# PACIFIC ENERGY AND GENDER NETWORK

## CANADIAN TRADE AND INVESTMENT FACILITY FOR DEVELOPMENT

## PACIFIC COMMUNITY

Gender-Based Assessment

**Part I: Clean Energy Sector Analysis**

May 2020

In Collaboration with:

ECONOLER

IUCN

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This document has been produced with the financial support of Global Affairs Canada. The views expressed herein can in no way be taken to reflect the official opinion of the Government of Canada

# ABBREVIATIONS

| | |
|---|---|
| AC | Alternating current |
| ADB | Asian Development Bank |
| APTC | Australia Pacific Training Coalition |
| CCS | Clean Cooking Solutions |
| CEDAW | Convention on the Elimination of All Forms of Discrimination against Women |
| CROP | Council of Regional Organizations of the Pacific |
| CTIF | Canadian Trade and Investment Facility for Development |
| DC | Direct current |
| EE | Energy Efficiency |
| EFL | Energy Fiji Limited |
| EPC | Electric Power Corporation (Samoa) |
| EPD | Energy Planning Division (RMI) |
| EPU | Energy Planning Unit (Kiribati) |
| ESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| ESMAP | Energy Sector Management Assistance Program (World Bank Group) |
| EU | European Union |
| FAESP | Framework for Action on Energy Security in the Pacific |
| FAO | Food and Agriculture Organization |
| FiT | Feed-in Tariffs |
| FJD | Fijian dollar |
| FNU | Fiji National University |
| GAC | Global Affair Canada |
| GBA | Gender-based Assessment |
| GBV | Gender-based violence |
| GDP | Gross domestic product |
| GEF | Global Environment Facility |
| GEM | Geoscience, energy and maritime (Division of SPC) |
| GFP | Gender focal point |
| GW | Gigawatt |
| GWh | Gigawatt-hours |
| HIES | Household Income and Expenditure Survey |
| IAP | Indoor air pollution |
| ICS | Improved Cooking Solutions |
| IFC | International Finance Corporation |
| ILO | International Labour Organization |
| ISO-IWA | International Organization for Standardization – International Workshop Agreement |
| IPP | Independent power producer |

| | |
|---|---|
| IRENA | International Renewable Energy Agency |
| IUCN ORO | International Union for Conservation of Nature - Oceania Regional Office |
| JICA | Japan International Cooperation Agency |
| KAJUR | Kwajalein Atoll Joint Utilities Resources (RMI) |
| KIT | Kiribati Institute of Technology |
| KSEC | Kiribati Solar Energy Company |
| kW | Kilowatt |
| kWh | Kilowatt-hours |
| LPG | Liquefied petroleum gas |
| M&E | Monitoring and Evaluation |
| MEC | Marshalls Energy Company |
| MEL | Monitoring, Evaluation and Learning |
| MIA | Ministry of Internal Affairs (RMI) |
| MISE | Ministry of Infrastructure and Sustainable Energy (Kiribati) |
| MLGWY | Ministry of Local Government, Women and Youth (Tuvalu) |
| MMERE | Ministry of Mines, Energy and Rural Electrification (Solomon Islands) |
| MNRE | Ministry of Natural Resources and Environment (Samoa) |
| MoIT | Ministry of Infrastructure, Transport, Disaster Management and Meteorological Services (Fiji) |
| MPUI | Ministry of Public Utilities and Infrastructure (Tuvalu) |
| MRD | Ministry of Resources and Development (RMI) |
| MW | Megawatts |
| MWh | Megawatts-hours |
| MWCPA | Minister for Women, Children and Poverty Alleviation (Fiji) |
| MWCSD | Ministry of Women Community and Social Development (Samoa) |
| MWYCFA | Ministry of Women, Youth, Children and Family Affairs (Solomon Islands) |
| MWYSA | Ministry of Women, Youth and Social Affairs (Kiribati) |
| NDC | Nationally Determined Contribution |
| NEO | National Energy Office |
| NWO | National Women Office |
| O&M | Operation and maintenance |
| OTEC | Ocean thermal energy conversion |
| PEG | Pacific Energy and Gender Network |
| PEGSAP | Pacific Energy and Gender Strategic Action Plan |
| PICs | Pacific Island Countries |
| PIFS | Pacific Islands Forum Secretariat |
| PIPSO | Pacific Islands Private Sector Organization |
| PRIF | Pacific Region Infrastructure Facility |
| PPA | Pacific Power Association |
| PPP | Public-private partnership |

| | |
|---|---|
| PUB | Public Utilities Board (Kiribati) |
| PUE | Productive use of energy |
| PV | Photovoltaic |
| RE | Renewable Energy |
| RESCO | Renewable energy service companies |
| RMI | Republic of Marshall Islands |
| RMP | Resource Mobilization Plan |
| SDG | Sustainable Development Goals |
| SEIAPI | Sustainable Energy Industry Association of the Pacific Islands |
| SINSO | Solomon Islands National Statistics Office |
| SHS | Solar home systems |
| SIDS | Small island developing states |
| SIEA | Solomon Islands Electricity Authority |
| SMEs | Small and medium enterprises |
| SPC | Pacific Community |
| SPREP | Secretariat of the Pacific Regional Environment Program |
| STEM | Science, technology, engineering and mathematics |
| TEC | Tuvalu Electricity Corporation |
| TVET | Technical and vocational education and training |
| UNDP | United Nations Development Program |
| UN Women | United Nations Entity for Gender Equality and the Empowerment of Women |
| USD | United States dollar |
| USP | University of the South Pacific |
| WBG | World Bank Group |
| WBL | Women, Business and the Law |
| WHO | World Health Organization |
| WTE | Waste-to-energy |
| YECSI | Young Entrepreneurs Council Solomon Islands |

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# EXECUTIVE SUMMARY

There is increased interest worldwide in expanding women's economic opportunities through employment and entrepreneurship in the clean energy sector[1]. Engaging women at every segment of the clean energy value chain would not only economically empower these women, but also potentially create a more inclusive business model to achieve the Sustainable Development Goal (SDG) 7.[2] At the global level, the proportion of women working in the renewable energy (RE) sector (28%) is still low compared to women's participation in the global labour force.[3] The Pacific region has deployed efforts on gender mainstreaming in the clean energy sector since 2003 with the establishment of the Pacific Energy and Gender (PEG) Network. Given the ambitious clean energy targets of Pacific Islands Countries and territories (PICTs) the region is undergoing a clean energy transition that will result in abundant economic benefits. It is therefore critical that regional and national authorities ensure that both women and men have equal access to these new opportunities.

The Pacific Community (SPC) requested technical assistance from the Canadian Trade and Investment Facility Development (CTIF) to relaunch the Pacific Energy and Gender (PEG) Network, whose objective is to increase women's engagement as entrepreneurs and professionals in the clean energy employment market. Under the PEG Network - Phase 1, which was implemented from 2003-2014, awareness raising material was developed, workshops and training conducted, and efforts deployed for mainstreaming gender into clean energy projects. The Second PEG network which involves all Pacific Islands Countries will be articulated by the Pacific Energy and Gender Strategic Action Plan (PEGSAP) for 2020-2030. Given the lack of sex-disaggregated data on gender and clean energy in the region, the consultancy first conducted a gender-based assessment (GBA) of a sample of six PICs representing all sub-regions, namely Melanesia (Fiji and Solomon Islands), Polynesia (Samoa and Tuvalu) and Micronesia (Kiribati and RMI ), to form the baseline for the development of the PEGSAP. A one-month field mission was conducted by representatives from Econoler and the International Union for Conservation of Nature (IUCN) Oceania Regional Office (ORO) in February 2020 to collect data and conduct consultation meetings. In total, 85 meetings were conducted for both data collection and consultations, resulting in 49 stakeholders being consulted on the scope and institutional structure of the PEGSAP (Appendix I). This represents 133 persons met during both bilateral meetings (63 females, 42 males) and group consultations with 28 women from rural communities.

[1] The clean energy sector encompasses both renewable energy (energy from sources that are naturally replenishing but flow-limited such as solar, wind, geothermal, hydropower and biomass) and energy efficiency (demand-side management measures to reduce energy consumption).
[2] SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all.
[3] IRENA (2019) Renewable Energy: A Gender Perspective. Available online : https://www.irena.org/publications/2019/Jan/Renewable-Energy-A-Gender-Perspective

This report presents the main findings from both a literature review and the field mission, along with analyses on the status of gender equality and the clean energy sector in each of the six targeted PICs. It also underlines the challenges related to women's inclusion in the clean energy value chain and outlines recommendations on priority actions and main entry points in the chain. The findings and recommendations are the backbone of the PEGSAP whose full version will be submitted in the second quarter of 2020.

## Status of Gender Equality in the Pacific Region

A first step in the gender-based assessment was to assess the level of gender equality in the Pacific region. The participation of women in the labor force being lower than that of men in all six PICs (see Table 1), the report first pinpoints the structural challenges preventing the economic inclusion of women.

**Table 1: Female and Male Participation Levels in the Labor Force (% Age 15 and Older)[4]**

| Gender | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
|---|---|---|---|---|---|---|
| Female | 40.8 | 62.5 | 23.7 | 38.3 | 33.6 | 29 |
| Male | 75.4 | 86 | 55 | 71 | 53.3 | 53.3 |

Six main impediments were identified, as briefly presented below.

- **Discriminatory legal framework**. According to the Women, Business and the Law (WBL)[5] index, women in all six countries face some type of legal discrimination when trying to join the labor force as employees or entrepreneurs (see Section 2.3.1). For example, half of the countries require women to meet a set of conditions different from those for men when applying for a passport. Four countries do not have any law mandating equal remuneration for equal work. Only one country requires granting a paid maternity leave of at least 14 weeks. Also, no country prohibits gender-based discrimination in relation to access to credit.
- **Family and community values and customs and Limited Participation of Women in Decision-Making.** All six studied PICs are patriarchal societies except the RMI, which is traditionally a matriarchal society.[6] As a result, in all six PICs women's participation in decision-making is low at all levels of society (parliament, state-owned enterprises, village councils, churches, private sector and households). Community and family values, stereotyping, social norms, streaming in schools, indigenous culture and religious beliefs also play an important role in what type of careers girls choose.

[4] World Bank Data (2019) Labour force participation rate (ILO estimates) was used for Fiji, Solomon Islands and Samoa. World Bank Data (2015) Labour force participation rate (national estimates) was used for Tuvalu and Kiribati and (2011) for RMI. https://data.worldbank.org/indicator
[5] The World Bank Group. (2020),"Women, Business and the Law". Retrieved from: https://wbl.worldbank.org/.
[6] According to UN Women, the matrilineal tradition in the RMI is, however, being steadily eroded as this country urbanizes and its population grows, making the tracing of lineage and land rights more difficult.

- **Balance of productive and reproductive roles.**[7] Reproductive and unpaid care work not only leaves little time for housewives to engage in paid work, but also makes it difficult for them to find jobs with a schedule that accommodates their household chores. Women are hence overrepresented in the informal economy. In the formal workforce women continue to shoulder multiples roles and responsibilities of unpaid work and community engagement.
- **Difficulties linked to female entrepreneurship.** The unfavorable business climate in the Pacific is challenging regardless of gender. However, some extra challenges are specific to women entrepreneurs, such as particular difficulties accessing credit due to lack of collateral and financial advisory services as well as pre-defined gender roles.
- **Lack of access to resources.** The gender inequalities regarding access to land, access to financing, market services and access to energy are an impediment to women's financial inclusion.
- **Gender-based violence (GBV)**. The Pacific region has one of the world's highest rates of violence against women, with over 60% of adult women suffering physical or sexual abuse during their lifetime (compared to an estimated world average of 35.6%).[8] In addition to all the physical and mental and psychosocial health suffering, domestic violence and GBV, gender inequalities, discrimination, risks of harassment and assault systematically translates into lower productivity or economic participation. Women living with disabilities are particularly more vulnerable to situations of violence.

## Situational Analysis of the Clean Energy Sector in Pacific Countries

This section provides a gender assessment of the employment in the clean energy sector, which is broken down into two value chains: (1) the upstream jobs that are in direct relation to the development of the EE/RE market; and (2) the downstream jobs that arise from improved energy access (in both quality and quantity). While reviewing the clean energy value chain in targeted countries, some **value chain weaknesses** impeding the green energy transition were pinpointed:

- Lack of a qualified technical workforce;
- Lack of a strong and qualified private sector;
- Missing value chain segments: maintenance and decommissioning.

These weaknesses need to be addressed for fostering the clean energy transition of Pacific countries. They also represent opportunities to increase the engagement of women in the clean energy value chain, as highlighted in this section and in the recommendations.

[7] Reproductive work involves performing caregiving and domestic chores including cleaning, cooking, childcare and other unpaid domestic housework.
[8] CROOK, Tony et al. 2016. loc. cit., WHO (2013), Global and regional estimates of violence against women. Retrieved from: https://www.who.int/reproductivehealth/publications/violence/9789241564625/en/.

## Gender Assessment of the Upstream Clean Energy Value Chain

Mapping the upstream clean energy value chain of all six PICs disclosed the stakeholders mostly involved, in which segments women are already engaged and what the weaknesses and gaps are to the green energy transition.

The national energy offices (NEO) and electricity utilities manage and oversee most of the clean energy development in targeted PICs. Their responsibilities encompass the supply of **off-grid electricity** in these countries that do not have a 100% electrification rate. Solar home systems (SHS) are installed as part of rural electrification programs in Fiji (300-peak watt (Wp) systems), RMI (150-200-Wp systems), as well as Kiribati and Solomon Islands (20-Wp systems). They also oversee supplying electricity through **on-grid and mini-grid infrastructure**. In some countries such as Fiji and Samoa, the private sector is involved in supplying, installing, and maintaining the RE systems. Private actors include renewable energy companies[9] and shops that sell pico-solar systems.

### Women Working in the Public Sector

The clean energy workforce overall **lacks diversity and is male-dominated**. As shown in Table 2, the proportion of female staff working in NEO varies from 8.7% in Fiji to 27.3% in Kiribati, while the proportion of females working for electricity utilities ranges from five percent in Tuvalu to 22.9% in Kiribati. Two NEO (Fiji and Samoa) reported having recruitment, promotion and training procedures that enhance female employee participation and growth.

**Table 2: Human Resource Data by Country for NEOs[10] and Utilities[11]**

| Country | Total Staff (NEO) | Proportion Females (%) | Total Staff (Utility) | Proportion Females (%) |
|---|---|---|---|---|
| Fiji | 53 | 8.7 | 805 | 12.7 |
| Solomon Islands | 17 | 21.7 | 255 | 16.1 |
| Samoa | N/A | 30 | 280 | 17.9 |
| Tuvalu | 8 | 25.0 | 62 | 5 |
| Kiribati | 11 | 27.3 | 153 | 22.9 |
| RMI (MEC) | 6 | 16.7 | 205 | 8.8 |
| RMI (KAJUR) | | | 81 | 12.3 |

[9] Renewable energy companies involved in the Pacific principally focus on solar energy. They provide a range of services including infrastructure design, consultancy, installation and maintenance of RE power systems.
[10] Econoler-IUCN (2020), Questionnaire to National Energy Offices in six PICs.
[11] PPA (2018). Benchmarking Study.

Women make up most of the administrative, finance, customer service and support staff, which are usually lower paid jobs with less decision-making power. The data collected from the NEO shows that women make up 22.4% of the total number of staff. While they represent only 12.1% and 15.5% of management and technical positions, they make up most of the administrative and support staff (51.5%). In the electricity utilities, women represent 14.2% of all staff. They make up 26.5% of higher management yet are almost absent from technical positions (1.4%). Among these women that occupy senior roles, women are mainly working in public relations, customer services and communications (41.9%), finance (27.9%) and administration (13.9%). Gender stereotyping and job segregation seem to be strong according to the interviews conducted with utility representatives[12], who mentioned women are pushed into administrative roles as a result of social stereotyping and institutional practices, where women are considered to be better at these positions and encouraged to take those career roles rather than pursue more technical ones.

The lowest proportion of women in intermediary technical positions (9.5%) compared to junior (19.2%) and senior (16.3%) positions concur with the international observations that women are often underrepresented in mid-level positions. This lower representation is usually explained by: (1) the challenges women encounter to get promoted and hence the higher drop-out rate among women that occupy junior positions and (2) the lack of an inclusive environment, lack of mentoring and existing cultural norms affects more women working in intermediary positions. Further human resources analysis should be done to assess if this is the case.

### Women Working in the Private Sector

The clean energy entrepreneurship ecosystem of the Pacific Region is still nascent. Some of the targeted countries, such as Fiji and Samoa, have a more active, but still insufficient, private sector; but in the other economies (Solomon Islands, Tuvalu, Kiribati and the RMI), the business acumen is almost absent. Women are also a minority in the clean energy private sector. The scope of this consultancy did not allow the team to collect comprehensive data on women employed in energy companies, but the information collected through a literature review and the interviews showed that women make up less than 5% of the technical staff, while representing a higher proportion in management (15% to 20%). RE companies report that gender equality has received a big push on the regional energy agenda over the past two years, mainly by international donors.

[12] Econoler-IUCN (2020) Field Data Collection.

Female business owners working in energy are almost non-existent in the Pacific. In this case, the challenges for women to start a business and access financing (as seen in the structural challenges presented above) coupled with the challenges for women to be involved in male-dominated sectors lead to women generally not considering this avenue. One regional program the Barefoot College initiative also commonly known as the "solar grandmothers" tries to fill the void by enhancing women's technical skills in installing and repairing off-grid solar systems to promote female energy micro entrepreneurship. However, as covered by Section 4.4.1 the program proved to have deficiencies that limit its success in engaging women in the clean energy value chain.

The analysis of the clean energy private sector disclosed that there is a big and untapped potential for women to act as energy entrepreneurs. Female energy entrepreneurship would contribute to solving the weaknesses of the clean energy value chain. For example, providing an enabling environment for the Barefoot College's graduates to use their skills would enable a qualified technical workforce to provide decentralized maintenance services of solar off-grid equipment. Entrepreneurship represents a huge opportunity for job creation in the region and would increase the participation of women and the private sector in the upstream energy value chain. This opportunity is part of the priority recommendations as discussed in Section 0.

### Gender Assessment of the Downstream Clean Energy Value Chain

Downstream jobs relate to increased access to RE-based productive uses of energy (PUEs). PUEs are the agricultural, commercial and industrial activities involving energy services as a direct input to the production of goods or provision of services.[13] PUEs have major potential to increase employment and income-generating opportunities in specific sectors wherein women are economically active (agriculture, fisheries and livestock, services and manufacturing).

## Challenges for the Inclusion of Women in the Energy Value Chain

Women face numerous challenges preventing their engagement in the clean energy value chain (upstream and downstream).

[13] GIZ. (2013). *Promoting Productive Use of Energy in the Framework of Energy Access Programmes.* https://sustainabledevelopment.un.org/content/documents/4738mayer.pdf.

First, **women are energy poor**. Women's energy consumption is shaped by their reproductive roles, their ability to access and afford the services that are available, locations, areas of residences and their proximity to energy sources, their vulnerabilities to climate change including disasters, leading to different energy needs than men. Energy solutions designed for off-grid communities (mainly stand-alone SHS) do not have enough capacity to fulfill their energy needs and are unreliable due to a lack of maintenance support and knowledge. On-grid energy supply can also fail to fulfill the households' energy needs because of the high energy losses, frequent power outages and high electricity tariffs. Women also lack the knowledge and access to decision-making spaces to voice their energy needs and financial resources to access energy technologies at the household and community levels. Indeed, men are indeed mostly responsible for making household purchasing decisions (and hence the decision regarding the sources and types of energy in the household and at the community level) and women also have little representation in community committees overseeing energy projects or infrastructure. Increased energy access is one of the main entry points to women's engagement in the clean energy value chain. Second, the **national energy policy frameworks**[14] **are gender blind**, which means they fail to recognize that roles and responsibilities of women and girls are ascribed to them, leading to different needs and situations. This gender blindness derives from two facts observed in all studied PICs:

› The countries generally do not have a favorable context for gender mainstreaming in energy policies[15]. All studied PICs express a political will (from the NEO) to promote gender inclusion in their organizations and have an institutional structure for mainstreaming gender (the NWO) and have a national gender equality policy, hence presenting a foundation to mainstream genderin the clean energy sector. However, the lack of knowledge and awareness on the gender and energy nexus within the NEO, the absence of sex-disaggregated data on energy consumption and economic activities and the lack of human and financial resources in the NWO are hindrances to operationalize gender mainstreaming in energy planning.

[14] A national energy policy framework includes all documents (policy, plan, roadmap, strategy, etc.) defining the energy orientation of a country.
[15] The consultant performed a comprehensive assessment of four enabling factors for gender mainstreaming in the energy sector: (a) decision-making process (by using field data collected from the NEOs and electricity utilities through interviews and the questionnaires), (b) sex-disaggregated data (by reviewing national statistics), (c) legal and political (by reviewing the legal framework and political commitment) and (d) institutional and financial (by assessing the existence of a National Women's Machinery and human, financial resources allocated to gender mainstreaming).

› The contents of the national energy policy frameworks[16] are gender blind because they fail to consider women's roles and needs and also because they propose an incomplete definition of energy access that is technology-centric and household-centric, leaving aside the PUEs and energy for community services. When gender equality is addressed in policy frameworks (e.g. Solomon Islands, Samoa, Tuvalu and Kiribati), it is as a very generic and broad statement that fails to specifically address women's practical and strategic energy needs.[17] Women are also portrayed (if they are portrayed at all) as beneficiaries only, not as stakeholders or agents of change. One exception is the Marshall Islands' Electricity Roadmap that has included the need to "encourage women to join the energy workforce in all roles" as one of its key principles.

Third, Pacific culture and values and earlier educational streaming in secondary or pre-university schools prevent women from joining traditionally male-dominated university programs and working fields. Parents and relatives often discourage youth from becoming entrepreneurs or women from pursuing male-dominated careers, and girls still think that engineering is a man's field that is too difficult for them. This results in female students only comprising around 20% of all university students enrolled in science, technology, engineering and mathematics (STEM) programs at the regional level[18] and being virtually absent from technical and vocational education and training (TVET) programs related to energy. Initiatives are being implemented in the region to increase female enrollment in STEM programs and challenge stereotypes. One of them is the Science Camp implemented in Fiji by an NGO named Graduate Women Fiji, which aim at increasing interest of girls (6 to 13 years old) in science. Remarkably, although women represent only a small proportion of total students enrolled in traditional STEM programs (physics, biology, geology, engineering, and mathematics), they constitute more than half the students in disciplines such as food technology, environment, climate change, agriculture, fisheries and forestry. These are all disciplines that would benefit to the energy sector which is mainly dominated by engineers and technical experts. Having a more interdisciplinary clean energy workforce would be highly valuable to redefine energy access according to international standards and add the missing segments of maintenance and decommissioning into the clean energy value chain.

[16] The consultant used an analytical grid initially developed by Mariëlla Feenstra (2002), "Towards a gender-aware energy policy: a case study from South Africa and Uganda", University of Twente. The grid aims to assess the level of gender awareness of the national energy policy frameworks considering the following characteristics: (1) gender-mainstreaming, (2) participation in developing the policy, (3) gender-disaggregation, (4) recognition of women's roles and their energy needs and (5) the integrated energy planning approach.
[17] To address a practical gender need is to improve a person's situation by widening her or his access to resources. However, such improvements will not directly affect their roles and relationships, or their control. Those changes that really empower people are called 'strategic' ones.
[18] This number is, however, aligned with world averages of females studying in traditional STEM.

Fourth, the few existing initiatives have had limited impacts in including women in the clean energy value chain. Project mapping indeed exposed that, out of the 46 clean energy projects identified, 22% had a focus on gender equality by promoting women's involvement in the energy sector (6 projects) or by increasing the penetration of efficient cookstoves (4 projects). When considering the energy projects without a gender focus (projects in capacity building, financial initiatives, on and off-grid power supply and DSM), we noticed that only six projects out of 36 had a gender component (16% of the projects). The flagship initiatives addressing women and energy (such as the Barefoot College training and efficient cookstove distribution programs) proved to have deficiencies hindering the achievement of results and would require reevaluation and rethinking. As one of the promising avenues for women's inclusion in the clean energy value chain, the Barefoot College approach and training curriculum should be adapted to the Pacific context and national rural electrification initiatives when moving forward with the Regional Barefoot College planned to be constructed in Fiji.

## Conclusions and Recommendations

The gender-based assessment of the energy sector in six Pacific countries unveiled the prevalence of gender inequalities in the access to not only economic opportunities available in the clean energy value chain, but also in the access to clean energy technologies. In this context, a business as usual scenario will lead to women being incapable to reap the socio-economic benefits of the regions' green energy transition. Priority interventions were identified to address the challenges women face in integrating the clean energy value chain. Many recommendations target both women and youth. Pacific youth, on the one hand, are disenfranchised and overrepresented in the unemployed population and, on the other hand, are aware of gendered energy poverty; as observed during the field mission they are also innovative and solution-oriented for solving energy issues[19]. Young entrepreneurs, for example, should be considered as allies for PEGSAP implementation to help ensure the sustainability of the results achieved.

[19] Econoler-IUCN (2020) Meeting with YECSI and Honiara Youth Council.

First and foremost, a **definition of energy access and energy security tailored to the Pacific region** is proposed herein. The definition is gender-responsive, considers all levels of energy access (households, productive uses of energy and community services) and proposes an approach based on demand-side user perspectives. This definition could be promoted regionally by SPC as a tool for Pacific countries to adapt their energy policy frameworks. Second, interventions should focus on the **main entry points for women into the clean energy value chain**. These are: (1) as micro-entrepreneurs and community self-help groups in sales, distribution and maintenance of RE off-grid systems; (2) as micro-entrepreneurs and community self-help groups in the efficient cookstove value chain; (3) as public servants in planning and implementing energy policies, projects and programs; and (4) as entrepreneurs in the fisheries and agricultural sector whereby increased access to clean energy could result in substantial business growth. The measures should follow a multi-level implementation framework to enhance women's economic development to break the interventions down at four levels: (1) institutional, (2) service provides, (3) community and (4) individuals. The detailed scope of each intervention, their financial evaluation and a proposed regional and institutional structure for the PEG network will be further discussed in the PEGSAP document.

# INTRODUCTION

The CTIF is a seven-year (2018-2025) Global Affairs Canada (GAC)-funded project to support sustainable trade and investment-related policy reforms that have high potential for reducing poverty in developing countries of the Asia-Pacific Region. The Pacific Community (SPC) required technical assistance from the CTIF to establish the Second Pacific Energy and Gender (PEG) Network, whose objective is to increase women's engagement in the clean energy employment market as entrepreneurs and professionals. The Second PEG network will be articulated by the Pacific Energy and Gender Strategic Action Plan (PEGSAP) for 2020-2030. Given the lack of sex-disaggregated data on gender and energy in the region, the consultancy involves conducting a gender-based assessment (GBA) in a representative sample of six Pacific Island Countries (PICs) representing all sub-regions, namely Melanesia (Fiji and Solomon Islands), Polynesia (Samoa and Tuvalu) and Micronesia (Kiribati and RMI), to inform the development of the PEGSAP.

Econoler, in collaboration with the International Union for Conservation of Nature (IUCN) Oceania Regional Office (ORO) was mandated to provide consulting services to SPC in conducting the GBA and developing the PEGSAP in close collaboration with SPC and its member states. Under the mandate, Econoler/IUCN ORO are required to carry out the following tasks and subtasks:

1 Conduct a GBA of SPC Member States' Energy Sectors
   - Subtask 1.1: Analyze the National Context
   - Subtask 1.2: Analyze Women's Engagement in the Clean Energy Value Chain
   - Subtask 1.3: Conduct an Internal Assessment of Implementing Agency
   - Subtask 1.4: Facilitate Consultations with Regional and National Stakeholders on the PEGSAP's Scope of Intervention and Institutional Structure
   - Subtask 1.5: Compile the Findings in a GBA Report
2 Support SPC in Developing the 2020-2030 PEGSAP
   - Subtask 2.1: Provide Technical Advice to SPC
   - Subtask 2.2: Draft the 2020-2030 PEGSAP and Implement its Review Process by consulting with PICs
3 Develop the Supporting Documents of the 2020-2030 PEGSAP
   - Subtask 3.1: Develop a Monitoring, Evaluation, Learning and Cost-benefit Analysis Framework
   - Subtask 3.2: Draft a Concept Note and a Resource Mobilization Plan
   - Subtask 3.3: Launching the 2020-2030 PEGSAP
4 Communication and Reporting

This initiative, jointly undertaken by the Pacific Community and the CTIF, is highly welcomed in the region given that no specific work on gender and energy was undertaken at the regional level since 2015. The approach promoted would enhance a policy development strategy that is sustainable, long-term and inclusive.

This report provides a comprehensive gender-based assessment of the clean energy sector and clean energy value chain in the targeted Pacific countries. Given that this topic has not been covered in recent times in the Pacific region, the report is extensive and analyses both the gender equality situation and the clean energy context in the six targeted countries. It also presents internationally recognized definitions of energy access and green jobs, as well as international best practices. Because women's engagement does not happen in a vacuum, the study furthermore provides a general analysis on the clean energy value chain and identifies its weaknesses.

The report is broken down into five main sections. The first section presents the methodological approach to conducting the data collection and stakeholders' consultations as well as performing the gender analysis. Section 2 provides a general overview of the gender situation in the Pacific by presenting international indicators and defining the regional and national policy frameworks. It also identifies the main structural challenges to Pacific women's economic empowerment. Then, Section 3 includes the bulk of the data collected during the field mission by presenting a situational analysis of the clean energy sector in the Pacific countries, identifying the weaknesses and gaps of the clean energy value chain and defining in which segments are women involved. Section 4 exposes the challenges specific to the energy sector that are undermining the inclusion of women in the energy value chain. Finally, Section 5 highlights the main entry points and recommendation to increase women's economic opportunities in the clean energy sector. These recommendations will be the backbone of the PEGSAP.

# 1 RESEARCH METHODOLOGY

This section explains the methodological approach applied to the literature review and data collection and analysis process.

## 1.1 Country Sampling

Given the lack of sex-disaggregated data on gender and energy in the region, the consultancy involved conducting a gender-based assessment of a representative sample of six PICs representing all the sub-regions, namely Melanesia (Fiji and Solomon Islands), Polynesia (Samoa and Tuvalu) and Micronesia (Kiribati and RMI). The selection of countries was defined by SPC.

## 1.2 Literature Review

More than 150 literature sources were consulted within the framework of the gender-based assessment, including reports from international organizations, scientific articles, policy briefs, project evaluations, policies, as well as strategic and framework documents. The literature consulted was at the national level of the six studied PICs as well as at the regional and international levels.

## 1.3 Field Data Collection and Analysis

### Stakeholders' Meetings – Data Collection and Consultations

From February 1 to February 27, 2020, Econoler and IUCN conducted a field mission in all the targeted countries. The stakeholders were selected by the Consultant in collaboration with SPC. A mission plan and a detailed agenda are provided in Appendix I. The agenda includes a detailed list of the organizations and representatives met from all sectors (the Council of Regional Organizations of the Pacific or CROP agencies, governmental bodies, the private sector, civil society and international organizations). In total, 85 meetings were conducted, including 49 stakeholders consulted on the scope and institutional structure of the PEGSAP. This represents 133 persons met during both bilateral meetings (63 females, 42 males) and group consultations with 28 women from rural communities.

## Data Collection

Data collection was performed via semi-directed interviews, focus group discussions and site visits (in Fiji's and the Solomon Islands' outer islands). The Consultant made sure to meet stakeholders outside the urban centers to grasp the urban-rural divide in terms of access to energy and gender equality. Site visits involved group discussions with village committees, village members and women's committees, household visits and site observations.

Focus Group Discussion with Rural Women in the Malaita Province in the Solomon Islands

## Consultations

Meeting with a Women's Group in Lilisiana Village in the Solomon Islands (above) and Meeting with the Village Committee in Ravuka in Fiji (below)

Consultation tools were used to present a preliminary scope of intervention and regional and national institutional structures for the PEGSAP and are presented in Appendix II. The tools that were available in a printed version enabled the stakeholders to closely analyze their content and actively comment and add written notes. Their comments were integrated, and the final version of the tools will be presented in the PEGSAP.

### Methodology for Assessing the Gender Awareness of National Energy Policy Frameworks

Under the scope of this project, an analytical grid was applied to the six targeted countries to assess the level of gender awareness of their national energy policy framework and enable their comparison (See Sections 4.2.2 and 4.2.3).

The grid was developed by Econoler[20] using the analytical framework developed by Mariella Feenstra[21] and a wide range of articles on women and energy[22]. It is among the first attempts in scientific literature to provide a clear and streamlined tool for decision-makers to mainstream gender in energy policies. The tool is broken down in two main components to not only assess the content of the energy policy but also the context for policy development. The assessment of the national conditions enabling the development of the gender-aware energy policy framework is presented in Section 4.2.2, while the analysis of the content of the energy policy framework is shown in Section 4.2.3.

[20] Econoler (2019) "Analytical Grid to Assess and Compare the Gender Awareness Levels of National Energy Policy Framework", within the framework of "Energy Efficiency Optimum Strategies to Promote Low Carbon Development in West Africa and Energy Justice for Women Living in Rural Areas", a project financed by the International Development and Research Center (IDRC), 2018-2021.
[21] FEENSTRA, Mariëlla (2002), "Towards a gender-aware energy policy: a case study from South Africa and Uganda", University of Twente.
[22] PARIKH, Jyoti K. "Gender issues in energy policy", *Energy Policy*, Vol. 23, No 9, pp. 745-754. Clean Energy Solution Center (2019) "Blueprint Guide for Creating Gender-sensitive Energy Policies". MIKKOLA, Mari (2017), "Feminist Perspective on Sex and Gender", *Stanford Encyclopedia of Philosophy*. Fall Edition. CLANCY, Joy et al. (2003), "Gender-Energy-Poverty Nexus: Finding the Energy to Address Gender Concerns in Development".

# 2 STATUS OF GENDER EQUALITY AND SOCIAL INCLUSION IN THE PACIFIC REGION

This regional and national-level analysis of gender equality starts with a literature review and an assessment of the main gender equality indicators of a representative sample of six PICs, namely Fiji, the Solomon Islands, Samoa, Tuvalu, Kiribati and the Republic of Marshall Islands (RMI). Then, an evaluation is made to take a close look at the gender-related policy and regulatory framework and assess the challenges faced by the effort to achieve economic empowerment among women in the Pacific region.

## 2.1 International Gender Indicators

The main indicators for gender equality and social development are explained in Table 3 below and are shown for the six targeted countries in Table 4. Wherever available, a world ranking is provided to show the group (Groups 1 to 4) in which the six countries stand (country group 1 having the highest scores and country group 4 having the weakest score).

