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Salvaging Durban with Clean Energy Innovation

BY MATTHEW STEPP AND ROBERT D. ATKINSON | NOVEMBER 2011

It's time to stop pretending we can solve climate change with unenforceable pledges to use fossil fuels a little less.

Kyoto. Copenhagen. Cancún. Now Durban. Don't expect much when representatives from nearly 200 countries meet in the South African city this week to try once again to create an international climate change agreement. Even if talks succeeded beyond the proponents' wildest dreams and every country agreed to carbon emissions targets, it would still not be a success. Why? Because carbon emission targets alone can't reduce greenhouse gas emissions enough—not with the current technology. Like previous conferences, Durban is likely to overlook the best way to drastically reduce carbon emissions—making unsubsidized clean energy cost-competitive with fossil fuels by driving innovation.

It's time to stop pretending we can solve climate change with unenforceable pledges to use fossil fuels a little less. We're seven billion people and growing. We're a 60 trillion dollar global economy and growing. It's time for some new ideas and better tools. Here's one: let's make innovation central to the Durban negotiations. *As an alternative to carbon targets, let's create government clean energy RD&D (research, development, and demonstration) investment intensity targets that countries can sign up for in lieu of agreeing to cap carbon emissions.* In doing so, world leaders would effectively boost investments in the front-end of clean energy innovation—an area of significant concern and underfunding—thus spurring the development of the very technologies all countries, rich and poor, need to drastically reduce emissions without ongoing expensive subsidies. Paraphrasing Arun Majumdar, director of Department of Energy's Advanced Research Projects Agency-Energy, there a lot of places around the world that want to turn the lights on for the first time.[1] We need to help turn them on the right way—that is, without using more fossil fuels and emitting more carbon.

Fortunately, the Durban talks seem ripe for new ideas for two reasons:

First, many countries and advocates want to begin discussing new emission reduction targets and legally binding mechanisms. The first commitment period of the Kyoto Protocol—which called for a five percent reduction in carbon emissions below 1990 levels—expires in 2012 (and only some European countries meet their targets, largely with the help of carbon offsets). Though targets and timetables aren't expected to be officially negotiated in Durban, each is expected to be a hot topic of discussion.

But as we've learned from the U.S. and international climate debate, carbon reduction targets is a small piece of the larger policy puzzle.[2] And, as we have seen, they might never get accepted by all nations needed to accept them. Mandating carbon reductions does apply pressure on governments to take policy action (and it has arguably helped spur some governments to make limited actions so far), but by itself is insufficient and ultimately diverts attention from the real agenda: driving clean energy costs down through innovation.[3] Caps rely almost exclusively on prices to induce change (caps raise the price of carbon emissions). And it is now clear that price hikes induce some behavior change (e.g., driving smaller cars, insulating buildings, etc.), but they don't magically lead to the creation of new generations of affordable non-fossil alternatives. So, while it is great that more countries are ready for new targets and caps, we need to be honest about their limitations.

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Second, Durban aims to complete an institutional framework for progress made during the Copenhagen and Cancún negotiations, such as finalizing the architecture of the Green Climate Fund—a financing mechanism to support accelerated technology transfer to developing countries for both adaptation and mitigation efforts. In Copenhagen, developed countries agreed to commit $30 billion to the Fund by 2012 and plan to invest $100 billion per year by 2020. While the details aren't set, it can be assumed that the lion's share of the Fund will be used to subsidize the sale of existing clean energy technologies.[4] But this doesn't get us very far at all.

The problem is that innovation is absent from discussions of the Fund.[5] This is just another kind of clean energy subsidy, akin to feed-in tariffs or tax credits for buying clean energy that rich countries have had in place for years. If innovation isn't central to these discussions, their impact will be limited to simply subsidizing high cost technologies for countries that can't afford them in the first place. Subsidies of existing clean energy technologies are not the answer in rich countries, and even less so in poor countries.

As such, the Fund should be completely rededicated away from subsidies of existing technologies and instead go toward research and development designed to get the unsubsidized cost of clean energy cheaper than fossil fuels. In other words, developing countries would be much better off if rich countries used their money on domestic clean energy RD&D rather than clean energy handouts. Only when clean energy is cheaper than fossil fuels will developing countries make the switch and only then will it make their economies stronger, rather than weaker. Again, we should seize on the apparent understanding that new technologies are needed and try to persuade negotiators that we

need to reprogram money to get these technologies developed, off the ground and ready for deployment. Developing nations will complain, arguing yet again that the North is oppressing the South, but the best way to help the South is for the North to continue to develop breakthrough technologies.

