

Sustainable Energy Policy for Papua New Guinea Incorporating Mandatory Environmental Impact Assessment (EIA)

¹Ora Renagi and ²Jacob Adejare Babarinde

Papua New Guinea University of Technology, Private Mail Bag Service, Lae 411, Morobe
Province, Papua New Guinea

¹ora.renagi@pnguot.ac.pg; ²jacob.babarinde@pnguot.ac.pg

Abstract

This policy paper presents some key policy implications of the current drive in Papua New Guinea to develop a Sustainable Energy Policy, coinciding with demonstrated national efforts aimed at designing a Sustainable Land Use Policy for the nation. The central thesis of the paper is that registered urban planners can play an imperative role towards actualizing a sustainable energy policy in Papua New Guinea. Registered planners uniquely hold the key to approving or rejecting applications for energy projects, which must be supported with standard environmental impact assessment (EIA) reports to be eligible for planning consent through the Department of Environment. However, for this to be possible the nation must overcome some challenges, including long-term funding and capacity building, without which the abundant renewable energy resources possessed by the country may amount to a colossal waste. The paper makes some policy recommendations for overcoming these challenges, including a careful design, funding and implementation of the proposed National Sustainable Land Use Policy and the proposed National REDD+ Strategy, backed by smart capacity building and energy research programs by the universities, as well as sustained public participation.

Keywords: Sustainable energy policy, sustainable land use policy, EIA, REDD+, Unitech, Papua New Guinea

1. Introduction

This paper examines some key policy and practice implications of the current drive in Papua New Guinea to develop a Sustainable Energy Policy for the nation. Interestingly, there is also an on-going debate in the country aimed at developing a National Sustainable Land Use Policy for the nation. This paper is, therefore, well-timed as a means of generating a stimulating discourse for strengthening bottom-up participation in the drafting and implementation of the two national policies. Public participation is a sticking point in policy formulation and implementation around the world because it is a *sine qua non* for the acceptability, sustainability and success of any public policy or program.

According to the World Bank's Technical Paper No. 154 (1991), energy has consistently been the Bank's second largest lending sector in recent years. Within the energy sector, power projects have accounted for most of the World Bank's lending. Large hydroelectric and thermoelectric power projects usually have impacts that are varied and potentially very significant. They are often highly controversial as well, from the standpoint of public acceptance.

Environmental impact assessment (EIA), according to the World Bank's Technical Paper No. 154, is the formal process used to predict the environmental consequences (positive or negative) of a plan, policy, program or project, prior to the decision to move forward with the proposed action. Formal impact assessments may be governed by rules of administrative procedure regarding public participation and documentation of decision-making, and may be subject to judicial review. As a mitigation approach, an impact assessment may propose measures to adjust impacts to acceptable levels or to investigate new technological solutions.

The purpose of environmental impact assessment is to ensure that decision makers consider the environmental impacts of a proposed project or program when deciding whether or not to proceed with the project or program (The International Association for Impact Assessment (IAIA); <http://www.preventionweb.net/organizations/336>; accessed on 12 November, 2017). The IAIA defines an environmental impact assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made." EIAs are unique in that they do not require adherence to a predetermined environmental outcome, but rather they require decision makers to account for environmental values in their decisions and to justify those decisions in light of detailed environmental studies and public comments on the potential environmental impacts. This definition rhymes with the provisions of Papua New Guinea's Environment Act, 2000.

Therefore, whether from the viewpoint of the United Nations, the World Bank or National Governments, the *Directives* or *Guidelines* on Environmental Assessment generally aim to provide a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation of projects, plans and programmes with a view to reducing their adverse environmental impacts. The Directives or Guidelines ensure *public participation* in decision-making and thereby strengthen the quality of decisions. Hence, the Directives on Environmental Assessment are crucial tools for sustainable development.

