EUROPEAN UNION PACIFIC TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING PROJECT ON SUSTAINABLE ENERGY AND CLIMATE CHANGE ADAPTATION

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Tuvalu Training Needs and Gap Analysis

Photo: Consultation held in conjunction with SPC-GIZ Biogas meeting

Conducted and Compiled by: Sarah Hemstock & Teuleala Manuela-Morris

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Acknowledgment

Organising a successful stakeholders consultation in a country is a complex exercise and requires an excellent knowledge of the country, in particular the 'who does what', and a broad communication and exchange network with the stakeholders. We were very fortunate to have the support of the Ministry of Education, the Department of Energy, the Department of Agriculture, and the Department of Environment. Thanks also to the unfailing support for this project from the USP Tuvalu Campus. Thanks also to Betty Seluka Vave TVET Officer from the Department of Education who helped Teu arrange the logistics for this workshop and contact the main stakeholders beforehand. The success of this workshop is the result of their work.

However, the key to the success of this consultation was really down to the involvement and the enthusiasm of the participants. Once again, we were very fortunate with the level of engagement of the different participants and their interest in the project. The atmosphere of cooperation between the different stakeholders was reassuring and an essential element in the identification of training needs and the best way to address them in the country. I would thus acknowledge the participants of the consultation workshop and give them many thanks for their hard work and support.

1. Background

The 10th European Development Fund European Union Pacific Technical and Vocational Education and Training on Sustainable Energy and Climate Change Adaptation (European Union PacTVET) project is component three within the broader regional Adapting to Climate Change and Sustainable Energy (ACSE) programme.

The project builds on the recognition that energy security and climate change are major issues that are currently hindering the social, environmental and economic development of Pacific - African Caribbean and Pacific (P-ACP) countries.

1.1 EU PacTVET Objectives

The general objective of this project is to enhance sustainable livelihoods in P-ACPs. Sustainable livelihoods are a high priority for Pacific Island communities and governments alike. They are central to current development policy including resource management and conservation but also in emerging policy to meet threats such as climate change. The project aims to enhance Pacific regional and national capacity and technical expertise to respond to climate change adaptation (CCA) and sustainable energy (SE) challenges.

The project is being implemented by the Secretariat of the Pacific Community (SPC) in partnership with the University of the South Pacific (USP) over a period of 53 months from August 2014 with an overall budget of EUR 6.1 million. It will achieve the following results:
1. Assess national training needs in SE and CCA and existing informal and formal TVET training courses and training and education providers are identified and strengthened
2. Develop and implement benchmarks, competency standards and courses on Training of Trainers (ToT) and create a pool of national trainers
3. Develop and establish training courses and support facilities within TVET institutions
4. Strengthen networking in SE and CCA

The project is being implemented in a sequential approach. Result 1 activities will provide a more detailed/clearer understanding of countries' needs and their requirements from the project. The activities under Results 2 and 3 will be then be tailored to the country needs. This report feeds into result area 1.

1.2 Location

The EU PacTVET project will be implemented in the Pacific region comprising of 15 Pacific ACP countries: Cook Islands, Federated States of Micronesia (FSM), Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands (RMI), Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.

Climate change is affecting the livelihoods of the P-ACP communities causing varying degrees of adversity depending on location.

1.3 Context

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Current total global greenhouse gas (GHG) emissions stand at 36.9 gigatonnes of CO2 (GgtCO2). Of this global GHG emission, Pacific Island countries emit less than 0.03% yet they are amongst the most vulnerable to adverse effects of climate change - the first to be exposed and the least able to respond. Hence there is a moral obligation for the island countries to start implementing measures to not only mitigate GHG but also adapt to climate imposed environmental change, and prepare for future adaptation measures. At the national level, Tuavlu's annual GHG emission is insignificant on a global scale.

In spite of efforts to reduce Pacific-African Caribbean and Pacific (P-ACP) countries reliance on fossil fuels and improve energy security almost all Pacific Island countries remain highly dependent on imported petroleum products for energy generation and transportation, which are the two major petroleum consumption sectors in the region.

With the Pacific Island countries facing challenges posed by climate change and energy security, sustainable energy and climate change adaptation are undeniably ranked above all other sectors in regional priorities, as evident through regionally endorsed frameworks, such as the wider Pacific Plan and the more specific Pacific Islands Framework Action on Climate Change (PIFACC) and the Framework Action on Energy Security in the Pacific (FAESP) and individual national policies.

Efforts in addressing energy security and climate change adaptation challenges are ongoing through various regional and national projects. On climate change mitigation, there were some familiar projects such as the Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (PIGGAREP) that addresses mitigation and Pacific Adaptation to Climate Change (PACC) that focused on climate change adaptation. The PIGGAREP was focussing on complementing PICs initiatives in promoting the widespread use of renewable energy in the regions and PACC focused on three thematic areas, namely, “Food security”; “Water Security” and “Coastal Management” - assisting communities to implement activities that help them in these three areas. Additionally the University of the South Pacific’s European Union Global Climate Change Alliance project has been active in all 15 P-ACPs enabling climate change adaptation by formal and informal education, direct community engagement and applied research. Sustainability of such projects is very important. Now that these projects are coming to their end, it is important that knowledge and skills being acquired and/or hardware that were put in place continue to function and be beneficial to the targeted beneficiaries. Not only on the renewable energy side, but on overall energy services, where there needs to be awareness and improvements to energy efficiency and conservation and what measures needs to be taken to use energy in a sustainable manner as compared to energy misuse and wastage.

Tuvalu is a small island developing state (SID) with least developed country (LDC) status. Presently, Tuvalu is close to being a totally oil dependent economy (83% of primary energy), whose energy security is dependent upon foreign aid to ensure its ability to pay international oil companies. The Tuvaluan Government has made a commitment to become 100% renewable – “being carbon neutral” - by 2020.

“For Tuvalu, the lack of access to adequate, affordable, reliable, safe and environmentally benign energy is a severe development constraint. Located 1100km north of Fiji, Tuvalu consists of 9 atolls, with a total landmass of 26 km2 spread over an EEZ of around 1,000,000km2. These physical characteristics have enormous consequences for Tuvalu’s economy. For example, there is no economy of scale for land-based production and, due to transportation costs, by the time any goods for export reach the international market they are very expensive. In addition, again due to high costs of transportation, any goods which are imported are also expensive. Two inter-island boats service the 8 outer-island settlements. Tuvalu’s total population is around 11,000: with around 4,500 on Funafuti – the administrative centre. The population density is high with around 423 people per km2 across Tuvalu as a whole and 1,610 in Funafuti. Many NGO’s and international organisations have run climate change awareness campaigns in Funafuti and people are generally alert to climate change issues.

The country’s main food resource is the ocean, agriculture is in no way self-sufficient and consists primarily of coconut and banana trees. Pig keeping is part of Tuvaluan culture and a food source for many households. Taro (staple root crop), has lost its economic importance over recent years due to climate change related seawater encroachment of Taro pits and disinterest in traditional farming techniques amongst the younger generations.

The remoteness of these islands has four major effects – all of which exacerbate Tuvalu’s vulnerability to climate change: 1) Very expensive imported goods due to shipping costs; 2)

A lack of exports; 3) A limited potential for tourism development; 4) Supply disruptions of all imported goods – especially food and fuel to outer islands.

In 2008, Tuvaluan imports (totalling Aus$26 million) were 186 times greater than exports. This situation is unsustainable. Foodstuffs represent around 25% of imports and fossil fuels around 19%. 76% of households on outer islands are in the bottom fifth of the income scale. The other quarter of the poorest households are on Funafuti and are often worse off in the more monetary economy there with no access to land on which to produce food or access to traditional biomass, cooking using plastic bottles as fuel is not uncommon. In addition, they have less access to water, electricity and other energy sources, sanitation and waste disposal services, and insecure tenure - they are more exposed to poor living standards and the conventional correlates of poverty. The copra market collapsed in 2002 leaving subsistence farming households in outer islands increasingly reliant on remittances from family members working overseas. Across Tuvalu, mode and average income per day ranges from 1.8A$ to 4.0A$." (Pacific Voices, 2014). Around 35% of the population have mobile phones and 40% have access to the internet. However, services are sporadic and expensive with 250MB costing 10Aus$.

Economic overview of Tuvalu:

Year	**2000**	**2003**	**2005**	**2008**
GDP: Gross Domestic Product (million current US$)	12	-	25	32
Development aid contribution to GDP (million US$)	4	6	9	16
Development aid as a % of GDP	33	-	36	50
GNI: Gross National Income per capita (current US$)	1204	-	2383	3213
Available average income per capita (US$)	806	-	1525	1607
Exports (million US$)	-	0.15	0.1	0.1
Imports (million US$)	-	24	18.5	26

Sources: http://data.un.org/CountryProfile.aspx?crname=Tuvalu (World Statistics Pocket Book, 2009); (UNCCA, 2005); (Chung, 2006); OECD international development statistical database (http://stats.oecd.org/qwids); (GoT, 2008)

1.4 Consultation purpose – links with ACSE Component 1

It should be mentioned at the outset that the in-country consultation decided to link SPC-GIZ Adapting to Climate Change and Sustainable Energy (Component 1) project on biogas in Tuvalu to the SPC-USP EU PacTVET project activities for Tuvalu.

