# MVC Web Application - Project Brief

## Overview

The client is a green energy provider who wants to help educate energy consumers (customers) on the sources of energy they consume, the energy usage of their electrical appliances, and the impact this has on the environment. The project is to develop a web-based application that allows customers to track the energy usage of their appliances and the sources of the consumed energy, that application will provide statistics about the energy usage and sources (based on the location of the customer in the country), users will also be able to post their statistics to a public leaderboard to help compare with other customers.

The project is to develop a user-friendly web application aimed at mobile users, following a mobile-first design philosophy. This application will enable customers to record and analyse the energy usage of their household appliances. It will provide insightful statistics on energy consumption, correlating the data with the geographical sources of energy. Additionally, the platform will feature a public leaderboard, encouraging users to share their energy consumption statistics, fostering a community-driven approach to energy awareness and conservation.

## Features

### Locations

This feature requires client-side scripting for filtering and structuring of data for presentation using a view. It provides a list of locations and search capabilities. Each item in the list should include the name of the location, the state, the total energy consumption per day (in watt hours) and the number of appliances. There should be buttons on each list item, one for viewing location statistics, and the other for editing the location. There should also be a button for creating new locations.

### Edit Location

This feature requires a client-side scripted Model-View-Controller (MVC) implementation for CRUD operations of data stored using the LocalStorage API. It allows users to create and edit locations and the details of appliances at those locations. The user must be able to specify the name of the location, state / territory, and each of the appliances at the location (including the appliance type, the hours used per day, and the quantity of that appliance). The appliances for that location should be listed, with a delete button associated with each.

### Location Statistics

This feature uses client-side scripting to compute values based on Model data and present the data using a View. It displays statistics about energy usage and sources for a specific location. The statistics should include at least a visualisation of the division of energy used from different sources and the totals used from each source in watt hours. Additional statistics can be added if time allows.

### Public Leaderboard

This feature requires a server-side scripted MVC implementation for CRUD operations of data stored using an in-memory store or simple database. It uses HTTP GET, POST, PUT, and DELETE methods, and the client-side view must fetch/request using each of these methods at least once. It allows users to view the leaderboard, post their statistics, update their statistics, and delete statistics. The public leaderboard should be presented as a list of all posted statistics, sorted by the sources with renewable sources listed higher. There should be a delete button on each post that allows users to clear old or invalid entries.

### Public statistics (energy usage and sources for all data in the leader board).

This feature requires server-side scripting to compute values based on model data, which is then accessible by the client-side for display in a view. It displays energy usage and sources for all data in the leaderboard. The computed statistics to display will be the national usage by energy source, displayed in watt hours and visualised as a division of each using charts or similar.

## Validity

All source code implemented for this project must comply with the relevant standards and be free from errors when validated. This includes, but is not limited to, the standards set out by the World Wide Web Consortium.

## Accessibility

All interfaces should be at least 90% compliant with the Web Content Accessibility Guidelines – Level AA standard.

## Security

All data processed by the application should be validated and sanitised before use. The user should receive feedback when invalid data is provided. The backend must not allow any kinds of code injection or related attacks.

## Data

You have been provided with sample datasets and data structures related to the project. You may improve and add to these datasets, but all original data and functionality must be maintained.

The two datasets (energy usage and energy production) are static (read-only) and must be stored on the backend and served via a HTTP API.

The locations data structure is dynamic (in-memory or local storage) and must be stored locally on the frontend.

You will need to implement your own suitable data structure to store, manipulate and read the leaderboard data. It must be dynamic (in-memory or key-value storage) and must be stored on the backend.

### Sample Energy Usage Dataset (JSON Format)

{

"appliances": [

{

"name": "Refrigerator",

"watts": 100

},

{

"name": "Air Conditioner",

"watts": 350

},

{

"name": "Heater",

"watts": 1500

},

{

"name": "Washing Machine",

"watts": 500

},

{

"name": "Dryer",

"watts": 3000

},

{

"name": "Dishwasher",

"watts": 1800

},

{

"name": "Oven",

"watts": 2150

},

{

"name": "Microwave",

"watts": 1000

},

{

"name": "Toaster",

"watts": 800

},

{

"name": "Coffee Maker",

"watts": 900

},

{

"name": "Television",

"watts": 150

},

{

"name": "Computer",

"watts": 200

},

{

"name": "Lamp",

"watts": 60

}

]

}

### Sample Energy Production Dataset (JSON Format)

{

"states\_and\_territories": [

{

"name": "New South Wales",

"energy\_sources": {

"wind": 12,

"solar": 15,

"gas": 25,

"coal": 48

}

},

{

"name": "Victoria",

"energy\_sources": {

"wind": 20,

"solar": 22,

"gas": 30,

"coal": 28

}

},

{

"name": "Queensland",

"energy\_sources": {

"wind": 10,

"solar": 20,

"gas": 25,

"coal": 45

}

},

{

"name": "Western Australia",

"energy\_sources": {

"wind": 15,

"solar": 20,

"gas": 35,

"coal": 30

}

},

{

"name": "South Australia",

"energy\_sources": {

"wind": 40,

"solar": 30,

"gas": 20,

"coal": 10

}

},

{

"name": "Tasmania",

"energy\_sources": {

"wind": 60,

"solar": 20,

"gas": 10,

"coal": 10

}

},

{

"name": "Australian Capital Territory",

"energy\_sources": {

"wind": 30,

"solar": 40,

"gas": 20,

"coal": 10

}

},

{

"name": "Northern Territory",

"energy\_sources": {

"wind": 20,

"solar": 30,

"gas": 40,

"coal": 10

}

}

]

}

### Sample Location Data Structure (JSON Format)

{

    "user\_locations": [

        {

            "name": "Home",

            "state": "Queensland",

            "appliances": [

                {

                    "name": "Refrigerator",

                    "count": 1,

                    "running\_hours": 24

                },

                {

                    "name": "Computer",

                    "count": 2,

                    "running\_hours": 4

                },

                {

                    "name": "Washing Machine",

                    "count": 1,

                    "running\_hours": 1

                }

            ]

        },

        {

            "name": "Work",

            "state": "Queensland",

            "appliances": [

                {

                    "name": "Refrigerator",

                    "count": 3,

                    "running\_hours": 24

                },

                {

                    "name": "Computer",

                    "count": 10,

                    "running\_hours": 8

                },

                {

                    "name": "Lamp",

                    "count": 20,

                    "running\_hours": 20

                }

            ]

        }

    ]

}