

# TUVALU COMMUNITY BIOGAS PROJECT RISK MATRIX ASSESSMENT



**SPREP**

Secretariat of the Pacific Regional  
Environment Programme

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Environment Programme

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## RISK MATRIX ASSESSMENT

LIKELIHOOD (OF EVENT)	CONSEQUENCES (OF EVENT)				
	Insignificant	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

Low

Medium

High

Extreme

This risk matrix was prepared for the ‘Tuvalu Community Biogas Project’ – a project which is being implemented with support from the Pacific Community (SPC) and German International Co-operation Agency (GIZ), and is part of a regional program funded by the European Union (EU) entitled the ‘Adapting to Climate Change and Sustainable Energy’ (ACSE) program.

The primary objective of the project is to increase the supply of energy to Tuvalu communities from biogas technologies. The key strategies comprise:

- demonstration of biogas system installation and operation at the household scale;
- a biogas “how to toolkit” which will cover all relevant technical information needed by households (and Falekaupule and Kaupule) to source, install, operate and maintain the biogas system;
- formal technical vocational trainings on the installation, operation and maintenance of the technology; and
- scientific technical report on methane production from the technology.

The expected useful life of a biogas system is 20–30 years.

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Low
Medium
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## CLIMATE CHANGE AND DISASTER RISK MATRIX FOR THE TUVALU COMMUNITY BIOGAS PROJECT

1. NATURE OF RISK		2. MAGNITUDE OF RISK			3. RISK TREATMENT STRATEGY	
External factor	Component of project design/logic affected by external factor	Likelihood of external factor occurring (almost certain, likely, possible, unlikely, rare)	Consequence of external factor, if it occurs (insignificant, minor, moderate, major, severe)	Overall risk rating (low, medium, high, extreme)	Risk treatment measure	Overall risk rating, with risk treatment (low, medium, high, extreme)
Drought (defined as rainfall less than 30% of the monthly mean for more than two consecutive months)	Freshwater is an input to the digester. If freshwater is not available, then production of methane will be reduced in that period (i.e. short-term loss of production).	Possible under “most likely” climate future scenario <sup>1</sup>  Likely under “worst case” climate future scenario <sup>2</sup>	Moderate <sup>3</sup>	Medium/High	Prudent to develop contingency plan. This could include actions such as use of greenwaste as temporary substitute for water. <sup>4</sup>  Also need to make sure that existing rainwater tank infrastructure is properly maintained and that contingency storage is available when droughts occur.  These practices will be incorporated into the ‘toolkit’ and TVET modules.	Low
Cyclone	Cyclonic winds and associated debris can damage the biogas system infrastructure, requiring repair or replacement. Damage, in turn, will also cause subsequent losses in methane production.  If cyclones also bring wave action and saltwater inundation, this may also spoil the digestate in the system as well as pig dung in pens. More info on nature of inundation impacts is outlined in row below.	Likely under “most likely” climate future scenario <sup>5</sup>  Likely under “worst case” climate future scenario <sup>6</sup>	Major <sup>7</sup>	High	Fixing digesters into positions where they are partially sunk into the ground  Potentially expel gas from the digester prior to the cyclone to reduce the chances the lid will be blown off.  Avoiding the use of pig dung that may have been contaminated by salt water from a cyclone’s storm surge.  These practices will be incorporated into the ‘toolkit’ and TVET modules.	Low/ Medium
Sea level rise and storm surge	Salt water inundation into the actual digester will spoil the digestate in the system -requiring cleaning of the system and also loss of production for about 6 weeks. <sup>8</sup>  Also, salt water inundation into pig pens will spoil pig dung (key input to production) which in turn will cause loss of production.	Almost certain <sup>9</sup> , increasing over time	Moderate <sup>10</sup>	High	Locate the digesters and pig pens outside the storm surge zone  When a pig pen is flooded, avoid using the dung until the pig pen has been cleaned out.  These practices will be incorporated into the ‘toolkit’ and TVET modules.	Low

- 1 this is 1 in every 50 years and is based on a simple analysis of historical rainfall data provided by the Tuvalu Met Office. note also that the project life is maximum 30 years over which time the incidence and duration of drought is not forecasted to worsen under “most-likely” climate scenarios (Pacific Climate Futures Version 2).
- 2 this is crude adjustment to the “most likely” scenario taking into account statements in the Tuvalu Country Report for the report Climate Change in the Pacific: Scientific Assessment and New Research (2014) that (i) there is only moderate confidence in abovementioned Pacific Climate Futures (version 2) forecast that drought will not worsen under “most-likely” climate scenario; (ii) historical rainfall data – used as primary basis for drought incidence above – is statistically insignificant; and (iii) severe droughts (though not defined) are expected to occur once every 20 years.
- 3 based on experience from previous biogas pilot project – the USP EU GCCA project. Pers comms Sarah Hemstock, SPC.
- 4 this was found to be an effective adaptation measure implemented for the previous biogas pilot project – the USP EU GCCA project. Pers comms Sarah Hemstock, SPC.
- 5 This is based on a return period of 1 every 25 years. According to the Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation (CSIRO, 2014) Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports 2014, 31 tropical cyclones passed within 400km of Funafuti during the period 1969 to 2010. However, it would appear that major damage has only occurred on land twice during that period (Cyclone Bebe in 1972 and Cyclone Pam in 2015). This same report further states that in the medium term future the frequency of cyclones in the Funafuti area is expected to decrease, though the intensity is expected to increase.
- 6 this is approximated at 1 in every 20 years and is crudely based on Tuvalu Country Report for the report Climate Change in the Pacific: Scientific Assessment and New Research (2014) that there is *only moderate confidence in forecasts for cyclone frequency and intensity*.
- 7 expert judgement of Jim Binney (Mainstream Economics and Policy).
- 8 based on experience from previous biogas pilot project – the USP EU GCCA project. Pers comms Sarah Hemstock, SPC.
- 9 Storm surges are currently a problem in some low-lying areas of Tuvalu and this hazard will incrementally increase over time under climate change.
- 10 based on experience from previous biogas pilot project – the USP EU GCCA project. Pers comms Sarah Hemstock, SPC.

The **Pilot Program for Climate Resilience: Pacific Regional Track (PPCR-PR)** is a regional program which aims to strengthen integration of climate change and disaster risk considerations into 'mainstream' policy making and related budgetary and decision-making processes (i.e. 'climate change and disaster risk mainstreaming').

*The PPCR-PR is implemented by the Secretariat of the Pacific Regional Environment Program (SPREP) and Asian Development Bank (ADB) and is funded through the Climate Investment Funds (CIF).*



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