Study sees potential for acceleration in U.S. emissions

U.S. greenhouse gas emissions could grow more quickly in the next 50 years than in the previous half-century, even with technological advances and current energy-saving efforts, according to a new study by Richard Eckaus, the Ford International Professor of Economics, emeritus, and his co-author, Ian Sue Wing (Ph.D. 2001).

What’s more, technology itself may be more the stuff that dreams are made on than the most available tool for reducing CO₂ emissions or solving the global energy crisis, cautions Eckaus.

“There is no a priori reason to think technology has the potential for reducing energy use while meeting the tests of economics. It’s politically unapetizing in the U.S., but in Europe, gas costs six dollars a gallon. Make energy more expensive: People will use less of it,” Eckaus says.


“We found that, in spite of increasing energy prices, technological change has not been responsible for much reduction in energy use, and that it may have had the reverse effect,” Eckaus says of their results.

The researchers studied the periods 1958 to 1996 and 1980 to 1996 and project- ed from 2000 to 2050. Based on their find- ings from the past 50 years and adjusted for a more realistic expectation for techno- logical changes, they found that the rates of growth for energy use and emissions may accelerate from the historical rates of 2.2 percent and 1.6 percent, respectively.

“The rates of growth could be higher by a half percent or more, which becomes significant when compounded over 50 years,” Eckaus says.

He acknowledges it has become coun- terintuitive to question technology’s poten-

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Building bridges in the brain

From left, Picower Center professor Morgan Sheng, Menicon Professor of Neuroscience, joins research scientist Myung J. Kim in the lab. They have shown how manipulating a brain scaffolding protein called PSD-95 could boost cognitive function. See story on page 7.

Team analyzes genomes of 12 fly species

 Approach could unlock secrets of human genome

In work that reveals important clues in the evolution of species, an international consortium of MIT scientists and colleagues has analyzed the genomes of twelve species of the fruit fly Drosophilia in one of the first large-scale compari- sons of multiple animal genomes.

The researchers’ approach may also help unlock the secrets of other genomes, including our own.

“The framework allows us to study the evolutionary forces that have shaped the fruit fly’s family tree, and to discover the working parts of the fly genome in a systematic way,” said Manolis Kellis, associate member of the Broad Institute of MIT and Harvard, and one of the project leaders. Kellis is also the Karl Van Tassel Career Development Assistant Professor of Electrical Engineering and Computer Science at MIT, and is affiliated with the Insti-

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Thirty percent of all cancer deaths are attributable to smoking, so being able to stop by step and by stop is one of the singularly clear advantages of a Smoke Free campus event at MIT on Nov. 15, the next step in the American Society's annual event, MIT's Community Health Initiative, or "quit kits" to three campuses nationwide.

The smoke initiative aims to inform the MIT community of the dangers of tobacco consumption and smoking cessation with an MIT-MIT Sloan students ready for leading roles

Sloan senior lecturer Catherine Kelly, left, explains the Front Page

On Nov. 16, MIT President Susan Hockfield will host a delegation on a smoking trip that will highlight MIT's history with India and the potential for future collaborations.

"This is a new, unique opportunity for our students to participate in the global debate on India," said Hockfield. "We are excited to be able to host a group of Indian students who are interested in learning about MIT's unique approach to innovation and entrepreneurship."
MIT Corporation grants tenure, makes tenured appointments to faculty

The Corporation’s Executive Committee has approved 50 faculty for tenure, effective July 1, 2007. Unless otherwise noted, all promotions are from associate professor without tenure to associate professor with tenure.

**MIT Faculty Promotions, 2007**

**Physics**

- **Erik Demaine**
  - Joined MIT faculty: 2001
  - A pioneer in the field of computational origami, Demaine has made many contributions to computa- 
  tional geometry and geometric 
  programming.

- **Michael Ernst**
  - Joined MIT faculty: 2000
  - Ernst works in the field of software engineering and has made major contri- 
  butions to program analysis, 
  programming language 
  design, and software 
  testing.

- **John Fernandes**
  - Electrical Engineering and Computer Science, B.S.E.E. 1995 (MIT), M.Arch. 1998 (Yale University)
  - Joined MIT faculty: 1998
  - A leader in the field of nanoscale 
  circuit design, Fernandes is 
  a practicing architect 
  whose research focuses on 
  the intersection of archi- 
  tectural design and materi- 
  ality.

- **Amy Filmus**
  - Electrical Engineering and Computer Science, B.S.E.E. 1996 (Yale University), M.S. 1997, Ph.D. 2000 (both from MIT)
  - Joined MIT faculty: 2000
  - An applied economist working in the fields of public economics and health economics, Filmus has studied the 
  role of government interven- 
  tion in the development of al- 
  ternative treatments for major 
  medical conditions.

