

2021 Final Year Project Definition Form

Project Title:

Performance monitoring and trend analysis towards the determination of potential benefits that could be unlocked by the optimisation of cleaning frequencies and practices of solar photo voltaic (PV) panels.

Company details:

(Please include company information, such as: company name, physical address, web site, etc.)

Next Renewable Generation (Pty) Ltd, 89 Protea Ave, Atholl, Sandton, 2196

www.nrgeneration.com

Company background:

(Please provide a brief background of the company/industry and the project environment)

Next Renewable Generation (NrG) (previously known as Kayema Energy Solutions) was originally founded in 2008 and has become a well-established entity in the South African energy market. Keeping abreast with new technologies and energy solutions, it was named Energy Company of the Year by the South African Energy Efficiency Agency in 2010 and nominated for the *Energy Efficiency Project of the Year* in 2011. NrG has focused its capabilities by offering a variety of financial solutions for renewable energy projects as an alternative to straight capital purchases.

In 2015, NrG acted as the African unit of the largest Independent Power Producer (IPP) of the USA (NRG Energy Inc.). Through this previous partnership, NrG retains the Technical, Financial and Legal expertise, financial models and documentation gained through NRG USA and leverages a continued working relationship with local and international funding institutions. NrG is now a locally owned entity.

NrG has executed Power Purchase Agreements (PPAs) across retail and commercial industries and education facilities, with assets currently operating at clients such as Coega Dairy, Smollan, Massmart, and The University of Pretoria. It has strong partnerships with industrial clients who are motivated by carbon-footprint reduction goals and the drive for sustainability in all spheres of their business. NrG is broadly categorised as a sustainability company with a focus on energy and water. The team is highly experienced in project development, EPCM, oversight, delivery of quality assured projects and consulting. Based on this reputation NrG qualified as a Tier 1 Energy Services Company (Esco) on the SANEDI Esco Registry.

The proposed project is aimed at optimisation of the existing PV plants currently being managed by NrG under PPA agreements with our clients. The student will be able to access these sites, such as the six buildings at UP that have installed PV systems. All relevant data obtained from the PV systems will be shared with the student for trending and interpretation.

Project description:

(Please stipulate the problem statement or opportunity for improvement, and the project scope)

Problem Statement:

Installed PV systems need to be actively managed and maintained by NrG to ensure the expected return on investment is met. Due to the nature of the systems, they are exposed to the elements resulting in the accumulation of dirt and other debris on the solar PV panels. This has an impact on the total efficiency of energy generation and the systems must be cleaned to mitigate the impact. Cleaning can be a resource intensive and costly activity though and will erode savings if unoptimized.

Opportunity for improvement:

The improvement opportunity will be realised by balancing the cleaning costs and frequency against the savings lost due to underperformance.

Project Scope:

The project envisaged should incorporate the following:

- 1) Conduct a literature review on this topic.
- 2) Evaluate different soiling metrics. This will include:
 - a. analysis of relevant parameters typically available
 - b. physical inspections
- 3) Cleaning optimisation. This will include:
 - a. scheduling optimisation e.g., use of predictive tools to determine timing of cleans
 - b. methodology analysis of cleaning practices
 - c. trend analysis to predict cleaning impact
 - d. market analysis of cleaning costs
 - e. financial analysis of cleaning regime scenarios
- 4) Evaluation of data generated from the solar PV plants under NrG's management.
- 5) Incorporate Industrial Engineering (IE) methods to improve the efficiency of the cleans

Industry mentorship:

A: Prof Bettie Lodolo (Project Development Manager)

S: Douglas Cooper (Project Engineer)

Industry mentor contact details:	<i>(Surname, name, title)</i>	<i>(E-mail address)</i>	<i>(Phone/ mobile)</i>
	Lodolo, Bettie, Prof	bettie.lodolo@nrgeneration.com	082 921 7720

Project topic application process:

*(Please stipulate your preferred application process and your application deadline for allocating a student to a project. Note that **students need to submit their industry-allocated projects by 30 March (strict)** where after each student will be allocated to an UP-supervisor).*

Student applications: January 2021

Student Interviews: February 2021

Student appointed: 26 February 2021

Any other relevant information:

(Please include any other relevant information)