

Making It

1st quarter 2012

Industry for Development

- Jeremy Rifkin
- Climate change, climate action
- WindMade
- 'Homeland security'
- Slovenia



Our low-carbon future



NUMBER 1, DECEMBER 2009

- We must let nature inspire us – Gunter Pauli presents an alternative business model that is environmentally friendly and sustainable
- Hot Topic: Is it possible to have prosperity without growth? Is 'green growth' really possible?



NUMBER 2, APRIL 2010

- The International Energy Agency's Nobuo Tanaka looks at energy transitions for industry
- Energy for all – Kandeh Yumkella and Leena Srivastava on what needs to be done to improve energy access



NUMBER 3, JULY 2010

- China's stunning economic rise: interview with minister of commerce, Chen Deming
- Towards a more productive debate – Ha-Joon Chang calls for an acceptance that industrial policy can work



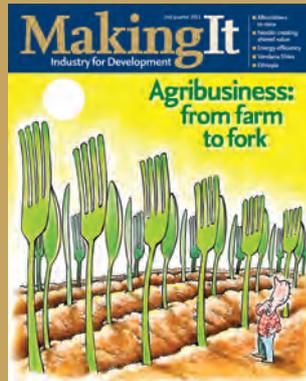
NUMBER 4, NOVEMBER 2010

- Strengthening productive capacity – Cheick Sidi Diarra argues that the LDCs should – and can – produce more, and better quality, goods
- Patricia Francis on climate change and trade
- Hot topic: The relevance of entrepreneurship



NUMBER 5, FEBRUARY 2011

- A window of opportunity for world trade? – Peter Sutherland assesses the prospects for the conclusion of a multilateral trade agreement
- A path to mutual prosperity – Xiao Ye on trade between sub-Saharan Africa and China



NUMBER 6, APRIL 2011

- Feeding a crowded world – IFAD's Kanayo Nwanze argues that smallholder farmers must have opportunities to be entrepreneurs
- Nestlé CEO Paul Bulcke on 'Creating Shared Value'
- Hot Topic: Does energy efficiency lead to increased energy consumption?



NUMBER 7, JULY 2011

- The globalization paradox – Dani Rodrik
- Unfair share – Thomas Pogge on affluent countries' responsibility for increasing global poverty
- Hot topic: Is nuclear power necessary for a carbon-free future?



NUMBER 8, NOVEMBER 2011

- Closing the gender gaps – Michelle Bachelet on overcoming the barriers that prevent women from seizing economic opportunities
- Engineering eco-friendly solutions – Carolina Guerra on hazardous waste in Colombia
- Hot topic: Growth: the end of the world as we know it?

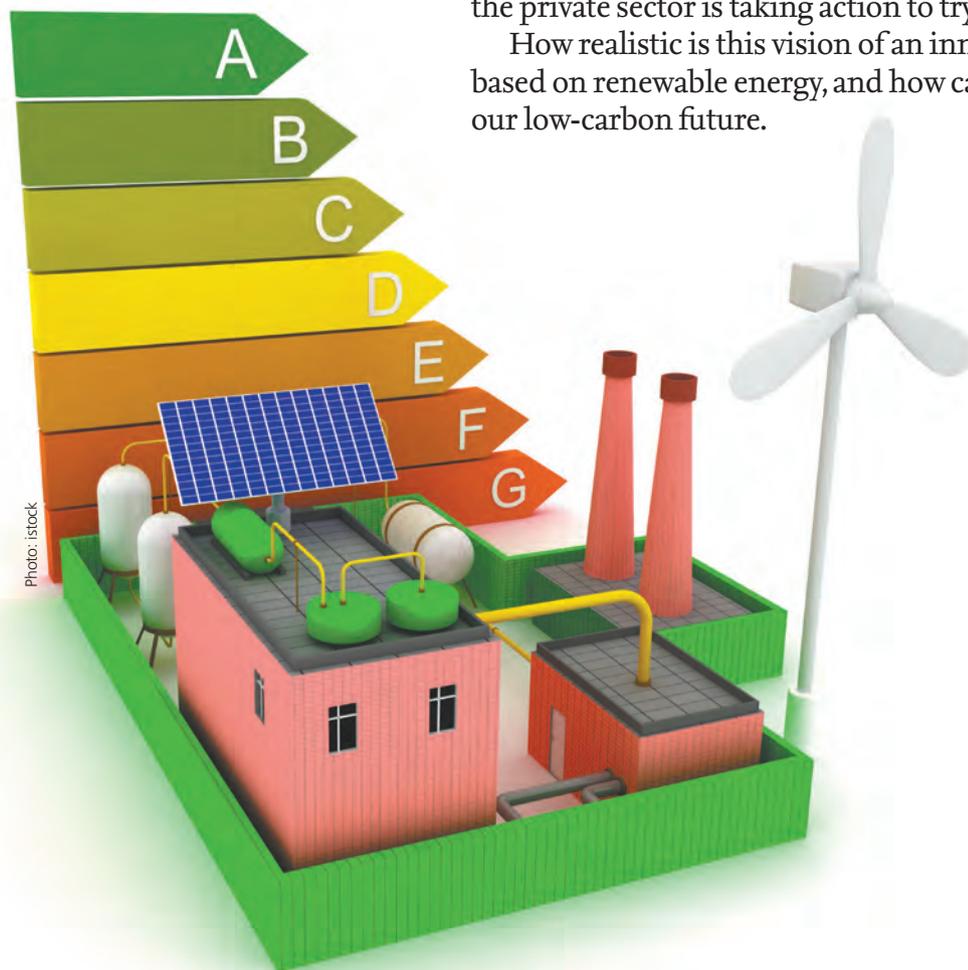
A quarterly magazine. Stimulating, critical and constructive. A forum for discussion and exchange about the intersection of industry and development.

Editorial

Imagine a future where the power of green technology drives a new economic revolution, and where everyone, all over the world, has access to clean, safe, and affordable energy services. Does this sound far-fetched? Not according to our contributors. Jeremy Rifkin, whose latest book, *The Third Industrial Revolution*, is making a big impact, sees developments in renewable energy and communications platforms coming together to form an economic paradigm which will drive humanity to more sustainable horizons. Kandeh K. Yumkella and Morgan Bazilian see the Sustainable Energy for All and Green Industry initiatives as key steps in an essential transition to an inclusive new economy.

With the International Energy Agency warning that the world is heading for irreversible climate change in less than five years, there is no time to waste. Elsewhere in this issue of *Making It*, Soogil Young explains how the Republic of Korea is one of the countries setting the pace in the drive to build a green economy. Jigar Shah from the Carbon War Room writes that business has a major role to play, too, and Morten Albaek of the WindMade group introduces one way that the private sector is taking action to try and secure our future.

How realistic is this vision of an innovative economic model based on renewable energy, and how can we reach it? Read on. This is our low-carbon future.



Editor: Charles Arthur
editor@makingitmagazine.net
Editorial committee: Ralf Bredel,
Tillmann Günther, Sarwar Hobohm,
Kazuki Kitaoka, Wilfried Lütkenhorst
(chair), Cormac O'Reilly and
Jo Roetzer-Sweetland
Editorial assistance, website and
outreach: Lauren Brassaw
outreach@makingitmagazine.net
Cover illustration: Mike King
Design: Smith+Bell, UK –
www.smithplusbell.com
Thanks for assistance to
Donna Coleman

Printed by
Gutenberg Press
Ltd, Malta –
www.gutenberg.com.mt
on FSC certified paper



To view this publication online and to
participate in discussions about
industry for development, please visit
www.makingitmagazine.net

To subscribe and receive future issues
of *Making It*, please send an email
with your name and address to
subscriptions@makingitmagazine.net

Making It: Industry for Development
is published by the United Nations
Industrial Development Organization
(UNIDO),

Vienna International Centre,
P.O. Box 300, 1400 Vienna, Austria
Telephone: (+43-1) 26026-0,
Fax: (+43-1) 26926-69
E-mail: unido@unido.org

Copyright © 2012 The United
Nations Industrial Development
Organization

No part of this publication can be
used or reproduced without prior
permission from the editor
ISSN 2076-8508

The designations employed and the
presentation of the material in this magazine
do not imply the expression of any opinion
whatsoever on the part of the Secretariat of the
United Nations Industrial Development
Organization (UNIDO) concerning the legal
status of any country, territory, city or area or of
its authorities, or concerning the delimitation
of its frontiers or boundaries, or its economic
system or degree of development. Designations
such as “developed”, “industrialized” and
“developing” are intended for statistical
convenience and do not necessarily express a
judgment about the stage reached by a
particular country or area in the development
process. Mention of firm names or commercial
products does not constitute an endorsement
by UNIDO.

The opinions, statistical data and estimates
contained in signed articles are the
responsibility of the author(s), including those
who are UNIDO members of staff, and should
not be considered as reflecting the views or
bearing the endorsement of UNIDO.
This document has been produced without
formal United Nations editing.

GLOBAL FORUM

6 Letters

8 WindMade and the case for transparency –
Morten Albæk introduces the first global
consumer label identifying corporations and
products made with wind energy

12 Hot Topic: Climate change, climate action –
Mary Robinson and Corinne Schoch on
inclusive sustainable development and
rethinking climate security

16 Business matters – news and trends

FEATURES

**18 Building the architecture for green
growth –** Soogil Young explains how the
Republic of Korea is leading the way in
de-linking economic growth and
environmental degradation

20 No place to plug in – The Carbon War
Room’s Jigar Shah sees small solutions
to big problems

KEYNOTE FEATURE

22 A new economic narrative –

Jeremy Rifkin explains
how the five pillars of a
third energy-
communications
revolution will create
the foundations for the
next great wave of economic
growth, while Morgan Bazilian and
Kandeh K. Yumkella see unique
opportunities arising from the
creation of a radically different
energy system





18



20



32 Sustainability: a lever for economic growth – European Commissioner Antonio Tajani explains how the European Union is finding solutions that compromise neither growth nor the climate and the environment

34 Country feature: Slovenia – Successful and innovative – Interview with His Excellency Danilo Türk, President of the Republic of Slovenia

38 A case of ‘homeland security’ – Alejandro Litovsky and Paulina Villalpando look at how the risks of investing in farmland create opportunities for sustainability

POLICY BRIEF

42 Networks for prosperity

44 Carbon capture and storage in industrial applications

46 Endpiece – Sumi Dhanarajan considers how the pharmaceutical industry can improve access to medicines in developing countries



GLOBAL FORUM

The Global Forum section of *Making It* is a space for interaction and discussion, and we welcome reactions and responses from readers about any of the issues raised in the magazine. Letters for publication in *Making It* should be marked 'For publication', and sent either by email to: editor@makingitmagazine.net or by post to: The Editor, *Making It*, Room D2142, UNIDO, PO Box 300, 1400 Wien, Austria. (Letters/emails may be edited for reasons of space).

LETTERS

Non-hazardous

I truly enjoyed reading "Engineering eco-friendly solutions", (*Making It*, issue 8). The article captures a real sense of innovation within the industry, and illustrates well how entrepreneurial activities can work. The article leaves me with two questions: The first thing that comes to mind is the question of other producers around the world. Since aluminum is produced and used in many parts of the world, what do other producers do with the aluminum dross? Is it recycled in a similar way, or is this a business model that can be expanded to other countries' markets?

The second question concerns safety. The article states that aluminum dross is a hazardous waste material, yet goes on to explain how the by-product of the aluminum dross is used for building material, benches, and fence posts. If at one point the material is hazardous, at what stage does it become non-hazardous?

● **Émile Potolsky, website comment**

Good to read about a woman making a success of industrial waste recycling "Engineering eco-friendly solutions", (*Making It*, issue 8). Why don't you feature some more women

eco-entrepreneurs? Two come to mind.

One is Lorna Rutto, who won the Cartier Women's Initiative Award 2011 for sub-Saharan Africa. Her company, EcoPost, in Kenya, uses 100% recycled plastics to manufacture aesthetic, durable, and environmentally friendly fencing posts and custom lumber profiles.

The other is Majora Carter, whose Sustainable South Bronx pushed both for eco-friendly practices and, equally important, job training and green-related economic development for her vibrant neighbourhood in New York. She now runs the economic consulting and planning firm, the Majora Carter Group, putting the green economy and green economic tools to use, unlocking the potential of every place – from urban cities and rural communities, to universities, government projects, businesses and corporations.

There must be loads more.

● **Stacia Grove, website comment**

The environmental brink

Re: "On the road again – with a new roadmap", (*Making It*, issue 8), it's great that the Commissioner is telling industry to be more resource-efficient. He needs to do more of this and less of trying to



make consumers the problem (and the solution). He was recently in Poland launching the "Generation Awake. Your choices make a world of difference!" programme, which wants to encourage citizens to think about their impact on the planet when making purchasing decisions. This is all very well, but as Gar Lipow, a long-time environmental activist who has spent years immersed in the subject of efficiency and renewable energy, recently wrote: "We did not get into this mess via individual consumer choice, and we won't get out of it that way either."

Setting an example by doing some simple, logical things to reduce an individual environmental footprint is wonderful, but ultimately, we will not make up, through private spending or lifestyle changes, for the fact that it is the state and the private sector that are to blame for bringing us to the environmental brink.

The answer to collective

political failure is political action.

● **Desmond Attis, website comment**

Solar Sister

I like this, "Solar Sister: empowering women with light and opportunity", (*Making It*, issue 7). It's clear that poor people can make savings by having a solar lantern rather than paying for kerosene, but the article doesn't make it clear how poor people can find the US\$20 to buy the lamp. This seems a lot of money for one single outlay for people trying to live on less than two dollars a day. Or maybe they can pay in installments?

● **Alice Postlewaith, website comment**

Katherine Lucey, CEO of Solar Sister, replies:

We find that our customers have an acute appreciation of the value proposition of a one-time expenditure of US\$20 versus the weekly expenditure of US\$2 or



For further discussion of the issues raised in *Making It*, please visit the magazine website at www.makingitmagazine.net and the social networking Facebook site. Readers are encouraged to surf on over to these sites to join in the online discussion and debate about industry for development.



more for kerosene. The family saves over US\$80 in the first year, which can be spent on other important expenses, typically on education, health care and better nutrition.

One of the misconceptions about those living 'on less than two dollars a day' is that the income somehow arrives in a regular stream and must be managed on a weekly basis, as if they are getting a paycheck each week. In reality, the true challenge is managing a low level of income that is also unpredictable and variable. A family will earn US\$100 when they harvest their coffee beans, and then nothing for three or four months. Or the father will move to the city for work, and send home money every few months.

Managing the slow expenditure of money (the US\$2

per week for kerosene) that has been received all at once is extremely difficult, especially in a culture where it is expected that you share what you have. As one of our customers told us: "When I have money, I like to invest it, but I don't trust the banks. They have fees that eat my money. A solar lamp is a good investment. When I invest in a solar lamp, I make money. And my brother can enjoy the light, but he does not reach in my pocket." In the perverse economics of poverty, the one-time expenditure is actually a better fit to income patterns and levels.

China's growth

The two main centres of the world economy, the United States and the European Union,

seem to be slowing down to a near standstill, or worse. The recovery (if we can call it that) from the recession of 2008-9 seems to have run into the sand.

Worse is the slow evaporation of the illusion that the emerging market economies, headed by China, will come to the rescue of the declining West. Certainly, China's robust recovery from the depths of the slump in 2008-9 has powered growth in economies supplying it with manufactures, food and raw materials, and encouraged a more general flow of capital into the Global South. But Dani Rodrik ("The Globalization Paradox" in *Making It*, issue 7, was a fascinating article) warned recently on the Harvard

University website against enthusiastic forecasts that this growth will continue:

"These predictions are largely extrapolations from the recent past and they overlook serious structural constraints. China's problems are already well recognized. The country's growth has been fuelled over the past decade by an ever-growing trade surplus that has reached unsustainable levels. China's leaders must refocus its economy away from export-oriented manufacturing and towards domestic sources of demand, while managing the job losses and social unrest this restructuring is likely to generate."

