ISE 519 – Database Applications in Industrial and Systems Engineering

Final Project Report

Project Title

Alternative Fueling Station Location and Availability Analysis

Team Number

08

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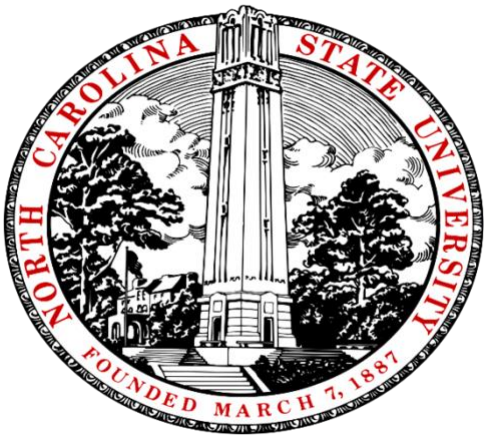

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Client Information

Client Name: National Renewable Energy Laboratory

Data Set: https://catalog.data.gov/dataset/alternative-fueling-station-locations-422f2

The dataset is a CSV file that contains information about every alternative fuel station in the US and Canada, including its address, the types of fuel it uses, and other specifics.

Company Details: The National Renewable Energy Laboratory (NREL), a research facility in Golden, Colorado, is funded by the US government. Its objective is to advance energy efficiency, ecologically friendly transportation, and the engineering and science of renewable energy. NREL conducts extensive research on a number of renewable energy sources, including solar, wind, geothermal, and biomass energy. They also provide technical assistance and training to help businesses and communities adopt renewable energy alternatives.

To minimize our reliance on fossil fuels, the rapidly growing renewable energy sector is committed to developing and deploying sustainable energy technology. The target audience for this dataset of every alternative fuel station in the United States and Canada would be stakeholders in the renewable energy sector, including academics, decision-makers, and business. The location and accessibility of alternative fuel stations, which are essential for promoting the use of clean energy vehicles, would be useful information included in this dataset. The data may be used to improve research on clean energy vehicle uptake and usage trends as well as investment and development decisions for infrastructure.

Problem Statement

For the purpose of lowering greenhouse gas emissions and advancing sustainable energy practices, alternative fuels must be widely used. The lack of information and access to fueling stations, however, is one of the main obstacles to the widespread use of alternative fuels. It is challenging for people and organizations to find and access alternative fueling stations because there is currently no comprehensive directory of these stations across the United States. The adoption of alternative fuels is significantly hampered by the lack of information and access, which also slows the transition to a more sustainable energy future. As a result, there is an urgent need for an extensive database of alternative fueling stations that gives users quick access to details about the availability, location, and types of alternative fuels at different stations.

The interactive system prototype will have details of the alternative fueling stations. The data set contains various attributes like fuel type (natural gas (CNG), ethanol (E85), propane/liquefied petroleum gas (LPG), biodiesel (B20 and above), electric vehicle charging, hydrogen, and liquefied natural gas (LNG)), location, station name, contact information, access time, type of payment options available, special requirements if any. A user or a potential new station owner can't go through the data sheets and comprehend everything. We have enough data which provides us with a scope to display required lists which reduces the significant amount of time in manually searching. A user might take a significant amount of time to find nearby stations of his preferred choices in fuel type, access time, payment options and in the nearby distance.

Objective

The goal of this project is to use MS Access to create an extensive database of alternative fueling locations across the US. Users will have quick access to information about the types, locations, and availability of alternative fuels at various stations thanks to the database. The project intends to overcome the information gap and access issue that are currently preventing alternative fuels from being widely used. To guarantee that users have access to the most recent information about fuel stations, the database will be routinely updated. Users won't be able to actively add information to the database, but the project team will still gather and validate material from a variety of sources to make sure the database is still complete and up to date. By achieving this objective, we hope to facilitate the adoption of alternative fuels and contribute to a more sustainable energy future.

Design Parameters

1. Data Collection: The project team gathered information about alternative fueling stations from a variety of sources, such as governmental organizations and trade organizations. MS Access was used to organize, clean up, and enter the data into the database.

2. Database Design: The database is made to give users quick access to details about the types, locations, and availability of alternative fuels at various stations. The database can be searched using many criteria, including location and fuel type. User-friendly and visually appealing describe the interface.

3. Data Verification: In order to guarantee that customers have access to the most recent data on fueling stations, the data collected for the database was checked. The project team checked the data's accuracy using a variety of sources.

4. Interactive Maps: Users can view a visual representation of the prevalence and location of alternative fueling stations across the United States thanks to the database's interactive maps. Users can look for stations by location and fuel type using the maps.

5. Security: To prevent unwanted access or data theft, the database was created with security in mind. To maintain the confidentiality of the data, the project team incorporated the necessary security measures, such as password protection for the executive login.

6. Scalability: The database is built to support extension and growth in the future. The project team will think about whether it would be possible to include new kinds of alternative fuels or broaden the database's geographic coverage.

7. Accessibility: A wide spectrum of users, including people, groups, and decision-makers, can access the database.

Overall, the project's design criteria and concerns centered on developing an extensive and user-friendly database of alternative fueling locations that tackles the knowledge and access gaps that are currently impeding the mainstream adoption of alternative fuels. The database must be available to a wide range of users and maintainable over time. The project team gave priority on data correctness, security, and scalability.

System Flow

IDEF0 Model – Customer Side

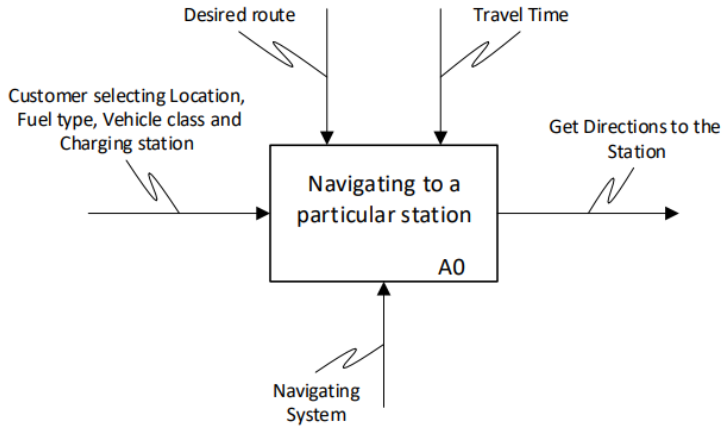


Figure 1. IDEF0 Model - Customer Side (Context View)

Context

A user who wants to find a specific gas station

- wants it to be on the required route in the desired state and city
- wants a specific fuel type

Viewpoint

- The perspective is from the user who wishes to find a specific station

Purpose

- The objective is to demonstrate the specifics and procedures for navigating to a certain station with a chosen state, city, and fuel type

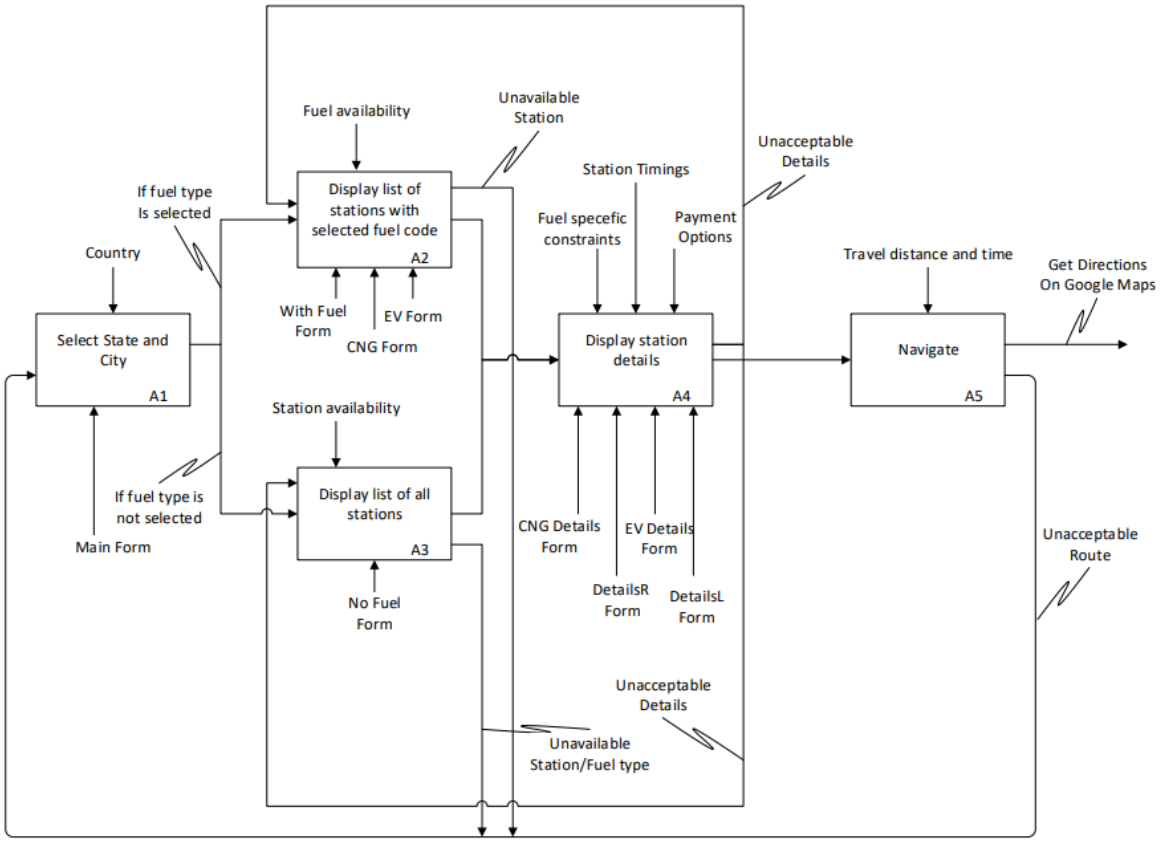


Figure 2. IDEF0 Model - Customer Side (Exploded View)

Navigating Mechanism

- MainForm
- WithFuelForm
- CNGForm
- EVForm
- NoFuelForm
- CNGDetailsForm
- EVDetailsForm
- DetailsLForm
- DetailsRForm
- NavigateForm

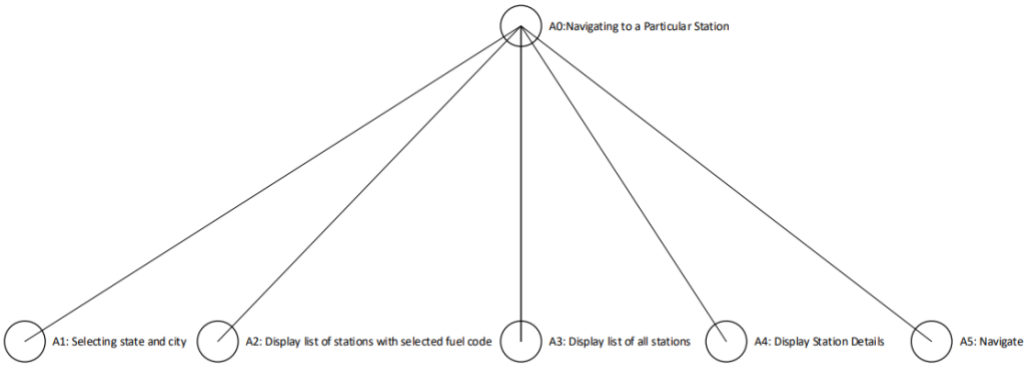


Figure 3. Node Tree (Customer Side)

IDEF0 Model – Executive Side

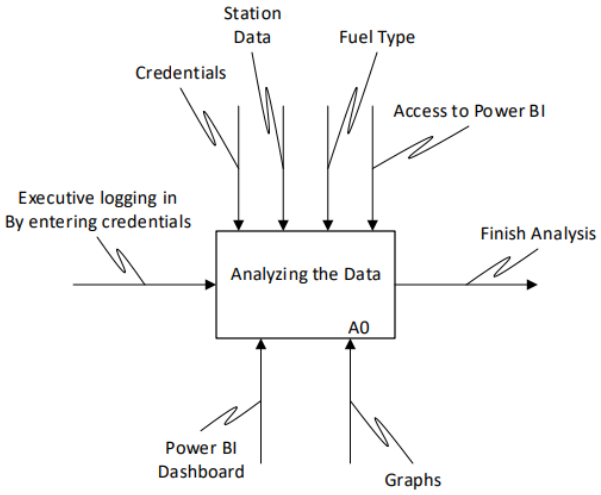


Figure 4. IDEF0 Model - Executive Side (Context View)

