

A Green Energy Revolution for Climate and Development

Feed-in Tariffs

Global Marshall plan

Green Energy Revolution

Big Push Public Investments

Global Green New Deal

Visions and arguments: A compilation of material

The climate crisis requires drastically reduced use of fossil fuels. At the same time at least two billion people need to increase their energy consumption to satisfy their basic needs.

With massive investments in renewable energy through global feed-in tariffs, both these challenges can be met simultaneously – while quickly making renewables competitive. A Marshall plan for climate and development where everyone can gain.



Swedish Society for Nature Conservation

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Secretary-General,
Swedish Society for Nature Conservation

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Preface

This compilation of articles, fact sheets, reports and other material seeks to generate interest and support for a bold, forward-looking win-win approach to simultaneously tackle climate change and global inequalities.

The idea is to mobilise substantial public funds for immediate, "front-loaded" investments that can tackle global energy poverty, while over 10-15 years time drive the price of renewable energy down to levels where it could be more competitive than fossil fuels.. This integrated approach to climate and development was originally put forward by the United Nations Department for Social and Economic Affairs (UN DESA) and has been presented under several different names: "A Global Marshall plan for climate and development", "A Global Green New Deal" and "A Green Energy Revolution".

Given the seriousness of both the climate and development crisis, we need bold new approaches that can turn the present impasse into constructive, cooperative solutions that have the potential to really make a difference – and that can rebuild the eroded trust between rich and poor countries.

We presented and discussed this investment approach at several of the "Key Issues for Climate Change" seminars that the Swedish Society for Nature Conservation organised in the lead-up to the Copenhagen meeting. As we now, post-Copenhagen, look ahead we are convinced this kind of approach is more needed than ever. Therefore, we have compiled a range of contributions from our own work, the UN, as well as other actors that in different ways present and promote these ideas.

This is something the world could actually come to agreement on, and the kind of visionary approach that could make us really move towards a structural transformation of the world's energy system – within the narrow window of opportunity we now have before we cross the line to catastrophic and irreversible global warming.

We sense a growing momentum and interest. We also see a tremendous potential in this investment approach as it has generated considerable interest among a very diverse set of actors: this seems to be something both mainstream and climate justice oriented civil society organisations, business small and large, communities as well as large banks, and governments in both the north and the south can find sensible, attractive and doable.

We find the approach very much in line with the climate convention's fundamental premise of common but differentiated responsibilities, but something that also goes beyond the debates on volume, responsibility and financial sources, to outline how some of this money can actually be used effectively.

Let us take these ideas forward. Let us build unconventional alliances with for example forward-looking businesses who can gain even in the short term. But let us also place these ideas in a larger context of transforming the dominant development model away from overconsumption and unsustainable growth.

The present crises of both climate and development need to be tackled both swiftly and boldly. Yet, there are always inherent risks involved when going large-scale and doing it fast.

From the very start, therefore, this visionary global investment approach needs broad-based participation by civil society as well as technology assessment procedures that ensure it becomes a win-win-win solution that benefits those in most need and avoids any false solutions.

Svante Axelsson
Secretary-General
Swedish Society for Nature Conservation

About the SSNC Key issues for climate change seminar series

The Swedish Society for Nature Conservation organised in the lead-up to the Copenhagen conference a series of nine seminars on “key issues” for the climate negotiations. The seminars reflect a diversity of opinions and highlight both areas of conflict and potential solutions. On several occasions, the need for substantial public investments in renewable energy to simultaneously tackle the challenges of energy poverty and the climate crisis was highlighted. This publication is a compilation of material from both SSNC and other institutions that speak in favour of such an approach, with a special focus on global feed-in tariffs for renewable energy.

Key issues reports and studies

Individual seminar reports: #1 *The Double Challenge*; #2 *Footing the bill for climate change*; #3 *The world's forests*; #4 *Winners and losers*; #5 *A Global Marshall plan for climate and development*; #6 *Technology and climate – cure or promise?*; #7 *Going fossil-free*; #8 *Patents – barrier or support to save the climate?*; #9 *Ambitious emissions reductions and a Green Energy Revolution*.

Key Issues for Climate Change: A 208-page compilation of all seminar reports and SSNC's views on the climate negotiations.

The Double Challenge: In support of a Green Energy Revolution: A folder with four factsheets outlining the investment approach and explaining the idea of global feed-in tariffs (also contained in this compilation)

Footing the bill for climate change: the duty of the rich and the right of the poor to development + Supplement with post-Copenhagen update: Report which presents estimates of the need for climate financing, and outlines both current and proposed new climate finance arrangements.

Retooling the planet? Climate chaos in the geoengineering age: A report about geoengineering which outlines the politics and interests in play, and exposes the many risks involved.

Individual seminar reports, sound files and other Key Issues studies and reports can be downloaded at www.naturskyddsforeningen.se/keyissues and ordered through keyissuesorder@naturskyddsforeningen.se

Useful links and other material

UN Department of Economic and Social Affairs (UN-DESA)

World Social and Economic Survey (WESS) 2009: Saving the planet: Promoting Development
www.un.org/esa/policy/wess/

A Global Green New Deal for Climate, Energy, and Development

www.un.org/esa/dsd/resources/res_pdfs/publications/sdt_cc/cc_global_green_new_deal.pdf

Estimating the Amount of a Global Feed-in Tariff for Renewable Electricity. DESA Working Paper No. 95 April 2010

www.un.org/esa/desa/papers/2010/wp95_2010.pdf

Deutsche Bank

GET FiT Program: Global Energy Transfer Feed-in Tariffs for Developing Countries. April 2010.

www.dbcca.com/research

Paying for Renewable Energy – TLC at the Right Price. White paper.

www.dbcca.com/research

Other material and websites on feed-in tariffs

World Future Council

FITness Testing: Exploring the myths and misconceptions about feed-in tariff policies

www.worldfuturecouncil.org/fileadmin/user_upload/PDF/FITness_Testing_Myths.pdf

Solar Feed In Tariff, Solar Energy And Renewable Energy Resource Website

<http://solarfeedintariff.co.uk/solar-worldwide/>

Wapedia Wiki: Feed-in tariff

http://wapedia.mobi/en/Feed-in_Tariff

En energirevolution mot fattigdomen

Klimatkrisen kräver att vi kraftigt minskar användningen av fossila bränslen. Samtidigt behöver minst två miljarder människor öka sin energiförbrukning för att säkra sina grundläggande behov.

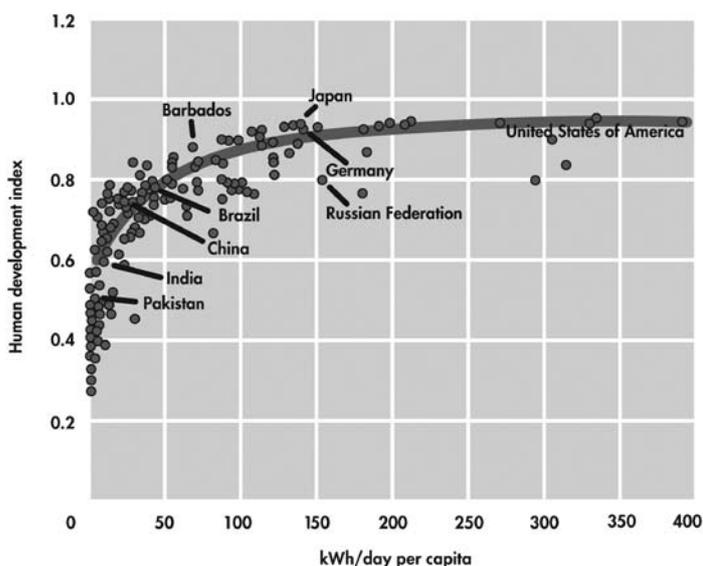
Med kraftigt ökade investeringar i förnybar energi genom globala garantipriser ("feed-in tariffs") kan båda dessa utmaningar mötas – och kostnaderna för förnybart sänkas dramatiskt.

En Marshallplan för klimat och utveckling där alla vinner.

Ökad tillgång till energi är ett måste för att världens fattiga ska kunna få sin rättmätiga del av utveckling och välbästand. Om fattiga människors behov inte tas på allvar så minskar förutsättningarna för en global överenskommelse för klimatet.

Två miljarder människor – halva befolkningen i utvecklingsländerna – måste fortfarande förlita sig på ved, jordbruksavfall och dynga när de ska laga sin mat. Lika många lever under den globala fattigdomsgränsen på 2 dollar per person och dag.

Tillgång till energi är en avgörande faktor för människors välbefinnande. Länder med en låg förbrukning har mycket låga värden på FNs index för mänsklig utveckling (HDI). Men för dessa länder leder en något högre energiförbrukning till mycket betydande ökning i HDI.



Källa: World Economic and Social Survey 2009. Förenta Nationerna.

Energi/HDI

För att ställa om mot förnybar energi använder industriländer gärna klimatåtgärder som gör användningen av fossila bränslen dyrare i relation till förnyelsebara alternativ. Men för fattiga människor är problemet att alls ha råd med den energi de behöver. För utvecklingsländerna är det därför viktigare att den klimatvänliga energin kan bli billigare.

Det är utgångspunkten för ett förslag kallat "A Global Green New Deal", som lanserades 2009 i FN-rapporten Promoting Development, Saving the Planet.

Naturskyddsföreningen ser detta förslag som oerhört lovande och tror att det kan få ett verkligt genomslag i klimatförhandlingarna. Om planen sätts i verket åstadkoms på kort tid stora förändringar, vilket skulle stärka det nu mycket svaga förtroendet mellan u-länder och i-länder. Inför klimatmötet i Mexiko i slutet av 2010 kommer Naturskyddsföreningen att driva på för att både den svenska regeringen/EU och andra organisationer inom miljörörelsen ska stödja detta visionära program.

Globala garantipriser

Grundidén i FN-förslaget är att skapa en efterfrågeboom på hållbar el till fattiga människor. Det främsta verktyget är att införa garantipriser, eller feed-in tariffs, för hållbar elproduktion. Garantipriser används redan i ett femtiotal länder och har bidragit till att kraftigt höja andelen förnybar el i bland annat Tyskland och Spanien.

Principen är att den som investerar i förnybar el garanteras att få sälja elen till överenskomna priser som gör att de kan räkna hem en vinst. Konsumentpriset sätts sedan på en nivå

som gör att också fattiga människor har råd att betala. Skillnaden i pris subventioneras av industriländerna genom en särskild fond. Enligt FN:s uppskattning skulle det krävas ca 100 miljarder dollar årligen under 10-20 år för att pressa ner priserna till en nivå då subventionerna inte längre behövs.

Finansiering

Genom FN:s klimatkonvention har alla industriländer gjort ett bindande åtagande om att hjälpa fattigare länder med finansiering både för att ställa om till en klimatsmartare utveckling, och för att anpassa sig till de klimatförändringar som ändå pågår. Men hittills har det varit mycket skralt med de faktiska bidragen.

FN:s förslag om subventionerade garantipriser skulle kunna öka betalningsviljan eftersom:

- Betalning sker först då ny, förnybar energi faktiskt levereras. Det finns ingen risk för att pengar spenderas till ingen nytta.
- Stödet för att subventionerna är tidsbegränsat. Ju snabbare kostnaderna för nya investeringar sjunker, desto snabbare försvinner också behovet av subventionerna.
- Sjunkande priser och ökad efterfrågan kommer också att skapa jobb och underlätta den nödvändiga energiomställningen i industriländerna.
- Utvecklingsländernas vill att offentliga anslag från industriländerna till fonder direkt under klimatkonventionens kontroll ska vara kärnan i finansieringen. Industriländerna, och inte minst EU, lägger däremot tyngdpunkten främst på marknadsbaserade mekanismer.

Naturskyddsföreningen lägger stor vikt vid konventionens krav på att industriländerna måste bidra med nya pengar. Det betyder främst att pengarna inte ska komma från ländernas biståndsbudgetar. Klimatfonderna måste även administreras på ett sätt som ger inflytande från berörda länder och grupper – inklusive det civila samhället – över hur pengarna fördelas, och insyn i hur de spenderas.

Teknologi

FN:s förslag förutsätter inte några tekniska genombrott. Programmet bygger tvärtom på att kraftigt öka efterfrågan på förnybara energilösningar som redan används.

Efterfrågan är en viktig drivkraft för att teknik vidareutvecklas och blir billigare. Ju kraftfullare världen satsar på att ge människor tillgång till förnybar el, desto snabbare kan alltså kostnaderna förväntas falla.

Men höga kostnader är inte det enda hindret. FN-rapporten föreslår även åtgärder för att anpassa både policy och teknik till varierande nationella och lokala förutsättningar, och för att stödja utvecklingsländerna med utbildning och teknisk support.

Man tar även upp problemet med patent, som gör det möjligt för företag att ta ut högre priser klimatsmart teknik, och komplicerade procedurer som kan begränsa tillgången i resurssvaga länder. Det internationella samarbetet om klimatet måste hitta lösningar för att röja undan dessa hinder.

Till sist behövs mekanismer för att på ett grundligt och trovärdigt sätt värdera teknikvalen och försäkra sig om att den teknik man satsar på inte leder till oönskade negativa effekter för människor och miljö. En sådan värdering måste göras på flera nivåer, från det globala till det lokala. Särskilt viktigt är att analysera dels hur teknikvalen påverkar de mest fattiga och sårbara grupperna i samhället.

Inte hela lösningen

En global handlingsplan för klimatet behöver dock innehålla mer än omställningen till förnybar energi. Huvudbudskapet i FN-rapporten är att ett nytt helhetsgrepp måste tas på klimatfrågan, som är långt mer ambitiöst och visionärt än det vi hittills sett. Det krävs kraftfulla offentliga investeringar och program även för energieffektivisering, nya effektiva och fossilfria transportsystem och insatser för att hejda avskogningen. Dessutom måste insatserna öka många gånger om för att hantera alla de konsekvenser klimatförändringarna får, och som slår hårdast mot de fattigaste. Klimatfrågan handlar i grunden om utveckling och rättvisa.

Läs vidare
www.naturskyddsföreningen.se/energimotfattigdom

The Double Challenge

In support of a 'Green Energy Revolution' to simultaneously tackle the right to development and the climate crisis



1

The excessive use of fossil fuels by a small minority of the world's population is the most important cause of climate change. Still, billions of people in developing countries do not have access to energy to meet even their most basic needs.

The fight against climate change must go hand in hand with massive efforts to improve poor people's access to affordable energy services. A clear commitment by the rich countries to invest in a rapid expansion of renewable energy for the poor is the key to bridging the trust gap in the negotiations.

In the proposal "The Green Energy Revolution", the UN outlines a plan to meet these objectives by pushing down the prices of renewable energy. A key component is a targeted program of guaranteed price support, "feed-in tariffs", that would greatly accelerate the scaling up of these technologies. This would propel a 'virtuous circle' of

2

investment, cost reductions and improved technologies, which would also help the necessary energy transition in developed countries.

This set of briefings discusses some of the key issues that need to be addressed in order to make cheap, renewable energy available to billions of poor people in developing countries. The package consists of the following briefings:

- Understanding the Challenge: Energy, Climate Change and Development
- Feed-in Tariffs and Front-loaded Investments
- Financing the Green Energy Revolution
- Technologies for the Green Energy Revolution



Swedish Society for Nature Conservation
www.naturskyddsforeningen.se/keyissues

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The Green Energy Revolution

The United Nations (UN-DESA) has proposed a strategy that they call 'The Green Energy Revolution'. The key messages are:

- Renewable energy is the key to economic development and a future without dangerous climate change.
- Renewable energy is too expensive for the world's poor, many of whom have no access to modern energy.
- Public policies can help produce a decline in the global price of renewable energy that will make it affordable within a decade.
- A "big push" in investment to scale up renewable energy will lead to rapid cost reduction, technology improvement, and learning by doing. This will generate a "virtuous cycle" of additional investment, economic growth, employment generation, etc.
- In the first decade, investments will have to be subsidized through globally funded guarantees or price supports (e.g. feed-in tariffs). The "virtuous cycle" will then make renewable energy the default option for new energy investment worldwide.
- Price supports will be complemented by a global extension program: research, technical, and policy support designed to accelerate the process.

Understanding the Challenge: Energy, climate change and development

Understanding the Challenge: Energy, climate change and development

Energy use is responsible for some 75 percent of global greenhouse gas emissions, and emissions from energy use are rising faster than other emissions. But unless billions of poor people get better access to energy, they will have no prospects for development. If this development dimension of energy is ignored, there can be no global agreement on how to tackle the climate challenge.

Country	Final	Electricity
US	167.07	39.01
Germany	98.09	20.39
Sweden	122.77	45.67
Korea	95.71	21.12
China	29.19	4.61
India	10.87	1.61
Brazil	30.39	6.41
Ghana	10.23	0.79
Tanzania	13.21	0.19
Bangladesh	4.11	0.42

Energy use per capita, kWh per day.
Source: WESS, United Nations 2009

Unequal access to energy

The last 200 years of development and human progress have been inextricably linked to increasing use of energy. Worldwide energy use multiplied 30 times between the years 1800 and 2000; over the same period, GDP multiplied by a factor of 100. But in spite of this economic growth, two billion people are still locked into poverty (surviving on less than 2 dollars per day).

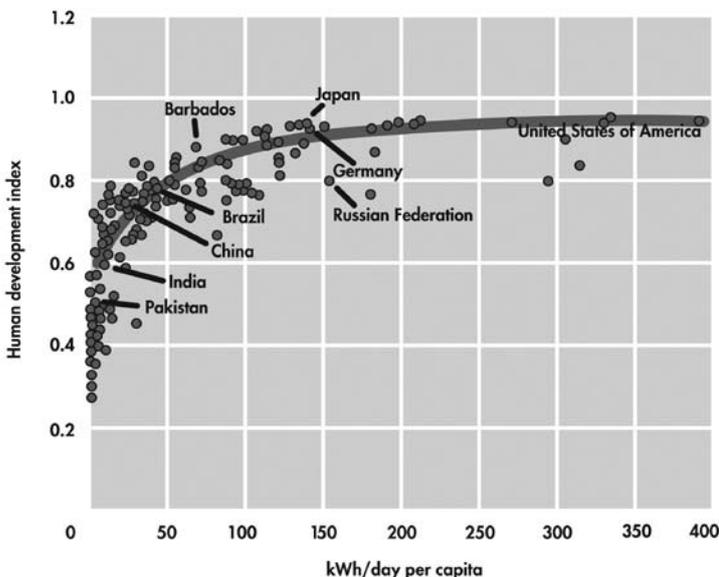
Just like the benefits of economic growth, the access to and the use of energy is extremely unequally distributed. The total primary energy consumption, measured in kWh per capita per day, of the average person in the United States is almost fifty times that of Bangladesh, and fifteen times that of Tanzania. The gap in electricity use is even more striking: the per capita electricity use in the United States is nearly a hundred times larger than in Bangladesh, and over two hundred times larger than in Tanzania.

2 billion people excluded

In addition, there is a huge problem of actual exclusion from access to important energy services. Some 1.6 billion people – almost half of the population of the developing countries – have no access to electricity. Two billion more people only have access to unreliable electricity services.

Two billion people also depend on traditional biomass fuels – firewood, animal manure, agricultural waste – for cooking. This use causes serious health effects, for women and children in particular, and collecting the fuel requires much of their time. In terms of energy output much of this use is also very inefficient. And although these fuels do not cause any net emissions of carbon dioxide (provided that they are indeed regenerated), they do contribute to global warming through emissions of hydrocarbons and soot (black carbon).

Solving the development challenge will depend on the continued expansion of new and better energy services in developing countries.



Source: World Economic and Social Survey 2009. United Nations.

Energy and human development

Energy use is essential for a whole range of human development indicators. The Human Development Index, HDI, measures of the status of countries in relation to a set of such indicators. A full

score on all indicators would result in the maximum HDI value of 1. With regard to their use of energy, the nations of the world can be divided into three categories:

- **Low energy countries:** Nations where energy use is low (below 50 kWh per person per day) are also characterised by very low scores on the HDI. Within this group, however, very small increases in energy use result in much larger improvements in HDI scores. There are very large developmental benefits to be had from increasing energy use in these countries.
- **Medium energy countries:** In this category (50-100 kWh/p/d), the energy-development relationship is a great deal flatter, implying that the development benefits from increased energy use are less pronounced.
- **High-energy countries:** For these nations, which are also the richest countries of the world, the relationship is essentially a flat line. Thus, one might argue that much of the energy use in rich countries is unnecessary, as it apparently does not contribute to human development.

Access to electricity is also important to human development. No country has ever been able to reach high HDI scores, such as 0.8 or 0.9, without all of the population having access to electricity.

Poor people need energy that they can afford

The immediate reason for the inequity in access to energy is affordability. In the South, the main concern is not the price gap between the climate-friendly energy and fossil fuels. The issue is the affordability of *any* form of modern energy, and how to give more citizens access to cheap energy services.

The price of energy in developed countries is usually around 10-20 US cents per kWh, but consumers in developing countries generally pay less. In emerging economies they pay roughly 10 cents, and in low-income developing countries perhaps 4-5 cents. But how much energy people can afford to use also depends on their incomes. For instance, in India, the average income is about

Understanding the Challenge: Energy, climate change and development

two dollars per day. If households can spend ten percent of their income on energy, the average daily energy budget of an Indian citizen is twenty cents. Even if the price is only 4-5 cents, the average person can only afford 4-5 kWh per day.

The energy that developing countries will opt for is any kind of energy that can be provided at prices that people can afford. The Chinese favour coal because, at a price of roughly three cents per kWh, it is affordable. Shifting to renewables that cost 15-20 cents would imply excluding significant parts of the population from access to electricity.

Developing countries can deal with the affordability problem by simply excluding large segments of the population from access to energy, or by reducing the quality of the services provided. Although from a health and environmental perspective biomass is anything but cheap, states often find it less expensive to shift poor people to burning firewood instead of providing them with modern energy.

Subsidies can increase access

Many developing countries also use targeted subsidies. In developed countries, industry pays less for energy than does households. In developing countries, the reverse is true: low-income households pay less for energy, high-income households and industry pay more. Similarly, the prices of diesel, kerosene, and petrol are kept low to stimulate public transport and other important sectors of society. Subsidies that are specifically targeted on societal benefits are in fact quite efficient, in contrast to many other kinds of subsidies.

Sources:

A Global Marshall Plan for Climate and Development: cost effectiveness and climate investments that make a difference Report from the fifth seminar in the SSNC seminar series "Key Issues for Climate and Copenhagen 2009".
www.naturskyddsforeningen.se/keyissues

World Development Report 2010.
The World Bank.
www.worldbank.org

World Economic and Social Survey 2009. United Nations Department of Economic and Social Affairs.
www.un.org/esa/policy/wess

But while these subsidies help increase access to energy, they generally do not help promoting renewable energy systems.

In industrialised countries renewable energy is promoted by the use of taxes or cap-and-trade schemes that raise the price of carbon-intensive energy. But the common goal of developing countries is to make *all* energy cheaper, so that a larger part of the population can have greater access to necessary energy services. A global strategy for promoting renewable energy must therefore seek to rapidly lower their costs, so that renewables becomes the natural choice for developed and developing countries alike.

A global 'Green Energy Revolution'

There is an urgent need for a 'Green Energy Revolution' to be developed and implemented on a global scale. The strategy must build on several different components:

- A cost-efficient system for investments in renewable energy solutions that will dramatically up-scale deployment and help push prices of the technologies down.
- A global financing mechanism, paid for by the industrialised countries, that can support these investments at a scale of some USD 100 billion per year.
- A radical increase in funding for energy research and development, and a clean shift of priorities to renewable energy, away from the current focus on fossil fuel and nuclear technologies.
- Revised rules and legislative frameworks for trade and intellectual property rights so that developing countries can get preferential access to climate-friendly technologies at prices they can afford.

These, and related, proposals are discussed in the other three briefings in this package.

Feed-in Tariffs and Front-loaded Investments

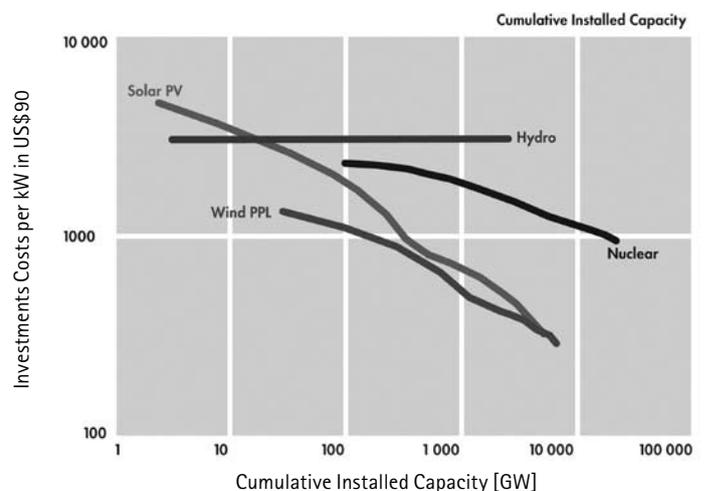
Feed-in Tariffs and Front-loaded Investments

What would be the best way of accelerating the deployment of renewable energy in developing countries? In industrialised countries, the main strategy has been to raise the price of conventional, carbon-intensive energy by the use of taxes or cap-and-trade schemes, in order to make renewable energy more competitive. These instruments do not necessarily work in the radically different economic and social context of a developing country that needs to make *all* energy cheaper, so that a larger part of the population can have greater access to necessary energy services.

A global strategy for promoting renewable energy must therefore seek to rapidly lower their costs, so that renewables becomes the natural choice for developed and developing countries alike.

Driving the costs of renewables down

The cost of producing renewable energy is already declining over time and nowhere is this decline more marked than in the wind and solar energy sectors. But the falling prices are actually more linked to the growing scale of deployment, rather than to time as such. Front-loaded investment with strong public support will speed up this process and make the prices come down faster.



The greater the installed capacity of an energy technology, the lower price for every new unit installed. Source: Nakicenovic, IIASA, 2009

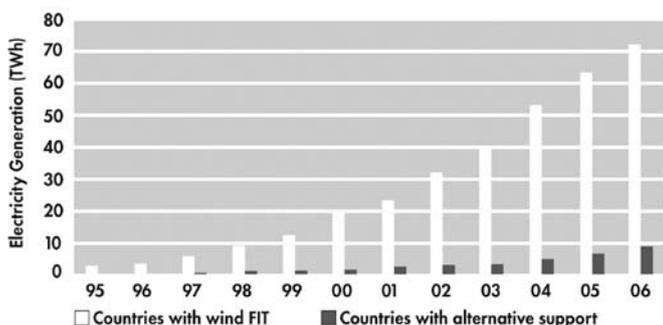
Feed-in Tariffs and Front-loaded Investments

The 2009 World Economic and Social Survey (WESS), published by the UN Department of Economic and Social Affairs (UN-DESA), launched a set of proposals for using environmental investment as a driver for drastically increasing the demand for renewable energy technologies. This 'Green Energy Revolution' would significantly speed up development and scale up production, so that the cost of these technologies will fall rapidly. Lower prices will, in turn, facilitate a yet more rapid diffusion and deployment of renewables in both developing and developed countries.

A common, international target should be set that costs for renewable energy investment should drop to e.g. one USD per Watt of capacity. This is on a level with the current cost of investments in coal power in China. Once the cost gap is eliminated and renewables are affordable, we will have achieved a large part of the solution for much of the climate problem, as well as for the development challenge.

Feed-in tariffs

One of the key proposals of the WESS concerns the creation of a global feed-in tariff program for renewable energy. Feed-in tariffs have been used in some fifty countries around the world – including Germany and Spain, as well as Brazil, China and India – with very favourable results. In the case of wind power in Europe, almost 90 percent of the rapid expansion since 1995 has occurred in countries that apply feed-in tariffs for power suppliers.



Expansion of wind power in EU countries using feed-in tariffs compared to EU countries using other forms of policy support for wind energy. Source: European Commission, 2008, cited by Johansson, 2009.

The principle behind feed-in tariffs is very simple. It is a guarantee that renewable energy can be fed into the grid at an agreed price. The price is set at levels which assure that producers can recover the cost of their investments, and also make a reasonable profit. The agreed price usually drops from year to year, which provides an incentive for new producers to join the system as early as possible.

Suppose a private company that sets up a solar power plant in India would need to sell it at twelve cents per kWh in order to make a profit. However, the Indian government sells electricity to its citizens at only four cents per kWh. Paying the remaining eight cents is what the feed-in tariff system is all about. The system provides support for poor consumers and low-carbon technologies alike.

International support

Feed-in tariffs *do* work in both industrialised and developing countries, but the scale at which developing countries can implement feed-in tariffs is constrained by what states can afford to pay. In order not to exceed the state budget, the government of India – or any other developing country – may have to limit the scale of the feed-in tariff so that only a few new solar plants will get built every year.

Large-scale international support for a global feed-in tariff program may well be the answer to this dilemma. The global scale of the program is necessary for boosting demand and accelerating industry growth all over the world, so that the costs can decline more rapidly. UN-DESA believes that contributions of 100 billion USD annually over the period 2010-2020, channelled through existing energy systems on the basis of output delivered, will be enough to bring about the transition to low-carbon societies and to lower the costs of renewables to the point where subsidies are no longer needed.

