Ivan Nygaard - DTU Orbit (18/11/2018)

Ivan Nygaard

Organisations

Chief Scientific Advisor, Department of Management Engineering
15/12/2011 → present
ivny@dtu.dk
VIP

UNEP DTU Partnership
18/12/2014 → present
VIP

Senior Researcher, Risø National Laboratory for Sustainable Energy
11/01/2007 → 07/04/2016 Former
ivny@risoe.dtu.dk
VIP

UNEP Rise Centre
08/06/2012 → 18/12/2014 Former
VIP

Research outputs:

The uptake and diffusion of solar power in Africa: Socio-cultural and political insights on a rapidly emerging socio-technical transition
This special issue focusses on the now rapidly growing solar photovoltaics markets across various geographies and scales in Africa. Herein we summarise the contributions of the component papers and position them within the context of the sustainable energy access literature. We argue that there is an urgent need for greater attention to the neglected socio-cultural and political dimensions of sustainable energy access, dimensions that are vital to understand if ambitious global commitments to sustainable energy for all by 2030 are to be achieved. Included in this special issue are papers on the systemic and socio-technical nature of energy access transitions; their politics and political economy; gendered dimensions; critiques of their technologically determinist framing and the implications for marginalising local actors; and, perhaps for the first time in the energy access literature, application of social practice perspectives to the energy access challenge. The result is a diverse range of empirically-grounded, theoretically and methodologically novel approaches, providing new insights into and understandings of the neglected socio-cultural and political dimensions of sustainable energy access.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership, University of Sussex
Pages: 122-129
Publication date: 1 Oct 2018
Peer-reviewed: Yes

Publication information
Journal: Energy Research and Social Science
Volume: 44
ISSN (Print): 2214-6296
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 4.89 SJR 2.063 SNIP 1.692
Web of Science (2017): Impact factor 3.815
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 5.14 SJR 1.845 SNIP 2.025
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 6.12 SJR 2.239 SNIP 1.375
Flood management in urban Senegal: an actor-oriented perspective on national and transnational adaptation interventions

In Senegal, considerable development assistance has been allocated to addressing the problem of repeated flooding in urban areas, involving changing thematic objectives, from short-term disaster relief to wide-ranging sanitation and drainage programmes. In spite of these numerous flood management interventions, the number of flood victims in Senegal’s urban centres has increased steadily since 1999. This article contributes empirically and conceptually to recent studies highlighting poor national disaster risk-management frameworks in West Africa, by investigating how floods have been managed in Senegal and why this management has not led to the results expected by the population. The article finds that the configuration of flood management policies and programmes in urban Senegal points towards three key intertwined issues which have influenced the limited achievements of flood management in urban areas. These include, but are not restricted to, the political and personal appropriation of flood management-related processes, the reinforcement of the dichotomy between central government and municipalities, and a fragmented institutional framework with overlapping institutions.
Market for the integration of smaller wind turbines in mini-grids in Kenya
This report is issued by the Kenya Miniwind project funded by the Ministry of Foreign Affairs of Denmark through the Danida Market Development Partnerships. The project aims to explore and develop the market for a partly locally produced kW wind turbine to be integrated into a PV mini-grid for rural electrification in order to reduce the cost of electricity and support local value creation.

The long-term objectives of the project are accordingly to contribute to poverty reduction, stimulate economic growth and increase the supply of sustainable energy. The short- to medium-term objective is to explore the market potential and learn more about how to design solutions and business models that are suitable for rural electrification. The project will therefore conduct a market study, engage in dialogue with local communities and authorities, and demonstrate the technical, social and economic feasibility of integrating a kW wind turbine into a smart solar-powered mini-grid in Kenya.

The project will also describe the assembly and production of a key component of the demonstration wind turbine. Finally, the project will work to improve the mini-grid developer sector in both Kenya and the wider region. The aim is that the knowledge generated through these activities will help develop the concept into a viable business model for the private companies involved, thus paving the way for the large-scale deployment of rural wind.

The project is a partnership between SustainableEnergy, Vestas Wind Systems A/S, the Technical University of Denmark, the Kenya Climate Innovation Center and the Rural Electrification Authority.

General information
State: Published
Organisations: UNEP DTU Partnership, Department of Management Engineering, Integration & Planning, Department of Wind Energy, Resource Assessment Modelling, Kenya Climate Innovation Center, Vestas Wind Systems AS
Number of pages: 50
Publication date: 2018

Publication information
Publisher: DANIDA
Original language: English
Electronic versions:
Kenya_mini_grid_market_study_FINAL.pdf
Research output: Research - peer-review › Journal article – Annual report year: 2018

Market for the integration of smaller wind turbines in mini-grids in Tanzania
This report is issued by the Kenya Miniwind project funded by the Ministry of Foreign Affairs of Denmark through the Danida Market Development Partnerships. The project aims to explore and develop the market for a partly locally produced kW wind turbine to be integrated into a PV mini-grid for rural electrification in order to reduce the cost of electricity and support local value creation.

The long-term objectives of the project are accordingly to contribute to poverty reduction, stimulate economic growth and increase the supply of sustainable energy. The short- to medium-term objective is to explore the market potential and learn more about how to design solutions and business models that are suitable for rural electrification. The project will therefore conduct a market study, engage in dialogue with local communities and authorities, and demonstrate the technical, social and economic feasibility of integrating a kW wind turbine into a smart solar-powered mini-grid in Kenya.

The project will also describe the assembly and production of a key component of the demonstration wind turbine. Finally, the project will work to improve the mini-grid developer sector in both Kenya and the wider region. The aim is that the knowledge generated through these activities will help develop the concept into a viable business model for the private companies involved, thus paving the way for the large-scale deployment of rural wind.

The project is a partnership between SustainableEnergy, Vestas Wind Systems A/S, the Technical University of Denmark,
the Kenya Climate Innovation Center and the Rural Electrification Authority.

**General information**  
State: Published  
Organisations: UNEP DTU Partnership, Department of Management Engineering, Integration & Planning, Department of Wind Energy, Resource Assessment Modelling  
Contributors: Nygaard, I., Andersen, A. E., Larsen, T. H., Cronin, T., Davis, N.  
Number of pages: 45  
Publication date: 2018

**Publication information**  
ISBN (Print): 978-87-93458-31-4  
Original language: English  
Electronic versions:  
Tanzania_mini_grid_market_study_FINAL.pdf  
Research output: Research - peer-review › Report – Annual report year: 2018

**Market for the integration of smaller wind turbines in mini-grids in Uganda**

This report is issued by the Kenya Miniwind project funded by the Ministry of Foreign Affairs of Denmark through the Danida Market Development Partnerships. The project aims to explore and develop the market for a partly locally produced kW wind turbine to be integrated into a PV mini-grid for rural electrification in order to reduce the cost of electricity and support local value creation.

The long-term objectives of the project are accordingly to contribute to poverty reduction, stimulate economic growth and increase the supply of sustainable energy. The short- to medium-term objective is to explore the market potential and learn more about how to design solutions and business models that are suitable for rural electrification. The project will therefore conduct a market study, engage in dialogue with local communities and authorities, and demonstrate the technical, social and economic feasibility of integrating a kW wind turbine into a smart solar-powered mini-grid in Kenya. The project will also describe the assembly and production of a key component of the demonstration wind turbine. Finally, the project will work to improve the mini-grid developer sector in both Kenya and the wider region. The aim is that the knowledge generated through these activities will help develop the concept into a viable business model for the private companies involved, thus paving the way for the large-scale deployment of rural wind.

The project is a partnership between SustainableEnergy, Vestas Wind Systems A/S, the Technical University of Denmark, the Kenya Climate Innovation Center and the Rural Electrification Authority.

**General information**  
State: Published  
Organisations: UNEP DTU Partnership, Department of Management Engineering, Integration & Planning, Department of Wind Energy, Resource Assessment Modelling  
Contributors: Nygaard, I., Bhamidipati, P. L., Andersen, A. E., Larsen, T. H., Cronin, T., Davis, N., Davis, N.  
Number of pages: 41  
Publication date: 2018

**Publication information**  
ISBN (Print): 978-87-93458-32-1  
Original language: English  
Electronic versions:  
Uganda_mini_grid_market_study_FINAL.pdf  
Research output: Research › peer-review › Report – Annual report year: 2018

**Off-grid access to electricity innovation challenge**

**General information**  
State: Published  
Organisations: Department of Management Engineering, UNEP DTU Partnership, The Energy and Resources Institute (TERI)  
Contributors: Nygaard, I., Hansen, U. E., Larsen, T. H., Palit, D., Muchunko, C.  
Pages: 47-54  
Publication date: 2018

**Host publication information**  
Title of host publication: *Accelerating the clean energy revolution - perspectives on innovation challenges*: DTU International Energy Report 2018  
Publisher: Technical University of Denmark (DTU)  
ISBN (Electronic): 978-87-93458-57-4  
Electronic versions:
Sustainability transitions in developing countries: Stocktaking, new contributions and a research agenda
An increasing number of studies have analysed the scope for, and the barriers to, transitions toward sustainability in the context of developing countries building on analytical perspectives from the sustainability transitions literature. This paper introduces a special issue on sustainability transitions in developing countries, which takes stock of this emerging field of research and presents new empirical research that contributes to further advancement of our understanding of the conditions in which sustainability transitions are likely to take place in developing countries and what is involved in these transformative processes. This introductory paper presents the five papers contained in the special issue. The first paper comprises a review of the existing literature on the subject, and the other four papers present new empirical research. The key findings of the papers are discussed in relation to previous research in the field specifically related to four crosscutting themes: (i) global-local linkages and external dependencies; (ii) stability and non-stability of regimes; (iii) undemocratic and non-egalitarian nature of regimes; and (iv) nurturing the development of niches versus the execution of individual projects. The introductory paper concludes by presenting a research agenda, which aims to provide promising avenues for future research on sustainability transitions in developing countries.
System building in the Kenyan electrification regime: The case of private solar mini-grid development

