Advancing Green Economy through Technology Transfer
Experiences from Malawi

Deepa Pullanikkatil, Leadership for Environment and Development Southern and Eastern Africa, Malawi; Stanley Mubako, University of Texas at El Paso, USA; and Misheck M. Munthali, Domasi College of Education, Malawi

Abstract

The transfer of green technologies to developing countries is often touted as a key green economy measure for alleviating poverty and improving welfare. This qualitative study explores the transfer of renewable energy technologies in Malawi with a view to (i) evaluating how green economy principles have been integrated in technology transfer projects, and (ii) highlighting how successfully implemented pilot and innovative solar energy kiosks and solar fish dryers can serve as case studies on enhancing environmental education efforts. Based on experiences from the projects, a literature review, site visits and key-informant interviews were conducted. A qualitative evaluation was performed based on intuitive judgment and a general framework of internationally agreed-upon green economy principles. The results show that the technology transfer projects integrated a substantial number of green economy principles, and that embracing local traditional knowledge in implementing modern green economy technologies in the context of helping local communities to alleviate poverty are key factors in encouraging innovation in environmental education, and improving project acceptability among local communities. We recommend increased knowledge-sharing to popularise the integration of green economy measures into poverty alleviation projects. This can be accomplished through both technical and educational study visits to the technology transfer projects, documenting practical, locally generated sustainable ideas, and disseminating information on successes and lessons learnt.

Introduction

The Rio+20 summit meeting outcome document *The Future We Want*, highlights poverty reduction as being central to the attainment of a socially, environmentally and economically sound world, supported by green economy policies (UN, 2012). Although constrained by several factors, among them the lack of appropriate human resource skills and inadequate financial resources (Hamdouch & Depret, 2012), transferring green economy technologies to developing countries is often touted as a key measure for alleviating poverty. In their 2009 study, Mog *et al.*, suggest that the transfer requires (i) adequate investments in enhancing user capacity; (ii) appropriate justification; (iii) institutions' engagement for maintenance and adoption; and (iv) emphasising the impartation of knowledge regarding correct usage of the technology.

What is the green economy?

Derived from the field of environmental economics, the 'green economy' concept was conceived 25 years ago in the widely quoted blueprint for a green economy report by Pearce, Markandya and Barbier (1989). The concept is now widely perceived as a potential mechanism for attaining sustainable development goals (Guo & Marinova, 2014), a solution to global economic and environmental crises (Ferguson, 2014), and the quoin of modern-day development policies (Newton & Cantarello, 2014). Certain schools of thought, however, contend that the term 'green economy' is still an emerging concept that has yet to get a consistent definition (Jeffrey *et al.*, 2014; Lorek & Spangenberg, 2014; Shear, 2014). Beyond this debate, the United Nations Environment Programme's widely used definition states that a green economy is,'one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities' (UNEP, 2013). Diverse lists of green economy principles emerged from a multiplicity of stakeholder contributions towards the Rio+20 summit (for example, 15 principles in Stoddart, Riddlestone & Vilela, 2012), but in this study we focus on nine broad principles in the UNEP (2013) outcome report that is widely considered a synthesis of the various stakeholder contributions from the summit. A summarised version of the nine internationally agreed-upon green economy principles is presented in Table 1.

There are divergent opinions on whether the green economy is a panacea for the challenges humanity is facing as a result of climate change and environmental and natural resource vulnerabilities. On the one hand, broad international consensus views the green economy as a route to poverty reduction and sustainable development (UNEP, 2011; Acey & Culhane, 2013; Burkolter & Perch 2014; Faccer, Nahman & Audouin, 2014; Musango, Brent & Bassi, 2014), and multilateral institutions such as UNEP and the International Labour Organisation (ILO) have been credited with the recent universalisation of the concept (Faccer *et al.*, 2014). On the other hand, critics contend that: (i) the concept is nothing new but just a re-emerging issue in the policy debate that does not account for political, economic and cultural constraints in trying to meet environmental and poverty reduction goals; (ii) the valuation of ecosystem services in monetary terms will result in the control and privatisation of natural resources by a few powerful players with financial capital, who will also unduly influence governments to the detriment of the rest of society's poor and vulnerable groups (IPACC *et al.*, 2011; Brand, 2012; Cock, 2014; Lorek & Spangenberg, 2014). The focus of this paper is not to wade into this debate; instead, we argue that based on the broad level of international consensus, green economy principles provide: (i) a useful and practical framework for integrating sustainability processes into technology transfer projects; and (ii) a comprehensive tool for evaluating whether or not implemented developmental projects have adopted green economy practices that can also serve as case studies to improve environmental education and awareness, and promote the implementation of innovative practices.

