Foreword

The green economy, within the context of sustainable development and poverty eradication, is one of the two themes of the 2012 Conference on Sustainable Development, to be held in Rio de Janeiro. It encompasses some of the most important challenges we face today: eradicating poverty, improving our relationship with the environment, addressing the potential negative impacts of global climate change, and creating a new path for sustainable development.

The green economy is defined as an economy that results in improved human well-being and reduced inequalities, while not exposing future generations to significant environmental risks and ecological scarcities. It seeks to bring long-term societal benefits to short-term activities aimed at mitigating environmental risks. A green economy is an enabling component of the overarching goal of sustainable development.

A green economy does not automatically imply higher levels of output and employment when compared with a "brown" (or traditional) economy. Rather, moving towards a green economy implies not only the mainstreaming of green niches in specific sectors of an economy but also a change in an economy's overall social construct. The sustainable development challenge for a green economy is to be able to produce more wealth, employment and better social services, coupled with a lower absolute use of natural resources and greater reliance on less carbon-intensive and renewable energy, without causing regional displacement due to uneven endowment of natural resources. There is important policy work to be done to ensure that paths to a greener economy are socially inclusive and contribute to equitable economic and social development.

How then, do we transition to a green economy?

There are at least four key elements that need to be addressed for a successful transition. First, identifying new sources of funding that can be directly applied to transitional efforts in developing countries; second, creating an enabling environment that is conducive to private investment that will support these efforts; third, taking advantage of trade as a supporting tool for sustainable development and avoiding the temptation of green protectionism; and fourth, designing new and effective mechanisms to transfer green technologies to developing countries.

The international community has a role to play in supporting the transition of developing countries and ensuring it takes place in accordance with the principles of equity and sustainable development.

Developed economies will have at hand greater financial, human resource and technological means to navigate their transition to a green economy with relatively low costs. Conversely, developing economies are likely to incur higher transition costs. It is difficult to imagine a transition phase in which, at least in the early stages, the internalization of the environmental and social costs do not result in a reduction in real income.

There is, therefore, a genuine basis to argue for significant investment to assist developing countries in their move to a green economy and thereby achieve a higher degree of sustainable development. This is particularly so if it is accepted that a more sustainable, green and less carbon-intensive world economy comprises a global common good that benefits all humanity. Short of accepting this, the internalization of environmental costs is an extra effort that many countries, both developed and developing, may not be willing to make voluntarily or undertake in isolation.

The green economy is not a theoretical concept. Some countries are already moving aggressively towards it and it is imperative that all countries consider reshaping their development strategies and practices accordingly. International cooperation will help ensure that opportunities arising from the transition are maximized and the risks minimized. Multilateral cooperative action is the only way forward.

The recent UNCTAD *Ad Hoc Expert Meeting on the Green Economy* identified the transfer of appropriate technology, the leveraging of climate finance and the transition to more sustainable lifestyles (as opposed to lower living standards) in industrialized economies as fundamental steps towards a feasible transition.

It will also be important to create innovative new markets such as forestry carbon credits, and focus more attention on South-South trade and technology transfer.

Furthermore, the international community must agree upon the principles for the design and implementation of trade-related instruments in relation to a green economy. The current WTO rules are not clear as there is no multilateral consensus on best practice. Without guidance, it is likely that green economy-related disputes will be referred to the World Trade Organization's dispute settlement mechanism, which could be corrosive to the multilateral trading system.

Whether a green economy has the potential to become the basis for a new development path will depend on how its benefits are perceived and the burden of the transition costs ultimately shared. UNCTAD will provide a forum for debating and addressing all the issues raised herein in the run up to the 2012 United Nations Conference on Sustainable Development.

It is the aim of this publication, **the Road to Rio+20**, to contribute to the debate through a collection of essays that provide different perspectives on how to increase the benefits and reduce the risks in the transition to a **development-led green economy**. I hope the articles will trigger more critical thinking and awaken the imagination on our journey to Rio de Janeiro in 2012.

Supachai Panitchpakdi
UNCTAD Secretary-General

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Approaching Rio+20:
the global context

Globalization in the era of environmental crisis

Jeffrey Sachs

In a world dominated by human activity, how can we ensure sustainability when economic growth is a given in the developed and a necessity in the developing world? Jeffrey Sachs offers two approaches. One involves stabilizing population, with the concomitant need to improve survival rates to ensure access to contraception and empower women and girls. For the other, Sachs calls for a systemic approach to new technology supported by an economic strategy "where markets and society make choices together". Furthermore, he emphasizes "we don't need global negotiations, we need global brainstorming and global problem solving".

We face more challenges per minute than we could handle per month, per year, per decade.

They're cascading upon us, and even though these finance, energy, or climate crises sometimes seem to be independent, they are interconnected. They are all signs of a tightly-knit world that is still unable to come to grips with the real nature, challenges, opportunities and threats of globalization.

I am going to write here about the global economy in the context of the environmental challenges that we face. In some ways, you will say, well, we know those things. Indeed, perhaps our biggest challenge is not exactly what we know, but how we act. How it is that we lose so much time on a planet that does not have the time and the luxury that we think it has.

We can no longer put economy and ecology in separate categories. They never were in separate categories—our economy rests on the base of ecology because we are biological organisms. We depend on water, the food we grow, the safety from natural hazards, the coming of the rains on time. Millions die and hundreds of millions are threatened by inadequate food supply, by chronic drought, by disasters that befall them, ever stronger storm events, higher variability, many threats to food security. So there is no separation of development and environment. Because the environmental challenge, the economic challenge and the social challenge are so integrally connected, they must not be separated intellectually or in the negotiations or brainstorming that the world must now undertake. That is my central message: we face a dire and growing crisis. We are in the age where sustainable development is truly the fundamental challenge. Our world is literally unsustainable right now in the way it operates, in all scales and dimensions.

We are unsustainable socially. The world fabric is coming apart, not coming together. The gaps of the richest and the poorest are widening. There are, of course, poor countries getting richer, but it is also true that many of the poorest people on this planet are dying of their poverty and, if not dying, struggling to survive and falling further and further behind.

What's happening? What's happening, of course, on the ecological front, is that the world is really bursting at the seams. Now some part of that is due to the success of our economic progress. We have become so productive that we can mine the oceans of fish till they disappear, we can mine the lands of mineral resources until they're gone, we can deplete resources at a rate that's absolutely staggering, because we've become pretty good at it through almost magical technologies. We've also become very numerous, of course, and the population growth rate continues at an unsustainable course. Even though the rate has come down, the human population is still increasing at about 75-80 million people per year. That means adding more than 2 billion people by mid-century to a planet that is already profoundly stressed. Still, each of those persons on the planet expects and will expect to have their human rights met and to have access to resources, which will lead to an extreme collision of resource and possibilities.

Now the concept that I really believe is pertinent for all of us and that I want to spend a few minutes on is a concept that was coined by a Nobel laureate, the atmospheric chemist Paul Crutzen. Crutzen is one of the three

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atmospheric scientists who discovered the ozone depletion effect of chlorofluorocarbon. Their great discovery saved vast numbers of people and spared us vast destruction. Incidentally, we didn't even know about this ozone depletion effect except by the accident of the brilliance of these scientists and then the accident that we actually had a NASA satellite that could take pictures of the hole of the ozone layer above Antarctica. I mention that fact because we do not even know what we're doing to the planet. Our effects are so pervasive, so inclusive, that we are doing damage the likes of which we won't recognize until the next Nobel winning scientist explains to us how we are destroying the life support systems of the planet through some mechanism that we're not even aware of today. That's what Crutzen and his colleagues did.

A few years ago, Paul Crutzen coined the neologism the 'Anthropocene' as the term for our new age. What is the Anthropocene? *Anthropo* is from Greek and means human, and ene means epoch. By using this term, Crutzen suggests that we are in the human-made epoch of the planet. What does he mean by that? He means that we are in the age of the planet—the geologic age, mind you—where human activity dominates the earth processes. This is an extraordinary concept: that humanity has become so large in absolute number and in average economic activity per each of us, that we have overtaken the physical earth processes in vital ways to the point of threatening the stratospheric ozone level, to the point of changing the climate, to the point of fundamentally changing the hydrologic cycle and so forth. The American Geologic Society looked at sediment patterns on the planet and climate patterns and found that Crutzen was not just speaking in metaphors, he was speaking in rigorous, geologic terminology: we've entered a new era where Earth processes have fundamentally changed.

The Earth's processes have changed in several ways of crucial note for us. First, there are nearly 7 billion people on earth now and, remember, that is 10 times the number that lived when Malthus wrote 'The principles of Popul' in 1798. There are 7 billion of us that are demanding so much food and land use that human beings are now appropriating almost half of all the photosynthesis occurring on the planet for 'primary productivity', as it's called. We're doing that in our croplands and in our pasturelands. And these calculations are also including the photosynthesis lost by previously vegetated land that is now under the asphalt of our cities. That's extraordinary—we're taking about half, maybe 40-50 per cent—of the primary food production on the planet for one species. You can be sure what that means. That means the mass death of other species, because we are appropriating what used to go for the rest of the biosphere. That may seem like a zero-sum struggle, but it's a negative-sum struggle because we are now pushing so hard on the food supply that we are leading to the extinction or dramatic population decline of the very plants and animals that we depend on for our survival. The pollinators: disappearing; whole classes of amphibians: disappearing; fisheries around the world: disappearing. It is absolutely extraordinary.

We're also fundamentally interfering in the hydrologic cycle, the earth's watercycle, because we've built about 60,000 major dams on the rivers around the world. I can't even imagine these numbers—how can there be 60,000 dams? But that's the count, I'm just referring here to what I read, because I can't really, viscerally, accept that. But what I do know is that many of our major rivers no longer flow to the sea. And you know it too. Major river ways are drying up well before they reach the sea: the Ganges, the Yellow River—even the Rio Grande is now the Rio Pequeño. This is the effect of mass interference of human beings in the hydrologic cycle, and there is more to come, as a very significant part of our food supply comes from irrigated crops. A very significant proportion of our irrigated crops come from groundwater irrigation. A very significant part of the groundwater irrigation is being discharged much faster than it's being recharged, so that the water table is falling sharply, and we have large populations at threat of water depletion. And when this is happening on the North China Plain or the Indo-Gangetic Plain, or the Ogallala Reservoir in the American Midwest, or in the Andes, there are no easy answers. There are short-term answers which are lousy.

This same story is true with our glaciers. The glaciers, you know, are pulling back. Snow melt, which is a buffer for seasonable river flow in the spring and summer, and provides the summertime irrigation for our food system, is coming earlier and earlier. Some snow melt never turns to snow anymore because of the warming and that means you get winter run-off of the water rather than spring and summer run-off. This means that the water is going before the crops can begin to develop. The glaciers, of course, are going to disappear entirely in many or most places, and

Tropical storm devastated communities
Gonaives, Haiti
3 September 2008

that represents the water supply for hundreds of millions of people in the Andes, in the American Northwest, and on the Himalayan Tibetan Plateau, for example. What are we doing about it? Nothing right now.

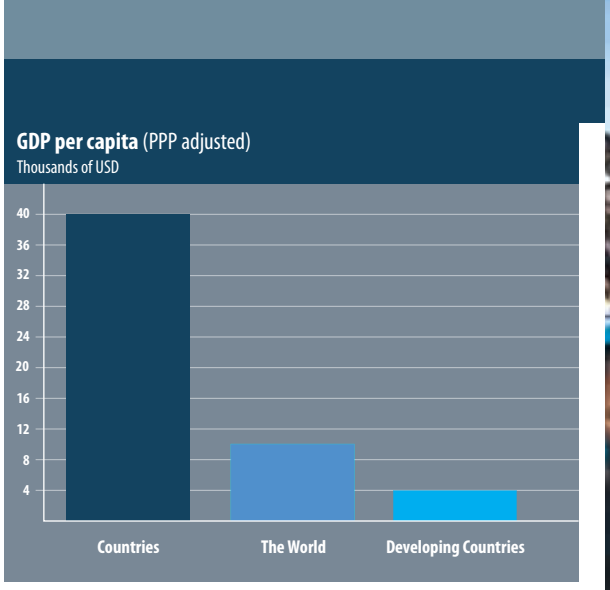
I have not touched upon the biggest challenge of all—and that, of course, is climate change and the greenhouse gases. Everything I've already mentioned would be problematic enough without the added impact of climate change. The water crisis and the dams and the zoonotic diseases and so forth have their own dynamics, as does the food supply and the land clearing, but add on top of that the climate change that's underway, and not just the climate change, but the other effects of the greenhouse gases.

When you don't like your climate anymore, it's too late. When your beautiful homeland is not inhabitable anymore, it's too late. Because the carbon dioxide remains in the air for centuries and because anything you see now—the storms, droughts, weather variability, disappearance of the short rains as is happening over the Sahel—all of this will continue even if we were to stop at zero new emissions now.

The effects of climate change will be pervasive—they already are. It will mean more droughts, more floods. It will mean loss of irrigation water when we need it, higher rates of evapotransportation, more intense episodes of precipitation leading to more run-off rather than more percolation into the soils. Higher temperatures will mean loss of crop yields because there is temperature stress to the crops. It will mean more extreme storms: the typhoons in the Indian Ocean and in the China Sea and in the Caribbean. Once we decide the 'theory' was right, it will be too late. We don't know how to turn that off, that's for sure, once it's turned on. All of this is to say that the age of the Anthropocene is real and is upon us.

Now if that were not enough, ladies and gentlemen, I'm going to add on another layer. That would be true even if we stopped what we are doing right now, even if there was no more economic growth. Of course, it is one of the key objectives of the world, to continue economic growth. And this is perfectly understandable—I work round the clock trying to promote economic growth in poor countries. That's a very worthy thing to do and is extremely important, especially important for the poor populations of the world. There is absolutely no shred of legitimacy to saying, "Sorry, stop, we've filled up on economic growth. No more." There's a lot more growth coming. One of the pieces of good news is that many parts of the world have unlocked the mobilization of science and technology for rapid growth.

China's economic growth is the fastest in history. We should all admire its phenomenal successes: 10 per cent growth per year for 30 years. That means a doubling every seven years of the size of the economy. Absolutely phenomenal. It's led to a dramatic drop of poverty. It's the kind of development we want to see happen. But think of the challenge of sustainability in a context not only in a world already unsustainable, but where growth is going to continue in the developing countries and it will continue because the essence of growth is mobilizing science and technology to meet human wants and needs, and that is now the providence of much of the world. Not everyone has availed of these levels of growth, not the countries stuck in a poverty trap. And that means we can expect more growth ahead— just what we want.



Let me just give a scaling, a sense of this: the rich countries average about USD 40,000 per capita, PPP, purchasing power parity adjusted. The world as a whole averages about USD 10,000 PPP, per capita. So in purchasing-power adjusted terms, the rich world is about four times the world average and the developing world is about USD 4,000 per capita in purchasing power adjusted terms, which amounts to one tenth of the rich world average. Suppose that the rich world stayed where it is right now and the developing world caught up. What would that mean for total output in the world? Well, that would be a factor of 4 increase of production for today's population—a factor of 4 —because we go from an average of USD 10,000 to an average of USD 40,000. But we're not done yet, because the population is growing. The current trajectory of the population will take us to about 9.2 billion people by 2050, another 40 per cent or so. Take an increase of 40 per cent and a four-fold increase of output per capita: it says that even if the rich world grows no more, the total size of the world economy would experience a six-time increase roughly.

Think about it, the paradox of our time. We are trying to promote economic development: I'm doing it every morning, noon and night, I can tell you—and I lose sleep over it too—and that means we're aiming for six times the production of today in a world already ecologically unsustainable. How are we going to do this? Now that's a good question. And that's what I want to write about. So what came before was all a prelude.

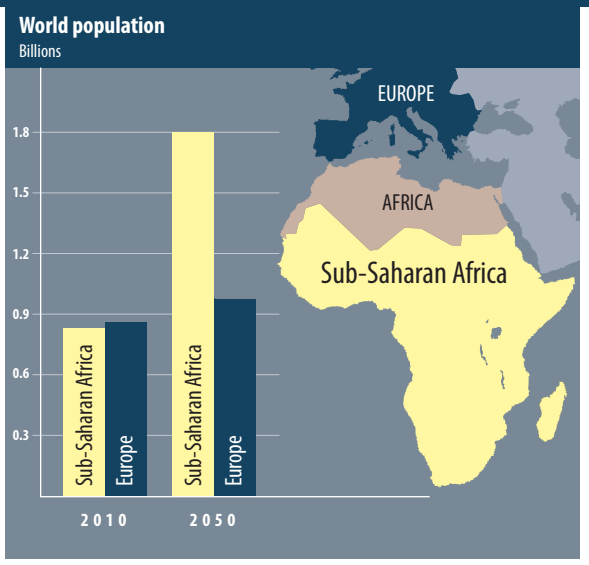
How can we be unsustainable today, pushing for a massive increase of output which we want, and which is going to occur whether we want it or not because countries will achieve economic growth? How can we possibly achieve sustainability in this way? Well, I think the answer can only come in a couple of ways and only one of them, in my view, can be the dominant way. Of course, one way is that we hit disaster one way or another so that the growth doesn't occur. Maybe the rich world collapses, or the poor world stops growing, or we have global crises, but one way or another, the world's aspirations for major regions are not fulfilled. I don't want my children to be in that world because that will be a very dangerous world. Aside from what it will mean for the people involved, that will be a world of conflicts. I've not yet seen a president or prime minister in the rich world say, "I've ran the numbers and I'm campaigning on cutting our living standards by half." Don't count on it, ladies and gentlemen. This will not go smoothly. That has not been the rallying cry in the United States, or even in the more enlightened European Union on these matters. Everybody wants to grow more. In fact, nobody is campaigning on a pledge, "Let's stay where we are," even—which was the basis of my calculation.

The other way is from the famous, so-called, IPAT equation.

$$I = P \times A \times T$$

I = impact of humans on the environment;
P = population;
A = is the level of economic activity; and
T = is a measure of technology.

I means impact of humans on the environment; **P** is population; **A** is the level of economic activity; and **T** is a measure of technology. And the famous equation says that our human impact is equal to our population, times output per capita, times a measure of our technological burden on the physical environment. If you take the view that we want A to go up—that is the per person level of economic activity—then the only ways to do that with a lower impact are either to slow the population growth rate, and maybe gradually have it come down, but not in a



disastrous way, because that would also violate what we're trying to accomplish, or you need a change, fundamentally, of our technological systems. I would recommend two things: I'm going to mention one quickly, and then I'm going to come to the second one.

One thing I would recommend is that we re-double our efforts to stabilize the human population. I believe every country should take the responsibility, where populations are growing quickly, to bring them under control through voluntary reductions of fertility. Africa cannot go on with total fertility rates of five children, or six children, or seven children, per woman in the countryside which is the level that now persists in much of rural Africa. These places are bursting at the seams. And you know that the U.N. forecast for sub-Saharan Africa's population is that it will grow from 800 million now to 1.8 billion by 2050, in a place already under profound ecological stress and extreme poverty. I believe that, if it occurs, it cannot be consistent with the kind of economic development Africa longs for. I believe that African's economic development requires leadership to reduce the fertility rates voluntarily and significantly and rapidly.

How can that be done? There are basically three aspects to that, very briefly. One is to make sure that all children survive because, when parents see that their children are surviving, they're ready to have fewer children. They don't have to have so many children as an insurance policy against child mortality. When they know that their children will survive, they'll cut the family size voluntarily. Second, make sure family planning and contraception is available to all for free. Poor people cannot afford contraceptives and family planning. You charge for it, it will not reach the poor, who are the one's having the most having children. And third, empower girls and women to make their choices. And the single most important thing of all is to enable young girls to stay in school and not get married at age 12. We must ensure girls finish primary school, and then secondary school.

We're working in a village in Ethiopia, for example, where, because of fellowships brought by the UN, girls are graduating high school for the first time. I can tell you that this is a traditional, patriarchal community. The men, the fathers, could not be more proud. They're thrilled. They're not keeping their daughters out of school. They're so happy that they have an opportunity now for a future. There is no cultural obstacle, in my view. There's a resource obstacle. The Millennium Development Goals, which I work on, got it wrong when it said universal primary education. We need universal secondary education. This is absolutely a prerequisite for a normal and productive life in the 21st century. This would bring the fertility rates down from 6 to 3 or under very quickly—this set of measures. Populations could begin to stabilize and this would be an enormous benefit for the whole world, especially for poor families, poor communities, poor countries, and poor regions.

But now let me turn to the **T**, which is an even bigger and more complex challenge: the technology. It must be the fundamental role and goal of all our policies going forward to have a fundamental, technological overhaul for global sustainability. Our current technologies—I hope I've convinced you—are incompatible with our development objectives and our ecological needs. We cannot go on with the internal combustion engine, with the coal-fired power plants, with the way we grow our food and eat our food now. We cannot simply scale this up. The planet will not accept it.

We need a fundamental, technological overhaul. That requires a new kind of economy and a new kind of economic policy because markets go some way towards technological change, but only some way. The essence of large-scale technological change is public-private partnerships. We will need a new kind of economic strategy, within countries and globally, to bring about the scale of technology change that we need in the next two to three decades to put our planet back on to a sustainable course.

What are those technologies that are needed? Well, broadly speaking, there are six sectors that contribute to the challenges that I mentioned before, the challenges of the Anthropocene. If I look at greenhouse gases, for example, six big sectors: one is agriculture. A major contributor to greenhouse gases is agriculture, something like 18 per cent of total emissions. Another sector contributing is deforestation, also related to agriculture, 15 to 18 per cent. There are also important contributions from buildings, the power, transport and industrial sectors.

In general, these are all roughly the same order of magnitude. Power, transport, agriculture, deforestation, are bigger—building and industries, slightly smaller—of the total emissions. We need new technologies in all of those sectors.

Major contributors to greenhouse gases are:

Let me talk briefly about a couple of them: the power sector, for example. Of course, we need different ways to produce electricity. There are three big categories. One is renewables: wind, solar, geothermal. I'm not a big fan of biomass because we don't have the land area for it. Biomass competes too much with biodiversity and with food supplies. In big categories, I would say wind and solar; geothermal is a niche. Nuclear power is an important area, and dozens of countries will certainly use that as well, and we need to find ways to ensure that it's used safely.

The other big category is carbon capture and sequestration: the ability to use fossil fuels safely by collecting the carbon dioxide that's released from their combustion and putting it safely in geologic storage. I want to make a point about all three of those possibilities: the renewables, the nuclear and the carbon capture. The point is the decisions to use those methods are not commercial decisions alone, those are societal decisions. Those methods are not something markets choose. Those methods represent areas where markets and society have to make choices together. We need regulatory systems; we need research and development; we need public awareness and education. This is not simply about markets. We need cooperation to bring about major change.

We can put a man on the moon and bring him back to earth, but we're not able, societally, to build a power plant anymore. That, by the way, technically, is called pathetic. And it's frightening. But Europe and China and India are not doing much better in this. We're wasting our time. As if we can write papers and give speeches like the one I'm giving, and that somehow solves the problem. It doesn't. We don't have in the whole world one coal-fired power plant that captures and sequesters its carbon dioxide, even though the engineers and scientists have been telling us for more than a decade, "You've got to try this, if you want to use your coal."

Let me say to all the coal-burning countries: try it. You've got to try it. Urgently. First, if you get there first, you can sell the units to others. I expect we'll be using China's carbon capture and storage technology all over the world soon. Great. Somebody take the lead. We can't go on more years like this not even building one plant.

I was at General Motors a few days ago, visiting the wonderful engineering team that is making the new plug-in hybrid, Chevy Volt. It is fantastic what our cars of the future could be like. The Chevy Volt could get 230 miles per gallon—that's 10 times what we're getting right now. That's possible, within reach, but it requires partnership in the U.S. that doesn't yet exist. The partnership would be between the auto industries, the power grid, the power generators, the regulators. It requires subsidies for consumers for the uptake of the early stage of this technology, and we don't have this yet. What we have is a great idea and some prototypes. And we don't yet have a countrywide strategy to bring this about.

So this is another example. I could go on and on. But the fact of the matter is that we have lots of options. They're powerful options. I have an institute filled with hundreds of marvellous engineers and scientists, filled with great ideas—many of them already at trial stage, some at demonstration stage, some commercializable—but we don't have a framework globally of what to do. And none of this, by its nature, can be done by markets alone.

You could put a price on carbon—which we should—to incentivize non-carbon energy sources. I want to point out that a simple tax wouldn't be enough to solve the problems of large-scale technological change. You need research, development, demonstration, regulation, public knowledge, public acceptability, testing, monitoring. It's a system approach. And, inherently, the initial investments in any new technology are public goods, not private goods. They don't give a return to those making the investment. No private company can develop these technologies on their own profitably. They need public partners.

And even with a tax it's not enough because the first movers are going to lose. They won't get property rights, they'll get a lot of learning that will be available for everybody. So my point is: large-scale technological systems change requires some clever policies on research and development, and demonstration, and regulation, and promotion, feed-in tariffs, subsidies for consumers, first-mover advantages, plus a proper pricing of the externality of greenhouse gas emissions. All of those things, and over time, there are so many wonderful things we can do to change the way

we build our homes, the cars we drive, the way we power our cities and our economies that can solve these problems. We can reduce the 'T' in the IPAT equation. We can achieve economic growth at a much lower impact on the planet if we think clearly, systematically, in systems terms, with a new kind of market and government approach. Public-private partnerships can be targeted to achieve shared global goals. That's what we need to do in the age of sustainable development.

Finally, where are we on this? We are not where we need to be. The way we structure the global negotiations is not right. Climate change is not a poker game where you hold your cards close to the vest and you bargain with others. That's how we're viewing the climate negotiations. Don't reveal your hand, don't say your position because it's viewed as a negotiation. If there is a model for it, it is trade negotiations.

That's the model people have in their heads. That's the wrong model for this problem.

The climate change problem is not a trade negotiation in any way. The climate change problem is simply the most complex engineering, economic and social problem that humanity has ever had to face together. And so we are well before the stage of negotiating; we should be at the stage of joint problem-solving. All cards should be on the table. And we should be discussing, "What can we do?" The U.S. should be saying, "Well, here's how fast we think a plug-in hybrid can be introduced. Here's what we think we can do on nuclear power. Here's what we think we can do in tapping solar power from the Mojave." Europe should be saying, "Well, we have the Desertec project to link solar and North Africa with Europe's energy needs. It's USD 400 billion. We're thinking of making that investment. And if the new technologies for electric vehicles come along, we could do that the following in our timetable." And China could say, "We are a coal-burning economy. 80 per cent of our electricity comes from coal. More than 50 per cent of all our primary energy needs come from coal, so we're ready to take the lead in testing carbon capture sequestration and we're going to put four plants around to see about our geologic capacity to capture our CO_2."

Then we'd start getting somewhere rather than having only diplomats around the table. We need engineers around the table; we need scientists around the table; we need hydrologists around the table. I'd even allow one or two economists around the table, to try to ask how much it might cost for different options. But I frankly don't understand doing this, holding up the cards as if this were a poker game. It's too complicated. This is a poker game where the people holding the cards don't even understand the rules of the game. How can they? It's too complicated. We need to put the cards down and have a new kind of process.

I've wanted all this time that the secretariat of the U.N. Framework Convention on Climate Change have a standing, a technical one. That is spilling out options, doing costing, asking what Tunisia could do, what's the option for this one, is Desertec a good idea, what is plausible for the next five years in such-and such country? To my mind, by the way, in that context, the issue of whether a national goal is binding or not is one of the least interesting questions. First of all, what's binding if you can't achieve it? So, if we don't know what's achievable, what's all the talk about legally binding? It's silly. We constantly agree to things that aren't achievable and aren't achieved. We should be talking about, not the debate of what's binding and what isn't binding, but what can we do. What can we do now, what can we do in five years, what can we do in ten years, how can we get this moving? Once we analyze those options, then we can talk about how to share the costs too. Because there's no doubt that the rich world must fund a significant part of the incremental costs of this effort. Absolutely no doubt about it.

But we're debating hypotheticals right now, not practicalities. We're debating concepts that barely have a real-life counterpart right now. Because what are these plans the way they are right now? They're not based on real, technological possibilities. They're not based on brainstorming, sharing technologies, creating global platforms for electric vehicles or carbon capture sequestration and the like.

So I keep saying, though not to much effect, that we don't need global negotiations right now, we need global brainstorming and global problem-solving. We need to get the world's minds together to solve these problems. That's a quite different exercise. Later on we'll figure out how to allocate the costs, once we know what we're doing. But we're not even at the point of really knowing what we're doing yet. We could be there, but we're not there.

Finally, let me say that we've got to get there fast, for all the reasons that I mentioned. Our sustainability depends on it. The current recovery of the world economy, which is so fragile, depends on robust investment in the future. But if you're an American business, you can't invest robustly

Two young boys in a fishing village
Bahia, Brasil
1 April 1975

right now if you don't know what the rules of the game are. What kind of power plant can you build? What's the cost of energy going to be? What should the auto companies do? How should infrastructure be built?