General and industry-specific assessment methods are available in many countries. These include: (i) Industrial products – for which product environmental life cycle analysis (LCA) is used for identifying and measuring the impact of industrial products on the environment. These EIAs consider activities related to extraction of raw materials, ancillary materials, equipment, production, use, disposal and ancillary equipment; (ii) Genetically modified plants - Specific methods are available to perform EIAs of genetically modified organisms, such as, GMP-RAM and INOVA; (iii) Fuzzy logic - EIA methods need measurement data to estimate values of impact indicators. However, many of the environmental impacts cannot be quantified, e.g. landscape quality, lifestyle quality and social acceptance. Instead information from similar EIAs, expert judgment and community sentiment are employed. Approximate reasoning methods known as fuzzy logic can be used. A fuzzy arithmetic approach has also been proposed and implemented using a software tool, called *TDEIA*.

At the end of the project, an audit evaluates the accuracy of the EIA by comparing actual to predicted impacts. The objective is to make future EIAs more valid and effective. Two primary considerations are: (i) Scientific - to examine the accuracy of predictions and explain errors; and (ii) Management - to assess the success of mitigation in reducing impacts.

Audits can be performed either as a rigorous assessment of the null hypothesis or with a simpler approach comparing what actually occurred against the predictions in the EIA report. After an EIA, the precautionary and polluter pays principles may be applied to decide whether to reject, modify or require strict liability or insurance coverage to a project, based on predicted harms.

Arguably, Papua New Guinea is currently an emerging-developing nation with enormous natural resources. Therefore, the nation cannot afford to wait any longer before it puts its house in order by putting in place realistic and sustainable energy and land use policies that can guarantee the attainment of sustainable development and city liveability (Babarinde, Holis and Mc-Adu, 2016). Such policies will also speed up Papua New Guinea's match towards achieving the Millennium Development Goals and its Vision 2050.

The paper is divided into six sections. Section 1 presents an introduction to the paper, followed by an analysis of the research problem in section 2. The conceptual framework is presented in the third section, while section four presents the research method. The findings and discussion are presented in the fifth section, while the concluding section outlines the major policy implications of the paper.

2. Nature of the Problem, Research Question and Contribution to Knowledge

Approved Guidelines for EIA, with some variations from country to country, often stipulate that every EIA Report submitted to the Local Planning Authority must specify a Plan in the report detailing arrangements made for achieving adequate targets of *Environmental Management, Training and Monitoring* to guarantee the sustainability of the project (World Bank, 1991). In order to identify the key challenges that these three requirements portend for Papua New Guinea, perhaps it is informative to highlight the relevant portions of the EIA Guidelines issued by the World Bank as follows:

In terms of *Management* and *Training*, the most critical environmental decision associated with electrical power transmission line construction and operation is the route selection. Environmental scientists need to work as a team with the transmission line engineers in route selection and development of mitigative measures. Depending on the education and experience of the staff, training in the environmental management of electrical power transmission lines may be warranted. The major environmental specialties related to the environmental management of electrical power transmission lines are ecological impact and social impact assessments. Environmental training and management may be warranted for ROW (Right of Way) maintenance techniques, including the proper use of chemical and mechanical clearing methods. The training should be done as part of the environmental assessment phase of the project and with assistance from the environmental consultant. If at all possible, the project sponsor's environmental staff should be involved in the environmental assessment study. This will ensure an understanding of the environmental aspects of the project. In particular, staff workers must have an understanding of the rationale for the recommended mitigation and monitoring that they may be implementing. Local, regional, and national environmental agencies involved in the review and approval of the project may also need training to monitor and enforce compliance during the construction and operation of the project. As far as *Monitoring* is concerned, the monitoring requirements for transmission lines will be dependent on the type of environmental resources involved and the degree to which they are affected. Monitoring construction activities may be required to assure that negative land use and/or ecological impacts are avoided and

proper mitigation measures are employed. Monitoring of these impacts will be short-term (e.g., weeks) and occur along the line as it is constructed. Monitoring may be especially critical at crossings of major water bodies or wetlands, near wildlands and cultural properties. The actual monitoring will be based on visual inspections of the materials being used, the construction practices, and mitigation measures. Monitoring of ROW maintenance activities is also to be required to assure proper vegetation control methods, to prevent invasion of exotic species, and to support decisions which take advantage of possible benefits to wildlife.

