The **Pacific Insight Briefs** capture climate and disaster integration knowledge, lessons, and insights from the Australia Pacific Climate Partnership, and implementing partners. The ten thematic briefs were developed with support from the University of Technology Sydney.

Australian Aid | Australia Pacific Climate Partnership

Pacific Insight Brief 9 | **Renewable Energy**

There is increasing focus across the Australian aid program in the Pacific region on supporting the uptake of renewable energy. This is evident in large scale programs like the Australian Infrastructure Financing Facility for the Pacific (AIIFFP), and inclusion of finance for small scale and off-grid renewable energy solutions to provide sustainable electricity to remote and rural populations. Electrification through renewable sources can offer a range of development, community, and household benefits, decoupled from carbon emissions and in place of expensive and high emission imported diesel-based options.

This brief provides insights based on the Australia Pacific Climate Partnership's (Climate Partnership) experience in supporting activities relating to renewable energy research, analysis, and evaluation in the Pacific, including lessons and opportunities.

Case example | **Outer Island Renewable Energy Project in Tonga.**

The Department of Foreign Affairs and Trade (DFAT) and the Asian Development Bank (ADB) has helped construct solar power plants on the outer islands of Tonga through the Outer Island Renewable Energy Project (OIREP). The project has installed solar power systems with a total capacity of 1.32MWp on 9 outer islands, and rehabilitated existing grid networks on 'Eua and Vava'u for on-grid distribution by Tonga's power utility – Tonga Power Limited (TPL).

It also sought to build the capacity of TPL in the operation and maintenance of renewable technologies. Informed by Australian aid's strategic focus on gender equality, OIREP supported more women to join the TPL workforce, transforming traditional gender roles and increasing family incomes. TPL used creative means to increase women's workforce participation, recognising that no women were trained as 'line workers' through local training colleges and gendered roles meant that this was not considered a 'woman's job'. There are now increasing numbers of women who are training to be 'line workers' and a strong appreciation of the role of women in all parts of the workforce in TPL, with the utility now experienced in providing women with diverse employment opportunities that were previously considered only for men.

Insights and lessons

Renewable energy penetration is increasing, but multiple and intersecting barriers are impeding progress.

Following the breakthrough Paris COP21[1] in 2015, Pacific Island countries (PICs) continue to set the pace on climate action. This includes setting ambitious emissions reduction targets and associated energy sector emissions reduction and renewable energy penetration targets, but progress is slow in some areas. This is not due to lack of will and ambition. Solutions to the range of challenges are within reach, though they require strengthened capacity to prioritise predictable investment pipelines, intra-governmental and partner coordination, and diverse and flexible finance. Factors including appropriate incentives to build and retain necessary skills, political economy, and access to land also need to be addressed.

Without careful planning and a dynamic and strategic communications strategy, renewable energy can be misperceived as 'free energy' within communities and projects may result in, or be perceived to have, increased cost burdens for consumers.

Energy from the sun and wind is understandably often considered as providing 'free' energy. While true to some extent, care needs to be taken to ensure community

[1] COP21, the 21st Conference of Parties to UNFCCC is significant for launching an international treaty that addresses climate change as an urgent issue, which require global commitment.

awareness of actual costs, with estimates based on adequately modelled tariff rates incorporating asset management costs and subsidies. Providing renewable energy at higher costs and / or without visibility of cost implications is at odds with the principle of a just energy transition for developing states.

Public development finance, delivered as grants, is needed, especially for remote and isolated projects.

For example, private sector funded mini grids are unlikely to be developed without significant donor support as full cost-recovery tariffs are usually too high to be affordable in rural communities.

Similarly, Solar Home Systems can be out of reach due to cost for many households, without subsidisation or other incentives. While loans and private finance offer alternatives, issues associated with scale, community access to finance, and uncertainty around risk and delivery models need to be addressed in the longer term.

Avenues to engage the private sector to stimulate private investment in need of further exploration and demonstration in the region include via social enterprise and pay-as-you go models; support for subsidised / concession green loans via local credit agencies; and support for business development to increase installation, operations and maintenance capacity.

Difficulties in achieving financial sustainability due to consumers' willingness or ability to pay, workable tariff collection systems, and capacity of technicians in remote communities to undertake ongoing Operations and Maintenance (O&M) are key challenges. Appetite for behind the meter (e.g roof top solar) installations paid by the consumer are apparent, but regulatory arrangements, complex connection applications and agreements, and hesitation from utilities (due to financial and grid stability concerns) are likely slowing uptake.