Complementary action

Feed-in tariffs is not the panacea that will solve all problems, and a number of outstanding issues need to be carefully considered in the design and operation of a global feed-in tariff program. There are also problems that feed-in tariffs may not be able to address, such as:

- Feed-in tariffs are most easily applied to grid-connected electricity generation. Complementary applications and/or alternative instruments need to be devised to promote the production and accessibility of off-grid electricity and of renewable energy sources other than electricity (such as improved fuels for cooking and for combustion engines).
- If the same incentives are given to all industries, it will be those low-carbon technologies that have the best cost structure that will become dominant in the end. However, obtaining the lowest possible cost of energy cannot be the only concern – the socio-economic and environmental impacts of using different technologies also need to be considered. This also includes the extent to which small-scale and informal producers can participate and benefit from the support systems.

Advantages of Feed-in Tariffs

A global feed-in tariff system would have many advantages, all of which stand out in contrast to the current state of negotiations on climate:

- Climate and development are still largely viewed as separate or even contrasting agendas. But feed-in tariffs for renewable energy address economic and human development goals as well as climate objectives. Also, the reduction in the unit cost of energy helps the North as well as the South, because green alternatives for replacing obsolete power plants in developed countries will also become cheaper.
- The results are demonstrable. More often than not, the relationships between inputs and outputs in different support mechanisms are vague, and there are real concerns on the part of developed countries that don't want to put their funds into a 'black hole', with end results that are uncertain or unknown. But feed-in tariffs rely on so-called output-based funding. If a project is unsuccessful and does not deliver the expected energy output, no money will be paid. What a feed-in tariff rewards is only actual results on the ground.
- International support for a system of feed-in tariffs is a time-bound commitment. The production costs of renewable energy will be coming down. At the same time, increasing access to affordable energy means that the household incomes in developing countries will be rising. The amount of funding needed for the subsidy will decrease from below as well as from above. Depending of how rapidly scales are ramped up, the need for subsidies will disappear within a span of ten to twenty years.

Financing the Green Energy Revolution

Sharing the burden...

In the 17 years that have passed since the UNFCCC was adopted, developed countries have channelled less than 3 billion USD through the convention's mechanisms for the financing of climate measures in developing countries.

Recent estimates put the cost for adaptation in the range from one hundred to several hundred billion USD per year, while mitigation funding needs are in the range from several hundred billion to one trillion dollars. The EU is offering to pay from as little as two billion euro per year, but possibly up to 15 billion. Even the higher amount is nowhere near the EU's legitimate share of the burden.

... and the benefits!

The Green Energy Revolution is a proposal that would help build trust and foster co-operation, which will be good for everyone. But it will also provide direct benefits for the countries that have to pay for the investments:

- Increasing demand for renewable energy technologies will create new business opportunities and jobs, also in developed countries.
- Falling prices of renewables will speed up their own energy transition, and reduce the costs.

Paying the polluters

The fossil fuel industry enjoys heavy subsidies from public funds. Instead of making the polluters pay, taxpayers are paying the polluters!

According to the World Bank, global subsidies to petroleum products alone amount to some 150 billion USD annually. Subsidies in developing countries may serve to improve energy access for the poor, but the estimated 67 billion USD that OECD countries provide annually to their fossil fuel industries serves no such purpose.

These 67 billion would go a long way towards financing the Green Energy Revolution.²

Financing the Green Energy Revolution

A global program for providing guaranteed prices, or feed-in tariffs, for providers of renewable energy is one of the key components of the proposed 'Green Energy Revolution'.

The feed-in tariff is a guarantee that the output from all new renewable energy projects will be fed into the grid at an agreed price. If this price is higher than the price that poor people can afford to pay, the difference would have to be paid for by public funds. The price guarantee would serve to increase investor confidence, and speed up deployment of renewable technologies. For more detail on feed-in tariffs, see Briefing 2.

A global programme to support feed-in tariffs for renewable energy would need to mobilise very substantial funds – the UN suggests a need for some 100 billion USD annually over a period of at least ten years.

Responsibility to pay

The rich developed countries bear the main responsibility for the emissions that are causing the climate crisis – but people in developing countries, those that are least to blame, will suffer worst from the effects. Poor people also lack both the economic and practical capabilities to adapt to the changing climate.

On this basis the United Nations Framework Convention on Climate Change (UNFCCC) establishes the principle of "*common but differentiated responsibilities and respective capabilities*". The agreement imposes a legal obligation on the rich countries to help developing countries in several ways, including by providing "new and additional financial resources" to assist them in meeting their costs of adaptation to the adverse effects of climate change, and to meet "the agreed full incremental costs" of implementing measures to mitigate climate change.¹

Enhanced action on the provision of financial resources and investment for mitigation and adaptation measures is one of the four key issues that are being negotiated in the process leading up to the Copenhagen meeting. So far, focus has been more on the mechanisms than on the money. Developing countries generally want to see a consolidated fund (or set of funds) under the

1. UNFCCC Article 4.4 and 4.3 (including reference to para. 4.1 (b)).

2. *World Development Report 2010*. The World Bank. *Redirecting Public Subsidies for Fossil Fuels in and from Annex 1 Countries*. OilChange International, 2009.

authority of UNFCCC. But outside the conventions, rich countries and institutions like the World Bank and the EU have initiated a plethora of new funding mechanisms, over which they exercise a high degree of control. The EU, in particular, also pushes very hard for market based mechanisms to play a major role in funding.

The Green Energy Revolution in the negotiations on finance

A global programme of this kind is clearly best suited for funding through direct public investments and a centralised financial mechanism – carbon markets have little or no role to play here – and in the run-up to the Copenhagen meeting, funding for feed-in tariffs is included in the financial mechanism proposal that the largest group of developing countries supports.

Given the history of funding under the UNFCCC (see "Sharing the burden" on the opposite page), it may seem unrealistic to expect that developed countries will step forward and provide the climate funding that will be needed. Very substantial amounts of funding will still be needed for other mitigation measures, as well as for adaptation, but there are several good reasons why feed-in tariffs is an attractive program to support:

- It is a "payment-on-delivery" mechanism – the system only pays for demonstrable results. This also reduces the need for costly procedures of assessment and decision-making on projects, and minimises the risk of corruption.
- Support to feed-in tariffs is a time-bound commitment – the bigger the scale, the faster will the program push down the price of renewable energy, and the subsidies can be phased out.
- Falling prices will also create business opportunities and jobs in developed countries, and falling prices of renewables will be beneficial to their own energy transition.
- "Front-loading" the investments – providing more money at the earliest possible stage – will speed up the process and reduce the total cost.

But even if only smaller amounts are provided initially, the system can be scaled up as the benefits become evident.

Civil society concerns and precautions

A clear and binding commitment by the rich countries to provide sufficient and predictable funding for mitigation and adaptation measures in developing countries is a necessary component

of any new international agreement on climate change. Some key points for the broader issue of climate financing are:

- The developed countries should agree to establish a new financial mechanism under the authority of the Conference of the Parties (COP) to the UNFCCC, along the lines of the proposal presented by the main group of developing countries.
- The governance of such mechanism(s) must be transparent and democratic, with balanced and equitable representation of all Parties, as well as representation of civil society organisations, social movements and indigenous peoples.
- Priority for programmes to be funded should be those that are based on national development strategies and climate action plans that have been developed in transparent processes and with the participation of affected groups and communities.
- Funds provided for climate change mitigation and adaptation must be additional to existing official development assistance (ODA) commitments (at least 0,7 percent of GNI for all OECD countries, higher for individual countries). Offsets – investments that developed countries (or their companies) make for the purpose of meeting their own mitigation commitments – must also not be accounted for as financial assistance to developing countries.

Given that it will be necessary to provide new funding on a scale that is at least several times larger than the current level of ODA, it is important that key experiences of managing large financial flows – ODA as well as foreign direct investments – are taken into consideration already when the programs are designed. With regard to financing for the Green Energy Revolution, it will be particularly important to:

- Base the choice of eligible technologies on transparent and participatory technology assessments that also consider socio-economic and environmental impacts (see also Briefing 4).
- Ensure that the program stimulates development of local and national economies and systems – including small and informal energy providers – and does not promote monopolies and neo-colonialism.

Technologies for the Green Energy Revolution

Geo-engineering

Some corporations, scientists and even governments, argue that modifying ecosystems on a planetary scale through "geo-engineering" (technological interventions in the atmosphere, oceans and land) may be our only option for stopping climate change. But these unproven technologies could further destabilise the climate system and have devastating consequences. There is an urgent need for a critical public review of geo-engineering technologies. An internationally agreed regulatory framework needs to be established, and a strict moratorium enforced on all real world experimentation. Geo-engineering projects must also not be accepted as offsets under the UNFCCC. Read more in the following SSNC reports:

- *Retooling the Planet? Climate Chaos in the Geoengineering Age.*
A report Prepared by ETC Group for SSNC.
www.naturskyddsforeningen.se/keyissues
- *Technology – Curse or Promise?*
Report from the sixth seminar in the SSNC series "Key Issues for Climate and Copenhagen 2009".
www.naturskyddsforeningen.se/keyissues

Technologies for the Green Energy Revolution

There is an urgent need for expanding people's access to basic energy services in developing countries. About half of their population still do not have access to modern energy services. This means that the bulk of energy infrastructure in developing countries has yet to be built. The vast majority of energy investments in the next decades will be taking place in developing countries, and perhaps as much as 90 percent of all their energy installations in 2050 will have been built between now and then.

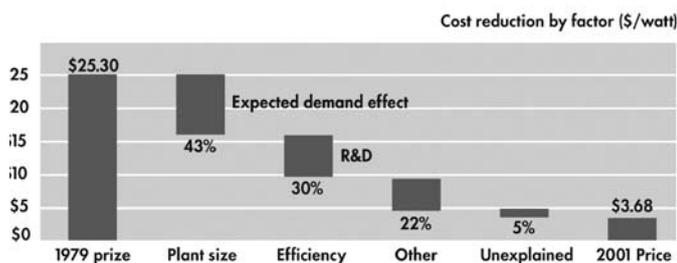
Now is the time

This provides a tremendous opportunity. Energy infrastructure investments are made for the long term: power plants are built to serve for 40-50 years or more. Now is the time to change course in order to ensure that as much as possible of these new investments are made in renewable and sustainable energy systems.

The United Nations *2009 World Economic and Social Survey*, WESS, launched the idea of a "Green Energy Revolution", a proposal for dramatically increasing the access by poor people to affordable energy from renewable sources. Massive investments in renewable energy solutions would dramatically up-scale deployment, and help push prices of renewable energy technologies down to the point where they become a more attractive choice than fossil fuels for further investments. Providers of renewable energy would be offered guaranteed prices (or feed-in tariffs, see Briefing 2) that cover the costs and leave a reasonable margin for profits, but these subsidies will decline over time. This means that investments will be drawn to those technologies that have a good enough potential to quickly reduce their cost.

Proven technologies

The Green Energy Revolution proposes to increase the demand for existing, well-proven renewable energy technologies with potential for considerable further improvements. It does not depend on hopes for the discovery of new wonderful technologies some time in the future.



Factors behind the reduction in the cost of solar photovoltaic power, from 1979 to 2001. Source: World Development Report 2010. The World Bank.

The prices of renewable energy technologies are falling sharply, and demand is an important factor that helps push the prices down. Solar power – photovoltaics – is just one example: in about 20 years the price for one W of solar panel capacity dropped by 85 percent. According to the World Bank, nearly half of the effect was attributable to expected demand, and only about one third to research.¹ The price of solar panels has continued to decline, and may soon become as cheap as the same amount of coal power capacity. Wind power and several other renewables are showing similar cost curves.

Capacity and extension

While price is a major obstacle to the spread of renewable energy in both the developed and the developing world, it is not the only one. In order to make it possible for developing countries to leapfrog to renewables, economic incentives need to be supported by an enabling policy environment and institutions that facilitate the rapid spread of the best technologies.

The WESS proposes a large-scale program for policy and extension support. The two cornerstones are

- a network of Innovation Centres to support both the harmonization of policy and the adoption and adaptation of suitable renewable energy technologies; and
- a ‘Global Climate Conservation Corps’ of experts and extension agents who could backup the national institutions, and provide training and technical support.

Technical support through decentralised extension services is believed to be a particularly suitable model to facilitate the rapid dissemination of small-scale and off-grid renewable energy installations.

Barriers to access

The WESS also discusses how patents and other protection of intellectual property rights can act as a barrier to technology transfer. Ensuring that the best energy technologies are made readily available to developing countries will be not only for their benefit. As a response to the climate threat, it will be for the benefit of everyone.

Ownership of patents for renewable energy technologies is highly concentrated: the EU, the United States and Japan hold more than 80 percent of these patents, while China holds less than 2 percent. The monopoly rights that are given to patent holders may result in higher prices that restrict accessibility. But poor countries may also be disadvantaged simply by their limited capacity for dealing with the complexity of intellectual property protection systems.

Intellectual property rights need to be managed in a manner that is supportive of large-scale transfer of both available and emerging renewable energy technologies. Countries may be able to take better advantage of the limited flexibilities that exist within the international system – limiting patentability or making use of compulsory licensing – but there is also a need for reviewing the rules. In addition, measures like increased sharing of publicly funded and open-source technologies, and dedicated mechanisms to support technology development and transfer, will have to be developed.

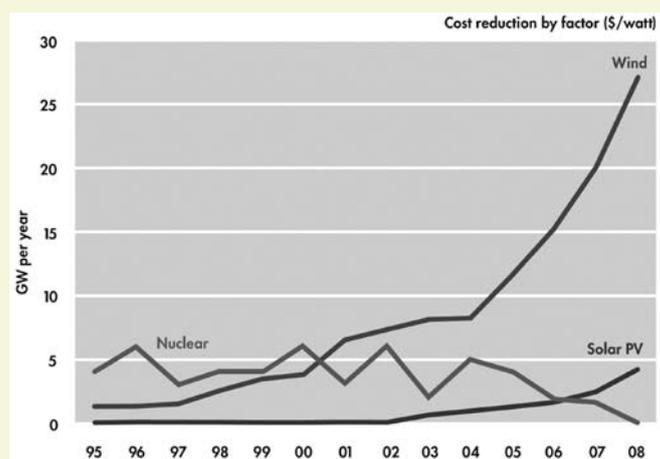
Technology assessments – the missing element

Enhanced action on technology development and transfer is one of the four key issues that are being negotiated in the climate negotiations. The texts that were presented to the Copenhagen meeting speak of the need to provide financing for research, development and demonstration of technologies, as well as for deployment and diffusion. But the vital steps of assessment and evaluation of technologies have so far been given very little attention.

Technologies for the Green Energy Revolution

Off-the-Shelf Renewables

In the last five years, global investments in renewable energy increased sixfold from USD 20 billion to 120 billion per year. Wind power capacity grew from below 50 to 120 GW (1 gigawatt, GW, is the capacity of one large nuclear power plant), and solar power from about 4 GW to 16 GW. During the same period, only about 13 GW of new nuclear power was commissioned.



The careful assessment and evaluation of technologies is an issue of global, national and local concern. Most technologies may not best be assessed at the international level, as the potential risks and benefits of their use are largely dependent on local social, economic and environmental factors. A technology that is considered to be 'environmentally sound' in one setting may have disastrous consequences in another – a case in point is much of the biofuel expansion in the last few years.

Assessments also tend to be particularly weak in capturing the social and economic impacts on the poorest and most vulnerable communities, and almost always fail to include secondary effects. The impact of the biofuel boom on food prices illustrates why it is so important that climate change must not be examined in isolation from other global crises – poverty, hunger, species extinction, biodiversity loss, ocean acidification, war – or the solutions that will be envisaged are liable to exacerbate other problems.

Technology assessments need to be performed at all relevant levels, and must be:

- Mindful of the precautionary principle, environmental integrity and human rights, and respectful of the principle of local free, prior and informed consent.
- Transparent, participatory and accessible to civil society organizations, indigenous peoples organizations and social

movements so that people likely to be affected by its deployment can be heard.

- Independent of corporate interests.

Civil society organizations have a vital role to play in this debate, and maybe in particular to:

- Ensure that marginalized voices are heard and that climate change is not seen in isolation from equally important crises.
- Demand accountability from governments, corporations and scientists.

Research

Investments in energy related research and development (R&D) have dropped sharply in the past decades. Since the early 1980's, the share of energy in publicly financed R&D has declined from over 10 percent to about 3 percent. Only about 10 percent of this research is on renewable energy – less, even, than the share devoted to fossil energy. Almost half of the money is still invested in nuclear power. In the private sector energy research spending has dropped, from 8 to 4,5 billion USD annually in the last decade alone.² Each year, the world today only spends 2 USD per capita on energy related research. Recent versions of the proposed texts for Copenhagen encourage developed countries to double expenditure on R&D for mitigation (which is mainly related to energy) and adaptation by 2012, and to quadruple them by 2020, which would however still be relatively modest sums.³



Climate Change

Key Issues

Seminar report from Seminar no. 5:

A Global Marshall Plan for Climate and Development:

Cost effectiveness and climate investments that make a difference

How can the world move, within just a decade or two, towards fossil-free societies where also the world's glaring inequalities are being addressed? What would be the main ingredients of a global 'Marshall plan' which achieves both these goals in a win-win manner? A new UN report argues that it is indeed possible to promote development while saving the planet, and that we need a public investment approach, where large resources are provided at an early stage and proven tools such as feed-in tariffs are used to subsidise renewable energy. This approach is different from the current focus in the climate negotiations on carbon markets and putting a price on CO₂. What approaches are the most appropriate? What is indeed most cost-effective? Are the ideas in the report something to take up for the Swedish and EU international leadership on climate change?

12 October 2009, Stockholm

A Global Marshall Plan for Climate and Development: Cost effectiveness and climate investments that make a difference

Svante Axelsson

Introduction

By the end of the Bangkok negotiations, it was clear to me and to many others that the main obstacle for reaching a good deal, or indeed any deal, in Copenhagen is the lack of trust between developing countries and developed countries. It obviously has not helped that Sweden and other actors are now discussing shifting to a 'single agreement', with contents unknown, instead of following up on the Kyoto Protocol.

Another major problem that is hindering progress is the lack of commitments on climate financing. This is tied to the fact that it may be difficult to secure enough financial resources for climate action without introducing major additional sources of funding. We also need stronger emissions targets for industrial countries, of course; targets that go far beyond the commitments announced thus far. But it is my view that in order to find a solution to this problem, we will need to go with approaches that present win-win-win situations: we need to combine our efforts to solve the financial crisis, the climate crisis, and also the poverty crisis, all at the same time.

We all know what needs to be done, but apparently we are still hesitant to do it. The Stern Review showed that it makes sense economically to act now instead of waiting. Most of the relevant technologies are already available, and so are the economic arguments for action; the time has come for policy makers to step up to the plate. It is my guess that what has so far deterred them are the possible distributional effects of strong climate policy measures.

While there are costs associated with acting on climate change, there are also benefits. In the negotiations there is much debate about burden sharing; but what about benefit sharing? Indeed, taking early action on climate change has made Sweden a winner: our dependence on oil has been drastically reduced, we are more energy efficient, and those of our industries that are at the forefront of the coming energy shift face an immense export potential. Thus,

'burden sharing' is in fact quite a dangerous word. What we ought to be discussing is benefit sharing.

As I said, solving the climate crisis needs to go hand in hand with poverty reduction. The rich countries world has the responsibility to take the first steps, and we must do so immediately; however, quite soon we will need to be joined in our efforts by countries such as China, India, and Brazil. That, among other things, is why we need to invest right now in a global technology shift: because the developed world cannot solve this problem alone, massive amounts of money must go from the North to the South in order to ease the transition of developing countries into low-carbon societies. Only by collective action can our collective challenges be overcome.

And so, we return to the financing issue; for how can we mobilise the funds for such a fundamental change not just to our societies, but to those of developing countries as well? Clearly, the climate crisis necessitates changing the consumer patterns of both households and the public sector. There are many figures on the costs of climate change currently floating around, but one benchmark may be that according to the UN, 500 billion USD will be needed every year for adaptation, mitigation and the protection of forests.

In contrast, the EU estimates that 100 billion euro will be enough; but according to their proposals the EU will only contribute 2-15 billion per year from public funds. Clearly, the amounts that, within the political mainstream, are considered possible to generate from public sources will not be enough. Thus, we will most likely need additional sources of funding. One such source might be a levy on the aviation and shipping industries. Such a tax would imply a 'double dividend': the double benefit of generating funds while also internalising the hidden costs of such sectors, essentially providing a much-needed correction of price levels to reflect true societal benefits and costs. It is promising that Swedish Minister of Finance Anders Borg is currently pushing for a minimum carbon tax within the



“One of the main advantages of a global feed-in tariff is that it would provide a massive boost to the demand for clean energy, thus driving economies of scale and significantly accelerating the decrease in both the cost and the price of renewables.”

Svante Axelsson

EU. Such initiatives could go a long way towards funding EU climate investments abroad.

The overall conclusion is that we need a global, investment-based, ‘Marshall plan’ for the climate. The bulk of those investments will need to be private; nevertheless, large-scale public funds are key to directing private enterprise. As a result, the Clean Development Mechanism is not optimal and could only form a marginal part of the solution to this crisis. Instead, we need something more along the lines of the proposals made in the WESS report: a global feed-in tariff system for subsidising renewable energy. That, I think, would prove a strong mechanism for addressing climate change while providing clean and affordable energy to the two billion people that still have no access to modern energy services.

One of the main advantages of a global feed-in tariff is that it would provide a massive boost to the demand for clean energy, thus driving economies of scale and significantly accelerating the decrease in both the cost and the price of renewables. As soon as costs drop sufficiently, clean energy will move decisively into the mainstream, and hopefully also become cheap enough for the billions of poor people across the planet.

Indeed, the potential for renewable energy is vast: solar technologies alone could provide for all of the world’s current energy needs. It is possible to build a global society relying only on renewables; there is no need to turn to uncertain and risky alternatives such as nuclear power. The fact that more solar energy than nuclear is currently being installed is, perhaps, a sign that this insight is spreading.

Niclas Hällström Introduction

I have just returned from Bangkok after spending two weeks at the UN negotiations on climate. There, nations across the world negotiate action on climate change as if this was a

zero-sum game, where no one may benefit without someone else losing. So far, the logic of the negotiations is still one very similar to that of global trade negotiations, where more than anything actors try to avoid committing themselves. Over the course of the two weeks, the trust gap between rich and poor countries only widened.

In that context, I think this seminar, and the proposal that Mr. Tariq Banuri will be presenting, is extremely timely. The idea is to move beyond the limitations and the mistrust of the negotiations and try to find some common ground in some proven mechanisms that are known to work and that could actually be implemented in a win-win context. Also, his proposed system is quite transparent and results-based, which could do much ease the concerns in the North about handing over very significant sums of money to regimes of the South.

For after all, this should be about finding the solutions around which a consensus could actually emerge. In this seminar today, we will explore ideas and mechanisms that could actually work, that would address equity and development *while simultaneously* tackling climate change – and which would also speed up the necessary transformation in the rich countries. It is a rare and liberating thing, I think, to find that kind of vision.

Tariq Banuri:

A global Marshall Plan for climate and development

As has been said, we have published a new report, entitled ‘World Economic and Social Survey 2009: Promoting Development, Saving the Planet’. Because this report was very popular at the Bangkok summit, I have only brought a few copies with me today; however, it is also available for download from the Internet.¹

First of all, relating to what has been said about burden sharing and climate policy as a zero-sum game, I have an observation to make, and that is that development has

1. www.un.org/esa/policy/wess

“The issue in the South is not the price gap between the energy that is climate-friendly and that which is not; the issue is rather the affordability of any form of modern energy. How to provide citizens with cheap energy services, including renewable energy, especially renewable energy: that is the issue.”

Tariq Banuri

largely served as a ‘positive-sum game’: the promise of increased income for all creates greater prospects for cooperation within society. Where development gains have been distributed equitably, it has led not only to greater prosperity, but to improved stability, resilience, and social solidarity as well.

It is a concern to us at the World Economic and Social Survey that climate change is increasingly being seen as a zero-sum game, a view which is inhibiting cooperation and effective action. What we have done is to take a development-based approach to climate change, with the goal of transforming this into a positive-sum game.

Benito Müller of Oxford University makes a useful distinction between three different models of cooperation on climate change: sovereign, conditional, and joint commitments. Sovereign commitments means that each country makes independent commitments, so that the overall level of ambition is equal to the sum of those commitments; conditional commitments means that action is taken only if some external condition is satisfied, such as, in the case of developing countries, the existence of financing and technology transfer from developed countries. Obviously, most of what we have seen so far in the climate negotiations concerns these two kinds of approaches. But then there is also *joint* commitment, where two or more countries take on commitments together.

This is where our development-based work is focused. Is there a scope for joint commitments, and if so, what can be done? At the global level, we believe that there are in fact common goals. The North has the common objective of full employment and energy security, both of them obviously related to climate change. The South has the goals of catch-up growth and also of energy access because, as you will see, energy poverty is a major issue. Now, because of this geography of common goals, there are three kinds of issues that are of special promise. These are the areas on which we should focus.

First, there are the areas in which there is already consensus; where everyone agrees what needs to be done.

Second, the areas where there is momentum; where already, steps are being taken and a process of change is underway. Third, the areas where there is transparency; where the relationships between inputs and outputs are not ambiguous, vague, or uncertain, but where the effects of policy are relatively clear. We believe that this focus will lead to results that are attractive to both developed and developing countries. It would allow developing countries to leapfrog to clean technologies; it would stimulate the private sector in both the North and the South; and most importantly, it would promote cooperation.

It could be argued that in most of the industrialised countries, the success criterion for climate policy is this: a successful policy is that which enables climate-friendly alternatives to become competitive in a market setting. However, we wish to stress that the success criterion for the South is not the same. The issue in the South is not the price gap between the energy that is climate-friendly and that which is not; the issue is rather the affordability of *any* form of modern energy. How to provide citizens with cheap energy services, including renewable energy, especially renewable energy: *that* is the issue.

We wish for a strategy that respects both of these goals. And indeed the main goal of our report is to sketch out such a strategy. Our proposal is based on what we call an investment-led approach, as opposed to a purely price-led approach. That is, putting a price on carbon is not enough; the public sector also needs to crowd-in private investment through its own strategic investments. In addition, we argue very strongly that investments should be front-loaded, in order to avoid the dangers of further ‘lock-in’ of carbon-intensive technologies, and also in order to take advantage of economies of scale and learning in these emerging industries. Finally, international transfers of finance and technology must be focused in a very targeted manner on achieving this ‘big push’ for low-carbon technologies. Those are the key messages of the WESS.

At this point, it might be asked why our proposal is so very much focused on energy. There are four reasons why.

First, the contribution of energy to human progress has been phenomenal. The development that the world has witnessed for the last two hundred years or so has been inextricably linked to ever increasing use of energy. In fact, discovering how to access the concentrated energy contained in fossil fuels has utterly transformed our societies. It gave us clean water, hygiene and health, the ability to manipulate our surroundings in an unprecedented way. Just think about the miracle that we discovered; a miracle that is now about to destroy us, but a miracle nonetheless. A single gallon of petroleum contains the same amount of energy as a person working for three months, and yet without thinking we consume it all just by driving a car for twenty minutes.

Second, although energy use is essential for a whole range of human development indicators, access to energy is extremely unequally distributed. Two hundred and fifty years after the technologies with which to access fossil energy sources were first discovered, still that is the case. Thus, solving the development challenge will depend on the continued expansion of energy services in developing countries.

Third, that inequity is not due to inertia, but affordability. This is a fundamental point when considering the transition to clean energy, and I will elaborate on it in a little while. Energy use is also responsible for some 75 percent of total emissions, and what is more, energy emissions are rising much faster than aggregate emissions, especially in developing countries, where growth in energy use outruns energy efficiency.

Finally, we believe that energy is a sector in which there is tremendous momentum, consensus, and transparency. Focusing on this sector then becomes the obvious choice.

Now, some facts about energy. Worldwide energy use multiplied 30 times between the years 1800 and 2000; over the same period, GDP multiplied by a factor of 100. Mobility, as measured by the number of kilometres per person and day, has increased a thousand times over the last two hundred years. Once again, it is clear that the transformation has been tremendous; and I personally believe that it is this

access to extra energy, together with the economic development it has made possible, that forms the basis for much social cooperation. It is because of energy that developed societies have found a way out of the Hobbesian trap of mutual distrust, rivalry, and violence.

Regarding the distribution of energy, we find that one might divide the nations of the world into three broad categories: low, medium, and high-energy countries. The nations where total primary energy use, as measured in kWh per capita per day, is low is also characterised by very low scores on the Human Development Index, so once more we see the strong correlation between energy and development. However, in addition, it is clear that the improvement curve describing the relationship between energy use and human development is very steep, so there are very large developmental benefits to be had from increasing energy use in these countries.

Moving on to the middle category, we find that the energy-development relationship is a great deal flatter, implying that the benefits from increased energy use are now less. And in the final case, for the nations with high energy consumption, which of course are also the richest countries of the world, the relationship is essentially a flat line. Thus, one might actually argue that much of the energy being used in Sweden and other rich countries is redundant, as it apparently does not contribute to human development.

The distributional differences are very great. For instance, the total primary energy consumption – once again, measured in kWh per capita per day – of the United States is almost fifty times that of Bangladesh. It is also the case that in very poor countries, almost all of the energy is for households. Middle-income, emerging economies tend to supply a disproportionately large share of energy to industry; for example, in China that share is 40-plus percent. Then, as countries continue to develop, the industry share eventually stabilises at around twenty to twenty-five percent.