Given the growing interest in the ability of the private sector to contribute to the goal of providing universal access to energy in developing countries, this study sets out to investigate the practices and business approaches of private actors in the emerging niche of private mini-grid development in Kenya. The paper’s analytical focus is on how niche actors are influencing and creating change in the incumbent electrification regime of grid extension to strengthen and expand the niche for private mini-grids. The analysis shows that, in addition to internal niche processes like the alignment of expectations, learning and network building, niche actors actively engage in various forms of institutional work. The greatest emphasis here is on regulatory institutional work in order to influence legal and economic frameworks, but niche actors also engage in cognitive institutional work to enhance acceptance of the niche technology by constructing a shared world view between niche and regime actors. Interestingly, niche actors also engage in normative work to establish positive normative associations with the private-sector model, like equity and social justice. The research concludes that in this case institutional work is collective work drawing on different mandates and relying on different skills and resources.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Pedersen, M. B., Nygaard, I.
Pages: 211-223
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Energy Research & Social Science
Volume: 42
ISSN (Print): 2214-6296
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 4.89 SJR 2.063 SNIP 1.692
The rise and fall of foreign private investment in the jatropha biofuel value chain in Ghana

The article draws on the multi-level perspective (MLP) and global value chain (GVC) frameworks to analyse the drivers and trajectories of foreign private investment in biofuel production in Ghana. It is based on a narrative of the evolution of a niche for jatropha production in Ghana in the period 1995 - 2016 including company case studies. The factors analysed relating to MLP are alignment of expectations, network formation, and learning and knowledge sharing, and those relating to GVC are chain structure, governance, ownership, and access to land and capital. High entry barriers for creating a new agriculture-based value chain for global biofuel markets, i.e. high volume requirements, high capital needs, and market risks contributed to the collapse of the jatropha sector in Ghana. A low level of learning and knowledge sharing between jatropha actors in Ghana, alongside weak public R&D support, reduced access to technical and managerial information. Confirming previous GVC research on biofuels, policy and NGOs had a stronger influence on the jatropha value chain than in typical agricultural chains. Moreover, global drivers and the strategies and capabilities of foreign investors can strongly influence the development of a new biofuel value chain in a developing country. The latter points complement previous research on jatropha, which highlights politicoeconomic factors such as land tenure, regional and local power relations, and the interests of donors and NGOs. The study exemplifies a nonevolutionary niche development that goes beyond the European experiences of industrial niche development on which the MLP framework was first established. The importance of investors and policy at different levels of the value chain illustrate the synergies in combining the MLP and GVC frameworks in research on energy transitions in developing countries.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership, Systems Analysis
Contributors: Nygaard, I., Bolwig, S.
Pages: 224-234
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Environmental Science & Policy
Volume: 84
ISSN (Print): 1462-9011
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.31 SJR 1.661 SNIP 1.711
Web of Science (2017): Impact factor 3.826
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.9 SJR 1.677 SNIP 1.581
Web of Science (2016): Impact factor 3.751
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.83 SJR 1.613 SNIP 1.467
Web of Science (2015): Impact factor 2.972
Access to electricity in rural Africa - from donor support to innovative business models

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I., Hansen, U. E., Larsen, T. H.
Number of pages: 1
Publication date: 2017

Host publication information
Title of host publication: Book of Abstracts, Sustain 2017
Publisher: Technical University of Denmark (DTU)
Article number: G-5
Electronic versions:
Evolution of the Jatropha Biofuel Niche in Ghana

This article draws on the multi-level perspective (MLP) and global value chain (GVC) frameworks to analyse the drivers and trajectories of foreign private investment in biofuel production in Ghana. The analyses are based on a narrative of the evolution of a niche for jatropha production in Ghana spanning the period 1995–2004 and including detailed company case studies. Relating to the MLP framework the factors analysed influencing internal niche processes are alignment of expectations, network formation, and learning and knowledge sharing, while those relating to the GVC framework are value chain attributes, including chain structure, governance, ownership, and access to land and capital. The study identifies significant entry barriers to establishing new agriculture-based value chains for global biofuel markets, especially high volume requirements, high capital needs and international market risks, which contributed to the collapse of the jatropha sector in Ghana and thus to the failure to capitalise on the initially high expectations of biofuel production. We also found a low level of learning and knowledgesharing between jatropha niche actors in Ghana, which, alongside weak public R&D support, reduced access to locally specific technical and managerial information. The report presents an example of non-evolutionary niche development, which goes beyond the European experience of industrial niche development on which the MLP framework was first established. The importance of investors and policy at different levels of the value chain illustrates the synergies that may be obtained from combining the MLP and GVC frameworks in research on energy transitions in developing countries.

Feasibility of wind power integration in weak grids in non-coastal areas of Sub-Saharan Africa: the case of Mali

Installed wind capacity in Africa has grown rapidly the last few years, and by late 2016 had reached about 4.8 GW. However, so far few investments have been made in inland localities due to the generally lower wind potential. This paper therefore explores if and to what extent it is possible to establish economically feasible wind-power plants in countries with lower wind potential. To address this question, the paper provides a combined wind resource mapping and a pre-feasibility study for grid integration of wind power at four specific sites in Mali. The study finds that Mali has generally poor wind conditions, with average wind speeds of below 5 m/s at 50 m above ground level in the south, while there are larger areas in the northern part with average wind speeds of above 7 m/s at 50 m above ground level. Overall the research shows that in countries with generally poor wind conditions, such as in the southern part of Mali, it is possible to identify a limited number of sites with local speed-up effects situated close to the existing grid, at which there are options for undertaking medium-size wind-power projects that would be economically feasible at current crude oil prices of 50 USD/barrel.
How can we stimulate and exploit a market in Africa for small wind turbines

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I.
Publication date: 2017
Media of output: Power Point Presentation
Size: 15

Event information
Event: WIND ENERGY DENMARK 2017
Location: MCH Messecenter Herning, Herning, Denmark

Bibliographical note
Presentation at the conference Wind Energy Denmark, Herning, Denmark, 2 October 2017
Source: PublicationPreSubmission
Source-ID: 141663448
Research output: Research - peer-review › Sound/Visual production (digital) – Annual report year: 2017

Measures for diffusion of solar PV in selected African countries
This paper investigates how African governments are considering supporting and promoting the diffusion of solar PV. This issue is explored by examining so-called ‘technology action plans (TAPs)’, which were main outputs of the Technology Needs Assessment project implemented in 10 African countries from 2010 to 2013. The paper provides a review of three distinct but characteristic trajectories for PV market development in Kenya (private-led market for solar home systems), Morocco (utility-led fee-for service model) and Rwanda (donor-led market for institutional systems). The paper finds that governments’ strategies to promoting solar PV are moving from isolated projects towards frameworks for market development and that there are high expectations to upgrading in the PV value chain through local assembly of panels and local production of other system elements. Commonly identified measures include support to: local production; financing schemes; tax exemptions; establishment and reinforcement of standards; technical training; and research and development.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I., Hansen, U. E., Mackenzie, G. A., Pedersen, M. B.
Pages: 707-721
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: International Journal of Sustainable Energy
Volume: 36
Issue number: 7
ISSN (Print): 1478-6451
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.17 SJR 0.471 SNIP 0.531
Policy and planning related to climate change in developing countries

**General information**

State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I.
Publication date: 2017

**Event information**

Event: Launch of DTU Launch of Renewable Energy Policy, Planning and Integration Advice Group (REPLI)
Location: Technical University of Denmark, Lyngby, Denmark

**Bibliographical note**

Udgivelsesmedie: Power Point
**Working in a broad partnership in the Kenya Miniwind Project**

**General information**
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I.
Publication date: 2017
Media of output: Power Point Presentation

**Event information**
Event: Danida Market Development Partnership's Information Meeting
Electronic versions:
DMDP_meeting_DTU_26.06.17_Ivan_Nygaard_final.pdf

**Exploring product development possibilities and alternative uses of PV solar cells in Ghana**

**General information**
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership, Department of Energy Conversion and Storage, Secretariat, IT, Ashesi University, Kwame Nkrumah University of Science and Technology
Publication date: 2016

**Publication information**
Original language: English
Electronic versions:
Final_report_05092016.pdf

**Bibliographical note**
104.GHANA.809-200

**Lignocellulosic residues for production of electricity, biogas or second generation biofuel: A case study of technical and sustainable potential of rice straw in Mali**

Biomass from agricultural residues, especially lignocellulosic biomass, is not only seen as a sustainable biomass source for the production of electricity, but increasingly as a resource for the production of biogas and second generation biofuel in developing countries. Based on empirical research in an irrigated rice-growing area, Office du Niger, in Mali, this article builds scenarios for the sustainable potential of rice straw. The paper concludes that there is great uncertainty regarding the size of the sustainable resources of rice straw available for energy, but that the most likely scenario estimates a resource of about 120,000 t, which would permit up to three 5 MWel rice straw-fuelled power plants. Based on the findings from the empirical studies, the article further suggests that recently published research on the potential of rice straw in a number of African countries seems first to underestimate the uncertainty of resource assessments, and secondly to overestimate the resources available for energy production, mainly due to optimistic residue-to-product ratios and availability factors. © 2016 Elsevier Ltd. All rights reserved.

**General information**
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership, Rural Polytechnique Institute for Training and Research, National Engineering College, Renewable Energy Agency, DHI GRAS A/S, University of Copenhagen
Pages: 202–212
Publication date: 2016
Peer-reviewed: Yes
Niche development and upgrading in the PV value chain: The case of local assembly of PV panels in Senegal

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I., Hansen, U. E.
Number of pages: 2
Pages: 247-248
Publication date: 2016

Host publication information
Title of host publication: EU-SPRI Conference Lund 2016: Book of abstracts
Keywords: Upgrading, Global Value Chain, Photovoltaic, Innovation system, Assembly factory

The emerging market for pico-scale solar PV systems in Sub-Saharan Africa: From donor-supported niches toward market-based rural electrification

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I., Hansen, U. E., Larsen, T. H.
Number of pages: 24
Publication date: 2016

Publication information
Publisher: UNEP DTU Partnership
ISBN (Electronic): 978-87-93458-09-3
Original language: English
Electronic versions:
Market_Pico_Solar_WEB.pdf

Utility led rural electrification in Morocco: combining grid extension, mini-grids, and solar home systems