● **Graham Roberts, Brussels, received by email**

UNIDO

The new project fact sheet series

Foster your understanding of sustainable development by reading more about the achievements and impact of technical cooperation projects. These project fact sheets provide concise, result-oriented information about UNIDO's global activities.

www.unido.org/factsheets



WindMade and the case for transparency

Morten Albæk introduces the first global consumer label identifying corporations and products made with wind energy.

MORTEN ALBÆK is Group Senior Vice President, Global Marketing and Customer Insight, Vestas Wind Systems A/S. Vestas is a Danish manufacturer, seller, installer, and servicer of wind turbines. It is the largest supplier of wind turbines in the world. In January 2011, Vestas was awarded the Zayed Future Energy Prize.

I am writing to share a story of how a certain historic initiative came to be. This initiative goes above and beyond the status quo of energy policy and development to show the world that so much more is needed. This initiative gathers the voices of an impressive and diverse set of stakeholders who know all too well that it is time for us to finally reach our renewable energy goals. This initiative demonstrates how corporate, philanthropic dollars can be allocated in new, powerful ways. And this initiative will allow our billions of global citizens to clearly and directly inform their favourite brands that they want more. I am writing

to introduce you to WindMade.

About 18 months ago, a couple of my colleagues at Vestas and I started mulling over an idea to create a global consumer label for wind energy. We had noticed that a growing number of non-utility companies were becoming more sophisticated energy users and purchasers. In fact, companies were following several paths for energy procurement, from sourcing clean energy via certificates, to signing power purchase agreements with utilities and developers, buying wind turbines for on-site installations, and even investing in wind farms directly. We believed that the more consumers knew

about what their favourite brands were doing with respect to procuring clean energy, the more these consumers would buy products from that brand, thus encouraging companies to procure even more renewable energy. Global labels like Fair Trade and FSC (Forest Stewardship Council) have proved that labels can indeed create these cycles, but we were fairly confident that a global label did not yet exist for renewable energy. Our observations eventually transformed into conviction, and we decided it was time to mould our ideas into something real.

I am excited and proud to announce that WindMade is now a real organization,

issuing real labels, to real members. It is the first global consumer label for brands and products made with wind energy. It took a great deal of work and creativity to reach this point, and we could not have pulled it off without the tremendous support from several partners. Last year, we gathered an impressive group of founding partners to create an independent non-profit organization for this historic initiative. Each founder represents an important stakeholder group and ensures that WindMade takes a comprehensive approach.

- **Vestas** is the lead sponsor and pioneering organization behind WindMade;
- **WWF** offers expertise as the leading global sustainability organization, and has already developed many certification standards;
- **UN Global Compact** represents the global policy sector, and has proclaimed WindMade the first global consumer label ever endorsed by the United Nations;
- **The Global Wind Energy Council (GWEC)** represents the voice of, and support from, the global wind industry's members;
- **PricewaterhouseCoopers** serves as the verification expert to ensure that the third party audit process is credible and functional;
- **Bloomberg** is the official data provider for WindMade;
- **The LEGO Group** represents WindMade's target audience: forward-thinking consumer brands.

The founding partners also appointed a group of respected sustainability experts to develop a certification standard that is rigorous yet practical for today's corporate sustainability officers. Finally, we worked with our cutting-edge, creative partner, Droga5, to develop a sleek and concise label that delivers consumer-savvy style, supported by a credible foundation.

The WindMade label shows consumers exactly how much renewable energy their

favourite brands use to run their operations. To accurately communicate the different approaches to clean energy procurement, WindMade has created a family of labels. The first label, which was revealed on October 10th, displays how much wind generated electricity is consumed as a share of a company's overall electricity consumption. In 2012, WindMade will also start issuing labels that can be placed on actual products to inform customers about how much wind electricity was used in its production.

At the time of writing, we had not yet announced our most exciting development to date: the unveiling of our first group of WindMade companies. However, by the time you read this, our launch event will have taken place, so please find out about our first global WindMade brands at www.windmade.org. They represent a diverse cross-section of global industries, further enforcing the fact that renewable energy is no longer a niche corporate purpose. They also highlight the fact that there are numerous options and methods for clean energy procurement around the world, proving that any country in the world can procure high-quality, clean energy, if it wants to.

At Vestas, we understand that WindMade is historic in more ways than one because it also demonstrates a new model for corporate philanthropy. Vestas believed so strongly in the power of a credible and usable consumer label for renewable energy that we chose to devote a full-time team to the idea, gathered a distinguished group of founding partners, and then funded a non-governmental organization that Vestas no longer controls. In other words, Vestas invested money, human capital, and our brand reputation, to create a global organization that aims to grow our entire industry, only to hand it back to society. While some might call this an overly complicated marketing strategy, we ►



“The WindMade label shows consumers exactly how much renewable energy their favourite brands use to run their operations.”

➤ consider it to be a cutting-edge philanthropic model that will significantly contribute to the continued growth of the wind industry.

Additionally, since WindMade was created on the basis of our perceptions concerning the topic of corporate renewable energy strategies, Vestas also saw the need to devote more resources to the collection of concrete data about the corporate sustainability trends. This information is being handed back to the world, because we believe that transparency is essential to accelerate the growth of renewable energy.

To contribute to our greater vision of transparency, we partnered with Bloomberg New Energy Finance to develop the Corporate Renewable Energy Index (CREX) to document and track the growth in corporate renewable energy trends. The CREX sheds light not only on the number of companies that procure renewable energy, but also reveals how much and from what source. The CREX is the first index of its kind, providing transparency to global purchases of renewable energy by creating a level of transparency that has never existed before.

We also commissioned TNS Gallup to conduct a global consumer wind study to understand the growing demand from the consumer side. In the largest survey of its kind, 31,000 consumers in 26 countries were asked about their opinions on topics such as renewable energy, products made with renewable energy, and about how corporate actions impact consumer behaviour. Key findings from this survey showed that not only do a majority of consumers consider climate change as the greatest single global challenge, but 90% of consumers worldwide want more renewable energy, and 79% would have a more positive perception of brands produced with renewable energy.

In the future, Vestas will continue to update and refresh the data for the CREX and the *Global Consumer Wind Study* (GCWS).





Photo: istock

“Not only do a majority of consumers consider climate change as the greatest single global challenge, but 90% of consumers worldwide want more renewable energy, and 79% would have a more positive perception of brands produced with renewable energy.”

For now, we look forward to seeing the number of WindMade members grow. The first WindMade companies are critical for strengthening the WindMade brand because they will demonstrate to the world that wind and other renewable energy industries are not only here to stay, but are also becoming increasingly relevant and attractive to a growing group of global stakeholders.

The lack of clarity about how markets for technologies, like wind and solar, are evolving is creating barriers for future growth. In fact, WindMade, CREX, and the GCWS, grew out of a firm belief that humankind is born sensible. And these three initiatives will continue to be supported by Vestas and our partners due to another firm belief: that activating this sensibility, through transparency, will foster the needed positive behavioural change. We believe that increased transparency will unveil the facts about what consumers and companies want, which will encourage increased investment in the global supply of renewable energy. WindMade, the CREX and the GCWS combine to form a powerful triumvirate of transparency, providing communication tools for global corporations and their stakeholders to see the truth behind the demand and supply of renewable energy. ■

HOT TOPIC

Climate change, climate action



MARY ROBINSON served as the seventh, and first female, President of Ireland (1990-1997), and as the United Nations High Commissioner for Human Rights (1997-2002), and was founder and President of Realizing Rights: The Ethical Globalization Initiative (2002-2010). She is currently the President of the Mary Robinson Foundation – Climate Justice (MRFJ).

Climate justice: inclusive sustainable development

MARY ROBINSON aims to put justice for the poor and the forgotten at the heart of the climate debate and to empower the marginalized to achieve sustainable and people-centred development.

The year 2012 brings with it fresh opportunities to reframe action on climate change in a positive light – to focus on the benefits – economic, social and environmental – of a low carbon green economy. 2012 is UN Year of Sustainable Energy for All and, in the middle of the year, all eyes will focus on Rio – 20 years on from the World Conference on Sustainable Development – when we will have a long hard look at how we have developed, who has benefited, and at what cost. Rio+20 provides an opportunity to look at how we can all grow and prosper, without overstretching our limited natural resources and without compromising the lives of many, for the benefit of a few. We need to mould economic, social and environmental development into a new model of inclusive development.

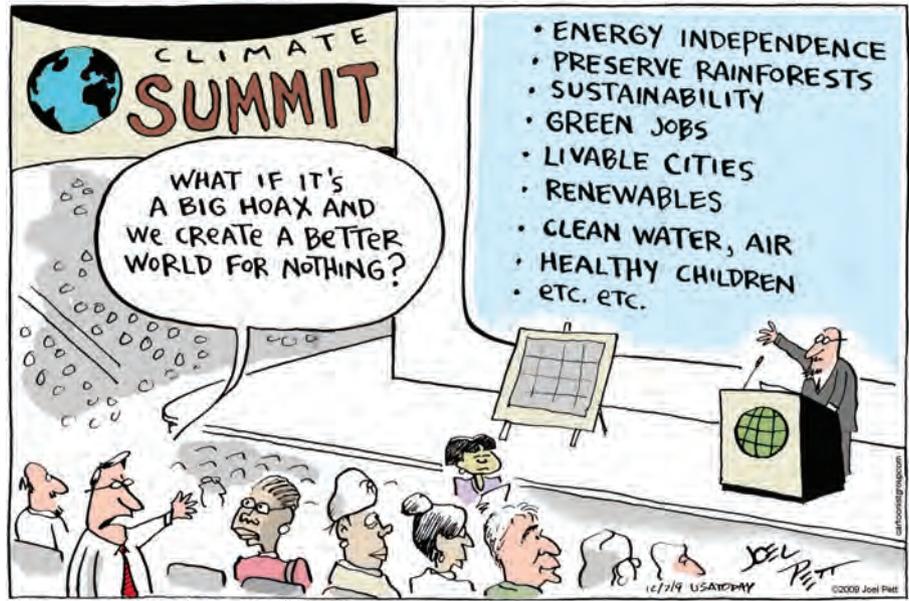
My approach to these issues is encapsulated in the climate justice approach I am dedicated to, and which my

Foundation, the Mary Robinson Foundation – Climate Justice (MRFJ), is committed to delivering. Climate justice links human rights and development to achieve a human-centred approach, safeguarding the rights of the most vulnerable, and sharing the burdens and benefits of climate change, and its resolution, equitably and fairly.

Developing countries

In the context of the next industrial revolution, it will be critical to ensure that benefits are shared equitably and fairly. Developing countries, and marginalized communities within these countries, must be enabled to actively participate in and benefit from the next wave of economic growth and opportunity. In many ways, developing countries have an advantage – as they are starting with a clean slate. They will be building infrastructure for the first time, rather than retrofitting. They are embarking on new fiscal and development policies, which can deliver a climate resilient, low-carbon economy. And they have growing, young, and increasingly educated populations to power this green economic revolution.

There is an urgent need to capture this potential now, so that developing countries can be part of the supply-side solutions, and part of the innovation and creativity that will inform a new wave of growth. Developing countries should not be mere consumers of green technology – they need to be empowered to be the engineers, designers, producers and marketers of the technologies that respond to their needs and facilitate their growth. This requires us to do things differently, to make brave investment choices, and to see the potential of innovators and entrepreneurs in developing countries. Business as usual will not do it, and we should see 2012 as the year where we make the choice to change direction, embrace opportunity, and bring some new actors onto the scene.



Real partnerships

We cannot assume that green technologies and policies will trickle down to benefit the poor and marginalized. Specific, targeted approaches will be needed to bring those at the bottom of the economic pyramid into the green economy – to enable them to contribute to, and to reap the economic and social benefits of, inclusive green growth. Without a doubt, the billions of people without access to modern forms of energy constitute a significant potential market for clean energy – but market forces alone will not deliver what they need. We need to work in real partnerships with developing country policymakers, researchers, and entrepreneurs to design energy solutions to complement and safeguard livelihoods, to improve social well-being, and to provide opportunity.

Women will be key users, and hopefully designers, of green technology, and can make a significant contribution to sustainable green growth. The World

Development Report 2012 reminds us that “women now represent 40% of the global labour force, 43% of the world’s agricultural labour force, and more than half the world’s university students.” Capturing this contribution would boost productivity and drive the green economy – “eliminating barriers that discriminate against women working in certain sectors or occupations could increase labour productivity by as much as 25% in some countries.”

In addition, women have a great sense of inter-generational equity, seeing life in terms of not just their lives, but those of their children and grandchildren. Harnessing this ability for long-term planning, with the productive value of their contribution to economic life, would provide a powerful engine for sustainable low-carbon and climate-resilient growth.

Women’s leadership

With this in mind, I am working to harness women’s leadership from the

grassroots to the international level to maximize the potential of women as agents of change, innovators, investors, and entrepreneurs. To enable this we need to provide women with access to education and credit, active participation at all levels of decision-making, and the chance to have their contribution valued. We have an opportunity to make 2012 the year we finally register the fact that women and men will power the next industrial revolution, and that inclusive sustainable development means investing for the long term, while making sure benefits flow to the vulnerable and marginalized. We have many untapped resources, and I am not just talking about wind and waves!

If we start to value the things we take for granted, everything from the power of the sun to the contribution of women to society – we will be able to power a new inclusive sustainable future for ourselves and, most importantly, for our children and grandchildren. ■

HOT TOPIC

Rethinking climate security

CORINNE SCHOCH asks if militarizing climate change might harm those communities most affected by the problem.

Once upon a time, climate change was strictly an environment and development issue. Today, it has become a matter of national and international security. Efforts to link climate change with violent conflict may not be based on solid evidence, but they have certainly captured the attention of governments. They have played a vital role in raising the much needed awareness of climate change as an issue that deserves global action, but at what cost?

Focusing on climate change as a security threat alone risks devolving humanitarian responsibilities to the military, ignoring key challenges, and losing sight of those climate vulnerable communities that stand most in need of protection.

Over the past five years, climate change has moved from being a purely environment and development issue to being a matter of national and international security.

For years, we have understood that civil wars generally break out as a result of political instability, a poor national economy, weakened infrastructures and, in the case of African states, the collapse of the Cold War. Now, it seems that environmental shocks can be added to that list – journalists, academics, policymakers, security institutions, and heads of states repeatedly tell us that the impacts of climate change pose a grave security threat.

As a result, the idea that prolonged heat waves, rising sea levels, more variable climates, and more frequent disasters – such as cyclones or droughts – will result in more civil conflicts has taken firm root in the public’s imagination. The popular belief that climate change will soon spark ‘water wars’ between water-scarce regions and countries is just one example.

But while the notion that climate change could lead to conflict is widespread, it is based on very little evidence and questionable sources. The debate tends to be characterized by conjecture, extrapolations, and a limited set of facts that make assumptions about how the climate will change in years to come, and how people will respond – for example, that increased climate variability automatically causes inter- and intrastate migration, or that a drop in rainfall is what led to the Darfur crisis. The links between what causes conflict have been simplified.

The truth is that there are, as yet, no concrete examples of violent conflicts induced by climate change, and a limited understanding of what the future holds. Take the example of water wars: many researchers argue that it is not climate change that is to blame, but rather it is issues such as poor governance of water resources that are the driving factor behind such conflicts.

Just how useful is it to reframe the climate change debate as a security issue?

A seat at the table

The debate on links between climate change, diminishing resources, violent

conflict and security is not new, but it wasn’t until the fall of the Soviet Union that discussions around them really became possible.

Up until the early 1990s, security agendas on both sides of the Atlantic were dominated by measures to protect the state and support military institutions. But in the aftermath of the Cold War, the new political landscape demanded a broader, wider approach to the term “security”. A 1994 report by the UN Development Programme articulated this need, and gave birth to the term “human security”, shifting the emphasis away from a state-centric approach towards one that focuses on securing individual people.

This created the space to incorporate “non-traditional” threats – such as the environment, health, and human rights – into the security agenda, alongside longstanding issues of military defence and state interests. In this way, climate change was “securitized”.