It all depends on our strategy. We need a strategy. We actually need a plan. Not a rigid, central plan, but a plan, an indicative plan. We need a public investment profile and a timetable. And without that, we won't get the robust investments that we need to sustain even the macro-economy. We certainly won't be able to solve the problems of the poorest of the poor. We need to decide to help Africa build an energy system from the ground up. Now Africa has more solar power than any other part of the world. It could provide all of the world's electricity needs were the cables long enough from a little square in the Sahara Desert. And we need to help Africa accomplish that because still 90 per cent, or more of the villages in Africa, I would guess, don't even have electricity. And I'll tell you, if there's one rule of development that I can assure you, it's that there is no development without electricity. We need to get on with electrification to ensure social stability.

And finally, we need to get on with it for the sake of ecological stability. And for that, I mean our children's future, because what we're doing is reckless right now. I'm always reminded in this regard when people ask me, "Well, could we ever agree to these things; could we ever really reach a consensus?" I'm always reminded of the words of John F. Kennedy, in what I regard as the greatest speech of an American president in modern times, which was his speech on peace at American University in June 1963. He said, "Let us not be blind to our differences, but let us direct attention to our common interests and to the means by which those differences can be resolved. And if we cannot end now our differences, at least we can help make the world safe for diversity. For in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's future. And we are all mortal." ◀

THE **Author**

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From a failed growth economy to a steady-state economy

Herman Daly

Herman Daly postulates the absurdity of infinite economic growth in a finite biosphere, arguing that there will always be a point where marginal costs exceed marginal benefits, i.e. there will be a point of uneconomic growth, as recent economic bubbles have amply demonstrated. In its place, he outlines the characteristics of a steady-state economy, with quantitative growth limited to ensure qualitative development through a variety of policy measures he advances, within the assimilative and regenerative capacities of the ecosystem.

A steady-state economy is incompatible with continuous growth—either positive or negative growth.

The goal of a steady state is to sustain a constant, sufficient stock of real wealth and people for a long time. A downward spiral of negative growth is a failed growth economy, not a steady-state economy. Halting an accelerating downward spiral is necessary, but is not the same thing as resuming continuous positive growth. The growth economy now fails in two ways: (1) positive growth becomes uneconomic in our full-world economy; (2) negative growth, resulting from the bursting of financial bubbles inflated beyond physical limits, though temporarily necessary, soon becomes self-destructive. That leaves a non-growing or steady-state economy as the only long run alternative.

The level of physical wealth that the biosphere can sustain in a steady state may well be below the present level. The fact that recent efforts at growth have resulted mainly in bubbles suggests that this is so. Nevertheless, current policies all aim for the full re-establishment of the growth economy. No one denies that our problems would be easier to solve if we were richer. The question is, does growth any longer make us richer, or is it now making us poorer?

I will spend a few more minutes cursing the darkness of growth, but will then try to light a few little candles along the path to a steady state. Some advise me to forget the darkness and focus on the policy candles. But I find that without a dark background the light of my little candles is not visible.

We have many problems, poverty, unemployment, environmental destruction, budget deficit, trade deficit, bailouts, bankruptcy, foreclosures, etc., but apparently only one solution: economic growth, or as the pundits now like to say, "to grow the economy".

But let us stop right there and ask two questions.

First, there is a deep theorem in mathematics that says when something grows it gets bigger! So, when the economy grows it too gets bigger. How big can the economy be? How big is it now? How big should it be? And most pointedly, what makes anyone think that growth (i.e. physical expansion of the economic subsystem into the finite containing biosphere) is not already increasing environmental and social costs faster than production benefits, thereby becoming uneconomic growth, making us poorer, not richer? After all, real GDP, the measure of "economic" growth so-called, does not separate costs from benefits, but conflates them as "economic" activity. How would we know when growth became uneconomic? Remedial and defensive activity becomes ever greater as we grow from an "empty-world" to a "full-world" economy, characterized by congestion, interference, displacement, depletion and pollution. The defensive expenditures induced by these negatives are all added to GDP, not subtracted.

We must recognize that many developing countries are still in the phase of truly economic growth—the marginal benefits of growth are still greater than the marginal costs. Yet the world as a whole is "full". Therefore the duty of limiting growth, and the policies discussed below, apply first to the richer countries where in fact growth has become uneconomic. The rich must free up ecological space for the poor to grow into, leading to a process of

> ...the duty of limiting growth... applies first to the richer countries where in fact growth has become uneconomic

convergence to a common level of resource use that is sufficient for a good (not luxurious) life and sustainable for a long (not infinite) future. Some worry that slowing growth in rich countries will hurt poor countries by reducing their export markets. That just means that developing countries will have to shift from the export-led model back toward the import-substitution model, developing their own internal markets.

Second question: is it possible to see growth as a continuing process, desirable in itself —or as a temporary process required to reach a sufficient level of wealth which would thereafter be maintained more or less in a steady state? Most of modern economic policy discussion revolves around the growth forever view. We have to go back to John Stuart Mill and the earlier Classical Economists to find serious treatment of the idea of a non-growing economy, the Stationary State.

Here are some reasons to think that the Classical Economists are right. A long run norm of continuous growth could make sense only if one, of the three following conditions were true:

- if the economy were not an open subsystem of a finite and non-growing biophysical system,
- if the economy were growing in a non physical dimension, or
- if the laws of thermodynamics did not hold.

Let us consider each of these three logical alternatives (if you can think of a fourth one let me know).

(a) Many in fact think of nature as the set of extractive subsectors of the economy (forests, fisheries, mines, wells, pastures, agriculture, etc.). The economy, not the ecosystem or biosphere, is seen as the whole; nature is a collection of parts. If the economy is the whole then it is not a part of any larger thing or system that might restrain its expansion. If some extractive natural subsector gets scarce we will just substitute other sectors for it and growth of the whole economy will continue, not into any restraining biospheric envelope, but into sidereal space presumably full of resource-bearing asteroids and friendly highly-evolved aliens eager to teach us how to grow forever into their territory. Sources and sinks are considered infinite.

(b) Some say that what is growing in economic growth is value, and value is not reducible to physical units. The latter is true of course, but that does not mean that value is independent of physics! After all, value is price times quantity, and quantity is always basically physical. Even services are always the service of something or somebody for some time period, and people who render services have to eat. The value unit of GDP is not dollars, but dollar's worth. A dollar's worth of gasoline is a physical amount, currently about half a gallon. The aggregation of the dollar's worth amounts of many different physical commodities (GDP) does not abolish the physicality of the measure even though the aggregate can no longer be expressed in physical units. True, $/q x q = $. But the fact that q cancels out mathematically does not mean that the aggregate measure, "dollars' worth", is just a pile of dollars. And it doesn't help to speak instead of "value added" (by labour and capital) because we must ask, to what is the value added? And the answer is natural resources, low-entropy matter/energy—not fairy dust or frog's hair! Development (squeezing more welfare from the same throughput of resources) is a good thing. Growth (pushing more resources through a physically larger economy) is the problem. Limiting quantitative growth is the way to force qualitative development.

(c) If resources could be created out of nothing, and wastes could be annihilated into nothing, then we could have an ever-growing resource throughput by which to fuel the continuous growth of the economy. But the first law of thermodynamics says NO. Or if we could just recycle the same matter and energy through the economy faster and faster we could keep growth going. The circular flow diagram of all economics principles texts unfortunately comes very close to affirming this. But the second law of thermodynamics says NO.

So if we can't grow our way out of all problems, then maybe we should reconsider the logic and virtues of non-growth, the steady-state economy. Why this refusal both to face common sense and to reconsider the ideas of the early Classical Economists?

Caroni River in the Canaima National Park
Concentration of mining activity is damaging the quality of the water courses.
Bolivar, Venezuela

Let us think about what policies would be required to move to a steady-state economy

I think the answer is distressingly simple. Without growth, the only way to cure poverty is by sharing. But redistribution is anathema. Without growth to push the hoped for demographic transition, the only way to cure overpopulation is by population control. A second anathema. Without growth the only way to increase funds to invest in environmental repair is by reducing current consumption. Anathema number three. **Three anathemas and you are out!**

And without growth how will we build up arsenals to protect democracy (and remaining petroleum reserves)? How will we go to Mars and Saturn and "conquer" space? Where can technical progress come from if not from unintended spin-offs from the military and from space research? Gnostic techno-fantasies of colonizing outer space, partially turning off the sun to make more room for greenhouse gasses in the atmosphere, and of abolishing disease and death itself, feed on the perpetual growth myth of no limits. Without growth we must face the difficult religious task of finding a different god to worship. The communist growth-god has already failed. Surely the capitalist growth-god will not fail! Let's jump-start the GDP and the Dow-Jones! Let's build another tower of Babel with obfuscating technical terms like sub-prime mortgage, derivative, securitized investment vehicle, collateralized debt obligation, credit default swap, "toxic" assets, and insider slang like the "dead cat bounce". (If you drop it from a high enough tower of Babel even a dead cat will bounce enough to make some profit.)

Well, let us not do that. Let us ignore the anathemas and instead think about what policies would be required to move to a steady-state economy. They are a bit radical by present standards, but not as insanely unrealistic as any of the three alternatives for validating continuous growth, just discussed.

Let us look briefly at a few specific policy proposals for moving to a steady-state economy, i.e. an economy that maintains a constant metabolic flow of resources from depletion to pollution—an entropic throughput that is within the assimilative and regenerative capacities of the ecosystem.

1. *Cap-auction-trade systems for basic resources*. Caps limit biophysical scale by quotas on depletion or pollution, whichever is more limiting. Auctioning the quotas captures scarcity rents for equitable redistribution. Trade allows efficient allocation to highest uses. This policy has the advantage of transparency. There is a limit to the amount and rate of depletion and pollution that the economy can be allowed to impose on the ecosystem. Caps are quotas, to the throughput of basic resources, especially fossil fuels. The quota usually should be applied at the input end because depletion is more spatially concentrated than pollution and hence easier to monitor. Also the higher price of basic resources will induce their more economical use at each upstream stage of production. It may be that the effective limit in use of a resource comes from the pollution it causes rather than from depletion—no matter, we indirectly limit pollution by restricting depletion of the resource that ultimately is converted into wastes. Limiting barrels, tons, and cubic feet of carbon fuels extracted per time period will limit tons of CO_2 emitted per time period. This scale limit serves the goal of biophysical sustainability. Ownership of the quotas is initially public—the government auctions them to the individuals and firms. The revenues go to the treasury and are used to replace regressive taxes, such as the payroll tax, and to reduce income tax on the lowest incomes. Once purchased at auction the quotas can be freely bought and sold by third parties, just as can the resources whose rate of depletion they limit. The trading allows efficient allocation, the auction serves just distribution, and the cap serves the goal of sustainable scale. The same logic can be applied to limiting the off-take from fisheries and forests. With renewables, the quota should be set to approximate sustainable yield. For non-renewables, sustainable rates of absorption of resulting pollution, or the development of renewable substitutes may provide a criterion.

2. Ecological tax reform—shift tax base from value added (labour and capital) and on to "that to which value is added", namely the entropic throughput of resources extracted from nature (depletion), and returned to nature (pollution). This internalizes external costs as well as raises revenue more equitably. It prices the scarce but previously un-priced contribution of nature. Value added is something we want to encourage, so stop taxing it. Depletion and pollution are things we want to discourage, so tax them.

A non-growing or steady-state economy is the only long run alternative

Ecological tax reform can be an alternative or a supplement to cap-auction-trade systems. Value added is simultaneously created and distributed in the very process of production. Therefore, economists argue that there is no "pie" to be independently distributed according to ethical principles. As Kenneth Boulding put it, instead of a pie, there are only a lot of little "tarts" consisting of the value added by different people or different countries, and blindly aggregated by statisticians into an abstract "pie" that doesn't really exist as an undivided totality. If one wants to redistribute this imaginary "pie", one should appeal to the generosity of those who baked larger tarts to share with those who baked smaller tarts, not to some invidious notion of equal participation in a fictitious common inheritance. I have considerable sympathy with this view, as far as it goes. But it leaves out something very important.

In our one-eyed focus on value added, we economists have neglected "that to which value is added", namely the flow of resources and services from nature. "Value added" by labour and capital has to be added to something, and the quality and quantity of that something is important. Now, there is a real and important sense in which the original contribution of nature is indeed a "pie", a pre-existing, undivided totality that we all share as an inheritance. It is not an aggregation of little tarts that we each baked ourselves. Rather it is the seed, soil, sunlight, and rain (not to mention the gene pools and suitable climate) from which the wheat and apples grew that we converted into tarts by our labour and capital. The claim for equal access to nature's gifts is not the invidious coveting of what our neighbour accumulated by her own labour and abstinence. The focus of our demands for income to redistribute to the poor, therefore, should be on the value of the contribution of nature, the original value of that to which further value is added by labour and capital.

3. Limit the range of inequality in income distribution—a minimum income and a maximum income. Without aggregate growth, poverty reduction requires redistribution. Complete equality is unfair; unlimited inequality is unfair. Seek fair limits to the range of inequality. The U.S. civil service, the military, and the university manage with a range of inequality of a factor of 15 or 20. Corporate America has a range of 500 or more. Many industrial nations are below 25. Could we not limit the range to, say, 100, and see how it works? People who have reached the limit could either work for nothing at the margin if they enjoy their work, or devote their extra time to hobbies or public service. The demand left unmet by those at the top will be filled by those who are below the maximum. A sense of community necessary for democracy is hard to maintain across the vast income differences current in the U.S. Rich and poor separated by a factor of 500 become almost different species. The main justification for such differences has been that they stimulate growth, which will one day make everyone rich. This may have had superficial plausibility in an empty world, but in our full world it is a fairy tale. I have advocated a maximum income as well as a minimum income for a long time. The idea has been very unpopular, but thanks to the banksters and their bonuses it is now becoming more popular.

4. Free up the length of the working day, week, and year—allow greater option for part-time or personal work. Full-time external employment for all is hard to provide without growth. Other industrial countries have much longer vacations and maternity leaves than the U.S. For the Classical Economists the length of the working day was a key variable by which the worker (self-employed yeoman or artisan) balanced the marginal disutility of labour with the marginal utility of income and of leisure so as to maximize enjoyment of life. Under industrialism the length of the working day became a parameter rather than a variable (and for Karl Marx was the key determinant of the rate of exploitation). We need to make it more of a variable subject to choice by the worker. Milton Friedman wanted "Freedom to Choose"—OK, here is an important choice most of us are not allowed to make! And we should stop biasing the labour–leisure choice by advertising to stimulate more consumption and more labour to pay for it. Advertising should no longer be treated as a tax-deductible ordinary expense of production.

5. Re-regulate international commerce. Adopt compensating tariffs to protect, not inefficient firms, but efficient national policies of cost internalization from standards-lowering competition. This "new protectionism" is very different from the "old protectionism" that was designed to protect a truly inefficient domestic firm from a more efficient foreign firm. We cannot integrate with the global

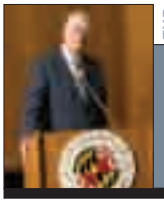
economy and at the same time have higher wages, environmental standards, and social safety nets than the rest of the world.

6. Stop treating the scarce as if it were non-scarce, but also stop treating the non-scarce as if it were scarce. Enclose the remaining commons of rival natural capital (e.g. atmosphere, electromagnetic spectrum, public lands) in public trusts, and price it by a cap-auction trade system, or by taxes, while freeing from private enclosure and prices the non-rival commonwealth of knowledge and information. Knowledge, unlike throughput, is not divided in the sharing, but multiplied. Once knowledge exists, the opportunity cost of sharing it is zero and its allocative price should be zero. International development aid should more and more take the form of freely and actively shared knowledge, along with small grants, and less and less the form of large interest-bearing loans. Sharing knowledge costs little, does not create un-repayable debts, and it increases the productivity of the truly rival and scarce factors of production. Existing knowledge is the most important input to the production of new knowledge, and keeping it artificially scarce and expensive is perverse. Patent monopolies (aka "intellectual property rights") should be given for fewer "inventions", and for fewer years. Costs of production of new knowledge should, more and more, be publicly financed and then the knowledge freely shared.

7. Stabilize population. Work toward a balance in which births equals deaths. This is controversial and difficult, but as a start contraception should be made available for voluntary use everywhere. We should support voluntary family planning, democratically enacted.

8. Reform national accounts—separate GDP into a cost account and a benefits account. Compare them at the margin, stop throughput growth when marginal costs equal marginal benefits. In addition to this objective approach, recognize the importance of the subjective studies that show that, beyond a threshold, further GDP growth does not increase self-evaluated happiness. Beyond a level already reached in many countries, GDP growth delivers no more happiness, but continues to generate depletion and pollution. At a minimum we must not just assume that GDP growth is "economic growth", but prove it. And start by trying to refute the mountain of contrary evidence.

While these policies will appear radical to many, it is worth remembering that they are amenable to gradual application. The range of distribution can be restricted gradually, caps can be adjusted gradually, etc. Also these measures are based on the conservative institutions of private property and decentralized market allocation. They simply recognize that private property loses its legitimacy if too unequally distributed, and that markets lose their legitimacy if prices do not tell the whole truth about opportunity costs. In addition, the macro-economy becomes an absurdity if its scale is structurally required to grow beyond the biophysical limits of the Earth. And well before reaching that radical physical limit, we are encountering the conservative economic limit in which extra costs of growth become greater than the extra benefits, ushering in the era of uneconomic growth, so far unrecognized. ◂



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Captain Planet communicated that concerted local action can have global impact and people have the power to change the world

1989

Ted Turner and Captain Planet
Photo: Joe Kohen/WireImage, April 24, 2008
The New York Post and LIFE magazine

Moving the Rio Agenda: re-engagement and re-commitment?

Melinda Kimble

Melinda Kimble looks back to the beginnings of international cooperation on the environment from the 1972 founding of UNEP to the early achievements of collective action such as the Montreal Protocol on Substances that Deplete the Ozone Layer, which, despite its naysayers and detractors, proved to be a milestone. She notes a political backlash in the United States in the wake of the 1992 United Nations Conference on Environment and Development (UNCED) in Rio from concerns over environmental costs and related industry competitiveness, which has seriously hampered international efforts to reach environmental consensus. She calls for new ideas and advocacy in the lead-up to Rio 2012.

In 1989, CNN founder Ted Turner developed ***Captain Planet,*** a cartoon series that both entertained children and taught them about environmental responsibility.

A two-part Captain Planet episode raised awareness about the **United Nations Global Summit on Environment and Development in Rio de Janeiro** in 1992. Watching an episode in Colombia early in 1992, it was easy to appreciate the message and the innovation behind Captain Planet's approach. Captain Planet communicated that concerted local action can have global impact and people have the power to change the world. Captain Planet imaginatively demonstrated the "think locally, act globally" message of the Rio Earth Summit. It was an entertaining and inspiring message. Now, a decade into the new millennium and two decades after adopting a global action plan to address environmental challenges and sustainable development, it is worth taking stock of what has been achieved and where work still needs to be done.

Early in the 1970s, the United Nations began an effort to assess global trends –charting what was happening globally in terms of population growth, resource availability, food security and urbanization. These discussions prompted President Jimmy Carter to direct the Council on Environmental Quality and the Department of State to organize an assessment, Global 2000 – a study that foreshadowed many of the emerging challenges we are now facing. This work and similar studies set the stage for a new level of international attention to environment and resource challenges.

Twenty years before the Rio Earth Summit, the first United Nations Conference on the Human Environment convened in Stockholm in 1972 dramatically accelerated international environmental cooperation. By the end of that year, the international community had established the United Nations Environment Programme (UNEP) with new monitoring and reporting mandates.[1] And, with more information on environmental and conservation challenges, the world proceeded to adopt a variety of new international agreements: the World Heritage Convention; the Ramsar Convention to Protect Wetlands; the Convention on International Trade in Endangered Species of Wild Fauna and Flora; the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and, in 1985, the Vienna Convention for the Protection of the Ozone Layer.[2]

Clearly, the adoption of the Vienna Convention for the Protection of the Ozone Layer signalled a watershed in that it mandated more observation, reporting and analysis of the status of the ozone layer –a gaseous belt that protects life on earth. It also committed states to "take appropriate measures" if a threat was conclusively identified. Scientists throughout the world had started to recognize a change in the ozone layer– and work was actively underway to identify the cause or causes.[3] Prior to the Vienna Convention, member states were encouraged to take national action to protect the environment. Vienna started to envision "collective action" based on an international agreement that would address planetary scale problems.

Within months of concluding the Vienna treaty, scientists in the United Kingdom and the United States confirmed that the ozone hole over Antarctica was expanding, and studies pointed directly to the use of chlorofluorocarbons (CFCs) as the primary culprit. More tests and debate ensued. Industry initially questioned the scientific analyses, but several industrial countries pursued a precautionary approach and started banning use of CFCs in aerosol sprays and as refrigerants. A small number of states, led by the Nordic countries and the United States, joined together to act as prescribed by the Convention to reduce and eliminate ozone-depleting substances. These actions, in collaboration with UNEP and its director, Mostafa Tolba, led to the negotiation of the Montreal Protocol to Reduce and Eliminate Ozone Depleting Substances. The Montreal Protocol was negotiated and opened for signature in 1987.[4]

The Montreal Protocol contained features that encouraged the relatively young international environmental movement that it had a formula to meet global environmental threats. The Protocol had clear targets and timetables for elimination of gases; a regular monitoring and reporting mechanism; a grace period for developing countries; and a fund to help developing countries build capacity and eliminate key substances. U.N. Secretary-General Kofi Annan noted that "perhaps the single most successful international agreement to date has been the Montreal Protocol".[5]

In the United States, however, some had a different view of the agreement. The "common but differentiated responsibilities" approach of the Protocol –exempting developing countries from comparable actions in the same timeframe as developed countries and requiring developed countries to pay for developing countries' actions– raised many concerns in the U.S. Congress. The most important was imposing a requirement on U.S. companies that was seen to raise costs, while permitting developing countries to continue to produce banned substances and displace U.S. firms.[6] Yet, the Montreal result seemed to underscore that we could cooperate to manage the "global commons." The Montreal experience had targeted the chemical industry and notably a set of produced chemicals used as refrigerants and propellants.

This success, and the progress made on a range of environmental agreements, emboldened the international environmental community to call for more scientific cooperation on climate change. In response, UNEP and the World Meteorological Organization, with the support of both UK Prime Minister Margaret Thatcher and

U.S. President Ronald Reagan, established a new international scientific panel –the Intergovernmental Panel on Climate Change in 1987– to ensure research findings were examined in a broader context.

All this activity led to a more focused discussion of other trends and an agreement at the General Assembly in 1989 to prepare for an international conference that would examine the challenges of environment and development. This meeting –the United Nations Conference on Environment and Development– was designed to formulate a course of action to address the complexities of the changing world. Among the issues were climate change, species loss, desertification and deforestation. At another level the U.N. also committed to examine population growth and urbanization. This effort was a huge undertaking and the U.N. asked the first Executive Director of UNEP, Maurice Strong, to lead it. Maurice Strong, a former businessman, environmentalist and government official, recognized he needed to increase public awareness of the issues. He reached out to the private sector, encouraging the creation of the World Business Council on Sustainable Development and discussions with his friend, media mogul Ted Turner, resulted in Turner intensifying his coverage of U.N. issues –and a decision to create the Captain Planet cartoon series– as one of many awareness-raising efforts.

The problem of global climate change was clearly more extensive and intensive than any challenge the world had previously addressed. And in light of its experience with the Montreal Protocol, the United States, under the new George H.W. Bush administration, was determined to shape the international approach to the challenge. The U.S. successfully sponsored a UNGA resolution and invited negotiators to Chantilly, Virginia, in 1989 to begin negotiating a "Framework Convention on Climate Change". with the goal of completing the negotiation before the United Nations Conference on Environment and Development (UNCED) convened in 1992.

The United Nations Conference on Environment and Development – also known as the Earth Summit or Rio Conference – sought to catalyze and integrate actions in social, environmental, and economic spheres to achieve sustainable development. Agenda 21 laid out a compendium of actions in many areas, including managing forests, controlling chemicals, planning urban settlements, etc. This roadmap was designed to integrate U.N. agency work across the three spheres –economic, social, and environmental.

World Summit on Sustainable Development
Children perform at the "South African Welcoming Ceremony" for the World Summit on Sustainable Development at Ubuntu Village, Johannesburg
24 August 2002

The first Executive Director of UNEP, Maurice Strong

In June 1992, UNCED convened in Rio de Janeiro, Brazil. One hundred seventy-two governments participated, with 108 participating at the level of head of State or Government. At that point, it was the largest meeting ever convened by the United Nations. Two thousand four hundred representatives of NGOs also participated, and 17,000 people attended a parallel NGO Forum.

Several documents were adopted at the Rio Conference, including the Rio Declaration, a set of 27 principles that have found their way into domestic law in many countries, and the Statement of Forest Principles. Negotiations were also completed on the Conventions on Climate Change and on Biological Diversity. Delegates also agreed to negotiate additional multilateral environmental agreements (MEAs): the Desertification Convention and the Straddling Fish Stocks Agreement. The U.N. Commission on Sustainable Development (CSD) was created to track implementation of the Rio commitments.

Despite the Rio admonition of "think globally, act locally" we actually "acted globally" to spur "local action." However, top down solutions invariably meet resistance, and in the U.S. there were warning signs at the national level that environmental policy might not be as easily implemented as it had been in the past. As the U.N. prepared for the Rio Earth Summit, environmental debate in the U.S. was focused on expanding the authority of the Clean Air Act to reduce emissions of sulphur dioxide from coal-fired power and manufacturing plants in the Midwest to prevent "acid rain", which was seriously impacting the forests in the Northeast.

Up to this point, the U.S. public had broadly supported the authority and actions of the Environmental Protection Agency (EPA) as it implemented the Clean Air and Water Acts. The acts were expansive in their nature and provided the EPA sweeping powers to protect the public from health risks. Once in place, these laws ensured that EPA could take action against practices or substances that posed risks to human health and enforce these actions in court. Eventually, U.S. chemical and manufacturing firms began to raise strong objections to the discretionary power and the uncertainty posed by the EPA's authority. The compromise on sulphur dioxide expanded the application of "market-based mechanisms" or "trading emission permits" under a regulated limit, or "cap". This mechanism was seen to minimize costs to companies and ensure that "lowest cost reductions" were taken first.

The ambitions of Rio hit the shoals of political backlash. In the U.S., a new shift was occurring that suggested environmental policy might be less bipartisan in the future. The Montreal Protocol was already viewed by some in Congress as a "dangerous precedent," and the implications in Al Gore's popular book, Earth in the Balance, that the world should adopt global treaties to shape domestic U.S. law proved to be a politically sensitive idea.

To balance the perceived pro-environmental tilt of federal policy, President George H.W. Bush also established the Council on Competitiveness, under Vice President Dan Quayle, and the Council took on the task of examining existing and proposed Federal regulations through the lens of competition; environmental regulations were on the firing line. The prospect of a new international treaty –even with the U.S. leading the charge– to prevent climate change and by implication dramatically restructure U.S. energy policy, became a controversial subject.

The consolidation and expansion of the European Union (EU) also complicated the international landscape. During the Montreal Protocol negotiations the U.S. chemical industry witnessed rapid loss of market share to the EU. Many domestic corporations believed that a climate agreement would disadvantage the U.S. *vis-à-vis* EU and Asian competitors –and that developing countries would also take advantage of regulations that imposed higher costs on U.S. firms. Moreover, the European Union was now integrating countries with vastly different legal systems and different approaches to policy. The EU was adapting to an enlarging union through the harmonization of policies and measures, negotiated in the European Commission in Brussels and adopted by states. The evolution of European policy was moving in a different direction, which would split the approach of the EU and the U.S. on climate action. This push to integration made the idea of "binding" global targets a plus for the European Union, but problematic for the United States.

Despite the success of the Montreal Protocol, the U.S. has been increasingly reluctant to ratify international environmental agreements, limiting its engagement to the U.N. Framework Convention on Climate Change (but

> If we want to advance the "Green Economy" we will need new tools and new markets

not the Kyoto Protocol) and the Convention to Combat Desertification and Land Degradation. Major chemical treaties –e.g. the Basel Convention on Hazardous Waste and the Stockholm Convention on Persistent Organic Pollutants are prime examples. The U.S. caution has clearly hampered both international action and slowed implementation of the Rio Agenda.

Global civil society needs to rethink how to approach these 21st century sustainability challenges in the context of reducing poverty and protecting the environment. It is increasingly evident that we are still trying to save the planet without establishing values for a number of environmental goods and services through policies that strengthen both supply and demand. If we want to advance the "Green Economy" we will need new tools and new markets. We also need new standards of progress to measure the acceleration of the transition to the Green Economy.

