

**TESTIMONY OF BRENDA EKWURZEL, Ph.D.  
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**FEBRUARY 25, 2009**

**BEFORE THE  
COMMITTEE ON WAYS AND MEANS  
U.S. HOUSE OF REPRESENTATIVES**

**THE HONORABLE CHARLES B. RANGEL, CHAIRMAN**

Honorable Chairman and Members of the House Committee on Ways and Means, I respectfully submit the following testimony in response to your invitation of February 19, 2009.

**Legislative hearing on “Scientific Objectives of Climate Change Legislation”**

Mr. Chairman and distinguished Members of the Committee, thank you for this opportunity to speak with you today on the scientific objectives of climate change legislation. I appreciate the opportunity to testify before you today on behalf of the Union of Concerned Scientists (UCS). UCS is a leading science-based nonprofit with more than 275,000 activists and members, which has been working for a healthy environment and a safer world for almost 40 years.

I am Dr. Brenda Ekwurzel, a geochemist with a deep understanding of climate science. In September of 1991, I was conducting research aboard an icebreaker in the Arctic Ocean. As our ship approached the North Pole station, I was astonished to find extensive open water that we easily passed through. Ever since, I have been committed to understanding climate change impacts in the Arctic and especially here in the United States. In 2007, the Nobel-prize winning IPCC released a report with the input of more than 1,200 authors and 2,500 scientific expert reviewers from more than 130 countries. This report found that human-induced warming is already having negative effects from rising sea level to more intense storms to severe drought.

For our nation, the most important objective of climate legislation is to cut heat-trapping emissions as quickly and as deeply as possible in order to avoid the worst consequences of global warming. At the same time, climate legislation needs to provide the funding necessary to invest in clean home-grown energy, transition assistance for consumers and affected workers, and climate

adaptation to make our nation more resilient. The good news is that many of the solutions that will curb global warming will also have profound benefits for public health, energy security, and our economy. UCS supports a comprehensive package of climate and energy policies of which cap and trade is a linchpin. If designed well, a cap and trade program sets the emission reductions that are necessary and then allows the market to achieve these reductions in a cost-effective and efficient manner.

In May 2008, more than 1,700 scientists and economists released a joint statement calling on our nation's leaders to swiftly establish and implement policies to bring about deep reductions in heat-trapping emissions. This was the first time in history that U.S. scientists and economists joined together to call for U.S. emission reduction targets. In their call to action they stated:

“The strength of the science on climate change compels us to warn the nation about the growing risk of irreversible consequences as global average temperatures continue to increase over pre-industrial levels (i.e., prior to 1860). As temperatures rise further, the scope and severity of global warming impacts will continue to accelerate.”

“We urge U.S. policy makers to put our nation onto a path today to reduce emissions on the order of 80 percent below 2000 levels by 2050. The first step on this path should be reductions on the order of 15-20 percent below 2000 levels by 2020, which is achievable and consistent with sound economic policy.”

They also warned that emerging science must be regularly evaluated to assess whether the goals set today are sufficient. In the nine months since the scientists and economists' call to action, the observations we're seeing are increasingly bleak and already may imply that more aggressive near-term emissions reduction targets are imperative. This is why we encourage members of Congress to include a “rapid response” science review provision in any climate legislation to ensure that the government updates policies in light of the latest evidence. In the science update in Appendix 1 of this testimony, we highlight a few of the latest scientific observations. These include sea level rising faster than expected and summer Arctic sea ice area plummeting which in turn places the frozen tundra at risk of releasing vast stores of carbon.

The most relevant fact for today is one that many may not be aware of. It is well documented that human activities have pumped excessive amounts of carbon dioxide (CO<sub>2</sub>) into the

atmosphere and studies have also concluded that the processes that absorb CO<sub>2</sub> simply cannot keep up. The ocean is critical to these processes. As it absorbs carbon dioxide, it becomes more acidic. This combined with increasing ocean temperatures, diminishes the ocean's ability to absorb CO<sub>2</sub> and clean the atmosphere which makes global warming worse.

By a simple analogy, my stomach would have no trouble digesting one slice of pizza. If I continued to eat, however, by the 12th slice of pizza my stomach would complain and have immense difficulty digesting one more slice. But I could easily eat those 12 slices over the course of a week. Likewise, the ocean is complaining and is starting to slow down its digestion of the excess CO<sub>2</sub> we have pumped into the atmosphere. Now that the "ocean's stomach" is almost full, it will take at least a thousand years for the ocean to digest the excess CO<sub>2</sub>. Hence, a ton of CO<sub>2</sub> emitted to the atmosphere today is worse than a ton emitted decades ago and means we cannot afford further delay. This is why a comprehensive climate solution to reduce emissions swiftly and deeply should be a top priority. The question is how swift and how deep.