Table 1. The nine principles of green economy framework for evaluating technology transfer projects

Principle		Criteria for qualitative evaluation
1.	The Sustainable Principle	Economy is a means to deliver sustainability. It addresses all three dimensions (environmental, social and economic) and develops policy mixes that integrate and seek the best results across all of them.
2.	The Justice Principle	Economy supports equity between and within countries and between generations. It respects human rights and cultural diversity, promotes gender equality and recognises the knowledge, skills, experience and contribution of each individual.
3.	The Dignity Principle	Economy creates genuine prosperity and well-being for all, empowers people and alleviates poverty. It delivers a high level of human development in all countries and provides food security and universal access to basic health, education, sanitation, water, energy and other essential services.
4.	Healthy Planet Principle	Economy restores lost biodiversity, invests in natural systems and rehabilitates those that are degraded. It ensures an efficient and wise use of natural resources, including water, natural gas, oil and mineral resources, without compromising future generations' prospects.
5.	The Inclusion Principle	Economy is inclusive and participatory in decision-making. It is based on transparency, sound science and the visible engagement of all relevant stakeholders. It supports good governance, empowers citizens and promotes full and effective voluntary participation at all levels.
6.	The Good Governance and Accountability Principle	Economy is accountable and provides a framework to structure markets and production in consultation with all stakeholders. It achieves transparency and promotes international co-operation and defines international liability.
7.	The Resilience Principle	Economy contributes to economic, social and environmental resilience and supports the development of social and environmental protection systems, and preparedness against and adaptation for climate extreme events and disasters. It builds on local skills and capacities and develops these further.
8.	The Efficiency and Sufficiency Principle	Economy delivers sustainable consumption and production and seeks to ensure prices reflect true costs incorporating social and environmental externalities. It implements the polluter pays principle. It prioritises renewable energy and renewable resources.
9.	The Generations Principle	Economy invests for the present and the future and delivers inter-generational and intra-generational fairness. It prioritises long-term, scientifically sound decision-making above the short-term and promotes equitable education at all levels and sustainability education for children.

Source: Modified from UNEP (2013).

A Green Economy in Malawi

Achieving a green economy not only requires innovative solutions, but also the knowledge and wisdom of local people, backed by scientific understanding and technological foundations (Hosono, 2013). Similar to most southern African countries experiencing high levels of

poverty, Malawi faces an uphill battle to achieve green economy policy goals for improving the livelihoods of its poor and vulnerable population groups. Major constraints in achieving green economies include (Faccer *et al.*, 2014):

- Economic development relying heavily on natural resource extraction industries such as agriculture and mining that are destructive to the environment;
- High dependence on fossil-fuel-based energy sources such as coal for electricity, coupled with inadequate investment in renewables and other alternatives;
- Lack of appropriate skills and adequate policies to develop and commercialise green technologies;
- Loss of green economy related skilled labour to other world regions, leading to a reduction in the export of green market goods, and an overreliance on technology transfer;
- Overreliance on labour-intensive primary industries such as agriculture, making alternative green development routes risky and infeasible.

Despite these region-wide constraints, the green economy concept promises transformation to more environmentally friendly production methods and consumption patterns for the Malawian economy through green jobs, green industries, green production processes, safe and healthy workplaces, decent jobs for all, social inclusion and social development (Chiotha *et al.*, 2014). Thus, a green economy would remedy challenges arising from the prevailing economic model in Malawi, especially in the energy sector (Government of Malawi, 2014).