ACSE Component 1 Project Title: Sustainable Community-Based Biogas Schemes for Domestic Energy and Improved Livelihoods

This project builds on the success of the Alofa Tuvalu biogas project in Nanumea and that of the USP EUGCCA project in Nanumaga. The project concept note has followed the normal EU-NAO Tuvalu approvals procedure (last quarter 2014). The project aims to strengthen the capacity of communities' to adapt to the adverse effects of climate change and to enhance the use of appropriate biogas technologies regionally. This scheme will increase access to energy services by using pig waste to make cooking gas. The scheme is culturally, environmentally and economically sustainable. Long-term sustainability will be achieved by providing training & a base for technical& operational support (TMTI, PWD and USP Campus) – improving Tuvalu's autonomy. The project will provide nationally available training and biogas systems (including pig pens, fresh water collection systems and family gardens) to 40 households across Tuvalu.

The project will also link with the EU PacTVET, SPC GCCA and USP EU GCCA projects and have close ties with the Department of Agriculture. SPC will be the contracting agency and the national implementing partner will be the Department of Energy under the Ministry for Public Utilities and Infrastructures working alongside the Department of Rural Development under the Ministry of Home Affairs.

With regard to the ACSE Component 1 project 10 government stakeholders attended the government consultation in June with representation from Departments of Energy, Environment and Agriculture, Ministry of Finance and USP.

Around 12 people, including PS Energy, Directors of Agriculture, Environment, Home Affairs and Education; and private sector, disability and DRM reps attended the final high level National Stakeholders meeting (10/8/2015) in conjunction with the EU PacTVET consultation meeting (participants listed in section below) findings were presented to the PM Tuvalu on 11/8/2015 and are outlined below:

a) Project Sites: a total of 40 household biogas units will be distributed amongst the seven islands and the distribution will be as follows:

Vaitupu will have 8 households to include 2 for Motufoua Secondary School (proposed by Director of Education); Niutao, Nui, Nukufetau, Nukulaelae and Funafuti will have 6 each and Niulakita will have 2 biogas units. Nanumea and Nanumaga already have these systems. This was done in order to distribute resources fairly to all communities that do not yet have biogas systems. The recommendations made on the concept note were rejected because they could lead to political criticism if an opportunity was not given to all communities to participate fairly.

b) A strict and fair selection criteria for the selection for households and institutions (e.g. Motufoua) will be developed and applied.

c) The Department of Agriculture will provide planting materials for the home gardens under the project using its current initiatives for food security in the country (in partnership with ROC Taiwan Farm project).

d) Consultation with the communities in June 2015 highlighted the need for all construction materials to be imported - Nukulaelae no longer allow gravel to be excavated. Therefore the project has government stakeholder support in place to use remaining materials (cement and gravel) from the road project.

e) Endorse the activities under the PacTVET project implemented by SPC and USP to establish training on the installation, maintenance and uses of biogas systems and the use and manufacture and safety of biogas compressors. This will support project activities and was originally requested by Nanumaga Falekaupule after installing 7 biogas units under the USP EU GCCA Project.

These findings were based on extensive community consultations as follows:

The touring consultation team consisted of Sioata Lota from the Department of Rural Development under the Ministry of Home Affairs, Tele Siaumua from the Department of Energy (Ministry of Public Utility and Infrastructure) and the GIZ Technical Assistant for the PDD Teuleala Manuella-Morris.

Consultations with Niutao (30+ attendees), Nukulaelae (30 attendees) and Funafuti (27 attendees) focussed on energy security problems that community members face and possible solutions to addressing them. For Funafuti the participants included the Kaupule members, Kaupule Secretary, Kaupule Planner and Community Worker, the Chief of the Island and the Pastor, leaders from the two main villages (Alapi and Senala), Women's President and women and youth from the community, with similar representation in Niutau and Nukulaelae.

Additionally, around 30 households per island (total of 240 households across Tuvalu) participated in 3 different sets of questionnaires. One set of questionnaires assessed the status of the 11 biogas digesters on Nanumea and Nanumaga so lessons learned could be identified and incorporated into the proposed activities – these lessons learned are incorporated in the various sections below.

For the PacTVET project Teu Manuella and Betty Seluka Vave held consultation meetings in Funafuti in July.

The purpose of the EU PacTVET in-country-mission was to:

- Identify present and future market demand in Tuvalu;
- Map existing training supply in Tuvalu;
- List priorities for future project activities – including selection of partner TVET institutions.

USP Tuvalu Open Day 2015

2. Schedule of Consultation Events

The August stakeholder consultation was held in conjunction with the ACSE Component 1 meeting.

It is evident that interventions in country should be customised to ensure consistency with what has begun or is already in place in country. There should be no “re-inventing of the wheel” and synergies between existing interventions must be identified and acted upon. The consultation template used for other in-country consultations was re-structured to match local requirements.

Discussion groups were broken down into identified sectors – Food Security, Water Security, Health and Agriculture. Results are presented according to these groups (Section 5.2 below).

2.1. Project Outline Presentation

An outline of the EU-PACTVET was made, with emphasis on the following aspects of the project:

a. Rationale - current scenario with regard to sustainable energy (SE) and climate change adaptation (CCA) in the P-ACPs and the issues. At a national level there is dependency on fossil fuel for power production and transportation. On the climate change side, the P-ACPs are more vulnerable to climate change, but have the least capacity to respond to these.
b. How the EU PacTVET project intends to responded to these issues by focussing on building the capacity based on country needs - recognising skills acquisition by benchmarking and defining country-requested competencies and accreditation.
c. The Key Result Area (KRA). Each of the 4 EU PacTVET KRAs were outlined and it was made know to the stakeholders that one of the activities under KRA 1 is this in-country consultative workshop and one-on-one consultations for the training needs and gaps analysis (TNGA). Activities that need to be conducted in the hope of achieving each of these KRAs were briefly outlined.
d. How the project is partnering with the Fiji Higher Education Commission with regard to competency development in the areas of CCA and SE.
e. How the project is partnering with USP and the Board of Educational Quality Assessment (formally SPBEQ) on accreditation of qualifications.
f. A brief overview of the budget. This was to give the stakeholders an outline of the allocation from the €6.1 million.
g. And finally, it was emphasised that the consultations are important to aid the stakeholders in identifying national needs to frame future EU PacTVET activities.

2.2. Stakeholders' Functions Outlines.

Stakeholder Presentations were given at the meetings in July and can be found here: http://prdrse4all.spc.int/production/node/4/content/pactvet-tuvalu-national-stakeholders-consultative-workshop-august2015

Participating Stakeholders August 2015 Meeting:

Firstly, thanks to the stakeholders for their commitment to the EU PacTVET project and for their insight and input into the needs and gap analysis process. Their enthusiasm and willingness to share their knowledge and experience to ensure that Tuvalu participates fully in the project was much appreciated. Their comprehension and identification of the various issues impacting CCA and SE TVET education in Tuvalu will form the basis of future project activities.

NAME	TITLE	ORAGNIZATION
Tavau Teii	Chairman	NPAC for the USP EU GCCA Project
Itaia Lausaveve	Director	Department of Agriculture, Ministry of Natural Resources
Mafalu Lotolua	Director	Tuvalu Electric Corporation (TEC), Ministry of Public Utility & Infrastructure.
Nielu Mesako	Energy Officer	Department of Energy, Ministry of Public Utility & Infrastructure.
Temetiu Maliga	Director	Department of Rural Development, Ministry of Home Affairs.
Malofou Sopoaga	PWD Officer	Department of Public Works, Ministry of Public Utility & Infrastructure
Falealili Feagai	Health Inspector	Health Department, Ministry of Health.
Dr Miliama Simeona	National Coordinator	Tuvalu Family Planning and Parenthood (TuPHA) Association.
Katalina Taloka	Director for Education	Department for Education, Ministry of Education, Youth and Sports.
Betty Seluka Vave	TVET Officer	Department for Education, Ministry of Education, Youth and Sports.
Jenny Teo	Labour Officer	Office of the Prime Minister
Katepu Laoi	Personnel Officer	Office of the Prime Minister
Teo Sopoaga	Energy Officer	Department of Energy, Ministry of Public Utility & Infrastructure.
David Manuella	Director	University of the South Pacific, Tuvalu Campus.

Day 1:
A plenary session followed the presentation on "Training Needs and Gaps Analysis". The Plenary Session's topic is *"Creating National and Regional capacity and technical expertise to respond to CCA and SE challenges"*
Day 2:
An actual Training Needs and Gaps Analysis was done after the plenary session discussion. Discussion of the Plenary Session and the TNGA are outlined in Section 5.

A plenary Session: Topic, "*Creating National and Regional capacity and technical expertise to respond to CCA and SE challenges*"

3. Consultation Methodologies

In trying to maximise output various methods of consultation were employed in this in-country mission. Determining which methodology to use depend on various factors ranging from availability, distance and timing. The following are the methods employed to capture the required data during the in-country mission:

3.1. Consultative Workshop/Meeting (TNGA)

A consultative workshop is a consultation with stakeholders in a venue where the agendum for discussion or consultation is done for all at once. This was the methodology employed for the first two days during this in-country mission. This methodology was employed because it used the forum to draw ideas and consolidates them.

3.2. One-to-one Consultations (Interview)

In a situation where stakeholders cannot make it to the consultative gatherings, due to other commitments, a one-to-one or face-to-face meeting or interviews are done. This was also employed where for a number of stakeholders who could not attend the consultative workshop.

