

Energy Efficiency (EE) on Refrigeration and Air Conditioning (RAC) Sector Regulations Development Options for Papua New Guinea

Deliverable 3 – Regulatory and Gender Mainstreaming
Assessment Report (Second Progress Report)

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ABBREVIATIONS

CCDA	Climate Change Development and Authority
CCMA	Climate Change Management Act
CEPA	Conservation Environment and Protection Authority
CTCN	Climate Technology Centre and Network
DPCI	Provincial Delegations of Commerce and Industry
ECOWAS	Economic Community of West African States
EE	Energy Efficiency
EEC	Energy efficiency class
EU	European Union
GHG	Greenhouse gas
ILAC	International Laboratory Accreditation Cooperation
MEP	Ministry (Department) of Energy and Petroleum
MEPS	Minimum energy performances standard
MVE	Monitoring, verification and enforcement (protocol)
NDE	National Designated Entity
NISIT	National Institute of Standards & Industrial Technology.
PICT	Pacific Islands Countries and Territories
RAC	Refrigerant and Air Condition
SGD	Single Goods Declaration
S&L	Standards and Labelling
UNFCCC	United Nations Framework Convention on Climate Change

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EXECUTIVE SUMMARY

This report presents the results of the relevant regulatory contexts in PNG, the relevant parameters for the selection of labelling scheme and the gender mainstreaming assessment in the PNG energy sector.

Many public documents have been analysed for this report, including the National Energy Policy 2016-2020. Also, the draft Electricity Industry Policy reviewed by the Consultant is comprehensive and covers almost all energy-related areas, including EE. One of the most interesting aspects of this draft policy is the intention to re-organise the electric power industry, including PPL, to encourage a market-oriented approach to generation and distribution services. However, the lack of a clear energy efficiency law that could support regulation for S&L for ACs is a major obstacle.

Also, PNG was classified among the countries with 'low equality', characterised by a large disparity of women's access to health and education as well as command over economic resources compared to those of men. Since efficient ACs are not only an opportunity to limit the electricity consumption resulting from the growing cooling demand, but also a way of mitigating the effects of women's exclusion from many energy decisions¹. Policies to improve the efficiency of ACs, such as MEPS, must therefore be adopted by countries. PNG is thus taking a step in the right direction by developing its national MEPS. The country must also ratify the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer that calls for the phase out of hydrofluorocarbons, damaging refrigerants that are much worse than carbon dioxide in terms of trapping heat in the atmosphere².

Finally, the regulatory context of PNG is sufficient to include a new regulatory text for MEPS and labelling for ACs. However, the challenges that the project team faced during the project could be indicative of future obstacles in the implementation phase. In effect, even with a strong rationale and solid regulatory texts, a lack of political leadership can seriously hinder this phase. Our technical assistance will provide the justification for the regulatory text, but the CCDA and the Ministry of Energy will have to push the proposed text forward and ensure that the government's legal department understands the purpose of the text and that the Ministry of Finances is on board. All of this requires a lot of political leadership.

¹ However, this could backfire since office AC overload (what has been called the 'thermostat patriarchy') generally increase women discomfort and can even affect their cognitive performance (see below).

² United Nations, Amendment to the Montreal Protocol on substances that deplete the ozone layer, Kigali, 15 October 2016. C.N.872.2016.TREATIES-XXVII.2.f.

INTRODUCTION

Papua New Guinea (PNG) is a net energy exporter and is completely self-sufficient in fossil fuels. The energy sector, which currently accounts for 14% of the country's GDP, is expected to make a substantial contribution to the country's economic growth and development. PNG has significant energy resource reserves, including oil, gas, coal, hydro and renewable energy, that can be harnessed to accelerate PNG's socio-economic development. Still, energy shortages and supply disruptions coupled with high energy costs are major impediments to economic growth and social well-being.

PNG is currently developing a comprehensive National Energy Policy (NEP), which is needed more than ever to structure the development of energy sources, strengthen the environmental regulatory framework, ensure government leadership in the energy sector to seize major economic opportunities and effectively respond to long-term energy-security challenges. The NEP is also being developed to address the challenges related to energy efficiency and conservation. Since about one half of the electricity produced in PNG comes from non-renewable sources, there could be significant benefits from adopting EE measures, such as standards and labelling (S&L) programmes.

The potential benefits that can be generated by the implementation of an S&L programme in PNG are the following:

- › Diesel imports reduction due to lowered energy demand;
- › Energy bills reduction for consumers;
- › Infrastructure costs avoided and reduced capital and maintenance costs;
- › Livelihood improvement through access to better-quality products;
- › Energy-efficient products by ensuring that Pacific Islands Countries and Territories (PICTs) do not have to accept inefficient products banned from sale elsewhere;
- › Emissions reductions.

The National Designated Entity (NDE) of PNG has submitted a request for technical assistance (TA) to the Climate Technology Centre and Network (CTCN), which is the operational arm of the United Nations Framework Convention on Climate Change (UNFCCC) Technology Mechanism and is co-hosted by the United Nations Environment Programme (UNEP) in collaboration with the United Nations Industrial Development Organization (UNIDO). The CTCN hired Econoler to offer TA to the PNG Climate Change Development Authority (CCDA) for the implementation of best policy and regulatory practices for both minimum energy performances standards (MEPS) and energy labelling in PNG for air conditioning (AC) appliances.

This report presents the results of the relevant regulatory contexts in PNG, the relevant parameters for the selection of labelling scheme and the gender mainstreaming assessment in the PNG energy sector.



1 ASSESSMENT OF THE EXISTING ENERGY REGULATIONS, POLICIES AND INSTITUTIONAL FRAMEWORK

The Pacific Appliance Labelling and Standards (PALS) Programme is part of South Pacific Countries' approach to increasing sustainable economic development through improved energy efficiency. Pacific Island countries such as Cook Islands, Fiji, Kiribati, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu are part of the PALS Programme.

In 2009, at the Pacific Islands Forum Leaders Meeting (PIFLM), the leaders of these countries highlighted the urgency to improve EE and conservation to reduce high dependencies on imported fossil fuels. In 2011, they expressed support for meeting EE targets, including expanding the existing electrical appliance energy efficiency standards and labelling programme to help realise significant energy savings. In 2017, the Pacific Energy Ministers meeting agreed to accelerate the adoption and enforcement of energy sector laws such as Energy Act and energy sub-sector laws related to energy efficiency. The last PIFLM was held in March 2019 and its key elements will be discussed later.

PNG has not yet adopted any EE specific policy statements (except for a draft policy, as discussed below). The most detailed treatment of EE is within the 2014 Climate Compatible Management Policy (CCMP), which highlights several specific actions, including energy efficiency building codes and minimum efficiency performance standards and labelling for appliances. The new climate law, for which the 2014 CCMP serves as the foundation, includes mandatory CO₂ emission reduction targets, for which EE is included as one of the key enabling actions.

The 2011 Electricity Industry Policy (EIP) and National Electricity Rollout Plan (NEROP) are the other key EE-related policies and policy instruments in PNG. The key goal of the EIP 2011 is the development of a plan for reaching electrification targets through the NEROP. The NEROP requires that energy efficiency be considered to improve the electricity infrastructure and services.