Attaching a security label to climate change has certain advantages. For a start, it gives the state or government power over the issue, and can end up mobilizing vast amounts of political and financial resources to address it.

But perhaps the biggest “win” in securitizing climate change has been raising awareness of this environmental issue and capturing the attention of Northern [developed] countries. There is little doubt that climate change is now firmly in the sights of decision makers at all levels – in a way that would have been much harder to achieve with an

environment and development framework alone. Prominent leaders, including Barack Obama, Al Gore, Nicolas Sarkozy, and Ban Ki-moon, have all cited climate change as an international security threat.

Within the global security community, climate change has also been given a seat at the table – it was discussed within the UN Security Council, both in 2007 and 2011. On both occasions, the push to include climate change under the council's remit met with fierce opposition from China, Russia, and much of the developing world.

Despite the reticence from some countries, the world has embarked upon a path that will be difficult to turn back on. It is true that securitization can, in theory, be “reversed”. But in practice, because security institutions, such as NATO and others, have begun actively engaging in the debate, new political power dynamics are taking shape that will make it hard to simply take climate change off the security agenda.

By turning climate change into a security issue, advocates may have got the attention of governments, but the question we must ask is: at what cost?

Climate change is filled with uncertainty. As with other highly politicized debates, uncertainty tends to breed anxiety, which could lead to fear and result in a set of policies that merely mirror sensationalist academic and media headlines.

The military of Northern countries argue that the world cannot afford to wait for 100% certainty before it acts to diminish the climate change security threat. But what form that action should take is already being discussed in many forums, such as the annual UN climate negotiations. Bypassing these to bring enforceable action through the UN Security Council would leave many of the most climate-vulnerable countries, who are not part of the council, out of the decision-making process.



CORINNE SCHOCH is a researcher in the Climate Change Group at the International Institute for Environment and Development (IIED).

Focus on people

There are other risks associated with turning climate change into a security issue, particularly when it comes to addressing the full spectrum of challenges posed by climate change. Deciding action based on the engagement of a limited pool of security institutions, risks sidelining or missing out completely issues such as adaptation, mitigation, development, economic growth, equity, justice and resilience, which do not figure as priorities on the security agenda but which are integral to addressing climate change.

In today's world – filled with talk about “human induced climate change”, “compensation”, “responsibility” and “global justice” – it is also important to ask ourselves to what extent the reframed climate-security debate is tackling the real drivers of climate change. And we must similarly ask ourselves whose interests we are serving. The impacts of climate change

will be felt first and foremost by some of the most vulnerable communities across the globe. The IPCC, for example, warns that Africa is one of the most vulnerable continents to climate change: agricultural yields could fall by up to 50% by 2050 in some countries and, by 2020, up to 250 million people are projected to face increased water stress due to climate change.

Will steps to involve security institutions and the military protect the interests of the most vulnerable – or merely the interests of the powerful? To what extent are we prepared to devolve responsibilities of a humanitarian or developmental nature to these new actors?

Ensuring that the most vulnerable are protected is not just a moral obligation but is a question of justice and equity. There is surely a great risk that the human security needs of the most vulnerable could be undermined.

Next steps

Perhaps the first step in moving forward must be to gather more evidence about the links between climate change and violent conflict. Stepping up the research in this area would enable policymakers, heads of state and security institutions to garner a much more accurate understanding of the issues at hand and allow for more informed decision making.

There is also a clear need to reshape the climate change and security debate to focus on protecting not ourselves but those most vulnerable to future impacts.

Climate change is not the first issue to be linked to security: issues such as HIV/AIDS and migration have both also been cast as a security matter in the past. Reflecting on these experiences – teasing out what worked, where and why, the impacts on different stakeholders, the political ramifications – could provide important lessons for ensuring the success of securitizing climate change. ■



■ Many companies are actively integrating sustainability principles into their businesses, according to a recent McKinsey survey, and they are doing so by pursuing goals that go far beyond earlier concern for reputation management – for example, saving energy, developing green products, and retaining and motivating employees, all of which help companies capture value through growth and return on capital. In McKinsey's sixth

survey of executives on how their companies understand and manage issues related to sustainability, the year 2011's results show that larger shares of executives say sustainability programmes make a positive contribution to their companies' short and long-term value.

This survey explored why and how companies are addressing sustainability and to what extent executives believe it affects their companies' bottom line, now and over the next five years.

On the whole, respondents report a more well-rounded understanding of sustainability and its expected benefits than in prior surveys. As in the past, they see the potential for supporting corporate reputation, but they also expect operational and growth-oriented benefits in the areas of cutting costs and pursuing opportunities in new markets and products. Furthermore, respondents in certain industries – energy, the

extractive industries, and transportation – report that their companies are taking a more active approach than those in other sectors, probably as a result of those industries' potential regulatory and natural-resource constraints.

See: *The business of sustainability: McKinsey Global Survey results* (McKinsey Quarterly)

■ Asia and the Pacific region countries should find ways to accelerate infrastructure investment to help maintain growth at a time of significant downside risk to the global economy, Asian Development

BUSINESS MATTERS

The prosperity index

An index that ranks countries on both wealth and well-being shows Norway ranked number one out of the 110 countries assessed, narrowly ahead of Denmark and Australia. The Legatum Prosperity Index provides the world's only global assessment of national prosperity based on both wealth and well-being.

Traditional measures of national prosperity are based entirely on indicators of a country's income. Yet for many people, 'prosperity' is not just about money, it is about satisfaction with our lives and our future prospects. The Index defines prosperity as both wealth and well-being, and finds that the most prosperous nations in the world are not necessarily those that have only a high GDP, but are those that also have happy, healthy, and free citizens.

The Legatum Prosperity Index assesses 110 countries, accounting for over 90% of the world's population, and is based on 89 different variables, each of

which has a demonstrated effect on economic growth or on personal well-being. The Index consists of eight sub-indexes, each of which represents a fundamental aspect of prosperity:

Economy – Stable and growing economies increase per capita income and promote the overall well-being of its citizens.

Entrepreneurship and opportunity – A strong entrepreneurial climate in which citizens can pursue new ideas and opportunities for improving their lives leads to higher levels of income and well-being.

Governance – Well-governed societies enjoy national economic growth and citizen well-being.

Education – Education is a building block for prosperous societies.

Health – A strong health care infrastructure in which citizens are able to enjoy good physical and mental health leads to higher levels of income and well-being.

Legatum Prosperity Index 2011 rankings:

Top five: Sub-Saharan Africa

Botswana, South Africa, Ghana, Namibia, Mali

Top five: Middle East and North Africa

United Arab Emirates, Kuwait, Israel, Saudi Arabia, Tunisia

Top five: The Americas

Canada, United States, Uruguay, Chile, Costa Rica

Top five: Asia-Pacific region

Australia, New Zealand, Singapore, China – Hong Kong SAR, China – Taiwan province

Top five: Europe

Norway, Denmark, Sweden, Finland, Switzerland

www.prosperity.com

Safety and security – Societies plagued by threats to national security and personal safety cannot foster growth in average levels of income or well-being.

Personal freedom – When citizens enjoy their rights to expression, belief, organization, and personal autonomy in a

society welcoming of diversity, their country enjoys higher levels of income and social well-being.

Social capital – Social networks and the cohesion that a society experiences when people trust one another have a direct effect on the prosperity of a country.

Bank (ADB) President Haruhiko Kuroda told the Asia-Pacific Economic Cooperation (APEC) group's 18th annual meeting of finance ministers in Honolulu, in November 2011.

Asia's booming economies have been supported by the rapid roll-out of new infrastructure but investments estimated at around US\$8trn are needed between now and 2020. This will require substantial support from the private sector, and Kuroda said governments must continue regulatory and policy reforms to encourage international and domestic investors, as well as public-private partnerships.

The ADB president also stressed the need for Asia to step up its efforts to rebalance its economies, putting more focus on domestic and regionally driven demand. He noted that this will require both demand and supply-side policy measures, including support for the development of small and medium-sized enterprises.

■ The Executive Secretary of the Economic Commission for Latin America and the Caribbean (ECLAC), Alicia Bárcena, reaffirmed the importance of improving regional integration in order to deal with global economic

turbulence. Addressing the Latin American Integration Association (ALADI) in Montevideo, Uruguay, in November 2011, Bárcena asked the countries for greater integration and a joint Latin American response to deal with the problems of the economic crisis. She called for more inter-regional trade and for fiscal matters, investment, innovation and social policies to be prioritized. At the same time, she said that in the event of a new recession in developed countries or a new global financial crisis, emerging countries' room for manoeuvre will depend on their external

balance and their international reserves, their fiscal and monetary policy space and the structure of their foreign trade in terms of products and markets.

The Executive Secretary of ECLAC stressed that the region faces this situation with great assets, but also significant weaknesses, such as current account deficit, a production and exports structure based on static comparative advantages rather than dynamic comparative advantages, low investment and lags in innovation, science and technology, education and infrastructure, and high costs of insecurity and violence.

Rags to riches

Reese Fernandez-Ruiz, co-founder of Rags2Riches Inc. an eco-ethical business based in Manila, the Philippines, won the *Young Entrepreneur Award* at the World Entrepreneurship Forum 2011, held in Singapore, in November 2011. She was selected as an entrepreneur under the age of 35 whose entrepreneurial achievement and commitment to society makes her a role-model for entrepreneurship that creates wealth and social justice.

Rags2Riches, founded in 2007, creates eco-ethical fashion and home accessories out of recycled scrap cloth, organic materials, and indigenous fabrics, by working with women living near Payatas – one of the Philippines' biggest rubbish dump sites.

Reese Fernandez-Ruiz was teaching children when she discovered that women at the dump site were scavenging the waste to find and recycle scrap pieces of fabric so that they could participate in handicraft

Photo: EMILYON Business School



Reese Fernandez-Ruiz (left), co-founder of Rags2Riches, receiving the Young Entrepreneur Award at the World Entrepreneurship Forum 2011.

production like rug and rag-weaving, while taking care of their children at home. An informal cottage industry of rug-weavers had developed but, over time, a series of middlemen had moved in to take control of both the supply of scrap fabric and the women's access to the market. This created an unfair value chain for the women who, at the end of the day, earned only pennies per finished product.

Rags2Riches Inc. was created to provide these women with fair access to the market and the formal economy, as well as with additional skills-based, financial, and health training, so that they can maximize their career potential and take steps towards long-term financial and personal well-being. It integrated a design solution by partnering with well-known local fashion designers, like Rajo Laurel, Amina Aranaz-Alunan,

and Oliver Tolentino, turning these rags into foot rugs, a line of small purses and bags, and higher-end designer handbags.

Fernandez-Ruiz says that she expects Rags2Riches to grow from working with 450 women today to 5,000 in the next five years. "It's not about lack of talent or determination," she told *Fast Company*. "People need opportunities to be able to get out of poverty."

The Republic of Korea's green growth policies were formally launched on August 15, 2008, when President Lee Myung-bak declared in his speech marking the 60th anniversary of the founding of the country's modern government that "low-carbon green growth" should be the core of the new development vision for the next 60 years. In this speech, President Lee defined 'green growth' as "achieving sustainable growth by reducing greenhouse gas emission and environmental pollution." How would this be possible? He answered this question by saying, "Green growth is a new development paradigm that creates new growth engines and jobs with green technologies and clean energies."

In the following one and a half years, the government set up the institutional framework to implement President Lee's declaration of the green growth strategy. It consists of four key pillars:

The Presidential Committee on Green Growth
This is an advisory institution for the president, consisting of 14 ministers and 36 appointed members from the private sector with professional backgrounds relevant to green growth, which is co-chaired by the prime minister and an appointed chairman. It serves as the highest level venue for inter-ministerial coordination of policies, as well as for public-private sector consultation on those policies.

The Green Growth Strategy and the Five-Year Plan

The Strategy, prepared by the Presidential Committee, envisages the Republic of Korea (hereafter, Korea) becoming one of the top seven ranked green economies by 2020 and one of the top five by 2050. It has three parts: first, to reduce greenhouse gas emissions while adapting to climate change; second, to create new growth engines from green technologies; and third, to improve the quality of life by greening lifestyles, while becoming an international role model as a green growth country.

The Strategy should show that Korea's green growth is indeed a new development model. It is far broader in scope than energy or environmental policies, though it does not go far enough to also address social policy goals.

Dr. SOGIL YOUNG is a Korean economist, who has been serving as Chairman of the Presidential Committee on Green Growth since July 2010. He is also the founding Chairman of the Green Investment Korea Forum.

The Five-Year Plan assigns 2% of annual GDP to green investment by the government – double the level recommended to governments by United Nations Environment Programme (UNEP).

As President Lee has indicated, the key to sustained green growth will be a pervasive and continuing process of innovation, in both the technological and the institutional sense. The role of this innovation will be to de-link economic growth and environmental degradation, most crucially by stimulating investment in the de-carbonization of energies, as well as in saving and recycling natural resources.

The National Greenhouse Gas Emissions Reduction Target

Given the country's highly energy-intensive industrial structure, which makes its economy vulnerable to international energy crises and possible carbon regulations, the main focus of green innovation is on cutting down CO₂ emissions. The determination to reduce greenhouse gas emissions is the major driver of the green innovation that Korea needs.

In November 2009, after several months of national debate, the government adopted a medium-term emissions reduction target of 30%, relative to 'business-as-usual', by 2020. The following month, at COP15, in Copenhagen, President Lee made this an international political commitment by declaring that Korea would pursue this target unilaterally and voluntarily, in what he called the 'me-first' spirit.

The country's business community expressed a strong objection to this target, considering it overly ambitious and fearing its impact on the competitiveness of industry. However, the Presidential Committee considered an ambitious target necessary in order to stimulate a broad range of clean technology innovation for greater energy efficiency across the economy, as well as for the deployment of renewable energies.

The unilateral adoption of the emissions reduction target has allowed Korea to become an 'early mover' for green growth, without having to wait for others to do the same.

The government has been playing a critical role in triggering, facilitating and sustaining the green innovation process with regulatory and supportive measures, especially in regard to research and development and creating the initial market. Among measures being implemented to achieve the emissions reduction target are the so-called sectoral

Sogil Young explains how the Republic of Korea is leading the way in de-linking economic growth and environmental degradation



Photo: Truth Leem/Reuters

Building the

emissions target management system, and the planned introduction of the emissions rights trading system in 2015.

The Framework Act for Low-Carbon Green Growth

This legislation, enacted in April 2010, permits the government to intervene in the market in order to address market failures in promoting green growth. Among other things, it makes provisions for the emissions rights trading system.

Green business boom

Since the formal launching of green growth policies in Korea in 2008, there has been a green business boom. All major business groups have made green business a high priority for investment in their short and long-term plans. Between 2008 and 2010, the combined total of such investment by the 30 largest business groups recorded an annual growth rate of 75% and amounted to 15.1 trillion won (about US\$13bn). Investment is focused on new and renewable energy equipment, high-efficiency electric equipment, green cars, and climate change adaptation.

Small and medium-size enterprises, too, have been joining in the green rush. For example, some of them are already emerging as champions in the global market for parts and components for solar and wind power systems.



Photo: Songdo IBD

Songdo International Business District (IBD) is a sustainable city currently under construction on 1,500 acres near Incheon, The Republic of Korea. Sustainable design practices are incorporating the latest design standards and technologies that reduce energy consumption, increase energy efficiency, utilize recycled and natural materials, and generate clean or renewable electricity. By its completion date in 2015, Songdo IBD will have more than 40% of its area reserved for green space, including a park of 100 acres, 16 miles of cycle lanes, numerous charging stations for electric vehicles, and a waste collection system that eliminates the need for garbage trucks.

architecture for green growth

The government itself has been a leading investor in green growth, especially in green infrastructure. Two leading examples are a major construction project to restore four major rivers and a project to create a nationwide network of high-speed railways in order to induce a modal shift of people from road to the rail.

By any measure, green growth policies in Korea have been a success. Businesses are actively exploring opportunities in green growth, and local governments are pursuing visions of green communities. There is enthusiastic support for green lifestyles and green growth among the public.