3.3. Internet – Online

This was used for searching for further information or publication of Reports or Policies. Not only that but to confirm or double-check on information given.

3.4. Literature Review

This forms the basis for evaluative report of information found in the literature related to technical, vocational education and training with the subject of sustainable energy and climate change as the content. Various literatures were consulted, within the education, energy and climate change sectors, on policy frameworks and national action plans or development strategic plans. Most Policy frameworks (regional and national) were reviewed and those were used as the basis for consolidating future SE and CCA demands or needs in country.

3.5 Limitations

The mission was carried out in Funafuti and did not make provision for travel to any of the outer islands.

Not all invited stakeholders attended the consultation and it was not possible to visit all stakeholders in the time allowed for the mission.

Obtainable literature surrounding some policy documents and strategies was out-of-date.

It was not possible to engage all stakeholders in the time given for the consultation.

4. Status Quo - Relevant National Policies and Frameworks and Sectoral Review

All national policy frameworks and their associated action plans set out principles and suggested initiatives designed to guide and support the development and implementation of national activities consistent with the these policy frameworks' visions and goals.

The Forum Leader's endorsement of the Pacific Islands Framework for Action on Climate Change in 2005 and the Framework for Action on Energy Security in The Pacific (FAESP) in 2010, demonstrated that sustainable energy and climate change adaptation are therefore top priorities for Pacific Island governments.

4.1. Education Sector

"Primary education is compulsory in Tuvalu and covers Year 1 to Year 8. The subjects currently offered in primary schools include English, Mathematics, Social Science, Basic Science, Business Studies, Art & Craft, Physical Education, Health Education, Writing and Printing. At the end of Year 8, students sit the Year Eight examination which is an entrance examination to secondary schools.

Secondary education in Tuvalu is from Year 9 to Year 13. Year 9 and Year 10 fall within the compulsory education policy. Of the two secondary schools in Tuvalu, one is government run and operated. " (Source: NCPF, 2013)

Tuvalu has a NCPF - National Curriculum Policy Framework (quality education for sustainable living for all) that was endorsed in 2013. It is the guiding framework in all curriculum requirements from pre-school to Year 13. It demonstrates Tuvalu's determination to create a philosophy of education that is underpinned by traditional values and beliefs. The setting up of a national assessment and qualifications agency and qualifications framework is underway.

Tuvalu is a member of the Pacific Islands Forum. As such the NCPF is bound by a number of regional frameworks. The Pacific Education Development Framework (PEDF) (2009) addressed the special needs of Small Island States (SISs) including Tuvalu. These educational priorities are embedded in the Pacific Plan and also the Millennium Development Goals (MDG's), Sustainable Development Goals (SDG's) and Education For All (EFA) agenda which address key strategic goals of: access & equity; quality; efficiency and effectiveness.

In Tuvalu's National Strategy for Sustainable Development 2005 – 2015, Te Kakeega II, Education and Human Resources were identified as one of the eight strategic areas. The ten key policy objectives which addressed the issues relevant for education in Tuvalu, were based on the overall objective for education that was articulated and adopted by the National Education Forum (NEF) in 2002; 'To provide a system of quality education which endows people with knowledge, skills and attributes necessary to achieve a higher degree of self-reliance in a rapidly changing world, and one that is consistent with Tuvalu's spiritual values'.

The Te Kakeega II, identified four key objectives relevant to education for sustainable development and the EU PacTVET project:
(i) Install sound, consistent and more appropriate curriculums that better target the needs of students and the economy;
(ii) Expand and improve technical and vocational training opportunities;
(iii) Make Math, English , Science subjects, Entrepreneurship Education, Tuvalu Studies and Technical and Vocational Training the central parts of the school curricula;
(iv) Expand services and facilities for special needs students, including pre-scholars and the disabled.

The first Tuvalu Education Strategic Plan 2006 – 2010 recommended that a more concise approach was to be taken to address the priority areas and led to the development of a new curriculum: "Quality education for sustainable living for all" .
The vision of this new curriculum addresses these 5 key areas.
(i) Curriculum and assessment
(ii) Increased student participation
(iii) Improving the quality and efficiency of management
(iv) Human resource development
(v) Strengthen partnerships and develop a culture of working together.

The NCPF recognises "Education for Sustainable Development" and "Climate Change" as 2 of 6 cross-cutting themes – integrated into all aspects of the curriculum. Climate change is recognised as "… an underpinning perspective across the curriculum in Tuvalu. This is a central theme and has a special place in the educational journey of every Tuvaluan child. Integrating aspects of climate change adaptation into the curriculum aims to build resilience among the young population as they seek ways to manage and deal with the everyday issues of rising sea levels, food and water security, and livelihoods in the 8 islands of Tuvalu."

4.2. Energy Sector

Lack of access to modern energy services has been identified as a severe development constraint for Tuvalu. A comprehensive National Energy Policy Framework (including Strategies and Activities) was developed by the Ministry of Works and Energy, Government of Tuvalu and National Workgroup, as part of the Pacific Islands Energy Policies and Strategic Action Planning (PIEPSAP, 2003) project. This project was facilitated regionally by SOPAC (from 2003 to 2006), and cost over US$1,800,000. Funding agencies included UNDP-GEF and the Government of Denmark via a partnership between the Pacific Islands Forum

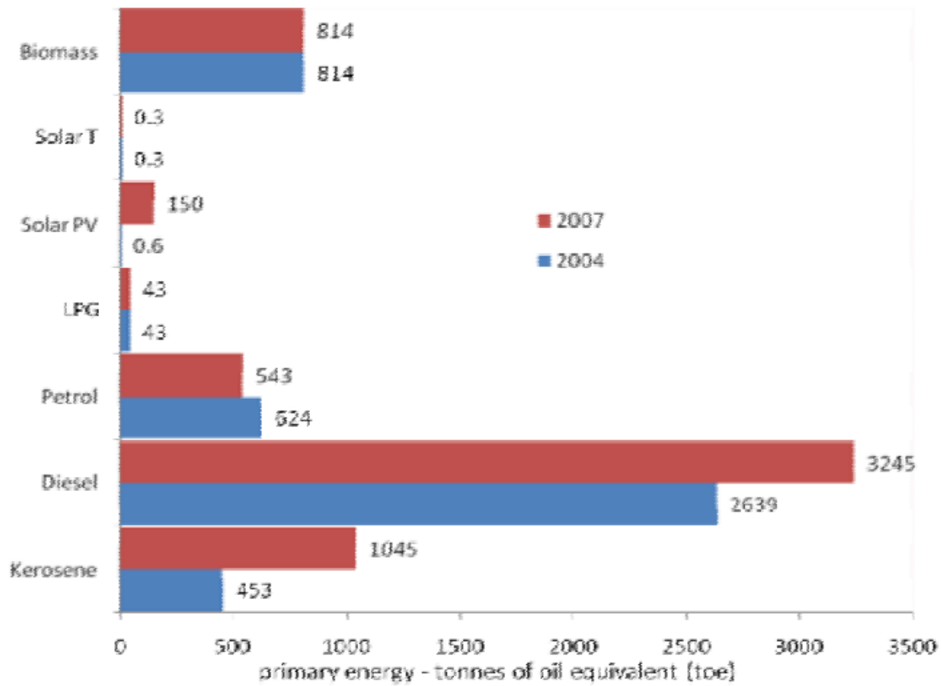
Secretariat and the European Union Energy Initiative for Poverty Eradication for Sustainable Development (EUEI). Tuvalu recieved 16.2 million US$ in development aid payments in 2008 – which accounts for half of its GDP (Table in section 1.3). From 2003-2007 JICA provided 9 million Aus$ for installation of three 600kW diesel electricity generators, new grid & connection to all houses in Funafuti. Since 2006 JICA have provided between one and two million Aus$ to pay for diesel for the generators.

Bilateral donors, such as RoC-Taiwan, JICA, New Zealand Aid, AusAid and Canada Aid have tended to fund GoT or community requested "concrete" projects and infrastructure. In contrast to this, over the past decade, regional and international organisations (such as United Nations Development Program (UNDP) & Global Environment Facility (GEF), South Pacific Applied Geosciences Commission (SOPAC), Pacific Islands Forum Secretariat (PIFS), South Pacific Regional Environment Programme (SPREP), etc. which all rely on multilateral aid), appear to have focused their development assistance on the formulation of policy frameworks and energy policy development. Since 1999, energy policy efforts have had some degree of coordination via the regional organisation CROP - Council of Regional Organisations of the Pacific Energy Working Group.

Figure 4 shows that in 2004, the total energy consumption was 4.6 ktoe, with oil accounting for 3.8 ktoe (82%) and biomass for 0.8 ktoe (18% of the total primary energy consumption). This includes diesel charged by the two inter-island vessels (Nivaga II and Manu Folau) in Suva, Fiji. Annual energy consumption in 2004 was approximately 0.4 toe per capita.

By 2007, the total energy consumption had increased to 5.8 ktoe, with oil accounting for 4.8 ktoe (83%), biomass for 0.8 ktoe (14%) and solar 0.1 ktoe (2%) (Figure below). Annual energy consumption in 2007 was approximately 0.5 toe per capita. The kerosene use of 1045 toe in 2007 accounts for refuelling of the Air Pacific plane in Funafuti. From 2004 to 2007, petrol use has decreased by 13%. This is mainly due to the impact of increased retail fuel prices. This has resulted in an increased use of "traditional" fishing canoes, rather than a large reduction in road vehicle use. The use of toddy ethanol to fuel small fishing boats could provide a viable role for toddy production.

