From "Green Growth" to sound policies: An overview*

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ABSTRACT

"Green growth" is an attractive slogan with a variety of possible meanings. This essay critically examines several potential meanings of this slogan and provides a brief overview of some of the main implications of the other papers in this special issue. Taken together, these papers argue for the importance of careful analysis of energy/environmental policies, particularly ambitious ones claiming to offer huge benefits with little or no cost.

> "When I use a word," Humpty Dumpty said, in a rather scornful tone, "it means just what I choose it to mean — neither more nor less."Lewis Carroll, *Through the Looking Glass*

1. Introduction

"Green Growth" is a wonderful slogan. After all, everyone agrees that being green is a good thing, and in the current Great Recession economic growth is even more desirable than usual. So "green growth," which combines these two good things, sounds like a truly great thing. Moreover, the OECD (2011a,b), the United Nations Environment Program (UNEP, 2011b), and the World Bank (2011) have all recently embraced green growth, as well as the related notion of "green economies". But wonderful slogans don't necessarily lead to wonderful actions — or even sensible ones. It all depends what the words involved really mean — both to those who use them and to those who hear them.[2] Indeed, it is not just that green growth lacks a commonly accepted definition; rather, different groups often utilize the phrase to mean or imply different things. This essay briefly examines several possible meanings of "green growth" and, in the process, provides an overview of some of the main implications of the other papers in this special issue.

2. Green business policies

Advocates of green growth naturally call on businesses – large businesses, mainly – to adopt "green policies." While what makes a business policy "green" is usually not defined very precisely, the basic notion is that business should go beyond what is legally required to protect the environment and conserve natural resources. Often there is a particular focus on limiting energy use and greenhouse gas emissions, though "green" is often intended to include other aspects as well. (See Furchtgott-Roth (2012–this issue) on the many broad, official definitions of "green jobs," for instance.)

Believers in the so-called Porter Hypothesis (Porter and van der Linde, 1995), which holds that well-designed environmental regulation typically triggers innovation that improves competitiveness, might argue that it is *generally* profitable to do more than is required on this front, to voluntarily impose more stringent environmental controls on one's own operations that the law requires. Even nonbelievers commonly admit that since pollution is generally waste and energy is expensive, innovation will *sometimes* make it profitable for businesses to go beyond what environmental regulators require. (Ambec et al. (2011) provide a useful discussion of post-1995 work on the Porter Hypothesis.)

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[1] I am indebted to Brian Flannery and anonymous referees for the helpful comments and to the International Green Business Economies Dialog project for the financial support. Errors contained in and opinions expressed in this essay are mine alone.

[2] Bär et al. (2011) provide a useful overview of much that has been written using these and related words in the run-up to Rio+20.

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Thus Plambeck (2012–this issue) provides a number of examples of firms that have voluntarily reduced greenhouse gas emissions in their supply chains in ways that enhanced their profitability. Moreover, as she points out, adopting such green policies can improve public relations, motivate employees, and gain voice with policy-makers. Voluntarily providing consumers with information about the carbon content of a firm's products may also yield benefits of these sorts, though as Cohen and Vandenbergh (2012–this issue) argue, labeling must be done carefully (and in a standardized way) if it is to have the potential to have significant effects on emissions.

Even if green behaviors and policies (or "socially responsible" policies more generally) reduce the accounting profits generated by a firm's assets, note that if investors value green policies, adopting them can increase the stock market value of those assets. They also argue that even if green policies increase profits, because of their positive impact on stock prices, they may increase or decrease the rate of return on market capitalization.

While businesses may thus benefit in a variety of ways from voluntarily adopting green policies and publicizing them, few believe that plausible voluntary actions are likely to have a significant impact on greenhouse gas emissions or more generally on the ambitious goals green growth advocates often embrace for the global environment. Thus all green growth advocates want more than voluntary actions. They seek to change government policies — indeed, to change the conceptual framework within which government policies are analyzed.

