Division of Technology, Industry and Economics

UNEP

Technology Innovation for Energy Access in Africa

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Outline

- UNEP's Climate Change and Development (CC+D) work
- Supporting technological innovations at the grassroots - UNEP's Toyola story
- Conditions for sustainability of technological innovations in Africa
- Key messages

UNEP's CC and Development Work

Low carbon growth

Supporting countries make the transition to low carbon growth and green economies by promoting access to finance and scaling up clean and renewable energy sources, energy efficiency & conservation.
http://www.unep.org/unite/30ways/flagship.aspx?id=2

Adaptation

Helping countries use ecosystem services and ecosystem management to build resilience against the impact of climate change.
http://www.unep.org/climatechange/adaptation/

REDD

Develop REDD strategies and to test innovative REDD pilot projects, including consideration of co-benefits such as biodiversity and livelihoods in REDD strategy and action. http://www.unep.org/climatechange/reddplus/

Climate science and outreach

Provide relevant climate change science and information for decision making to national policymakers and negotiators, major groups, civil society and the private sector.
http://www.unep.org/climatechange/adaptation/ScienceandAssessments/tabid/29573/Default.aspx

Framing the SD Issue - the GE Initiative

UNEP

United Nations Environment Programme
environment for development

Climate Change | Disasters & Conflicts | Ecosystem Management | Environmental Governance | Harmful Substances | Resource Efficiency

GREEN economy

HOME | ABOUT GEI | WHERE WE WORK

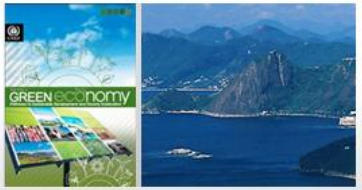
Peru

Peru has experienced an unprecedented period of economic growth over the past years. Its GDP registered a record of over USD 153 billion during 2010 - read more...

Advisory Services

UNEP's Green Economy Initiative is providing a range of advisory services to countries around the world.

Research Products



Underpinning all of the Green Economy Initiative's work is a focus on robust economic research and policy analysis.

Partnerships

Building an Inclusive Green Economy for All

News and Events

Environmental Economist Pavan Sukhdev Named New UNEP Goodwill Ambassador

Mr. Sukhdev Targeting Increased Awareness of Value of Natural Resources

More

Success Stories

Waste Management in Republic of Korea

Read other Green Economy Success Stories from around the world

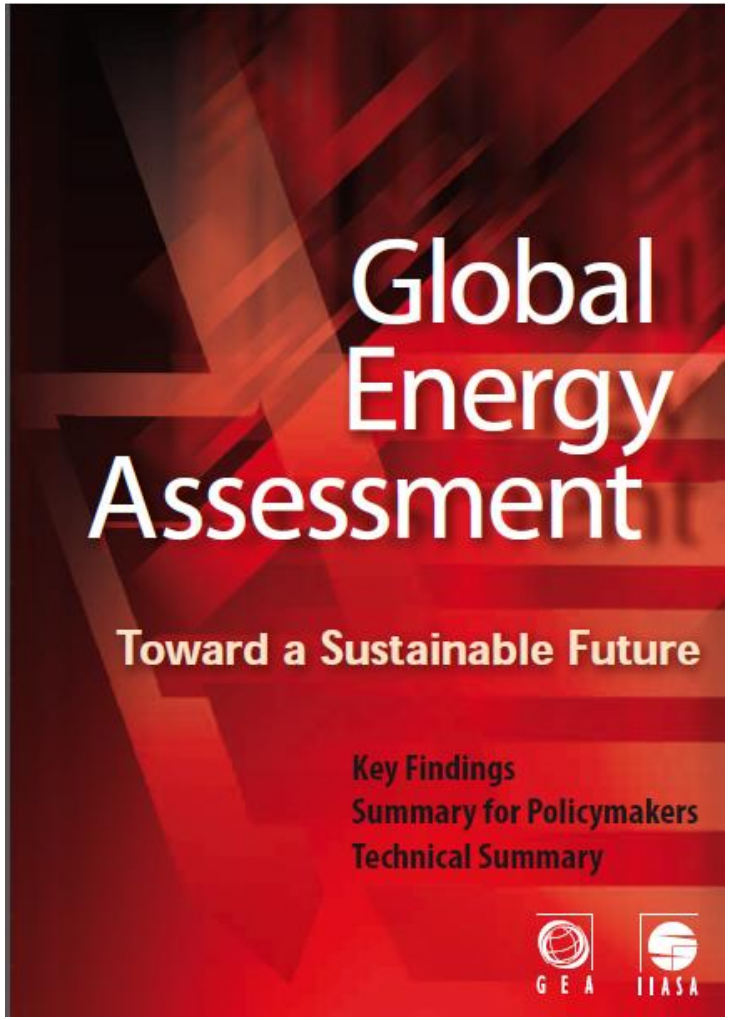
Do you have a success story to tell about activities in your country? Share it with us