**Table 3: International Indicators of Human Development and Gender Equality**

| Indicator[23] | Description |
|---|---|
| Human Development Index (HDI) | The worldwide HDI value in 2018 was 0.731.[24] It is a statistical composite index of life expectancy, education, and per-capita income indicators. |
| Gender Inequality Index (GII) | The worldwide GII value in 2018 was 0.439.[25] It measures gender inequalities in three important aspects of human development: reproductive health, empowerment and the labor market. It ranges from 0 (gender equality in all three dimensions) to 1 (gender inequality in all dimensions). |
| Human Capital Index (HCI) | Uses factors related to the quality of education and health to assess the human capital that a child born today can expect to attain by the age of 18. |
| Youth Development Index (YDI) | The worldwide YDI value in 2016 was 0.616.[26] It measures youth development in five different aspects: education, health and well-being, employment and opportunity, political participation, and civic participation. |

[23] United Nations Development Program (UNDP) (2018), "Human Development Indices and Indicators, Statistical Update", World Bank Group (2018), The Human Capital Project.
[24] UNDP (2019), "Human Development Report 2019 - Beyond Income, Beyond Averages, Beyond today: Inequalities in Human Development in the 21st Century".
[25] Ibid.
[26] Commonwealth Secretariat. 2016. "Global Youth Development Index and Report 2016". London, https://doi.org/10.14217/global_youth-2016-en.

Table 4 provides a snapshot of socio-economic development status and level of gender equality in the targeted PICs. All countries have an HDI that places them in the 3rd country group, except for Solomon Islands that stands in the 4th country group, reflecting that the countries shorter life expectancy, low education levels, and small per-capita incomes. The gender Inequality Index (GII) which is only available for Fiji and Samoa discloses that both countries score better than the world average (0.439) regarding the gender equality in reproductive health, empowerment and the labor market and that their score place them in the second country group. Both the Human capital Index (HCI) and Youth Development Index (YDI) provides a bleak picture of children and youth development in the region. The HCI of Solomon Islands, Tuvalu and Kiribati indicate that children in these countries will only attain about half of their human capital potential by the age of 18 while the YDI of Fiji, Solomon Islands and Kiribati indicate a low youth development regarding education, health and well-being, employment and opportunity, political participation, and civic participation. Samoa is the only targeted country that has a YDI higher than the average value of Commonwealth States (0.616), which places it in the second country group. The indicators also show that the Pacific region has the lowest proportion of women involved in parliament in the world (compared to a global average of 24.5%). The women's share in the workforce is also among the lowest in the world.

**Table 4: Overview of Gender and Social Aspects and Indicators in the Six PICs**

| Gender Aspects and Indicators | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| HDI (2018) | 0.724 | 0.557 | 0.707 | N/A | 0.623 | 0.698 |
| GII (2018) | 0.357 | N/A | 0.364 | N/A | N/A | N/A |
| Share of seats in parliament occupied by women (%)[27] (2019) | 19.6 | 4.1 | 10.0 | 6.3 | 6.5 | 9.1 |
| HCI (2018) | N/A | 0.44 | N/A | 0.55 | 0.48 | N/A |
| Female labor force (% of female population aged 15 and above)[28] | 40.8 | 62.5 | 23.7 | 38.3 | 33.6 | 29 |
| Female heads of households (%)[29] (2017) | 15 | 10 | N/A | N/A | N/A | N/A |
| Mean of years of schooling by gender | Female: 11.0<br>Male: 10.8 | Female: 9.7<br>Male: 10.7 | Female: N/A<br>Male: N/A | Female: N/A<br>Male: N/A | Female: N/A<br>Male: N/A | Female: N/A<br>Male: N/A |
| YDI (2015) | 0.600 | 0.599 | 0.687 | N/A | 0.602 | N/A |

1st World Country Group
2nd World Country Group
3rd World Country Group
4th World Country Group

[27] Inter-Parliamentary Union (2019). Official Website "Percentage of women in national parliaments".
[28] World Bank Group data (2019). <https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS>. Accessed January 24th, 2020. (for Fiji, Solomon Islands and Samoa). World Bank Data. (2016) for Tuvalu, (2015) for Kiribati and (2011) for RMI. https://data.worldbank.org/indicator/SL.TLF.CACT.FE.NE.ZS
[29] United Nations Department of Economic and Social Affairs (2017), "Household Size and Composition Around the World". The Solomon Islands National Statistic Office.

## 2.2 The Pacific Region's Policy Framework Related to Gender

This section gives an overview of the policy and legal framework related to gender equality at the regional and national levels.

### 2.2.1 Regional Level

The regional policy framework related to gender encompasses four main policies as presented below. Only the Beijing Platform for Action 1995 addresses specifically the necessity to involve women in the clean energy sector.

#### The Pacific Leaders Gender Equality Declaration Endorsed in 2012

The Pacific Leaders Gender Equality Declaration was endorsed by 18 countries, including Fiji, the Solomon Islands, Samoa, Kiribati, Tuvalu and the Republic of Marshall Islands. It focuses on six priority areas: gender responsive policies and programs; women's leadership and decision-making; ending violence against women; women's economic empowerment; sexual reproductive and health services; and gender parity in education. Although the relation between women and energy was not specifically identified as one of the priority areas, the declaration aims to remove barriers to women's employment, implement equal employment opportunities, and provide targeted support to women entrepreneurs. It also aims to eliminate discrimination against women through legislative and statutory reforms and policy initiatives across the government, increase the representation of women in the private sector and local governance boards and committees, and fight against violence against women by gradually implementing essential services (protection, health, legal, etc.) for women and girls. Gender parity should also be encouraged in creating education and training opportunities.

At the 46th Pacific Island Forum[30], PICs leaders reaffirmed their commitment to the implementation of the 2012 Pacific Leaders Gender Equality Declaration and noted that while there has been notable progress on gender equality in three of the six key Declaration areas: gender responsive policies and programmes, gender parity on education and ending violence against women, there has been less progress on women's economic empowerment, and sexual reproductive and health services.

[30] Pacific Islands Forum (2015) Communique of the Forty-Sixth Pacific Islands Forum, Port Moresby. Available online : https://www.forumsec.org/wp-content/uploads/2017/11/2015-Forum-Communique_-Port-Moresby_-PNG_-8-10-Sept.pdf

### The Revised Pacific Platform for the Advancement of Women and Gender Equality (2018-2030)

The Revised Pacific Platform for Action on Advancement of Women and Gender Equality was adopted in 2017 by 20 countries, including Fiji, the Solomon Islands, Samoa, Kiribati, Tuvalu and the Republic of Marshall Islands. The Platform does not specifically address women's employment in the energy sector or women's access to energy. However, it advocates the need to take actions in four priority areas: mechanisms to promote the advancement of women; women's legal and human rights; women's access to services; and economic empowerment of women. Recommendations include adopting policies and legal reforms in compliance with the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)[31]; establishing policies, programs and services to fight against sexual and family violence; adopting measures to support equal access to education and equal employment opportunities in all fields.

### The Beijing Platform for Action 1995

The Beijing Platform for Action was adopted by 198 member states, including the six Pacific island countries covered by this study and covers multiple aspects and sectors affecting women's rights and well-being. The platform of action proposes energy-focused measures to promote women's employment in the energy sector and to ensure access to energy resources. The platform of action aims to ensure that women's priorities are included in public investment programs for economic infrastructure, including electrification and energy conservation, and promote greater involvement of women beneficiaries in projects. The knowledge and experience of indigenous women should also be promoted, notably regarding natural disaster prevention and renewable energy sources. The platform of action supports the development of women's equal access to housing, water, and sustainable and affordable energy technologies. The platform of action also includes measures aimed at enhancing women's access to financial and technical services, improving women's and girls' access to education in science, technology, education and mathematic (STEM) fields, eliminating violence against women, stimulating women's entrepreneurship and promoting the adoption of policies and legal reforms that consider gender equality for women as a priority.

## 2.2.2 Country Level

Table 5 makes an overview of the gender policies and the government bodies in charge of their implementation.

[31] Adopted in 1979 by the UN General Assembly, the CEDAW is often described as an international bill of rights for women.

**Table 5: National Gender Policies and Responsible Government Agencies**

| Country | Policy Framework | Government Agency |
|---|---|---|
| Fiji | › The Fiji National Gender Policy (2014)<br>› Women's Plan of Action (2010- 2019) based on the Beijing Platform for Action (currently under review) | Ministry for Women, Children and Poverty Alleviation (MWCPA) |
| Solomon Islands | › The National Gender Equality and Women's Development Policy 2016 – 2020 (currently under review) | Ministry of Women, Youth, Children and Family Affairs (MWYCFA) |
| Samoa | › The National Policy for Gender Equality 2016 – 2021 | Ministry of Women Community and Social Development (MWCSD) |
| Tuvalu | › Tuvalu National Gender Policy: Strategic Plan of Action 2014 - 2016 | Ministry of Local Government, Women and Youth (MLGWY) |
| Kiribati | › The National Gender Equality and Women's Development Policy;<br>› The National Approach to Eliminating Sexual and Gender-based Violence in Kiribati policy. | Ministry of Women, Youth and Social Affairs (MWYSA) |
| RMI | › The 2015 National Gender Mainstreaming Policy<br>› The RMI National Strategic Plan 2015 – 2017. | Ministry of Internal Affairs (MIA) |

## 2.3 Structural Challenges to Women's and Girls' Economic Inclusion

The participation of women in the labor force is lower than that of men in all six PICs, as shown in the table below. This section looks at the structural challenges hindering the Pacific region's women in their economic empowerment. This analysis is useful in defining those obstacles that women encounter in all industries and sectors. The challenges specific to those women who intend to join traditionally male-dominated industries and sectors (such as energy) will be covered later in the report (Section 3 and 4) and add up to the structural challenges.

**Table 6: Female and Male Participation Levels in the Labor Force (% Age 15 and Older)[32]**

| Gender | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
|---|---|---|---|---|---|---|
| Female | 40.8 | 62.5 | 23.7 | 38.3 | 33.6 | 29 |
| Male | 75.4 | 86 | 55 | 71 | 53.3 | 53.3 |

[32] World Bank Data (2019) Labour force participation rate (ILO estimates) was used for Fiji, Solomon Islands and Samoa. World Bank Data (2015) Labour force participation rate (national estimates) was used for Tuvalu and Kiribati and (2011) for RMI. https://data.worldbank.org/indicator

### 2.3.1 Legal Framework

The Women, Business and the Law (WBL)[33] index measures how a country's regulatory framework affects women's economic inclusion throughout their adult lives. The table below shows the countries' total scores (out of 100) and a summary of the discriminatory legal aspects affecting women. The six PICs' scores on the WBL Index range from 56.9 for the Republic of Marshall Islands to 80.0 for Samoa. Data for Tuvalu is not yet available as of 2020. The closer the score is to 100% the less discriminatory the legal framework it is for women.

The scores and assessment in Table 7 highlight the fact that women face legal discrimination when trying to join the labor force as employees or entrepreneurs. Half of the countries require women to meet a set of conditions different from those for men when women apply for a passport. Four countries do not have any law mandating equal remuneration for equal work. Only one country requires granting a paid maternity leave of at least 14 weeks. Also, no country prohibits gender-based discrimination in relation to access to credit.

**Table 7: Laws Affecting Women's Participation in the Energy Value Chain**

| Discriminatory Aspects | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
|---|---|---|---|---|---|---|
| WBL Index | 79.4 | 56.9 | 80.0 | N/A | 78.8 | 58.8 |
| **Mobility** | | | | | | |
| Women can apply for a passport in the same way as men | No | No | No | N/A | Yes | Yes |
| **Workplace** | | | | | | |
| Existing law prohibiting discrimination in employment | Yes | No | Yes | N/A | Yes | No |
| Existing legislation on sexual harassment in employment | Yes | No | Yes | N/A | Yes | No |
| Existence of criminal penalties or civil remedies for sexual harassment in employment | Yes | No | Yes | N/A | Yes | No |
| **Pay** | | | | | | |
| Mandatory law of equal remuneration for work of equal value | No | No | No | N/A | Yes | No |
| Women can work in jobs deemed dangerous in the same way as men | Yes | Yes | Yes | N/A | Yes | Yes |
| Women can work in the same industries as men | No | No | Yes | N/A | Yes | Yes |

[33] The World Bank Group (2020),"Women, Business and the Law". Retrieved from: https://wbl.worldbank.org/

| Discriminatory Aspects | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
|---|---|---|---|---|---|---|
| **Assets** | | | | | | |
| Women have equal ownership rights to immovable property[34] as men | Yes | Yes | Yes | N/A | No | No |
| Law provides for the valuation of non-monetary contributions[35] | Yes | No | Yes | N/A | No | No |
| **Parenthood** | | | | | | |
| Paid leave of at least 14 weeks available to mothers | Yes | No | No | N/A | No | No |
| Paid leave available to fathers | Yes | No | Yes | N/A | No | No |
| Dismissal of pregnant workers prohibited | Yes | No | Yes | N/A | Yes | No |
| **Entrepreneurship** | | | | | | |
| The law prohibits discrimination in access to credit based on gender | No | No | No | N/A | No | No |
| A woman can register a business in the same way as a man | Yes | Yes | Yes | N/A | Yes | Yes |

### 2.3.2 Family and Community Values and Customs and Limited Participation of Women in Decision-Making

Families, the community, and the local culture and customs are central to life in the region and shape much of the way in which society functions. Indeed, families, kinship, and communities have established many of the social roles, obligations and expectations that are deeply entrenched in how people act and think and in their sense of identity. The family is considered the main space for the socialization of an individual, and the family members often influence their youth's choice of profession and uphold the stereotypes.[36] Addressing gender inequality in the PICs requires taking this dimension into account.

All the six studied PICs are patriarchal societies except the RMI, which is traditionally a matriarchal one. In patriarchal societies, it is usually difficult for women to voice their interests or needs, or influence decision-making.[37] For example[38], the patriarchal nature of Tuvaluan society is still a major constraint for progress towards gender equality; Kiribati's predominantly patriarchal society is centered around unimwane (a male elders system) and defines the gender roles and a culture that is complex and diverse with each island having its unique ways.

[34] Immovable property is property that cannot be moved from one place to another. It is generally connected to the ground or land on which it sits. The term immovable property also includes the land.
[35] Non-monetary contributions include caring for minor children, taking care of the family home, or any other non-monetized contributions from a stay-at-home spouse.
[36] SPC (2014), "Gender Relations in the Pacific - Case Studies - Lessons Learnt from the International Climate Initiative Capacity-building Program". Econoler-IUCN (2020) field data collection.
[37] SPC (2014), loc cit.
[38] Econoler-IUCN (2020). Field data collection.

Women's participation in public decision-making is low. Women are poorly represented in parliament, on the boards of state-owned enterprises, and in leadership at the village level, in churches, and in the private sector. At the community level, due to the traditional stereotypes and cultural attitudes, women lack confidence, momentum and self-esteem to assume decision-making responsibilities, and the community's attitudes may discourage women from participating. Yet, women are called upon to fulfill many social, family and societal (particularly to the village and the church) obligations.[39] These are the very institutions in which they lack representation at a leadership level.

On the other hand, matrilineal societies tend to position women in such a way as to enable them to influence decision-making.[40] However, the matrilineal tradition in the RMI is being steadily eroded as this country urbanizes and its population grows, making the tracing of lineage and land rights more difficult.[41] Still, in 2016, RMI elected Hilda Heine as the first female president in the Pacific island countries. However, she was not reelected in 2020 and a man took the presidency. Traditional leaders who are the chiefs of land under the land tenure system also include both men and women.

### 2.3.3 Balance of Productive and Reproductive Roles

Women's reproductive duties conflict with their productive duties. Reproductive duties involve performing caregiving and domestic chores, including cleaning, cooking, childcare and other unpaid domestic housework. Productive duties refer to the work done to earn livelihoods and paid employment. In the Pacific region, housekeeping work falls overwhelmingly on women's shoulders. These time-consuming activities not only leave little time for housewives to engage in paid work, but also make it difficult for them to find jobs with a schedule that accommodates their household chores. Reproductive work is also expensive. It was reported that a third of the Pacific-region women's income was spent to fulfill family commitments, such as school fees and other social obligations.[42]

[39] Australian Aid (2012). "Samoa Country Case Study: AusAID Pacific Social Protection Series - Poverty, Vulnerability and Social Protection in the Pacific".
[40] Gender Relations in the Pacific - Case Studies.
[41] UN Women. Official website. https://asiapacific.unwomen.org/fr/countries/fiji/co/republic-of-the-marshall-islands
[42] Nagarajan, Vijaya (2019), "Social Norms and Women's Economic Empowerment", a presentation made during the Pacific Women Regional Learning Forum on Women's Economic Empowerment, Fiji, May 27-30. https://pacificwomen.org/resources/pacific-women-regional-learning-forum-on-womens-economic-empowerment/

### Women's Reproductive Role Keeps them in the Informal Economy

Women tend to be engaged in the more-flexible informal economy than in the formal one. According to ILO, the informal economy is neither taxed nor monitored by any governmental body. The informal economy encompasses the unincorporated enterprises and self-employed workers engaged in producing goods for the exclusive use by their households, often with family members or relatives as the workers. The workers involved in the informal economy have precarious work conditions, which are not subject to labor legislation, social security regulations, or collective agreements. Data about the economic importance of this informal economy and about women's contributions to it is not widely available, but it has been estimated that 80% of the women who engage in economic activities do so in the informal sector.[43] Because most women try to schedule the income-generating activities around their domestic duties, many of these activities fall in the informal economy. As such, women are trying to strike a balance between work and their domestic duties. But this situation is not captured in statistics and it does not negate the need for women to participate more in the formal economy.

### Childcare and Family Care as an Impediment to Women's Participation in the Labor Force

Childcare represents another major hurdle to women's participation in the labor force. Looking after kids requires time commitment, a work schedule that accommodates that of the children, income to pay for things such as school fees, among other things. These responsibilities most often fall on women. In Fiji, it is estimated that an average of 12.7 workdays per employee is lost every year due to the responsibilities of working parents (both women and men). Absenteeism, lateness, low productivity, distraction, exhaustion and stress are all side effects of trying to balance working and child-caring.[44] In Samoa, women mentioned the difficulty of performing this balancing act, especially when work involves odd hours or travel to remote areas.[45]

## 2.3.4 Female Entrepreneurship

Entrepreneurship is a powerful way to promote the economic inclusion of women. However, the path towards becoming an entrepreneur in the Pacific poses its unique difficulties and challenges. One of these main difficulties is the general unfavorable business climate in the Pacific countries regardless of gender. The low scores displayed in Table 8 imply that the targeted PICs have a challenging regulatory framework for entrepreneurs to start a business, to register property, to get electricity and credit, to pay taxes, etc.

[43] Lawal, Abdulkareem and Jessica Rust-Smith (2018), "The interactions between women's economic empowerment and ending violence against women – Insights from the Pacific Women project", ITAD, May 15.
[44] International Financial Corporation (2019), "Tackling Childcare: Business Case for Employer-Supported Childcare in Fiji".
[45] Econoler-IUCN (2020), Field data collection.

**Table 8: The Ease of Doing Business in Pacific Countries[46]**

| Economies | World Ranking (out of 190) | Score (out of 100) |
|---|---|---|
| Fiji | 102 | 61.5 |
| Solomon Islands | 136 | 55.3 |
| Samoa | 98 | 62.1 |
| Tuvalu | - | - |
| Kiribati | 164 | 46.9 |
| Marshall Islands | 153 | 50.9 |

Stakeholders from the private sector reported challenges such as:

- High electricity tariffs and a lack of access to reliable energy with the appropriate capacity needed to operate certain types of businesses are some major impediments.
- The education system is not adapted to the needs for developing entrepreneurship skills (e.g. financial literacy and marketing skills). There is also a gap between knowledge and practice: quite often, there are not enough opportunities to learn by doing or obtain mentoring of sorts.
- The initiatives undertaken by regional and international organizations to foster entrepreneurship are not designed with sustainability in mind and thus are not self-sufficient.

In addition, other challenges more specific to women were reported by local stakeholders:[47]

- Lack of access to financing that particularly affects women to develop and grow a business and keep it running or high interest rates on loans or other issues pertaining to loans that make them difficult to obtain or manage (see Section 2.3.5). Also a lack of initial capital to start a business. For example, in Fiji, entrepreneurs need to have 5,000 FJD (around 2,200 USD) in their checking account to open a business.
- Women have less access to financial advisory services because they usually own smaller enterprises. For example, in Fiji, business owners need to have at least 500,000 FJD (225,000 USD) in their account to receive personalized banking services. With bank savings below this threshold, they only have access to the advice of a general branch manager. A young Fijian businesswoman interviewed[48] indicated that the only way she could navigate out of the highly complex process for obtaining a loan to start her company was by having access to a mentorship program.

[46] World Bank group (2020), Doing Business 2020.
[47] Econoler-IUCN. 2020. Interviews held with a wide range of entrepreneurs, youth groups, business hubs and chambers of commerce (Fiji, Solomon Islands and Samoa).
[48] Econoler-IUCN (2020), Interview with Graduate Women in Fiji, February 5th.

- The pre-defined roles of women and youth in the family can be at odds with the role of an entrepreneur (e.g., in Samoa, it was observed that women starting businesses in some rural communities without the involvement of men would be subject to increased violence).[49]
- Financial literacy and the opportunities for helping women and youth become entrepreneurs need to be tailored to their specific conditions to really help them develop and establish their own businesses.
- Women-owned business are not necessarily business where women have decision-making power. For instance, some women who set up their own business and obtained a start-up loan in their name were not in charge of decisions related to business operations.[50]

### 2.3.5 Access to Resources

Access to resources, such as access to land for commercial purposes, access to financing to start a business and access to energy to support income-generating activities or reduce the burden of domestic duties are needed to join the labor force. This section looks at the need to provide access to land and financing. Section 4.1 will discuss in details the need to provide a gender equal access to energy.

Generally, in the Pacific Region, land ownership is customary; property is registered in men's names, and agreements on land use and ownership are settled by men. That said, in Fiji, the Solomon Islands and Samoa, women have equal ownership rights to immovable property as men (as shown above in Table 7). There is also some evidence to suggest that women are increasingly left out of decisions relating to the commercial use of land and other resources, and may be excluded or treated unequally in the distribution of benefits.[51] This means that women are often excluded from land ownership, thus making it difficult to use land for commercial activities or to obtain financing. In RMI, there is a land tenure system in which traditional leaders are the chiefs of all the land.[52] In the Solomon Islands, according to the Chamber of Commerce and Industry, 70% to 80% of the land is traditionally owned.[53] In Tuvalu, the lack of ownership and control over land for women has been linked to issues of financial insecurity.[54]

[49] Econoler-IUCN (2020), Interviews with Women in Business Development, Samoa Business Hub, Samoa Chamber of Commerce (Samoa).
[50] Ibid.
[51] Tony Crook, Sue Farran and Emilie Röell (2016), "Understanding Gender Inequality Actions in the Pacific: Ethnographic Case Studies and Policy Options".
[52] Econoler-IUCN (2020), Field Data Collection.
[53] Ibid.
[54] Pacific Islands Forum Secretariat (PIFS) (2016) Pacific Leaders Gender Equality Declaration Trend Assessment Report 2012-2016.

Access to financing is another challenge impeding women's and youth's economic empowerment. In Fiji, 56.8% of the females have a bank account (compared to 62.7% of the males).[55] The lack of land ownership makes it harder to secure a loan. However, even when a loan is obtained, it does not always help its beneficiaries. High interest rates were reported in Samoa[56], making it difficult to repay loans. Financial-inclusion initiatives using microfinance have had mixed results in the region. Micro-loans are indeed tailored to poor rural women without a bank account or proper access to banking services. Although such micro-loans represent an interesting approach for providing credit to women without support from banks, this approach lacks a component for entrepreneurship capacity-building and contribute to keeping women in the informal sector.[57]

### 2.3.6 Gender-based Violence

The Pacific region has one of the world's highest rates of violence against women, with over 60% of adult women suffering physical or sexual abuse during their lifetime (compared to an estimated world average of 35.6%).[58] Prevalent violence against women affects them on many levels, including negative impacts on their health and inability to prevent unwanted pregnancies, which increase their childcare responsibilities. Gender-based violence (GBV) systematically translates into lower productivity or economic participation.[59] It has been estimated that productivity losses caused by GBV may amount to between 1% and 2% of a country's GDP.[60] In Fiji, on average, 10 days per person in absenteeism among victims and supporters of victims can be attributed to GBV.[61] A survey conducted in Kiribati between 2008 and 2015 indicated that the majority of victims of domestic violence were unemployed.[62] Violence can take different forms. For example, girls can also be victims of negligence by their parents, who fail to help their daughters gain opportunities because of girls' lower social status.[63]

It is common for women to think it is acceptable for men to abuse them, blaming it on culture or alcohol and drugs.[64] In Fiji, a survey shows that 60% of women think that "a good wife obeys her husband even if she disagrees", and that roughly 3 out of 5 women believe a man abusing his wife is a private matter in which no one should intervene.[65] Under-reporting of violence makes it challenging to tackle this issue. Prevalent violence against women is a real problem: it not only represents a kind of severe human rights abuse but also directly damages women's employability and economic opportunities.

[55] Fiji Bureau of Statistics. 2017. "National Census".
[56] Econoler-IUCN. 2020. Interview with Samoa Business Hub.
[57] Econoler-IUCN (2020), Interviews with various stakeholders including youth entrepreneurs' councils, international organizations and microfinance institutions (Fiji, the Solomon Islands and Samoa).
[58] Tony Crook et al. 2016. loc. cit., World Health Organization (WHO) (2013), Global and regional estimates of violence against women. Retrieved from: https://www.who.int/reproductivehealth/publications/violence/9789241564625/en/
[59] PIFS. 2016. loc. cit.
[60] Tony Crook et al. 2016. loc. cit.
[61] IFC. 2019. "The Business Case for Workplace Responses to Domestic and Sexual Violence in Fiji".
[62] PIFS. 2016. loc. cit.
[63] Lawal, Abdulkareem and Jessica Rust-Smith. 2018. loc. cit.
[64] Ibid.
[65] Tony Crook et al. 2016. loc. cit.

# 3 SITUATIONAL ANALYSIS OF THE CLEAN ENERGY SECTOR IN PACIFIC COUNTRIES

This section aims at mapping the clean energy value chain in all six countries and evaluating in which segments and which roles are women involved. The first sub-section provides a framework for assessing jobs opportunities in the clean energy value chain and defines the upstream versus downstream value chain. The second sub-section presents an overview of the targeted countries' clean energy sector and their upstream energy value chains. Then, the third sub-section highlights the three main challenges and gaps in Pacific countries' upstream energy value chain. Subsequently, Section 3.4 provides a situational analysis of women's involvement in the upstream clean energy value chain. Finally, Section 3.5 analyses women's involvement in the downstream energy value chain and its economic opportunities.

## 3.1 Framework for Assessing Jobs Opportunities in the Clean Energy Value Chain

This sub-section provides a mapping of the jobs available along the clean energy value chain, which will then be applied to the six targeted countries in Section Appendix II. National energy profiles including the mapping of the actors involved in the national clean energy value chains are provided in Appendix III.

Jobs will be generated in direct relation to the development of the clean energy market. Logically, as markets grow and sales volumes increase, green employment will also increase. As new sales are generated, more staff will be needed to distribute the products and provide the services related to the green energy technologies. These jobs are defined as upstream jobs. Figure 1 below shows an example of some of these jobs that are created throughout the value chain. They are divided into two main categories: (1) general non-STEM jobs that have transferable skills and knowledge and are employed in companies in the clean energy market; (2) specific STEM jobs, including engineers, salespeople and technicians who need a certain amount of technical knowledge to perform their duties.

On the other side of the value chain, we see the development of employment thanks to improved energy access (in both quality and in quantity). These jobs are defined as downstream jobs and are related to an increased access to productive use of energy (PUE). Some energy solutions, such as off-grid solar photovoltaic (PV), can enable increased access to employment and income opportunities in specific sectors (agriculture, fisheries and livestock, services and manufacturing).

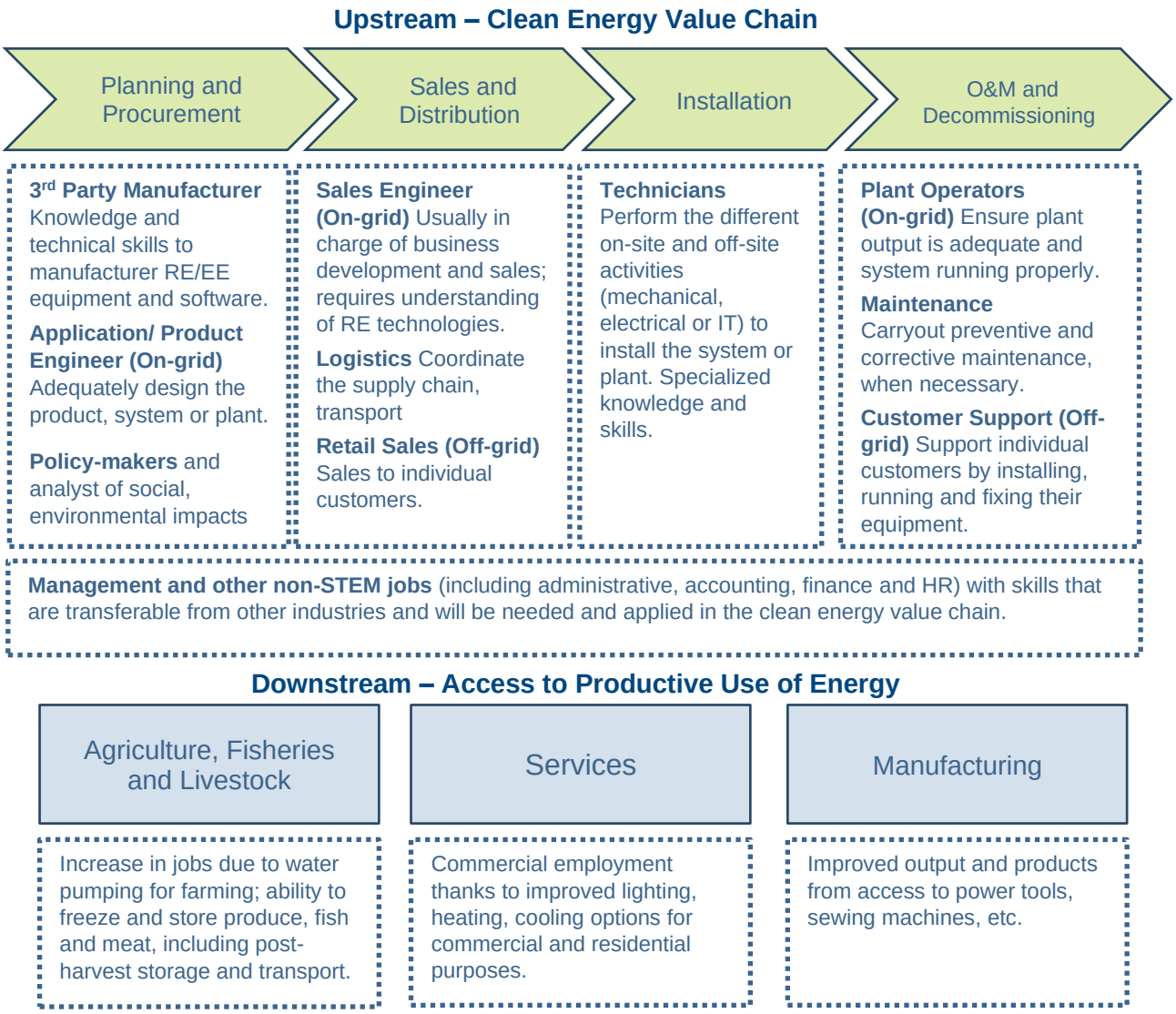



**Figure 1: Economic and Employment Opportunities Available in the Clean Energy Value Chain**

## 3.2 Weaknesses and Gaps of the Upstream Clean Energy Value Chain

The Pacific countries all show a strong dedication to turning away from diesel-powered energy and entering a green energy transition. They, however, face several challenges to achieve this goal. This section exposes the challenges and gaps directly linked to the upstream clean energy value chain. These include: (1) the lack of a qualified workforce, (2) the lack of a solid private sector and (3) the missing segments of maintenance and decommissioning. Another main challenge is the lack of diversity among the clean energy workforce and principally the gender imbalance. This challenge is covered in detail in the next section (Section 3.3).

### 3.2.1 Lack of a Qualified Technical Workforce

The shortage of a qualified technical workforce is a major bottleneck preventing the deployment and maintenance of clean energy technologies in all the targeted PICs.[66] Stakeholders mention primarily (solar) installers and technicians as the primary experts needed. However, as it is later highlighted in Section 3.2.3, the shortcomings in maintenance and decommissioning justify the need for a wider array of expertise to ensure more sustainable planning of energy strategies and programs. Environmental, climate-change and sustainable-development experts would add value to the planning process by ensuring that identified RE technologies are resilient to climate change, avoid early obsolescence and do not create a regional waste management conundrum. Furthermore, the need to harmonize energy with food and water security as per international best practices (see Section 4.2.1) and to promote productive use of energy in the agriculture and fishery sectors (see Section 3.4.1) calls for a greater expertise in food technology, agricultural engineering, marine sciences and fisheries.

#### Education System not Adapted to the Market's Needs

There is a mismatch between the curricula of technical programs and the actual skills that technicians need to have on the job market. Curricula are theoretical and not up-to-date. This was reinforced by the executive director of CBS Power Solutions, who underlined that the company needs to provide one to two years of on-the-job training to each of their new employees, even if they are graduates of clean energy programs from the region's universities.[67] In some countries, the private sector is dedicated to solving the deficiencies of the education system. In Fiji, the Fiji Commerce and Employers Federation is a strong advocate for reforming the education systems to better address the market's needs. The Pacific Island Private Sector Organization (PIPSO) sits on the board of the University of the South Pacific (USP) Pacific Technical Assistance and Further Education[68] to review the course content.

#### Brain Drain to Foreign Countries

The exodus of technical graduates and workers to Australia, New Zealand and other foreign countries is a critical issue too. According to USP, more than 50% of the engineering graduates work in companies outside the region.[69] Electricity utilities also reported losing technical employees that seek work opportunities outside the region.[70] This brain drain creates additional pressure on the already limited Pacific technical workforce.