Secrets of green growth success thus far

The success of Korea's green growth can be attributed to at least three factors, including the visionary leadership of a political leader firmly committed to a new green growth strategy; the 'me-first' approach to carbon emissions reduction and environmental protection;

and an effective coordination among all the relevant ministries.

The challenge now is to sustain progress toward the realization of the emissions reduction target and environmental protection goals. This is no small challenge, considering industry's constant concern with its international competitiveness and the political uncertainties, which will heighten as the presidential election of December 2012 approaches.

Towards a global architecture for green growth

One of the objectives of Korea's green growth policies is to promote the adoption of a green growth strategy in all countries, especially the developing ones. A global architecture for green growth will enhance the effectiveness of national green growth policies, offer a foundation for global sustainable development, and facilitate international cooperation for the mitigation of climate change.

To this end, the government has taken a number of international initiatives:

- In 2008, annual work programmes were launched to help developing countries in Asia undertake green growth projects under the East Asian Climate Partnership (EACP) Initiative .
- In 2010, Korea formally acceded to the Organization for Economic Cooperation and Development's Development Assistance Committee and declared that the country would continue to increase its Official Development Assistance (ODA) commitment, with focus on green ODA, including the EACP Initiative, to meet the level of the OECD average ratio of ODA to GNI by 2020.
- In June 2010, the Global Green Growth Institute (GGGI) was launched as an international think tank to advise developing countries on their green growth policies, as well as to help them with specific green growth projects. The GGGI is run by an international board of directors, and draws financial resources from Korea and other advanced partner countries. As of October 2011, eleven countries, including six developing countries, have joined GGGI as partner countries. It also partners with many international organizations and institutions.
- In 2009, the OECD accepted Korea's proposal to conduct a study of the green growth strategy, and a two-year project was begun. When the final report was released in May 2010, the OECD declared its intention to push the green growth strategy with its member countries, as well as with non-member countries. The OECD has begun to collaborate on green growth with other international organizations and institutions such as UNEP and the World Bank. Korea will continue to work closely with all these institutions to promote global green growth.
- The government is preparing to launch a Green Technology Centre, which will promote international green technology cooperation in general, and for developing countries, in particular.

All these efforts will contribute to the creation of a global architecture for green growth for the benefit of all countries, and help facilitate sustainable development and climate change cooperation. ■

The most important innovation in the past decade related to wealth creation and development has been the growth of the mobile phone industry. There are 5.3 billion mobile subscribers worldwide – yet, according to *Green Power For Mobile: Charging Choices* by the GSMA Development Fund, nearly 500 million of these folks do not have a means of charging a mobile phone.

While the statistics are devastating and staggering, I believe that this and other energy challenges are the wealth opportunities of our lifetime. I call this ‘impact investing’. This is investing that is socially responsible and delivers compelling financial returns.

By leveraging the explosive growth trajectory of mobile communications, we can create entire industries that solve critical issues and create hundreds of billions, if not trillions, in market value.



JIGAR SHAH is the CEO of the Carbon War Room, and the founder of SunEdison. He is a successful clean tech entrepreneur who is leading the Carbon War Room's crusade in making gigaton savings in carbon, while at the same time creating wealth, jobs and growth. The Carbon War Room harnesses the power of entrepreneurs to implement market-driven solutions to climate change. The War Room's unique approach focuses on bringing together successful entrepreneurs, business leaders, policy experts, researchers, and thought leaders to focus on market-driven solutions.

Our lack of charging stations can actually charge a new market which will achieve four significant goals:

1. Make an impact by solving a pressing problem of our time;
2. Generate compelling returns for investors;
3. Generate growth for economies; and
4. Generate prosperity for developed and developing nations.

So, let's look at the simple, yet growing, problem of cell phones with no place to plug in. It has actually pushed entrepreneurs to find solutions, and to find new business opportunities. For example, in just the past few years, new solar-powered cell phones have evolved for impoverished places like Central America, the Caribbean, and the South Pacific, where there is no grid and no plug. And last year, wireless mobile phone carrier, Vodafone, introduced a solar-powered mobile handset

No place to plug in

Solar visionary **Jigar Shah** sees small solutions to big problems.



for India, where a third of the population does not have access to the power grid.

If we think about these big problems, the solution is not a silver bullet. For example, cell phones solutions are often numerous and small in scale, such as solar phones, solar chargers, wind-up chargers, base station charging or village charging stations. These answers are all practical examples of miniaturizing power sources – a trend that started back in the 1970s. This miniaturization trend has accelerated in other areas, such as clean water, transportation, and agriculture.

With regard to power sources for electricity, the answers have become miniaturized by tapping sources, like solar and wind – off-grid.

I found this out first hand at SunEdison, a company I founded in Beltsville, Maryland, USA, in 2003. SunEdison employed a business solution, a power purchase agreement (PPA);

to sell solar power to businesses as a service, not to sell a power plant. In doing so, it made it sense for leading US retailers like Walmart, Staples, Kohl's, Whole Foods, and others, to have an energy source right on their rooftops.

With SunEdison installing, owning and operating the solar power plants on rooftops, customers sign power purchase agreements locking in electricity prices for as long as 20 years.

This has created an affordable way for customers to use (very) locally generated, clean, miniaturized power (compared to the grid) for their businesses. They replaced peak energy delivered from the grid with point-of-use solar energy. It made real the theory that Amory Lovins, Chairman and Chief Scientist of the Rocky Mountain Institute, depicted in his book, *Small Is Profitable*. The book uncovered proper accounting for the

economic benefits of “distributed” (decentralized) electrical resources. Part of this is avoiding social costs. A recent case in point is the social cost we just witnessed with the tsunami in Japan, which led to the meltdown of a nuclear reactor.

Before we attempt to invent new technologies, we need to unlock business solutions that will deploy distributed energy solutions – as we found with the PPA for solar that unleashed a multi-billion dollar industry.

So, ‘Job One’ is to make business sense out of existing technologies that are not yet deployed. This is what we did with solar, and it is the opportunity that Vodafone is trying to realize with the growth of global cell phones.

Another example is how, at the Carbon War Room, we have just helped organize a multi-billion dollar market without government money. We have launched a new consortium that will unlock billions of dollars of investment in renewable energy and energy efficiency technologies for United States commercial real estate. With the consortium, the Carbon War Room is deploying simple developed technologies that were not being deployed to improve efficiency of buildings.

The consortium released incentive legislation that was sitting dormant. The Property Assessed Clean Energy (PACE) legislation enables property owners to accept a voluntary tax assessment as a means of repaying upfront financing of energy efficiency and renewable energy improvements.

The business consortium, that includes Lockheed Martin and Barclays Bank, plans to invest as much as US\$650 million over the next few years to cut the energy consumption of older buildings in Miami, Florida, and Sacramento, California. These cities’ programmes alone could stimulate US\$2.3bn and create more than 17,000 jobs.

A key point is that the implementation is in buildings, one-at-a-time – a miniaturized solution.

The answers are here. The answers are through miniaturization. From the cell phone that is solar-powered, to the building that is solar-powered.

We are at the threshold of the next great industrial revolution through thousands of deployments – first, using our existing technologies. While there is no magic solution to meeting our energy demand by using clean fuels, we can win it a thousand cuts at a time.

Five hundred million cell phone users with no place to plug in is just one multi-billion dollar opportunity in the ‘Third Industrial Economy’.







A new economic narrative

In a two-part keynote, **Jeremy Rifkin** opens the door to a post-carbon future, while **Kandeh K. Yumkella** and **Morgan Bazilian** explore the challenges of inclusivity.



Internet technology and renewable energies are merging to create a powerful new infrastructure. **Jeremy Rifkin** explains how the five pillars of a third energy-communications revolution will create the foundations for the next great wave of economic growth.

The third industrial revolution

Our industrial civilization is at a crossroads. Oil and the other fossil fuel energies that make up the industrial way of life are dwindling, and the technologies made from and propelled by these energies are antiquated. The entire industrial infrastructure built on fossil fuels is aging and in disrepair. The result is that unemployment is rising to dangerous levels all over the world. Governments, businesses and consumers are awash in debt, and living standards are plummeting everywhere. A record one billion human beings – nearly one seventh of the human race – face hunger and starvation.

Worse, climate change from fossil fuel-based industrial activity looms on the horizon. Our scientists warn that we face a potentially cataclysmic change in the temperature and chemistry of the planet, which threatens to destabilize ecosystems around the world. We may be on the brink of a mass extinction of plant and animal life by the end of the century, imperilling our own species' ability to

survive. It is becoming increasingly clear that we need a new economic narrative that can take us into a more equitable and sustainable future.

A new convergence of communication and energy

By the 1980s, the evidence was mounting that the fossil fuel-driven industrial revolution was peaking and that human-induced climate change was forcing a planetary crisis of untold proportions. For the past 30 years, I have been searching for a new paradigm that could usher in a post-carbon era. I came to realize that the great economic revolutions in history occur when new communication technologies converge with new energy systems. New energy regimes make possible the creation of more interdependent economic activity and expanded commercial exchange, as well as facilitating more dense and inclusive social relationships. The accompanying communication revolutions become the means to organize and manage the new temporal and spatial dynamics that arise from new energy systems.

In the 19th century, steam-powered print technology became the communication medium to manage the coal-fired rail infrastructure and the incipient national markets of the First Industrial Revolution. In the 20th century, electronic communications – the telephone and later, radio and television – became the communication medium to manage and market the oil-powered auto age and the mass consumer culture of the Second Industrial Revolution.

An “energy Internet”

In the mid-1990s, it dawned on me that a new convergence of communication and energy was in the

“The great economic revolutions in history occur when new communication technologies converge with new energy systems”

offing. Internet technology and renewable energies were about to merge to create a powerful new infrastructure for a Third Industrial Revolution that would change the world. In the coming era, hundreds of millions of people will produce their own green energy in their homes, offices, and factories, and share it with each other in an “energy Internet,” just like we now create and share information online. The democratization of energy will bring with it a fundamental reordering of human relationships, impacting the very way we conduct business, govern society, educate our children, and engage in civic life.

In 2006, I began working with the leadership of the European Parliament in drafting a Third Industrial Revolution economic development plan. Then, in May 2007, the European Parliament issued a formal written declaration endorsing the Third Industrial Revolution as the long-term economic vision and road map for the European Union (EU). This is now being implemented by the various agencies within the European Commission, as well as in the member states.

The five pillars

The establishment of a Third Industrial Revolution infrastructure will create thousands of new businesses and millions of jobs, and lay the basis for a sustainable global economy in the 21st century. However, let me add a cautionary note. Like every other communication and energy infrastructure in history, the various pillars of a Third Industrial Revolution must be laid down simultaneously or the foundation will not hold. That’s because each pillar can only function in relationship to the others. The

five pillars of the Third Industrial Revolution are:

- 1) shifting to renewable energy;
- 2) transforming the building stock of every continent into micro-power plants to collect renewable energies on-site;
- 3) deploying hydrogen and other storage technologies in every building and throughout the infrastructure to store intermittent energies;
- 4) using Internet technology to transform the power grid of every continent into an energy-sharing intergrid that acts just like the Internet (when millions of buildings are generating a small amount of energy locally, on-site, they can sell surplus back to the grid and share electricity with their continental neighbours); and
- 5) transitioning the transport fleet to electric plug-in and fuel cell vehicles that can buy and sell electricity on a smart, continental, interactive power grid.

Integrate and harmonize

The critical need to integrate and harmonize these five pillars at every level and stage of development became clear to the EU in the fall of 2010. A leaked European Commission document warned that the EU would need to spend €1trn between 2010 and 2020 on updating its electricity grid to accommodate an influx of renewable energy. The internal document noted that “Europe is still lacking the infrastructure to enable renewables to develop and compete on an equal footing with traditional sources.”

The EU is expected to draw one-third of its electricity from green sources by 2020. This means that the power grid must be digitized and made intelligent to handle the intermittent renewable energies ►



“The creation of a renewable energy regime, loaded by buildings, partially stored in the form of hydrogen, distributed via smart intergrids, and connected to plug-in, zero-emission transport, opens the door to a Third Industrial Revolution”

► being fed to the grid from tens of thousands of local producers of energy.

Of course, it will also be essential to quickly develop and deploy hydrogen and other storage technologies across the EU’s infrastructure when the amount of intermittent renewable energy exceeds 15% of the electricity generation, or much of that electricity will be lost. Similarly, it is important to incentivize the construction and real estate sectors with low-interest green loans and mortgages to encourage the conversion of millions of buildings in the EU to mini power plants that can harness renewable energies on-site and send surpluses back to the smart grid. And unless these other steps are taken, the EU won’t be able to provide enough green electricity to power millions of electric plug-in and hydrogen fuel cell vehicles being readied for the market. If any of the five pillars fall behind the rest in their development, the others will be stymied and the infrastructure itself will be compromised.

A new economic paradigm

The creation of a renewable energy regime, loaded by buildings, partially stored in the form of hydrogen, distributed via smart intergrids, and connected to plug-in, zero-emission transport, opens the door to a Third Industrial Revolution. The entire system is interactive, integrated, and seamless. When these five pillars come together, they make up an indivisible technological platform – an emergent system whose properties and functions are qualitatively different from the sum of its parts. In other words, the synergies between the pillars create a new economic paradigm that can transform the world.

The conventional, centralized business operations

of the First and Second Industrial Revolutions will increasingly be subsumed by the distributed business practices of the Third Industrial Revolution; and the traditional, hierarchical organization of economic and political power will give way to lateral power organized nodally across society.

At first blush, the very notion of lateral power seems so contradictory to how we have experienced power relations through much of history. Power, after all, has traditionally been organized pyramidally from top to bottom. Today, however, the collaborative power unleashed by the coming together of Internet technology and renewable energies, fundamentally restructures human relationships, from top to bottom, from side to side, with profound implications for the future of society.

The music industry didn’t understand distributed power until millions of young people began sharing music online, and corporate revenues tumbled in less than a decade. *Encyclopedia Britannica* did not appreciate the distributed and collaborative power that made *Wikipedia* the leading reference source in the world. Nor did the newspapers take seriously the distributed power of the ‘blogosphere’; now many publications are either going out of business or transferring much of their activities online. The implications of people sharing distributed energy in an open commons are even more far-reaching.

The democratization of energy

To appreciate how disruptive the Third Industrial Revolution is to the existing way we organize economic life, consider the profound changes that have taken place in just the past twenty years with the introduction of the Internet revolution. The democ-

ratization of information and communication has altered the very nature of global commerce and social relations as significantly as the print revolution in the early modern era. Now, imagine the impact that the democratization of energy across all of society is likely to have when managed by Internet technology.

The Third Industrial Revolution build-out is particularly relevant for the poorer countries in the developing world. We need to keep in mind that 40% of the human race stills lives on two dollars a day or less, in dire poverty, and the vast majority have no electricity. Without access to electricity they remain “powerless,” literally and figuratively. The single most important factor in raising hundreds of millions of people out of poverty is having reliable and affordable, green electricity. All other economic development is impossible in its absence. Universal access to electricity is the indispensable starting point for improving the lives of the poorest populations of the world.

Because renewable energy – solar, wind, geothermal, hydro and biomass – is widely distributed, a Third Industrial Revolution is ideally suited to take off in the developing world. Although a lack of infrastructure is often viewed as an impediment to development, what we are finding is that because many developing nations are not saddled with an aging electrical grid, they can potentially “leapfrog” into a Third Industrial Revolution. In other words, by building a new, distributed electricity system from scratch, rather than continuing to patch up an old and outworn grid, developing countries significantly reduce the time and expense in transitioning into a new energy era. Moreover, because of the distributed

nature of the Third Industrial Revolution infrastructure, risk can be more widely diffused, with localities and regions pooling resources to establish local grid networks, and then connecting with other nodes across regions. This is the very essence of lateral power.

Energy regimes shape the nature of civilizations – how they are organized, how the fruits of commerce and trade are distributed, how political power is exercised, and how social relations are conducted. In the 21st century, the locus of control over energy production and distribution is going to tilt from giant fossil fuel-based centralized energy companies to millions of small producers who will generate their own renewable energies in their dwellings and trade surpluses in an info-energy commons.

