

# Leading edge

“Innovation and technology are key to meeting the energy supply challenge,” says Chief Scientist Jose Bravo

In the changing landscape of fuel manufacturing, new ideas and solutions are vital in the fight to stay ahead. With the establishment of a team of chief scientists, the Shell Group has underlined its commitment to developing innovative technology. The scientists are leading the Group’s direction in research and innovation, and driving excellence across the organisation.

Jose Bravo, chief scientist for physics and physical separation, explains: “Our role within Shell is many-fold, but essentially our function is to enhance the visibility and the relevance of technology. We are all members of the chief scientist team, which provides advice and guidance to the Group on science and technology issues. We are individually responsible for our own discipline speciality, and we also act as ambassadors to communicate the importance of technology inside and outside the Group.”

Oil companies need to develop technology-based strategies to address today’s challenges. Fuel quality specifications are becoming ever more stringent as governments legislate for cleaner fuel. At the same time, the quality of the raw material is diminishing, and refiners and oil producers need to seek new ways of meeting demand. Bravo elaborates: “We are producing fuels now that have

100 times less sulphur than the fuels that were produced just a few years ago. And some of the crude oils that we use now to produce those fuels have 100 times more sulphur than the ones we used previously. That is a tremendous gap, and the only way to bridge that gap is with technology.

“To maintain availability and security of energy supply,” Bravo continues, “energy businesses need to diversify; for example, by developing unconventional oils and using alternative raw materials to produce fuel. This is where technology is already playing a vital role, and where Shell draws on its experience to provide innovative solutions to meet the challenges.”

In Canada, Shell uses enhanced oil recovery techniques on bitumen at the Peace River complex that cannot be extracted using conventional oil production technology. The nearby Scotford upgrader uses a hydrogen-addition process to convert the high-viscosity, extra-heavy bitumen from the Muskeg River Mine into a wide range of synthetic crude oils.

Alternative carbon sources are being converted into fuels using Shell’s

gasification processes – Gas to Liquids (GTL), Coal to Liquids (CTL) and Biomass to Liquids (BTL). Bravo explains: “The gas, coal or biomass undergoes a different transformation process from traditional refining. In this case, the first step is gasification, which produces a single building block called syngas. Syngas can then be manipulated to produce gasoil or diesel, or different chemicals such as solvents and raw materials for textiles, and, of course, it can be used directly to provide power.

“A good example of fuel produced from syngas is the new, synthetic diesels that are being used around the world. The Audi R10 car that won the Le Mans race earlier this year had an engine fuelled with diesel produced by Shell’s GTL process. This demonstrates that it is possible to produce a very high performance differentiated fuel using a new manufacturing route that is underpinned by technology,” says Bravo.

Shell is working towards sharing expertise and advancing the development of new processes with other companies. The organisation is also working with

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CHOREN Industries in Germany at the world's first commercial facility for converting biomass into fuel. CHOREN's biomass-gasification process converts biomass such as woodchips into syngas. The syngas is, in turn, converted into an advanced bio-component for use in diesel using Shell technology that is based on the GTL process. "We see this as a significant way of providing liquid fuels from biomass that does not follow the traditional route of bio-technology," says Bravo. "It is about the chemical processing of biomass. This is very new technology, and it is starting to become a commercial reality."

Bravo is keen to stress that processes such as GTL are not simple solutions. They take persistence and commitment: "This technology has been refined over decades of research and development in Shell laboratories and years of operating experience in the Shell middle distillate synthesis plant in Bintulu, Malaysia – the world's first commercial-scale GTL plant of its type. We are now working on the Pearl GTL project – a world-scale 140,000-bbl/d plant being developed in Qatar." This is a good example, Bravo suggests, of how innovative technology is

being used to meet customers' needs in increasingly demanding markets.

"Technology plays a significant role in developing the diversity of both the raw materials and the finished products for a secure energy future. Shell understands that technology will drive the changes and that leadership in innovation will facilitate positive sustainable results, for both society and Shell stakeholders. We need to be producing fuels that are environmentally sound, commercially appropriate and available in sufficient quantities. We aim to satisfy the demands of our stakeholders; technology plays a fundamental role in this," concludes Bravo.



**CHIEF SCIENTIST JOSE BRAVO:**  
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