But what is truly striking is the massive difference in electricity use between developed and developing countries. For example, the number of electricity kWhs per capita per

“[...] the common goal of developing countries is to make all energy cheaper, any joint commitments strategy must seek to rapidly lower the costs of renewable energy, so that renewables becomes the natural choice for developed and developing countries alike.”

Tariq Banuri

day in the United States is nearly a hundred times larger than in Bangladesh, and over two hundred times larger than in Tanzania. And there can be no doubt about the importance of access to electricity; no country has ever been able to reach high scores on the Human Development Index, such as 0.8 or 0.9, without all of the population having access to electricity.

The inequality in energy access is truly fundamental to our discussions. From these figures, it stands out clear that there will be a need for additional energy in developing countries, simply in order to achieve higher levels of human development. But which kind of energy will it be? The answer is simple: it will be the kind that people in developing countries will be able to afford.

Let us examine this fact. What are the energy prices, in terms of cents per kWh, in different regions of the world? We find that in developed countries, the price of energy is generally around 10-20 cents per kWh. In emerging economies it is less, roughly 10 cents. And in low-income developing countries perhaps 4-5 cents. But how much people can actually afford depends, naturally, on their incomes. For instance, in India, the average yearly income is 750 USD. That translates to two dollars per day. Assuming that ten percent of the income is spent on energy, the average daily energy budget of an Indian citizen is twenty cents. If then the price of energy is twenty cents per kWh, no more a single kWh per day will be affordable.

Thus, the price and the affordability of energy are closely linked. Energy that is cheap is the one which countries will opt for, because that is the energy which can be provided at prices that people can afford. The Chinese favour coal which, at a price of roughly three cents per kWh, is affordable. Shifting to renewables costing perhaps fifteen or twenty cents would imply excluding significant parts of the population from access to electricity.

The strategies that developing countries use to solve the affordability problem are well known. First, as I mentioned, in many countries large segments of the population are

simply excluded from access to energy. We have already heard about the two billion people with no access to modern energy; that is half of the population of the developing world. Although from a health and environmental perspective biomass is anything but cheap, states often find it less expensive to shift these people to burning firewood instead of providing them with modern energy. Another strategy is of course to reduce the quality of the services provided: cheaper buses, appliances, inefficient but cheap energy technologies.

Finally, the most important strategy that developing countries use is targeted subsidies. In developed countries, industry pay less for energy than does households; in developing countries, the reverse is true. Low-income households pay less for energy, high-income households and industry pays more. Similarly, the prices of diesel, kerosene, and petrol are kept low to stimulate public transport and other important sectors of society. An excellent 2007 study by the World Bank identified that subsidies that are specifically targeted on societal benefits are in fact quite efficient, in contrast to many other kinds of subsidies.

Now, returning to the climate issue, we know that there is pressure on developing countries to mitigate, by some calculations more than even developed countries themselves. If we are to stabilise greenhouse gas concentrations in the atmosphere at 450 parts per million of carbon dioxide equivalents, and developed countries cut their emissions by 20 percent, then according to the science, developing countries will need to make a cut of 25 percent against the ‘business as usual’ baseline. If developed countries cut by only ten percent, developing countries will have to cut by thirty percent against the baseline; and so on.

The picture is clear: if we want to arrive at 450 ppm, we need to bring about greater cuts. The challenge is to reconcile these demands with the problems of energy access and the need to maintain growth. Once again, there are two approaches: by sovereign commitments, or by joint commitments centred around investment.

The main strategy for promoting renewable energy within the ‘sovereign commitment’ approach is as we know to raise the price of conventional, carbon-intensive energy by the use of taxes or cap-and-trade schemes. But because, quite to the contrary, the common goal of developing countries is to make *all* energy cheaper, any joint commitments strategy must seek to rapidly lower the costs of renewable energy, so that renewables becomes the natural choice for developed and developing countries alike.

Luckily, this is doable; and the formula for success is quite a simple one. We need to use environmental investment as a driver.

A reasonable starting point would be forming a global partnership for setting common, international targets for the price of renewable energy. For example, deciding that costs should drop to one USD per Watt of renewable energy investment. That is on a level with the current cost of coal in China, but is much lower than what are presently the investment costs of green energy. Remember, once that cost gap is eliminated, renewables will become affordable and we will have solved much of the climate problem, as well as the development challenge.

What would be the elements of a successful partnership of the kind I just outlined, a partnership between the rich and the poor countries of the world, a ‘Marshall plan’ for climate and development? We think there are three key criteria: there should be common and shared goals to which all parties can subscribe; results should be clear and demonstrable; and the partnership should be time-bound.

All of these points stand out in contrast to the current state of negotiations on climate. First, most actors still view climate and development as separate or even contrasting agendas. We believe this to be a false dichotomy. They can and indeed must be brought together in order to create a joint agenda to which all nations can subscribe. Second, more often than not, the relationships between inputs and outputs in the mechanisms being proposed within the UN framework are vague, and there are real concerns from the

part of developed countries that some of these mechanisms essentially amount to putting funds into a kind of ‘black hole’, with end results unknown.

And finally, results are open-ended. There is no end in sight to the commitments made under the UN negotiations. At what date will it be possible for developed countries to withdraw once more their public funding of mitigation projects in developing countries? When will solving the climate issues become a self-sustaining process? No one can say.

Our approach, then, has been to present concrete proposals that move beyond all three of these limitations, that combine the climate and development agendas into a framework of partnership and shared goals. One such proposal concerns the creation of a global feed-in tariff program for renewable energy.

There is a lot of detail on this, but I will try to be brief. Feed-in tariff programs have been used in some fifty countries around the world, including Germany and Spain, with very favourable results. The policy itself is very simple. It is a guarantee that the output from all new renewable energy projects will be fed into the grid; and what is more, producers are assured that the price at which they sell their energy will be consistent with making a profit. The price is preset.

This is how it works. Suppose a private company plans to set up a solar power plant in India. The price they need to receive in order to make a profit is twelve cents per kWh. However, the Indian government sells electricity to its citizens at only four cents per kWh. Paying the remaining eight cents is what the feed-in tariff is all about. Unfortunately, the financial resources possessed by the government of India and other developing countries are not unlimited; and so, in order not to exceed the state budget, the government may choose to limit the scale of the feed-in tariff so that only a few new solar plants will get built every year.

Of course, the cost of producing renewable energy is generally declining over time, and nowhere is this decline

“Up-front, front-loaded investment with strong public support will be necessary.”

Tariq Banuri

as marked as in the wind and solar energy sectors. However, it is clear that in the immediate future feed-in tariffs will require subsidies so that the end price faced by consumers will still be affordable. Thus, the capacity of developing countries for implementing large-scale feed-in tariff systems will be constrained by the amounts that states can afford. What is then the best way of accelerating the deployment of renewable energy in developing countries?

We believe that a global feed-in tariff program, which supplements the policies of governments, may well be the answer. The global scale of the program is necessary because cost reductions are related to scale expansion: accelerating industry growth means costs will decline more rapidly. So if we wish to eliminate the price disadvantage of renewable energy as quickly as possible, we need to boost demand all over the world.

What are the advantages of a global feed-in tariff system? We believe that it meets all three of the criteria which I previously described. First, the goals are common and shared. Everyone believes that renewable energy is necessary; it addresses economic and human development goals as well as climate objectives. Also, the feed-in tariff subsidy will only pay incremental costs, which are well known. And the reduction in the unit cost of energy helps the North as well as the South, because green alternatives for replacing obsolete power plants in developed countries will be cheaper.

Second, the results are demonstrable. It is a system which relies on so-called output-based funding. This is not about simply throwing money at developing country governments that may or may not be corrupt; this is about funding specific projects. And if the project is unsuccessful so that the energy is not forthcoming, there will be no financial compensation. What a feed-in tariff rewards is actual results on the ground.

Third, this is a time-bound commitment. The production costs of renewable energy will be coming down, while at the same time, ever-increasing access to affordable energy means that the incomes of households in developing

countries will be rising. Thus, the amount of funding needed for the subsidy will decrease from below as well as from above. Depending of how rapidly scales are ramped up, within a span of ten to twenty years, the subsidy will disappear altogether. The only question is how quickly we wish to make this transformation happen.

The feed-in tariff then provides support for poor consumers and low-carbon technologies alike. The same incentives are given to all industries; therefore, it will be those low-carbon technologies that have the best cost structure that will become dominant in the end.

In conclusion: up-front, front-loaded investment with strong public support will be necessary. There are of course other important elements that I will not cover in detail at this time: improving energy efficiency, transferring knowledge, and building new national institutions appropriate for implementing the relevant policies. However, the bottom line is that we believe that contributions of 100 billion USD annually over the period 2010-2020, channelled through existing energy systems on the basis of output delivered, will be enough to bring about the transition to low-carbon societies and to lower the costs of renewables to the point where subsidies are no longer needed.

My message to the policy makers and citizens of the world is this. On the targets for emissions reductions, let the debate continue. But here are concrete programs addressing issues where everyone agrees and where the goals are shared. Let us then find a way of making them happen; let us bring about the transition to clean energy that everyone is now seeking. If we can expand the scale of renewable energy and lower the costs, we will have solved the problem; and we will have done so regardless of whether or not we agree on national targets. Ladies and gentlemen, if we can only summon the will to action, here is how it can be done.

Clarifying questions

Question. Anders Wijkman. Thank you for an excellent presentation. I recall that in 1992, Brazil had a proposal for quite a similar funding mechanism to help invest in green

technology. It was dismissed by the elder George Bush, but just imagine what might have happened if things had turned out differently.

Now for the question. You say that you want an across-the-board kind of feed-in tariff, so that the most cost-effective or cheapest energy sources will become predominant. I am not certain that this is the correct approach. I fear that investing too heavily in what is today the least expensive renewable energy sources may have the adverse effect of delaying breakthroughs in other areas. For instance, I do not think that investments in concentrated solar power technologies, which has such an immense potential, would be forthcoming under an across-the-board system. I imagine you would need to differentiate between technologies.

Answer. Tariq Banuri. The system is based on calculating what prices would make different technologies profitable, as well as the learning curves² of the various industries. This means that the absolute price level that is guaranteed by the feed-in tariff is not the same for all technologies. Moreover, within this system it would be possible for policy makers to prioritise among technologies, favouring especially promising energy sources.

Question. Svante Axelsson. A short question: who will pay for the grid?

Answer. Tariq Banuri. Of course, the process of investment will in itself take time, and the shift to renewables will in some sense be a gradual one. The major issue is to plan for the transformation itself; unless there are also plans to increase renewable energy generation, expanding the grid will be much more difficult.

Now, when the costs of delivering energy are calculated within the feed-in tariff system, there are in fact two components: not only generation, but transmission and distribution as well. For instance, in Europe, where in many cases energy systems are old, around three cents of the cost is due to energy generation, while six or seven cents is for transmission and distribution. In developing countries, the transmission and distribution component is generally cheaper, around two or three cents, because energy generation tends to be concentrated in a few areas.

We believe that these grids need to expand in the future, and so the feed-in tariff is based on calculating total costs, including the costs of grid expansion. Because of the grid issue, the one dollar per Watt figure, which corresponds to a cost of two to three cents per kWh, means that the price per kWh *delivered* will be higher, perhaps around five cents.

Ola Alterå **Comments on the report and reflections on cost-effectiveness.**

It is a privilege to be State Secretary of Enterprise, Energy and Communications at this pivotal moment in history, where there are overwhelming threats but also, I agree, many opportunities, not least for development.

I also had the privilege of representing European youth organisations in the process leading up to the Rio Conference in 1992; an experience which had a significant impact on the direction of my subsequent political career and on my present focus on energy issues.

The WESS report certainly raises many interesting points; I will only select a few which I feel are especially important to our discussion. First of all, I agree that it is

2. A learning curve shows how the costs for a technology will shrink as one learns how to make it more efficient and more effectively, thus driving down the costs per kilowatt-hour: the more renewable energy we produce, the more we learn about how to do it, and the less expensive it becomes.

“I think that if taxing carbon emissions proves unfeasible at the global scale, at least gradually phasing out subsidies for fossil fuels ought to be an alternative.”

Ola Alterå

crucial to supplement the ‘cost-sharing’ approach with a development perspective. We are trying to bring this into the broader European debate by making the theme of ‘eco-efficient economies’ central to the Swedish EU presidency leading up to the Copenhagen conference.

In part, this agenda addresses the very same points brought forward by Svante Axelsson; that this issue is not just a matter of short-term economic cost-effectiveness, but one of active industrial policy and of long-term change to a more eco-efficient path. In addition, it is not just about climate; it concerns water resources, biodiversity, ecosystems. The bottom line is, we need to do more with less; welfare must increase at the same time as impacts on natural systems, as well as the use of limited resources, decrease.

To me personally, the greatest source for hope for the future lies in the fact that the tragedy of climate change has finally made it obvious, beyond any doubt, that there is no future but our common future. Certainly, climate change is not the only urgent threat facing humanity, but the way in which it has brought that insight home is unique. We need to do this together.

The development agenda, of course, is central. The development that we have witnessed has been remarkable, with billions of people actually rising out of poverty. Yet another billion people are still left outside of the process. And if the convergence to a global welfare society is to continue, it has been estimated that the size of the global economy will need to increase by four or five times until 2050. At the same time, the world’s population will grow from six billion up to nine billion people. Any way you look at it, that equation just does not add up. That is why, again, we will need to use what we have in a much more efficient manner.

I am sure, also, that bringing affordable energy to the world’s poor will help to slow population growth. Millions of African women need to walk many miles just to acquire woodfuel; if cheap and modern energy could allow them to participate in the economy to a much larger degree and to

receive more education, it would certainly affect birth rates.

On the feed-in tariff idea and the remarks about cost-effectiveness, I have the following comments. As Mr. Banuri pointed out, given the difference in objectives between developed and developing countries, it is difficult to pursue a global agenda, but I believe we need a three-fold approach.

The first part concerns putting a price on carbon. Despite what has been said about investment, still I think this is crucial. There is potential for investment in some areas, yes. But if there is no market; if it is not profitable for the private sector to take the energy shift on, in the worst case this will become just another failed industrial development policy rusting away in developing countries. Thus, we need to price emissions.

Also, it is the Swedish experience that long-term, stable CO₂ taxes are very efficient. Of course, the circumstances in developing countries are radically different. Still, I think that if taxing carbon emissions proves unfeasible at the global scale, at least gradually phasing out subsidies for fossil fuels ought to be an alternative. That needs to be done in developing countries as well; at the very least, I think that it is a strategy that should be put on the table.

The EU Emission Trading Scheme has a lot of shortcomings, certainly. Still, I think it is one of the major social innovations of our time; it is the first example of at least a regional approach to a global problem. Twenty-seven countries have agreed to pricing carbon emissions and to common targets. Also, the architecture of the scheme itself will no doubt improve over time.

The second component is technology development and investment. From listening to the debate, one could get the idea that Swedish climate policy is all about CDM and offsetting domestic emissions through flexible mechanisms. Indeed, one third of the Swedish 40 percent target will be reached through mitigation abroad. I noted that the report did not deliver any serious criticism of the flexible



mechanisms; however, I agree that they need to be improved. Still, let us not forget that the other two thirds will be done within Sweden. There are very specific instruments for making this happen: taxes, standards, and so on. We will reach that target, I am sure.

But in addition to all of this, we have the development of new technology. We are spending billions of Swedish kronor on changing the direction of the Swedish automotive industry from gas-guzzlers to fuel-efficient cars such as hybrids, electric vehicles, cars run on efficient biofuels, and so on. We have started a bilateral cooperation with China on sustainable city building, and with Brazil on efficient biofuels. There have been interesting discussions with Brazil on the possibility for third party cooperation with African countries for producing, if not actually truly sustainable, then at least the *most* sustainable biofuels possible in the world. I believe that these projects would present important opportunities for Africa to take part in the global economy.

Third and finally, institutional barriers, which goes for developed and developing countries alike. All the way from helping small cutting-edge businesses in Sweden to decreasing their energy consumption to introducing more efficient stoves for families in Eastern Africa, changing institutional frameworks and attitudes towards structural change will be a necessity.

All in all, the second of the two kinds of cost-efficiency that Svante Axelsson described in his presentation is very much present in the policy of the Swedish government, and we are trying actively to bring it into the broader European discussion on climate change.

Finally, about the proposal for a global feed-in tariff, reading the overview of the WESS report I noted that the feed-in tariff idea did not have a dominating position; there were roughly ten other suggestions that were also mentioned as important. I think this is a good thing. As we have heard, feed-in tariffs have their virtues, and going forward could play a constructive role as one solution to the climate issue. During the presentation there were a few

points regarding the development agenda that were new to me, that struck me, and I will bring them with me.

However, in Sweden we use the different system of green certificates, similar to mechanisms in the proposed US Kerry-Boxer bill; these have other virtues that I feel will become increasingly obvious over the coming decade. I suspect that green certificates would not work in developing countries, as it requires a mature electricity market. Still, creating a global feed-in tariff? Even instituting a common system between Sweden and Norway can prove a staggering challenge; and those are neighboring countries. Not to mention the difficulties of coordinating the, after all relatively simple, policy of putting a price on carbon between the twenty-seven member states of the EU.

And now, if I have understood correctly, Mr. Banuri proposes a global system of feed-in tariffs for electricity, even with all the technological and administrative complexities that these entail. I am afraid that in practice, taking such a comprehensive approach from day one would mean that no progress would be made at all in many areas. Still, feed-in tariffs could undoubtedly prove important instruments for developing countries in cooperation with developed countries; maybe also for regional approaches.

Some contradictions of the global feed-in tariff system have already been brought up. We have already heard about the level playing field for different technologies. Also, on-grid and off-grid electricity should be treated alike; but if it is off-grid, say, in the countryside of Tanzania, how can you even measure the amount of energy produced? I think this proposal adds so many issues and unanswered questions, it becomes even more complicated than what is already on the negotiating table. It is an interesting idea which is not without merit, and I think it deserves to be brought up and possibly even used; but certainly not in the first phase of a global agreement, as it needlessly complicate things even further.

On cost-effectiveness, one should bear in mind that when Nicholas Stern and others argue that acting on climate change will not cost more than one or two percent of GDP,

“Globally, climate policy will succeed or fail based on one very simple thing: whether or not we can reduce the price of climate-friendly alternatives in developing countries. If we cannot reduce those prices, no matter what we do, climate policy will fail.”

Tariq Banuri

they do so based on an assumption of cost-effectiveness. That is, if we are not cost-effective, it will be much more costly to deliver the emission cuts we need.

And even if all of us in this room and in government stood up for the long-term version of cost-effectiveness, what help would it be? It would mean only losing the next election; no democracy will be able to deliver that agenda in its pure form. Thus, we need to respect the idea of short-term cost-effectiveness as well. In the real world, we will have to use taxation, trading, and offsets in developing countries while at the same time keeping long-term objectives in mind. We must maintain both perspectives.

It is only too easy to identify investment as the lowest common denominator and then to push for that. But the issue of who will pay remains unresolved; and so, we are back at the very same debates that are already taking place.

There are some shortcomings in the EU position, granted. However, the hundred billion euros that the EU has been discussing is much more when expressed in dollars. Forty percent of that figure is set to be taken from auctioning of emission credits; and what is that, if not public spending? Also, an additional twenty to forty percent, of which the EU is prepared to take its fair share, will be raised from other public sources in developed countries. It is not really fair to say that this is only one tenth of what is needed.

One might always argue that our positions are inadequate, that we offer too little. But as the chair nation of the EU, when at the G20 meetings even putting these kinds of figures on the table is rejected, sometimes I think we are being too hard on ourselves. On the global scene, we often struggle for support. The recent financial crisis has not helped either; especially when it comes to the capacity of the US for spending, given the serious budget problems they are facing.

Tariq Banuri. Response to Ola Alterå. When someone disagrees with me, I always say that it is only a matter of

time. I have two points in response to Mr. Alterå. One is that we do understand that carbon pricing is central to the approaches of industrialised countries. I would, however, like to put to Ola Alterå that globally, climate policy will succeed or fail based on one very simple thing: whether or not we can reduce the price of climate-friendly alternatives in developing countries. If we cannot reduce those prices, no matter what we do, climate policy will fail.

When developed countries implement schemes for carbon pricing, it is usually combined with various income transfers designed to protect low-income households from the impacts of the tax. But in developing countries, as well as internationally, having that kind of cushioning will be much less feasible. This is one of the reasons why we think that an investment-based approach is the right one. Raise the price in developed countries, by all means; but make sure to also use an investment program for developing countries as a supplement.

The second point is that fifty countries, including developing countries, already has a feed-in tariff policy in place. It is incorrect to say that this mechanism is unproven and that it remains just an interesting idea for the future. Also, regarding the claim that it implies a great deal of complexity: absolutely not. The only information that is needed is data on the domestic industry structure, and on the international pricing profile of renewable energy. The domestic structure is in most cases quite well known, and in fact most countries have used the same pricing profile when designing domestic feed-in tariff schedules. To say that there is complexity does not respect experience from existing feed-in tariff systems.

I would ask those present to give this proposal a more sympathetic hearing; it could well prove the main solution to this problem. Only if we have a concrete and solid program in place will transforming the energy systems of developing countries be possible. Given a sympathetic hearing, I am sure that over time our views will converge.

Ola Alterå. If it is only a matter of time before we agree, in this particular instance I think that the timespan proved short indeed; I agree to essentially all of the points made. Most of all, I concur that lowering the costs of renewable energy is vital.

I am well aware of the advantages of feed-in tariffs; after all, several of our neighbours use them to great effect, though occasionally also at great cost. My point was not that feed-in tariffs do not work; I was merely expressing concern about constructing such a system at the global scale. The fact that feed-in tariffs may be used as an instrument to boost competitiveness may prove problematic, and overall it seems to me there would be a number of similar complicating factors if the system was global. In my mind I had already given this idea quite a sympathetic hearing, and I certainly think that it should be further discussed.

Eva Alfredsson

Comments on the report and reflections on cost-effectiveness

I am very happy to have been reading the WESS report. I and a colleague of mine made an analysis one and a half years ago in which we came to very similar conclusions; indeed, these are conclusions that have been reached by researchers all over the world. It is good to see such a constructive and knowledge-based global approach to climate change.

Further development without sustainability is not possible. Thus, massive investment is needed, and it is needed all over the world: this is a development challenge not only for developing countries, but for developed countries as well.

I would, however, go even further than the report in my conclusions; for instance, it does not reject the use of CDM and other offsets, towards which we are very critical and which we regard as extremely marginal solutions. In comparison, feed-in tariffs are much more promising.

Some parts of the report are also misleading in that they

maintain the false idea of large differences in energy efficiencies between countries. Moreover, this report readily accepts the concept of technology transfer, which I believe is not an accurate way to describe what is needed. The truth is that we need to implement existing energy efficient and low carbon technologies and solutions everywhere: not just in developing countries, but in developed countries as well. But the funds for such investment is available only in developed countries, and so they will need to invest in transforming both their own energy and transportation sectors and those of developing countries.

Our starting point in reaching these conclusions was a critical analysis of the ideas, and perhaps even foregone conclusions, on which climate policy is often based. For example, within Swedish policy debate climate change has been discussed as if there was an environmental Kuznets curve for carbon emissions. That is, as if there was a parabolic relationship between income and emissions: as incomes rise emissions would also initially rise, then peak, and finally begin to fall back. Many pollutants have exhibited this kind of pattern; yet carbon dioxide has not.

Thus, the Swedish discussion has been premised on us being at the high-income, low-emissions end of a Kuznets curve. And indeed, our emissions have been reduced, but due to conditions which are not easily replicated elsewhere. Generally, developed countries do not have low emissions, but high. Again, there is no Kuznets curve.

And as a result, there is nothing, at least not yet, on the other side of the hypothetical 'tunnel' below the parabolic Kuznets line, the shortcut to low-carbon energy systems that developed countries were supposed to open up for developing countries. There simply are no developed, low-carbon societies anywhere in the world.

Rather, the true shape of the relationship between income and emissions is linear. When incomes increase as a result of standard economic growth policy, the unequivocal result is increased emissions. Thus, this is a challenge for every nation in the world, for low and high income countries alike.

However, the linear correlation between incomes and emissions is only a historical relationship; there is no reason to assume that it will be impossible to change for the future. Indeed, it must be changed.

If we imagine that the linear relationship is a plotted line, no country will of course have incomes and emissions that place it exactly on that line: there will be national differences in efficiencies. Some countries will have lower emissions than expected based on their income; the emissions of others will be higher. Many of the countries that might serve as positive examples are quite small, however, such as Sweden and Iceland; and due to the banking crisis, Iceland quite recently dropped like a stone back towards the plotted line. Clearly, it is the overall unsustainable linear relationship which must be changed.

The WESS report uses GDP figures that are purchasing power parity (PPP)-adjusted, which is of course quite correct as it is standard practice in economics. Without PPP-adjustments, making comparisons between countries would be of little use. However, the Swedish debate has been confused by misleading calculations that were not based on PPP-adjustments, making it appear like rich countries are much more carbon efficient than poor countries. But in fact, what the linear relationship between income and emissions tells us is that overall, there are no differences in efficiencies between rich and poor countries.

The differences that exist, in the shape of individual nations deviating from the overall relationship, are mostly due to differences in the mix of energy resources used. Some countries, for instance, use higher-quality fuels that cause less emissions; however, the total amount of fossil fuels does not change. The implication is that if one country for instance starts using cleaner coal, it only means that dirty coal will be used by another: this is a zero-sum game across time and regions.

The reason, then, that I am sceptical to the concept of technology transfer is that technologies are actually the same worldwide. We drive the same kind of cars, we fly the

same airplanes, and data shows, for instance, that Chinese steel factories are neither more nor less efficient than similar plants in Sweden or the US. The factories that the Chinese build are state-of-the-art, just as in developed countries, and it is those same factories that are responsible for the increasing Chinese emissions. Technology is global.

What we need is to change those technologies, to focus on global implementation of CO₂-efficient solutions. There are a number of possible policies for making this happen; however, what policies that are appropriate crucially depend on assumptions regarding the income-emissions relationship. If we assume a Kuznets curve for carbon, then obviously as a result climate policy will be all about evening out differences in efficiency; using trade and flexible mechanisms such as CDM to make sure that developing countries become just as efficient as developed countries.

However, as we saw, that assumption would in fact be false, as the true relationship is linear. As a result, the correct policy is different: given a linear relationship, the focus needs to be on massive investment for implementing existing, but currently costly, solutions. We need to do so even if for the foreseeable future these may be quite expensive. Over time, of course, mass production may imply that economies of scale are attained and that prices drop; at the same time, we should keep in mind that increases in scale have a tendency to impact negatively on the environment, and of course lead to increasing emissions.

In addition, we need a number of command-and-control measures. Because some available technologies are or may be harmful, some government regulation is called for. Also, taxes will be necessary; however, these should mostly be used for generating funds for investment, rather than driving change in developing countries. A feed-in tariff system, we feel, would fit nicely into all of this.

Now, as we know, time is short; the energy transformation in essence needs to be completed by 2050. This means that we do not have the luxury of going slowly, trying out the relative strengths and weaknesses of different technologies,

“Although the traditional economic growth agenda forms the basis of modern society as we know it, it has not been to the benefit of all; and looking to the future, it is clear that it is not sustainable. It must be modernised to correct for these flaws.”

Eva Alfredsson

proceeding one step at a time. Implementation needs to happen in parallel instead of in sequence; everything we have should be rolled out at the same time, starting immediately.

There can be no doubt concerning the scale of the challenge. Assuming that energy use grows by 1.5 percent per year in the future, by 2050 we will need 36 000 TWh, which is nearly twice the amount that we use today. Of that, 30 000 TWhs should be CO₂-free in order to reach stated targets on climate change. In comparison, one nuclear power plant produces approximately five TWhs. In fact, no one technology will be able to overcome this challenge.

There are of course some promising signs that things are moving in the right direction. For more than a decade, global annual installed wind capacity has consistently seen exponential increase, and in 2007 reached 20 GWs per year. But again, compared to the enormity of the challenge, where we are currently at is still very far from where we need to go. According to one scenario, in just over a decade the 20 GW figure needs to increase to around 150 GWs per year, and stay there until the year 2050.

Similarly, it has been estimated that the EU regulations setting automobile emissions to 120 grams CO₂ per kilometre will not lead to an absolute decrease in emissions, but only to decreasing the increase of those emissions from forty to thirty percent. That is a step forward, of course, but we clearly cannot expect it to be enough. Likewise, simulating what it would take to reduce emissions from the transport sector by 20 % up to 2020, we found that the following was needed.

First, by 2012 we need regulations capping automobile emissions at 70 grams of CO₂ emissions per kilometre. Second, the fuel efficiency of trucks needs to be improved by 10 percent. And third, *half* of all transport of people and goods needs to be shifted to environmentally superior alternatives such as cycling, public transport, and trains. Remember, that is for a 20 percent reduction until 2020, which in the long run is only the beginning.

One might ask: if the transport sector is not prepared to deliver any cuts at all, then where is there potential for the huge cuts that are actually needed? We can no longer afford to regard each sector separately; we must look at the overall picture.

Certainly, there exist solutions and ways forward; but unless, as has been noted, we adopt some sort of Marshall plan, we will fail. Analysis of the Swedish certificate system supports the argument that focusing on technology neutrality and short-term cost-effectiveness leads to sequential, rather than parallel implementation of solutions while also tending to discourage much-needed innovation and the development of new technologies. We should seek bolder approaches, even if it means making mistakes in the process; we have no choice.

