Customer Satisfaction Survey, Leadership of Business Ethics survey and various communication forums such as Channel of Communication meetings, Town Hall and HR Connect.

This year we also revamped our suggestions portal- Reflexions to capture Employees' feedback, ideas, suggestions, and solutions, which they pose directly to the concerned process owners across the organisation.

Recognising Employee Efforts

At TCE, recognition goes hand in hand with achievement, from appreciating the small wins every day to celebrating the business accomplishments. Through the course of the year, we strengthened our digital instant recognition program, Kudos, to recognise the efforts put in by our employees during these challenging times. The program has seen a manifold increase in recognition of our employees over the years. Our other recognition programs on Value Awards, Innovista, ePRIDE poster competition and Instant Awards form part of our reward and recognition framework and empower employees to recognise individuals and teams on an ongoing basis for high performance, living our values and demonstrating the behaviours that ensure the success of the organisation.

Augmenting Learning Opportunities to Thrive and Grow

At TCE, we value each employee's unique talent. Our constant endeavour to foster a culture of continuous learning helps shape the individual career paths of our employees while creating a robust talent pipeline to deliver on TCE's long-term strategies. We are committed in developing our talent with cutting edge learning solutions and help them unleash their true potential and to drive with optimal performance.

We provide opportunities for life-long learning, and all our employees are called upon to upgrade their skills in a fast-changing world. Bringing out the best in our people is the hallmark of our development efforts across different levels through the myriad training interventions each year. This ethos will continue to propel our endeavours in the times to come.

Our commitment to invest in developing our talent and delivering cutting-edge learning solutions has been reinforced, with TCE being recognised as Asia's Best Employer Brand for Training and Development by the World HRD Congress in 2021.

Empowered Learning through Technology Integration

We offer an extensive suite of learning programs supported and inspired by our subject-matter experts who share their



learning and experience to inspire the next generation of talent.

Employees can access their learning journeys through the plethora of digital learning resources available at their fingertips. Our virtual learning academy, SMILe-Percipio, provides an on-demand, seamless learning experience combining self-paced, virtual classroom and mobile learning options. Through this intelligent learning platform, employees can create their own personalised digital learning experience across varied

learning modalities such as curated channels, full-fledged courses, micro-learning videos, books, podcasts, webinars, etc.

This year, we also conducted the second season of our flagship virtual gamified learning tournament called Learning Premier League (LPL). The program's first season was launched in 2020 to catalyse employee behavioural and technical competency development by incentivising learning engagement and adoption. The LPL week saw fervent participation from

employees across locations and helped imbibe the learning mindset in our employees.

As part of our Qlik2Learn digital learning initiative, we also rolled out the second season of our much-awaited functional learning webinar series called Technology Lecture Series. Through weekly masterclass sessions delivered by our in-house subject matter experts, we threw a spotlight on new-age technology solutions such as Hyperloop, Floating Solar, and Green energy, among others.

