

Energy Transitions, Innovation and Development: Global Imperatives and African Realities

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MAKING ENERGY TRANSITIONS

The Problem

We have yet to begin the process of making a transition to clean and sustainable energy and transport systems--- anywhere in the world.

Policies have been initiated and then abandoned as oil prices rose and fell and new technologies provided a lease on life for fossil fuels whose consumption continues to grow.

Understanding Transitions

- Transitions are more than simple changes in machinery and equipment.
- They are long-term, socially embedded processes that involve changes along many dimensions.
- These include changes in production and consumption patterns, in knowledge, skills and organizational forms, and – most importantly- changes in the established habits, practices and norms of the actors involved –the enterprises, governments at all levels, consumers, research organizations and many others whose participation in the transition process make it happen.

MOVING FORWARD

IN THE GLOBAL ENERGY ASSESSMENT (2012) we began the process of analyzing the many different pathways that could lead us towards an energy transition and

In Chapter 25 , we explored how, developing countries, could link this process to innovation and to sustainable and inclusive development?

All too often, however, we found that these objectives were considered as 'either' / 'or' options. As I will illustrate here, this need not be the case.

WHAT IS NEEDED

Energy transition, innovation, Sustainable and Inclusive Development can be complementary.

Making this happen will require

- New Thinking
- New Tools and
- New Capacities

for making choices about change.

NEW THINKING

Linkages
and
Multi-Goal Perspectives

Creating New Linkages

One of the most important links between clean and sustainable energy and transport systems and inclusive development is their link to agriculture.

From this perspective, agriculture becomes less part of the problem, as the earlier development literature would have us believe, and more a part of today's solution.

RETHINKING BIOFUELS FROM A Multi-goal perspective

Biofuels have alternatively been praised as a means to provide energy access and reduce greenhouse gas emissions, and criticized as contributing to the destruction of tropical forests & competing with food crops for the use of agricultural land.

The production of biofuels CAN move us towards a transition to clean and sustainable energy, & sustainable and inclusive growth and the case of Garalo shows us one way how.

Jatropha for Local Development

Jatropha has been praised as a feedstock for biofuels and a good substitute for petroleum-based diesel and kerosene because it can grow on marginal land and in arid environments unsuitable for food crops (UNEP,2009). It is also a good candidate for small holder production and for local inclusive development projects based on a multi-goal approach. Garalo, Mali is a successful example of such a trajectory.

In early 2007, rather than rely on imported diesel for a future off-grid generator, villagers from the commune of Garalo chose to plant jatropha on 440 hectares of their land , of which two were for a nursery.

A Multi-Goal Approach

Jatropha was part of multi-goal project designed to provide electricity for lighting, refrigeration, the use of welding equipment and agricultural processing machinery by businesses and workshops. It was also designed to reduce the cost of the village water pumping systems by replacing the diesel genset then in use with electricity from the local mini-grid to be build - which has now over 250 paying clients.

Much of the success of this project lies with the farmers who played an important role in the decision to plant jatropha and in the design of the project. They chose to intercrop Jatropha and local food crops such as maize, sorghum and beans – thus dealing with the assumed need to choose between food and fuel. They have also sustained close links to research to two local research Institutes which has led to considerable follow-up experimentation and local learning as well as improved methods of intercropping.

The Limits to Jatropha

The problem with using jatropha oil for fuel arises when it is reconceptualized as an export commodity. Upscaling the smallholder model for large-scale production of biodiesel fuel for the domestic market, and even more so for export, requires considerable rethinking.

First, the assumption that jatropha is a low cost, low-input crop that grows virtually by itself is problematic in this context. Research in India shows that the price of jatropha depends on increasing the yields, which in turn requires improved seeds, water and fertilizing. (Altenburg et.al.2008). Failure to reach anticipated yield levels has led to the abandonment of a number of joint ventures in India (Dogbevi,2009a:2006).

Second, movement towards mass market and export activities requires a quite different management and often ownership, model that increases uncertainties associated with global pricing trends and limits the role Jatropha can play as a driver of local development.