But in order to facilitate this transition it will be necessary to provide a favourable playing field, and that means financial aid, technology transfer, and training programs to assist emerging countries. What’s going on in developing nations heralds a historic transformation, as households jump from the pre-electricity era directly into the Third Industrial Revolution age. This process represents the democratization of energy in the world’s poorest communities.

The Third Industrial Revolution offers the hope that we can arrive at a sustainable post-carbon era by mid-century. We have the science, the technology, and the game plan to make it happen. Now it is a question of whether we will recognize the economic possibilities that lie ahead and muster the will to get there in time. ■

JEREMY RIFKIN is president of the Foundation on Economic Trends, and the author of more than twenty bestselling books on the impact of scientific and technological changes on the economy, the workforce, society, and the environment. His most recent books include *The Third Industrial Revolution: How Lateral Power Is Transforming Energy, the Economy, and the World*; *The Empathic Civilization: The Race to Global Consciousness In a World In Crisis*; and *The Hydrogen Economy: The Creation of the Worldwide Energy Web and the Redistribution of Power on Earth*. Jeremy Rifkin has been an advisor to the European Union for the past decade and is the principle architect of the European Union’s Third Industrial Revolution long-term economic sustainability plan to address the triple challenge of the global economic crisis, energy security, and climate change.





Morgan Bazilian and Kandeh K. Yumkella see unique opportunities arising from the creation of a radically different energy system

The new economy: inclusive and sustainable

In this issue of *Making It*, Jeremy Rifkin cites numerous interacting crises as the impetus for a new economic narrative, which he terms the “Third Industrial Revolution”. He sees the seeds of this narrative in the confluence of “new communication technologies [and] new energy systems”. The label, “Third Industrial Revolution”, is indeed attractive from a number of perspectives. It helps to form in the mind an image of the potential transformative power of the communication/energy nexus. Others have begun to use it too. In October 2011, Christiana Figueres, the Director of the UN Framework Convention on Climate Change (UNFCCC), used the phrase to help motivate the business community to take action on climate change. She described it in this way:

“A low-carbon economy necessitates a multifaceted paradigm shift across a broad spectrum, from indi-

vidual behaviour to national policies. But let me assure you that the shift will not be a clean straight line. We are barely putting in the foundations of the new economy. We are constructing it, and all construction sites are messy.”

The First Industrial Revolution was not premeditated as an inclusive, global movement that would bring prosperity to all. While it brought untold technologies and unimagined riches, it also left in its trail an unhappy history of inequity and exploitation of both people and natural resources. The advances of the past century have led to a world more interdependent than ever in terms of trade, finance and movement of labour, yet the great unfairness remains: the First and Second Industrial Revolutions were not designed with the poor in mind. Clearly, therefore, in transitioning to a new economy, based on a radically different energy system, we have the unique opportunity to make the next industrial revolution an inclusive one.

Sustainable Energy for All

Let us examine in more detail the critical role of energy in the next industrial revolution. Energy powers human progress, from job generation to economic competitiveness. From strengthening security to empowering women, energy is the great integrator, it cuts across all sectors, and lies at the heart of all countries’ core interests. Now more than ever, the world needs to ensure that the benefits of modern energy are available to all and that energy is provided as cleanly and efficiently as possible. This is a matter of justice, first and foremost, but it is also an issue of urgent, practical importance – and this is the impetus for the UN Secretary-General’s new Sustainable Energy for All initiative.

“From strengthening security to empowering women, energy is the great integrator, it cuts across all sectors, and lies at the heart of all countries’ core interests”

The initiative can be viewed as a firm commitment by the UN and its partners to make sure the next industrial revolution is powered for the poor, not by the poor. It has been launched in a time of great economic uncertainty, great inequity, high urbanization and high youth unemployment. But it is also a time when there is finally an emerging consensus on the need to act cohesively towards global issues such as sustainable development. We are not, however, starting from scratch. New technologies ranging from improved photovoltaic cells, to advanced metering, to electric vehicles and smart grids, give us a strong foundation on which to build. How we capture these opportunities for wealth and job creation, for education and local manufacturing, will be the key to unlocking any real revolution.

Three linked objectives underpin the goal of achieving Sustainable Energy for All by 2030:

- Ensuring universal access to modern energy services – access to electricity and to modern fuels and technologies for cooking, heating, and productive uses.
- Doubling the rate of improvement in energy efficiency – increasing the current pace of improvement to 2.5% per year, achieving a 40% reduction by 2030, measured in terms of global energy intensity.
- Doubling the share of renewable energy in the global energy mix – increasing the current renewable energy share of global energy consumption to 30%.

These three objectives are mutually reinforcing. Increasingly affordable renewable energy technologies are bringing modern energy services to poor rural communities where extension of the conventional electric power grid would be prohibitively expensive and impractical. More efficient devices for lighting and other applications require less energy, and thus reduce

the amount of power needed to support them. Increased efficiency in the production and use of electricity relieves strained power grids, allowing them to stretch further and reach more households and businesses.

Does this sound far-fetched? Consider the alternative: unconstrained expansion of today’s conventional fossil fuel-based energy systems, locking in a long-term infrastructure commitment to an unsustainable emissions path for the world’s climate.

An action agenda

The UN Secretary-General has formed a high-level group to design an action agenda and provide momentum to the goal of providing Sustainable Energy for All. This will require catalyzing action from a broad array of stakeholders to help meet its stated objectives by 2030. The Secretary-General, in an input to the 2012 UN Conference on Sustainable Development (Rio+20) process, described the Initiative as follows:

“At Rio+20 we will ask all stakeholders to make a global commitment to achieving Sustainable Energy for All by the year 2030. Reaching this goal will require action by all countries and all sectors to shape the policy and investment decisions needed for a brighter energy future. Industrialized countries must accelerate the transition to low-emission technologies. Developing countries, many of them growing rapidly and at large scale, have the opportunity to leapfrog conventional energy options and move directly to cleaner energy alternatives that will enhance economic and social development.”

The action agenda will be a “living document” that establishes clear actions and commitments over ►

“Any definition of ‘green economy’ will need to provide diverse opportunities for both economic development and poverty alleviation”

Photo: istock



► time that will dramatically shift current energy pathways onto new trajectories that will:

- establish firm political commitment
- create stable policy and regulatory frameworks
- finance the transformation
- strengthen local capacity and forge global partnerships
- ensure accountability and transparent reporting
- strengthen the analytical foundation
- disseminate information

Within the UN system we are working closely through the UN-Energy mechanism, which is fostering new partnerships and better communication, and facilitating effective action on the ground. We want the UN to bring the energy benefits of the next industrial revolution to all parts of the globe.

Green economy and green industry

In the run-up to Rio+20, there is growing agreement that in a resource and carbon-constrained world any Third Industrial Revolution should be rooted in a green economy. However, such a shift cannot be made at the expense of the developmental priorities of developing countries, and any definition of ‘green economy’ will need to provide diverse opportunities for both economic development and poverty alleviation.

In response to these challenges, UNIDO created its ‘Green Industry Initiative’, which aims to accelerate the green growth of the manufacturing and related sectors. It provides the international community and national governments with a platform to foster the positive role of industry in achieving sustainable development. ‘Greening’ industrial development is thus an integral

pillar of the ‘green economy’ concept, as it provides a framework for developing countries to ‘green’ their industrialization process and to promote businesses that provide environmental goods and services. A holistic framing of the global energy issue is required to underpin this work.

While these issues resonate in both developed and developing economies, the impact on the Least Developed Countries is a matter of which we are acutely aware. Even within these countries, good precedents for national action exist: Rwanda and Ethiopia are prime examples. These countries are putting together sophisticated national plans to address sustainability issues for the entire economy.

For a model of transformative change that has reached every corner of the world, we can look to the mobile phone and the ICT sector. This precedent is now influencing the possibilities for smart grids, even in the most remote corners of the world. In the future, “Smart and Just Grids” for developing countries could provide similar functionality to smart grids in industrialized countries, even though they are likely to follow a different pathway and timeframe. This will require attention to constraints, such as lack of good governance, limited investment capital, largely inadequate infrastructure and lack of well-trained power sector personnel. Such impediments are most likely stifling innovative practices that could already be occurring organically in developing countries. For the next industrial revolution to take hold, these must be overcome.

The massive electricity infrastructure requirements to reach universal access offer a unique opportunity to learn from the nexus between ICT and energy systems, and move forward without necessarily repeating all previous development stages.

An important year

The UN General Assembly named 2012 as the International Year of Sustainable Energy for All, thus placing energy at the heart of the multilateral process. It is an enormous opportunity to share models that work, are scalable, and can help fill gaps in existing funding or capacity. It is also a chance to ensure that the political momentum currently focused on this area is maintained.

We must do considerably more than scratch the surface if we want to make the new industrial revolution an inclusive and sustainable one. This will mean commitment from many different stakeholders. On the energy side, emerging partnerships, such as the Norwegian Energy+ and the UN-Energy/Global Sustainable Electricity Partnership, offer conduits for multi-stakeholder engagement and dialogue, as well as for real action on the ground. Meanwhile, Rio+20 offers UN member states and agencies the opportunity to reframe the very concept of development in the context of sustainability and green growth, with an eye on global commitments beyond 2015. The Third Industrial Revolution starts here. ■

MORGAN BAZILIAN is the Special Advisor to the Director-General of the United Nations Industrial Development Organization (UNIDO) on international energy and climate policy. In this role, he helps shape the United Nations approach to energy for development. Previously, he served as Senior Advisor on energy and climate change to the Irish energy minister. He has been the lead climate change negotiator for the European Union on low-carbon technology, and a member of the UNFCCC’s Expert Group on Technology Transfer.



KANDEH K. YUMKELLA is the Director-General of UNIDO. He is also Chair of UN-Energy and Co-chair of the High-level Group on Sustainable Energy for All, consisting of 46 global leaders in business, finance, government and civil society. Previously, he served as Chair of the UN Secretary-General’s Advisory Group on Energy and Climate Change. Prior to joining UNIDO, he served as Minister of Trade, Industry and State Enterprises for the Republic of Sierra Leone.



One of the biggest societal challenges facing the European Union (EU) in these times of financial and economic crisis is how to deliver much needed growth and jobs, while doing the right thing by the planet. This is a challenge that by no means is isolated to the EU. The economic and environmental mechanisms are globally interlinked, and what happens on one side of our globe can have dramatic consequences on the other side of the planet.

Acknowledging that, to a large degree, we share the same challenges, and that our actions have an impact on other nations, we also have an opportunity to learn from each other and create new global markets. The smarter development of our industries and technologies in Europe will make us better equipped to combat the pressure on resources, an ageing population, climate change, and a threatened environment. But, first and foremost, setting up the right conditions for investment in promising sectors will foster the immediate recovery from the crisis.

As Commissioner for Industry and Entrepreneurship, I am proud to spearhead the making of an even stronger and more competitive European industry. The Commission's Europe 2020 strategy sets out a vision of how we can turn the European Union into a smart, sustainable, and inclusive economy, with strong growth rates, delivering employment, productivity, and social cohesion.

With sustainable growth being one of the three priorities of *Europe 2020*, we want to promote a more resource-efficient, greener, and more competitive economy. In doing so, we try to keep our heads clear when assessing the impacts of our policy actions. We must ensure that green is compatible with – and does not compromise – growth.

Sustainable industry should not be perceived as the domain of certain environmental industries. It has, on the contrary, become the business of all businesses. The transition to more sustainable means of production, or more sustainable products and services, can offer opportunities, but we must keep in mind that it requires a prior investment, which may not be affordable in the short term. We are therefore striving to make clear, coherent, and well-conceived industrial, climate, energy, and related policies that promote eco-innovation, without leading to industrial outsourcing and the loss of jobs and prosperity. And it is for this reason that, in 2011, we launched the Sustainable Industry Low Carbon initiative, which is a practical, industry-based initiative at EU level for 'tradi-

Sustainability: a lever for economic growth

Antonio Tajani explains
how the European Union
is finding solutions that

neither compromise
growth nor the climate
and environment.

tional' manufacturing industries, aiming to stimulate innovation to reduce the carbon intensity of energy-intensive manufacturing processes.

Sustainable growth and resource efficiency are opportunities for EU industry

Finding solutions that neither compromise growth nor the climate and environment is – I must admit – not always an easy task. But although at first this merging of interests might seem like a marriage of convenience, we often see that many of them turn out to be fruitful relationships. There is, in fact, a growing tendency among businesses to produce in more resource-efficient ways. These businesses are not necessarily driven

by a desire to invest in a greener planet, but they make changes to their business concepts because green production has become economically sound.

Indeed, industry is a core driving force behind the technical and technological innovation required for greater sustainability and resource efficiency. Although eco-innovation remains under-exploited, public and private investment in this area in the EU has continuously increased over the last 10-20 years.

The eco-industries sector has grown to become a sector equivalent (in terms of employment) to chemicals or electrical and optical equipment. Annual employment growth in this sector between 1999 and 2008 has averaged approximately 180,000 jobs per

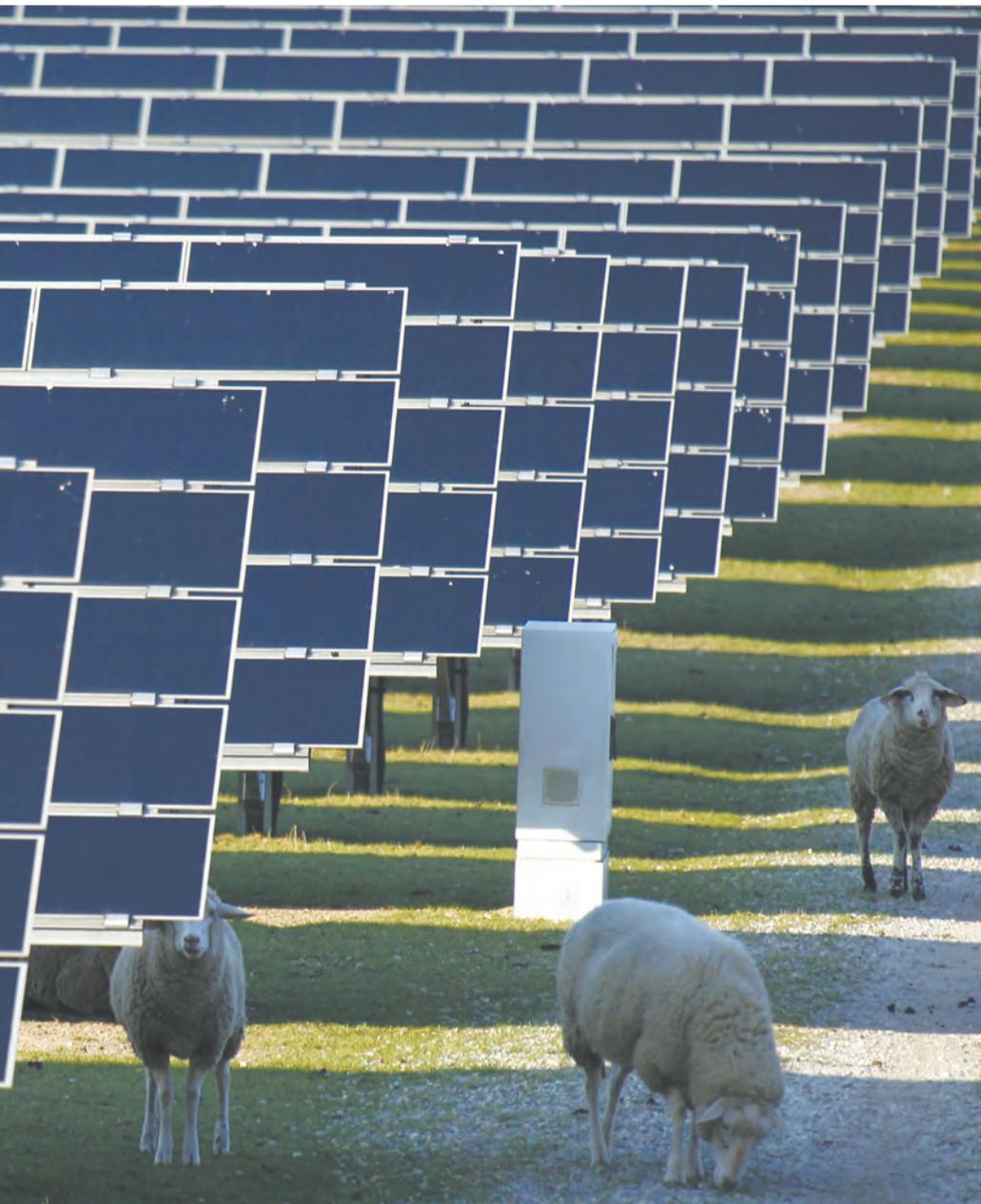


Photo: Kai Pfaffenbach/Reuters



Photo: European Union 2011

ANTONIO TAJANI is Vice-President of the European Commission and Commissioner for Industry and Entrepreneurship.

tion, others will be confronted with high investment costs in new technologies and innovation. This is especially a problem for small and medium-size enterprises (SMEs) which lack time, information, and human and financial resources and miss out on the opportunities offered by efficient products and services in terms of a reduced energy bill and greater effectiveness. In February 2011, the Commission revised the so-called ‘Small Business Act’, and shifted the focus to helping SMEs with the transition to resource-efficient growth.