Context

An executive who desires to analyze the search history data

- should be aware of their credentials
- should have access to Power BI and station data to view dashboards

Viewpoint

- The perspective is held by the one wishing to analyze the user search history

Purpose

- The objective is to demonstrate how to access the executive portal and examine the data

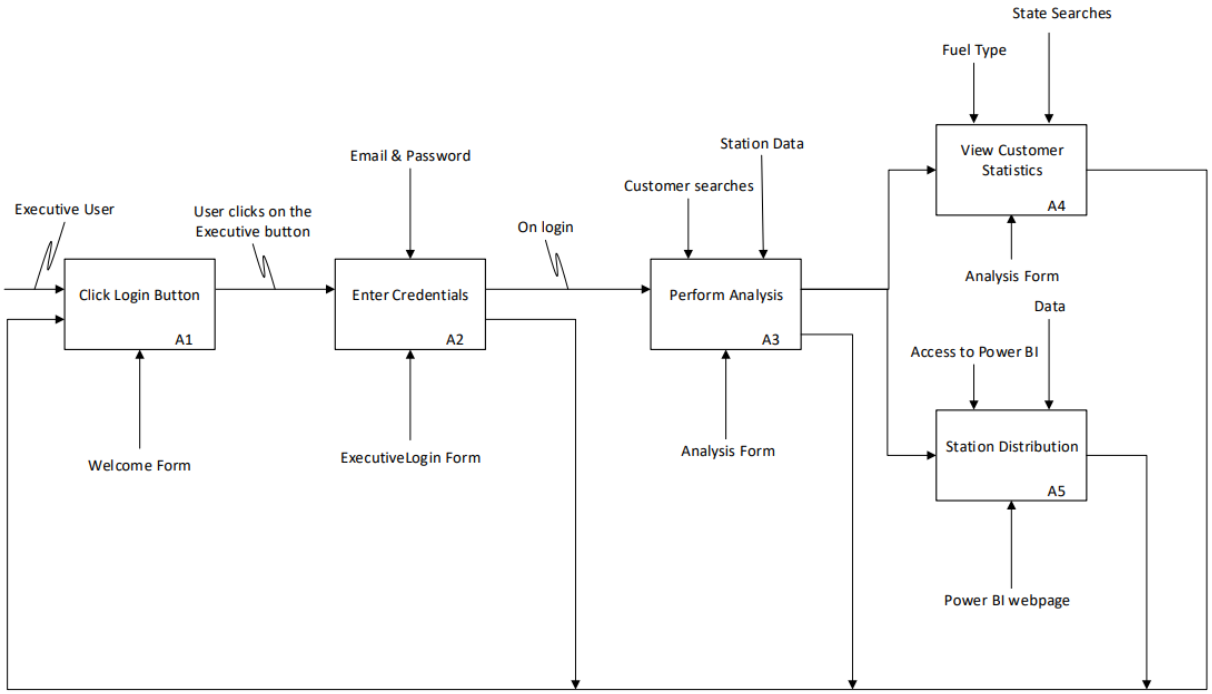


Figure 5. IDEF0 Model - Executive Side (Exploded View)

Analysis Mechanism

- WelcomeForm
- ExecutiveLoginForm
- AnalysisForm
- PowerBI Webpage

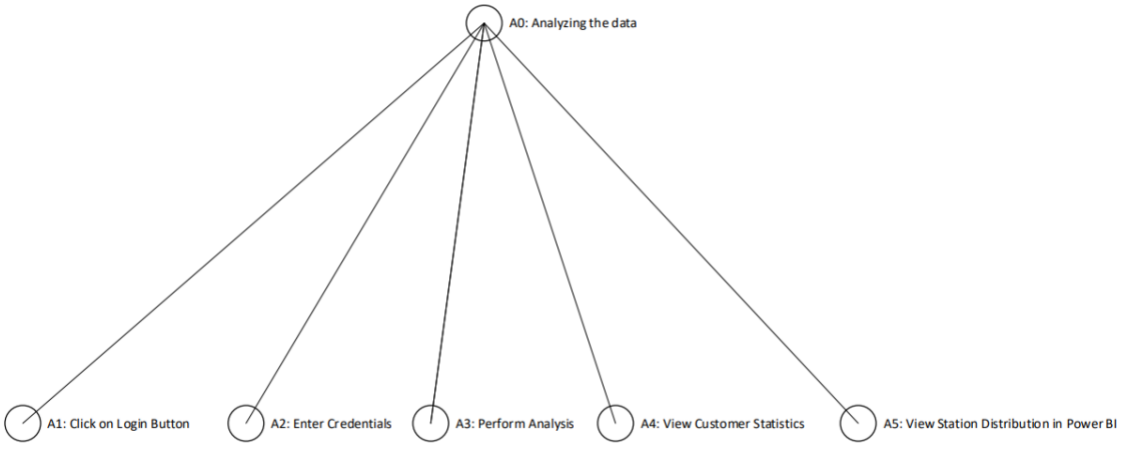


Figure 6. Node Tree - Executive Side

IDEF1X Model

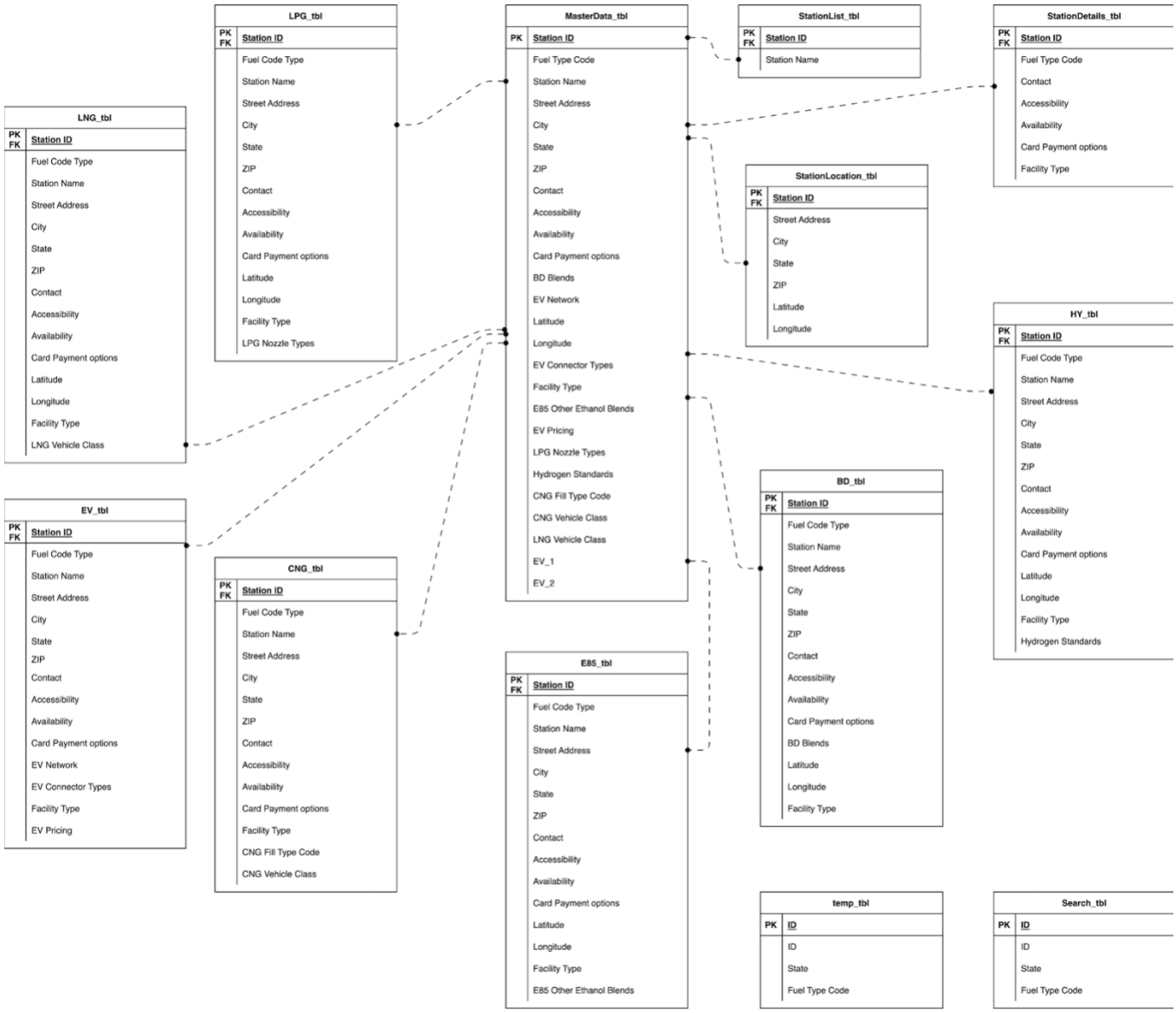


Figure 7. IDEF1X Model

Application Design

Customers and executives can both use the application. The user is asked on the first page if they are a client or an executive.

- If the user is logged in as an executive, they are directed to a login page where they must enter their credentials. If there is a match between the credentials and the database, it directs them to the analysis page. The executive can then view consumer statistics on the analysis form, including the frequency of searches for different fuel types, states, and a correlation between fuel and state searches. The graphs are hidden and only become visible after clicking the corresponding button. There is also graphical access to a PowerBI dashboard that contains all the data required to create the app.
- If the user is a customer, they choose the city, followed by the state, to search for the gas station they want to visit. Choosing a fuel type is a decision.
    1. Various things can happen if the user chooses a fuel type. In the event that CNG is chosen as the fuel type, a combo box asking for the vehicle class (Heavy Duty, Medium Duty, or Passenger) appears and must be chosen. It then takes you to a list of stations that has some basic information.
    2. If electric is chosen as the fuel type, a combo box asking for the type of car (Tesla or Other) appears, and a choice must be made. It then takes you to a list of stations that has some basic information.

  When a station is chosen from the list, the user is taken to a thorough description of the station that includes all of the station's specifics. When the user chooses a station, certain information is saved in a temporary table for navigation and another table that aids in retrieving information for analysis. When user hits Navigate, they are taken to the Navigate form where they can utilize their current location to navigate to the station they have chosen. If the user is not happy, they can go back to the main form and begin the procedure once more.