A new draft standard has been drafted, i.e., the Energy Labelling and Minimum Energy Performance Standards for Appliances, Equipment and Lighting Products Regulation 2017, with the main objective being to 'reduce anthropogenic emissions of greenhouse gases in the electricity generation sector' (Section 11(1)(c)). The reduction of GHG emissions is expected to materialise by increasing the energy efficiency of electrical appliances, equipment and lighting products imported into as well as manufactured in PNG (There is no AC manufacturer in PNG.). Since this regulation places a particular focus on the RAC sector, it is necessary to promulgate it as a legal document so that the basic provisions for introducing S&L in PNG are formally enacted as law. Then, work can begin to develop a regulatory framework text for MEPS and energy labelling.

This section presents different tools necessary for implementing EE initiatives in PNG: (1) policy and planning; (2) legal and regulatory frameworks; (3) key institutions and organisations for EE policy, regulation and programme implementation; and (4) utilities and energy suppliers.

1.1 Policy and Planning

1.1.1 Overview

Under the National Constitution, the power to enact laws for Papua New Guinea vests with the National Parliament. The preparation and publication of bills and statutes are the responsibility of the OLC, under the Legislative Drafting Service Act (Chapter 80).

In PNG, implementing EE initiatives requires a strategy aligned with the key national poverty-reduction policy goals. The three key national development goals with which EE must be aligned are:

- › Electrification
- › Access to reliable energy sources
- › Affordable energy

One of the conditions conducive to overcoming the barriers to EE is an enabling legal and regulatory environment. Ideally, the legal and regulatory environment provides 'push' and 'pull' for EE projects. International best practice has shown that EE efforts in a country are successful only if there is strong leadership by the government. Not only is it necessary to make laws and regulations that encourage EE, but the government itself should embrace these standards and be the 'first to market' by incorporating energy-efficient systems and transformative initiatives into its own planning and everyday operations.

PNG's current energy-related policy shows little consideration of EE. Today, most energy-sector technical assistance projects, like those from the ADB, show EE as a low-impact activity when compared to other strategies for low-carbon development, such as the development of renewable energy. So, it is easy to understand the low priority and inadequate recognition that the GoPNG has given to EE-specific policy, laws and regulations. The primary energy-related laws that are relevant to EE are as follows:

- › *The Electricity Supply Act*. This law gives the Minister for Energy the power to oversee the generation, supply and transmission of electricity from power facilities built with government funds.
- › *National Energy Policy (2016-2020)*.
- › *Grid Code and Third Party Access Code*: This is the codification of the two key electricity market regulatory elements discussed in the 2011 EIP required to encourage private-sector investment in the electricity industry.
- › *The Electricity Industry Act*. This law defines the powers and functions of PPL.
- › *The Independent Consumer and Competition Act*. This law regulates electricity and petroleum and their pricing. It has ended PPL's monopoly on power generation and has paved the way for IPPs.

- › *The Independent Public Business Corporation Act.* This law stipulates the government's ownership framework for PPL.
- › *The Organic Law on Provincial Government and Local Level Government.* This law grants authority to 19 provincial and 299 local (district/sub-district) governments to regulate electricity. This is part of the government's initiative to transfer control of power generation from PPL to IPPs and local governments. The law is a central component in the effort to improve provision of power to rural areas to allow providers that are best positioned in the market to operate independently.
- › *The Community Services Trust Act.* This law requires PNG Power to supply services at subsidised rates to rural or low-income populations. The impact of this law has been a disincentive to PPL to serve local areas due to cost recovery issues.

What follows is a brief overview of these policy and planning documents.

1.1.2 PNG Development Strategic Plan (PDSP) 2010-2030

This is a long-term development plan outlining how PNG can become a prosperous nation by 2030. The plan recognises that one of the fundamental issues that PNG's development is contingent on is access to reliable and clean energy for the entire population. The PDSP makes a forecast that PNG's electricity demand will increase by almost 1,000 MW by 2030.

1.1.3 PNG Mid-Term Development Plan (MTDP) 2018-2022

Published in 2017, the PNG MTDP 2018-2022 is the latest in PNG's rolling 5-year development planning documents presenting a near-term plan for investments in the country's development priorities set forth in the PDSP 2010-2030. According to this document, 'the overall goal of MTDP III is to secure the future through inclusive sustainable economic growth'.

The target for household electrification rate in 2015 was 26% but as in 2017 only 21% was achieved. The PDSP targets for 2022 and 2030 are, respectively, 33% and 70%. These objectives are addressed in the National Electricity Supply Roll out Plan (see 1.1.5). Given the poor electricity access levels in PNG, one of the development priorities of PPL is to expand services to rural areas and its capacity on all grids. The table below lists the goals for increasing electricity capacity in PNG by 2050.

**Table 1: Electricity Generation Expansion Projections
from the PNG MTDP, 2011–2015³**

Technology	2011	2020
Hydro	207	580
Diesel	198	60
Gas	72	280
Geothermal	53	112
Solar	n/a	8
Wind	n/a	13
Biomass	n/a	24
Biogas	n/a	3
Coal	n/a	30
Total	530	1110

1.1.4 Electricity Industry Policy (2011)

The Electricity Industry Policy (EIP) was developed and promulgated for the primary purpose of accelerating the provision of reliable and affordable electricity services to the yet unserved populations of PNG. The EIP 2011 addresses some key weaknesses of the Electricity Industry Act of 2002 and further strengthens a regulatory framework for implementing national electrification goals set forth by the national planning documents. From a practical perspective, the EIP 2011 was developed to outline a plan to encourage investment in the electricity sector and accelerate expansion of electricity infrastructure by catalysing participation of private-sector partners.

The EIP 2011 addresses the following areas:

- › Provision of community service obligations (CSOs)
- › Regulation of electricity markets
- › Increase competition in the electricity industry
- › Increase private-sector participation

Community Service Obligations (CSOs)

The policy outlines a need for the government to help fund construction and operation of electricity services in areas that are not commercially viable, because of the large initial investment required or low cost-recovery potential due to customers' poor ability of to pay. These services are considered as 'Community Service Obligations'. For these areas that are not commercially attractive, the policy indicates the government's responsibility to provide incentives for investors to develop electricity services. These CSOs are to be targeted for load groups not larger than 10 MW.

³ PNG Department of National Planning and Monitoring. (2010). *MTDP 2011-2015*. Retrieved from <http://www.undp.org.pg/docs/publications/MTDP.pdf>

To encourage investment in less profitable areas, the policy allows the regulator to cap the costs to IPPs in areas deemed CSO-eligible and fund the shortfall through a negotiated electricity purchase price. Services in these CSO areas would be competitively tendered to potential IPPs. Under the policy's provisions regarding CSO, certain tax incentives should also be granted to investors in CSO areas for providing electricity to support enterprise development that creates positive economic outcomes for local communities.