GEI Highlights

Steven Stone; Working towards a Green Economy after Rio+20

Green Economy Initiative Highlights

Framing SD Issues- participation in GEA



Identifies four challenges to sustainability posed by high carbon growth:

- "Soaring greenhouse gas emissions
- Decreasing energy security
- Air pollution at regional and local levels…"
- Extreme energy inequity and poverty

Defines four "aspirational goals":

- "Stabilizing global climate change...
- Enhanced energy security by diversification and resilience…
- **Eliminating household and ambient air pollution**
- **Universal access to modern energy services by 2030.**

Toyola Energy Limited

History:

- Established in 2006 by Messrs. *Suraj Wahab* and *Peter Kyei*. It was one of about 30 clean energy enterprises supported under UNEP's African Rural Energy Enterprise (AREED) initiative.

Mission:

- To bring cleaner stoves and other energy products to households in Ghana

The Technology

- Hour-glass-shaped metal body.
- Charcoal is burned in a heat-retaining ceramic liner, with holes to supply air, and let the ash fall down.
- An adjustable door in the metal body controls the air flow and therefore the rate of burning.
- Stove top designed for the round-bottomed pots that are popular in Ghana.

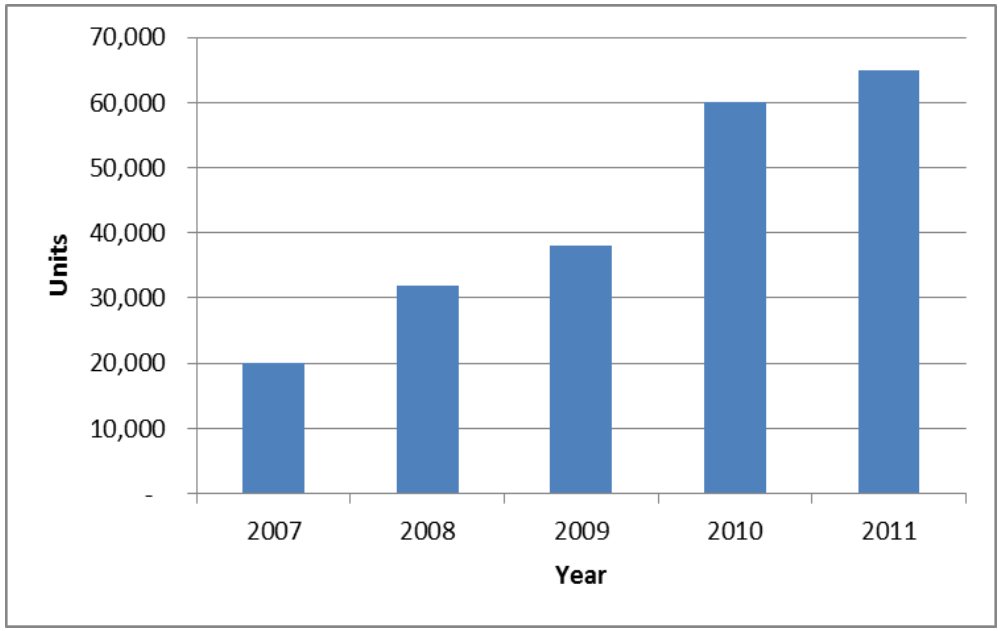
Cost to Users

- Domestic sizes ranging from 270 to 360 mm top diameter = GHC 10 to 12 (US$ 6.60 to US$8.00).
- Commercial sizes - 460 and 510 mm top diameter = GHC 40 and 50 (US$ 26 and US$33).