Creating a Future-Fit Talent Pipeline

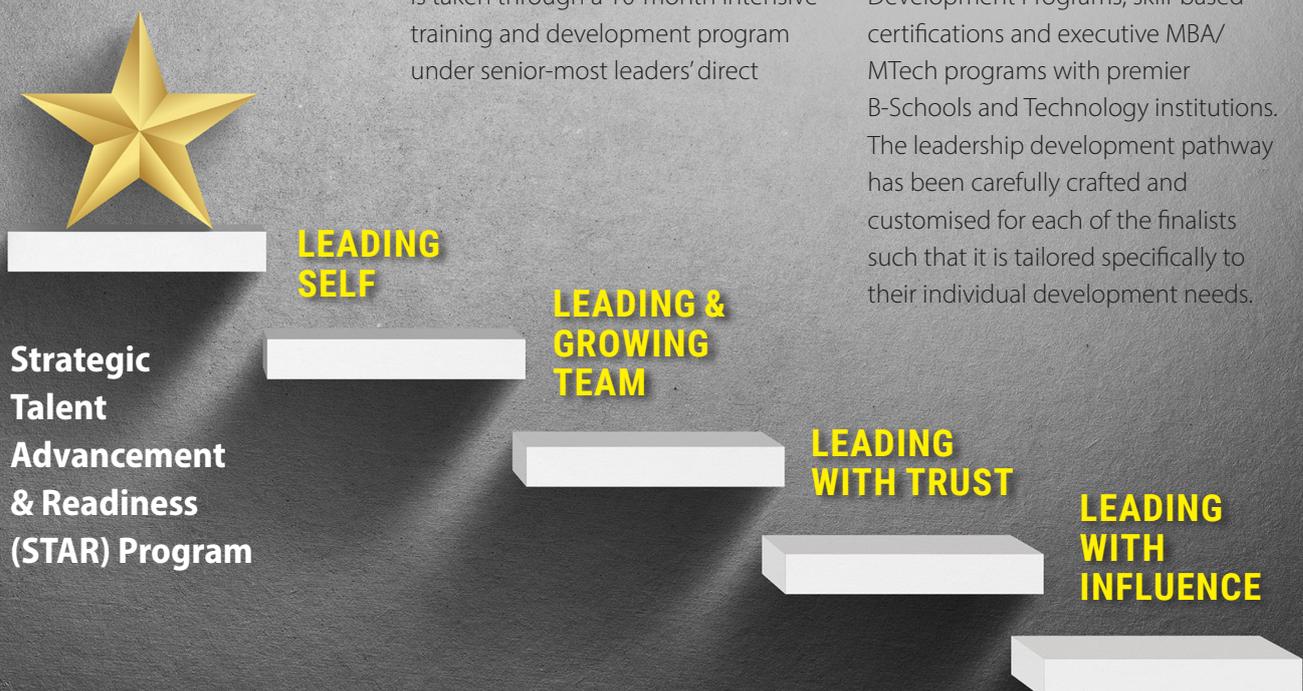
At TCE, we believe in nurturing the leaders of tomorrow by building a solid pipeline from within. In December of 2021, we launched the Strategic Talent Advancement & Readiness (STAR) Program. STAR is a one-of-a-kind flagship program intended to identify and groom TCE's young Talent who can join the ranks of the leadership pipeline in the organisation.

This annual fast-track career acceleration program identifies high performing and high potential talent from first-line employees through a rigorous stage-gate selection process comprising of aptitude assessment, possible assessment through a Virtual Assessment Center and Talent Council Interview.

The potential STAR talent who qualifies is taken through a 10-month intensive training and development program under senior-most leaders' direct

supervision and mentorship. The STAR Program allows high-potential employees to gain the experience and skills needed to advance their careers faster than industry standards.

The finalists also gain experience by working on various special projects across TCE. Additionally, they get exclusive access to many learning opportunities through Management Development Programs, skill-based certifications and executive MBA/ MTech programs with premier B-Schools and Technology institutions. The leadership development pathway has been carefully crafted and customised for each of the finalists such that it is tailored specifically to their individual development needs.



Curated Learning Pathways for Agile Leadership

In the wake of the disruptive business environment of the post-pandemic reality, it has become an impending reality for organisations to keep pace with the evolving leadership paradigm. To align with the pressing demands of the new normal, we at TCE continued the cadence of transformative leadership journeys this year to help our leaders rethink the art of the possible and become more agile and proactive.

Our specially crafted journey, PIVOT, for senior executive leaders in partnership with Tata Management Training Center (TMTC), provides a catalytic experience of rich learning, new ideas, fresh perspective, and inspiring stories from leading experts focusing on a wide range of strategic leadership competencies. This experiential virtual learning journey spanning six months encompasses various learning modalities, including live classroom connections with industry stalwarts and renowned subject matter experts, self-paced learning programs, and access to the digital platform of Tata Tomorrow University.

This year we expanded the reach of our flagship program coined, LEAP. Leadership Excellence through Awareness and Practice (LEAP) is aimed at catalysing the transition of managers to thought leaders and fostering a growth mindset, strategic- thinking, and managing change & diversity. The pedagogy includes integrative and reflective learning.

This augmented journey is spanned over five months and is delivered over a high-impact virtual environment. To provide participants with real-time insights, we incorporated Peer-to-Peer Learning, Speed Coaching, and Action Learning projects as a part of the development journey. The program focuses on four aspects of capability building, i.e., Leading Self, Leading and Growing Team, Leading with Trust and Leading with Influence.

**TCE has been recognised
as Asia's Best Employer
Brand for Training and
Development by the World
HRD Congress in 2021**

Building Resilience Through Empathetic Leadership

We believe empathetic leadership steers the organisation towards its true North in the crucibles of crisis. To enhance the resilience of our human growth engine, this year, we embarked on a journey to SHIFT the leadership paradigm towards new beliefs and ideas and foster a culture of compassion, accountability and empathy. The SHIFT program, in partnership with ProventusHR, followed an immersive learning experience comprising virtual classroom workshops, experiential activities, along with group coaching sessions. The program primarily aims at leadership teams across clusters, business units, team leads, and STAR talent. Six batches of the program were successfully concluded with a leadership pledge by all the participants.