[66] Econoler-IUCN (2020), Interviews with energy companies, business associations, electricity utilities, etc. (all countries)
[67] Econoler-IUCN (2020), Interview with CBS Power Solutions, February 6.
[68] USP Official Website, "About Pacific Technical and Further Education (Pacific TAFE)", Retrieved from: https://www.usp.ac.fj/index.php?id=20065
[69] Econoler-IUCN (2020), Interview with USP, Faculty of Science, Technology and Environment, February 7.
[70] Econoler-IUCN (2020), Interview with EFL, February 3.

### 3.2.2 Lack of a Strong and Qualified Private Sector

The entrepreneurship ecosystem of the Pacific Region is nascent. Some of the targeted countries, such as Fiji and Samoa, have a more active, but still insufficient, private sector; but in the other economies (Solomon Islands, Tuvalu, Kiribati and the RMI), the business acumen is almost absent. Although Fiji has some well-established clean energy companies, its policy framework underlines the lack of significant private-sector participation in the energy sector as a major weakness.[71] Some of the reasons are the weak sector governance, the lack of a clear regulatory framework for encouraging IPPs, resource information not being made public, high costs of doing energy-related business in the Pacific (for example, shipping costs may represent 30% of the budget)[72], the unavailability of local technical knowledge and capacity to implement complex energy projects and the general unfavorable business climate in the Pacific countries.

While electricity utilities and the NEO have knowledge on their grid's baseload energy (fuel and hydro in some countries) they have limited know-how and capacity on RE (solar, wind and bioenergy).[73] A weak private sector is thus detrimental to the penetration of clean energy technologies, especially for off-grid renewable technologies. This leaves RE projects to be typically developed and implemented by donors and public stakeholders (state-owned utilities and NEO), which do not always work in the public interest because their bureaucracies make them less responsive than a private company in addressing market forces and consumer needs. Finally, the region's solar programs, which are typically funded by international donors, show a chronic lack of attention to long-term economic and technical sustainability.

The Pacific region could consider Southeast Asia as an interesting model for the deployment of RE technologies. Southeast Asia has a vibrant private sector producing a wide array of home-based RE products. Some of them are of poor quality but the consumers have choices and market dynamics tend to reward good performance.[74] An active private sector using innovative and consumer-centric business models, such as Pay-as-you-go (PayGo) companies, whose application proved successful in other markets could also be an opportunity to enhance maintenance services.

[71] Fiji National Energy Strategy 2013-2020.
[72] Econoler-IUCN (2020), Interview with CBS Power Solutions, February 6.
[73] Econoler-IUCN (2020), Interview with EFL, February 3.
[74] Mike Ives (2016), "Why the South Pacific island Kiribati is making a big bet on solar", The Discourse, April 19.

### 3.2.3 Missing Value Chain Segments: Maintenance and Decommissioning

As identified by most of the energy stakeholders (in private and public sectors), the two weakest links of the clean energy value chain in the Pacific region are maintenance and decommissioning.[75] In Section Appendix II, the tables presenting the stakeholders involved in the clean energy value chain showed who should theoretically oversee maintenance and decommissioning. However, additional research and analyses demonstrated that these two segments have been overlooked, leading to a shortened lifespan of RE systems (especially stand-alone off-grid). The existing clean energy value chain in the Pacific countries, therefore, omits operation and maintenance (O&M) and decommissioning and goes straight to the disposal of EE/RE systems (Figure 2). This truncated value chain threatens to lead to an environmental and waste management crisis in the countries, which are already facing significant waste problems due to limited available land, illegal dumpsites and lack of recycling facilities.[76]


**Figure 2: Existing Clean Energy Value Chain in the Pacific Countries**

#### Maintenance

Most of RE systems, primarily solar mini-grid and off-grid systems, are installed and left to operate until something goes wrong. Some rural electrification schemes are contradictory when determining the stakeholder in charge of maintenance. For example, the Fiji Rural Electrification Policy specifies that the NEO oversees training rural communities to maintain and repair RE systems and that a maintenance and repair network throughout rural Fiji shall be established. In fact, rural communities generally do not have the necessary capacities to repair their SHS and even when they do, they cannot access the SHS main parts (controller, inverter, battery, etc.) which are locked.

This lack of maintenance is even more problematic given that the weather conditions of the Pacific countries call for additional maintenance of RE systems:

[75] Econoler-IUCN (2020), Interviews with off-grid communities, DoE, electricity utilities and energy companies (in all countries).
[76] ADB (2014), "Solid Waste Management in the Pacific Series". Retrieved from: https://www.adb.org/publications/series/solid-waste-management-pacific

- First, the **hot weather** is detrimental to the efficiency of batteries and solar panels. A wet cell battery dies more quickly under hot conditions since the heat makes the plates either gain or lose material and reduces the water from the electrolyte solution. When solar panels are exposed to heat, they degrade, losing their structural integrity and efficiency. Solar panels work optimally at 25 degrees Celsius (compared to an average temperature of 30 degrees Celsius in pacific countries). Above this threshold, heat reduces the output efficiency of solar panels by 10% to 25%.
- The **saline air and humidity** cause early corrosion of the solar panel structure. It also complexifies some maintenance logistics and adds costs. For example, to maintain the wet cell batteries in Tuvalu[77], water must be imported from Fiji on a regular basis, given that rainwater in Tuvalu is salty.[78]
- Finally, **extreme weather conditions** are a major challenge. In all countries, cyclones and sea flooding frequently damage RE equipment, with solar being the most vulnerable RE source. With climate change, cyclones are predicted to be more and more frequent, which will cause additional challenges to RE maintenance.

In optimal conditions, solar panels have a lifespan of 20 to 25 years and batteries, 5 to 6 years. The lack of maintenance combined with unfavorable weather conditions, however, leads to early obsolescence of the solar systems, mainly because of battery failure.

[77] Wet cell batteries, also commonly known as lead-acid batteries, need to be manually filled with deionized water every two weeks.
[78] Econoler-IUCN (2020), Interview with the Motufoua Secondary School in Vaitupu (Tuvalu), where solar panels and wet cell batteries were installed by IUCN in 2010.

## Decommissioning

> "The old batteries, here, people they drop them into the sea. You'll see along the seaside, it's full of dead batteries."
>
> - Government Representative, Solomon Islands

Decommissioning concerns the e-waste management and recycling. It is intertwined with the maintenance segment given that ill-maintained clean energy equipment will result in premature end-of-life. Although all types of clean energy equipment must have adequate maintenance and decommissioning, the problem is exacerbated with solar energy due to the prevalence of this technology, the toxicity of its components and the short life span of lead-acid batteries. Lead-acid batteries supposedly have a lifespan of around five years. But most of the rural households and energy companies met during this study confirmed that after one or two years the SHS do not work anymore due to battery failure.[79] Batteries from hybrid cars were also reported to be an issue due to the lack of recycling facilities. There is a lead-acid battery manufacturing plant in Suva, Fiji (Pacific Batteries), which also recycles the batteries from other locations. The recycling capacity is, however, not sufficient for the whole region. Stakeholders have reported households using old batteries for everyday use in the household or disposing of them in the environment or in the landfill. All stakeholders working in the energy field underlined that there was no proper recycling facility or approach in the region and that this was an urgent issue to be addressed. The Pacific Regional Waste and Pollution Management Strategy 2016-2025 highlights the issue of increased consumption of lead-acid batteries due to an emphasis on RE systems and urges the Pacific countries to ensure the disposal of the used batteries to environmentally sound recycling facilities.[80] But anything that is disposed of (even through recycling) is waste of material and resources that must be avoided through better program design. Three solutions are presented below (in an order of importance, they can all be implemented concurrently).

### 1. Promoting Circular Economy Principles

The most effective approach is to not produce waste. This could be achieved if the countries plan their clean energy strategies by prioritizing energy sources that use local resources and local manufacturing for energy production (e.g. biogas, on-the-river hydro, depending on the location) instead of energy sources that require importation of foreign equipment (e.g. solar). The PICs would gain from following the circular economy principles when identifying the most suitable energy sources for off-grid electrification. "A circular economy is a system in which all materials and components are kept at their highest value at all times, and waste is designed out of the system."[81]

[79] Econoler-IUCN (2020), Focus Group Discussion with Rural Women Groups (Solomon Islands), Site visit to Lilisiana and Falake (Solomon Islands), Interview with CBS Power Solutions (Fiji).
[80] SPREP, Cleaner Pacific 2025: Pacific regional Waste and Pollution Management Strategy.
[81] World Economic Forum (2014), "Towards the Circular Economy: Accelerating the scale-up across global supply chains".

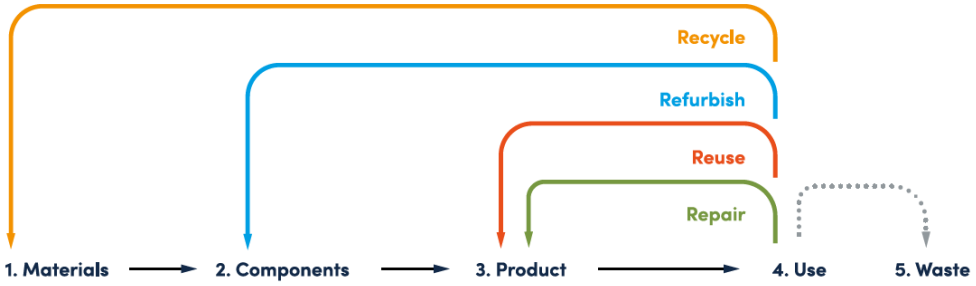



**Figure 3: Basic Principles of Circular Economy[82]**

Biodigester prototype developed by Bobby Siarini from the Honiara Youth Council and financed by OXFAM

Biogas is a good example of circular economy. There are some ongoing projects in Fiji, Samoa and Tuvalu. Furthermore, a pilot project developed by Bobby Siarani, Coordinator of the Honiara Youth Council, and financed by OXFAM led to a promising prototype[83] (See picture on the left). The biodigester creates methane from organic waste, such as meal leftovers, that is put in a water tank. This will enable households to benefit from a daily supply of gas for cooking. It costs 900 SBD (110 USD) to build with materials locally available in Honiara. A team of high school students designed and built it and it would be easily replicable for the communities to build it themselves. The tank water makes organic fertilizer. They are now working on a second prototype, a bigger model that would be fueled with piggery waste and septic tanks. This one could produce bioenergy for a small community. These biogas systems that use waste to produce three outputs (cooking gas, organic fertilizer and bioenergy) and use only locally available materials and resources are a great example of a regional application of circular economy.

[82] GOGLA (2019), "E-waste Toolkit Module 2 Briefing Note".
[83] Econoler-IUCN (2020), Site visit to Tuvahuru, Solomon Islands, February 11.

## 2. Establishing RE Standards and Guidelines to Enhance Quality and Reduce Waste

Solar energy represents such high potential for the region that it will probably be pursued as the main technological avenue for integrating a higher share of RE into the grid and for rural electrification. Therefore, the countries should work towards enhancing the lifespan of solar equipment and limiting their e-waste. Establishing solar standards is a good first step to achieve these goals. This policy framework was already identified as a need by some energy departments.[84] The Sustainable Energy Industries Association of the Pacific Islands (SEIAPI) has also developed a set of industry guidelines for RE systems.[85] The standards developed need to be aligned with international standards, such as Lighting Global.[86]

Solar standards should furthermore follow the criteria of the Off-Grid Solar Scorecard,[87] a tool that includes a set of indicators to measure the repairability, access to spare parts and recyclability of products. These indicators look at the product design but also at other critical aspects of the manufacturer's business model such as: (1) "Are spare parts and components available?"; and (2) "Does the manufacturer make available technical designs and specifications of the product and components (with the product, online or in training materials)?" Off-grid solar equipment falls into three categories of after-sale and repair services:

1 In-house and proprietary: Exclusively provided by the original manufacturer (or distribution partner or service provider); thus, products must be returned to the distributor to be repaired by trained technicians.
2 Collaboration with competitors: Using a third-party repair center with verified standards to service a category of product rather than specific brands. This would mean that it may be shared with competitors.
3 Open and informal: Replacement components and repair guides are made available publicly.

The third category would have the highest potential for job creation within the maintenance and decommissioning segments in the region. Solar standards should encourage the importation of solar systems that can be locally repaired.

[84] Econoler-IUCN (2020), Interview with DoE, Solomon Islands, February 10.
[85] Sustainable Energy Industries Association of the Pacific Islands (SEIAPI) and PPA (2018/2019), Industry Guidelines. Retrieved from: https://www.seiapi.com/guidelines/
[86] Lighting Global Official Website, https://www.lightingglobal.org/.
[87] Off-Grid Solar Scorecard, Official Website, http://www.offgridsolarscorecard.com/repairability.php

3. Ensure Contract Liability for E-waste Management and Disposal

Another avenue for limiting the inadequate disposal of e-waste is to capture it in the contract liability with the manufacturer and to establish stewardship programs to support the return, consolidation and export of batteries to environmentally sound recycling facilities. For example, within the framework of an SPC-European Union (EU) solar program implemented in the Federated States of Micronesia, the supply contract requires a commitment to ship the used batteries back to a recycling facility in Germany at the supplier's cost (Hoppecke, a German battery manufacturer).[88] These measures need to be accompanied by awareness-raising on battery hazards and disposal protocols in communities and among energy stakeholders.

## 3.3 Participation of Women in the Upstream Clean Energy Value Chain

As demonstrated in this section, women's participation in the clean energy value chain is low in all kinds of workforce, as employees or entrepreneurs or in the public and private sectors. In addition to all the structural obstacles for women's economic empowerment as discussed in Section 2.3, women face the additional challenges to enter a traditionally male-dominated workforce.

### 3.3.1 Women Working in the Public Sector

Sex-disaggregated human resources data are hereby presented for the NEO and the electricity utilities of the targeted countries. Table 9 shows the proportion of women working in the governmental department in charge of energy and in the electricity utilities by country. The proportion of females working in the NEO is generally higher than those in the electricity utilities. The proportion of female staff working in NEO varies from 8.7% in Fiji to 27.3% in Kiribati, while the proportion of females working in the electricity utilities ranges from 5% in Tuvalu to 22.9% in Kiribati.

**Table 9: Human Resource Data by Country**

| Country | Total Staff (NEO) | Proportion Females (%) | Total Staff (Utility) | Proportion Females (%) |
|---|---|---|---|---|
| Fiji | 53 | 8.7 | 805 | 12.7 |
| Solomon Islands | 17 | 21.7 | 255 | 16.1 |
| Samoa | N/A | 30 | 280 | 17.9 |
| Tuvalu | 8 | 25.0 | 62 | 5 |
| Kiribati | 11 | 27.3 | 153 | 22.9 |
| RMI (MEC) | 6 | 16.7 | 205 | 8.8 |
| RMI (KAJUR) | | | 81 | 12.3 |

[88] IRENA (2015), "Case studies: battery storages". Retrieved from: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/

Table 10 presents at which hierarchical level and in which department women are involved in the NEO. The data shows that women make up 22.4% of the total number of staff. While they represent only 12.1% and 15.5% of management and technical positions, they make up most of the administrative and support staff (51.5%). Administrative and support staff are usually lower paid jobs with less decision-making power.

The lowest proportion of women in intermediary technical positions (9.5%) compared to junior (19.2%) and senior (16.3%) positions concur with the international observations that women are often underrepresented in mid-level positions. This lower representation is usually explained by: (1) the challenges women encounter to get promoted and hence the higher drop-out rate among women that occupy junior positions and (2) the lack of an inclusive environment, lack of mentoring and existing cultural norms affects more women working in intermediary positions. Further human resources analysis should be done to assess if this is the case in the targeted NEO.

**Table 10: Human Resource Data by Category of Position – Department in Charge of Energy[89]**

| Positions | Number of Staff | | Proportion Females (%) |
|---|---|---|---|
| | Male | Female | |
| Higher Management | 16 | 2 | 11.1 |
| Middle Management | 13 | 2 | 13.3 |
| Senior Technical | 36 | 7 | 16.3 |
| Intermediary Technical | 19 | 2 | 9.5 |
| Junior Technical Staff | 21 | 5 | 19.2 |
| Administrative Positions | 3 | 7 | 70.0 |
| Program Assistant | 2 | 6 | 75.0 |
| Logistics and Support | 11 | 4 | 26.7 |
| **Grand Total** | **121** | **35** | **22.4** |
| Total Management | 29 | 4 | 12.1 |
| Total Technical | 76 | 14 | 15.5 |
| Total Administrative and Support | 16 | 17 | 51.5 |

Table 11 and Table 12 present human resource data for electricity utilities. In the electricity utilities, women represent 14.2% of all staff. They make up 26.5% of higher management yet are almost absent from technical positions (1.4%). Among these women that occupy senior roles, women are mainly working in public relations, customer services and communications (41.9%), finance (27.9%) and administration (13.9%).

[89] Econoler-IUCN (2020), Questionnaire to National Energy Offices in six PICs.

**Table 11: Human Resource Data by Category of Position – Electricity Utilities[90]**

| Positions | Number of Staff | | Proportion Females (%) |
|---|---|---|---|
| | Male | Female | |
| Higher Management | 50 | 18 | 26.5 |
| Technical Staff | 936 | 13 | 1.4 |
| **Grand Total** | **1580** | **261** | **14.2** |

**Table 12: Senior Female Staff by Type of Role – Electricity Utilities[91]**

| Roles/Departments | Proportion (%) |
|---|---|
| Finance | 27.9 |
| Procurement and Supply | 4.7 |
| Human Resources | 9.3 |
| Public Relations, Customer Services and Communications | 41.9 |
| Administration | 13.9 |
| Other | 2.3 |
| **Total** | **100** |

The small representation of female in the public instances of the energy sector is an issue that is being addressed in the region. The PPA and ADB have launched initiatives to promote the involvement in key positions in the electricity utilities. For example, the Palau Public Utilities Corporation (PPUC) is currently working with ADB to update its corporate governance to include policies and procedures to increase female employment in technical and managerial fields.[92]

### 3.3.2 Women Working in the Private Sector

As previously seen in Section 3.2.2 ,the clean energy entrepreneurship ecosystem of the Pacific Region is still nascent. Some of the targeted countries, such as Fiji and Samoa, have a more active, but still insufficient, private sector; but in the other economies (Solomon Islands, Tuvalu, Kiribati and the RMI), the business acumen is almost absent. Women are also a minority in the energy private sector. They only make a small proportion of employees in renewable energy companies and are almost inexistent as energy entrepreneurs.

[90] PPA (2018). Benchmarking Study.
[91] PPA (2018). loc cit.
[92] Consultations with Member States, Palau Public Utilities Corporation, July 2020.

### Women as Employees

> "Sometimes being a woman and pitching a concept to the Department of Energy is challenging."
>
> - Milicent Barty, Female Energy Entrepreneur

The scope of this consultancy did not allow the team to collect comprehensive data on women employed in energy companies, but the information collected through a literature review and the interviews showed that women make up less than 5% of the technical staff, while representing a higher proportion in management (15% to 20%). It is so unheard-of to have a woman occupying a technical position in the energy sector that when they do, their story is published in media.[93] RE companies report that gender equality has received a big push on the regional energy agenda over the past two years, mainly by international donors.

Companies generally do not have policies to promote gender equality, although some are in the process of drafting them. One company, CBS Power Solutions, described having a gender-sensitive recruitment process. When advertising a new position, they will conduct the first round of interviews with women only. They could have up to 10 interviews with women but never had more than three female candidates for a technical position. They indicated that on average, out of 20 to 35 candidates for a technical job opening, they are likely to get 1 or 2 applications by women. CBS Power Solutions have an entirely local workforce and the director reported that this is a challenge to hiring more female technical staff.

### Women as Entrepreneurs

Female business owners working in the clean energy sector are almost non-existent in the Pacific. In this case, the challenges for women to start a business and access financing (as seen in Section 2.3) coupled with the challenges for women to be involved in male-dominated sectors lead to women generally not considering this avenue.

Milicent Barty is a young female entrepreneur involved in the clean energy sector. Also chair of the Young Entrepreneurs Council Solomon Islands (YECSI), she is the founder of Sol Bridge Ltd[94]., a company that offers solid waste solutions in Solomon Islands and the Pacific. The company distributes biogas plants to boarding schools across Solomon Islands and has designed biogas systems for households and industrial enterprises. The company is also engaged in consultancy for legislative reforms and training. She reported that it is sometimes hard to be taken seriously as a female entrepreneur working in the energy sector.

[93] Fiji Sugar Corporation (2020), "A Woman in Power: Meet Roberta, Fiji Sugar Corporation's First Female Power Systems Controller", Fiji Sun, January 22. Retrieved from: https://fijisun.com.fj/2020/01/22/a-woman-in-power-meet-roberta-fiji-sugar-corporations-first-female-power-systems-controller/
[94] Sol Bridge Ltd. Official Website, https://www.solbridgeltd.com/biogas-for-home.

This leads to big and untapped potential for women to act as energy entrepreneurs. Indeed, although Pacific women are underrepresented in the formal business, they are very resilient, hardworking and show a problem-solving attitude when it comes to finding ways to earn their livelihoods. Energy entrepreneurship would also solve the issue of the deficient clean energy private sector (as underlined in Section 3.2). Entrepreneurship represents a huge opportunity for job creation in the region and would increase the participation of women having no technical degree in the upstream energy value chain. This opportunity is part of the priority recommendations as discussed in Section 0.

### 3.3.3 Main Constraints for Women Involved in the Clean Energy Value Chain

The obstacles for women already working in the energy sector as reported by the stakeholders are presented below.[95] These restrictions, which are more specific to male-dominated fields, are in addition to the list of structural challenges to women's economic empowerment as presented in Section 2.3.

#### General Challenges

- Although maternity and childcare are always a challenge for working women, it seems a heavier burden for women working in the energy sector. Childcare and family duties are a burden especially for these women working in the field. Companies reported having difficulty retaining female staff: many women quit their jobs when they get married or have kids.
- Women lack self-confidence and do not have any role models. They think they are not good enough to hold important roles in the energy sector.
- The work attitude of men, including aggressiveness and rudeness. The male staff would need to change their usual way of communication in the presence of females.

#### Women in Managerial and Leadership Positions

- Women leadership is still challenging the norm. A group of men would react strongly against having a female supervisor, especially in technical roles. There need to have strong higher management support to female candidates.

> "Try to imagine how men act when they have a female supervisor. They always try to overrule."
>
> - Female Manager, Energy Sector

#### Women in Technical Positions

- Having females deployed in the field requires more logistical efforts to have a suitable accommodation. It would not be culturally acceptable to have women sleeping in the same accommodation as men.
- Lifting heavy equipment and material can be challenging for women.
- In some outer islands, where the society is more conservative, it is inappropriate for women to wear trousers, let alone climb on roofs or poles.

[95] Econoler-IUCN (2020), Interviews with various stakeholders including the DoEs, electricity utilities, private energy companies (all countries).

Despite all these challenges, many stakeholders reported that they feel the sector is changing and that now women are more and more willing to take traditionally masculine jobs. Several stakeholders highlighted the benefits of having women in technical positions regarding high work quality and efficient project management. The institutional structure and employers now need to take actions to support this movement and level the playing field for women wishing to enter male-dominated sectors.

## 3.4 Access to Energy and Downstream Energy Value Chain in the Pacific

On the other end of the value chain, economic opportunities arise from improved energy access (in both quality and quantity). These jobs are defined as downstream jobs and are related to increased access to productive uses of energy (PUE). PUE are the agricultural, commercial and industrial activities involving energy services as a direct input to the production of good or provision of services.[96] PUE may also encompass access to household energy services (cookstoves, refrigerators, etc.) that could lead to income-generating activities. This section analyzes how energy solutions can enable increased access to employment and income-generating opportunities in specific sectors (agriculture, fisheries and livestock, services and manufacturing). This section analyzes energy access in the agricultural, fisheries and forestry sectors, as well as in the service and manufacturing sectors as the main economy drivers in the Pacific and the sectors that have the direst energy needs. These sectors where women are active for both subsistence and livelihoods.

### 3.4.1 Agricultural, Fisheries and Forestry Sectors

These sectors encompass cash-cropping and subsistence farming, livestock production and management, fisheries and aquaculture, food processing and value-adding fisheries and are economy drivers in all Pacific countries. Agriculture has a commercial importance in some countries (Fiji and Solomon Islands), while some other countries' small land area limits their prospects for agriculture and livestock-raising (Tuvalu and the RMI). Livestock-raising has a very small scale and is essentially for subsistence. Table 13 outlines the most prevalent harvested and fished products in terms of production quantity, as reported by the Food and Agriculture Organization (FAO).[97]

[96] GIZ (2013), *Promoting Productive Use of Energy in the Framework of Energy Access Programmes.* https://sustainabledevelopment.un.org/content/documents/4738mayer.pdf
[97] FAO (2020), *FAOSTAT* http://www.fao.org/faostat/

**Table 13: Most Prevalently Harvested and Fished Products in the Targeted Countries**

| Country | Fisheries | Agriculture | |
|---|---|---|---|
| | | Main Crops | Main Crops Processed |
| Fiji | Aquaculture (finfish, crustacean and seaweed), subsistence fishing and commercial fishing for urban food markets and export (octopus, shellfish, freshwater mussels, tilapia, milkfish, pearls, prawn, bêche-de-mer and trochus). | Sugar cane, cassava, taro (cocoyam), coconuts, vegetables | Sugar raw centrifugal, molasses, beer of barley, coconut oil (copra) |
| Solomon Island | Small-scale rural fisheries concentrated on coastal and nearshore reefs and lagoons (finfish, bêche de mer, trochus, giant clam, lobster, and turbo) and offshore industrial fisheries for tuna. | Coconuts, oil palm fruit, sweet potatoes, yams, taro (cocoyam) | Palm oil, palm kernels, coconut oil (copra), beer of barley |
| Samoa | Offshore fisheries for tuna longlining. Coastal fishing for both subsistence and commercial purposes | Coconuts, taro (cocoyam), bananas, tropical fruit, yams | Coconut oil (copra), beer of barley |
| Tuvalu | Subsistence activities dominate Tuvalu's fisheries sector. Mainly ocean species (tuna) and some reef and lagoon species. | Coconuts, vegetables, tropical fruit, bananas, roots and tubers | Coconut oil (copra) |
| Kiribati | Subsistence and small-scale commercial fishing (coastal fishing and seaweed aquaculture). Industrial fisheries for tuna. | Coconuts, roots and tubers, bananas, vegetables, taro (cocoyam) | Coconut oil (copra) |
| The Republic of Marshall Islands | Subsistence fishing dominates. Small-scale and industrial fisheries for tuna. A large number of aquaculture activities (black-lip pearl oysters, giant clams, trochus and corals). | Coconuts | N/A |

## Fisheries

Small-scale and subsistence fishing is critical for ensuring households' livelihoods and food security. For example, in Samoa, about a quarter of all households received some income from fishing. In Tuvalu, 74% of households participate in reef fishing and 63% in ocean fishing. With 90% of the Solomon Islands' population living in rural areas, subsistence and artisanal fishing activities are widespread and of great importance. Fisheries are also an important source of formal employment. In 2016, in Kiribati, it is estimated that 5,000 people were engaged in marine fisheries, either full-time or part-time. There is much reliance on marine resources for livelihoods, government revenues, and especially nutrition. In Samoa, 30% of all exports of the country consisted of fishery products. In Fiji, fisheries' contribution to GDP in 2015 was estimated at USD 65.7 million, representing 1.6% of national GDP.

Fishing village of Lilisiana, Malaita Province (Solomon Islands)

### Gender Roles

Women are heavily involved in both subsistence and commercial fisheries. Men typically fish from canoes and boats in deep water while women glean the reefs, shores and swamps, and use fish traps, nets and hand lines to fish in lagoons and tidal pools. They also contribute to post-harvest activities such as cleaning, soaking, salting, smoking or drying fish.[98] In addition, women sell the fish caught. Other differences between men's and women's activities in the fisheries sector are that women's fishing activities are more regular and destined to feeding their families, whereas men fish less frequently and sell their catches to the markets.[99] Fisheries management and control of fisheries tenure at the rural level is also male-dominated. However, a recent FOA/SPC analysis about Solomon Islands notes that the roles are becoming more flexible, with more instances of women doing varied types of fishing and men participating in some post-harvest processing.[100]

[98] Ibid.
[99] SPC (2018), *Women in fisheries: information bulletin*.
[100] FAO, SPC (2019), "Country Gender Assessment of Agriculture and the Rural Sector in Solomon Islands", Honiara.

## Agriculture

Agriculture is a widespread economic activity in most of the targeted countries[101] (all except RMI). In Fiji, agricultural land accounts for 22.9% of the total land area. The country has a mix of commercial and subsistence agriculture, although commercial agriculture dominates. Most of Fiji's households grow both food and cash crops, in addition to doing the work of a wage earner. In Solomon Islands, at the national level, 89% of the households have gardens (99% in rural areas and 45% in urban areas).[102] The majority of farmers in Samoa are involved in subsistence agriculture with surplus sold for cash. Development of commercial farming on a larger scale in Samoa and Kiribati is held back by the lack of good quality soil and land, as well as the cost of export and the effects of the annual cyclone season. It is estimated that at least 75% of the labor force in Tuvalu works in subsistence agriculture and the informal economy.[103] Copra is the most widely cultivated cash crop with the potential to increase cash incomes for more rural people than any other single agricultural activity.

### Gender Roles

Growing subsistence crops and cash crops is considered a male enterprise, except in some Melanesian countries where subsistence crop is a female responsibility. Women are at the same time expected by their families to contribute to cash crop production, even though they may not necessarily have control over the income generated.[104] The following tasks are also mainly women's: tending to the subsistence gardens to maintain sustainable sources of food for their families and sell to local markets; processing subsistence crops (coconut oil and honey); niche agricultural ventures (in floriculture, vanilla and bees); and raising poultry and small livestock (pigs and sheep).[105]

[101] Nexus Commonwealth Network, http://www.commonwealthofnations.org/commonwealth/
[102] Solomon Islands National Statistics Office (SINSO).
[103] UN Women, Asia and the Pacific, Tuvalu Profile. https://asiapacific.unwomen.org/en/countries/fiji/co/tuvalu
[104] FAO, SPC (2019), "Country Gender Assessment of Agriculture and the Rural Sector in Solomon Islands", Honiara.
[105] FAO (2019), *Country Gender Assessment of the Agriculture and Rural Sector in Fiji.*

## Forestry

Forestry is an important commercial activity in the region. Forestry for subsistence is widespread in many Pacific countries, mainly regarding firewood collection for cooking purposes or for processing products from agriculture and fisheries. In addition, part of the forestry industry is for conservation purposes. For example, the Government of Fiji has set a target to grow 30 million trees in 15 years to align with the United Nations SDG 15. Communities are involved in the national efforts by cultivating seedlings of indigenous tress that they may then sell to the government. In Solomon Islands, some villages are involved in forestry resource management to fight the detrimental impacts of the logging industry. The Ministry of Forestry is overseeing the implementation of two community-based sustainable forestry resource management pilot projects in Malaita and Guadalcanal. The results so far have been promising and show high potential for upscaling and commercialization.

Tree nursery, Ravuka Village, Vanua Levu (Fiji)

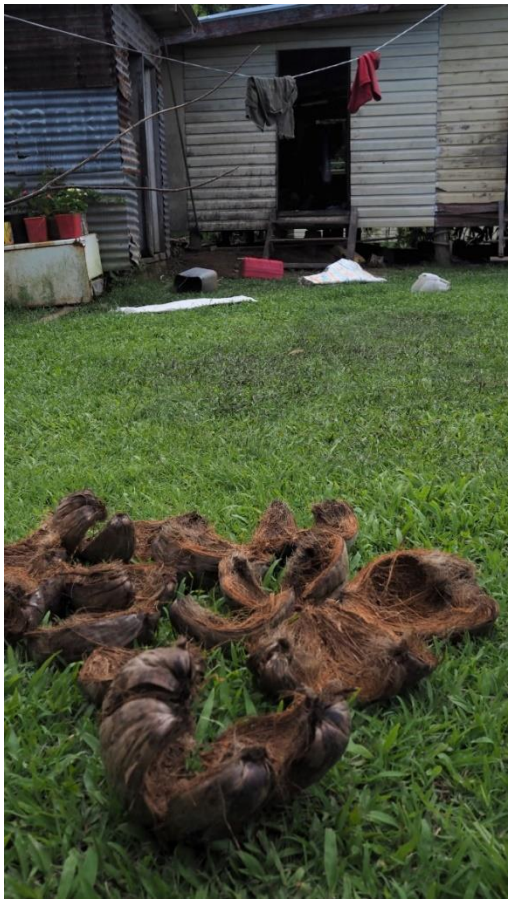
### Gender Roles

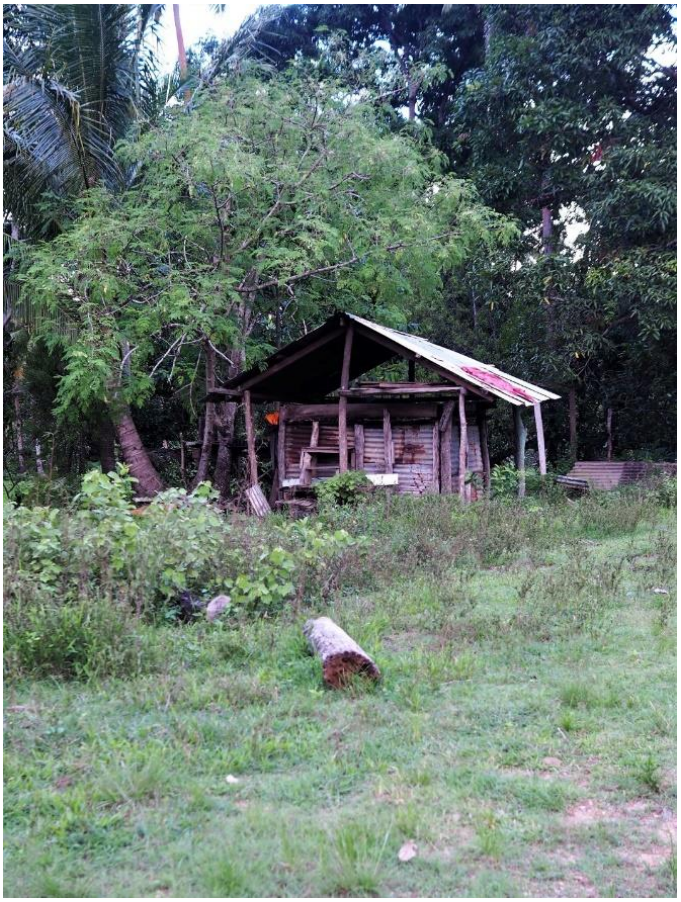
The role of women in the commercial forestry industry is limited. It was, however, observed that women have a role in forestry for conservation purposes by overseeing the tree nurseries while taking care of the family garden. Women have a major role to play in collecting firewood (as further developed in Section 4.1.1).