- **Ivan Werning**
  - Economics, B.A. 2001 (Boston College), M.A. 2003, Ph.D. 2007 (Yale University)
  - Joined MIT faculty: 2007
  - Werning is an urban design- 
  er and economist whose 
  work focuses on the 
  natural equilibrium 
  groups that are in 
  number theory.

**Mathematics**

- **Ju-Lee Kim**
  - Joined MIT faculty: 2003
  - Kim is a leading represent- 
  ative on the natural symmetry 
  groups that are in number 
  theory.

**Architecture**

- **Talbot Hammons**
  - Architecture, B.A. 1985 (Northwestern University), M.A. 1990 (Massachusetts Institute of Technology), Ph.D. 1997 (Harvard University)
  - Joined MIT faculty: 2007
  - Hammons has developed 
  a rigorous approach 
  to design practice and 
  specific technical conditions 
  that arise on a global 
  level such as rapid 
  urbanization.

**Design**

- **Senthil Thirumalai**
  - Architecture, B.A. 1990 (Harvard University), M.A. 1993, Ph.D. 2000 (both from MIT)
  - Joined MIT faculty: 2003
  - Thirumalai is an architect 
  who studies the 
  interaction of 
  city design and media 
  design, and software test- 
  ing.

- **Paul A. Seidell**
  - Architecture, B.A. 1994 (Bucknell University), M.L.A. 2000 (Harvard University)
  - Joined MIT faculty: 2008
  - Seidell is a leading figure in 
  architectural design in 
  the field of furniture and 
  environmental psychology.

- **Nader Tehrani**
  - Architecture, B.S. 2001 (Illinois Institute of Technology), M.S. 2005 (MIT), Ph.D. 2007 (University of Toronto)
  - Joined MIT faculty: 2007
  - Tehrani is an architect 
  and educator, is an 
  international leader in 
  the design of 
  molecular, nanostructured 
  materials technology with 
  city design.

**Computer Science and Engineering**

- **Christopher A. Schuh**
  - Computer Science and Electrical Engineering, B.A. 1997 (University of Illinois), M.S. 1999 (both from MIT)
  - Joined MIT faculty: 2001
  - Schuh has contributed 
  significantly to computational 
  origami research in three main 
  areas: understanding 
  the fundamental interaction 
  of paper and 
  programming language 
  design, and software 
  testing.

- **Dennis Frenchman**
  - Joined MIT faculty: 2003
  - Frenchman, an urban design- 
  er, is an international leader in 
  the development of al- 
  ternative 
  technologies for the 
  urban environment.

**Media Arts and Sciences**

- **Debra Kamin**
  - Media Arts and Sciences, B.A. 1992, M.S. 1995, Ph.D. 1999 (both from MIT)
  - Joined MIT faculty: 2001
  - Kamin is a leading repre- 
  sentative on the 
  natural symmetry groups 
  that are in 
  number theory.

- **Piotr Indyk**
  - Media Arts and Sciences, B.S.E.E. 1992 (Princeton University), M.S. 1995, Ph.D. 1999 (both from MIT)
  - Joined MIT faculty: 2000
  - Indyk is a leading 
  representative on the 
  natural symmetry groups 
  that are in 
  number theory.

**Engineering**

- **Soumitro Dutta**
  - Joined MIT faculty: 2001
  - Dutta is a pioneer in the field of 
  neurodegenerative diseases, 
  whose research focuses on 
  the design of 
  computational origami, 
  programming language 
  design, and software 
  testing.

- **John Perry**
  - Media Arts and Sciences, B.A. 1996 (Colgate University), M.A. 2000, Ph.D. 2006 (both from MIT)
  - Joined MIT faculty: 2007
  - Perry is a leading 
  representative on the 
  natural symmetry groups 
  that are in 
  number theory.

**Chemistry**

- **John A. Poon**
  - Chemistry, B.S. 1993 (University of California, Berkeley), M.S. 1995, Ph.D. 1997 (both from MIT)
  - Joined MIT faculty: 2002
  - Poon is a leading 
  representative on the 
  natural symmetry groups 
  that are in 
  number theory.

- **Robert Langer**
  - Chemistry, B.A. 1979 (Yale University), M.S. 1981, Ph.D. 1983 (both from MIT)
  - Joined MIT faculty: 2007
  - Langer is a leading 
  representative on the 
  natural symmetry groups 
  that are in 
  number theory.

