



LEADING ON INNOVATION

Your home is powered by cleaner burning natural gas, your lightweight car runs on biofuel from algae, and carbon dioxide emissions from the refinery you drive past on your way to work don't pour into the atmosphere. Instead, they are captured and sent for storage underground. That's if Jose Bravo's vision of the future turns out to be right.

SHELL CHIEF SCIENTIST SEPARATIONS

JOSE BRAVO

On the hunt for fuels of the future

Jose is Chief Scientist Separations at Shell and he is passionate about his specialist area – helping to make cleaner fuels, for example, or cut emissions from power plants.

A keen hunter, Jose compares his pastime to his research: "On safari you put a lot of work into the preparation and then you have to act very quickly and decisively to get a result," says Jose. "It's rather like my work, which often involves the extensive development and search of a technology to separate out pollutants. Then it is – hopefully – quickly deployed."

He is single-minded in all aspects of his life, setting his goal first, working out a plan to reach it...then hitting his target. His role covers many aspects of the oil industry and he travels to many different places. But where does he feel at home?

"I love Africa. It's like going to your mother's house. You have a feeling that this is where it all started, it feels comfortable, familiar, old."



“Innovation doesn’t come when you have a lot of space and freedom. It comes when you’re under intense pressure and you simply have to solve a problem”

Africa may give Jose a strong sense of the past, but his work gives him a sharp focus on the future.

Driving change

When he looks to the coming decades, Jose believes only a wider range of energy sources will meet rising demand. Part of his work is on technologies that separate oil from sand – used in Shell’s Canadian oil sands operations – or to cool and separate naturally occurring gas into liquid fuel for transport (LNG).

Jose is also helping to make fuels cleaner and more energy efficient – and he reflects on cars and the future. Fossil fuels will still play a major role, but vehicles will be increasingly powered by biofuels, solar energy, wind-fuelled electricity, hydrogen and compressed natural gas.

“The choice will depend on where you live,” he says.

Easier access to oil and gas will, for example, enable some regions to continue using more fossil fuels. Countries with restricted access to hydrocarbons will depend more on alternative energy sources.

“In cities like New York, where journey distances are short, electric cars that need recharging are viable.”

Jose is involved in biofuels, in particular a project to extract fats from sea algae to produce biodiesel.

“If we can work out how to do this economically on a large scale, many people could be running their cars on algae in 20 years or less,” he predicts.

Putting theory into practice

Jose developed a strong interest in the separations field at the University of Texas, where he built up a rapport with a professor who funded his research. He did his graduate work in Chemical Engineering and in Distillation. Yet when he had arrived at the university from his native Mexico a few years earlier, he only had a very basic understanding of English. “It’s proof that when you need to learn, you do!”

After a spell as a university lecturer, researcher and consultant, Jose joined Shell in 1995 to work as a researcher, manager, and commercial director before his appointment as a chief scientist in 2005. He realised he was captivated by the dimensions of big

industry. As a man with ideas and a spirit of adventure he found the lecture hall too confining: “I like the scale of separations – big plants, giant distillation columns. Before I could only read about them in books. I always like to follow my instincts, so I joined Shell.”

Innovation isn’t a hobby, he says. It’s essential to meeting some of the world’s greatest challenges. “Innovation doesn’t come when you have a lot of space and freedom. It comes when you’re under intense pressure and you simply have to solve a problem. A major project or millions of dollars can be at stake if you don’t. That’s pressure.”

He explains that the processes and technologies involved in separations work are used in all chemical plants and refineries. “We make chemical reactions to change things using catalysts and then use our know-how to apply technology that physically separates out pollutants to make products purer,” says Jose. The work touches many aspects of everyday life – in helping to produce clean water, better fuels for drivers and everyday items from shampoo to CDs.

Today Jose’s achievements are internationally recognised, with awards including one from the American Institute of Chemical Engineers in 2008 for Outstanding Contributions in Separations.

Raising awareness, reducing emissions

Jose is deeply concerned about climate change. But he believes that many people struggle to accept the realities of having to meet energy demand.

“People love diesel but they don’t like refineries. They love electricity but they don’t like power plants. They love nice warm homes but they don’t like LNG plants. We shouldn’t be afraid of the technology and, of course, it shouldn’t damage the environment.”

The world, he predicts, is entering an era of greater awareness of the challenges ahead.

Better energy efficiency is one, and helping to achieve it is part of Jose’s role. At Shell’s Pernis refinery, in the Netherlands, in 2009 he supported a team that applied a filtration technology for the



first time to remove particles from hot fluids. The newly applied technology makes the chemical reaction to remove solids possible at high temperatures, avoiding reheating and cutting energy use.

CO₂ emissions must fall to help avert climate change. Jose is seeking to improve separations technology that captures CO₂ for storage from sites such as power plants. He is working with other scientists at Shell on a number of demonstration projects to develop CO₂ capture and storage technology for widespread use. But government support and the right policies are essential if the technology is to work commercially: "The world talks about CO₂ a lot. But still there are no clearly defined economic incentives to developing the technology to tackle it."

Jose's reflections on the future match the goals of his work: helping to meet rising energy demand and seeking to reduce emissions.

"I love the outdoors," he says. "And I want to do what I can to see that future generations are able to enjoy the same landscapes."