

# Software Requirements Specification For BioDiesel Web App

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1.0

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## Revision History

Version	Date	Name	Description
1.0	2/21/18	Patrick V	Initial Documentation

# 1. Introduction

## 1.1. Overview

This document defines the requirements for the Biodiesel Production Web Simulation system that is being developed for Dev Shrestha and the college of Agriculture Sciences at the University of Idaho. The purpose of this document is to represent the system requirements in a readable way so that clients and stakeholders can understand them and verify them for correctness but with enough detail that developers can design and implement a software system from them.

This document doesn't address project issues such as schedule, cost, development methods, etc. That documentation will be contained separately in a Google Drive Folder, the project's Github, and a Slack channel.

The Biodiesel Production Web Simulation system is a web-based tool for teaching users about the biodiesel production process. It provides a way for students of the program to run through the simulation before physically making biodiesel themselves.

## 1.2. Goals and Objectives

The main goals of the biodiesel production web simulation are:

- Provide an intuitive, interactive way for users to learn the creation of biodiesel.
- Act as an education enhancement to the college's biodiesel program.
- The system should provide feedback to the user when things go wrong.
- The simulation should directly represent the University of Idaho's biodiesel laboratory.

## 1.3. Scope

The innovative biodiesel production web simulation will provide a step-by-step biodiesel creation process. It will take the user from the used cooking oil collection process all the way to the finished product.

## 1.4. Definitions

**Use case** – describes a goal-oriented interaction between the system and an actor. A use case may define several variants called scenarios that result in different paths through the use case and usually different outcomes.

**Scenario** – one path through a use case

**Actor** – user or other software system that receives value from a use case.

**Role** – category of users that share similar characteristics.

**Product** – what is being described here; the software system specified in this document.

**Project** – activities that will lead to the production of the product described here. Project issues are described in a separate project plan.

**Controls** – the individual elements of a user interface such as buttons and check boxes.

### **1.5. Document Conventions**

Portions of this document that are incomplete will be marked with TBD. Each TBD item will have an owner and estimated date for resolving the issue.

Other portions of this document that are incomplete may have TBE (to be extended). Each TBE will also have an owner and estimated date for gathering the information necessary to complete the requirements specification. There is the possibility that the section with TBE will never need to be extended or contain any content whatsoever.

### **1.6. Assumptions**

*TBE*

## **2. General Design Constraints**

### **2.1. Product Environment**

The biodiesel production web simulation will be a stand alone single page web application that will be another resource for users of the following website:

- <http://biodieseleducation.org/>

We assume that it will fall under the Education section. We will provide the security, authentication, etc. as needed. As design goes forward, we will set up a relational database such as MS SQL Server Express.

### **2.2. User Characteristics**

The predominant users are assumed to be students of the College of Agriculture's biodiesel program. The audience could also be high school students and anybody interested in the biodiesel creation process as anyone could be in favor of sustainability. We will design and develop the system with the college students in mind as the highest priority audience.

### **2.3. Mandated Constraints**

*TBE*

### **2.4. Potential System Evolution**

*TBE*

## **3. Nonfunctional Requirements**

*TBE*

### **3.1. Usability Requirements**

*TBE*

### **3.2. Operational Requirements**

TBE

### **3.3. Performance Requirements**

The application should have no lag when performing computations related to the various chemical interactions that take place. *TBE*

### **3.4. Security Requirements**

*TBE*

### **3.5. Legal Requirements**

*TBE*

### **3.6. Documentation and Training**

The system will provide documentation that details how users can interact with the system. With time permitting, we will also provide an interactive tutorial of the simulation.

### **3.7. External Interface**

External interfaces may be user interfaces or software interfaces.

#### **3.7.1. User Interface**

The feel of the system will be an animated, two dimensional interface. It will only be ran on a desktop (not mobile). The user interface will be supplemented with documentation and possibly a walk through tutorial; however, 75% of users will be able to 80% of the features within 5 minutes without prior training.

#### **3.7.2. Software Interface**

TBE

## **4. System Features**

The system will provide the following *must have* features:

- User collects crude oil with interactive map
- User tests levels of fatty acid and water content
- Pump user specified amount of oil into reactor
- User chooses catalyst for reaction
- User takes the oil through the 80/20 process
- User water washes the oil
- User dries the oil
- Cost-Benefit Analysis

The system will potentially have the *nice to have* features:

- The user can take finished oil into a testing laboratory to test equality

## ***4.1. Feature: User collects crude oil with interactive map***

### **4.1.1. Description and Priority**

User makes an oil collection run around a simulated map such as one about Moscow and the various locations users can get oil in Moscow, Idaho. User must collect enough oil and try to do so in a cost efficient matter.

Cost: medium

Risk: low

Value: high

### **4.1.2. Use Case: Collect Oil**

User starts from the University of Idaho lab and clicks on various locations to collect oil. Each choice costs time and fuel along with how many gallons collected. The system provides the user with the running cost and oil yield.

## ***4.2. Feature: User tests levels of fatty acid and water content***

### **4.2.1. Description and Priority**

User will be able to test the levels of fatty acid and water content to decide whether or not this oil should be used for biodiesel production.

Cost: medium

Risk: low

Value: medium

### **4.2.2. Use Case: Test for Quality**

User clicks on different tools the system provides and tests the oil. The system provides a response detailing the properties of the crude oil.

## ***4.3. Feature: Pump user specified amount of oil into reactor***

### **4.3.1. Description and Priority**

User can decide how much crude oil they want to use to create biodiesel.

Cost: medium

Risk: low

Value: high

### **4.3.2. Use Case: Transfer Crude Oil to Reactor**

User clicks on transfer button, specifies from/to location, and finally specifies amount.

#### ***4.4. Feature: User chooses catalyst for reaction***

##### **4.4.1. Description and Priority**

User can choose what catalyst to use for reaction which has a different cost/benefit value.

Cost: medium

Risk: low

Value: high

##### **4.4.2. Use Case: Choose Catalyst**

User clicks on one of several catalysts and specifies how much to use.

#### ***4.5. Feature: User takes the oil through the 80/20 process***

##### **4.5.1. Description and Priority**

User must use their specified catalyst amount and split it into a two step process.

Cost: medium

Risk: low

Value: high

##### **4.5.2. Use Case: 80/20**

User can specify how much catalyst they want to use for the two step process. The user will specify the first percentage of catalyst to use, and then the percentage for the second amount of catalyst to use.

#### ***4.6. Feature: User water washes the oil***

##### **4.6.1. Description and Priority**

User water washes the oil to remove impurities.

Cost: medium

Risk: low

Value: high

##### **4.6.2. Use Case: Water Wash to Remove Impurities**

User chooses how many times to water wash the oil before moving forward to the next step.

#### ***4.7. Feature: User dries the oil***

##### **4.7.1. Description and Priority**

User heats up oil to remove the H<sub>2</sub>O content that is in the oil.



Cost: medium

Risk: low

Value: high

#### **4.7.2. Use Case: Remove Water**

User chooses how hot to heat the oil, how long to heat it, and how many times to heat it.

### **4.8. Feature: Cost-Benefit Analysis**

#### **4.8.1. Description and Priority**

A running tally of the total cost is provided along with tradeoffs at each step.

Cost: medium

Risk: low

Value: high

#### **4.8.2. Use Case: User Optimizes the Biodiesel Creation Process**

System provides user with costs for every action depending on current prices of required material, distance traveled, and time used.