For consumers in the Pacific, renewable energy is prioritised for its affordability and reliability access to electricity along with the development opportunities it brings.

While emissions reductions are important, the focus of renewable energy uptake should be on the range of community, social, economic and security benefits that arise with increased access to more affordable and less import-dependant (diesel) energy.

Women and girls typically bear the burden of managing household energy, and can benefit the most from renewable energy investments.

Women and girls are typically responsible for gathering and managing fuel for household energy supply including biomass, which is still a very common fuel for cooking in rural areas and poor urban communities. Evidence also indicates that women use personal cash to pay energy bills. This can reduce the time and resources women and girls have available for income generation, education, recreation and family time. The potential equality and development benefits arising from renewable energy projects are apparent (e.g. women's micro-businesses and participation in education opportunities) though these tend to be under monitored, evaluated and promoted. Systems to help illustrate the benefits need to be in place at the commencement of each project.

Transforming and expanding access to energy can have a profound impact on a community, including unintended impacts. Strong planning, design, safeguard and risk management strategies need to be defined from the outset.

In addition to development benefits, including increased education and income generation opportunities potentially unforeseen and negative impacts can arise. This can include increased household bills due to higher energy usage and potentially mis-understood impacts on tariffs, unforeseen increase in demand due to accelerated uptake of electrical appliances, and poorly defined ownership and maintenance arrangements. Appropriately scaled, multi-dimensional impact, options, modelling and risk analysis are needed.

Transitioning to large-scale renewable energy systems also re-configure the financial model underpinning costs and repayments (whether for consumers or utilities). As opposed to incurring on going and fluctuating fossil fuel costs, renewable energy can mean high upfront capital costs. Implications on tariff prices and implications for consumer costs need to be considered.

As the energy system transforms, so too does local capacity to operate and maintain systems.

Old models of community maintenance need to transition from operating and maintaining diesel generators, to more sophisticated and complex renewable (e.g solar photovoltaic) energy systems. Capacity training, backstopping and clearly defined asset ownership, operations and maintenance arrangements and partnerships are needed. Retaining skilled personnel will require adequate incentives to reduce 'brain drain' to bigger cities in the region. While it is not realistic to have technical experts on all islands, local diagnostic capacity will be needed.

Pacific utilities face difficulty in assessing the value of proposed projects and negotiating fair generation agreement terms and prices. This has led to many Power Purchase Agreements (PPAs) resulting in high prices that left a long-term burden on electricity consumers.

Engaging with and empowering utilities to inform investment and decision-making is critical. Having a clear understanding of the baseline fixed and operating costs involved is important for appropriate planning and setting of tariffs. Utilities maintain and operate most of the energy system and have good knowledge of challenges and priorities. Early engagement with and support for utilities to help inform energy transition investments is critical to ensuring a stable, cost-effective and compliant energy transition.

Further, investment in utilities can build foundational capacity for more effective and sustainable energy transition.

Capacity Expansion Models, like the OpenCEM Samoa initiative (see case example) is supporting the utility (EPC) and regulator (OOTR) to better model and coordinate advice on priority and least cost investments to achieve their renewable energy targets.

Coordination across energy utilities, regulators and related government departments is critical to support strategic investment. Donors and development partners can facilitate this.

Coordinating the transformation of the energy system is a huge undertaking, even in small island states. One key challenge is to support coordination across key decision makers in government and utilities. Supply driven projects from donors and developers can be at odds with utility plans and needs, for example by focusing on lower priority generation investment prior to adequate investment in grid stability and function. Continued engagement between different stakeholders involved in the energy transition has proven effective in Tonga, where TPL and Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) have built a strong understanding of each other's perspectives and priorities.

Australian energy sector partners add value and have a comparative advantage in providing consultative services across technical planning, project feasibility, training programs and project delivery.

Opportunities to develop partnerships between Australian companies and off-grid photo voltaic (PV) installers could provide smaller Australian contractors with a greater ability to access and win tenders for work in PICs.

Further, by fostering improved people-to-people links, either through scholarships to Australian universities, trade fairs, trade delegations, or other mechanisms, Australia can continue to build energy sector capabilities across the region.

Case example | **Capacity Expansion Models to optimise energy system decision making.**

In 2023, the Climate Partnership, building on previous research, needs analysis and engagement on energy sector issues, commenced support for a project to help Samoa's long-term electricity sector planning and decision-making capability. Collaborating with the Electricity Power Corporation (EPC) and Office of the Regulator in Samoa, the initiative seeks to address a challenge, common across the region, related to the lack of robust analytical data and information to support longer-term planning, management, and investment decisions regarding grid expansion, strengthening, and new energy generation.