Talent Transformation and Way forward

The pandemic brought the need to pay attention to the external business landscape and be aware of the rapidly evolving people's practices. We are aware that existing workforce structures are being disrupted by new technology and changing business models.

TCE embarked on a Talent Transformation exercise this fiscal year with our management consulting partner, Deloitte, to stay ahead of the curve. This intervention encompasses various elements such as conducting a detailed Job evaluation of the unique roles across TCE, critical role evaluation, revisiting the organisation structure, benchmarking compensation & related policies in line with market practices, etc.

This talent transformation exercise is one of the many ways we plan to bolster our efforts towards enhancing our people practices and provide cutting edge human capital solutions to help the business achieve aggressive growth targets. As we continue on our path to improve our employee experience and connection, we are excited to drive more such interventions that will shape the workforce of tomorrow at TCE.



Ethics @ TCE

Living the Code in Infinite Ways

The Company has adopted the Tata Code of Conduct (TCoC), which encompasses Ethics, Transparency, and Accountability. TCoC articulates the Tata Group's values and ideals that guide and govern the conduct of the group companies and outlines the Company's commitment to each of its stakeholders, including the communities in which the Company operates.

Leadership Engagement

Ethical behaviour is intrinsic to the way we conduct our business. We comply with all regulatory laws and corporate governance guidelines and adopt global best practices. Guided by the

Tata Code of Conduct (TCoC), we have deployed the Leadership of Business Ethics (LBE) framework that reflects our commitment to shared values and principles.

The governance structure of TCE includes Location Ethics Counsellors (LECs) and Ethics Flag Bearers. The Chief Ethics Counsellor is responsible for driving LBE initiatives and reports to the MD & CEO and the Principal Ethics Officer.

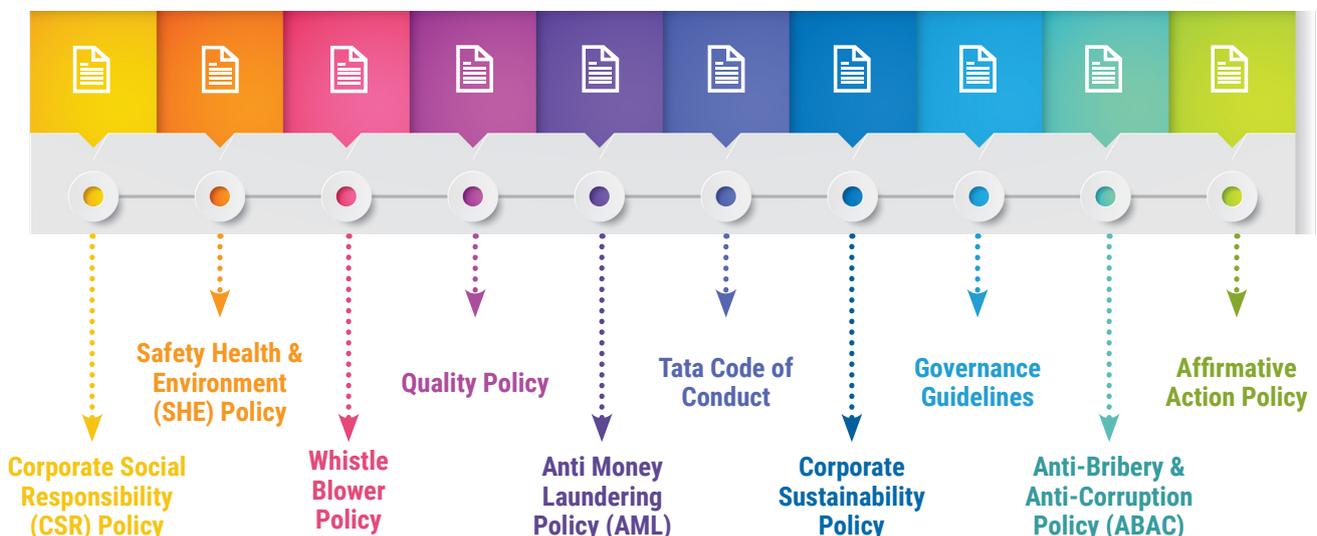
Compliance Structure

With Integrity and Trust as the pillars on which the Company operates, the Company understands and recognises its impact on the larger ecosystem. The Company has well thought out, stringent practices and processes to ensure high standards of ethics and local compliance while delivering world-class projects to our clients across the globe. In line with the Tata Code of Conduct requirements, the Company has developed various internal policies that reinforce the Company's practices towards multiple stakeholders. Governing Principles and Policies practised in the Company are as shown below.

