

## The Economics of 350

The world can afford to reach for the 350 parts per million (ppm) CO<sub>2</sub> levels recommended by climate science to reduce the risks of climate disaster.

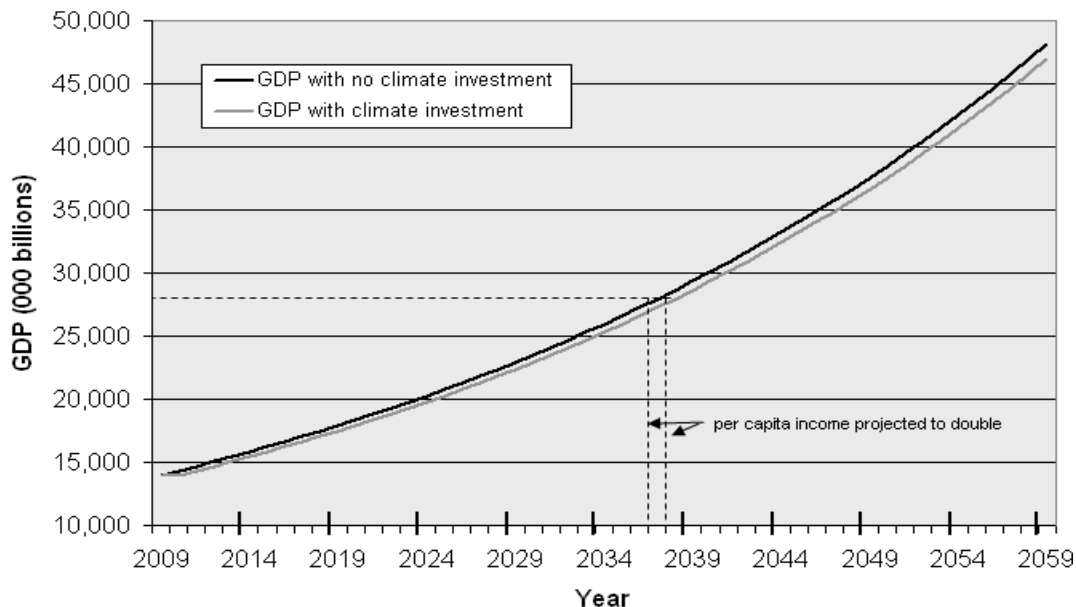
This is the conclusion of a recent report by the Economics for Equity and the Environment Network, *The Economics of 350: The Benefits and Costs of Climate Stabilization*. The report, surveying economic studies informed by the most up-to-date science, finds that more ambitious emissions targets make good economic sense. The report outlines what it will take to achieve 350 and finds that a comprehensive global strategy is still affordable now to avoid far greater damages from climate change in the future.

### The Costs of 350

Most studies of the benefits and costs of getting to 350 ppm confirm that, with investments no larger than 1-3% of global GDP, the world can transform to a clean energy economy, rebuild global forests to trap billions of tons of carbon, create a net increase in jobs, and stabilize the climate. This result is consistent with earlier estimates by the Stern Review and the Intergovernmental Panel on Climate Change (IPCC) of the costs of achieving far less ambitious emissions targets. As the E3 Network report demonstrates, the bad news on the climate front is not that the costs of solving the climate problem are becoming too expensive; the bad news is that the costs of inaction are becoming unbearable.

One to three-percent of global output is a reasonable premium to insure our children against climate damages. Most households, individually and in the aggregate, already spend a greater percentage of income on insurance policies to protect against calamities less likely than climate change.

### Impact of Climate Investment on U.S. GDP



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To put these figures further in context, the US economy grows at 2.5% a year. Spending 2.5% of GDP on climate protection each year is equivalent to skipping one year's growth, and then resuming (see figure). Stated differently, Americans in 2050 would have to wait one additional year, until 2051, to be as rich as they otherwise would have been, had they not been steadily investing in the transition to clean energy. In China, where the economy is growing at a much faster pace, spending 2.5% of GDP on climate change prevention is equivalent to skipping a few months of growth before resuming. Military spending, another type of insurance against risk, is greater than 4% of GDP per year in both the U.S. and in China. Both countries are already diverting more from annual consumption, year after year, than what most economists estimate it would take to stop global warming.