The future of European sustainable industrial policy

Additional investments will be needed if European industry is to move further in the direction of resource efficiency. The starting points vary widely in different European regions. This is why the Commission is supporting investments in infrastructure, and is helping to kick-start economic development in the different regions.

Finding new ways to reduce inputs for manufacturing industry, to improve management of resource stocks, to optimize production processes, and to make the best usage of waste, are just some examples showing how increasing resource efficiency can also bring economic opportunities for companies. This will help stimulate technological innovation, boost employment in the fast developing green technology sector, and open up new markets.

It is important to me and to my colleagues in the Commission to be open to new ideas and to consider new ways of dealing with our economic and environmental challenges. It is, after all, my first and finest priority to work for a flourishing and viable European Union – a competitive society which leaves a healthy environment for future generations. ■

year, representing over 7% annual growth, and in 2008 it was estimated to employ 3.4 million people across the EU.

Furthermore, our 2020 energy goals can result in €60bn less in oil and gas imports, and over 1 million new jobs in the field of renewable energy and energy efficiency.

A key driver for sustainable industry is the Commission’s product policy. The first nine measures under the Ecodesign and Energy Labelling Directives are expected to reduce annual energy consumption by some 340 TWh by 2020. This is equivalent to 12% of the total electricity consumption in the European Union or the entire electricity consumption of Italy in 2007.

Whereas some sectors will meet few barriers in changing to a more sustainable produc-

“Industry is a core driving force behind the technical and technological innovation required for greater sustainability and resource efficiency.”

Sheep grazing in a solar park in Waghäusel, 12 miles southeast of Karlsruhe, Germany.



Successful and innovative

A country with spectacular mountains, thick forests, and a short Adriatic coastline, Slovenia was always the most prosperous and liberal corner of Yugoslavia. Multi-party elections in 1990 were followed by a referendum that chose independence, and since going it alone in 1991, the country has prospered. It moved quickly from a centrally planned economy to a market one, and embraced free trade, making it a model of economic success and stability for the region. Slovenia joined the European Union (EU) in May 2004, and was the first of the newcomers to adopt the euro currency in 2007.

Slovenia is, by a wide margin, the richest country in eastern central Europe, well ahead of its Balkan neighbours, and even ahead of Portugal, which has been a member of the EU since 1986. The high living standards enjoyed by the two million-strong population are largely a legacy of the past, when Slovenia was Yugoslavia's trading arm. In the 1970s and 1980s, a large number of Slovenian manufacturing concerns obtained western technology through licensing agreements, and this enabled them to become

internationally competitive. Since independence, and especially since the country joined the EU, traditional industries, such as textiles and truck-making, have contracted, but at the same time, there has been an increase in light manufacturing and higher value-added sectors, such as pharmaceuticals and electrical engineering.

Industries with strong links to Western European economies, and those that are highly export-oriented, have performed strongly. The best example is Revoz, the Slovenian subsidiary of the French carmaker, Renault, which for many years has been the top Slovenian exporter. Production increased by around 40% between 1998 and 2009. Despite the financial and economic crisis, 2009 was a record-breaking year for the Revoz plant, which produced 212,680 cars, 7% more than in the previous year. Since 2007, Revoz has been the first and only Renault plant to manufacture the Twingo model. The plant, which is located in the town of Novo Mesto, 40 miles south-east of the capital, Ljubljana, was awarded the most environmentally-aware company prize by Slovenia's Environmental Development Fund in 2003.

Apart from cars and car components, other important sectors of Slovenia's strong and diversified manufacturing base are domestic appliances and other electrical items, pharmaceuticals, and metal-processing. Services have grown in importance since independence, reflecting a broader economy-wide shift away from traditional 'smokestack' industries. Investment in infrastructure and greater quality in the tourism industry have led to healthy growth in tourism services receipts.

Machinery and chemical products are among Slovenia's main exports, with

Germany its main market. In 2010, machinery and transport equipment represented 39% of total exports, manufactures 22%, and chemicals 16%.

At home and abroad, Slovenian companies have produced and marketed successful and highly innovative products. For example, Elan is among the top manufacturers of skis and snowboards; Seaway is one of the world's leading boat development companies; Pipistrel is a successful light aircraft manufacturer; and Gorenje is a manufacturer of high-quality, design-oriented, domestic appliances.

Following years of uninterrupted growth, to a large extent fuelled by a rapid increase in investments and exports, Slovenia was one of the central European countries worst affected by the international economic and financial crisis. In 2009, the country's export-oriented economy was hit hard, shrinking by 8%. Economic growth returned in 2010, with the recovery driven by an upturn in demand, particularly in the EU and Balkan markets, but this slowed again in 2011.

Interview with His Excellency **Danilo Türk**, President of the Republic of Slovenia

Looking at the current global situation – with the financial crisis, climate crisis, fuel crisis, food crisis – one could paint a gloomy picture. Has globalization failed us?

First, globalization is an old process that has been going on for centuries. For example, in the 19th century already globalization progressed with various innovations, including telecommunications and expanded navigation. The specific feature of the current phase of globalization is that it affects more people, in more places, at a much faster pace than in any other phase of globalization before. This is, to a large extent, due to the operations of today's global markets for goods and services. Today, we should ask ourselves whether these markets are really put in the right normative framework?

This is the second question, which is at the centre of the globalization debate now. As you know, there has been a period during the past 30 years when deregulation was the primary order of the day. Regulation was seen as inimical to market forces and it was therefore not promoted. I think these times have passed and we are entering into a phase when the question of regulation has to be put on the global agenda and considered very seriously – and in fact, this is already happening. In 2009, after the first wave of the financial crisis, market regulation and global economic governance issues were at the centre of the debate, and have stayed there ever since. In the fields of financial services and global financial regulations in particular, there is a very serious need for a new era of sophisti-



Photo: Bobo

cated regulation, which should not stifle the dynamism of finance, but rather put the financial system into a framework, which will ensure its orderly functioning.

Coming to the impact of all these important global shifts, what can be done at the local level to mitigate these crises? Is regional integration a response to controlling the impacts of globalization?

This is an interesting question, particularly as it is a real challenge nowadays to define what is local. Of course, people live and act locally, but very often their local action is part of a much larger system. For example, if you go to a factory in Ljubljana that produces automotive light systems, it is, at the same time, a local production system and part of a global system of automotive manufacturing. So, the local manufacturers need to consider global trends and issues when thinking about their local logistical or managerial problems.

Globalization has really changed the understanding of what is local and what is global. The question of what can be done at the local level to mitigate global problems can therefore not be answered easily. The fact remains, however, that individual actions are happening locally rather than globally. If you take the emission of greenhouse gases, for example, much can be done through regulating and organizing local traffic, especially in large cities. Here, one cannot expect specific answers from global or even national regulators. Very often, the decisive response comes from the cities themselves. They themselves ►

Dr DANILO TÜRK was born in 1952 in Maribor, Slovenia. He studied law, and followed an academic career at the Faculty of Law, University of Ljubljana, Slovenia. After Slovenia's declaration of independence, Dr Türk took an active role in its diplomatic activity, and in 1992 he assumed the position of Ambassador of the Republic of Slovenia to the United Nations.

From 2000 to 2005, he served as UN Assistant Secretary-General for Political Affairs. In 2005, he returned to Slovenia, becoming professor of international law and vice dean of student affairs at the Faculty of Law of the University of Ljubljana.

He ran as an independent candidate in the 2007 presidential election and, with the backing of centre-left parties, won 68% of the vote, becoming the third president of Slovenia on December 22, 2007.



► contribute to a large part of global greenhouse gas emissions, and they themselves can change that. So, much can be done locally, but one needs to use imagination and see how that fits into a larger scheme of things.

As far as the European Union (EU) is concerned regarding the regional framework for Slovenia, we appreciate the development of environmental standards in the EU. They help national policymakers to design stricter and more seriously conceived standards than would otherwise be the case. This, combined with the direction of the financial resources of the EU to related local infrastructure development, is very helpful indeed.

And again, in Europe everything regional is also local. To give you an example: a few weeks ago, I opened a new sports centre in Mokronog, a small town in the south-east of Slovenia. The centre has been built with environmentally friendly material and in an energy-efficient way. A part of the resources came from the EU, and EU standards were applied. As a consequence, local people at the opening talked a lot about the EU as a “local” actor in their local development efforts. You see, these are interplays that nowadays exist. Overall, I think that the EU has a very crucial role to play in mitigating global problems and environmental challenges.

In view of this positive appraisal, could the EU serve as a model for other regions as well?

Probably not – one needs to be realistic about these things and understand that circumstances vary considerably from one place to another. If you take the EU with its 500 million people and compare it to India, for example, with more than one billion people and a very



Photo: Bobo

different level of development, one can very easily understand that the same model of environmental protection or economic and social development is not conceivable. What needs to be done is to figure out how one can work at the global level to improve the performance of mitigation of environmental impact in different circumstances. How to combine different policy models into a workable global programme? One must not deny the differences but work with them.

In fact, this question exemplifies the increasing complexity of today’s global governance system, which functions without a single global centre of power, as we do not have a central global government. We will need to find a clever combination of the various normative, financial, and policymaking instruments, to make them suitable for the diverse local and regional circumstances and situations in our world. In Europe, we will largely coordinate these instruments within the framework of the EU. In India, it will be national policymaking, and the same will apply to China. This does not mean that all these governance instruments cannot be put together in a coherent fashion. On the contrary, I think, the challenge for global

governance today is to make these different approaches converge.

But we are still in a long learning process in this regard. Take the experience of Copenhagen 2009 for example; you can see the difficulties because it was not yet clear then how one can put these different policymaking systems together. We need global rules and a global regulatory system, but we cannot simply say that we need to have a single legal framework with a compulsory power – this has not worked so far. But this does not mean that we should rule out the possibility for a coordinated regulatory system to emerge in the

future, with the full understanding and participation of large national systems, such as India, China, Brazil, and other big players.

In the current network governance system, many people are expecting the G20 to be an answer to many global problems, as it is often seen as fast and decisive. Is this the way forward in global network governance?

Well, I think that one has to be very realistic about the G20. The G20 proved to be quite effective in 2009, and that produced a great degree of encouragement everywhere in the world. This shows that it is very important to have leadership – leadership with the appropriate amount of power – so that things can be moved forward.

However, in 2010 and 2011, we have discovered that the G20 has also lost a lot of steam and hasn't been able to perform, just when much of the global economy is entering a new phase of the crisis. I believe that this should be a very clear sign to the G20 to remobilize.

Remobilization, of course, cannot be the end of the story. Once the main direction of future governance is developed, it needs to be put into a proper normative framework, and that normative framework will have to be legitimate. I therefore think the G20 – and I believe the members of the G20 understand this perfectly well – will have to operate within such normative systems as the United Nations and the International Monetary Fund. That is where the norms and rules of the game will have to be elaborated and determined in a participatory process.

A two-phase approach is therefore unavoidable. The first phase is the remobilization of the G20, and the second phase is norm-setting and legitimization of norms through appropriate institutions such as the UN and the IMF.

Looking at Rio+20 in 2012 in this context – what would be, in your view, the best recipe for success?

Rio+20 is coming very fast, and we do not have much time. The questions are whether the

“If you go to a factory in Ljubljana that produces automotive light systems, it is, at the same time, a local production system and part of a global system of automotive manufacturing.”

experience of the past years will be properly absorbed, and whether the most appropriate and realistic outcome will be envisaged in due time. I think that the time is really very short.

We, in Slovenia, will obviously be looking at the European Commission's leadership, which has been fully involved in the negotiations and various conferences from Cancun to Durban and beyond. Therefore, the EU countries will coordinate their policies within the framework of the Union, and the Commission will lead the process.

EU countries understand that Rio in itself was a huge success with its Agenda 21, the climate change framework, and biodiversity as a major task. But the follow-up was rather varied, and did not succeed in every respect. It is important that the preparatory process towards Rio+20 finds a timely definition of sustainable development priorities and goals for the next decade.

UNIDO and others are looking at a new, sustainable industrial revolution. Would you agree with such an approach, which also means a stronger involvement of the private sector in the problem-solving processes?

Absolutely. I think that a new industrial revolution is not only called for but indeed is already happening. In this context, we should very carefully examine countries such as the Republic of Korea or China – very different in size but very similar in their ambition to change towards environmentally friendly technologies and green growth. That, I think, should be the priority.

Obviously, the private sector has a major role to play on such a development path. The private sector has been the driving force in technological change in the past and will remain so in the future.

In this context, UNIDO has shown a remarkable capacity to adapt – it has gone through several stages in a very short period of

time. Now, I think, there is a real opportunity for UNIDO to play a coordinating role in bringing together all these different policies and models aiming at green growth. And, of course, many of these models and policies are based on private sector engagement.

This is not new. At the recent 50th anniversary of the OECD, I saw a very clear direction towards green growth. Indeed, wherever one goes, green growth is talked about as the desired policy direction. The main question remains whether the international community is sufficiently well-organized for defining this direction to move ahead. We have sophisticated methods for promoting this direction and, I believe, UNIDO can play a very critical role in this context.

Coming back to the local impact and responses to global sustainability challenges: where is Slovenia in all this?

First of all, Slovenia is a member of the EU. So, for us, its standards apply, and policies are designed in conformity with EU policies. Now, where we are lagging behind is in the use of our own natural resources for the purpose of technological change. For example, we are a heavily forested country. About 60% of our territory is covered by forests. I think that we are not using enough the opportunities of biomass for the production of energy. We are not using enough our wood as a material for energy-efficient houses. So, in certain areas, we are lagging behind. But, in others, we are doing better than average, for instance in the production and use of solar panels, which is somewhat surprising because we are an Alpine country. We are also doing better in areas such as water protection and purification, and so forth. You can see that this is a varied picture – in some technological fields we are more advanced, in some we are not. Our focus, however, should be on those technology areas where we lag behind and where we need to make more progress.

● *Interview by Kazuki Kitaoka, UNIDO.*

A case of 'homeland security'

Alejandro Litovsky and Paulina Villalpando look at how the risks of investing in farmland create opportunities for sustainability.

Photo: istock

How agricultural land is owned, what is grown on it, and by whom, will probably determine much of the next century's profits, politics and, possibly, revolutions. As the agricultural paradigm of industrial productivity faces growing social, economic, and governance pressures, investors seeking to manage the resulting risks will require an unconventional approach to risk management: inserting ecological limits and human security into the agricultural equation.

Food commodity prices are on a steady rise. Much of the planet's arable land is being cultivated, and large proportions of it are being used to grow biofuels and crops to feed livestock. The extraordinary amounts of water needed for irrigation further compete with increasing human water consumption and with the needs of hydropower plants. As the world's population continues to grow, 'land' is quickly becoming the nexus that

holds all the trade-offs together. Add recurring droughts, and one begins to understand why the United States military calls climate change a "threat amplifier".