Table and Tree of Forms

Customer Side

Table 1. Customer Side Forms List

Form Name	IDEF0 Node
Welcome	A0
MainForm	A1
NoFuelForm	A3
CNGForm	A2
EVForm	A2
With FuelForm	A2
DetailsLForm	A4
DetailsRForm	A4
CNGDetailsForm	A4
EVDetailsForm	A4
Navigate	A5

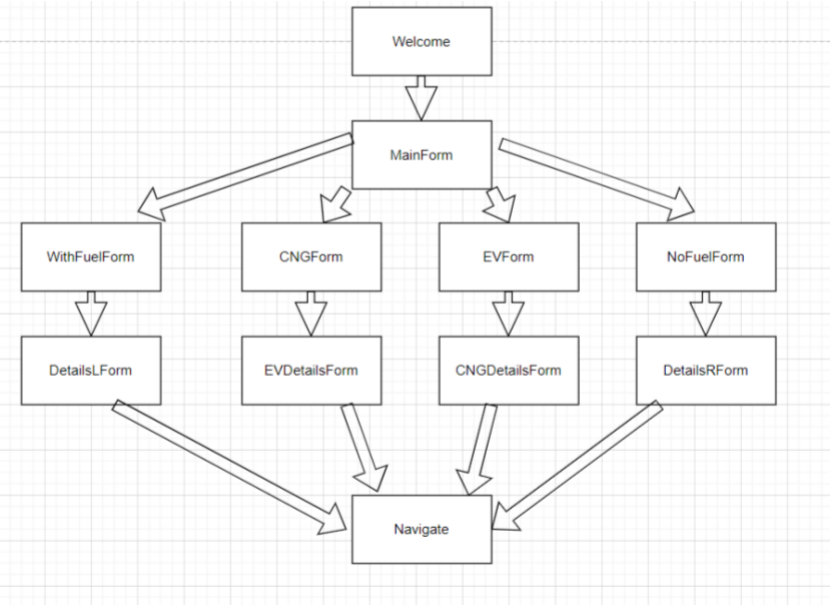


Figure 8. Customer Side Forms Tree

Executive Side

Table 2. Executive Side Forms List

Form Name	IDEF0 Node
Welcome	A0, A1
ExecutiveLoginForm	A2
Analysis	A3, A4, A5

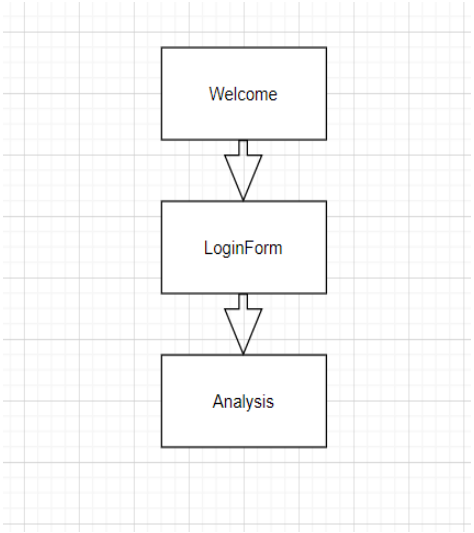


Figure 9. Executive Sides Forms Tree

Forms

WelcomeForm

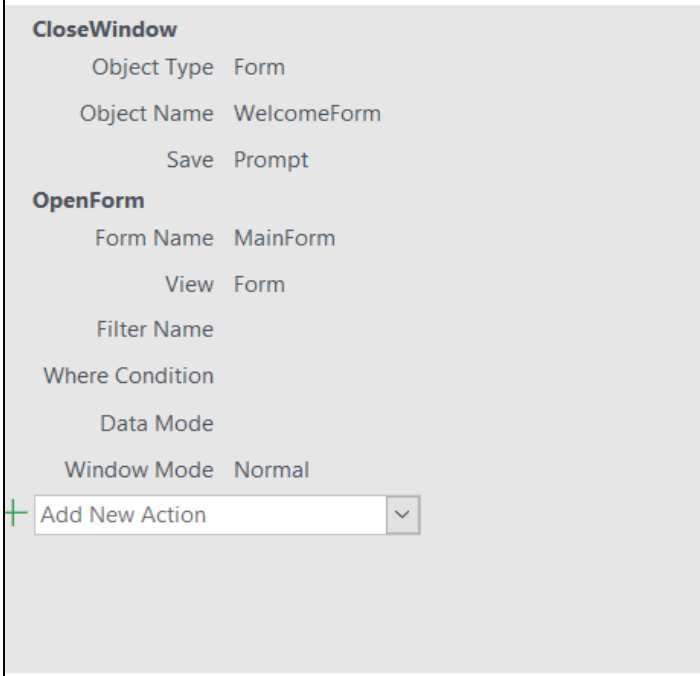
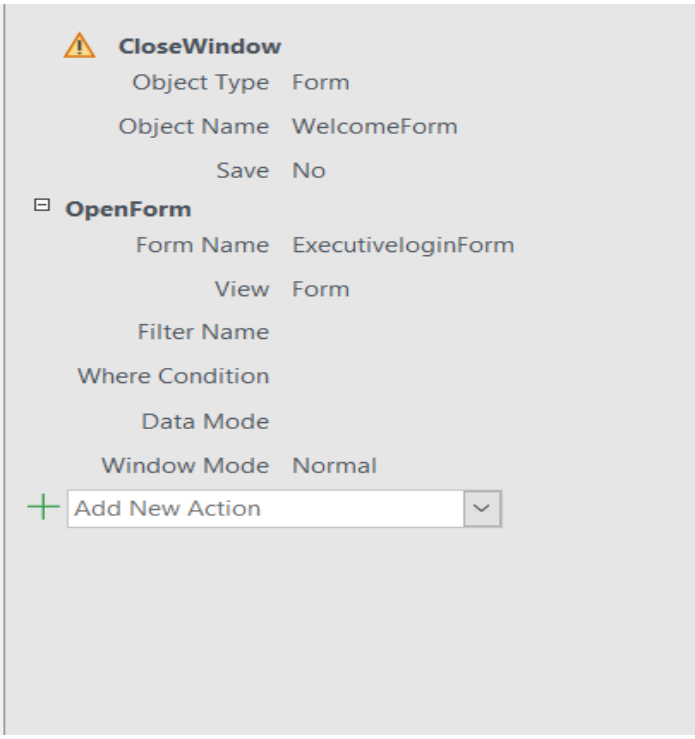
When the application opens, this form is the primary form. The user can choose the type of login they want to use using the options provided on this form.

Figure 10. Welcome Form of the Application

Table 3. Welcome Form - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
WelcomeForm	Form	N/A	N/A	N/A
customerlogin_btn	Button	N/A	Customer_macro	On Click
executivelogin_btn	Button	N/A	Executive_macro	On Click

Table 4. Welcome Form - Attached Macros & Description

Object Name	Attached Macro	Description
customerlogin_btn	**Customer_macro** 	Close the welcome form and open the main form
executivelogin_btn	**Executive_macro** 	Close the welcome form and open the executive login form

ExecutiveLoginForm

The executive must enter his credentials in this form to view data on fuel and state-by-state user search analysis. Any other individual attempting to log into this form will be denied access since it is automated so that only executives can access the information whose information is given through "executives_tbl".

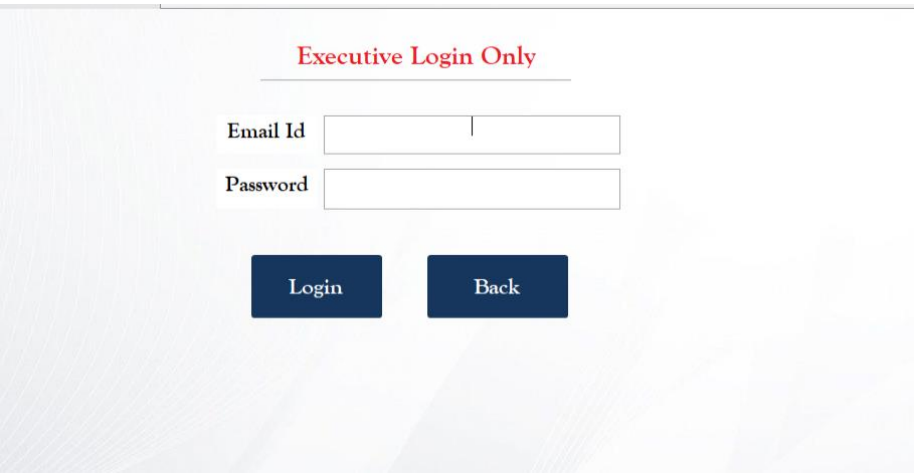


Figure 11. Executive Login Form

Table 5. Executive Login Form - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros / VBA	Property
Executiveloginform	Form	N/A	N/A	N/A
executiveemail_txtbx	Textbox	N/A	N/A	User email Id input text box
executivepassword_txtbx	Textbox	N/A	N/A	User password input text box
executivelogin_btn	Button	N/A	Event procedure through VBA	On Click
bck2welcmfrmexec_btn	Button	N/A	Back2WelfrmExec_macro	On click

Table 6. Executive Login Form – Attached Macros / Event Procedures & Description

Object Name	Attached Macro / Event Procedure	Description

executivelogin_btn	**Event Procedure**
	Option Compare Database
	Private Sub executivelogin_btn_Click()
	If (IsNull(Me.executiveemail_txtbx)) Then
	MsgBox "Please Enter Your EmailId", vbInformation, "EmailId Required!"
	Me.executiveemail_txtbx.SetFocus
	ElseIf (IsNull(Me.executivepassword_txtbx)) Then
	MsgBox "Please Enter Your PassWord", vbInformation, "Password Required!"
	Me.executivepassword_txtbx.SetFocus
	Else
	If ((IsNull(DLookup("email", "executives_tbl", "email ='" & Me.executiveemail_
	(IsNull(DLookup("password", "executives_tbl", "password ='" & Me.executivepa
	MsgBox "Username or Password is Incorrect", vbCritical, "Login Credentia
	Me.executiveemail_txtbx = ""
	Me.executivepassword_txtbx = ""
	Me.executiveemail_txtbx.SetFocus
	Else
	DoCmd.OpenForm "Analysis"
	[Forms]![ExecutiveloginForm].Visible = False
	End If
	End If
	End Sub
		✓ Check the details of email and password with the "executives_tbl" and provide access to Analysis Form
		✓ Close the Executivelogin_frm and open "Analysis" Form for correct credentials
		✓ Deny the access for customers

bck2welcmfrmexec_btn	**Back2WelfrmExec_macro** CloseWindow Object Type Form Object Name ExecutiveloginForm Save Prompt OpenForm Form Name WelcomeForm View Form Filter Name Where Condition Data Mode Window Mode Normal Add New Action	Close "ExecutiveloginForm" and open the "WelcomeForm"

AnalysisForm

The analysis form follows the executive login in order. Only the executives of the application have access to this section. There are 4 alternatives on this form, or you can return to the welcome page. The user will receive all the information regarding the fuel type and state searches conducted throughout time from the fuel type and state analysis. The link between fuel type and state will display a glimpse of the fuel kinds that are searched in each state. The user can view the distribution of states, fuel, and places around the nation by clicking on the distribution statistics, which will display a PowerBI dashboard.

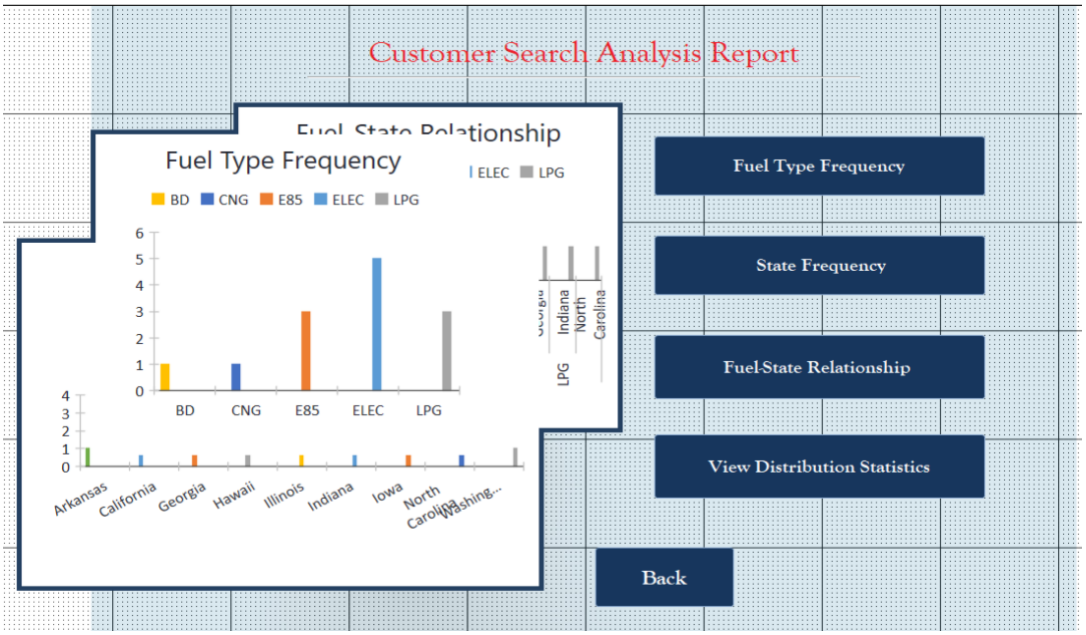


Figure 12. Analysis Form

Table 7. Analysis Form - Object List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
Analysisform	Form	N/A	N/A	N/A
FuelFre_btn	Button	N/A	VBA Procedure	On Click
StateFre_btn	Button	N/A	VBA Procedure	On Click
FuelStateFre_btn	Button	N/A	VBA Procedure	On Click
ViewStats_btn	Button	N/A	PowerBI Hyperlink	On Click
bck2welcmfrmana_btn	Button	N/A	Back2WelfrmAna_macro	On Click
Chart 3 (hidden)	Chart	GraphFuel_qry	N/A	
Chart 4 (hidden)	Chart	GraphState_qry	N/A	
Chart 5 (hidden)	Chart	GraphStateFuel_qry	N/A	