In 2004, a total of 1170 toe (36% of total national energy consumption) was used for domestic purposes, 91% of it (1070 toe) was for cooking & boiling water. Biomass provided 64% (746 toe) of total domestic energy use, kerosene 23% (263 toe), electricity 10% (118 toe), and LPG 4% (43 toe). Solar energy provided 0.6 toe mainly for lighting & electrical appliances. These values have been estimated from in-country survey. By 2007, a total of 1383 toe (25% of total national energy consumption) was used for domestic purposes, 88% of it (1213 toe) was for cooking & boiling water. Biomass provided 54% (746 toe) of total domestic energy use, kerosene 29% (401 toe), electricity 14% (193 toe), and LPG 3% (41 toe). Solar energy provided 0.6 toe mainly for lighting & electrical appliances (on Nuilakita the only electricity source is solar pv). These values have been estimated from incountry survey. However, despite these increases in primary energy, there is relatively little impact for those living on outer-islands, who remain up to 80% biomass energy dependent.



Tuvalu is currently importing the vast majority of its energy (83%) in the form of fossil fuel which is a major drain on foreign exchange resources. Without the annual 2 million Aus$ subsidy from JICA, electricity production on Funafuti would be economically unsustainable. Tuvalu's small size, remoteness, diseconomies of scale and the manner in which electricity tariffs are structured all contribute to an over-reliance on external aid programmes. Obviously, in order for Tuvalu to improve its energy security situation, it must use its indigenous energy resources such as biomass, solar and wind. However, as with fossil fuel technologies, renewable energy technologies (RETs) will require the capital costs of equipment to be covered by donor agencies.

<u>Renewable Energy Technology Implementation (Tuvalu)</u>

Tuvalu has had experience with renewable energy technologies (excluding traditional uses of biomass energy) since the early 1980's when 12v stand-alone solar photovoltaic (pv) systems were installed for domestic use. These systems ran well initially, but fell into disrepair when replacement components were needed. A "pay-to-hire" mechanism was implemented at the same time as the pv systems, with some families providing 100 coconuts per month for use of their system. However, these payments did not produce the revenue required to buy replacement components. In addition, safe disposal of spent batteries from solar systems was also problematic. Lessons have been learnt from this. For example, the USP EUGCCA project and the NGO Alofa Tuvalu have installed low-tech domestic energy systems, such as biogas, along with extensive training for users so that repair and maintenance of systems can be carried out on site using available materials. In addition, new solar installations are grid connected and run by Tuvalu Electricity Corporation (E8, 2009). Tuvalu's capacity for wind generation is currently being assessed. For these recent renewable energy installations various approaches have been taken to ensure long-term sustainability of such as: capacity building via training and strengthening service provision; tariff setting; community involvement from the outset; appropriate technology which does not require the continuing intervention of foreign agency "Technical Assistance"; the build-up of a critical mass of similar apparatus throughout Tuvalu, so systems maintenance is cost effective; an integrated multi-disciplinary and multi-sector approach which builds on Tuvalu's existing infrastructure and institutions for service provision; and rigorous assessment of the natural resource base which can be sustainably accessed and harvested for use in the case of biomass energy projects.

Biomass is a fuel that people are familiar with and currently provides 64% of energy to the domestic sector. However, although continued use of traditional biomass will provide for basic needs, it will not solve the problem of providing the modern energy services required for economic growth and improved living standards. It is apparent that the modernisation of biomass energy use, via biogas, biodiesel and gasification, will involve some social and cultural changes; in addition further political and techno-economic changes will be required for successful implementation of the biomass energy initiatives discussed. The successful implementation of sustainable modern biomass energy schemes is certainly a major, but achievable, challenge for Tuvalu. The constraints and strategies are outlined in section 5.1 below.

Tuvalu's decision-makers are aware of the value and potential of Tuvalu's indigenous energy resources. Unfortunately, they do not control the capital or have the capacity to capitalise on indigenous resources as a means of sustainable energy provision (Hemstock, 2008). At the UNFCC Cop16/CMP6 (Bangkok, July 2009), the then Minister for Public Utilities & Industry, the Hon. Kausea Natano, declared "We look forward to the day when our nation offers an example to all - powered entirely by natural resources such as the sun and the wind," and set a goal of having all Tuvalu's energy from renewable resources by 2020. Clearly, there is political backing of renewable energy technologies - at least intellectually. In practice, however, the picture is very different (Figure above). Tuvalu's balance of payments, and resulting dependency on overseas aid programmes, makes it very difficult to translate the well-intentioned aspiration of a fossil fuel-free future into a reality. Failures are not due to a lack of political will, and successes (though limited) are not due to policy formulation. Tuvalu's energy security is aid dependent – the majority of recent energy sector infrastructure has been paid for by external development aid.

Subsidies, which encourage the use of fossil fuels, are also currently in place such as the JICA donation to cover fuel costs of diesel for electricity generation. To improve energy security, aid has to be spent in line with "needs", and with a view towards sustainability. In addition, multilaterally funded regional efforts to encourage renewables have previously placed much of their emphasis on policy and "market development" rather than practical help and actual RET installations, such as the e8 (which comprises ten leading electricity companies from the G8 countries) 40 kW grid-connected solar system in Funafuti (E8, 2009) and the recent installation of solar on the roof of the government building and at Motafoa School have ensured that around almost 8% of Tuvalu's electricity demand is now met by solar. These are all moves in the right direction.

4.2.1 Linking EU PacTVET activities with ACSE Component 1 (Biogas)

Tuvalu's National Energy Policy calls for the development of "local expertise in the installation, operation, management and maintenance of technically and economically proven renewable energy systems". Combining all these issues here it was decided that the ACSE Component 1 project on biogas would link with the EU PacTVET project to provide training on biomass energy installation, operation and maintenance – linked with horticulture and livestock husbandry training. Biogas has been proven to be effective in Tuvalu, and training has been identified via community consultation, as the most effective intervention for the success of renewable energy technology projects - linkages with Tuvalu National Energy Policy, the ACSE Component 1 Biogas project and EU PacTVET are outlined in the table below.

National and sector policies, strategies, action plan or goals.	ACSE Component 1 and EU PacTVET alignment
In the TNE Policy under section 5 on the Renewable Energy Policies which states to: 1.1 Promote and implement the use of appropriate, proven, affordable and cost effective renewable energy technologies both for urban and rural applications; 1.2 Establish and maintain a knowledgebase for all available and appropriate renewable energy sources and technologies; 1.3 Ensure Tuvalu's limited biomass, copra bio-fuel and other renewable energy resources are used efficiently, in an economically, environmentally and culturally sustainable manner; 1.4 Develop local expertise in the installation, operation, management and maintainence of technically and economically proven renewable energy systems; 1.5 Develop partnerships with potential foreign and local investors, donors and agencies in seeking funding sources for the development of renewable energy programmes. Develop an implementation plan to realize the target of 100% of electricity generation through renewable energy technologies by 2020.	Response to TNE Policy 5.1 – the digesters are appropriate, proven (the systems of pig pen, water tank, family garden and digester are already in place in Nanumea since 2010 and Nanumaga since 2013), affordable and cost effective. They will be installed in rural outer islands and in urban Funafuti. Response to TNE Policy 5.2 Lessons learned and all relating documents will be available on the SPC, EDD Energy for All database and also available on the USP knowledge centre. Response to TNE Policy 5.3 The activities will use available pig manure as a renewable energy resource. This will be done in an efficient, culturally acceptable and environmentally sustainable manor that will bring improvements to livelihoods. Response to TNE Policy 5.4 Courses will be developed and delivered in partnership with EU PacTVET. They will cover operation, maintenance, horticulture, animal husbandry and safety aspects of biogas systems. Response to TNE Policy 5.5 A "Biogas Toolkit" will be developed which will examine all aspects related to duplication of project activities. It will be written for local planners and it will examine financial aspects, role of the Kaupule/ governance and funds available for set-up of similar initiatives from regional donors. It is estimated that participating households will displace *4,800 litres of kerosene (over 3 tonnes of carbon) and 160 bottles of liquefied gases (over 2.7 tonnes of carbon) per year*. (Also refer to PDD Section 8). While these figures may be regarded as minimal, they provide support to Tuvalu's commitments to reducing the use of non-renewable energy sources.
Framework for Action on Energy Security in the Pacific 2010-2020	All project activities are in line with this framework: '…all people at all times have access to sufficient sustainable sources of clean and affordable energy and services…'
How does the project align to national development policies/strategies? All planned project activities fall within the following declaration from Tuvalu's Energy Policy and Energy Policy Strategy and Activities Paper & PIEPSAP regional goals: "By the year 2020 guided by the principles in the "Te Kakeega II" (the National Strategy for Sustainable Development 2005-2015) and the "Malefatunga Declaration", where Tuvalu shall attain a prosperous living standard via the provision of "socially, financially, economically, technically, politically and environmentally sustainable energy systems", within the framework of the Tuvalu Initial National Communication Under the United Nations Framework on Climate Change (Oct 1999).	

4.3 Climate Change

At the United Nations Climate Change Conference, held in Copenhagen in December 2009, Tuvalu was described as being at serious risk of becoming the first state to become uninhabitable due to the impacts of climate change. The majority of the land area is less than 3m above sea level.