3. A subset of sustainability

Inherent in the "growth" part of "green growth" is a focus on the relatively long term. And the usual starting point for discussions of long-term development policies is the notion of sustainability (Heal, 2012). In what has deservedly become canonical text, the Brundtland Report (World Commission on Environment and Development, 1987) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Many subsequent discussions of sustainability refer to its economic, social, and environmental pillars.

For economists, a natural way to sharpen the notion of sustainability is to consider the various stocks a nation or group of nations holds at any particular time. These would include various types of renewable and non-renewable natural resources, fixed capital, knowledge, human health, human capital, and environmental quality. What Heal (2012) calls *weak sustainability* would then be defined as the requirement that the stocks we pass to future generations be at least as capable of providing them with good living standards as the stocks we inherited.[3] This doesn't mean that none of our stocks can ever be reduced, just that the overall value of the whole portfolio cannot be decreased.

Heal (2012) notes, for instance, that both Botswana and Namibia are depleting their stocks of natural capital, but Botswana may be on a sustainable development path because it is building up stocks of human and fixed capital, while Namibia is not doing so. He argues that Saudi Arabia, which is mainly using non-renewable oil resources to support consumption rather than any sort of investment, is "the ultimate country example of unsustainability." Similarly, it is hard to see what assets are being built up to offset the global declines in fish stocks and underground aquifers or the increases in greenhouse gas concentrations.

While these examples are fairly clear, Heal (2012) and Reilly (2012–this issue) show that assessing the sustainability of a nation's development path encounters some difficult, longstanding conceptual and measurement issues. All economists would agree that GDP growth is not an adequate measure of progress: a nation that sells more of its oil every year to finance increasing consumption is getting poorer, not richer. Selling the family silver to pay the rent does not increase properly measured income, even if it permits a move to a better apartment. Similarly, the uncertain future costs of climate change must be offset against the current benefits of fossil fuel use.

The U.S. Bureau of Economic Analysis has developed a system of Integrated Environmental and Economic Satellite Accounts to address these issues, and the World Bank has developed a conceptual framework and data to measure Adjusted Net Savings (Heal, 2012). But serious problems remain. The valuation of such assets as air quality and forested public lands is difficult conceptually. How should one value the health status of today's workforce — or today's children? How should one compare the asset value of whales (or sea slugs) with the intellectual capital involved in videogame production?

Using the weak definition of sustainability, one could argue for the sustainability of British development in the 19th century, in which burning the nation's coal resources and making London's air toxic for decades enabled the accumulation of a variety of tangible and intangible assets that made possible sustained, historically unprecedented growth in living standards. But few advocates would accept this as an example of green growth. Even Botswana's policies might not pass muster. The OECD (2011a, pp. 4, 5) defines green growth as follows:

> Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.... Green growth has not been conceived as a replacement for sustainable development, but rather should be considered a subset of it. It is narrower in scope, entailing an operational policy agenda that can help achieve measurable progress at the interface of the economy and the environment.

Similarly, Hallegatte et al. (2011, p. 3) assert that Green growth is about making growth processes resource-efficient, cleaner and more resilient *without necessarily slowing them*. [emphasis added] The italicized phrase has no obvious content, since few would intentionally slow growth processes unless doing so had other benefits. Whatever it is intended to mean, the discussion they subsequently present makes clear these authors' view that taking the steps they propose will more likely speed up growth than slow it down.

In both these definitions, the "social pillar" of sustainable development is completely absent. In contrast, it plays the central role in the World Bank's push for "inclusive growth," growth that is "broad-based across sectors and inclusive of the large part of the country's labor force" (Ianchovichina and Lundstrom, 2009; emphasis removed). Green growth would thus appear to be a "subset" of sustainable development in the sense that only a subset of the capital stocks relevant to meeting the needs of future generations is explicitly considered.

Hallegatte et al. (2011, p.2) defend this approach by arguing that that social improvements follow more or less automatically from economic growth:

> ...the links between the economic and social pillars of sustainable development are generally positive. Economic and social improvements tend to go hand in hand, and even more so in the presence of policies to reduce inequality.