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But reprogramming the Fund is not enough. Durban can and should go even further. This is where clean energy RD&D intensity targets come in.

We are a long way off from developing a global clean energy system that is cheaper than fossil fuels. We need radical innovation in storage technologies. We need dramatic innovations in biofuels, including those from algae. We need much better solar energy technology. Etcetera. And these advancements require investments in the foundation of energy innovation, including basic research, applied research, prototyping and commercial scale demonstration projects. Without investments in each, the clean economy will fail to provide a steady flow of technological improvements, breakthroughs, and enabling technologies necessary to get the unsubsidized cost of clean energy down to where the poorest nations will want to buy it, because it makes economic sense.

Using data from the International Energy Agency (IEA) and the Belfer Center at Harvard, global clean energy RD&D investments total over $16 billion a year (in 2008, the most relatively complete dataset, global clean energy RD&D intensity was 0.027 percent).[6] But the IEA calculates that global RD&D investments of $40 – $90 billion per year (a 2008 RD&D intensity of 0.065 percent to 0.147 percent) is needed to stimulate the development of the affordable clean technologies we need.

So the world is underfunding the foundation of clean technology development by $25 to $75 billion per year. Assuming, as IEA does, that governments must pick up the tab of at least half of that amount, the world's leaders must boost RD&D investments by $12 to $38 billion. It's unlikely that this has even come up during the Green Climate Fund talks. So we are setting ourselves up to tackle an increasingly big job with tools not fit for the job. That's a recipe for failure.

To fill this gap, countries should be offered a choice: they can agree to carbon target reductions, or instead they can agree to meet gradually increasing government clean energy RD&D intensity targets. Clean energy is defined here as renewable technologies, advanced nuclear, energy efficiency, carbon capture, and the host of enabling technologies needed to make these technologies competitive such as storage and smart grids. And investments could come from a mixture of direct government expenditures, such as to national laboratories and through grants, as well as through the tax code, such as through targeted clean energy R&D tax credits.

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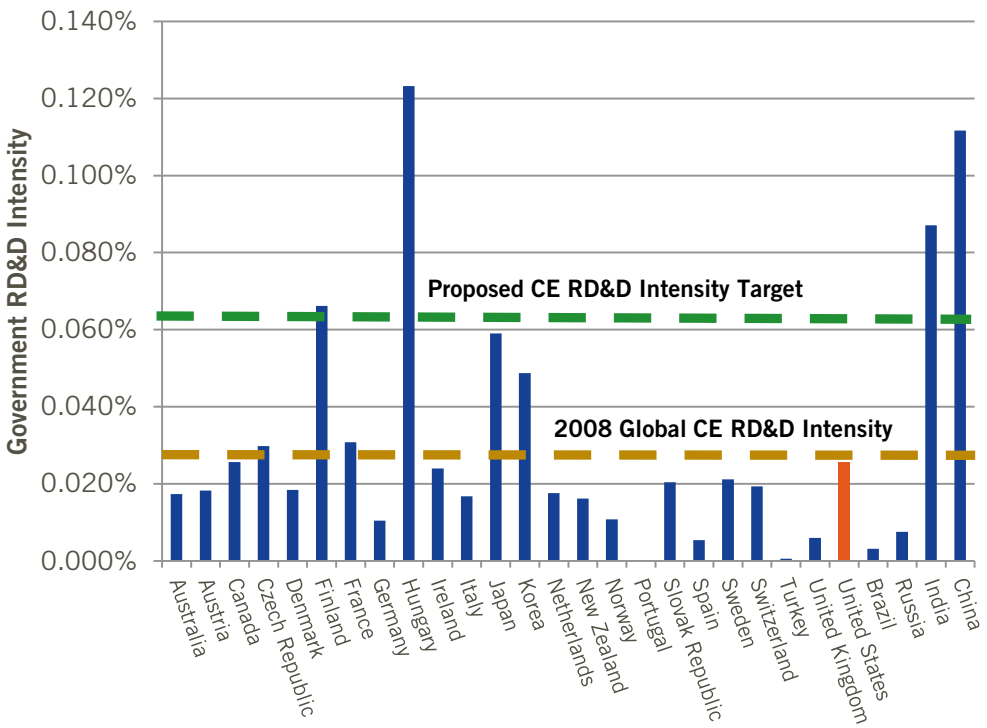

Figure 1: Comparison of select 2008 government clean energy RD&D investment intensity (RD&D investment/GDP). Clean energy is defined as renewable energy, nuclear energy, CCS, battery storage, and smart grid. Green dashed line represents proposed global RD&D investment target of 0.065 percent. Yellow dashed line represents total 2008 global clean energy RD&D intensity. United States noted in orange. China, India, Russia, and Brazil data only includes direct government RD&D investments, excluding investments made through state owned enterprises.