Tuvalu ratified the UNFCCC in 1993 and the Kyoto Protocol (as a non-Annex I country) in November 1998. Tuvalu's first national communication under the UNFCCC was in 1999 and its second national communication is currently in preparation. It is a member of the Alliance of Small Island States (AOSIS) and participates in Secretariat of the Pacific Regional Environment Programmes such as the Pacific Adaptation to Climate Change project.

"The Ministry of Natural Resources, Energy and Environment was the main government ministry responsible for climate change, it then moved to Foreign Affairs. In 2014 a National Advisory Council on Climate Change was launched by the Prime Minister to provide advice on how to effectively co-ordinate a whole of government response to the challenges of climate change, known as the National Climate Change Response Process. The main functions of the National Advisory Council on Climate Change are to identify actions or strategies to achieve energy efficiencies, to increase the use of renewable energy, to encourage the private sector and NGOs to reduce GHG emissions, to ensure a whole of government response to adaptation and climate change-related disaster risk reduction, and to encourage the private sector and NGOs to develop locally appropriate technologies for adaptation and climate change mitigation.

Two main documents, both published in 2012, drive climate change policy in Tuvalu – Te Kaniva: Tuvalu National Climate Change Policy, and the National Strategic Action Plan for Climate Change and Disaster Risk Management (NSAP). The NSAP recommended that the National Climate Change Advisory Committee and the National Disaster Committee should merge to co-ordinate and drive the plan's implementation. The merged committee is known as the National Strategic Action Plan Co-ordinating Committee and is supported by a specific NSAP Management Team within the Department of Environment." (Source: London School of Economics, Grantham Institute, 2015).

EU PacTVET supports the overarching vision of the Te Kaniva (2012): "To protect Tuvalu's status as a nation and its cultural identity and to build its capacity to ensure a safe, resilient and prosperous future." And the goals:

- Strengthening Adaptation Actions to Address Current and Future Vulnerabilities
- Improving Understanding and Application of Climate Change Data, Information and Site Specific Impacts Assessment to Inform Adaptation and Disaster Risk Reduction Programmes.
- Enhancing Tuvalu's Governance Arrangements and Capacity to Access and Manage Climate Change and Disaster Risk Management Finances

- Developing and Maintaining Tuvalu's Infrastructures to Withstand Climate Change Impacts, Climate Variability, Disaster Risks and Climate Change Projection
- Ensuring Energy Security and a Low Carbon Future for Tuvalu.
- Planning for Effective Disaster Preparedness, Response and Recovery
- Guaranteeing the Security of the People of Tuvalu from the Impacts of Climate Change and the Maintenance of National Sovereignty

Given the considerable overlap between disaster risk reduction and climate change adaptation, the policy is aiming to integrate both in terms of policy, institutional arrangements and capacity building, and in the technical tools and risk-reduction disaster management methods utilised as set out in the National Strategic Action Plan for Climate Change and Disaster Risk Management (NSAP).

"Tuvalu actively participates in both adaptation at the nation-state level and encouraging international co-ordination on adaptation activities. Locally, the 2012 National Strategic Action Plan for Climate Change and Disaster Risk Management (NSAP) identifies 141 specific actions to bolster adaptation and better prepare for disaster. Projects include increasing water storage capacity on four of Tuvalu's islands with the help of the United Nation Development Programme's Least Developed Countries Fund and AusAID, as well as work carried out by the Tuvalu Association of Non-Governmental Organizations, a network of grassroots NGOs, on initiatives such as environmental awareness campaigns and tree-planting projects. A national water policy is also being developed.

Internationally, in 2008 Tuvalu presented an International Blueprint on Adaptation to the UNFCCC Bali COP which argues for predictable and adequate international funding instruments to support adaptation in less developed countries. Tuvalu has spoken publicly about the challenges of receiving development funding for adaptation projects, such as from the UN Kyoto Protocol Adaptation Fund." (Source: London School of Economics, Grantham Institute, 2015).

From the predictions on continual sea level rise; increase in temperature and increasing ocean acidification, there would be new and additional challenges. This will require additional efforts and resources in building Tuvalu's capacity to be able to face these challenges, hence building the capacities of TVETs to be able to deliver to the rural communities the relevant knowledge and skills to be well equipped to face the challenges of the predicted effects of climate change and natural disasters is crucial. Although Tuvalu has historically experienced few major disasters, the effects of climate change on the frequency and magnitude of disasters around the world has served as a catalyst to increase its preparedness for future disasters, especially as a Pacific microstate prone to cyclones and storms. Since 2005 the Tuvalu's government has been taking measures to strengthen its national disaster risk management. Tuvalu was recently affected by Cyclone Pam – causing an estimated 10 million USD of damage – equivalent to just less than 50% of Tuvalu's GDP.

Shifting weather patterns in recent years have caused droughts – one of which was so severe that a "state of emergency" was declared. Additionally, increased demand for water, ground pollution, and climate change effects such as drought and sea level rise, no mean there are no fresh water lenses in Funafuti, and the number across the rest of Tuvalu has decreased dramatically over the last decade.

5. Consultation Analysis

5.1 Training Needs and Gaps Analysis (TNGA) - Plenary

The TNGA was preceded by the 4CT meeting and a Plenary Session where participants gave their view on the topic, "*Creating National and Regional capacity and technical expertise to respond to CCA and SE challenges – what are the constraints"*

Constraints to renewable energy development:

Constraints	Strategy
Lack of appropriate technology selection – mainly due to a reliance on outside aid which has dictated technology options.	Technology selection must follow energy policy strategies and activities. Aid for energy applications must take into account PIGGAREP, PICCAP, PIREP & PIEPSAP recommendations and GoT Energy Policy/Strategy. Only appropriate and established RET's should be implemented. An international agreement signed by all UN members and bilateral funders, such as RoC Taiwan, which states that all funded projects will be in accordance with national and regional policy.
Lack of technical expertise and institutional structure to plan, manage and maintain RE programs.	Training is the key to this barrier. Any RE intervention must have an associated training program. In addition, Tuvalu's existing facilities (TMTI, Amatuku) should be strengthened to provide ongoing training & back-up. All interventions should have an agreed management & economic plan, possibly with the set-up of a dedicated or strengthening of an existing (Tuvalu Electricity Corporation) service provider, as part of any project exit strategy.

- Technology changes have tended to be donor driven and reactive so it has been difficult to predict future markets for skills.
- In order to engage youth, the role of education in the process of job creation needs to be emphasised.

- Integration of renewables, particularly solar, to the grid can result in instability and reduced power. Systems need to be designed and managed – skills are needed to do this.

Other constraints:

- Ad-hoc training given to and by NGO's leads to no qualification and has no status.
- Gaps identified in current project management training were specific to CCA and DRR projects and included: proposal writing and project planning, accessing funds – CC & DRR finance, logistical frameworks, CC and DRR budgeting at national and sector levels, using assessment toolkits.

5.1.1 General findings from the Plenary session and links to existing initiatives:

The meeting agreed that the first EU PacTVET priority should be to support training for compressor manufacture and use with biogas and for training on biogas installation, operation and maintenance as this will benefit energy and food security. Additionally, ensuring local delivery of training and education should be an EU PacTVET priority. Participants requested all training to be done in-country, whether as part of programme/project delivery, or for technical, communication or awareness-raising.

DRM: With respect to disaster response training (including training on post-disaster assessment), the participants were very interested in getting DRM and disaster relief training built into competencies and qualifications. If people in communities were equipped with these skills already it would negate the wait for assessors to visit communities post disaster and disaster responses could be faster. Recognised qualifications in disaster response would provide a professional aspect to the training currently offered. It was concluded that all training should be aligned toward the overall "professionalization" of disaster response and management, including an identifiable career paths with sequential learning stages. (This is in agreement with the findings of Analysis of Disaster Response Training in the Pacific Island Region Provisional Version September 2012, United Nations Office for the Coordination of Humanitarian Affairs, Regional Office for the Pacific, September 2012).

Data analysis: The Climate Change and Disaster Risk Management Policy (2012) has an increasing desire to ensure and continually improved evidence-based decision making – meteorological services are mentioned specifically.

EU PacTVET could support these actions by providing training on data collection and analysis for natural resource management (GIS) and SE planning.

Knowledge and skills for project management: General project management skills were identified as a major constraint.

This is something that could be delivered by the EU PacTVET project, possibly as a regional initiative.

Traditional knowledge is to be emphasised and used wherever possible.

5.2 Training Needs and Gaps Analysis (TNGA) – Group Work

5.2.1 Sectors identified for priority action

5 clusters/sectors were identified and groups were formed accordingly

NO.:	CLUSTERS' INPUTS
1	*Energy security:* • Solar &wind for electricity • Household appliances - that is: gas kerosene, refrigerators, lights. • Transportation -that is: motorbikes, trucks, ships, cars, bikes etc. • Biogas-COMPRESSORS &SAFETY • Energy intervene into the school curriculum
2	*Food security* 1. Agriculture • Agroforestry –growing of plants that use water less (banana, fig,cassava, sweet potatoes, talo tanna, pulaka in concrete pits, chicken &pig farming, plants for retension from coastal erosion, ornamentals;use of compost; • Conservation of land • Aquaponics (fish and agriculture)-small scale for households. 2. Fisheries a) Methods of fishing b) Preparation of fishing gears c) Conservation of marine life d) Canoe making traditionally e) Boat making ie catamaran etc where using less fuel. 3. Food processing ie jam making. 4. Food preservation (drying, frozen, cooking) 5. Food safety
3	*Water security* • Water catchment -roofing, gutters, plastic &concrete tanks maintance. • Water management -recycling of water, rationing of water (number of people by households due to urbanization),COMPOST TOILET • Ground water/rainwater -water testing for portable water, building of ground water catchments.
4	*Health and safety related to disaster risk reduction and management* • Care for the Elderly & Disabled people in disaster periods • Occupational safety – proper gears • Waste management that are health hazards ie energy waste(like no proper areas for dumping batteries, diesel etc) • Sanitation – toilets, sewage waste, solid waste,portable water, WASH program • Good Nutrition - affected during disaster periods.
5	*Project Management for climate change and adaptation & sustainable Energy Project* Project cycle - identification through situational analysis; planning, implementation, monitoring and evaluation.