Table 8. Analysis Form - Attached Macros / Event Procedures / Hyperlink & Description

Object Name	Attached Macro/VBA	Description

FuelFre_btn	**Event Procedure**
	`Private Sub FuelFre_btn_Click()`
	`  Me.Chart3.Visible = True`
	`  Me.Chart4.Visible = False`
	`  Me.Chart5.Visible = False`
	`End Sub`
		Makes chart visible when clicked

FuelStateFre_btn	**Event Procedure**
	`Private Sub FuelStateFre_btn_Click()`
	`  Me.Chart3.Visible = False`
	`  Me.Chart4.Visible = False`
	`  Me.Chart5.Visible = True`
	`End Sub`
		Makes chart 5 visible when clicked

StateFre_btn	**Event Procedure**
	`Private Sub StateFre_btn_Click()`
	`  Me.Chart3.Visible = False`
	`  Me.Chart4.Visible = True`
	`  Me.Chart5.Visible = False`
	`End Sub`
		Makes chart 4 visible when clicked

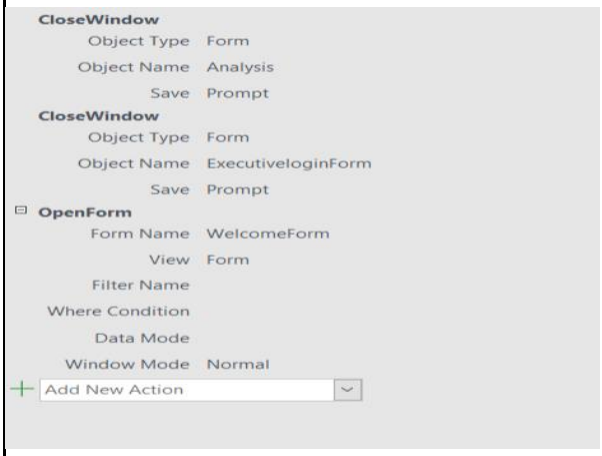
ViewStats_btn	**PowerBI Hyperlink** https://app.powerbi.com/groups/me/reports/a1a13f94-a0af-4196-b9d2-35a553b91278/ReportSection?ctid=80f23f4a-91a4-4566-8db1-3bcabb21d1cb	Opens PowerBI dashboard
bck2welcmfrmana_btn	**Back2WelfrmAna_macro** 	Closes the analysis and executive login window and makes the welcome window visible

Table 9. Analysis Form - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
Chart 3	GraphFuel_qry	SELECT [Fuel Type Code], COUNT(*) AS Frequency FROM Search_tbl GROUP BY [Fuel Type Code];	Selects the fuel type code and counts the number of times it is present in the table
Chart 4	GraphState_qry	SELECT State, COUNT(*) AS Frequency FROM Search_tbl GROUP BY State;	Selects the state and counts the number of times it is present in the table
Chart 5	GraphStateFuel_qry	SELECT State, [Fuel Type Code], COUNT(*) AS Frequency FROM Search_tbl GROUP BY State, [Fuel Type Code];	Selects the state and related fuel type code and counts the number of times the fuel type is present for that state in the table

MainForm

If the user is a customer, the main form follows the welcome form in order. The user can choose their needs for the station they want to go to in this section of the application. The customer must enter the city and state. If the consumer wants to precisely filter out the fuel type, fuel type is an optional input.

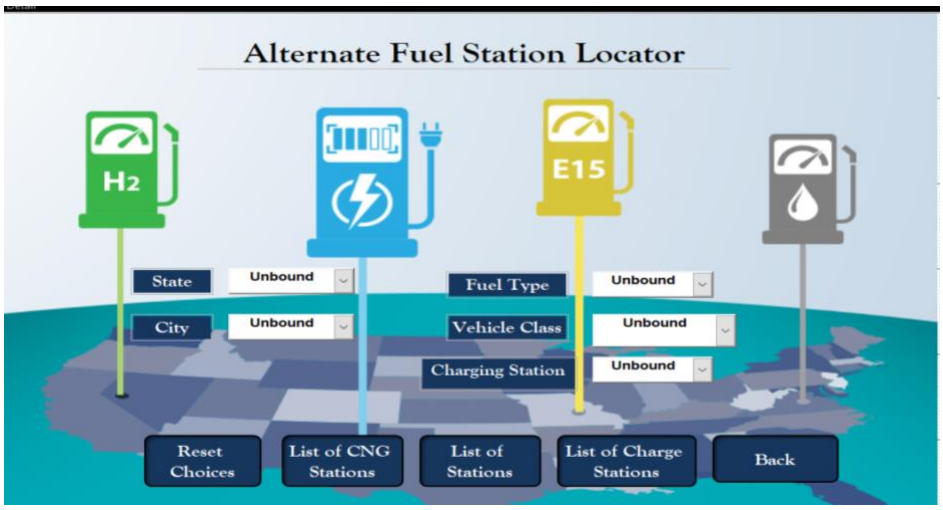
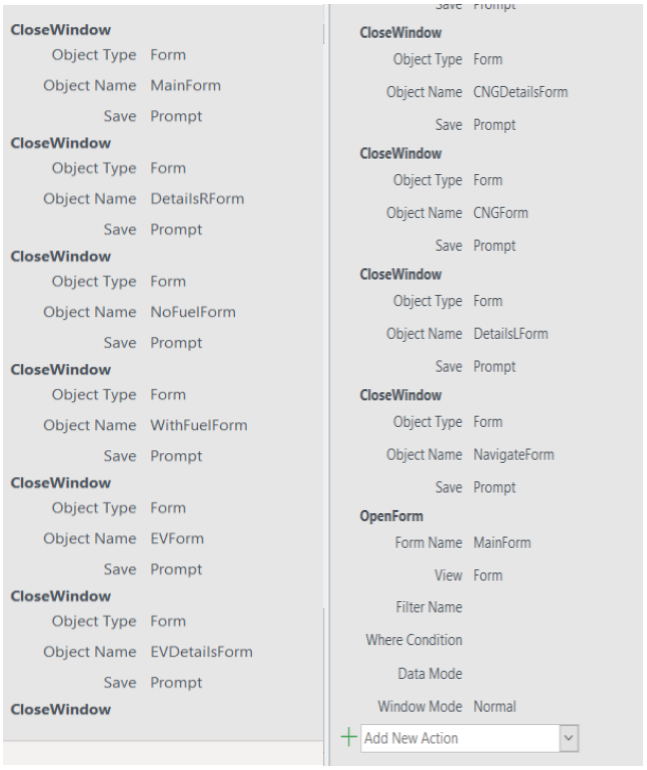
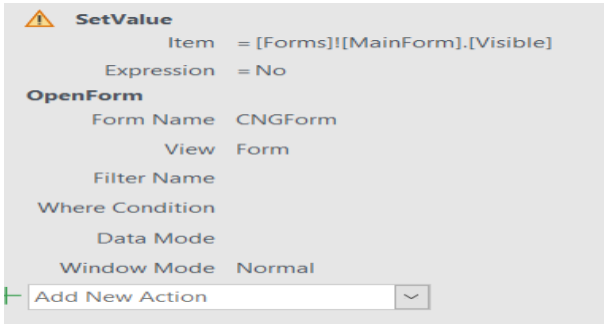


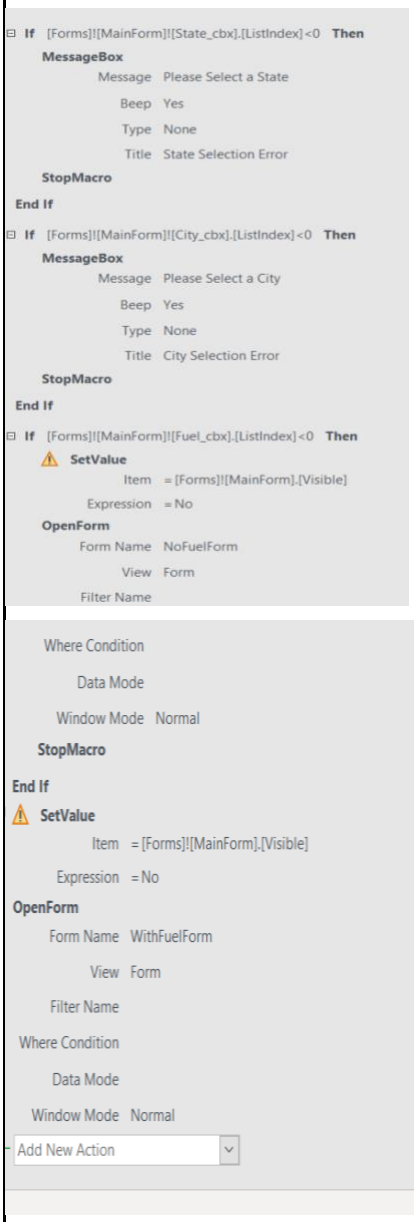
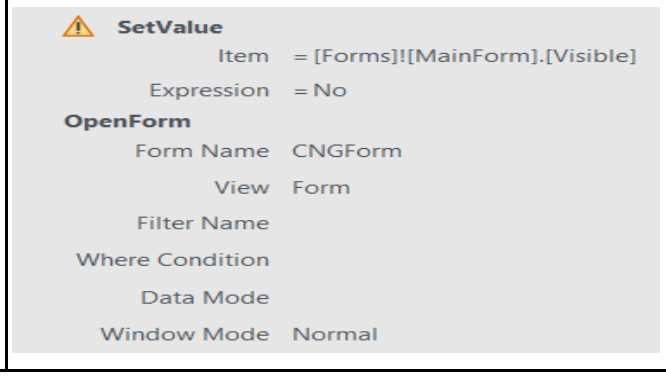
Figure 13. Main Form (Customer Side)

Table 10. Main Form - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
MainForm	Form	N/A	N/A	N/A
Reset_btn	Button	N/A	ResetChoices	On Click
CNG_btn (hidden)	Button	N/A	CNGLOS	On Click
LOS_btn	Button	N/A	ListofStations	On Click
EV_btn (hidden)	Button	N/A	EVLOS	On Click
Back2WelfrmMain_btn	Button	N/A	Back2WelfrmMain	On Click
State_cbx	Combo Box	GetState_qry	VBA Procedure + UpdateCity	After Update+ On Change
City_cbx	Combo Box	GetCity_qry	N/A	N/A
Fuel_cbx	Combo box	GetFuelCode_qry	VBA Procedure	N/A
VehicleType_cbx (hidden)	Combo Box	GetVehicleType_qry	VBA Procedure	N/A
EVehicle_cbx (hidden)	Combo Box	RowSource: Tesla; Others	VBA Procedure	N/A

Table 11. Main Form - Attached Macros / Event Procedures & Description

Object Name	Attached Macro/VBA	Description
Reset_btn	**ResetChoices** 	Closes all forms and opens the main form again
CNG_btn	**CNGLOS** 	Hides the main form and opens the CNG Form

LOS_btn	**ListofStations** 	Checks if State and City have been entered. If not, shows a message box. If Fuel has been selected, then it hides the main form and opens the With Fuel Form. If not, it opens the NoFuelForm.
EV_btn	**EVLOS** 	Hides the main form and opens the EV Form

Back2WelfrmMain_btn	**Back2WelfrmMain** CloseWindow Object Type Form Object Name MainForm Save Prompt OpenForm Form Name WelcomeForm View Form Filter Name Where Condition Data Mode Window Mode Normal Add New Action	Closes the Analysis and Executive Login window and makes the Welcome window visible

State_cbx	**VBA Procedure**
	`Private Sub State_cbx_Change()`
	`If Not IsNull(Me.State_cbx) Then`
	`Me.City_cbx.Visible = True`
	`Me.City_txt.Visible = True`
	`Else`
	`Me.City_cbx.Visible = False`
	`Me.City_txt.Visible = False`
	`End If`
	`End Sub`
		If a selection is made in the State_cbx, then it shows City_cbx and the label. If not, City remains hidden.