Overview of Malwi's energy sector

The energy mix for Malawi consists of biomass, petroleum, hydroelectricity, coal and renewables (Table 2). Biomass is clearly the most prominent source of energy (Table 3). Like most countries in sub-Saharan Africa, biomass is widely perceived as a retrogressive source of energy that degrades the environment and engenders poverty (Owen, Der Plas & Sepp, 2013).

Table 2. Total national energy demand by sector and fuel

Sector	Energy demand by fuel type (TJ/yr)					
	Biomass	**Petroleum**	**Electricity**	**Coal**	**Total**	**%**
Household	127 394	672	1 798	5	129 869	83.4%
Industry	9 664	3 130	2 010	3 481	18 285	11.7%
Transport	270	5 640	35	15	5 960	3.8%
Service	452	558	477	174	1 661	1.1%
Total	137 780	10 000	4 320	3 675	155 775	100%
	88.5%	6.4%	2.8%	2.4%		

Source: Malawi BEST (2009).

Table 3. Energy mix trends for Malawi, 2000–2050

Energy source	2000 (actual)	2010 (actual)	2020	2050
Biomass	93.0	80	50.0	30.0
Coal	1.0	4.0	6.0	6.0
Electricity	2.3	8.0	30.0	40.0
Liquid fuels	3.5	5.5	7.0	10.0
Nuclear	0.0	0.0	0.0	4.0
Renewable	0.2	2.5	7.0	10.0
Total (%)	100.0	100.0	100.0	100.0

Source: Gamula *et al.* (2013).

Sources of renewable energy in Malawi include solar, wind, solar-wind hybrids, natural gas and biogas (Kambewa & Chiwaula, 2010). Renewables made an actual contribution of only 0.2% to the total energy mix in 2000 (Table 3) but in 2010 the actual contribution had increased to 2.5 % (Gamula, Hui & Peng, 2013). Most people cannot afford renewable-energy-based facilities such as stand-alone solar home systems. The study by Zalengera *et al.* (2014) outlines additional major challenges affecting Malawi's energy supply industry, including shortage of trained human resources, increasing energy-demand, poor governance, weak legislation and a weak regulatory framework. The next section provides an overview of recent, successfully implemented technology transfer case studies.

Technology Transfer Case Study: The Solar Energy Kiosks Project

Rational use of appropriate technologies is a major prerequisite for attaining sustainable energy development (Mandelli *et al.*, 2014). Technology transfer, or its movement from its creator to end-user, often requires governments to be intricately involved in creating an enabling environment (Pisani, Erasmus & Hartzenberg, 2012). Technological transfer can reduce costs and increase competitiveness, and can occur through best practices, knowledge sharing, educational and technical exchanges, and promulgating norms and standards (JICA, UNOSSC &UNEP, 2013). It is not only a crucial mechanism for maximising sustainable development benefits (OECD, 2014), but also assists in mitigating impacts resulting from loss and damage due to climate change (Appleton *et al.*, 2014). In this section, we briefly present technology transfer projects involving (i) solar energy kiosks implemented from 2012 to 2013 by a consortium of partners funded by the Scottish government; and (ii) solar fish dryers in the Thyolo and Phalombe districts of Malawi implemented by a partnership funded by the Norwegian government.

The solar energy kiosks project was piloted to demonstrate an innovative and off-grid community electrification solution where batteries charged from the solar panels would be rented out to communities (RENAMA, 2012). Initially, 150 households in each community were able to rent out and charge a variety of appliances, including low-power televisions, mobile phones, light bulbs, radios and laptop charging kits. The rental and re-charging stations

were managed and staffed by the community. Some community members generated income from this by using batteries to charge cell phones in public market places for a fee.