<u>Feedback from group work:</u>

Health and safety related to disaster risk reduction

No	**Cluster Inputs** ***Health Security***	**Technical Skills Required by Private Sectors** (Current & Future Demand)	**Technical Skills Required by Community Sector** (Current & Future Demand)
1	**Nutrition & food safety:** • Safety of food quality • Promote nutritionist diets	• Training skills to: - Train the trainers on food quality. - Provide stakeholders with a better understanding on food quality.	• Food processing • Food handling • Food preparation • Food storage • Food transportation
2	**Care taking** • Old People • People with Special Needs • Pregnant Mothers • Children	• Appropriate skills and knowledge in care taking for the target groups in the areas of: - Handling - supporting - Managing - Tolerating - Apply sanitation	Care-taking skills for the following: - Old people - People with Special Needs - Pregnant mothers - Children
3	**Sanitation** - Water - Toilet Sanitation - Water And Sanitation Hygiene (WASH)	• Acquire skills and knowledge on: - Water - Toilet sanitation - WASH	• Provide awareness programmes on sanitation for: - All households - Island Communities - Church - Youth groups - Schools - Workplace
4	**Waste Management** - Liquid Waste - Solid Waste - Hazardous Waste	• Train trainers to acquire skills and knowledge on waste management; - Dumping - Storage	• Awareness programmes for: - Households - Island Communities - Church - Youth groups - Schools - Workplace

	Cluster Health Security	Constraints
1	Nutrition / Food Safety	• Lack of financial support • Lack of resources • Lack of relevant equipments/ facilities • Endorsement of food security regulations • Lack of training for high level officials • Lack of fair distribution trained trainers on all islands • No building allocated for training programmes • No proper transport designed for food transportation.
2	Care Taking for: - Old People - People with Special Needs - Pregnant Mothers - Children	• Lack of proper equipments & facilities to enable easy access for target people • Lack of financial support • No special building allocated for the target groups of people.
3	Sanitation	• Lack of proper toilet sanitation for all households. • Lack of financial support for households and communities.
4	Waste Management	• Lack of knowledge on waste management, i.e. sorting of waste. • Lack of labour force to strengthen proper waste management. • Lack of facilities to sort out waste, i.e. solid waste, hazardous waste, and liquid waste.

Water Security:

1. <u>WATER STORAGE – HARVESTING:</u>
• Concrete Water Cistern
• Plastic Water Tank
• Guttering
• Piping and fittings
	2. <u>WATER SANITATION</u>
	• Water testing – good water quality
	• Septic Tank – protect underground water & sea-wage
	• Waste water recycle
	   o Livestock
	   o Gardening

3. <u>BUILDING CODES</u> • Guide for infrastructure • Everybody to adhere for every construction	4. <u>UNDERGROUND WATER</u> • Not all islands have good quality of underground water • Underground water testing • How to construction of underground water

5. <u>WATER MANAGEMENT</u>
• Water Authority
   o Rationing of water
   o Govt and Kaupule contributions to water cistern
• Repair and fixing of water leaks and piping's
• Basic needs including livestock needs.
   o Food and drinks, cookings
   o Washing /Shower
• Control of movement
	6. <u>URBANIZATION</u>
	• Negative impact to livelihood and water security
	   o Domestic migration
	   o Overcrowded
	   o Epidemic-spread of disease
	   o Informal Settlement
	      ▪ Housing
	      ▪ Land Tenure
	Access to services and utilities

NO:	CLUSTER'S INPUT	SKILLS REQUIRE BY THE PRIVATE SECTOR (Current & Future Demand)	SKILLS REQUIRE BY COMMUNITIES (Current & Future Demand)

.	Water Security
	• Water Catchment
	  ○ Roofing
	  ○ Gutters
	  ○ Plastic & concrete tanks
	  ○ Maintenance
		• Procurement of suitable facilities
		• Design of house
		• Design of water tank
		• Training of Trainers
			• Construction work
			• Carpentry
			• Plumbing
			• Plastering
			• Maintenance process

	• Water Management
	  ○ Water recycle
	  ○ Water rationing
	  ○ Compost toilet
		• Water recycle process/treatment
		• Season cycle
		• Enhancement of water system
		• Awareness program
		• Increase Government grant
		• Training of Trainers
			• Awareness program
			• Design of toilet
			• Construction
			• Partnership

	• Ground Water/Rain Water
	  ○ Water testing
	  ○ Construction of underground water catchments
		• Water testing
		• Construction
			• Water testing
			• Construction
			• Sanitation and hygiene
			•

CLUSTER	CONSTRAINTS

Water Security	• No proper training
	• No appropriate equipment
	• Lands space
	• Opportunities
	• Resource Management
	  ○ Lack of resources
	• Proper Planning
	• Funding
	• Conflict of technology
	  ○ Flush Toilets-village
	  ○ Compost- outside village

Energy security

NO.:	MAIN ENERGY SOURCES	TECHNICAL SKILLS REQUIRED BY PRIVATE SECTOR (Current & Future Demand)	TECHNICAL SKILLS REQUIRED BY COMMUNITIES (Current & Future Demand)	SET OF PRIORITY
1	Solar, wind, electricity	Design; Installation; Maintance; Monitoring; Operation & Maintance; Data collection. Manufacture and use of compressors (Need to cover in school curriculum)	Operation, Appreciate the technology, safety measures.	1=
2	Household appliances	Energy efficiency; cost and analysis (appliances) Energy audit. (Need to cover in school curriculum)	Change their mindset on the use of energy wisely. Compare of appliances	Cross cutting issue 1-4
3	Transportation	Operation&Maintance; Cost and Analysis.	Cost and Analysis; O&M, safety (in driving)	3
4	Biogas & Compressor (Human, Animal & Rubbish waste)	Home system/power generation, Design; Installation, Operation, Maintance, Cost and Benefits analysis, Monitoring, Data collection, Safety, Power generation. (Need to cover in school curriculum)	Safety, cost and analysis, operation, maintance of equipment, data collection	1=
5	Biofuel	Design, Installation, Operation, Maintance, Cost and benefit Analysis, Monitoring, data collection, safety. (Need to cover in school curriculum)	Safety, knowledge in using by-product of technology, date collection, Operation.	4

CLUSTER	**Constraints identified:**
Energy security	O &M (Operation and Maintenance) Knowledge and skills (design, installation, maintenance, data collection, cost and benefit analysis). Monitoring, Data collection, Safety, Funds required, Intermittent technology (solar/wind), High cost of spare parts Isolation of the islands, High seawater spray

<table>
<tr><th>Clusters Inputs
(Food security)</th><th>Technical Skills required by Private & Community Sector (Current & Future Demand)</th><th>Challenges</th></tr>
<tr><td>AGRICULTURE
How to raise these food crops including floriculture;
(refer to competency skills)

<u>Traditional food trees</u>
Coconut, Breadfruit
Pandanus, Felo
Banana, Pawpaw
<u>Traditional Root crops</u>
Pulaka, Talo (colocassia)
<u>Annual Crops</u>
Sweet potato, Cassava
Talo n tana, Tamu
Cabbages, Cucumber
Tomato, Capsicum
Hot pepper
<u>Floriculture plants</u>
Frangipani, Hibiscus
Tiale/tiare, Talotalo
Temili</td><td>Site selection
Selection of planting materials
Propagation of planting materials
Preparation of planting materials
Compost making
Filling of planting holes/beds/containers, etc
Plant spacing
Crop protection/pest control (organic)
Harvesting
Post harvests
Marketing</td><td>Land availability / land tenure
Lack of trainers
Access to adequate water
Lack of information in local language
Access to funds
Training facilities
Lack of Equipment
Lack of community interest/commitment
Lack of labour force at household / community levels
Lack of transport in agr marketing from outer islands to capital market and inter island.</td></tr>
<tr><td>LIVESTOCK
Pigs, Chickens, Ducks</td><td>Breeds
Housing
Feeding
Breeding
Slaughtering
Butchering</td><td>As above</td></tr>
<tr><td>Food processing /preservation</td><td>Jam making
Pickles
Breadfruit chips
Banana chips
Dried pulaka chips
Breadfruit dried chips
Dried felo</td><td>As above</td></tr>
<tr><td>Conservation of Biodiversity areas</td><td>Wild life conservation skills; turtle breeding
Farming land crops
Milkfish farming
Bird harvesting and control
Coconut crab harvesting and control
Turtle breeding, harvest and control</td><td>Lack of awareness
Lack of resources
Lack of finance
Lack of training
Loss of traditional knowledge</td></tr>
</table>

5.3 The Training Supply and TVET Providers

This section outlines the various educational, tertiary and Technical and Vocational Education and Training Institutions in the Cook Islands along with the courses and awards they provide.