This is a weak argument, however, since, as they correctly observe (p. 3), "Some countries reduce inequality as they grow; others let it increase."[4]

4. A new engine of growth

Some advocates seem to claim that the exclusive focus on natural resources and the environment implied by the "green growth" agenda

[3] Heal defines strong sustainability as weak sustainability that also sustains all forms of life on the planet as well as maintaining human living standards.

[4] This is reminiscent of the "Environmental Kuznets Curve" idea that after some point income growth would automatically lead to environmental improvement, an idea that has not held up well (Carson, 2009).

actually offers greater economic and other benefits than would a less green sustainable development strategy. The 2011 OECD Ministerial Council (OECD, 2011b) concluded that "sustainable use of natural resources combined with environmental protection can improve the economy." Similarly, the UNEP (2011b, p. 2) claims that "there is now a growing recognition that achieving sustainability rests almost entirely on getting the economy right" and that (p. 3)

> …the greening of economies is not generally a drag on growth but rather a new engine of growth; that it is a net generator of decent jobs, and that it is also a vital strategy for the elimination of persistent poverty.While it may not cure cancer, it seems that green growth does almost everything else one might want! Saving the environment is not only free; making the economy greener will cause it to grow faster!

There are two reasons why this last assertion could in theory be correct. First, it is almost tautological that while putting the right prices on pollution and other externalities, eliminating subsidies to fossil fuels, and managing fisheries and other common property resources efficiently may lead to actions that reduce GDP as conventionally measured, such a policy regime would increase the efficiency of overall resource use and thus raise properly measured income. Second, sufficient unchecked environmental degradation and reduction in natural capital stocks could at some point make it difficult or impossible to sustain economic growth in some regions. But I know of no studies indicating that this possibility is a serious threat capable of slowing growth materially on a global or even large regional scale in the near- or medium-term.

These two theoretical points are plainly not sufficient to support the strong assertion that "greening of economies is … a new engine of growth" in the world today. The main arguments that have been offered in support of that assertion and of policies based upon it do not stand up to close scrutiny.

Some have argued that going green can accelerate growth because it requires investment that creates jobs, and the U.S. federal government, among others, counts the number of "green jobs." As Furchtgott-Roth (2012–this issue) demonstrates, however, existing definitions vary, and none are quite satisfactory. In an economy with high unemployment it is theoretically possible that green regulation or subsidies can increase total investment and thus add to employment, perhaps even green employment, and GDP via traditional Keynesian channels. However, argue that infrastructure investment is not a very effective stimulus vehicle. (One problem they note, which is perhaps particular to the U.S., is the political difficulty of imposing adequate project-related taxes or user fees.)

Under more normal conditions, however, the main effect of green policies will be on the composition of investment and employment, not their levels (Helm, 2011). Shifting investment from expanding productive capacity to controlling pollution may or may not have benefits in excess of its costs, but it will ultimately reduce growth in both conventionally-measured GDP and total employment. More generally, if going green serves to raise energy prices, all else equal, it will have the same effect (Furchtgott-Roth, 2012–this issue). At the most general level, shifting from investments with benefits that exceed costs to investments with benefits less than costs will slow the growth of properly-measured income.

Others argue that green technologies for generating electricity are more labor-intensive than brown alternatives, so that going green will create jobs directly. While this choice may increase employment when the economy is depressed (but not very much per dollar of investment, since all generation technologies are relatively capital intensive), shifting *away* from labor-intensive technologies is the historical and logical key to growth in living standards over time. There would be more jobs in agriculture if tractors were banned, for instance, but except possibly in the very short run in a deep recession, the result would be a sharp fall in output per hour worked, which would translate directly into a sharp fall in real income.

Many advocates stress the long-term benefits of shifting employment and investment to green industries because they represent the future. Thus in his 2012 State of the Union Address,[5] President Obama asserted,

> But I will not walk away from the promise of clean energy. I will not walk away from workers like Bryan. I will not cede the wind or solar or battery industry to China or Germany because we refuse to make the same commitment here.