New Tools

Metrics for Transitions

Making Choices About Energy Transitions

Path dependence is the tendency for past practices and decisions to shape present choices. It is reflected in a range of beliefs and boundaries that shape choices about new technologies such as

- engineering beliefs about what is feasible or at least worth attempting
- boundaries that shape processes or choices such as lines of research to pursue, kinds of products to produce, and
- organizational routines and development trajectories.

Path-dependence also emerges in contexts where earlier investments result in high sunk costs and lead to entrenched habits and practices that are difficult to change . Path-dependence, it has been argued, is responsible for the slow adoption of smart grids in, among other, the UK (Global Energy Assessment,2012,p.1759).

The Challenges of Path Dependence for Energy Transitions

Traditional norms and practices are not always the best guides to what needs to be done in a period of transition.

In the Tata Mundra case that follows, path dependence took two forms.

- Traditional norms that were opposed to the use to the use of subsidies.
- Economic practices that made choices based on metrics that are focused on the short term and the bottom line.

The Tata Mundra project

- In 2008, the World Bank's International Finance Corporation approved a US\$450 million loan for the Tata Mundra project, designed to build five coal-fired power plants in the Indian state of Gujarat.
- The first of the Tata Mundra power plants was commissioned last year. It is expected to emit 40% less CO₂ than existing coal-fired power plants in India, but given the lifespan of these new plants, it will contribute "23.4 million tons of CO₂ per year" to the environment for the next 25–30 years (IFC, 2009).

Path Dependent Decision-Making

- Rashad Kaldany, then, IFC vice-president, justified this decision on the grounds that, in comparison with alternatives, such as wind or solar, which would require subsidies, this was by far the least expensive (Wroughton,2008).
- Basing the choice on traditional norms that opposed subsidies as the point of departure, thus had the effect of eliminating many new or renewable energies from serious consideration, although India had an already developed wind and solar industry.

NEW TOOLS FOR NEW TIMES

Traditional economic practices based on short-term static cost comparisons, then precluded taking into account longer term considerations, such as the future costs of retrofitting a plant with carbon capture and sequestration (CCS) technology, or the imposition of a carbon tax on coal-fired power plants, that might have altered the choice matrix.

From a development perspective, locating the new coal-fired plants on the coast and importing coal , when India has considerable reserves of coal, has led recently to electricity shortfalls associated with the rising costs of imported coal and inefficient distribution practices.

A Repeat Performance: South Africa

➤ In 2010 the World Bank approved yet another loan for the construction of a coal-fired power plant - this time in South Africa. Once fully operational in 2015, the Medupi power station will emit 26 million tonnes of CO₂ per year (Duffy, 2010: 11). South Africa's Sasol is one of the world's major developers of Fischer-Tropsch based Syngas and Coal-to-Liquids processes.

➤ **As in India, path dependent decision-making in South Africa reduces opportunities for local innovation & the stimulus to move towards an energy transition.**

NEW CAPACITIES

Research

Dialogues

Making Energy Transitions

Until recently developing countries were regarded as “Technology Users”, reliant on imports of technology from abroad, as opposed to being “Technology Producers” and “innovators” in their own right.

Making energy transition, as we saw earlier, is not only about new technologies, their acquisition and use, but about local knowledge and linkages of various sorts. In the time remaining, I would like to briefly talk about just one of these new ‘capacities for energy transitions’ –the capacity for dialogue and the consensus building that can make transitions happen.

Dialogues

- Until recently, dialogues did not feature centrally in policymaking or project planning. Although they relate to the broader set of habits, practices and norms that affect the transition process, they were not well established practices.
- Instead, the common approach involved a top-down linear process in which the flows of knowledge and information were driven by governments , research or, business. These were of two sort:
- **communication** – the transfer of information through the distribution of material, awareness- raising campaigns and formal training programs, and

Communication, Consultation and Dialogues

- **consultation**– which through focus groups and stakeholder meetings give the impression of being dialogues but in fact, they have pre-established boundaries that provide little opportunity for those consulted to express interests, needs or preferences not already on the agenda.
- In contrast, **interactive dialogue processes** offer room for the articulation of a broad range of views, interests, preferences and needs that are essential for consensus building.