With regards to the above Guidelines, it is contended that Papua New Guinea may find it very challenging to enforce its own bespoke and locally designed Energy Policy due to an acute shortage of relevant manpower, particularly urban planners who uniquely hold the key to approving or rejecting project and development proposals. This explains why the country is currently finding it challenging, if not impossible, to enforce its own standard physical planning regulations (e.g. the Physical Planning Act 1989), which otherwise should enable the country to keep its towns and cities *liveable* (Babarinde, 2015). For example, Port Moresby, which mirrors most of the other cities in PNG, has been ranked as the third least liveable city in the world (The Economist Intelligence Unit Limited, 2015; Babarinde, Holis and Mc-Adu, 2016). The good news, however, is that the shortage of urban planners in the country will hopefully become history if current proposals by the PNG University of Technology (Unitech) to commence a Master's program in Urban and Regional Planning in 2018 becomes a reality (DSLS-Unitech, 2017).

Therefore, this paper is designed to exploit the link between *standard urban planning* and *sustainable energy policy* because the latter depends on the former in order for it to be functional and sustainable. For example, no functional installation of energy facilities, such as electricity right of way (ROW), can be accomplished if land has not been properly subdivided into standard plots/lots that are approved by the local planning authority for horizontal and vertical developments to proceed. On the other hand, no town or city can survive without adequate energy supply.

In addition to relevant manpower shortages in the country, the proposed Energy Policy for PNG may also be hindered by financial problems unless the current budget cuts of the Central Government are quickly reversed. Even then, the funding situation will depend on positive signals being received from the wider global economy that dictates the prices of oil and other natural resources that sustain the economy of PNG. There is a dearth of research findings focusing on the practical implications of an Energy policy for Papua New Guinea. This paper is intended to bridge this gap. The paper answers the following research question in an attempt to contribute to the knowledge of the subjects of Energy policy and EIA in Papua New Guinea:

“What role can urban planners play toward the actualisation of a sustainable energy policy for Papua New Guinea”?

3. Conceptual Framework

To facilitate a quick understanding of the issues involved in the formulation and implementation of an Energy Policy for PNG and the role of professionals, we have adopted an integrated Conceptual Framework (Figure 1) that gleans from the theoretical and

practical attributes of nine (9) mutually beneficial urban development concepts. Occupying a central position, PNG's Sustainable National Land Use Policy will benefit a lot from a healthy association with four *hard* variables and four *soft* variables. The four *hard* variables are: (i) Long-term Funding (ii) Competitive Capacity Building and Research (iii) National Energy Policy, and (iv) National REDD+ Strategy (NRS). **REDD+** refers to strategies to “**R**educe Emissions from **D**eforestation and forest **D**egradation, and plus (+) conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks. The four *soft* variables are: (i) Public Participation (ii) Enforcement of Environmental Regulations (iii) EIA/Land-use Planning, and (iv) Sustainable Economic Opportunities. It should be noted that both *hard* and *soft* variables are equally important, just like the “soft and hard costs” terms used by project financiers in preparing pro-forma cash flows for purposes of securing project loans from banks or other lenders.