Award-winning consumer financing

About 30% of credit customers use a '**Toyola money box**' to reserve their savings on charcoal. They use this money to make their credit payments.

Sales and Benefits: 2007 - 2011



As at end 2011:

- 143,000 stoves in use
- 940,000 people served
- 26,000 tons charcoal saved/year for stoves in use.
- 150,000 tons C02e saved/year for stoves in use.

- *Toyola stoves are registered for Gold Standard carbon finance (from Goldman Sachs).*
- *There is regular monitoring of stoves in use, surveys of users, and audits of greenhouse gas savings.*

Sustainability of innovations

Two questions about Toyola Energy's success story:

- Is the improved cook stove, as a technological innovation, sustainable?
- Is the AREED approach, as an innovative model for deploying innovative technologies for energy access, sustainable?

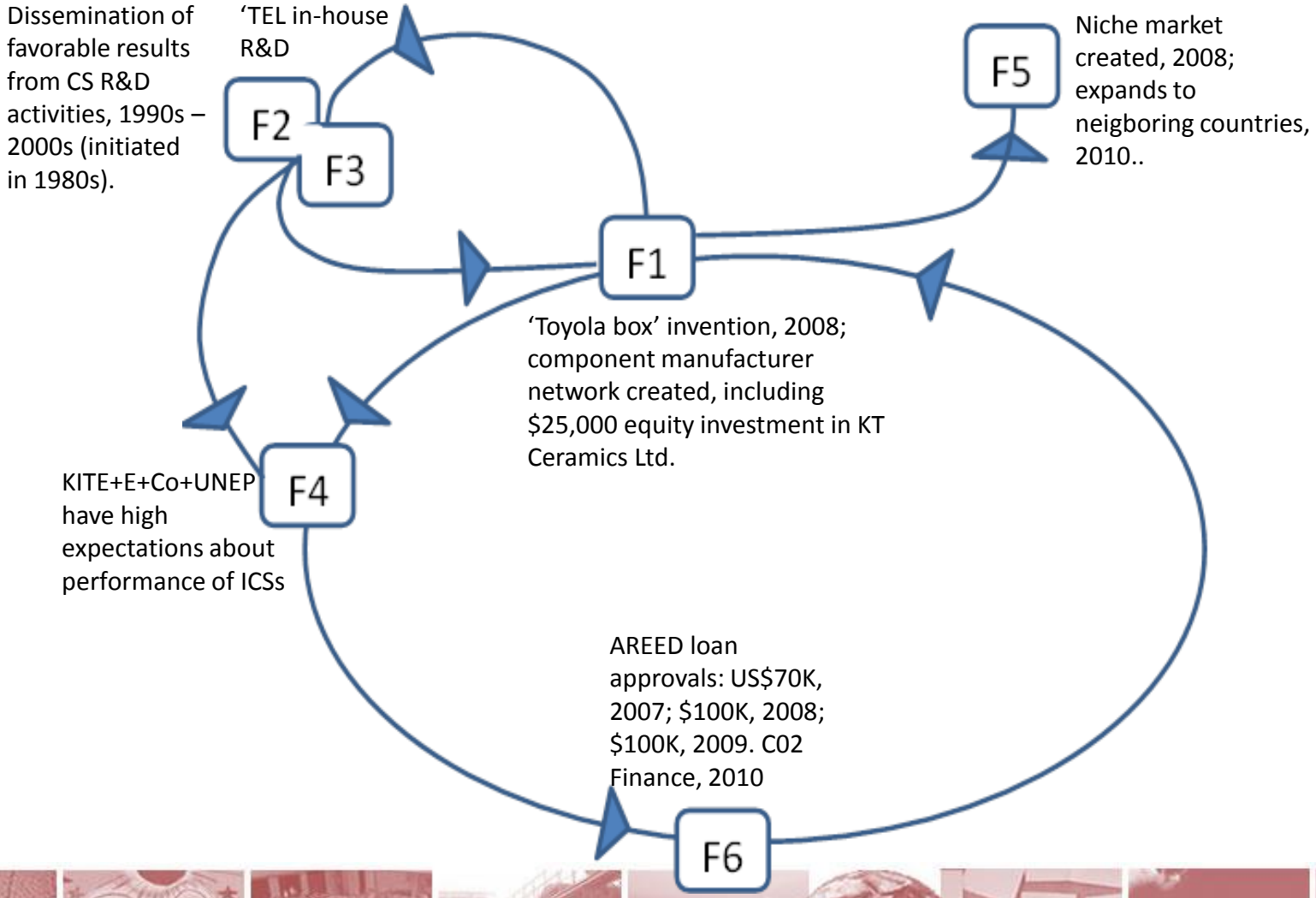
First, some basic definitions

- **Invention**: “the discovery or creation of a new material…a new process, a new use for an existing material…”
- **Innovation**: Bringing an existing invention to a broader audience, often entailing a learning process on the part of the ‘innovator.’
- **Technological innovation system**: “..a dynamic network of actors and institutions that interact and contribute to the development of a novel technology.”
- **Cumulative causation**: Multiple changes within a system, set in motion by some initial event or process, propelling the system not only in the same direction as the initial change but much further (positive feedback loops).
- **TIS functions**: A set of interacting events that are involved in the build up (or ‘pull-down’) of the TIS.

Seven Dynamic TIS Functions

Function (dynamic)	Definition: *Indicator*
F1. Entrepreneurial activities	Recognition and exploitation of business opportunities by risk taking individuals: *implementations of commercially oriented projects, demonstrations, etc.*
F2. Knowledge development	Technology R&D activities: *Studies, laboratory trials, pilots*
F3. Knowledge diffusion	Information exchanges through meetings, networking: *Conferences, workshops, joint ventures*
