But today, China is "by far" the biggest emitter of carbon dioxide, Antypas said, responsible for 24% of the global greenhouse gas output in 2011. That's about the same emissions as the United States (15%) and European Union (10%) combined.

"This is a real different place where we're at now. It tells you a lot about the bargaining power. By far the most powerful actor of this is China," Antypas said, noting that China and India will be responsible for much of the future load.

"Everyone else is either staying the same, growing slowly, or gradually decreasing," Antypas said, including the United States, which has seen a decline back to 1994 emissions levels.

But when adjusting for population, the most responsible party becomes less clear. With a population of 34.3 million, Canada was the clear frontrunner in per capita emissions in 2011, followed by the United States, Russia, Japan, and the European Union.

The Chinese are well aware that much of their greenhouse gas output is due to American companies outsourcing their production, Antypas said. Fortunately, there are two clear leaders who can shape emissions policies.

"The rest of the world will go where the U.S. and China go—if they go together," Antypas said. "China is in a position to lead the rapidly developing countries, and the U.S. is in a position to lead the developed countries."

SEVERAL SESSIONS AT THE CONFERENCE were dedicated to the effects of climate change on human settlements. About 4 million people call the Arctic their home, many in indigenous communities that have lived in connection with the land for many years. They rely in large part on subsistence hunting and fishing. As melting ice leads to new possibilities for shipping, drilling, and other industrial activities, "a lot of people are looking at the economic opportunities. But people up here are looking at some very significant threats," said Diane Hirshberg, director of the Center for Alaska Education Policy Research at the University of Alaska Anchorage. "The immediate change has already happened for indigenous communities—people falling through the ice when they're using traditional ice routes. Whalers have lost their lives or had to be rescued because the ocean is unpredictable. Animals aren't migrating in the same patterns, which causes food insecurity."

Arctic communities are facing an increased frequency and severity of extreme weather events, changes in seasonality, and impacts on their terrestrial and marine ecosystems. Traditional ice paths are disappearing, tree lines are increasing, and riverbanks are eroding, according to Mary Dallas Allen, associate professor at the University of Alaska Anchorage School of Social Work.

Later freezing and earlier breakup of ice disrupts travel, infrastructure, and subsistence hunting activities. Food that is traditionally stored in cellars is going bad. Parents are deciding that it's not safe to take their children on hunting and other traditional food-gathering outings, resulting in cultural loss.

Arctic communities are losing what it means to be home, Allen said, which is having significant social, emotional, and psychological effects.

Even for children to get to school, many communities rely on stable ice to get across rivers that have always been frozen, Allen said. With unstable ice, children miss school. Or, getting to school is scary and unsafe.

"Climate change is affecting people's lives every day," Allen said. "When people are losing homes, livelihoods, and the safety net of their communities, there are associated mental health challenges. They experience depression, anxiety, post-traumatic stress, increased substance abuse, and higher rates of suicide."

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**Awards honor early-career women in the chemical sciences**

The inaugural AAAS Marion Milligan Mason awards recognized four outstanding chemists and mentors

*By Kathy Wren and Andrea Korte*

Luisa Whittaker-Brooks wants to create a material that can be used to harvest ambient heat—from our bodies, for example—and turn it into electricity.

This material will need to be a good electrical conductor, but it mustn't be thermally conductive or the heat would escape from the system. So Whittaker-Brooks, an assistant professor of chemistry at the University of Utah, is working on integrating organic and inorganic materials—essentially, plastics and semiconductors—at the nanoscale. Because these two types of materials "don't like each other," as she says, Whittaker-Brooks must manipulate the interfaces between the particles to encourage them to mingle.

This is just part of a master plan, whose ultimate goal is creating a device that can capture and store both thermal and solar energy, to continuously produce electricity. Such ambitious research can be tricky for early-career scientists, who too often find themselves in a Catch-22-like situation with regard to funding, especially when they want to do "high-risk, high-reward research" that could potentially lead to major breakthroughs.

"As an early-career scientist, this is very difficult at times, to get the funding for high-risk research," said Alison Fout, an assistant professor of chemistry at the University of Illinois at Urbana-Champaign. "We need preliminary results, we need data, we need publications, and then we need to get that funding. And as you can imagine, all that takes time, and time costs money."

Fout and Whittaker-Brooks now have the means to tackle this problem, however, because they and two other early-career chemists have won the first AAAS Marion Milligan Mason Awards for Women in the Chemical Sciences. The group—which also includes Kristin Parent, an assistant professor of biochemistry and molecular biology at Michigan State University, and Katherine Mackey, an assistant professor of Earth system science at the University of California, Irvine—was recognized at a 15 October award ceremony at AAAS.

The awards, made possible by a $2.2 million bequest to AAAS, provide each chemist with $50,000 to ramp up their research projects while mentoring their own students.

A chemist and long-time AAAS member, the late Marion Tuttle Milligan Mason wanted to support the advancement of women in
While Whittaker-Brooks is a materials chemist, Fout and the other winners are working on topics that blend chemistry and biology.

Fout builds synthetic and organic molecules and studies models of them in her lab. One of the questions she is investigating is how hemoglobin reduces nitrite, a process that affects blood pressure.

Parent uses cryoelectronic microscopy to determine the three-dimensional structure of large, complex viruses. This information sheds light on how viruses recognize and infect their hosts.

Mackey studies how marine phytoplankton respond to changing nutrient and light conditions. She is particularly interested in how climate change is affecting these microscopic organisms, as the oceans become more acidic and the vertical mixing of water layers becomes more sluggish.

“The life of an early-career scientist has a lot to do with writing grants and hoping you get funding so that you can get those students and support them,” said Mackey. “This grant will enable me to go out and get my students involved in fieldwork right away so that I can have the same effect on them that my mentors have had on my career.”

AAAS Council reminder

The next meeting of the AAAS Council will take place during the 2016 AAAS Annual Meeting in Washington, DC and will begin at 9:00 a.m. on 14 February 2016 at the Omni Shoreham Hotel.

Individuals or organizations wishing to present proposals or resolutions for possible consideration by the council should submit them in written form to AAAS Chief Executive Officer Rush Holt by 1 December 2015. This will allow time for them to be considered by the Committee on Council Affairs at its winter meeting.

Items should be consistent with AAAS’s objectives and be appropriate for consideration by the council. Resolutions should be in the traditional format, beginning with "Whereas" statements and ending with "Therefore be it resolved."

Late proposals or resolutions delivered to the AAAS Chief Executive Officer in advance of the February 2016 open hearing of the Committee on Council Affairs will be considered, provided that they deal with urgent matters and are accompanied by a written explanation of why they were not submitted by the 1 December deadline. The Committee on Council Affairs will hold its open hearing at 2:30 p.m. on 13 February 2016 in the Congressional Room of the Omni Shoreham.