

SECTOR

Hydrocarbons and Chemicals



“ The future of process industries will be shaped by how effectively businesses balance growth, efficiency and sustainability. By combining process engineering expertise with emerging technologies, we are helping clients develop the facilities and manufacturing ecosystems that will support the next phase of industrial growth.

Mozammel Biswas
Business Head, HCBU

The hydrocarbons and chemicals industry is balancing two priorities that were once viewed separately: meeting growing demand for energy, chemicals and industrial products while reducing environmental impact and improving resource efficiency. Alongside continued investments in refining, petrochemicals and chemicals, new opportunities are emerging in sustainable fuels, advanced materials and manufacturing technologies. These developments are reshaping investment priorities and creating demand for engineering solutions that combine operational reliability, sustainability and long-term value creation.

Tata Consulting Engineers' Hydrocarbons and Chemicals Business Unit (HCBU) brings decades of process engineering experience across conventional and emerging industries. By combining deep technical expertise with integrated project delivery capabilities, HCBU supports clients in developing and modernising industrial assets that improve productivity, enhance efficiency and support future growth. From refining and chemicals to sustainable fuels and advanced manufacturing, HCBU continues to create reliable, sustainable and intelligent assets across a broad spectrum of industrial sectors.

Industry Trends and Market Outlook

The global hydrocarbons and chemicals sector continues to evolve as industries respond to changing energy requirements, sustainability commitments and advances in manufacturing technologies. While oil and gas, refining and petrochemicals remain important contributors to economic growth, increasing investments in sustainable fuels and lower-carbon technologies are creating new opportunities across the value chain.

Green hydrogen, green ammonia, green methanol and biofuels are attracting significant investment as industries seek practical pathways to reduce emissions and diversify energy sources. In India, policy initiatives and industrial demand are accelerating the development of these sectors, creating opportunities for large-scale engineering and project delivery. As projects move from concept studies towards commercial deployment, demand is increasing for engineering partners capable of delivering complex facilities safely, efficiently and at scale. At the same time, the chemicals sector is moving towards greater value addition through speciality chemicals, advanced materials and integrated production facilities. Circular economy initiatives, recycling technologies and carbon management solutions are also gaining importance as businesses focus on resource efficiency and environmental performance.

Another major growth area is advanced manufacturing. Investments in semiconductor fabrication, assembly and testing facilities, battery manufacturing and high-purity materials are creating demand for specialised engineering capabilities. These facilities require stringent quality standards, sophisticated utility systems and complex process integration, making engineering expertise a critical success factor. Together, these developments are expanding the role of engineering from asset creation to long-term industrial growth, creating opportunities across both traditional and emerging sectors.

Engineering Excellence Across Process Industry Value Chains

HCBU provides engineering and project delivery services across the lifecycle of industrial assets, from concept development and feasibility studies to detailed engineering and project execution support.

Its capabilities span conventional hydrocarbons, chemicals and fertilisers as well as emerging sectors that are expected to shape the future of industrial growth.

In conventional industries, HCBU continues to support refining, petrochemicals, chemicals and fertiliser facilities, helping clients improve operational efficiency, enhance safety and expand production capabilities. Its experience across large and complex process facilities provides a strong foundation for delivering projects that demand technical depth and multidisciplinary coordination.

HCBU has also strengthened its presence in sustainable fuels and energy transition projects, including green hydrogen, green ammonia, green methanol and biofuels. These sectors are becoming increasingly important as industries seek lower carbon alternatives and more sustainable production pathways.

Advanced manufacturing represents another area of growing focus. HCBU has expanded its capabilities in semiconductor facilities, battery manufacturing and associated materials ecosystems, creating expertise in sectors that require precision engineering, specialised infrastructure and highly controlled operating environments. Investments in capability building, including specialised training programmes in semiconductor manufacturing and gigafactory operations, are helping strengthen readiness for future opportunities in these rapidly growing sectors.

A key differentiator is HCBU's ability to combine process engineering, project delivery and digital engineering within a single framework. This integrated approach helps clients manage complexity, improve decision-making and create long-term value across their industrial assets.

Engineering sustainable industrial growth through process engineering excellence across oil and gas, chemicals, sustainable fuels and advanced manufacturing value chains.