- **Sara Saenger**
  - Chemistry, B.A. 1995 (Haverford College), M.S. 1997, Ph.D. 2000 (both from MIT)
  - Joined MIT faculty: 2007
  - Saenger’s research goals 
  are to understand the 
  interaction between the 
  bulk properties and 
  atmospheric 
  composition of 
  reactions that 
  have been 
  understood at 
  the molecular level 
  and the environmental 
  factors that 
  influence them.

- **David Perreault**
  - Chemistry, B.A. 1995, Ph.D. 1999 (both from MIT)
  - Joined MIT faculty: 2001
  - Perreault is a leading 
  representative on the 
  natural symmetry groups 
  that are in 
  number theory.

- **Vladimir Bulovic**
  - Electrical Engineering and Computer Science, B.S.E.E. 1996 (Princeton University), M.S. 1999, Ph.D. 2001 (both from MIT)
  - Joined MIT faculty: 2001
  - Bulovic is a leading 
  representative on the 
  natural symmetry groups 
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  number theory.

- **J. Troy Littenberg**
  - Materials Science and Engineering, B.S. 1990 (Lehigh University at Bethlehem), B.A. 1996, Ph.D. 1997 (both from Berkeley College of 
  Medicine)
  - Joined MIT faculty: 2001
  - Littenberg, a specialist in 
  molecular 
  biology, focuses on 
  understanding how 
  molecular 
  interactions form 
  and function, and has 
  recently developed 
  methods to 
  understand the 
  interactions 
  between 
  neural 
  systems.

- **Senthil Todadri**
  - Materials Science and Engineering, B.S. 1990 (University of Texas at El Paso), M.S. 1995, Ph.D. 1999 (University of California at 
  Santa Barbara)
  - Joined MIT faculty: 2001
  - Todadri is a specialist in 
  the development of 
  atomic and condensed 
  matter systems with 
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MIT student engineers go for the burn with pedal-powered laptop

MIT students have come up with a way to exchange your laptop for a bicycle. At least, that’s how they see it. The students designed and built an exercise bike with a “pedaling power” to charge a laptop as the “biker’s instant power bank.”

The students are part of a class project at the Massachusetts Institute of Technology (MIT). They’ve designed and built an exercise bike that can charge a laptop while you pedal.

The bike has a generator that produces electricity as you pedal, which is then sent to a battery that powers the laptop. The students say they’ve created a “self-sustaining” system that can provide up to 20 hours of power per hour of pedaling.

The bike was designed to be lightweight and easy to use, with a comfortable seat and handlebars. It also has a display that shows how much power is being generated and stored in the battery.

The students say they hope to use the bike to power laptops for students who are unable to afford electricity or who are in areas without power. They plan to test the bike in different locations and continue to improve the design.

MIT students go for the burn with pedal-powered laptop

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Time magazine honors MIT for inventions, inventors

Six MIT inventions and two MIT inventors were celebrated as the best of 2007 in Time magazine’s annual survey of the world’s most promising—and sometimes startling—visions of the future, as seen by scientists, engineers, educators and designers.

The two inventors chosen by Time are Tim Berners-Lee and Vannevar Bush.

Berners-Lee, senior researcher and holder of the 3Com Founders Chair at MIT’s Computer Science and Artificial Intelligence Laboratory, is known as the father of the web. He proposed it in 1989, launched it on the Internet in 1991 and continues to guide its evolution in his role as founder and director of the World Wide Web Consortium (W3C), an international forum.

MIT’s first dean of engineering, Bush developed a modern analog computer to solve complex equations during the 1930s. Bush envisioned what he called a “mechanized private file and library of exceeding speed and flexibility,” opening the door to breakthroughs in computer and Internet technology.

Time singled out MIT inventions that may improve life for people living in cities, in space, in remote or disadvantaged areas, or with disabilities.

MIT Media Lab Professor Hugh Herr and his team of researchers have developed the world’s first robotic ankle, an important advance for lower-limb amputees.

Domo, a robot designed by Aaron Edsinger and Jeff Weber, shows promise as an assistant for the elderly or wheelchair-bound.

The MIT Media Lab developed the low-cost XO Laptop to provide the world’s poorest children with a means for learning, self-expression and exploration.

Above, the SENSEable City Laboratory’s fluid building imagines programmable water walls that sense a visitor and automatically part, like curtains.

The Smart Cities group at the MIT Media Lab is working on the foldable, electric City Car, which it hopes will revolutionize mass transit and help alleviate pollution.

Dava Newman’s prototype BioSuit is designed to allow superior mobility when humans eventually reach Mars or return to the moon.