Although I am by no means an expert on feed-in tariffs, from the little I have read about them, I feel that they could prove a very important instrument. Their capacity to introduce new technologies has been shown empirically in Germany and elsewhere.

In conclusion, although the traditional economic growth agenda forms the basis of modern society as we know it, it has not been to the benefit of all; and looking to the future, it is clear that it is not sustainable. It must be modernised to correct for these flaws.

That transition will not happen by itself. Large amounts of resources, as well as a professional approach based on very clear-cut and coherent goals, will be crucial. Results will need to be evaluated quite frequently as we go along: for instance, because of the so-called rebound effect improvements in energy efficiency has so far not reduced energy use. Taking a wider perspective is vital if we wish to avoid for instance reducing emissions from individual cars while overall emissions from transport keep rising. And finally, while pushing ahead with all of these policies, let us make sure also to conduct research and make long-term plans for achieving sustainable development.

“Many people of the South actually have a better perspective on what the climate problem is and what can be done to solve it.”

Larry Lohmann

Larry Lohmann

Comments on the report and reflections on cost-effectiveness

Although I have not yet had the opportunity to examine the WESS report in all its detail, I cannot stress enough how refreshing it is to finally encounter a document which actually confronts many of the central political, technical, and investment issues for dealing with climate change.

So many things in this report are welcome: the stress on front-loaded investment; the recognition of the fact that we need to start at a scale far beyond what the market-based approaches that have dominated the debate so far are capable of delivering; the point that private investment needs to be given clear direction in order to be successful; and of course, the suggestion of a global feed-in tariff, which I think is a very constructive and interesting proposal.

It is interesting to note that many of the points made by the report are shared by popular movements calling for climate justice. One example is of course the need for massive investment and transfers from North to South, separate from and additional to the usual foreign aid framework. However, there are also some questions that I imagine might be raised by climate justice movements towards a report such as this.

I too attended the Bangkok meeting, though unlike Niclas Hällström, I spent most of my time outside of the conference hall, and thus was able to escape the pervasive doubt, horror, and despair of the official negotiations. Instead, I participated in a number of popular movement events surrounding the meeting.

One thing in particular stands out in my mind as I look back: a protest of thousands of people marching through the streets of Bangkok, including outside the United Nations. I think it is fair to say that part of what the protesters were calling for was in line with the basic thrust of the report, namely the need to get off fossil fuels. Affordable energy; respect for the needs of the South; a moratorium on new coal-fired power plants; an end to oil drilling; also, an end to nuclear; these were a few of the strong demands made.

And these protesters were not only Thai, but people all over South East Asia and beyond. I do not think that anyone in that march would have contested the right to affordable electricity and the centrality of such issues to the entire climate debate.

At the same time, I also noted that the protesters were also calling attention to many other things. No more hydroelectric dams: that was one strong element in the protest. Wind power was not very prominent as a theme; however, I know that many of the protesters were concerned with large-scale wind power projects usurping land across the global South; taking over pastures, closing commons, and so forth.

Thus, one question that might be raised is probably this: how can those demands and perspectives be brought together with the somewhat traditional and developmentalist perspective which is reflected in the report? For instance, the idea that somehow biomass is less efficient than electricity. Generally, I think there are many nuances that should be openly acknowledged when discussing these issues, and to such a debate the perspectives of popular movements could contribute greatly.

The other point which probably the protesters I spoke with would have stressed concerns the necessity of transfers from the South to the North. I am not referring to finance, of course, but to transfers of knowledge and proper understanding of the climate problem which the North often lacks. Many people of the South actually have a better perspective on what the climate problem is and what can be done to solve it. In particular, there is a need for transfers of Southern technologies and institutions which are appropriate for dealing with the climate problem.

This perspective could perhaps usefully supplement the largely traditional, Northern-dominated, developmentalist perspective which shines through somewhat in the WESS report. Certainly, the whole idea of technology transfer, as Eva Alfredsson pointed out, needs to be more thoroughly interrogated, as well as the assumption that the North is somehow the locus of efficiency, whereas in fact it is the South



which has been most energy efficient over the last 150 years.

A few more overlapping questions might be raised. How does the emphasis on growth in the report – I believe the phrase was ‘catch-up growth’ – square up to the fact that historically, growth has neither led to convergence nor served the interests of the poor? How will the growth advocated in the report avoid that reality?

Also, how might the feed-in tariff proposal be further developed in order to support, and be supported by, climate justice movements? I have already indicated some points of overlap, but I think that in subsequent discussions more attention needs to be placed on the institutional structures for financial and technical decision making. Meaning: who is actually going to decide which technologies benefit from the feed-in tariffs? What about large hydroelectric dams, large-scale windfarms, massive solar arrays in the desert; will they be supported?

One last question. As probably one of the few US citizens present, I find it interesting that both the Marshall Plan and the New Deal are brought up as role models. As you know, both of these were US initiatives, so perhaps it is then my responsibility as a US citizen to provide some critical discussion of what they actually accomplished.

While being aware of the benefits brought on by the New Deal and the Marshall Plan, we likewise need to be aware that both initiatives were undertaken in the context of not only trying to pre-empt, but in fact also to suppress democratic movements of liberation both within and outside the borders of the United States. If we are unwilling to accept the political package that came with those reforms, we need to be careful with such analogies.

Finally, I wish to make a few critical remarks about the fetish of cost-effectiveness which has dominated the climate debate so far. There may be some overlap with previous speakers; indeed, like Svante Axelsson I find it important to examine different kinds of cost-effectiveness. In particular, what kind of cost-effectiveness will the carbon markets supposedly deliver, and is that really the kind that is needed?

The carbon markets are in fact constructed in a way that creates a steady movement away from actually dealing with the climate problem. That problem, which I think the report emphasises both indirectly and directly, concerns shifting the economy away from the historical pathway of fossil fuel use. But as soon as we let ourselves be dominated by the problem of finding a way to deal with climate change cost-effectively and within a market context, we start to lose touch with the basic problem and instead are mired in technical discussions on numerical short-term targets and the technicalities of imposing an emissions cap.

One might think this would be the same thing as solving the actual problem; it is not. A cap which is quantifiable and can be chopped up into allowances is needed for starting up a market operation where emissions can be traded around for efficiencies. But people involved in the carbon markets do not even discuss fossil fuels. Their concern is rather issues like technology neutrality; it might as well be fossil fuel neutrality.

The trading is where the cost-effectiveness is supposedly achieved. Once the equivalence of all or most emissions sources is established, transforming carbon into a common currency, all issues of technology, history, and place are conveniently made abstract. Then perhaps, some efficiencies will be attained; but considering that this approach means losing touch with the underlying historical problem of climate and fossil fuels, what is the point?

In the extreme case offsets are introduced, meaning that emissions reductions are made equivalent to everything under the sun, from ocean fertilisation to not riding an elevator. Then, the scope for efficiencies is huge; and of course, there will be no effect whatsoever on climate change.

My final remark is that the whole premise of cost-effectiveness is based on a flawed understanding of the climate science. The Harvard economist Martin Weitzman argued in a recent paper that it would be dangerously misleading to disregard the incredible magnitude of the deep structural uncertainties that are involved in climate-

“The very quest for cost-effectiveness actually reduces the chance that our actions will be cost-effective in the long term.”

Larry Lohmann

change analysis by presenting a cost-benefit estimate for a situation with potentially unlimited downside exposure as if it is accurate and objective.

That is, because of the uncertainty with regard to the risks and effects of the nonlinear impacts known as ‘tipping points’, it is false to assume that some economically optimal, climatically ‘safe’ level of greenhouse gas concentrations or global temperatures could even be calculated, much less follow like clockwork from progressively reducing a cap on emissions.

In summary, trying to achieve cost-effectiveness through trade becomes incoherent insofar as creating the market framework necessary to make sense of the idea of cost-effectiveness entails losing touch with what is supposedly

being costed. Hence, the very quest for cost-effectiveness actually reduces the chance that our actions will be cost-effective in the long term. This is a strange paradox, but a powerful one.

The cost-effectiveness ideology assumes that finding a historical trajectory away from fossil fuels is simply a question of finding the right short-term price for the carbon commodity. That amounts to treating a *Tyrannosaurus rex* as if it were a little kitten. But of course, it should be recognized that the entire agenda of short-term cost-effectiveness is partly based on the idea that it will, or should, be possible to cash in on carbon. This incentive is very real; and we should all be careful not to allow it to dominate scientifically informed discussions on climate change.

Panel conversation and interaction with the audience

Remark. Svante Axelsson. Having spoken again with Ola Alterå in the coffee break, I feel that I should clarify some points about the 100 billion euro figure. Forty percent of that sum is money for offsets; this essentially means funding for the emissions reductions of developed countries, albeit reductions carried out in developing countries. Thus, these forty percent are in fact not additional. Another forty percent are ‘low-hanging fruits’, cheap projects that are in fact paid by developing countries themselves; yet for some reason the EU has chosen to include that figure in its own package. And so, what is left in terms of actual EU commitments for action in developing countries, is the 2-15 billion euro figure.

At least, this was the bottom line of the communication from the European Commission which was published some weeks ago. Most likely, however, that document will form the basis for the overall EU negotiating position on finance over the coming weeks and months.

I also have one more reflection on the feed-in tariff. It struck me that this approach is quite similar to the agricultural policies of Sweden and the EU. As we know, subsidies have been extremely effective – indeed, one might argue they have been only too effective – in boosting the domestic production of agricultural products. This is then yet another area where guaranteeing high prices for producers and low prices for consumers has proved a successful policy; although in this particular case the policies in question have outlived their use and ought to be scaled back. My point is that it works.

Finally, I should point out that in Eva Alfredsson’s presentation there was no mention of the fact that Sweden has shown that it is possible to decouple GNP and emissions growth through strong climate policy. Swedish CO₂ taxes have proved quite successful, allowing us to increase GNP while decreasing emissions. I am sure it would be a powerful combination if revenues from such a carbon tax could be redirected into an investment program. Putting the polluter pays principle at the centre of climate policy implies taxing

emissions. Still, carbon taxes are much less feasible in poor countries; that is why feed-in tariffs are such attractive alternatives for developing countries.

Question. Alan Atkisson, AtKisson Group. I would like the panel to comment on the present state of the world’s dialogue on the issue of growth. We have just had the Stiglitz Commission present its report on rethinking economic indicators, and despite the remarks made by Larry Lohmann, I think few people here would dispute that the developing world needs continued growth in the number of schools as well as other kinds of infrastructure. Still, we need to be able to respond to the likely criticisms of the climate justice movement about promoting a traditional growth agenda.

Generally, there is a tendency to confuse growth in the purely monetary sense with the kind of growth that actually reflects creating more of the things we truly need. In the wake of the financial crisis there were signs of some serious re-evaluation taking place, and the Stiglitz Commission was timely in that sense. But now that dialogue seems to be fading once more into the mist, and I wonder if an opportunity has been missed. That is why I am curious to hear the views of the panel on how the climate problem stacks up to the dialogue on what growth means.

Answer. Eva Alfredsson. This is in fact exactly the kind of issues I was referring to when I mentioned the need to move in parallel, with strong investment in the short to medium term as well as longer term reconsideration and restructuring of the entire economic system. Still, even garnering support for clean energy investments may often prove enough of a challenge. Although it needs to be done, I am afraid that also calling for rebuilding the economic system from the ground up may prove one provocation too many. We should certainly investigate and research the possibilities of moving away from the unsustainable and unequal present growth model, though.

“The institutions that have clustered around the ideology of economic growth for at least the last fifty to seventy years need to be critically examined as part of any attempt to deal with climate change.”

Larry Lohmann

Answer. Tariq Banuri. This question is quite interesting; so fascinating, in fact, that in order for us not to entirely get caught up in it, perhaps it would be best left for another time. I will say this, though. In this century, paradoxically it may turn out that climate change is the easiest of the problems that we will face. Humanity is already hitting against many planetary boundaries, and fast approaching others. At least with climate change, there is a technological solution: once fossil fuels are replaced with renewable energy, it would in fact be possible to grow for quite a long time even within the existing growth model.

However, the other planetary limits do not come with easy solutions, and we will need to adapt our lifestyles, our political structures and the very way we think about growth to live in a steady-state economic system. That challenge is much more complex than the one we face today, though if we manage to solve the climate problem collectively we will at least be left with many tools at our disposal for dealing with the real sustainability problems.

What the WESS report does is only to propose solutions for the after all rather concrete problems of climate change and development. The longer term issues are waiting at the door, at we will need to address them eventually; but I suppose I have to leave something for my daughter to do when she grows up as well!

Answer. Svante Axelsson. The distinction between the short and the long run is useful in this case. In the short run, we need to make the point that ambitious climate policy and growth are not conflicting goals. Again, Sweden is a good example of this. Likewise, the large-scale clean energy investment needed will in fact boost growth rates worldwide. Thus, calling for an end to growth is not constructive, because changing the energy system will in itself generate GNP growth. In the long run, however, I do believe that further economic growth will become an impossibility.

In fact, the entire debate is somewhat confused, because obviously growth for growth's sake is meaningless. After all,

the point of growth is supposed to be that overall welfare increases: but is it not then in fact welfare, and not growth, that should be discussed? We need to start by asking the right questions.

Answer. Larry Lohmann. When it comes to the growth issue, I confess myself slightly more pessimistic than both Tariq Banuri and Svante Axelsson. The historical record is that the emphasis on economic growth has resulted in wider gaps between rich and poor; it has made the poor poorer, it has destroyed certain kinds of knowledge as well as certain possibilities for sustainability. The high-flown debate about the nature of growth, the ideological purposes of how growth is defined and how those definitions could be revised; these issues are not very interesting to me. To some extent, they are simply a matter of semantics.

On the other hand, the institutions that have clustered around the ideology of economic growth for at least the last fifty to seventy years need to be critically examined as part of any attempt to deal with climate change. In fact, if those institutions and their politics are not addressed, we are not going to be able to deal with the problem; or rather, those issues are the climate problem. Indeed, this is not a new problem, but one that has been with us for a long time. It centres on issues of distribution, of struggles, of the dominance of fossil fuels, all of which are of a political nature. If we are to deal with the climate problem, these issues must be put front and centre.

Question. Per Bolund, Member of Parliament for the Swedish Green Party. First of all, I very much agree that a global feed-in tariff system would prove quite efficient. However, I fail to see that it would intrinsically be able to reduce emissions unless it were combined with some mechanism for pricing fossil fuels out of the market. Are there any comments on this?

Also, one implication of the EU communication that was



mentioned earlier is actually that countries in the global South will be forced to start trading in carbon in order to be granted a share of EU funds. At the same time, we know that the EU Emission Trading Scheme (ETS) was extremely ineffective in its first period, and its second-period performance has so far also not been impressive.

In theory, carbon trading is cost-effective and thus very attractive; but in reality it has not yet proved capable of reducing emissions at a sufficiently rapid pace. My second question is this: can the ETS be saved through reform, or would it be better to start again with some other instrument, such as carbon taxes?

Answer. Tariq Banuri. In the Brundtland Commission Report of 1987, *Our Common Future*, there is a passage which argues that although it is not possible to state exactly at what point human society will start hitting against the environmental boundaries of the planet, boundaries there are; and before we reach them, we will need to have achieved equitable access to natural resources. The reason is that once there is equity, the prospects for effective cooperation against common threats increases.

This insight is central to our work. We seek to bring about a transition which will at least mean equitable access to the energy services that are of such crucial importance to the climate issue. Raising the cost of carbon, whether through a carbon tax or through carbon trading, will not be enough simply because it works only by excluding those who cannot afford to pay. This is one important similarity between carbon taxes and cap-and-trade.

In some sense, carbon is life. It is almost as if overnight, water had been scarce. Would any civilised country then consider it a decent solution to tax drinking water, including that of poor people? No; pricing can only be acceptable if you start from a relatively equitable income distribution.

In conclusion, for us at the WESS, imposing a global price on carbon is a viable alternative only at the end of a long process making energy more generally available worldwide.

However, we do believe that the industrialised countries are at the stage where taxes or carbon trading could be utilised, ineffective as it might be.

Apart from the similarity I just mentioned, there is an important difference between taxes and trading schemes, as Larry Lohmann pointed out. To the extent that a very elaborate pricing system obscures reality, it is a serious problem; the financial crisis clearly demonstrated the dangers of having large amounts of resources channelled into an unstable sector of the economy. As a result taxes, as is also believed by many economists, may be preferable to carbon trading.

Answer. Larry Lohmann. I agree; pricing carbon through a tax would have a use, but only at the end of a process involving many other things, such as investment in alternatives to fossil fuels. I should add, however, that there are some additional problems with any carbon trading system involving offsets, and especially with a global carbon market.

Carbon trading will interfere with technical progress on climate change, however one defines that. It gives incentives for delay and actively discourages shifting to a different technological path. Not only does it not support climate-friendly technologies, it actively interferes with the preservation or development of existing low-carbon technologies such as, for example, sustainable irrigation systems in the global South which have been continually improved upon for generations. These long-term experiments in low-carbon ways of life, if you will, are now being actively destroyed by the carbon markets.

Answer. Eva Alfredsson. Like Tariq Banuri, we made the analogy that imposing a global tax on carbon is like pricing air or water. One reason why we are very critical to the CDM is the fact that poor countries do not have any offsets to sell, as they will basically need all their emissions allocations for themselves. They will need to keep increasing their emissions

for some time. The only way around that paradox is, once again, heavy investment.

Still, we argue that carbon taxes do have a part to play, if only in raising funds for investment. Because of the PPP-adjustment issue, though, we do not think that carbon trading will work; in fact, it is wildly inappropriate for the task at hand. At least the magnitude of a carbon tax can be adjusted to local circumstances. Cap-and-trade only benefits countries with high price levels.

I think that some consensus along these very lines has begun to emerge among most researchers that have devoted serious study to these issues. The main obstacle is that conventional wisdom among policy makers is still very much one of single-mindedly promoting industry competitiveness, making a profit off carbon trading, and so on.

In addition, policy needs much more to get actively involved. For a long time, policy makers have been content to take a step back and let the market sort things out; but this crisis is one that markets have proved unable to solve. Policy makers need to step back into the breach and take the lead in designing appropriate incentive structures, regulations and investment policies to deal with climate change.

Answer. Svante Axelsson. My view is that rather than being an economic or a technical problem, at its heart climate change is a distributional problem. That is why a feed-in tariff is so important: it helps to resolve the distributional issues, because it does not rely on having poor countries adopt the carbon pricing approach which in any case only the rich countries can really afford to implement.

But even within Sweden and other developed countries, we need to pay attention to distributional issues. How will policy makers manage to radically increase the prices of electricity and gasoline without losing the support of the electorate?

According to most economists, in theory taxes are the best solution because of low 'transaction costs'. However,

the argument is that taxes are difficult to implement, which means that cap-and-trade works as a second-best alternative. I disagree that carbon trading is ineffective; it does work, but only if the cap is sufficiently low. And this has so far not been the case with the ETS. It is quite possible for an instrument to work perfectly in theory, but be riddled with problems because it has not been correctly or ambitiously implemented.

For instance, even Swedish Prime Minister Fredrik Reinfeldt agrees that carbon taxes are the most effective way of pricing carbon. But how much is he willing to raise those taxes? If the answer is no more than a few öre³, no wonder his policies have little effect. The instruments themselves are only as effective as our targets allow them to be. The real issue, regardless of whether we are discussing taxes or cap-and-trade, concerns how to create broad support for higher electricity and gasoline prices. Personally, I do not doubt that this challenge could be overcome.

As I see it, the main problem with cap-and-trade is the offsets market. This is a purely political construction with no theoretical arguments to back it up. Instead using sectorial carbon trading would make a superior approach, I think, such as creating a global carbon market only for energy intensive industries. Imposing an international carbon tax upon those sectors would in any case prove very difficult. The sectorial cap-and-trade system could then be combined with international carbon taxes for other sectors of the economy.

Remark. Tariq Banuri. I wish to repeat the general point I made earlier: carbon really is life. We are made of carbon; we consume carbon; and we excrete carbon. We have done it for millennia. But it is a closed loop. The thing that changed with the Industrial Revolution is that we started digging carbon out of the ground and burning it. Now some little part of that carbon ended up in the atmosphere, and it is going to kill us.

“The thing is to build confidence that the money put in, [...], is actually put to good use”

Tariq Banuri

But the closed loop of carbon is really what life is about: it is like water. We have a tendency to miss this difference. Poor people’s consumption of carbon is still a closed loop, by and large. It is really the extra amount that we are emitting which causes the problem.

Question. Barbara Evaeus, WWF. I personally find many of the things that I have heard here today very appealing, especially the concept of benefit sharing as opposed to burden sharing, and the proposal for a global feed-in tariff. At the same time, being somewhat of a veteran in all of this, I cannot help but feel somewhat pessimistic, and I am still worried about the financial aspects. The words ‘global carbon tax’ are still taboo to many people, and the meagre funds offered up by the EU are outright scandalous. So how can we actually make this happen?

Furthermore, the concept of linking climate and development, thus hitting two birds with one stone, as it were, is very appealing. But then, is there not a risk that funds that should be dedicated to traditional development aid are instead diverted to climate aid? Or, although we may not wish to admit it, could it be that this risk actually proves to be a benefit in the end? Perhaps it would be correct to view developmental gains as a kind of ‘bonus’ to dealing with the climate issue?

Answer. Tariq Banuri. Will the dollars be there? Of course, we cannot say. Our analysis is simply that the likelihood of the mechanism being well funded is at least much improved, if what is on the table are concrete programs with end results that are likewise concrete and transparent. The thing is to build confidence that the money put in, no matter the ultimate size of those amounts, is actually put to good use in making energy investment happen and in protecting global public goods.

Now, will the funds be additional? Again, we do not know; but as the words ‘new and additional’ are consistently used, one assumes that this will be the case.

I always think of a development analyst as someone who believes that the development problem is temporary; that we will solve it, and that in one or two generations there will be no inequalities between countries of the type that exist today. For renewable energy in particular, we think that a short-term injection of funds as a way of getting over the hump is both possible and desirable. Instead of another poverty trap lasting for a hundred years, let us imagine a ten-year program; and when it ends, we will have solved these problems. That is the idea which I think needs to go to taxpayers and negotiators alike.

Answer. Svante Axelsson. Although the finance issue is of course a major obstacle, I do think that the feed-in tariff concept is a good one. It helps to make headway on three problems at the same time: the climate crisis, the economic crisis of developed countries, and the poverty crisis of developing countries. There are simply not enough resources for tackling each of these problems separately. We need an integrated approach.

Still, we should face up to the fact that consumer patterns will in fact need to change: generating funds for investment means increasing the tax burden on households, and it may also prove necessary to redirect funds from military budgets and other parts of public spending. Again, one way to do so would be through a tax on aviation and shipping. Changing consumer patterns will generate GNP growth; but of a different kind than what we have witnessed so far.

Question. Lovisa Hagberg, WWF. I understand that one of the advantages of the feed-in tariffs would be that similar policies are already in place in many countries. However, I

3. One Swedish Krona is 100 öre.

wonder if there is a need for new institutions, or could the feed-in tariffs fit into the existing global system of governance?

Also, I have a question about land-use change, which is another important and very tricky component of the climate issue. Larry Lohmann has mentioned some of the many challenges in this area; for example, how to reduce deforestation while taking into account different localities, social systems et cetera. In this context, would the feed-in tariffs imply some kind of criteria for ascertaining the sustainability of projects; or is it assumed that this would cause the system to bog down in excessive detail and bureaucracy?

Answer. Tariq Banuri. Certainly, there are some areas where additional criteria would need to be developed: forests, biofuels, hydroelectric power, and more. For instance, the guidelines of the World Commission on Dams have been consistently ignored. But if there is at least a framework for starting up activities in areas where good guidelines are already in place, other things can be added as we proceed.

Answer. Larry Lohmann. Let us not forget that the basic problem concerns fossil fuels. When it comes to land-use change, there is a temptation to assume that dealing with land use is the same as dealing with fossil fuels, because in both cases emissions could be reduced. But it is not. Many farmers and forest dwellers in the South recognise this and consequently oppose schemes designed to incorporate for instance forest conservation into climate investment plans or carbon markets.

Question. Anders Friström, Sveriges Natur Magazine. A question for Mr. Tariq Banuri. You argued that the feed-in tariff system must be of a global scale in order to work properly. But in practice, how global would it really be? I understand that a global financial framework is necessary,

but still, would this system not in large part need to be run nationally? In my mind, the potentially largest weakness of your proposal is that it requires building up the institutional competence of national electricity utilities, which in many cases is sorely lacking. Can they actually handle such a system?

Answer. Tariq Banuri. Clearly, every idea does need some institutions. Still, our view is that overall, the feed-in tariff is really institutionally light. It is true that institutional capacities vary across countries, however implementation of the global feed-in tariff system will most likely begin in areas where institutions are already well developed, countries that have already started to invest in renewable energy.

Our understanding is that there are national institutions capable of rising to the task, and in any case that the global feed-in tariffs should only form a supplement to what national governments are already doing. National institutions would need to be supported and strengthened, yes; but crucially, it would be in the own interest of governments to link those institutions to a global program.

Regarding what specific institutional shape the system might take, again, there are several possibilities. It could be placed directly under the UN Climate Convention, or it could perhaps form part of the International Renewable Energy Agency; I basically have no view on this. I will simply stress an institutionally light, output-based approach as appropriate.

Answer. Eva Alfredsson. We need to focus on getting the resources for making this happen; my view is that institutional issues are secondary. We also need to realise that there is no role model in this case. Sweden may be the world leader in reducing emissions while improving welfare, but that feat is due to nuclear, hydro power, and biomass, all of which are policies will not be easily copied by other countries.

“ But first, find real solutions that work; then focus on designing institutions for putting them into place across the world. ”

Eva Alfredsson

Again, we need to invent a new development path. Because technology is global, other countries will follow once we manage to construct an advanced energy system where per capita emissions, which is the most relevant metric, are low. The problem is the pace at which we will need to proceed. But first, find real solutions that work; then focus on designing institutions for putting them into place across the world.

Remark. Larry Lohmann. I find that much of today’s seminar has stressed listening to people in the global South concerning where and how investments need to be made in order to solve the climate problem as well as the challenges of what has been referred to as development.

On the other hand, it is always a good thing to allow for some nuances and to ask ourselves: when we listen to voices from the South, which groups do these voices actually speak for? Everyone would perhaps agree that investments in affordable renewable energy are important, but to a large degree, it is actually the elites of the South that are most

strongly making this demand. While important, there are other also voices that one should pay attention to.

What I have noticed about some of these other groups – activists, NGOs, ordinary villagers – is that when one asks them what they think about climate change and investment, often their first priority is not in fact massive transfers of energy investment from North to South.

They might agree with that to some extent, of course. But what they really want is for investment to happen here, in the North, to make sure we get off fossil fuels as soon as possible. That way, not only would they benefit directly from the action taken, but they would also face less risk from the kinds of impacts that tend to result when there is massive North-to-South investment and ‘transfer of technologies’. In addition, they would face less risk of having their struggles against their own elites undermined.

These voices also need to be heard and heeded; although our goals of eliminating the inequalities between the North and the South are justifiable, we need to be very careful about which groups in the South we choose to listen to.

Participants

Eva Alfredsson

works as a senior analyst at the Swedish agency for growth policy analysis where she is responsible for analyses within the area of sustainable economic growth and development. Recent work include the much debated *How to reach both climate policy goals and good economic growth*, and a study on the service sector which explains the ‘service sector paradox’ i.e. why a transition towards a service economy have not reduced material flows.

Ola Alterå

is State Secretary at the Ministry of Enterprise, Energy and Communications in Sweden. His background includes studies in Engineering Physics at Chalmers University of Technology. As Secretary General for the Centre Party, Mr Alterå initiated a reform process in terms of politics and organisation. In order to put into practice one of his core interests, Renewable Energy, he then moved on to a position as the Managing Director of the Swedish District Heating Association. Since 2006, he holds the position as State Secretary with responsibility for Energy, State Ownership Policy, Primary Industries and Sustainable Development.

Svante Axelsson

has been Director of the SSNC since 2000, having previously worked at the Swedish Society for Nature Conservation (Naturskyddsföreningen) as environmental economist and as head of the Environment Department. Svante Axelsson developed environmental economics as a subject at the Swedish University of Agricultural Sciences, 1988-1993, and he has been a pioneer in developing ideas around a tax shift from labour to environmentally damaging activities in the economy. His work at the SSNC covers a broad range of environmental issues, but has a strong focus on climate change.

Tariq Banuri

is Director for the UN Division for Sustainable Development. Prior to taking up the UN position he worked with the Stockholm Environment Institute where he headed the Asia

office, and later became Senior Fellow and head of the Future Sustainability Program. Banuri has extensive experience from the interface between policy, research and practical work on sustainable development and the integration of climate change and development. He has played an important role within the IPCC, where he coordinated the chapter on sustainable development in the third assessment report and contributed to the chapter on equity and social justice in the second report. He did his PhD in economics at Harvard University and founded and directed a policy think tank on sustainable development in Pakistan prior to joining SEI.