## Access to Productive Uses of Energy

Most of fisheries, agricultural and forestry activities are performed following an artisanal and traditional approach. Crops and gardens are mostly rain-fed and processed without specific technologies. For example, the copra, the main agricultural output is either dried under the sun or with a biomass-fired drying stove (See pictures below). All the stakeholders and communities met underlined the importance of access to cooling, drying and irrigation devices to enhance their commercial activities. There have also been some initiatives to distribute standalone solar refrigeration systems for in outer islands.[106]

[106] "Solar supports villages livelihoods and spurs business in Fiji", Green Business News Africa. http://www.greenbusinessnewsafrica.com/solar-supports-village-livelihoods-spurs-business-fiji/. "Solar powered freesers Ono-I-Lau Fisherman", Fiji Sun, https://fijisun.com.fj/2019/01/18/solar-powered-freezers-excite-ono-i-lau-fisherman/





Copra dried in traditional ways, Ravuka Village, Vanua Levu (Fiji)

Access to clean energy technologies is, therefore, a key success factor for agriculture and fisheries to thrive. The following PUE[107] could support income-generating activities in these sectors:

- Solar chillers and refrigerators
- Solar-powered ice-making machines
- Solar dryers, efficient stoves
- Geothermal heating for drying
- Solar or wind-powered water-pumping and irrigation systems provide greater productivity than rain-fed crops
- Biodiesel fuels for tractors and machinery as well as transportation
- Biodigesters

[107] FAO (2015), http://www.fao.org/3/a-i5125e.pdf (Last accessed February 21, 2020)

The initiatives targeting PUE are ad hoc and scattered among different stakeholders (the ministry in charge of agriculture, rural development, NGOs, etc.). Some communities take the initiative to buy PUE. In an isolated fishing village of Nabubu, Vanua Levu (Fiji), the community bought solar freezers that lasted 10 years. Now, the appliance is broken due to battery failure. They could not repair it and it is still standing near the shore.[108]

### 3.4.2 Services and Manufacturing

Women are heavily involved in the service industry related to the agricultural and fisheries sector. They are responsible for selling the goods to local markets and creating and selling handicraft products (mats, baskets, shell crafts, etc.). Between 75% and 90% of the vendors working at Pacific marketplaces are women, and their incomes often make up a significant portion of the incomes of many low-income households.[109] Access to PUE could also enhance income-generating manufacturing activities. For example, in the Malaita province (Solomon Islands) and in Tuvalu, women highlighted that having access to sewing machines would enable them to sew school uniforms for their children and to sell. School uniforms are a major budget item for households (especially rural households) in Solomon Islands. All children need several school uniforms and the families buy them at high prices from a tailor based in the provincial capital.[110]


Many services and manufacturing tasks are women's responsibilities, such as weaving mats and market selling (Vanua Levu, Fiji)

[108] Econoler-IUCN (2020), Site visit to Nabubu, Fiji.
[109] UN Women (2016), "Market for Change Project". Retrieved from: https://asiapacific.unwomen.org/en/digital-library/publications/2016/02/markets-for-change#view
[110] Econoler-IUCN (2020), Site visit in Falake Village, Malaita Province, Solomon Islands, February 14.

Furthermore, access to RE infrastructure has potential for developing the sustainable tourism industry and promoting local development. For example, the small eco-tourism business, Nugu Beach Resort, located in Solomon Islands is a family-owned business, which also creates livelihoods for the nearby village. The main impediment to their business model is the lack of access to electricity (they have a diesel generator providing intermittent and expensive power).[111] Having access to clean electricity and reliable transportation would enable small resorts to thrive and women to access employment through family and small businesses.

### Access to Productive Uses of Energy

Women face several energy access limitations in the service and manufacturing sectors. This was exemplified by women in rural communities in Solomon Islands, who cannot access the market at night and do not have lighting to carry out income-generating activities after sunset.[112] UN Women highlighted the need for women market sellers to acquire lighting and refrigeration technologies, but women lack the funds to buy these technologies.[113] Mobility access is also a major constraint to the market sellers who have to travel almost every day to sell their perishable goods. For example, in the Soka Village of the Central Province, one of the least connected in the Solomon Islands, villagers have to travel every day or every second day to Honiara (2-hour perilous boat ride on high seas) to sell their fish surpluses at the market.[114] Example of PUE for the services and manufacturing sectors are provided below:

- Efficient lighting for markets and other selling areas
- Cooling appliances for markets and other selling areas
- Biodiesel fuels for transportation
- Sufficient clean energy supply to power sewing machines and power tools

[111] Econoler-IUCN (2020), Site Visit in Soka Village, Central Province, Solomon Islands, February 15-16.
[112] Econoler-IUCN (2020), Focus group discussion with rural women (Malaita, Solomon Islands), February 13.
[113] Econoler-IUCN (2020). Interview with Aleta Moriaty, Gender Expert on Women Economic Empowerment, February 3.
[114] Econoler-IUCN (2020), Field Data Collection.

# 4 CHALLENGES FOR THE INCLUSION OF WOMEN IN THE ENERGY VALUE CHAIN

This section underlines the obstacles that women encounter in engaging in the clean energy value chain (upstream and downstream). First, women are energy-poor. Second, the energy policy frameworks are gender-blind, thus exacerbating women's lack of energy access. Third, the Pacific culture and values prevent women from joining traditionally male-dominated university programs and working fields. Fourth, the few existing initiatives have had limited success in including women in the clean energy value chain. Section 0 provides a series of recommendations on how to address these challenges.

## 4.1 Energy Poverty as a Gender-related Experience

Access to energy is vital to economic, social and human development. To be meaningful to end-users, energy supply must be adequate in quantity, available when needed, of good quality, reliable, convenient, affordable, legal, healthy and safe.[115] Although energy access is a universal need, gender roles result in different uses of energy and creates different energy needs. Combined with gender-blind energy policies (see Section 4.2), these challenges lead to women being more affected by energy poverty. During the field data collection activities, it became obvious that energy access was one of the main entry points to increase the involvement of women in the energy value chain. Lack of energy access exacerbates women's and girls' time poverty. With the proper access to energy, women could free up some precious time to engage in economic activities and add value to their ongoing livelihoods.

### 4.1.1 Women's Energy Consumption Shaped by Their Reproductive Role

As explained in Section 2.3.3, women and girls are responsible for most of the daily household tasks and caring for children and other family members and are therefore the main household energy users. In case of power supply gaps and the shortage of electricity, women must dedicate more time to household work rather than spending time on income generation and in self-development activities. Women also lack the knowledge and decision-making power to voice their energy needs and financial resources to access energy technologies.

#### Energy Solutions Do Not Fulfill Housekeeping Energy Needs

Energy solutions designed for off-grid communities (mainly stand-alone SHS) do not have enough capacity to fulfill their energy needs and are unreliable due to a lack of maintenance support and knowledge (see Section 3.2.3). On-grid energy supply can also fail to fulfill the households' energy needs because of the high energy losses, frequent power outages and high electricity tariffs.

[115] As highlighted by the Sustainable Development Goal (SDG) 7.

Solar home systems are distributed as part of the rural electrification programs in Fiji (300-Wp systems), RMI (200-Wp systems), Kiribati and Solomon Islands (20-Wp systems). The 300-Wp systems have enough capacity to power lighting, phone-charging, a LED TV set, a radio and a fan but no appliance (such as a small fridge or a washing machine), thus providing little support for domestic chores and little income-generating potential. The supply to consumers connected to isolated grids and solar home systems is available for only a small number of hours.

A focus group with 23 women from rural areas[116] showed that the Solomon Islanders had a negative opinion of small SHS. These systems are donated by the government or sold at local hardware shops. They reported that a system broke down after one year and they struggled to get it repaired. Buying a new one is sometimes impossible. Its low potential for income-generating activities was also underlined because these systems do not allow for much more other than a light or a cellphone charger connected to it.

### Lack of Access to Clean Cooking Solutions

> "Often we get itchy eyes and choke on the smoke. But we are used to it"
>
> - Group of women, Ravuka Village, Fiji

The World Health Organization (WHO) estimates exposure to air pollution from cooking with solid fuels (wood, dung, charcoal, coal, or crop residues) is associated with over four million annual premature deaths worldwide, including half a million children under the age of five from pneumonia.[117] Solid fuels are commonly burned in inefficient simple stoves in poorly ventilated conditions, which results in indoor air pollution (IAP) exposure. Women and their youngest children are disproportionally exposed to IAP, even more so if they live in low-income and rural households. They are mostly exposed due to their household roles; women may cook up to three meals per day using such cooking methods, and women and children often spend more than five hours per day in smoky kitchens and poorly ventilated homes.[118] Epidemiological literature firmly associates exposure to IAP with acute lower respiratory infections (including pneumonia) in young children and chronic obstructive pulmonary disease and lung cancer in women (and to a lesser degree in men). It was observed that women stack multiple fuel solutions for access to cooking energy. In coastal communities in Solomon Islands, women use up to three cooking energy sources: wood (collected or bought), sawdust and LPG. This is a survival strategy. Their primary choice is the free collected wood, but during raining periods, they have no other choice than to buy the alternatives at very high costs. Wood cutting is also very damaging for the environment and cannot be considered as a sustainable energy source. In the communities visited in Fiji, some households had access to liquefied petroleum gas (LPG) stoves, yet women would use them only for boiling water and preparing breakfast for kids before school. They would still cook lunch and dinner over open fire because LPG is too expensive.

[116] Econoler-IUCN (2020), Focus Groups with rural women, Auki, Solomon Islands, February 13.
[117] WHO's official website, "Ambient (Outdoor) Air Pollution", <https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health>, accessed January 5, 2020.
[118] Bipasha Baruah (2017), "Opportunities and Constraints for Women's Employment and Entrepreneurship in Renewable Energy", *GrOW Working Paper Series,* GWP-2017-10, p. 22.

### Fetching Water and Wood as Time-consuming Activities for Women

> "We have access to electricity, but this is not enough, we need more power to have fridges, washing machines and other appliances."
> - Community representative, Ravuka Village, Fiji

Currently, Pacific women spend long hours collecting wood or fetching water. While this situation is more prevalent in rural areas, women from urban areas also sometimes cook with solid fuel and act as fuel providers. In Solomon Islands, 59% of the households have to travel for water (21% in urban areas and 66% in rural areas).[119] Women in Solomon Islands report having to walk long distances to find wood, sometimes spending a full day; distances have gotten longer due to logging activities in the region.[120] In the village of Falake (in Malaita province) women spend two full days per week collecting wood and drying it.[121] In the villages visited in Vanua Levu, Fiji, the task seems more generally shared by men and women, but cooking remains women's responsibility. Even in countries that have electrification rates of 100% (or close to), it is still common for households to use wood for cooking, as this is the case in Samoa and Kiribati.

Another common activity that prevents women from allotting time to income-generating activities is the need to supply the household with water. For example, women from rural communities in Solomon Islands reported having to go fetch and carry water every day.[122] In Fiji, fetching water and other such unpaid work is affecting women's participation levels in fisheries.[123] Other communities have water pipes but no pumping system, making water supply unreliable.

Therefore, by providing greater access to reliable energy systems with appropriate capacity to power small appliances, clean cooking solutions, solar water pumping systems and solar desalination systems, energy would help reduce the time and efforts women devote to housekeeping work.

### 4.1.2 Women Lack Knowledge, Decision-making Power and Resources to Access Energy Solutions

PICs are largely patriarchal societies, thus leading to asymmetrical gender roles and implicit biases against women's leadership and decision-making capacities. Women are not represented in decisions related to politics and society. In addition, men are often responsible for making household purchasing decisions (and hence the decision regarding the sources and types of energy in the household and at the community level). One explanation for this dynamic is that women's contribution to the household budget is often lower than men's or made through their free labor rather than money. Women also do not have the necessary knowledge to voice their energy needs. For example, women in Solomon Islands have shared that they do not have an avenue to express their needs regarding energy or obtain information on the matter. The intra-household decision-making pattern is detrimental to women who are the primary household energy users due to their domestic chores and are therefore more vulnerable to risks related to energy supply and use.

[119] SINSO (2012-2013), loc. cit.
[120] Econoler-IUCN (2020), Interview with the National Council of Women (Solomon Islands), February 12.
[121] Econoler-IUCN (2020), Focus Groups with rural women, Auki, Solomon Islands, February 13.
[122] Ibid.
[123] Econoler-IUCN (2020), Interview with Women in Fisheries Network, Suva, Fiji, February 17.

From the data available, households headed by women vary from 10% in Solomon Islands to 15% in Fiji. Poor households often headed by women are concerned about the cost of electricity and are unable to afford meter-based consumption unless supported by subsidies. The same dynamic applies to female entrepreneurs, who usually own smaller businesses (micro or small enterprises) in the informal sector. Energy shortages have negative impacts on all business but affect micro and small businesses even more since the latter cannot afford to invest in additional generation capacity or even to pay the electricity tariff. Women also have little representation in community committees overseeing energy projects or infrastructure. The committees are sometimes required by donors or governments to have female representation but that it is not always possible given the customs and gender roles prevailing in rural areas. A challenge experienced by several projects is that men more often than women have previous technical education and village councils are usually predominantly composed of men.

## 4.2 Gender-blind Policy Framework and Incomplete Definition of Energy Access

Another challenge that reinforces women's energy poverty and prevents women from being included in the energy value chain is the gender-blind energy policy framework that only provides an energy access definition that is incomplete, supply-oriented and focused on households' energy needs. This section first describes an international framework for defining energy access and then provides a comprehensive gender assessment of the energy policy framework by assessing (1) gender-mainstreaming capacities in the energy sector and (2) the policy documents related to energy. The detailed methodology for this assessment is provided in Section 1.

### 4.2.1 International Definition and Measurement of Energy Access

The international framework for defining and measuring energy shows that energy access is multifaceted. Energy should be clean, safe, reliable, and affordable.[124] It should ensure the wellbeing of households, while also facilitating economic activities and the delivery of key public services, including healthcare, education, and infrastructure services. Finally, energy access should also promote food security[125] and clean water access and management[126].

#### Energy Access: Going Beyond Electricity Connection

While there is no single internationally accepted or internationally adopted definition of modern energy access, similarities exist among the definitions. In general terms, access to energy is frequently discussed in terms of household access, productive uses, and access to energy for community facilities, as shown in Figure 4 below.

[124] SDG 7. https://sustainabledevelopment.un.org/sdg7
[125] SDG 2. https://sustainabledevelopment.un.org/sdg2
[126] SDG 6. https://sustainabledevelopment.un.org/sdg6


**Figure 4: Total Energy Access Framework[127]**

Access to energy is defined as "the ability of the end-user to utilize energy supply that is usable for the desired energy services. Energy access can be defined either inclusive or exclusive of use of appliances. When defined inclusive of appliances, it is called access to energy services, and when defined exclusive of appliances, it is called access to energy supply."[128] Access to productive energy services (for example, to contribute to home businesses or other income-generating purposes) and access to energy services for community facilities (for example, streetlights) are two additional facets of energy access.

## 1. Household Access to Energy

In a simplified conceptual framework, access to household energy is composed of two key elements: access to electricity and access to energy for cooking (as well as heating and drying). Both electricity access and energy access for cooking have significant impacts on household time-use, budgets, and safety, particularly for women and children.

[127] Practical Action (2019), Poor Peoples' Energy Outlook.
[128] ESMAP (2015), "Beyond Connections: Energy Access Redefined", Technical Report 008/15.

### Access to Electricity

Binary measurement of electricity access based on whether a household has a grid connection may mask key elements of poor supply and overlook alternative electricity solutions. For example, poor electricity supply from the grid may limit its usefulness and the use of electricity may also be constrained by its affordability. As the quality of electricity access provided by off-grid stand-alone and mini-grid solutions improves, the need keeps growing for tracking both off-grid electricity access and grid connections in terms of the volume and quality of electricity delivered, among other relevant parameters. To properly examine these various scenarios, the concept of a technology-neutral multi-tier framework is promoted by the World Bank's Energy Sector Management Assistance Program (ESMAP). It perceives energy access as a continuum of increasing levels of access, thus leading to "the energy ladder" metaphor. The energy ladder concept has helped highlight how multiple interventions can lead to better access to energy. A simplified version of this framework is summarized in Table 14 below, which shows that in addition to the power capacity, the following factors need to be considered to define energy access: duration (including daily supply and evening supply); reliability; affordability.

**Table 14: Multi-tier Matrix for Measuring Household Access to Electricity Supply and Electricity Services[129]**

| Criteria | | TIER 0 | TIER 1 | TIER 2 | TIER 3 | TIER 4 | TIER 5 |
|---|---|---|---|---|---|---|---|
| Capacity | Peak capacity ratings | | Min 3 W | Min 50 W | Min 200 W | Min 800 W | Min 2kW |
| | | | Min. 12 Wh | Min. 200 Wh | Min. 1.0 kWh | Min. 3.1 kWh | Min. 8.2 kWh |
| | Electricity services | | Lighting and phone charging | General lighting and phone charging and television and fan (if needed) | Tier 2 and any medium-power appliances | Tier 3 and any high-power appliances | Tier 2 and any very high-power appliances |
| Availability (duration) | Hours per day | | Min. 4 hrs | Min. 4 hrs | Min. 8 hrs | Min. 16 hrs | Min. 23 hrs |
| | Hours per night | | Min. 1 hr | Min. 2 hrs | Min. 3 hrs | Min. 4 hrs | Min. 4 hrs |
| Reliability | | | | | | Max. 14 disruptions per week | Max. 3 disruptions per week of a total duration <2 hrs |
| Affordability | | | | | Cost of a standard consumption package of 365 kWh/year <5% of household income | | |

[129] Adapted from ESMAP (2015), *loc. cit.*

### Energy for Cooking

Classifying cookstoves in terms of efficiency, health benefits and reduction of emissions is a complex endeavor that is being attempted by various organizations in the world. The International Organization for Standardization (ISO) International Workshop Agreement (IWA)[130] has worked to establish interim standards for cookstoves and provide interim guidance for rating cookstoves according to five performance indicators: fuel use, total emissions, indoor emissions, safety and durability. For each of the indicators, a tier-based classification system has been adopted, as shown in Table 15 below. Tier 0 represents the typical performance of open fires and the simplest cookstove. The Tier 5 emission rates defining the levels of fine particulate matter and carbon monoxide conform to the WHO's guidelines for indoor air quality.[131]

**Table 15: ISO-IWA Voluntary Performance Targets – Default Values[132]**

| Tier | Thermal Efficiency (%) | Carbon Monoxide Emissions (gram/megajoule delivered) | Fine Particulate Matter Emissions (milligram/megajoule delivered) | Safety (score) | Durability (score) |
|---|---|---|---|---|---|
| 5 | ≥50 | ≤3.0 | ≤5 | ≥95 | <10 |
| 4 | ≥40 | ≤4.4 | ≤62 | ≥86 | <15 |
| 3 | ≥30 | ≤7.2 | ≤218 | ≥77 | <20 |
| 2 | ≥20 | ≤11.5 | ≤481 | ≥68 | <25 |
| 1 | ≥10 | ≤18.3 | ≤1031 | ≥60 | <35 |
| 0 | <10 | >18.3 | >1031 | <60 | >35 |

The two main categories of cooking solutions are the Improved Cooking Solutions (ICS) and the Clean Cooking Solutions (CCS). Their general description is provided in Figure 5 below and the types of technologies they feature are further detailed in Table 16.

[130] ISO/IWA. (2012), "Guidelines for Evaluating Cookstoves Performance". Available online: https://www.iso.org/obp/ui/#iso:std:iso:iwa:11:ed-1:v1:en
[131] "WHO Guidelines for indoor air quality: household fuel combustion". Retrieved from: https://www.who.int/airpollution/guidelines/household-fuel-combustion/en/
[132] Clean Cooking Alliance, "Voluntary performance targets". Retrieved from: https://www.cleancookingalliance.org/technology-and-fuels/standards/iwa-tiers-of-performance.html

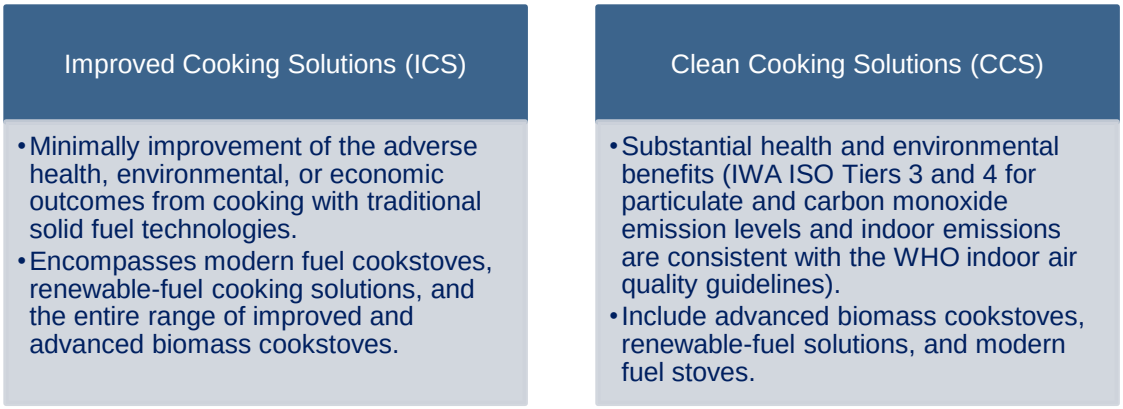



**Figure 5: Main Categories of Cooking Solutions[133]**

Table 16 below shows the wide array of cooking technologies available on the international market and that "efficient cookstove" is not a blanket term that can be applied uniformly to all technologies available. Although any technology from the most basic ICS is better than cooking over an open fire, the cookstove technology can have a wide range of potential impacts on fuel-use efficiency, indoor air quality and emissions. In general, ICS stoves do not bring significant health or environmental improvements. In terms of the detrimental impacts of indoor air pollution, ventilation equipment and chimneys can be more beneficial than the type of biomass stoves.

Furthermore, one technology can be perfectly suitable for a community but can be detrimental or useless to another one. A specific assessment of a community's needs and access to fuel is essential for identifying the most suitable technology. Cooking techniques also differ from culture to culture and from region to region. Thus, the proposed ICS should be designed to meet the cooking needs of the target community; otherwise, the proposed solutions can be rejected. In communities where firewood is not a scarce resource, people may be less willing to adopt the ICS proposed. In this case, benefits like reduced indoor air pollution and faster cooking could help convince the beneficiary group.

The following table provides an overview of some of the cooking technologies that have been distributed in the Pacific region, including the Fijian rocket stove (intermediate ICS), the saw dust stove commonly used in the Solomon Islands (intermediate ICS), the LPG cookstove (modern fuel solutions) and Ezy Stove (intermediate ICS) promoted in Kiribati and pilot biodigesters (Renewable-fuel stoves). The potential impacts in terms of the health and environmental benefits as per ISO-IWA indicators are shown with a color code in the column on the right (light green means low potential impact and dark green means high potential impact).

[133] WBG/ESMAP (2015), "The State of the Global Clean and Improved Cooking Sector". Retrieved from: https://openknowledge.worldbank.org/bitstream/handle/10986/21878/96499.pdf

**Table 16: Categories of Improved and Clean Cooking Solutions (ICS and CCS)[134]**

| Categories | Models and Technical Specificities | | Pros | Cons | Potential Impacts[135] |
|---|---|---|---|---|---|
| **Improved Cooking Solutions (ICS)** | | | | | |
| Basic portable ICS | Basic efficient charcoal<br>Basic efficient wood<br>Anagi Cookstove (Sri Lanka)<br>Metal insulator-lined<br>Ceramic and clay stoves (Jiko and Jambar in Africa) |  <br>  | Better than three-stone fire.<br>Low costs (can be made locally with minimal materials (3 to 10 USD).<br>Artisan-produced (may create economic opportunities). | Artisan-produced (quality varies).<br>Small functional improvements of fuel efficiency.<br>No significant health improvements without a chimney or ventilation.<br>Initial fixed costs and need regular repair and maintenance. | |
| Basic Chimney ICS | Basic chimney ICS constitute most of the “improved” solutions in the field.<br>Fixed rocket chimney. |  <br>  | Chimneys decrease indoor emissions (Tier 1 or higher).<br>Artisan-produced (may create economic opportunities).<br>Low costs (12 to 50 USD). | Small improvements in thermal efficiency.<br>May be Tier 0 for thermal efficiency (<15%) and Tier 0 for total emissions.<br>Artisan-produced (quality varies).<br>Limited health and environmental benefits.<br>Initial fixed costs and need regular repair and maintenance. | |

[134] Ibid. Images from: Clean Cooking Alliance, “Clean Cooking Catalog”. Retrieved from: http://catalog.cleancookstoves.org/ (consulted on March 23, 2020).
[135] Potential impacts on health and environment as defined by the ISO-IWA Voluntary Performance Targets.

| Categories | Models and Technical Specificities | | Pros | Cons | Potential Impacts[135] |
|---|---|---|---|---|---|
| Intermediate ICS | A wide range of improved cooking solutions that conform to the ISO's ICS Tier 2 efficiency level.<br>Portable rocket stoves i.e., an L-shaped combustion chamber design, such as the **Ezy Stove** (first picture) and **Rocket Stove** (Second picture) and Kasabia Stove (both used in Fiji), **Saw-dust stoves (used in Solomon Islands)** (third picture)<br>Other design features that promote thermal efficiency as in the case of intermediate coal and charcoal ICS.<br>Highly improved charcoal stoves. |  <br>  <br>  | Low cost (USD 25 to 80 USD).<br>Highly improved fuel efficiency.<br>Moderate to significant improvements in thermal efficiency (up to >25% thermal efficiency rating). | Still limited health and environmental benefits.<br>Initial fixed costs and need regular repair and maintenance.<br>Moderate gains in combustion efficiency. | |
| **Clean Cooking Solutions** | | | | | |
| Advanced cookstoves (ACS) | Fan draft or natural draft biomass gasification cookstoves that achieve (IWA/ISO Tier 3 for indoor emissions, Tiers 3 or 4 for efficiency).<br>Natural draft models.<br>Fan draft rocket style stoves, like the Biolite.<br>Top-loading fan gasifiers, like the Oorja in India and the Phillips/ACE-1 fan gasifiers. |  <br>  | Significant particulate emission reductions.<br>Very high fuel and combustion efficiency.<br>May require pellet/briquette fuel (opportunity for economic activity). | Higher costs (USD 40-250).<br>Initial fixed costs and need regular repair and maintenance.<br>May require pellet/briquette fuel (could be a deterrent for more solid fuel processing). | |

| Categories | Models and Technical Specificities | | Pros | Cons | Potential Impacts[135] |
|---|---|---|---|---|---|
| Modern fuel solutions | Cooking systems that rely on petrochemical fuel (LPG, natural gas) or electricity:<br>LPG or Dimethyl Ether (DME) cookstoves;<br>electric stoves;<br>electromagnetic induction cookstoves. |  <br>  | High fuel efficiency.<br>High health benefits due to very low particulate emissions.<br>Limited time spent on fuel collection drudgery. | Higher costs (device costs USD 40 to 60 but requires purchasing fuel and/or electricity).<br>Since fuel or electricity is expensive, this solution becomes a supplementary cooking option rather than a replacement of solid-fuel cooking.<br>Necessitate subsidies or policies to support access to commercial fuels. | |
| Renewable-fuel stoves | Derive energy from renewable non-wood fuel energy.<br>Solar cookers.<br>Biogas (**Biodigesters**)<br>Methanol.<br>Retained heat cookers. |  <br>  | Renewable, clean technology.<br>Some models promote circular economy by transforming waste to energy.<br>Limited time spent on fuel collection drudgery.<br>Optimize indigenous resources. | A wide range of costs (some can be locally made at very low costs; otherwise, USD 50 to 500 USD).<br>Some are supplementary rather than primary cookstoves. | |

**Legend:** Moderate impacts Highest impacts

2. Access to Productive Uses of Energy

Productive uses of energy (PUE) are the agricultural, commercial and industrial activities involving energy services as a direct input to the production of goods or the provision of services.[136] They can be on-grid or off-grid and use electrical or mechanical power. Productive uses of energy can use relatively small amounts of energy to provide services, such as to power clippers in a barbershop or lighting to extend business hours, and can include large consumers of energy, for example, facilities milling grains and facilities providing cold storage. Availability of these services can impact the availability of energy services to households and directly impact their energy use (through charged lighting rental services, for instance), but are typically considered apart from household energy use patterns.

3. Access to Energy for Community Facilities

Community facilities can include recreational facilities and locations where a community can gather and engage in activities, including schools, as well as community services, such as street lighting, provided by the community or the local government. Community facilities can also improve energy service availability to households and reduce the energy use at home if local inhabitants have access to community facilities with energy access.

### Energy-water-food Nexus

Energy access should also promote food security[137] and clean water access and management[138]. The energy-water-food nexus framework arises from the fact that water, food and energy security is fundamental to the quality of life and well-being of the modern society. It is increasingly clear that in an interlinked world, there is no place for conventional planning and decision-making that focuses on single-sector approaches. The overarching governance problem that the nexus concept attempts to address is that policies are fragmented across the water, energy and food sectors, thus leading to unintended consequences. The goal is to achieve policy coherence by identifying synergies and trade-offs, optimizing policy options, and adapting governance arrangements.[139] The nexus approach helps define trade-offs between resource sectors and the environment and helps build synergies across these sectors and the environment to increase resource-use efficiency. In comparison with the existing independent sectoral approaches to the management of water, food, energy and ecosystems, this nexus approach thus helps reduce costs and increase benefits for both the society and the environment.[140] Food security and water management being critical challenges in the Pacific, the energy-water-food nexus need to be considered in the definition of energy access.

[136] GIZ (2013), "Promoting Productive Use of Energy in the Framework of Energy Access Programmes". https://sustainabledevelopment.un.org/content/documents/4738mayer.pdf (Last accessed February 20, 2020).
[137] SDG 2. https://sustainabledevelopment.un.org/sdg2
[138] SDG 6. https://sustainabledevelopment.un.org/sdg6
[139] Weitz, N. et. al. (2017), "Closing the governance gaps in the water-energy-food nexus: Insights from integrative governance". *Global Environmental Change*, 45, pp. 165–173.
[140] Van der Geest, M. and D. Slijkerman (2019), "Nexus interventions for small tropical islands: case study Bonaire". www.wur.eu/sustainablewatermanagement

### 4.2.2 Assessing Gender Mainstreaming Capacities in the Energy Sector

This section makes an assessment of each country's domestic conditions for enabling gender-mainstreaming in energy-related policy-making and program development. This assessment was done using a detailed analytical grid to allow for not only making an in-depth examination of each country but also making a comparison of the countries. The methodology and references used to develop the tool are described in Section 1. Only the main findings and summaries of the analytical grid assessment are however presented in this section. For the purposes of this study, to determine whether a country has "a favorable context for gender-mainstreaming", the following four kinds of framework are carefully examined: (1) decision-making; (2) sex-disaggregated data; (3) legal and political; and (4) institutional and financial. This analysis serves as a complement to the gender-sensitive assessment of the national energy policy framework in Section 4.2.3.

#### Decision-making Framework

Our examination of this framework looks at whether women are involved in the decision-making process related to energy, whether the policy-makers and data producers and analysts are aware of gender as a concept, gender issues pertaining to energy and whether they have the necessary skills to perform gender-mainstreaming. The information about each country is shown in Table 17. All the information shown in the table is from the field data collected from the NEOs using the interviews and the questionnaire, unless otherwise indicated.[141]

The table shows that women's share of decision-making positions in the NEO ranges from 8.7% (Fiji) to 53% (Samoa). Among the electricity utilities' decision-makers, women's share ranges from 0% (Tuvalu) to 10% (Kiribati). These numbers show the cultural bias favoring men to fulfill decision-making roles, especially in the energy sector. In their responses to the survey, all the NEOs declared that their higher management has a vision for promoting gender inclusion in their organizations. However, all the national NEOs, except two, declared that they do not have any internal procedure (recruitment, promotion and training) to enhance gender balance. The Fiji NEO said that it has an internal measure to ensure that at least one female member must be in a recruitment evaluation committee. In Samoa, the Public Service Commission addresses gender equality in human resources policies. Most of the NEOs and electricity utilities said that they have a "merit-based" recruitment process and they encourage women to submit their applications in response to job ads. Furthermore, two NEOs (Fiji and the Solomon Islands) informed that their departments intend to adopt gender-equality policies in the future. Tuvalu's NEO said that it does not have any gender-equality policy but did mention that its national gender-mainstreaming strategy applies to the NEO. The NEOs' levels of awareness and capacity related to gender-mainstreaming are quite low. Two NEOs (Fiji and the Solomon Islands) declared that their staff receive gender-mainstreaming training, which is, however, not mandatory or systematic. In Fiji, the last gender-mainstreaming training session was conducted in 2017 and 25 participants (12 men and 13 women) from several ministries attended.

[141] Econoler-IUCN (2020) Field data collection.

**Table 17: Assessment of Gender-mainstreaming Capacities – Decision-making Framework**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| **Proportion of women in decision-making** | | | | | | |
| Proportion of women working in the energy-sector decision-making organizations[142] | | | | | | |
| Department of Energy (%) | 8.7 | 13.2 | N/A | 14.3 | 25 | 16.7 |
| Electric utility (%)[143] | 2 | 4.8 | 2.5 | 0 | 10 | 3.6 |
| **Internal strategy of NEO to enhance gender equality** | | | | | | |
| Does the higher management have a vision to promote gender inclusion and allocate the necessary resources? | Yes | Yes | Yes | Yes | Yes | Yes |
| Is there existing recruitment, promotion and training procedures that enhance female employee participation and growth? | Yes | No | Yes | No | No | No |
| Does the organization intend to adopt gender-equality policies in the future? | Yes | Yes | N/A | No | No | No |
| **Gender-mainstreaming awareness and capacities** | | | | | | |
| Existence of a gender training or awareness-raising program for policy-makers | Yes | Yes | Yes | No | No | No |
| Training program delivered on a regular basis (at least annually)?[144] | No | Yes | Yes | - | - | - |
| Mandatory training program? | No | No | Yes | - | - | - |
| Is there capacity on gender analysis among policy-makers (tools and analytical methods) | No | No | N/A | No | No | No |

To sum up, these numbers show that: (1) there are a very small number of women holding decision-making positions in the countries' governmental bodies and in the energy sector; (2) the energy decision-makers and policy-makers lack the necessary knowledge and sensitivity about gender-equality issues and lack the necessary capacity to perform gender-mainstreaming. Nevertheless, it is still encouraging to learn that all the NEOs said that their higher management has a vision to promote gender inclusion and intends to allocate the necessary resources to implement new policies and initiatives. However, no resources have been devoted to the effort to implement internal procedures, policies or training that could challenge the status quo.