The report's conclusions are very different than those based on proprietary models used by groups determined to defeat climate legislation. For example, analyses by the Charles River Associates for the National Association of Manufacturers and the US Chamber of Commerce purportedly demonstrate that the costs of achieving far less ambitious targets than 350 will "destroy the economy." Studies like these are well-known for making very pessimistic assumptions about technological change, innovation, policy design and implementation, and for examining only costs -- and ignoring benefits. As Senator Bingaman recently noted, models are "imperfect tools" which have "often been used or manipulated to make a predetermined point or to show favorable or unfavorable results for any given policy." The way to decode models is to understand their assumptions, which can change the recommendations quite dramatically.

Rather than rely on the results of any one model, the report by E3 Network surveys the results of non-proprietary analyses of the costs of achieving the 350 target. The report is notable for what it did not find. It found no reasonable economic studies that conclude that a 350 ppm stabilization target will destroy the economy. On the contrary, almost all studies agree that immediate action aimed at ambitious emissions targets makes good economic sense.

### **Why 350 and What Will It Take to Get There?**

Climate policy in the U.S. and abroad has been largely focused on stabilizing CO<sub>2</sub> concentrations at 450 ppm. But in recent years, scientists led by NASA's James Hansen, argue convincingly that to avoid triggering the collapse of the ice-sheets and eventual flooding of the great coastal cities of the world as well as other catastrophic climate disasters, global warming must be held to less than 2 degrees C. This means stabilizing atmospheric levels at 350 ppm, a target recently endorsed by the Chair of the IPCC, RK Pachauri, and former Chief Economist of the World Bank, Sir Nicholas Stern.

Hansen describes a detailed scenario for reducing greenhouse gas emissions to reach 350 ppm CO<sub>2</sub> by 2100, including phasing out coal completely (or achieving 100% carbon capture) by 2030; large-scale reforestation; avoided deforestation; and withdrawing and sequestering CO<sub>2</sub> from the atmosphere. The world would have to quickly go beyond reductions to achieve net negative emissions—removing more greenhouse gases from the atmosphere than are emitted each year. Skeptics argue that such actions are economically impossible.

Yet E3 Network shows how a 350 ppm goal is feasible. It starts with a less demanding but still ambitious trajectory, one that reaches 350 ppm CO<sub>2</sub> by 2200 but does not require the world to achieve negative

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net emissions. In this scenario, emissions are reduced to 54 percent of 1990 emissions by 2020, 3 percent by 2050, and then zero out, but do not go negative.

Eliminating carbon emissions by 2050 is possible with, roughly, the suite of technologies now available or on the near-term horizon. Very aggressive policy, however, will still be required very soon to drive down the costs of renewables, to redesign cities, transport and agricultural systems, and insure that all efficiencies are captured. These actions taken together can achieve 350 by 2200. Taking the additional steps to develop large-scale cost-effective sequestration technologies to get negative emissions that go well beyond reforestation could get us to 350 by 2100. A goal of 350 by 2100 is the safest strategy, as it minimizes the chances of surpassing critical thresholds in the climate system.

### **Conclusion**

A realistic policy scenario for stabilizing CO<sub>2</sub> emissions at a level as low as 350 ppm demands not only maximum progress in pursuing energy efficiency and promoting renewable energy, but also measures that remove carbon from the atmosphere.

How much can be gained by energy efficiency, solar power, carbon capture and storage, and other new technologies? This is a question about an unknowable future. A century ago, just before the outbreak of World War I, no one could have anticipated mobile phones, laptop computers, and the internet. These technologies revolutionized society and created jobs. Many of the technologies that will be needed for large-scale sequestration are not yet mass-produced or commercially available, but we can imagine them and work is underway. Technologies do not evolve in a vacuum: the pace and direction of technological change is highly responsive to public policy. The pace of the clean energy revolution will determine whether and when we can meet ambitious CO<sub>2</sub> concentration goals. But we also know that failure to stop global warming will impose very high costs on our children.

This report shows that reaching a 350 ppm goal is affordable. What we cannot afford is too little climate policy, too late.

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*Dr. Sheeran is the director of Economics for Equity and the Environment Network, a national network of economists devoted to developing and applying economic principles to protect human health and the environment, and one of eight authors of the report, *The Economics of 350: The Benefits and Costs of Climate Stabilization*. The full report is available for download at [www.e3network.org](http://www.e3network.org).*