The below policies can be accessed at

<https://www.tce.co.in/ethics-and-compliance/>.

Our policies are also available on TCE's intranet RHYTHM's Ethics webpage.



Disclosures as per the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013: The company has zero-tolerance for sexual harassment. It has adopted a Policy on prevention, prohibition and redressal of sexual harassment at the workplace in line with the provisions of the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 and the Rules thereunder for prevention and redressal of complaints of sexual harassment at workplace. One case has been reported under the Prevention of Sexual Harassment Act in FY 2020-21. It was duly investigated and closed within the timeline stipulated as per the Act.

Communication and Training

To reinforce TCoC and its policies, a training and communication programme encompassing classroom and e-learning sessions has been implemented in delivery centres and domestic & overseas locations. These programmes are designed based on the target audience, such as leadership team, employees, Consultants, third party workforce and suppliers/ partners. E-learning training programs on TCoC, POSH, ABAC, AML, Whistle-Blower & Gifts and hospitality policy are mandatory for all employees and stakeholders. They go through refresher e-learning sessions annually and submit an online declaration to have understood TCoC and that they will abide by TCoC.

Like every year, a live session on "Prevention of Sexual Harassment (POSH)" was conducted in October 2021 by a subject matter expert. This mandatory session was

attended by employees, Consultants and Third-Party workforce across India and Overseas and was anchored by POSH Presiding Officer. The audience was encouraged to ask questions or express dilemmas during the session, which the expert resolved.

Workshops are conducted every quarter by Compliance Officer in ABAC, AML, Gift and Hospitality, and Whistle Blower Policy for all stakeholders, including third Party workforce and Supplier /Partners. Participants are encouraged to understand the policies and consequences based on the case study approach. The effectiveness of such sessions is gauged through a quiz at the end of the session.

Location Ethics Counsellors and POSH Internal Committee members were taken through annual refresher training by external subject matter experts to hone skills for conducting objective investigations and keeping updated on compliance requirements.

In FY 2021-22, we conducted 23,310 person-hours training on TCoC/ POSH and Compliance across stakeholder segments.

FY 2021-22 had posed many challenges due to the ongoing pandemic, resulting in the virtual working environment (Working from home/ remote working). There was an increased focus on TCoC related communications to promote an ethical climate in the virtual work environment. Imbibing TCoC among new and existing employees continued to be a focus area. "Ethics Week" is conducted bi-annually to enhance TCoC and LBE framework awareness.



In FY 2021-22, 'Ethics Week' was uniquely celebrated in October 2021 and March 2022 since it also coincided with the celebration of TCE's Diamond Jubilee Year. The theme of Ethics Weeks was "Infinite Ethics", depicting that there are infinite possibilities of being ethical. LECs conducted Virtual Awareness Sessions during Ethics Week on the Tata Code of Conduct and expected behaviours for all stakeholders at their respective Delivery Centres, Sites and International locations. The awareness sessions focused on the channels of raising ethical dilemmas and concerns without fear. TCE employees and associates took an 'e-Ethics Pledge' as a constant reminder of every employee's responsibility to abide by TCoC.

An appropriate tone is set at the top with the leaders as role models and effectively designed policies and robust processes playing a pivotal role in instilling 'Values' in our employees.

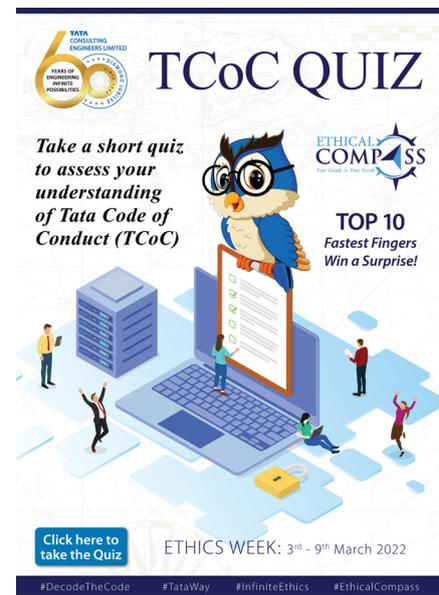
TCoC / POSH related communication was done by Senior Leadership in various communication forums such as Corporate Management Committee (CMC) meetings, Townhall, Channel of Communication Meetings (COCs), and Ethics Open House by CEC.