Larry Lohmann

works with the Corner House, a small research and solidarity organisation in the UK. He has worked on a broad range of issues, including climate change, racism, forest conflicts, development and the politics of cost-benefit analysis. In recent years he has focused much of his work on climate change and critical analysis of carbon trading. He was the lead author and editor of the Dag Hammarskjöld Foundation publication *Carbon Trading: A critical conversation on climate change, power and privatisation*, which has been downloaded in more than 500 000 copies. He is currently examining the potential impact of carbon trading on the financial markets and new speculative bubbles.

Moderator

Niclas Hällström

works as expert on climate at the SSNC International Department, focusing on policy issues connected to climate and development. Before joining SSNC in 2008 he worked with the Dag Hammarskjöld Foundation for many years, and, before that, was part of creating the Centre for Environment and Development Studies (Cemus) in Uppsala, where he still teaches. He is presently setting up an independent initiative – “What Next?” – in parallel to the work on climate.



Swedish Society for Nature Conservation

Extract from Key Issues for
Climate Change seminar no 9

Visions and solutions: Ambitious emissions reductions and a Green Energy Revolution

At the final seminar in the 'Key Issues' series 2009, taking place at the COP15 itself, the ideas of a bold investment approach to climate and development – a green energy revolution through global feed-in tariffs – was presented and discussed. Here follows an extract from the full seminar report – highlighting an overview presentation of the approach and supportive comments and reflections from the very prominent panel.

16 December 2009, COP15, Bella Center, Copenhagen

Participants: Alan AtKisson, President, AtKisson Group, Svante Axelsson, Executive Director, SSNC, Tariq Banuri, Director, United Nations Division for Sustainable Development, Thomas B Johansson, Professor, International Institute for Industrial Environmental Economics, Emma Lindberg, SSNC, Nebojša Nakicenovic, Deputy Director, International Institute for Applied Systems Analysis, Sunita Narain, Director, Centre for Science and Environment, Johan Rockström, Executive Director, Stockholm Environment Institute, John Schellnhuber, Director, Potsdam Institute for Climate Impact Research

Moderator and project coordinator: Niclas Hällström, SSNC

The full report can be downloaded at www.naturskyddsforeningen.se/keyissues9

“How can climate policy and investment in renewables be redefined as a potential win-win situation rather than a zero-sum game?”

Alan AtKisson

Alan AtKisson

Global feed-in tariffs and a Green Energy Revolution

I will now try to give you all a sense of one possible strategy for addressing climate change. There are of course many dimensions to the problem, ranging all the way from adaptation to forest conservation. I will deal only with the energy dimension; still, as I am sure you would all agree, this is a crucial one.

Now, the work that I am presenting today at the request of Tariq Banuri of the UN Division for Sustainable Development is based on a very comprehensive report, the World Economic and Social Survey (WESS), which is put out regularly. Its most recent version focused strongly on the energy-development-climate nexus and on pathways to a renewable energy future that meet several needs at once, including ending energy poverty.

Having not participated in carrying out the analysis itself, I can afford to compliment it: the WESS report contains one of the most comprehensive modelling approaches I have ever seen, taking a very hard look at what impacts an energy transition would have on economies and per capita incomes worldwide, in addition to actual effects on emissions.

However, the key insight is that a shift is needed in how we think about mitigation of climate change. That is, how can climate policy and investment in renewables be redefined as a potential win-win situation rather than a zero-sum game?

Now, at the UN Department of Economic and Social Affairs (DESA) our job was to take the very thick WESS report and condense it into a strategic policy roadmap for scaling up renewables investment globally, quickly, and more importantly, sustainably. We have taken the currently available analysis and figures, compared those with the needs as dictated by science, and tried to provide a way forward in concrete policy and investment terms.

We asked: how can self-sustaining virtuous cycles of investment, reinvestment and expansion be created that quickly bring down the price of renewable energy to the three to five cents per kWh which entails global affordability? I will soon take a closer look at why that question is essential to ask.

But first, some background information. As many of you are probably aware, some 1.6 billion people still have no access to electricity; 2.4 billion cook using firewood or dung and are thus exposed to dangerous levels of indoor air pollution. Yet ninety percent of the future energy infrastructure in such countries is

going to be built in the period between now and 2050. As a result, the opportunity to steer the energy markets of developing countries into renewables is huge; and it will either be one that we miss, or one that we grab.

To succeed, we need to take a hard look at how to push down the price of clean energy. Of course, prices are already falling and dramatic technological advances are being made in places like China, where solar energy companies have now three times revised their estimates of when they will achieve price level targets. Yet despite this, even under the most optimistic projections prices are not going to fall fast enough to be consistent with staying below two degrees.

Thus, left to itself, we know for sure that the market will not provide this. One example is given by a recent comprehensive study from the UK Committee on Climate Change which examined market mechanisms designed to support renewable energy and reduce emissions. Now, these mechanisms had been left to their own devices, if you will; and it turns out that they had achieved only thirty to thirty-five percent of what was needed during the period under study. Policy is necessary; and that means subsidies as well as steering the development of the energy infrastructure.

The key to lowering the price of renewable energy is scaling up its production. With expanded production, economies of scale and learning-by-doing are unleashed. This is the leverage point that we will need to push hard on, globally. It will not take us all the way, but this is one key puzzle piece that we need to consider.

When it comes to getting this job done, feed-in tariffs are pretty much the only credible policy mechanism out there – in my mind, at least. In case you are not familiar with them, they are a guaranteed price for renewable electricity development. Producers building for example a solar plant or a windmill are paid a price for delivering electricity to the grid, and this price is preset, guaranteed, by the government.

More than fifty countries have already implemented feed-in tariff schemes, and even more are about to. South Africa and India use them; China has only recently expanded its feed-in tariff policies; and, in another side event on technology transfer I heard from UNEP Executive Director Achim Steiner that within six months of establishing a feed-in tariff system, Kenya had secured financing for a 350 MW wind plant which would

“A figure somewhere between 100 and 150 billion USD per year, over a period of roughly fifteen years, would be enough to achieve in time the goal of pushing down the price of renewables to affordability.”

Alan AtKisson

increase total national electricity production by roughly twenty-five percent.

There is exceptionally good data on this, some of which comes from my fellow guest speaker, Thomas B Johansson. The figures show that feed-in tariffs are head and shoulders above all other policies when it comes to results: they are something like seven to eight times more effective in terms of installed capacity.

The strategy embedded in the WESS report, which we have been laying out more clearly in policy terms, basically involves front-loading and rapid scale-up of investment in renewable technologies. This happens through an international investment fund, with national governments overseeing and managing inputs to their economies.

It would not be a global program in the sense that it would have a unified structure; however, it would have to be globally coordinated in some fashion to make sure that funds are channelled to the right places at the right time. In any case, as we have seen most recently in Kenya but also in countries like Germany and Spain, once the feed-in guarantee is in place, public and private financing will follow suit.

The beauty of the feed-in tariff approach is that the subsidies are gradually phased out over time. In our report we have not specified what level of investment will actually happen, because that is a political decision hinging on what happens here in Copenhagen and in the months and years to follow. Nevertheless, by our calculations a figure somewhere between 100 and 150 billion USD per year, over a period of roughly fifteen years, would be enough to achieve in time the goal of pushing down the price of renewables to affordability.

Yet it is absolutely critical that we do not fall into the trap of putting the investment plan on hold until those amounts have been secured. This should happen at whatever scale is currently politically acceptable, regardless of whether it is physically sufficient to achieve climate stabilisation.

Finally, let us then run through the eight key features of our proposal. One: set clear targets for the cost of renewable energy. In order words, it should be clear that the explicit point of the program is to push energy costs down to a certain level; ideally, somewhere between three to five cents per kWh. That is global affordability; that ensures that wind or solar is no longer a luxury good in rich countries, but one which people in places like Pakistan or Kenya can afford as well.

Two: the level of the feed-in tariffs need to be based on the best estimates of what will happen to the price. Already costs are declining very rapidly. Thus, it may be that our projections are overly conservative. It is possible to imagine a scenario where, once investments get underway, costs are brought down even faster than expected, so that the subsidies can be phased out ahead of time. In any case, the bottom line is that the feed-in tariffs are not some open-ended process of financial transfers, but a time-limited investment in achieving a specific result, namely that of making renewables affordable.

Three: for each country, figure out what they can and should be contributing to the feed-in subsidy. Also, insure that all countries have the help that they need for bridging the gap between what they can afford and what they need to achieve in terms of improving energy access and/or reducing emissions.

Four: establish a global investment fund for renewable energy. Again, this is a time-limited initiative which will only exist for the fifteen or twenty years necessary to get the job done, depending on how quickly investment is scaled up.

Five: provide the additional support that least-developed countries need with grid expansion, capacity building, research, information sharing, and so on; insuring that they can keep up in the race to roll out renewable energy.

Six: create mechanisms to serve off-grid communities, to insure that energy can be accessed by everyone rather than just those connected to the grid.

Seven: in support of the investment program, initiate a rollout of innovation centres and a kind of global ‘Conservation Corps’. As you may know, the agricultural Green Revolution involved a rapid and rather comprehensive range of policy support, financing, and research institutions that all supported farmers and policy makers in making reforms. I recognise that not all support the actual content of the Green Revolution, but the mechanisms certainly worked; and we need something similar today. The ‘Conservation Corps’ would provide opportunities for idealistic young professionals, for skilled retirees, and for working people in relevant countries to contribute as renewables are rolled out.

Finally, eight: develop an institutional architecture. This being an object of political negotiations, our proposal was primarily concerned with fairly new institutions, although in relation to existing ones. In any case, we did identify a need for some kind

of accountability mechanism. Given that we will in essence be buying renewable energy futures for the world, we have to be able to see clearly the returns on that investment.

In short, that is the roadmap. Again, by our calculations we are looking at a total of 1-1.5 trillion USD over the course of ten to twenty years, depending on how fast investments are ramped up. Now, that buys energy affordability. That buys the end of energy poverty: an energy market where renewable energy is the default option for energy build-out. That buys a market supporting the additional and complementary research and development which we need on things like storage technologies to solve the intermittency problem.

Speaking of which, just last night I heard of a new technology in California using melted salt for energy storage in solar concentration PV plants; the salt stores the heat overnight, then drives a turbine together with a little bit of natural gas to yield baseload solar electricity.

Technologies like this are coming, and with a massive expansion program they will get here even faster. This is the magic of scale economies. In order to take off, however, it needs a major investment push from the world as a whole, with the understanding that we will be buying a renewable energy future. We will not just be buying time to avoid an undesirable future, but rather buying our way to the desirable one.

Summing up, we propose a major investment push that will require significant funds in the short term but which also offers tremendous returns. As renewables scale up, technologies improve, standardisation occurs, markets expand, revenues increase, and user costs fall. All these elements combine into one great virtuous cycle with immense spin-off benefits to the world as a whole. Regardless of what comes out of Copenhagen this week, we believe that this is a plan worth putting force behind, as well as energy into – if you will pardon the pun.

Reflections from the panel

Nebojša Nakicenovic

I have to say that I agree with almost everything I have heard so far. John set the stage quite well by outlining just how deep we need to bend the emissions curve: we have only around a thousand Gigatonnes of CO₂ equivalent emissions over the next fifty years. Interestingly, that is on about the same order of magnitude as total cumulative emissions since the industrial revolution. Thus, in a sense we are only halfway through the fossil era – or at least, the emissions era, if you think that emissions can be somehow offset.

Being then already halfway down the path of dangerous climate change, we really have no time to lose. Johan provided an excellent account of the boundary conditions of that process, and we have heard about some possible solutions in the shape of green investment and feed-in tariffs. Yet trying to find the way forward, putting all these parts together, I find that in many ways we really have to rethink everything that we have been doing so far. We are talking about a grand transformation here, a completely new path and paradigm for development with much less emphasis on consumption and much more focus on efficient and clean technologies.

I would like to highlight two key components of such a new development path, features that in my mind have also been central to today's presentations. Number one, as we have heard from John and Johan, decarbonisation. The future economic system cannot include carbon technologies. At the very least, we must find ways of capturing carbon rather than emitting it to the atmosphere.

Number two, green development. I do believe the crucial issue in this context is access. At least one third, if not half of the global population have not really benefited from the first thousand Gigatonnes of emissions. We should view the next thousand as a cumulative investment in bringing development to the people who are currently still left out.

I would like to briefly mention a few numbers before concluding. First, let us put the challenge into perspective: can it be done? I think the answer is yes, provided of course that we have the will and the right institutions in place. Current energy investment is anywhere between five and six hundred billion a year. This year, because of the economic downturn, the true amount is likely near the lower end of that range. But the global economy as a whole is on the order of fifty trillion, making energy

investment a comparatively small amount.

Interestingly enough, between two and three hundred billion are put into energy subsidies. Thus, as I understand it, the global feed-in tariff is really about redirecting the massive subsidies going into conventional energy systems into building a green development path. And again, I think it can be done and that the formula for success is clearly provided in the DESA report.

So, let us keep in mind the three hundred billion figure for annual energy subsidies. I think no more than half of that amount would be enough to solve all issues of access. One hundred and fifty billion USD is a very small amount: one tenth of a cent, if you will, of every dollar of total energy value-added. Even back-of-the-envelope calculations show that this would be enough over the next twenty years to provide electricity connection to all of the five hundred million households that currently lack access. One could even provide essential fuel access as well.

As I said, let us keep this in mind. Now, how much would today's proposed investment program cost? Most probably, also around one hundred and fifty billion annually. In the WESS report, for instance, there is an estimate that the total cost of lowering the price of photovoltaic solar is roughly one trillion. Taken over the course of twenty years, the annual cost would then be no more than fifty billion. Of course, one will also need to support clean technologies other than solar PV. Yet, even if we assume that we need feed-in tariffs for four or five different technology systems – or perhaps six or seven, to hedge for the risk that some technologies might not succeed – annual cost will probably not exceed one hundred and fifty billion. Thus, I would argue strongly that it can be done.

Finally, I would like to highlight one point that perhaps was not clearly made in the presentation. As we heard, by investing in a feed-in tariff system, we will be improving new technologies and reducing costs. I would like to stress that, although an uncertain process, this is not something that has never been done before. In fact, it is a situation in which we have found ourselves many times before. When cars were introduced, they were more expensive than horses. When digital watches first arrived on the market, they also were much more expensive than their analog counterparts; and it was the same with jet engines and propeller aircraft.

There really are hundreds and hundreds of examples; all successful technologies have undergone this process of driving

“The global feed-in tariff is really about redirecting the massive subsidies going into conventional energy systems into building a green development path.”

Nebojša Nakićenovic

down costs while developing superior quality – which, in our case, would be decarbonisation and environmental sustainability. The feed-in tariff, I believe, is one of few instruments that can very strongly drive market access for new technologies as well as research and development. Aggressive investment in the short term can indeed be a profitable course of action in the long term.

Thomas B Johansson

I too agree with much of what I have heard here today, and I think these issues are extremely important. It also seems to me that one of the most promising aspects of the investment proposal is that it is a big-push strategy for meeting multiple objectives at once. It is not just about climate change mitigation.

What this means is that once you start taking action on renewables or energy efficiency, benefits can be expected in all of the multiple areas. The importance of such a structure for a successful outcome in the negotiations cannot be overstated: while the argument for adopting the program will not be the same everywhere, there is at least some benefit to be had for every single constituency. And of course, one benefit is shared by all: that of climate mitigation.

One of the beauties of feed-in tariffs is that they are relatively inexpensive, yet produce substantial results. The experience with feed-in tariffs in countries such as Germany and Spain was that these policies fostered very impressive growth. In Germany, the 2010 target for renewable electricity was exceeded already two years ahead of schedule: generation from renewables is now way beyond the original forecasts.

With the other main approach to supporting clean energy – certificate systems – that could never happen. Certificates encourage no growth whatsoever in renewables beyond the target that is set. Given that the situation we are in calls for very large investment over a very short time, I think it is only prudent to go for policy mechanisms that potentially could deliver beyond targets. After all, there is no such thing as going too quickly in this energy transformation.

It is also worth pointing out that feed-in tariffs have performed admirably not only in industrialised countries, but in China as well. As you know, China has doubled wind energy investments every year for the last five years. This has been achieved largely thanks to a feed-in mechanism.

Finally, a few comments on the issue of energy poverty. Energy access, in my mind, specifically concerns access to modern and affordable technologies. Now, such access is only a starting point, a necessary requirement to get going. It is not sufficient because you also need various end-use appliances ranging across illumination, refrigeration, information, and a whole set of income-generating activities. It is only the first step in the complex process of making real development take off.

Access to electricity is clearly key to the part about income generation. But what about clean cooking fuels and all the rest? This is in fact one area where energy investment would yield immense co-benefits. Currently, women and children in five hundred million households across the globe spend a great deal of their time gathering firewood for cooking, exposing themselves to vast amounts of indoor air pollution in its use. This gives rise to serious health problems and premature deaths; thus, the health and development argument for addressing energy use in these places is just as strong as the environmental one.

In addition, it turns out that when woodfuel is used, usually the conditions are so poor that incomplete combustion tends to occur. This results in emissions of various by-products including black carbon – that is, soot – further exacerbating global warming.

So, what can be done to solve such health and development problems? One solution is biogas production; this has seen large-scale implementation in China, Nepal and elsewhere. Another is using alcohols for cooking; here, there are links to biofuel production. And one might also go for fossil fuels, such as in South America, where liquefied petroleum gas is used very extensively. Before any of you complain that fossil fuel use is not an option, let me add that the warming potential of soot implies that even turning to fossil fuels will actually significantly reduce greenhouse gas emissions from cooking.

In closing, I would like to applaud this investment-approach initiative. I do hope it gains political support.

John Schellhuber

It really is bizarre, would you not agree? Here we are, talking about forty percent reductions and all the right things, while all across the rest of the conference centre it is all noise and no action. ‘Real’ politics, it seems, does not take notice, though it should. Indeed, these issues should be discussed in the plenary.

“One of the most promising aspects of the investment proposal is that it is a big-push strategy for meeting multiple objectives at once. It is not just about climate change mitigation.”

Thomas B Johansson

Concerning the feed-in tariffs, yesterday evening I attended a dinner roundtable discussion – although I believe the table was in fact square – organised by the Worldwatch Institute. The topic was, how can the EU, the US and India work together? A somewhat patronising tone pervaded much of the event, as the people from the EU and US kept thinking along the lines of what they can do for India; whereas I kept trying to reverse the order, to get them thinking about what India can do for us. Actually, I believe India can be a role model.

Now, I made the proposal that the US and EU might finance a feed-in tariff for India, accelerating the transition to sustainability and helping India to leave the rest of the world some environmental space by tunnelling, as it were, through the Kuznets curve of carbon emissions. That was my proposal. Considering I am a physicist, it was of course a very naïve suggestion which no one present resonated with and which in all likelihood will fall flat. Yet I personally think it would be the right thing to do.

Sunita Narain

Like the other panellists, I totally agree with this approach. In India we have been raising the same points that John made so eloquently today: the carbon budget and emissions space is limited, and we all need to share it. In order to do so equitably, it means that the North has to cut emissions very rapidly. The responsibility of the South is to start making the transition. Moreover, it needs to do so in a way that it is possible for the North to pay for green investment in the South. The transition will need to be fast enough so that the South no longer needs to pollute in accordance with its fair share of the carbon budget. The South has a right to pollute, yes, but the Earth does not have the space for such further pollution.

Thus, the North will have to pay the South to make the transition. To me, this is the most logical approach to solving the problem; and I used to think that this is what we have been negotiating over the last two years. Now, however, I am starting to think that after Copenhagen all of us should reconsider whether the dialogue of the past years has not after all been one of the deaf and the dumb.

Now, unless we wish to remain at the kindergarten level, we must know that the only way forward is to create an enabling framework that allows the North to reduce emissions while at the

same time the South also makes the transition.

I believe feed-in tariffs will be an integral part of that framework. I was not present at the workshop John mentioned, and thus cannot comment on the specifics; however, I do think that the rest of the world really has no clue about how far ahead the developing countries really are willing to move, and are already moving. I am a member of the Indian Prime Minister's Council on Climate Change; two years ago, after thorough internal discussions we agreed to undertake a 'Solar Energy Mission' to increase the amount of solar energy in India. There was enormous excitement. The first concrete figure we came up with was a grand one: a goal of twenty thousand MW of solar energy by 2020.

Then we all sat down together in a newly formed subcommittee to come up with the hard numbers of how to make it happen. After all, forming a target was only a start. The real question was, how would India afford such a transition? And our calculations gave a very clear answer: India would not. As has been argued, really the issue is affordability. No one in India is opposed to solar; no one is saying that this transition is undesirable. We know that there are tremendous opportunities, that there are large parts of the country that are not connected to the grid and thus have the potential of leapfrogging the fossil trajectory altogether. No one should be preaching to us about solar energy.

Yet we need to actually make it work. To me, that is the issue we should be discussing today as a global community. There are constraints to how much energy supply a country can afford. I come from a nation where sixty percent of the population have no energy access. Energy supply is a major challenge; and if you want to increase access, you simply cannot have unaffordable solutions that by their cost limit access even further.

For every kWh of conventional energy, households pay three Rupees fifty. By comparison, the solar feed-in tariff we were setting was seventeen Rupees fifty per kWh. I do not know what this makes in Euros or dollars; just consider the difference. That is the price which would make solar energy not just competitive, but profitable. That is the price we would need in order to kickstart the transition, yet someone will have to pay for the price gap.

Once we performed cost calculations, including an assessment by the Ministry of Finance on how much could actually be allocated to the Solar Energy Mission, we found that the level of

“I do think that the rest of the world really has no clue about how far ahead the developing countries really are willing to move, and are already moving.”

Sunita Narain

ambition had to be reduced. As of right now, our objective is to produce one thousand MW between 2010 and 2013, and four thousand MW from 2014 to 2017. Now, this is not bad at all; for a poor country like India to pay the full price differential between conventional and solar energy is a major step.

However, this is the reason why the German approach does not work in India. Germany can afford to pay the full price differential because it has large numbers of paying consumers; the difference in cost can be distributed all across the paying population. India does not have that kind of market structure.

We hope that even with the targets we have, two things could happen. Firstly, in the Mission statement it says that if there is a global fair deal on climate, the one thousand MW target could be ramped up to four thousand. This means that the remaining three thousand MW would in effect be paid for through a kind of global feed-in tariff, because a fair deal would include some manner of transfer from the North to the South.

Secondly, in connection to setting our deadlines and targets we also state that the learning curve of solar technologies may perhaps be steep enough as to allow prices to become competitive before 2020. That is, the cost of our feed-in tariff policy may drop in the future as the price gap between clean and conventional energy narrows.

This is the scheme that, as of right now, is being given the go-ahead by the Indian cabinet. However, the bottom line is that our capacity is limited unless there is a global fair deal in which the North agrees to pay, through a global feed-in tariff, for the transition of the South.

John Schellnhuber's figures on the immense scale of the challenge should really frighten us all. Our response, in the shape of a global fair deal, needs to be on a sufficient scale; yet I am sorry to say that the pitiful amounts and promises that are on the table right now are not.

Svante Axelsson

Elaborating on how to make this thing take off, I would argue that the main challenge is cleverly framing the argument. We all know the poor proposals and alternatives that are out there; in order to eclipse them, we need to sharpen our thinking and our arguments. For instance, the idea of climate policy as 'burden-sharing' is misleading and counterproductive; in reality, it is all about benefit sharing. The easiest way to influence policy is

probably to challenge how the issue is being framed by politicians and others; to change their mindset.

Another way to gain support, I believe, is to combine responses to several crises. By combining into a single package efforts on the three problems of eradicating poverty, tackling climate change and stimulating the economy we will be moving beyond burden sharing and creating strategies for win-win-win solutions. A global feed-in tariff would do just that. As we have heard, it would it work to speed up the price fall in renewables. But what I find most interesting about it is how it would fight poverty while at the same time providing strong incentives for investors. High prices for investors, low prices for consumers: that is the crucial element.

Let me also suggest one way to finance such a 'Global Marshall Plan'. There are many options relying simply on enforcing the Polluter Pays Principle and collecting so-called double dividends: when taxing emissions, the one benefit comes from the resulting emissions reductions, and the other from tax revenues. For instance, the aviation and shipping sectors are both currently untaxed. If bunker fuels were to be regulated, perhaps twenty or thirty billion USD could be raised annually: a sizable chunk of the funds necessary for a new Marshall Plan. Public consumption patterns also need to change; taxes need to be used in new ways.

From now on, let us talk about investment rather than costs. After all, this is a recipe for a new kind of economic growth that takes us in the right direction. And let us promote policy packages that win allies in as many places as possible. We know enough about the crisis already; the rest is all about framing the issue and finding the package.

Tariq Banuri

I firmly believe that John Schellnhuber's points about a limited carbon budget are true. Still, when dealing with complex problems, how one chooses to look at them makes a very real difference for the solution one finds. I often give the example of how during the Great Depression, economists would be advising countries to increase savings rates based on a certain framework for looking at macro-economic problems. And then John Maynard Keynes came along with arguments for other ways of looking at things. He did not change the facts, but he interpreted them in a different way which turned out to be quite helpful.

“It is not actually a question of burden-sharing, but of investment. You incur expenses today that result in benefits tomorrow.”

Tariq Banuri

Similarly, we argue that an exclusive focus on the fixed nature of the carbon budget will invariably lead to conflict over its allocation. Moreover, if nothing is done to change our energy infrastructure, the fixed carbon budget translates into a fixed energy budget. We would then have to fight each other over energy. Our approach is different: we ask, would it be possible through investment to expand the energy budget without affecting the carbon budget? That is, can we convert this problem from a zero-sum to a positive-sum game?

The next step is to find a strategy. What can be done to start off a process that is self-sustaining? An analogy is that if you want to carry water uphill you can put it in a bucket and start walking; but it will not flow uphill by itself. There are a lot of mechanisms out there that are like carrying water uphill: a constant effort being done one percent at a time, or one bucket at a time. Yet the system we should be looking for ought to be more like opening a sluice and letting water flow downhill, carried forward only by the force of gravity. We need a mechanism whereby things start moving by itself.

How can this be achieved? Let me put it this way. There are two main energy approaches on the table here in Copenhagen. One is to make renewables competitive by raising the price of fossil fuels. The problem is that such an approach will devastate developing countries. They cannot afford even current conventional energy prices. Sunita gave an excellent example. If electricity costs eight cents per kWh in a country where per capita income is two dollar per day, and an average individual spends ten percent of income on electricity, how much could she afford? Only two and a half kWh per day; and by any calculation, in order to have a decent standard of living I am willing to bet you will need at least ten per day.

In order to bring electricity use up to that level, we will need to pursue the other main approach, which is lowering the price of renewable energy. This is best done through investing in the expansion of capacity, which in turn is most easily achieved by setting up some kind of global system.

It is not actually a question of burden-sharing, but of investment. You incur expenses today that result in benefits tomorrow. Industrialised countries need to reduce carbon emissions rapidly over the next forty years, to an end state which is as close to zero emissions as possible. If the cost of renewables come down to three cents per kWh, one dollar per W, it would be

a 75 percent cut from the four dollars per W price prevailing today. And the investment can be made anywhere needed.

Solar energy, as Sunita explained, costs seventeen Rupees fifty, which is roughly forty cents per kWh. On two dollars per day, how many kWh could you afford? Half a kWh. Governments could support renewable energy to some extent, true; however, they do not have the resources to expand capacity fast enough.

When we put together the WESS report, it was a stated aim to make the analysis as conservative as possible. That is, we tried to find the maximum subsidy cost of making renewables competitive. The figure we came up with was a total cost of 1400 billion dollars. I should point out, however, that my own personal estimate is much less. As incomes rise, the level to which energy prices need to drop also rises; thus, as countries develop, less subsidies will be needed. Within five years, no more subsidies for middle-income countries will be needed; within twelve to fifteen, not even for low-income countries. My own feeling, looking at the potential of many clean technologies, is that probably the total cost will not exceed 1000 billion USD, spread over ten to fifteen years.

The Centre for Global Development in Washington, D.C. has just done a study on concentrated solar technologies; in it, they argue that once capacity hits twenty thousand MWs, the price will come down to the competitive level of seven to eight cents per kWh. According to them, the extra funds needed for such a push would be only about eighty billion USD, which is notably less than the 1000 billion dollar figure.

In summary, this can be done at costs very much on the same order of magnitude as the amounts that policy makers and negotiators are already discussing. However, it needs to be viewed as an investment, not a burden. Consider the example of mobile phone producer Nokia. They ran a deficit for the first twenty years of their business; had they lost heart at that point and given up, they would obviously not be the world leaders that they are today. We similarly need to run a deficit for the first ten years in order to profit in the future.

”Så löser vi knäckfrågan inför Köpenhamnskonferensen”

”Ny FN-plan läggs fram i Stockholm i dag: Enkel metod löser problemet med finansieringen av klimatinsatserna i utvecklingsländerna.”

Publicerat på *Dagens Nyheters* debattsida 2009-10-12

FN presenterar i dag ett förslag på en Marshallplan för klimat och utveckling. Idén är att bekämpa fattigdom samtidig som utveckling av billiga solceller och energieffektiva lösningar påskyndas. Principen är enkel och beprövad. Genom att ge ett garantipris i u-länderna för förnybar el kan investerare räkna hem en vinst som de inte skulle kunna göra om de konkurrerade på marknadsvillkor. Samtidigt får även fattiga länder och människor råd att betala för denna annars dyra energi. Skillnaden i pris är en subvention som bekostas av industriländerna via en global energifond, skriver FN:s klimatansvarige Tariq Banuri och Naturskyddsföreningens Svante Axelsson.