Morocco has become known for being an example of a well-performing utility-led rural electrification program, but so far little independent research has scrutinized this extraordinary case. Based on a critical review of the available literature, this study attempts to draw a picture of the evolution of rural electrification in Morocco, the policies and programs that have been implemented, and their institutional, technical, and financial dimensions. The review reveals that information available about the success of the programme has almost entirely been provided by the utility ONE, which has strategic and commercial interests in showing its achievements in a favorable light. With this in mind, three main principles are identified as having contributed to the rapid evolution of levels of electrification: (1) a clear vision and a continuing political commitment to follow the plan; (2) an institutional framework that brings into action the strength of the utility and of both national and international actors; and (3) a finance model that includes all stakeholders and international financial institutions. However, three factors may have been equally important in achieving these results: (1) a level of rural electrification in Morocco that from the outset was far below that in comparable neighboring countries; (2) a high GDP compared to sub-Saharan African (SSA) countries; and (3) a high level of urban electrification that allowed cross-subsidization from urban consumers. So while the Moroccan case is inspiring for SSA countries, we need to be prudent before we relate the rapid increase in electrification to the implementation model alone. © 2015 John Wiley & Sons, Ltd.
Enhancing Access to Electricity for Clean and Efficient Energy Services in Africa

This report examines key issues related to electricity access in Africa, through the lens of selected case studies of countries that have successfully managed to increase access significantly in a short period of time, backed up with more general regional analysis. On the basis of this overview and analysis, the report makes a number of recommendations on priorities and necessary actions by countries and the donor community as to how the electricity access challenges may be addressed.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Christensen, J. M., Mackenzie, G. A., Nygaard, I., Pedersen, M. B.
Number of pages: 64
Publication date: 2015

Publication information
Publisher: UNEP DTU Partnership
Original language: English
Electronic versions:
Enhancing_Access_to_Electricity.pdf
URLs:
http://www.unepdtupartnership.org
Research output: Research › Report – Annual report year: 2015

Governance and Community Responses to Floods in Poor Peri-urban Areas: The case of Urban Disaster Risk Reduction and Climate Change Adaptation in Pikine, Senegal

In recent years, urban flooding has become an increasingly severe and frequent problem for the poor in many West African urban centres. In diverse metropoles of the region, including Lagos, Cotonou, Accra, Abidjan and Dakar, low-income populations who typically live undesirable flood-prone areas see their already considerable vulnerability increased for every flooding event. In the long term, climate change is expected to make matters worse for these already tried populations, due to an increase in storm frequency and intensity, and with them in the risk of floods. However, climate change-induced changing weather patterns and more extreme weather events are only part of the explanation for this situation, as large segments of the urban population in West Africa are not offered the public services, infrastructure and protective regulations needed in order to respond to floods. In Senegal, in spite of significant development aid and interventions, the number of flood victims in urban centres has increased steadily since 1999.

Against this background, this dissertation examines how the governance for floods is configured at the national and municipal scales, in a context of weak state capacity. The dissertation addresses how urban flood management, community responses and resulting public services are produced, as well as the implications thereof. It is investigated how floods have been managed in urban Senegal during the last fifteen years and examines why it has not led to the results expected by the population, state institutions and the donor community. It is found that the significant support allocated to flood management has created a political and personal appropriation of flood management processes at the national level. This has resulted in a fragmented institutional framework with overlapping institutions, duplicate mechanisms and an ongoing ‘negotiation’ of competencies and interpretation of mandates, which have limited the impact of flood management in Senegal. In spite of the lack of achievement in the domain of flood management, it is found that weak state capacity does not mean that the urban poor are simply passive victims of climate change, or that collective services and interventions relative to flood management are inexistent or ungoverned. Instead, the ability to respond to floods is to a large extent formed outside the realm of the state and is maintained through a set of complex negotiation processes among various actors involved in diverse governance modes, found inside and outside the formal state bureaucracy and the official policies and plans in Senegal. The findings also reveal that community responses may not, by themselves, sufficiently compensate for the lack of basic services and infrastructure that is forcing the urban poor to cope with disproportionate levels of risk.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership, Roskilde University
Contributors: Schaar, C., Nygaard, I., Hahonou, E. K.
Number of pages: 126
Publication date: 2015

Publication information
Publisher: UNEP DTU Partnership
Original language: English
Electronic versions:
Overcoming Barriers to the Transfer and Diffusion of Climate Technologies

This guidebook provides practical and operational guidance on how to assess and overcome barriers facing the transfer and diffusion of technologies for climate change mitigation and adaptation. The guidebook is designed to support the analysis of specific technologies, rather than pursuing a sectoral (e.g., transport) or technology group (e.g., renewable energy) approach. Given that there is no single solution to enhancing technology transfer and diffusion policies need be tailored to country-specific context and interests. Therefore, the guidebook presents a flexible approach, identifying various assessment options and tools for analysts and decision makers. The guidebook has been developed through an experience-based approach during the first phase of the TNA, and has benefitted from feedback from national consultants and workshop participants alongside inputs from UDP staff and external reviewers. It should be noted that this second edition of the guidebook has undergone major changes with respect to structure and content for the benefit of the readers.
business-as-usual scenario. This paper advocates the use of second generation ethanol for transport, to the extent that it is economically exploitable. Resorting to first generation ethanol would require the allocation of over 580,000 ha of agricultural land for ethanol production. © 2015 Elsevier Ltd. All rights reserved.
Review of solar PV policies, interventions and diffusion in East Africa

Previous research on the diffusion of solar PV in Africa has mainly focused on solar home systems (SHS) in individual countries and thus overlooked developments in other PV market segments that have recently emerged. In contrast this paper adopts a regional perspective by reviewing developments in supportive policies, donor programs and diffusion status in all PV market segments in Kenya, Tanzania and Uganda, as well as identifying the key factors put forward in the literature to explain differences in the diffusion of SHS in these three countries. The paper finds two emerging trends: (i) a movement from donor and government-based support to market-driven diffusion of solar PV; and (ii) a transition from small-scale, off-grid systems towards mini-grids and large-scale, grid-connected solar power plants. The paper points out three generic factors that have contributed to encouraging SHS diffusion in all three countries: (i) the decline in world market prices for PV modules; (ii) the prolonged support from international donors; and (iii) conducive framework conditions provided by national governments. The paper also identifies five key factors that have been elaborated in the literature to explain the higher level of SHS diffusion in Kenya compared to Tanzania and Uganda: (i) a growing middle-class; (ii) geographical conditions; (iii) local sub-component suppliers; (iv) local champions; and (v) business culture. Finally, the paper discusses the lack of attention in the literature given to analysing the amount, nature and timing of donor and government support across countries, processes of learning and upgrading in local PV industries and the interaction between the different explanatory factors.
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 10.54 SJR 3.036 SNIP 3.594
Web of Science (2017): Impact factor 9.184
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 9.52 SJR 2.998 SNIP 3.501
Web of Science (2016): Impact factor 8.05
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 8.35 SJR 2.921 SNIP 3.368
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 7.79 SJR 3.03 SNIP 3.72
Web of Science (2014): Impact factor 5.901
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 7.88 SJR 2.98 SNIP 3.893
Web of Science (2013): Impact factor 5.51
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 7.24 SJR 2.734 SNIP 3.861
Web of Science (2012): Impact factor 5.627
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 7.39 SJR 2.717 SNIP 3.911
Web of Science (2011): Impact factor 6.018
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.338 SNIP 3.092
Web of Science (2010): Impact factor 4.595
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.457 SNIP 3.608
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.425 SNIP 3.173
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.001 SNIP 3.386
Scopus rating (2006): SJR 0.86 SNIP 1.704
Scopus rating (2005): SJR 0.921 SNIP 2.591
Scopus rating (2004): SJR 1.123 SNIP 2.216
Scopus rating (2003): SJR 0.795 SNIP 2.464
Scopus rating (2002): SJR 0.664 SNIP 2.331
Scopus rating (2001): SJR 0.196 SNIP 1.018
Scopus rating (2000): SJR 0.157 SNIP 1.065
Scopus rating (1999): SJR 0.207 SNIP 1.44

Original language: English
Keywords: Solar photovoltaic, Market segments, Policies, Kenya, Tanzania, Uganda
Electronic versions:
The conceptual and practical challenges to technology categorisation in the preparation of technology needs assessments

The strong focus in climate negotiations on the transfer and diffusion of technologies as a means to mitigate and adapt to climate change has entailed various programs to promote the transfer and diffusion of climate technologies, including the Technology Needs Assessment project (TNA). Despite the technology focus in the project, practice shows that the questions of what a technology is and how the key concepts of technology transfer and diffusion should be understood and operationalized remain diffuse. This paper explores the reasons for this by analysing the experience of the TNA project in using a framework for categorizing technologies according to the types of markets and non-markets in which they are diffused. While the framework has contributed to a higher degree of ‘market literacy’ among national stakeholders, four challenges in categorizing technologies have been identified: i) technologies comprising varying degrees of software, orgware and hardware; ii) technologies appearing as whole systems of production; iii) technologies covering different application markets; and iv) technologies situated on a continuum between research, development and diffusion. These challenges are proxies for the challenges in formulating plans of actions for technologies. If, due to a lack of conceptual clarity, it is not clear to countries whether the diffusion of a specific technology should be implemented by a project or by means of an enabling framework, the measures proposed in the action plans may be misleading. We therefore call for an increased focus on clarifying the technology concept in the training for the next generation of TNAs.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I., Hansen, U. E.
Number of pages: 15
Pages: 371-385
Publication date: 2015
Peer-reviewed: Yes
Early online date: 2015

Publication information
Journal: Climatic Change
Volume: 131
Issue number: 3
ISSN (Print): 0165-0009
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 4.06 SJR 2.035 SNIP 1.554
Web of Science (2017): Impact factor 3.537
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.52 SJR 1.978 SNIP 1.361
Web of Science (2016): Impact factor 3.496
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.67 SJR 2.166 SNIP 1.42
Web of Science (2015): Impact factor 3.344
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 4.31 SJR 2.44 SNIP 1.701
Web of Science (2014): Impact factor 3.43
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.47 SJR 2.559 SNIP 1.851
Web of Science (2013): Impact factor 4.622
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
Measures for diffusion of solar PV are aligned in technology action plans for 6 countries in the African region

General information
State: Published
Organisations: Department of Management Engineering, UNEP Risø Centre
Contributors: Nygaard, I.
Publication date: 2014
Media of output: PowerPoint

Event information
Event: 1st Africa Photovoltaic Solar Energy Conference and Exhibition
Location: Durban, South Africa
Keywords: Developing countries, Dissemination, Policy, PV market, Rural electrification, Solar home system

Measures for the Diffusion of Solar PV are Aligned in Technology Action Plans for Six Countries in Africa
Recently, development projects have provided support to governments to facilitate technology transfer for climate change adaptation and mitigation. These include the Technology Needs Assessment (TNA) funded by the Global Environmental Facility (GEF). In the TNA project, which was implemented in ten African countries from 2010 to 2013, dedicated government committees have prioritized climate change mitigation technologies and developed action plans for the diffusion of the selected technologies. The project results show that solar PV is high on the agenda in Africa. Six out of ten
countries in the region prioritized solar PV, and action plans for the diffusion of solar home systems were put forward in Côte d’Ivoire, Kenya, Mali and Senegal, while the implementation of grid-connected systems was proposed in Rwanda, Mali and Senegal. The project reports and technology action plans prepared in these six countries are used as the basis for comparing how solar PV is perceived in these countries and how policy measures enabling environmental adjustments and investment programmes are being planned to promote diffusion of the technology in these different contexts.