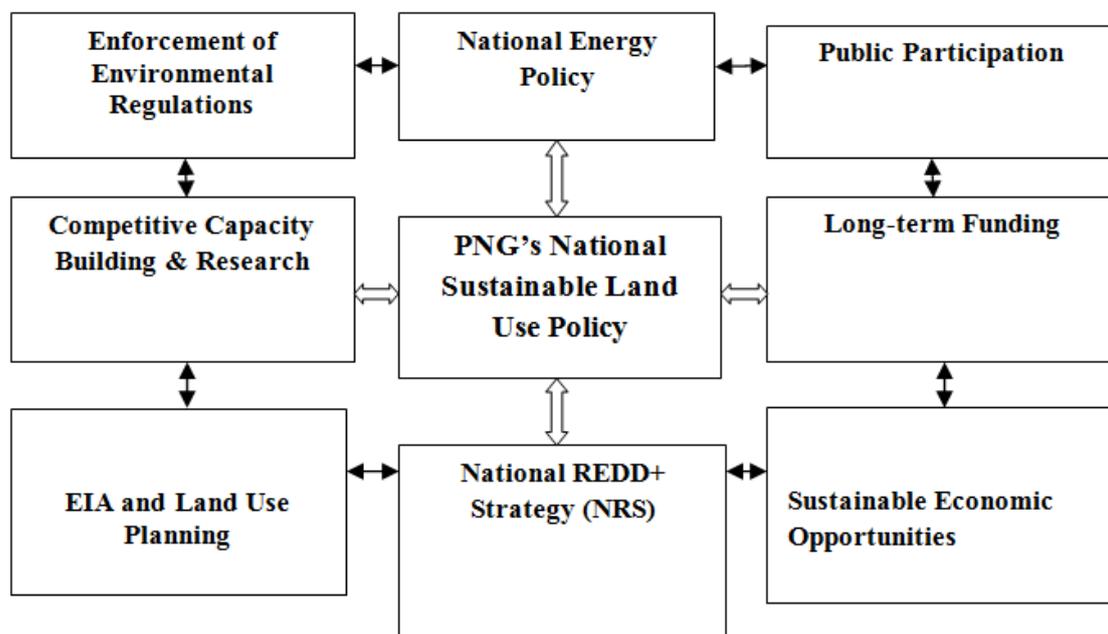


Figure 1: Conceptual Framework
 Source: Authors (2017)

Therefore, in order for PNG to derive maximum benefits from this conceptual framework, all the eight (8) constituent variables (sub-systems of the main *Land Use Policy* system) should be accorded equal attention by the Government and other policy stakeholders when developing and funding a National Sustainable Land Use Policy for the country.

4. Method

The paper has been prepared using a combination of oral interviews, secondary data, and the authors' field experiences accumulated over more than 30 years of consultancy services in the areas of environmental impact assessment of projects and policy analysis for urban management and related environmental issues in several countries around the world. Although the authors have produced professional EIA reports on many projects for various clients in several countries

around the world, ethical and client confidentiality rules prevent them (the authors) from disclosing data concerning such projects in this paper. Therefore, the paper is mainly qualitative in nature.

The authors have benefitted immensely from their individual affiliations with several international professional and educational associations, which regularly collaborate with National Governments and International Organisations on policy analysis related to project planning, development, management and monitoring. Such affiliations have enriched the quality of this paper.

5. Findings and Discussion

Our findings are discussed under four separate sub-headings: (i) PNG National Energy Policy (ii) PNG Renewable Energy Resources (iii) PNG Climate Change Targets; and (iv) Unitech's Role in Capacity Building and Research.

5.1 PNG National Energy Policy

Our initial investigations focusing on published public policy documents reveal that Government deeply treasures Energy as the engine of economic growth in Papua New Guinea, while it also recognises the need to manage energy assets in an efficient and sustainable manner. Accordingly, the Government of the Independent State of Papua New Guinea is currently pursuing the development of Energy resources to guarantee the attainment of four key objectives. These are: (i) To ensure that PNG attains sustainable Energy exports (ii) To ensure that the cost of unit Energy is reduced for PNG (iii) To ensure that PNG is an internationally competitive country to invest in, and (iv) To meet PNG's economic development goals while protecting and conserving the environment.

Our investigations further reveal that a National Energy Policy has been drawn up by the Department of Petroleum and Energy and the Department of Public Enterprise. Currently, the energy sector has assets in 2 key energy resources, namely: (i) Fossil fuels (petroleum, natural gas and coal) and (ii) Hydro, geothermal, solar, wind, wave, tidal, ocean current, and biofuel. PNG has huge hydro power potentials estimated at 15,000 MW, and Government has already finalised a proposal to establish the National Energy Authority of Papua New Guinea. Furthermore, plans have been finalised to unbundle PNG Power into distinct entities operating generation, transmission, distribution, retailing and regulation.

Currently, PNG Power Limited (PPL) operates as a fully integrated power authority. The Nationally-owned Power Company has authority to sell Power Purchase Agreement and has developed a 15-year (2015 - 2030) plan for this purpose (PNG Power, 2016). The PNG Government has been encouraging Independent Power Producers (IPP) to develop renewable energy resources involving the use of (i) Natural Gas (ii) the development of Hydro potentials; and (iii) Geothermal options (Petroleum and Energy Department, 2015). There is a National Electrification Rollout Plan with the goal of recording at least 70% of households in the country being powered by the Year 2030 (The Earth Institute, 2016).