Delivering Reliable, Sustainable and Intelligent Assets

FY26 was a year of steady progress despite geopolitical uncertainty, supply chain disruptions and market volatility. HCBU continued to strengthen its position across both traditional and emerging sectors, delivering projects that support industrial growth, sustainability and technological advancement.

HCBU achieved important milestones across sustainable fuels, speciality chemicals and advanced manufacturing. The successful commissioning of first and second-generation bioethanol facilities demonstrated growing capabilities in alternative fuels and lower-carbon energy systems. Expansion of long-standing programmes and repeat engagements further reinforced customer confidence in HCBU's delivery capabilities.

The year also saw entry into new markets and the addition of new customers, strengthening the portfolio across chemicals, fertilisers and industrial manufacturing. International assignments expanded HCBU's geographic footprint while providing opportunities to apply its engineering capabilities in new operating environments. A fertiliser project in Central Asia opened a new geography for the business, while new engagements in petrochemicals and industrial manufacturing broadened the customer base. Repeat engagements in advanced manufacturing and speciality materials reflected the increasing relevance of HCBU's expertise in emerging industrial sectors.

Reliability remains central to HCBU's delivery philosophy. Quality, safety and schedule adherence are embedded throughout project execution through structured engineering practices, rigorous design reviews and disciplined project governance. Particular emphasis is placed on Safety in Design principles, including hazard identification, risk assessment and process safety studies, ensuring that safety considerations are integrated from the earliest stages of project development.

HCBU has also strengthened project execution through greater use of digital engineering platforms, integrated design environments and project management tools. 3D engineering, digital workflows and connected engineering systems are improving collaboration, reducing rework and supporting more efficient project delivery. Enhanced project dashboards and monitoring systems are providing better visibility into project performance and enabling more proactive decision-making.

Sustainability remains a key focus area across the portfolio. HCBU continues to support projects involving sustainable fuels, lower-carbon technologies and improved resource efficiency. Its growing presence in green hydrogen, green ammonia, green methanol and biofuels reflects the industry's broader transition towards cleaner production pathways. Engineering solutions that improve energy efficiency, optimise resource utilisation and reduce environmental impact are increasingly becoming part of mainstream project development.

Several assignments delivered measurable environmental benefits through lower carbon technologies and resource-efficient designs. Projects involving biofuels, battery manufacturing and advanced materials are contributing to reduced emissions and supporting broader sustainability objectives across industrial value chains.

Capability building also remained a priority during the year. More than 40 engineers completed specialised programmes in semiconductor manufacturing and gigafactory operations through collaboration with Arizona State University. Strategic partnerships and technology collaborations further expanded technical knowledge and strengthened readiness for future opportunities.

Through its combination of process engineering expertise, disciplined execution, digital integration and sustainability-focused solutions, HCBU continues to create reliable, sustainable and intelligent assets across diverse industrial sectors.

10%
Share in
total revenue

8%
Share in total
acquisition

1,004
Workforce on
31st March 2026

₹ 115 cr
Worth value engineering
for customer

Future Outlook and Priorities

The outlook for HCBU remains positive, supported by continued investment across oil and gas, chemicals, sustainable fuels and advanced manufacturing. Demand for engineering expertise is expected to remain strong as industries modernise existing facilities, invest in lower carbon technologies and expand manufacturing capabilities. HCBU will continue to focus on strengthening relationships with strategic customers while expanding its presence in high-growth sectors such as sustainable fuels, semiconductor facilities, battery manufacturing and speciality chemicals. Advanced manufacturing is expected to remain a significant growth area, supported by increasing investments in electronics, energy storage and high-value materials.

HCBU also sees increasing opportunities in sustainable fuels and process decarbonisation as industries seek practical pathways to reduce emissions while maintaining competitiveness. Green hydrogen, green ammonia, green methanol and biofuels are expected to move from pilot and demonstration projects towards larger commercial deployments, creating demand for integrated engineering and project delivery capabilities. Investments in speciality chemicals, circular economy solutions and resource-efficient production technologies are also expected to grow as manufacturers focus on sustainability performance, energy efficiency and supply chain resilience. The business will continue to strengthen its digital engineering capabilities through greater use of advanced analytics, digital twins and integrated project management systems. These tools will support improved project execution, better decision-making and enhanced lifecycle value for clients. International opportunities across the Middle East, Africa, Europe and Asia will remain an important focus, particularly in sectors linked to sustainable fuels, petrochemical integration and advanced manufacturing. By combining process engineering excellence with integrated project delivery, HCBU will continue to support industrial growth while helping clients improve efficiency, reduce emissions and build resilient operations for the future.

