Request for Proposals

Energy Land Hydrogen Gas Generation and Storage Demonstration

# Introduction

Embry-Riddle Prescott Campus is interested in creating an energy lab called Energy Land that would be a hands-on learning experience for aspiring engineers to draw them to the study of alternative energy. The proposed Energy Land will include demonstrators of alternative energy sources such as solar, wind, hydropower, fuel cells, etc. Hydrogen fuel is one exciting area of research in the field of alternative energy which can be illustrated in Energy Land.

Embry-Riddle Prescott Campus has had a 1-Watt fuel cell for many years to demonstrate alternative energy sources to aspiring mechanical engineers. The fuel cell is not currently being used due to lack of access to hydrogen gas to fuel it. With the creation of Energy Land, there is an opportunity to use the Embry-Riddle fuel cell while also demonstrating the creation and storage of hydrogen gas.

We are requesting proposals for the problem statement listed below. All proposals must meet the listed requirements, and be presented in the requested format, in order to be considered.

# Problem Statement

We seek a proposal for a hydrogen generating device to go in Energy Land. Hydrogen needs to be produced and stored to demonstrate the production of hydrogen and the possibilities of hydrogen as a fuel. In order to solve this problem, the following requirements need to be met.

# Requirements

## 1.0 Function

1.1 The system must produce hydrogen gas.

1.1.1 The system must produce enough hydrogen gas to run the fuel cell for 10 minutes at 1 watt.

1.2 The system must store double the previously specified amount of hydrogen gas.

1.3 The system must be able to use both alternative energy sources and grid power.

1.3.1 The system must be able to switch from grid power to alternative energy sources automatically.

## 2.0 Safety

2.1 The system must allow for safe extraction of hydrogen gas without risk of death to both the operators and viewers.

2.2 The system must follow Embry-Riddle Prescott Campus’ safety requirements.

## 3.0 Educational

3.1 The system must serve as an educational demonstrator or lab device for the public.

3.1.1 The system should be visible for educational purposes.

3.1.1.1 The system components can only be buried if they produce a risk of injury to onlookers.

3.1.2 The system must have labeled components.

3.1.2.1 The system must display the amount of hydrogen gas being produced.

3.1.2.2 The system must display the volumetric flow rate of hydrogen gas.

3.1.2.3 The system must display the exact amount of hydrogen gas stored along with the pressure and temperature in the tank.

3.1.3 The system must have a learning feature about the hydrogen economy and where it could go in the future.

3.1.4 The system must display all values used for demonstration purposes in English units.

## 4.0 Performance

4.1 The system efficiency of the unit must be at least 50%.

4.1.1 The fuel entering the system will produce hydrogen gas at 50%.

4.2 The system must include a proposed Energy Land layout.

4.2.1 The system must be located near the fuel cell demonstration. This can be overruled by 3.1.1.1.

4.3 The system must be able to run for 4 consecutive hours.

4.4 The system must meet IP code 57W.

## 5.0 Human Factor

5.1 The system must include notifications and alarms to alert the operators and observing individuals.

5.1.1 The system must include sensors and alarms if detection of excess hydrogen gas occurs outside of the system alerting individuals to evacuate.

5.1.2 The system must include a fire/smoke detection system to alert the surrounding public.

5.1.3 The system must include an extreme temperature warning alarm.

5.1.4 The system must include the proper signage needed for safety and evacuation purposes.

5.2 The system should be easy to operate by a trained tour guide.

5.2.1 The system should be only operable by authorized users.

# Proposal Preparation and Submission Instructions:

## Format

All proposals must be a maximum of 20 pages using a serif typeface and no smaller than 11-point type.

## Required Sections

All proposals must include a Cover Page, Contact Information, Project Description, Installation Details, Operations, and Budget. Any applicable additional sections may be included for review.

## Submission

All proposals must be submitted to Hannah Spiller ([spillerh@my.erau.edu](mailto:spillerh@my.erau.edu)) before 5pm on October 12th. No late submissions will be accepted.

# Timeline

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| **Deliverable** | **Due Date** |
| Design Concept Review | Fri, 10/7 |
| Design Concept Proposal | Wed, 10/12 |
| Design Specification Document | Thurs, 11/10 |
| Preliminary Design Review | Fri, 12/2 |
| Design Report and Verification Plan | Sun, 12/11 |