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AMIT KUMAR



UNIVERSITY OF ALBERTA

*Analyzing energy use for more
balance and efficiency*

By Jim Bentein

If you could invent a machine that would more accurately predict how Canadians will use energy in the future and how that use will affect the environment and the country's economy, would you want to do so? And if that was even possible, who would you ask to head the team building that machine?

Amit Kumar, a professor in the department of mechanical engineering at the University of Alberta (U of A), might come to mind.

Kumar, who has already led a team that developed an energy-environment planning and forecasting tool using the widely accepted Long-range ►

“[Amit] Kumar’s work has helped inform the government of Alberta strategy on energy efficiency and our strategy and focus on innovation to support the government of Alberta’s climate change plan.”

—Eddy Isaacs, chief executive officer, Alberta Innovates – Energy and Environment Solutions

Energy Alternatives Planning System model (LEAP), was named in mid-June to head new national research based on that work.

He is the first academic to hold two new research chairs that will allow him and a team of 20 researchers at the U of A to assess how different energy sources, from wind to biomass, to coal, hydro and oilsands, can be developed in a balanced and efficient manner while also reducing greenhouse gases (GHGs), conserving water and reducing other environmental impacts.

Kumar was appointed the Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research Chair in energy and environmental systems engineering. He was also named to head the inaugural Cenovus Energy Endowed Chair in Environmental Engineering.

These latest appointments follow the path of an already-distinguished career for Kumar, who received his B.Sc. and M.Sc. from prestigious institutions in his native India, before moving to Canada and receiving his PhD

in 2000 from the U of A. He became a postdoctoral fellow in 2004 at the University of British Columbia, before moving back to Alberta in 2005.

And that machine?

It’s not actually a machine, but a complex computerized model, based on the LEAP approach, which was developed at the Stockholm Environment Institute and which has now been adopted by thousands of organizations and 190 countries worldwide. It can be used to track energy consumption, production and resource extraction in all sectors of an economy and can also be used to account for GHG emissions in the energy and non-energy sectors.

There’s a precedent to the U of A’s LEAP-based work.

Kumar and other U of A researchers produced a report in April 2011 for Alberta Innovates – Energy and Environment Solutions, which modelled the development of energy, GHG emissions and water flow in Alberta using a LEAP model, based on 2005 data.

That study analyzed the demand, supply and resource data specific to

Alberta and modelled it over a 30–50-year planning horizon. It looked at demand by end users in the residential, commercial, industrial, agricultural and transportation sectors.

In addition, it looked at energy “transformation processes” such as electricity generation, oil refining and coal mining, assessed available resources in Alberta and developed Alberta-specific emissions measurement models.

Eddy Isaacs, chief executive officer of Alberta Innovates, says those efforts laid the groundwork for what Kumar will now be involved in.

“Dr. Kumar’s work has helped inform the government of Alberta strategy on energy efficiency and our strategy and focus on innovation to support the government of Alberta’s climate change plan.”

(The climate change plan aims at cutting GHGs by 14 per cent below 2005 levels by 2050.)

Kumar’s two research programs have \$4.4 million in total funding, including a \$3-million endowment from Cenovus Energy Inc., \$925,000 from NSERC and \$250,000 from Alberta Innovates.

Brian Ferguson, president and chief executive officer of Cenovus, says that such fact-based, scientific information is necessary if resource development is to continue in a responsible fashion.

“To ensure the long-term viability of the industry, Cenovus and its peers must constantly look for better ways of doing things,” Ferguson said on Kumar’s appointment.

As an example of the type of analysis the U of A team will be able to conduct, he said it will be able to assess the life cycle of GHG emissions being produced by rail as opposed to pipelines—work that might play an important role in the debate over whether major pipeline projects like Northern Gateway should proceed.

Kumar says the U of A work will be made publicly available over the next year. **OSR**