State_cbx	**UpdateCity**
	If [Forms]![MainForm]![State_cbx].[ListIndex]<0 Then
	MessageBox
	Message Select a State
	Beep Yes
	Type None
	Title Error
	StopMacro
	End If
	Requery
	Control Name City_cbx
	Add New Action
		After State is selected, it updates the values in City_cbx immediately.

VehicleType_cbx	**VBA Procedure**
	`Private Sub VehicleType_cbx_AfterUpdate()`
	`If Not IsNull(Me.VehicleType_cbx.Value) Then`
	`Me.CNG_btn.Visible = True`
	`Me.LOS_btn.Visible = False`
	`Else`
	`Me.CNG_btn.Visible = False`
	`Me.LOS_btn.Visible = True`
	`End If`
	`End Sub`
		If a selection is made in the Vehicle Type_cbx then it shows CNG_btn and hides the LOS_btn If not, opposite is true.

EVehicle_cbx	**VBA Procedure**
	`Private Sub EVehicle_cbx_AfterUpdate()`
	`If Not IsNull(Me.EVehicle_cbx.Value) Then`
	`Me.EV_btn.Visible = True`
	`Me.LOS_btn.Visible = False`
	`Else`
	`Me.EV_btn.Visible = False`
	`Me.LOS_btn.Visible = True`
	`End If`
	`End Sub`
		If a selection is made in EVehicle_cbx then it shows EV_btn and hides the LOS_btn If not, opposite is true.

Fuel_cbx	**VBA Procedure**
	`Private Sub Fuel_cbx_AfterUpdate()`
	`If Me.Fuel_cbx = "CNG" Then`
	`Me.VehicleType_cbx.Visible = True`
	`Me.VehicleType_txt.Visible = True`
	`Else`
	`Me.VehicleType_cbx.Visible = False`
	`Me.VehicleType_txt.Visible = False`
	`End If`
	`If Me.Fuel_cbx = "Elec" Then`
	`Me.EVehicle_cbx.Visible = True`
	`Me.EVehicle_txt.Visible = True`
	`Else`
	`Me.EVehicle_cbx.Visible = False`
	`Me.EVehicle_txt.Visible = False`
	`End If`
	`End Sub`
		If Fuel selected is CNG, shows Vehicle Type combo box. If Fuel type is Elec, shows EV combo box. If neither, both remain hidden.

Table 12. Main Form - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
State_cbx	GetState_qry	SELECT DISTINCT State FROM StationLocation_tbl ORDER BY State;	Select Distinct State from Station Location table.
City_cbx	GetCity_qry	SELECT DISTINCT City FROM StationLocation_tbl WHERE State=forms![MainForm]![State_cbx].Value;	Gets the Distinct City from Station Location table based on value in State_cbx
Fuel_cbx	GetFuelCode_qry	SELECT DISTINCT [MasterData_tbl].[Fuel Type Code] FROM MasterData_tbl, StationLocation_tbl WHERE [StationLocation_tbl].State=forms!MainForm!State_cbx.Value And [StationLocation_tbl].City=forms!MainForm!City_cbx.Value AND [MasterData_tbl].[Station ID]=[StationLocation_tbl].[Station ID];	Selects Distinct Fuel Type Code from Master Data table where State and City are from State_cbx and City_cbx and Station ID in Location and Master table are same.
VehicleType_cbx	GetVehicleType_qry	SELECT DISTINCT [CNG Vehicle Class] FROM MasterData_tbl WHERE [Fuel Type Code] = “CNG”;	Selects Distinct CNG Vehicle Class from MasterData table where Fuel Type Code is CNG.

NoFuelForm

This form is open when a user does not choose a fuel type but only chooses the state and city. The form provides user with the list of all the stations of all fuel types based on the State and City selection.

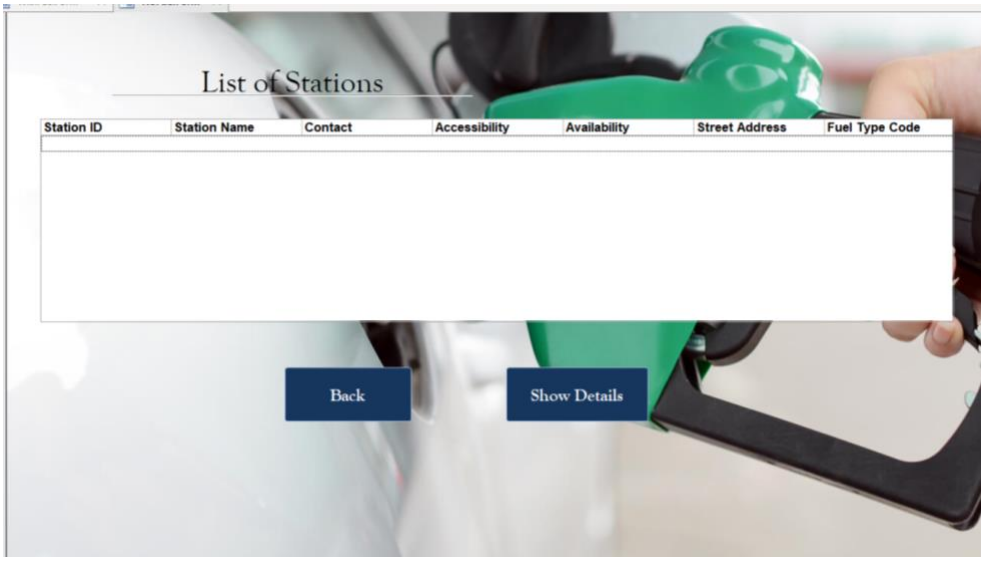


Figure 14. NoFuel Form

Table 13. NoFuel Form - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
NoFuelForm	Form	N/A	N/A	N/A
FullList_lbx	List Box	NoFuel_qry	N/A	N/A
Back2Main_btn	Button	N/A	Back2Main	On Click
OpenDetR_btn	Button	N/A	OpenDetR	On Click

Table 14. NoFuel Form - Attached Macros & Description

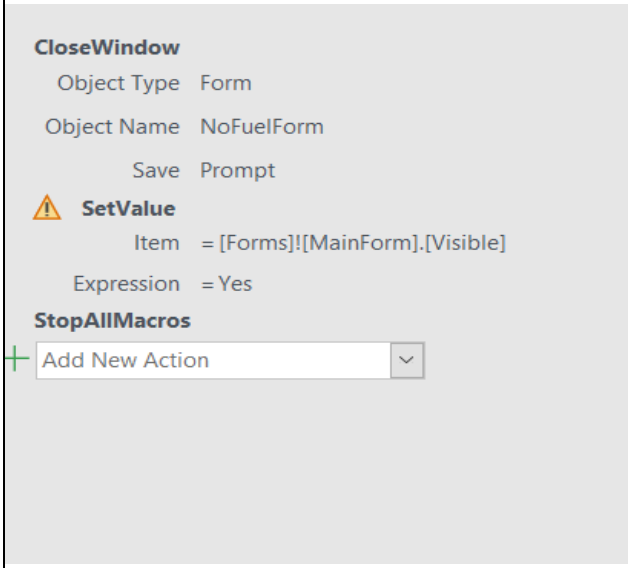
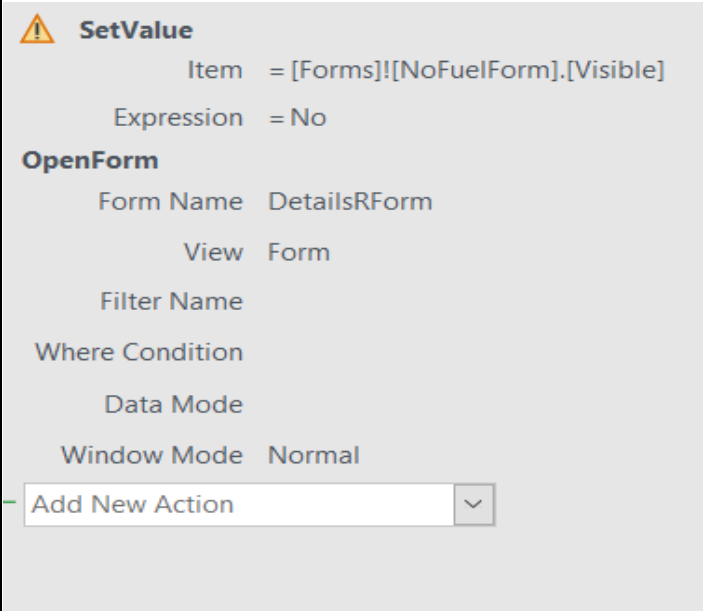
Object Name	Attached Macro	Description
Back2Main_btn	**Back2Main** 	Close the No Fuel form and makes the Main Form Visible
OpenDetR_btn	**OpenDetR** 	Hides the NoFuelForm and opens the DetailsRForm

Table 15. NoFuel Form - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
FullList_lbx	NoFuel_qry	SELECT MasterData_tbl.[Station ID], [StationList_tbl].[Station Name], [StationDetails_tbl].Contact, [StationDetails_tbl].Accessibility, [StationDetails_tbl].Availability, [StationLocation_tbl].[Street Address], [MasterData_tbl].[Fuel Type Code] FROM StationList_tbl, StationLocation_tbl, StationDetails_tbl, MasterData_tbl WHERE [StationLocation_tbl].State=forms!MainForm!State_cbx.Value And [StationLocation_tbl].City=forms!MainForm!City_cbx.Value And [StationList_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [StationDetails_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [MasterData_tbl].[Station ID]=[StationLocation_tbl].[Station ID] ORDER BY [MasterData_tbl].[Fuel Type Code];	Selects the Station ID and Fuel Type Code from MasterData, StationName from StationList, Contact, Accessibility, Availability from Station Details and Street Address from Station Location table by checking the values of State and City from State and City combo box and matching the Station ID in all the tables.

WithFuelForm

When a user selects a fuel type in relation to the state and city, this form is displayed. Based on the user's selection of the state, city, and fuel type, the form shows them every station that offers every kind of fuel.

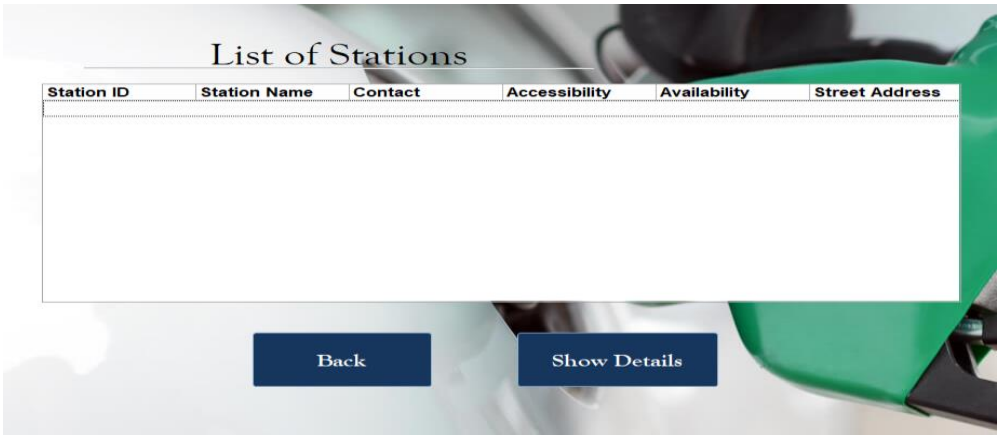


Figure 15. WithFuel Form

Table 16. WithFuel Form - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
WithFuelForm	Form	N/A	N/A	N/A
WithFuel_lbx	List Box	WithFuel_qry	N/A	N/A
Back2MainfrmWithFuel_btn	Button	N/A	Back2MainfrmWithFuel	On Click
OpenDetL_btn	Button	N/A	OpenDetL	On Click