**General information**
State: Published
Organisations: Department of Management Engineering, UNEP Risø Centre
Pages: 141-150
Publication date: 2014

**Host publication information**
Title of host publication: 1st Africa Photovoltaic Solar Energy Conference Proceedings
Publisher: WIP Renewable Energies
ISBN (Electronic): 978-88-89407-103
Keywords: Developing countries, Dissemination, Policy, PV market, Rural electrification, Solar home system

**Measures identified in technology action plans to enhance national capacity: The case of Solar PV in Africa**

**General information**
State: Published
Organisations: Department of Management Engineering, UNEP Risø Centre
Contributors: Nygaard, I.
Publication date: 2014
Media of output: PowerPoint

**Event information**
Event: UNFCCC (Technology Executive Committee) workshop on Strengthening national systems of innovation in developing countries
Location: Bonn, Germany
Electronic versions:
Presentation_TEC_meeting_UDP_ivan_nygaard.pdf

**Bibliographical note**
Oral presentation
Number of pages: 17
Research output: Research › Sound/Visual production (digital) – Annual report year: 2014

**Prospects for investment in large-scale, grid-connected solar energy in Africa**

**General information**
State: Published
Organisations: Department of Management Engineering, UNEP Risø Centre
Contributors: Nygaard, I.
Publication date: 2014
Media of output: PowerPoint

**Event information**
Event: Conference on Sustainable Energy Investments in Africa - Engaging the Private Sector
Location: UN City, Copenhagen, Denmark
Electronic versions:
Prospects_for_investment_in_large_scale_grids.pdf

**Prospects for investment in large-scale, grid-connected solar power in Africa**
Solar power in Africa is on its way to becoming a market-based commodity, thus escaping the niche for individual electricity supply that is mainly supported by international donor organisations. Significant reductions in the cost of
photovoltaic (PV) panels and a 400 percent increase in oil prices since the 1990s have changed the competitiveness of solar PV in all markets, ranging from individual households via institutions to mini-grids and grid-connected installations. In volume and investment, the market for large-scale grid-connected solar power plants is by far the most important, and as production costs are today competitive with large-scale diesel, this market is rapidly emerging. Donor-influenced plans and visions for solar PV development have often been optimistic with regard to the diffusion of solar PV in Africa, but the last three years of development, in terms of a number of large-scale investments in grid-connected solar power plants and local assembly facilities for PV panels, have exceeded even optimistic scenarios. Finally, therefore, there seem to be bright prospects for investment in large-scale grid-connected solar power in Africa.

General information
State: Published
Organisations: Department of Management Engineering, UNEP Rise Centre
Contributors: Hansen, U. E., Nygaard, I., Pedersen, M. B.
Number of pages: 24
Publication date: 2014

Publication information
Publisher: UNEP Rise Centre, Technical University of Denmark
ISBN (Print): 978-87-93130-08-1
Original language: English
Electronic versions:
Prospects_for_investment.pdf
Research output: Research › Report – Annual report year: 2014

Review of Solar PV Market Development in East Africa

General information
State: Published
Organisations: Department of Management Engineering, UNEP Rise Centre
Contributors: Hansen, U. E., Pedersen, M. B., Nygaard, I.
Publication date: 2014

Host publication information
Title of host publication: 1st Africa Photovoltaic Solar Energy Conference Proceedings
Publisher: WIP Renewable Energies
Article number: 3BV.3.2
ISBN (Electronic): 978-88-89407-103
Keywords: Solar PV, East Africa, Market development, Market drivers
DOI: 10.5071/1stAfricaPVSEC2014-3BV.3.2
Research output: Research › peer-review › Article in proceedings – Annual report year: 2014

Review of Solar PV Market Development in East Africa
While the diffusion of solar home systems in Kenya has been market-based for some years, the diffusion of PV in most other Sub-Saharan African countries has been driven by government and donor-supported projects aimed at serving specific needs for electricity while at the same time creating a national niche market for PV. This practice is rapidly changing and, as in industrialised countries, there is evidence of a transition towards more market-based diffusion and private-sector involvement for PV systems for private consumers, institutions and villages. This transition has been facilitated to varying degrees by conducive enabling frameworks comprising innovative financing schemes, exemptions from VAT and import taxes, standardised power-purchasing agreements and feed-in tariffs. Few analyses have so far been conducted on the effects of such measures. This paper aims to contribute to understanding these effects by reviewing the development of markets for solar PV in Kenya, Tanzania and Uganda, focusing on how the differences in market development have been explained in the literature. The paper finds that, although Tanzania and Uganda are rapidly catching up, Kenya is still leading the development of PV markets not only in terms of installed capacity and market volume, but also with regard to local industry and PV business development. The paper concludes by drawing attention to particular factors that have been used in the literature to explain disparities in market-development trajectories in the three countries.

General information
State: Published
Organisations: Department of Management Engineering, UNEP Rise Centre
Contributors: Hansen, U. E., Pedersen, M. B., Nygaard, I.
Number of pages: 22
Publication date: 2014
Sustainable energy transitions in emerging economies: The formation of a palm oil biomass waste-to-energy niche in Malaysia 1990–2011

The economic development in emerging economies in Southeast Asia has significantly increased the use of fossil fuel based energy. This has severe implications for global climate change, and against this background, scholars within the sustainable transition tradition have taken an interest in addressing how transitions towards more sustainable development pathways in this region may be achieved. This paper contributes to the abovementioned literature by examining the conducive and limiting factors for development and proliferation of a palm oil biomass waste-to-energy niche in Malaysia during the period 1990–2011. Rising oil prices, strong pressure on the palm oil industry from environmental groups, and a persisting palm oil biomass waste disposal problem in Malaysia appear to have been conducive to niche proliferation, and on top of this national renewable energy policies and large-scale donor programmes have specifically supported the utilisation of palm oil biomass waste for energy. However, in spite of this, the niche development process has only made slow progress. The paper identifies reluctant implementation of energy policy, rise in biomass resource prices, limited network formation and negative results at the niche level, as the main factors hindering niche development.
Development of biomass power plant technologies in Malaysia: niche development and the formation of innovative capabilities

The objective of this thesis is to contribute to advance further the emerging research agenda on the transfer and diffusion of low-carbon technologies in developing countries by adopting a study of the development of biomass power plant technologies in Malaysia. The main research question addresses the main factors influencing the transfer and diffusion of biomass power plant technologies in Malaysia. This question is explored in the four papers comprising the thesis, which are based on analyses of qualitative data, mainly in the form of interviews, documents and observations collected during successive periods of fieldwork in Malaysia.

The thesis conceptualises the diffusion of biomass technologies in Malaysia as a niche development process and finds that the development of a palm oil biomass waste-to-energy niche in Malaysia has only made limited progress despite a period of twenty years of niche formation. The thesis identifies the reluctance to implement an efficient energy policy as the main limiting factor for niche development in this case. Although a number of donor programs have advocated the introduction of a stronger enabling framework for niche development, they have generally had only a limited impact on
policy development. This was mainly attributed to the strong opposing interests of key actors in maintaining the existing situation, particularly the national electricity utility company in Malaysia, which deliberately obstructed niche development over an extended period because it was against their economic interests. When the government decided to improve incentive structures through a reduction in fossil fuel subsidies and by introducing a feed-in tariff system, the niche development momentum had already been lost because investors had limited confidence in project investments. Since many planned plants were never put into operation and those that were constructed generally showed only poor performance, the lack of investor confidence was due mainly to the largely negative results from experimentation activities in the niche. Moreover, a number of alternative biomass waste utilisation options gained increasing interest in the Malaysian palm oil industry, which were considered more commercially attractive compared to energy generation. On top of this, the increasing interest in these alternative usages of palm oil biomass waste led to a significant rise in biomass resource prices, which meant that it became difficult to negotiate long-term biomass fuel contracts. These factors turned out to be detrimental for niche development.

The transfer of technology is understood in this thesis as the exchange of knowledge through international inter-firm linkages, which contribute to enhancing the technological capability of the recipient firms, thus enabling them to engage in innovation. The thesis considers whether the use of different learning mechanisms could explain differences in the accumulation of technological capabilities in the biomass boiler and power plant supplier industry in Malaysia. It is found that not only is differences in the levels of technological capability achieved by individual firms influenced by the specific combination of learning mechanisms the firms employ, but also by the differences in the relative levels of resources dedicated to exploiting these learning mechanisms. Firms relying on a combination of learning from foreign technology partners and internal learning by planned experimentation make most progress in terms of technological capability. Firms using a combination of learning by imitating national competitor firms and internal trial and error also made advances in technological capability although to a comparatively lesser extent. The thesis also finds that CDM projects implemented in Malaysia played a limited role in stimulating the introduction of new technology and knowledge to Malaysian biomass boiler and power plant equipment suppliers. Their involvement in CDM projects did not add anything above and beyond what was already encompassed in the existing relationships between the firms in question.
energy niche in Malaysia. The paper contributes to the existing literature by a conceptual and empirical examination of this research question. With regard to its empirical findings the paper concludes: (i) that advice on energy policy had a limited impact mainly due to strong opposing interests in maintaining the existing situation; (ii) that creating the necessary conditions for transferring a private-sector model of electricity production to Malaysia remains a challenge; and (iii) that the short duration and unpredictability of interventions generally can be seen as an important impediment for programs in reaching their objectives.