CASE STUDY

Turning Crop Waste into Clean Fuel

India's First Integrated 1G and 2G Bioethanol Refinery, Bargarh, Odisha

A major public sector energy company commissioned this greenfield integrated biorefinery in Odisha as part of India's national programme to blend ethanol with petrol and reduce dependence on crude oil imports. The facility is the first in India to combine first-generation (1G) grain-based and second-generation (2G) residue-based ethanol production within a single plant, processing rice grain and rice straw across a combined capacity of 200 kilolitres per day.

The 1G stream converts rice grain through conventional fermentation, whilst the 2G stream processes rice straw, an agricultural residue widely burnt in open fields, into fuel-grade ethanol through enzymatic hydrolysis and fermentation. Both plants have been successfully commissioned, establishing this as a replicable model for integrated biofuel production in India.

TCE's Role

TCE served as Owner's Engineer and Project Consultant, delivering detailed engineering for both the 1G and 2G packages, procurement planning, tender preparation across civil, mechanical, electrical, and instrumentation works, vendor coordination, and manufacturing-stage inspection. TCE acted as the single point of coordination between vendors and the client across a complex multi-package project.

Commissioning assistance was provided for both plants through to successful start-up. Engineering covered all process units including fermentation, distillation, and dehydration systems, utilities, a Zero Liquid Discharge system, a Distributed Control System, and all civil works across the site.



Impact

Sustainable: The facility converts rice straw into fuel-grade ethanol, reducing greenhouse gas emissions and agricultural air pollution while supporting India's ethanol blending target and reducing crude oil imports

Reliable: TCE's integrated approach ensured effective interfacing between process technologies, licensors, and a multi-package model, with both plants commissioned, demonstrating strong project management and coordination for a first-of-its-kind facility.

Intelligent: TCE coordinated multi-disciplinary engineering across process, civil, electrical, instrumentation, and utilities disciplines as the single engineering authority across the full scope of the project. This unified approach enabled consistent design decisions, efficient resolution of technical interfaces, and streamlined project delivery from detailed engineering through to plant start-up.

200

KLPD total ethanol production capacity

100

KLPD from rice grain (1G) and rice straw (2G)

1st

Integrated 1G and 2G bioethanol plant in India

E20

India's national target for ethanol blending in petrol, which this project directly supports

SECTOR

Hydrocarbons and Chemicals USA

Industrial facilities across North America are entering a period of significant change. Rising energy demand, ageing infrastructure, evolving environmental requirements and increasing expectations around reliability are driving a new wave of investment across refining, chemicals, energy and manufacturing sectors. While many facilities continue to operate successfully, owners are increasingly focused on modernising assets, improving operational resilience, reducing emissions and preparing for a lower-carbon future.

Tata Consulting Engineers' U.S. Hydrocarbons and Chemicals business supports this transition through engineering, project delivery and technical advisory services across the lifecycle of industrial facilities. From sustaining capital programmes and turnaround projects to large-scale expansion and decarbonisation initiatives, the business helps clients improve reliability, enhance performance and create long-term value from existing and new assets.

Industry Trends and Market Outlook

The United States continues to be one of the world's most attractive destinations for industrial investment. Abundant natural gas resources, expanding power demand, growing manufacturing activity and continued investment in domestic supply chains are supporting capital deployment across refining, chemicals, energy and industrial infrastructure.

At the same time, owners are balancing growth ambitions with increasing expectations around operational efficiency, environmental performance and capital discipline. Facilities that were originally designed decades ago are being upgraded to improve reliability, enhance safety and extend operating life.

Modernisation programmes are becoming a critical component of long-term competitiveness, particularly in sectors where asset performance directly impacts profitability and operational continuity.

Decarbonisation is also reshaping investment priorities. Companies are increasingly exploring carbon capture and storage, lower-carbon fuels, electrification, energy-efficiency improvements and emissions-reduction technologies. These investments are no longer limited to pilot projects and are increasingly being integrated into mainstream capital programmes. Digital technologies are accelerating this transformation. Artificial intelligence, predictive analytics, automation, digital twins and advanced process controls are helping operators improve reliability, optimise production and reduce downtime. As facilities become more connected and data-driven, engineering organisations are expected to combine traditional technical expertise with digital capabilities that support better decision-making and more efficient project execution.

