Christian Science Monitor

                          January 9, 2008, Wednesday

**Will nations build on climate-change momentum of 2007?**
SECTION: WORLD; Pg. 13
LENGTH: 1534 words

If 2007 was the year when an international scientific - and popular - momentum
built around tackling global warming, this year is likely to be one of boosting
that commitment. Last year, three major reports from the UN-sponsored
Intergovernmental Panel on Climate Change covered the science of global warming,
its potential effects, and ways for addressing the challenge. A special UN
meeting in September ahead of climate-change talks in Bali last month was
matched by a Washington-led initiative for major carbon-emitting nations. In
2008, expect developing nations to play a more active role in negotiations for
the post-Kyoto Protocol period, (as they did in Bali). Will the Bush
administration steal a march this year on the UN climate talks? The US will be
pumping more research money into carbon sequestration - ways to capture CO2 -
and solar energy, and several climate bills are pending before Congress, reports
Peter N. Spotts.

With the Kyoto Protocol kicking in this year, what will happen to greenhouse-gas
emissions?

Jan. 1 marked the start of the Kyoto Protocol's first commitment period, which
runs until 2012. Current projections suggest the countries taking part will
collectively achieve the protocol's goal of reducing emissions to levels more
than 5 percent below 1990 levels.

But Nobuo Tanaka, executive director of the International Energy Agency (IEA),
notes that since 1990, global emissions have grown 20 percent. By 2030, the
agency expects energy-related carbon emissions to climb to 56 percent above 1990
levels.

Developing countries would account for 74 percent of that increase, with China
and India accounting for nearly half of the total. Fossil fuels - oil, gas, and
most of all, coal - are expected to fuel some 84 percent of the greater demand
between 2005 and 2030. This business-as-usual scenario leads to carbon-dioxide
emissions that would raise global average temperatures by nearly 11 degrees
Fahrenheit by 2100.

Mr. Tanaka says that to cap warming at about 3.6 degrees, countries would have
to begin - today - aggressively using existing or nearly-ready technologies -
the equivalent of bringing online each year some 30 nuclear reactors, at least
two Three Gorges dams, 17,000 wind turbines, and 22 coal plants using carbon
capture and storage (CCS). After 2013, every coal new plant would need to use
CCS technology. A significant boost in energy efficiency is also needed. Rising
demand for energy through 2030 will call for a $22 trillion investment, he says.

What's likely to happen on the international scene?

Two tracks bear watching.

Track 1: UN talks that received a green light and a negotiating framework at
December's global climate talks in Indonesia. The aim is to have a new
greenhouse-gas reduction agreement ready to take over after 2012. "It's not
impossible, but it's very ambitious," says Manik Roy of the Pew Center on Global
Climate Change.

Newly influential developing countries must be part of any new agreement if it's
to gain political traction and have a meaningful long-term effect. In a first,
those countries, along with the European Union, stared down the US over final
wording in the road map at the Bali talks, and the US blinked.

To move forward this year, negotiators may try to set an agenda that starts with
issues the White House is most comfortable with, such as technological
approaches to reducing CO2 emissions. Tougher issues - binding emissions targets
for industrial countries and more-flexible goals that appeal to developing
countries - may wait for a new US administration. At the least, analysts say,
they will be watching to see if the White House tries to block elements it
doesn't like.

Track 2: The Bush administration's Major Economies Meetings (MEM) on Energy
Security and Climate Change. The idea is to gather the major emitters -
responsible for some 80 percent of global greenhouse-gas emissions - to explore
paths to reducing emissions significantly under a new agreement. Representatives
from 17 countries, the European Union, and the UN took part in the first meeting
in Washington last September. Now, the process is set to go into high gear,
beginning with a meeting at the end of January in Hawaii. According to James
Connaughton, who heads the president's Council on Environmental Quality, the
meetings will look for ways to help support the new Bali road map.

But many environmentalists worry that the White House is trying to replace the
UN Bali process with the MEM one. A key indicator of how much stock participants
place in the Bush meetings will be the clout of the teams they send. By some
accounts, the White House plans five or six MEM meetings even as participants
face an ambitious UN negotiating schedule. Analysts will be watching where the
"A" teams go for a hint about the relative priority the Bush process receives.
And they will be watching to see how smoothly any final results, which may come
as early as July, feed into the UN process.

Will climate-change bills in Congress move forward?

Last month, the Lieberman-Warner Climate Security Act cleared the Senate
Environment and Public Works Committee. According to its sponsors, the bill
covers greenhouse-gas sources that account for 80 percent of US emissions; they
would have to cut those emissions by 70 percent by 2050, leading to an overall
cut in US emissions of 63 percent below 1990 levels. Those levels are comparable
to the cuts most scientists say are needed from developed countries to hold
global warming to around 3.6 degrees Fahrenheit by the end of the century.

Passage is not certain, but the bill's prospects appear to be improving. For one
thing, the president is trying to burnish his legacy and avoid dropping a
high-profile environmental issue into Democratic laps in an election year.

In the Senate, 48 lawmakers have backed some form of cap-and-trade bill. And in
the House, two influential moderates have indicated they would like to harness
the cap-and-trade approach: John Dingell (D) of Michigan and Rick Boucher (D) of
Virginia. Among the forces at work there: Industry. It's getting more difficult
to site a coal-fired power plant. State programs are springing up like
dandelions, raising the prospect of adhering to a regulatory patchwork. And
after the US Supreme Court affirmed that the Environmental Protection Agency has
the authority to regulate CO2 as a pollutant, industry is loath to see the EPA
craft emission regulations.