5.2 PNG Renewable Energy Resources

Our findings indicate that PNG is blessed with abundant renewable energy resources. These include: (i) Biomass (Markham Valley) (ii) Oil Palm Waste (WNB, Oro, and Milne Bay) (iii) Geothermal (WNB, ENB, Niuailan, Bougainville and Oro Central) (iv) Potential Hydro (Mongi/Bulum, Upper Lake Hargy and Upper Warongoi); and (v) Hydro, Solar and Wind (Nation-wide).

5.3 PNG Climate Change Targets

As indicated under the conceptual framework (Figure 1), addressing climate change is an integral cornerstone of the National Sustainable Land Use Policy of PNG, which currently features as one of the key issues being addressed as part of the National REDD+ Strategy (NRS). The Government of PNG is currently preparing to implement REDD+ as part of its contribution to tackle global climate change through the Paris Agreement that was launched in 2015. REDD+ will contribute to PNG achieving its vision of a more environmentally sustainable development pathway (UNDP, 2017; www.pngreddplus.org.pg, accessed on 11 September, 2017).

Findings also indicate that Energy generation in PNG will reach 50% through the use of renewable resources by Year 2030. There are plans to achieve zero net emission by Year 2050. COP 23 will be achieved by National Determined Contributions (NDCs). Workshops will be arranged around the country to form the basis of a TWG to formulate NDCs, while the Government is finalising preparation of an action plan to meet the targets. As funding is also an integral part of the Energy Policy, Government is actively engaging with international partners to raise funds through the (i) Green Climate Fund, and (ii) the REDD+ program.

To demonstrate Government's serious support for the development of a National Sustainable Land Use Policy for PNG, a 4-day Lands and Physical Planning Sector Planning Retreat, fully funded by the UNDP FCPF Project, was successfully organised in Madang City, Madang Province, between 25th and 29th September, 2017. Currently, "the Government, through the Climate Change and Development Authority (CCDA) and PNG Forest Authority (PNGFA) with financial support of the UNDP's World Bank's Forest Carbon Partnership Facility (FCPF), is progressing the implementation of REDD+ Readiness Phase in order to establish capacities for efficient management of REDD+ and the National REDD+ Strategy (NRS) in PNG" (DLPP, 2017).

5.4 Unitech's Role in Capacity Building and Research

Oral interviews held with a random sample of stakeholders of the PNG University of Technology, including PNG Power Limited (PPL), indicate that Unitech must continue to develop appropriate curricula that are geared towards delivering quality graduates for immediate employment in the energy industry. On their part, academic departments at Unitech must be diligent and proactive in conducting research programs in Energy Efficiency (e.g. using smart grids), Rural Electrification (using mini-grids), Solar Systems, Wind and Tidal Energy. Research should also focus on Energy Storage Systems, Biomass, Developing a Technology Transfer Centre (Renewable Energy), and the Development of Patents, Innovation and Entrepreneurial Hub.

5.5 Research Question Revisited

To answer our research question in this paper, we interviewed ten senior urban planners based in Port Moresby and Lae cities in order to assess the quality of some EIA Reports that had been produced in the recent past. Four of the planners interviewed are working as consultants while six of them are working in the public sector. Our oral interviews sought to ascertain whether or not the EIA Reports submitted for planning approval really satisfied the *test of minimum contents*. A reminder of our research question:

“What role can urban planners play towards the actualisation of a sustainable energy policy in Papua New Guinea”?

Our findings reveal that planners in the country are doing a good job to adhere to international guidelines for EIA Reports, but there is need for improvement. Based on sampled best practices (e.g. World Bank Guidelines) and the authors’ field experiences, it would be necessary for the Government of PNG (through the DLPP) to begin to strictly enforce compliance with standard EIA Guidelines by all urban planners producing EIA Reports for Energy projects. The following list indicates our recommended minimum contents of a good EIA Report (prepared and signed by a Registered Urban Planner), which should feed into the preparation of a Sustainable Energy Policy for PNG:

- i) Executive Summary;
- ii) Policy, Legal and Administrative Framework;
- iii) Description of the Proposed Project;
- iv) Description of the Environment;
- v) Significant Environmental Impacts;
- vi) Analysis of Alternatives;
- vii) Mitigation Management Plan;
- viii) Environmental Management and Training;
- ix) Monitoring Plan;
- x) Inter-Agency and Public/NGO Involvement;
- xi) List of References; and
- xii) Appendices:
 - a) List of Environmental Assessment Preparers;
 - b) Records of Inter-Agency and Public/NGO Communications; and
 - c) Data and Unpublished Reference Documents.