5.3.1 Non-formal Training

For the Tuvalu, training delivered through ad-hoc project delivery or general training events has resulted in little longer term sustainable capacity. Climate change awareness has increased, but genuine capacity building for climate change adaptation by communities in the outer islands has not improved significantly. The Taiwan Mission (agriculture), Government of Tuvalu Departments, Alofa Tuvalu and the USP EUGCCA project are the only initiatives that have translated to anything effective in the outer islands, despite a multitude of efforts.

Some of the areas that were the focus of prior training and education have also been identified by participants in this needs and gap analysis – including the following:

- Climate change awareness
- Biodiesel
- Bioethanol
- Biogas (building, operating and maintaining camatec digesters; installing, operating and maintaining plastic digester systems)
- Home gardening
- Agriculture
- Vulnerability capacity assessment
- Processes and tools associated with vulnerability and adaptation assessment
- Community planning
- Identifying the barriers to renewable energy use
- Global, regional and national long-term observing systems
- Greenhouse gases inventory assessment
- International negotiations
- Disaster risk management (various topics related to this)

5.3.2 Formal Training

Motufoua Secondary School (MSS) is a co-educational boarding school. Government provides all the running costs including those for teachers and support staff. It charges a small tuition fee of fifty Australian dollars a term on a three term academic year. MSS offers the following subjects: English, Mathematics, Chemistry, Physics, Biology, Agriculture Science, History, Geography, Accounting, Economics, Design Technology, Woodwork, Home Economics, Computer Science, and Commercial Studies. At the end of Year 10, students sit the Tuvalu Junior Certificate examination (TJC), the Tuvalu Senior Secondary School

Certificate (TSSC) at the end of Year 12 and the South Pacific Form Seven Certificate at the end of Year 13 The school also offers vocational and technical learning programs.

The other secondary school, **Fetuvalu Secondary School (FSS)** is a faith-based school run and operated by the Congregational Church of Tuvalu. FSS, although follows a different curriculum, offers quality secondary education to all its students. It provides education equivalent to that offered at MSS from Year 9 to Year 12.
Students from FSS may proceed to Year 13 at the government Form Seven program or at the Foundation program offered through the Tuvalu USP Campus.

On each of the islands there is a **Community Training Centre (CTC)**. These centres offer learning programmes for students who cannot access secondary education and who would also like to pursue more hands-on learning. These centres offer vocational learning programmes as well as basic trade courses to match their respective communities' needs. These programmes are made available with assistance from the EdDep in partnership with Kaupule.

Maretta Kabane Typing and Computer School (MKH) is a privately owned vocational training institution specialising in office skills situated in Funafuti. It was established in 1996 and mostly trains women in office and secretarial skills. It was opened to provide career paths for women as they were not allowed to enter Tuvalu Maritime Training Institute. Subjects include: typing technology; specialized typing; secretarial skills; audio typing; small business calculations; MSWord; MSExcel; and accounting & book-keeping.

Tuvalu Maritime Training Institute (TMTI) courses are taught in accordance with International Maritime Organisation Standards of Training, Certification and Watchkeeping (STCW) Standards. Courses include:
1. Pre-sea Training Program
For new entrants, young men and women between 17-25 years of age.
18 months per course
Divided into 3 stages, Junior (shorebased training), Intermediate (shipboard phase) and Seniors (shorebased training) at 6 months per stage
20 trainees per course intake (60 trainees in training any of the year).

2. Upgrade, Revalidation and Refresher courses
For experienced seafarers
Course duration varies from 1 day courses (Security Familiarization) to 2 week courses (Basic Sea Safety revalidation/refresher courses).

TMTI also run pre-sea training courses in the following areas:
SHOREBASED STAGE
TR01 Introduction & Orientation

TR02	Basic English
TR03	Prevention & Control of Shipboard Fires
TR04	Proficiency in Survival Craft (ST)
TR05	Occupation Health and Safety
TR06	Elementary First Aid for Seafarers
TR07	Safe Operation of Small Craft & Engines
TR08	Deck Watch keeping Preparation (BBP)
TR09	Basic Seamanship
TR10	Basic Engine-room Practices
TR11	Engine-room Watch keeping Preparation
TR12	Basic Catering Practices

SHIPBOARD STAGE

TR13	Seamanship Practices Aboard Ship
TR14	Deck Watch keeping Aboard Ship
TR15	Engine-room Practices Aboard Ship
TR16	Engine-room Watch keeping Aboard Ship
TR17	Catering Practices Aboard Ship

SHOREBASED STAGE

TR18	Vocational English
TR19	Advanced Seamanship Practices
TR20	Deck Watch Rating
TR21	Advanced Engine-room Practices
TR22	Engine Watch Rating
TR23	Advanced Catering Practices
TR24	Tanker Familiarization
TR25	Final Review & Pre-departure Routine

Revalidation and Refresher Courses
Basic Sea Safety (STCW Reg. VI/I); Survival techniques
Prevention and Control of Shipboard fires; Elementary First Aid
Personal Safety and Social Responsibility; Tanker Familiarization (STCW Reg. V/I)

Upgrade Courses
Deck Watch Rating (AS Deck, STCW Reg. II/4)
Engine Watch Rating (AS Engine, STCW Reg. III/4)
Qualified Steward Certificate

NEW COURSE
Purseine Crew Training

Designed to equip already qualified seafarers to be able to man and operate Purseine Fishing vessels within our oceans.
Newly introduced course (started 27th July, 2015)
Funded by NZ Aid
Target students: Experienced seafarers without job opportunities overseas
Meets STCW F standards
Course intake is 20 per course

UPCOMING COURSES
Certificate in Hospitality (Upgrade of the TMTI Qualified Steward Course)
Basic Welding and Fitters Course

1. TMTI upcoming audit (2016)

- TMTI is currently in preparation for the upcoming IMO audits on the newly amended STCW Convention (STCW 95 – STCW 2010) expected next year (date TBC).
- TMTI is currently complying with the STCW 95 Convention which only lasts till end of next year, 2016.

A. Gaps

- Provide training for TMTI trainers in order to meet the STCW Reg. I/6
- Provide audit training for TMTI staff in order to be able to conduct internal audits as required by IMO.

Accreditation of TMTI Courses

- Although most courses offered at TMTI are STCW approved, some still need accreditation by a recognised Institution or body, national or international (like the upcoming **Certificate in Hospitality Course, Engine Welding and Fitters Course** and any future courses.

Improving the mentioned gaps will greatly assist TMTI in;

Gap 1:

Its preparation for the upcoming IMO audits.

Improve TMTI's reputation in the world seafaring industry

Maintain and improve the employment of Tuvalu Seafarers

Gap 2:

Accrediting all TMTI Courses

USP:

www.uap.ac.fj

The University of the South Pacific is the premier institution of higher learning for the Pacific region, uniquely placed in a region of extraordinary physical, social and economic diversity. Established in 1968, USP is one of only two universities of its type in the world. It is jointly owned by the governments of 12 member countries: Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Samoa. The University has campuses in all member countries. The main campus, Laucala, is in Fiji. The Alafua Campus in Samoa is where the School of Agriculture and Food Technology is situated, and the Emalus Campus in Vanuatu is the location for the School of Law. The academic Schools, Institutes and Centres at the University of the South Pacific are organised into three faculties: the Faculty of Arts, Law and Education; the Faculty of Business and Economics; and the Faculty of Science, Technology and Environment. Each faculty comprises of a number of schools which offer a wide range of academic programmes and courses at the undergraduate and postgraduate levels.

The University also offers programmes through distance and flexible learning in a variety of modes and technologies throughout USP's 14 campuses.

Advanced communication technologies through USPNet are used to reach distance and flexible learning students.

The University has set a high standard for quality in its research. Major research commitments include business management, teacher education, Pacific studies, marine studies, agriculture, science and technology.

USP is a self-accrediting university registered with the Fiji Higher Education Commission.
All courses offered by USP as blended or on-line can be offered at the Tuvalu Campus.

Students in Tuvalu are currently enrolled in 74 different courses from foundation to PhD level in-country. Details of courses offered at USP can be found here: http://www.usp.ac.fj/fileadmin/scripts/OtherReport/Prospectus_2015/Prospectus_2015/index.html#/30

Full programmes delivered in regional campuses include MBA, Bachelor of Commerce, Diploma in Early Childhood Education, Bed Primary, B Ed ECE, Masters in Education, PGDip International Affairs, PGDip Climate Change. Project Management – USPCI hosts a Graduate Certificate in Project Management in conjunction with AUT University.

5.4 Suggested priorities for future EU PacTVET activities

As outlined at the beginning of this report – Tuvalu identified its main priority for EU-PacTVET intervention is the support for the community biogas project (SPC-GIZ ACSE Component 1). It is anticipated that EU –PacTVET will provide training on compressor manufacture and maintenance and installation, maintenance and operation of household digesters. Training will also be given on safe operation of compressor and digester, animal husbandry and associated agricultural production and use of digestate.