The "promise" of clean energy here is *economic*: good jobs in growth industries for workers like Bryan. And the perceived problem is presumably the private sector's failure to make adequate investments in these industries, despite their growth prospects. Both demand-side and supply-side policies have been advocated to address this perceived problem, and the U.S. and other nations employ both.

Demand-side policies stimulate domestic demand for "clean energy," via regulation or subsidies. In the United States, the federal government and most states provide tax breaks for designated renewable technologies, and 29 states and the District of Columbia have requirements for the use of renewable technologies to generate electricity (Schmalensee, 2010, 2012). Particularly in recent years, the state requirements have been explicitly intended to create in-state employment. The result of all this has been remarkable growth in both wind and solar electric generation, which has served to increase the cost of electricity — some of which is borne by taxpayers, not ratepayers. According to the U.S. Energy Information Administration (2011), total shipments of solar cells and modules in the United States grew by an average of 48% per year between 2004 and 2009. But, as Detroit has learned in recent decades, healthy domestic demand for a tradable good does not necessarily imply a healthy domestic industry. Whereas imports accounted for only 26% of total shipments of solar cells and modules in 2004, they accounted for 58% of the total in 2009.

Supply-side policies, for which the President seemed to be calling in his State of the Union address, aim to help domestic producers meet foreign competition in selected industries by a mix of demonstration projects, public–private partnerships, loan guarantees, and other subsidies. In the clean energy context, it is commonly claimed that this sort of industrial policy is necessary to counteract similar policies in China.[6] Unfortunately, as Morris et al. (2012–this issue) document, doing industrial policy well is difficult in principle, since it requires outguessing private investors, and the record of the U.S. government picking and supporting winners in the energy sector is not encouraging. Moreover, the U.S. President is not the only national leader who feels it is important to lead in clean energy manufacturing. While the result of dueling subsidies may be cheaper products in the short run, in the long run governments, particularly the losers, will almost certainly tire of the duel, and solar cells, wind turbines, batteries, and other green products will be manufactured where it is most efficient to manufacture them. This will depend on much more on national circumstances and policies for labor and investment than on subsidies to deploy green products.

Looking beyond these demand-side and supply-sided policies, economists generally agree that because of spillovers, the private sector generally under-invests in basic scientific research and pre-commercial technology development. Government support for these activities and for related education is thus appropriate in principle, though determining the right level and kind of support in general or for any particular sector or project is far from simple. One can even argue that the failure of the U.S. to price carbon emissions leads to more serious private-sector under-investment in R&D aimed at

[5] http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address.

[6] It is a bit surprising that the President linked Germany with China in this context, since the Germans are also unhappily facing a rising tide of imported solar cells and modules from China.

producing low-carbon technologies than in other areas (Noll, 2011). While this rationalizes a tilting government support in the direction of such technologies, quantitative guidance does not follow.

Looking beyond economic growth, in the passage quoted above the UNEP asserts that going green is "a vital strategy for the elimination of persistent poverty." This may be just a corollary of their finding that greening the economy generally promotes growth. But it may also be an assertion that going green particularly favors the long-term poor. Collier and Venables (2012–this issue) ask whether Africa, home of much persistent poverty, is well-positioned to benefit from going green, and they argue on the basis of comparative advantage that it should lag not lead in this area. Africa's shortages of capital, skills, and regulatory capacity make green options relatively expensive, while its natural endowments of fossil fuels make their uses relatively cheap. Wealthy countries could, of course, change this by providing substantial capital, skills, and regulatory capacity, but it is not clear that greening these economics would be the best use of such transfers.

5. Invest two percent of world GDP

The discussions in the preceding two sections, like the material on which they draw, are rather general and academic and do not directly imply any specific policy recommendations. It is almost impossible to argue that any nation's current portfolio of environmental policies yields the maximum possible benefits for the costs it imposes: examples of sub-optimal incentives and widely divergent benefit/cost ratios abound. It is even hard to argue with the notion that many environmental services are currently underpriced in most of the world and that the world would be better off if a more stringent set of environmental policies were broadly adopted — at least as long as those policies were well-designed.