The multiple use of Dialogues in Change Processes

- In the Global Energy Assessment, case studies of the diffusion of solar home services systems and mini-hydro systems in Asia and Africa and the implementation of on-shore wind power in Europe illustrate that dialogues play an important role in developing and institutionalizing processes of working together and joint problem solving.
- While dialogues do not solve problems, they do open channels for innovative ways to deal with them. By recognizing the legitimacy of local concerns, interests, and needs, they strengthen confidence building measures that are supportive of the change process.

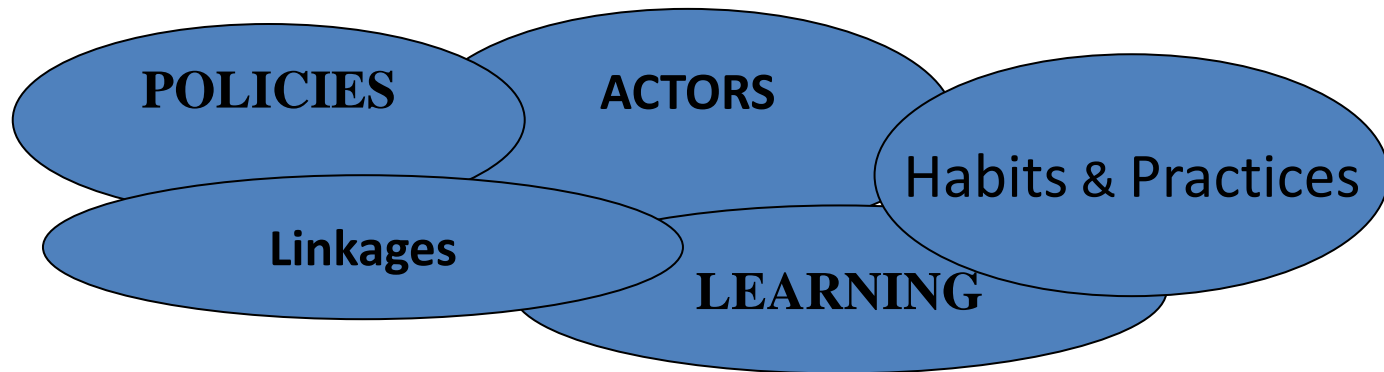
THANK YOU

From Traditional Practices to Dialogues for Transitions

- In contrast to dialogues, traditional top down consultative practices, are focused on the transmission of information and not on the search for ways to overcome the resistance of actors to the process of change.
- For business, government, consumers and other actors in the transition to clean and sustainable energy and transport systems change is seen as both an expensive process that involves investment in new machinery and equipment and a 'costly' process because of the need to change existing habits and practices – for example, learning to co-operate and exchange knowledge, building the capabilities to absorb new technology or generate systematic improvements in productivity and efficiency by changing management and organizational practices.

MAKING THE TRANSITION TO A DYNAMIC INNOVATIVE ECONOMY

Policies, Processes & Practices



Designing Policies

From an Innovation System Perspective
Understanding the habits and practices
of actors in the system is critical.

Designing policies through Participatory
practices – the role of dialogues

Policy Learning Matters: Build flexibility into
programs and a continuous process of
feedback along the way

DESIGNING POLICIES FOR THE TRANSITION TO A DYNAMIC INNOVATIVE ECONOMY

- Adopt a longer term, multi-goal, systems perspective in the development of industrial, science, technology, foreign investment and innovation policy making
- Build learning and innovation strategies into policies from the outset
- Target processes that affect the innovative behaviour of actors on both the supply and demand sides and create a dialogue between the two.

- Focus on reducing uncertainty, information asymmetry and risk for SMEs
- Strengthen knowledge and innovation flows through dialogue, continuous participatory monitoring and evaluation
- Build into such projects the complementary policies needed to strengthen opportunities for inclusion.