These trends are creating opportunities for engineering partners capable of helping industrial facilities modernise, decarbonise and remain competitive in an increasingly complex operating environment.

Engineering Excellence Across Industrial Facilities

The business provides concept-to-commissioning EPCM services across refining, hydrocarbons, chemicals and energy transition projects. Its capabilities span front-end studies, detailed engineering, Owner's Engineer services, project controls, procurement support and construction management.

Technical expertise extends across process engineering, rotating equipment, mechanical systems, piping, civil and structural engineering, electrical infrastructure, substations and instrumentation and control systems. Strong capabilities in DCS migrations, SIS upgrades, process safety management and advanced engineering analysis enable the business to support complex projects requiring high levels of technical rigour and operational reliability. A particular strength lies in supporting brownfield facilities where upgrades must be executed without compromising ongoing operations. Laser scanning, cloud-enabled collaboration and 3D engineering are used extensively to improve design accuracy, reduce rework and minimise uncertainty during project execution. The business is equally comfortable supporting small turnaround projects, sustaining capital programmes and large greenfield developments. This flexibility allows it to align engineering resources with client requirements while maintaining consistent standards of quality, safety and execution.

Delivering Reliable, Sustainable and Intelligent Assets

FY26 was marked by strong customer engagement and the successful delivery of projects that improved reliability, supported decarbonisation and strengthened industrial competitiveness. Long-standing customer relationships remained a cornerstone of performance. Repeat work from major clients across refining, chemicals and industrial manufacturing reflected continued confidence in the business's engineering quality, responsiveness and delivery capabilities. Framework agreements and recurring programmes enabled deeper engagement with customers while supporting long-term planning and execution.



“ We achieve our greatest success when we act as a true partner to our clients, understanding their priorities, challenges and long-term goals. By combining engineering excellence with responsiveness and practical delivery, we help industrial facilities modernise operations, reduce emissions and remain competitive in a changing world.

Matt Rouse
Business Head, HCBU (USA)

Engineering the modernisation and decarbonisation of industrial facilities across refining, chemicals and energy value chains.

The year included several significant project milestones. The business expanded its footprint in Europe through engineering work associated with a green direct-reduced iron facility in Finland, delivered through close collaboration between teams in the United States and India. This project demonstrated the ability of TCE's global network to combine specialised expertise and integrated delivery capabilities across geographies.

A major achievement during the year was the award of the largest project in the business's history, involving engineering services for a large-scale blue ammonia development in Louisiana. This project reinforces the growing role of lower-carbon fuels within industrial decarbonisation strategies and highlights the business's expanding capabilities in energy transition projects.

Electrical infrastructure and control system modernisation also emerged as important growth areas. Industrial operators are increasingly investing in electrical reliability, automation upgrades and digital control systems to improve plant performance and operational resilience. The business continued to support these priorities through engineering solutions that enhance safety, reliability and long-term asset performance.

Another area of continued strength was support for sustaining capital programmes and turnaround projects across operating facilities. These assignments require a different approach from large greenfield developments, combining technical depth, speed of execution and close coordination with plant operations.

The business continued to support clients in executing reliability improvements, equipment upgrades, debottlenecking initiatives and operational enhancements while minimising disruption to ongoing production. This capability has strengthened long-term customer relationships and positioned the business as a trusted partner for both strategic investments and day-to-day operational improvement programmes.

Safety remains deeply embedded within the culture of the organisation. During FY26, the business recorded zero OSHA recordable incidents, reflecting a strong commitment to safe engineering practices, proactive risk management and operational discipline. Safety considerations are integrated into every stage of project delivery, from design development through field execution.

Decarbonisation projects represented another important area of activity. The business supported multiple carbon capture and sequestration initiatives across the United States and Canada. Most notably, engineering was completed for a major carbon dioxide dehydration and compression facility supporting ammonia production in Louisiana. The facility enables sequestration of approximately two million tonnes of carbon dioxide annually, making it one of the largest projects of its kind in North America. Additional engineering assignments for carbon capture infrastructure in Mississippi and Canada further strengthened the business's position within the growing carbon management sector. Together, these projects demonstrate how engineering can contribute to meaningful emissions reductions while supporting industrial productivity and economic growth.