However, at the same level of abstraction it also seems hard to argue with the notion that an exclusive focus on "greening the economy," neglecting other beneficial economic reforms and social issues, would produce unbalanced policies and undesirable long-run results. The world might well be better off if it were somewhat greener than it is today (however that might be measured), but it is certainly not true that greener is always better. People of good will can debate abstract questions like "How green is green enough?" and "What aspects of greenness are most important?" endlessly without ever coming to any operational conclusions.

The UNEP (2011a,b) has sought to cut this Gordian tangle by making a more specific proposal to "green the economy": invest an *additional* 2% of world GDP over 2010–2050 in order to halve energy-related CO_2 emissions and to achieve the UN's Millennium Development Goals. On the basis of the results of a system dynamics model, which is not presented in detail, it is claimed that this policy would increase global GDP growth after a fairly short transition as well as raise employment and reduce poverty. Employment growth is predicted to occur mainly in agriculture, oddly enough, and poverty reduction seems mainly a mechanical consequence of the predicted higher levels of global aggregate GDP.

It is important to recognize that this is a very ambitious investment program by any standard. Suppose as a first approximation, for instance, that the high-income OECD nations, which accounted for 68% of world GDP in 2008 were to bear all these costs.[7] Then each would need to contribute 2.9% of GDP, which would come to $442 billion for the U.S. in 2011. To say that this would be a difficult proposition to sell to this or any imaginable Congress is to understate the likely level of opposition. Two percent of world GDP would add substantially to capital formation, particularly in developing nations where much of the investment would presumably occur. Two percent of 2008 world GDP amounted to 9.1% of world gross capital formation and 25.1% of gross capital formation outside the high-income OECD nations.

In the abstract, it would be a surprise if such a dramatic increase in investment, even if some were allocated to unproductive uses, did not eventually produce an increase in GDP. In reality, of course, attempting such dramatic increases in capital formation in many nations would surely encounter bottlenecks, increased costs, and significant managerial difficulties — not to mention outright theft.

While it is difficult to be certain based on published materials, the greening-induced increase in growth in the UNEP simulations seems to come importantly from avoiding environmental and resource constraints that slow growth in business-as-usual scenarios. While, as I noted above, it is certainly possible that such constraints will slow growth at some point in some regions, it is not clear that we know enough about these constraints to quantify their impacts reliably, and few, if any, other models attempt to do so. While this may (or may not) be a serious issue, it is important to note that all other studies of the consequences of emissions reduction of which I am aware predict a *reduction* of GDP as compared with business-as-usual, and a substantial reduction if the objective is stabilizing greenhouse gas concentrations at levels that have been widely discussed (National Research Council, 2010; Carraro et al., 2012–this issue; Edmonds et al., 2012–this issue).

In fact, Edmonds et al. (this issue) argue that research since the 1992 Framework Convention on Climate Change was adopted has shown that the task of atmospheric stabilization is much more difficult than the framers of that Convention could have imagined. They argue that drastic changes to the global energy and economics systems would be required; new technologies must be developed; very stringent policies will be needed; and the scale and pace of change would require that major policy changes begin almost immediately. Atmospheric stabilization may well be a vitally important objective, as world leaders continue to assert, but it is hard to read the relevant literature and believe that it will be easily or cheaply attained.[8]

Finally, the UNEP analysis rests on a model that treats the world as a single region. It thus cannot reflect the costs and difficulties of designing policy in a world with many sovereign states. In the climate context, a basic finding is that it may not be feasible and would certainly be very expensive to reduce emissions substantially without near-universal international participation. Moreover, many of the lowest-cost reduction opportunities are in developing nations, which are extremely reluctant to bear the costs involved.

In one recent analysis, Jacoby et al. (2009) consider reducing all greenhouse gas emissions by 50% by 2050, an objective embraced by the G8, in a way that minimizes global costs, and they assume that developed nations bear all the costs involved. They find this policy implies costs of 2% of economic welfare in 2020, rising to 10% in 2050. While one can perhaps imagine rich country voters accepting these costs as they become more concerned with the threat of catastrophic climate change, Jacoby et al. find that to compensate developing nations fully, developed countries would have to transfer $400 billion in 2020, rising to $3 trillion in 2050. This is considerably more than the $100 billion by 2020 pledged by rich countries in the

[7] Except for data on U.S. 2011 GDP, which are from the U.S. Bureau of Economic Analysis, all data in this paragraph are from the World Bank's World Development Indicators (http://data.worldbank.org/data-catalog/world-development-indicators).