Table 17. WithFuel Form - Attached Macros & Description

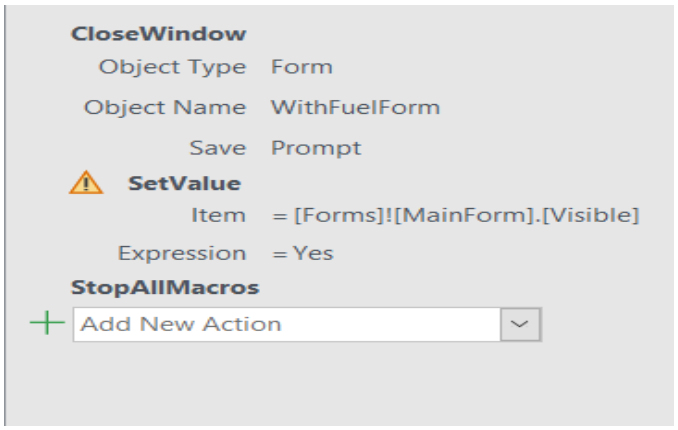
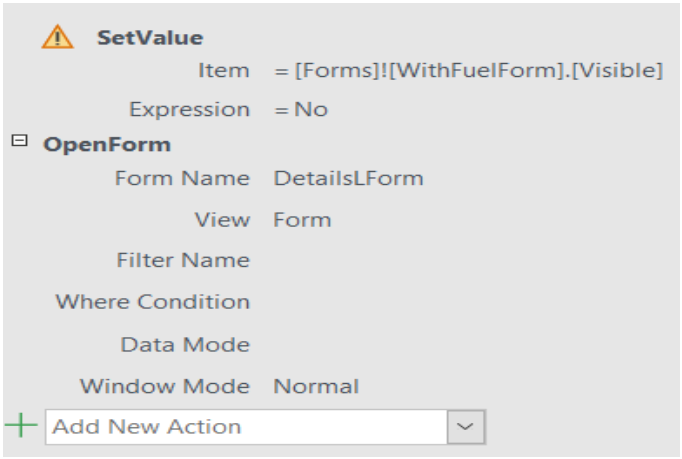
Object Name	Attached Macro	Description
Back2MainfrmWithFuel_btn	**Back2MainfrmWithFuel** 	Close the With Fuel form and makes the Main Form Visible
OpenDetL_btn	**OpenDetL** 	Hides the WithFuelForm and opens the DetailsLForm

Table 18. WithFuel Form - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
WithFuel_lbx	WithFuel_qry	SELECT DISTINCT MasterData_tbl.[Station ID], [StationList_tbl].[Station Name], [StationDetails_tbl].Contact, [StationDetails_tbl].Accessibility, [StationDetails_tbl].Availability, [StationLocation_tbl].[Street Address] FROM StationList_tbl, StationLocation_tbl, StationDetails_tbl, MasterData_tbl WHERE [StationLocation_tbl].State=forms!MainForm!State_cbx.Value And [StationLocation_tbl].City=forms!MainForm!City_cbx.Value And [StationList_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [StationDetails_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [MasterData_tbl].[Station ID]=[StationLocation_tbl].[Station ID] AND [MasterData_tbl].[Fuel Type Code]= forms!MainForm!Fuel_cbx.Value;	Selects the Station ID and Fuel Type Code from MasterData, StationName from StationList, Contact, Accessibility,Availability from Station Details and Street Address from Station Location table by checking the values of State and City from State and City combo box, Fuel type from Fuel Combo box and matching the Station ID in all the tables.

CNGForm

When a user selects CNG as the fuel type, this form is displayed. This form gives the user access to every station that offers the CNG fuel type and the designated vehicle class.

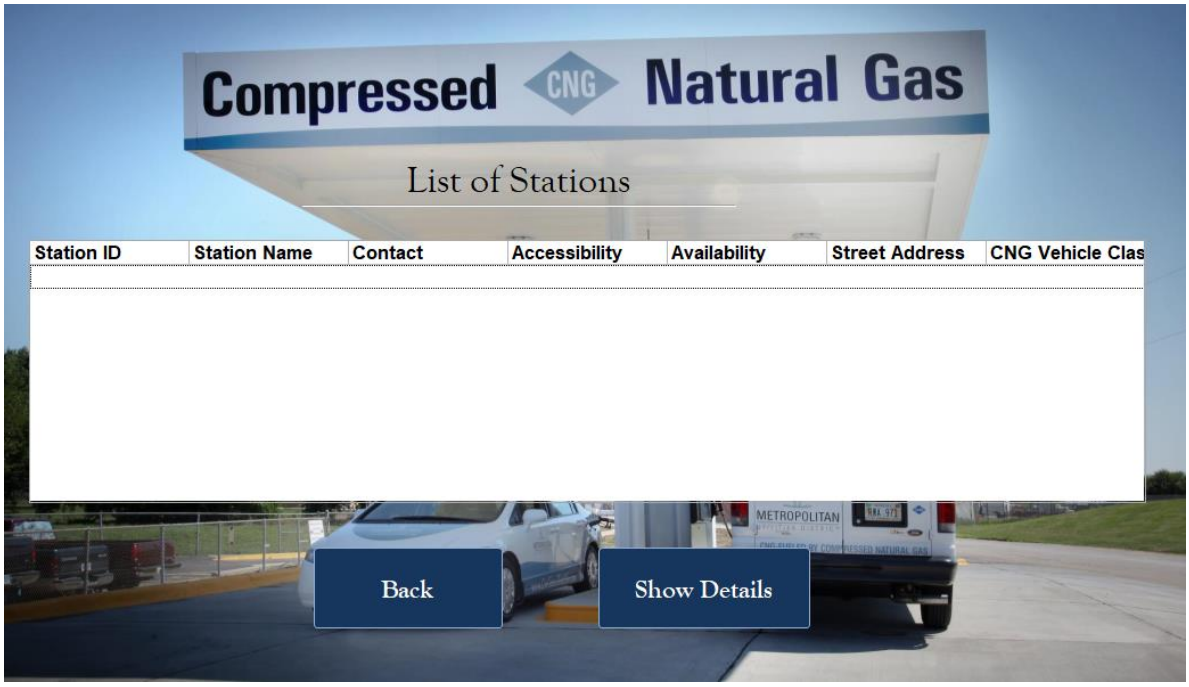


Figure 16. CNGForm

Table 19. CNGForm - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
CNGForm	Form	N/A	N/A	N/A
CNGL_lbx	List Box	CNGLeft_qry	N/A	N/A
Back2MainfrmCNG_btn	Button	N/A	Back2MainfrmCNG	On Click
OpenCNGDetails_btn	Button	N/A	OpenCNGDetails	On Click

Table 20. CNGForm - Attached Macros & Description

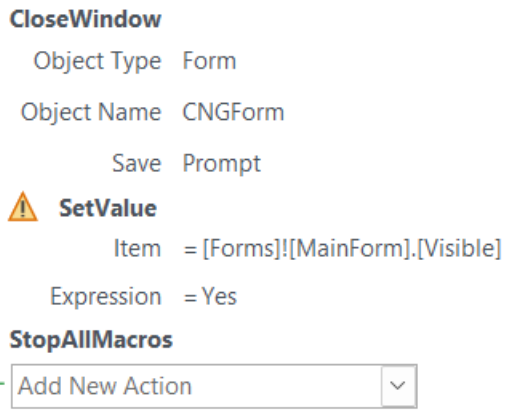
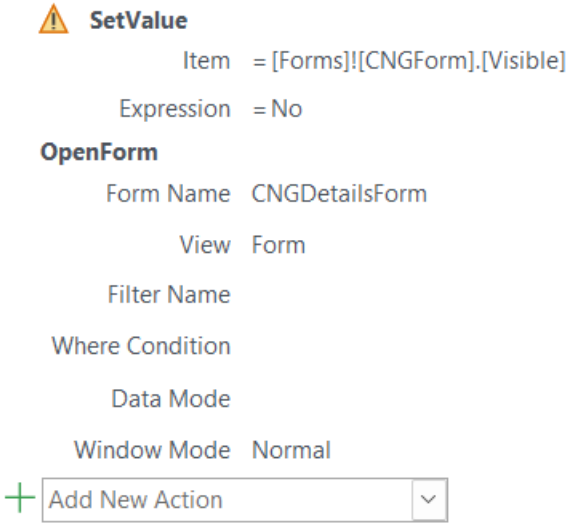
Object Name	Attached Macro	Description
Back2MainfrmCNG_btn	**Back to main from CNG** 	Close the CNG form and open the Main Form
OpenCNGDetails_btn	**Open CNG Details** 	Close the CNG form and open the CNG Details form

Table 21. CNGForm - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
CNGL_lbx	CNGLeft_qry	SELECT DISTINCT MasterData_tbl.[Station ID], [StationList_tbl].[Station Name], [StationDetails_tbl].Contact, [StationDetails_tbl].Accessibility, [StationDetails_tbl].Availability, [StationLocation_tbl].[Street Address], MasterData_tbl.[CNG Vehicle Class] FROM StationList_tbl, StationLocation_tbl, StationDetails_tbl, MasterData_tbl WHERE [StationLocation_tbl].State=forms!MainForm!State_cbx.Value And [StationLocation_tbl].City=forms!MainForm!City_cbx.Value And [StationList_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [StationDetails_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [MasterData_tbl].[Station ID]=[StationLocation_tbl].[Station ID] AND [MasterData_tbl].[Fuel Type Code]= "CNG" AND [MasterData_tbl].[CNG Vehicle Class]= forms!MainForm!VehicleType_cbx.Value;	Selects the Station ID and CNG Vehicle Class from MasterData, StationName from StationList, Contact, Accessibility,Availability from Station Details and Street Address from Station Location table by checking the values of State and City from State and City combo box, CNG Vehicle Class from the Vehicle Type combo box and matching the Station ID in all the tables.

EVForm

When the user selects EV as the fuel type, this form is displayed. This form gives the user access to all stations that have the designated charging station and are EV-compatible.

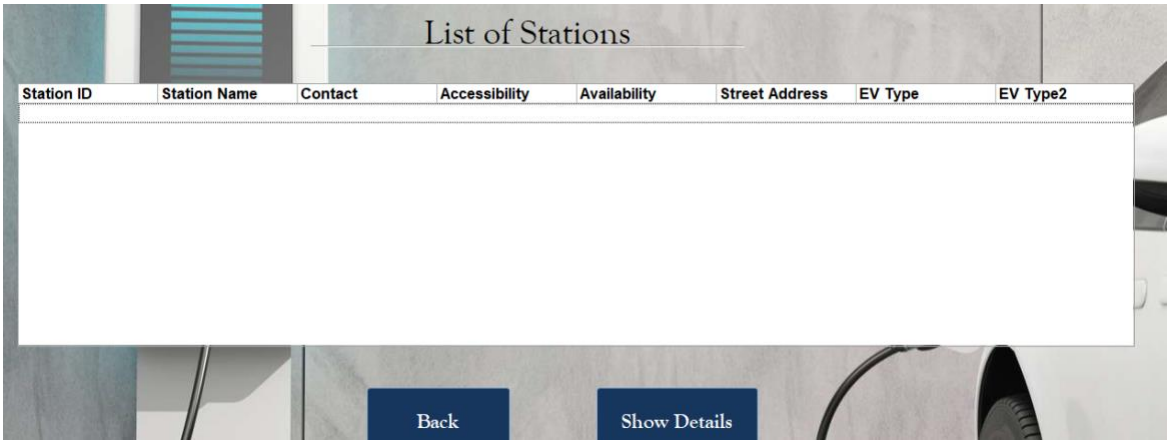


Figure 17. EVForm

Table 22. EVForm - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
EVForm	Form	N/A	N/A	N/A
EVL_lbx	List Box	EVLeft_qry	N/A	N/A
Back2MainfrmEV_btn	Button	N/A	Back2MainfrmEV	On Click
OpenEVDet_btn	Button	N/A	OpenEVDet	On Click

Table 23. EVForm - Attached Macros & Description

Object Name	Attached Macro	Description
Back2MainfrmEV_btn	**Back to main from EV macro** **CloseWindow** Object Type Form Object Name EVForm Save Prompt **SetValue** Item = [Forms]![MainForm].[Visible] Expression = Yes **StopAllMacros** Add New Action	Close the EV form and open the Main Form
OpenEVDet_btn	**Open EV Details macro** **SetValue** Item = [Forms]![EVForm].[Visible] Expression = No **OpenForm** Form Name EVDetailsForm View Form Filter Name Where Condition Data Mode Window Mode Normal Add New Action	Close the EV form and open the EV Details form

Table 24. EVForm - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
EVL_lbx	EVLeft_qry	SELECT DISTINCT MasterData_tbl.[Station ID], [StationList_tbl].[Station Name], [StationDetails_tbl].Contact, [StationDetails_tbl].Accessibility, [StationDetails_tbl].Availability, [StationLocation_tbl].[Street Address], MasterData_tbl.Ev_1 AS [EV Type], MasterData_tbl.Ev_2 AS [EV Type2] FROM StationList_tbl, StationLocation_tbl, StationDetails_tbl, MasterData_tbl WHERE [StationLocation_tbl].State=forms!MainForm!State_cbx.Value And [StationLocation_tbl].City=forms!MainForm!City_cbx.Value And [StationList_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [StationDetails_tbl].[Station ID]=[StationLocation_tbl].[Station ID] And [MasterData_tbl].[Station ID]=[StationLocation_tbl].[Station ID] AND ([MasterData_tbl].[EV_1]= forms!MainForm!EVehicle_cbx.Value OR [MasterData_tbl].[EV_2]= "ALL");	Selects the Station ID and EV Type from MasterData, StationName from StationList, Contact, Accessibility, Availability from Station Details and Street Address from Station Location table by checking the values of State and City from State and City combo box, matching the value of EV_1 from the EVehicle combo box OR EN_2 being “All” and matching the Station ID in all the tables.