**General information**

State: Published  
Organisations: Department of Management Engineering, UNEP Risø Centre  
Contributors: Hansen, U. E., Nygaard, I.  
Pages: 1-19  
Publication date: 2013  
Peer-reviewed: Yes

**Publication information**

Journal: Environmental Innovation and Societal Transitions  
Volume: 8  
ISSN (Print): 2210-4224  
Ratings:  
BFI (2018): BFI-level 1  
Web of Science (2018): Indexed yes  
BFI (2017): BFI-level 1  
Scopus rating (2017): CiteScore 4.84 SJR 2.14 SNIP 1.687  
Web of Science (2017): Impact factor 5.265  
Web of Science (2017): Indexed yes  
BFI (2016): BFI-level 1  
Scopus rating (2016): CiteScore 2.65 SJR 1.38 SNIP 1.148  
BFI (2015): BFI-level 1  
Scopus rating (2015): CiteScore 2.69 SJR 1.108 SNIP 0.982  
BFI (2014): BFI-level 1  
Scopus rating (2014): CiteScore 3.14 SJR 1.527 SNIP 1.524  
BFI (2013): BFI-level 1  
Scopus rating (2013): CiteScore 3.84 SJR 1.581 SNIP 2.046  
ISI indexed (2013): ISI indexed no  
Scopus rating (2012): CiteScore 3.26 SJR 1.984 SNIP 1.202  
ISI indexed (2012): ISI indexed no  
ISI indexed (2011): ISI indexed no  
Original language: English  
Keywords: Developing countries, Donor programs, Multi-level perspective, Renewable energy, Strategic niche management, Transnational linkages  
DOIs:  
10.1016/j.eist.2013.07.001  
Source: dtu  
Source-ID: n:oai:DTIC-ART:elsevier/391346049::31522  
Research output: Research - peer-review  
Journal article – Annual report year: 2013

**Agricultural residues for energy production in Mali**

**General information**

State: Published  
Organisations: Department of Management Engineering, UNEP Risø Centre  
Contributors: Nygaard, I., Beck Bruun, T., Traoré, O. F., Dembélé, F., Dao, I., Mariko, A., Coulibaly, N., Kamissoko, F., Borgstrøm, R.  
Publication date: 2012

**Publication information**

Publisher: UNEP Risø Centre on Energy, Climate and Sustainable Development. Department of Management Engineering. Technical University of Denmark (DTU)  
Original language: English  
Electronic versions:
Agricultural residues.pdf

Research output: Research › Report – Annual report year: 2013

Applications de production d'énergie éolienne et solaire au Mali : évaluation basée sur les cartes des ressources éoliennes et solaires du Mali

General information
State: Published
Organisations: Department of Management Engineering, UNEP Risø Centre, Department of Electrical Engineering, Center for Electric Power and Energy, Department of Wind Energy, Meteorology
Contributors: Nygaard, I., Nørgård, P. B., Dewilde, L., Badger, J., Olander Rasmussen, M., Hansen, L. B., Ouattara, O., Kamissoko, F., Maiga, A. I., Diarra, S., Coulibaly, N.
Number of pages: 96
Publication date: 2012

Publication information
Publisher: UNEP Risø Centre on Energy, Climate and Sustainable Development. Department of Management Engineering. Technical University of Denmark (DTU)
ISBN (Print): 978-87-92706-76-8
Original language: French
Electronic versions:
Applications_d_energie_eolienne_et_solaire.pdf
URLs:
http://www.frsemali.org/reports/00 final reports/Applications d'energie eolienne et solaire.pdf
Research output: Research › Report – Annual report year: 2013

Estimation des ressources éoliennes et solaires au Mali

General information
State: Published
Organisations: Department of Wind Energy, Meteorology, Department of Electrical Engineering, Center for Electric Power and Energy, Department of Management Engineering, UNEP Risø Centre
Publication date: 2012

Publication information
Publisher: UNEP Risø Centre on Energy, Climate and Sustainable Development. Department of Management Engineering. Technical University of Denmark (DTU)
Original language: French
Electronic versions:
Estimation_de_resources_eolienne_et_solaire.pdf
URLs:
http://www.frsemali.org/reports/00 final reports/Estimation de resources eolienne et solaire.pdf
Research output: Research › Report – Annual report year: 2013

Estimation of wind and solar resources in Mali

General information
State: Published
Organisations: Department of Wind Energy, Meteorology, Department of Electrical Engineering, Center for Electric Power and Energy, Department of Management Engineering, UNEP Risø Centre
Publication date: 2012

Publication information
Publisher: UNEP Risø Centre on Energy, Climate and Sustainable Development. Department of Management Engineering. Technical University of Denmark (DTU)
Original language: English
Electronic versions:
Pre-feasibility study for an electric power plant based on rice straw

General information
State: Published
Organisations: Department of Management Engineering, UNEP Rise Centre, EA Energy Analysis A/S
Contributors: Fock, F., Nygaard, I., Maiga, A., Kone, B., Kamissoko, F., Coulibaly, N., Ouattara, O.
Number of pages: 75
Publication date: 2012

Publication information
Publisher: UNEP Rise Centre on Energy, Climate and Sustainable Development. Department of Management Engineering. Technical University of Denmark (DTU)
ISBN (Print): 978-87-92706-69-0
Original language: English
Electronic versions:
Prefeasibility_study_of_straw_fired_power_plant.pdf
URLs:
http://www.frsemali.org/reports/00 final reports/Prefeasibility study of straw fired power plant.pdf

Bibliographical note
DANIDA contract 1711
Research output: Research › Report – Annual report year: 2013

Résidus agricoles pour la production de l'énergie au Mali

General information
State: Published
Organisations: Department of Management Engineering, UNEP Rise Centre
Contributors: Nygaard, I., Beck Bruun, T., Traoré, O. F., Dembélé, F., Dao, I., Mariko, A., Coulibaly, N., Kamissoko, F., Borgstrøm, R.
Publication date: 2012

Publication information
Publisher: UNEP Rise Centre on Energy, Climate and Sustainable Development. Department of Management Engineering. Technical University of Denmark (DTU)
ISBN (Print): 978-87-92706-72-0
Original language: French
Electronic versions:
Residues_agricoles.pdf
URLs:
http://www.frsemali.org/reports/00 final reports/Residues agricoles.pdf
Research output: Research › Report – Annual report year: 2013

Rural Electrification Approaches in West Africa: Some reflections

General information
State: Published
Organisations: Department of Management Engineering, UNEP Rise Centre
Contributors: Nygaard, I.
Publication date: 2012

Event information
Event: International Workshop on Financial and Institutional Challenges facing Off-grid electrification
Location: De Montfort University, Leicester, United Kingdom
Electronic versions:
Rural_Electrification.pdf
Research output: Research › Sound/Visual production (digital) – Annual report year: 2013

Screening of feasible applications of wind and solar in Mali: Assessment using the wind and solar maps for Mali
Institutional options for rural energy access: Exploring the concept of the multifunctional platform in West Africa

The concept of the multifunctional platform for rural energy access has increasingly been supported by donors in five West African countries since 1994. While it is often referred to as a highly successful concept, recent reviews and interviews with local stakeholders in Mali and Burkina Faso indicate that the high aspirations to be found in project descriptions and early evaluations are only partly reflected in activities on the ground. This paper illustrates how the multipurpose aspects of the platform have made the concept a nexus of potential achievements that are highly valued in the dominant discourse of development, and how including concerns, such as poverty alleviation, gender equity, local democracy, decentralisation and the environment, have attracted donors outside the energy sector. The paper thus argues that, while the integration of multiple technical functions, preconceived organisational set-ups and local fuel production have in fact had limited or even adverse effects on the outcome of the multifunctional platform programme, these virtues have proved essential in presenting the concept at the policy level. This analysis of the dilemma between mobilizing funding and implementing practical programmes provides an argument for building development aid on existing structures instead of inventing new complicated concepts and approaches.

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Risø National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Pages: 1192-1201
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Energy Policy
Volume: 38
ISSN (Print): 0301-4215
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.97 SJR 1.994 SNIP 2.094
Web of Science (2017): Impact factor 4.039
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.49 SJR 2.197 SNIP 1.985
Web of Science (2016): Impact factor 4.14
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.98 SJR 2.287 SNIP 1.762
Web of Science (2015): Impact factor 3.045
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 3.62 SJR 2.143 SNIP 1.892
Web of Science (2014): Impact factor 2.575
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.74 SJR 1.891 SNIP 2.168
Web of Science (2013): Impact factor 2.696
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 3.52 SJR 1.75 SNIP 2.042
Web of Science (2012): Impact factor 2.743
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 3.35 SJR 1.578 SNIP 1.934
Web of Science (2011): Impact factor 2.723
ISI indexed (2011): ISI indexed yes
Review of national frameworks for involvement of agro-industries in rural electrification

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, IED, AFREPREN/FWD, East Africa Tea Trade Association
Number of pages: 139
Publication date: 2010

Publication information
Publisher: Risø National Laboratory for Sustainable Energy
Edition: 2
Original language: English
Electronic versions:
Review_of_national_frameworks.pdf

Bibliographical note
PACEAA, Poverty Alleviation through Cleaner Energy from Agro-industries in Africa
Using modeling, satellite images and existing global datasets for rapid preliminary assessments of renewable energy resources: The case of Mali

This paper presents a novel approach to the preliminary, low-cost, national-scale mapping of wind energy, solar energy and certain categories of bio-energy resources in developing countries, using Mali as an example. The methods applied make extensive use of satellite remote sensing and meteorological mesoscale modeling. The paper presents first results from applying the methodology in Mali and discusses the appropriateness of the results obtained. It is shown that northern Mali has considerable wind energy potential, while average wind speeds in the southern part are too low to make wind power a competitive option. Solar energy resources are shown to be abundant in all of Mali, though the highest values are found in the south. The temporal variation is relatively limited. Bio-energy resources are also concentrated in the south, but there are small pockets of high vegetation productivity in the irrigated areas of the Niger inland delta that might be interesting from a renewable energy resource perspective. Finally, the paper discusses the role that renewable energy resources might play in the energy systems of Mali, given the spatio-temporal distribution of renewable energy resources. It is argued that at the current price of about 70 US$/barrel for fossil fuels, renewable energy resources are becoming economically as well as environmentally attractive options.