[8] It is not clear that UNEP's apparently ambitious objective of a 50% cut in CO_2 emissions from fossil fuels by 2050 is consistent with atmospheric stabilization at widely discussed levels. According to the World Resources Institute's Climate Analysis Indicators Tool (http://cait.wri.org/), CO_2 emissions from fossil fuels accounted for 70% of total global greenhouse gas emissions in 2005, the latest year for which complete data were available, and total 2005 greenhouse gas emissions were 28% above 1990 levels. It follows that if CO_2 emissions from fossil fuels had been cut in half in 2005 and other greenhouse gas emissions had not changed, 2005 emissions would have been only 18% below 1990 levels — not an impressive cut. And if those other emissions grew at 0.9% per year on average between 2005 and 2050, with CO_2 emissions from fossil fuels constant at half their 2005 level, total emissions in 2050 would exceed those in 1990.

2009 Copenhagen Accord, a pledge that seems increasingly unlikely to be honored.

Cooper (2012–this issue) argues that ensuring that grants of these magnitudes would be spent effectively for their intended purposes would be extremely challenging. Moreover, the political pressures in developing nations against imposing severe emissions restrictions on domestic firms on competitiveness grounds would be quite serious, but countries that give into such pressures might induce others to protect their firms from the resulting "unfair" competition. Such cycles of protectionism could put the world trading system at risk. Cooper concludes that the solution to these problems is a regime based on a global system of carbon taxes, initially diverse but converging to uniformity over time. Many economists would agree, but few politicians seem to share their enthusiasm.

6. Far-sighted and hard-headed analysis

The critical tone of the preceding three sections mainly reflects an economist's strong negative reaction to claims that a large free banquet has been located under our noses. At best, attempts to hide costs and over-state benefits lower the level of environmental policy debates. When they fail, such attempts can result in a powerful backlash. The Clinton administration tried to persuade Americans that meeting our Kyoto Protocol commitments would be nearly costless, and the Protocol was overwhelmingly rejected in part because sophisticated people realized that that assertion was obviously false. Meeting those commitments would not have been costless, but their cost could easily have been borne, and U.S. participation in the Protocol might have paved the way to a later, broader agreement.

In an ideal world, hearing "green growth" would remind us that long-lived effects of current activities on environment and natural resource stocks should be taken into account in a variety of policy settings, as well as effects on other "social pillar" stocks that will affect future generations. Policy responses to serious environmental problems, including climate change, would be based on analysis that was both far-sighted, taking into account impacts on future generations, and hard-headed, using the best available scientific and economic analysis. In this ideal world, presenting the results of such analysis to the public honestly, treating voters as adults, would produce broad support for sensible policies. It is hard to predict what policies would be adopted in such a world, but they might well end up slowing consumption growth moderately in the interest of slowing climate change and, more generally, increasing the ability of our children and their children to meet their own needs. And there might well be non-trivial North–south transfers in the interest of efficiency — especially if they were structured to generate support from both donor and recipient nations and carefully managed.

This possible meaning of "green growth" does not seem to have many adherents in the political community, though it does reflect the thinking of many analysts in academia and, increasingly I believe, in the business community. Based on their public positions, however, politicians seem either to believe that "Greener is *always* better because it's free" or that "Doing *anything* green will cost too much." Where the second faction is dominant, as in the United States today, those who favor serious action to deal with serious environmental and resource problems would have little to lose and might have much to gain by experimentally replacing catchy slogans with careful analysis and calm argument. A clear discussion of the costs and benefits of various levels of action and of alternative policies might, at least, replace some rhetorical heat with analytical light — a good trade if one is trying to look to the future.

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