I december ska klimatförhandlingarna avslutas i Köpenhamn. Men än så länge befinner sig förhandlingarna i ett dödläge. En knäckfråga är finansieringen av de stora investeringarna som krävs i u-länderna för att ställa om till ett klimatsmartare samhälle. Eftersom u-länderna redan står för hälften av de globala utsläppen ligger det i den rika världens direkta självintresse att stödja omställning och se till att den börjar så snart som möjligt.

Enligt en FN-rapport kan det behövas flera hundra miljarder dollar per år, en Marshallplan för klimatet av sällan skådat slag. Hittills har i-länderna varit mycket motvilliga till att lova några större summor. EU-kommissionen har föreslagit att EU bara ska stå för 2–15 miljarder euro per år.

I morgon, tisdag, presenterar FN:s kommission för hållbar utveckling vid FN i New York, ett mycket konkret förslag på hur en Marshallplan för klimat och utveckling kan utformas. Men redan i dag presenterar vi förslaget, dels här på DN Debatt och dels på ett seminarium i Kulturhuset.

Planens grundidé är dels att skapa en enorm efterfrågeboom på både små- och storskalig hållbar elproduktion i hela världen och dels ge elförsörjning till de två miljarder fattiga människor som i dag står utan. Detta skulle bli en grundbult i fattigdoms-

bekämpningen och samtidigt påskynda utvecklingen av billiga solceller och energieffektiva lösningar.

Principen är enkel och beprövad. Genom att ge ett garantipris i u-länderna för förnybar el som levereras kan både privata och offentliga investerare räkna hem en vinst som de inte skulle göra om de konkurrerade med fossil energi på marknadens villkor. Samtidigt kan denna annars dyra energi säljas till konsumenter för ett pris som även fattiga människor och länder klarar av att betala. Skillnaden i pris är en subvention som bekostas av industriländerna, enligt principerna i klimatkonventionen. För att införa systemet på global nivå, behöver världens länder komma överens om att betala för det till en global energifond, menar FN-rapporten.

Dessa så kallade feed-in-tariffer eller garantipriser har redan använts i Tyskland och Spanien med resultatet att dessa länder nu är världsledande på att investera i solceller och vindkraft. Rätt utformat kommer investerare att stå i kö för att satsa på solceller, vindkraft med mera. En stor fördel med systemet är att detta är tidsbegränsade subventioner som är utformade så att de försvinner över en tioårsperiod allt eftersom den förnybara energin blir billigare att producera och inkomsterna i u-länderna ökar.

Förslaget har också den stora fördelen att det minskar risken för korruption eftersom subventionen betalas ut först när den fossilfria elektriciteten levereras. I dag innebär klimatavtalet från Kyoto att länderna kan tillgodoräkna sig utsläppsminskningar i u-länder genom att i förväg bekosta byggandet av stora anläggningar vilka riskerar att blir dyrare och dessutom leder inte dessa klimatprojekt till minskade utsläpp totalt sett på klotet eftersom de ingår i en byteshandel där industriländerna i stället får släppa ut motsvarande mängd växthusgaser. En energifond med garantipris blir något som görs utöver handeln med utsläpp.

Förslaget i FN-rapporten kan betyda stora möjligheter för

näringslivet, inte minst i Sverige, att bidra till omställningen. Genom feed-in-tarifferna blir investeringar i förnybar energi plötsligt högintressant. Fler jobb, företagsvinster och skatteintäkter i i-länderna ökar dessas vilja att satsa pengar. Men en större tillgång till el stimulerar också till jobb och företagsvinster i u-länderna.

En global Marshallplan behöver dock innehålla mer än omställningen till förnybar energi. FN-rapporten som presenteras i FN-högkvarteret i morgon visar tydligt att det krävs kraftfulla offentliga investeringar och program även för energieffektivisering, nya effektiva och fossilfria transportsystem och insatser för att hejda avskogningen. Dessutom måste insatserna öka många gånger om för att hantera alla de konsekvenser – stormar, översvämningar, torka och så vidare – av klimatförändringar som redan sker och kommer att ske, och som slår hårdast mot de fattigaste.

Vi hoppas att idéerna i denna FN-rapport kan hjälpa till att återskapa en del av det skadade förtroendet mellan u-länder och i-länder som nu råder i klimatförhandlingarna. Här kan Sverige och EU ta ett positivt ledarskap.

Men fler knäckfrågor måste lösas i Köpenhamn. Glappet mellan vad forskarna anser är nödvändigt och vad politikerna hittills levererar är alarmerande. Ännu har i-länderna bara deklarerat en vilja att minska sina utsläpp med 11–18 procent till 2020, medan FN:s klimatpanel menar att 25–40 procent minskningar krävs för att klara 2-gradersmålet. Dessutom indikerar nya forskarrön att läget är än värre. Mycket tyder på att många människor drabbas hårt av klimatförändringarna redan vid två grader och att hotet om tröskeeffekter verkar allt allvarligare. Världens korallrev bleknar redan vid 1,5 graders temperaturökning.

Ett hinder för kraftfullt agerande är en överdriven bild av de kortsiktiga kostnaderna. FN-rapporten menar att dessa kostna-

der mer än väl kompenseras genom vinster i form av utsläppsminskningar och energitillgänglighet. EU har alltid varit ledande i att identifiera alternativ som bygger på internationellt samarbete för klimatet och kan fortsätta att spela denna roll genom att föra fram ett konkret paket som uppnår både klimat- och utvecklingsmål. Det kan bygga upp förtroende mellan u-länder och i-länder.

Huvudbudskapet från både Naturskyddsföreningen och FN-rapporten är att ett nytt helhetsgrepp på klimatfrågan som är långt mer ambitiöst och visionärt än det vi hittills sett måste tas. Världens länder måste våga investera i framtiden nu, klimatfrågan handlar i grunden om utveckling och rättvisa. Vi har både politiskt, ekonomiskt, etiskt och ur snävt egenintresse allt att vinna på en omställning där u-länderna snabbt kan anta en klimatsmart fossilfri väg – precis som vi nu påbörjat. Som FN-rapporten konstaterar: ”att frysa de rådande globala orättvisorna över det kommande halvsekle eller mer (samtidigt som världen försöker tackla klimatkrisen) är ekonomiskt, politiskt och etiskt oacceptabelt.”

Utmaningen är stor – något liknande har aldrig tidigare skett i historien, och det kommer att kräva en uppsättning verktyg som skiljer sig markant från vad som nu ligger på bordet i klimatförhandlingarna.

Tariq Banuri

chef för FN:s kommission för hållbar utveckling, CSD

Svante Axelsson

generalsekreterare Naturskyddsföreningen

”How to tackle the deadlock”

Translated version of op-ed on a global Marshall plan on climate and development, published in the main Swedish daily *Dagens Nyheter* 12 October 2009

In December the climate negotiations are supposed to be concluded in Copenhagen. But so far, the negotiations are in a deadlock. One critical issue is how the large investments that are needed in developing countries to move towards low carbon emission societies should be financed. As the developing countries already account for half of the global emissions, it is in the direct self-interest of the rich of the world to support this transformation and ensure that it begins as soon as possible.

According to a UN-report there may be a need of hundreds of billion USD a year, a Marshall plan for the climate that we have hardly seen before. So far, the industrialised countries have been very reluctant to promise any significant sums. The EU commission has proposed that the EU should only provide 2-15 billion euro per year.

Tomorrow Tuesday, the Division for Sustainable Development at the UN presents a very concrete plan for how a Marshall plan for climate and development can be designed. But already today we present this proposal, both here at *Dagens Nyheter* and at a seminar at Kulturhuset.

The core idea of the plan is to both create a huge boom in demand for both small and largescale sustainable electricity production in the whole world and to provide electricity to the two billion poor people who today do not have electricity. This would be a significant contribution in the fight against poverty and would at the same time speed up the development of cheap photovoltaics and energy efficient solutions.

The principle is simple and proven. By giving a guaranteed price in developing countries for renewable electricity that is delivered, both private and public investors can count on a profit that they would not be able make if they just competed on the market with fossil energy. At the same time this otherwise expensive energy can be sold to consumers at a price that even poor

people and countries can afford. The difference in price is a subsidy that is financed by the developed countries, in line with the principles of the climate convention.

These so called feed-in tariffs, or guaranteed prices, have already been used in Germany and Spain with the result that these countries are now world leaders in investments in photovoltaics and wind energy. Correctly designed, this will lead to investors lining up to go for solar, wind and other sustainable energy. A major advantage is that these are time-bound subsidies that will disappear over a ten-year period as renewable technologies become cheaper and income and affordability in developing countries rises.

Several countries, also in the third world, are already experimenting with these kinds of systems. But to make the large and quick transformation that is required, the system must be introduced at a global level, the UN report suggests. And the world's countries need to agree in the climate agreements to provide money for it to a global energy fund.

A system such as this also has the big advantage that it lessens the risk of corruption as the subsidy is only paid upon delivery of the fossil free electricity. Today, the Kyoto protocol allows the countries to take credit for decreases of emissions by financing big installations in advance, which risk becoming both more expensive and not give the real emissions reductions that were intended. This is furthermore problematic as such emissions reductions are part of a trade where industrialised countries instead can emit the same amount of greenhouse gases. An energy fund with feed-in tariffs would instead be pursued in addition to carbon trading.

The proposal in the UN report would of course mean major opportunities for far-sighted business, also Swedish, to contribute to the transformation that is needed. Through the feed-in

tariffs, investments in renewable energy all of a sudden become very interesting. More jobs, business profits and tax incomes in industrialised countries improve their willingness to make money available for the feed-in tariffs. But a larger supply of electricity also stimulates jobs and business profits in developing countries.

A global Marshall plan needs more than the transformation to renewable energy, however. The UN report that is presented at the UN Headquarters tomorrow clearly shows that there is a need for substantial public investments and programmes for energy efficiency, new effective and fossil free transport systems and actions to halt deforestation. In addition, the efforts must increase many-fold to handle the consequences – storms, floods, droughts – of climate change that are already happening, and will continue to happen, and which affects the poorest the hardest.

We hope the ideas in this UN report can help rebuild some of the eroded trust between developing and developed countries that is now characterizing the climate negotiations. Here Sweden and the EU can take a positive leadership.

But more key issues must be resolved in Copenhagen. The gap between what scientists and experts consider necessary and what the politicians offer is alarming. So far the developed countries have only declared a willingness to reduce their emissions between 11 and 18 per cent by 2020 while the IPCC mean that 25-40% reductions are needed to meet the 2-degree target. And new research indicates that the situation is even worse. There are strong indications that the coral reefs are bleached already at 1.5 degrees and many people who are already affected by climate change would suffer irreversible consequences of climate change already at two degrees temperature increase.

One barrier to forceful action on climate change is an exaggeration of the short-term costs. The UN report suggests that

these costs are more than compensated by the gains both in emissions reductions and energy affordability. The EU has always been a leader in identifying cooperative options for climate action. It can continue to play this role by putting forward a concrete package that achieves both climate and development goals and therefore helps build a level of trust between developed and developing countries.

The main message from the Swedish Society for Nature Conservation and the UN report is that we need to take a new integrated approach tackling climate change that is more ambitious and visionary than what we have seen so far. The countries of the world need to invest in their future now. We must also understand that climate change is at the core also an issue of development and equity and that we both politically, economically, ethically and from a narrow perspective of self-interest have all to win from a transition where developing countries quickly can move to a fossil-free path – just as we have to do. As the UN report concludes: “to freeze the current global injustices over the coming half century or more (while the world tries to tackle the climate crisis) is economically, politically and ethically unacceptable”.

The challenge is great – anything similar to this has never happened in history before, and it will need a set of tools that are markedly different from what’s now on the table in the climate negotiations.

Tariq Banuri

Director, UN Division for Sustainable Development

Svante Axelsson

Secretary-General, Swedish Society for Nature Conservation.

Technical Note

A Global Green New Deal for Climate, Energy, and Development

A big push strategy to

Drive down the cost of renewable energy
Ramp up deployment in developing countries
End energy poverty
Contribute to economic recovery and growth
Generate employment in all countries
and
Help avoid dangerous climate change

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United Nations Department of Economic and Social Affairs



December 2009

Key Messages

Energy is the key to economic development, and renewable energy is the key to a future without dangerous climate change.

But renewable energy is too expensive today, especially for the world's poor, many of whom have no access to modern energy at all.

Although the price of renewable energy is falling, it will not fall fast enough anywhere, on its own, to help the world win the race against time with dangerous climate change.

Public policies can help produce the necessary decline in the global price of renewable energy and make it universally affordable in one to two decades.

The key mechanism is a rapid increase in installed capacity. A “big push” in both public and private investment to scale up renewable energy will lead to rapid cost reduction, technology improvement, and learning by doing.

Investment and cost reduction will generate a “virtuous cycle” of additional investment, economic growth, employment generation, energy security, geopolitical stability, international cooperation and emission reductions.

This “big push” cannot be implemented by any country alone. In the first decade-and-a-half, it will require globally funded guarantees, or price supports (e.g., through a global “feed-in tariffs” program), to subsidize investment.

After that, the “virtuous cycle” will take over and make further price supports or international transfers unnecessary, as renewable energy becomes the default option for new energy investment worldwide.

Price supports will be complemented by a global renewable energy extension program: research, technical, and policy support designed to accelerate the process.

This strategy is called *the Global Green New Deal*, and the time to adopt it is now.

Introduction: Push Down to Lift Up

The world *can* avoid dangerous climate change – by pushing down the price of renewable energy, as quickly as possible.

The aim of climate negotiations is to reduce greenhouse gas emissions and enable adaptation to climate change without endangering momentum on development. This paper proposes an approach that can help achieve all these objectives in a practical and timely manner: a focus on accelerated investment in a renewable energy future.

There is now broad agreement on the need to *dramatically reduce* global emissions of carbon dioxide in the coming decades. At the same, there is also agreement on the need to *dramatically increase* the economic prospects of the world's poorest people, and in particular to provide them with modern energy services. These goals are often seen as being in conflict with one another, and continuing to view them as conflicting slows progress towards either. Only by considering them together as a single, *integrated* challenge does a way beyond the impasse become visible.

But first, we must change our strategic perspective on the problem of climate change. Currently, all eyes are locked on the accumulation of greenhouse gases in the atmosphere, and therefore on emissions reduction, or "mitigation," as the strategic response to this problem. But we must remember that emissions reduction is a *goal*; it is not a *strategy*. In fact, the almost exclusive focus on emissions targets offers few attractive choices to negotiators (Birdsall and Subramanian, 2009). It locks the world into a perceived "win-lose" or even "no-win" scenario, as an ever-shrinking emissions pie must be divided up among (1) those who have already eaten more than a lion's share, and (2) those whose growing and justifiable hunger exceeds the size of the remaining pieces on offer.

As a *goal*, the need for emissions reduction is unimpeachable. As a *strategic focus*, however, it is leading us down a dead-end path.

The only viable strategy is to create a bigger pie – and this requires us to shift our focus from the rapid reduction of greenhouse emissions to *the rapid expansion of renewable energy*.

Energy is the key to economic development and social wellbeing, and renewable energy is the key to a future without dangerous climate change. While forest conservation, land-use changes, and efficiency measures are essential contributors to any positive climate scenario, there can be no future climate stability without a rapid conversion from fossil fuels to sun, wind, and water-based energy technologies.

Fortunately, there are encouraging signs that such a transformation in the energy sector is already under way. The global market for renewable energy has been estimated at \$1.6 trillion as of 2007-08. Annual growth rates have been reported as 25% for wind energy, and 80-100% for solar photo-voltaics. With these dramatic increases in capacity have come equally dramatic declines in cost. For example, the cost of solar panels has

fallen from \$5 per watt in 2005 to just over one dollar per watt in 2009; and in just three to five years, Japanese planners are expecting to cut the cost of a solar electricity generation system in half (European Commission, 2009).

Despite these rapid advances, renewable energy remains expensive, especially for the two billion people who have no access to modern energy services. Prices are falling, driven by increasing market demand, scale economies, and technological diffusion as well as technology improvement. But prices have not fallen fast enough to make such technologies affordable at large scale in developing and emerging industrial economies. They have not fallen fast enough to outcompete coal, oil, and natural gas as the default choices for energy. They have not fallen fast enough to offer a realistic alternative to millions of women huddled over wood fires, or to others who continue to suffer from the health- and planet-damaging soot of burning biomass.

In sum, the price of renewable energy has not fallen fast enough to save the world from experiencing dangerous climate change. Nor will it fall rapidly enough, on its own, to do so.

But this problem is actually an enormous opportunity in disguise – for it is a problem the world can do something about. By working together to *push down* the price of renewable energy, as rapidly as possible, we can *lift up* the prospects of people everywhere, both environmentally and economically.

Creating positive tipping points and virtuous cycles

Recent research by the United Nations and others (see, e.g., United Nations 2009, Birdsall and Subramanian 2009, Jacobsen and Delucchi 2009) has focused on ways to drive down the price of renewable energy in the near term, accelerate its spread globally, improve the economies of both the developed and developing world, and end energy poverty. This genuine "win-win" strategy carries with it another extremely important benefit: it makes possible the attainment of critical emission reduction targets, and thus reduces the risk of dangerous climate change.

The "Global Green New Deal" (GGND) brings the different components of the strategy together into an integrated program: international goal-setting, limited-time subsidies, targeted investments, coordinated national development policies, and comprehensive extension systems. Together these can accelerate the global economy's arrival at a "positive tipping point" in the spread of renewable energy. Pushing down the price of renewables and removing the barriers to their adoption will accelerate the process of industrial scaling-up in that sector – a process which is already under way. Expanded markets for renewable energy, and faster growth rates in production, will lead to faster technology improvement, which will further lower costs and thus prices. The result will be a "virtuous cycle" of expansion, learning, and cost reduction. Within a relatively short period of time – between 10 and 20 years, depending on how quickly the world ramps up – prices will have fallen to the point where subsidies for renewable energy are no longer necessary. (See box, "The Global Green New Deal - By the Numbers.")

The Global Green New Deal - By the Numbers

The mechanics of the GGND strategy are straightforward. Step 1: define the “global affordability target”, assumed here to be \$0.03 to 0.05 per kilowatt-hour, corresponding roughly to \$1.00-\$1.50 per Watt investment cost. Step 2: Collect information on current investment costs as well as current and expected future (in this case, 2025) levels of installed renewable energy capacity, assuming no global renewables investment program. Step 3: use learning curves to estimate the installed capacity corresponding to the global affordability target. Step 4: Estimate the additional investment needed to expand installed capacity to the level estimated in the previous step. Step 5: Estimate the share of the incremental investment that needs to be supported through international price guarantees.

The main variation in the result stems from different estimates of technology learning curves. However, even the conservative estimates of learning curves show that the global affordability target can be reached with additional investment of up to \$100 billion (in 2005 dollars) per year over fifteen years. This would bring down the costs of two leading renewable technologies (solar PV and wind) to a level that is universally affordable. Significantly greater investment is necessary for Solar PV than for Wind, but even wind requires subsidized investment to achieve the target price within the target timescale.

Step		Wind	Solar PV
1.	Global Affordability Target (Investment cost \$/W)	1.00	1.00
2a.	Current investment costs (\$/W)	1.50	2.90 - 3.40
2b.	Current installed capacity (GW)	120	13
2c.	Installed capacity expected in 2025 under BAU (GW)	570	160
3.	Installed capacity corresponding to GAT cost (GW)	700	1390
4a.	Additional capacity needed to achieve GAT (GW)	130	1230
4b.	Additional investment cost (billion 2005 USD)	\$33	\$1,476
5.	TOTAL ADDITIONAL INVESTMENT COST	\$1000-1500 billion	

Source: Preliminary analysis by UN/DESA-DSD, using expected installed capacity data provided by IEA (2009), and learning curve estimates (investment costs per watt of installed capacity) provided by IIASA (2009).

This is the upper end of such estimates. The actual figure would very likely be lower. Step 5 (i.e., international transfers) is not estimated explicitly, but it can be expected that at least two-thirds of the additional capacity would be deployed in developing countries. In higher income countries, the additional costs of renewable energy are generally passed on to consumers in their electricity bills.

The strategic objective of the GGND is to make proven renewable technologies universally affordable, so that renewable energy becomes the default choice for the world as a whole. Making renewable energy affordable directly addresses the needs of developing countries and emerging economies, where the demand for new energy services is most acute, and where the vast majority of new energy development is expected to occur in the coming decades.

But pushing down the price of renewable energy also ensures that, as aging infrastructure comes up for replacement in the industrialized countries, those replacements will also result in a shift from fossil to renewable power sources. In both cases, pushing down the price helps prevent the lock-in of investment capital in fossil-fuel-based technologies, which would expose the poor to decades of pollution, and doom humanity to suffer the consequences of additional global warming.

The GGND involves the mobilization of large-scale public and private financing for *investments*, whose returns at the global scale include:

- *Employment*: Millions of new "green jobs" in a rapidly expanding renewable energy sector in both developed and developing countries. (Investments in renewable energy have been shown to create two to three times as many jobs as investments in conventional energy development.) (Pollin and Garrett-Peltier, 2007)
- *Energy Security*: Increased geo-political stability, improving the conditions for trade and exchange of all kinds. (As nations become less dependent on the production and importation of fossil fuels, they will have less reason for conflict over the sources of both energy and emissions.)
- *Reduced Climate Risks*: A significant reduction in costs associated with the expected damages from accelerated global warming. (As the Stern Review and others have noted, inaction on global warming could result in costs as high as 20% of world output in the coming century.) (Stern, 2006)
- *International Cooperation*: A clear pathway for multiple actors to channel international finance for mitigation, as well as a mechanism for phasing out such financing within one to two decades. (In recent work, Stern et al. note that a well-structured finance scheme will create aligned incentives, encourage governments and private sector actors to work together, and create the virtuous cycle of investment and development that is the essence of this strategy.) (Stern, 2009)
- *Greenhouse Gas Mitigation*: The contribution of this investment to greenhouse gas mitigation consists of two components: direct and indirect. The *direct* component is the avoided emissions due to the substitution of a new renewable energy plant for a conventional energy alternative, most likely coal. In this case, this works out to the avoidance of between 2.5 and 3.5 billion tons of carbon dioxide per year by 2025 and every year thereafter. Assuming an investment life of 40 years, the cumulative emission reduction would be between 100 and 140 billion tons of carbon dioxide at an incremental cost of up to \$1,500 billion, in other words, between \$15 and \$11 per ton of carbon dioxide. However, this is only a part of the story. Once the cost of the renewable energy becomes competitive and affordable, it will become the default option for future power sector investments. This means that, between 2025 and 2050, the initial investment of \$1,500 billion will continue to produce additional offsetting of

carbon dioxide. If power sector capacity continues to grow at historic rates and in accordance with rising demand from developing countries, this will result in the avoidance of an additional 8 billion tons of emissions per year at no additional cost.

From forward-looking firms in the energy sector, to individual householders in the world's poorest countries, to skilled workers and experts in all countries, a Global Green New Deal creates many winners in the global economy. Implementing the GGND will lay the foundation for a new, self-sustaining cycle of green growth globally, while steering the world on a course to end the scourge of energy poverty and avoid the threat of dangerous climate instability (Figure 1).

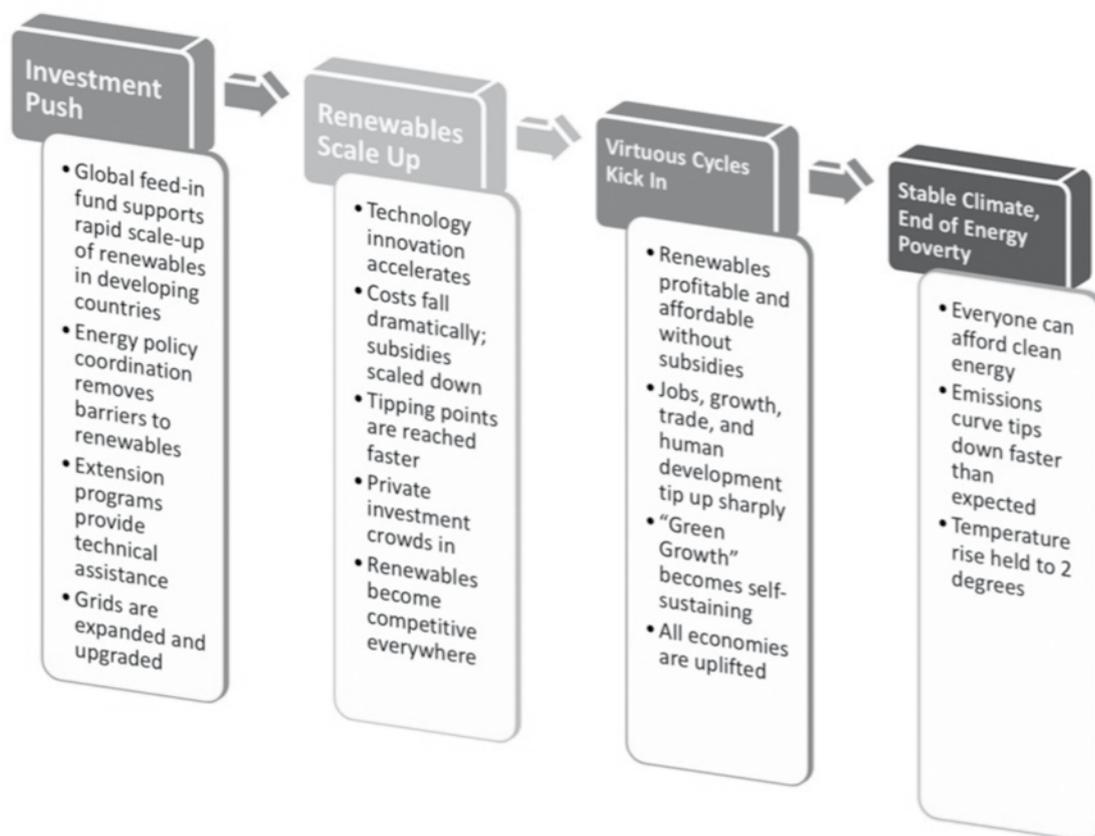


Figure 1. A schematic of how the Global Green New Deal will work to accomplish its objectives

The Elements of a Global Green New Deal

The GGND involves the rapid deployment of nine integrated mechanisms that will work together as a renewable energy accelerator:

The GGND Road Map

- 1. Set Targets:** Set clear targets for both *renewable energy costs* (i.e., the cost needs to become affordable as well as competitive with conventional technologies, currently between \$0.03 and \$0.05/kWh), and for *the year by which the target cost is to be reached* (e.g., a global target year of 2025). Given known rates of cost reduction, this will imply a corollary target for renewable energy installed capacity.
- 2. Set Price Guarantees:** Determine a schedule of guaranteed prices ("tariffs") to be offered to suppliers of renewable energy, based on estimates of current and future costs. The tariffs offered to new entrants in the market would decline by a predetermined amount every year, converging on the target price by the target year. This tariff schedule would provide a strong incentive for accelerated investment and development of installed capacity in the near term.
- 3. Determine Host Country Contributions:** Create a formula for estimating the share of the feed-in-tariff to be paid by the host country. This formula would be related to per capita income in each country, the cost of specific renewable and conventional alternatives, domestic investment capacity, and other relevant factors.
- 4. Establish a Global Investment Fund for Renewables:** A global investment fund for renewable energy is essential for underwriting the gap between the feed-in-tariffs that need to be offered to suppliers to make renewables competitive, and the share of the subsidy that can be contributed by host countries. The investment fund will guarantee – *for a fixed period of time* – a subsidized price for the delivery of new renewable energy in developing countries.
- 5. Provide Additional Support to the Least Developed Countries:** Support could include low interest loans, e.g., for grid expansion, financial assistance for capacity building and institutional development, technical assistance, or subsidized access to technological information.
- 6. Create Mechanisms to Serve Off-Grid Communities:** Offer special provisions within the global financing scheme to support renewable energy development for off-grid communities, e.g., supplementary subsidies or assistance for building local grids.
- 7. Create a Network of Innovation Centers:** Building on the analogy of the Green Revolution, establish a network of research and extension centers that will adapt technical knowledge to local conditions, and make that knowledge available to policy makers, investors, and communities.
- 8. Create a Global Climate Conservation Corps:** Learning from the lessons of several successful large-scale initiatives – including the Peace Corps, the Civilian Conservation Corps, and Médecins Sans Frontières – establish and recruit a global body of skilled practitioners who can support national institutions and serve as their link to international experts and knowledge bases.
- 9. Develop the Appropriate Institutional Architecture:** Careful attention must be paid to creating appropriate institutional vehicles – both new and in relationship to existing bodies – to channel the resources from the global feed-in fund, through national energy administrations, to renewable energy suppliers.

Agreement and action on these elements as rapidly as possible, at a global scale, will speed renewable energy toward its own "global tipping point" – a point of self-sustaining take-off powered by accelerated learning and expanding markets.

While the GGND is a new, comprehensive strategic approach, it brings together the converging conclusions of several recent global analyses, all of which point to a central role for increased public investment in renewable energy, particularly in the developing world (e.g., Stern, 2009; Birdsall and Subramanian, 2009; UNEP-SEFI, 2009). The strategy also builds on what is already happening: successful models for each of these mechanisms exist, in both the developing and developed world. A number of developing countries (notably China, India, and Brazil) have already established key elements of such policy, finance, and technical support mechanisms. However, the scale expansion needed to bring about the necessary cost reduction is larger than what can be achieved by these countries acting alone. The GGND will supplement national actions with international support, and simply enable developing countries to do more – and more quickly.