[142] With a management (at the middle and higher levels) or technical position (at the intermediate and senior levels) in the decision-making organizations in charge of the energy sector.
[143] Pacific Power Association (2018)
[144] Despite having made the requests for the gender-mainstreaming training materials, the Consultant did not receive any.

### Sex-disaggregated Data

Our examination of this framework has assessed the availability of gender-disaggregated data to support the development of energy policies and programs. The results of the analysis are summarized in Table 18 below. It was found that some countries do not have up-to-date national statistics. Solomon Islands, Kiribati and RMI's statistics are quite outdated, because they last conducted their HIES respectively in 2012, 2006 and 2002. RMI and Kiribati were conducting HIES in 2019 and the Solomon Islands plans to conduct it in 2020.[145]

**Table 18: Assessment of Gender-mainstreaming Capacities – the Sex-disaggregated Data Framework[146]**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| Availability of data on women's use of energy and other resources | No | Partly | No | No | No | No |
| Availability of data on women's economic activities | No | Yes | Yes | No | No | No |

The results show that there is very little sex-disaggregated primary data available on women's use of energy and women's economic activities in targeted countries. Except for Solomon Islands, none of the countries have collected and published data on women's use of energy and other resources (e.g water, fuel wood, etc.). The Solomon Islands' HIES indeed documents traditional fuels (biomass, wood, dung) and household efforts for accessing water. Regarding women's economic activities, only the statistics of Solomon Islands and Samoa indicated women's involvement in the informal sector and their free domestic labor. Local stakeholders highlighted this absence of reliable data as a challenge.[147] This is problematic because if a situation is not documented, it cannot be identified as a problem and therefore cannot be solved.

### Legal and Political Framework

Our examination of this framework has looked at two main aspects: (1) whether the national legal and policy frameworks embrace the international principles regarding women's well-being and the human rights and facilitate the integration of gender considerations in legislation and policies regarding the energy sector; (2) whether there is a political framework supporting the gender-mainstreaming effort in energy decision-making.

[145] SPC, Census and Survey Calendar, http://sdd.spc.int/census-and-survey-calendar.
[146] Data retrieved from the national statistics agencies: Fiji Bureau of Statistics (FBS), Solomon Islands National Statistics Office (SINSO), Samoa Bureau of Statistics (SBS), Tuvalu Central Statistics Division (CDS), Kiribati National Statistics Office and RMI Economic Policy and Planning Statistics Office.
[147] Econoler-IUCN (2020), Interview with Gender Affairs Department and DoE (Tuvalu)

**Table 19: Assessment of Gender-mainstreaming Capacities – Legal and Political Framework**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| Ratification of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) | 1995 | 2002 | 1992 | 1999 | 2004 | 2006 |
| Political framework supporting the gender-mainstreaming effort in energy decision-making | Partly | Partly | Partly | Partly | Partly | Partly |
| Are there active women's groups/human rights groups in the country?[148] | Yes | Yes | Yes | Yes | Yes | Yes |

The legal and political framework assessment has shown similar results for all the targeted countries. Women's rights are not enshrined in the constitution of none of the six countries[149] and there is no existing legal directive mandating gender assessment in the energy infrastructure. Notwithstanding these two missing factors, the countries all have ratified the CEDAW and have a national gender policy to support their gender-mainstreaming efforts in the energy policy and program development. Finally, the countries also have active civil society that may defend women's rights against the policy and decision-makers.

### Institutional and Financial Framework

Our examination of this framework has looked at two main aspects: (1) whether there is an institutional framework supporting the gender-mainstreaming effort in energy decision-making; (2) whether gender-mainstreaming is supported by financial resources.

[148] Econoler-IUCN (2020), Field data collection. Based on the number of women's groups and their access to the government.
[149] Assessment performed using: IDEA International (2016), "Constitution Assessment for Women's Equality".

**Table 20: Assessment of Gender-mainstreaming Capacities – Institutional and Financial Framework**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| What is the institutional structure for mainstreaming gender? | MWCPA | MWYCFA | MWCSD | MLGWY | MWYSA | MIA |
| Is there a Gender Focal Point (GFP) covering energy affairs? | Partly | Partly | No | No | No | No |
| Does the government perform gender budgeting? | In progress | In progress | In progress | In process | In progress | No |

All the countries have an institutional structure for mainstreaming gender although most of them reported having insufficient human resources and financial resources to cover all governmental activities. Fiji's Department of Women at MWCPA is working on a large-scale Gender Mainstreaming Action Plan (with Canadian funding) to be implemented across all the ministries to enhance institutional capacity-building and gender-budgeting. The Department of Women will also conduct a national study on green jobs in the tourism, forestry and energy sectors in 2020 (with ADB funding). Fiji's and the Solomon Islands' gender policy has made it compulsory for all their national ministries to establish a gender focal point (GFP). The GFP, however, has no specific budget to carry out their activities and their work is not exclusively focused on gender-mainstreaming. In the Solomon Islands, the GFP is occupied by management staff, who receive gender-mainstreaming training twice a year; but their job description does not include gender-related activities. Another challenge is that, for each ministry, there is one GFP working for the whole ministry and this GFP covers numerous matters and issues. Gender-budgeting is being gradually implemented in four countries.[150]

### 4.2.3 Assessing the Level of Gender Awareness of the National Energy Policy Framework

This section investigates the gender awareness of the energy policy framework in all targeted countries. As a reminder about Section Appendix II, the main documents considered in the energy policy framework for each country are summarized in Table 21 below. The policy assessment is broken down in five indicators: (1) gender-mainstreaming, (2) participation in developing the policy, (3) gender-disaggregation, (4) recognition of women's roles and their energy needs and (5) the integrated energy planning approach. The assessment was conducted with a thorough document analysis. If a policy did not provide enough information to answer a question, "non-available" is indicated in the table.

[150] ESCAP (2018), "Gender-responsive Budgeting in Asia and the Pacific". Retrieved from: https://www.unescap.org/sites/default/files/SDD_Gender-Responsive_Budgeting.pdf

**Table 21: Summary of Policies Considered in the Energy Policy Framework**

| National Policies | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| National Energy Policy | ● | ● | | ● | ● | ● |
| National Energy Plan/Roadmap | | | ● | | ● | ● |
| National Development Plan/Strategy | ● | ● | ● | ● | ● | ● |
| Rural/Outer Island Electrification Strategy | ● | | | | | |
| Clean Cooking Strategy | | | | | ● | |

### Gender-mainstreaming

This indicator assesses if energy needs are comprehensively addressed and if and how women are mentioned in the energy policy frameworks (Table 22). The energy policies in the targeted countries generally focus on households' uses. All the policies overlooked the productive use of energy, while three (Fiji, Solomon Islands and RMI) partially addressed community services. The latter was, however, only mentioned in broad terms, but no concrete measure was proposed. When gender equality is addressed in the policy frameworks, it is as a very generic and broad statement. For example, the energy policy frameworks of Solomon Islands, Samoa, Tuvalu, and Kiribati recognize that a gender-sensitive approach should be considered in understanding the gender-specific energy needs but fail to specifically address women's energy practical and strategic needs. Interestingly, the two Micronesian energy policy frameworks consider women as potential stakeholders of energy (for cooking and SHS maintenance) instead of only portraying them as beneficiaries. Some countries are currently reviewing their national energy planning framework and working on mainstreaming gender in the new versions of the policies. This is the case of Fiji that is reviewing its National Energy Program and Rural Electrification Policy.[151]

We note that the gender equality policy framework (as presented in Section 2.2.2) is also silent on women's energy needs and the issue of lack of access to clean cooking options. Samoa's gender policy is the only one mentioning women's economic empowerment with access to PUE. The policy aims to "support potential research into new initiatives and incentives that help women's business growth through ICT of green jobs (renewable energy) in the tourism and agriculture sector"[152].

[151] Consultations with Member States, Fiji Department of Energy, July 2020.
[152] Samoa National Policy for Gender Equality (2016-2020).

**Table 22: Gender-aware Energy Policy Framework – Gender-mainstreaming**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| **Definition of Energy Needs** | | | | | | |
| Is energy identified as a basic need? | Yes[153] | No | No | No | No | Yes |
| Is the need for affordable energy underlined? | Yes | Yes | Yes | Yes | Yes | Yes |
| Are energy needs of end-users defined considering the three levels of energy needs and the areas where they live (urban/ rural) | Partly | Partly | No | No | Partly | Partly |
| **Women's Inclusion in the Policy** | | | | | | |
| Does the policy portray women as stakeholders or agents of change? | No | N/A | No | N/A | Yes | Yes |
| Does the policy framework consider the five hierarchical levels of gender equality that can be achieved (welfare, access, awareness-raising, participation and control)? | No | No | No | No | No | No |
| Are the social, economic and environmental benefits to women underlined? | Partly | No | No | No | Yes | Yes |

### Participation

This indicator looks at the public consultations conducted for the development of the existing policy framework and those planned for future policy or program development. The results show that few consultations with women or women's groups were conducted and that most of the policy framework does not plan future consultations or propose a strategy for enhancing gender capacities. For Fiji, the energy policy includes a disclaimer on how the lack of an institution with overall responsibility has limited the opportunities for broad-based consultations.

[153] Rural Electrification Policy 2016.

**Table 23: Gender-aware Energy Policy Framework – Participation**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| Were women end-users consulted to define their energy needs? | No | No | Yes | N/A | No | Yes |
| Does the policy framework plan for women consultations/gender analysis for energy initiatives, programs and projects? | Partly[154] | No | No | No | No | Yes |
| Does the policy framework highlight the need to increase gender equality in the energy workforce? | No | No | No | No | No | Yes |

RMI stands out in terms of its participation process. Its policy framework was based on consultations with women's groups. It plans on holding future consultations for the energy policy and programs. In addition, the RMI Electricity Roadmap has included the need to "encourage women to join the energy workforce in all roles" as one of its key principles. Proposed interventions include:

- Ensuring adequate separate toilet facilities and a safe working environment for technical and field jobs.
- A quota for the number of women included in apprenticeship intake will be considered.
- Interested women will be encouraged to apply for roles, apprenticeships, and engineering studies through social media and personal contacts.
- Women already in the sector will be advocates to encourage more women to work in the sector.
- Links will be established with the Pacific Power Association (PPA) Gender Champions Initiative.

Interestingly, this roadmap was designed under the leadership of two women: Angeline C. Heine, Director of the RMI National Energy Office, and Nicole Baker, Energy Consultant.

### Gender Disaggregation

This indicator underscores that none of the policies refers to sex-disaggregated data on differentiated energy uses by men, women and children. The results were expected given the lack of available sex-disaggregated energy statistics as revealed in Section 4.2.2.

[154] Fiji National Energy Policy 2013-2020: "Going forward, there is a need to actively involve women as a target group when introducing other forms of energy sources for cooking."

**Table 24: Gender-aware Energy Policy Framework – Gender Disaggregation**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| Does the policy refer to sex-disaggregated statistics on energy use by men, women and children? | No | No | No | No | No | No |

### Recognition of Women's Roles and Their Energy Needs

This indicator aims to assess if the policy framework considers women's role in society and how this relates to their practical and strategic energy needs. What emerged from this analysis was that most policy frameworks refer to the clean cooking needs as a practical need for women's empowerment, health and well-being. Fiji, Solomon Islands, Kiribati and RMI have established targets for reducing the use of solid fuel as a main cooking fuel. The absence of such a target is justified in Tuvalu because the widespread use of LPG for cooking, but less so in Samoa where more than half of the population cook over open fire. Samoa's policy framework is the only one that depicts the triple role of women in society but unfortunately has failed to announce concrete measures to address women's energy needs.

**Table 25: Gender-aware Energy Policy Framework – Women's Role and Energy Needs**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| Does the policy address both women's practical and strategic needs related to energy? | Only practical | Only practical | No | No | Only practical | Only practical |
| Does the policy try to reduce women's time poverty linked to energy needs? | No | No | No | No | Yes | No |
| Does the policy consider the triple role of women in society namely the productive, reproductive and community role? | No | No | Yes | No | No | No |
| Does it consider the energy needs associated with each of these roles? | Partly | Partly | No | No | Partly | Partly |

### Integrated Energy Planning Approach

Integrated energy planning is an approach that addresses many deficiencies of conventional power planning, such as underestimation or overestimation of demand requirements, a lack of consideration for all supply-side and demand-side options as well as social and environmental costs of energy generation. The results showed that energy policies in the Pacific focus on supply-side and technology-centric approaches and that little attention is paid to the demand-side user perspectives. The countries would benefit from the conducting of demand assessment as a crucial starting point for ensuring that their energy investments provide cost-effective solutions to their citizens' energy needs.

**Table 26: Gender-aware Energy Policy Framework – the Integrated Energy Planning Approach**

| Criteria | Melanesia | | Polynesia | | Micronesia | |
|---|---|---|---|---|---|---|
| | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| Does it use a demand-driven approach towards energy planning? | No | No | No | No | No | No |
| Does the policy recognize that energy has multidisciplinary (political, social, economic and environmental) aspects? | Yes | Yes | Yes | Partly | Partly | Yes |

Section 4.2.3 aimed to identify the standards for establishing whether people have access to energy and whether these standards address women's energy needs. The comprehensive assessment of the national energy framework showed that none of the countries has defined the minimum level of service that is qualified as "electrification" (including the types of appliances that may be supported by a power supply system's capacity). The implicit definition of electricity access proposed in all the energy policy frameworks features a binary electrification analysis: namely whether an end-user is connected to the grid, to a mini-grid or to a stand-alone power supply system. In Fiji, Solomon Islands, Kiribati and RMI, the definition is complemented by access to clean cooking options, such as LPG and efficient cookstoves. However, more details are lacking about the types and minimum standards for efficient cookstoves (as discussed in Section 4.2.1) as well as quantified long-term benefits for women.

Furthermore, most of the energy access definitions focus on households' access, overlooking the productive uses of energy and energy for community services. This household-centric vision of energy was also observed in the interviews with energy stakeholders in all countries.[155] A truncated definition of energy is not aligned with the international framework for defining energy access (as mentioned in Section 4.2.1) and limits the socio-economic development benefits associated with access to clean and modern energy, especially for women and other vulnerable groups.

[155] Econoler-IUCN (2020), Field Data Collection.

## 4.3 Culture and Values Prevent Women from Joining Male-dominated Fields

Conservative gender stereotypes related to personal development and professions seem to be strongly ingrained in the Pacific society. Family culture and values were mentioned as a conveyor of stereotypes and a strong influence on what youth choose as university programs or professions. Parents and relatives often discourage youth from becoming entrepreneurs or women from pursuing male-dominated careers. Girls still think that engineering is a men's field, which is too difficult for them. This factor, other structural challenges (as discussed in Section 2.3), early pregnancies and a lack of role models explain women's low proportion among the students studying STEM.

> "Solomon Islanders see jobs in the energy sector and entrepreneurship as a 'big men thing' and don't dare doing it"
>
> Harry James, President, Honiara Youth Council

### 4.3.1 Women's Low Proportion among Students Studying STEM

Table 27 below shows the sex-disaggregated university enrollment data. This table shows that female students only make up around 20% of all the university students enrolled in STEM programs and are virtually absent from technical and vocational education and training (TVET) programs related to energy (except for some programs at the Kiribati Institute of Technology). This proportion is unsurprising given that it is aligned on global averages. In most Pacific universities, however, when considering all programs, there are more female than male graduates, or the numbers are even.

**Table 27: Sex-disaggregated Enrollment Data in STEM and TVET Energy Programs[156]**

| Education Institution | Program/Course Title | Number of Students | |
|---|---|---|---|
| | | Male | Female |
| **STEM University Programs (2019)** | | | |
| Fiji National University (FNU) | **College of Engineering, Science and Technology - Total all programs** | **79%** | **21%** |
| | *Sample of technical programs related to energy:* | | |
| | Bachelor of Engineering (Electrical & Renewable Energy) | 100% | 0% |
| | Bachelor of Engineering (Electrical Engineering) | 89% | 11% |
| | Bachelor of Engineering (Mechanical Engineering) | 90% | 10% |
| | Advanced Diploma in Engineering (Electrical & Electronics) | 83% | 17% |
| | Trade Diploma in Electrical Engineering (Electrical and Renewable Energy) | 100% | 0% |
| | Trade Diploma in Electrical Engineering | 100% | 0% |
| University of South Pacific (USP) | **Science and Technology Programs[157]** | **80%** | **20%** |
| | *Sample of technical programs related to energy:* | | |
| | Bachelor of Engineering (Electrical Engineering) | 90% | 10% |
| | Bachelor of Engineering (Mechanical Engineering) | 92% | 8% |
| **TVET Energy Programs** | | | |
| College of Marshall Islands (Ebeye)[158] | Solar Photovoltaic Training: 2-week program/3-month internship with the electricity utility (vocational training) | 100% | 0% |
| Australia Pacific Training Coalition (APTC)[159] | Certificate III in Electrotechnology Electrician | 96% | 4% |
| | Certificate III in Air-conditioning and Refrigeration | 97% | 3% |
| Kiribati Institute of Technology (KIT) | Certificate II in Automotive Servicing Technology | 95% | 5% |
| | Certificate II in Electrotechnology (career start) | 67% | 32% |
| | Certificate II in Sustainable Energy | 76% | 23% |

By asking the question “What programs do women enroll in?”, we wanted to make a more in-depth assessment. The data shown in Table 28 below provides an insight of Pacific women’s interests and career aspirations.

[156] Communication with the administration of education and training institutions. February 2020.
[157] Programs include engineering, chemistry and marine science.
[158] Data throughout program lifetime.
[159] Data are from 2007-2019

## Table 28: Programs with High Female Enrollment

| Education Institution | Program/Course Title | Number of Students | |
|---|---|---|---|
| | | Male | Female |
| FNU | **College of Engineering, Science and Technology - All programs** | **79%** | **21%** |
| | Bachelor of Science - Biology and Chemistry | 28% | 72% |
| | Bachelor of Science - Environmental Management | 22% | 78% |
| | Bachelor of Science - Environmental Science | 20% | 80% |
| | Bachelor of Science - Food Technology | 12% | 88% |
| | Bachelor of Science - Food Technology and Chemistry | 13% | 87% |
| | Certificate III in Agricultural Engineering | 53% | 47% |
| | Diploma in Engineering (Agricultural) | 50% | 50% |
| | Higher Education Diploma in Environmental Science | 0% | 100% |
| | Higher Education Diploma in Food Technology | 0% | 100% |
| | Postgraduate Diploma in Environmental Conservation & Climate Change | 17% | 83% |
| | Trade Diploma in Occupational Health and Safety | 45% | 55% |
| | **College of Agriculture, Fisheries and Forestry – All Programs** | **43%** | **57%** |
| | Bachelor of Science in Agriculture | 43% | 57% |
| | Bachelor of Science in Fisheries | 38% | 62% |
| | Bachelor of Science in Forestry | 42% | 58% |
| | Bachelor of Veterinary Science & Animal Husbandry | 44% | 56% |
| | Trade Diploma in Agriculture | 47% | 53% |
| | Trade Diploma in Animal Husbandry | 36% | 64% |
| | Trade Diploma in Applied Fisheries | 33% | 67% |
| | Trade Diploma in Forestry | 44% | 56% |
| USP | **Faculty of Science, Technology and Environment** | **57%** | **43%** |
| | Bachelor of Arts (Environmental Management) | 38% | 62% |
| | Bachelor of Agriculture | 49% | 51% |
| | Bachelor of Science (Marine Sciences) | 44% | 56% |
| | Bachelor of Science (Environmental Sciences) | 29% | 71% |
| | Master of Science in Chemistry | 35% | 65% |
| | Master of Science in Climate Change | 49% | 51% |
| | Postgraduate Diploma in Climate Change | 35% | 65% |

Remarkably, although women represent only a small proportion of the total students enrolled in traditional STEM programs (chemistry, physics, biology, geology, engineering, and mathematics), they make up more than half the students in disciplines such as food technology, chemistry, environment, climate change, agriculture, fisheries and forestry. These are all disciplines that are currently overlooked in the Pacific energy sector, yet they would be highly valuable to redefine energy access according to international standards and add the missing segments of maintenance and decommissioning into the clean energy value chain.

### Evolution of Female Representation in STEM Programs

The governments and the civil society have tried to encourage women to take up male-dominated vocations by providing them with scholarships. Yet, USP's enrollment data shows that the proportion of women in traditional STEM fields has steadily decreased over the past five years (Figure 6).

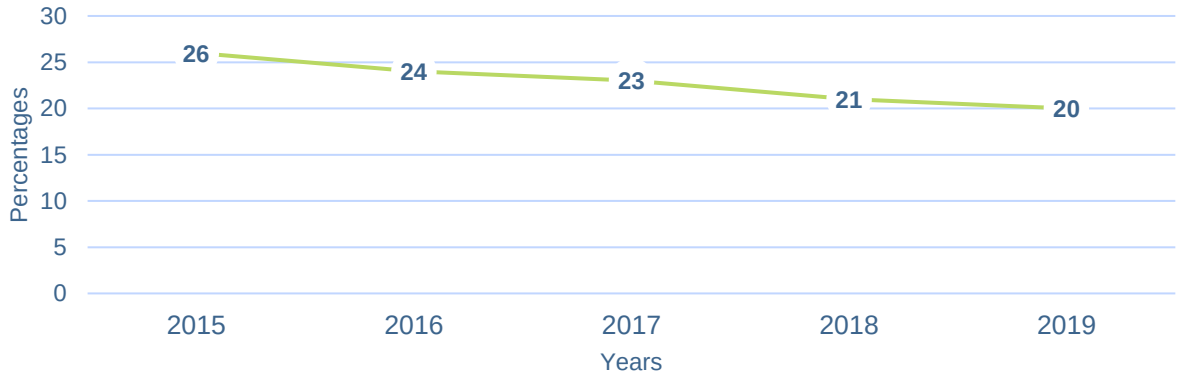



**Figure 6: Evolution of the Proportion of Female Students in Traditional STEM Programs at USP over the Past 5 Years**

The Pacific region is not alone in facing the challenge of having a small number of women choosing to study in traditional STEM programs. Most of developed and developing countries are facing this issue and have ended up having a lack of gender diversity in their energy workforce. Awareness-raising efforts and incentives should still be deployed to encourage women to follow traditional STEM career paths. What is even more important is to address energy as an integrated sector cutting cross all development sectors including poverty alleviation, food and water security, health and sustainable socio-economic development. Clean energy deployment in the Pacific also needs to be urgently assessed from the perspective of climate change to limit its environmental impacts (most urgently, the disposal of e-waste). All these issues go beyond the knowledge and capacity of engineers, and hence there is the need to expand the disciplines included in the energy sector. The Pacific countries would thus not only ensure that their transition to clean energy is more resilient, environment-friendly and aligned with socio-economic development targets, but also involve more women in their workforce.

> "The more women will study in the technical field, the more we will deepen the field of knowledge."
>
> Engineer, Department of Energy, Fiji

## 4.4 Existing Clean Energy Initiatives Have Had Limited Success in Involving Women

Table 29 below provides an overview of the types of clean energy initiatives that are currently being implemented or were recently implemented in the targeted countries. For each project category, the total number of projects in the region is shown and the targeted countries identified. Note that several projects are multi-country initiatives. A detailed project table which includes the title, the funding agencies, a short description of the project and its implementation status is provided in Appendix IV. The project mapping shows that out of the 46 projects, 22% have a focus on gender equality by promoting women's involvement in the energy sector (6 projects) or by increasing the penetration of efficient cookstoves (4 projects). Energy stakeholders are generally not involved in these types of projects, which are implemented by stakeholders such as the ministry of women and civil society. When considering the energy projects without a gender focus (projects in capacity-building, financial initiatives, on- and off-grid power supply and demand-side management), we noticed that 6 projects out of 36 have a gender component (16% of the projects).

**Table 29: Mapping of Clean Energy Projects and Programs in PICs**

| Category of Clean Energy Project | Total Number of Projects | Initiatives in PICs | | | | | |
|---|---|---|---|---|---|---|---|
| | | Fiji | Solomon Islands | Samoa | Tuvalu | Kiribati | RMI |
| Gender Equality in the Energy Sector/Green Economy | 6 | ● | ● | ● | ● | ● | ● |
| Efficient Cookstoves | 4 | ● | ● | | ● | ● | ● |
| Capacity-building and Reinforcing Institutional Structures | 5 | ● | ● | ● | ● | ● | ● |
| Financial Initiatives | 1 | ● | ● | | | | |
| On-grid Power Supply | 13 | ● | ● | ● | ● | ● | ● |
| Off-grid/Mini-grid Power Supply | 16 | ● | ● | ● | ● | ● | ● |
| Demand-side Management | 1 | | ● | | | | |

1 to 2 projects
3 to 5 projects
More than 5

When analyzing the off-grid initiatives, it was found that the three types of energy needs (households, productive use of energy and community services) are all addressed. Indeed, five projects involved promoting productive uses of energy, five promoted energy for community services and the rest focused on energy access for households. Projects addressing these two types of energy needs (PUE and community services) are usually the responsibility of non-energy stakeholders such as the ministries in charge of agriculture and rural development as well as local governments. Some findings and reflections on initiatives relevant to women's involvement in the clean-energy value chain and women's energy access are discussed in the subsections below.

### 4.4.1 The Barefoot College Initiative

The Barefoot College initiative also commonly known as the "solar grandmothers" is a flagship project focusing on women and solar energy and is widely known in the region. During the field visit, Econoler-IUCN learned about the program's results and gained insights by interviewing four women that graduated from the Barefoot College training in India (three from Fiji and one from Tuvalu). An interview was also conducted with a representative from the Barefoot College administration to complete the information collected from the field.[160]

#### Barefoot College Model

The Barefoot College promotes a self-sustaining community development model that has been implemented in many parts of the world including Asia, Africa and Latin America. The target constituency has been the rural poor families relying on candles and flashlight batteries for lighting. The training was designed for illiterate or semi-literate grandmothers who maintain strong roots in their rural villages and play a major role in community development. By training illiterate rural grandmothers to be fully competent solar engineers, the approach eliminates rural communities' dependence on urban technicians. After the training, the solar equipment is shipped to the graduates' villages to provide electrification of the houses in their communities. The financial approach of the Barefoot College is to have the communities pay every month between USD 5 to USD 10 (roughly what they would pay for kerosene or candles) for the use of solar lighting equipment. This money goes into a fund for purchasing replacement components and the monthly salary of the woman solar engineer.[161] This payment system is yet under revision by the College to have the households pay an installation fee and monthly payments for a duration of 12 months, after which they own the system and then pay only upon receiving maintenance services.[162]

Through the Women Prosper Initiative (established in 2018) and the Enriche Livelihood Development Program (established in 2016), the curriculum starts to cover additional topics such as: aspirations and agency, women's health financial literacy, digital literacy, sustainable living, entrepreneurship skills, micro-enterprise skills, etc.

[160] Econoler-IUCN (2020), Interview with Barefoot College Pacific Islands (BCPI), Melinda Lee Harvey, April 30.
[161] Barefoot College (2012), "The Barefoot College Approach". Retrieved from: https://www.barefootcollege.org/women-barefoot-solar-engineers-a-community-solution/
[162] Econoler-IUCN (2020), Interview with BCPI, loc cit.

### Barefoot College Solar Training to Pacific Women

In 2016, a group of 40 Pacific women from 10 different countries went to India to receive six months of solar engineering training at the Barefoot College in Tilonia, Rajasthan. These women were selected by the ministries in charge of women's affairs from rural communities with no electricity. The project's objective was to help women get into those male-dominated employment sectors. Following this training, on October 24, 2018, the Ministry of Women, Children and Poverty Alleviation and the Barefoot College of India signed a formal agreement to establish and operate a Regional Barefoot College in Vanua Levu, Fiji. The site has already been selected (the Naleba Youth Center) and there is a FJD 750,000 (USD 330,350) budget item for construction fees in Fiji's budget estimates 2019/2020. The Regional Barefoot College's curriculum will be expanded to include livelihood trainings such as beekeeping, tailoring and soap making.

During the 6-month training in India, the Pacific women learned how to assemble, install, maintain and repair solar electrification systems, mainly small home lighting systems and solar lanterns. The trainees learned how to repair the systems, from the solar panels to the battery (Figure 7).[163]


**Figure 7: Parts of a Solar System Covered by the Training (in Green)**

They also learn how to set up a rural electronic workshop in their village to store components for repair and maintenance. The women receive a weekly allowance during the training. The training does not provide diploma, certificate, or license as promoted by the Barefoot College philosophy.[164]

### Analysis of Program Design and Results

All women underlined how useful and hands-on the training content was for them. After six months, they gained solid skills in solar engineering and could install and repair small-scale solar systems. More importantly, the training boosted the women's self-confidence by providing them with new valuable skills and a professional purpose.

> "I dreamed of becoming a solar engineer and come back to Fiji so that my country can benefit from my skills."
>
> Siliva Vuki, Solar Grandmother, Fiji

Unfortunately, the program has yet to reach its full potential in enhancing the employment and economic opportunities of Pacific women in clean energy. The limited economic impact is linked to a variety of reasons including the following shortcomings:

[163] Econoler-IUCN (2020), Interviews with Barefoot College graduates (Fiji).
[164] The college describes itself as: "a place where NO degrees and certificates are given because in development there are no experts – only resource persons."

› First, the solar equipment has yet to be sent to the graduates' villages. The delay was due to a long and complex process for equipment funding and shipping. The Barefoot College administration nonetheless informed that the equipment reached two countries (Fiji and Papua New Guinea) in April 2020 and is planned to reach other Pacific countries later.

Two Barefoot College Graduates from Fiji: Losena Watiwere from Nabutubutu Village (above) and Mere Kaukau Turagavou, Nubu Village (below)

- Second, the skills they learned are not necessarily compatible with the level of electrification of their villages or the technology installed. The Barefoot College approach is designed for unelectrified communities (Tier 0 as per the Multi-tier Matrix for Measuring Household Access to Electricity Supply) (refer to Table 14 in Section 4.2.1) that would then reach Tier 1 or 2 with the input of the solar mamas. Since the training however some villages benefited from rural electrification program that made them access Tier 2 or higher. For example, in the communities visited in Fiji, all households had access to a larger AC SHS, and some were soon to be connected on the grid. The Barefoot College administration is currently developing a solar mini-grid system to adapt its program offer to higher levels of electrification.[165] It would be important to adapt the training content to the level of energy access, especially in countries with high electrification rates.
- Third, the informal training is not recognized by energy authorities (NEO, utilities and RE associations). Women are hence not allowed to perform maintenance work on larger AC SHS installed in their house and communities. They would require a license to perform this type of electrical work, which is mandatory in all countries (except RMI, where it is under development). Because of this lack of recognition, women cannot either maintain their own SHS systems, since the controller, the battery and the inverter are in a locked box[166]. Losena Watiwere, a Barefoot graduate from Fiji, asked if she could have a spare key, but this was denied by the installation company.

The fourth shortcoming is related to the Barefoot College's philosophy. The electrification model promoted by the college is indeed based on the assumption that women will stay in their communities and will not seek employment or become entrepreneurs (outside their communities) with the skills they acquired. This explains why the college does not deliver training certificates and why it does not train men. Bunker Roy, the founder of Barefoot College affirms:

> *First, we declared that men were untrainable. Men are restless, men are compulsively mobile, men are ambitious, and they all want a certificate to show for their efforts… And the second idea we'd practise was not to give out certificates. Because the moment you give a woman a certificate, like a man, she'll see it as a passport for leaving rural areas and going to urban areas to find a job.*[167]

[165] Econoler-IUCN (2020), Interview with BCPI, loc cit.
[166] This is a requirement under the rural electrification policy for Fiji and it is locked because of past experiences where households tamper with the system.
[167] Bunker Roy (2013), Acceptance Speech of the Clinton Global Citizen Award.

This philosophy has proved useful to provide decentralized maintenance services to rural communities and income generating activities to women in many parts of the world. It however limits the scope of how women can use their skills and discourages them from working outside their communities. In summary, the Barefoot College approach presents an excellent opportunity for women's engagement in the clean energy value chain. During the consultations, the Fiji DOE recognized the work accomplished by the Barefoot College and committed to provide them with technical support.[168] It is indeed critical that the government of Fiji and the Barefoot College assess these shortcomings to ensure that the regional training program is adapted to the Pacific context and aligned with national rural electrification initiatives. Efficient Cookstoves

Efficient cookstoves have been distributed in the Pacific region, including intermediate Improved Cooking Solutions (ICS) (Fiji, Kiribati and RMI) and LPG Cookstoves (Kiribati). There is also an initiative to develop household-use biodigester prototypes in Solomon Islands, Fiji and Tuvalu. The government agency in charge of energy is usually not involved in these programs. They are implemented by local or foreign NGOs, research centers and sometimes overseen by the ministry in charge of women's affairs or the ministry of rural development. Although small-scale and fragmented, these initiatives are welcomed, because they address issues that are otherwise overlooked by the energy stakeholders. Cookstove initiatives face multiple challenges:[169]

- ICS only have limited health and environmental benefits. Clean Cooking Solutions (CCS) bring higher benefits but are also more expensive (see Section 4.2.1).
- Effectively improving access to clean cooking requires a level of social and behavioral change that is difficult to achieve, and there is little evidence or data on behavioral change.
- Working with financial institutions to develop a clean cooking financing package to help working-class households to have access to efficient cooking.
- Gaining access to LPG does not necessarily stop people from cooking with charcoal or wood. Unless the providers of clean cooking fuels and technologies build long-term, reliable distribution networks and maintenance plans, there is always a risk that users will go back to unclean conventional cooking practices.
- Clean cooking solutions need to prioritize end-users' needs by continually taking feedback and improving cooking solutions to meet these needs.

[168] Consultations with Member States, Fiji Department of Energy, July 2020.
[169] SPC (2018), Cooking for Life Program (Kiribati, RMI, Tuvalu) and ESCAP (2019), Clean Cooking: Evidence and Innovations for Filling the Gap. November 7.
https://www.unescap.org/events/clean-cooking-evidence-and-innovations-filling-gap


Cooking Set with Rocket Stoves and Open Fire, Navukebuli village, Macuatu, Vanua Levu (Fiji)

The villages visited in Vanua Levu[170], Fiji, had benefited from the distribution of rocket stoves. Some households also had LPG stoves. It was observed that women used LPG to boil water and cook breakfast for the kids before school, but they prepared lunch and dinner over open fire because of the high cost of LPG. As for the efficient stoves, it appears that they are not often used. Some of the reasons mentioned by the women for not using the efficient cookstove are:

- Very heavy to carry around.
- Too low if set up on the ground, forcing women to bend to cook, but it cannot be set up on a table or a porch because it would burn them (all the households visited had a high fire pit allowing women to cook while standing).
- Too small to cook traditional meals (a problem also raised in RMI).
- Not hot enough (although this was disputed by other women).