Let's assume by 2013, countries wanting to meet their commitments through R&D must increase their clean energy RD&D intensity to 0.027 percent (must meet the yellow dashed line in the graph above). A number of countries, including China, Japan, South Korea, and India already exceed this target. So if all other countries (where data is available) increased their clean energy RD&D investments to meet this goal, global clean energy RD&D would increase by almost $5 billion (to a total of $22 billion). For reference, the United States would have to increase its RD&D investment by $400 million compared to 2008 funding levels.

Then over the following five years, the clean energy RD&D target should gradually increase. For arguments sake, compared to 2008 GDP and investment data, if every country meets a target of 0.065 percent RD&D intensity by 2018, almost $19 billion in additional RD&D investment would be made (or globally a total of $35.5 billion). Countries like India, Finland and Hungry already meet this more aggressive goal while the United States would have to increase investments by almost $6 billion compared to 2008 funding levels (China may also meet this, but it's not entirely clear how much funding comes directly from the government). And, of course, higher targets can be set later depending on how much further clean technologies must develop to become affordable and globally viable.

The benefits of pursuing this type of international agreement are clear. From a climate mitigation perspective, significantly boosting global investment in clean energy innovation would be a huge victory that addresses the heart of the emissions problem—providing viable clean substitutes to dirty energy. Ultimately the only way to meet global carbon emission targets is for economic actors to want to reduce emissions voluntarily because cleaner technology makes it economically advantageous to do so. So even without carbon targets, increased RD&D investments would be a bold leap towards reducing carbon emissions. And if there is ever international carbon targets, increased RD&D investments would make hitting those targets significantly easier.

Ultimately, the only way to meet global carbon emission targets is for economic actors to want to reduce emissions voluntarily because cleaner technology makes it economically advantageous to do so.

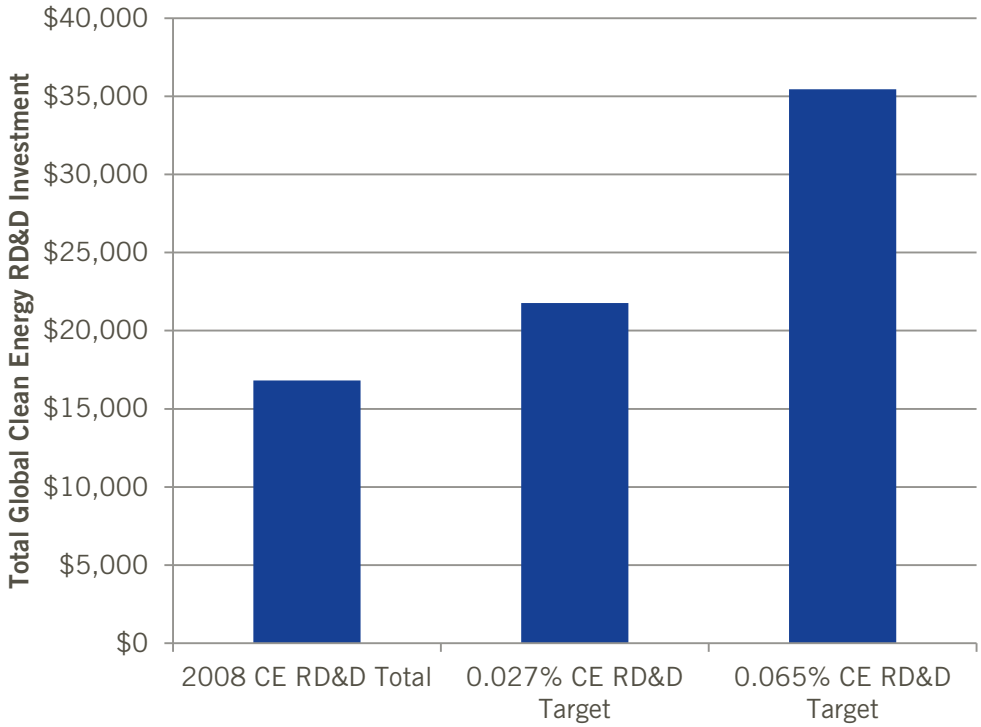

Figure 2: Comparison of total global clean energy RD&D investments. It's assumed that countries exceeding theoretical RD&D intensity targets (0.027 percent and 0.065 percent) continue at higher investment levels. Year 2008 data is used as a benchmark. Only direct government RD&D investments are counted.