The table below shows current and planned activities that will integrate with this action:

Existing or planned programmes, projects and initiatives at the national level	Complementarity / Lessons
The University of the South Pacific European Union Global Climate Change Alliance project. (USP EUGCCA) Ref: Hemstock, S.L., Manuella Morris, T. (2015). Biogas as a renewable technology option for small islands. Case Study 9.1. In "The Biomass Assessment Handbook: Energy for a sustainable environment." Second edition. Edited by Frank Rosillo-Calle, Peter de Groot, Sarah L. Hemstock and Jeremy Woods. Routledge: Earthscdan pp 255-262	The successful USP-EU GCCA project in Nanumaga has been use as a blue-print for this type of activity in Tuvalu. Project outputs outlined above should ensure the successful expansion of appropriate biogas installations across the outer islands of Tuvalu.
Alofa Tuvalu "Small is Beautiful" project. Ref: Hemstock, SL; Manuella-Morris, T. (2014) 'Small is Beautiful: An analysis of the NGO Alofa Tuvalu's 10 year renewable energy project in Tuvalu.' In: Pacific Voices: Local Government and Climate Change (USP Press).	This project successfully introduced biogas to Nanumea (Tuvalu) and was used as the blueprint for USP-EU GCCA activities in Nanumaga. This project scales up these initiatives.
The Secretarial of the Pacific Global Climate Change Alliance project. (SPC GCCA)	One of the lessons learned from the SPC GCCA project has led to the inclusion of "project management" training in this project. This project builds on the findings of the SPC GCCA.
Taiwan Technical Mission – improve agricultural production and food security.	Will be engaged to provide support for establishing family gardens. Will work towards achieving food secure outer islands.
Tuvalu National Adaptation Programme of Action 2 (NAPA2). "…to strengthen fair and inclusive development through this project. We are looking at how we can contribute to the development of rural sectors, outer islands and communities, which are in need of development." The Min. of Foreign Affairs, Trade, Tourism, Environment and Labour, HonTaukelina	The proposed activities will complement those of NAPA2 as they will build capacity of outer island communities in the areas of food and energy security. The activities should also improve livelihoods for the outer island communities.

Existing or planned programmes, projects and initiatives at the national level	Complementarity / Lessons
SPC-USP EU PacTVET project aims to enhance Pacific – African, Caribbean and Pacific's (P-ACPs) regional and national capacity and technical expertise to respond to climate change adaptation (CCA) and sustainable energy (SE) challenges.	As described in the wider text, EU PacTVET will partner with all capacity building and linked activities. Capacity building for CCA and SE in outer island communities will also lay the groundwork for other initiatives such as USP EU GCCA Phase 2 and NAPA2.
There are a range of TVET initiatives regionally that this project will complement. For example: SPBEQ and FHEC "mutual recognition of qualifications" initiatives, and APTC, VOCTEC, PPA and the Sustainable Energy Industries Association of Pacific Islands (SEIAPI) training. Additionally, a new UNDP/UNESCO TEVET and migration project is just beginning in Tuvalu.	22 Tuvaluan participants recently benefited from USP EU GCCA, VOCTEC and APTC TVET Training of Trainers initiatives (2010-2014). This project will hopefully use personnel trained in these to implement some of the proposed capacity building activities. Networks and partnerships will be pursued and established with similar activities in Tuvalu and across the region.

Sustainable energy:

Gap/Skill Needed	Level	Training type/ intervention	Who	Content/Competencies
ToT for Solar PV system design skills Solar PV system installation skills Solar PV systems O&M skills	Advanced	Technical training for existing TEC staff – couls TEC be a registered training organization? Train existing staff at TMTI – could TMTI provide solar PV training?	EU PacTVET supported – TEC and TMTI	Trained to international industry standards (grid connected and stand-alone systems)
Solar PV system design Solar PV system installation Solar PV systems O&M	Basic to advanced	Course design and implementation	Courses offered at TEC or TMTI	Content based on international standards for grid connected and stand-alone systems
Energy auditing and efficiency	Basic to advanced	Course design and implementation	Courses offered at USP Tuvalu Campus – on-line mode	Energy audit Rational use of energy Labelling and appliance standards
Biogas system design, installation, operation and maintenance	**Basic**	**Course design and implementation**	**Courses offered by NGO sector**	**Safety, installation, operation and maintenance, feedstock mixing, animal husbandry, use of digestate – associated water management and food security/agriculture trainig**

Climate change:

Gap/Skill Needed	Level	Training type/ intervention	Who	Content/Competencies
Disaster risk reduction and disaster response	Basic to advanced	TOT and Course design and implementation	Courses offered at Tuvalu Red Cross and in NGO sector	Various – to be determined
Climate science and meteorological services	Basic to advanced	ToT & Course design and implementation	Courses offered at USP Tuvalu – on-line	Basic climate science, competencies based on International Meteorological Service standards – World Met Org support
Agriculture and food security – linked to biogas progect (ACSE Component 1)	Basic to advanced	Course design and implementation – integration into existing USP/TMTI/ Taiwan mission/ Ministry of Agriculture programmes	Courses offered by NGO sector and USP/ TMTI	Crop resilience knowledge-based skills; Soil adaptability knowledge-skills; Crop seasonal cycles knowledge-based skills; Crop/food preservation skills – traditional skills; Pest/weed control skills; Knowledge-based and implementation skills on agro-forestry; General food handling and hygiene skills
Water security	Associate Degree & Certificate of Achievement	Course design and implementation - Integrate in existing courses at CITTI	USP with SPC support	Plumbing; Water collection and preservation skills; Water purification and testing skills; Watershed management; Enforcement of regulations

Participants identified all these priorities, however those identified as immediate priorities are in red text

Transferable Skills:

Gap/Skill Needed	Level	Training type/ intervention	Who	Content/Competencies
Project Management	Basic- Advanced	Course design and implementation - Integrate in existing courses at USP	USP with SPC support	Project design skills; Community engagement; Audit/ accountability; Monitoring and evaluation; Sourcing funding; Networking skills; Planning and time management skills
Business skills	Basic to Advanced	Course design and implementation - Integrate in existing courses at USP & ILO	USP with SPC support – can be offered in NGO sector	Costing and pricing; business analysis and planning; marketing plan creating; enterprise operations and management; product development, value-adding, and branding skills
Data analysis	Basic to advanced	Course design and implementation - Integrate in existing courses at CITTI	USP with SPC support – can be offered in government sector	Types of data, sources of data, questionnaire design, research skills, data analysis, data entry, basic statistics

Participants identified all these priorities, however those identified as immediate priorities are in red text

6. Consultation Outcome

Present and future marked demand for TVET in Tuvalu has been identified and existing training supply mapped.

Tuvalu identified its main priority for EU-PacTVET intervention is the support for the community biogas project (SPC-GIZ ACSE Component 1).

Current TVET and tertiary education generally in Tuvalu has been highlighted as not fulfilling the countries development needs.

By providing a “skill-set” approach to CCA and SE training EU PacTVET could go some way to providing educational linkages to economic priorities and job creation – especially in the areas of renewable energies such as solar and in project management and DRM as funding for projects in these areas is set to continue.

SPC Secretariat of the Pacific Community

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EU PacTVET

European Union Pacific Technical and Vocational Education and
Training on Sustainable Energy and Climate Change Adaptation Project

Training Providers

Table TP1 provides information on the only Tuvalu training institutes identified in the study. GSES project team member Geoff Stapleton interview Mr Toma Mesako from Tuvalu Maritime Training Institute (TMTI) while in Tuvalu conducting a training course. Mr Mesako indicated that TMTI would be interested in conducting solar training courses; he indicated that he would complete the survey, however it was not returned. Based on the interview GSES estimates their capabilities as shown in Table TP2.

Table TP1: Training Institutes Identified in Tuvalu

Institute	Contact	Position	E-mail	Phone
Tuvalu Maritime Training Institute	Mr Toma Mesako	Chief Officer	tmesako@gmail.com	

Table TP2: TMTI Capabilities estimated by GSES

Does your TVET have any department that could conduct any of the following types of courses	Yes or No?
Renewable Energy Technologies?	Yes
Grid Connect PV Systems?	Yes
Off Grid PV Systems?	Yes
Solar Hot water?	No
Wind Power Systems?	??
Hydropower?	
Micro-Hydro Power?	
Biomass?	Yes
Biogas?	Yes
Geothermal	
Others	

technologies?	
Energy Efficiency?	Yes
Refrigeration?	Yes
Air-conditioning?	Yes
Electrical wiring?	Yes
Efficient land and water transport systems?	
Energy sector planning and management?	

Based on the project team's experience and the survey response, 4 x solar related courses were identified as having been conducted in Tuvalu in the last 5 years. Information on the courses is contained in Appendix 15.

In summary these included;

- Solar PV Mini-Grid Training Workshop
- Training Workshop on SMA Off-Grid Inverters and Save Controller
- Household energy survey training for surveyors and power utility staff-
- Design and Install Grid connect PV Course

In addition to these courses, 4 staff members of the Tuvalu Electricity Company have undertaken the GSES online courses and travelled to Australia to undertake the practical training.

The grid connect PV course was conducted by GSES, a company which is a Registered Training Organisation in Australia. Those who passed are eligible to apply for industry certification under the Pacific Power Association (PPA) and Sustainable Energy Association of Pacific Islands (SEIAPI) certification and accreditation program.

The VOCTEC course had the intention of capacity building

Biogas, biodiesel, bioethanol, solar powered transportation and gasification equipment are all installed at TMTI by the NGO Alofa Tuvalu. Training of trainers on all these technologies was provided and equipment installed at TMTI. Some TMTI students, and around 500 people in Tuvalu have received training on biogas, gasification and biodiesel.