Land security

Investors are flocking to land-based assets as a more secure alternative to the volatile stock and bond markets; and for countries like Saudi Arabia and China, food and commodity supplies are becoming a matter of national security. Both trends are resulting in large-scale acquisitions of land in regions where the soil is still fertile and water still available. In sub-Saharan Africa alone, in just ten years, over 200 million hectares have been leased to investors for agricultural development by governments that often ignore the interests of communities living on the land, leading to forced evictions and social instability.

A close-up photograph of a person's legs and feet standing on a field of reddish-brown soil. The person is wearing a light blue, frayed hem skirt. The soil is uneven and rocky, with many small clumps and larger stones. The lighting is bright, casting soft shadows on the ground.

The results are direct reputational and political risks for investors that undermine the long-term viability of investments. Conventional risk management approaches will struggle. What is needed is for companies and investors to align agricultural productivity, human rights, and ecological limits as an integrated investment strategy.

Just as large carmakers have turned to electric cars, large agribusiness firms will turn to organic farming. Just as new companies are being created on the basis of providing services through distributed networks, like car-sharing schemes in large cities, so too, agribusiness must better integrate the role of smallholder farmers into a radical rethink of its business models. Incentives for pursuing these innovations are more likely to arise from fully understanding the security and risk challenges involved in the current model, than from appeals to global

sustainability. The sort of security framework that is emerging combines three inter-related types of risk:

Productivity

In the United States, to cite one example, an exponential growth in pests that have effectively adapted to pesticides such as glyphosate is leaving US farmers either unable to shoulder the costs of additional chemicals or having to experiment with untested chemical cocktails that are likely to increase the toxicity of water supplies and the soil. Investment analysts have signalled that the growing resistance of pests to chemical pesticides is a cause for concern for investors in agrochemical companies.

Ecological limits are forcing farmers to acknowledge the importance that a healthy environment has on long-term agricultural productivity. Organic methods that shy ►

“Investment deals may boost food or commodity exports, but human security concerns and land-related conflicts will make their way to the top of the business and investment agenda.”

► away from the heavy use of chemicals and genetic modification to, for example, strengthen biodiversity of crops and crop rotation as a strategy to challenge pests, have proven to be effective.

Recently, after 30 years of scientific research, the Rodale Institute in the United States has found that organic farming, although providing lower yields in the first years, in the long term outperforms conventional chemical farming in terms of crop yields, sustainability and profit. It is the longest-running scientific comparison between organic and conventional agriculture.

A part of this paradigm shift implies conceiving the fertility of the soil and the diversity of supporting ecosystems as ‘natural assets’ that must be taken into account in the agricultural economic equation. In sub-Saharan Africa, where farmers are either too poor to afford chemical options or the distribution models are not sufficiently developed, natural ways of fixing nitrogen into the soil are driving agricultural innovation which can offer considerable insight to the research capabilities of more developed nations. One example is ‘fertilizer tree systems’: by planting certain types of nitrogen-fixing trees alongside crops, farmers have managed to boost crop fertility, while increasing the biological diversity needed to face climate changes, such as more frequent droughts.

In light of the long-term risks involved for agricultural productivity, when transitioning from ‘Green Revolution’ to ‘Green Economy’, it will probably make economic sense for companies and investors to assume the short-term costs of switching to environmentally friendly agriculture.

Human security

The generally low levels of government accountability in sub-Saharan Africa mean that large-scale land investment deals made

between governments and investors, even if by well-meaning investors, are likely to increase the vulnerability of poor communities. The risks to human security are significant, whether because communities are forcibly evicted from the public lands they have cultivated, usually without formal rights, for various generations, or because new water canals, meant to improve large-scale irrigation, jeopardize water availability for small-scale subsistence farming. The growing social instability and vulnerability created by this booming industry is growing in visibility, and a few high-profile cases have shown just how material these reputational and political risks are for investors and companies.

Taking human security into account will become a norm for farmland investments, even if that means going beyond legal compliance. Ethiopia, for example, recently offered to lease 3 million hectares to foreign investors for agricultural production at a time when 2.8 million Ethiopians are suffering from hunger in one of the worst famines in history. These investment deals may boost food or commodity exports, but human security concerns and land-related conflicts will make their way to the top of the business and investment agenda.

Blaming unaccountable governments is not likely to be enough to get investors ‘off the hook’. They will have to take proactive measures to ensure the transparency of investment deals and bridge the gap between private and informal land tenure by communities. History shows that, as with other areas where governments have been slow to respond or just sloppy – for example, in relation to labour standards or Apple’s recent standoff over the environmental footprint of its supply chain in China – the private sector will be held to account. It is reasonable to think that a proactive approach to risk management must include ways of involving and benefitting local communities, not just

through an their informed and prior consent to these deals, but also with options that build their capacity and livelihood to participate in development.

Ecological limits

The situation in Mali illustrates the challenges that lie ahead. A recent study aggregated all the new land deals entered into by the government of Mali, and found that, if they all fully developed, there won’t be enough water in the Niger River to irrigate them. The availability of water and water rights that come with land rights will be the main point of contention. Currently, two large investments are said to require more than half of the critical reserve of water for the dry season, and have exclusivity of service in emergency situation. Some of the new contracts take water rights for granted. A large irrigation canal is being built by Libyan investors to cater for the needs of industrial-scale agriculture. This canal is said to affect the water supply for more than 90,000 hectares of land used by small-holder farms for subsistence (of one or two hectares per person), as well as cut routes of passage for livestock. Given the impending water scarcity, analysts foresee a serious problem arising both in terms of water availability for agriculture, as well as water-related conflicts. Climate change and recurrent droughts, which are increasingly difficult to predict, are likely to aggravate the situation.

Land contracts that grant preferential access to water resources, or fail to consider water rights, should concern investors – as should the overall institutional capacity put in place by government agencies to manage the aggregated demands of agricultural developments on limited water resources.

Further unintended consequences from surpassing these ecological limits pose additional risks for investors. For example, since 2004, Saudi Arabia has leased more than

376,000 hectares from the Sudanese government to grow rice, a water-intensive crop. Weak water regulation has forced the Sudanese government to halt its wheat production because of water scarcity, which in turn has reduced grain supplies and increased its price on the local market. Another example is Tanzania, where water demand from land investments has had a detrimental effect on electricity supply, which in turn has affected the country's entire economy since more than half of Tanzania's electricity is generated by hydropower.

It is reasonable to assume that these trade-offs and externalities, which will increasingly translate into costs to be written-off the balance sheet, are re-defining how to assess the long-term productivity and risk of land and agricultural investments.

Where next?

While progress depends on host governments getting good governance and land planning right, the costs of inaction will undoubtedly land on the balance sheets of companies and investors. Avoiding these risks requires some foresight. Two areas of opportunity to move this agenda forward are:

Transparency

Pressures for greater transparency are increasing. Within civil society, a research partnership between the International Land Coalition and a number of development agencies aims to become the world's largest database on large-scale land investments. Increasing transparency by investors can create virtuous circles with governments and communities, but transparency will not be an easy subject, especially due to competitive pressures within the investment sector. Initial steps are being taken however through the Principles for Responsible Investment's (PRI) Farmland Working Group, where six pension funds are pooling their combined



US\$1.3 trillion in assets to explore how to drive more responsible investments. Operationalizing a commitment to transparency is among their main interests. Considerable opportunities exist for cooperation, but precisely how investors operationalize transparency is an area where the first mover will have the advantage.

Agribusiness beyond compliance

Obtaining prior and informed consent from local communities for large-scale investments is becoming a central demand of civil society to both governments and investors. Framing this in terms of compliance is important, but more important from a business perspective will be to create more inclusive value chains and offer local communities ways to be involved in development. As the global media becomes increasingly interested in this agenda, investors are likely to continue to be exposed when promises are not kept, as was recently the case with biofuel investments

in Tanzania. Ensuring there is a long-term view of a community's development is likely to feature centrally on this agenda.

With global financial markets in turmoil, investors regard land-assets as a more stable opportunity. Many will think it is unfair for a broader human rights and sustainability agenda to be coupled with investment focus, but, incorporating productivity risks, human security and ecological limits into the equation is essential to fully understand what lies ahead. Managing these risks proactively offers not only an extraordinary opportunity to move the sustainability agenda forward, but also one that looks at productivity in a new way. Time is of the essence, and everyone has a stake in trying to make the land agenda work for the long-term.

● Alejandro Litovsky is Founder and Director of the Earth Security Initiative; Paulina Villalpando is an Associate at the Earth Security Initiative. www.earthsecurity.org

Networks for prosperity

By **KAZUKI KITAOKA**, Programme Management Officer, UNIDO

While not a new phenomenon, knowledge networking and network governance have gained importance with the rapid globalization in all spheres of our societies: a country's economic success, social cohesion, and environmental sustainability depend more than ever on the performance and behaviour of its neighbours, regional leaders, and global economic powers. This knowledge, with a focus on the driver of development – private enterprise, has therefore become of crucial importance, and knowledge management and knowledge networking are important topics for change agents and policymakers.

A joint publication by UNIDO and the Leuven Centre for Global Governance Studies, *Networks for Prosperity – Achieving Development Goals through Knowledge Sharing*, lays the basis for the development of knowledge networking concepts that will help developing countries to acquire and adapt private sector development (PSD)-relevant knowledge to their specific contexts and needs, and enhance the knowledge capabilities of the United Nations system and its national counterparts and partners in the field of PSD policy. UNIDO was requested to prepare the publication as the technical convenor agency of the funding window, 'Development and the Private Sector' of the Spanish MDG Achievement Fund (MDG-F).

The report first explains why information and knowledge networks are important, differentiating between learning,

information and knowledge creation networks. It then explores the empirical evidence in a global "Connectedness Index", which ranks countries in accordance with their internal and international knowledge networking capacities. Using this initial ranking, the top 20 connected countries are:

- 1 **Switzerland**
- 2 **Sweden**
- 3 **Netherlands**
- 4 **United States**
- 5 **Finland**
- 6 **Singapore**
- 7 **Norway**
- 8 **Canada**
- 9 **Germany**
- 10 **United Kingdom**
- 11 **France**
- 12 **Australia**
- 13 **Japan**
- 14 **Malaysia**
- 15 **Czech Republic**
- 16 **New Zealand**
- 17 **Israel**
- 18 **Slovenia**
- 19 **Korea, Republic of**
- 20 **Thailand**

“The ‘connectedness’ of a country has a strong positive correlation with various aspects of its economic performance, justifying the growing interest of policy-makers in knowledge networks.”

The report clearly shows that the ‘connectedness’ of a country has a strong positive correlation with various aspects of its economic performance, justifying the growing interest of policymakers in knowledge networks. Specific issues related to the governance of international, inter-organizational and intra-organizational networks are discussed in separate chapters. These are illustrated with detailed examples from a wide range of developing countries and transition economies.

What stands out in all cases is that there are great benefits from ensuring that knowledge networks are successfully embedded in the structures and networks related to development policy. But vibrant knowledge networking needs more than that. It requires a living ‘institutional ecosystem’, with new organisms providing new knowledge and opportunities; and it implies the development of solid, durable networks, which are built on trust, as well as constant movement between relevant networks to capture new information.

The report makes the following recommendations:

1. **The international community** should actively promote knowledge networking and network governance structures for achieving local, regional and global development objectives. This may include:
 - Fostering international, national and local knowledge networking approaches in all capacity-development activities;
 - Improving national ownership through multi-stakeholder networking arrangements in the policymaking processes at all levels;
 - Making the international system more inclusive through the engagement of more countries and institutions in solution-finding processes; and
 - Supporting networking arrangements with the goal of enhancing innovation and private sector development.

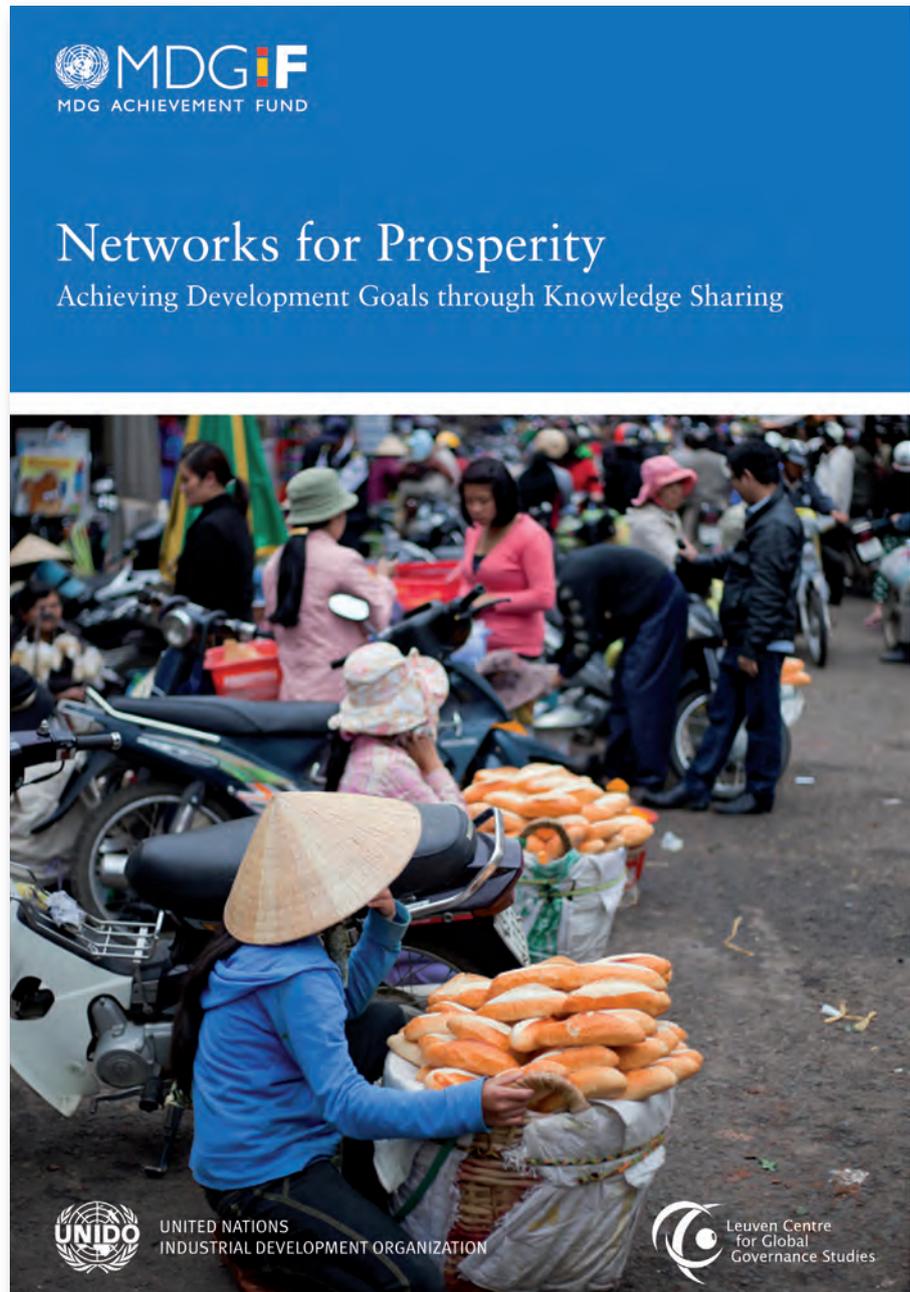
2. Member states of the United Nations should encourage and facilitate the international knowledge networking capacities of their public and private institutions. This may include:

- Formulating networking strategies for the achievement of development objectives and reforms;
- Supporting regional policy and research network participation;
- Investing in institutional infrastructure and innovation networks domestically and internationally (South-South and ‘triangular’);
- Upgrading the knowledge networking capacities and capabilities of domestic institutions; and
- Providing incentives for the formation of new networks in specific fields of strategic interest.