But a significant selling point would be how more investment boosts a country's international competitiveness. Unlike carbon caps (or taxes) which hurt a nation's global economic competitiveness (since it raises the prices of its exports), clean energy innovation can help a nation's competiveness. It would be up to each country to decide which technology categories to invest in as well as what stage of innovation (i.e. basic battery science vs. applied solar research vs. CCS demonstration) it wants. So, these investments could leverage existing competitive advantages (such as U.S. universities or Brazilian agriculture) or spur countries to develop new ones.[7] In all cases, more public investment would increase additional private sector investment. This would also to boost exports as technologies develop further. Ultimately it would be a win-win for individual economies, global commercial opportunities and, of course, the global climate.

Negotiators headed to Durban this week represent the hopes of the entire planet for sustainable growth, just as their predecessors did in Kyoto and Copenhagen and Cancún. However earnest their aspirations and creative their proposals, they should recognize that epic struggle to stem and reverse climate change is doomed without bold new approaches. Dramatic changes in how we produce and consume energy are only going to come with aggressive direct efforts to spur clean energy innovation. Let's get countries as committed to the clean energy innovation race in Durban as they are to making earnest but ultimately futile pledges to cut emissions through emissions targets.

ENDNOTES

1. Arun Majumdar's comments were made during a presentation at Energy Innovation 2011 on November 17, 2011 in Washington, D.C. The presentation and keynote address video can be found at the conference website: http://www.itif.org/events/energy-innovation-2011.
2. There is a vigorous discussion on the limits of national and international carbon caps, prices, and targets policies. For a good overview on restarting the international climate debate see Robert Atkinson et al., "Climate Pragmatism: Innovation, Resilience, and No Regrets," (technical report, ITIF and Breakthrough Institute, Washington, D.C., July 2011), http://thebreakthrough.org/blog/Climate_Pragmatism_web.pdf. For a discussion on the limits of international carbon caps see Ted Nordhaus and Michael Shellenberger, "How to Change the Global Energy Conversation," *Wall Street Journal,* November 29, 2010.
3. For a good discussion on the limits of carbon pricing see Matt Hourihan and Robert D. Atkinson, " Inducing Innovation: What a Carbon Price Can and Can't Do," (technical report, ITIF, Washington, D.C., March 2011), http://www.itif.org/publications/inducing-innovation-what-carbon-price-can-and-can%E2%80%99t-do.
4. Michele de Nevers, "Green Climate Fund Designers Need to Think Big," (blog, Center for Global Development, October 3, 2011), http://blogs.cgdev.org/globaldevelopment/2011/10/green-climate-fund-designers-need-to-think-big.php.
5. For a good discussion on international climate finance, see Letha Tawney and Lutz Weischer, " Innovation and Technology Transfer: Supporting Low Carbon Development with Climate Finance," (technical report, World Resources Institute, January 2011), http://pdf.wri.org/working_papers/innovation_and_technology_transfer.pdf.
6. International Energy Agency, *Global Gaps in Clean Energy RD&D: Update and Recommendations for International Collaboration*, (2010), http://www.iea.org/papers/2010/global_gaps.pdf; Ruud Kempener, Laura Anadon, and Jose Condor, "Governmental Energy Innovation Investments, Policies, and Institutions in the Major Emerging Economies: Brazil, Russia, India, Mexico, China, and South Africa," (technical report, Belfer Center for Science and International Affairs, November 2010), http://belfercenter.ksg.harvard.edu/files/ETIP_DP_2010-16-V3.pdf.
7. Letha Tawney, Francisco Almendra, Pablo Torres, and Lutz Weischer, "Two Degrees of Innovation: How to Seize the Opportunities in Low-Carbon Power," (technical report, World Resources Institute, September 2011), http://www.wri.org/publication/two-degrees-of-innovation.

ABOUT THE AUTHORS

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ABOUT ITIF

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