F4. Guidance of search	Policy targets, outcomes of studies, expectations: *policy targets, standards*
F5. Market formation	Decisions + actions that facilitate creation of niche markets within which new technologies can grow: *market regulations, tax exemptions*
F6. Resource mobilization	Financial, material and human factors made available via venture capitalists, government programmes, etc. *subsidies, investments, infrastructure development*
F7. Support from advocacy coalitions	Political lobbies, social pressures that support the new technology and/or counteract the inertia of established technological regimes. *Active lobby groups, advisory services*

‘Motor of innovation’ in CS technology, Ghana



The sustainability questions – a second look

Question	"Yes, but…"
Is the improved cook stove, as a technological innovation, sustainable?	The risk of failure remains unacceptably high to the following blocking mechanisms: • Operational challenges posed by low accessibility to rural markets and unreliable electricity at ICS component fabrication workshops [-F6] • Absence/weakness of support from domestic advocacy coalitions [–F7]. • Continued absence of strong policy incentives [-F4]
Is the AREED approach, as an innovative model for promoting technology innovations for energy access, scalable?	"Yes, if…" • REED supported enterprises continue to expand • National governments and donors recognize the model as a serious option for energy access expansion. • Capacity and expertise of local enterprise developers improves. • National/regional financial institutions buy-in

Key messages

- The key to entrepreneurial success during the formative stages of any TIS is active learning – learning by exploring and learning by doing.
- In order to enhance success of innovations in energy access, policy instruments should focus on removing barriers to positive reinforcements building up the overall capacity of the system.
- The innovation systems approach offers a powerful tool for deeper understanding of the life-cycle of innovations to inform more effective technology policies and planning in Africa.

Thank You!

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