Millions of people in Malawi are directly or indirectly dependent on fishing for a livelihood (Kafumbata, Jamu & Chiotha, 2014). Preserving fish involves drying and smoking, and traditional drying is done outdoors with nets spread between poles. This exposes fish to contamination by dust and flies, and the drying process is often incomplete in bad weather.

Solar fish dryers were constructed under the Lake Chilwa Basin Climate Change Adaptation Programme, implemented by a consortium of partners over four years from 2010. Demonstration solar fish dryers were constructed at Kachulu and Swangoma landing beaches by the World Fish Center, in collaboration with beach village committees.

Beneficiaries included self-formed women's groups, who were specially trained to use the solar fish dryers, as well as in the hygienic handling of food products, quality control, grading, brining and packaging of processed fish according to the Malawi Bureau of Standards. Packaging was done in 100g packets, enabling the women's groups to supply fish to supermarkets that brought in better returns. Eventually, the women's groups were linked to mobile banking services where they could conveniently save their income.

This paper draws on the experiences on the solar energy kiosks projects discussed above. The specific objectives of this study are (i) to evaluate how green economy principles have been included in technology transfer of solar energy kiosks and solar fish dryers in Malawi; and (ii) to highlight how successfully implemented, innovative, efficient and environmentally friendly solar energy kiosks and solar fish dryers can serve as case studies on enhancing environmental education efforts. Such an assessment is crucial for making recommendations on strengthening green economy policies that can potentially alleviate poverty through enhancing the welfare of poor and vulnerable populations in Malawi. This case study is particularly important because:

- Most donor funded projects in Malawi target villages where communities are mostly illiterate, and there is a need to document green economy initiatives implemented in such communities for environmental education purposes;
- Innovative entrepreneurship ideas that need to be captured can come out of these rural communities through technology transfer initiatives; and
- These technology transfer stories need to be told in order to promote further targeted assistance by replicating successful green economy projects in locations where benefits to intended recipients can be maximised.

The methodology involved a combination of a literature review, site observations and key-informant interviews with stakeholders selected to represent different interest groups in the technology transfer projects. Interviews were guided by questions meant to intuitively capture elements of the green economy principles. Interactions with different stakeholder interest groups included: (i) interviews with officers from implementing agencies for the technology transfer projects (RENAMA, Project Concern and LEAD for the solar energy kiosks, and World Fish Center and LEAD for the solar fish dryers project); (ii) open-ended in-depth interviews with five community members who were beneficiaries of the solar energy kiosks

project; and (iii) focus group discussions with 20 members of women's fish processing groups who were part of the solar fish dryers project. A total of three site visits were carried out – one during the implementation phase, and two after project completion.

Analysis of technology transfer projects and renewable energy in Malawi

International consensus is that the implementation of green economy measures covered by the nine principles (Table 1) will result in a better quality of life for all within the ecological limits of the planet (UNEP, 2013). This general framework of green economy principles and their characteristics was applied in the intuitive evaluation of the implemented technology transfer projects. Questions addressed during in-depth interviews and participant observations conducted during site visits were the basis for an intuitive judgment process that teased out the extent to which different aspects of the principles were captured by the technology transfer projects. The use of intuitive judgment in qualitative research is not new, and has been widely published across various disciplines, especially in attribution theory (see for example, Magnusson, Netz and Wästland, 2014; Miles & Sadler-Smith, 2014; Schmidt, 2014).

Results and Discussion

The results from our intuitive evaluation on the integration of the green economy principles in the technology transfer case study projects are presented in Table 4. A positive evaluation was given for each green economy principle where at least one criterion was considered to have been met. According to these findings, some elements of the green economy principles' evaluation criteria (see Table 1) covering seven out of the nine principles were addressed in implementing the solar energy kiosks project. The two exceptions were Principle 3: the Dignity Principle, and Principle 7: the Resilience Principle. The solar fish dryers project, however, appeared to have satisfied at least some criteria covering each of the nine principles for a green economy, although not in an exhaustive manner.