Underlying policies and measures that will deliver emissions reductions and low-carbon growth most effectively should be attractive in their own right. Four core elements–or building blocks–of an effective response to climate change include: energy efficiency, renewable energy, forest conservation and sustainable land use, and adaptation. Achievable gains in the first three of these areas could achieve up to 75 per cent of needed emissions reductions in 2020 at a net savings of USD 16 billion, based on analysis by McKinsey Global Development Institute's Project Catalyst.[7] These actions, along with additional investments in adaptation, can help developed and developing countries alike address a variety of strategic interests, including sustainable development and job creation, energy security and energy access, food security and improved rural livelihoods – as well as producing co-benefits in environmental quality and public health.

More than 20 years after Captain Planet began spreading his message of environmental sustainability and responsibility the world seems to need a new generation of both ideas and advocacy. The U.N.'s decision to convene a reprise of the Earth Summit in Rio+20 offers an opportunity to regain momentum and accelerate our work on sustainable development.

Endnotes

1 UNGA Res. 2997, Dec. 15, 1972, established UNEP and Maurice Strong of Canada was appointed the first Executive Director.

2 List of Environmental Treaties, U.S. Dept of State.

3 UNEP Ozone secretariat, www.unep.org, discuss the Vienna Convention and the Montreal Protocol.

4 UNEP, ibid.

5 UN, International Day for the Preservation of the Ozone Layer, http://www.un.org/en/events/ozoneday/background.shtml, accessed January 18, 2011.

6 Encyclopedia of the Earth, see Richard E. Benedick, *Science, Diplomacy, and the Montreal Protocol*, a summary of what ensued, including the loss of U.S. market share after unilateral EPA decision to ban CFCs.

7 Project Catalyst, www.project-catalyst.info, accessed November 15, 2010.

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PART 2

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Going green:
what's at stake?

Are there downsides to a green economy?

The trade, investment and competitiveness implications of unilateral green economic pursuit

Aaron Cosbey

In response to concerns voiced over the trade and competitiveness impact of a range of measures governments might employ in pursuit of the 'green economy', Aaron Cosbey's analysis finds the majority domestically focused, with no significant impact on imports or exports, some with potentially positive impacts for foreign exporters and others, while not inherently negative, with possible troubling aspects dependent on their design. A "clutch of measures" do have troubling impacts but are actually covered by WTO disciplines, while only a few could be problematic and are not adequately covered. Interestingly, Cosbey notes that a large number of the measures analysed do not fit the traditional mould of pitting developed against developing countries.

Assessing the potential measures in pursuit of the green economy

There is a wide range of measures that governments might employ in pursuit of a green economy. Table 1 (next page) depicts measures to achieve a green economy, surveys many of them, but not all. And it is important to note that most of the measures described there have many different variations—that the design of the measure makes a significant difference.

Table 1 contains a number of measures which are unimportant to the theme of this paper, since they have insignificant effects on trade, investment and the terms of competition. But some of them (denoted by shading) do have particular relevance, and they will be discussed in the remainder of this section. The aim is to predict in each case what forms the measures might take, and assess the significance of their potential impact.

The analysis that follows sometimes touches on the WTO-legality of certain measures, but this is not a central focus. Where it does so, it is usually to show that there are remedies available to prevent abuse or that there is international consensus that some types of policies are unacceptable.

Table 1

Route to a green economy	Rationale	Measures	Sectors where these measures might be particularly important
Institutional			
A network of laws, norms and organizations that encourage long-term and efficient management and use of resources	The right combination of laws, incentives, agreements and understandings can encourage the rational exploitation of finite resources and the sustainable exploitation of renewable resources, preserving the economic value of natural resources and the markets that rely on them. When they encourage efficiency, they can reduce the burden of economic activity on natural resources, though only if efficiency gains exceed growth in the use of those resources. National and international organizations can be instrumental in the management of these laws and norms.	Strategic, integrated planning, e.g. baskets of complementary policies; consideration of policy effects cross-sectorally and at local, provincial, national and international levels	Agriculture, Buildings, Cities, Energy, Fisheries, Forests, Manufacturing, Transport, Waste, Water
		Reform of property right law	Agriculture, Fisheries, Water
		Reform of ecosystem access right laws	Agriculture
		Use of rules and regulations, standards or prohibitions, e.g. vehicle engine efficiency standards, outlawing bottom-trawling	Agriculture, Buildings, Cities, Energy, Fisheries, Forests, Manufacturing, Transport, Waste
		Use of negotiated and voluntary agreements	Buildings, Cities, Forests, Waste
		International cooperation, agreements, laws and organizations	Fisheries, Waste
Laws and norms that encourage the transfer of technologies	Access to technology can be instrumental to the improved management of resources, preserving their economic value and the markets that rely on them. It can also create new economic opportunities.	Redesign of intellectual property rights	Agriculture, Energy, Transport,
		Removal of trade barriers to green goods and services	Agriculture, Energy, Transport, Water
Improved administrative and technical capacity in government and other organizations	In some cases, governments may need to enlarge their administrative and technical capacities as a prerequisite to enacting policies that stimulate investment in green economic activity.	Investments in technical and administrative capabilities	Energy, Fisheries, Manufacturing, Transport, Waste
		International cooperation, e.g. Bali Strategic Plan, international financial institutions etc.	Fisheries, Transport, Waste, Water
Improved transparency and accountability	Transparency and accountability are pillars of good governance. They allow for monitoring and evaluation of policies intended to stimulate green investment, and in this way can help ensure that policies are achieving their objectives, and in an efficient way.	Monitoring and evaluation as a component of other policies	All
		Transparency to make info. about decision-making and spending available in a user-friendly way	Cities, Forests, Transport,
		Accountability mechanisms as a component of policies, e.g. critical reviews, performance targets	All
Effective enforcement of laws	Unless laws can be adequately enforced, they may partially or fully fail to alter investments flows towards green economic activity.	Create adequate enforcement incentives, e.g. adequately priced fines for non-compliance etc.	Cities, Manufacturing, Waste
		Develop government capacity to enforce	Fisheries, Manufacturing
Economic			
Support for green sectors	In some sectors, direct support or specific infrastrucure may be required to effect immediate change (especially where there is lengthy capital stock turnover) or to support infant green industries.	Increased funding for the innovation chain, e.g. research, development, deployment, information-sharing	Agriculture, Cities, Energy, Waste
		Investment incentives: low-interest loans, feed-in tariffs, exemption from certain regulation, etc.	Agriculture, Buildings, Cities, Energy, Fisheries, Forests, Manufacturing, Transport, Waste
		Sustainable public procurement, including green infrastructure spending	Buildings, Energy, Waste
		Conditioned support: contingent on use of local goods, technology transfer, etc.	Energy, Manufacturing, Waste
Policy support for green sectors is clear, predictable and stable	Investors may be cautious of industries that rely on policy support. Investment can increase if support of green-sectors is predictable, clear and has long-term stability.	Investment-grade policy design, e.g. long-term guarantees, predictable changes, gradually phased out support etc.	Energy, Transport
			Agriculture, Energy, Fisheries, Forests,
Prices that reflect true costs of goods and services	When the price of an unsustainable good or service does not reflect its true societal cost, it is more likely to lead to overexploitation of natural resources, inefficiency and waste. Prices that reflect true costs can make green opportunities relatively more attractive.	Reform of harmful subsidies	Manufacturing, Water
		Environmentally-related taxation, other tax instruments, certificate trading markets, fees and charges	Agriculture, Buildings, Cities, Energy, Fisheries, Forests, Manufacturing, Transport, Waste, Water
Information-based			
Increased data and analysis about ecological conditions	Policy must be informed by accurate information, and in many cases data collection must be instituted, improved or increased in order to establish local best practice.	Development and use of accurate indicators of progress.	Agriculture, Fisheries, Transport, Waste
Increased awareness about sustainability challenges	Increased awareness of sustainability challenges will increase popular demand for green goods and services and policies that support them.	Educational initiatives, e.g. a government 'vision' for the green economy, information campaigns, material in state education	Agriculture, Buildings, Fisheries, Forests, Transport, Waste
Increased information about life-cycle costs of goods and services	Increased information about the life-cycle costs of goods and services helps consumers choose which products they would prefer to buy and can increase the market share of green good and services.	Label and certification schemes, green audits, or legal requirements for disclosure (also covered above under regulations, standards and prohibitions)	Agriculture, Buildings, Forests, Manufacturing, Waste
A workforce equipped with the skills needed to take advantage of green opportunities	As many of the innovations in green sectors require particular skills and knowledge, the workforce will need to adapt to take advantage of new opportunities.	Retraining and support schemes for workers using new techniques or changing employment to new sectors	Agriculture, Fisheries, Manufacturing, Transport, Waste
		Support to encourage the take-up of codified and tacit knowledge about technology	Energy, Transport
		Local, national, regional and international knowledge-sharing and skills workshops	Agriculture, Waste

Subsidy reform

Subsidy reform involves reduction or elimination of subsidies that have perverse economic (and often environmental) outcomes. Perverse subsidies are common in the areas of agriculture, energy, fisheries, forests, manufacturing and water.

Removing such subsidies frees up potentially significant levels of public finance for other (green) policy priorities. It may also reduce unsustainable activities and consumption, depending on the sector. For traded commodities, any subsidies will negatively impact unsubsidized foreign competitors, so subsidy reform in those cases removes distortions from the conditions of competition. The same holds for subsidies to inputs for traded goods such as energy and water, but to potentially a lesser degree of significance depending on subsidy design. In the end, this instrument promises a positive potential impact on trade and conditions of competition, since it removes distortions in the market.

Environmentally-related taxation, other tax instruments, fees and charges

In general, environmentally-related taxation and levies aim to internalize external costs, and thereby to dampen activity in sectors that work against the goals of the green economy. These sorts of levies may affect trade, since they affect domestic demand for the covered products and their alternatives. But they do not generally reflect protectionism. In fact such taxes, fees and charges will tend to raise the prices of domestically produced goods relative to those produced elsewhere.

Taxes applied to international transportation services, or applied at the border, offer a different context than those applied as part of domestic regulations. Levies on transport services, for example related to carbon emitted in transport to market, will be inherently punishing for traded goods vis-à-vis locally produced goods.

Another type of tax or charge related to imported goods is border carbon adjustment, or a levy at the border that tries to level the playing field between regulated domestically produced goods and foreign goods that are less stringently regulated.[1] With such schemes the devil is entirely in the details. If the regime were designed such that it did not alter the conditions of competition, imposing on foreign producers exactly the equivalent of regulatory burden imposed on domestic producers (accounting for whatever regulatory burden had already been borne in the country of export), then it could at least be argued that the regime was non-discriminatory (and potentially more likely to be accepted as WTO-legal). Even in this scenario, however, there would be impacts that punished high-intensity producers and rewarded clean producers.

But the administrative and methodological difficulties involved in constructing such an ideal scheme are daunting,[2] and the schemes that have been proposed to date take significant pragmatic shortcuts. One risk is that such schemes will be constructed in ways that reduce the administrative burden of implementation, but thereby discriminate against foreign producers.

Another risk is that, even if market share is unchanged, the result may be unfair. If, for example, a country takes action to address climate change through one sector (e.g. avoiding deforestation) and thereby achieves its "fair" share of economy-wide mitigation, but takes no action in another sector (e.g. steel), then to impose a levy on steel exports from that country would amount to an unreasonable demand.

The bottom line seems to be that domestic regulatory tax instruments are probably not a significant concern, but instruments applied to international transport, or applied at the border, have the potential to negatively impact trade and the conditions of competition for developing country exporters, or to unfairly penalize them. The solution is clearly careful regime design, ideally based on internationally agreed principles.

Use of regulations, standards or prohibitions

There is a rich body of law in many countries that dictates how production should be carried out such that environmental objectives are respected. It comes in a variety of forms: rules and regulations, standards both mandatory

and voluntary, and prohibitions on certain practices, or on trade in certain products. By far the majority of these rules apply only to domestic production and therefore have little impact in terms of trade and the conditions of competition. The regulations, standards and prohibitions that are potentially of concern are those that apply to imports.

The question to be addressed here is whether, if these sorts of measures are used in pursuit of green economy, they will alter the terms of international competition; that is, can they be used as protectionist instruments?

A sectoral analysis can give solid grounding to the discussion. In the agriculture sector, and particularly in the agri-foods sector, there are a number of rules that dictate the method of production and processing at the domestic level. Some also extend to the international level, imposing standards on imports. Most of these are related to sanitary and phytosanitary concerns and are not particularly relevant for the green economy discussion. There are few environmental requirements to such processes, and the standards are not applied by governments in any case, meaning they could not be considered part of any government-led push to green the economy. Where governmental agreement is necessary to recognize foreign certifications and regimes as equivalent to domestic regimes, there is certainly scope for concern.

The energy sector occupies a central place in the pursuit of a green economy and most countries' energy sectors are heavily regulated with respect to environmental performance. Few of these sorts of regulations apply to trade in energy or energy products, though. There are a few notable exceptions. In California (U.S.) and British Columbia (Canada) there are now low-carbon fuel standards and GHG emissions standards for imported electricity. In both cases the focus seems to be legitimately to protect the integrity of domestic regulations vis-à-vis neighbouring states, rather than to favour domestic producers.

Another exception is the potential use of border carbon adjustment. This was discussed above as a tax measure, but it could also be employed as a regulatory measure, if importers were forced to buy into domestic cap and trade schemes, for example.

In the fisheries sector, again the bulk of measures addressing production methods are targeted at domestic producers, mandating methods and timing of harvest for specific species, allocating permits and quotas for harvest, and so on. Where there may be concerns is with measures that impose PPM-based standards on imports. The WTO US-Shrimp case laid down several useful conditions:

- Measures should be preceded by efforts at international agreement to address the environmental problem in question.
- Measures should not specify particular technologies, but should only specify outcomes to be achieved in ways that may vary from country to country.
- Measures should take into account the efforts of individual producers, rather than assign some sort of default production method to a country or sector as a whole.

In the forestry sector the only measures of concern are those that are related to imports. Some such measures indeed exist today, and include laws prohibiting the import of timber that has been illegally harvested. The only

other type of forestry measures aimed at imports are voluntary standards certifying sustainable harvest. Unless such standards actually feature as part of mandatory government-led requirements (e.g. as part of government procurement specifications) they cannot be seen as part of a government-led drive for a green economy.

In the manufacturing sector most countries have laws with respect to production and processing methods, including emission standards and restrictions on the use of particularly harmful substances. There are no international standards for energy efficiency in manufactured goods, and having many different (and changing) standards in different markets is a costly proposition for exporters.

There may also be trade implications to specified technologies – prohibitions of certain types of environmentally damaging manufactured products, or new technology standards. Despite notable cases of bans on certain kinds of technology leading to expanded new markets for export of the alternative technologies, there is clearly potential for technology standards to be used in a manner that benefits primarily domestic producers.

Standards are not the only concerns in this sector. Countries might also implement regulatory requirements for take-back and recycling of goods that contain hazardous component materials. Such regimes have the potential, if not designed carefully, to disadvantage foreign producers with small market share, since the fixed costs of such a regime would be spread over a much smaller total sales base.

In the area of transport, most rules will cover domestic services, specifying fuel standards, for example, and vehicle emissions standards. Any rules governing international transport will obviously affect international trade. However, regulations that increase the cost of shipping to regulated economies will, by the same token, also increase the costs of exports from those economies. As such, these rules as adopted would certainly alter trade patterns, but there seems to be no clear-cut pattern of detriment to non-regulating states.

In the waste sector, most countries have stringent domestic regulations as to the handling and transport of certain types of waste. Trade-related regulations in this sector cover the import and export of hazardous waste. Bans on the import of hazardous waste are not a major concern. Bans on the export of hazardous waste may be problematic if they deprive the destination countries of a source of raw materials for manufacturing or processing. The key (unresolved) issue here is how to differentiate hazardous waste from scrap for recycling, since states that ban exports may end up benefiting from a lower-priced flow of feedstock.

Removal of trade barriers to green goods and services

Countries may seek to increase their imports of green goods and services by lowering barriers to their trade. There are talks ongoing under the Doha Round of WTO negotiations with a mandate to lower or remove such barriers, but any country could do so unilaterally if it so chose. The justification would be to foster greener patterns of production by lowering their costs relative to conventional goods and services. The likely trade impacts from such a move would be positive for foreign producers, making any environmental goods and services exports more viable in the implementing country.

Increased funding for the innovation chain

Many governments choose to pursue a green economy with financial support that fosters increased innovation in clean technologies. There are various types of forms for this sort of support, spanning the length of the innovation chain:

- support for research and development: joint R&D, funding for R&D;
- support for commercialization: low-interest loans, loan guarantees;
- support in the form of demonstration projects: project financing, low-interest loans/loan guarantees.

Support for deployment and dissemination of commercial technologies –the final segment in the innovation chain – usually takes other forms than funding: technology standards, feed-in tariffs, investment incentives, etc.

Funding for the innovation chain will not have any immediate direct effect on trade patterns and conditions of competition, but the long-term indirect effects are precisely the purpose of this sort of support. The ultimate aim is to foster domestic competitiveness in particular sectors of the new economy. As such, innovation funding if it is successful may be one of the most significant policy instruments in terms of potential impact.

That said, it is more or less recognized that support for innovation is within the bounds of acceptable sovereign practice. Support for mature industries, however, may raise more acute trade and competitiveness issues. The WTO panel decision in EC – Aircraft gives some reassurance that this sort of support is governed by clear rules.

Support offered to aid in the commercialization of a technology, or in the form of demonstration projects, is almost by definition offered to technologies that are not yet on the market, where trade impacts will be felt only

well into the future. In that sense they are like support for R&D to non-mature sectors; they may eventually have trade impacts, but not in the medium term. Also like R&D support, the use of this type of support is commonplace.

Investment incentives

Governments may, as part of a drive for a green economy, grant financial support to attract green investment to a particular location. Often this sort of support will be part of a larger strategy to build up economies of scale and competitiveness in a particular sector. But it may also be simply a question of increasing local economic activity, and doing so in a sector that furthers environmental objectives.

Clearly such measures, if successful, can help to establish viable industries in sectors that are key to building a green economy. It is possible that such support would result in more green production than would otherwise be possible. But they also, by definition, distort investment decisions. In the longer term they may affect the competitiveness of national sectors if economies of scale can be reached, and/or agglomeration effects result in a critical mass of related sectoral investment. The jurisdictions at the losing end of the competition for this sort of investment will tend to be small and/or poor economies without the financial means to triumph in a battle of spending.

Most of the investment incentives described above can be employed as instruments of competition between jurisdictions in attracting investment. The bottom line is that such incentives, whether WTO inconsistent or not, will always affect investment decisions and, in most cases, will thereby rob other jurisdictions of the opportunity to exploit their comparative advantage.

Conditioned support

Support for green sectors, whether in the form of investment incentives or other measures discussed above, is sometimes conditioned on requirements designed to foster "green infant" industries. This meshes the economic and environmental objectives that so strongly characterize the green economy. The most common sort of condition for support is that there be some domestic sourcing of materials or labour, but there may also be demands for export performance, or for technology transfer. Support measures with these sorts of conditions might include:

- feed-in tariffs or preferential grid access granted to renewable energy power producers –can be conditioned on local content in the technologies used, joint ownership of any investment, transfer of proprietary technology;
- investment incentives to green manufacturing –can be conditioned on sourcing local inputs, use of local labour, joint ownership, technology transfer;
- export credit instruments granted to green exporters, investors (export credit, various types of insurance) –are by definition conditioned on the export of goods or on outward investment.

Clearly, such measures distort investment location decisions and patterns of international trade; in fact that is their primary aim.

There are many more programmes using conditional support than there are WTO disputes founded on them, in part precisely because they are so widely used that few countries have a clean enough record to feel comfortable challenging others. But it is important to note as a point of principle that the international community has decided that such conditions are inappropriate. Any subsidy conditioned on use the of domestic inputs or export performance is prohibited under the WTO's Agreement on Subsidies and Countervailing Measures.

Sustainable public procurement

Government spending is a powerful force in many economies and still a significant enough force in most economies that governments have tried to spur green economic activity through their purchasing decisions, and also to lead by example.

Government outlays on greening national infrastructure have featured heavily in the national stimulus packages introduced by many governments in the wake of the financial crisis. This sort of spending has spin-off benefits

for other countries if it creates markets for their green products and services, and if it pushes the technology envelope toward lower costs and wider working knowledge of new technologies.

That sort of upside holds true for green government procurement in general, since government purchases can help generate economies of scale for new technologies, and through a demonstration effect can help in further deployment and dissemination. It should be noted, however, that green government procurement is often accompanied by the sort of conditions discussed above, and particularly by requirement for domestic content or sourcing. This sort of conditioning risks losing the direct benefits for exporters of green goods and services, but may still retain the indirect spin-off benefits associated with greater diffusion and deployment.

Conclusions

The first thing to note about the range of measures available to governments in pursuit of a green economy is how few of them actually have trade and competitiveness impacts. The clear majority of measures is domestically focused and does not significantly impact imports or exports.

It is also worth noting that some of those measures that are trade-relevant may actually have positive impacts for foreign exporters. Subsidy reform and strong environmental taxes probably raise the cost of domestic goods relative to foreign goods. Liberalization of trade in environmental goods, and new technology specifications, may open up new markets for foreign exporters. And green infrastructure spending may create both new markets and lower the costs of technology for all, as economies of scale are reached.

Other measures have potentially troubling aspects, but are not inherently negative. The final impact of this class of measures depends strongly on the design of the measures involved. Environmental taxes, for example, can be constructed in such a way that they are non-discriminatory and yet still punish foreign producers, though few examples of this exist. Take-back regulations can be similarly punishing or not, depending on the design of the regime. Border carbon adjustment has many variations that make it more or less problematic.

There are, however, still a clutch of measures that governments might take that have troubling impacts on trade or investment flows, and on terms of competition. Many of those surveyed above are actually covered by WTO disciplines: environmental taxes, PPM-based standards or prohibitions, R&D support, and support conditioned on local sourcing, for example, have all been the subject of WTO disputes, and several are the subject of ongoing disputes. While WTO coverage does not guarantee there will be no negative impacts, it nonetheless must lessen the concern about the potential abuse of such measures.

Only a few measures are left as potentially problematic and not adequately covered by WTO rights and obligations. International transport taxes as contemplated under the UNFCCC are in this category, though the UNFCCC negotiations are working hard to ensure that the final result respects the principle of common but differentiated responsibility. Another measure in this category is border carbon adjustment, simply because we don't know yet what sort of scheme will be enacted and how it will be viewed by the dispute settlement mechanism. Energy efficiency standards are another measure with potential problems but no obvious solution. Many competing standards can raise costs for exporters, and an international harmonization of standards would be a solid step toward green economies, but there is no obvious forum for such harmonization.

It is interesting to note that while the trade and competitiveness debates have traditionally pitted developed against developing countries, a large number of the issues discussed here do not fit that mould. For example, Canada is being challenged by Japan on the conditioning of provincial-level feed-in-tariffs. The U.S. government has initiated a WTO dispute against China for its support to clean energy sectors. The low-carbon fuel standard being used in North America is being used on fellow North American states and provinces. Investment incentives for the most part pit OECD countries and regions against one another. In part this reflects the fact that the developed-developing distinction needs more nuance in a changing world. But it is also a sign that the traditional split is not a defining framework in this discussion. Developed and developing economies alike are using the measures discussed here, and both feel the impacts. That said, developing and least developed countries are clearly more vulnerable as a group, saddled as they are with a lack of export diversity and a relative lack of resources to adapt to the changing demands of a greening global market.

How can we deal with those few measures that have the potential for negative impacts? Each probably deserves a tailored approach. The harmonization of international energy efficiency standards, for example, needs an institutional home and champion. Levies on international transportation deserve careful attention in the forum that is already mandated to handle them – the UNFCCC. BCAs probably need some effort at defining how best to design the instrument so as to avoid unfairly punishing developing country exporters, and the same approach might yield results for those measures with final impacts that are design-dependent (e.g. environmental taxes, take-back regulations).

At the end of the day, there are some grounds for developing country concern about the green economy's implications for trade, investment and the conditions of competition. But, put in the perspective of the whole green economy effort, the few measures that are problematic seem to be the exception rather than the rule. There is a clear need to delve deeper into those types of measures that may need special attention from the international community if we are to get the greatest potential from the international drive for green economy. ◀

Endnotes

1 For an overview of these instruments see Wooders, Peter, Aaron Cosbey and John Stephenson, 2009. *Border Carbon Adjustment and Free Allowances: Responding to Competitiveness and Leakage Concerns*. Background paper to an OECD Roundtable on Sustainable Development, 23 July 2009, Singapore. (SG/SD/RT(2009)8).

2 See Cosbey, Aaron, 2009. *Border Carbon Adjustment: Questions and Answers (but more of the former)*. Background paper produced for the GTDF/IISD Round Table Discussion: *Toward International Agreement on Border Measures for Climate Change,* November 12, 2009, Geneva. Winnipeg: International Institute for Sustainable Development.

3 Note that these conditions were not framed as general requirements for the use of unilateral extrajurisdictional measures, but were entirely case-specific. That said, they have some relevance in considering what measures would be considered acceptable by future panels.

4 This is not clear cut, however. Investment incentives could conceivably just serve to offset the inefficiencies inherent in a particular production location, in which case the net effect would not lower the firm's costs.

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Reflections on the relationship between the 'green economy' and sustainable development

Chandrashekhar Dasgupta

Chandrashekhar Dasgupta believes the interdependence of social and economic development and environmental protection is not adequately addressed in what he calls the "uni-dimensional 'green economy' approach". While he finds that a number of 'green economy' policy recommendations deserve serious consideration on their own merits, he says others fail to deal adequately with the concept of development or are in conflict with other agreements, while still others, notably provisions on industrial standards, might be protectionist. He concludes that "a new and ill-defined concept" should not displace the well-established concept of sustainable development.

The concept of a "green economy" has acquired a remarkable salience in UN forums even though it lacks a clear definition.

Current formulations of the "green economy" fail, in particular, to do justice to the mutually interdependent relationship between environmental protection and inclusive economic and social development. If we squander our environmental heritage, we will imperil the prospects of future development. At the same time, if developing countries fail to achieve rapid and inclusive economic and social development, they will lack the resources necessary to protect the environment. For poorer countries, development is an indispensable requirement for environmental protection.

At the Stockholm Conference in 1972, Mrs Indira Gandhi succinctly summed up the viewpoint of India, as a developing country: "the environmental problems of developing countries are not the side-effects of excessive industrialization but reflect the inadequacy of development. The rich countries may look upon development as the cause of environmental destruction, but to us it is one of the primary means of improving the environment for living, or providing food, water, sanitation and shelter, of making the deserts green and the mountains habitable".[1]

The mutually interdependent relationship between economic and social development and environmental protection is now recognized. It is embodied in the concept of sustainable development, as elaborated in the Brundlandt Commission Report (1987)[2] and subsequently adopted at the Rio Summit on Environment and Development (1992). Economic development, social development and environmental protection are the three pillars of sustainable development. The interdependence is also reflected in Principle 3 of the Rio Declaration on Environment and Development, which states, "The right to development must be fulfilled so as to equitably meet the developmental and environmental needs of present and future generations".

How does the "green economy" approach deal with the interdependence between developmental and environmental imperatives? A 2009 UNEP policy document informs us that "a common misperception is that there is a trade-off between economic development and environmental stewardship... In reality this is not a trade-off because all human activity depends upon the existence of a responsible framework for using environmental assets".[3] This fails to recognize fully the interdependence between the environment and economic and social development. It rightly reflects the fact that the prospects of future development will suffer in the absence of appropriate environmental

"Environment cannot be improved in conditions of poverty"

Indira Gandhi

stewardship but it fails to recognize the reality that, for developing countries, development, economic and social, is an essential requirement for environmental protection. Without development, poorer countries will lack the resources necessary to protect the environment. To quote Mrs Gandhi once again, the "environment cannot be improved in conditions of poverty". The element of interdependency is heavily discounted in the uni-dimensional "green economy" approach.

The "green economy" is both a conceptual construction and a menu of policy options. Many of the policy recommendations are unexceptionable and these deserve serious consideration on their own merits, independently of the conceptual framework in which they are embedded. However, a number of other proposals, as shown below, reflect inadequate attention to the developmental dimensions of sustainable development. Some propositions are also in conflict with the provisions of the UN Framework Convention on Climate Change and the Rio Declaration on Environment and Development. Finally, the "green economy" policy menu includes propositions that must be looked at very closely in the context of current protectionist moves, disguised as environmental concern, in evidence in some developed countries.