CNGDetailsForm

This form appears when the user selects to request information about a CNG station. With the option to return to the previous page and another to travel to the selected station, this form gives the user comprehensive information about the station.

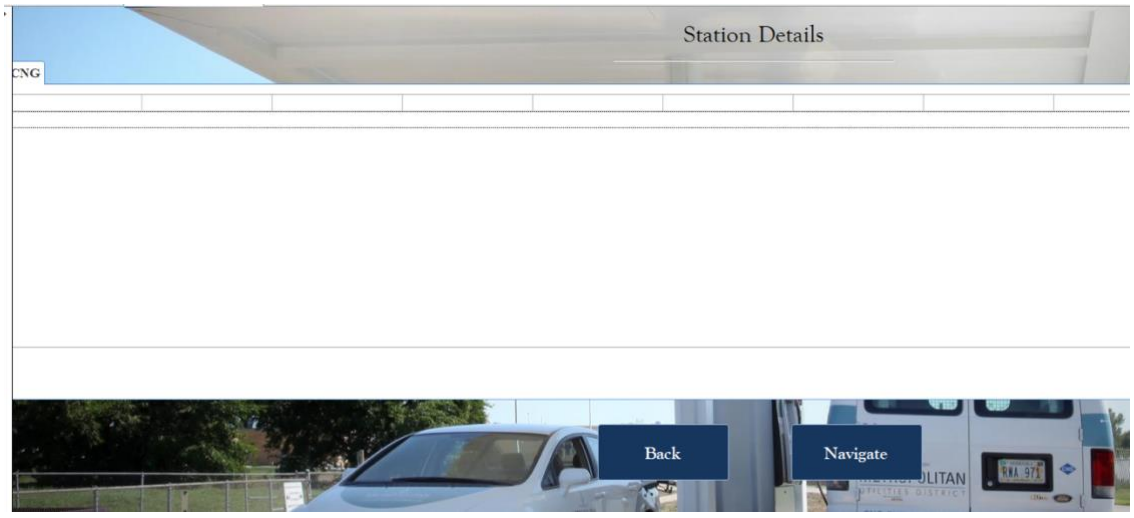


Figure 18. CNGDetailsForm

Table 25. CNGDetails Form - Object List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
CNGDetailsForm	Form	N/A	N/A	N/A
CNGLDetails_lbx	List box	Details_CNGL_qry	CNGLinsert	After Update
BackfrmCNGDet_btn	Button	N/A	BackfrmCNGDet	On Click
NavigatefrmCNG_btn	Button	N/A	NavigatefrmCNG	On Click

Table 26. CNGDetails Form - Attached Macros & Description

Object Name	Attached Macro	Description
BackfrmCNGDet_btn	**BackfrmCNGDet** SetWarnings Warnings On No CloseWindow Object Type Form Object Name CNGDetailsForm Save Prompt OpenQuery Query Name deltemp_qry View Datasheet Data Mode Edit SetValue Item = [Forms]![CNGForm].[Visible] Expression = Yes StopAllMacros Add New Action	Close the CNG Details Form and open the CNG Form
NavigatefrmCNG_btn	**NavigatefrmCNG** SetValue Item = [Forms]![CNGDetailsForm].[Visible] Expression = No OpenForm Form Name NavigateForm View Form Filter Name Where Condition Data Mode Window Mode Normal SetWarnings Warnings On No OpenQuery Query Name Searchinsert_qry View Datasheet Data Mode Edit Add New Action	Close the CNG Details Form and open the Navigate form. Also opens the SearchinsertQuery
CNGLDetails_lbx	**CNGLinsert** SetWarnings Warnings On No OpenQuery Query Name insertCNGL_qry View Datasheet Data Mode Edit Add New Action	Opens the query

Table 27. CNGDetailsForm - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
CNGLDetails_lbx	Details_CNGL_qry	SELECT DISTINCT CNG_tbl.[Station ID], CNG_tbl.[Station Name], CNG_tbl.[Street Address], CNG_tbl.[Fuel Type Code], CNG_tbl.[CNG Fill Type Code], CNG_tbl.[CNG Vehicle Class], CNG_tbl.Contact, CNG_tbl.Accessibility, CNG_tbl.Availability, CNG_tbl.[Card Payment options], CNG_tbl.[Facility Type] FROM CNG_tbl WHERE CNG_tbl.[Station ID]=forms![CNGForm]!CNGL_lbx.Value;	Selects various details from the CNG Table after matching the Station ID with that of the list box on the CNGForm.
BackfrmCNGDet_btn	deltemp_qry	DELETE * FROM temp_tbl;	Deletes all values in temp table
NavigatefrmCNG_btn	Searchinsert_qry	INSERT INTO Search_tbl SELECT * FROM temp_tbl;	Inserts values from temp table into Search Table
CNGLinsert Macro	insertCNGL_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!CNGDetailsForm![CNGLDetails_lbx].Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.

DetailsLForm

This form displays information about the chosen station according to the fuel type that was chosen in the with fuel form. This form offers the user the option to navigate to the selected station or return to the previous page to select a different station.

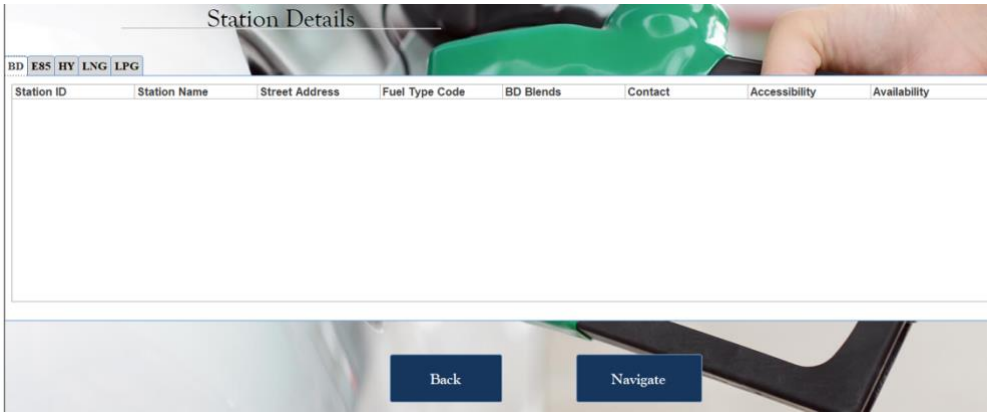
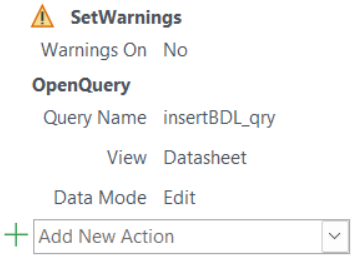
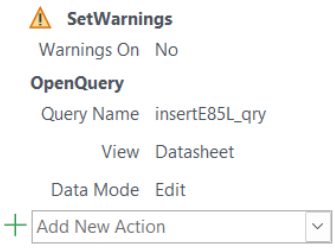
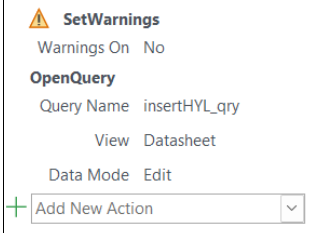
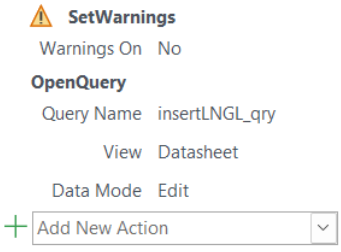
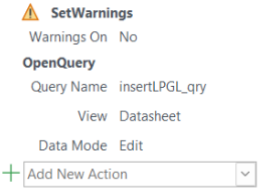


Figure 19. DetailsLForm

Table 28. DetailsLForm - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
DetailsLForm	Form	N/A	N/A	N/A
BDL_lbx	Tab Control List Box	Details_BDL_qry	BDLinsert	After Update
E85L_lbx	Tab Control List Box	Details_E85L_qry	E85Linsert	After Update
HYL_lbx	Tab Control List Box	Details_HYL_qry	HYLinsert	After Update
LNGL_lbx	Tab Control List Box	Details_LNGL_qry	LNGLinsert	After Update
LPGL_lbx	Tab Control List Box	Details_LPGL_qry	LPGLinsert	After Update
Back2Withfuel_btn	Button	N/A	Back2Withfuel	On Click
NavigatefrmDetL_btn	Button	N/A	NavigatefrmDetL	On Click

Table 29. DetailsLForm - Attached Macros & Description

Object Name	Attached Macro	Description
BDLinsert	**BDL_macro** 	Opens the query
E85Linsert	**E85Linsert_macro** 	Opens the query
HYLinsert	**HYLinsert_macro** 	Opens the query
LNGLinsert	**LNGLinsert_macro** 	Opens the query
LPGLinsert	**LPGLinsert_macro** 	Opens the query

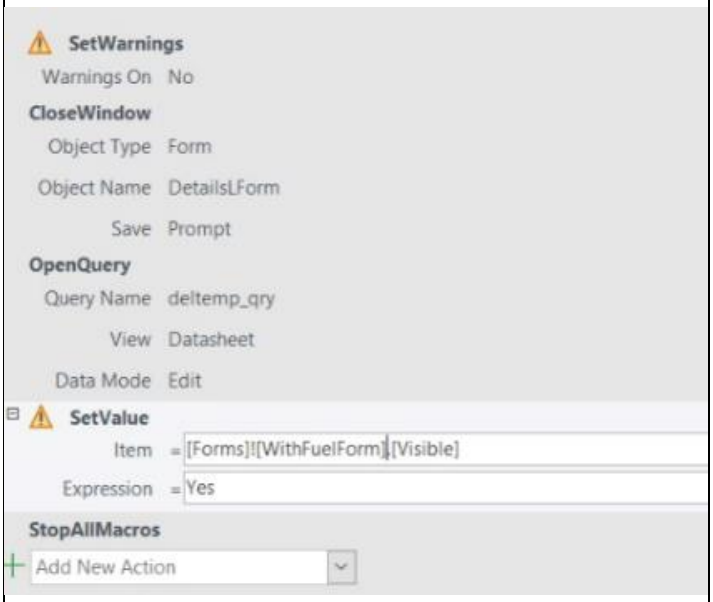
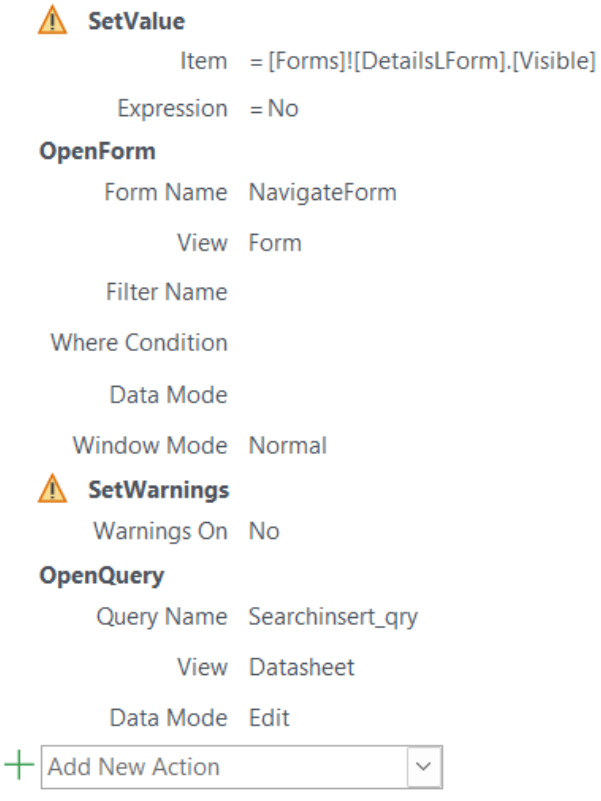
Back2Withfuel_btn	**Back2Withfuel _macro** 	Close the DetailsLform and open the With Fuel Form
NavigatefrmDetL_btn	**NavigatefrmDetL _macro** 	Close the DetailsLform and open the Navigate form