The Consultant also met women that used the rocket stoves and were satisfied. It is therefore unclear whether they would warrant a redesign or simply need to be accompanied by increased awareness-raising on how and why to use them.

Another critical missing aspect of the efficient cookstoves programs is that these programs treat women as beneficiaries and not as stakeholders. As discussed later in Section 0, there is high potential of income-generating activities for women in the efficient cookstove value chain and this potential is still untapped in the Pacific region.

[170] Econoler-IUCN (2020), Site visits to Ravuka, Nabubu, Turagavou and Navukebuli villages, Vanua Levu, Fiji, February 19-20.

These observations underline the need for performing monitoring and evaluation of cookstove initiatives to improve understanding of what works and allow for adjusting and utilizing market assessments to learn about consumer behavior. Program evaluations and market assessments will also support the development of an evidence-based approach to move the debate from theoretical impacts to real impacts.

### 4.4.2 Clean Energy Projects with Gender Components

Of the 36 clean-energy initiatives, only 16% (6 projects) include a gender component. International donors have contributed to ongoing and recently completed initiatives (Table 30). Some of the shortcomings observed with gender components in donor-funded programs are summarized below.

**Table 30: Donor-funded Projects with Gender Components**

| Donors/Beneficiaries/ Status | Title | Gender component |
|---|---|---|
| UNDP-GEF / Samoa Trust Estates Corporation and MNRE<br>Ongoing (2019 - 2020) | Improving the Performance and Reliability of RE Power Systems in Samoa (IMPRESS) | The project will help strengthen and enhance the involvement of women in multiple areas, including designing and developing policy and regulatory frameworks, operating biomass production and gasification facilities, income generation, developing and implementing capacity-building and awareness-raising programs.[171] |
| ADB / Ministry of Mines, Energy and Rural Electrification and Solomon Power<br>Ongoing (2016 – 2021) | Solar Power Development Project in Solomon Islands | Gender Action Plan[172] promotes the mobilization of women in communities, assessment of employment and training opportunities, gender-mainstreaming training at Solomon Power, M&E of gender indicators, etc. |
| WBG / MMERE<br>Ongoing (2016 - 2023) | Electricity Access and Renewable Energy Expansion Project in Solomon Islands | The project will seek to address the gender imbalance in the energy sector, which currently employs a very small number of women, by providing, for instance, employment opportunities for rural women to maintain solar panels and sites.[173] |
| WBG / Tuvalu Electricity Corporation<br>Completed (2015 - 2019) | Energy Sector Development Project in Tuvalu | The project had a Gender Action Plan[174] that included the following activities: gender-mainstreaming training at TEC, behavioral change training in the community, encouraging women in decision-making roles in the energy sector, improving women's access to energy through partnerships, M&E of gender equality improvement in the energy sector. |
| ADB / Ministry of Public Utilities and Infrastructure<br>Ongoing (since 2018) | Increasing Access to Renewable Energy Project in Tuvalu | The project's Gender Action Plan[175] includes measures for consulting at least 50% of women for the infrastructure installation sites, increasing women staff at TEC by 20%, and providing training scholarships for up to two years for each of two Tuvalu women, etc. |
| EU GIZ ACSE / Ministry of Infrastructure and Transport<br>Completed (2016 – 2019) | Energy Hybrid Power Project in Fiji | The youth and women's groups' additional responsibilities will include basic maintenance of solar PV systems for which capacity-building was part of the project.[176] |

[171] UNDP-GEF (2016), Improving the Performance and Reliability of RE Power System in Samoa (IMPRESS), Project Document. Retrieved from: https://www.undp.org/content/dam/samoa/docs/UNDP_WS_ProDoc_Signed_IMPRESS_PIMS_%205669_Samoa.pdf
[172] ADB (2016), Solar Power Development Project: Gender Action Plan. Retrieved from: https://www.adb.org/projects/documents/sol-solar-power-development-gap
[173] WBG (2018), Renewable Energy for Nearly 10,000 Solomon Islanders, Press release, July 5. Retrieved from: https://www.worldbank.org/en/news/press-release/2018/07/05/renewable-energy-for-nearly-10000-solomon-islanders
[174] WBG (2014), Energy Sector Development Project – Project Document, December 30. Retrieved from: http://documents.worldbank.org/curated/en/519561468102907968/pdf/PAD6620PAD0P140010Box385398B0OUO090.pdf
[175] ADB (2019), Increasing Access to Renewable Energy Project: Gender Action Plan. Retrieved from: https://www.adb.org/projects/documents/tuv-49450-015-gap
[176] EU-GIZ (2015), "Energy Hybrid Power Project, Concept Note". Retrieved from: http://prdrse4all.spc.int/data/eu-giz-acse-fiji-energy-hybrid-power-project-concept-note-0

Some of the shortcomings observed with gender components in donor-funded programs are:

- The implementing partner (often the electricity utility or government agency in charge of energy) usually oversees the implementation of the gender component but they themselves have little gender-mainstreaming capacity (as discussed in Section 4.2.2).
- Gender-mainstreaming is generally based on hiring a local gender specialist, which is challenging because there is little local gender expertise in the Pacific countries.
- A common activity is to build gender-mainstreaming capacity among electricity utilities' staff, but this type of training is not backed by a gender-aware policy framework (as discussed in Section 4.2.3). Furthermore, periodic training can hardly lead to sustainable results.
- Assessing employment opportunities for women to maintain RE infrastructure and equipment is a common measure. It should be defined if women require a license to fulfill such a role and how can they generate revenues by fulfilling this role in a sustainable way. Also, community committees overseeing energy projects' O&M are sometimes required to be gender-balanced, but that it is not always possible given the customs and gender roles prevailing in rural areas. A challenge experienced by several projects is that men more often than women have previous technical education and village councils are usually predominantly composed of men.

These challenges can impede the implementation of gender activities in energy programs. For example, the ADB's Gender Action Plan for the Solar Power Development Project (2016-2021) required the hiring of a local gender expert at the onset of the program to train the electricity utility on gender-mainstreaming and how to perform a baseline social assessment and raise awareness among various stakeholders. As reported by SIEA[177], the Gender Specialist position was, however, only formally advertised in February 2019 and out of four candidates, three turned down the offer. The gender-mainstreaming training program has therefore been postponed ever since. In February 2019, the construction of the solar power plant began at least on one site but there was not, yet any gender expert involved in the project.

[177] SIEA (2019), "Solar Power Development Project: Environmental and Social Monitoring Report", Semi-annual Report. Retrieved from: https://www.adb.org/sites/default/files/project-documents/48346/48346-002-esmr-en_1.pdf

# CONCLUSION AND RECOMMENDATIONS

The gender-based assessment of the energy sector in six Pacific countries unveiled the prevalence of gender inequalities in the access to not only economic opportunities available in the clean energy value chain, but also in the access to clean energy technologies. In this context, it is essential to mainstream gender in the energy sector to ensure that women can reap the socio-economic benefits of the regions' green energy transition.

The objective of the Pacific Energy and Gender (PEG) network is to increase women's engagement in the energy employment market as entrepreneurs and professionals Employment in the energy sector is broken down in two value chains: (1) the upstream jobs that are in direct relation to the development of the EE/RE market and (2) the downstream jobs that arises from an improved energy access (in both quality and in quantity). When mapping the upstream clean energy value chain it however became obvious that women are underrepresented - or even absent - at every segment (planning, sales/distribution, installation, operation and maintenance/ decommissioning) and within all types of stakeholders (government, electricity utilities, energy companies and village committees). In the downstream jobs, women face a lack of access to productive use of energy that hinder the profitability of their income-generating activities.

The clean energy sector itself faces some weaknesses and gaps that impede its deployment. The weaknesses include a lack of qualified technical workforce, a weak and often ill-qualified private sector and deficient or absent segments (maintenance and decommissioning).

The causes of gender inequalities in the energy sector are diverse and numerous. First, Pacific countries being generally patriarchal societies, women face structural challenges to their socio-economic development, such as a discriminatory legal framework, gender-biased family and community values and customs, the difficulty of balancing productive and reproductive roles, the unfavorable business climate for females, the lack of access to resources and the ubiquity of gender-based violence.

Second, energy poverty is an acute reality for many Pacific women. Although a deficient energy access affects all Pacific citizens, it is a more acute reality for women given their higher energy consumption shaped by their reproductive role and their lack of knowledge and decision-making power to access energy solutions. This energy poverty is reinforced by the gender-blind energy policy framework and lack of gender mainstreaming among national stakeholders in charge of clean energy policy and programs development. A comprehensive assessment of the national energy framework of six countries showed that the implicit definition of electricity access features a binary electrification analysis: namely whether an end-user is connected to the grid, to a mini-grid or to a stand-alone power supply system. Furthermore, most of the energy access definitions focus on households' access, overlooking the productive uses of energy and energy for community services. A truncated definition of energy limits the socio-economic development benefits associated with access to clean and modern energy, especially for women.

Then, the existing and recent clean energy initiatives have had limited success in involving women in the clean energy value chain or addressing women's energy needs (e.g. for cooking). A project mapping indeed exposed that out of the 46 clean energy projects identified, 22% had a focus on gender equality by promoting women's involvement in the energy sector (6 projects) or by increasing the penetration of efficient cookstoves (4 projects). When considering the energy projects without a gender focus (projects in capacity-building, financial initiatives, on- and off-grid power supply and DSM), we noticed that only 6 projects out of 36 had a gender component (16% of the projects). The flagship initiatives addressing women and energy (such as the Barefoot College trainings and efficient cookstoves distribution programs) have high potential but proved to have deficiencies hindering their results and would require reevaluation and redesign. Rethinking the Barefoot College approach to align it with existing rural electrification initiatives is an urgent matter given the impending establishment of a Pacific Barefoot College in Fiji.

The following sub-sections first propose priority interventions for addressing the challenges identified in the previous section. Secondly, they recommend actions to implement the priority interventions. Thirdly, they suggest a high-level scope of intervention for the PEGSAP. Note that many recommendations target both women and youth. Indeed, the field mission[178] showed that Pacific youth, on one hand, are disenfranchised and overrepresented in the unemployed population and, on the other hand, are aware of the gendered energy poverty, innovative and solution-oriented. It was beyond the scope of this assignment to perform a detailed youth-focused assessment. However, the field information collected showed that youth also face the structural challenges to economic empowerment (Section 2.3) and the challenges to their inclusion in the clean energy value chain (Section 4). Young entrepreneurs, for example, have an important role to play as allies for the PEGSAP implementation, helping ensure the sustainability of its results. The recommendations made here are oriented towards women's inclusion and empowerment, but discussions are also made about the recommendations' relevance to youth, where necessary and appropriate.

## Priority Interventions of the PEG Network

The priority interventions of the PEG network are two-pronged. First Pacific countries need to adopt energy policy frameworks that promote a gender-responsive definition of energy access tailored to the Pacific region. Second, the PEG Network need to focus on the main entry points to increase women's engagement in the clean energy value chain. Both interventions are further detailed below.

[178] Econoler-IUCN (2020), Interviews with Graduate Women in Fiji, USP (Fiji and RMI Capuses), FNU, Honiara Youth Council, YECSI, KIT.

## Proposing a Gender-responsive Definition of Energy Access for the Pacific Region

As demonstrated in Section 4.2, the energy policy framework of Pacific countries is gender-blind and does not consider women's role in society or their practical and strategic energy needs. The definition of energy access being used is household-centric and technology-centric and overlooks the energy needs linked to economic activities and community services, which should have been considered as per international best practices (Section 4.2.1). A new definition of energy access tailored to the Pacific region is proposed in Table 31.

**Table 31: Criteria for a Gender-responsive Definition of Energy Access**

| Criteria | Supporting Measures |
|---|---|
| **Energy Needs** | |
| Energy needs of households | › Conducting gender-inclusive energy demand assessments.<br>› Defining a minimum level of energy service that supports women in their housekeeping role.<br>› Providing access to efficient cookstoves with a focus on CCS and exploring the potential for locally manufactured biodigesters. |
| Energy needs for income-generating activities | › Conducting gender-inclusive energy demand assessments in the agricultural, fisheries, forestry, manufacturing, and services sectors<br>› Provide access to productive use of energy (PUE) |
| Energy needs for community services | › Conducting gender-inclusive energy demand assessments.<br>› Identifying energy solutions for street lighting, water access, health centers, schools, etc. |
| Energy needs for transportation | › Conducting gender-inclusive energy demand assessments<br>› Promoting access to public transportation, especially for outer islands. |
| Energy needs to promote food security and water access and management | › Conducting gender-inclusive energy demand assessments.<br>› Addressing food security and water access and management in energy policies and programs. |
| **Characteristics of Energy Access** | |
| Affordability | › Progressive tariffs available for low-income households.<br>› Establishing financing mechanisms for purchasing PUE systems. |
| Reliability | › Identification of RE sources is based on climate change scenarios.<br>› Preference is for indigenous energy resources and material to improve energy security and resilience. Electricity infrastructure is disaster resilient.<br>› Maintenance services are decentralized and available; outer island communities have maintenance capacities. |
| Sustainability | › Clean energy sources are chosen and implemented based on circular-economy principles.<br>› Waste management strategies are implemented for batteries and other components. |

This definition could be promoted regionally by SPC as a tool for Pacific countries to adapt their energy policy frameworks. This is aligned with other regional-level best practices, such as the approach promoted by the Economic Community of West African States (ECOWAS).[179] Most importantly, communities should be consulted at the design phase of energy programs and policies and should have their say about the energy source (solar, bioenergy, wind, or hydro) and type of infrastructure to be deployed in their community (stand-alone systems, mini-grids, productive use of energy). It should, however, be considered that village governance generally does not include women and youth and that wider participation by individuals in decision-making at the village level is essential.[180] Women and youth should also be properly informed about the advantages and downsides of every technology.

## Focusing on the Entry Points to Increase Women's Participation in the Clean Energy Value Chain

This section identifies the main opportunities to increase the involvement of women in the clean energy value chain in income-generating roles. The potential roles and mechanisms for women's greater involvement are first presented in Table 32 below. They are categorized as either subsistence (to meet the survival needs; usually in the informal economy) or economic growth (salaried jobs or formal entrepreneurship). The subsistence mechanisms do not require much training and are mainly relevant to rural areas, whereas economic growth opportunities demand a higher level of education or training and are based in urban areas.

**Table 32: Roles and Mechanisms for Women's Involvement in Clean Energy**

| Subsistence | | Economic Growth | |
|---|---|---|---|
| **Community self-help groups (SHGs)** | **Micro-entrepreneurs** | **Small and medium-sized enterprises (SMEs)** | **Public servants** |
| A gathering of individuals at the village level on a regular basis as a means of aggregating resources and funds towards either individual or collective economic activities. In the Pacific, women's savings groups at the village level are a form of community self-help group. | Micro-entrepreneurs can distribute, maintain and repair energy equipment on a regular basis, in both rural and urban areas. Enterprises can be driven by necessity or by opportunities and usually are not registered. The Barefoot College uses a micro-enterprise approach. | SMEs are considerably different than micro-enterprises. They are generally registered, have functioning financial systems, have assets, are required to pay taxes and have employees. As previously mentioned in the report, there are few SMEs specialized in energy in the Pacific region. | Public servants are salary-earning employees at the ministry/department of energy, the electricity utility or another governmental agency in charge. |

[179] ECREEE (2016), ECOWAS Policy for Gender Mainstreaming in Energy Access. Retrieved from: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/ECOWAS_Policy_for_Gender_Mainstreaming_in_Energy_Access.pdf
[180] "Towards an Energy Secure Pacific: Implementation Plan for Energy Security in the Pacific [2011-2015]".

Table 33 to Table 35 depict the main roles where women have the potential of being involved in each segment of the upstream and downstream value chain. The range of potential has been defined by considering the following factors:

- The current involvement of women in each segment;
- Evidence of opportunities from international experience;[181]
- Existing structure enabling the involvement of women;
- If the opportunity is culturally safe for women;
- Findings and recommendations presented in this report.

The potential for including women in the upstream value chain is high for the distribution and maintenance of off-grid RE systems. This opportunity is driven by the strong need to establish decentralized maintenance services (see Section 3.2.3) and the future establishment of the Pacific Barefoot College, which promotes a micro-enterprise approach. Unless the Barefoot College approach is adapted to the Pacific energy sector (see Section 4.4.1), the potential for income-generating activities in the off-grid sector will remain untapped (micro-businesses and SMEs). In addition, there is a medium to high level of potential for young female graduates and women to act as public servants involved in the planning of energy policies and programs. This potential can be realized if the energy sector embraces a whole-sector approach and if social and environmental impacts of energy projects are considered, as per international best practices and regional recommendations.[182] Adopting a gender-responsive and socially inclusive definition of energy access (as proposed in Section 0) will also promote the involvement of experts from those disciplines that are popular among female students (such as sustainable development, environmental studies, climate change, food security, etc.). The opportunities for including women in the efficient cookstoves value chain are also very high in number but vary depending on the type of technology, as explained in Table 34.

[181] ENERGIA (2019), Women's Energy Entrepreneurship: A Guiding Framework and Systematic Literature Review.
[182] Framework for Action on Energy Security in the Pacific, 2010-2020. Implementation Plan for Energy Security in the Pacific, 2011-2015.

**Table 33: Potential for Including Women in the Upstream Energy Value Chain**

| Role/Mechanism | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Marketing, Sales and Distribution | Installation | O&M and Decommissioning |
| **RE On-grid** | | | | |
| Public servants | Medium-high | Medium-high | Medium-high | Medium-high |
| SMEs | | Medium-low | | |
| **RE Mini-grid** | | | | |
| Public servants | Medium-high | Medium-high | Medium-high | Medium-high |
| SMEs | | Medium-low | Low | Low |
| Community self-help groups | | Low | Low | Medium-low |
| **RE Off-grid (stand-alone residential and PUE)** | | | | |
| Public servants | Medium-high | Medium-high | Medium-high | Medium-high |
| SMEs | | Medium-low | Low | Low |
| Micro entrepreneurs | | High | Medium-high | High |
| Community self-help groups | | High | Medium-high | High |
| **Efficient Cookstoves** | | | | |
| Public servants | Medium-high | Medium-high | Medium-high | Medium-high |
| SMEs | Medium-high | Medium-high | Medium-high | Medium-high |
| Micro entrepreneurs | High | High | High | High |
| Community self-help groups | High | High | High | High |

High Potential
Medium-high Potential
Medium-low Potential
Low Potential
Actor not involved in the segment

For the efficient cookstove value chain, the potential for involving women varies according to the types of technologies (initially presented in Table 16 in Section 4.2.1). As shown in Table 34, the cooking technologies providing the greatest health and environmental benefits (the CCS) also provide fewer opportunities for women's involvement in their value chain, whereas those that provide lower health and environmental benefits (the ICS) present higher potential for women's involvement, especially in the sales segment. A notable exception, namely RE fuel stoves (such as biodigesters and solar box cookers), present high potential for the involvement of women throughout their value chain.

Including women as stakeholders (not just as beneficiaries) in efficient cookstove initiatives must be at the center of every program and policy. Women from rural communities should be involved at every step of the program design and implementation (selection of technology, design, manufacturing, sales, installation and after-sale services) and have access to upfront technical and entrepreneurship training. Promoting rural women as natural allies of cookstove initiatives will not only ensure the success and sustainability of efficient cooking initiatives, but also create income-generating activities for women.

**Table 34: Potential for Including Women in the Efficient Cookstove Value Chain**

| Role/Mechanism | Value Chain Segments | | | |
|---|---|---|---|---|
| | Manufacturing | Marketing, Sales and Distribution | Installation | Operation and Maintenance |
| **Improved Cooking Solutions** | | | | |
| Basic Portable ICS | Medium-high | High | High | High |
| Basic Chimney ICS | Medium-low | High | High | High |
| Intermediate ICS | Medium-low | High | High | High |
| **Clean Cooking Solutions** | | | | |
| Advanced Cookstoves | Medium-low | Medium-low | Medium-low | Medium-low |
| Modern Fuel Solutions | Low | Low | Low | Low |
| RE Fuel Stoves | High | High | High | High |

High Potential
Medium-high Potential
Medium-low Potential
Low Potential

The potential for including women in the downstream energy value chain is between medium-high and high. The downstream value chain shows greater potential than the upstream energy value chain because of the already high involvement of women in the agricultural and fisheries sectors. The best opportunity is for women to have increased access to RE technologies to move from subsistence to economic growth mechanisms. Table 35 shows the agriculture and fisheries value chain and demonstrate that women working at each segment would benefit from enhanced access to PUE.

**Table 35: Potential for Including Women in the Downstream Energy Value Chain**

| Role | Value Chain Segments (Agriculture and Fisheries) | | | |
|---|---|---|---|---|
| | Production | Processing and Storage | Distribution and transport | Retail Market |
| **Agriculture and Fisheries** | | | | |
| SMEs | Medium-high | Medium-high | Medium-high | Medium-high |
| Micro-entrepreneurs | High | High | High | High |
| Community self-help groups | High | High | High | High |

High Potential
Medium-high Potential
Medium-low Potential
Low Potential

This analysis exposed that the main entry points for women into the upstream clean energy value chain are: (1) as micro entrepreneurs and community self-help groups in the sales, distribution and maintenance of RE off-grid systems, (2) as micro entrepreneurs and community self-help groups in the efficient cookstoves value chain and (3) as public servants in the planning and implementation of energy policies, projects and programs. Women's potential involvement in the downstream clean energy value chain in the fisheries and agricultural sector is very high and could result in substantial business growth.

## Main Actions Recommended

The main actions recommended for the two priority interventions of the PEG Network are listed below.

### Gender-responsive Definition of Energy Access

- **Develop and adopt a regional policy** promoting gender-mainstreaming in energy access and energy security that addresses gender-related poverty through the following measures:
  - Promoting fair and equal access to modern energy services as a basic need.
  - Accelerating and harnessing different forms of energy (at the household, work and community level) that promote a gender-responsive definition of energy access as proposed in Section 0.
  - Harmonizing legislation and practices across the PICs with regards to gender equality and energy.
  - Promoting practices to enhance gender-mainstreaming capacity and knowledge in the energy sector.
- Assist the Pacific countries in developing, adopting and implementing **national gender-aware energy policy and regulatory frameworks**, including standards (e.g., for power-generating equipment), incentives (e.g., tax exemption and public procurement) and financial mechanisms to support the regional policy.

› **Enhance knowledge and capacity on gender and/or energy** among all stakeholders involved in clean-energy initiatives (governments, NGOs, the private sector and communities).

## Entry Points to Increase Women's Participation in the Clean Energy Value Chain

The recommendations for promoting women's involvement in the clean energy value chain through those roles with high to medium-high potential are presented below. The structural challenges to women's economic empowerment (Section 2.3) must also be considered and addressed as part of the PEGSAP.

### Women's Involvement in the Sales or Distribution and Maintenance of RE Off-grid Systems

› Develop and adopt national **standards for power-generating equipment** to ensure that the technologies introduced are resilient and follow the best standards for equipment maintenance and repair. National quality standards are critical to foster maintenance services as an income-generating activity, since they ensure that imported energy systems can be repaired.

› Perform comprehensive monitoring and evaluation (M&E) of training and education programs (including the Barefoot College initiative) to complement the findings of this study. **Apply necessary modifications to the training approach** and curriculum to adapt them to the Pacific technological and environmental context and national rural electrification plans. The following questions can be considered when moving forward with designing or adapting training programs:

- Does the practice of non-certification prevent women from performing electric work in their community? Does the non-certification provide benefits in the context of the Pacific or should it be adapted to reflect the reality on the ground?
- Can agreements with relevant energy authorities (NEO, utilities, SEIAPI) help recognize the barefoot training and increase the economic prospects of Barefoot graduates, especially in these countries with high electrification rates?
- Can the curriculum be adapted to the wide array of RE technologies available in the Pacific (from solar lamps to larger SHS compatible with AC appliances to solar desalination systems)?
- Can the training offerings be complemented by entrepreneurship skills for women to have the tools to start and grow their businesses?

› Provide **support to women and young entrepreneurs** through ongoing training (business management, financial literacy, and marketing skills), networking and market access, mobility, access to credit, gender-responsive procurement, etc.

› Increase awareness by advertising the potential of the energy sector as an income-generating activity for women. Promote the engagement of young women in STEM programs.

### Women's Involvement in the Efficient Cookstoves Value Chain

- Perform comprehensive **M&E of the existing efficient cookstoves programs**. Develop a set of regional data, best practices and recommendations for program development and implementation.
- **Include cookstoves in the national energy policies** (as proposed in the gender-responsive definition of energy access). Learn from those countries with existing policies as examples (such as the Kiribati Cooking for Life Strategy). Clearly publicize that women must be included as stakeholders or agents of change in clean cooking initiatives (not only as beneficiaries).
- Develop and adopt national **standards for efficient cookstoves considering their health and environment benefits and their potential to include women in the value chain.**
- **Conduct a demand assessment** on the most suitable cookstove technology in each community by considering the cost-effectiveness, households' needs, available cooking fuel (commercial and non-commercial), cooking options, and cooking needs for traditional meals. Map existing local initiatives and prototypes (with a good starting point being young entrepreneurs' groups and associations).
- Consider the opportunities to **create income-generating activities** for women throughout the value chain.
- **Involve women from rural communities** at every step of the program design and implementation (selection of technology, design, manufacturing, sales, installation and after-sale services).
- Provide **support to women and young entrepreneurs** through ongoing training (business management, financial literacy and marketing skills), networking and market access, mobility, access to credit, gender-responsive procurement, etc.
- **Raise awareness on health and environmental impacts** of low efficiency cooking stoves to enable households to make informed decisions.

### Women's Involvement in the Planning and Implementation or Energy Policies, Projects and Programs

- Adopt and implement a clear **whole-sector approach**, which means that energy must be mainstreamed in other development sectors (transport, agriculture, climate change, education, health, water access, etc.)[183] and that energy initiatives must consider social and environmental impacts of energy projects. This will contribute to attract young women studying in in disciplines such as food technology, chemistry, environment, climate change, agriculture, fisheries and forestry, which are currently overlooked in the Pacific energy sector

[183] "Towards an Energy Secure Pacific: Implementation Plan for Energy Security in the Pacific [2011-2015]". Retrieved from: http://prdrse4all.spc.int/system/files/energy_framework_implementation_plan.pdf

- **Expand the expertise to be involved in the clean-energy projects' and policies'** planning, implementation and monitoring and evaluation phases to attract more women studying in disciplines relevant the whole-sector approach to energy. For example, a preliminary rationale for the disciplines taught in the Pacific region's universities and their input to the energy sector is provided in Appendix V.
- Promote an **inclusive work environment** in the government agencies and electricity utilities by adopting gender-aware internal policies, procedures and work culture.
- Establish **mentoring programs and networks for women and girls** working on and studying energy-related topics and scholarship programs for women to enroll in engineering and energy-related topics.
- **Provide awareness-raising** on the clean-energy sector in universities and training institutions by targeting young women to attract them in these sectors.

### Women's involvement in the Downstream Clean Energy Value Chain

- Promoting gender-responsive energy access and a whole-sector approach to energy will help enhance women's participation in the downstream energy value chain.
- Provide **support to women entrepreneurs** through ongoing training (business management, financial literacy, and marketing skills), networking and market access, mobility, access to credit, gender-responsive procurement, etc.
- Focus on **business growth** for women to increase their experience and knowledge in the agricultural and fisheries sectors and move from subsistence to economic-growth mechanisms.

These findings and recommendations provide a structure for the PEGSAP. The measures should follow a multi-level implementation framework to enhance women's economic development to break the interventions down at four levels: (1) institutional, (2) service provides, (3) community and (4) individuals. The detailed scope of intervention and institutional structure will be discussed in the PEGSAP document. The detailed scope of interventions, their financial evaluation and a proposed regional and institutional structure for the PEG network will be further discussed in the PEGSAP document to be submitted to SPC in the second quarter of 2020.

# APPENDIX I
# GENDER-BASED ASSESSMENT – MISSION AGENDA

## Key Information and Participants

**Duration:** February 1st to 27th, 2020

**Countries visited** Fiji, Solomon Islands, Samoa, Tuvalu, Kiribati, Republic of Marshall Islands (RMI)

**Participants:**

| Name | Gender | Position | Countries | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Fiji | Solomon | Samoa | Tuvalu | Kiribati | RMI |
| Joëlle Matte | F | Project Coordinator / Gender and Energy Adviser | ● | ● | | | | ● |
| Jackelline Siles Calvo | F | International Gender Expert | ● | | ● | ● | ● | |
| Ifereimi Dau | M | Energy Adviser | | | | ● | | |
| Paula Katirewa | M | Energy Adviser | | | ● | | | |
| Seruwaia Qimaqima | F | Regional Gender Equality Expert | ● | ● | | | | |
| Fipe Tuitubou | F | Logistic support | ● | | | | | |

## Missions Detailed Agenda – Data Collection and Consultations

The agenda includes a detailed list of organisation and representatives met from all sectors (Council of Regional Organisations of the Pacific (CROP) Agencies, government bodies, private sector, civil society and international organisations). In total, 85 meetings were conducted, including 49 stakeholders consulted on the scope and institutional structure of the PEGSAP.

**Table 36: Mission Detailed Agenda – Data Collection and Consultations**

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 3rd | 9:30 am | SPC, Geoscience, Energy and Maritime (GEM) Division | Makereta Lomaloma, Team Leader Policy and Governance | F | | | Fiji, Suva |
| | 11:00 am | Soqosoqo Vakamarama Taukei (Women's Group) | Leba Halofaki, Member and Volunteer | F | | | |
| | 2:00 pm | UN Women | Aleta Moriaty, Expert on Women Economic Empowerment | F | | | |
| | 3:00 pm | Electricity Fiji Limited (EFL) | Karunesh Rao, Corporate Affairs and Communication Manager | M | | | |
| February 4th | 9:00 am | Department of Energy, Ministry of Infrastructure, Transport, Disaster Management and Meteorological Services (MoIT) | Jeke Pai, Biofuel Engineer, Sovaia Kakavou, Supervisor Higher Grade (Mechanical), Waisale Vulagi, Senior Scientific Officer - Rural Energy Development Program, Vishol Prasad, Senior Scientific Officer - Demand-Side Management. | 3 M<br>1 F | | | Fiji, Suva |
| | 10:30 am | International Finance Corporation (IFC) | Deva De Silva, Resident Representative for Fiji, Samoa, Tonga, Kiribati and Tuvalu | M | | | |
| | 12:00 pm | SPC, Social Development Program (SDP) | Joanne Lee Kunatuba, Gender Specialist | F | | | |
| | 3:00 pm | Asian Development Bank (ADB) | David Fay, Portfolio Administration Unit Head, Mairi Macrae, Social Development Specialist, S. Beatrice Olsson, Country Coordination Officer | 1 M<br>2 F | | | |

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 5th | 9:00 am | UN Capital Development Fund (UNCDF) | Krishnan Narasimhan, Deputy Program Manager, Praneel Pritesh, Financial Inclusion Specialist | 2 M | ■ | | Fiji, Suva |
| | 11:00 am | Fiji Women's Fund | Kuini Rabo, Program Officer | F | ■ | | |
| | 12:30 pm | Graduate Women in Fiji (GWF) | Maria Ronna Luna Pastorizo-Sekiguchi, President. | F | ■ | | |
| | 2:00 pm | Clay Energy | Bruce Clay, Director | M | ■ | | |
| | 3:30 pm | Pacific Power Association (PPA) | Andrew Daka, Director | M | ■ | ■ | |
| | 5:00 pm | Ministry of Women, Poverty and Culture Alleviation | Selai Korovusere, Director for Women, Mehrak Mehraz – Gender Adviser | 2 F | ■ | ■ | |
| February 6th | 9:30 am | The Pacific Community (SPC) | Akuila Tawake, Deputy Director for Georesources and Energy Program | M | ■ | ■ | Fiji, Suva |
| | 11:00 am | CBS Power Solutions Ltd | Amit Singh, General Manager | M | ■ | | |
| | 12:30 pm | Pacific Islands Private Sector Organization | Alisi Tuqa, Chief Executive Officer | F | ■ | ■ | |
| | 3:00 pm | UN Development Program | Emma Sale, Program Analyst, Resilience & Sustainable Development Unit | F | ■ | | |

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 7th | 8:30 am | Environmental and Energy Consultants, Ltd | Peter Johnston, Director | M | | | Fiji, Suva |
| | 10:00 am | SQ Consultants – Gender equality | Sivia Qoro, Director | F | | | |
| | 11:00 am | Global Green Growth Institute (GGGI) | Katerina Syngellakis, Pacific Regional Representative | F | | | |
| | 12:00 pm | Korea International Cooperation Agency (KOICA) | Jihi Kim, Country Director Fiji Office, Yeji Bak, Young Professional Fiji Office | 2 M | | | |
| | 3:00 pm | University of the South Pacific (USP) | Dr. Sereana Kubuabola and Professor Atul Raturi | 1 F/ 1 M | | | |
| February 10th | 10:00 am | Ministry of Mines, Energy and Rural Electrification | John Korinihona, Director of Energy | M | | | Solomon Islands, Honiara |
| | 11:00 am | Willies Electrical and Solar | David Iro, Director | M | | | |
| | 12:00 pm | Ministry of Women, Youth, Children and Family Affairs (MWYCFA) | Thomson Arai- Training Coordinator, Koisau Sade, EVAW Coordinator, Juliana Zutu, Safenet Coordinator, Cyrene Vai | 1 M 3 F | | | |
| | 2:00 pm | Solomon Islands Council of Women | Casper Fa'asala, Director | M | | | |
| | 4:00 pm | Solomon Islands Electricity Authority | Pradip Verma, Chief Executive Officer | M | | | |