The solar energy kiosks project addressed elements of Principle 1: the Sustainable Principle, in line with green economy principles because the implemented technology is based on solar – a renewable and sustainable form of energy. Evidence gathered from our site visits also revealed that operational costs such as salaries for the kiosk manager and guards, as well as a maintenance and extension fund were being sustained by income from the solar energy kiosks. In targeting the remote Dzenje area in Phalombe District that previously had no access to any form of electricity supply and had very limited livelihood options for its low-income population, the project captured some elements of 'equity' and 'justice' that are associated with the Justice Principle (Principle 2).

The Inclusion Principle (Principle 5) was considered fully integrated in relation to this technology transfer project. The findings showed that the kiosks had adopted an inclusive approach with regard to who benefits from them, and communities had developed their own constitution covering various issues that include long-term legal status for memorandums of understanding with building owners and other service providers. In line with this principle, we also observed that women were very active users of the kiosks. An advisory board consisting

of members from the consortium of project facilitators, local government and local traditional leaders was formed to guide and support the development of a long-term strategy. This is in line with the Good Governance and Accountability Principle (Principle 6).

Table 4. Evaluation results for technology transfer projects

Solar energy kiosks project		
Principle	**Addressed**	**Not addressed**
Principle 1	X	
Principle 2	X	
Principle 3		X
Principle 4	X	
Principle 5	X	
Principle 6	X	
Principle 7		X
Principle 8	X	
Principle 9	X	
Solar fish dryers project		
Principle	**Addressed**	**Not addressed**
Principle 1	X	
Principle 2	X	
Principle 3	X	
Principle 4	X	
Principle 5	X	
Principle 6	X	
Principle 7	X	
Principle 8	X	
Principle 9	X	

Principle 4 (Healthy Planet) and Principle 8 (Efficiency and Sufficiency) both allude to the need for innovation as a way of achieving the goals of a green economy. Innovative actions were encouraged and promoted through an inventors' competition where participating local primary school children and communities proposed 'green' solutions, including using windmills and waste from pit latrines to generate electricity. Participants in the innovation competition were recognised at a public event attended by officers from the District Council and local traditional leaders that included the chief of the area. The Generations Principle (Principle 9) was also engrained in this innovation competition that saw the participation of primary school age children. The involvement of school children is a crucial step towards building a future skills base for ensuring intergenerational sustainability of the pilot projects, and a positive step towards incorporating environmental education into the school curriculum.

The solar fish dryers project not only presented a more sustainable method of processing fish that reduced post-harvest losses through efficient drying, but also targeted vulnerable groups such as women and raised income levels of the local project beneficiaries. Thus, it provided social, economic and environmental benefits that are enshrined under the Sustainable Principle (Principle 1). The project was also seen to embrace gender equality by benefiting women's groups, in line with the Justice Principle (Principle 2). By promoting the self-empowerment of women through training and linking them to more lucrative fish markets, and creating genuine prosperity and well-being for the local beneficiaries, the project contributed to poverty alleviation and improved the dignity of poor and vulnerable groups in Malawi (elements captured under Principle 3). Most importantly, the training sessions on new, efficient and environmentally friendly fish drying technology contributed towards environmental education and awareness among different stakeholder groups.

The introduction of a more efficient alternative method to open drying contributes towards better ecosystem health by minimising post-harvest losses (Principle 4: Healthy Planet), in comparison to those experienced under traditional open drying. Under the open drying technique, pollution of the local environment was very apparent through the dumping of foul-smelling rotten fish in water or on land. Participatory approaches and the adoption of local knowledge were an integral part of this project from conception to commissioning, and the engagement and voluntary participation of relevant stakeholders at all levels was instrumental in ensuring successful project implementation (the Inclusion Principle). For example, the innovation to alter the design of the solar fish dryers was credited to local communities.

The project contributed to capacity building by improving organisational, administrative and leadership skills among local communities in the Lake Chilwa Basin. Governance of the solar fish dryers was delegated to the self-formed women's groups, in accordance with the Good Governance and Accountability Principle (Principle 6). The improvement of skills through the project will improve climate change adaptation capacity and build the resilience of local communities against the shocks of climate variability and change (the Resilience Principle) in a region where climate change impacts are already being experienced.

