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PHOTO SHOT

Ernest Moniz looks set to be the next leader of the US Department of Energy.

POLICY

Physicist tipped for US energy post

Ernest Moniz considers natural gas a bridge to clean energy.

BY JEFF TOLLEFSON

As the administration of US President Barack Obama prepares for a renewed push towards cleaner energy and reduced greenhouse-gas emissions, the White House appears to have chosen another physicist to head the effort. The leading candidate to replace departing energy secretary Steven

Chu is Ernest Moniz, director of the Energy Initiative at the Massachusetts Institute of Technology (MIT) in Cambridge. He would bring to the office a pragmatic support for nuclear power and natural gas, along with a candid desire to, in his own words, “innovate like hell” on basic energy technologies. Colleagues at MIT are waiting for a confirmation of the appointment, which could come as early

as this week. “Ernie is a real people person, and he took us to a whole new level in terms of both size and visibility,” says Howard Herzog, a participant in the Energy Initiative who works on carbon capture and sequestration technologies at MIT.

Both Chu and Moniz are respected physicists with a passion for energy, but the resemblance ends there. Chu came to Washington as a policy outsider — and sometimes struggled with relationships on Capitol Hill (see *Nature* **462**, 978–983; 2009). But Moniz is primed for the post: he served as an associate director in the White House Office of Science and Technology Policy under president Bill Clinton before becoming undersecretary of energy in 1997. In that role, he worked on science and energy issues as well as nuclear weapons and nonproliferation programmes. For the past four years, he has served on the President’s Council of Advisors on Science and Technology (PCAST).

Equipped with a disarming smile and a trademark over-the-ears hairstyle, Moniz can address science, engineering and public policy in plain English, on the fly and under a spotlight. “Ernie is really a big-picture guy,” says Rosina Bierbaum, a fellow PCAST member and an environmental-policy expert at the University of Michigan in Ann Arbor. “He can talk the details of science far better than most of us, but he never ever gets lost in the weeds.”

Colleagues say that Moniz would probably aim to build on the work of Chu, who sought to overhaul the Department of Energy’s research and development programme. Chu’s initiatives include the Advanced Projects Research Agency—Energy, which funds risky, high-impact research, and five innovation hubs intended to promote interdisciplinary research on topics such as energy-efficient buildings and batteries.

Moniz took a similar interdisciplinary approach to energy research when he returned to MIT from Washington DC in 2001. His first major project was *The Future of Nuclear Power*, a 2003 report that declared that nuclear energy is an “important option” for producing low-carbon power, and that explored the science, engineering, economics and policy needed ▶

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► to expand it. After launching the Energy Initiative in 2006, Moniz and his MIT colleagues produced a series of reports on topics including geothermal energy, the electric grid, coal and the nuclear fuel cycle.

Most prominent, and controversial, was a 2011 report on natural gas. It highlighted the possibility that hydraulic-fracturing technologies could expand US gas production, displacing dirtier-burning coal in electricity generation and thus reducing US greenhouse-gas emissions. Moniz's enthusiasm for natural gas worries some environmentalists, who

are concerned about the air and water pollution resulting from its extraction. But gas has indeed helped to reduce emissions: in 2011, US greenhouse-gas emissions were nearly 8% below those in the peak year of 2007.

Talking to *Nature* last July, Moniz laid out his energy-policy goals for the current decade: reduce demand; substitute gas for coal; and innovate to reduce the cost of low-carbon technologies for areas such as nuclear power, renewable energy and capturing and sequestering carbon dioxide from fossil-fuel combustion. Moniz noted how basic research on

hydraulic fracturing, funded by the Department of Energy and dating back to the 1980s, is now paying off. "If you came out with a policy to reduce coal use by a third, all hell would break loose politically. But the market did it by itself, and you don't hear anybody complaining," he said. "To me, the lesson from that is the importance of innovation to reduce the costs of the zero-carbon options."

The key, he said, is to put in place a long-term plan to reduce greenhouse-gas emissions once gas has replaced coal. "Gas is a bridge, but it has to be a bridge to somewhere," he said. ■

HEALTH

Cholesterol limits lose their lustre

Revised guidelines for heart health are set to move away from target-based approach.