During an introductory corporate presentation, customers are informed about TCE's policy guidelines on ethical approaches. Every purchase order (PO) carries a note requesting suppliers to report any ethical misconduct to LEC. Contact details of LEC are mentioned in the PO. A letter signed by the MD & Compliance Officer communicating various channels of raising TCoC concerns is emailed to Suppliers / Partners once a year. Apart from the network of LECs, employees and associates can also submit their problems related to TCoC and ABAC

through email helplines ethics@tce.co.in and tceabac@tce.co.in, which CEC and Compliance Officer, respectively, directly attend.

Learnings from past ethics-related cases and actions are shared in every Quarterly DC Communication and Ethics Week celebrated bi-annually. Year on year, the number of concerns reported and resolved is shared with employees to reinforce confidence in the company's review mechanism to monitor/ investigate ethics concerns. Ethics related problems received anonymously also are investigated and concluded. This also instils confidence in employees and stakeholders to raise concerns.

The ethical behaviour of employees is considered an essential requirement for their growth and recognition in the company. Employees are recognised with Value Awards for extraordinary efforts towards exhibiting behaviours consistent with the Company values and ethical workplace practices. Employees and associates are identified and rewarded as Ethics Flag Bearers for their contribution to displaying commitment to TCoC and promoting ethics by participating in organisation initiatives.





Our ethics mascot Dr Owlivia (Ethics advisor in TCE), continues to advise employees and other stakeholders on resolving ethical dilemmas and spreading awareness of TCoC through the monthly communication emailer “Ethical Nugget of the month”. Ethics Open House was launched in August 2021, wherein employees and the contract workforce can discuss and resolve their ethical dilemmas directly with CEC.

To bring greater focus on promoting ethics through digitisation and establishing wider reach across stakeholders, a new Ethics Webpage was launched on RHYTHM in March 2022. With the launch of this web page and in-house online platform, employees and associates are encouraged to report cases/grievances, disclose gifts, and submit a Conflict of Interest disclosure. The Ethics webpage is also used to host ethics-related contents like “Leadership Talk”, “Case Studies”, “Self-Assessment Quiz on TCoC/POSH”, “e-Ethics Pledge”, and essential policies translated into regional languages, which imbibes the true spirit of any time learning. A dedicated page on Yammer – “Ethics: DecodeTheCode”, is available on RHYTHM to enhance awareness on TCoC related matters. TCE’s in house magazine “TCEExpression” has a section on ethics used to communicate updates on initiatives taken by TCE to promote and strengthen the ethical environment to internal and external stakeholders. (Link: <https://www.tce.co.in/tcexpressions/>)

Measurement of Effectiveness:

The effectiveness of the ethics programme is measured by the LBE Index, Annual Compliance Report Maturity Rating, Self-assessment quiz on TCoC/ POSH/ ABAC / AML/ Gift & Hospitality / Whistle Blower Policy, number of concerns received, % concerns resolved in stipulated time and benchmarking exercises with Group Companies. Ethics best practice publications under Leadership of Business Ethics on the Tata Edge platform are also referred for process and policy benchmarking. The feedback received through LBE Survey/ ACR and benchmarking data is incorporated into the annual plan for LBE deployment.

LBE Survey on Ethics was conducted in May 2021 to measure the progress/ effectiveness of the LBE framework. TCE’s LBE index increased from 81 to 86 for employees, 82 to 85 for Associates and 86 to 94 for Suppliers, which shows remarkable improvement in the perception of employees and other stakeholders.

TCEndeavour

CARE | SHARE | RESTORE



Corporate Social Responsibility

- Infrastructure Development
- Education
- Healthcare
- Sustainable Livelihood

8513

Corporate Volunteering Person hours

20005

Lives Touched

2426

Employees Volunteered

Rs 2.28 Cr

Invested in CSR projects

Corporate Social Responsibility

Tata Consulting Engineers Limited (TCE) is guided by the vision and philosophy of Tata Group’s founder Mr J N Tata, who believed that **“In a free enterprise, the community is not just another stakeholder in business, but it is, in fact, the very purpose of its existence.”**

Under its Corporate Social Responsibility (CSR) brand, TCEndeavour works with the motto of leveraging company core skills and employee volunteers to **“Engineer Life”**. We believe in building sustainable societies by creating the required infrastructure and imparting necessary education, skills, and training so that the community can improve its standard of living and be aware of the benefits of a healthy dwelling. Our efforts are aligned with select UN Sustainability Goals and are focused on four pillars:

EDUCATION
42968

Lives Touched



HEALTHCARE
22512

Lives Touched



SUSTAINABLE LIVELIHOOD

9360

Lives Touched



INFRASTRUCTURE DEVELOPMENT

38160

Lives Touched



Composition of the CSR Committee

The Corporate Social Responsibility Committee guides the functioning of the CSR team. As of the date of this report, the committee constituted:

1. Ms Anjali Kulkarni, Member Chairman
2. Mr Ashok Sethi, Member Director
3. Mr Amit Sharma, Member Director

The CSR Committee recommends the amount of expenditure for the CSR activities and monitors CSR activities from time to time.