In contrast to traditional fish drying techniques, the more efficient solar energy dryers clearly led to a rise in income levels, reflecting the integration of aspects from Principle 8 that focus on efficiency and sufficiency. Finally, we contend that long-term conservation of fish resources for the benefit of future generations could be realised through cumulative reductions of post-harvest losses as project beneficiaries strive to meet fish delivery targets to the market (Principle 9: the Generations Principle).

This study has revealed how technology transfer projects implemented in remote rural communities of Malawi integrated a substantial number of green economy principles, and also contributed to environmental education and awareness through the involvement of school children and stakeholder learning through training sessions. However, the study did have limitations and there is certainly scope for improvement. First, it is acknowledged that our qualitative evaluation against the set criteria is not exhaustive. Each green economy principle has several aspects associated with it as specified in Table 1. While deciding that a certain principle has been addressed, it is not practical for the project to have integrated every principle

in totality. In the long term, we recommend strengthening such a qualitative evaluation with quantitative indicators as well. Second, we acknowledge the possibility that our intuitive judgments could be prone to evaluator biases that can arise from the evaluators' understanding of the study area, the adequacy of collected evidence, the methods of analyses applied and assumptions used, among other factors. Lastly, there is a need to assess end-of-project lifespan sustainability issues and document how access to solar power from these technology transfer case studies actually changed lives over the course of the project, which should be a subject for future study.

Conclusions

This study revealed that the nine green economy principles have been substantially incorporated into the two technology transfer projects, although they are not explicitly referred to as green economy initiatives by the project implementation team. Substantial elements of environmental education are reflected in the study through stakeholder learning experiences, and the involvement of school children in promoting the implementation of new innovative technologies that are more efficient and environmentally friendly. The technology transfer case studies demonstrated that environmental education must be placed within the context of helping local communities to solve existing challenges, and integrating modern technologies with local traditional knowledge in order to improve project adoption and acceptability by local communities. We recommend increased knowledge-sharing as a way of enhancing environmental education and popularising green economy measures in Malawi. This can be accomplished through study and technical visits to these pilot solar kiosks and solar fish dryers, and disseminating successes and lessons learnt. Finally, it is critically important to engage continuously with all levels of stakeholders on these pilot technology transfer projects in order to identify and document practical, innovative and locally generated sustainable ways of integrating green economy principles through poverty alleviation projects.

Acknowledgements

The solar energy kiosks project was implemented by the International Resource & Recycling Institute (in Scotland) and Renew'N'Able Malawi (in Malawi) with funding from the Scottish government. Other partners were Eqnon Consultancy Ltd (Malawi), Concern Universal, Leadership for Environment and Development Southern and Eastern Africa (LEAD SEA), Airtel Malawi Mobile Money, the David Livingstone Centre for Sustainability at the University of Strathclyde (in Scotland) and the Centre for Water, Sanitation and Appropriate Technology Development (WASHTED). The solar fish drying project was implemented by LEAD SEA, the World Fish Center and Forestry Research Institute of Malawi, under the Lake Chilwa Basin Climate Change Adaptation Project, funded by the Norwegian government. The authors would like to thank Dr Anand Babu Prakasam for his contributions to this paper.

Notes on the Contributors

Deepa Pullanikkatil worked as a project manager at Leadership for Environment and Development Southern and Eastern Africa (LEAD SEA) based in Zomba, Malawi, during this study. E-mail: d_pullani@yahoo.com

Stanley Mubako is a research assistant professor at the University of Texas, USA. He has contributed writings to reports such as the *Africa Environment Outlook*, and journals such as the *African Geographical Review* and *Water Resources Research*, among others. E-mail: smubako@hotmail.com

Misheck Munthali is a chief lecturer in Social and Development Studies at Domasi College of Education (Malawi) and also a country director for a school-based civic education department at Domasi College, called Civitas Malawi. E-mail: myagontha@yahoo.co.uk

References

Acey, C.S.E. & Culhane, T.H. (2013). Green jobs, livelihoods and the post-carbon economy in African cities. *Local Environment*, 18(9), 1046–1065.