### ***Overview: Setting a U.S. Emissions Reduction Target***

Establishing an emissions reduction target that avoids the worst consequences of climate change should be the central objective of well-designed climate legislation.

#### **Step 1: Define a Global Temperature Limit & Atmospheric Concentration**

Substantial scientific evidence from the IPCC indicates that an increase in the global average temperature of more than two degrees Celsius (°C) above pre-industrial levels (i.e., those that existed prior to 1860) poses severe risks to natural systems and human health and well-being. That's about 2 degrees F above where we are today. Studies indicate that, to have even a 50/50 chance of preventing temperatures from rising above this level, we must stabilize the concentration of heat-trapping gases in the atmosphere at or **below** 450 parts per million CO<sub>2</sub>-equivalent (450 ppm CO<sub>2</sub>eq—a measurement that expresses the concentration of all heat-trapping gases in terms of CO<sub>2</sub>). As you've already heard from Dr. Hansen, a lower concentration may be prudent.

## **Step 2: Define the Global Emissions Budget**

Lingering CO<sub>2</sub> in the atmosphere builds up as we continue to emit global warming pollution. We can only emit so much before we exceed our goals. Just like a spending budget, we have a limited budget of emissions. We must make specific assumptions in order to make the calculations to stick within our budget. For illustrative purposes we are going to focus this example around a 450ppm atmospheric concentration goal, even though that level may not be sufficiently precautionary. We consider this level an absolute minimum in order to avoid the worst consequences of global warming. Studies suggest that in order not to exceed 450ppm, we must limit worldwide cumulative emissions to around 1,700 gigatons (Gt) CO<sub>2</sub>eq over the 2000–2050 time period.

## **Step 3: Define the U.S. Share of Global Emissions Reduction**

There are several ways to determine the U.S. share of the overall industrialized nations' emissions budget, such as comparing it with our share of those nations' population, gross domestic product (GDP), or heat-trapping emissions. In this example, over this same 50-year period, let's assume that 40 percent or 700 GtCO<sub>2</sub>eq of the global budget is allocated to the industrialized nations based on their emissions share in 2005. For the United States' share of these emissions, this would mean our budget is 265 GtCO<sub>2</sub>eq. However, if it were based on U.S. share of population it would be as low as 160 GtCO<sub>2</sub>eq. As was stated, a concentration of 450ppm only has a 50 percent chance of staying below 2 degrees C and therefore the top end of this range (265 billion tons) is probably too high. Therefore it may be prudent to recommend a deeper reduction target. Now, how does this cumulative budget translate into percent emissions reductions?

## **Step 4: Define the U.S. Emission Reduction Targets**

To meet the cumulative budget of no more than 265 GtCO<sub>2</sub>eq, the United States must reduce its emissions at least 80% by 2050. As we strive to make these reductions, the earlier we start, the more flexibility we will have later. If, however, U.S. emissions continue to increase until 2020

(even on a “low-growth” path projected by the Energy Information Administration (EIA)), we would need to double the rate of reductions to avoid a crash finish. Companies are making decisions today about how to invest in our energy infrastructure. Considering the life of a power plant can be upwards of 60 years, we must send the signal now to build clean energy infrastructure and avoid dirtier choices that will lock in irreversible consequences. That’s why we need to set a near-term emissions reduction target for the next ten years. To set a near-term target for U.S. reductions, we must consider the need to:

1. Limit “lock-in” of carbon-intensive technologies;
2. Guarantee we’re on track to stay within our long-term cumulative budget; and
3. Maintain options if scientific evidence reveals effects are worse than expected.

Taken together, these considerations suggest that near-term reductions should be as swift and deep as possible. In its most recent report, the IPCC looked at a range of studies on what different countries would have to do to reach 450ppm. The range the IPCC reports for the industrialized nations is 25-40% below 1990 levels by 2020, which is at least 35% below today’s levels.

Given the urgency of the science, the danger of carbon lock-in, and the need to hit long-term goals, UCS thinks it is prudent to reduce our U.S. emissions by approximately 35% from today’s levels (about 25% below 1990 levels) by 2020. In our analysis approximately 10% of these reductions can come from tropical forest protection and the rest can come from emissions reductions in the electric, transport and agricultural sectors of the economy. To reach this goal we recommend a comprehensive package of climate and energy policies, including a cap and trade program that ensures near-term reductions and includes a mechanism for course correction to respond to new scientific evidence. We look forward to working with Congress on a policy that achieves the needed emissions reductions to ensure a safe climate for us and our children.