The policy's provisions are intended to competitively tender state funding for CSOs. Currently, PPL is provided with exclusive access to funding for CSOs. Once put into effect, this policy would result in PPL being treated as an equal market competitor in tendering for CSOs against other market players. Competitive tendering is one of the key strategies for minimising government expenditures on CSOs by allowing the market to competitively determine the subsidy level from the government. As part of the competitive tendering process for CSOs, the policy calls for developing a national electricity rollout plan to identify the areas and estimate the range of subsidisation that may be required. Another major feature of the policy that promotes private-sector participation in the electricity market is to allow the investor to keep the ownership of the infrastructure developed in CSO areas.

Regulations

Originally, the Electricity Industry Act of 2002 was promulgated with the aim of reducing the cost of electricity supply by providing a legal basis for allowing IPPs to sell electricity to PPL networks. However, it is recognised that there has been poor participation in the electricity market by IPPs due to the lack of a robust framework for connection to PPL networks and sale of electricity through PPL network. The EIP 2011 aims to identify those requirements that constitute barriers to IPP investments and provide a plan to address them to improve private sector participation in the electricity industry.

Two of the major issues addressed by the EIP 2011 are the rules by which regulated networks (PPL) are accessed and the rules for using PPL networks to transmit power to customers of an electricity retail distributor. This policy had provided the basis for a Third Party Access Code and an Electricity Grid Code, both of which were subsequently promulgated by the GoPNG.

1.1.5 National Electricity Rollout Plan (NEROP)

In partial fulfillment of the EIP 2011, the NEROP has been developed through a consultative process to provide a roadmap for electrification. The NEROP also defines the formation of an Electricity Management Committee, which is in charge of managing the long-term electrification strategy and underlying programs. The following key elements are covered by the NEROP:

- 1 **The government's long-term commitment and leadership:** The government's commitment to the establishment of an Electricity Management Committee (EMC), which ensures continuity in the management of the ongoing implementation of PNG's electrification initiatives and strategy.
- 2 **Many stakeholders:** Commitment to engaging relevant stakeholders to the electrification efforts in PNG.

- 3 **One plan:** A commitment to involving all the stakeholders and developing ongoing support for a single, dynamic, well-thought-out electrification plan.
- 4 **Clear roles:** Commitment to a clear division of roles and responsibilities and holding those assigned for deliverables accountable.
- 5 **A consultative process:** Commitment to consulting with all the stakeholders and developing buy-in.
- 6 **An inclusive program:** A commitment to including a wide variety of stakeholder groups including local communities and the marginalised social groups.
- 7 **Household affordability:** A commitment to making electricity affordable to households currently without access to electricity and developing a subsidy system that is appropriate and fair.
- 8 **Financial sustainability:** Revenues must be sufficient to fund the organisations implementing the NEROP through a combination of consumer payments and subsidies.
- 9 **Differentiated targets:** Commitment to developing well-targeted electrification solutions with services and costs tailored to particular groups according to their needs and ability to pay.
- 10 **Major role for PPL:** A commitment to leveraging the current market position, experience, and relationships with existing customers for the planning and implementation of the NEROP.
- 11 **Private-sector involvement:** It must be recognised that the private sector must be involved to realise the investment level required to achieve electrification goals. This involves providing the appropriate level of incentive and engagement in a flexible way that is not too prescriptive.
- 12 **Importance of capacity-building:** It must be recognised that the NEROP must be a programme developed and directed by PNG's own personnel. This means that there must be a commitment to finding and developing these human resources through a range of capacity-building efforts.

The EE Model Business Plan should be aligned with the principles of the NEROP and support the objectives defined.

1.1.6 PNG Climate-compatible Development Management Policy

The PNG Climate-compatible Development Management Policy (CCDMP) was approved in 2014 and serves as the foundation of PNG's new climate change law, which was recently approved. The CCDMP demonstrates PNG's commitment to taking the steps to lower the carbon intensity of future development. Although the plan is a very high-level discussion of abatement opportunities, much of the emission mitigation effort will involve conserving vast natural resources and expanding electricity access through renewable energy sources, as its economy grows.

More importantly, the CCDMP is the GoPNG's only official policy statement with details about EE and sustainability goals, which could be used to impose mandatory EE targets on major economic sectors.

The following key actions are outlined by the CCDMP:

- › Energy Efficiency Building Codes
- › Green Building Development Programs
- › Funding Energy Efficiency in Communities

1.1.7 Draft Electricity and Energy Sector Policies

A number of energy-related policies have been drafted for some time; these policies could potentially have an impact on EE. Although the new draft energy policies mention EE, they only state that it is important and will be pursued. There are few details about how EE will be achieved. Error! Bookmark not defined. These draft policies include:

- › National Energy Policy
- › Rural Electrification Policy
- › Geothermal Energy Policy
- › Renewable Energy Policy

The draft Electricity Industry Policy reviewed by the Consultant is comprehensive and covers almost all energy-related areas, including EE. One of the most interesting aspects of this draft policy is the intention to re-organise the electric power industry, including PPL, to encourage a market-oriented approach to generation and distribution services.

2 GENDER MAINSTREAMING ASSESSMENT

EE projects can play an important role in providing access to energy, creating new economic opportunities, strengthening livelihoods and improving health, safety and quality of life. Energy-efficient technologies are, however, not gender-neutral because of a wide range of factors such as cultural gender norms, women's and men's differentiated access to institutions and their relations in households and communities. Therefore, their opportunities to access and benefit from these technologies differ. Gender equality and social aspects must therefore be taken into account not only because of such potential for creating far-reaching benefits but also because it facilitates the adoption of new technologies. The gender and social assessment is a key element in ensuring that gender equality and social aspects are included as a transversal objective in the components of this technical assistance. To this end, the Consultant proposes a gender assessment methodology that is coherent with the CTCN and UNIDO methodologies for gender mainstreaming⁴. We suggest an approach that will involve addressing three analysis levels simultaneously, as described below.

- › **Analysis Level 1: National Level** to provide a general gender and social analysis of PNG
- › **Analysis Level 2: Thematic Level** to look at the differentiated needs of women and social dynamics within the energy sector as well as efficient end-use appliances and policymaking
- › **Analysis Level 3: Internal Level** to examine the structural, management and cultural characteristics of the partner organisations, namely the CCDA and the Conservation Environment and Protection Authority (CEPA), and identify gender-related gaps and gender-specific needs at the internal level

This report will, for each level of the analysis, identify the main challenges to gender equality and social inclusion. Analysis levels 2 and 3 will also recommend mitigation approaches to ensure that this project consultancy and energy policymaking in PNG do not reinforce existing unequal social structures.

2.1 Analysis Level 1: National Situation

This analysis level is aimed at providing a general gender analysis of PNG. Gender equality and social inclusion are affected by multiple factors that go far beyond the specific scope of this assignment. A general gender equality and social analysis is therefore needed to better understand relevant aspects, such as human development and human capital levels, women's freedom of travel, access to employment and education, legal rights of ownership, access to political participation, etc. A first overview of the main indicators available for PNG is provided in Table 2 while a more detailed policy and regulatory framework analysis regarding women's rights is shown in Table 3.