Appleton, A., Domingos, N., Doran, P., Harris, M., Lebada, A., Leone, F., Louw, K., Movius, D., Offerdahl, K. & Schulz, A. (2014). A summary report of the UN Climate Summit 2014. *Climate Summit Bulletin,* 172(18).

Brand, U. (2012). Green economy – the next oxymoron? No lessons learned from failures of implementing sustainable development. *GAIA-Ecological Perspectives for Science and Society*, 21(1), 28–32.

Burkolter, P. & Perch, L. (2014). Greening growth in the South: Practice, policies and new frontiers. *South African Journal of International Affairs*, 21(2).

Chiotha, S., Pullanikkatil, D., Chipeta, C., Mvula, P., Phalira, W., Mphepo, G. & Mkanthama, C. (2013). *Malawi's progress towards achieving sustainable development goals 20 years since the 1992 Earth Summit in Rio: Stocktaking Report on Rio+20*. Zomba, Malawi: LEAD SEA Publications.

Cock, J. (2014). The 'green economy': A just and sustainable development path or a 'wolf in sheep's clothing'? *Global Labour Journal*, 5(1), 23–44.

Faccer, K., Nahman, A. & Audouin, M. (2014). Interpreting the green economy: Emerging discourses and their considerations for the Global South. *Development Southern Africa*, (ahead-of-print), 1–16.

Ferguson, P. (2014). The green economy agenda: Business as usual or transformational discourse? *Environmental Politics*, (ahead-of-print), 1–21.

Gamula, E.T., Hui, L. & Peng, W. (2013). Development of renewable energy technologies in Malawi. *International Journal of Renewable Energy Technology Research*, 2(2), 44–52.

Government of Malawi. (2014). National Climate Change Policy (Draft). Lilongwe: Environmental Affairs Department.

Guo, X. & Marinova, D. (2014). Environmental protection and sustainability strategies in China: Towards a green economy. In Yao, S. & Herrerias Talamantes, M.J. (Eds), *Energy security and sustainable economic growth in China*. London: Palgrave Macmillan, p.286.

Hamdouch, A. & Depret, M.H. (2012). Sustainable development policies and the geographical landscape of the green economy. *Finisterra*, 47(94), 49–80.

Hosono, A. (2013). Catalyzing an inclusive green economy through South-South and Triangular Cooperation: Lessons learned from three relevant cases. In *Tackling global challenges through triangular cooperation*. Tokyo: Japan International Cooperation Agency (JICA) Research Institute. p.53.

IPACC, Natural Justice, OSISA & UNEP. (2011). *African indigenous peoples and the UNEP Green Economy Initiative: Report on green economy, equity and green governance*. http://www.unep.org/civil-society/Portals/24105/documents/publications/UNEP_GEI.pdf, visited 9 October 2014.

Jeffrey, K., Seaford, C., Abdallah, S., Beça, P., Benson, E., Brouwer, F.M., Cosme, I., Porsch, L., Rizos, V. & Verburg, R.W. (2014). *Report on definitions of the Green Economy and progress towards it: Deliverable 2.1*. Network for Green Economy Indicators (NETGREEN), p.84.

JICA, UNOSSC & UNEP. (2013). *Tackling global challenges through triangular cooperation: Achieving sustainable development and eradicating poverty through the green economy*. Tokyo: JICA Research Institute.

Kafumbata, D., Jamu, D. & Chiotha, S. (2014). Riparian ecosystem resilience and livelihood strategies under test: Lessons from Lake Chilwa in Malawi and other lakes in Africa. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 369(1639), 20130052.

Kambewa, P. & Chiwaula, L. (2010). Biomass energy use in Malawi. A background paper prepared for the International Institute for Environment and Development (IIED). Zomba, Malawi: IIED.

