



EMERGING RENEWABLES PROGRAM

GUIDANCE TO APPLICANTS

ESTIMATING THE PROJECT'S COST OF ELECTRICITY GENERATION

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Introduction

One of ARENA's objectives is to assist in driving down the cost of renewable energy generation through support for innovative new technologies. With such a diverse range of renewable energy projects to consider, it is important for ARENA to have a clear understanding of the relative costs of generation of each technology.

Applicants whose projects involve generation of electricity can help ARENA in this aspect of the assessment process by providing clearly defined estimates of all of the costs of building and operating the proposed generating facility, together with some key assumptions about the likely operational performance of the generating plant.

In addition, ARENA would appreciate the views of the applicant on how the costs of generation would be expected to decrease in the future, as the technology is demonstrated and deployed. ARENA would be interested to know the potential for improvement in the various cost components and performance, so that a view can be formed about the potential for overall reductions in the cost of generation.

This information has been prepared to give potential applicants to the ERP a brief overview of the sorts of cost and performance data that ARENA would like ERP applicants to submit as part of their application (under Projects Merit Criterion A – Potential to deliver economic benefits).

This information can be used by ARENA to calculate an indicative cost of generation (or 'levelised cost of electricity generation') for the proposed project, with a view to comparing the prospective cost with other renewable energy generation technologies, and assessing the potential for reductions in the cost of generation as the technology is further developed.

Comparisons of these estimates of levelised costs of electricity will NOT be used as the basis for selecting successful projects. It is understood that the levelised cost of generation for a first of a kind generation technology project will always be high in comparison to mature, commercial generation technologies. The purpose in seeking this information is to develop an informed view about indicative cost of generation of the technology, and the realistic potential for reducing the costs of generation of the technology in future.



The provision of this cost and performance data by ERP applicants is voluntary, but ARENA would appreciate these estimates being provided by ERP applicants, where possible. All information received will be treated with the appropriate confidentiality.

Data Requirements

The cost of electricity generation reflects the minimum price that an electricity generator must sell its electricity for in order to repay all the costs of electricity production over the life of the generation project. In order to estimate the cost of generation for a project, you need to estimate or identify:

- (a) All of the project's cost over the life of the generating plant; and,
- (b) Three key operational parameters – the plant maximum capacity (MW), capacity factor (%) and the operational life of the generation plant (years).

Cost Components

The cost components and performance assumptions may vary significantly for different types of renewable energy technologies. However, the total cost of a project can generally be broken down into two main categories – fixed and variable costs – where fixed costs are independent of the electricity output of the plant, and variable costs vary in line with plant output.

The following list provides an indication of the basic fixed and variable project costs that applicants should seek to identify and include as part of the Project Funding Application, should they be invited to submit one. Due to the word limit restrictions at the EOI stage, it is recommended that applicants make reference to the fact that these costs have been established and will be supplied if the application progresses to the second stage.

Fixed Costs

- Capital costs (i.e. all costs associated with the engineering, procurement and construction phase of the project)
- Interest payments on any debt associated with the project, and/or the required return on equity invested in the project
- Fixed operating and maintenance costs (e.g. staff salaries, replacement parts, insurance)
- Decommissioning costs
- Contingencies

Variable Costs

- Fuel costs (e.g. energy input costs including fuel transportation costs)
- Variable operating and maintenance costs (e.g. cooling water costs, waste management)

Performance Assumptions

In order to estimate the costs of generation, it is also necessary to understand three key operational parameters of the plant – the plant maximum capacity, capacity factor and the operational life of the plant.



The *plant maximum capacity* of a generation plant is its maximum sustained ability to generate electricity expressed in megawatts (MW).

The *capacity factor* of a generation plant is the ratio of the annual energy production from the plant over the energy production of the plant if it operated continuously at its maximum capacity for a year, and is usually expressed as a percentage.

For example, a generator that operated at maximum capacity for 12 hours a day, every day of the year, (and zero at all other times) would have a capacity factor of 50%.

The *operational life* of the plant is simply how long the generation plant will operate for, before having to be replaced or decommissioned, generally expressed in number of years.

ARENA would therefore appreciate ERP applicants whose projects involve the generation of electricity providing information and/or assumptions regarding these operational parameters of their proposed project.

Further Information

The following references might be useful for applicants who want further information on the process of estimating the costs of electricity generation of various technologies, or on currently available electricity cost estimates for various technologies.

- The IEA report *Projected Costs of Generating Electricity – 2010 Edition*, available at: http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=2207
- CSIRO publication *Unlocking Australia's Energy Potential*, 2011, available at: www.ret.gov.au/energy/Documents/Unlocking_Australias_Energy_Potential.pdf
- Australian Academy of Technological Sciences and Engineering (ATSE) *Low Carbon Energy*, 2010, available at: <http://www.atse.org.au/resource-centre/ATSE-Reports/Energy/>
- National Renewable Energy Laboratory on-line levelised cost of energy calculator, available at: http://www.nrel.gov/analysis/tech_lcoe.html