The "Global Green New Deal", launched by UNEP in March, 2009, addresses the current recessionary trends in the OECD countries. The Policy Brief begins with the assertion that the "world today finds itself in the worst financial and economic crisis in generations".[4] In this context, it identifies three objectives for the Global Green New Deal: reviving the world economy; promoting "sustainable and inclusive growth", including achievement of the MDG poverty reduction target, and reducing carbon dependency.

The principal recommendation –that fiscal stimulus packages should be used to promote a sustainable post-recession economy– is unexceptionable. The same cannot be said, however, for the way in which the issue is framed or the specific policy recommendations for the developing countries.[5]

The current recession in developed countries does, indeed, constitute a major global problem not only for those countries but also because of its negative impact on growth rates in the developing countries. From an OECD perspective, it may, indeed, be the "worst financial and economic crisis in generations". But does this apply to the world as a whole? Many developing countries are continuing to achieve relatively high growth rates (though these might have been higher but for the global situation) and their living standards today are much higher than they have been in recent centuries. From their perspective, the present situation can hardly be described as the "worst financial and economic crisis in generations".

Policy recommendations reflect a similar inadequacy. A major recommendation is that "developing countries should prioritize investment in agricultural productivity measures, freshwater management and sanitation, as these have demonstrable and exceptional social returns". [6] This is a highly selective list. The three areas must, of course, figure in any priority list. But, why exclude other essential areas, such as investing in energy efficiency or public transportation or constructing an infrastructure with enhanced capacity to withstand the impacts of climate change? While raising agricultural productivity, many, if not most developing countries also need to develop the industrial and services sectors, in order to promote employment and raise living standards.

The recommendations for reducing carbon dependency are even more problematical. They echo the position of the developed countries in ongoing UNFCCC negotiations in asserting that the "principle of CBDR" must be upheld with regard to developed countries, emerging economies, countries with economies in transition and least developed countries".[8] As many developing countries have pointed out, the UN Framework Convention on Climate Change applies the CBDR principle with regard to developed countries and developing countries, making a clear differentiation between their respective commitments. Nowhere does it recognize a category of "emerging economies". The cumulative per capita emissions of

developing countries, including those undergoing industrialization, remain relatively low. There is no justification for ignoring UNFCCC treaty provisions, particularly since the cumulative per capita emissions of the "emerging economies" are still relatively low compared to the developed countries.

The UNEP Policy Brief also asserts that the "international policy architecture needs attention in the areas of **trade**, aid, **carbon pricing** and technology and **policy coordination**" (emphasis added).[9] UNFCCC does not call for policy coordination between developed and developing countries. Indeed, it lays down differentiated commitments for these groups. It might well be asked if the call for policy coordination in the context of carbon pricing and linking this call with international trade policy, signals an endorsement of the disguised protectionism in evidence in many developed countries.

In a similar vein, at the launch meeting of the "Green Economy Initiative" it was suggested that "government-backed and defined Best Available Technology Standards (BATs) are required. Here lies a challenge of convergence across national boundaries…".[10]

The proposed convergence of technology standards between developed and developing countries is inconsistent with Principle 11 of the Rio Declaration on Environment and Development, which states: "Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost in other countries, in particular developing countries".

These preliminary observations underline the need for independently examining the merits of each of the numerous proposals that are bunched together under the banner of the "green economy". The offered menu of policy options is an amalgam of good, bad and indifferent proposals. These must be de-linked from one another and considered independently on their own merits. As indicated above, a number of current "green economy" policy proposals should be rejected by developing countries.

In 2012, the Rio+20 Summit will have on its agenda an item on "green economy in the context of sustainable development and poverty eradication". The context is of primary importance. The so-called "green economy" proposals are relevant only to the extent that they promote sustainable development, including economic and social development.

It must be ensured that a new and ill-defined concept does not displace the well-established concept of sustainable development. The Summit is expected to reaffirm the global commitment to sustainable development. It would be a singular tragedy if it ends up endorsing a new, vaguely defined concept which waters down the developmental dimensions of sustainable development. ◀

Endnotes

1 Address to the plenary session of the UN Conference on the Human Environment, Stockholm, June 14, 1972.

2 *Our Common Future.*

3 UNEP, *Global Green New Deal – A Policy Brief*, March 2009, p.7.

4 Ibid.

5 UN-DESA has produced its own version of the "new deal". See, UN-DESA, Policy Brief No. 12: *A Global Green New Deal for Sustainable Development.* This rectifies some of the omissions of the UNEP paper but the expanded title raises the question whether a new conceptual construction is at all required to supplement sustainable development.

6 Ibid. p.1.

7 CBDR: common but differentiated responsibilities.

8 Ibid, p.7.

9 Ibid, p.1

10 UNEP, Meeting Report, *Launch meeting of the Green Economy Initiative*, December 2008, p.6.

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PART 3

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3 Managing
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Green Economy as a programme for sustainable development

Carlos Márcio Cozendey

Carlos Márcio Cozendey says the legitimacy of the green economy concept should derive from actions that promote more sustainable ways of producing and consuming and wider opportunities for developing countries to enter markets in environmental products and services. He calls for greater interlinkage between economic growth, environmental concerns and social priorities associated with capacity building in green market-related activities. Cozendey cautions against green conditionalities being applied to development financing and supposed green concerns used as a pretext for trade protectionism. He emphasizes the need for continued international consensus and a rebalancing of current resource and knowledge asymmetries.

From a developing country perspective, the consensus around the concept of sustainable development, enshrined in the 1992 Rio Declaration, was possible because it recognized the possibility of ensuring social and economic development whilst addressing pressing environmental challenges.

It went beyond a debate that, too frequently, taking developed countries' reality as a point of departure, tended to oppose growth and favour environmental protection. At the same time that it recognized poverty as a major cause of environmental degradation, it was based on a dynamic view: this was not a static world and we could neither sit and see it deteriorate nor cease to believe in the transforming power of mankind. Under such a vision, international cooperation was natural and followed suit.

Twenty years later, we have decided to reinforce the promotion of sustainable development and it has been proposed that "Green Economy" be one of the main themes of the 2012 Rio Conference. This has generated discussion on the contents of this concept, which, given its diffuse origin, is far from being consensually understood. It has, in fact, been used with a number of different meanings and applications.[1] By its terms, the concept tries to conjugate environment and economic activity, but in what relationship? The fact that we have got used to seeing environment and social and economic development side by side for some time now justifies the preoccupation that, "green" being the qualifier, we might be back to a preservationist approach that emphasizes limitations to development. Or, as it has now been expressed by many delegations of developing countries, that it would imply a prevalence of "green" over "economy" that would justify trade restrictions or the imposition of new conditionalities on financing for development.

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To alleviate those concerns, some efforts - such as UNEP's Green Economy Initiative and UNCTAD's background note for the *Ad Hoc Expert Meeting on the Green Economy: Trade and Sustainable Development Implications*,[2] are well under way, to develop the relationship between the concept of green economy and the basic assumptions and objectives condensed in the concept of sustainable development. But if one follows this track, in the end, the green economy concept would incorporate so many additional aspects to ensure the adequate anchoring in the development expectations of developing countries and their social dimension, that the concept would become equivalent to sustainable development itself. In such a case, why build a new concept?

On the other extreme, the concept and its variations, such as the term "green growth", being used in the OECD, could be seen simply as a marketing reformulation to sell the necessity of incorporating environmental preoccupations in the normal functioning of economic activities. It would aim at conveying an image of harmony between economic activity and the need for environmental conservation, as a tool to persuade businesses on the acceptability of environmental policies, often viewed as generating further production and administrative costs to the detriment of competitiveness. In a field where businesses have often equated state action with "additional costs of regulatory policies", "limits on growth", "need for consumption pattern change", they would now be able to read "economic opportunities", "financing, diffusion and business deals on new technologies", "exports of environmental goods". In parallel, sectors of the public opinion would be pleased by the active stance of governments in pushing the environmental agenda with the private sector, while supporting green incentives for companies, be it under stimulus packages or not. In this case, the risk would be that emphasis on the green economy concept becomes not much more than a way of promoting the sales of some companies in developed and in very few developing countries.

The discussions around the concepts of green economy and green growth have frequently highlighted, for instance:

(a) fast-track mechanisms for the granting of intellectual property rights for green technologies, particularly patents;

(b) promotion of access to green technologies, understood as licensing and sale of intellectual property rights or of goods and services which embody these technologies;

(c) Liberalization of trade in goods and services incorporating green technologies, as negotiated in the framework of the Doha Round of the WTO;

(d) Development and promotion of market instruments in the design and implementation of environmental policies, given their potential to generate more efficient solutions in terms of cost-effectiveness.

Although these approaches are not per se necessarily negative, they tend to:

(a) favour developed countries, which own those technologies for the most part;

(b) consolidate at the global level the few existing poles of production of goods and services considered to be environmental, thus reducing both the potential for competition in the long run and the scope for adaptation to local economic, environmental and social conditions;

(c) reduce the space for the mobilization of public resources and international cooperation, despite the recognition of its importance, given the focus on the action of the market;

(d) reduce the role of sustainable development as the guiding concept of the international debate on issues related to the environment.

In effect, let us examine a category of green goods whose contribution to climate-change stabilization is particularly straightforward and meaningful: renewable energies. According to Jha,[3] an analysis of the areas of biofuels, solar, wind and photovoltaic energy shows that: (a) 18 out of the 20 biggest companies in the fields of renewable energies proceeded from developed countries, mostly

European; (b) European countries, many of which benefited from incentives in the past, enjoyed a commanding position in exports of components in the covered areas; (c) trade of developing countries in the covered areas was less than half of that of developed nations and was basically performed by only 14 developing countries; (d) the contribution of developing countries to the exports of selected products, representative of the renewable sectors covered, was dominant only in photovoltaic panels (60 per cent), to a large extent due to China's weight, amounting to less than one-fifth on the other goods considered. The share in exports of wind turbines and solar heaters was below 3 per cent; (e) developed country markets were supplied with massive subsidies and a sizable volume of venture capital investment in the realm of renewables; (f) two-thirds of patent holders of renewable technologies in developing countries were multinationals, basically from developed countries.

A recent analysis by the WTO secretariat of the list of environmental goods (composed of 164 subheadings of the Harmonized System) proposed for liberalization by a group of 9 countries (mostly developed) in the context of the Doha Round negotiations discloses a fairly similar picture: developed country members are responsible for around 78 per cent of exports and 67 per cent of imports of listed goods in value terms.

In a Schumpeterian way, development is about change in the structure of production and consumption of an economy. Under this definition, all movements towards a greener economy are development –departing from the regular way of doing things, identifying or creating new markets, providing for them. But the concept of a green economy will only be of interest to developing countries if, through its implementation, new opportunities of sustainable development are effectively created for them. A concept of green economy which implies that developing countries will produce the same things, but with new inputs and technologies generated or produced in developed countries, would mainly mean additional development for developed countries, at the expense of greater equity in the international system. It is necessary that the research and discussions associated with the concept of green economy incorporate areas that can realistically and feasibly be appropriated and developed by developing economies, as well as address the provision of the necessary international financial and technology flows.

An emphasis on the technological challenges and perspectives of developing a low carbon economy, followed by a policy conclusion on the need to establish and dedicate resources to research centres, sounds terribly exciting, but is very far from the reality of the majority of developing countries. According to a joint UNEP/EPO/ICTSD study,[4] the majority of patenting activity in the area of clean energy technologies is concentrated in six countries, which account for 80 per cent of all patent applications (Japan, United States, Germany, France, Korea and United Kingdom). Furthermore, the study shows that Licensing Agreements with non-OECD countries are at a low level and are also very concentrated, mainly benefiting stakeholders in China, India, Brazil and Russia.

It is necessary to look at accessible technology that can generate realistic investments and development in developing countries. Take, for example, certain biofuels: they

Instead of expending time and resources to produce a concept to compete with sustainable development, perhaps we should rather conceive it as a programme to construct sustainable development

are highly adaptable in tropical countries, derived from fairly stabilized and simple technology, yield important environmental benefits and, finally, can be a source not only of exports, but also of clean energy for local consumption, both as fuel and through cogeneration of electricity.

Failure to strike the right balance between economic and environmental needs in developing countries might engender unwelcome barriers to development. This same reasoning could apply to the multilateral context, in which ill thought out outcomes could lead to further constraints on development efforts.

In this way, the discussion of the green economy has to be strongly anchored in the objective of sustainable development. The concept of green economy should probably not be seen as an objective, a guidance for policy-making. This reading is implicit, for instance, in the idea of a "transition to a green economy", a formulation that immediately generates confusion as to the relation with the overall sustainable development objective, giving the impression, in particular, that the social aspects of development will be left, once again, for later down the road. Instead of expending time and resources to produce a concept to compete with sustainable development, perhaps we should rather conceive it as a programme to be implemented in order to construct sustainable development, a set of activities in different sectors that would facilitate and promote sustainable ways of producing and consuming. In other words, a balanced set of activities from which developing countries can clearly identify realistic and feasible development opportunities for them.

This implies not only a balanced green economy programme but also a programme of balanced proposals for action . The areas of focus should be approached in a way that puts in a dynamic economic perspective the environmental requirements and the social urgencies of our time. First, the environmental perspective itself has to be examined in a balanced multidimensional way. In a number of situations, sustainability aspects compete with each other. For instance, hydroelectric power generation may be key to a low carbon energy grid, but at the same time, the construction of new dams, if not well conceived, may pose environmental challenges in terms of destruction of natural vegetation. Second, from a developing country perspective, the balance between environmental needs and social urgencies has to be accounted for. For instance, the elimination of subsidies for fossil fuel consumption has been identified as an action that would favour both economic rationality and the reduction of carbon emissions. We know, nevertheless, that a lot of those subsidies are given by developing countries to allow poor populations the satisfaction of basic energy needs in terms of heating or cooking, therefore posing the issue of finding alternatives to solve the social problem, before taking the otherwise reasonable action. Third, those balances have to be analyzed in a dynamic economic perspective, one that incorporates the changes that innovation and investment bring into the economic processes. It has, therefore, to incorporate the dimension of changing comparative advantages and the policies necessary to allow developing countries to develop new industries that are going to be relevant in a more sustainable economy, instead of focusing only in short-term economic efficiency. Efforts to liberalize trade in environmental goods, as a consequence, should be approached with caution and flexibility, in order not to kill the possibilities of newcomers, who would in the long run favour competition on a global level through less concentrated industries.

A green economy programme should, therefore, incorporate a real "sustainable balance analysis" when selecting principles of action and activities, incorporating, but going beyond instruments like life cycle analysis, internalization of externalities through market instruments, etc. Only in that way would the green economy concept favour a greater interlinkage between economic growth, environmental concerns and social priorities in a legitimate way.

The legitimacy of a green economy programme would not only base its attention on areas of real opportunity for developing countries but also require that certain policy issues be dealt with in international fora and promoted by international institutions without fear of touching areas of sensitivity to developed countries. Take for example the issue of agricultural subsidies, which induce unsustainable practices in exhausted lands in developed countries, while undermining rural development efforts in poor countries. Frequently overlooked in the discussions around the economy-environment link, the issue is a victim of efforts by some developed countries to downplay its relevance every time it is raised by the secretariat of international institutions like the OECD or UNCTAD.

The conception of a green economy programme has to take into account that, in a number of areas, we will be dealing with the induction or direct creation of markets. This is true for developed countries –take, for instance, the creation of a carbon market through carbon allowance schemes– but particularly important in developing economy societies, where, for instance, the low purchasing power of large portions of the population may pose difficulties to the substitution of energy sources, adoption of resource efficient construction materials or energy efficient durable goods. Therefore, attention will have to be given to the ability of the State to develop the instruments of market induction or creation that will be necessary.

In the case of developing countries, this would require important efforts in terms of capacity building and mobilization of resources in the public sector. In this same context, the issue of subsidies for the development of greener industries will have to be discussed. If, on the one hand, subsidies may be an important instrument in developing new markets and industries, their abuse may create enormous asymmetries between countries with more ample resources and those with a smaller subsidization capacity. Green incentive programmes embedded in recent fiscal stimulus packages will tend to deepen the gulf between developed and most developing countries in relation to technology generation and production of the goods and services relevant for a green economy programme. In such a scenario, it would be difficult to count on enthusiasm from less-favoured economies for such a programme.

A green economy programme would also have to be a guide for international cooperation in the promotion of sustainable development and, as such, should be attentive to certain principles. Adaptation to local conditions, for instance. Only by adapting to locally defined environmental, economic and social priorities, can we ensure ownership by different countries and societies, a requirement for the success of the deep transformations needed. In that sense, it should not be a source of new conditionalities for development financing, be it through loans or ODA, to the extent this would distort local priorities and tend to impose "successful" models on very different realities. Rather, locally generated programmes should receive the support of developed countries, as a legitimate expression of the principle of common but differentiated responsibilities, established in the Rio Declaration on Environment and Development.

The legitimacy of a green economy programme would not only base its attention on areas of real opportunity for developing countries but also require that certain policy issues be dealt with in international fora

In the same vein, attempts to use trade to induce behaviour should be avoided. They also imply the distortion of environmental, economic and social priorities defined by local stakeholders and express a self-supposed superiority in the capacity to define the best policies. In this context, the role and risks of private standards should be discussed, given the possibility that they create unnecessary obstacles to trade when they do not follow international standards or lack scientific justification, thereby running counter to their own well-intended objectives.

Another issue of great relevance in this debate pertains to the environmental efficacy and trade restrictiveness of certain trade and regulatory measures with environmental aims. Implemention of international commitments and domestic legislation related to climate stabilization, for example, are likely to favour some sectors of the economy to the detriment of others. In this respect, worries about competitiveness loss, especially in energy-intensive trade-exposed sectors, have motivated political pressure for the adoption of unilateral border protection measures in developed countries. A few of these have considered putting in place border adjustment measures - carbon taxes, mandatory acquisition of emissions allowances by importers, and even antidumping duties and countervailing measures - on imported goods and services based on their carbon content. These run the risk of both creating unnecessary and unjustifiable discrimination or a disguised restriction on international trade and failing to achieve legitimate environmental goals. In view of this, countries should resist the temptation of green protectionism and favour environmentally oriented policies and measures, including for climate stabilization, based on international consensus built in organizations of both developed and developing countries.

International cooperation should act in the direction of rebalancing present asymmetries of knowledge and resources, in order to open to developing countries a wider realm of possibilities of seizing the opportunities that a green economy programme would bring for their development. Effective initiatives in terms of transfer

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of technology, technology absorption, capacity building and financial resources would turn more areas of the programme into realistic benefits for developing countries willing to engage the necessary national efforts.

In sum, a green economy programme will only be successful at the global scale if we understand that what is at stake is not only the ability of and willingness to protect the environment or contribute to climate-change mitigation and adaptation, which are themselves legitimate goals. Equally vital are the economic and social gains that are likely to result from an equitable access to the knowledge, technologies, goods, and production processes which will make feasible the transition to a resource-efficient, sustainable economy. Correctly addressing the economic, environment and social pillars of sustainable development in the context of a green economy programme does not mean an ever expanding set of issues in those three realms, but is rather about focus and interlinkage among them. Building a green economy programme that is capable of generating interest and adherence by both developed and developing countries is a challenging, yet attainable task.

Endnotes

1 See in this volume *Green Economy and Sustainable Development*, by Tarik Banuri.

2 Available at www.unctad.org.

3 See *Climate change, trade and production of energy-supply goods: the need for levelling the playing field,* by Veena Jha. Presentation at the WTO workshop on environmental goods and services, Geneva, September 2009. Trade data from 2007.

4 *Patents and clean energy: bridging the gap between evidence and policy*, Munich, UNEP, EPO and ICTSD, 2010.

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Peak oil and the necessity of transitioning to regenerative agriculture

Daniel De La Torre Ugarte and Chad Hellwinckel

Authors Chad Hellwinckel and Daniel De La Torre Ugarte posit a transition to regenerative agriculture as necessary to avoid being locked into a system that depletes soils and is dependent on an energy resource in decline (fossil fuels). They point to successful regenerative systems that meet these three imperatives: (1) sponsor their own energy; (2) regenerate soils; and (3) produce in abundance. They also stress that modern knowledge of biological dynamics should be used in conjunction with appropriate scale technologies to enhance traditional practices. Biofuels, say the authors, could be a vital part of long-term agricultural policy. They caution, however, that agriculture should not simply become a part of energy policy.

The food crisis of 2008 gave a first glimpse of the problems that are emerging as global oil production peaks.

As the total annual quantity of oil physically capable of being extracted from the earth begins to decline over the next several decades, agriculture may find itself dependent upon a scarce and expensive resource. In 2008, world commodity prices reached their highest levels in 30 years, food prices skyrocketed and food shortages emerged, leading to riots affecting more than 40 countries. After many years of having to deal with the negative consequences of chronically low prices, poorer nations suddenly had to deal with the opposite.

With the global economic downturn starting in late 2008, both energy and food commodity prices receded from their high water mark. But forecasts of declining conventional oil production suggest it is only a matter of time before oil prices rise again, and a food crisis re-emerges due to higher input costs and renewed emphasis on bioenergy production to fill the shortfall in conventional energy sources.[1]

Agriculture, like all other industries over the past century, has taken great advantage of the extraction and refining of plentiful, energy-dense, fossil fuels. Today, agriculture has evolved into a net energy user for the first time in 10,000 years—instead of being a means of converting free solar energy into metabolizable energy, it now transforms finite fossil energy into metabolizable energy. The industrial agricultural system has allowed for the cheap production of plentiful food to feed a growing population, but evidence indicates that it is ill-suited to meet the challenges of the 21st century. Over the next several decades, the practices of agriculture must reverse the fossil energy dependence and once again become a net source of energy, stop erosion and begin to regenerate soil, and meet human food needs. In other words, agriculture must transition to practices that run on solar energy, regenerate fertility and produce in abundance.

Fossil energy dependence: the U.S. example

To meet the needs of a growing population, the modern U.S. food system uses 10.25 quadrillion BTU's of fossil energy inputs, or about 10 per cent of U.S. annual fossil fuel consumption. The industrialization of agriculture has, for the first time in history, led to the situation where agriculture actually uses more energy than it creates, with 7.3 units of energy going to create and deliver one unit of metabolizable energy.[2] This energy deficit of agriculture is an historic anomaly. Up until the past 50 years, agriculture had always yielded more energy than it used.[3]

Historically, by producing more energy than the farmer needed, others were freed from food production, and civilizations were built on the small positive gains in energy from agriculture.

The Energy Returned on Energy Invested ratio (EROEI) of U.S. agriculture in 1920 has been estimated to be 3.1, but by the 1970s had fallen to 0.7.[4] Add the energy required to move, process, package, deliver and cook food in the modern food economy, and EROEI becomes 0.14, indicating that agriculture has lost its traditional role as an energy production system and become simply another user of fossil fuels.

Historically, the foundation of civilization rested on consistent solar radiation. Now it rests on the annual extraction of finite fossil fuels. One solution is to find other energy sources, such as wind or solar, for energy-intense agriculture. Yet when comparing the EROEI ratios of the alternative fuels, the benefits of oil are apparent.[5] Today, economies are running off the large oil discoveries of the 1950s and 1960s with EROEI ratios of 50+.[6] Alternative fuels will likely have an increasing role in meeting the energy needs of the larger economy, but to believe agriculture can continue to function under the current energy balance is folly. It is imperative that agriculture return to a more balanced energy ratio over the next century.

Soil loss

By using energy-dense inputs to produce on remaining land, industrial agriculture has been able to offset soil loss with intensification of production. But in the transition to less energy-intensive methods, continuing soil losses are not feasible. Every year, 75 billion metric tons of soil erode from the earth's agricultural lands, and 30 million acres are abandoned due to over-exhaustion of the soil.[7 8] This is equivalent to losing an area the size of Ohio every year.

Erosion is a problem that has followed cultivation for 10,000 years. Its slow effects are evident in the lands surrounding fallen civilizations such as in the Tigris/Euphrates valley, Israel, Greece or the hills of Italy. Over time, agriculture has led to the loss of one-third of global arable land, much of it within the past 40 years.[9] Green revolution methods of mechanization have sped the rate of erosion in many regions and led to the abandonment of traditional practices, such as integrated crop-animal systems or polyculture plantings, that had slowed erosion and enabled some traditional systems to function for centuries.[10]

Soil is a depletable resource that forms over thousands of years. It is estimated that it takes 800 years for one inch of soil to form in the American Midwest.[11] Modern agriculture is depleting soils at a rate of one to two magnitudes faster than they are formed.[12] The United States, which has much lower erosion rates than Africa and Asia, is still losing soil at a rate of four tons per acre per year.[13 14] This use of soils can be thought of as spending the accumulated capital of millennia, not unlike the use of fossil fuels. In the past, if one culture exhausted its soils and declined, civilization could re-emerge in newly settled fertile areas. Today, with 3.7 billion acres under cultivation, there are few remaining virgin soils. If this trend of soil depletion continues, we will face an increasingly hungry world, even without the added burden of biofuels production.

Once soil is eroded, it cannot be easily or quickly recreated.

Establishing regenerative practices

Long-term agricultural policies must be guided by three imperatives: (1) reverse fossil energy dependence and once again become a net source of energy; (2) stop erosion and begin to regenerate soil; and (3) meet human food needs.

There is increasing evidence that regenerative agriculture can produce more food with less energy than industrial agriculture, while increasing the health of soils.[15 16]

Regenerative agriculture[17] allows natural systems to maintain their own fertility, build soil, resist pests and diseases and be highly productive. Regenerative agriculture uses the natural dynamics of the ecosystem to construct agricultural systems that yield for human consumption.

Regenerative methods regenerate the soil, the fertility, and the energy consumed in semi-closed nutrient cycles, and by capturing, harvesting and reusing resources such as sun, rain, and nutrients that fall within the farm's boundary. Other terms refer to similar principles, such as natural farming, permaculture, agro-ecology, integrated agriculture, perennial polyculture, holistic management, forest gardening, natural systems agriculture and sustainable agriculture.

Successful regenerative practices are used by small landholders capable of managing more intensive and complex systems which rely on the integration of crop-animal-human functions, use of perennial species, and the growing of multiple crops in the same field[18]. Many of these practices are based on traditional cultural land-use practices, but others are newly forged systems.

For example, one of the most promising and easily scalable methods to improve the health and productivity of large amounts of land is the use of intensive grazing—dividing a pasture into several small fields and closely managing the time livestock are allowed to graze each field.[19 20] Evidence indicates that by finely managing when herbivores are placed in a field to graze, total primary

productivity of the landscape can be increased dramatically.[21 22] Grassland productivity can also be augmented through Keyline ploughing, a method of widely-spaced deep chisel ploughing following the contour of hillsides. This acts to shed water away from eroding valleys, directing it to water-poor ridges while increasing ground absorption.[23] The increased grassland productivity and the regenerative capabilities of the grasses take a considerable burden off energy intensive feedlot production. Intensive grazing is a good example of a practice that is already developed and spreading on its own. It may not take much of a push for these practices to become widespread.

Another proven practice, the traditional highland Vietnamese production system (VAC) that integrates aquaculture, garden, livestock and forest agriculture in small plots, could serve as a template for other tropical regions.[24] VAC illustrates a key principle of regenerative practices—using the waste stream of one component to feed another component. Food scraps are placed in the pond to feed the fish, pond biomass growth is removed and fed to pigs, and pig manure is used to fertilize the garden and fruit trees. In this manner, regenerative systems conserve energy and maintain fertility.

VAC has other notable practices indicative of regenerative systems: it makes full use of vertical space by planting vegetables and fruiting bushes below fruit and nut trees. It uses riparian zones (small ponds), the most productive ecosystems on earth, yielding more net primary productivity per unit of area than any other ecosystem. It also stacks functions of components in the system, such as the use of the pond for waste disposal, microclimate cooling, and fish, duck, feed and fertilizer production.

Other regenerative systems already in use include the Zai methods in the Sahel of Africa,[25] the no-till rice-legume-rye system developed by Masanobu Fukuoka in Japan,[26] and the edible forest system indigenous to the Kerala region of India. There are also efforts underway to develop new regenerative systems, such as the perennial polyculture system being developed at The Land Institute, which mimics the native prairie ecosystem in form and function.[27]

Successful regenerative systems will look different depending on local ecosystem capabilities and constraints. By studying the foundational elements of existing systems, new practices unique to individual ecosystems can be developed fairly rapidly. Research investments should be made in locally-adapted regenerative systems. While they borrow principles from traditional agricultural systems, it is important to emphasize that new regenerative systems are not a step backwards in time. Indeed, it is critical that modern knowledge of biological dynamics be used in conjunction with appropriate scale technologies to enhance traditional practices and meet the three policy imperatives.

Extension education and community investments

To begin transitioning agriculture from its current non-sustainability into practices that regenerate fertility, capture solar energy, and produce adequate amounts of food, national government and international entities must invest in:

- Creating regenerative practices appropriate for each ecosystem,
- Extension education with farmers about the value of regenerative practices, and
- Infrastructure to help farmers capture more of the value of their goods.