What technology is being eyed to tackle CO2 emissions?

Look for significant increases in R&D for greener energy sources, at least in
the US. The omnibus spending bill President Bush signed in December contains a
23 percent increase in the Department of Energy's energy R&D budget over the
amount the White House requested. The administration's original request
represented a 10 percent cut from the previous year, according to an analysis by
the American Association for the Advancement of Science. Congress gave the
department authority to spend nearly $1.9 billion on energy research.

The goal is to advance technologies such as carbon sequestration, energy from
biomass, and solar energy. Carbon sequestration is particularly important,
because for developing countries like China and India, coal remains the
cheapest, most abundant fuel. The countries with the largest lead are likely to
reap the greatest economic benefits as international agreements include or
enlarge incentives to grow in a greener way.

What about energy efficiency?

This plays a prominent role in both IEA projections and in the Lieberman-Warner
bill. The IEA estimates that improved efficiency in buildings, vehicles,
appliances, lighting, and other power-hungry technologies could contribute
nearly 25 percent of the CO2 cuts needed by 2030 to reach the 3.6 degree-warmer
climate mark by century's end. The Lieberman-Warner bill calls for new codes
that by 2010 would lead to new or renovated residential and commercial buildings
that are 30 percent more energy efficient. The bill calls for a 50 percent
increase in efficiency by 2020.

What projects are scientists planning?

In February, federally-funded scientists head to the Southern Ocean to measure
the rate at which carbon dioxide moves from the atmosphere to the ocean and
back. It's one of the latest efforts to get a better handle on the processes
Earth uses to store carbon dioxide. The rate at which the oceans and biomass on
land can store CO2 is critical for estimating how quickly the heat-trapping gas
will build up in the atmosphere.

Scientists estimate that oceans soak up about 25 percent of the CO2 produced by
industrial activity. Rates of CO2 exchange between sea and air have been
measured for the North Atlantic and the equatorial Pacific, but not the Southern
Ocean. Yet the amount of surface area in the Southern Ocean available for CO2
absorption is huge. Wind is thought to be the key factor driving the exchange.
But wave height also may play a role: high waves may block wind, calming the
seas between crests. Calmer water takes up less CO2. Pinning down these
processes also can help scientists project the region's future CO2 uptake as
global warming alters weather patterns.

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Nuclear Engineering International

                               January 9, 2008

**More haggling ahead after Bali compromise.**

SECTION: Pg. 5

LENGTH: 540 words

The United Nations Climate Change Conference in the Indonesian island of Bali
ended with a compromise deal that was hailed as a great success by some and
derided as weak by others.

The eleventh-hour agreement in Indonesia saw sleep-deprived delegates agree to a
'roadmap' that begins a two-year round of negotiations rather than imposing
binding emissions targets.

Even this watered-down agreement looked set to fail when the USA refused to sign
up. But it was embarrassed into changing its position by the outraged booing of
some delegates, including one from Papua New Guinea, who said: "If you're not
willing to lead, please get out of the way."

The main industrialised countries agreed to cut their greenhouse gas emissions
but refused to agree to a European Union proposal for a target of 25-40% cuts by
2020. The wording that "deep cuts" to emissions are required was adopted.

Representatives of 187 countries agreed to the agenda based on key issues to be
discussed up to 2009, which include: action for adapting to the negative
consequences of climate change, such as droughts and floods; ways to reduce
greenhouse gas emissions; ways to widely deploy climate-friendly technologies;
and financing both adaptation and mitigation measures.

More talks scheduled for 2009 are supposed to ensure that a new deal can come
into force by 2013, after the first phase of the Kyoto Protocol expires.

Bali delegates also reached agreements on deforestation, adaptation, technology
and carbon markets.

However, immediately following the agreement, America's White House issued a
statement outlining its "serious concerns" about the Bali consensus. It called
for "common but differentiated" responsibilities - meaning that developing
countries should take bigger steps to cutting emissions.

It continued: "Major developing economies must likewise act. Just as the work of
the Intergovernmental Panel on Climate Change has deepened our scientific
understanding of the scope of the problem and action required, so too empirical
studies on emission trends in the major developing economies now conclusively
establish that emissions reductions principally by the developed world will be
insufficient to confront the global problem effectively.

"We must give sufficient emphasis to the important and appropriate role that the
larger emitting developing countries should play in a global effort to address
climate change."

The statement then went on to comment that a post-2012 agreement would only be
effective if "developed and developing countries are prepared to negotiate
commitments consistent with their national circumstances."

In any case, after the agreement was made, Indonesian environment minister and
president of the conference, Rachmat Witoelar said: "We now have a Bali roadmap,
we have an agenda and we have a deadline. But we also have a huge task ahead of
us and time to reach agreement is extremely short, so we need to move quickly."

The conference, held on 3-14 December 2007, included the sessions of the
Conference of the Parties to the United Nations Framework Convention on Climate
Change, its subsidiary bodies as well as the Meeting of the Parties of the Kyoto
Protocol. A ministerial segment in the second week concluded the conference.