The company held 3 Corporate Social Responsibility Committee Meetings during the financial year. The dates and attendance for the said meetings are given below.

The CSR contribution, as calculated under the provisions of the Act, was Rs 228.16 Lakhs and the total amount spent for the FY 2021-22 was Rs 179.34 Lakhs. The balance of Rs 48.82 Lakhs has been transferred to a separate account on April 22, 2022, in accordance with the provisions of Section 135 of the Act.

The Company's spending for the current financial year is in line with the CSR Policy and guidelines. The Company has a long-term outlook for the design of the CSR programs, typically a three-year horizon, such that the intended benefits can be maximised and sustained by the beneficiaries. Phase I of the flagship programs was a pilot. Post an external audit, the programs were scaled up for another 3-year period in FY 2019-20. In FY 2021-22 the scaled programs were implemented as planned and resulted in the targeted outcomes.

Date of CSR Committee Meeting	No. of Directors present at the CSR Committee Meeting	Total Number of Directors	Attendance (%)
April 29, 2021	3	3	100
July 05, 2021	3	3	100
March 29, 2022	3	3	100

EDUCATION

TCE is a technology company and has been supporting projects on enhancing education standards in the country. TCE recruits and trains hundreds of engineers every year. It partners with other non-profits like Door Step School to improve the quality of education for underprivileged children. It seeks to ensure pre-primary and primary education for all children up to 14, leading to their overall development.

Bridge School Program with the Society of Door Step School (DSS)

The Bridge schooling for children focuses on the segment among the poorest of the poor and children who do not come under the radar of any government initiative for primary education. The School on Wheels is a bridge schooling program designed to provide basic literacy for children of migratory labourers who live in urban slums. These children do not have access



to any formal education as they either move with their parents to construction sites or stay home to care for their siblings while their parents work. The program is designed to provide essential reading and writing to enable the children to access education in a municipal school near their homes.

This signature program of DSS, 'School on Wheels, is a bus designed as a mobile classroom to provide alternate educational facilities to children in different locations such as pavement dwellings, road construction sites, temporary slums, and areas where street children are found in large numbers, and there is a lack of space for conducting classes. Education Activity Centers (EAC) is another program held in labour camps or construction sites where the builder provides a location, a tin shed or a room.

The COVID19 pandemic affected these labourers and their children in the worst possible way as schools were closed and classes could not be held for the first two quarters of the year. However, the education for these children continued through mobile phones, and WhatsApp calls with the full cooperation of the parents, even as the reverse migration to the villages took place. To bridge this COVID19-induced education gap, DSS launched 'Project Phoenix' in 2021, which TCE wholeheartedly supported.

We have reached out to 2913 children across 22 locations in Mumbai and Pune through all these programs. Fifty-three children were enrolled in government schools from April 2021 to January 2022.

TCE also supported DSS during the COVID19 pandemic by helping more than 5000 beneficiaries by distributing food

essentials and groceries. The training was also provided on COVID19 management, and parents were assisted with enrolment in the CoWin app for the government vaccination programs.

Vocational Courses for Sustainable Income

The Career Cell program is a short-term skilling program for out of school urban poor. The beneficiaries come from the poor urban segment who strive for a better life by enrolling themselves in night schools. In FY 2021-22, 70 (30 carried forward from previous) students were enrolled in various short-term vocational skill development programs targeting about 84% placements for these students. Cumulatively, about 187 students have undergone the vocational skilling program. The FY 2021-22 is expected to receive placements by April-June 2022 once they complete their courses. Courses such as automobile mechanic, welding, beautician, tailoring, photography, fashion designing, computer hardware and software programs, mobile repairs, air-conditioning maintenance, interior design, multimedia, animation, etc., were imparted.

Before the TCE intervention, the students worked primarily in the unorganised sector earning an average income of Rs 2000 to Rs 10,000. Post-intervention, the students were employed in the organised sector with income ranging from Rs 8000 to 25,000. There was a shift from menial jobs to data entry, beautician, mechanic, technician, tally operator, photographer, graphic designer, animator, back-office executive, sales & marketing executives, bookkeeping professionals, etc.