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Risoe National Laboratory for Sustainable Energy, Meteorology, Wind Energy Division
Contributors: Nygaard, I., Rasmussen, K., Badger, J., Nielsen, T., Hansen, L., Stisen, S., Larsen, S. E., Mariko, A., Togola, I.
Pages: 2359-2371
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Renewable & Sustainable Energy Reviews
Volume: 14
Issue number: 8
ISSN (Print): 1364-0321
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 10.54 SJR 3.036 SNIP 3.594
Web of Science (2017): Impact factor 9.184
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 9.52 SJR 2.998 SNIP 3.501
Web of Science (2016): Impact factor 8.05
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 8.35 SJR 2.921 SNIP 3.368
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 7.79 SJR 3.03 SNIP 3.72
Web of Science (2014): Impact factor 5.901
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 7.88 SJR 2.98 SNIP 3.893
Web of Science (2013): Impact factor 5.51
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 7.24 SJR 2.734 SNIP 3.861
Web of Science (2012): Impact factor 5.627
Organisation of rural electrification: The case of Burkina Faso

**General information**
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development, Risø National Laboratory for Sustainable Energy, Systems Analysis Division
Contributors: Nygaard, I.
Publication date: 2009

**Event information**
Event: PACEAA training seminar, Kigali (RW), 22 Oct
Electronic versions:
Research output: Research - Sound/Visual production (digital) – Annual report year: 2009

Review of national frameworks for involvement of agro-industries in rural electrification

**General information**
State: Published
Organisations: Risø National Laboratory for Sustainable Energy, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, IED, AFREPREN/FWD, East Africa Tea Trade Association
Number of pages: 129
Publication date: 2009
Rural electrification in Sub Saharan Africa in a context of fluctuating oil-prices

Solar PV is one among other low carbon technologies for rural electrification in Sub Saharan Africa (SSA). Solar PV systems have for almost 30 years been disseminated in SSA, resulting in more than half a million installations concentrated in a few countries. While PV systems have technically matured and markets have gradually developed, PV for rural electrification has often been perceived with scepticism from potential users, donors, government officials and researchers, and solar PV has in many camps been labelled as donor driven, expensive and fragile technology mainly serving the richest parts of the populations and with little or no value for productive uses. However, feasibility for solar PV has improved in the last few years. Retail prices for solar photovoltaic modules are reduced by 20-30% since 2001, and although far from the peak in 2008, oil prices in the next two years to come are expected to settle at a level, which is about three times the world market average in the years from 1985-2003. Therefore, rather than being limited to a niche for populations living in dispersed settlements outside the reach of grid electrification, solar PV is expected to play an important role in mini grid rural electrification schemes based on hybrid solar PV-diesel generators. This may bring PV systems in line with fossil fuel based systems in terms of consumer cost and options for productive use and it changes the market for PV from mainly donor supported schemes into mainstream rural electrification schemes governed and financed by electric utilities and rural electrification agencies. Based on a literature review and the experience with a full scale hybrid wind/PV diesel system at RISØ DTU, this paper provides cost estimates for hybrid PV-diesel systems and policy recommendations to change the application of PV technologies for development in SSA.
The Role of Existing SMEs in Developing Low Carbon Energy: The Case of the MFP Programme in West Africa

General information
State: Published
Organisations: Systems Analysis Division, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Rise National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Publication date: 2009

Event information
Event: DIIS conference on Low Carbon Development and Poverty Reduction in Low Income Countries – Opportunities and Challenges for Development Assistance
Location: Copenhagen (DK), 13 Jan.
Keywords: Climate and energy systems, Cleaner energy and sustainable development
Electronic versions:
2009_80.pdf
Source: orbit
Source-ID: 248571
Research output: Research › Sound/Visual production (digital) – Annual report year: 2009

Aide mémoire sur les principes d'accordement de la subvention dans l'approche ERD - une réflexion spécifique sur la proposition de mettre en oeuvre les principes de l'Aide Basée sur le Résultat ABR. Rapport de travail élaboré dans l'assistance technique au Fonds de Développement de l'Électrification, Burkina Faso

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Rise National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Number of pages: 30
Publication date: 2008

Publication information
Place of publication: Roskilde
Publisher: Danmarks Tekniske Universitet, Risø Nationallaboratoriet for Bæredygtig Energi
Original language: French
Source: orbit
Source-ID: 233362
Research output: Research › Report – Annual report year: 2008

Aide mémoire sur les principes de tarification appliqués dans l'approche ERD - Analyses et proposition de lignes directrices pour la tarification de centres ERD. Rapport de travail élaboré dans l'assistance technique au Fonds de Développement de l'Électrification, Burkina Faso

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Rise National Laboratory for Sustainable Energy
Aide mémoire sur les propositions de modification ou d'ajustement des formes d'organisation de l'ERD. Rapport de travail élaboré dans l'assistance technique au Fonds de Développement de l'Electrification, Burkina Faso

Climate change and energy challenges facing developing countries - with special focus on Sub-saharan Africa

External support to local institutions: providing political leverage to weaker groups, or sustaining traditional relations of power?

Il existe tout un pan de la littérature qui montre que les institutions appuyées par les bailleurs de fonds en Afrique Subsaharienne (ASS) sont accaparées par les élites locales, mais cette littérature se demande rarement si ce comportement dépend ou non des institutions. Si c'est le cas, certaines de ces institutions peuvent cependant permettre à des groupes plus faibles d'exercer une certaine influence politique alors que d'autres maintiennent les rapports de force...
existants. Le but de cette étude, qui comporte trois études de cas d'institutions appuyées par des bailleurs de fonds au Burkina Faso, est de comprendre pourquoi des parents proches de chefs traditionnels cherchent à prendre le contrôle de la municipalité alors qu'ils ne montrent qu'un intérêt limité pour obtenir le contrôle; des groupements villageois et de la coopérative d'électricité. L'article défend l'idée que bien que les acteurs locaux soient généralement attirés par les rentes de développement liées aux institutions appuyées par les bailleurs de fonds, les parents des chefs traditionnels semblent donner une plus grande importance à la valeur symbolique des institutions qu'aux ressources économiques. L'étude renforce ainsi notre compréhension des mécanismes d'accès aux institutions appuyées par les bailleurs de fonds.

General information
State: Published
Organisations: Department of Management Engineering, UNEP DTU Partnership
Contributors: Nygaard, I.
Pages: 649-665
Publication date: 2008
Peer-reviewed: Yes

Publication information
Journal: European Journal of Development Research
Volume: 20
Issue number: 4
ISSN (Print): 0957-8811
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.21 SJR 0.477 SNIP 0.987
Web of Science (2017): Impact factor 1.323
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.12 SJR 0.617 SNIP 0.971
Web of Science (2016): Impact factor 1.11
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.17 SJR 0.589 SNIP 1.108
Web of Science (2015): Impact factor 0.72
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 0.77 SJR 0.406 SNIP 0.711
Web of Science (2014): Impact factor 0.851
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 0.77 SJR 0.541 SNIP 1.002
Web of Science (2013): Impact factor 0.564
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.69 SJR 0.434 SNIP 0.867
Web of Science (2012): Impact factor 0.553
ISI indexed (2012): ISI indexed no
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 0.78 SJR 0.63 SNIP 0.923
Web of Science (2011): Impact factor 0.679
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.353 SNIP 0.616
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.321 SNIP 0.613
Future energy systems to cope with climate and energy challenges: Africa

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Risø National Laboratory for Sustainable Energy, EECG
Number of pages: 79
Pages: 60-62
Publication date: 2008

Host publication information
Title of host publication: Risø energy report 7: Future low carbon energy systems
Place of publication: Roskilde
Publisher: Danmarks Tekniske Universitet, Risø Nationallaboratoriet for Bæredygtig Energi
Editor: Larsen, H. H.
(Denmark. Forskningscenter Risoe. Risoe-R; No. 1651(EN)).
Keywords: Risø-R-1651, Risø-R-1651(EN)
Electronic versions:
ris-r-1651.pdf
Source: orbit
Source-ID: 229258
Research output: Research - peer-review; Journal article – Annual report year: 2008

Ideas for concrete energy interventions in Africa: Paper developed for the Africa Commission

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Risø National Laboratory for Sustainable Energy
Contributors: Mackenzie, G. A., Nygaard, I., Painuly, J.
Number of pages: 21
Publication date: 2008

Publication information
Publisher: Danmarks Tekniske Universitet, Risø Nationallaboratoriet for Bæredygtig Energi
Original language: English
Keywords: Climate and energy systems, Cleaner energy and sustainable development
Source: orbit
Universal energy access and rural electrification in developing countries: Promoting investment in clean energy technologies

General information
State: Published
Organisations: Systems Analysis Division, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Risø National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Publication date: 2008

Event information
Event: BP Madrid forum on energy and sustainability
Location: Madrid (ES), 16-17 Apr

Electronic versions:
2008_168_1_.pdf
Source: orbit
Source-ID: 232621
Research output: Research › Sound/Visual production (digital) – Annual report year: 2008

Access to Energy: Experiences, Challenges and Dilemmas

General information
State: Published
Organisations: Systems Analysis Division, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Risø National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Publication date: 2007

Event information
Event: Danida Development Days
Location: Copenhagen (DK), 12-14 June

Electronic versions:
2008_179.pdf
Source: orbit
Source-ID: 236859
Research output: Research › Sound/Visual production (digital) – Annual report year: 2007

Energy Security and Sustainability in Africa

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Risø National Laboratory for Sustainable Energy
Contributors: Nygaard, I., Wamukonya, N.
Number of pages: 89
Publication date: 2007

Publication information
Publisher: Forum of Energy Ministers in Africa
Original language: English
Source: orbit
Source-ID: 236857
Research output: Research › Report – Annual report year: 2007

Révision organisationnelles d'ERD et principes ABR

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy, Systems Analysis Division, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC)
Contributors: Nygaard, I.
Publication date: 2007

Event information
Event: Direction Générale de l’Energie (DGE)
Location: Burkina Faso
Research output: Research › Sound/Visual production (digital) – Annual report year: 2007

Synthèse et recommandation

General information
State: Published
Organisations: Systems Analysis Division, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Risø National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Publication date: 2007

Event information
Event: L’atelier “Renforcer l’impact économique et social de l’Electrification rurale”
Location: Ouagadougou (BF), 19-24 Mar
Electronic versions:
2008_180.pdf
Source: orbit
Source-ID: 236860
Research output: Research › Sound/Visual production (digital) – Annual report year: 2007

Energy and development: The difficult encounter at the development interface

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy, Systems Analysis Division, UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC)
Contributors: Nygaard, I.
Publication date: 2006
Media of output: PowerPoint

Event information
Event: International Masters Programme in Environmental Studies and Sustainability Science
Location: Lund University, Lund, Sweden
Electronic versions:
2008_181.pdf
Research output: Research › Sound/Visual production (digital) – Annual report year: 2006

Institutions - invented, reinvented and changed. A challenge for development intervention

General information
State: Published
Organisations: UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC), Systems Analysis Division, Risø National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Publication date: 2006

Publication information
Original language: English
Source: orbit
Source-ID: 309339
Research output: Research › Ph.D. thesis – Annual report year: 2006

Proceedings
Institutions, social processes and power relations at village level - two options for case studies of rural electrification?