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 10th | 9:00 am | Samoa Chamber of Commerce and Industry | Lemauga Hobart Vaai, Chief Executive Officer | | ■ | ■ | Samoa, Apia |
| | 11:00 am | Samoa Umbrella for Non-Governmental Organizations (SUNGO) | Fuimaono Vaitolo Ofoia, Chief Executive Officer, Atonio P. Mulipola | | ■ | ■ | |
| | 12:30 pm | Ministry of Natural Resources ad Environment (MNRE), Renewable Energy Division | Vanda Faasoa-Chan Ting, Acting Chief Executive Officer<br>Fefiloi Renate Kerstin, Principal Renewable Energy Officer | | ■ | ■ | |
| | 2:00 pm | Electric Power Corporation | Mau Simanu, Chief Engineer | | ■ | ■ | |
| February 11th | 9:30 am | Vois Blong Mere Women's Rights Movement | Lisa Horiwapu, Programs and Training Officer | F | ■ | ■ | Solomon Islands, Honiara |
| | 10:30 am | South Pacific Business Development (SPBD) micro finance | Ronald Singh, Chief Financial Officer | M | ■ | | |
| | 2:00 pm | Honiara Youth Council<br>Site visit to BIOGAS | Harry James-Youth Council President, Bobby Siarani-Council, Coordinator | M | ■ | ■ | |
| | 3:00 pm | Site Visit BIOGAS funded by OXFAM | Bobby Siarani, Project Manager | M | ■ | | |
| February 11th | 9:00 am | Ministry of Women, Community and Social Development | Afamasaga Fa'auiga Mulitalo, Chief Executive Officer | | ■ | ■ | Samoa, Apia |
| | 10:00 am | Ministry of Natural Resources and Environment-Forestry Division | Iau Afioga Moafanua, Acting CEO | | ■ | ■ | |
| | 12:00 pm | Ministry of Finance | Heremoni Suapai | | ■ | | |
| | 2:00 pm | Women in Business Development | Adimaimalaga Tafuan'I, Executive Director | | ■ | | |
| | 4:00 pm | Samoa Business Hub | Alafina Ivelu, Director | | ■ | ■ | |

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 12th | 10:30 am | Young Entrepreneurs Council Solomon Islands (YECSI) | Milicent Barty, Chair | F | ■ | ■ | Solomon Islands, Honiara |
| | 12:00 pm | Solomon Islands Women in Business | Pamela Zoleveke, President | F | ■ | | |
| | 2:30 pm | Solomon Islands Chamber of Commerce | John Kanai Ta'amora, Advocacy Officer | M | ■ | ■ | |
| February 12th | 10:00 am | Office of Regulator | Unutoa Fonoti, Chief Executive Officer | | ■ | ■ | Apia, Samoa |
| February 13th | 2:30 pm | Rural Women's Group, Focus Group Discussion | Malaita, Women in business<br>Mailata Provincial Council of Women (MPCW)<br>Women's caucus | 23 F | ■ | | Solomon Islands, Malaita Province |
| | 4:00 pm | Coastal Village Lilisiana, Site Visit | Village Women's Group | 5 F | ■ | | |
| February 13th | 10:00 am | Women in Fisheries | Marama Tuivuna, Network Co-ordinator | F | ■ | | Fiji, Suva |
| | 11:00 am | Pacific Islands Forum Secretariat (PIFS) | Taleki Tuinamuana, social policy officer and Melinia Nawadra, Social Inclusion Adviser | 2 F | ■ | ■ | |
| | 2:00 pm | Women Business Enterprises Council (WBEC) | Eseta Nadakuitavuki, Senior Manager Microfinance and Women's Market | F | ■ | ■ | |
| | 3:00 pm | GIZ | Christine Fung, Senior Technical Adviser | F | ■ | | |
| | 4:00 pm | SPC-GEM | Amelia Siga, Team Leader EU-PacTVET | F | ■ | | |

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 14th | 9:00 am | Odoo Agri-business Project, Site Visit | Falake village committee | - | | | Solomon Islands, Malaita Province |
| | 2:00 pm | Ministry of National Planning/ Development Coordination (MoNPDC) Rural Development Program | Johnwley Waneta, Deputy Team Leader | M | | | |
| | 3:00 pm | Provincial Government of Malaita, Youth Division | Frank Samo, Project Officer | M | | | |
| February 14th | 10:00 am | SPC | Andrew Thompson, Human Resources Manager | M | | | Fiji, Suva |
| | 11:00 am | SPC-GEM | Koin Etuati, SPC Energy Policy Officer | F | | | |
| February 16th | 2:00 pm | Soka Village, Site Visit | - | - | | | Solomon Islands, Central Province |
| February 17th | 11:00 am | Tuvalu Electricity Corporation | Mafalu Lotolua, General Manager | M | | | Tuvalu, Funafuti |
| February 18th | 10:00 am | Gender Affair Department | Asita Molotii, Director and Brigitte Leduc, GESI Advisors | 2 F | | | Tuvalu, Funafuti |
| | 2:00 pm | Department of Energy | Telesia Mua, Energy Project Officer | | | | |
| | 3:00 pm | Tuvalu National Council of Women | Mela Kuine, Director (also Barefoot College Graduate) | F | | | |
| | 4:00 pm | Tuvalu Association of Non-Governmental Organization (TANGO) | Teresa Lifuka-Drecala Director | F | | | |

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 19th | 10:00 am | Macuata Provincial Government Office | Makelesi Mate Raciri, Provincial Conservation Officer | F | | | Fiji, Vanua Levu |
| | 1:00 pm | Ravuka Village, Namuka District, Site Visit and Focus Group Discussion | Village Council | - | | | |
| | 3:00 pm | Nabubu Village, Namuka District, Site Visit and Focus Group Discussion | Village Council | - | | | |
| February 20th | 10:30 am | Nabutubutu Village, Nadogo District | Losena Watiwere, Graduate of Barefoot College | F | | | Fiji, Vanua Levu |
| | 11:30 am | Nubu Village, Nadogo District | Mere Kaukau Turagavou, Graduate of Barefoot College | F | | | |
| | 2:00 pm | Navukebuli Village, Nadogo District | Siliva Vuki, Graduate of Barefoot College | F | | | |
| February 24th | 9:30 am | College of Marshall Islands | Theresa Koroivulaono, Director | F | | | RMI, Majuro |
| February 24th | 10:00 am | Ministry of Infrastructure & Sustainable Energy | Ueaniti Kiritimati, Junior technical staff -Energy Planning Unit | | | | Tarawa, Kiribati |
| February 25th | 8:30 am | Women United Marshall Islands (WUTMI) | Daisy C. Heine, Director | F | | | RMI, Majuro |
| | 9:30 am | USP, RMI Campus | Irene Taafaki, Director | F | | | |
| | 12:00 pm | Single State Agency | Julia Alfred, Director | F | | | |

| Date/ time | | Organisation | Name and position | Gender | Meeting Scope | | Location |
|---|---|---|---|---|---|---|---|
| | | | | | Data Collection | Consultations | |
| February 25th | 9:30 am | Kiribati Climate Action Network (KiriCan) | Pelenise Alofa, President, Torote Kauongo, Board Member | | | | Kiribati, Tarawa |
| | 10:00 am | Ministry of Women, Youth and Social Affairs | Annemarie Kautu, Head of Women Development | | | | |
| | 11:00 am | Kiribati Institute of Technology (KIT) | Peter Langbien, Director | | | | |
| February 26th | 10:00 am | RMI Parliament | Hilda Heine, Senator, Former President of the RMI (2016-2019) | F | | | RMI, Majuro |
| | 12:00 pm | Marshall Islands Council of NGOs (MICNGOs) | Laitia Latama, Director | F | | | |
| | 2:00 pm | Majuro Energy Company (cancelled) | Kayo Yamaguchi-Koton | | | | |
| | 4:00 pm | National Energy Office | Angeline C. Heine, Director, Benjamin Wakefield, Deputy Director | 1 F<br>1 M | | | |
| February 26th | 10:00 am | Public Utility Board (PUB) | Kirita Tibwere, Human Resource Manager, Teitibwebwe, Kaberiera, Customer Service Manager | | | | Kiribati, Tarawa |
| | 12:00 pm | Ministry of Finance-Department of Statistic | Aritita Tekaieti Senior Statistician<br>Agnether Lemuelu Statistician | | | | |
| March 15th | 5:00 pm | IRENA Coordinator for the Pacific and former head of Nauru Utility Corporation | Apisake Soakai | F | | | Virtual meeting |
| March 31st | 5:00 pm | Secretariat of the Pacific Regional Environment Program (SPREP) | Audrey Brown Pereita, Executive Officer | F | | | |

# APPENDIX II
# PEGSAP CONSULTATION TOOLS

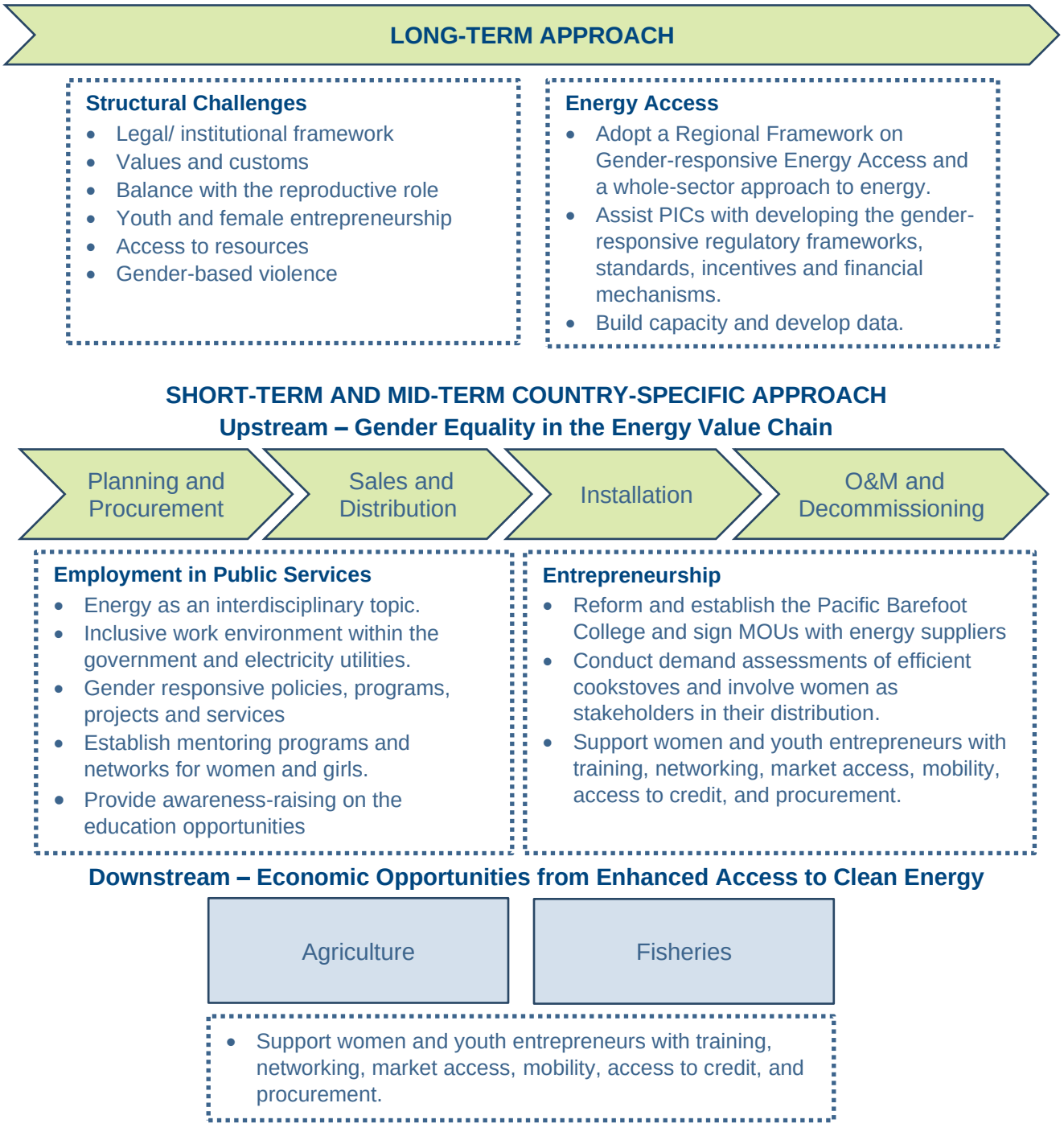



**Figure 8: PEGSAP – Proposed Areas of Intervention**

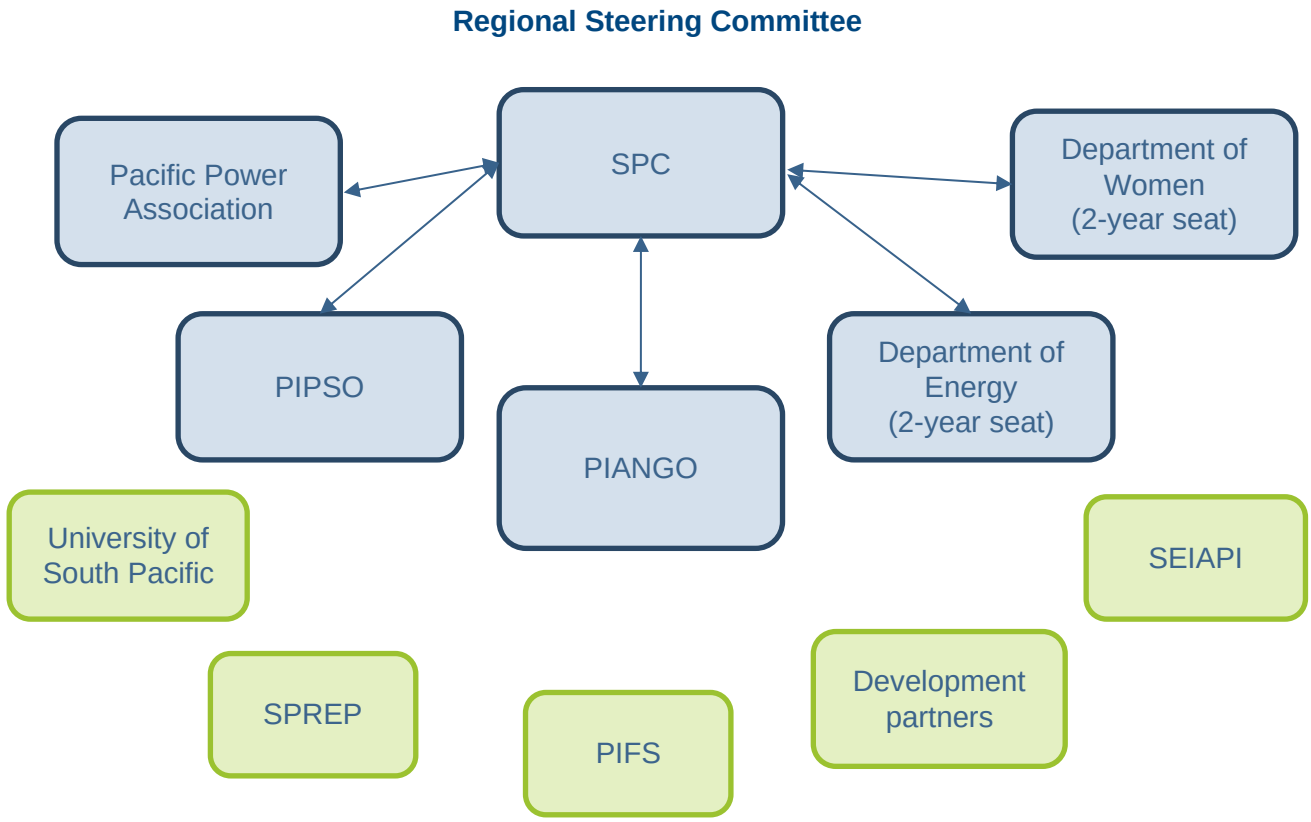



**Figure 9: Proposed Structure of the Regional Steering Committee**

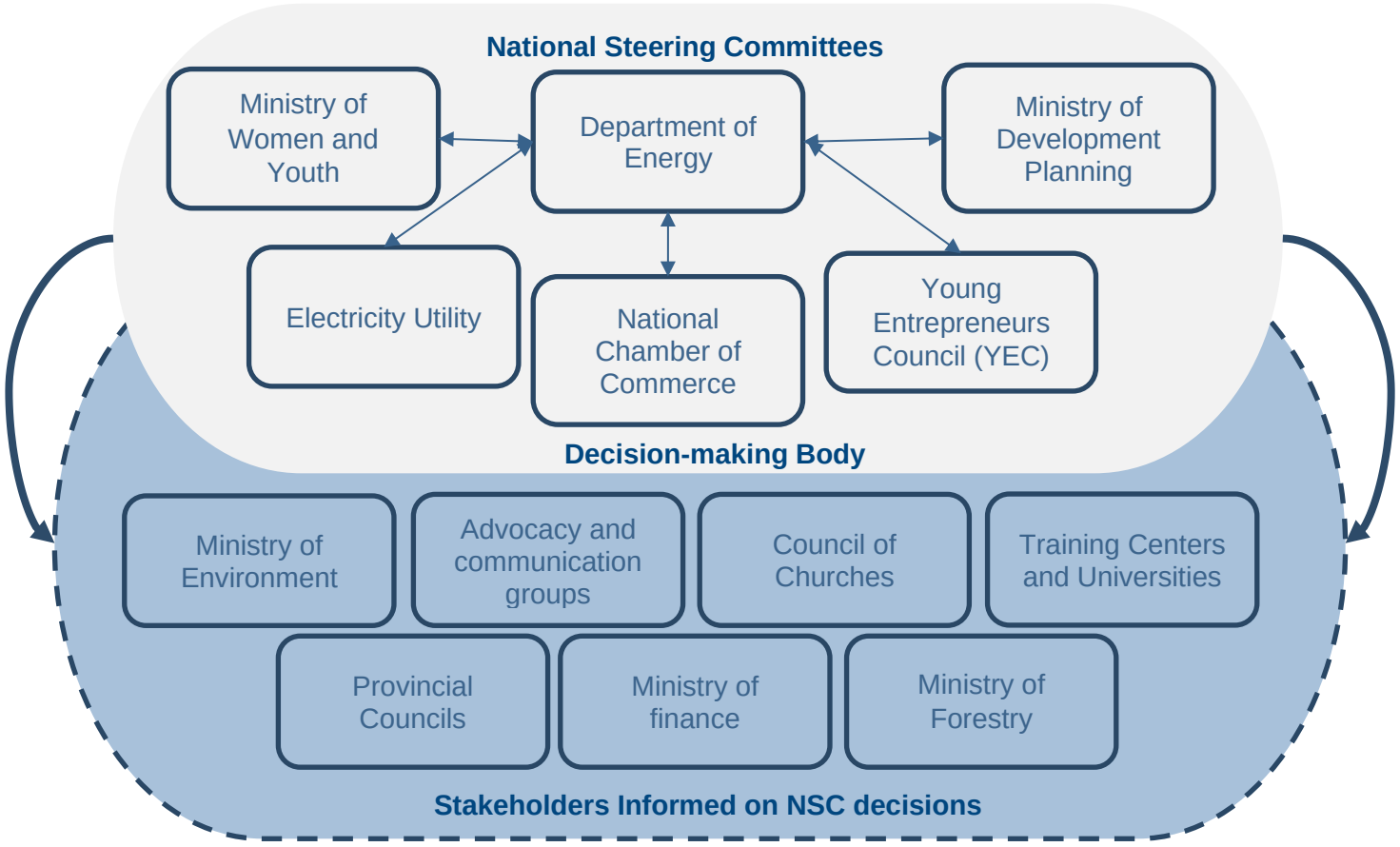



**Figure 10: Proposed Structure of the national steering committee (NSC)**

# APPENDIX III
# ENERGY PROFILES AND UPSTREAM ENERGY VALUE CHAINS

For each country, we present a summary table with relevant metrics on their energy situation. This is followed by an overview of the energy policy framework, main stakeholders in the electricity sector and a mapping of the upstream clean energy value chain. Most of the data was gathered through desk research. However, where possible, more accurate or up-to-date information was obtained during the field mission. Throughout this section, and later in the report, the term "national energy office" (NEO) is used to generally refer to the national governmental agency overseeing the development and implementation of clean energy policies and programs.

## REGIONAL POLICY FRAMEWORK

The policy and strategic documents composing the regional framework for sustainable energy in the Pacific region are the Framework for Action on Energy Security in the Pacific (FAESP 2010-2020), the Implementation Plan for Energy Security in the Pacific, the Pacific Roadmap for Sustainable Development

- the SIDS Accelerated Modalities of Action "SAMOA Pathway"[184] supports the efforts of PICs to (1) integrate a gender perspective in the priority areas for sustainable development, (2) strengthen women's economic empowerment and ensure equal access to full and productive employment and decent work and (3) give women equal rights with men to economic resources, including access to, ownership of and control over land and other forms of property, credit, inheritance, natural resources and appropriate new technologies.
- Framework for Resilient Development in the Pacific 2017-2030[185]: drafted by regional organisations and development partners, in consultation with PICTs is set of voluntary guidelines for the Pacific region to guide action at the sectoral level, including energy, to address the cross-cutting issues of climate change and disaster risk management. Gender equality is part of the recommended priority actions for low-carbon energy: "Ensure that all initiatives related to low-carbon development respond to country and community priority needs and opportunities in an equitable manner, including being gender responsive".

[184] "SIDS Accelerated Modalities of Action (SAMOA) Pathway", developed at the Third International Conference on Small Island Developing States (SIDS Conference) held on 1-4 September 2014 in Apia, and endorsed by the General Assembly of the United Nations on November 14, 2014 (A/RES/69/15). Retrieved from: https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/69/15&Lang=E

[185] SPC, SPREP, PIFS, UNDP, UNISDR and USP (2016) Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP): 2017–2030. Retrieved from: http://gsd.spc.int/frdp/assets/FRDP_2016_Resilient_Dev_pacific.pdf

- PICs engagement towards the UNFCCC and Paris agreements and the 2030 UN Agenda: In 2015, leaders of the PIF made an engagement to the full implementation of the 2030 Agenda and the Sustainable Development Goals (SDGs) and recognised that "very few countries made gains in achieving gender equality and the empowerment of women." They also called for an international climate change agreement applicable to all parties to recognise the disproportionate impact of climate change on women, youth, the elederly, disabled, indigenous peoples and other vulnerable groups and acknowledged "the crucial role women will play in a global solution to climate change and the importance of gender responsive outcomes that encourage full and equal participation of women in all climate change actions, decision-making processes and improved accessibility to financial resources."[186]
- The Pacific Roadmap for Sustainable Development 2015-2030[187] respond to the Pacific Leaders' directives for the 2030 UN Agenda and SDGs (see point above). It promotes a regional monitoring mechanism through which the Pacific will produce a four-yearly report on sustainable development consolidating reporting against the 2030 Agenda and the SDGs, SAMOA Pathway and the Framework for Pacific Regionalism including the Pacific Leaders Gender Equality Declaration to be submitted for consideration and endorsement by Forum Leaders.

The regional policy framework related to clean energy development is keen to underline the importance of promoting gender equality in sustainable development endeavors. It therefore provides a strong political foundation to the establishment of the PEG Network. The regional policy framework remains, however, vague in terms of the exact approaches and mechanisms that could be deployed to mainstream gender in the clean energy sector to promote equal access to energy resources and to enhance women's economic empowerment in the clean energy value chain. The PEGSAP will be essential for filling this void and providing SPC with a clear action plan for mainstreaming gender in the energy sector of the PICs.

# NATIONAL ENERGY PROFILES

## Fiji

Fiji depends heavily on imported petroleum products for transportation and electricity generation. With a population of just over 885,000, Fiji has a total installed power capacity in 2019 of 330 megawatts (MW), with 94% being operated by the main power company Energy Fiji Limited (EFL). Grid-connected electricity is supplied in four of the islands by EFL. Hydropower accounts for 55% of the electricity supply, making Fiji vulnerable to extreme weather events and climate change, which can often pose a challenge to the effort of developing clean reliable electricity.

[186] Pacific Islands Forum (2015) Communique of the Forty-Sixth Pacific Islands Forum, Port Moresby
[187] Pacific SDGs Taskforce, The Pacific Roadmap for Sustainable Development 2015-2030. Available online: https://www.forumsec.org/wp-content/uploads/2018/10/The-Pacific-Roadmap-for-Sustainable-Development.pdf

**Table 37: Fiji Energy Profile**

| Data and Indicators | Country Data |
|---|---|
| **General Country Data** | |
| Population (thousands) 2017 | 885 |
| Number of Islands | 332 |
| GDP per capita (current USD) 2017 | 5,639 |
| **Energy Data** | |
| Installed capacity and electricity production per capita (2016 est.) | 0.37 kW and 1,033 kWh per capita |
| Electrification rate (2020) | 99%[188]<br>100% target by 2021 |
| Share on-grid/off-grid (2020) | Grid: 93% / Off-grid: 7% |
| Main electricity generation sources (grid-connected) | Hydro (55%), Petroleum products (44%), Biomass, Solar and Wind (1%) |
| Main energy sources for cooking (2017)[189] | LPG (38%), Kerosene (24%)<br>Traditional biomass (19%)[190], Electric (15%), Others (4%) |
| Renewable Energy target | 100% for total electricity in 2030 |
| Electricity Tariff | Households: 0.14 USD per kWh[191]<br>Business: between 0.15 - 0.18 USD per kWh depending on the type of connection and the size of the business |
| **Legal Framework** | |
| Existing Feed-in Tariffs? | Yes (0.15 FJD (0.066 USD)/kWh in 2013)[192] |
| Existing IPP Procurement? | Yes (for solar,wind and biomass) |

## Energy-related Policy Framework

The main policy framework governing renewable energy is **the Final Draft of the Fiji National Energy Policy 2013-2020**. Supporting policy and plans include the **5-year and 20-year National Development Plan**[193], the **Rural Electrification Policy 2016**.[194] and the **Electricity Act of 1966**.

[188] Official data but includes community diesel and solar off-grid systems someof which are not functionning.
[189] Fiji Bureau of Statistics
[190] Official national data but probably underestimated since it hasn't been measures in decades.
[191] EFL (Accessed March 20, 2020) http://efl.com.fj/your-home/electricity-tariffs-and-rates/
[192] EFL is actively negotiating a FIT conducive to private-sector involvement as it was deemed too low to stimulate RE investments (National Energy Policy 2013-2020).
[193] "Transforming Fiji (2017): 5 Year and 20 Year National Development Plan https://www.fiji.gov.fj/getattachment/15b0ba03-825e-47f7-bf69-094ad33004dd/5-Year-20-Year-NATIONAL-DEVELOPMENT-PLAN.aspx
[194] Fiji Nationally Determined Contribution (NDC) (2019). https://www4.unfccc.int/sites/NAPC/Documents/Parties/National%20Adaptation%20Plan_Fiji.pdf

## Main Stakeholders Involved in the Upstream Clean Energy Value Chain

Table 38 presents the stakeholders involved in the upstream clean energy value chain by energy sources. The Department of Energy from the Ministry of Infrastructure, Transport, Disaster Management and Meteorological Services (MoIT) oversees the off-grid electrification strategy under its Rural Electrification Policy. The NEO was foreseen to become Fiji's central policy-making and planning entity for the energy sector, but this did not materialize and NEO remains largely focused on detailed implementation in specific areas such as rural electrification, rather than focusing on sector-wide planning and oversight.[195]

Fiji has an active RE private sector, which operates locally and regionally. The RE providers that install solar and wind equipment and operate in the country include Sunergise/Clay Energy, CBS Power Solutions, Powerlite Limited, and Vision Energy Solutions.

Two main weaknesses characterize the institutional and policy frameworks of Fiji's energy sector: (1) the limited coordination of the various public sector institutions with responsibilities in the energy sector and (2) the absence of an institution with overall responsibility for energy planning and policy development.

**Table 38: Stakeholders Involved in the Energy Value Chain – Fiji**

| Stakeholders | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Sales and Distribution | Installation | O&M and Decommissioning |
| **Hydroelectricity** | | | | |
| Electricity utility | ● | ● | ● | ● |
| Department of Energy | ● | ● | ● | |
| Foreign Companies | | | ● | |
| Communities (for small hydro) | | | ● | ● |
| **Solar (on-grid)** | | | | |
| Electricity utility | ● | ● | ● | ● |
| Local or Foreign Companies | | ● | ● | ● |
| **Solar (stand-alone systems)** | | | | |
| Department of Energy | ● | | | ● |
| Local Companies | ● | ● | ● | ● |
| Village Solar Committees | | | | ● |
| **Wind** | | | | |
| Electricity Utility | ● | ● | ● | ● |
| Foreign Company | | | ● | |

[195] Fiji National Energy Policy 2013-2020.

| Stakeholders | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Sales and Distribution | Installation | O&M and Decommissioning |
| **Efficient Cooking** | | | | |
| MWCPA | ● | | | |
| Foreign/Local NGO/company | | ● | ● | |
| System Owners | | | | ● |
| **Biofuel (Demonstration Project)** | | | | |
| Department of Energy | ● | ● | ● | ● |
| Community | | | | ● |
| **Biomass Waste Cogeneration** | | | | |
| Electricity Utility | ● | ● | | |
| Local Private Companies | | ● | ● | ● |

## Solomon Islands

Energy supply is particularly challenging in the Solomon Islands given its relatively small population scattered across more than 997 islands (of which only 97 are inhabited) spread across 1.3 million square kilometers. The Solomon Islands almost completely depends on imported diesel fuel for generating power. Approximately 80% of the generating capacity and 87% of all the energy generated come from diesel-fired facilities. As a result, households pay one of the highest prices in the world for electricity. Although the country has one of the largest populations in the Pacific region, the rate of access to electricity is among the lowest, with only 21% of its population connected to the grid. The total energy production is around 103 GWh (in 2016) with 38 MW in installed capacity. The following table gives an overview of the Solomon Islands' energy sector.

**Table 39: Solomon Islands Energy Profile**

| Data and Indicators | Country Data |
|---|---|
| **General Country Data** | |
| Population (thousands) 2017 | 670 |
| Number of Islands | 997 |
| GDP per capita (current USD) 2017 | 1,724 |
| **Energy Data** | |
| Installed capacity and electricity production per capita (2016 est.) | 0.06 kW and 154 kWh per capita |
| Electrification rate (2018) [196] | 45% |
| Share on-grid/off-grid (2016) [197] | Grid: 20% / Off-grid: 25% |
| Main electricity generation sources (grid-connected) | Diesel (87%), Solar (13%) |
| Main energy sources for cooking[198] | Biomass (wood) (89%), Others (11%) |
| RE target | 100% by 2030 (might be reevaluated to 90%) |
| Electricity Tariff (2019) | Households: Average of 0.71 USD per kWh[199]<br>Business: between 0.63 - 0.74 USD per kWh depending on the type of connection |
| **Legal and Institutional Framework** | |
| Existing Feed-in Tariffs? | Non-existent |
| Existing IPP Procurement? | None as of 2020, but the country plans to develop it.[200] |

## Energy-related Policy Framework

The **Solomon Islands National Energy Policy 2019-2030**, the **National Development Strategy** constitutes the country's energy-access strategy. The main policy framework will be the RE roadmap, which is to be finalized this year[201]. There is also the Electricity Act of 1969. In addition, the national electrification strategy and plan, the electricity tariff and the independent power producers (IPP) procedures are also under revision and preparation[202]. Other pieces of legislation relevant to this assignment include the solar standards (which are expected to be developed) for the import and disposal of PV modules and inverters.

[196] Solomon Islands National Energy Policy 2019-2020.
[197] Ibid.
[198] PRIF (2016), Pacific Infrastructure Performance Indicators.
[199] SIEA (Accessed March 15, 2020 http://solomonpower.com.sb/tariffs/archives/
[200] Econoler-IUCN (2020) Interview with SIEA, Solomon Islands.
[201] With support from Japan International Cooperation Agency or JICA, working with the MMERE and SIEA.
[202] With the support from the World Bank Group.

### Main Stakeholders Involved in the Upstream Clean Energy Value Chain

Table 40 presents the stakeholders involved in the upstream clean energy value chain by energy sources.The Energy Division of the Ministry of Mines, Energy and Rural Electrification (MMERE) is the government body in charge of managing the rural electrification program and energy policy-making. The SIEA is a state-owned utility in charge of supplying electric power to the islands. It mainly supplies Honiara, as well as eight provincial centers, namely Auki, Kirakira, Lata, Tulagi, Buala, Gizo, Malu'u and Noro in the Western Province.

**Table 40: Stakeholders Involved in the Energy Value Chain – Solomon Islands**

| Stakeholders | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Sales and Distribution | Installation | O&M and Decommissioning |
| **Hydroelectricity** | | | | |
| Electricity Utility | ● | ● | ● | ● |
| Department of Energy | ● | | | |
| Foreign Companies | | | ● | |
| Communities (for small hydro) | | | ● | ● |
| **Solar (Mini-grids)** | | | | |
| Electricity utility | ● | ● | ● | ● |
| Department of Energy | ● | ● | | |
| Foreign Companies | | | ● | ● |
| **Solar (Off-grid)** | | | | |
| Department of Energy | ● | ● | | |
| Ministry of Rural Development | ● | ● | | |
| Hardware and General Shops | | ● | | |
| System Owners | | | ● | ● |

## Samoa

Of the almost 200,000 Samoans, most live on two main islands, Savaii and Upolu. With a high electrification rate, almost 97% of the population have access to electricity, although power generation relies heavily on diesel. The national power company produces almost all the annual total of 132 GWh of electricity, with only 5% generated through solar IPPs (2016). The total installed grid-connected capacity is around 45 MW.

**Table 41: Samoa Energy Profile**

| Data and Indicators | Country Data |
|---|---|
| **General Country Data** | |
| Population (thousands) 2017 | 197 |
| Number of Islands | 2 plus adjacent small islets |
| GDP per capita (current USD) 2017 | 4,258 |
| **Energy Data** | |
| Installed capacity and electricity production per capita (2016 est.) | 0.23 kW and 670 kWh (per capita) |
| Electrification rate (2017) [203] | 96.8% |
| Share on-grid/off-grid[204] | Grid: 99%<br>Off-grid: 1% |
| Main electricity generation sources (grid-connected) [205] | Diesel (67%), Hydro (23%), Solar (8%), Wind (1%), Biomass (1%) |
| Main energy sources for cooking (2017) [206] | Open wood fire (54%), Electric (11.6%), LPG (10.5%), Other (24%) |
| RE target | 100% RE in the electricity sector by 2025 |
| Electricity Tariff[207] | Domestic: USD 0.24 - 0.29/kWh<br>Non-domestic: USD 0.29/kWh |
| **Legal and Institutional Framework** | |
| Existing Feed-in Tariffs? | Yes |
| Existing IPP Procurement? | Yes, 5% of energy is produced through IPP. |

## Energy-related Policy Framework

The key framework includes the **Energy Sector Plan 2017-2022**, the **Electricity Act of 2010** and the **Strategy for the Development of Samoa 2016-2020**.