The GGND also encourages an even faster diffusion of working models in the industrialized world, where countries like Denmark, Germany, and Spain have led the way on developing the necessary technologies, policies and programs. These early investments in renewable energy are already being rewarded with both near-term financial returns and longer-term competitiveness; the Global Green New Deal will work to amplify these effects, reward innovative enterprises, expand employment opportunities in technologically advanced countries, and spread the benefits more rapidly to other countries.

The GGND ensures long-run predictability and market stability for renewable energy producers as well as equipment suppliers, and thus creates the basis for effective public-private partnership, mobilization of large-scale private sector resources for investment and innovation, capacity expansion, and cost reduction.

The GGND also ensures that international resources are linked to tangible outputs (delivery of final renewable energy services) rather than inputs.

Finally, adopting the GGND will bring many benefits of the kind that economists call "intangibles," but that are widely recognized as both real and necessary for success in any venture of magnitude. These include:

- a feeling of *hope and optimism* – specifically, that large-scale problems like global warming and energy poverty can be solved;
- an encouragement to *entrepreneurship* – there are genuine business opportunities to pursue; and
- a sense of common strategic *focus* – on the goal of reducing the price of renewable energy, and accelerating a global transition to a clean energy future.

The GGND represents a global opportunity for cooperation, for only by pushing together, and pushing hard, can we lower the price of renewable energy enough to lift many millions out of energy poverty and provide clean, affordable energy to the world.

The Case for a Global Green New Deal: Changing the Game on Climate, Development, and Energy

The GGND represents a new approach to addressing, simultaneously, the problem of global warming and the imperative of bringing energy and economic development to the world's poorest peoples. But while the overall concept is new, the elements of the GGND are based on existing models and supported by extensive current research. The following sections summarize the case for the GGND, explain the underlying assumptions, and describe how the strategy would work in more detail.

A. Climate, development, and energy are interconnected issues.

The rationale for the GGND begins with a fundamental insight: climate change is not a problem that is somehow set apart from other problems. In particular, it is intimately connected to both the type of development and the energy path chosen to power that development.

Behind the GGND is the following postulate: A massive deployment of nonrenewable, fossil-based energy technologies in the *developed* world is what enabled those countries to attain unprecedented levels of prosperity within a short span of time; but it also led to the current climate dilemma. A rapid and equally massive deployment of clean, renewable energy technologies in the countries of the *developing* world can enable them to attain similar levels of prosperity and, when joined to a large-scale energy switch in developed countries, can lead the world out of that dilemma.

The energy needs of the world's poor have long been overlooked in the global discussion on climate change, in terms of both current needs and future planning. (Figure 2) And yet, the poor also represent the world's largest undeveloped energy market. Today, about 1.6 billion people lack access to electricity; and 2.4 billion still cook with firewood. By 2050, there will be 3 billion additional people living on planet Earth, and the vast majority of them will be relatively poor urban dwellers in developing countries. If the energy systems developed to provide light, heat, mobility, and other services to all of these people are based on fossil fuels, there will be no possibility of attaining the emission reductions necessary to maintain climate stability.

Providing energy to the world's poor should not merely be seen as a "long-term vision"; it is an urgent global imperative. Energy services are key inputs to development generally, and to human development in particular. Improvements in health, education, and standards of living are closely correlated with access to energy. Inadequate and unreliable energy services are

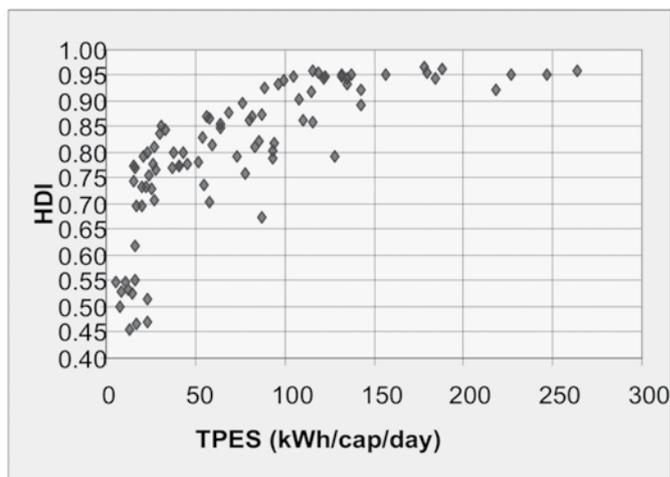


Figure 2. Distribution of countries showing the correlation between Total Primary Energy Supply (TPES) and score on the Human Development Index (HDI). Source: United Nations, based on IINDP and IEA data.

centrally implicated in the inability to provide clean drinking water or sanitation facilities.

On the other hand, most low-cost energy sources available today to meet the needs of the poor are neither clean nor renewable. They contribute to greenhouse gas emissions and often carry with them significant health risks, such as respiratory illness from exposure to soot particles.

When the low-cost energy needs of the poor are seen as being in opposition to emission reduction goals, agreement on a way forward becomes exceedingly difficult. But by looking at climate change and development as *united* by a common issue – energy – rather than divided by it, true win-win solutions become possible.

The GGND offers such a win-win solution in the form of a strategy that meets the needs of developing nations for energy development, while accelerating progress toward the goal of a low-emissions economy for the world as a whole. It functions as a bridge between perspectives and priorities, providing everyone at the climate negotiating table with a common goal: the provision of clean, affordable, renewable energy to all.

B. The world has a common interest in reducing the price of renewable energy, worldwide, as rapidly as possible.

The next 10-20 years are a critical window for the implementation of the GGND, because so much new energy development will be planned and implemented during this period. If renewable energy is to contribute a significant portion of new energy development, especially in the developing world, reducing its price is essential.

As of August 2005, about 1.4 billion people in the developing world were living on less than \$1.25 per day (the World Bank's poverty line). However, even people living on ten dollars per day cannot afford to buy adequate amounts of renewable electricity at the current price per kilowatt-hour, which ranges from about 36 cents from solar photovoltaic panels to as low as 10 cents from a wind turbine. For low-income people around the world, energy that costs more than 3-5 cents per kilowatt-hour is simply not affordable; and so in the absence of subsidies renewable energy will not be their choice.

From a developing country perspective, a strategy of simply *increasing* the price of conventional energy to make renewable energy more competitive makes no sense. Nor can the governments of developing and emerging-market countries afford to subsidize renewable energy on a large scale, given current costs and per capita incomes. Meanwhile, in the developed world, the strategy of simply waiting for the market to produce competitive renewable energy, and greenhouse gas emission reductions, has also been "failing to deliver" (*The Economist*, 15 October 2009, citing Committee on Climate Change, 2009).

To make progress at a pace that can win the race against time with global warming, we need a global strategy for reducing the price of renewable energy, everywhere. This requires accelerating the process by which the price of these new technologies is already falling: that is, by scaling up.

For example, in Europe today, every time the amount of wind generation capacity doubles, the price of electricity produced by wind turbines falls by 9 to 17% (Krohn, European Wind Energy Association, 2009). With each new wind turbine, the industry

learns how to make these machines more efficiently and more effectively, thus driving down the costs per kilowatt-hour. Economists call this effect a "learning curve": the more renewable energy generating capacity gets installed, the more we learn about how to produce renewable energy, and the less expensive it becomes.

Such steep and beneficial learning curves are associated with several so-called "emerging technologies", including wind energy, solar photovoltaic and concentrated solar energy (Figure 3). In contrast, "mature technologies", such as Hydro PPL (Figure 3), have stable cost curves with relatively small opportunities for further cost reductions. Current evidence suggests a very large potential for cost reductions in wind and solar energy. There is even evidence to suggest that their learning curves are changing in favorable ways, creating the prospect that a virtuous cycle of investment scale-up and cost reduction will happen even faster than current analyses might predict. For example, a consortium of solar cell companies in China has twice revised estimates on the speed of cost reduction just since 2007. They have moved up the planned target year to achieve a government target price (\$0.146 per kWh) from 2020 to 2012, because of unexpectedly fast technological advances and lower polysilicon prices (Saber, 2009).

Relatedly, studies on the costs of compliance with government environmental policies and regulations support the conclusion that *ex ante* costs are often overestimated because of a failure to take into account scale economies and technological advances (EC 2005).

Although learning rates have occasionally been described in terms of the cost decline per year, their primary driver is the *installed capacity*. (Figure 3) That is, prices fall with growing installed capacity because of such factors as a larger market, greater market stability and predictability, standardization of equipment and component production, competition amongst suppliers, improved designs, and learning by doing.

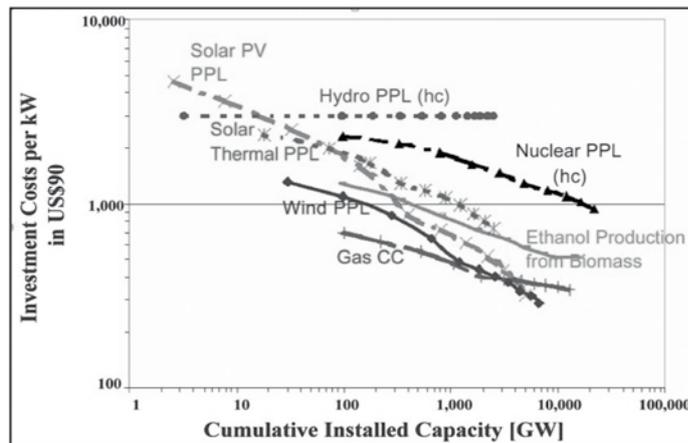


Figure 3. The greater the installed capacity of an energy technology, the lower price for every new unit installed. (Source: Nakicenovic, IIASA, 2009)

In sum, one can accelerate progress down a learning curve by *speeding up the increase in installed capacity*. The GGND proposes to do just that, by reducing the primary barrier standing between developing countries and current renewable energy technologies: their relatively high price. Using public investments and subsidies to reduce the price to rough parity with fossil fuels, combined with a stable policy environment and technical support, will remove the major constraint to accelerating installed capacity. It will also unlock waves of demand and drive the rapid deployment of these technologies. As the technologies spread, industries scale up, and capacity doubling times decrease, then prices will fall, following the well-known pattern of the learning curve.

Having described the driver of the GGND – the technology learning curve – we now turn to the accelerator: price supports.

C. A globally coordinated program of price support guarantees for renewable energy will unleash a transformation in the global energy sector.

Countries have used a variety of mechanisms to promote renewable energy, including direct public investment, investment incentives (e.g., low interest rates, tax write-offs, accelerated depreciation), portfolio obligations, and feed-in-tariffs. While all policy mechanisms have had their share of success, the most dramatic expansion in renewable energy capacity was witnessed under the feed-in-tariff programs enacted in Germany and Spain. "Feed-in tariffs" obligate electricity grids to purchase renewable energy as it becomes available (to "feed it in"), and they offer to potential providers of renewable energy a guaranteed price (the "tariff," or rate paid for the electricity). The tariffs are generally fixed for a given period, between 10 and 20 years, at levels that ensure the profitability of the investment. The existence of a guarantee that successful development of a solar or wind energy installation will be rewarded with a customer as well as a subsidized price essentially levels the playing field, removing the cost barrier to renewable energy development in comparison to fossil-fuel-based technologies.

The effectiveness of the feed-in tariff policy is by now well-established. A study comparing the effect of these policies to other policy mechanisms designed to support the spread of wind energy found that they resulted in 7-8 times as much installed wind capacity. (European Commission, as reported by Thomas B. Johansson, Chair, Global Energy Assessment) (Figure 4) The overall success of the German, Spanish, Danish and other national-level feed-in programs has inspired similar initiatives in China and, more recently, South Africa and India, as well as by regional and state governments in the UK, US, and Australia. Today well over 50 countries now have feed-in tariff laws on the books, and smaller-scale experiments are now a global phenomenon.

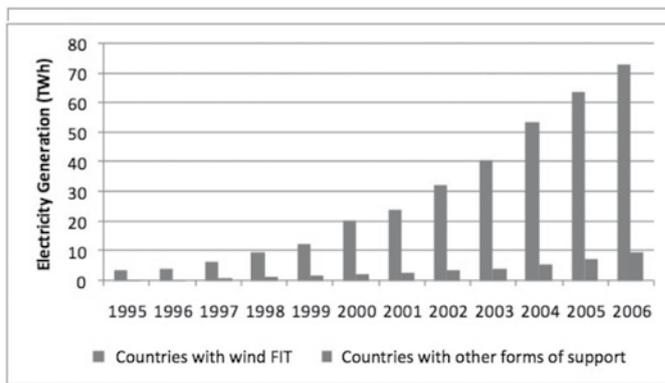


Figure 4. Countries using feed-in tariffs compared to countries using other forms of policy support for wind energy. (Source: European Commission, 2008, cited by Johansson, 2009)

Of the different options to support renewable energy, the feed-in tariff is increasingly seen as the "policy of choice" that provides the most benefit at least cost (DB Climate Change Advisors, 2009). It can be applied consistently and transparently, while being readily adapted to different specific conditions in different countries.

Where feed-in tariffs have been employed in developing countries, they often have to be accompanied by government budgetary allocations to cover the differential between the guaranteed price that the utility pays to the renewable energy suppliers, and the average rate that it is allowed to charge consumers for each kilowatt-hour of electricity. This dependence on national budgets to cover the difference places a cap on the total expansion of renewable energy that can take place in a developing country, and thus creates a disincentive for expanded renewable energy investment. International

financing to support the tariff, or price guarantee, will remove this constraint and create highly favorable conditions for accelerating renewable energy investment and development.

As the phrase itself indicates, feed-in-tariff policies have been employed exclusively in regard to grid connections. Given the current level of grid development in most developing countries, the policy framework would need to be amended to be able to include off-grid areas as well.

In practical terms, the GGND involves linking the demonstrated favorability and effectiveness of feed-in-tariff policies with the rapidly growing energy needs of developing countries, offering suitable mechanisms for finance, policy, and technical support for rapid scale-up. It delivers the right mix of policy and market stability that, according to recent research summarized by Stern et al., can create the highest possible leverage for public financing, mobilizing up to 15 times the original investment in additional, follow-on funding (Stern, 2009, and UNEP SEFI, 2009).

The GGND Road Map (page 6) brings together elements of successful programs, including feed-in-tariffs as well as other complementary actions, in such a way as to accelerate the process of policy design and technology diffusion and adoption that is already occurring, remove major barriers and obstacles, and adapt the program both to international requirements and local conditions.

As mentioned in the GGND Road Map (Paragraph 4), a new global investment fund needs to be established to contribute the global share of the subsidy for renewable energy services and supplement the national guarantees offered by each country. As such, the Fund will reduce uncertainty and ensure predictability in the renewable energy industry. Once it is in place and adequately resourced, it would help stimulate a rapid and massive expansion in the market for solar, wind and other renewable technologies – and speed them toward an economic tipping point, after which they would be on track to become the dominant energy option on the planet.

The price support mechanisms need to be structured in such a way as to reward the most efficient renewable energy suppliers and to give them an incentive to reduce costs as rapidly as possible. The concept of a declining tariff schedule mentioned in the GGND Road Map (Paragraph 2) seeks to ensure this by stipulating that price supports decline and disappear within a defined period of time (10-20 years). Producers would race to enter the market ahead of the declining subsidy and establish their competitive position in the marketplace. Where appropriate, countries could choose additional policies (such as renewable portfolio standards and innovative financing of upfront costs) that would encourage utilities and local governments to be more proactive in cooperating with renewable energy suppliers.

If the GGND were launched immediately, the economics and the technologies of the world energy sector could be transformed by 2025. With renewable energy costs becoming competitive with fossil fuels, subsidies could soon be discontinued. The majority of the world's poor would have access to energy from affordable, renewable sources – the new default option.

D. A large-scale global investment in renewable energy will bring multiple economic, social, and environmental benefits – especially to the developing world.

The GGND would transform the global economy, to the great benefit of people everywhere. For example, renewable energy is a much more effective engine for employment creation than fossil-fuel based energy production: research suggests that it produces *two to three times as many jobs*, in comparison with conventional fossil-based energy development. (Pollin and Garrett-Peltier, 2008)

Wind and solar energy systems do have the problem of intermittency – that is, they are less available when the wind is not blowing or when the sun is obscured – and this will need to be addressed in the coming decade as the scaling-up process gains speed. But technology is also advancing in the area of energy storage. Initially, the expansion of intermittent renewable technologies might need to be accompanied by additional consumer guidance on tailoring demand to availability, as is often provided in many developing countries whose energy systems are subject to frequent service interruptions. More generally, renewable energy is also viewed as a more resilient, reliable, and safe technology: wind and solar-based systems break down far less often than fossil-fuel combustion-based systems, they are simpler, less dangerous to operate, and far less polluting.

For energy importers (a term that includes all but a handful of countries), economic stability will also benefit from creating a global energy sector that is far less reliant on imports. Poor countries especially will be shielded from the impacts on their balance of payments and growth prospects from global price swings and peaks.

The reduction in fossil-fuel emissions will also bring significant health benefits by reducing exposure to pollutants like soot and ground-level ozone. And while renewable energy installations take up space on the land or in the water, this can be managed in ways that are minimally disruptive to natural ecosystems.

Private companies producing and installing renewable energy technologies, and the private banks and international financial institutions that finance them, are already significant beneficiaries of the world's transition toward renewable energy. The GGND would certainly accelerate that trend as well. But also benefitting would be companies that provide material inputs for production of renewable energy, as well as companies providing such associated services as smart grid development, smart metering, energy storage and batteries. These technologies would get a significant boost as a by-product of the GGND, from private investors as well as from international financing institutions such as the World Bank and regional development banks (who would play a crucial role in financing the development of smart grids, for example). All of this additional economic activity would further accelerate the "virtuous cycle" of investment and technology improvement.

A GGND could be an engine of true "green growth," improving per-capita incomes and employment in countries around the world. The greater levels of job generation, energy reliability, technology advance, and economic stability, together with reduced vulnerability to fossil-fuel price fluctuations, can be expected to support the world's long-term recovery from the recent financial crisis.

Overall, the GGND is expected to put the future world economy on a more solid foundation for long-term sustainable development. This expectation is supported by

United Nations economic models looking at the impact of high levels of public investment in low-emissions energy (World Economic and Social Survey 2009) as well as relevant case studies. In Germany, for example, approximately 280,000 jobs have been created in renewable energy – two-thirds of them as a direct result of the country's renewable energy laws. And the rate of job growth is still increasing. (German Ministry of Environment, 2009)

E. Direct public investment and investment support are essential; offsets and other market mechanisms focused on the price of carbon are not sufficient to achieve the goal.

The logic of the GGND is straightforward. To address climate change, renewable energy must be made both competitive and affordable. To do this, the installed capacity of renewable energy must be expanded. To expand capacity, there will be a need for some form of subsidy in the near term, either from governments or from consumers. Subsidies for renewable energy are happening today, but in an uncoordinated manner. New energy infrastructure is being built rapidly in developing countries, but the share of renewable energy is limited by the lack of financial and technological resources. Effective global cooperation in the form of additional financial resources and technology transfer will be needed to scale up the national efforts to the required level.

The GGND supports simultaneous investment in two global goods, namely, social and economic development based on renewable energy, and climate stabilization. It involves public investment in energy infrastructure as well as investment support to renewable energy suppliers, to ensure adequate private rewards for supplying these social benefits. It offers a straightforward business proposition: do well by doing good. For national economies, this large-scale investment in bringing renewable energy to the developing world and making it universally affordable will bring benefits, in terms of employment, growth, greater macroeconomic stability and energy security.

Specific options for mobilizing international finance for green energy investments in developing countries have already begun to be explored and described in several recent institutional and independent studies (Stern, 2009; Avato, 2008; Mendonça, 2007; UNEP SEFI, 2009). Some of the mechanisms to raise the funds might include: traditional government treasury bonds, "green" bonds linked to renewable energy investments, auctioning of national or international CO₂ emission allowances, carbon taxes, levies on international passenger and freight transport, a tax on financial transactions, an allocation of developed country SDRs, to name a few. Careful review of these and other options would be among the first orders of business in planning the implementation of a Global Renewable Energy Fund, with the likely conclusion involving a mix of options. Complementary investments in grid development (e.g., transmission lines from solar or wind installations to cities) in the developing countries would likely be financed through existing mechanisms and agencies such as the World Bank and regional development banks.

Of course, the need for policy direction and enhanced public support to investment in renewable energy is not limited to the developing world. As noted above, the most striking successes in switching to renewable energy have taken place in countries that adopted feed-in tariff programs. Similarly, as cited earlier, recent analyses in the UK suggest that efforts to reduce carbon emissions by relying primarily on the market deliver only a fraction of the desired result (Committee on Climate Change, 1999). While cap-and-trade programs, carbon offset purchases, carbon taxes, and other economic

instruments will continue to be helpful additions to the policy mix, they appear unable on their own to stimulate the development of the market for carbon-free energy solutions at anything like the required pace to address climate change by making renewable energy affordable to the poor.

Estimates on the scale of investment required to bring about a true transformation in the global energy sector vary, but a preliminary review of current learning curve analyses suggests that investments at the level of approximately \$100 billion per year, deployed over a fifteen-year period, would be sufficient to increase the installed capacity of renewable energy to the point where costs were drawn down to the level of affordability in developing countries. That is, in the next fifteen to twenty years (depending on how quickly investments were ramped up), clean and renewable energy could come down to the 3-5 cents-per-kilowatt-hour level that would put it in reach of nearly everyone on the planet (See box, page 3).

Adoption and implementation of the Global Green New Deal is not dependent on raising that level of investment immediately. The mechanisms described here can be put in place at lower levels of investment, and then ramped up over a 3-5 year period (for example), as additional information becomes available on how these mechanisms are working and as confidence grows in their effectiveness. Still, there are payoffs to early and rapid scale-up (that is, to front-loading investments), both in progressing towards the Millennium Development Goals (MDGs) and in avoiding dangerous climate change. Each year's delay in reducing emissions adds significantly to the costs – and reduces the chances – of avoiding dangerous climate change (AVOID, Met Office Hadley Center, 2009). But inability to mobilize funds for \$100 billion-per-year investments at the outset is not a reason to forego this significant opportunity to cooperate in creating a sustainable energy future.

A "global feed-in tariff" program of price support for renewable-generated electricity is a payment-on-delivery mechanism; funds flow only when the electricity comes on line, that is, when real and tangible benefits are being provided. Experience suggests that the existence of an internationally guaranteed price support for renewable energy will address the traditional issues of investor confidence associated with renewable energy, opening the door to private bank lending and other debt financiers of new capacity. (Experience in Spain suggests that banks and other financiers see investments in renewable energy, backed up by a feed-in tariff, as very safe; and Deutsche Bank notes that "within a consistent and durable integrated policy framework incentives such as feed-in tariffs are a key driver of investability" (DB Climate Change Advisors, 2009).)

F. A complementary global program of coordinated policy guidance and large-scale extension activities will ensure success.

While price is the principal obstacle to the spread of renewable energy in both the developed and the developing world, it is not the only one. The Global Green New Deal includes a commitment to a large-scale program of policy and extension support. Creating a predictable enabling environment for the rapid spread of these technologies is an essential element for the success of this strategy. These have been addressed in Points 7, 8, and 9 of the Road Map described above.

Models for globally coordinated extension programs do exist. The Green Revolution, notwithstanding its environmental and social drawbacks, does provide an example of a global strategy that delivered new technologies from the hands of a few hundred

scientists to millions of poor farmers (most of whom were illiterate) in poor countries at a breathtaking speed and scale. The innovations included the establishment of research institutes and extension programs to assist farmers and other agricultural sector actors with the adoption of new seeds and growing methods. These programs also helped create integrated systems of policy, technology, and capacity that ensured rapid uptake and resulted, as is widely known, in greatly increased agricultural yields.

Point 7 of the Road Map (“Create a Network of Innovation Centers”) envisages the creation of a similar network of institutes and centers to support both the design and harmonization of policy and the adoption and adaptation of suitable renewable energy technologies. While the funding and goal-setting will be global, the implementation of the actual policies and energy systems must happen at the national level, with full respect for national differences and preferences.

To further accelerate the process, Point 8 of the Road Map proposes the establishment of a “Global Climate Conservation Corps,” a global corps of experts and extension agents who could back up the national institutions, provide training, technical support, and helping hands. Ideally, experts in universities, technical institutions, industry associations, and volunteer networks could be mobilized through financial support as well as network development to participate in a global enterprise. Participants in this program could be drawn from young entrants to related professions, experienced professionals, and highly-skilled retirees from both the developing and developed world. For some, the motivation to participate would be the ideal of service; for others, especially young people from developing countries, the program would serve as on-the-job training and an employment opportunity. It would also help to accelerate the development of the next generation of technical experts to service a rapidly expanding industry.

Since renewable energy installations can be decentralized and small-scale, mechanisms and policies are needed to accommodate small-scale and off-grid installations, particularly in developing countries (see Point 6 of the Road Map). While large, industrial-scale installations of solar, wind, and other technologies are central to the Global Green New Deal, the extension model is ideally suited to this additional decentralized dimension and medium and small scale installations.

These programs, in addition to materially supporting and accelerating the implementation of a renewable energy revolution, will create a global feeling of hope and inspiration – intangibles that are important to meeting the challenges we face. In a time when the world is locked in a literal race against time, with both the eradication of poverty and the restoration of climate stability as conjoined goals, these programs of on-the-ground cooperation may prove as important to success as financial investments and technical advances.

G. Both renewable energy technologies and complementary technologies will be adapted to national situations.

Although explicit mention has been made above of wind turbines, solar photo-voltaic arrays, solar heat concentrators, wave and tidal energy convertors, and other emerging renewable technologies powered (ultimately) by incoming solar radiation, a number of other technologies would be needed to achieve success. As noted earlier, the GGND would include measures to support the adoption and diffusion of complementary technologies. These include:

"Smart grids" and "smart meters." These are now picking up speed in the developed world and should also be the focus of leapfrog technology efforts in the developing world.

Efficiency technologies. In the building sector, rapid advances are permitting drastic reductions in the energy needs of both new and retrofitted housing. Light, heat, cooling, and other energy-dependent services can now be provided at fractions of previous electricity consumption, depending on the designs and materials used and the methods employed. The GGND should include mechanisms that encourage an equally rapid spread in these technologies as well.

Selected specific and acute priorities. The GGND could potentially include provisions to address a limited number of non-grid but energy-related issues that have been identified as acute, global-scale problems, such as the black soot emitted by cooking fires (which is both a serious health hazard and a dangerous addition to global warming). The extension program of the GGND could, for example, be used in concert with policy and finance mechanisms to plan and accelerate a conversion to cleaner and more sustainable cooking technologies. Indeed, the green revolution extension model appears well-suited to fostering adoption of new cooking technology by hundreds of millions of dispersed rural households.

Finally, the proposed network of research and policy institutions would keep a close and continuous eye on innovations and developments emerging around the globe. It would provide analyses on new opportunities to further improve the implementation of the program with better technologies and additional policy support.

Seizing the Opportunity for an Energy Transformation

At this historical juncture, the international community of nations faces unprecedented challenges. It must find a way to address the following simultaneously: to stimulate and sustain global economic recovery, to end poverty, and to avert dangerous climate change. The GGND is a strategy designed to contribute substantially to all three objectives. While there are details remaining to be developed, the broad outlines are clear. Addressing the closely linked challenges of climate change, sustainable economic development, and global energy poverty will require greatly enhanced levels of cooperation among nations – a requirement that in itself could generate very positive impacts in terms of global understanding, trust, and collaboration.

The transformation of the world's energy sector is an opportunity not to be missed. The word "transformation" can often be misused but, in this case, the term is both appropriate and timely. A transformation in the global energy sector is not optional if we are to confront the challenges we face, especially that of averting dangerous climate change. The rapid growth in energy demand in developing countries and an inevitable decline in the availability of cheap and abundant oil make an early start on a renewable energy transformation all the more imperative.

A global-scale combination of targeted price supports, policy coordination, and extension programs to ramp up renewables over the next 10-20 years has the potential to make the transformation happen. By pushing down the price of renewable energy, we can raise living standards of poor people, boost our economies and significantly increase our chances of living in a world of relative climate stability.

It is realistic to imagine that implementation of this strategy could begin within two years of the conclusion of the Copenhagen climate summit (CoP-15). International dialogue necessarily takes time, but two years would be adequate for an accelerated program of fashioning the relevant global policy agreements, thoroughly investigating the financing options, and drawing up the appropriate institutional designs. This two-year period of implementation planning would afford the opportunity for additional research and refinement as well as pilot testing, drawing on examples and models around the world, of those mechanisms and programs envisioned under this strategy. It would give the international community the opportunity to establish, in time for the 20th anniversary of the United Nations Conference on Environment and Development, a fully convincing and confidence-inspiring response to the challenges acknowledged and the promises made in Agenda 21.

Great global transitions do not happen instantaneously. Years of visionary thinking, innovative actions, and many small steps seem to produce only marginal results for a period of time; but once they reach a tipping point, their collective impact generates an accelerating virtuous cycle, and the outcome becomes overwhelmingly greater than the sum of the initial incremental steps.

So it can be with the adoption and implementation of this strategy. The incremental actions of nations, international institutions, and initiatives large and small, in the public, private, and civil society sectors, over many years, have paved the way for this opportunity. The parts are all there. It is time to sum them up – to make a big push that will carry us beyond the tipping point – and to achieve an impact greater than what we currently believe to be possible.