General information
State: Published
Organisations: Risø National Laboratory for Sustainable Energy
Contributors: Nygaard, I.
Pages: 8-41
Publication date: 2002

Host publication information
Title of host publication: Proceedings
Place of publication: Copenhagen
Publisher: University of Copenhagen; Institute of Geography
Source: orbit
Source-ID: 304155
Research output: Research › Article in proceedings – Annual report year: 2002

Projects:

Trade in Environmentally Sound Technologies
The project aims to contribute towards sustainable, environmentally credible and inclusive value chain integration and trade in technologies, by providing support to developing countries to objectively assess and understand the opportunities, benefits and challenges of liberalized trade in environmentally sound technologies, including the EGA as an important means of implementation, and to host dialogues with a broad range of stakeholders to discuss EGA and environmental technology trade opportunities and perspectives in developing countries, and to build related capacities of developing country stakeholders.

Nygaard, I., Project Manager, Department of Management Engineering, UNEP DTU Partnership
Hansen, U. E., Project Manager, Department of Management Engineering, UNEP DTU Partnership
Gregersen, L. E., Project Participant, Department of Management Engineering, UNEP DTU Partnership
01/05/2017 → 01/06/2018
Collaborators: University of Malaya, African Centre for Technology Studies
Documents:
Est trade two pager
Project: Research

Kenya Miniwind: Supporting sustainable mini-grid development and local production of wind turbines using the case of Kenya
With the long-term objective to reduce poverty, stimulate economic growth and increased sustainable energy supply, the project aims to develop a market for low-cost, partly locally produced kW wind turbines for rural electrification. The project will demonstrate the technical, social and economic feasibility of integrating a kW wind turbine into a smart solar-powered mini-grid in Kenya, and aims to develop this concept into a viable business for the private companies involved, having the technical, economic and management capacity to exploit it. The expected long term impact of the project are (i) local jobs in production, installation, O&M of low cost kW turbines in mini-grids; and (ii) reduced cost of electricity provided by mini-grids, benefitting disadvantaged communities. The project will bring together communities, public institutions and commercial companies.
TENTRANS: Tendering sustainable energy transitions

The overall objective of the project is to contribute to a transition toward sustainability in the energy sector of emerging economies, including sustainable development of local communities and local industries. The project will analyse the developmental implications of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) implemented in South Africa (SA) with a focus on the effects of wind power projects on local industrial development and socioeconomic development in local communities. The project will contribute to enhance the research capacity of the younger researchers involved. It will build upon and contribute to significantly advance the literature on sustainability transitions in developing countries through an innovative combination of complementary perspectives on institutional change, global value chains and infant industry development. It will draw on in-depth fieldwork carried out in SA based on qualitative research methods, such as interviews, documents, direct observations and project inventories. Through direct engagement with key policy makers and stakeholders, the project will seek to ensure that local developmental impacts are prioritized and ensured in renewable energy tendering schemes currently being implemented in SA, other countries in Sub-Saharan Africa (SSA) and internationally. The project will contribute to socially inclusive models of implementation by private companies involved in large-scale wind power projects by cooperating with the wind industry associations in Denmark and SA and through direct consultations. Finally, the project serves as a pilot research for a subsequent five year research programme, which will be up-scaled to include solar PV, concentrated solar power (CSP) and hydro-power, and additional countries in SSA, such as Ethiopia, Kenya, Ghana and Malawi.

**Collaborators:** Danish Institute for International Studies, University of Cape Town, University of Stellenbosch

**Project:** Research

---

**Capability transfer and upgrading in PV value chains in Sub Saharan Africa**

Davy, E., PhD Student, Department of Management Engineering
Nygaard, I., Main Supervisor, Department of Management Engineering
Dhar, S., Supervisor, Department of Management Engineering

Institut stipendie (DTU)
01/12/2017 → 30/11/2020

**Award relations:** Capability transfer and upgrading in PV value chains in Sub Saharan Africa

**Project:** PhD

---

**Innovative Approaches to Rural Electrification in Africa: Organisational models that can accelerate and scale up access to modern energy services for rural households in Sub-Saharan Africa**

Pedersen, M. B., PhD Student, Department of Management Engineering
Nygaard, I., Main Supervisor, Department of Management Engineering
Olsen, K. H., Examiner, Department of Management Engineering
Mulugetta, Y., Examiner
Raven, R., Examiner

Institut stipendie (DTU) Samf.
15/12/2012 → 22/06/2017

**Award relations:** Innovative Approaches to Rural Electrification in Africa: Organisational models that can accelerate and scale up access to modern energy services for rural households in Sub-Saharan Africa

**Project:** PhD

---

**Governing Transition towards Low-carbon societies: The Role of Institutions in Designing Low Carbon Development Strategies**

Henrysson, M., PhD Student, Department of Management Engineering
Hinostroza, M. L., Main Supervisor, Department of Management Engineering
Nygaard, I., Examiner, Department of Management Engineering
Funder, M., Examiner
Jerneck, A., Examiner
Funder, M., Examiner
Jerneck, A., Examiner
Institut/centerfinansieret
01/03/2012 → 25/09/2017
Award relations: Governing Transition towards Low-carbon societies: The Role of Institutions in Designing Low Carbon Development Strategies
Project: PhD

Analytical approaches to integrating agriculture and forestry in low carbon and resilient development strategies
Kongsager, R., PhD Student, Department of Management Engineering
Olhoff, A., Main Supervisor, Department of Management Engineering
Mertz, O., Supervisor
Nygaard, I., Examiner, Department of Management Engineering
Hansen, C. P., Examiner
Murdiyarso, D., Examiner
Hansen, C. P., Examiner
Murdiyarso, D., Examiner
Institut/centerfinansieret
01/02/2012 → 24/08/2015
Award relations: Analytical approaches to integrating agriculture and forestry in low carbon and resilient development strategies
Project: PhD

The effectiveness of South-South Cooperation: Climate Change Technology Transfer from Brazil to Latin American Countries
Bry, S., PhD Student, Risø National Laboratory for Sustainable Energy
Hinostroza, M. L., Main Supervisor, Risø National Laboratory for Sustainable Energy
Haselip, J. A., Supervisor, Risø National Laboratory for Sustainable Energy
Nygaard, I., Examiner, Risø National Laboratory for Sustainable Energy
Christensen, S. F., Examiner
Milani, C., Examiner
Christensen, S. F., Examiner
Milani, C., Examiner
Institut/centerfinansieret
01/02/2011 → 19/12/2014
Award relations: The effectiveness of South-South Cooperation: Climate Change Technology Transfer from Brazil to Latin American Countries
Project: PhD

Community Based Adaptation to climate change in Sub Saharan Africa - the role of local institutions and social capital
Schaer, C., PhD Student, Risø National Laboratory for Sustainable Energy
Nygaard, I., Main Supervisor, Risø National Laboratory for Sustainable Energy
Hahonou, E. K., Supervisor
Olsen, K. H., Examiner, Risø National Laboratory for Sustainable Energy
Funder, M., Examiner
Vincent, K., Examiner
Funder, M., Examiner
Vincent, K., Examiner
Institut/centerfinansieret
15/10/2010 → 30/10/2015
Award relations: Community Based Adaptation to climate change in Sub Saharan Africa - the role of local institutions and social capital
Project: PhD

The transfer of technologies for climate change mitigation and industrial development in developing countries
Hansen, U. E., PhD Student, Risø National Laboratory for Sustainable Energy
Nygaard, I., Main Supervisor, Risø National Laboratory for Sustainable Energy
Fold, N., Supervisor
Christensen, J. M., Examiner, Risø National Laboratory for Sustainable Energy
Romijn, H. A., Examiner
**2GBIONRG: Biofuel Production from Lignocellulosic Materials**

The overall objective of the 2GBIONRG project is to develop sustainable technologies for production of 2nd generation biofuels (biogas, bioethanol and biodiesel) from lignocellulosic waste material in developing countries in Africa. In addition, it is also to utilize residuals from the production as fertilizer improving soil fertility and food security. The suggested technologies will make it possible to switch from a society depending more and more on fossil energy to a modern biomass based society. Ghana will be used as a model country. We will develop and adopt sustainable biofuel production systems for three different types of communities: rural villages, cooperatives and large towns. The project is supported by the Danida Fellowship Centre.

Bolwig, S., Project Participant, Department of Management Engineering, Systems Analysis, DTU Climate Centre, Energy Systems Analysis
Nygaard, I., Project Participant, Department of Management Engineering, UNEP Risø Centre

**Project: Research**

**Green Energy and Low Carbon Development**

The Danida Fellowship Course “Green Energy and Low Carbon Development” is a three-week training course to be held in Copenhagen, Denmark, 19 May – 6 June 2014. The course will explore green energy and low carbon development business opportunities in developing countries. The course is relevant for managers and decision makers from the private and public sectors seeking to develop their skills within improved energy efficiency, renewable energy and new markets related to trading in CO2 reductions. The course supports that new ideas are developed into realistic action plans for business development and enabling frameworks for public-private partnerships. The course is being held for the 5th year in 2014. The contract is for one year at a time.