Although there is great potential in the widespread application of existing successful regenerative systems, they are not being adopted on a large scale.

It takes time, initial resources and knowledge to transform land into regenerative systems. Without massive efforts through extension education, widespread adoption may not result. Demonstration farms should be established within travelling distance of every farmer to demonstrate and test locally-adapted regenerative practices. The old adage 'seeing is believing' holds very true for the world's farmers. By seeing the new practices in action, farmers will more likely adopt them, leading to further adoption by neighbours.

Agricultural infrastructure investment has typically meant more roads, ports and large storage facilities. Future infrastructure investments must be in line with future energy decline and the needs of successful agricultural systems in such an environment. Investments in electric railways and waterway transportation may be in line with declining traditional liquid fuels. Paving or graveling smaller roadways will increase access to populous markets which may otherwise be inaccessible during certain times of the year.

While large-scale national investments will be important, the most important infrastructure needs may be at the local and even farm level. At the farm level, the transition to a locally-adapted regenerative agriculture may begin with construction of ponds and swales or planting orchards. Investments in small-scale appropriate technologies, like simple bicycles, can have significant effects on poorer farmers' profitability.[28] Microprocessing technologies, such as canning equipment or oil presses, could enable farmers to process their harvest into higher value commodities closer to home.

Role of biofuels

The three policy imperatives of agricultural transition must be the primary guide in setting biofuels policy. How can biofuels help facilitate the transition to a sustainable agricultural system that will adequately feed people, build soil and meet its own energy needs? Viewing agriculture simply as a potential source for meeting the greater economy's fuel demand will not guarantee the necessary transition, and could even exacerbate soil destruction, increase agriculture's input consumption and lead to food shortages. If appropriate, biofuels could be a vital part of long-term agricultural policy, but agriculture should not simply become a part of energy policy.

How can biofuels policy help the transition of agriculture to sustainability over the next several decades? The relevant question is not the potential contribution of biofuels to reduce dependence on fossil fuels, but rather the optimal level of biofuels production to encourage the transition of agricultural to a system that enhances food security, reduces poverty and improves the earth's soils. Biofuels demand could be a catalyst creating the right conditions for a transition to a truly regenerative agriculture, particularly if that demand moderately increases all commodity net returns. If crafted within a larger agricultural policy matrix, biofuels policy can be part of the solution.

As energy becomes scarce in the coming decades, agriculture must transition to practices that run on solar and other renewable energies, regenerate soil fertility and produce in abundance. These three policy imperatives should be the long-term guideposts in setting all policies that affect agriculture. The importance of meeting this transition should not be undervalued—if we fail, the future of our complex society could be in jeopardy.

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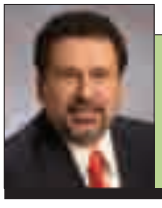

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Trade, finance and the green economy

Dimitri Zenghelis

Dmitri Zenghelis contends that, with the right policies and incentives in place and commitments respected, environmental targets are achievable. Developed countries, he says, should demonstrate the advantages of green growth in advance of implementation by developing countries. He places emphasis on good governance and institutions, a competitive market for green technology, and a willingness to cooperate, share and co-finance technology. Further, Zenghelis calls for open trade in environmental goods and services, clear policy frameworks to deliver low-carbon growth and investment incentives, rapid translation of innovation into green product development and a collaborative approach to reducing emissions and carbon pricing.

Over the coming few decades, the global economy will transition towards carbon neutral production.

The associated "green revolution" will afford many opportunities, but will require up-front investment and yield changes in global comparative advantages. Green finance and technology sharing will be necessary both to incentivise investment and innovation and to compensate those sectors that lose out over the transition. This is necessary to achieve an efficient, pareto-superior outcome, where the winners compensate the losers, and in many cases it is necessary for a fair outcome. The long term goal is a coordinated global policy effort to reduce emissions with the aid of a broadly comparable global carbon price. Before then, developed economies must demonstrate the virtues of green growth, before developing countries risk compromising growth and poverty reduction aspirations. It may sound obvious, but a collaborative approach which acknowledges and builds on these principles is vastly preferable, in terms of efficiency and equity, to one based on coercion, partial pricing, trade sanctions and threats.

The science of action versus delay

The Copenhagen Accord put forward by Brazil, China, India, South Africa, and the U.S. recognised that climate policies should seek to limit the rise in global average temperature to no more than 2°C above preindustrial levels. Analysis at the Grantham Research Institute on Climate Change and the Environment at the London School of Economics showed that in order to have a reasonable, or 50 per cent, chance of reaching the 2°C goal the stock of greenhouse gasses would need to stabilise at close to 450 ppm CO_2 equivalent (CO_2 e). We are already around 440 ppm CO_2 e. Holding concentrations below 500 ppm CO_2 e and eventually stabilising at 450 ppm CO_2 e would require emissions to peak before 2020 and decline by 2-3 per cent *per annum* (p.a.) thereafter. It is important to note that emissions are the annual flow into the stock of greenhouse gases. These gases stay in the atmosphere for tens even hundreds of years, depending on the gas. In order to stabilise at any level of the stock, the inflow of GHGs needs to fall to the level at which the earth can naturally absorb them. This means global annual emissions of greenhouse gases should be reduced from about 47 billion metric tons of carbon-dioxide-equivalent today to about 44 billion metric tons in 2020, to much less than 35 billion metric tons in 2030, and to much less than 20 billion metric tons in 2050. To give a sense of the scale of the transformation, under business as usual where no action is taken, emissions are set to double to between 80 and 90 billion metric tons by 2050.

With a projected 9 billion people on the planet, a fall in total emissions to less than 20 billion metric tons in 2050 would require the world to emit an average of around two metric tons per capita of carbon-dioxide-equivalent. The current average is about seven tons per capita, with the United States averaging more than twenty metric tons, Europe ten to twelve metric tons, China about six metric tons, India less than two metric tons. Due to a lack of public consensus, we have lost critical decades in the battle to cut greenhouse gas emissions. Now only sound analysis, visionary leadership, and a collaborative spirit can tackle the immense risks we are facing.

So far, 75 nations collectively responsible for more than 80 per cent of global emissions of greenhouse gases have set targets outlined in the annex to the Copenhagen Accord. If countries deliver these "high intention" reductions, the plans would result in global annual emissions of about 48 billion metric tons of carbon-dioxide-equivalent by 2020. While this would imply that emissions would peak before 2020, it would nevertheless fall short of a "climate responsible" target of 44 billion metric tons. Nevertheless, this could still—at a stretch—be consistent with a 2°C goal, but would involve more rapid and costly annual emissions reductions during the decades after 2020. When compared with an estimated level of emissions of 55-56 billion metric tons under "business as usual", the ambitious actions would take us two thirds of the way towards what is required – a modest but important start.

The longer it takes for emissions to peak, the faster they have to fall thereafter. This raises the costs of meeting a given stabilisation. Reductions in excess of 5 per cent per year would mean scrapping working capital and bringing on technologies before they fully mature. The alternative of an early managed transition would mean working with the capital depreciation and replacement cycle and waiting for the costs of technologies to fall through learning and experience. Every year of delay raises the costs and a 10 year delay almost doubles the annual rate of decline required. Unlike, say WTO talks, which when stalled, can be picked again up several years down the line; delaying climate action raises costs and opens humanity to ever greater climate risks. Without an early start, the prospect of a 2 degree world will slip over horizon in a few years.

Many studies have demonstrated the feasibility of attaining ambitious emissions reductions necessary to have a fighting chance of keeping temperatures below two degrees. Savings can be found in a broad range of sectors including energy efficiency, power, transport, avoiding deforestation and –as a significant proportion of global energy supply is still likely to be from hydrocarbons by mid-century– carbon capture. The question is how can policy catalyse action?

Creating new markets to drive an effective transition

What are the key elements driving trade and finance in the context of the green sustainable economy? First, the world needs to create profitable, large-scale markets in energy efficiency and low-carbon transport, power and land use. Many of these markets are likely to develop initially in rich countries, as a result of explicit policy measures, but trade will quickly transmit the benefits and opportunities globally as new markets for low-carbon goods and services emerge. An open competitive environment is required to share ideas and technologies and take advantage of new opportunities, as well as build production capacity in developing countries and encourage the transfer of technological know-how. By virtue of their size, and in recognition of the historic responsibility of the developed world (most of the change occurring in the next 20 years will be as a result of past emissions, the majority of which came from rich countries), developing countries will hold the key to designing the world's low carbon –future and rightly play the driving role in the negotiations.

Most major developing countries have already outlined domestic low-carbon action plans, but before they take on their own emissions caps, the developed world needs to demonstrate by example how green investment can support growth. The promised finance must flow and technologies must be shared. Such plans can shift developing country economies to a higher value-added more knowledge-intensive sectoral composition of growth.

Carbon finance

The High-level Advisory Group on Climate Change Financing (AGF) is crucial to generating support from developing countries. Its task was to propose measures to find USD 100 billion p.a., new and additional, by 2020 (to support adaptation, forestry and the transition to the low-carbon economy in developing countries).[1] The extra cost of financial support to catalyse mitigation in developing countries, sufficient to deliver a 2 degree consistent pathway, has been estimated to be EUR 60 billion *per annum* (p.a.) by 2020.[2] Extra adaptation costs resulting from a more hostile climate are likely to be at least EUR 80/USD 100 billion p.a. extra flows by 2020.[3]

Both public and private sources of finance will need to be utilised to achieve such transfers . In addition, private sources such as global carbon markets, private sector flows and private finance leveraged through the multilateral development banks, could all deliver significant net flows. The report argues that such sums are readily achievable if the appropriate policy frameworks and institutions are put in place. Revenue potential from private finance was estimated to be up to USD 500 billion in 2020, generated with a leverage factor of 2-4 on public flows/carbon market offsets.

Inducing low-carbon technology

There is deep suspicion in developing countries that the rules of the game will be designed to require poor countries to pay for rich world technologies in order to meet emissions targets. Sharing technologies will require the opening up of patents, as has been seen in some parts of the essential drug industry. But the buying out of intellectual property rights, and the design of intellectual property (IP) resolution mechanisms will only form part of the solution. Many energy efficiency technologies are not protected by patents or face competition from ready substitutes. The key knowledge-based component in many renewables technologies is often not formula-based IP (as in for example pharmaceuticals) but specialist equipment, expertise, logistics, scientists, engineers and finance know-how. It is predominantly private companies that retain ownership of technologies and know-how, so policy must be designed to incentivise private involvement in the sharing of this know-how for example through joint ventures with international financial institution support.

Beyond joint ventures, a number of ideas can help the diffusion of ideas and know-how, these include the building of local innovation centres; R&D funds for developing country-specific technologies (for example very simple but effective solar powered cooking stoves); international research networks; prize funds for advances in technology; pilot, demonstration and deployment funds, "smart-grid" demonstration projects; policy and planning support for connected urban development; patent buyout funds and so on.

Preserving forests

Direct action on reduced deforestation, degradation and reforestation will also be of central importance. **An internationally-funded strategy for halting deforestation must include direct support for forest funds such as the Amazon Fund.** The ultimate aim must be to give economic value to trees left standing and allocate the rent to those responsible for the use of the land. Introducing forests into carbon trading and carbon finance would be a powerful way of commoditising standing trees, but this will require some careful design. Particular attention must be paid to the problems of corruption and property rights in forest governance to insure that money is not wasted and incentives are targeted effectively at property managers.

Carbon pricing and carbon markets

The restructuring and scaling-up of carbon markets, with improved regulation and good co-ordination across the trading schemes of different countries or regions, will be a vital means of harnessing the power of the market to deliver cost-effective, low-carbon investments. Carbon taxes can play a powerful supporting role too in delivering a carbon price, though international co-ordination may be harder to realise.

Developing countries will need to take on quotas eventually: China perhaps around 2020; India sometime before 2030. But in the meantime, there will need to be a period of one-sided trading where developing countries can sell credits in to carbon markets if they make verifiable additional GHG reductions, but will not be penalised if they don't. The son or daughter of the Clean Development mechanism (CDM) will require greater scale and less administration. It will need to move away from the administratively burdensome project-by-project approach to large-scale programmatic approaches, using standards on technologies and sectoral benchmarks and other 'wholesale' offset schemes. For example, an energy efficiency programme, land-use reform, or technology standard will be credited in proportion to the estimated emissions reductions the scheme delivers. This would mean losing the strict one-to-one link between a dollar's worth of carbon credit and a unit of GHG emissions reduced, and there will be some error, but it should yield administrative savings that could make up for any loss due to the presence of some less effective projects, making the unit cost of leaving emissions reduction cheaper.[6]

The ability of developed economies to 'offset' domestic emissions reductions by investing in reductions elsewhere will provide much needed finance to developing countries. It is also inefficient and impractical to expect developed countries to meet targets entirely with physical domestic emissions. Take the U.S. for example. It would need to make physical cuts of 80 per cent by 2050 relative to 1990 levels to play its part in a two degree pathway. It is already more than 15 per cent above 1990 levels, and would need to lose this addition by 2020 and then reduce emissions by a further 25 per cent each decade if it is to reach the 2050 target. That is clearly too ambitious to handle domestically and would require costly scrapping or retrofitting of existing capital. The U.S. could more effectively aim to meet its commitments by providing finance to support a tropical forest fund or investment in renewables and energy efficiency in poor countries, for example. By the same token, international offsets provide cost-effective opportunities for emissions reductions and opportunities for developing countries to attract investment and finance.

Organisation and institutions

Cost-effectively financing global investment in low carbon infrastructure requires a new and evolving climate finance architecture; one that builds on existing structures, including bilateral and multilateral flows, but which facilitates other forms of investment and development finance. The new and evolving climate finance architecture is likely to include a registry, or schedule of actions, to capture domestic commitments and policies, creating transparency and trust. It will also require an effective system to measure, report and verify emissions from countries on a regular and frequent basis. Transparency of method and data is a key issue. Emissions reductions need to be credible and verifiable, but without intrusive infringements of sovereignty – a source of sensitivity in the developing world. That is, there will need to be trustworthy alternatives to foreign inspectors on the ground if key countries are to participate. New remote sensing technologies together with earth observation/data management systems will play a key role in overcoming intrusiveness and sovereignty.

Trade and competitiveness

The revolution heralding a low carbon economy will mean that the balance of opportunities and costs will not be spread evenly. To begin with, those countries that take a stronger stance on climate action may impose additional costs on their carbon–intensive production sectors relative to those which do not. If the products are tradable, this may mean a loss of market share and a relocation of production (and emissions) to countries with more relaxed regimes. In the longer run, the opportunities are likely to be reversed, with businesses in those countries that moved earliest, or received finance and technology support, being best placed to take advantage of new opportunities in growing markets and develop new technologies and exploit changing comparative advantages.

There remains a strong political economy element to the discussion that dictates the understanding of competitiveness issues as vested interests are prone to lobby hard against change, so it is important to be quantitative about likely impacts.

There is strong body of evidence to draw on which suggests that the unilateral application of the kinds of carbon policies described here, applied broadly across sectors and sustained through time, are unlikely to lead to significant loss of market share, even among tradable carbon intensive sectors (which is limited mostly to a narrow industrial sector including steel, cement, ceramics, aluminium, minerals and paper). Yet they are likely to prove sufficient to instigate the necessary behavioural and technological change.[3]

Part of the reason is that the impact of carbon pricing on costs is limited. To give an illustrative example, application of a USD 40 per ton cost of CO_2 would raise the cost of a barrel of Brent crude -approx. USD 15-USD 20/bbl. Resulting energy cost changes will be small relative to the underlying costs and revenue drivers that determine a firm's long-term location. Such decisions depend on access to markets; access to raw materials; access to skilled competitively priced labour; access to technology; fiscal incentives; political stability, legal jurisdiction; infrastructural networks. Carbon costing of the kind suggested is a small factor with a small impact relative to regular changes in exchange rates and fossil fuel prices. Moreover, before relocating, businesses must be confident that differentials in carbon policy are likely to endure for the duration of their capital stocks' lifespans, which may run into decades. This would be a brave bet. Studies of bordering U.S. states that apply differing environmental policies show that even where language, law and currency would not provide barriers to relocation, polluting firms in exposed tradable sectors usually stay put and adhere to policy.[8]

Nevertheless, for a few sectors such as aluminium, steel, cement and one or two others, costs are likely to be higher and transition arrangements would have to be carefully managed. And the reality must be recognised that from a political economy perspective, the mere possibility that policy may undermine a sector and cost local jobs without reducing emissions is a political time bomb. Governments will therefore need to make financial and technology support available for re-skilling and re-tooling vulnerable sectors in transition to a green economy. However, competitiveness concerns that affect only a few sectors should not hold the course of green development to ransom. The temporary losers from the transition to a green economy know who they are and their voice tends to be relatively loud. The voice of potential winners in the private sector, on the other hand, is not being heard loudly enough, with many of these sectors yet to emerge, being just that: potential.

Trade policy options

The most efficient and equitable choice would be for all countries and sectors to move forward together in the application of green policies, collaborating in the application of policies to reduce emissions. This is not as banal or dreamy as it may sound. Key constituencies in business and government in most major economies are profoundly concerned about the challenges of climate change. The Chinese are worried about vulnerabilities to their urban and rural development and the changes in business opportunities as green technologies and markets emerge, as are many Americans. This provides the basis for a common collaborative understanding on which to advance.

Open trade is essential in creating large markets in clean goods and services and transmitting innovation across the world (see next section). It is already creating such markets. The decision by Walmart to reduce emissions along its supply-chain has prompted Chinese producers to innovate to reduce emissions. This means policy must continue to aim at reducing tariff and non-tariff barriers (such as fuel subsidies) for environmental goods/services and aspire to setting something akin to a "level playing field" with a broadly comparable global carbon price. This is not likely soon, but a roadmap towards this destination is required.

In the meantime, and in order that unilateral policy can effectively reduce emissions with limited risk of production and emissions relocating, alternative policy arrangements need to be deployed. A second best pragmatic approach, in the absence of an early global agreement, is the establishment of sectoral agreements to establish a "sectoral level playing field".[9] Where such agreements cannot be reached then, and only then, should the threat of trade policy in the form of domestic subsidies or border taxes be deployed. This can take the form of transitory allowances in tradable permit schemes (though these must be withdrawn to the extent that production diminishes and markets relocate) as has been deployed in the early years of the EU Emission Trading System (ETS). Or it could take the form of a unit price subsidy equal to the difference between the actual global price for a traded good or service and that which would prevail with the application of a uniform global carbon price (as recommended by the Garnaut review in Australia[10]). Finally, it may take the form of a non-discriminatory border tariff tax adjustment, which adjusts the price of foreign imports in accordance with their carbon content to make them compatible with domestic sectors facing carbon pricing. Such tools must be retained as a "credible threat" and a deterrent of last resort, but measures such as these do risk a broader trade war which may hurt a range of traded sectors for little gain.[11] Yet in the presence of persistent lack of collaboration, especially from developed economies, there needs to be a clear signal that if the rest of the world moves ahead, these countries must expect to miss out on new technological opportunities and eventually face tariffs.[12]

Trade and business opportunities and costs

For all the commercial risks associated with early action to reduce emissions, there are at least an equal number of commercial risks associated with delayed action. The world is becoming increasingly carbon constrained and those businesses, governments and regions that plan ahead and prepare to manage the transition stand to gain the most from developing new technologies, taking advantage of fast growing new markets and minimising costs by working with the investment replacement cycle.

Firms in developed and developing countries have already begun to take advantage of the fast growing new market. Toyota, Honda, GE, Duke Energy, Dupont, Chevron, Shell and BP are all carbon exposed businesses actively engaged in low-carbon innovation to prevent being written out of a business. IT companies like IBM and Cisco are also actively seeking to invest in smart connected technologies like smart grids, smart buildings and travel virtualisation, which reduce resource intensity.[13] Some of the most successful and productive companies providing the world's renewable technologies are in developing countries. Suntech in China is among the leading providers of solar technologies selling to over 80 countries worldwide, while Suzlon in India has become one of the largest wind power companies. Indian companies are also busy developing electric cars and scooters, improved efficiency in steel production, waste to energy technologies and smart IT solutions.[14] So trade itself promotes growth and technology transfer and the global transmission of technology and efficiency standards, and it is vital thus that free trade is promoted as part of the collaborative global solution to climate change.

In addition, South Korea is planning for green growth at a national level and China is centring its Twelfth Five Year Plan on the development of green industries.[15] Crucially, these strategic national plans are based not solely—or even primarily—on concerns about the climate, they are seen as part of a short- and long-term business opportunity in leading the green revolution.

Even in the present more uncertain global green policy environment, without as much of an ambitious and coordinated a global policy response as might have been hoped, private investment in new energy generation and energy efficiency has quadrupled since 2004 according to Bloomberg New Energy Finance (NEF). New investment in clean energy is expected to surpass investment in conventional energy generation in 2010, rising to between USD 180 and USD 200 billion, 30 per cent up on the previous year and compares with USD 46 billion invested in 2004. The International Energy Agency estimates that energy infrastructure investment will average more than USD 1 trillion per year over the next twenty years. To move to a low carbon pathway consistent with 2° C warming, Project Catalyst[16] estimates that about USD 290 billion per annum by 2020 of this total capital investment will be needed for low carbon infrastructure in developing countries.

The opportunities for developing countries to receive additional investment finance in the short term are also significant. Developing countries can benefit from selling credits in carbon markets as well as official financing designed to leverage private funds. Developing countries also stand to benefit from new technology transfer and demonstration and in some case, opportunities to leapfrog developed countries by establishing new infrastructure.

The scale of new technologies, services and products required to shift to a low carbon economy is vast Most of this will need to be delivered by the private sector, but in order for businesses to invest, public intervention will be necessary to drive new markets. This requires clear, long-term market signals through credible policy and transparent frameworks.[17] Market instruments remain the most efficient means to change behaviour without discriminating between technologies and processes. Consequently they are both more efficient and less susceptible to rent-seeking activities where influential vested interests seek to influence policy decisions at the expense of consumers and citizens. Market mechanisms can include carbon prices, standards and regulations across product, technology and supply-chains[18] and an easing of planning restrictions to further drive energy efficiency and renewable energy. It also requires incentives for accelerated investment in low-carbon technologies so as to induce innovation that may not be privately viable and measures to avoid deforestation, plan land-use change and reduce and better re-use waste. Policy also needs to apply to institutions, including common carbon accounting standards, calculation methods, budgeting and disclosure processes.

How much will the green revolution cost? It is extremely difficult to quantify formally the dynamics of this process. Standard economic models calculate the additional marginal cost of deploying and operating new technologies relative to existing processes (for example renewable versus conventional energy). Such models suggest that stabilising at around 450 ppm CO_2 equivalent might cost one or two per cent of GDP.[19] However, models do less well at costing the dynamic of such a non-marginal economic transformation of the kind we are likely to see this century. Applying new technologies yields smarter ways of using them through learning and experience, which spurs further innovation. Knowledge spillovers from such innovation can then be applied across other sectors, as has been the case with technologies originating from US military and aerospace programmes. Standard economic models score most policy intervention as a distortion in an otherwise efficient and optimal environment. It therefore always constitutes a cost. But here we are dealing with massive non-marginal changes in an existing inefficient system. Some models are just now coping with market failure and waste, as well as with learning and experience associated with new innovation. A few even include knowledge spillovers. But all struggle to model the 'animal spirits' and innovative dynamism usually associated technological revolutions. Entrepreneurs understand the transformative value of such processes even where economists fail to do so.

Conclusion

There is only one growth and development story, and that is the story of green growth and resource efficiency. High carbon growth will kill itself, ultimately because of the hostile climate it generates, but before then through spiking energy, mineral and raw material prices. With clear policy frameworks, businesses in the developing and developed world will supply innovation, entrepreneurialism and manufacturing capabilities to transition to a low carbon economy. But inducing the innovation required to deliver the necessary growth requires the right policy framework, founded on global collaboration across countries and sectors. It requires a non-discriminatory, long-term price signal to encourage market dynamism, entrepreneurship and creativity. There is also a need for openness, competition and sharing of ideas and technologies.

The first-best outcome requires the developed world to demonstrate the virtues of green growth to developing countries, providing support and financing before asking developing countries to take on their own targets (at which point further support and financing will become necessary). This is vastly preferable in terms of efficiency and equity to uncoordinated policy action applied at different speeds and subject to border tariffs and other threats and penalties.

Meeting the challenge is likely to generate a new revolution comparable to or exceeding that of electricity, telegraph, railways or internet – each of which promoted a global productivity surge. To get there, businesses require clear, creditable long-term policy frameworks to foster new innovation. We know the technologies and economic incentives for effective action are available or can be created. The blockages to progress are not economic or technological; they are institutional, cultural and political. Valuable time has been lost. The onus is on policymakers, businesses and civil society to build a common understanding of the challenge and drive forward human ingenuity. This will trigger the kind of open, global collaborative creativity and innovation necessary to drive global smart, clean and sustainable growth for decades to come.

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Endnotes

1 Details on the AGF co-chaired by the Prime Ministers of Ethiopia and Norway can be found at: http://www.un.org/wcm/content/site/climatechange/pages/financeadvisorygroup.

2 See Project Catalyst: *From Climate Finance to Financing Green Growth* (November 2010).

3 The UNDP (HDR 2007/2008) estimated global extra costs for meeting Millennium Development Goals of USD86 billion p.a. by 2015. Fankhauser and Schmidt-Traub (2010) estimate extra external financing necessary for meeting MDGs for Africa alone of USD 30 billion p.a. for next decade.

4 The report provides analysis of a full range of potential climate finance sources and quantifies the levels of finance that could flow from each in 2020. Sources include: auctioning of emissions allowances, instruments in the aviation and maritime sectors, and the redirection of fossil fuel subsidies.

5 Full details can be found at http://www.un.org/wcm/content/site/climatechange/pages/financeadvisorygroup/pid/13300.

6 One-sided trading might yield large economic rents for low-carbon reductions in some poor countries and it may be pragmatic to consider some price differentiation to limit excessive profits and reduce costs. Mixed price mechanisms might make mitigation finance stretch further, incentivise more marginal activities and limit an over-blown bonanza in the cheapest opportunities.

7 The evidence base is not small: Input-Output studies, specific sectoral/industry studies, instrumental variable panel studies: U.S. state and global cross-border activity following differential application of environmental policies. Stern Review: PIK; WRI; Peterson Institute; Carbon Trust; Climate Strategies; Climate Group; Australian Treasury; Garnaut Review; IEA; McKinsey; and numerous academic papers.

8 See Antweiler, Copeland and Taylor (2001).

9 This can take the form of the global application of a uniform carbon price in a specific sector or commonly agreed efficiency or technology standards. Agreement between firms may not be much easier than between countries and targeted assistance may be required to support exposed firms that must invest to reduce emissions.

10 See http://www.garnautreview.org.au/domino/Web_Notes/Garnaut/garnautweb.html.

11 There remains a complex and lengthy debate about whether such tariffs would be WTO compatible. Each case will have to be argued out, resulting in likely long and protracted legal wrangles involving claims and counter claims over the definition of "comparable effort".

12 However, the value of such instruments should not be overstated and they remain a last resort. For example, from a U.S. perspective imported Chinese steel is not a major threat to domestic production whereas imported European and Canadian steel is, and yet these sources are likely to incorporate 'comparable' or greater effort on carbon abatement than the US.

13 See Esty and Winston (2006) and also Friedman (2008).

14 Companies include Reva, Vijiya, SELCO, Tata steel and Wipro technologies.

15 Of the seven "Magic Growth sectors" identified in the Twelfth Five Year Plan, three are low-carbon industries: clean energy, energy efficiency, clean energy vehicles; the others are high-end manufacturing.

16 For more information, see www.project-catalyst.info.

17 Though substantial short run benefits are also likely to accrue, see Zenghelis (2011) and Bowen et al, (2010). See also ILO Green Jobs Report (2008).

18 For example by rationalizing the 15 or so international smart grid standards currently in operation.

19 See Stern Review 2007. Models of course vary greatly in their assumptions and the variations lead to different results. Key assumptions include: levels and growth rates of emissions; flexibility between sectors, technologies, gases, countries; and the rate of discovery of new technologies.

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Making climate change finance work for human development

Lucas Assunção and Gilles Chevalier

Lucas Assunção and Gilles Chevalier argue that the future climate change financial regime should enable the design and implementation of adaptation and mitigation measures that match developing country and vulnerable community needs. They call for a bottom-up approach to climate change policy making, derived from Aid Effectiveness Principles and linked to the Millennium Development Goals Tracking System. There is, they say, a need for technology transfer and capacity building to ensure that climate financing can be effectively absorbed by developing countries and become, as a side effect, a catalyst for poverty alleviation. The authors propose a financial and governance framework that helps vulnerable communities minimize the risks of climate change while focusing on their development strategies. This, in their view, will enable developing countries to engage effectively in the global green economy through technological and business synergies.