BY HEIDI LEDFORD

Soon after Joseph Francis learned that his levels of 'bad' LDL cholesterol sat at twice the norm, he discovered the shortcomings of cholesterol-lowering drugs — and of the clinical advice guiding their use. Francis, the director of clinical analysis and reporting at the Veterans Health Administration (VA) in Washington DC, started taking Lipitor (atorvastatin), a cholesterol-lowering statin and the best-selling drug in pharmaceutical history. His LDL plummeted, but still hovered just above a target mandated by clinical guidelines. Adding other medications had no effect, and upping the dose of Lipitor made his muscles hurt — a rare side effect of statins, which can cause muscle breakdown.

So Francis pulled back to moderate Lipitor doses and decided that he could live with his high cholesterol. Later, he learned that other patients were being aggressively treated by doctors chasing stringent LDL targets. But Francis found the science behind the target guidelines to be surprisingly ambiguous. "You couldn't necessarily say lowering LDL further was going to benefit the patient," he says.

The standard advice may soon change. For the first time in more than a decade, the US National Heart, Lung and Blood Institute is revising the clinical guidelines that shaped Francis's treatment (see 'How low can you go?'). Expected to be released later this year, the fourth set of guidelines, called ATP IV, has been drawn up by an expert panel of 15 cardiologists appointed by the institute. The guidelines will set the tone for clinical practice in the United States and beyond, and will profoundly

influence pharmaceutical markets. They will also reflect the growing debate over cholesterol targets, which have never been directly tested in clinical trials.

"We can't just assume that modifying the risk factor is modifying risk," says Harlan Krumholz, a cardiologist at Yale University in New Haven, Connecticut. "We've been burned so many times in the past decade by that assumption."

Since 2002, when ATP III called on doctors to push LDL levels below set targets, the concept of low cholesterol has become synonymous with heart health. Patients brag about their cholesterol scores, physicians joke about adding statins to drinking water, and some hospitals reward doctors when patients hit cholesterol targets.

In 2011, US doctors wrote nearly 250 million prescriptions for cholesterol-lowering drugs, creating a US\$18.5-billion market, according to IMS Health, a health-care technology and information company based in Danbury, Connecticut. "The drug industry in particular is very much in favour of target-based measures," says Joseph Drozda, a cardiologist and director of outcomes research at Mercy Health in Chesterfield, Missouri. "It drives the use of products."

ATP III reflected a growing consensus among physicians that sharply lowering cholesterol would lessen the likelihood of heart attacks and strokes, says Richard Cooper, an epidemiologist at the Loyola University of Chicago Stritch School of Medicine in Illinois, who served on the committee that compiled the guidelines. The committee drew heavily on

clinical data, but also took extrapolations from basic research and post hoc analyses of clinical trials. LDL targets were set to be "less than" specific values to send a message, Cooper says. "We didn't want to explicitly say 'the lower the better' because there wasn't evidence for that," he says. "But everybody had the strong feeling that was the correct answer."

By contrast, the ATP IV committee has pledged to hew strictly to the science and to focus on data from randomized clinical trials, says committee chairman Neil Stone, a cardiologist at Northwestern University School of Medicine in Chicago. If so, Krumholz argues, LDL targets will be cast aside because they have never been explicitly tested. Clinical trials have shown repeatedly that statins reduce the risk of heart attack and stroke, but lowering LDL with other medications does not work as well. The benefits of statins may reflect their other effects on the body, including fighting inflammation, another risk factor for heart disease.

Krumholz's scepticism is rooted in experience. In 2008 and 2010, the Action to Control Cardiovascular Risk in Diabetes (ACCORD) clinical trial challenged dogma when it

"We can't just assume that modifying the risk factor is modifying risk."

HOW LOW CAN YOU GO?

US guidelines set by the Adult Treatment Panel (ATP) have gradually lowered acceptable levels for LDL 'bad' cholesterol, while shifting focus to prevention in patients at risk of a heart attack.

Name	Year	LDL target for people with the highest risk of heart attack (mg dL ⁻¹)
ATP I	1988	≤130
ATP II	1993	<130
ATP III	2002	<100
ATP III (update)	2004	<70

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For more on heart health, see *Nature's* Outlook:
go.nature.com/rbift4