TCE recruits and trains hundreds of engineers every year. It partners with other non-profits like Door Step School to improve the quality of education for underprivileged children. It seeks to ensure pre-primary and primary education for all children up to 14, leading to their overall development.



SUSTAINABLE LIVELIHOOD ●

● Sustainable Livelihood – Livelihood Security Program

The Livelihood Security Program in Jawhar block began as a pilot in 2015-16 in the hamlet of Khoripada, aiming to uplift the rural poor from below the poverty line. The program evaluation at the end of three years recommended the scale-up of the program to include more hamlets in the region in the same format. In 2018-19 three more hamlets Malghar, Navapada and Dapti, were selected to increase the ambit and reach out to more beneficiaries. The baseline study conducted revealed the unique needs of the three hamlets. A geological survey of the land terrain was undertaken to assess the possibilities of water sources. The selection criteria were from among the poorest of the poor in the most remote forest areas on the periphery of Mumbai. The focus areas for the new hamlets were:

- Infrastructure for Water
- Sustainable Livelihood means
- Health and Hygiene
- Governance

Water Management Initiatives

The underlying issue identified in the three hamlets in the Palghar block was water scarcity. Since it started working in this region, TCE's efforts were first to address the water issue as the resultant outcome would decide the effectiveness of other livelihood interventions.

As a part of water management related initiatives, in FY 2021-22, 4 more farm ponds were added, totalling 16 farm ponds so far, thus helping harvest about 2.4 Cr litres of water now. Eleven solar panels (3 installed in FY 2021-22) were set up for water distribution. Harvested rainwater helped restore surface water for use both during and after the monsoon.

The Wadi Programme – Tree-based, Horticulture & Floriculture

With the availability of water, the means for additional and sustainable income throughout the year was enabled through jasmine cultivation and vegetable cultivation. Through the unique Agri-Horti-Forestry model, 65 acres of land belonging to 65 farmers were brought under cultivation. On 65 acres, 2600 fruit saplings (mango and cashews) and 11500 forestry saplings were also planted as an afforestation measure. Eighty-five families planted short duration crops like vegetables, moisture crops and jasmine flowers cultivation, which helped the farmers increase their annual income between Rs 6000 and Rs 10000. The farmers were also trained in crop management techniques to increase the yield from the major monsoon crop. A water lift project is underway for pumping river water to the higher farmlands for irrigation.

TCE also provided water wheels to all the families in Dapti village, thus reducing women's struggle.



Facilitating Rural Banking through eDost Initiative

Enabling access to banking and financial services in these remote villages is a key focus area of our sustainable livelihood initiative. This has been made possible by leveraging technology and partnering with BAIF Institute for Sustainable Livelihoods and Development to provide last-mile access in Malghar village. In the absence of banking services in this village, the villagers would have to walk miles away to the nearest Taluka to avail of this service leading to the loss of 1 full day of productive work.

e-Dost is now fully running, and many villagers, along with those from the nearby villages, are utilising this facility for their respective banking needs. We have

successfully trained a young woman beneficiary from Dapti village, who is now maintaining records of all the transactions done through this programme.

TCE's intervention has helped reduce the need for frequent migration to earn a living. In all, 71% (106) out of 150 families have benefitted and the migration reduced by 49%.

Governance

A village committee was set up to plan and contribute to village development work as a self-governance measure. A collective marketing system for jasmine produce was also developed that successfully sold an average of 39 kgs of jasmine at Rs 634.5 per kg per month.



HEALTH & HYGIENE & COVID19

- One hundred ninety families from all the three hamlets adopted seasonal kitchen gardens that ensured better nutrition, health, and quality of life for all the villagers. Regular training on Solid Waste Management was also imparted to all the households for maintaining appropriate village cleanliness and sanitation.

The pandemic brought in more hardships as the supply of essentials was hampered due to the region's remoteness. Food essentials and groceries were supplied to tide over the times. COVID19 related awareness programs were conducted, and assistance in vaccination of the population was provided.



INFRASTRUCTURE DEVELOPMENT

Leveraging Solar Power

Solar streetlights were installed in the Konkanpada hamlet that ensured enough lighting conditions and safety in the village. TCE provided LED lighting for all households in the three hamlets. The terrain being a forest area, the villagers were facing dangers from snake bites as there was no electricity or lighting at night. Eight solar-powered lights were supplied as there were no streetlights.