⁴ CTCN Gender Mainstreaming Tool for Response Plan Development, available online: <https://www.ctcn.org/resources/ctcn-gender-mainstreaming-tool-english> and UNIDO Guide on Gender Mainstreaming in Energy and Climate Change Projects. Available online: https://www.unido.org/sites/default/files/2015-01/Guide_on_Gender_Mainstreaming_ECC_0.pdf

2.1.1 Assessment of the Main Gender and Social Indicators

The main indicators for gender equality and social development are provided in Table 2 below, which depicts a country with a low human development level and a high disparity between women's and men's development levels.

Table 2: Overview of Gender and Social Aspects and Indicators in PNG

Gender aspects and indicators	PNG
Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)	Ratified in 1995
Human Development Index (HDI)	0.544 (Rank 153)
UNDP Gender Inequality Index (GII) ⁵	0.741
Gender Development Index (GDI) ⁶	n/a
Share of seats in parliament (% held by women) ⁷	0.1
Human Capital Index (HCI) ⁸	0.38
Female labour force (% of total labour force)	49

The HDI value classifies PNG in the countries with low human development (compared to the world value of 0.728). PNG's GII value of 0.741, which measures gender inequalities in three human development aspects (health, empowerment and labour market) ranks it 153 out of 160 countries (compared to the world value of 0.441). The HCI of 0.38 means that, if current education and health conditions in PNG persist, a girl born today will be less than 40% as productive as she could have been if she enjoyed complete education and full health by age 18.

Gender Indicators: GII and GDI

The GII factor (0.741) indeed testifies that women's status in PNG is precarious and challenging with regards to reproductive health (maternal mortality ratio and adolescent birth rate), empowerment (women with at least a secondary education, women's share of parliamentary seats) and labour market (women's labour force participation rate). In fact, PNG women and children suffer some of the worst health outcomes in the world regarding child and maternal mortality⁹. No women were voted into the country's 111-seat parliament in 2017. Gender norms and attitudes constrain women's work and economic opportunities and hamper productivity. Although participation rates in the labour

⁵ UNDP, 'Technical Notes: Calculating the Human development Indices', Human Development Indices and Indicators, 2018 Statistical Update. Available online: http://hdr.undp.org/sites/default/files/hdr2018_technical_notes.pdf. The GII measures gender inequalities in three important aspects of human development: reproductive health, empowerment and labour market. It ranges from 0 (gender equality in all three dimensions) to 1 (one gender rate as poorly as possible in all measured dimensions).

⁶ UNDP, *loc cit.* The GDI measures gender inequalities in achievement in three dimensions of human development: health, education and command over economic resources. It is the ratio of female to male Human Development Index (HDI) values. Data only available for year 2000: GDI = 0.862.

⁷ UNDP, HDR Data, 2017.

⁸ World Bank, 'The Human Capital Project'. 2018. The HCI uses factors on quality of education and health to assess the human capital that a child born today can expect to attain by age 18.

⁹ Lamprell G. and J. Braithwaite (2017) 'Mainstreaming gender and promoting intersectionality in Papua New Guinea's health policy: a triangulated analysis applying data-mining and content analytic techniques', International Journal for Equity in Health, vol. 16, no. 65.

force are relatively even, men are almost twice as more likely to hold a wage job in the formal sector and women are three times more likely to work in the informal sector¹⁰. The most recent GDI value for PNG is from 2000 and too old to use within the framework of this study. As an indication, a GDI of 0.862 shows that, 20 years ago, PNG was classified among the countries with ‘low equality’, characterised by a large disparity of women’s access to health and education as well as command over economic resources compared to those of men.

Violence against Women

Traditional gender roles are a major hindrance to gender equality. According to Human Rights Watch: ‘Papua New Guinea is one of the most dangerous places in the world to be a woman’¹¹. An estimated 70% of women experience rape or assault in their lifetime, witch hunting annually causes the death of hundreds of people, mainly women and girls¹², and women face systemic discrimination. More than 90% of women and girls experiences some form of violence when accessing public transportation, including verbal sexual remarks, inappropriate touching, extortion, robbery, threats or intimidation¹³. In November 2018, the PNG government announced 25 million Kina (USD7.8M) in funding to end violence against women, set up child protection and address violence following sorcery accusations¹⁴.

2.1.2 Policy and Regulatory Framework

In 2019, PNG scored 62.50 (out of 100) on the Women, Business and the Law (WBL) index, which measures how a country’s regulatory framework affects women throughout their adult lives. Scores in the Pacific region span from 74.38 (Fiji) to 56.88 (Solomon Islands). The assessment shows that while women in PNG may access institutions, use property and go to court almost as equally as men (on a legal basis), the national regulatory framework fails to protect women from violence, support them in accessing employment and incentives to work once they have children and support them in building credit. The policy and regulatory framework is however not the main factor for gender inequality. Rather, traditional beliefs and the cultural subordination of women in PNG society and politics are a hindrance to moving forward with women’s rights and ending violence against women.

Table 3: Gender Equality and the Law in PNG¹⁵

Indicator	Score (out of 100)	Laws Impacting Women's Rights	
Accessing institutions	75	Equality factor	In PNG, a woman has the same access to institutions as a man does and may without legal barriers apply for official documents, travel inside and outside the country, get a job,

¹⁰ ADB, Country Partnership Strategy: Papua New Guinea, 2016-2020. Gender Analysis (Summary). Available online: <https://www.adb.org/sites/default/files/linked-documents/cps-png-2016-2020-ga.pdf>

¹¹ HRW, Country Summary: Papua New Guinea, January 2017.

¹² Signe Poulsen, Office of the United Nations High Commissioner for Human Right (OHCHR) in Papua New Guinea. Interview conducted by DW, 16 June 2014.

¹³ UN Women, PNG Scoping Study, 2014.

¹⁴ Amnesty International, The States of the World’s Human Rights, Report 2017-2018. Available online: <https://www.amnesty.org/download/Documents/POL1067002018ENGLISH.PDF>

¹⁵ WBG, Women, Business and the Law, 2018.



Indicator	Score (out of 100)	Laws Impacting Women's Rights	
			sign a contract, register a business, open a bank account, choose where to live and be a head of household.
		Inequality factor	A woman cannot apply for a passport in the same way as a man.
Property	80	Equality factor	Equal ownership of immovable property, equality of inheritance rights between sons and daughters and between surviving female and male spouses.
		Inequality factor	The PNG law does not provide for valuation of nonmonetary contributions at the time a marriage is dissolved that benefits both spouses (including the stay-at-home spouse).
Access to employment	42	Equality factor	Employers are legally required not to discriminate based on gender in employment and dismissal of pregnant workers is prohibited, women can work the same night hours men can and women can retire with full/partial pensions at the same age as men.
		Inequality factor	PNG has no paid leave available to mothers nor parental leaves ¹⁶ . The law does not mandate equal remuneration for work of equal value. Women are prevented from working in particular industries that are deemed too hazardous for women.
Provide mothers with incentives to work	20	Inequality factor	The PNG government does not provide support for childcare services, mothers are not guaranteed an equivalent position after maternity leave and primary education is not compulsory.
Going to court	75	Equality factor	A woman's testimony carries the same evidentiary weight in court as a man's, the law mandates legal aid in civil/family matters and there is a small claims court/fast-track procedure.
		Inequality factor	The law does not establish an anti-discriminatory commission in courts.
Building credit	25	Equality factor	Retailers provide information to credit agencies.
		Inequality factor	Discrimination based on gender or marital status is not prohibited in access to credit. Utility companies do not provide information to credit agencies.
Protecting women from violence	20	Equality factor	In 2013, domestic violence was proscribed under the Family Protection Act (FPA).
		Inequality factor	There is no legislation to prevent sexual harassment in the workplace or schools. Prosecutors rarely pursue investigations of criminal charges against perpetrators of family violence, even in cases of attempted murder, serious injuries or repeated rape. There are no criminal penalties or civil remedies for workplace sexual harassment.