Until now it has been obvious that the existing sources of climate change finance for both mitigation and adaptation fall short of the needs identified by developing countries.

Existing climate-related funds and UNFCCC mechanisms have failed to generate significant new and additional finance to support what Lord Nicholas Stern, a member of the High Level Advisory Group on Climate Change Financing[1] (AGF), calls the "new industrial revolution" towards a low carbon future. Moreover, past experience shows that this daunting challenge requires significant new investment but also greater efficiency with financial proposals, and greater access and effective use of climate-related resources. The highly pressing need for coordination and harmonization is evident if one considers the *status quo*: lack of transparency, weak regulation or the inexistence of compliance mechanisms governing eligible funds administered by the Conference of the Parties (COP) authority, public and private sector investment channels or carbon finance.

The current climate change financial governance system is fragmented. It is characterized by a myriad of funds and instruments autonomously managed through *ad-hoc* rules and governance structures which make them difficult to access. More than 50 international public funds, 60 carbon stock markets and 6,000 private equity funds are already providing green finance.[2]

Current dedicated resources for climate change in developing countries

MITIGATION (USD BILLIONS)		
GEF	0.25	P.A. (per annum)
CARBON MARKET	8+	P.A.
WB CLIMATE INVESTMENT FUNDS (CIF)	5+	TOTAL
OTHER		
TOTAL	**~10**	**P.A.**

ADAPTATION (USD BILLIONS)		
LDCF & SCCF	0.3	P.A.
ADAPTATION FUND	0.1	P.A.
WB CLIMATE INVESTMENT FUNDS (CIF)	~0.5	TOTAL
OTHER	0.6+?	P.A.
TOTAL	**~10**	**P.A.**

Source: World Bank, April 2009

Regrettably, most of these financial windows do not necessarily take into consideration the explicit needs of developing countries nor do they involve them in the decision-making process of fund allocation. Moreover, they require extensive and costly national expertise for recipient countries and investors who need to permanently adapt to this opaque fragmented supply model and struggle to identify the most suitable financial instrument for each situation.

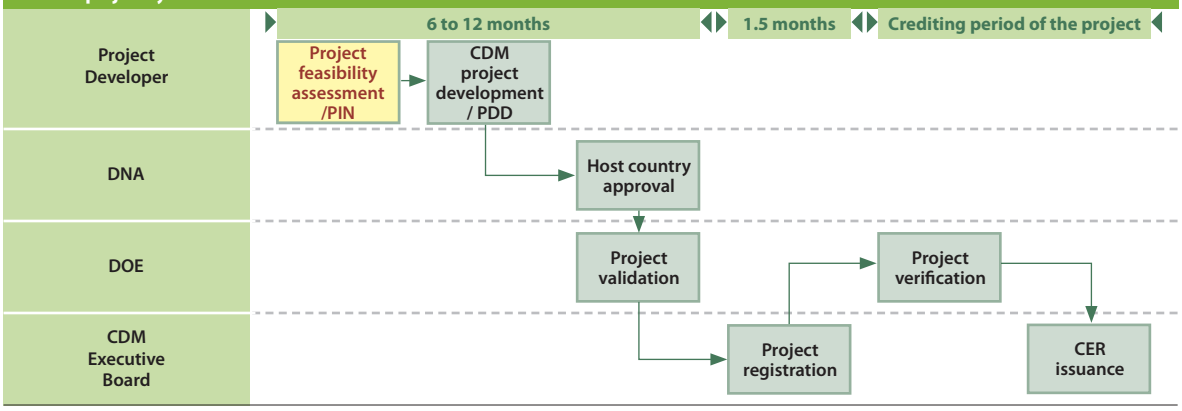
For instance, the Clean Development Mechanism (CDM) created by the cap-and-trade Kyoto Protocol shows a very high potential in promoting sustainable development associated with greenhouse gas (GHG) emission reductions in developing countries. Despite its success in generating roughly USD 5 billion in new investments in just five years since 2005, it remains a modest portfolio of projects.[3] Furthermore, due to the technical complexity and the length of the project approval procedure, only five countries are expected to generate 80 per cent of carbon market credits by 2012. Considering the major beneficiaries of the CDM have been China, India, Brazil, South Korea and Mexico and that less than 2 per cent of the benefits will go to Sub-Saharan Africa, one can conclude that under the current state-of-play the supposedly win-win CDM model partly misses its objective. To that extent, the recent steps forward registered by the COP16[4] to streamline and simplify the CDM and CER (Certified Emission Reductions) registration and emission procedure as well as the encouragement for further standardization of the baselines,[5] demonstrate negotiators are on the right track.

In order to design an appropriate climate change financial framework, negotiators must address the following questions: what is the ultimate objective of a much needed new climate finance governance structure? And, what are the fundamentals it has to rely on to fulfill its objectives?

The need for a paradigm shift: human development as *leitmotiv* for tackling climate change

Climate change remains a daunting development challenge, requiring a fundamental structural transformation of the way we produce and consume products and services. Moreover, emerging consensus that the costs of inaction tend to increase with time creates additional pressure to act now both in mitigating emissions and in adapting to adverse effects. It follows that unless the international community makes an important effort for a profound paradigm shift, unabated climate change and its impacts may reverse the progress made in achieving the Millennium Development Goals and in reducing human poverty. This serious predicament underscores the need to ensure that integrated strategies implemented to tackle climate change contribute directly to poverty eradication and sustainable development.

The CDM project cycle



Source: The Project Cycle, CDM & MDG Carbon Facility, Robert Kelly, UNDP EEG

An effective response to climate change therefore needs to be seen in the context of comprehensive action towards meeting sustainable human development goals. Such a 'human development approach' includes the various parameters that enable the process of enlarging people's choices and capabilities, for example by enabling them to live a longer and healthier life, having access to knowledge, having a decent standard of living and participating in the life of their community and the decisions that affect their lives.[6]

Among today's scientific community, few contest that GHG concentrations in the atmosphere are induced by human activity and that climate change has already started to intensify, causing an increase in the frequency of extreme weather events such as droughts, floods, or rising sea levels. This in turn will exacerbate the stress on economic and humanitarian aid systems. Over the

past twenty years the number of natural disasters has increased by 400 per cent while the number of people affected each year has risen from around 174 million to over 250 million, with over 90 per cent of those affected living in developing countries.[7] Climate change has had an effect on rainfall, randomness in extreme temperature variation and water availability in developing countries. The World Bank estimates that 2 billion people may lack sufficient drinking water by 2050. And, according to the 2007-2008 Human Development Report, drought-riden areas in Sub-Saharan Africa could expand by 60 to 90 million hectares with dryland zones suffering losses worth up to USD 26 billion by 2060. As a result, climate change impacts will likely trigger human security concerns as vulnerable groups will have to fight to preserve their vital subsistence needs and basic human rights.

Short of being alarmist or fatalistic, this frightening picture should prove the case that the interplay of environment, social and economic impacts of climate change calls for a strategy built on collective and collaborative action including both developed and developing countries. This means that response measures must go beyond only mobilizing new climate finance, but should take into consideration implications across different sectors, including energy, health, education, agriculture, water resources, transport, trade and the economy, as well as research and development policies.

Experience has shown that comprehensive and coherent development planning frameworks, including national and decentralized sustainable development strategies, are useful means of integrating all of the aspects related to climate change and human development. Therefore, UNFCCC Parties may wish to go beyond emission reduction and adaptation measures and consider the experience gathered with human development strategies in order to ensure that the climate regime is not disconnected from human development objectives. Useful tools and principles that have been developed to maximize aid effectiveness and address poverty alleviation could be incorporated in the forthcoming climate change financial governance.

An existing cross-sectoral tracking system for strategic impact assessment: the MDGs

Adopted by world leaders during the 2000 Millennium summit and set to be achieved by 2015, the Millennium Development Goals (MDGs) represent a framework of cooperation and partnership for tackling extreme poverty in its many dimensions.

If this global strategy is to deliver more than just political wishful thinking, it might result in a 50 per cent reduction in poverty levels, tens of millions of lives being saved and in promoting access to the global economy to a significant percentage of the world population. One of the ambitious paradigm shifts the MDGs suggest lies in the de-compartmentalization of the traditional "silo" development approach by offering a universal framework where all actors (multilateral, bilateral, public and the private sector, civil society and NGOs) can effectively interact and share their expertise, political support and bring their added value to reach a common target.

Even though the overall MDG framework includes combating climate change as a cross-sectoral prominent objective, and as a specific quantifiable and measurable target, UNFCCC parties have not utilized the MDG roadmap as an *Ariadne's thread* for the future financial regime. That clearly shows a disconnect in current multilateral policy-making and calls for greater understanding of climate change as a development policy challenge.

To illustrate this lack of policy coherence and the recurrent tunnel vision in international negotiations, one only has to go as far back as September 2010 in the MDG Summit conclusions,[8] where Heads of State reiterated their commitment to achieve the MDGs by 2015. Yet, at the UNFCCC COP15 in Copenhagen less than 90 days later the same Member States did not agree on a climate justice approach which would recognize the inter-connectedness of climate change and the need to give special attention to its effect on poor people, the disempowered, the marginalized and vulnerable groups such as women or indigenous groups.[9]

Thus, in recognizing the close correlation between combating climate change and human development it would seem that policy- and decision-makers currently negotiating on the partnerships and governance for the climate finance framework stand to gain by adopting the MDG implementation tracking system. Likewise, by referring to past experience with aid effectiveness principles they can build an efficient and coherent financial mechanism under the climate regime in general and the Kyoto Protocol in particular.

Below are some of the ways climate change affects the MDGs

1. Eradicate Extreme Poverty and Hunger

Agricultural production and food security, access to clean and abundant water resources and gainful employment that underpin the solution to extreme poverty and hunger are vulnerable to climate change.

2. Achieve Universal Primary Education

Climate change stresses pose additional burdens on agricultural production and other subsistence activities like water collection, which may burden families enough to remove children from school. Livelihood activities must become more resilient to future climate for education goals to be met. Climate change also threatens to destroy infrastructure (e.g. schools) and increase the displacement and migration of families thus disrupting and limiting education opportunities.

3. Promote Gender Equality and Empower Women

Women, the majority of the world's poor, are the most vulnerable to climate change. Their traditional roles as the primary users and managers of natural resources, primary caregivers, and unpaid laborers mean they are involved in and dependant on resources that are put most at risk by climate change. Further women lack rights and access to resources and information vital to overcoming the challenges posed by climate change.

4. Reduce Child Mortality

Climate change will worsen health primarily through: increased vulnerability to poor health due to reduced food security and water security; water-borne diseases associated with reduced water quality due to floods and drought; more favourable conditions for the spread of vector-borne and air-borne diseases; and the direct link between temperatures and heat stress.

5. Improve Maternal Health

Climate change will worsen health primarily through: increased vulnerability to poor health due to reduced food security and water security; water-borne diseases associated with reduced water quality due to floods and drought; more favourable conditions for the spread of vector-borne and air-borne diseases; and the direct link between temperatures and heat stress.

6. Combat HIV/AIDS, Malaria and other Diseases

Climate change will worsen health primarily through: increased vulnerability to poor health due to reduced food security and water security; water-borne diseases associated with reduced water quality due to floods and drought; more favourable conditions for the spread of vector-borne and air-borne diseases; and the direct link between temperatures and heat stress.

7. Ensure Environmental Sustainability

Climate change threatens environmental sustainability because it will cause fundamental alterations in ecosystem relationships, change the quality and quantity of available natural resources, & reduce ecosystem productivity. The poor depend on these resources for their day-to-day survival and livelihoods in many parts of the developing world.

8. Global Partnership for Development

Climate change threatens to exacerbate current challenges to the achievement of the MDGs.
Funding for development and adaptation must be greatly increased to meet the needs of the poor.

Source: http://www.undp.org/climatechange/cc_mdgs.shtml

Why reinvent the wheel when the founding principles of a successful climate *cum* development strategy already exist?

In the scenario of a considerable increase in new and additional climate finance, some indisputable lessons gathered through 60 years of international development aid may be a useful guide in paving the way for a successful climate *cum* development strategy.

The 2005 OECD Paris Declaration and the 2008 Accra Agenda for Action (AAA) established targets and indicators that provide benchmarks for the quality of development aid[10] allocation. This matrix was originally designed to assess and enhance Official Development Aid (ODA) but it may perfectly fit the complexity associated with the efficient disbursement of new climate change finance for mitigation and adaptation.

As in the case of climate change negotiations, the well-established Paris and Accra aid framework addresses issues and principles such as ownership, alignment, harmonization, capacity building, effective result monitoring and mutual accountability. These have been present in climate negotiations and deliberations. Importantly, this very same developmental approach was used in the definition of the AGF principles.[11] Linking the relevant experience in setting up the AAA aid framework with the principles that helped guide the mobilization of new and additional climate finance could thus inspire climate negotiators as they define the future climate change financial aid framework.[12]

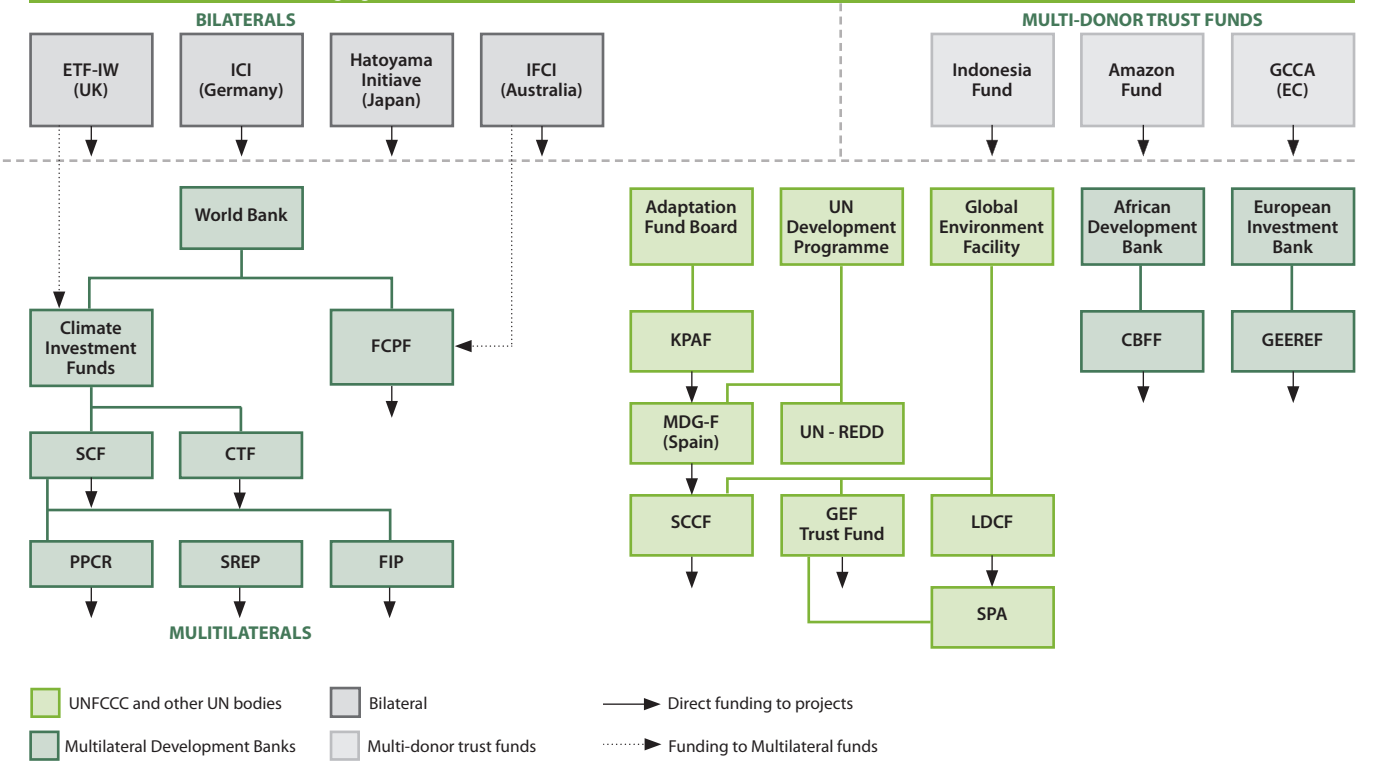
A good example of the symmetry between the two sets of principles is the ownership and alignment principles contained in the founding 2005 OECD Paris declaration. These prescribe that all kinds of external assistance must directly support developing country development efforts, while fully respecting their needs and ensuring policies emerge out of genuinely country-led processes.[13] This is most appropriate when talking about mitigation and adaptation funds. The new financial strategy will be successful only if the financial aid delivery system guarantees that beneficiary countries are fully involved and committed at all levels of decision-making. It therefore follows that we should question the management and disbursement principles of the current vertical funding systems that do not sufficiently associate developing countries in policy or decision-making processes. Emerging models such as the new Technology Executive Committee[14] or the Adaptation Fund, which ensure representation from the five U.N. regional groups, the small island developing states, the Annex I Parties as well as the non-Annex I Parties, should be inspiring in terms of political empowerment and ownership.

However, recent experience indicates that mitigation and adaptation projects are often unrelated with national development strategies and tend to be mostly supply-driven. In attempting to reduce the so-called transaction costs, such projects tend to be formulated with a top-down approach, often imposing foreign aid rules to national circumstances in beneficiary countries. This breaches the alignment principle and would prove to be counterproductive over time. Directly relating climate finance to country priorities and strategies is a *sine qua non* condition for new mitigation and adaptation finance. Additionally, greater predictability and reliability of the new finance must be secured to preserve the coherence of climate policy with national development strategies.

For these reasons, the new climate finance mechanism must make subsidiarity[15] the cornerstone of project implementation. This would allow developing countries to identify climate policy *cum* development priorities, decide where to direct funding and how to connect it, for instance, to their Nationally Appropriate Mitigation Actions (NAMAs). It would also enable governments to appoint a lead ministry that would manage national climate strategies and the interface with other sectoral ministries. Instead, current supply-driven practices often make national entities dependent on donor priorities and preferences to work with selected ministries.[16] This calls for greater alignment of climate finance to capacity needs of beneficiary countries. Similarly, this "ownership and alignment shift" implies that beneficiary country governments take full responsibility to align national climate change strategies with benefits for local communities and vulnerable groups. As more than half of GHG emissions are influenced by local investment options, including local land use, transport and energy planning, sub-national authorities must be part of decisions, choices and climate policy-making processes.[17] One way to reflect national realities and specific needs in the planning and delivery of climate change *cum* development strategies is to rely on an inclusive approach that ensures active participation of stakeholders, including public and private sectors, representatives of civil society and decentralized cooperation partners.

The effectiveness of the future architecture for global climate change finance will also very much depend on its capacity to foster harmonization and coordination among existing funds and funding mechanisms. Today's patchwork of instruments tends to duplicate and overlap, leading to competition and confusion. More damaging, the fragmented financial mechanism landscape limits the impact of climate projects. A number of financing sources are under-represented among certain developing countries. For instance, the Sub-Saharan region accounts for less than one per cent of total private investment in clean energy whilst it remains the region with the greatest needs. Taking that into consideration, the 16th Conference of the Parties moved forward. Indeed, the establishment of the Green fund should facilitate the channeling of resources as well as the geographic and thematic allo-

Dedicated Climate Funds in an Emerging Global Climate Finance Architecture



Source: www.climatefundsupdate.org

cation of climate finance. Aside from that, Parties agreed to revise the Clean Development Mechanism by boosting the development of top-down baseline and monitoring methodologies that are applicable to underrepresented project activity types. Moreover, Cancun provided a loan scheme to support the development of CDM project activities in countries that support a programmatic shift and that so far have faced difficulties to access these funds.

Greater climate finance harmonization would thus benefit donors and recipients alike. However, national capacity building is the vehicle to efficient funds and is the counterpart of ownership. Indeed this development of knowledge and technical transfer is crucial for developing countries to access and absorb climate change funding and ensure integration in national strategies. Capacity building enhances the ability of countries to evaluate and choose the right options to address their country concerns thus reinforcing their leadership in the process.

Developed countries and private companies share a responsibility to cover incremental financial costs and transfer of technology required to achieve a low carbon transition and respond to the irreversible impact of climate change through adaptation measures. For their part, developing countries assumed their responsibility to effectively utilize these investments. Without this binding and mutual commitment, developing countries will not have any incentive to take part in a global agreement and will not be able to embark on a long-term energy policy reform process.

The COP13 Bali Action Plan had already called for effective responses to climate change with actions undertaken by the Parties that are measurable, reportable and verifiable (MRV). Taking into account differentiated responsibility and respective capabilities, the Cancun Agreement strengthened the idea that all initiatives are designed so as to generate performance information and use it for continuous improvement. Keeping in mind the complementarity between climate change actions and human development strategies, there is much to gain in connecting the MRV principle with the Results Base Management framework that was applied to the MDGs. Indeed, MDG goals, targets and indicators were screened for how 'SMART' (specific, measurable, agreed, realistic and time bound) they were. This tracking system constitutes one of the most detailed cross-sectoral evaluation matrixes for measuring policy impact on human development. It relies on a joint commitment and mutual responsibility of both donors and beneficiaries. By making reference to the MDG tracking system, UNFCCC negotiations could also help address the shared but differentiated responsibility that exists between developed and developing states when referring to financial accountability. Moreover it would underpin the necessity to provide developing countries with the capacity to monitor and evaluate their nationally-led strategies.

The distinct role of the UN system

Considering the interdependency of human development and climate change impacts, and given the necessity to significantly scale-up, harmonize and coordinate funding, the future finance and partnerships framework will have to be effective.

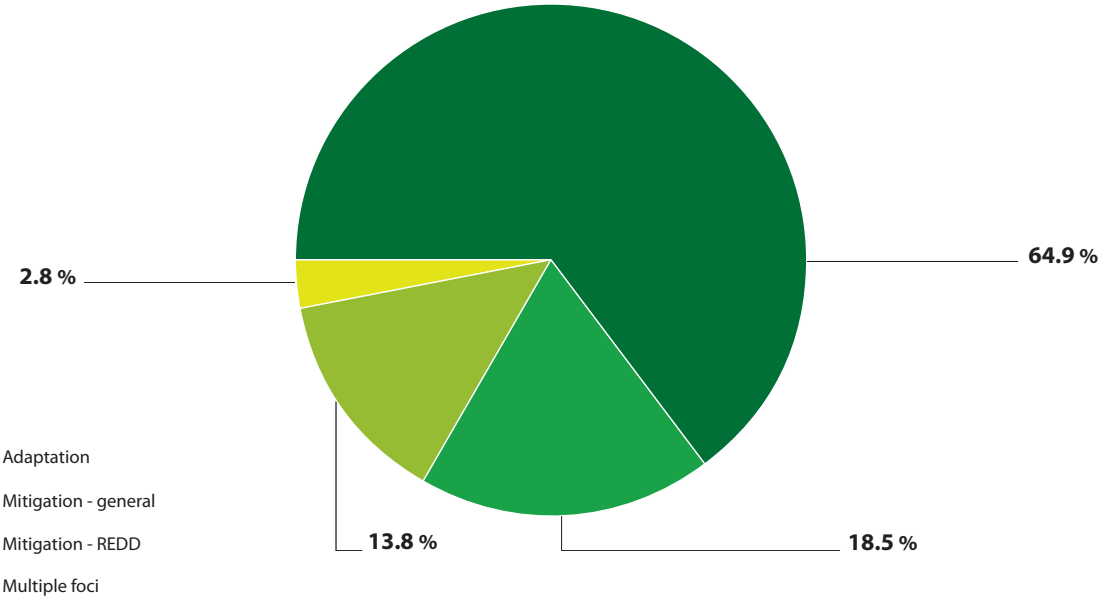
Predictability and sustainability in financing are important not only for developing countries but for all stakeholders, especially private investors, whether domestic or foreign. As the AGF report mentioned, reducing greenhouse gas emissions will require significant levels of investment, both private and public. And the UNFCCC estimates that 86 per cent[18] of the financing required to address climate change will need to come from the private sector. Indeed scarce public resources will need to be used in a highly catalytic manner, and governments must make sweeping efforts to create an enabling environment for private investment.

U.N. agencies can help build absorptive capacities and an enabling policy environment in developing countries to attract private investment flows. They can also assist developing countries in improving their country risk profile to increase the return on projects funded by private investors.

The U.N. system already develops, manages and coordinates various financial mechanisms, which provide funds for catalyzing capital flows towards low carbon and propoor measures. It also has unparalleled experience in ensuring that funds are used in meeting development objectives and priorities. With more than USD 4 billion being managed through multi-donor trust funds and over USD 2.6 billion channeled through the Multilateral Fund of the Montreal Protocol alone, the United Nations has established itself as an effective manager and efficient disburser of climate-related funds. The United Nations' well tested and increasingly effective asset base can play an important role in helping countries mobilize the needed climate investment.

Due to its uneven geographical distribution of adverse impacts, climate change is expected to exacerbate inequality among countries. Taking into consideration differences in economic development paths, there is a need to properly address the issue of mitigation and adaptation costs, the shared of responsibility and the transfer of knowledge and technology necessary for successful implementation of national strategies in developing countries. Therefore, the future financial governance body will have to ensure "equity" in financial efforts and balance in the thematic allocation of funds (i.e. funds for mitigation, adaptation, transfer of technology and for capacity building). Once more, by establishing a Technology Executive Committee whose aim is to analyze needs and technologies to be transferred to developing countries and by setting up a Climate Technology Centre Network that matches technology needs and suppliers, the Cancun Agreement[19] provides an operational tool to help developing countries access low carbon technology and adapt to climate change.

Current thematic allocation of funds



Source: *www.climatefundsupdate.org/graphs-statistics/areas-of-focusorg/graphs-statistics/areas-of-focus*

To date, mitigation and adaptation strategies have been top-down, supply-driven and project oriented, however the U.N. advocates an approach that is country-led, programming-oriented and integrated to national development strategies. The U.N. assists developing countries in aligning proposed climate activities with national development priorities and needs –a key factor in determining policy and investment success and yielding a double dividend of climate and development impacts. It works to ensure developing countries can exercise choice and ownership over their climate strategies and policies and can benefit from equitable access to climate financing and support.

Furthermore, scaling up and managing the global funding of the post Kyoto regime is an important part of the future climate finance governance mission. Equally, it is crucial to deploy the best know-how in allocating these funds and in implementing effective climate policy in the field.

Through this lens, the United Nations system delivers incomparable value added to multilateral and regional development bank lending: it provides a global presence through country and regional offices with unmatched in-country networks of staff and experts, as well as expertise in climate-relevant sectors. It has the mandate, the experience, and the human resources to assist countries in developing their own national capacities to access climate finance. The agencies of the United Nations have a long and proven track record in supporting governments to address various barriers to create a conducive environment or 'readiness' for climate investment. This technical assistance and capacity building can have a high leverage ratio, creating the demand for financing that can then be fulfilled through public funds and direct private investment. In doing so, the special circumstances of small developing and least developed countries are considered.

However, the U.N. will only fulfill its mission if it also integrates and associates itself with other climate change actors' expertise and creativity. Taking into account the unprecedented amount of money that will have to be channeled, disbursed and implemented through a single coordination mechanism, it will be crucial to seek synergies with major multilateral and regional development banks in order to benefit from their know-how and avoid creating parallel competing structures. The time has come to build an attractive and highly competitive human resources base within the U.N. in order to face and respond efficiently and effectively to the titanic amount of work a successful global climate change strategy will bring about.

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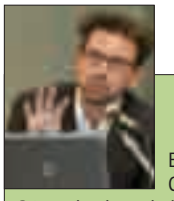

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Environmental, social and governance disclosure to manage the change to a green economy on the path to sustainable development

EXPERIENCES • SUCCESS FACTORS • RISKS • CHALLENGES

Against a background of political commitment to include environmental, social and governance (ESG) concerns in business practice, the Global Reporting Initiative (GRI) presents the GRI Sustainability Reporting Framework. GRI describes this as an integrated approach to economic growth and sustainable development, where the mainstreaming of ESG disclosure leads to the convergence of economic, social and environmental pillars. GRI argues that companies and organizations that follow the GRI Reporting Framework are "transparent about their impact on society, paving the way to a green economy and ultimately sustainable development".

Introduction

It is now almost four decades since the sustainable development principles and commitments were first articulated in Stockholm in 1972; followed by Rio in 1992 and Johannesburg in 2002. These principles and commitments remain valid today. Despite some achievements, substantial challenges remain in the implementation. The strong involvement and participation of the business sector[1] in implementing internationally agreed goals is crucial. In the last ten years, Corporate Social Responsibility (CSR) has spread impressively and currently plays an important role, as noted by several delegations and major groups at the First Preparatory Committee for the U.N. Conference on Sustainable Development.[2]

A study by UNCTAD highlighted that, "CSR can present policy makers with new options and tools for addressing key development challenges".[3] The convergence of environmental, social and economic considerations in the economy represents a key issue in achieving internationally agreed objectives in the area of sustainable development.