Digital delivery continues to play an important role in project execution. Laser scanning, model-based engineering, digital work packaging and cloud-enabled collaboration tools are helping improve constructability, reduce rework and enhance project predictability. Automation within engineering workflows and advanced analytical tools further support design quality and execution efficiency.

Capability development remained a key priority throughout the year. Investments in carbon capture, electrical infrastructure, controls modernisation and digital delivery capabilities strengthened technical depth while supporting future growth. Knowledge management systems, estimating tools and engineering work processes were further enhanced to improve consistency, scalability and delivery performance.

Through a combination of engineering expertise, project execution discipline and a strong understanding of industrial operations, the business continues to help clients modernise facilities, improve reliability and reduce environmental impact.

Future Outlook and Priorities

The outlook for the business remains positive as industrial operators continue to invest in modernisation, reliability improvements and decarbonisation initiatives. Demand is expected to remain strong across refining, chemicals, industrial manufacturing, energy infrastructure and carbon management projects.

Future priorities include expanding carbon capture and energy transition capabilities, strengthening expertise in electrical infrastructure and controls modernisation, and accelerating the adoption of digital engineering and artificial intelligence within project delivery. The business will also continue to grow its on-site engineering and turnaround support services, helping clients manage sustaining capital programmes more efficiently.

International collaboration will remain an important area of focus. The successful execution of projects involving teams from both the United States and India has demonstrated the value of TCE's global delivery model and created opportunities to support increasingly complex projects across multiple regions. The Finland green DRI project has shown how specialised expertise from different parts of the organisation can be brought together to support emerging industrial technologies and new market opportunities.

As industrial facilities continue to evolve, the business remains focused on helping clients improve reliability, enhance competitiveness and reduce carbon intensity. By combining engineering excellence with practical project delivery experience, HCBU USA is well-positioned to support the next phase of industrial modernisation and decarbonisation.

19%
Share in
total revenue

16%
Share in total
acquisition

307
Workforce on
31st March 2026

CASE STUDY

Decarbonising One of Industry's Toughest Challenges

Carbon Capture and Sequestration Unit, Louisiana, USA

Ammonia production is one of the most carbon-intensive industrial processes in the world. At one of the largest ammonia production complexes in the United States, a major fertiliser producer developed a decarbonisation strategy to reduce its emissions footprint and enable production of lower-carbon ammonia at industrial scale. At the heart of this strategy is a carbon capture and sequestration unit that captures CO₂ emissions, compresses them to pipeline specification, and transports them for permanent geological storage and enhanced oil recovery. The unit started up successfully in the third quarter of 2025 and is now the second largest operational carbon capture facility in the United States, demonstrating that industrial-scale carbon capture is commercially viable in hard-to-abate sectors.

TCE's Role

TCE supported the project from inception through to commissioning, delivering full front-end engineering across three sequential phases as well as detailed design engineering. The scope included procurement support through requisition packages, bid evaluations, and technical oversight across multiple vendor packages. TCE engineered all supporting infrastructure from the CO₂ capture tie-in point through the full unit and onward to the export pipeline, ensuring a coherent and integrated design across a complex, multi-package facility. Key engineering contributions included coordination of dynamic compressor foundation design with specialist consultants, CO₂ relief and dispersion modelling to determine safe relief locations and equipment placement, and structured management of vendor design reviews across multiple global technology providers to ensure seamless integration into a single functional unit.



Impact

Sustainable: The unit sequesters up to 2 million metric tonnes of CO₂ annually, significantly reducing emissions and enabling production of around 1.9 million tonnes of low-carbon ammonia.

Reliable: TCE's involvement from front-end phases to commissioning ensured continuity of engineering intent, with seamless integration of multiple vendor packages into a fully operational unit delivered on schedule.

Intelligent: Advanced CO₂ dispersion modelling, dynamic foundation analysis, and structured vendor integration across global partners reflect the depth of engineering rigour brought to a first-of-its-kind deployment at this scale. This project now serves as the reference model for further carbon capture facilities planned across the client's North American operations.

2

Million metric tonnes CO₂ captured and sequestered annually

1.9

Million tonnes of low-carbon ammonia enabled per year

2nd

Largest operational carbon capture facility in the United States

5,500

Tonnes per day CO₂ compression capacity across two matching trains