¹⁶ ILO recommends a standard of 14 weeks with a corresponding wage varying from 25% to 100% of earnings.

National Policies on Gender Equality

2011-2015 National Policy for Women and Gender

The 2011-2015 Policy was launched to ensure equal opportunities, treatment and entitlements for men and women, and considers how inequalities related to the household, customs, religion and culture result in the unequal distribution of power, control over resources and decision-making power. The Office for the Development of Women (ODW) within the Department for Community Development was established and charged with policy implementation. It focused on the following three components: women's equality and representation, women's economic empowerment and gender-based violence and vulnerability.

National Public Service Gender Equity and Social Inclusion (GESI) Policy¹⁷

The GESI policy includes targets to increase the participation of women within the public sector and the number of women in public service leadership positions to 30%.

2.2 Analysis Level 2: Thematic Level

This level will involve looking at the differentiated needs of women within the sector of efficient end-use appliances and policymaking and the more general local context pertaining to gender equality. This level will involve making an initial gender assessment regarding the following aspects:

- › availability of gender-disaggregated quantitative and qualitative data on the economic sector and identification of gender gaps;
- › practical gender-specific needs and strategic interests of potential or identified beneficiaries;
- › potential gender-equality impacts of the project (opportunities and risks in terms of equal access, control and use of resources and benefits);
- › awareness and capacity of partners regarding the integration of a gender perspective in project development.

Current and previous gender-equality assessments related to energy will be used for this analysis level, e.g. the World Bank's PNG Energy Sector Development Project that involved conducting consultations with women for a preliminary social assessment.

In 2009-2010, the National Statistical Office carried out the PNG Household Income and Expenditure Survey (HIES) with a nationally representative sample of 4,081 households and gathered information on topics such as family demography, education, health, employment and consumption. This is the most up-to-date data source on households available. Table 4 presents data on energy consumption in dwellings disaggregated by living area and sex of the head of household. It shows that there are no significant differences between male- and female-headed households and that the main sources of energy used in the dwelling varies more across the urban-rural divide. For example, statistics show that 68% of urban households get their lighting from electricity (from the grid or privately generated electricity) compared to 19% of rural households. For cooking, these rates are respectively 19% and 4%. These data combined with the very low percentage of Papua New

¹⁷ Produced by the Department of Personnel Management.

Guineans living in urban areas (13%) indicate that air conditioning demand is limited to only a few middle-class urban households as well as offices and factories.

Table 4: Access to Light in the Dwelling by Rural and Urban Areas and by Sex¹⁸

Source of Energy	Household National (%)			Rural Household (%)			Urban Household (%)		
	All	Male-headed	Female-headed	All	Male-headed	Female-headed	All	Male-headed	Female-headed
Lighting									
Electricity	16.7	16.2	20.8	6.3	6.2	7.0	67.8	67.4	69.8
Privately generated electricity	2.8	2.7	4.1	2.7	2.6	4.3	3.4	3.3	3.5
Coleman (gas pressure lantern)	5.1	5.1	5.8	5.3	5.2	6.2	4.4	4.4	4.5
Kerosene lamp	45.1	45.7	39.4	51.0	51.5	46.4	15.9	16.0	14.7
Candles/battery flashlight	10.5	10.6	9.5	11.3	11.4	10.8	6.2	6.4	4.7
Improvised lamp	5.7	5.6	5.7	6.5	6.5	6.6	1.7	1.5	2.8
Other	14.2	14.2	14.7	16.9	16.8	18.8	0.8	1.0	0.1
Cooking Fuel									
Gas	4.2	3.8	7.1	1.2	1.1	2.0	19.0	18.0	25.5
Electricity	4.1	4.0	4.5	1.0	1.0	0.7	19.4	19.6	17.8
Firewood	87.5	87.7	85.8	94.7	94.6	96.0	51.8	52.2	49.3
Kerosene	3.8	3.9	2.3	2.7	2.8	1.1	9.1	9.4	6.9
Saw dust	0.1	0.1	0.1	0.0	0.0	0.0	0.6	0.6	0.5
Charcoal	0.3	0.3	0.0	0.4	0.4	0.0	0.0	0.1	0.0
Other	0.1	0.1	0.2	0.2	0.1	0.3	0.0	0.0	0.0

The survey also suggests that nearly two-fifths of health and sub-health centers, and an even greater proportion of rural health posts, have no access to electricity or essential medical equipment. In the small number of schools with access to electricity, energy costs account for up to 70% of their budget. Almost all (95%) of rural households collect firewood for cooking compared to half (52%) of urban households.

2.2.1 Air Conditioning and Climate Change

The International Energy Agency (IEA) identifies the growing demand of air conditioning as one of the main energy and climate change issues for the coming decade¹⁹. Air conditioners are a major source of GHG emissions, and their penetration rate will explode in the upcoming years, especially in tropical countries. The IEA estimates that the global average rate of household ownership of ACs

¹⁸ National Statistical Office PNG, Household Income and Expenditure Survey 2009-2010. Available Online: <https://www.nso.gov.pg/index.php/projects/household-income-expenditure-survey>

¹⁹ IEA The Future of Cooling: Opportunities for energy-efficient air conditioning, 2018.

will surge from 30% in 2016 to almost two-thirds in 2050²⁰. The growing penetration of ACs will seriously hamper global efforts in maintaining the temperature rise below 2°C this century. Exacerbated climate variations will severely impact women, considering that women are more vulnerable to climate change than men²¹. Also, dealing with electricity to operate appliances and equipment is often considered men's work, whereas women are not expected to be involved with power generation and fuel distribution²². Thus, efficient ACs are not only an opportunity to limit the electricity consumption resulting from the growing cooling demand, but also a way of mitigating the effects of women's exclusion from many energy decisions²³. Policies to improve the efficiency of ACs, such as MEPS, must therefore be adopted by countries. PNG is taking a step in the right direction by developing its national MEPS. The country must also ratify the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer that calls for the phase out of hydrofluorocarbons, damaging refrigerants that are over 1,000 times worse than carbon dioxide in terms of trapping heat in the atmosphere²⁴.