How can the change to a green economy on the path to sustainable development be managed? The Global Reporting Initiative (GRI) strongly believes this is possible, encouraging business and all organizations to disclose environmental, social and governance (ESG) performance alongside financial performance. **Through ESG disclosure, it is possible to monitor and manage the change to a green economy, paving the way to identifying the gaps that need to be closed to achieve internationally agreed objectives.** GRI offers guidance to organizations and companies that want to manage their change to a green economy and contribute to sustainable development. Those that follow the GRI Sustainability Reporting Framework –the world's most widely used ESG reporting guidelines– are transparent about their impact on society, and demonstrate commitment to progressing the green economy and, ultimately, sustainable development.

The Global Reporting Initiative (GRI) is a multi-stakeholder organization that has pioneered, through an inclusive and open process, the development of the world's most widely used reporting framework to disclose environmental, social and governance (ESG) information: the GRI Reporting Framework. According to the KPMG International Survey on Corporate Responsibility Reporting, nearly 80 percent of the Fortune 250 companies issued reports addressing sustainability or ESG performance in 2008. KPMG's survey of the 100 largest companies in 22 countries found an increase in sustainability reporting in every region of the world. Approximately two-thirds of the reports identified contained references to the Global Reporting Initiative's Sustainability Reporting Guidelines.[4] In 2009, of the total number of reports identified, 308 came from non-OECD[5] countries, an increase of 33 per cent on the 2008 figure of 232 reports. 143 reports came from Brazil, Russia, India and China, up 22 per cent from 117 in 2008.

The GRI Framework is a free global public good. Over 3,000 individual experts from across business, civil society and labour participated in the development of the current generation of essential guidance in the GRI Sustainability Reporting Framework, the G3 Guidelines. This resulted in guidelines that are more user-friendly and adapted to diverse reporting needs. The Guidelines outline core content for reporting and include performance indicators on the environment, human rights, labour practices and decent work, society, product responsibility, economic performance and governance. The Guidelines are relevant to all organizations regardless of size, sector, or location and can be flexibly and incrementally adopted. The Framework is voluntary and, through monitoring sustainability and ESG information, represents a tool for companies and reporting organizations to:

- Assess sustainability performance with respect to laws, norms, codes, performance standards, and voluntary initiatives;
- Create a continuous platform for dialogue and stakeholder engagement about expectations for responsibility and performance;
- Understand the impacts (positive and negative) that organizations can have on sustainable development; and
- Compare performance within an organization and between different organizations over time to inform decisions.

GRI's Consolidated Reporting Framework builds on relevant internationally accepted legal frameworks (e.g. the ILO, UNFCCC, UNCBD and other main conventions), the most widely used normative frameworks and principles (e.g. OECD Multinational Enterprises Guidelines, United Nations Global Compact), and theme-specific reporting guidelines (e.g. CDP), all of which are referred to in the Technical Protocols of the G3 Guidelines. GRI was created as a United Nations Environmental Programme (UNEP) collaborating organization at the U.N. Headquarters in 2000, in the presence of U.N. Secretary General Kofi Annan. In 2002, at the invitation of the Netherlands government and through a U.N.-led process, GRI settled its headquarters in Amsterdam. In the same year, at the Johannesburg Summit, where the second generation of the GRI Guidelines was launched, governments endorsed and encouraged the use of GRI's Reporting Framework by adopting the World Summit on Sustainable Development Plan of Implementation.[6] For GRI this represents a global "licence to operate" in developing countries. GRI has synergies and formal relations with several international organisations, such as a Memorandum of Understanding (MoU) with the UNEP, United Nations Global Compact (UNGC), OECD and United Nations Conference on Trade and Development (UNCTAD).

Several international and regional organisations and initiatives refer to GRI[7] in their policies. The GRI Guidelines are also linked to the Millennium Development Goals (MDGs): the majority of the MDGs are covered by GRI Indicators.[8] Through its synergies and MoUs, GRI seeks the alignment of the most important (CSR) initiatives through the common language of reporting, in the global public interest. Ten governments[9] have a formal reference to GRI in their governmental corporate responsibility guidance documents and/or policies.

In the pursuit of its vision GRI, together with the Prince's Accounting for Sustainability Project (A4S), announced the formation of the International Integrated Reporting Committee (IIRC)[10] in August 2010. In making the change towards a green economy, clear and comprehensive information must inform decisions around tackling current challenges such as over-consumption of finite natural resources, climate change, and the need to provide clean water, food and a better standard of living for a growing global population. The IIRC's remit is to create a globally accepted framework for sustainability: a framework that brings together financial, environmental, social and governance information in a clear, concise, consistent and comparable format –an "integrated" format. The intention is to help with the development of more comprehensive and comprehensible information about an organization's total performance, prospective a well as retrospective, to meet the needs of the emerging, more sustainable, global economic model.

What is the role of policy-makers?

In the Johannesburg Plan of Implementation (JPOI), states committed to enhance corporate environmental and social responsibility and accountability through legislative initiatives,[11] with the aim of encouraging the business sector to improve social and environmental performance through voluntary initiatives, including environmental management systems and public reporting on environmental and social issues.

Over the last few years the regulatory landscape has evolved substantially all over the world. More codes and regulatory measures are now available in more countries. A review of mandatory and voluntary sustainability reporting standards and legislation in 30 countries has revealed that international and national standards, codes and guidelines, and legislation for sustainability reporting, have been evolving strongly. Evidence suggests the increasing number of reporters goes hand in hand with this increasingly comprehensive regulatory network.

A research conducted by UNEP, KPMG, GRI and the University of Stellenbosch Business School[12] revealed that the role of governments is an important part of current increases in sustainability reporting. There are many choices available to regulators, influenced by many factors including geopolitical considerations. However, some general trends are discernible. The first is a stronger role for the state in its regulatory function, to ensure a minimum level of disclosure and risk prevention. The second is an emerging emphasis on a complementary combination of voluntary and mandatory approaches. A third is the trend of integration; the combination of corporate governance, financial, and sustainability reporting in one reporting framework.[13] This trend may be a response to avoid new financial scandals and crises. It is also a sign of the maturing field of sustainability reporting, contributing to the transition to sustainable markets and economies. This overall regulatory trend is exemplified by the political commitment of governments to increase inclusion of ESG concerns in business practice.

The transition towards a green economy implies not only the mainstreaming of green niches in specific sectors of the economy but a change in the overall social construct. Consequently it requires an integrated approach to economic growth and sustainable development, where the mainstreaming of ESG disclosure leads to the convergence of economic, social and environmental pillars. As highlighted in a recent report from UNCTAD, "a number of voluntary initiatives are taking a leading role in designing and facilitating CSR and responsible investment instruments, encouraging improved corporate communication on ESG issues and creating important benchmarks, based on universally agreed principles. Policy makers can become involved in these initiatives with the aim of promoting sustainable development goals and identifying useful tools to complement government rules".[14] At the same time regulators should play a role against fragmentation by reinforcing the demand and call for harmonization of guidance, aiming for an international reference level.

As a key driver for growth and well-being, trade represents an important tool in the strategy for sustainable development. Nevertheless, the formulation of trade policy has mostly been dominated by short-term commercial considerations, with limited advances in sustainable development concerns.[15] Innovative policies are required in the field. National and international trade policy should include environmental, social and governance (ESG) considerations, along with economic, in a long-term perspective.

Recent interesting discussions and policy developments have to be acknowledged, such as the two Reports adopted with the resolution of the European Parliament on 25 November 2010: Report on Corporate Social Responsibility in International Trade Agreements by Harlem Désir, Committee on International Trade, proposing to include transparency and reporting in CSR clauses for the international trade agreements; and the Report on Human Rights, Social and Environmental Standards in International Trade Agreements by MEP Tokia Saïfi, Committee on International Trade, stressing the importance for trade agreements to effectively provide for the highest levels of transparency and reporting by businesses.[16]

It is clear that consideration of environmental and social dimensions can lead to a system aimed at global sustainable development, contributing to the transition to a green economy. Furthermore, CSR and ESG concerns in trade policy would not represent a barrier to free trade but can increase competitiveness and create a level playing field.

Addressing new and emerging challenges

Emerging challenges are increasing in urgency. GRI is committed to facing emerging challenges and contributing to the transition to a sustainable and green economy. It has over the years developed a range of sectoral guidance, and thematic guidance and training material, often in collaboration with sector-specific global centres of excellence:

Gender empowerment guidance

GRI and IFC launched the resource document Embedding Gender in Sustainability Reporting - A Practitioners' Guide in 2009. The extensive multi-stakeholder consultation process supporting the development of the Practitioners' Guide indicated that while gender-disaggregated data in sustainability reports is rare, there is demand for this information. With the support of GTZ, the G3 Guidelines have been updated on this matter. A geographically diverse international working group used GRI's characteristic consensus-seeking approach to develop these recommendations, which are currently under public comment in line with GRI's due process. The Working Group contained representation from Iran, Mongolia, India, Brazil and South Africa, among other countries.

Research and guidance on community impacts

One of the most important stakeholder groups for all organizations is the local community. Working together with the University of Hong Kong and CSR Asia, GRI has conducted a survey in order to gain a better understanding of current practice in the reporting of community performance and impacts.

Human rights and business

GRI, the United Nations Global Compact, and Realizing Rights: The Ethical Globalization Initiative, marked the 60th anniversary of the Universal Declaration on Human Rights with the collaborative project: "Human rights –A call to action". The project aimed to foster greater integration of human rights principles into corporate sustainability reporting. GRI, U.N. GC and Realizing Rights assembled an expert multi-stakeholder working group to shape greater consensus on what constitutes good human rights practice and measurement. The Working Group reached a consensus which culminated in a report submitted to GRI's governance bodies. The revisions address the policy framework put forward by the United Nations Special Representative of the Secretary General on Business and Human Rights, John Ruggie, and formulate disclosure expectations in the field of human rights due diligence and access to grievance and remedy mechanisms. These endeavours have also led to the development of practical resources to help companies improve their human rights reporting: A Resource Guide to Corporate Human Rights Reporting (2009), and Corporate Human Rights Reporting - An Analysis of Current Trends (2009).

Biodiversity and ecosystems guidance

GRI, supported by the Dutch Ministry of Foreign Affairs and in consultation with stakeholders, developed a resource document on biodiversity in 2007. Biodiversity is among the core G3 Indicators, but is a challenging area for reporting. The resource document assists reporting organizations to understand biodiversity issues, and their relationship to their activities and operations. It discusses how the GRI Guidelines can be used to report on biodiversity, and provides further resources to help organizations with their biodiversity reporting.

The current work on ecosystem services is intended to fill a gap in emerging thinking by helping to translate concepts into measurement and reporting approaches for use at corporate level. By providing a blueprint for how to address ecosystem services, GRI's work can set a vision and catalyze practical steps by companies, investors, civil society and others to measure, assess, and benchmark corporate performance. In addition, it can lay the groundwork and provide the necessary intellectual base for future updates to the G3 Guidelines.

The study "The Economics of Ecosystems and Biodiversity" (TEEB) is also highly important. TEEB is laying the economic groundwork and argument for why ecosystems matter for public policy and livelihoods, translating this for different stakeholder groups; government, business, etc. It has the potential to shift environmental thinking away from inputs and outputs to the functioning of ecosystems, and how to better reflect these values in markets, business planning, and public policies. Nature's goods and services are not unlimited or free. Markets must internalize the cost of losing these goods and services. This has implications for how companies measure performance and how markets value companies' current and future prospects. Therefore, reporting will play a key role in enabling this understanding and integration.

Climate change

The G3 Guidelines include 5 energy-related indicators (EN3-EN7), and 3 GHG-related indicators (EN16-18), and an indicator on the financial implications and other risks and opportunities related to climate change (EC2). The G3 Guidelines refer to the key global tool, the Greenhouse Gas Protocol (GHG Protocol), developed by WRI and the WBCSD. The Carbon Disclosure Project (CDP) is a private initiative that uses surveys to collect carbon information from global companies. They also use the GHG Protocol of WRI/WBCSD, and the G3 Guidelines, as the basis of their work.

In July 2010, GRI and the CDP released a document linking the G3 Guidelines and CDP's 2010 Questionnaire. The guidelines and questionnaire invite reporting on GHG emissions and climate change. The Guidelines, however, cover broader elements of sustainability and ESG reporting. Both organizations will employ the linkage document in the further development of guidelines and questionnaires. Where it will lead to more and better reporting, CDP will seek alignment when preparing its 2011 questionnaire. GRI aims to align the next generation of its guidelines more closely with the CDP.

In 2009, GRI and ACCA partnered for a research project on climate change reporting entitled: "High Impact Sectors: The Challenge of Reporting on Climate Change". The report provides unique insight into the degree to which large companies around the world have begun to disclose their GHG accounting and strategies for reduction. It not only provides an overview of current climate change initiatives and the changing landscape ahead but presents an analysis of carbon reporting disclosures across 14 high-impact industry sectors from 2003 to 2008. In particular, it includes an analysis of carbon reporting disclosures in the BRIC countries (Brazil, Russia, India and China) and South Africa, and a series of expert perspectives on the corporate response to climate change. About half of the large companies studied in China, Brazil, South Africa and India measure their carbon emission on the basis of a baseline, have climate change policies that include risk studies, and report all of this through the G3 Guidelines.

Sectoral guidance

As mentioned, GRI has developed a whole range of thematic guidance material. This sectoral guidance usually takes the form of Sector Supplements, which are widely used.

Sector Supplements are available or under development for the following sectors: mining and metals, food processing, oil and gas, textile and apparel, construction, electric utilities, financial, tourism, public agency reporting, and large events.[17] They will be used in capacity building in developing countries. In addition, new thematic guidance for developing countries will be developed as need arises. There are plans to develop a Forestry Sector Supplement in collaboration with the Forest Stewardship Council. There are also plans to develop ESG Reporting Guidance for Bio-Fuel Cultivation and Transport.

GRI strongly believes that the mainstreaming of sustainability practices all over the world is crucial, in every organization and company. Believing that it is possible to manage only what gets measured, GRI offers guidance to organizations and companies to monitor and disclose their ESG performance. GRI contributes to the mainstreaming of sustainability practices by running special programs for SMEs and on supply chains, as well as by means of capacity building in developing countries through its regional network presence and training programs.

The green economy in the context of sustainable development and poverty eradication

Strong economic growth remains the main route to poverty eradication and human development. Maintaining growth is crucial and can be sustainable. Organizations and companies that consider their impact on society and the environment evince good economic performance. The concept of the green economy highlights the crucial importance of mainstreaming environmental and social concerns, informing economic strategies and policies.

Internationally agreed principles and objectives have existed since 1972. Now there is a requirement to manage the transition to a green economy. ESG reporting offers a tool for making this change.

GRI contributes to poverty eradication and sustainable economic development from an economic, social and environmental point of view. GRI pursues this goal by developing the content and ownership of sustainability reporting with the G3 Guidelines.

Given the need for more transparency and awareness on these matters, GRI has the following strategic objectives for developing countries:

- To enhance all stakeholders' understan-ding and ownership of sustainability reporting, and its link to sustainable development, poverty reduction, resource conservation and biodiversity protection; and to increase the capacity to report.
- To strengthen the sustainability performance of local business actors in order to positively impact sustainable development, and strengthen their competitiveness in the regional and global market.
- To empower stakeholders -in particular civil society, labour unions and local authorities- to engage in constructive dialogue with local and multinational businesses on their environmental, social and economic performance, on the basis of sustainability reporting. This should enable the creation multi-stakeholder approaches that are specific to developing countries.
- To increase transparency regarding the impact of foreign/multinational companies that invest and operate in developing countries. This should strengthen companies' governance around sustainability performance and impacts in their host countries, and increase their transparency for investors and stakeholders.

Global Reporting Initiative™

For more about the Global Reporting Initiative please visit:

www.globalreporting.org

Endnotes

1 Co-Chairs' Summary, *First Preparatory Committee Meeting for the UN Conference on Sustainable Development*, 2012, 20 May 2010, paragraph 28.

2 idem.

3 UNCTAD, *Investment and Enterprise Responsibility Review*, *Analysis of Investor and Enterprise Policies on Corporate Social Responsibility*, Switzerland, 2010.

4 KPMG, *International Survey of Corporate Social Responsibility Reporting 2008*, p.4; UNEP, KPMG, *Carrots and Sticks for Starters*, *Current Trends and Approaches in Voluntary and Mandatory Standards for Sustainability Reporting,* 2006, p.4.

5 OECD stands for the Organisation for Economic Co-operation and Development.

6 U.N., *Plan of Implementation of the World Summit on Sustainable Development*, paragraph 18: "Enhance corporate environmental and social responsibility and accountability. This would include actions at all levels to: (a) Encourage industry to improve social and environmental performance through voluntary initiatives, including environmental management systems, codes of conduct, certification and public reporting on environmental and social issues, taking into account such initiatives as the International Organization for Standardization standards and Global Reporting Initiative guidelines on sustainability reporting, bearing in mind principle 11 of the Rio Declaration on Environment and Development; (b) Encourage dialogue between enterprises and the communities in which they operate and other stakeholders; (c) Encourage financial institutions to incorporate sustainable development considerations into their decision-making processes; (d) Develop workplace-based partnerships and programmes, including training and education programmes".

7 Amongst others: the OECD, Commentary OECD MNE Guidelines, III. Disclosure; *WSSD Implementation Plan*, paragraph 18; G8 Summit 2007, Heiligendamm *Growth and Responsibility in a World Economy*, Summit Declaration, 7 June 2007, paragraph 84; United Nations Global Compact, *Policy for the Communication of Progress*, 3 April 2009; *United Nations Principles of Responsible Investment*, Principle 3.

8 With support of the Norwegian Government, GRI made a comparative analysis of the eight MDG's and the GRI indicators. Of the eight goals, 5 are directly related to GRI, and 3 indirectly. This led to a linkage document explaining the link between MDG's and the GRI Guidelines. An unknown number of companies specifically refer to their adherence to the MDG's in their sustainability report. It should be noted that the MDG's have been designed at country level, and the GRI guidelines operate at organizational level.

9 Namely: Austria ,Belgium, Canada, Denmark, Finland, Germany, Netherlands, Norway, Sweden, United States.

10 www.integratedreporting.org

11 The so-called Johannesburg Plan of Implementation: U.N., *Plan of Implementation of the World Summit on Sustainable Development*, paragraph 18: "bearing in mind principle 11 of the Rio Declaration on Environment and Development", i.e. "States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and development context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries".

12 KPMG Advisory N.V., United Nations Environment Programme, Global Reporting Initiative, Unit for Corporate Governance in Africa, *Carrots and Sticks - Promoting Transparency and Sustainability*, 2010.

13 See paragraph 2.10 for more information about the International Integrated Reporting Committee and the role of GRI in it.

14 UNCTAD, *Investment and Enterprise Responsibility Review, Analysis of investor and enterprise policies on corporate social responsibility*, 2010.

15 European Parliament resolution of 25 November 2010 on Corporate Social Responsibility in International Trade Agreements, paragraph 26: "Proposes that this 'CSR clause' should incorporate: [...] (d) a requirement – which takes into account the specific situation and capabilities of SMEs within the scope of the recommendation 2003/361/CE of May 2003 and according to the 'think small first' principle– for corporations to publish their CSR balance sheets at least every two or three years; takes the view that this demand will reinforce transparency and reporting and encourage the visibility and credibility of CSR practices by making CSR information available to all stakeholders, including consumers, investors and the wider public in a targeted manner".

16 European Parliament resolution of 25 November 2010 on Human Rights, Social and Environmental Standards in International Trade Agreements, paragraph 20: " [...] Calls for EU trade agreements effectively to provide for the highest levels of transparency, stringent public procurement standards and country-by-country reporting by businesses in both developed and developing countries, [...]".

17 http://www.globalreporting.org/ReportingFramework/SectorSupplements/.

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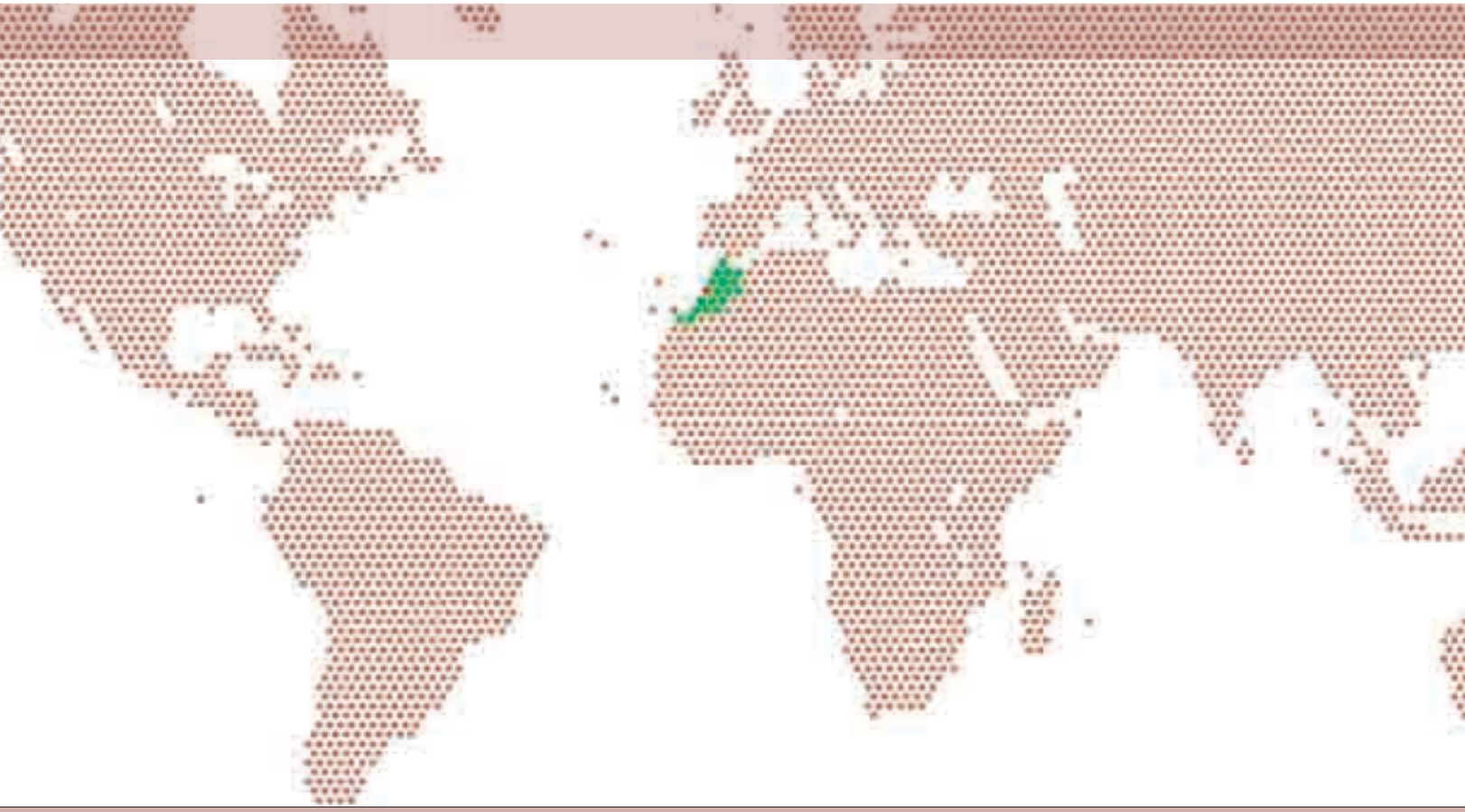

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PART 4

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The green transition of Morocco

The Government's strategy on the green economy

Omar Hilale

H.E. Ambassador Omar Hilale, outlines his Government's commitment to environmental protection and sustainable development, detailing the work of the Foundation for Environmental Protection as well as the leading role of its diplomacy in environmental issues. He highlights national initiatives in the fields of agriculture, industry and associated 'green market' opportunities, environmental impact studies, 'green citizenship', green cooperation between government departments and green training programmes. Emphasizing the boost to technical innovation from the green economy, he further describes the country's renewable energy choices and comments potential savings in terms of dollars and CO_2 emissions.

Since its participation in the Earth Summit in Rio de Janeiro, Morocco has embarked on an irreversible process of implementing the recommendations of the United Nations Conference on Environment and Development.

In 1992, as part of the implementation of these commitments and within the context of global sustainable and human development efforts and initiatives, Morocco developed a new strategy based on an integrated approach to development. It sets the government's guidelines to deal with development needs, protection of the environment and reducing the destructive impact of climate change.

In this regard, Morocco has adopted a series of development strategies, notably the National Strategy for Environmental Protection and Sustainable Development, the implementation of the National Action Plan for the Environment (PANE), the 2020 Strategy for Rural Development, and the launch of the National Initiative for Human Development (NIHD).

To realise its ambitions, Morocco has committed itself to an extensive and broad programme in the fields of renewable energy and the green economy, opting for a new agricultural strategy called the Green Morocco Plan. The results achieved in these areas by Morocco in record time confirm the strategic importance the government assigns to sustainable development and rational management of natural resources.

In 2009, conscious of the scope and severity of the degradation of its biodiversity and determined to meet the challenges of protecting its environment and in conformity with the Royal guidelines, the Kingdom of Morocco issued the draft National Charter for Environment and Sustainable Development.

Thanks to its global vision of environment and biodiversity, the National Charter covers not only the environmental issue but is also a social project and an authentic reference for public policy in the country. It reflects efforts made in the field of environment and major advances in the institutional and legal fields to include environmental issues in public policies related to development. It was for this reason that all nation's institutions and various stakeholders responded to the call of His Majesty the King to strongly join this initiative and become involved in its implementation and achievement. Furthermore, the choice of Rabat by the 'Earth Day Network as a world city to host the celebrations of the 40th anniversary of the Earth Day is indeed a unique opportunity to demonstrate our country's commitment to the environmental cause. It bears witness to all Morocco's efforts to preserve the environment that justify its being considered a Development Model in Africa.

The designation of Morocco to host the festivities is a clear recognition of the commitment of the Kingdom, under the reign

of HM King Mohammed VI, to a proactive environmental approach in all sectors, in particular through a partnership approach involving all social and economic actors and a pragmatic approach with ambitious and realistic programmes. It is also the result of the commendable and significant efforts of Her Royal Highness Princess Lalla Hasna, President of the Mohammed VI Foundation for Environmental Protection, for the promotion and protection of the environment and the eco-system within a context of sustainable development.

Moreover, and by way of illustrating this commitment in terms of concrete projects, on 22 April 2010, HRH presided over the celebration ceremony of Earth Day and Sustainable Development, marked by the signature of several conventions and the presentation of a large number of projects to be carried out within a long-term environmental strategy. These projects aim to protect resources and eco-systems as well as monitoring the state of the environment in all regions of Morocco.

The outcome of the various programmes undertaken by the Foundation is noteworthy, with several initiatives launched since 2009. They include: the 'Eco-Schools' programme; the programme 'Young Reporters for the Environment', with two international prizes awarded to Morocco by an international jury in Paris; the co-organization with the Islamic Educational, Scientific and Cultural Organization (ISESCO) of a national workshop dedicated to sensitizing teachers to the relationship between environment, health and sustainable development; and the organization of a contest for 'Young Reporters for the environment' targeting students from four Arab countries: Jordan, Syria, Tunisia and Morocco.

Other initiatives launched under the auspices of the Foundation include the 'Clean Beaches' programme, many of which have been labelled 'Blue Flag' and the 'Qualit'air' programme, which seeks to raise awareness among mechanics, offering them environmental training programmes; organize campaigns of vehicle control, removing ordinary diesel and making provision for diesel 50 ppm; establish a national air quality monitoring network in major cities of the Kingdom; and launch an eco-epidemiological study in partnership with the Ministry of Health and with the assistance of a WHO expert.

It is thanks to these achievements that the Foundation has, since December 2009, the status of observer at the UN Conference on Climate Change in Copenhagen.

In addition, many initiatives have been undertaken in the field of clean development, with important national programmes initiated, notably the establishment of laws necessary for the protection of the environment, namely to combat air pollution and provide for waste management, including prohibition of the use of non-biodegradable bags.

A major step has been taken in the agricultural sector which is strategic for the socio-economic development of Morocco, representing 15 to 20 per cent of national GDP

The programme, adopted in 2008 and called **'the Green Morocco Plan'**, constitutes the new agricultural strategy in Morocco aimed at providing a boost to the economy of the agricultural sector.

Morocco's commitment is also reflected in a number of initiatives taken by the different Ministerial Departments to draw the attention of Moroccan companies to the various business opportunities offered by the green market, create the appropriate environment for the its development and facilitate access of Moroccan companies to major structural projects of the Kingdom, namely sanitation programmes and the solar plan.