Lorek, S. & Spangenberg, J.H. (2014). Sustainable consumption within a sustainable economy: Beyond green growth and green economies. *Journal of Cleaner Production*, 63, 33–44.

Magnusson, P. R., Netz, J. & Wästlund, E. (2014). Exploring holistic intuitive idea screening in the light of formal criteria. *Technovation*, 34(5), 315–326.

Malawi BEST. (2009). *Malawi biomass energy strategy*. Lilongwe: Government of Malawi.

Mandelli, S., Barbieri, J., Mattarolo, L. & Colombo, E. (2014). Sustainable energy in Africa: A comprehensive data and policies review. *Renewable and Sustainable Energy Reviews*, 37, 656–686.

Miles, A. & Sadler-Smith, E. (2014). 'With recruitment I always feel I need to listen to my gut': The role of intuition in employee selection. *Personnel Review*, 43(4), 606–627.

Mog, J., Kersten, W., Rahaman, M.M., Keskinen, M., Downs, T.J., Wahid, S.M., Martins, R.D.A., Connor, H., Williamson, L.E., Moezzi, M., Houri, A., Kumar, B., Hiremath, R.B., Scholtens, B., Ajayi, Oc, Akinnifesi, Fk., Sileshi, G. & Somorin, O.A. (2009). What would be the three key preconditions for jumpstarting or scaling up the transfer of environmentally sound technologies for climate change to developing countries? *Natural Resources Forum,* 33(4), 334–337.

Musango, J.K., Brent, A.C. & Bassi, A.M. (2014). Modelling the transition towards a green economy in South Africa. *Technological Forecasting and Social Change*, 87, 257–273.

Newton, A. C. & Cantarello, E. (2014). *An introduction to the green economy: Science, systems and sustainability*. New York: Routledge.

Organization for Economic Co-operation and Development (OECD). (2014). *Development Co-operation Report 2014: Mobilising resources for sustainable development*. OECD Publishing. DOI: 10.1787/dcr-2014-en.

Owen, M., der Plas, R.V. & Sepp, S. (2013). Can there be energy policy in Sub-Saharan Africa without biomass? *Energy for Sustainable Development*, 17(2), 146–152.

Pearce, D., Markandya, A. & Barbier, E.B. (1989). *Blueprint for a green economy*. London: Earthscan.

Pisani, A., Erasmus, G. & Hartzenberg, T. (Eds) (2012). *Monitoring regional integration in Southern Africa*: *Yearbook 2012*. Stellenbosch: Tralac.

RENAMA (Renew'N'Able Malawi). (2012). Proposal for off-grid rural electrification using solar energy kiosks in Malawi. Unpublished report, Blantyre.

Shear, B.W. (2014). Making the green economy: Politics, desire, and economic possibility. *Journal of Political Ecology*, 21, 193–209.

Schmidt, C.D. (2014). Questioning intuition through reflective engagement. *Journal of Moral Education*, (ahead-of-print), 1–18.

Stoddart, H., Riddlestone, S. & Vilela, M. (2012). Principles for the Green Economy: A collection of principles for the green economy in the context of sustainable development and poverty eradication. http://www.stakeholderforum.org/fileadmin/files/Principles%20FINAL%20LAYOUT.pdf, visited 8 November 2014.

UN (United Nations). (2012). *The future we want: Declaration of the Rio + 20 – United Nations Conference on Sustainable Development*. Rio de Janeiro: UN.

UNEP (United Nations Environment Programme). (2013). What is the Green Economy? http://www.unep.org/greeneconomy/AboutGEI/WhatisGEI/tabid/29784/Default.aspx, visited 8 October 2013.

UNEP. (2011). *Towards a green economy: Pathways to sustainable development and poverty eradication*. Nairobi: UNEP.

Zalengera, C., Blanchard, R.E., Eames, P.C., Juma, A.M., Chitawo, M.L. & Gondwe, K.T. (2014). Overview of the Malawi energy situation and a PESTLE analysis for sustainable development of renewable energy. *Renewable and Sustainable Energy Reviews*, 38, 335–347.