2.2.2 AC as a Leverage for Human Development

Air conditioning has already proven its benefits to the socio-economic development of tropical countries. It boosts productivity, improves health and increase education levels. Researchers have found that, in hot climates, people without cooling could not work during 15% to 20% of working hours²⁵ and that the GDP falls by 1% for each degree above 26°C²⁶. Cooling offices and factories has great benefits in improving occupational health and limits heat-related physical exhaustion. Cooling education facilities reduces the heat stress on cognitive performance and has a direct impact on increasing students' grades²⁷. A higher penetration of efficient AC systems could therefore result in substantial social and economic benefits to Papua New Guineans. However, these benefits might not benefit the entire population equally given the existing gender inequalities regarding access to school, health services and the formal economy. For buildings and workplaces equipped with ACs, it is also important to consider the gender-discrimination bias in thermal comfort. The ASHRAE standard, which is used in the Australian (and Papua New Guinean) Building Code, uses the metabolic rate of an average male as a standard value in their thermal comfort model. The model results in indoor temperatures adapted to the male thermal demand, while they would be as much

²⁰ *Ibid.*

²¹ UN Women Watch, Fact Sheet: Women, Gender Equality and Climate Change.

²² Where Energy is Women's Business: National and Regional Reports from Africa, Asia, Latin America and the Pacific http://www.energia.org/pubs/papers/karlsson_csdbook_lores.pdf

²³ However, this could backfire since office AC overload (what has been called the 'thermostat patriarchy') generally increase women discomfort and can even affect their cognitive performance (see below).

²⁴ United Nations, Amendment to the Montreal Protocol on substances that deplete the ozone layer, Kigali, 15 October 2016. C.N.872.2016.TREATIES-XXVII.2.f.

²⁵ Kjellstrom, T. et al. 'Climate conditions, workplace heat and occupational health in South-East Asia in the context of climate change', Australian National University, Canberra, 2017.

²⁶ Hsiang, Solomon M. 'Temperatures and cyclones strongly associated with economic production in the Caribbean and Central America', Proceedings of the National Academy of Sciences, August 2010.

²⁷ Hancock, P.A. and I. Vasmatzidis, 'Effects of heat stress on cognitive performance: the current state of knowledge', International Journal of Hyperthermia, vol. 19, no. 3, May-June 2003, pp. 355-372.

as 3°C too cold for women²⁸. A too cool temperature not only creates physical discomfort for women but also hampers their cognitive performance and decrease their productivity²⁹.

2.2.3 MEPS Driving AC Price Surge

Implementing MEPS will invariably affect the market by increasing the price of AC units as a result of forbidding cheap AC units that do not abide by the new policy. Households and SMEs can find themselves in a situation where they can no longer afford this technology. Female-headed households and women entrepreneurs would be more affected by this price surge given the exclusion of women from the formal financial system. The gender gap has remained persistent at 9% in developing economies since 2011³⁰. In PNG, access to credit is unequal between men and women and the legal system does not prohibit discrimination based on gender or marital status in credit access.

2.2.4 Air Conditioning and the Sick Building Syndrome

A study published in 2004³¹ stated that people working in office buildings with air conditioning (AC) systems had more symptoms of illness than those who did not work in buildings with AC. The symptoms included headache, fatigue, mucous membrane irritation, breathing difficulties and skin irritations. The study noted that a likely explanation is that AC systems spread contaminants in the air. The United States Environmental Protection Agency (EPA) notes that Sick Building Syndrome (SBS) refers to acute health and comfort effects that appear to be linked to time spent in a building, but no specific illness or cause may be identified. Most of the complainants report relief soon after leaving the building. The sicknesses might be caused by inadequate ventilation. It is critical that buildings where ACs are installed follow the norms to ensure the health of their occupants. As specified by the Australian Building Code, to which PNG abides, building ventilation should ensure a supply of outdoor air.

2.3 Analysis Level 3: Internal Level

This level will involve examining the structural, management and cultural characteristics of the partner organisations, namely the CCDA and the Conservation Environment and Protection Authority (CEPA) and identifying gender-related gaps and gender-specific needs at the internal level so as to design internal action plans to reduce the gaps and promote gender equality. Specifically, the following main aspects can be examined:

- › organisational strategies and policies;
- › human resources procedures;
- › communication protocols;
- › structure and management style;

²⁸ Kingma, B. and W. Van Marken Lichtenbelt, 'Energy consumption in buildings and female thermal demand', *Nature*, 3 August 2015.

²⁹ Chang, T.Y. and A. Kajackaite, 'Battle for the thermostat: Gender and the effect of temperature on cognitive performance', *PLoS ONE*, 2019. Available online: <https://doi.org/10.1371/journal.pone.0216362>

³⁰ Alliance for Financial Inclusion, *Financial Inclusion for Gender and Women*, 2016.

³¹ Mendell, Mark J., 'Air conditioning as a risk for increased use of health services', *International Journal of Epidemiology*, Volume 22, Issue 5, October 2004, pp. 1123-1126.

- › organisational culture and awareness of gender equality.

For example, the Papua New Guinea Climate Change (Management) Act 2015 that determines the functions and responsibilities of CCDA requires that the National Climate Change Board include at least one member to represent the National Council of Women of Papua New Guinea. Such gender considerations should be identified and assessed as part of an evaluation of institutions' capacity for gender-mainstreaming. Unfortunately, the project team has not received the collaboration needed to accomplish such an in-depth task.

CCDA is basically tasked with ensuring that Papua New Guinea follows a path of climate-compatible growth; that the country's economy develops while simultaneously mitigating GHG emissions and reducing vulnerability to climate change related risks. Its official mission is "to build a climate resilient and carbon neutral pathway for climate compatible development in Papua New Guinea". Currently, from our survey, aits general make up are as follows: the three general managers positions are currently filled by two men and a woman. Its total employee count is 61, consisting of 21 females and 39 males, with 6 women in middle management and 1 woman in top management (General Manager. CCDA does have a HR Policy, but it does not include the GESI concept. However, CCDA is currently updating the HR Policy to incorporate the GESI policy into its different components.

3 RECOMMENDATIONS ON EFFECTIVE IMPLEMENTATION OF THE MEPS AND LABELLING PROGRAMME FOR AIR CONDITIONING PRODUCTS

The Consultant's team will provide an implementation plan covering the following aspects: the types and format of label, the timetable for enforcing the regulatory process and a draft MVE scheme. First, the implementation plan will involve making recommendations on the types and format of label for air conditioning products, as outlined below.

3.1 Selecting a Type of Label

There are two major labelling scheme categories used in the international market, namely the comparative label and the endorsement label, as briefly described in **Erreur ! Source du renvoi introuvable.** below. Endorsement labels are voluntary and only the kinds of equipment that meet a minimum performance threshold are eligible to carry these labels.