OpenCEM Samoa, is a Capacity Expansion Model, that will be used by the EPC to support its grid planning needs. The openCEM is an open-source, cloud computing tool, originally developed to support decision-makers, energy system planners, regulators, project developers, and investors in Australia. Working with ITP Renewables Australia, OpenCEM has been tailored for Samoa, with EPC collaborating on model development, training and operation and maintenance planning to support ongoing use.

"Not knowing what, where or when they should add generation, storage and transmission capacity forces planners and regulators to negotiate PPAs on a case-by-case basis with no visibility in terms of their costs, their long-term value to the system or their integration to other generation and storage assets." – Climate Partnership Workshop Report finding.

Photo: Australia's Deputy High Commissioner, Ms Claire McGeechan at a ceremony to recognise the handover of OpenCEM Samoa in April 2024.

Opportunities

There are a range of opportunities to support the Pacific Island's commitment to a fossil fuel-free future. This includes across grid-connected rooftop solar; mini (off) grid renewables and Solar Home Systems generation, as well as grid management capacity support. Consideration of storage requirements (e.g. batteries) and prioritising energy efficiency to reduce demand should not be overlooked. The types of support and initiatives need to be tailored to the specific development context including geographic, demographic, cultural, existing access, demand and capacity, and other factors. Initiatives that develop and maintain local capacity, build business and social enterprise opportunities, and address key development priorities will be of most value.

Continue and strengthen support to utilities who face considerable challenges in undertaking adequately detailed demand forecasting; modelling to inform optimised generation decision-making and power system connections; and maintaining and upgrading grids to accommodate future expansion. Investment and support for enhanced use of Capacity Enhancement Models and network models can empower PICs to better determine investment priorities and negotiate more favourable PPA to deliver more affordable energy.

Support capacity development of local technicians and business. By building the capability of local engineers and technicians (and retaining them through appropriate incentives), the ability to deliver a broader range of renewable energy initiatives to communities will increase in the longer term. Local capacity building could be achieved through train-the-trainer models that support locally-led development priorities. There also appear to be opportunities to work with local training institutions and opportunities to provide support for collaboration between international partners and local entities should also be explored (see RENEW Case example). Mixed models of support, where Australian expertise fills short term capacity gaps, while also building an appropriate level of local expertise can be incorporated.

Prioritise small scale renewable projects based on an understanding of defined development outcomes to be achieved, and with consultation of diverse stakeholders - including women. The emissions reductions achieved through investments are (in general) less significant for communities than the development benefits that can be derived from better access to energy. This is particularly true for women, who stand to benefit due to their roles which often include running the household, and ability to establish micro-businesses and social enterprises. Investments should prioritise the attainment of outcomes for women, girls and the community, while supporting energy access, transition and reducing the dependence on fossil and biofuels.

Be sure to undertake or support adequate assessment of impact on tariff rates and development of asset hand-over and operations and maintenance strategies. To avoid adverse costs to consumers and safeguard the sustainability of assets, investments need to be clear on the impacts on tariffs and arrangements for asset handover and maintenance responsibilities. Further, the life cycle of renewable energy assets, including disposal should be determined. Strong community baseline studies are critical to capturing the socio-economic impact of investments, especially on women's livelihoods and economic empowerment.

Case example | **RENEW in Timor-Leste.**

The partnership developed between the Alternative Technology Association (ATA, also known as RENEW), an Australian renewable energy organisation, and the National Centre for Employment and Professional Training (CNEFP) in Timor-Leste demonstrates the value of supporting local training organisations. This partnership was highlighted in an analysis of solar PV potential in Timor-Leste, undertaken on behalf of APCP.

The ATA established a presence in Timor-Leste through a program of off-grid electrification in. In the early stages of this program, they faced difficulties in O&M training and PV education. This led to a partnership with CNEFP, whose vocational training experience was valuable in this context. The ATA assisted with the development of CNEFP's training program and developed the capacity of CNEFP technicians to perform installations and deliver PV education programmes in rural communities. CNEFP trainees' experience was scaled up through involvement in the 300 kW UNDP rooftop PV project. Through this partnership, the ATA was able to provide the necessary design expertise, providing CNEFP with the additional capacity it required to install the system. The CNEFP technicians now provide ongoing O&M support for the systems.

Please visit ClimateWise. to access a range of knowledge products including Pacific Renewables Snapshot report and Strengthening Long Term Planning for Samoa's Energy Sector with openCEM postcard.