6. Conclusion and Policy Implications

Apart from its role in producing engineering graduates for the country, the role of the PNG University of Technology in capacity building for EIA will be tested eventually when the institution begins to produce Urban Planners at the post-graduate level in a few years’ time, *ceteris paribus*. However, for now, the country will almost certainly continue to depend on its few citizens who are all foreign-trained planners, in addition to some urban planning consultants based in Australia, New Zealand and other foreign countries, who currently perform EAI roles as consultants to the country.

An attempt has been made to answer the research question posited earlier in Section 2 of this paper, while findings from our interviews with some senior planners operating in the two largest cities of Port Moresby and Lae strongly suggest that Government (through the DLPP) must now begin to review urban planning practice guidelines used in the country, particularly for EIA Reports. Indeed, we believe that it is high time that the whole of the Physical Planning Act 1989 of PNG, together with all related statutory provisions (e.g. Environment Act 2000; Land Act 1996), were reviewed and amended.

Finally, we would like to make the following additional recommendations to the Council and Senior Executive Management Team (SEMT) of the PNG University of Technology:

- i) Unitech can advocate for a finalisation of the National Energy Policy;
- ii) The University should strongly advocate for quality student intake;
- iii) It must establish its position as the leading Science and Technology University in the Pacific Region with full devotion to consultancy and research on the energy front;
- iv) The University needs to strongly expose itself to both the government and the private sector and have its share of inputs into development programs in terms of R&D; and
- v) Unitech must strongly build on research programs that are relevant, and aggressively demand better funding support for improving its profile at the national and international levels.

References

- Babarinde, J. A. (2015), *Papua New Guinea*, in Ryser, J. and Franchini, T. (eds.), *International Manual of Planning Practice*, 6th Edition, The Hague, ISOCARP, p. 168.
- Babarinde, J. A., Holis, S. S., and Mcvie-Adu, R. (2016), Bridging the Gap between Physical (Environmental) Planning Legislation and City Liveability in Papua New Guinea: Reality or Fantasy? *Melanesian Journal of Geomatics and Property Studies*, Vol. 2, pp. 16-33.
- DLPP (2017), Department of Lands and Physical Planning, National Capital District, Port Moresby, Papua New Guinea; Available Online At: www.lands.gov.pg; accessed on 29 September, 2017.
- DSLS-Unitech (2017), Proposed MSc. Urban and Regional Planning Program, Department of Surveying and Land Studies, PNG University of Technology, Available Online At: www.unitech.pnguot.ac.pg; accessed on 2 September, 2017.
- PNG Power (2016), National Distribution Grid Expansion Plan, Final Report, Port Moresby.
- PNG Department of Petroleum & Energy and Department of Public Enterprises (2015), National Energy Plan, 2015-2020.
- The Earth Institute (2016), Preparation of National Electrification Rollout Plan and Financing Prospectus, London, UK.

The Economist Intelligence Unit Limited (2015), World Ranking of Liveable Cities, London, UK.

The International Association for Impact Assessment (IAIA); Available Online At: <http://www.preventionweb.net/organizations/336>; accessed on 12 November, 2017.

UNDP (2017), Papua New Guinea's National REDD+ Strategy; Available Online At: www.pngreddplus.org.pg; accessed on 27 September, 2017.

World Bank's Technical Paper No. 154 (1991), Environmental Assessment Sourcebook: Volume 3 - Guidelines for Environmental Assessment of Energy and Industry Projects (English), The World Bank.

Conflict of Interest

The authors declare no conflict of interest.

Author Biographies

Ora Renagi, PhD, is an Applied Physicist and the Deputy Vice-Chancellor, Papua New Guinea University of Technology, Lae, PNG.

Jacob A. Babarinde, PhD, FRICS, MCIP, is a Registered Urban Planner, Chartered Valuation Surveyor, Licensed Realtor and Professor of Property Studies in the Department of Surveying and Land Studies, the Papua New Guinea University of Technology, Lae, PNG.