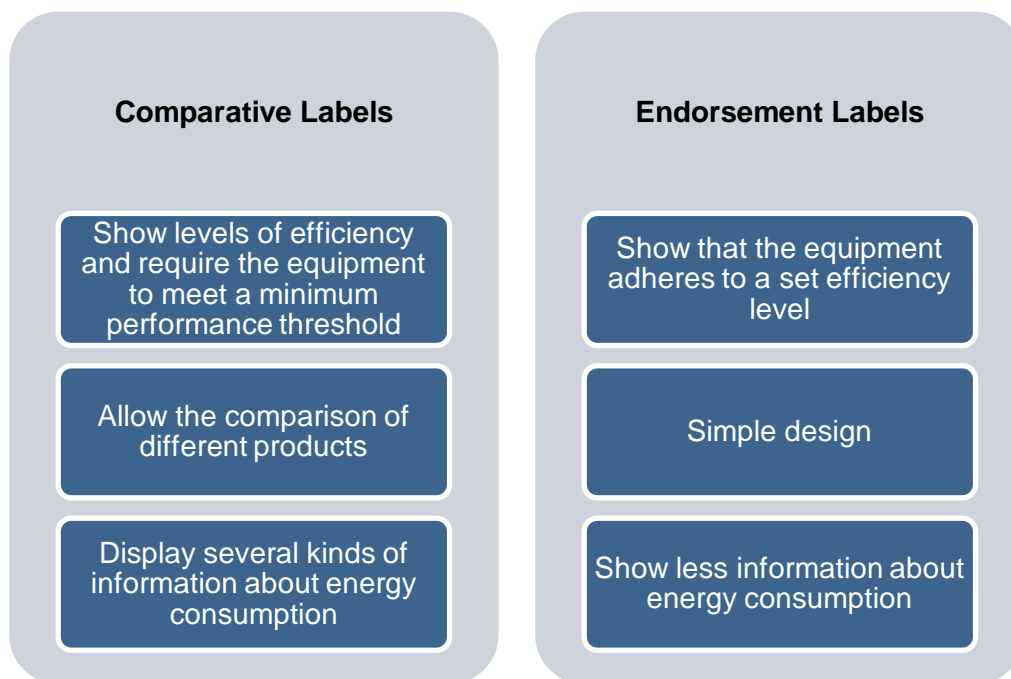


Figure 6: Two Major Kinds of Energy Efficiency Labels

Given its location in the Asia-Pacific region, PNG should favour the adoption of a comparative labelling scheme, such as that applied in Australia since the adoption of Australia's national framework for product energy efficiency in 2012, namely the Greenhouse and Energy Minimum Standards (GEMS) Act 2012. This will be discussed with CCDA and the Government of PNG during our team's mission. However, no matter which type is finally selected, our team will keep in mind that harmonising the label with the existing scheme in the region is a desirable feature in facilitating the label's acceptance and adoption by market stakeholders.

3.2 Selecting a Format for the Label

There are two major types of label graphic design used around the world, namely the bar system (used in the European Union and many other economies) and the star system (used in some Asian and African countries and in Australia). Again, PNG's proximity to Australia may dictate the selection of a format similar or close to the one used by Australia or New Zealand; this possibility will be assessed in the course of this assignment. Even if the Australian scheme is selected, there are still several elements of the label that need to be modified, as explained in Table 7 below.

Table 4: Main Elements of a Label Format

Elements	Brief Description
Equipment categories	This element is essential to ensuring the validity of energy usage comparison. For instance, a labelling programme for refrigerators defines several categories of refrigerators to differentiate units with different features. These features may include different compartment temperatures, the presence or lack of a freezer compartment, the presence or lack of ice makers, etc. It should be mentioned that these should usually be harmonised with whatever categorisation system is used in the development of MEPS and that the same test procedures, product categorisation system and energy efficiency indices adopted should be applied to both the labelling scheme and the MEPS.
Energy performance classes on the label	This corresponds to the number of bars or stars on the label but is also determined by the most common levels of product energy efficiency found in the market and the potential for energy efficiency improvement. Ideally, these classes should be selected in a way that can be most easily and clearly understood by consumers and most effectively encourage them to use the label; therefore, the choice of energy performance classes may be culturally specific.
Coding scheme	The classes of energy performance may be coded using a symbol (e.g. stars in Australia), letters (e.g. from A to G) or numbers (e.g. from 1 to 10), or a combination of a letter and a symbol (e.g. A+++ in Europe).
Indication of equipment performance	For instance, the European system uses an arrow in front of the corresponding bar of efficiency to indicate performance.
Texts and logos	All the texts and logos on the label that provide further information for consumers (more comprehensive on comparative labels while simpler on endorsement labels).
Language	Whether the label should be bilingual or unilingual or language-free, icons should be used (such as in the more recent Australian energy labels). If unilingual, English is more appropriate.

There is thus a wide range of graphic design options to choose from for the PGN label, and various approaches may be considered in the development of a label. In this activity, the Consultant will work with CCDA to prepare several graphic design options for the label. Two focus groups of at least 10 customers will be held to gather feedback on the various proposed options shown to them. The feedback from the focus groups will be reviewed to determine which label format will be chosen.

Process for Enforcing the New Regulations

We recommend that, once the regulations are adopted and enacted, the new regulations be publicly released according to a suitable enforcement timetable so as to allow market actors sufficient time to adapt to the new EE performance requirements. Thus, the process for enforcing the new regulations must be discussed with the Technical S&L Committee and the line ministries in order to establish a suitable timetable to be included in the implementation plan of the new regulations.



4 IDENTIFICATION OF GAPS AND IMPLEMENTATION PLAN

In order to establish the most effective and impactful market transformation or S&L programmes, governments can benefit from a thorough understanding of the markets they aim to influence. Market baselines provide the necessary level of detail about a given market at a specific point in time and may be invaluable in the establishment of MEPS, energy labelling or other EE policy measures. The benchmark level for the baseline is based on the availability and quality of data. Where efficiency parameters and sales data for all models in a market are known, baseline thresholds can be less stringent as compared to the case where only the model data is available.

According to the 'Methodological tool' of the UN's Framework Convention on Climate Change, Appendix 2:

The baseline thresholds shall be set at least the 80th percentile of units sold in the reference period where the units are sorted from highest to the lowest baseline energy intensity factor ($EC_{90/80,p}; SEC_{90/80,q}; EEI_{90/80,r}$) under the condition that the data of refrigerator or air conditioner models available is complete including the sales data.

Otherwise, where requirements in paragraph 2 cannot be complied with (e.g. sales data is not available) the baseline threshold shall be set at minimum 90th percentile of models available in the reference period where the units are sorted from the lowest to highest energy efficiency or at the level specified by the mandatory minimum efficiency performance standard (MEPS) whichever is higher.

In the case of PNG, it was not possible to obtain market data directly. Despite significant efforts from the local consultant team and an official intervention from the CCDA, no appliance distributors or even the PNG Customs have provided data to the research team. Indeed, the market assessment has struggled to obtain the collaboration of PNG stakeholders in terms of the sharing of their data. In addition, no answers from the ten stakeholders have been received, even after many attempts and follow-ups. An official letter from the CCDA office was sent to the stakeholders but to no avail.

For this market assessment, the sales data in PNG was collected with difficulty by consolidating different sources of information. Thus, the recommended strategy (i.e. the baseline threshold set at least the 85th percentile of models available) should be implemented. In effect, the last strategy would have been to set the baseline threshold at least the 90th percentile of models available if no sales data at all were available.