The time has come for a Global Green New Deal.

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Planetens räddare

Vad har Tariq Banuri, en högt uppsatt chef inom FN, gemensamt med en gammal amerikansk utrikesminister? Båda har lagt fram en Marshallplan. Men den här gången är det miljön som ska räddas.

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Chefen för FN:s kommission för hållbar utveckling, Tariq Banuri, har bråttom.

Varje år släpper FN en global ekonomisk och social kartläggning. I år är temat klimatförändringen och rapporten går under namnet "Promoting development, saving the planet", (främja tillväxt, rädda planeten).

Och just nu reser Tariq Banuri runt och föreläser om rapporten. Hans presentation på Kulturhuset i Stockholm i mitten av oktober får närmast ses som en generalrepetition. Dagen efter var han nämligen hemma i New York igen för att göra om samma sak inför FN:s generalförsamling.

Urtavlan på Tariq Banuris stora Rolexklocka är lika bred som

hans handled. Tiden för att rädda planeten är kort om du frågar honom. Själv är han 60 år. Han har större delen av sitt yrkesliv bakom sig och makten att påverka finns nu. Han skämtar om att han måste lämna några frågor till sin dotter att lösa, men iver lyser igenom.

Över en espresso berättar Tariq Banuri om rapporten. Vid det här laget har han hunnit dra principerna i planen ett antal gånger, men han verkar inte alls trött på det, tvärtom.

Rapporten har redan fått ett smeknamn: den nya Marshallplanen. Anledningen är att förslaget innebär att konststycket från 40-talet ska göras om. Då hjälpte USA Europa på fötter igen efter andra världskriget. Skillnaden nu är att Europa

är med och betalar. Den här gången är det länderna i syd som behöver hjälp.

Likheterna mellan den nya och den gamla Marshallplanen är framför allt tre: För det första handlar det om stora summor pengar. Hela 100 miljarder dollar behövs enligt rapporten. För det andra ska planen genomföras under en begränsad tid: tio år. Slutligen finns det tydliga mål för vad som ska uppnås. På 40-talet handlade det om att bygga upp Europa igen efter kriget. Den här gången ska länderna enas kring en lösning av klimatfrågan som bygger på ett tydligt instrument för att öka tillgången på förnyelsebar energi.

Vi återkommer till planen senare för beskrivningen blir knappast meningsfull om Tariq Banuris grundläggande problembeskrivning får vänta.

Innan han började på FN arbetade han med hållbar utveckling på Stockholm Environment Institute, SEI. Och även om han inte var stationerad i Stockholm då säger han att det känns som att komma hem när han besöker Sverige.

”Det är alltid ett nöje att komma till Sverige. Sverige har under en lång tid drivit frågor om hållbar utveckling och många viktiga idéer kommer från den här delen av världen”, säger Tariq Banuri.

Upprepade gånger berömmar han Sverige för arbetet med att minska koldioxidutsläppen. Det är en viktig pusselbit för att komma till rätta med klimatproblemen.

Stoltheten över att vara svensk går dock över lika fort som Tariq Banuris trummande stämma beskriver sin syn på utsläppsproblematiken. För att bara sluta använda fossila bränslen leder nämligen inte framåt.

Han återkommer gång på gång till den resa som mänskligheten gjort tack vare upptäckten av fossilt bränsle. Han kallar det ett mirakel att vi med hjälp av olja lyckats koncentrera energi.

”Visserligen är det ett mirakel som kommer att döda oss, men det är fortfarande ett mirakel. Betänk till exempel att fyra liter bensin ger lika mycket energi som om en person skulle arbeta i tre månader.”

Problemet är enligt honom att resurserna, energin, fördelas ojämnt i världen. Och här är Sverige verkligen inget föregångsland. I snitt förbrukar vi 180 kilowattimmar per person och dag. Det är högt även om man bara ser till övriga länder i Europa.

”I utvecklingsländerna kostar en kilowattimme cirka 70 öre. I västvärlden är det lite dyrare och en kilowattimme kostar i genomsnitt cirka en krona och 50 öre”, förklarar Tariq Banuri.

Det intressanta är hur mycket energi varje person har råd med. Han tar Indien som exempel där en arbetare tjänar cirka 14 kronor per dag.

”Hur mycket energi har man råd med då? Det jag försöker säga är att tillgången på energi och priset är nära sammankopplat. Vi kan jämföra med vatten. Tänk om vi skulle sätta ett pris på vatten

och säga att bara de som hade råd med vatten fick tillgång till det. Inget civiliserat land skulle göra så.”

Om vi adderar bilden av hur länge de fossila bränslena räcker blir det snart tydligt att de fattigas tillgång till el knappast ökar i framtiden.

Vare sig du frågar en expert som säger att de fossila bränslena sinat inom tio år eller en annan som tror 50 år gör marknadskrafterna att de rika övertrumfar de fattiga och köper de små resurser som finns kvar.

Det är det scenariot som Tariq Banuri nu vill ändra. Han reser runt och sprider idén om hur tillgången på el ska öka genom utveckling av teknik som ger förnyelsebar energi.

”Just nu ökar inte efterfrågan på förnyelsebar energi eftersom folk inte har råd med det. Och eftersom det inte finns någon efterfrågan finns det ingen massproduktion. Och eftersom det inte finns någon massproduktion kan vi inte få ner kostnaden.”

Lösningen är att ge en kraftfull injektion precis där den behövs. Det måste finnas en ”strategisk ingångspunkt.”

Och det är här som den nya Marshallplanen kommer in i bilden. Genom att de rika länderna satsar miljardbelopp i en stor fond öronmärks pengar till utveckling av teknik för framställning av klimatvänlig energi. Tekniken kommer länderna i syd till del genom att elen får ett pris som de har möjlighet att betala.

Systemet kallas feed-in-tariff. Flera länder, bland annat Tyskland, har använt sig av det för att öka tillgången på miljövänlig el. Principen är att beställaren, staten, sätter ett pris gentemot leverantören som gör det lönsamt att satsa på att framställa grön el. Staten sätter sedan ett pris mot kunden som denne har råd att betala. Mellanskillnaden, eller fakturan om man så vill, betalas av staten med hjälp av offentliga medel.

”Om företagen investerar och utökar produktionen av förnyelsebar energi går kostnaden ner och förhoppningsvis blir det åtminstone lika billigt som energi som kommer från fossila källor. När priset går ner behövs inte planen längre.”

Fördelarna för utvecklingsländer är tydliga, men även svenska företagsledare har all anledning att dra på smilbanden.

”Om du tillverkar komponenter inom exempelvis vindkraftsteknologi får du en enorm ökning i efterfrågan på dina produkter. Det är en uppmuntran till dessa företag att starta produktion i länder där efterfrågan kommer att bli hög.”

Och han tror inte att det blirsärskilt svårt att få företagen med sig på tåget. I dag handlar mycket av företagens miljösatningar om att minska utsläppen men med den nya Marshallplanen flyttas fokus.

”Den här typen av idéer är i linje med de lösningar som vissa företag har presenterat i syfte att komma till rätta med klimatförändringarna. Det här är också ett sätt att undvika en global recession eftersom det går att minska utsläppen men ändå hålla produktionen uppe.”

I grund och botten handlar det om fattigdomsbekämpning. Han är övertygad om att ökad tillgång på energi ger tillväxt vilket i sin tur leder till ökad välfärd.

Det märks att han är van vid att behöva försvara tron att marknadskrafterna kan användas för att bekämpa fattigdomen. Tariq Banuri får det att framstå som den mest naturliga sak i världen. Och det råder ingen tvekan om att han brinner för att bekämpa fattigdom. Det säger han inte rakt ut, men när han får frågan om vad han gör på fritiden börjar han skruva på sig. Det är i och för sig vad alla högt uppsatta personer med fulla agendor brukar göra. Men Tariq Banuri verkar inte förstå frågan. Visst umgås han med familjen och läser en och annan bok, men något annat kan han inte nämna. Han har förmånen att arbeta med det som är hans livs intresse.

Han har på olika sätt genom hela sitt yrkesliv verkat för hållbar utveckling. Han började sitt arbete i hemlandet Pakistan och tog vägen via Stockholm Environment Institute för att till slut hamna på FN. Han har bland annat suttit med i FN:s klimatpanel som tillsammans med Al Gore vann Nobels fredspris år 2007.

Tariq Banuri är påtagligt oroad över förtroendegapet mellan nord och syd som bara har ökat i takt med att klimatförhandlingarna närmar sig sitt klimax i Köpenhamn den 7–18 december.

Tariq Banuri hoppas att den nya Marshallplanen kan bidra till att återupprätta förtroendet parterna emellan och föra diskussionen framåt.

”Förtroende byggs genom att man gör saker tillsammans. Därför har vi försökt identifiera området där det är möjligt att nå framsteg snabbt.”

Planen är inriktad på att lösa klimatfrågan eftersom den berör alla länder. Förhoppningen är att feed-in-tariff-modellen ska attrahera eftersom det är ett tydligt instrument.

Han vill inte ge sig in i diskussionen om vad som är fel med dagens bistånd. Han nöjer sig i stället med att nämna lite av den kritik som finns mot det. Mottagarna av biståndet uppfattar det många gånger som oförutsägbart. Både vad gäller den tidsperiod

som stödet betalas ut och de kriterier som länderna måste leva upp till för att få bistånd.

”Resultatet är i relation med ambitionsnivån. Med andra ord: Om vi säger att det tar 40 år att verkligen uppnå en hållbar utveckling kommer det att ta minst 40 år. Om vi säger att det ska ta 10 år betyder det att vi har en mycket tydligare ambition.”

Än så länge är den nya Marshallplanen bara en rapport som vilken annan, ytterligare en pappersbunt från en institution vars möjlighet att påverka ständigt ifrågasätts. För att den nya Marshallplanen ska kunna bli verklighet måste synen på förnyelsebar el förändras. Det räcker inte med att se den som ett dyrt komplement till fossilt bränsle, som ”en boutique vid sidan om”.

Han tror att planen kan bli verklighet om bara finansieringen kommer på plats. Här finns det en stor skillnad mellan den nya och den gamla Marshallplanen. Den gången, på 40-talet, handlade det om en stormakt som ensam hostade upp den stora summan pengar som behövdes.

Nu är det många länder som ska enas. De summor som har nämnts i förhandlingarna inför Köpenhamn är långt ifrån de nivåer som Tariq Banuri och hans medarbetare skulle vilja se.

”Många utvecklade länder har redan avsatt stora offentliga resurser, men vad vi vill göra är att multiplicera den summan med tio. Orsaken är att vid den summan kommer kostnadsredueringen att inträffa mycket snabbare. Och då behöver vi inte, enligt våra beräkningar, internationellt stöd om tio år.”

Tanken kan tyckas svindlande. Samtidigt är det befriande med en så obotlig optimist. Efter allt jobbigt prat om miljöproblemen i världen är det skönt att bada i det positiva ett tag.

Tvivlet kommer dock snart tillbaka. För är det inte så att han måste tänka att det går?

”Jag tänker mig någon som jobbar med hållbar utveckling en person som ser problemen i utvecklingsländer som temporära. Som tror att vi löser dem. Om en eller två generationer kommer ojämlikheten i förutsättningar mellan länder inte längre att finnas.”

Tove Carlén

Carbon markets don't motivate clean investment, says Deutsche Bank

Carbon Finance Online, 28 October, 2009

Emissions trading has done little to encourage investment in renewable energy and energy efficiency, and governments should focus on introducing feed-in tariffs and mandates if they want to prevent the worst effects of climate change by 2020, according to analysis by Deutsche Bank's Asset Management (DeAM) division.

"The carbon price is not forcing companies to change their behaviour," said Kevin Parker, New York-based global head of DeAM. "There are aspects about cap-and-trade that are distorting supply and demand, and that's going to delay implementation [of clean technologies]," for example, the giving away of allowances and volatility in the carbon price due to recession, he said. He added that the credibility of carbon markets "is up for debate".

The firm analysed 270 major climate policies in 109 countries and assigned each country a high, medium or low risk profile for investors. Countries with the lowest risk included Germany, while Italy was among those given a high risk rating – despite both countries being in the EU Emissions Trading Scheme, which caps greenhouse gas emissions.

"Carbon markets may provide policy support to investors in the long term," said Mark Fulton, global head of climate change investment research at DeAM. "However, for the foreseeable future, investors will be focused on mandates and incentives."

Feed-in tariffs, which provide renewable energy developers with a bankable revenue stream, have "demonstrated their ability to deliver scale", he said, citing the examples of Spain and Germany which have developed world-leading renewable energy sectors.

DeAM also engaged Columbia University's Earth Institute to calculate how current and proposed policies would impact emissions in 2020. The Institute found that even if such policies made their maximum possible impact, emissions would likely exceed the amount needed to limit world temperature increases to 2°C – by an amount equivalent to the current annual emissions of the US.

What investors want is Transparency, Longevity and Certainty – 'TLC' – in policy regimes to mobilise capital.

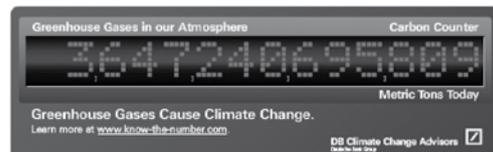
GET FiT Program

Global Energy Transfer Feed-in Tariffs for
Developing Countries

Extract: Summary for Policy Makers

April 2010

Greenpaper available online: <http://www.dbcca.com/research>



Carbon Counter widget available for download at:
www.Know-The-Number.com

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Editorial Letter



Mark Fulton
Global Head of Climate Change Investment Research

Over the past several years, developing world governments and international organizations have been seeking solutions for energy access for the underprivileged, energy scale-up for more developed countries and on top of this, how to do so in a clean and environmentally-friendly manner. Wherever we have encountered this discussion, the need for private capital has always been a key component. The question is how to generate scaled response through efficient Public-private Partnerships?

In our view, what is most often lacking is an understanding of the basic issues being faced literally on-the-ground by project financiers and developers. Hence, we have set out to identify these issues as clearly as possible and then, building on our own and others' previous work, provide a potential solution: Global Energy Transfer Feed-in Tariffs - GET FIT.

In essence, GET FIT is simple:

- International AAA-rated donors: national governments, development banks, and international climate-related funds provide premium payments for renewable energy in partnership with developing country governments. The payments would be structured in a way to support renewable energy technologies' progress towards grid parity. This is a major de-risking for investors and can establish fair and sufficient returns;
- Developing countries' governments and utilities administer the process and guarantee to pay generators at a rate based on the avoided costs of fossil fuel generation.
- An array of technical and risk mitigation programs will need to be aggregated and coordinated as well.
- Private investors then deploy capital in renewable energy projects.

However, the execution is complex, which our paper addresses.

We believe that while there are many options available for renewable energy deployment, advanced and well-designed feed-in tariffs can be applied to accelerate the scale-up of on-grid resources, and to promote energy access through mini-grids, while plotting a course to grid parity for the technologies. We have written extensively about feed-in tariffs in the developed world context already in our "Paying for Renewable Energy – TLC at the Right Price" whitepaper. In the developing world, any such policy proposal like this would need to be put in the context of national infrastructure development, energy regulatory frameworks, and plans such as Nationally Appropriate Mitigation Action plans (NAMAs), or what have been termed Low Carbon Growth Plans. Importantly, Public-private Partnerships can be adapted to FIT structures. In turn, these satisfy the key investor criteria we believe are critical to private sector investors: Transparency, Longevity and Certainty – TLC.

As we noted in our recently published whitepaper, "Global Climate Change Policy Tracker – The Green Economy: The Race is On," the developing world should not be left out of this race, both for the sake of the world's environment but more importantly, for the long-term viability of their own economies. The race is on – GET FIT!

We welcome feedback on this "Green Paper."



Summary for Policy Makers

Overview

The world faces two interrelated energy challenges that require serious capital mobilization: global CO₂ must be stabilized to avoid catastrophic climate change, and access to affordable, reliable and clean energy must be extended to the 1.5 billion people of the developing world in rural areas without grid connection to alleviate poverty and drive economic development. Renewable energies can help achieve these goals, in tandem with complementary efforts focusing on funding for energy efficiency, other low carbon energy options, and electricity grid expansion. Within this wider context of national plans, the Global Energy Transfer Feed-in Tariffs (GET FiT) Program is a concept to specifically support both renewable energy scale-up and energy access in the developing world through the creation of new international Public-private Partnerships. GET FiT would efficiently combine a fund of public money directed for renewable energy incentives with risk mitigation strategies and coordinated technical assistance to address project development and financing barriers. This combined approach would catalyze the supply of, and the demand for, private sector financing of renewable energy projects in both middle- and low-income countries, while also insuring maximum incentive capture at least cost to the funding partners. Importantly, it would provide what we see as crucial for private investors: Transparency, Longevity and Certainty – TLC. GET FiT would serve as a bridge to grid parity for renewable energy both by allowing developing countries to gain experience with renewable resources prior to break-even scenarios, and by adjusting incentive rates to reflect lower prices over time. This proposal is written from a standpoint of developers and financiers of renewable energy projects, highlighting the instruments which would help to mobilize private capital. The GET FiT concept could be flexibly adapted to specific national contexts, and could be launched on a bilateral, regional, or global basis. The race is on to create green economies and the developing world should not be left out.

Renewable Energy Financing

There is a broad range of policies in place that support renewable energy around the world, including mandates and standards, innovation policies, carbon pricing, and others¹. The primary goal of GET FiT is to support renewable energy policies that reduce or mitigate investment risks, and consequently attract significant private capital to drive markets for commercially-available technologies. Feed-in tariffs, and similar performance-based incentives, have proven to be effective and efficient mechanisms for creating investor security and driving rapid renewable energy growth. The Stern Review on the Economics of Climate Change, for example, concluded that feed-in tariffs “achieve larger deployment at lower costs.” By 2008, feed-in tariffs had driven 75% of PV capacity and 45% wind capacity worldwide. Although ~27 developing countries have adopted feed-in tariff policies, their designs and effectiveness vary widely, and some countries lack the financial strength, grid infrastructure, and/or regulatory frameworks for full policy implementation. GET FiT would partner with these and other developing countries to financially support policy structures that appropriately adapt best practices to national contexts, as part of broader, low-carbon development strategies (e.g. NAMAs)². Such policies would include:

- a) Primarily, the deployment of advanced feed-in tariff designs that target on-grid, commercialized, renewable resources at the right price³ and that focus on the most appropriate technologies for local conditions.
- b) Power purchase agreements as a pre-FiT regulatory mechanism in countries that face grid integration constraints, or for technologies that have a limited in-country track record, with the ultimate goal of the implementation of broader FiTs; and
- c) The adaptation of FiT design principles to create performance-based incentives for decentralized multi-user energy generation, especially mini-grids, in rural areas not included in current grid expansion plans.

By supporting a range of policy structures, GET FiT could be tailored to work in different national contexts, including least developed countries, which may lack the grid infrastructure to initially support full feed-in tariffs. In each of the three cases

¹ DBCCA (2009). *Global Climate Change Policy Tracker: An Investor's Assessment*. Available from <http://www.dbcca.com/>

² Nationally Appropriate Mitigation Action

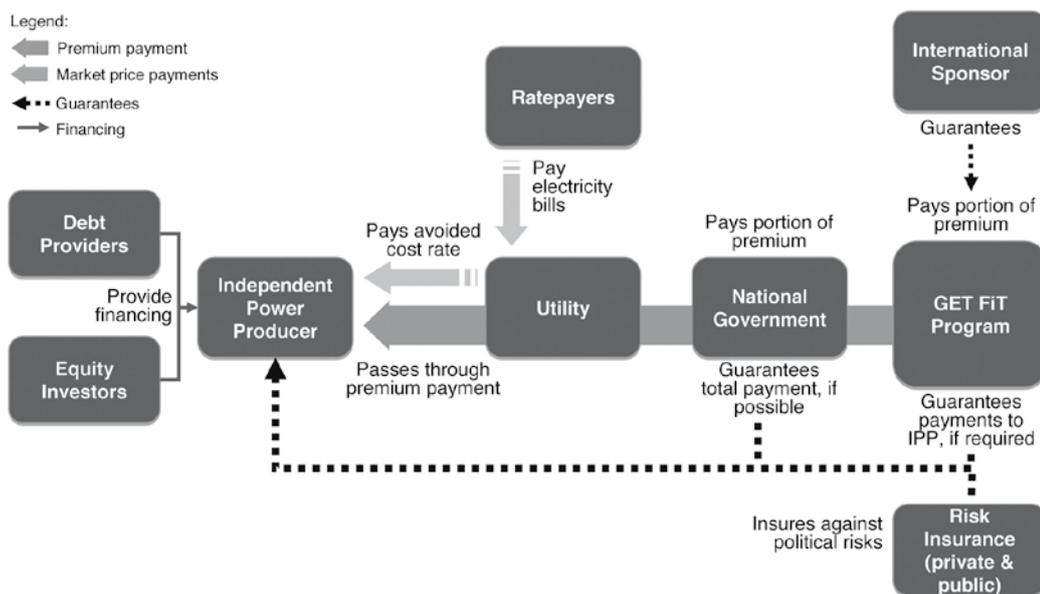
³ Advanced feed-in tariffs include cost/price discovery processes, the flexibility to respond to markets, and mechanisms to efficiently establish a pathway to grid parity while still operating within a transparent framework. See DBCCA (2009). *Paying for Renewable Energy: TLC at the Right Price - Achieving Scale through Efficient Policy Design*. Available from <http://www.dbcca.com/>

Summary for Policy Makers

outlined above, the GET FiT Program would contribute public sector funds to share the above-market costs of renewable electricity with partner countries, whereas utilities would commit to purchasing electricity from generators at market price.⁴ This stabilization of revenue streams would attract significant amounts of private sector capital from both domestic and international sources to build renewable energy projects. The payments would be adjusted to reflect market conditions over time and chart a pathway to grid parity.

Renewable Energy Risk Mitigation

In addition to providing direct incentives for renewable energy development, GET FiT would work with national and international partners to address a variety of risks and barriers faced by project developers, investors and financiers, including development risk, off-take and counterparty risks, political risk, market risk, reinsurance risk and currency risk. As can be seen in the graphic below, GET FiT would provide premium payments, passed through the national governments and utilities to independent power producers (IPPs). The utility would pay at least the market rate to the IPP, and there would be minimal additional burden on the electricity ratepayer. The transfer payments of the FiT premium to the IPP could be guaranteed by the national government, or by the GET FiT Program, depending on the national context and creditworthiness of the involved parties. An international sponsor would provide an ultimate guarantee for the GET FiT payments.⁵ Political risk insurance entities, (e.g. MIGA, OPIC, private sector providers, etc.) could play a role in mitigating sovereign risk⁶, and could also backstop governments' guarantees of renewable energy payment where necessary. Currency risk is also a concern in the global renewable energy market, and it is envisioned that the GET FiT portion of the payments would be made in hard currency, thereby significantly minimizing local currency risks.



⁴ The portion of the renewable energy premium payment borne by GET FiT would vary based on national conditions; a portion of the premium could also be recovered from national utility ratepayers.

⁵ For decentralized energy generation, in particular mini-grids, a renewable energy service company (RESCO), owned either by the local community or by third party-developers replaces the utility in the chart shown above. The RESCO might also fully integrate both the independent power producer and utility functions shown in the graph above into a single entity, depending on the business model.

⁶ The involvement of political risk insurance entities would depend on a wide range of factors, such as coverage eligibility criteria (i.e. national ownership requirements), each insurer's capacity to cover sovereign risk related to project development, government creditworthiness, etc.

Summary for Policy Makers

Aggregating and Coordinating Existing Capacity Building and Technical Assistance

Direct financial support and risk mitigation strategies can create the financial conditions necessary to attract domestic and international capital. In the developing world, however, renewable energy projects can also face an array of non-financial challenges. GET FiT would seek to address these challenges by coordinating existing resources in the energy sector and directly involving domestic players in the Program's management and transactions. As can be seen in the graphic above, GET FiT would maximize the involvement of domestic government and utilities in the management of the program in order to reinforce the development of renewable energy expertise and capacity. GET FiT would also seek to create the conditions for private sector actors – such as local banks and energy service companies – to establish track records with renewable energy finance, development, and operations. This could be accomplished both through direct partnerships and through indirect effects, such as structuring feed-in tariff policies that create stable demand for the services of local contractors.

The combination of sustainable local involvement, with focused and appropriate technical assistance could enable developing countries to capture the full economic and social potential of the GET FiT strategy, in particular with regard to job creation, the expansion of technical know-how, and domestic market development. In order to strengthen demand for financing and to address the non-financial barriers to renewable energy in the developing world, GET FiT would help source technical assistance and capacity building focusing on areas such as:

- Advanced feed-in tariff policy design, including initial rate setting and ongoing review
- Grid capacity and expansion cost analyses, resource assessments, project feasibility studies, and integrated energy planning processes for governments and government agencies,
- Grid management and renewable energy integration strategies for utilities,
- Financial due diligence and risk mitigation strategies for local financiers, and
- Renewable energy project development, system construction, and operation and maintenance services for local private sector players.

Of this broad menu of activities, GET FiT would directly fund some technical assistance (e.g. feed-in tariff policy and rate design), but would primarily focus on aggregating and coordinating existing technical assistance resources from multi-lateral, bi-lateral, and private sector partners.

The challenges addressed by the GET FiT Program's approach are summarized in the table below:

Barrier	GET FiT Solution
Rapid scale-up of renewable energy may not be affordable for developing countries, and many existing policies do not offer sufficient payment levels to generators	GET FiT will support the payment of above-market premiums for renewable energy projects through feed-in tariffs or similar policy mechanisms
Many developing countries face grid or other renewable energy integration constraints which do not allow them to implement broad FiTs	In countries that only limited capacity for on-grid resources, GET FiT will also support the development of transparent "lighthouse" PPAs in order to build an early in-country technology track record and prepare for a broader FiT regulation. During the "PPA phase", Get FiT will continue to work with governments on grid expansion and renewable energy integration plans.
Renewable energy projects have trouble accessing affordable capital because of a broad range of risks	GET FiT will mitigate risks for developers, financiers, and investors by creating financeable incentives, backed by appropriate guarantees
There are a wide range of technical, regulatory, legal, and political barriers to renewable energy deployment that cannot be resolved through policy design alone	GET FiT Program will provide and coordinate targeted technical assistance focusing on feed-in tariff policy design, price discovery, rate setting, and policy review. The Program will actively aggregate and coordinate energy-related capacity building efforts of other public and private institutions
FiTs to date have targeted energy access in a limited regard (e.g. Ecuador has a FiT for off-grid systems but it is not fully operational)	GET FiT Program will support the development of off-grid solutions, such as mini-grids, in remote areas of developing countries

Summary for Policy Makers

Program Impact

Renewable energy investments in the developing world yield lower carbon abatement costs than in the developed world, while also achieving a broad range of additional social, economic, and environmental objectives. Based on a preliminary analysis, a 3 bn US\$ commitment under the GET FiT scheme could facilitate:

- Over 1 GW of newly installed on-grid and off-grid renewable energy capacity;
- The abatement of approximately 100 million tons of CO₂ emissions over funded projects' lifetimes, which would translate into abatement costs of approximately 30 US\$ per ton CO₂⁷; and
- Access to affordable, clean, and reliable electricity for over half a million people in rural areas, assuming that 60 MW of off-grid renewables are included in the portfolio of funded generation technologies.
- We would expect around 4 US\$ billion of project finance capital to be attracted to such an investment program.

Governance and Capitalization

The GET FiT concept is intended to be a flexible, but detailed, program design that could be managed and funded through a number of different existing and/or new channels. At this stage of concept development, neither capitalization strategies nor governance structure are addressed in detail. To a large extent, these issues will be shaped by the way in which the GET FiT Program is ultimately adopted and implemented. One of the original guiding principles of the GET FiT concept was that it should serve as a template for parties seeking near term action on renewable energy development in the post-Copenhagen environment. It is conceivable that the GET FiT template could be deployed as a truly global structure as proposed in recent concept papers from international organizations. It may be challenging, however, to deploy and fund such a global structure in the near-term. Alternatively, it is also possible that GET FiT could be implemented in phases, with the initial phase prioritizing near-term bi-lateral or regional implementation opportunities. There are currently several ongoing or proposed bi-lateral national partnerships focusing on climate change and renewable energy technology deployment in developing countries that currently have feed-in tariff policies. South Africa, for example, is exploring working with Germany, whereas Kenya has announced plans to work Japan. Such bilateral partnerships could provide an avenue for deploying the GET FiT concept in an institutionalized way. It might also be possible to form specific multi-lateral partnerships in support of target regions.

Depending on the ultimate structure of the GET FiT Program, there are a wide range of potential capitalization strategies that could be pursued (e.g. fast start funds, international carbon markets, national donor strategies, bonds, etc.). A key funding challenge will be how best to secure the funds necessary to guarantee long-term incentive payments to projects. It is unlikely that national donors would be able to provide the upfront the capital necessary for the entire projected incentive payment. As a result, it may be necessary for the GET FiT fund to explore funding opportunities in bond markets secured by commitments from donor organizations and other revenue streams through long-term annual commitments.

⁷ Based on preliminary modelling conducted by Deutsche Bank; the results of this analysis will vary, strongly depending on assumptions about baseline emissions, technology mix, incentive levels, and the split between on-grid and off-grid capacity. Conservative assumptions have been chosen for the decentralized projects, taking into account required technical assistance and length of implementation process.

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