[203] World Bank data.
[204] PRIF (2016), loc cit.
[205] ADB (2018), Pacific Energy Update. Retrieved from: https://www.adb.org/sites/default/files/institutional-document/425871/pacific-energy-update-2018.pdf
[206] Ibid.
[207] Notice of change in the tariff per unit of electricity due to multi-year tariff 2018-2021. http://prdrse4all.spc.int/sites/default/files/order_of_the_regulator_2019_e67_mar2019_eff_010319_social_media_epc.pdf

### Main Stakeholders Involved in the Upstream Clean Energy Value Chain

Table 42 presents the stakeholders involved in the upstream clean energy value chain by energy sources. The government agency in charge is the Renewable Energy Division of the Ministry of Natural Resources and Environment (MNRE). The Energy Policy Coordination and Management Division within the Ministry of Finance implements and monitors the Energy Sector Plan. Electricity supply is provided by the EPC, with IPPs supplying 5% of total energy from solar farms. The local companies involved as IPPs are Green Power Samoa and Sun Pacific Energy Limited.

**Table 42: Stakeholders Involved in the Energy Value Chain – Samoa**

| Stakeholders | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Sales and Distribution | Installation | O&M and Decommissioning |
| **Hydroelectricity** | | | | |
| Electricity Utility | ● | ● | ● | ● |
| Department of Energy | ● | | | |
| Foreign Companies | | | ● | |
| **Solar (On-grid)** | | | | |
| Electricity Utility | ● | ● | | |
| Local Companies | | | ● | ● |
| **Solar (Stand-alone Systems)** | | | | |
| Local Companies | | ● | ● | |
| System Owners | | | ● | ● |
| **Wind** | | | | |
| Electricity Utility | ● | ● | | ● |
| Foreign Companies | | | ● | |
| **Biomass Gasification Plant** | | | | |
| Department of Energy | ● | ● | ● | ● |

## Tuvalu

Tuvalu is a small atoll country with a high electrification rate but limited land for installing renewable energy projects. Advances in solar system designs and installation technologies, such as floating solar power plants and stacked designs, may help address this issue. The country with just over 11,000 inhabitants generates 12 GWh of electricity per year and has an installed capacity of 5.1 MW (2016). The following table gives an overview of the country's energy profile.

**Table 43: Tuvalu Energy Profile**

| Data and Indicators | Country Data |
|---|---|
| **General Country Data** | |
| Population (thousands) 2017 | 11.30 |
| Number of Islands | 9 atolls |
| GDP per capita (current USD) 2017 | 3,545 |
| **Energy Data** | |
| Installed capacity and electricity production per capita (2016 est.) | 0.45 kW and 1061 kWh (per capita) |
| Electrification rate[208] | 100% |
| Share on-grid/off-grid | On-grid: 100% |
| Main electricity generation sources (grid-connected) [209] | Diesel; solar with batteries |
| Main energy sources for cooking | LPG |
| RE target | 100% for total electricity in 2025 |
| Electricity Tariff[210] | USD 0.40 per kWh |
| **Legal and Institutional Framework** | |
| Existing Feed-in Tariffs? | None, but grid-connected systems feeding into the grid offset their electricity bill against their solar system production. |
| Existing IPP Procurement? | None |

## Energy-related Policy Framework

The Tuvalu **National Energy Policy 2009-2024** and the **National Climate Change Policy 2012-2021**, **Renewable Electricity and Energy Efficiency Master Plan 2012-2020**define current and future energy developments so that Tuvalu can achieve its RE penetration target. The country's power sector is regulated by the Laws of Tuvalu and the Tuvalu Electricity Corporation Act enacted in 1990.

## Main Stakeholders Involved in the Upstream Clean Energy Value Chain

Table 44 presents the stakeholders involved in the upstream clean energy value chain by energy sources. The energy sector is managed by the Department of Energy within the Ministry of Public Utilities and Infrastructure (MPUI). All the electricity is produced and distributed by the TEC. No private company is involved in the RE sector in Tuvalu. The private companies hired to install the solar infrastructure and equipment mostly come from Fiji.

[208] World Bank data.
[209] IRENA (2013), Pacific Lighthouses: Renewable energy opportunities and challenges in the Pacific Islands region.
[210] PRIF (2016), loc cit.

**Table 44: Stakeholders Involved in the Energy Value Chain – Tuvalu**

| Stakeholders | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Sales and Distribution | Installation | O&M and Decommissioning |
| **Solar (On-grid)** | | | | |
| Electricity Utility | ● | ● | ● | ● |
| Department of Energy | ● | ● | ● | ● |
| Foreign Companies | | ● | ● | |
| **Solar (Stand-alone Systems)** | | | | |
| Department of Energy | ● | ● | ● | ● |
| Local Companies | | ● | ● | |
| System Owners | | | ● | ● |
| **Biogas** | | | | |
| Department of Energy | ● | ● | ● | |
| System Owners (households, schools, etc.) | | | | ● |

## Kiribati

Kiribati consists of three archipelagos. Only 21 of the 33 islands are populated. As a remote small island state, Kiribati is highly dependent upon energy imports. The remoteness and wide dispersal of these islands leads to high energy costs that place a burden on local development. In 2016, the country produces around 29 GWh of electricity annually and has an installed capacity of 11 MW, mainly consisting of diesel-fired generation. As was reported in the Kiribati Integrated Energy Roadmap: 2017-2025, “The current fossil fuel-based power system is inadequate to meet future demand. Renewable energy is necessary to be deployed to improve environmental performance, increase energy access and reduce fossil fuel dependence”. This will require Kiribati to modernize its energy infrastructure and operational practices.

**Table 45: Kiribati Energy Profile**

| Data and Indicators | Country Data |
|---|---|
| **General Country Data** | |
| Population (thousands) 2017 | 113 |
| Number of Islands | 33 |
| GDP per capita (current USD) 2017 | 1,729 |
| **Energy Data** | |
| Electrification rate (2017) [211] | 98.6% |
| Installed capacity and electricity production per capita (2016 est.) | 0.10 kW and 256 kWh (per capita) |
| Share on-grid/off-grid (2017) | Grid: 70% / Off-grid: 30% |
| Main electricity generation sources (grid-connected) | Fossil fuels (73%) Solar: (27%) |
| Main energy sources for cooking (2017) [212] | Biomass (57%), Kerosene (38%), LPG (4%) Electric (1%) |
| RE target | 45% by 2025 (for Tarawa) |
| Electricity Tariff (2018) [213] | Households: 0.24 USD per kWh<br>Government and Industry: USD 0.42 per kWh<br>Commercial 0.33 USD per kWh |
| **Legal and Institutional Framework** | |
| Existing Feed-in Tariffs? | Yes |
| Existing IPP Procurement? | Yes (for solar and wind) |

## Energy-related Policy Framework

The main legislative and reference documents are the **National Energy Policy 2009**, the **Kiribati Integrated Energy Roadmap: 2017–2025** and the **Kiribati Cooking for Life Strategy (2014)**. The Energy Planning Unit (EPU) of the Ministry of Infrastructure and Sustainable Energy (MISE) is currently working on drafting a policy for rural electrification.[214]

[211] World Bank data.
[212] Ibid.
[213] Kiribati Integrated Energy Roadmap: 2017-2025, 2017, https://irena.org/publications/2017/Jul/Kiribati-Integrated-Energy-Roadmap
[214] Econoler-IUCN (2020), Interview with EPU, MISE, Kiribati.

### Main Stakeholders Involved in the Upstream Clean Energy Value Chain

Table 46 presents the stakeholders involved in the upstream clean energy value chain by energy sources. The EPU oversees the management of rural off-grid energy deployment and is the policy-making body. All generation assets and distribution infrastructure are owned and operated by the state-owned utility, the Public Utilities Board (PUB), which, according to the 1977 Public Utilities Ordinance, has a monopoly on electricity generation, transmission and distribution. Nonetheless, electricity supply is irregular across the islands, particularly in South Tarawa where independent generators, such as fish processing plants, maintain private diesel generators to ensure continuous electricity supply. If permitted by PUB, grid-connected PV plants can be connected to the grid.

In addition, there is the Kiribati Solar Energy Company (KSEC), a state-owned company, which also provides electricity generation using solar PV. KSEC leases off-grid solar units to households and medium-size systems for communities for a base deposit and a monthly fee. The involvement of the private sector is limited to private distributors of solar off-grid equipment (e.g., Triple Tee, Taotin Trading, Agiriin Enterprise, Goodlife Enterprise, Value City, and Slim Price). Kiribati is a very small economy that does not have a strong private sector involved in energy. Most of the private actors are hardware stores distributing RE off-grid technologies.

**Table 46: Stakeholders Involved in the Energy Value Chain – Kiribati**

| Stakeholders | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Sales and Distribution | Installation | O&M and Decommissioning |
| **Solar (On-grid)** | | | | |
| PUB | ● | ● | ● | ● |
| KSEC | ● | ● | ● | ● |
| **Solar (Stand-alone Systems)** | | | | |
| Department of Energy | ● | | ● | ● |
| KSEC | ● | ● | ● | ● |
| Local Companies (Hardware Stores) | | ● | | |
| System Owners | | | ● | ● |
| **Efficient Cooking** | | | | |
| Department of Energy | ● | ● | | |
| Foreign/Local NGO | | ● | ● | |
| System Owners | | | | ● |

## RMI

The Republic of Marshall Islands consists of 29 atolls and 5 isolated islands. It has a population of 55,000. The country has an installed capacity of 52 MW, mainly composed of diesel-fired power plants with a total annual production of 650 GWh (2016).

**Table 47: RMI Energy Profile**

| Data and Indicators | Country Data |
|---|---|
| **General Country Data** | |
| Population (thousands) 2017 | 55 |
| Number of Islands | 34 (5 islands, 29 atolls made up of an unknown number of islets) |
| GDP per capita (current USD) 2017 | 3,669 |
| **Energy Data** | |
| Installed capacity and electricity production per capita (2016 est.) | 0.95 kW and 11,800 kWh (per capita) |
| Electrification rate (2017) [215] | 94.8% |
| Share on-grid/off-grid (2016) [216] | Grid: 68% Off-grid: 32% |
| Main electricity generation sources (grid-connected) | Diesel: 99%, Other RE: 1% |
| Main energy sources for cooking (2017) [217] | Biomass, LPG main source on Majuro |
| RE target | 20% of electrical generation by RE in 2020[218]<br>100% RE by 2050[219] |
| Electricity Tariff (2015) | Households: USD 0.41 - 0.43 per kWh.<br>Commercial: USD 0.49 per kWh<br>Government: USD 0.50 per kWh |
| **Legal and Institutional Framework** | |
| Existing Feed-in Tariffs? | Non-existent[220] |
| Existing IPP Procurement? | None |

[215] World Bank data.
[216] PRIF (2016), loc cit.
[217] IRENA (2015), The Republic of Marshall Islands Renewables Readiness Assessment.
[218] Ibid.
[219] As committed under the Marrakech Partnership, Government of RMI (2018), Nationally Determined Contribution, November 22.
[220] The need to develop a feed-in-tariff policy is highlighted in the RMI NDC (2018).

## Energy-related Policy Framework

RMI's energy policy framework includes the **National Energy Policy and Action Plan (2016)**, the **RMI Electricity Roadmap (2018)** and the **RMI National Strategic Plan (2015-2017)**. No legislation designates authority or responsibilities to regulate renewable energy systems. Not even the national utilities have a legislative basis. There is no electric power act to define the authority and responsibilities of either Marshalls Energy Company (MEC) or the Kwajalein Atoll Joint Utilities Resources (KAJUR). The Energy Sector Management Act, which clarifies the powers and responsibilities among government agencies to streamline decarbonization policies across the energy sector, is currently under development.[221] The main obstacle that must be overcome is the absence of legislation related to the responsibilities and authority of the Energy Planning Division (EPD) of the Ministry of Resources and Development (MRD). Without such legislation, it is difficult to maintain a stable environment for renewable energy development in the RMI because government administrations change.

## Main Stakeholders Involved in the Upstream Clean Energy Value Chain

Table 48 presents the stakeholders involved in the upstream clean energy value chain by energy sources. The Marshall Islands' energy sector is led by the EDP. Although there has been an Energy Director since 2008, the EPD has been in existence only since 2018.The Energy Director spent the last 10 years collaborating with different national actors to establish the EPD, find resources and establish PPPs. Now, she hopes to dedicate her team's time and effort exclusively to energy access and clean energy development. The generation and sale of electricity is carried out by two state-owned utilities. First, the MEC supplies Majuro, Jaluit, and Wotje. Second, the KAJUR supplies the Kwajalein atoll and the Ebeye island. The rural electrification program is jointly managed by MEC and the EPD.

[221] Econoler-IUCN (2020), Interview with the EDP, Republic of Marshall Islands.

**Table 48: Stakeholders Involved in the Energy Value Chain – RMI**

| Stakeholders | Value Chain Segments | | | |
|---|---|---|---|---|
| | Planning and Procurement | Sales and Distribution | Installation | O&M and Decommissioning |
| **Solar (On-grid)** | | | | |
| MEC | ● | ● | ● | ● |
| KAJUR | ● | ● | ● | ● |
| **Solar (Stand-alone Systems)** | | | | |
| Department of Energy | ● | ● | ● | ● |
| MEC | ● | ● | ● | ● |
| Local Companies (Hardware Stores) | | ● | | |
| System Owners | | | ● | ● |
| **Efficient Cooking** | | | | |
| Department of Energy | ● | | | |
| Local NGOs | ● | ● | ● | |
| Foreign NGOs | ● | ● | ● | |
| System Owners | | | | ● |

# APPENDIX IV
# MAPPING CLEAN ENERGY INITIATIVES IN THE PACIFIC REGION

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| **Gender Equality and Social Inclusion in the Energy Sector/ Green Economy** | | | | |
| Ministry of women (Pacific Region) and Barefoot College of India | Solar electric engineering training for women | Pacific Island Countries | In 2016 a group of 40 Pacific women from 10 different countries went to India to undergo a six months Solar Engineering Training at the Barefoot College in Tilonia, Rajasthan. Women were selected from rural communities that are without electricity. The project objective was a way to promote women into those employment sectors that are male dominated. | Completed (2016) |
| Fiji Ministry of women, Children and Poverty Alleviation and Barefoot College of India | Establishment of a Regional Barefoot College for the Pacific | Based in Fiji but open to women from all the region | The Fijian Government and Barefoot College signed an agreement to build a regional center that will provide mastery of renewable energy technology coupled with a holistic approach to building technical maintenance skills of solar equipment for women, with little to no previous formal education. | Planned (agreement singed in 2018) |
| IFC, support from NZ and Australian Government / Solomon Islands Chamber of Commerce and Industry | Waka mere | Solomon Islands | Promoted female recruitment and leadership in the private sector with the 15 largest companies in the country, including Solomon Power (SIEA). Through this project, SIEA committed to: promote women in leadership, build respectful and supportive workplaces and increase opportunities for women in jobs traditionally held by men. | Completed (2019) |
| USAID / The University of the South Pacific | Vocational Training and Education for Clean Energy Program | Federated States of Micronesia, Fiji, Kiribati, RMI, Nauru, Palau, Papua New Guinea, Samoa, the Solomon Islands, Tonga, Tuvalu, and Vanuatu | Train local technicians to install and maintain rural solar power systems. VOCTEC's capacity building activities incorporate gender and social issues in solar PV related technical training as well as entrepreneurship skills in its vocational courses. The program ensures that local institutions can continue to educate and manage future operators and technicians within the region. VOCTEC's activities had an exceptionally high level of acceptance of gender inclusion by the trainees. | Completed (2013 – 2018) |

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| World Bank Group, Pacific Power Authority | PPA Gender Program | All Pacific Island Countries | With the support of the WBG, PPA established a gender portal and now collects sex-disaggregated human resource data to include in the annual utility benchmarking report. Mainly a marketing exercise, the program designated gender champions and made short videos. It is proposed that a PPA Women's Network be established to develop a centralized base for the education and training, outreach, policy and metric components | Ongoing (2018-2020) |
| South Pacific Business Development (SPBD) | Micro-enterprise development organizations in the South Pacific | Solomon Islands, Samoa | SPBD improves conditions for families living in poverty by providing accessible micro-credit, training, and guidance to help them start, grow and maintain micro-businesses, build assets, finance home improvements, and afford to educate their children. The objective is to create a network of micro-enterprise development organizations in the South Pacific and neighboring regions to empower women through financial access and economic development. One of their microfinance scheme is dedicated to fund small standalone solar systems. | Ongoing |
| **Efficient cookstoves** | | | | |
| The GEF Small Grants Program / Kio In Okrane Club | Kio smokeless stove per home initiative | RMI | Promote safe, improved smokeless stoves for women by providing biomass cook stoves to every single household by importing smokeless stoves and distributing them in all outer islands. | Completed (2013 – 2019) |
| Ministry of Women, Children and Poverty Alleviation | Fijian Rocket Stove | Fiji | The project's objective is to empower women in rural communities by training women in Mother's Club communities to build and use Green Rocket Stoves. The Ministry is also partnering with Kasabias Ltd to distribute cooking stoves in the rural and maritime communities. | Ongoing (since 2014) |
| CGIAR Research Program on Fish Agri-Food Systems | Improved cooking stoves | Solomon Islands | The use of improved cooking stoves can reduce mangrove degradation, gender norms that inhibit community-based resource management, and thereby provide a starting point for the conservation and rehabilitation of mangroves. | Ongoing (since 2018) |
| SPC / National DOE | Cooking for Life Program | Kiribati, Tuvalu, RMI | To promote and increase access to modern, cleaner and more affordable sources of energy for cooking. The use of fuel wood and kerosene for cooking is both an environmental problem in terms of the unsustainable cutting of trees and emissions and a health hazard to women and children mostly. | Completed (2014-2018) |

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| OXFAM, Honiara Youth Council | Small grant for pilot biodigester | Solomon Islands | Development of a biodigester prototype that creates methane from organic waste, such as meals leftovers. This would enable households to benefit from a daily supply of gas for cooking. It costs 900 SBD (110 USD) to build with materials locally available in Honiara. A team of high school students designed and built it and it would be easily replicable for the communities to build it themselves. | Ongoing (Since 2019) |
| **Capacity Building and Reinforcing Institutional Structures** | | | | |
| GIZ / Solomon Islands National University | Development of Accredited Technical Course Programs | Solomon Islands | Development of an Accredited Technical Course Programs for solar technicians and refrigeration and AC technicians at SINU and establishment of licensing system for the industry practitioners. | Completed (2015 – 2017) |
| World Bank Group, Pacific Power Association | Sustainable Energy Industry Development Project (SEIDP) | Fiji, Kiribati, PNG, Samoa, Solomon Islands, Tonga, Tuvalu, FSM, RMI, Palau, Nauru, Vanuatu. | The project aims to increase the data availability and capacity of power utilities in PICs, to enhance their ability to incorporate and manage renewable energy technologies and long-term disaster risk planning. It involves acquisition of modeling software and consultancy services for renewable energy integration and capacity building, development of industry guidelines and competency standards training/workshops. | Ongoing (2015-2020) |
| Ministry of Economy | 5-Year Development Plan | Fiji | Provide affordable, reliable, modern and sustainable energy services for all Fijians. As well as, increase the share of electricity generation from renewable energy resources and improve energy efficiency in the electricity sector.<br>Implement Green Growth Framework for Fiji. | Ongoing (2017 – 2021) |
| EU GIZ ACSE / Samoa Ministry of Finance - Energy Policy Coordination and Management Division | Samoa Energy Bill and the development and implementation of sustainable bioenergy | Samoa | The objectives are to: develop an Energy Bill providing the legal framework for sustainable use of diverse energy resources; enable environment in place to encourage private sector participation in energy investments; increase production and supply of biodiesel to feed the energy needs of the transport sector. | Completed (2016 – 2019) |

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| ADB / Samoa's Government | Power Sector Expansion Project | Samoa | The Project will improve the capacity of the power sector to meet growing electricity demand and improve quality, reliability, and cost-effectiveness of power supply by (i) improving the financial performance of EPC, (ii) supporting EPC's investment plan to meet growing demand, (iii) improving the operational efficiency of EPC, and (iv) establishing effective regulation of the power sector. | Completed (2008 – 2018) |
| **Financial Initiatives** | | | | |
| Global Environment Facility through the Word Bank | Sustainable Energy Finance Project | Fiji, PNG, Solomon islands | Establish a risk sharing fund to encourage financial institutions to lend money for renewable energy equipment like solar panels and hydro units, as well as energy efficiency measures. Participating banks include Fiji Development Bank, ANZ Fiji and Central Bank of the Solomon Islands (CBSI) | Completed (2007-2017) |
| **On-grid Electricity Supply** | | | | |
| KOACI / GGGI and Energy Fiji Ltd | Taveuni island solar | Fiji | GGGI is supporting the Government and working with Fiji's Ministry of Economy, the Fiji Electricity Authority (FEA), and the Department of Energy (DOE) to develop a 1.55MW solar PV project. The project is currently at his first phase. | Planned (2020) |
| ADB / Sun Pacific Energy Limited | Solar Power Development Project | Samoa | To expand existing 2.2 MW solar farm that has been in operation since April 2015. | Completed (2017 – 2018) |
| ADB / Samoan Government | Renewable Energy Development and Power Sector Rehabilitation Project | Samoa | The project will rehabilitate three small hydropower plants on Upolu and construct three new hydropower plants on Upolu and Savai'i. It will provide training to the Electric Power Corporation on operation and maintenance. | Ongoing (2012 – 2020) |
| ADB / Majuro Atoll Waste Company and JICA | Solid Waste Management in the Pacific | RMI | The ADB funded a prefeasibility study to assess the potential for investment in a waste-to-energy facility to dispose of Majuro's waste and produce electricity. The study found that the proposed investment was not financially feasible. | Completed (2010) |

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| GEF and UNDP / Samoa Trust Estates Corporation and MNRE | Improving the Performance and Reliability of RE Power Systems in Samoa (IMPRESS) | Samoa | The aim is to improve the performance and reliability of RE Power Systems in Samoa. The plant will consume the invasive merrimia vine to produce power. The plant is planned to be commissioned in April 2020. **Gender component:** The project will contribute to the strengthening and enhancement of the involvement of women in multiple areas, including design and development policy and regulatory frameworks, operation of biomass production and gasification facilities, income generation, development and implementation of capacity building and awareness programs.[222] | Ongoing (2019 - 2020) |
| ADB / Ministry of Mines, Energy and Rural Electrification and Solomon Power (executing agency)/ Solomon Island Electricity Authority (SIEA) (implementing Agency) | Solar Power Development Project | Solomon Islands | The aim is to convert electricity networks in five provinces almost entirely to solar power. The project will be the first solar power project in Solomon Islands to install battery storage. **Gender component**: It includes a Gender Action Plan[223] that promotes the mobilization of women in communities, assessment of employment and training opportunities, gender mainstreaming training at SIEA, M&E of gender indicators, etc. | Ongoing (2016 – 2021) |
| WBG / MMERE | Electricity Access and Renewable Energy Expansion Project | Solomon Islands | The project development objective is to increase access to grid-supplied electricity and increase renewable energy generation in Solomon Islands. Building on the Electricity and Expansion Project. The focus will be on providing electricity connections to households, small businesses, and community infrastructure such as schools and health centers, throughout Honiara and surrounding towns. **Gender component:** The project will seek to address the gender imbalance in the energy sector, which currently employs very few women, providing, for instance, employment opportunities for rural women to maintain solar panels and sites.[224] | Ongoing (2016 - 2023) |

[222] UNDP-GEF (2016), Improving the Performance and Reliability of RE Power System in Samoa (IMPRESS), Project Document. Retrieved from: https://www.undp.org/content/dam/samoa/docs/UNDP_WS_ProDoc_Signed_IMPRESS_PIMS_%205669_Samoa.pdf
[223] ADB (2016), Solar Power Development Project: Gender Action Plan. Retrieved from: https://www.adb.org/projects/documents/sol-solar-power-development-gap
[224] WBG (2018), Renewable Energy for Nearly 10,000 Solomon Islanders, Press release, July 5th. Retrieved from: https://www.worldbank.org/en/news/press-release/2018/07/05/renewable-energy-for-nearly-10000-solomon-islanders

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| WBG / Tuvalu Electricity Corporation | Energy Sector Development Project | Tuvalu | The project's investment in an improved communication system between Funafuti and three outer islands (Nukulaelae, Nukufetau and Nui) will enable TEC to better manage operations from the Fogafale station. In turn, resident of the outer islands will benefit from significantly improved service through more timely action on customer complaints and avoidance of supply disruptions. **Gender component:** Project had a Gender Action Plan[225] that included the following activities: gender mainstreaming trainings at TEC, behavioral change training in community, encourage women in decision making roles in the energy sector, improve women's access to energy through partnerships, M&E of gender development in the energy sector. | Completed (2015 - 2019) |
| UNDP / Ministry for Public Utilities and Infrastructure | FASTNETT (Facilitation of Achievement of Sustainable National Energy Target of Tuvalu) | Tuvalu | Assist the government's energy sector targets including generating 100% renewable energy-based electricity by the year 2020, as well as increase energy efficiency on Funafuti by 30%. | Ongoing (2018 – 2022) |
| ADB / Ministry of Public Utilities and Infrastructure | Increasing Access to Renewable Energy Project | Tuvalu | Reduce diesel generation and increase the renewable energy contribution from 15% to 32% in Funafuti and from around 70% to over 90% in Tuvalu's outer islands. **Gender component:** the project's Gender Action Plan[226] includes measures on consulting at least 50% of women for the infrastructure installation sites, increase women staff at TEC by 20%, provide training scholarships of up to two years each for two Tuvalu women, etc. | Ongoing (since 2018) |
| World Bank, Government of Kiribati | Grid Connected Solar Photovoltaic (PV) Project | Kiribati | The project invested in grid connected solar photovoltaic equipment without storage, provided a maintenance program and capacity building and supported the recipient to effectively manage the fiduciary aspects of the project (including procurement and financial management) through the central fiduciary unit. | Completed (2019) |

[225] WBG (2014), Energy Sector Development Project – Project Document, December 30th. Retrieved from: http://documents.worldbank.org/curated/en/519561468102907968/pdf/PAD6620PAD0P140010Box385398B0OUO090.pdf
[226] ADB (2019), Increasing Access to Renewable Energy Project: Gender Action Plan. Retrieved from: https://www.adb.org/projects/documents/tuv-49450-015-gap

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| EU, Government of New Zealand, Government of Kiribati and Pacific Community (SPC) | Kiritimati Island Energy Sector Program | Kiribati | Building of two new powerstations, 30km of HV network and a 150kWp solar PV plant. Installation of 66 street lights. | Completed (2018) |
| Government of Taiwan, Government of Kirbati, KSEC | Taiwan Solar Lighting Kit project | Kiribati | Distribution of 16,000 solar lighting kits donated by Taiwan | Completed (2015) |
| **Off-grid/ Mini-grid Power Supply** | | | | |
| Sunergise (Fiji) Limited, the Fiji Locally Managed Marine Area Network (FLMMA) and EFL | Fiji Rural Electrification Fund (FREF) | Fiji | The Fund will bring affordable solar power and battery storage to communities with no electricity or that rely on pollution-emitting diesel generators. | Ongoing (since 2018) |
| GGGI / Ministry of Economy | Bio-fuel Industry Development Program | Fiji | The objective is to reactivate the existing projects of the biofuel program stopped in 2016, and explore complementary economic opportunities present within the nine island biofuel mills. | Ongoing (restarted in 2017) |
| Ministry of Agriculture | Solar for agriculture | Solomon Islands | Promote **productive use of energy** by enhancing solar cocoa drying method to improve the quality of cocoa beans. | Completed (2013 – 2015) |
| Taiwan ICDF / Taiwan Technical Mission's Livestock Center and local government | Livestock Project | RMI and Kiribati | Work with farmers to increase and promote the local production and sale of pigs to local markets. Utilize pig waste to develop small-scale household biogas energy, thereby promoting **productive use of energy** and reducing farmers' fuel costs. | Completed (2011 – 2015) |
| Ministry of Rural Development | One Student One Solar Lamp program | Solomon Islands | Energy for **community services**. Provide lighting to rural schools with small solar roof-top systems SHS (20 w). Those are free, and easy to install and maintain. | Ongoing (since 2011) |

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| EU GIZ ACSE / The Pacific Community and Kiribati Energy energy Planing Unit - MPWU | Kiribati PV Solar Hybrid for Boarding Schools in the Rural Communities | Kiribati | Energy for **community services**. For community schools, access to electricity for the need of lights, water, internet, computers, etc. is available throughout the days and nights. Students will no longer find it difficult to meets their assignment due dates and thus improve their academic performances. | Completed (2016 – 2019) |
| EU GIZ ACSE / MMERE and Ministry of Environment, Climate Change, Disaster Management & Meteorology | Replacement of Diesel-Powered Generation with Low Voltage Solar Grid Smart System in Large Boarding Schools in Solomon Islands | Solomon Islands | Energy for **community services**. Reduce the amount of diesel fuel usage for electricity by more than 60% and reduce costs on fuel while at the same time increasing the availability of electricity and freshwater to staff and students of both schools. This will be done by installing a 70kW solar-diesel hybrid systems in each school. | Completed (2015 – 2018) |
| EU GIZ ACSE / Tuvalu Energy Office and Pacific Centre of Environment & Development (PACE) - University of the South Pacific | Sustainable Community-Based Biogas Schemes for Domestic Energy and Improve Livelihoods | Tuvalu | Delivery and installation of small-scale biogas units to be sited in a minimum of 5 communities across Tuvalu. Installation of water tanks and catchment collection to support the use of installed digesters. Development and delivery of 3TVET courses developed to support the installation, operation and maintenance of digesters and associated infrastructure. | Completed (2016 – 2017) |
| EU GIZ ACSE / MMERE | ACSE Program | Solomon Islands | To assess the forest biomass feedstock supply chain as part of creating and enabling environment for the biomass gasification power. | Completed (2015 – 2017) |
| EU GIZ ACSE / Ministry of Public Works and Utilities | Solar Boarding Schools Project | Kiribati | Energy for **community services**. To install 2 PV solar hybrid systems at Mereang Tabai secondary school and Alfred Sadd Memorial College in the rural areas to reduce the energy cost of diesel fuels, improve schools' facilities to boost students' academics capabilities. | Completed (2016 – 2019) |

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| KSEC | Solar power for fish centers pilot projects | Kiribati | **Productive use of energy**. Installation of a 4kW solar power system for the fish center on Butaritari Island. This was a pilot project and the success of this project has eventually led to the installation of more solar power system for the fish centers on outer islands. Two more solar power systems have been installed on Kuria, and Tamana | Completed (2016) |
| EU GIZ ACSE / Ministry of Infrastructure and Transport | Energy Hybrid Power Project | Fiji | To establish environmentally sound and sustainable power systems for energy production and end-use. To increase the use of indigenous energy sources to reduce the financial burden of high cost fossil fuels on rural and remote communities. To prove the operational/financial model of village solar/diesel hybrid systems for larger deployment in Fiji. **Gender Component:** The Youth and women's group additional responsibilities will include basic maintenance of solar PV systems for which capacity building will be part of the project.[227] | Completed (2016 – 2019) |
| UNDP-GEF, SPREP | Pacific Islands Greenhouse Gas Abatement thro Renewable Energy Projects (PIGGAREP) | Cook Islands, Fiji, Kiribati, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu | The project is expected to bring about in the PICs: (1) Increased number of successful commercial RE applications; (2) Expanded market for RE applications for power generation and productive uses; (3) Enhanced institutional capacity to design, implement and monitor RE projects; (4) Improved availability and accessibility of financing to existing and new RE projects; (5) Strengthened legal and regulatory structures in the energy and environmental sectors; and, (6) Increased awareness and knowledge on RE among key stakeholders. | Completed (2007-2014) |
| EU, AusAID, WBG, Ministry of National Planning and Development Cooperation | Rural Development Program | Solomon Islands | Community driven projects are submitted for financing. A sub-implementation committee (SIC), is formed of rural citizens trained and takes care of the project implementation from the procurement to the completion. One project involved **productive use of energy** through the installation of solar rooftop system to power lighting and cooling appliances. The MoNPDC requires that the SIC (4 community members) are gender balanced. | Ongoing (2020) |

[227] EU-GIZ (2015), Energy Hybrid Power Project, Concept Note. Retrieved from: http://prdrse4all.spc.int/data/eu-giz-acse-fiji-energy-hybrid-power-project-concept-note-0

| Funding/ Implementing Agency | Project Title | Targeted Countries | Objectives and Short Description | Status and Dates |
|---|---|---|---|---|
| Italian Government and Tuvalu Electricity Company (TEC) | Solar Home Standalone (SHS) Systems and PV Cooling Storage Facility for NIULAKITA/FUNAFALA | Tuvalu | The Government of Tuvalu has proposed the installation of Solar Home Standalone (SHS) Systems and **productive use of energy** with PV Cooling Storage Facility for the islands of Niulakita and Funafala. | Completed (2016-2017) |
| Government of Japan, PIFS, National Governments | Pacific Environment Community (PEC) Fund | Pacific Islands Countries | The PEC Fund provides solar power generation systems and energy for **community services** including sea water desalination plants, or a combination of both. | Completed (2012-2018) |
| **Demand-side Management** | | | | |
| Pacific Appliance Labelling and Standards Program / MMERE | EE standards for AC and Cooling | Solomon Islands | The program aims to prohibit the entry of inefficient electrical appliances through the adoption of legally enforceable minimum energy performance standards and energy labelling. The energy label helps buyers choose the more efficient of the products that meet the minimum standards. | Ongoing (since 2012) |

# APPENDIX V
# RATIONALE FOR INTERDISCIPLINARITY IN THE CLEAN ENERGY SCETOR

| Discipline | Contribution to the Clean Energy Sector |
|---|---|
| Climate change | › Introduce climate-change considerations to ensure the resilience and sustainability of the power-generating systems.<br>› Develop climate-change scenarios.<br>› Support planning of natural resources. |
| Environmental science | › Perform environmental assessments and life-cycle analyses of energy infrastructure.<br>› Integrate circular-economy principles in the identification of RE generation technology and efficient cookstoves.<br>› Develop strategies for e-waste management (e.g., batteries, RE systems components, etc.)<br>› Foster the energy-water nexus by identifying suitable RE systems to promote clean water access and management. |
| Sustainable development | › Assess the economic, social and environmental impacts and benefits of clean-energy projects and measures to ensure their sustainability. |
| Food technology | › Foster the energy-food security nexus.<br>› Assess the energy needs for income-generating activities at every level of the food production value chain (processing, preservation, post-harvest technology, packaging, distribution and marketing as well as producing safe, nutritious, and wholesome food). |
| Agriculture | › Foster the energy-food security nexus.<br>› Assess the energy needs for income-generating activities at every level of the agricultural value chain.<br>› Promote the integration of productive use of energy in the agricultural sector. |
| Sustainable fisheries | › Foster the energy-food security nexus.<br>› Assess the energy needs for income-generating activities at every level of the fishery value chain.<br>› Promote the integration of productive use of energy in the fishery sector. |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