4.1 Producers and Suppliers

List of Importers

According to the OEC³², air conditioning products are mostly imported from China and Australia (39% and 35%, respectively), following by Malaysia (9.6%), the Czech Republic (4%), Japan (3.4%),

³² The Observatory of Economic Complexity (OEC), Papua New Guinea (2017), <https://oec.world/en/profile/country/png/>. Consulted on 29 November 2019.

Singapore (3.0%), Germany (2.4%) and the Netherlands (0.6%). The remaining 3% is distributed between New Zealand, Fiji, the Netherlands, the Philippines, Turkey, Canada, Indonesia, Italy, Israel, Korea and the U.S.A.

It is highly advisable to benchmark the technical minimum energy performance requirements of PNG's trade partner countries. Intra- and inter-regional harmonisation of the MEPS within the regular international trade flows are expected to bring many benefits to market actors (as explained in Figure 7 below). The Consultant identified the main trade partner organisations by analysing customs information about the four priority types of energy-using equipment.

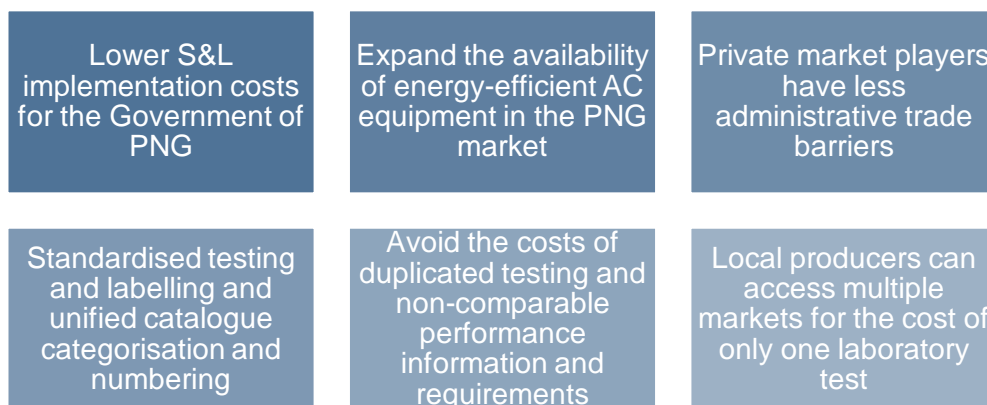


Figure 1: Benefits of Harmonising MEPS with Trade Partner Countries

PNG is a member of Melanesian Spearhead Group (MSG), the Pacific Island Countries Trade Agreement (PICTA), the South Pacific Regional Trade and Economic Cooperation Agreement (SPARTECA) and the World Trade Organisation (WTO). According to the International Trade Centre (ITC), PNG's main import partners are Australia, Singapore, China, Japan and Malaysia³³. The International Institute for Energy Conservation (IIEC) report previously stated that China was the main source of ACs (all sizes) with an average share of 28% in 2010, while the combined share of Australia and New Zealand represented 11% of imports and Malaysia had the largest share with 34%.

During its survey of three major retailers and wholesalers in Port Moresby in June 2012, the IIEC compiled information on the proportion of energy labels for each type of electrical appliance and the respective country of origin of these labels. Note that the study only provided information on the electrical appliances that had affixed any type of energy label, which represent 10% to 20% of the air conditioners (all sizes). Of those with energy labels, 95% to 100% had an Au/NZ energy label and only one appliance had a Hong Kong energy label. The share of ACs with energy labels in PNG was relatively low (< 20%). These findings provide a rough indication of the market share of ACs sourced through Australia and New Zealand.

The challenges that the project team faced could be indicative of future obstacles in the implementation phase. In effect, even with a strong rationale and solid regulatory texts, a lack of political leadership can seriously hinder this phase. Our technical assistance will provide the

³³ <http://www.intracen.org/country/papua-new-guinea/>



justification for the regulatory text, but the CCDA and the Ministry of Energy will have to push the proposed text forward and ensure that the government's legal department understands the purpose of the text and that the Ministry of Finances is on board. All of this requires a lot of political leadership.

CONCLUSION

Specific to the PNG, it was necessary to establish a baseline of the AC market in order to establish the most effective and impactful market transformation and S&L programmes. The benchmark level for the baseline is based on the availability and quality of data. In the case of PNG, it was not possible to obtain market data directly. However, the baseline was established by consolidating different sources of information. Thus, the establishment of AC MEPS for PNG can follow the recommended strategy by the UNFCCC for such conditions.

The recommended approach would be to begin with the establishment of MEPS at the lower level supported by the product labelling regime, with the full and transparent intention of moving the MEPS requirements to the higher EER within a short time period (two to three years). Establishing the EER at the lower level accomplishes two important objectives:

- › It introduces the MEPS and labelling programme into the PNG market.
- › It eliminates the worst performing appliances without significantly changing how the products enter the PNG market.
- › Once the S&L programme is established and accepted by stakeholders, the transition to the higher MEPS level would be less of a market disruption than starting the programme at a higher requirement level at the outset.

It should be noted that starting the programme at a lower level would result in energy and cost savings at the lower end of the projection. However, the faster the programme can transition from the lower MEPS to the higher MEPS level, the closer to the maximum cumulative savings it will achieve. In addition to the direct energy and emissions savings, implementing the S&L programme in PNG can result in these additional benefits:

- › Diesel imports reduction through lowering energy demand;
- › Energy bills reduction for consumers;
- › Infrastructure costs avoided and reduced capital and maintenance costs;
- › Livelihood improvement through access to better-quality products;
- › Energy efficient products by ensuring that PICTs do not have to accept inefficient products banned from sale elsewhere;
- › Emissions reductions.

Also, PNG was classified among the countries with 'low equality', characterised by a large disparity of women's access to health and education as well as command over economic resources compared to those of men. Since efficient ACs are not only an opportunity to limit the electricity consumption resulting from the growing cooling demand, but also a way of mitigating the effects of women's exclusion from many energy decisions³⁴. Policies to improve the efficiency of ACs, such as MEPS, must therefore be adopted by countries. PNG is thus taking a step in the right direction by developing its national MEPS. The country must also ratify the Kigali Amendment to the Montreal Protocol on

³⁴ However, this could backfire since office AC overload (what has been called the 'thermostat patriarchy') generally increase women discomfort and can even affect their cognitive performance (see below).

Substances that Deplete the Ozone Layer that calls for the phase out of hydrofluorocarbons, damaging refrigerants that are much worse than carbon dioxide in terms of trapping heat in the atmosphere³⁵.

Finally, the regulatory context of PNG is sufficient to include a new regulatory text for MEPS and labelling for ACs. However, the challenges that the project team faced during the project could be indicative of future obstacles in the implementation phase. In effect, even with a strong rationale and solid regulatory texts, a lack of political leadership can seriously hinder this phase. Our technical assistance will provide the justification for the regulatory text, but the CCDA and the Ministry of Energy will have to push the proposed text forward and ensure that the government's legal department understands the purpose of the text and that the Ministry of Finances is on board. All of this requires a lot of political leadership.

³⁵ United Nations, Amendment to the Montreal Protocol on substances that deplete the ozone layer, Kigali, 15 October 2016. C.N.872.2016.TREATIES-XXVII.2.f.