Olsen, K. H., Project Manager, Department of Management Engineering, UNEP Risø Centre
Fenhann, J. V., Project Participant, Department of Management Engineering, UNEP Risø Centre
Lütken, S., Project Participant, Department of Management Engineering, UNEP Risø Centre
Nygaard, I., Project Participant, Department of Management Engineering, UNEP Risø Centre
Lybecker, S., Project Participant, Department of Management Engineering, DTU Executive School of Business

**Project: Research**

**Activities:**

**Potential for integration of small wind turbines in mini-grids in East Africa**

**Period:** 17 Oct 2018 – 19 Oct 2018

Ivan Nygaard (Speaker)

UNEP DTU Partnership

Department of Management Engineering
Degree of recognition: International
Documents:
Ivan Nygaard, Presentation of wind measurement conference paper, mallorca final

Related event
International Conference on Solar Technologies & Hybrid Mini-grids
17/10/2018 → 19/10/2018
Palma de Mallorca, Spain
Activity: Talks and presentations › Conference presentations

Bæredygtighedsmål – hot or not?
Period: 13 Dec 2017
Ivan Nygaard (Panel member)
Department of Management Engineering
UNEP DTU Partnership

Description
Paneldeleger på konferencen, Energi på toppen: Hvad koster bæredygtighed ? afholdt I anledning af Dansk Fjernvarme's 60 års jubilæum, Berlinske Media, København
Degree of recognition: National
Documents:
Program - Energi på Toppen - 13-12-2017

Related external organisation
Dansk Fjernvarme Forening
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Trade in Environmentally Sound Technologies
Period: 5 Dec 2017
Ivan Nygaard (Speaker)
Department of Management Engineering
UNEP DTU Partnership

Description
Presentation at Stakeholder Workshop on Trade in Environmentally Sound Technologies in the East African Region, ACTS Kenya.
Degree of recognition: International

Related event
Stakeholder Workshop on Trade in Environmentally Sound Technologies in the East African Region
05/12/2017 → 05/12/2017
Nairobi, Kenya
Activity: Talks and presentations › Conference presentations

How can we stimulate and exploit a market in Africa for small wind turbines?
Period: 2 Oct 2017
Ivan Nygaard (Invited speaker)
Department of Management Engineering
UNEP DTU Partnership

Description
Presentation in the session: Visionary projects in wind energy
Degree of recognition: International
Documents:
wind energy denmark Ivan Nygaard
Related event

WIND ENERGY DENMARK 2017
02/10/2017 → 03/10/2017
Herning, Denmark
Activity: Talks and presentations › Conference presentations

Reviewer for the Swedish Research Council FORMAS (External organisation)
Period: 1 Aug 2017 → 15 Sep 2017
Ivan Nygaard (Member)
Department of Management Engineering
UNEP DTU Partnership

Description
Member of evaluation panel for the Swedish Research Council for development research. Natural, engineering and environmental sciences (UF-3)
Degree of recognition: International
Links:
https://www.vr.se/inenglish/researchfunding/assessment/reviewpanels/developmentresearch/uf3naturalengineeringandenvironmentalsciences.4.7e727b6e141e9ed702b141c9.html

Related external organisation

Reviewer for the Swedish Research Council FORMAS
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

Working in a broad partnership in the Kenya MiniWind project
Period: 26 Jun 2017
Ivan Nygaard (Invited speaker)
Department of Management Engineering
UNEP DTU Partnership
Degree of recognition: National
Documents:
DMDP meeting DTU 26.06.17 Ivan Nygaard final

Related event

Danida Market Development Partnership's Information Meeting
26/06/2017 → 26/06/2017
Activity: Talks and presentations › Conference presentations

Policy and planning related to climate change in developing countries
Period: 11 May 2017
Ivan Nygaard (Invited speaker)
Department of Management Engineering
UNEP DTU Partnership

Description
Presentation at the launch of DTU Renewable Energy Policy, Planning and Integration Advice Group (REPLI). Danish Technical University
Degree of recognition: International
Documents:
DMDP meeting DTU 26.06.17 Ivan Nygaard final
Links:

Related event
launch of DTU Launch of Renewable Energy Policy, Planning and Integration Advice Group (REPLI)
11/05/2017 → 11/05/2017
Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

Energy Research & Social Science (Journal)
Period: 13 Mar 2017 → 30 Jun 2018
Robert Byrne (Editor)
Ulrich Elmer Hansen (Editor)
James Arthur Haselip (Editor)
Ivan Nygaard (Editor)
David Ockwell (Editor)
Department of Management Engineering
UNEP DTU Partnership
Description
Special Issue on uptake and diffusion of solar power in Africa
Degree of recognition: International
Links:
https://ean.hypotheses.org/112

Related journal

Energy Research & Social Science
2214-6296
Central database
Activity: Research › Journal editor

Reviewer for the Swedish Research Council FORMAS (External organisation)
Period: 1 Aug 2016 → 15 Sep 2016
Ivan Nygaard (Member)
Department of Management Engineering
UNEP DTU Partnership
Description
Member of evaluation panel for the Swedish Research Council for development research. Call on resilience and sustainability
Degree of recognition: International

Related external organisation

Reviewer for the Swedish Research Council FORMAS
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

Niche development and upgrading in the PV value chain: The case of local assembly of PV panels in Senegal
Period: 8 Jun 2016
Ivan Nygaard (Speaker)
Department of Management Engineering
UNEP DTU Partnership
Description
Degree of recognition: International
Documents:
local assembly of PV modules in Senegal, EU-SPRI conference 2016 final
Related event

2016 Annual Conference of the EU-SPRI Forum
07/06/2016 → 10/06/2016
Lund, Sweden
Activity: Talks and presentations › Conference presentations

Regional Capacity Building Workshop for Technology Needs Assessment (TNA) project: Barrier analysis, enabling frameworks and technology action plans
Period: 23 Feb 2016 → 26 Feb 2016
Ivan Nygaard (Lecturer)
Department of Management Engineering
UNEP DTU Partnership
Degree of recognition: International
Links:
http://www.tech-action.org/Events/Regional-CB-Workshop-Senegal-February-2016 (Presentations can be downloaded from project webpage)

Related event

Regional Capacity Building Workshop for Technology Needs Assessment (TNA) project
23/02/2016 → 26/02/2016
Dakar, Senegal
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

Energy transition research in Asia – useful for practitioners of development cooperation?
Period: 27 Aug 2015
Ivan Nygaard (Panel member)
Department of Management Engineering
UNEP DTU Partnership

Related event

The International Sustainability Conference 2015
25/08/2015 → 28/08/2015
Falmer, Brighton, United Kingdom
Activity: Talks and presentations › Conference presentations

Private sector investment in the biofuel value chain in Ghana seen in an innovation system perspective
Period: 26 Aug 2015
Ivan Nygaard (Speaker)
Department of Management Engineering
UNEP DTU Partnership
Degree of recognition: International
Documents:
Præsentation ITS conference final

Related event

6th International Sustainability Transitions Conference, Brighton (UK)
25/08/2015 → 28/08/2015
Brighton, United Kingdom
Activity: Talks and presentations › Conference presentations

Environmental Science & Policy (Journal)
Period: 1 Aug 2015 → 31 Dec 2017
Ulrich Elmer Hansen (Editor)
Ivan Nygaard (Editor)
Henny Romijn (Editor)
Anna Wieczorek (Editor)
Linda M. Kamp (Editor)
Laurens Klerkx (Editor)

Department of Management Engineering
UNEP DTU Partnership

Description
Special issue on sustainability transitions in developing countries
Degree of recognition: International
Links:
https://doi.org/10.1016/j.envsci.2017.11.009

Related journal
Environmental Science & Policy
1462-9011
ISSI indexed (2013): ISI indexed yes
Central database
Activity: Research › Journal editor

Regional Capacity Building Workshops for Technology Needs Assessment (TNA) project, Prioritization of technologies
Period: 22 Jun 2015 → 26 Jun 2015
Ivan Nygaard (Lecturer)
Department of Management Engineering
UNEP DTU Partnership
Links:

Related event
Regional Capacity Building Workshops for Technology Needs Assessment (TNA) project. Prioritization of technologies
22/06/2015 → 26/06/2015
Dakar, Senegal
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

Barrier analysis and enabling frameworks
Period: 12 May 2015 → 13 May 2017
Ivan Nygaard (Speaker)
Department of Management Engineering
UNEP DTU Partnership

Description
Barrier analysis and enabling frameworks, Presentation at TNA internal capacity building workshop, UN-CITY, Copenhagen, May 12-13, 2015
Documents:
Presentation barrier analysis and enabling framework c

Related event
Internal capacity building workshop for Technology Needs Assessment (TNA) project
12/05/2015 → 13/05/2015
Copenhagen, Denmark
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities
Measures identified in technology action plans to enhance national capacity: The case of Solar PV in Africa  
Period: 14 Oct 2014  
Ivan Nygaard (Invited speaker)  
Department of Management Engineering  
UNEP DTU Partnership  

Description  
2014: Measures identified in technology action plans to enhance national capacity: The case of Solar PV in Africa.  
UNFCCC (Technology Executive Committee) workshop on strengthening national systems of innovation in developing countries, Bonn, Germany, 13/10/14  
Degree of recognition: International  
Documents:  
Presentation TEC meeting UDP ivan nygaard  

Related event  
Strengthening national systems of innovation in developing countries. UNFCCC (Technology Executive Committee) workshop  
13/10/2014 → 13/10/2014  
Bonn, Germany  
Activity: Talks and presentations › Conference presentations  

Prospects for investments in Large-scale, grid connected solar energy in Africa  
Period: 24 Jun 2014  
Ivan Nygaard (Speaker)  
Department of Management Engineering  
UNEP DTU Partnership  
Degree of recognition: International  
Documents:  
Prospects for investment in large-scale, grid-connected solar energy in Africa final ver. 15.09 link  

Related event  
Opportunity Africa: Sustainable Energy Investment in Africa, DANIDA conference held in the UN City, Copenhagen  
24/06/2014 → 25/06/2014  
Copenhagen, Denmark  
Activity: Talks and presentations › Conference presentations  

Measures for the Diffusion of Solar PV are Aligned in Technology Action Plans for Six Countries in Africa  
Period: 27 Mar 2014  
Ivan Nygaard (Speaker)  
Department of Management Engineering  
UNEP Risø Centre  

Related event  
1st Africa Photovoltaic Solar Energy Conference and Exhibition  
27/03/2014 → 29/03/2014  
Durban, South Africa  
Activity: Talks and presentations › Conference presentations  

Wiley Interdisciplinary Reviews: Energy and Environment (Journal)  
Period: 16 Apr 2010 → …  
Ivan Nygaard (Editor)  
Department of Management Engineering  
UNEP DTU Partnership
Description
Associated Editor
Degree of recognition: International
Links:
http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)2041-840X (Link to journal)

Related journal
Wiley Interdisciplinary Reviews: Energy and Environment
2041-8396
Central database
Activity: Research › Journal editor