School Infrastructure

One school building roof was refurbished, and its playground was developed in Dapti village, thus positively impacting 44 children.

Infrastructure for Disaster Management

TCE participated in the relief programs in the aftermath of Cyclone Fani relief in Orissa and the floods in Hyderabad. TCE worked with Tata Communities Initiative Trust, Tata Sustainability Group, and Tata Consultancy Services Foundation to provide relief in disaster management by rebuilding infrastructure. TCE is helping construct six government schools from Orissa and Hyderabad that would benefit 1760 children.



R & D for Sustainability

TCE continued to provide R & D support to the Indian Institute of Technology, Bombay and the Indian Institute of Science for R & D programs and innovation for new era requirements. The R & D assistance promoted renewable energy grid efficiency, waste recycling, and asset lifecycle management zeolite synthesis core lab for oxygen generation.

Volunteering Programs

Tata Consulting Engineers Limited (TCE) volunteering program is aligned to the Tata Group Volunteering program, Tata Volunteering Week (TVW), conducted in September-Oct & Mar-April every year.

FY 2021-22 saw volunteering person-hours of 8513 contributed by 2426 volunteers. The volunteering programs touched the lives of 20005 beneficiaries across the country.



CSR Program External Assessment

In FY 2021-22, an independent assessment was conducted by Tata Sustainability Group (TSG) on the three CSR programs to gauge the efficacy of the programs. The assessment outcome is the basis for required course corrections and further scale to cover more beneficiaries. TCE's CSR programs focus on segments among the poorest of the poor to bring about transformation.

The outcome of the third-party evaluation was placed before the CSR committee on 29 March 2022, and the recommendations will be considered in the next financial year's CSR programs.

Evaluation summary:

Career Cell Programme in Mumbai with non-profit, Masoom

- The profiling and selection of the target beneficiaries for the project were on point, ensuring that the project reached out to the socio-economically marginalised youth
- Course mapping in line with interest and education of students and post consideration of employability quotient after training
- High placement/self-employment percentage – 84%
- Increase in average earnings of students – From ₹ 7,042 to ₹ 11,219 per month
- Heightened self-esteem, confidence and finding a purpose/goal to pursue in life

School on Wheels (SoW) and Education Activity Centres (EAC) in Pune with non-profit, the Door Step School

- 85% of children reached the 'expected level' during the 120 days programme, of which 13% of children can read and write fluently.
- Learning continuity during the pandemic. Dropouts at 0.6% even during pandemic times
- 56 children mainstreamed in schools during 2019-22

Livelihood Security Program in Jawhar block, Palghar, with non-profit BAIF Institute for Sustainable Livelihoods and Development (BISLD) –

- The Wadi Programme is an excellent programme offering a bouquet of farm livelihood options to ensure short, medium- and long-term gains
- Successful efforts are being made towards building livelihood security.
- E-dost is an exemplary initiative not only in terms of empowerment but also in terms of the convenience, cost and time-saving services offered to the community

TCEndeavour plans to continue Engineering Lives of the beneficiaries it serves and grow with the communities it operates in while Engineering Infinite Possibilities.



Corporate Information

OFFICES AND ADDRESSES

Registered Office

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10 Veer Nariman Road
Mumbai 400 001

Corporate Office

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Cloud City Campus
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United Arab Emirates (UAE)

Nepal Branch – Liasion

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Kathmandu, Nepal

FRANCE Branch

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75017, Paris 17

UK Establishment Office

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London, SW1X 7HS

The Netherlands Branch

C/o Vistra
Delflandlaan 1 1062EA
Amsterdam

BANKERS

Axis Bank

Bank of Baroda

Citibank

EXIM Bank

HDFC Bank

ICICI Bank Limited

State Bank of India

Yes Bank

AUDITORS

B S R & Co. LLP, Chartered Accountants (Statutory Auditors)

Aneja Associates (Internal Auditors)

Robert Pavrey & Associates, Company Secretaries (Secretarial Auditors)

DIRECTORS

Mr Ashok Sethi

Ms Anjali Kulkarni

Mr Sriram Kadiyala

Mr Amit Sharma

VISION

To be an internationally respected engineering consultant offering comprehensive solutions

MISSION

Provide technically excellent and innovative solutions, for adding value for all stakeholders, and operate globally as professional consulting engineers

CORE VALUES

- Customer Satisfaction and Loyalty
- Technical excellence with professional ethics
- Responsibility to society
- Employee dignity and self-respect
- Organisational and individual growth



TATA CONSULTING ENGINEERS LIMITED

Engineering a Better Tomorrow™

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JULY 2022