Aware of the growing strength of the green economy, commonly called 'green business', and the opportunities it offers as the global economy of tomorrow, Morocco is determined to use it to trace a new path towards sustainable development. It is

thus committed to transforming the constraints linked to the respect of the environment into opportunities, advantages and benefits for development in terms of employment and industrialization. This is evidence of the level of maturity reached by Morocco after a number of structural reforms in the political, human, social and economic fields. Now, it is ready to include in its progress and evolution the concept of sustainable development in all its dimensions.

Morocco has managed to respond to the challenge thanks to the commitment of all its industrial actors and the devotion of all sectors, which have demonstrated a great ability to adapt to new rules and act in full compliance with the requirements needed in this area. Indeed, all business firms and companies feel involved with the integration of sustainable development into their management approach. The correlation between climate change and economic development is no longer a strange concept to them, having opted for a promising green approach leading to optimal economic, social and environmental returns.

One of the authentic achievements in this approach is the Environment law, which states that every industrial project must first carry out a thorough study of its environmental impact. Such a data base has today become a principle and working method for all stakeholders. This visible conviction by everyone (government, economic and political actors, associations, NGOs and citizens) and widespread ecological attitude constitute the beginning of a new concept that has largely found its place in Moroccan society, namely 'green citizenship'.

In addition to the contribution of national media and press agencies, this new concept has been translated into concrete

terms thanks to the emergence of a number of associations and civil society actors that play a key role in initiating and promoting it. Seminars and conferences have been organized at national and regional level to stimulate a debate, cover its challenges and launch an awareness campaign around the concept. The latter is targeting all sectors, private or public, all business functions and all citizens without exception, with the slogan "Green Business is everyone's business".

At Ministerial level, we notice synergies coordination between different Departments involved in the advocacy and promotion of the virtues of the green economy. For example, the Ministry of Energy is working with both the Ministry of Housing on energy efficiency in all buildings, particularly in new cities, and with the Ministry of Transportation to reduce greenhouse gas emissions through better management of urban space.

Regarding efforts in the field of education and training, a training programme is being set up making available qualified human resources to teach students the principles of sustainable development. Within this context, the competent Department collaborates with other partners such as the Agency for Solar Energy, and industries and businesses to identify needs as accurately as possible by 2015-2020, and translate them into educational programmes. Morocco's reference base draws inspiration from foreign experiences in the fields of training in green technologies and ecological techniques.

Morocco's implementation of the green economy also implies giving a strong boost to technological innovation as well as carrying out research and making progress in the field of sustainable development. This approach has led to developing innovative projects in renewable energy and energy efficiency, in addition to other major projects like the National Liquid Sanitation Programme, whose total cost is estimated at 80 million dirhams in 2030 (approximately 9.6 million USD in January 2011), and the National Household Hazardous Waste Programme, whose total cost is estimated at 40 million dirhams in 2020, directly allowing for the creation of thousands of jobs.

As far as energy is concerned, several projects are underway including in the field of renewable energy. Within the framework of the strategy diversifying sources of supply of energy products initiated by H.M. King Mohammed VI, Morocco announced on 2 November 2009 an ambitious project in Ouarzazate to produce electricity from solar energy, with a capacity of 2,000 megawatts (MW), representing an investment of 9 billion dollars.

Renewable energy—solar, hydraulic and wind power—will contribute in equal parts to the 2,000 MW. The future 500 MW solar site will be established in Tamezghitene, in the north-east of Ouarzazate and will begin operating in 2015. The estimated cost of the Morocco Wind Energy Programme, based on the creation of new wind farms to increase power output from the current 280 MW to 2,000 MW by 2020, is 31.5 billion dirhams.

In addition to reducing Morocco's energy dependence from 97 per cent to 85 per cent, the implementation of such projects should allow annual savings of around one million tonnes of oil equivalent (TOE), to USD 500 to 700 million. Ecologically speaking, such projects would avoid the emission of 3.7 million tonnes of CO_2 per year.

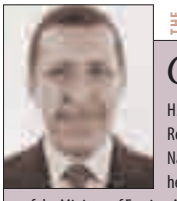
To support this momentum for renewable energy development, Morocco has established a legislative framework through the adoption of a draft law on energy efficiency and involving several Ministerial Departments.

The creation of such a large project, focusing on solar energy and wind power, reflects Morocco's irreversible choice to promote sustainable development and demonstrates its commitment to a clean and green economy, which fits within the framework of the Copenhagen process.

Morocco, motivated by its achievements at national level and experience in the field and a fervent advocate of environmental causes, has opted for an active diplomacy, committed to the respect of the environment and sustainable development, which has become its doctrine for action. In this regard, Moroccan diplomacy is constantly mobilized to serve the interests of both Morocco and the African continent in all international and multilateral fora.

The commitment to diplomacy in this field resulted in 2011 in the designation of Morocco as the coordinator of both the African Group in charge of the environmental issues and the World Meteorological Organization (WMO). This coordination gave rise to the genuine involvement of the Geneva African Group in environmental issues.

In this respect, Morocco will chair several meetings at both the ambassadorial and expert levels, in order to develop the African position and finalize the Group's statements for 2011, a special year full of important meetings. This is especially the case regarding the follow up to decisions taken internationally on environmental issues at the 16th United Nations Conference on Climate Change in Cancun, which has just ended, and the involvement in this event of the African Group through its active participation and contribution.



THE Author

Omar Hilale

H.E. Ambassador Omar Hilale is Permanent Representative of Morocco to the United Nations Office in Geneva. Prior to that he was from 2005, Secretary-General of the Ministry of Foreign Affairs and Cooperation of Morocco. Between 2001 and 2005, he served as Permanent Representative of Morocco to the United Nations Office in Geneva. A career diplomat, Mr. Hilale was Ambassador to Indonesia, Singapore, Australia and New Zealand, from 1996 to 2001. He also served as Deputy Head of Mission at the Moroccan Embassy in Monrovia from 1979 to 1980; First Secretary at the Moroccan Embassy in Addis Ababa from 1976 to 1979; and Second Secretary at the Moroccan Embassy in Algiers from 1975 to 1976.

Switzerland-Morocco Foundation for Sustainable Development

Mohamed Mike Fani, President and Founder
Offers a brief description of the vision, values, goals and work of the FSMD

The Switzerland-Morocco Foundation for Sustainable Development, FSMD (*Fondation Suisse Maroc pour le Développement Durable*) was created in 2004 and has since been recognized as a non-profit public service provider by the Finance Department of the Canton of Geneva. The FSMD is a non-profit and a non-governmental organization (NGO), with headquarters in Geneva.

Today, the FSMD is highly acknowledged for its role in boosting the socio-economic growth of Morocco. It has strong governance in driving its organization and managing its projects and has been granted the Consultative Special Status ECOSOC by the United Nations. This facilitates the FSMD's contribution as technical expert, adviser and consultant to the work programmes and goals of the United Nations, as well as by participating in ECOSOC and its various subsidiary bodies through attendance at their meetings and oral interventions and written statements on their agenda items.

Over the last two decades, Morocco has successfully implemented courageous and impressive programmes of social and economic growth. Moroccan leaders have continuously instituted solid reforms to liberalize trade relations especially with the E.U. and U.S., invested heavily in basic infrastructure, stabilized macroeconomic policy, diversified investment opportunities, improved education, and opened the political system. Strong economic progress has been observed, with growth rates averaging around 5 per cent during the last 10 years.

Despite progress, Morocco's growth remains vulnerable to natural and economic shocks, with social indicators out of sync with the country's income level. Morocco's youth is still heavily touched by unemployment (more than 30 per cent in urban areas) and large segments of the population remain socially and economically marginalized. Furthermore, Morocco's economic sectors are still tied to commodities highly dependent on foreign energy (97 per cent of energy needs are imported) and technologies and its trade balance is heavily linked to the E.U., especially France.

Within this context, the FSMD has emerged as a novel tool for socio-economic growth through know-how and competency transfer primarily between Switzerland and Morocco. The FSMD model aims at helping provide Morocco increasing freedom in assimilating novel technologies tailored to the kingdom's specific needs. The NGO is especially focused on boosting Morocco's transition from a fossil resources dependent economy to sustainable green development, this being the only option for the sustainable growth of a country not blessed with significant fossil resources. The active integration of novel technologies through international partnerships is creating a new value growth dynamism, in which education and training, especially of young people, play a predominant role in securing the talents and workforce necessary to drive emerging business opportunities in the country.

The FSDM believes in Switzerland, thanks to the latter's distinctive culture of innovation and proven tradition of entrepreneurship, as a model strategic partner for Morocco, especially in the sector of green economy, identified as the key driver for Morocco's sustainable growth. Switzerland's extensive experience and expertise in this sector represent an interesting model for Morocco in terms of capital market structure, environmental standards, industrialization of R&D results and economic framework conditions.

The NGO, through its Swiss and Moroccan members, is today well positioned to empower partnerships between the two countries. Every two years, it traditionally organizes an economic symposium in Geneva bringing together leaders, decisions makers and professionals from Morocco and Switzerland, from which opportunities for partnerships and collaboration are likely to stem. So far, the Foundation is very proud of the number of projects successfully implemented between the two countries, with around 10 projects realized in the sectors of health and social development.

The FSMD is constantly pushing to implement projects that benefit the poor and the underprivileged regions by raising the awareness of socially responsible and green investment among the strategic players. The city of Oujda in the north-east of Morocco, with 20 per cent unemployment, provides a good illustration: three partnership agreements were signed at the Economic Symposium the Foundation held in Geneva on 5 November 2010 relating to waste treatment, wastewater treatment, renewable energy, good governance and E-government, respectively between: (i) the FSMD, the Urban Municipality of the City of Oujda and Holcim Morocco, (ii) the FSMD, the Urban Municipality of the City of Oujda and IFGRA; and (iii) the FSMD, the Urban Municipality of the City of Oujda and SGS Morocco SA.

In line with this, the FSMD is adding another building block to the green economy orientation by federating stakeholders from the public and private sector to jointly create a regional model that can be further leveraged across the country. ◂

Fondation Suisse Maroc pour le Développement Durable (FSMD)
www.fsmd.ch

Renewable energy

IN MOROCCO

Saïd Mouline explains the commitment to renewables of the Moroccan National Agency for Development of Renewable Energy and Energy Efficiency (ADEREE). He describes achievements in the fields of wind, solar, solar thermal, hydro and biomass energy. He outlines future plans to increase the capacity of renewable sources of energy and hence the proportion of the country's energy needs derived from renewable, with a focus on enacted laws, energy funding and potential energy exports.

A continuous commitment to renewables

In the early 1980s, the creation of the Renewable Energies Development Centre (CDER), which is now an Agency (National Agency for Development of Renewable Energy and Energy Efficiency, ADEREE), demonstrated the Moroccan government's determination to promote renewable sources of energy. Current policy aims to develop renewable energies in ways that complement other forms of energy and contribute to security of energy supply, to develop local industries and capacities, and to implement a strategy of partnerships with the private sector. The renewable energies policy is currently in its generalized implementation phase with large renewable energy and energy efficiency programmes, supported by national and international institutions and banks. In fact, Morocco remains committed to a vision of sustainable development in which sensitivity to ecological and environmental issues is considered essential.

Why renewable now?

Morocco has some of the best renewable energy (RE) resources in the world, which have the potential to meet a rising and significant share of national energy demand. Many of the new technologies that harness renewables (including wind, solar, and biomass) are, or soon will be, economically competitive with the fossil fuels that meet 95 per cent of Moroccans' energy needs (2009). On the other hand, the electricity sector plays a crucial role in the development of industrial activities and socio-economics of the rural areas. Morocco has launched huge national development programmes in strategic sectors (health, tourism, industries, agriculture, education, infrastructure, etc.) and the need for security of energy supply and national energy production has become critical. Moreover, dynamic growth rates of RE in the world are driving down equipment costs, which leads to cost effective RE projects. Dependence on energy imports remains one of the main reasons for a key status being assigned to renewable in official plans for the energy sector. RE, including hydropower, accounted for 14.5 per cent of electricity produced in 2009.

A huge potential

With a 3,500-km long coast and average wind speeds of up to 11 meters per second in the north (Taza, Tangier, Tetouan) and south (Tarfaya, Dakhla, Laayoune), Morocco's wind power potential is estimated at 25,000 MW. The conditions for solar energy are also extraordinarily favourable, 5.5 kwh/m²/day and 3,000 h/year. Over 200 feasible Micro Hydro Power projects ranging from 15 to 100 kw have also been identified. Marine energy projects, including algae fuel production and valorisation, are currently under development.

A commitment at the highest level of the state

In March 2009, a royal letter to the participants at the Energy Forum mentioned:

> In our effort to secure our energy supply, we must stress how important it is to diversify energy sources, mobilise renewable resources.
>
> Together with renewable energy, energy efficiency can deeply transform the sector thanks to the new technologies and the social attitudes they imply.

It also called for the expanded use of renewable energy to meet the twin challenges of increasing renewable energy investments and social development. It gave strong support to the use of renewable energy resources and to environment protection. This strategy was reinforced by the two national 2,000 MW solar and 2,000 MW wind energy programmes, which call for an investment of USD 12.15 billion (in solar and wind parks) over the next decade to catalyze private efforts to build a renewable energy future. Specifically, the plan calls for renewable energy to reach 42 per cent of electrical capacity by 2020.

Solar energy targets and initiatives

The 2,000 MW Solar Energy Programme

On the 2nd of November 2009, Morocco launched an ambitious 2,000 MW solar power programme, estimated at USD 9 billion, to be completed in 2020. It is, in fact, an energy revolution in Morocco's efforts to respond to the global increase in the cost of energy, growing national demand and environmental protection. With high solar potential, the five sites selected for the programme — Laayoune, Boujdour, Tarfaya, Ain Beni Mathar and Ouarzazate — will soon be host to photovoltaic and solar thermal energy plants. The sites will cover 10,000 hectares and should produce up to 2,000 MW of electricity, with an annual saving of one million tons of oil.

Ain Beni Mathar (East Morocco): Morocco has considered the installation of its first solar thermal plant, a 470 MW natural gas unit, including a 20 MW solar unit. The project comprises a unit based on solar energy (a solar field of cylindro-parabolic mirrors covering a land surface of approximately 20 ha.) and a natural gas combined cycle unit. The site is located in Ain Beni Mathar, 86 km south of the city of Oujda. Solar production is estimated at up to 55 GWh/year.

Photovoltaic systems: decentralized photovoltaic solar electrification

Currently, photovoltaic solar energy in Morocco is used mainly in rural and off-grid areas. Distribution is estimated as follows:

- rural electrification: sub-programme of decentralized rural electrification (150,000 households to be electrified by Photovoltaic Systems, SHS) and community applications, 6 MWp;
- water pumping: 1.12 MWp;
- commercial sector (telecommunications, TV relays, radio, etc.): 5.85 MWp;
- other applications: 1.1 MWp.

Wind power parks a large potential

In recent years, wind has become an increasingly attractive source of renewable energy. Wind energy is the world's fastest-growing energy technology and Moroccan capacity has more than doubled in the past three years. Wind power currently supplies about 1.86 per cent of national electricity needs but capacity is expanding rapidly. Wind power amounts to an installed production capacity of 280 MW and 720 MW are under construction. About 5 sites have been identified for the next 1,000 MW programme, all of which have considerable development potential. Numerous private foreign operators are interested in using wind power in Morocco to produce green electricity. A Wind Atlas produced by ADEREE is available for those who wish to consult it.

Tangier Wind Park

The 2,000 MW Wind Parks Initiative

Since the first wind power plant installed in Koudia El Baida in 2000, several further wind parks have been built. The largest one, the 140 MW in Tangier, was set up in 2009. The national programme aims to install a number of new wind farms, raising installed electrical wind power from the current 280 MW to 2,000 MW by 2020. Five parks have already been installed: The Koudia Al Baida Wind farm (50 MW capacity), The Abdelkhaled Torres wind farm (3.5 MW), The Essaouira Wind farm (60 MW), a private wind park (Lafarge - 30 MW) and the 140 MW wind farm at Tangier. 720 MW are underway. Other regions have been identified, mostly located in the north and south of Morocco, to implement the second 1,000 MW parks: Tanger 2 (150 MW), Koudia El Baida à Tétouan (300 MW), Taza (150 MW), Tiskrad à Laayoune (300 MW) and Boujdour (100 MW). The project investment cost, estimated at USD 3.15 billion, will be covered by national and international public and private funds or other financing mechanisms.

Hydroelectricity in progress

Hydroelectricity is currently the largest producer of renewable power in Morocco, generating around 14.1 per cent of the nation's total electricity production in 2009. Total hydro capacity amounted to 1,265 MW in 2009 and a further 472 MW are planned. Morocco is also interested in developing decentralised small hydropower projects for isolated areas. The amount of hydroelectric power generated is strongly affected by changes in precipitation and surface runoff. Hydroelectric power does not necessarily require a large dam – some power plants use just a small canal to channel river water through a turbine and a number of these projects is currently under development by ADEREE. A small or micro-hydroelectric power system can produce enough electricity for a home or remote village.

Biomass preservation

Biomass can be utilized for all three major energy needs: electricity, heating/cooling and transportation fuel. However, each usage is distinctly different from the others, especially with regard to efficiency/ the percentage of energy utilized from the biomass source.

Rational use of wood fuel in rural areas

Biomass accounts for an important share of Moroccan energy consumption (34 per cent), representing a major deforestation problem (30,000 hectares annually). It is estimated that about 50 per cent of the population using fuel wood collects it from neighbouring forests (in the neighbourhood of 10 km) while the other 50 per cent buys the wood, with an average monthly consumption of about 50 kg/household. In order to improve the use of fuel wood, programmes carried out by ADEREE and other national and international partners have focused on fuel switching and energy efficiency. These include:

- Dissemination of small agricultural Bio-Digesters for producing Biogaz. Since 1983, more than 350 units have been installed in different regions of country. For example, an ADEREE/GTZ cooperation programme introduced more than 100 Biogaz digesters in the pilot region of Souss Massa to encourage this technique and reduce thermal deforestation.
- Dissemination of fuel wood-saving stoves for cooking and heating in rural zones and encouragement to consume gas.
- Promoting the use of wood energy-saving technologies for urban and rural hammams through training, supervision, awareness-raising, informative and incentive measures to save neighbouring forests. The new technologies can attain a 78 per cent efficiency rate.

ADEREE is also working on an algae fuel pilot project near TanTan in the south of the country.

National energy efficiency programmes

National energy efficiency programmes aim to achieve a 15 per cent energy saving by 2020 in the following main sectors: industry, transport, residential and tertiary. Energy efficiency programmes are to be implemented through the Energy Efficiency Codes in Residential Buildings and Energy Efficiency

The Programme for the Improvement in Commercial and Hospital Buildings in Morocco (carried out by ADEREE and institutional partners) includes the following components:

1. Setting up a Building/Construction Energy Efficiency Code Authority;
2. Designing, implementing and evaluating Building/Construction Energy Efficiency Regulations through thermal building codes for hospitals, hotels and housing;

3. Developing guidelines for technical professionals (hospitals, hotels/services, housing);
4. Comprehensive Barrier Review/Promotion of knowledge-sharing;
5. Developing the local market for solar water heating systems. The goal is to implement 440,000 m² to be installed in 2012 and 1.7 million m² by 2020.

Policy, regulatory framework, RE/EE funds and institutional reforms

Morocco has set up a several incentive measures to promote renewable energy, with new enacted renewable energy laws and institutions in the last twelve months. Its strategic geographic location and its liberalization policy enable it to export toward an extensive market where demand is strong (Europe, Africa and the Middle East). A law on projects for Renewable Energy (Law 13-09) has been promulgated in the parliament as well as a new law to transform the national renewable energy development centre (CDER) into a renewable energy and energy efficiency agency (ADEREE), and the creation of the Moroccan Agency for Solar Energy (MASEN), which will be in charge of carrying out all technical, economic and financial studies necessary for the implementation of the 2,000 MW solar programme. Another energy investment company (*Société d'investissement énergetique-S1E*) has also been created to invest in projects to increase the production capacity of renewable energy and intensify energy efficiency. In fact, the Renewable Energy law set up the legal framework for promoting investment for export, assistance in site selections, permits and authorization, access to the national grid and electrical interconnections, export of RE, and so on.

Energy development funds

Morocco has, in its efforts to increase energy security and reduce its vulnerability to oil price shocks, set up a fund, called *"Fond de Développement de l'Energie (FDE)"*, currently with USD 1 billion in deposits. Its legal status and operational priorities are set out in the Finance Act of 2009. The FDE's present priority areas lie in developing generation capacity and security of supply, developing renewable energy and energy efficiency. This fund will be instrumental in achieving financial closure for projects with the greatest potential for GHG emissions savings and that face viability gaps due to additional costs or risk premiums. The focus will be on: **(a)** increased penetration of renewable energy into Morocco's electricity generating portfolio, with an emphasis on wind power, and **(b)** energy conservation measures, particularly industrial energy efficiency and urban transport. The majority of FDE funds are to be invested with the aim of generating returns for the State. Such projects will include, but will not be limited to, power generation from renewables.

All the renewable energy and the energy efficiency projects will be implemented using carbon funds (Clean Development Mechanism with 5 projects already registered, the clean technology fund, etc.).

New industrial parks dedicated to the production of industrial components for the renewable energy and energy efficiency sectors are being implemented with the objective of developing the renewable energy industry. The first one is located near Oujda. Furthermore, a new policy calls for the inclusion of specific courses and research and development in these sectors in the curricula of a number of universities and engineering schools.

The regional approach

Morocco has a leading role in Euro-Mediterranean energy cooperation through its electricity interconnections with neighbouring countries. The country also adapted its new legislation to facilitate green energy export. It has joined the Mediterranean Solar Plan and Moroccan companies are involved in the MedRing and Desertec projects.

In conclusion, Morocco is, with its highly proactive renewable energy policy, demonstrating that, at national and international level, the technological progress made in the last few years, the increasing cost of fossil fuel and the high level commitment to renewable energy, energy efficiency and environment protection, are the main drivers in the ongoing growth of its national renewable energy market. ◂

THE Author

Saïd Mouline

Director of the Moroccan Agency for Development of Renewable Energy and Energy Efficiency (ADEREE)

MANAGEM

80 YEARS OF DEVELOPMENT AND VALORISATION OF NATURAL RESOURCES

Ismail Akaley, General Manager at MANAGEM describes how his company specializing in the production and valorisation of base metals, precious metals and cobalt, has been able to creatively transform environmental protection constraints into business opportunities. Through its own research and development of recycling techniques and recuperation of waste matter, it has been able to improve the lives of citizens living around its industrial installations, contribute towards the career opportunities of young people and help create small enterprises and jobs.

A key actor in Morocco, MANAGEM Private Group, specializes in the production and valorisation of base metals, precious metals and cobalt.

In each branch of its activities, MANAGEM deploys its highly specialized competences, its advanced technology equipment and its strong capacity in research and development, allowing the group to constantly meet its clients' needs from different sectors such as the steel industry, aeronautics, energy, industrial tools, the chemical industry and electronics.

A historical engagement for local and regional development

The mining activity historically has always been a strong tool for local development and is still nowadays an important linchpin in the development of and a driving force behind the provision of medical services, schools and socio-cultural infrastructure in the regions where it is implemented.

For more than 80 years, MANAGEM has accelerated and facilitated access to vital needs, in particular to drinking water, electric sources and new technologies.

In addition, MANAGEM contributes to the development of communities surrounding its production plants, mainly by promoting and encouraging children's education, supporting various programmes for rural women and democratizing access to water through various partnerships.

Ethics at the centre of MANAGEM's social policy

MANAGEM's social policy is carried out according to principles and today the group is proud to have a human resources policy based on shared values, corporate culture, clear and open communication and a motivating system of incentives.

One of MANAGEM's subsidiaries, *Compagnie de Tifnoute Tiranimine* (CTT), has received the General Confederation of Moroccan Enterprises (CGEM) Corporate Social Responsibility Label.

In addition, thanks to the health and safety system, the hydrometallurgical units and the Research Centre received the Occupational Health and Safety Assessment Series (OHSAS) 18001 in 2010.

Act for the environment, one of MANAGEM's key values

MANAGEM considers the protection of the environment one of its priorities by pushing hard to minimize the environmental impact of its activities. The Group has mobilized efforts in the field of recycling industrial effluents, waste water minimization and treatment, dust control and plantation and management of open spaces.

The know-how acquired over the years and the important efforts in research and development deployed by MANAGEM's Research Centre have allowed the group to view environmental restrictions as real development opportunities.

The group has already implemented several projects on mining waste recovery and industrial effluents:

Bou Azzer's mining waste valorisation

Since 1929, the cobalt mine of Bou Azzer has accumulated millions of tons of solid waste from gravimetric treatment for the production of a cobalt concentrate. Thanks to a hydrometallurgical process developed by MANAGEM's Research Centre REMINEX, the environmental restriction has become an opportunity, with 500 tons of cobalt metal produced every year from this solid waste.

Sodium sulphate project

MANAGEM's different hydrometallurgical units produce liquid effluent rich in salt (sodium sulphate). These effluents are stored in evaporation tanks. The development of hydrometallurgical activities, which generate more than 700 m³ of liquid effluents per day, encouraged the group to develop an environmental and sustainable solution involving salt crystallization of sodium sulphate, a marketable product, and a water recycling unit. This unit, which started up in 2009, produces 25,000 tons of sodium sulphate and recycles 200,000 m³ of water per year.

E-waste recycling project

MANAGEM, with its expertise and command of treatment processes, has created, through its Cobalt and Specialties Branch, a recycling field for the valorisation of nonferrous and precious metals waste. This e-waste recycling project was born within the MANAGEM Research Centre in 2006.

In December 2009, a partnership agreement was signed between CTT and *Al Jisr*, a Moroccan NGO working in education. This partnership allowed the project to be upscaled to include a social component.

Under the project, the *Al Jisr Association*, through the Green Chip project, is in charge of collecting, dismantling and sorting e-waste in workshops equipped by MANAGEM. These dismantling workshops are located in some schools and involve young people in academic failure. The goal is to show them the way to create their own dismantling workshops in order to become CTT suppliers.

CTT is in charge of the valorisation of dismantled products, nonferrous and precious metals, and the sale of the other dismantled products such as steel and plastic.

The partnership with *Al Jisr* contributed to:

- Supplying e-waste;
- Facilitating the integration of young people in academic failure
- Reducing the digital bill in Morocco

The valorisation process of electronic cards and nonferrous metals has allowed the group to treat 1,500 tons/year and facilitated the creation of 80 dismantling workshop and more than 200 jobs.

Dismantling workshop of electronic waste.
Green Chip, Casablanca

The group plans to increase progressively its treatment capacity to 100,000 to 120,000 tons per year, with the potential of 1,500 to 2,000 kg of gold, 15 to 20 tons of silver, and an annual turnover of USD 100 to 120 million.

Pyrrhotite project

The solid waste from the Guemassa polymetallic mine (an unusual iron sulphide mineral with a variable iron content) is stocked on more than 100 hectares. At present, the potential is more than 20 million tons, with an annual increase of 1 million tons.

With this in mind, the MANAGEM group has launched a project of pyrrhotite valorisation to produce sulphuric acid, iron oxide and electrical energy with zero waste. In this way, it has transformed a constraint, solid waste, into a real asset to promote sustainable development.

Through the treatment process developed by the MANAGEM research centre, involving a baking furnace, mining waste is transformed into a number of different value added products:

- Sulphuric acid, a strategic reagent for MANAGEM plants;
- Iron oxide, a raw material for the steel industry;
- Electricity, to be used for plant's needs.

This industrial unit will, according to the economic feasibility study, allow the treatment of 100,000 tons of waste (pyrrhotite) to produce:

- 100,000 tons of sulphuric acid, covering MANAGEM's own needs;
- 140,000 tons of iron oxide, a marketable product for the steel industry;
- 4.5 MWh (megawatt hour) of electricity, covering 50 per cent of the Guemassa plant needs.

The project has been presented with the Cleaner development Mechanism (CDM) due to the fact that it is capable of produces energy at the same time as avoiding the emission of 7,000 tons of CO_2 per year.

Partnership with the Moroccan Cleaner Production Centre (CMPP)

In June 2009, MANAGEM Group signed a partnership agreement with the Moroccan Cleaner Production *Centre or Centre Marocain de Production Propre* (CMPP) with the aim of promoting cleaner production, efficient use of resources and sustainable development.

CMPP is member of an international cleaner production network set up by the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP)

The centre has access to national as well as international expertise in different fields related to cleaner production, resources efficiency, sound environmental technologies and sustainable development.

Development that meets the needs
of the present without compromising
the ability of future generations
to meet their own needs

Sustainable Development as defined in
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