3. International organizations should improve their inter-institutional information and knowledge exchange systems and facilitate better knowledge networking among their members. This may include:

- Improving thematic information exchange in communities of practice to provide more user-friendly platforms for knowledge sharing among members;
- Seeking the involvement of non-state actors in policy development processes; and
- Supporting knowledge network development in relevant fields.

4. An international and cross-sectoral research and policy network should be established to further develop the initial findings on connectedness and knowledge networking for the achievement of development goals. It should recommend measures and programmes that enhance development effectiveness through increased knowledge networking, in particular in the field of private sector development. ■



Carbon capture and storage in industrial applications

By the International Energy Agency Energy (IEA) Technology Policy Division and the United Nations Industrial Development Organization (UNIDO) Energy and Climate Change Branch

Current options for reducing CO₂ emissions from industrial sources will not be sufficient to achieve deep emissions reduction in industry, so new technologies are required. Recognizing the importance of carbon capture and storage (CCS), the IEA and UNIDO have collaborated to develop a technology roadmap for the application of CCS in industry.

Key findings

Carbon capture and storage is a key cost-effective option for reducing carbon dioxide (CO₂) emissions from industrial applications. Whereas the power sector can take advantage of alternatives to fossil fuels, in several industries deep emission reductions can only be achieved through CCS.

CCS could reduce CO₂ emissions by up to 4.0 gigatonnes annually by 2050 in industrial applications, accounting for about 9% of the reductions needed to halve energy-related CO₂ emissions by 2050. To achieve this target, 20% to 40% of all facilities need to be equipped with CCS by 2050.

High-purity sources, such as natural gas processing; hydrogen production from natural gas, coal or biomass; ethylene oxide production; coal-to-liquids; and ammonia

production, offer an early opportunity to demonstrate CCS. If this opportunity can be linked to enhanced oil recovery, costs could be lower than US\$10 per tonne of CO₂, or even negative.

As with CCS in general, incentives and regulatory measures will be required to facilitate industrial applications of CCS. The mechanisms should be selected according to the maturity of the technology, and should distribute funding for CCS

demonstration programmes efficiently between power generation and industrial production processes.

CCS in industry needs more specific support, including financial assistance for investing and operating CCS. Over time, however, incentives for CCS technologies should be linked primarily to their ability to reduce CO₂ emissions.

Additional capital investments of about US\$256bn would be required for industrial CCS between 2010 and 2030. Of this total, US\$172bn will be needed in developing countries. This high additional capital cost is one of the main barriers to implementation.

For developing countries, CCS could be part of a low-carbon industrial development strategy. If CCS can be implemented through the United Nations Framework Convention on Climate Change (UNFCCC), Clean Development Mechanism (CDM), or other new global climate mechanisms, the cost barrier could be partly overcome. It is likely that if CCS moves forward under the CDM, the first projects will be in industry.

Key actions in the next 10 years

Governments need to ensure adequate funding for CCS demonstration projects in major industrial and fuel transformation sectors such as ammonia, gas processing, biomass conversion, refineries, iron and steel, and cement manufacturing. By 2020, investment worth US\$27bn will be needed to fund about 60 early large-scale projects.

“For developing countries, carbon capture and storage could be part of a low-carbon industrial development strategy.”

If additional operating costs, transportation and storage are included, the total additional cost would reach an estimated US\$45bn.

Governments and financiers need to ensure funding mechanisms are in place to support demonstration and deployment of CCS in developing countries, where the largest opportunities exist for CO₂ capture in industrial applications.

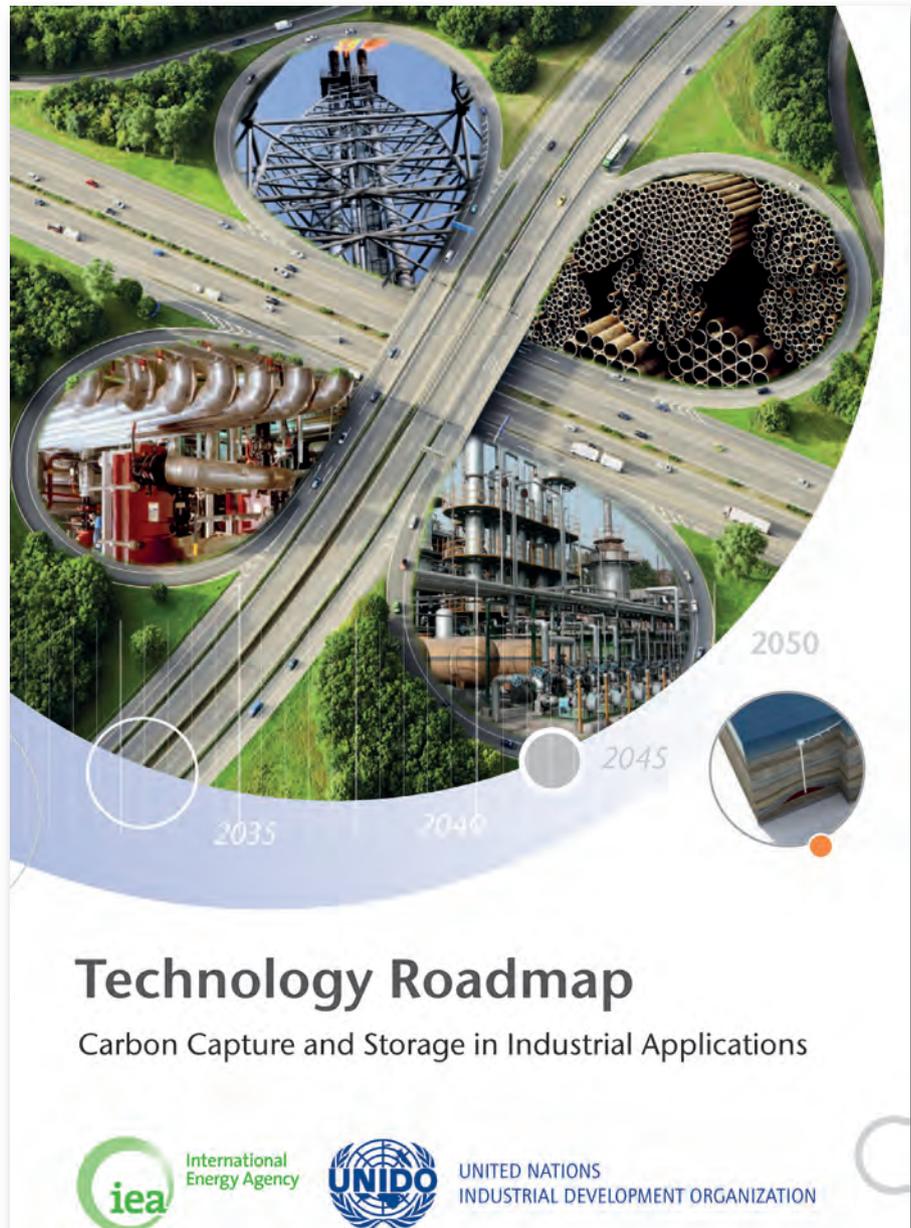
To enable a deeper understanding of the potential for CCS in industrial applications, more data need to be made available on emissions, technologies, costs and projections. Governments need to review the opportunities for industrial CCS in their countries and ensure that industrial CCS is given prominence in the short term, especially in low-cost applications.

Although industry will eventually need to implement the technology, public research and development programmes on CCS in industrial applications are required to bring more information into the public domain.

Best practices for CCS in industrial applications need to be developed and disseminated, so that interested parties can learn faster how to apply the relevant technologies.

CCS opportunities in industrial applications need to be mapped better and more consistently at the national and local level, including CO₂ storage opportunities in enhanced oil recovery operations.

● *Technology Roadmap – Carbon Capture and Storage in Industrial Applications*, © The OECD/International Energy Agency and United Nations Industrial Development Organization, 2011, page 5



The new pharmaceutical frontier

Looking ahead to the next issue of *Making It*, which focuses on industry and health, **SUMI DHANARAJAN** considers how the pharmaceutical industry can improve access to medicines in developing countries.

It has been a challenging decade for the pharmaceutical industry. With patents expiring in high numbers, new-product pipelines drying up, and intensifying competition from generics, branded pharmaceuticals have been haemorrhaging value.

At the same time, traditional markets are becoming saturated. Stark realities in industrialized countries – such as the impact of aging populations on tax-based and employer-funded health-care models – are leading governments to adopt regulatory regimes that demand more economical, value-based, and transparent drug pricing.

Under these circumstances, emerging markets present a new frontier. Originally attractive for offering low-cost production, developing countries now present a viable market for multinational corporations. The pharmaceutical industry has been eyeing this trend for a while. A recent study predicts that sales in 17 ‘pharmerging’ countries – including India, Indonesia, Pakistan, Thailand, and Vietnam – will “in aggregate expand by US\$90 billion during 2009-2013.”

But in many emerging economies, a large proportion of the population is poor, and those who are not, remain vulnerable to falling into poverty in times of crisis. Health care is financed largely out-of-pocket – up to 60% in Asia – and many countries shoulder a “triple disease burden” of “old” diseases like tuberculosis



and malaria, new infectious diseases like Influenza A (H1N1), and a “silent pandemic” in the form of non-communicable diseases such as diabetes and cancer. The challenges surrounding access to medicines remain critical, and, indeed, relevant to the industry’s business model.

Philanthropic approaches to the problem have achieved little systemic change. Drug donations by companies have been criticized for being mostly unsustainable. Often, the medicines are unsuitable for patients, unfamiliar to local prescribers, do not match national clinical guidelines, or are near expiry.

Because supplies of donated medicines can be unpredictable, they can create chaos in the market by preventing accurate quantification of needs and thus affecting

“The challenges surrounding access to medicines remain critical, and relevant to the industry’s business model.”

planning. Donated supplies also have the overarching negative effect of undermining market competition – even generics cannot compete with free medicines. Price discounts have been more effective, though their effect is limited by their focus on specific high-profile diseases and least developed countries (LDCs).

Advocates of improved access to medicines have posed three demands of the pharmaceutical industry:

- Transparent pricing schemes that systematically address the challenge of affordability;
- Investment in research and development that is relevant to the diseases affecting developing countries, and in medicines suitable for resource-poor contexts (for example, heat-stable formulations or fixed combination drugs); and
- A flexible approach to intellectual property (IP) rights, in recognition of the role that generics play in vastly reducing medicine prices.

Leading companies are starting to understand how integrating these concerns into core business practices may hold the answer to sustainable long-term profitability in emerging markets. Reliance on the traditional “blockbuster” model, which targets the elite, is proving unfeasible and short-sighted.

For starters, it limits the size of the consumer base. More importantly, the model’s dependence on aggressive defence of patents and high profit margins, in order to generate the all-important US\$1bn per annum, keeps companies from serving target markets effectively by providing products that are relevant,

affordable, and accessible. Many argue that the perverse incentives created by the blockbuster model discourage innovation.

Finally, governments of the developing countries are beginning to prioritize health care and are seeking cost-efficient outcomes, as well as the means to effectively manage disease burdens. In these countries, building access to medicine into companies' core business models has become vital to securing a license to operate.

At the end of 2008, one company attempted to beat a new path. The chief executive of GlaxoSmithKline (GSK) unveiled a four-point plan that included a commitment to cap prices for patented medicines in LDCs at 25% of the price in the developed world. In middle-income countries, prices would more closely reflect a country's ability to pay (for example, GSK cut the price of its cervical cancer vaccine, *Cervarix*, by 60% in the Philippines and gained a 14-fold increase in volume sales). Further, it proposed the establishment of an LDC patent pool for neglected tropical diseases and donated to it 13,500 compounds for malaria vaccines.

Slowly, other companies are following suit. Sanofi-Aventis recently announced that it would halve the price of its diabetes drug, *Lantus*, and cancer treatment, *Taxotere*, in Indonesia and the Philippines. The Japanese firm Eisai dropped its price for *Aricept*, an Alzheimer's treatment in six Asian countries.

Other companies are experimenting with base-of-pyramid models that seek to boost sales. Novartis's *Arogya Parivar*

model sells medicines in smaller, more affordable package sizes. The jury is still out on whether or not these new approaches deliver systemic change, and whether companies are adopting a "serve" rather than "capture" market strategy, but at least the issue of access to medicines is no longer being viewed at arm's length.

More needs to be done on the issue of intellectual property (IP) rights – the sacred cow of the pharmaceutical industry. Governments of developing countries continue to go head-to-head with 'Big Pharma' in battles over compulsory licensing and patent legislation. There is serious questioning of whether IP rights are actually an effective incentive for drug development, especially with respect to medicines that are relevant to diseases in developing countries, given the current dearth of research and development into these diseases.

New models are being tested. UNITAID's patent pool for AIDS medicines, for example, allows generics producers to make cheaper versions of patented medicines by enabling patent holders to license their technology in exchange for royalties. Ultimately, generics remain the current front-runner in terms of delivering affordable medicines. Formulating policies that enable generic competition with the branded pharmaceutical industry will require creative measures that emphasise the imperative of maximizing public health.

● Copyright: Project Syndicate, 2010.
www.project-syndicate.org

SUMI DHANARAJAN is an independent consultant specializing in the field of business, human rights and sustainable development. Since August 2009, she has been based in Singapore. From 1998 to 2008, she was Head of the Private Sector Team at Oxfam GB, the international development organization addressing poverty issues worldwide.



FURTHER READING

- Economic Commission for Latin America and the Caribbean (ECLAC) – The Economics of Climate Change in the Caribbean Summary Report
 Ford, Martin – The Lights in the Tunnel: Automation, Accelerating Technology and the Economy of the Future
 Heinberg, Richard and Lerch, David (eds) – The Post Carbon Reader: Managing the 21st Century's Sustainability Crises
 Kugelman, Michael and Levenstein, Susan (eds) – Land Grab? The Race for the World's Farmland
 Lovins, Amory – Reinventing Fire: Bold Business Solutions for the New Energy Era
 Martenson, Chris – The Crash Course: The Unsustainable Future of Our Economy, Energy, and Environment
 Palast, Greg – Vultures' Picnic: In Pursuit of Petroleum Pigs, Power Pirates and High-Finance Carnivores
 Parenti, Christian – Tropic of Chaos: Climate Change and the New Geography of Violence
 Srinivasan, Ancha, Ling, Frank, Nishioka, Shuzo and Mori, Hideyuki Mori (eds) – Transition to Low-Carbon and Climate-Resilient Economies in Asia: Challenges and Opportunities
 Yergin, Daniel – The Quest: Energy, Security, and the Remaking of the Modern World

FURTHER SURFING

- <http://cleanenergysolutions.org> – The Clean Energy Solutions Centre helps governments turn clean energy visions into reality.
<http://regions20.org> – A coalition of partners led by regional governments, working to develop, finance, implement, evaluate and replicate low-carbon and climate-resilient projects
www.carbonwarroom.com – The Carbon War Room harnesses the power of entrepreneurs to implement market-driven solutions to climate change.
www.chinadialogue.net – The world's first fully bilingual website devoted to the environment that aims to promote direct dialogue and the search for solutions to our shared environmental challenges.
www.earthsecurity.org – The Earth Security Initiative explores new cross-sector responses to the risk and opportunity of the ecological limits that fundamentally challenge the security of people, economies and nations.
www.foet.org – The Foundation on Economic Trends examines emerging trends in science and technology, and their impacts on the environment, the economy, culture, and society.
www.gggi.org – The Global Green Growth Institute is dedicated to pioneering and diffusing a new model of economic growth, known as "green growth."
www.mrfcj.org – The Mary Robinson Foundation – Climate Justice is a centre for thought leadership, education and advocacy.
www.rmi.org – Rocky Mountain Institute is an independent, entrepreneurial, non-profit think-and-do tank, co-founded by Amory Lovins.
www.sustainableenergyforall.org – The International Year of Sustainable Energy for All promotes action on energy issues at the local, national, regional and international levels.
www.windmade.org – An initiative leading to the first global consumer label identifying products and companies made with wind energy.
www.un-energy.org – UN-Energy is a mechanism to promote coherence within the United Nations family of organizations in the energy field.

MakingIt

Industry for Development

A quarterly magazine to
stimulate debate about global
industrial development issues



partner for prosperity