Table 30. DetailsLForm - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
BDL_lbx	Details_BDL_qry	SELECT DISTINCT BD_tbl.[Station ID], BD_tbl.[Station Name], BD_tbl.[Street Address], BD_tbl.[Fuel Type Code], BD_tbl.[BD Blends], BD_tbl.Contact, BD_tbl.Accessibility, BD_tbl.Availability, BD_tbl.[Card Payment options], BD_tbl.[Facility Type] FROM BD_tbl WHERE BD_tbl.[Station ID]=forms![WithFuelForm]![WithFuel_lbx].Value;	Selects various details from the BD Table after matching the Station ID with that of the list box on the WithFuelForm.
E85L_lbx	Details_E85L_qry	SELECT DISTINCT E85_tbl.[Station ID], E85_tbl.[Station Name], E85_tbl.[Street Address], E85_tbl.[Fuel Type Code], E85_tbl.[E85 Other Ethanol Blends], E85_tbl.Contact, E85_tbl.Accessibility, E85_tbl.Availability, E85_tbl.[Card Payment options], E85_tbl.[Facility Type] FROM E85_tbl WHERE E85_tbl.[Station ID]=forms![WithFuelForm]![WithFuel_lbx].Value;	Selects various details from the E85 Table after matching the Station ID with that of the list box on the WithFuelForm.
HYL_lbx	Details_HYL_qry	SELECT DISTINCT HY_tbl.[Station ID], HY_tbl.[Station Name], HY_tbl.[Street Address], HY_tbl.[Fuel Type Code], HY_tbl.[Hydrogen Standards], HY_tbl.Contact, HY_tbl.Accessibility, HY_tbl.Availability, HY_tbl.[Card Payment options], HY_tbl.[Facility Type] FROM HY_tbl WHERE HY_tbl.[Station ID]=forms![WithFuelForm]![WithFuel_lbx].Value;	Selects various details from the HY Table after matching the Station ID with that of the list box on the WithFuelForm.

LNGL_lbx	Details_LNGL_qry	SELECT DISTINCT LNG_tbl.[Station ID], LNG_tbl.[Station Name], LNG_tbl.[Street Address], LNG_tbl.[Fuel Type Code], LNG_tbl.[LNG Vehicle Class], LNG_tbl.Contact, LNG_tbl.Accessibility, LNG_tbl.Availability, LNG_tbl.[Card Payment options], LNG_tbl.[Facility Type] FROM LNG_tbl WHERE LNG_tbl.[Station ID]=forms![WithFuelForm]![WithFuel_lbx].Value;	Selects various details from the LNGTable after matching the Station ID with that of the list box on the WithFuelForm.
LPGL_lbx	Details_LPGL_qry	SELECT DISTINCT LPG_tbl.[Station ID], LPG_tbl.[Station Name], LPG_tbl.[Street Address], LPG_tbl.[Fuel Type Code], LPG_tbl.[LPG Nozzle Types], LPG_tbl.Contact, LPG_tbl.Accessibility, LPG_tbl.Availability, LPG_tbl.[Card Payment options], LPG_tbl.[Facility Type] FROM LPG_tbl WHERE LPG_tbl.[Station ID]=forms![WithFuelForm]![WithFuel_lbx].Value;	Selects various details from the LPG Table after matching the Station ID with that of the list box on the WithFuelForm.
Back2Withfuel_btn	deltemp_qry	DELETE * FROM temp_tbl;	Deletes all values from temp table
NavigatefrmDetL_btn	Searchinsert_qry	INSERT INTO Search_tbl SELECT * FROM temp_tbl;	Inserts temp table values into Search Table
HYLinsert Macro	insertHYL_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsLForm!HYL_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.

BDLinsert Macro	insertBDL_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsLForm!BDL_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
E85Linsert Macro	insertE85L_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsLForm!E85L_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
LPGLinsert Macro	insertLPGL_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsLForm!LPGL_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
LNGLinsert Macro	insertLNGL_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsLForm!LNGL_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.

DetailsRForm

This form displays information about the chosen station according to the fuel type that was chosen in the with fuel form. This form gives the user the option to navigate to the selected station or return to the previous page to choose another station.

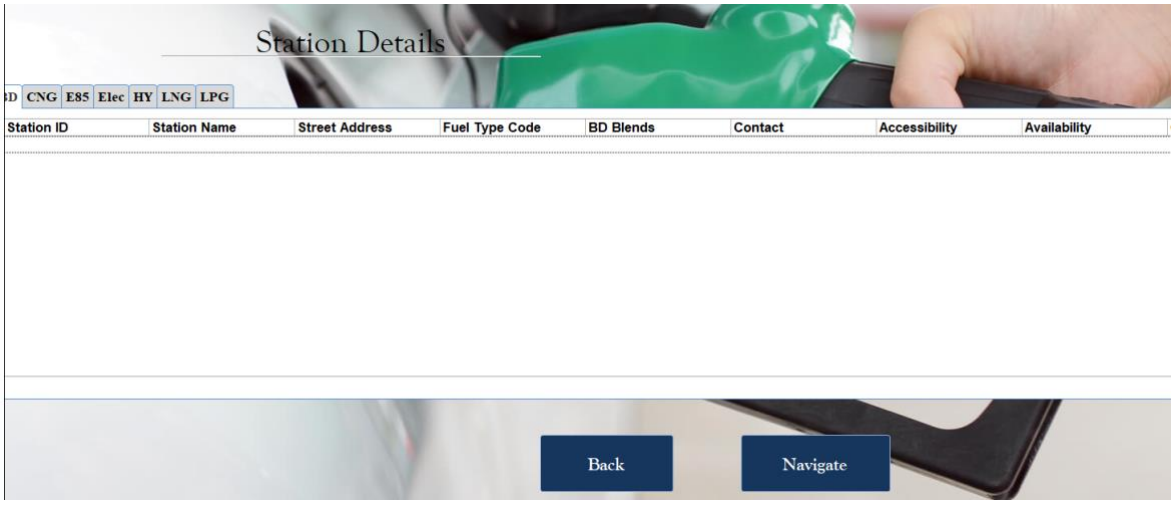
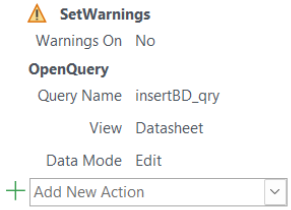
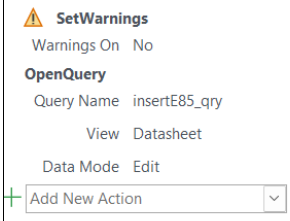
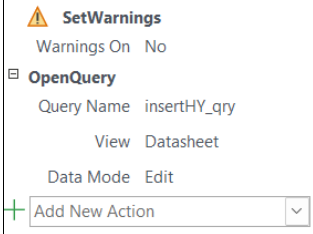
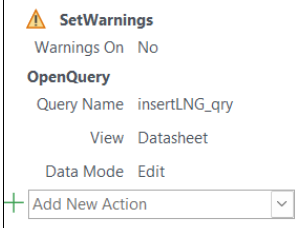
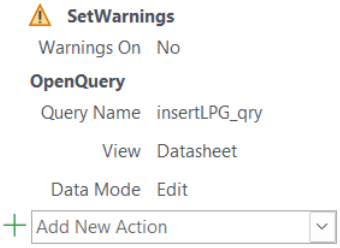


Figure 20. DetailsRForm

Table 31. DetailsRForm - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
DetailsRForm	Form	N/A	N/A	N/A
BD_lbx	Tab Control List Box	Details_BD_qry	BDinsert	After Update
E85_lbx	Tab Control List Box	Details_E85_qry	E85insert	After Update
HY_lbx	Tab Control List Box	Details_HY_qry	HYinsert	After Update
LNG_lbx	Tab Control List Box	Details_LNG_qry	LNGinsert	After Update
LPG_lbx	Tab Control List Box	Details_LPG_qry	LPGinsert	After Update
CNG_lbx	Tab Control List Box	Details_CNG_qry	CNGinsert	After Update
EV_lbx	Tab Control List Box	Details_EV_qry	EVinsert	After Update
Back2Nofuel_btn	Button	N/A	Back2Nofuel	On Click
NavigatefrmDetR_btn	Button	N/A	NavigatefrmDetR	On Click

Table 32. DetailsRForm - Attached Macros & Description

Object Name	Attached Macro	Description
BDinsert	**BD_macro** 	Opens the query
E85insert	**E85insert_macro** 	Opens the query
HYinsert	**HYinsert_macro** 	Opens the query
LNGinsert	**LNGinsert_macro** 	Opens the query
LPGLinsert	**LPGinsert_macro** 	Opens the query

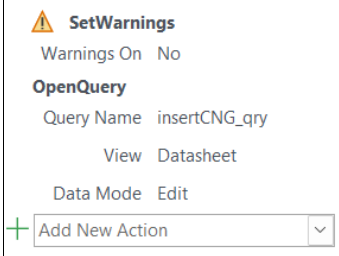
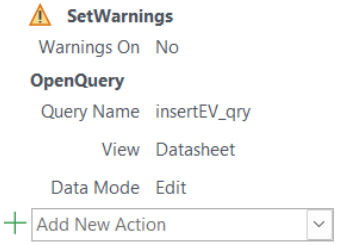
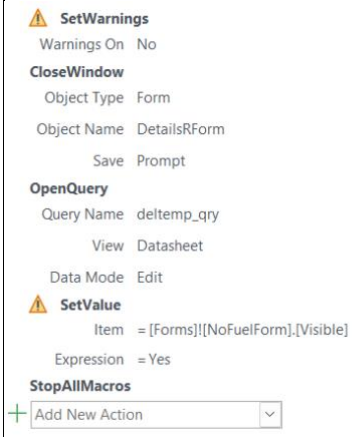
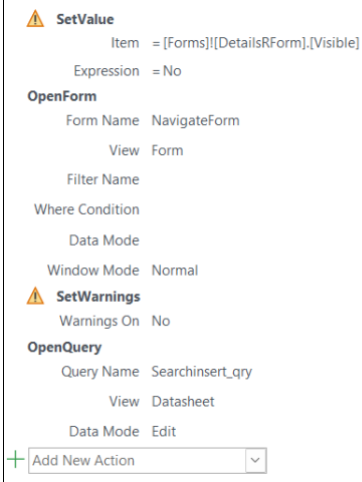
CNGinsert	**CNGinsert_macro** 	Opens the query
EVinsert	**EVinsert_macro** 	Opens the query
Back2Npfuel	**Back2Withfuel _macro** 	Close the DetailsLform and open the No Fuel Form
NavigatefrmDetR	**NavigatefrmDetR_macro** 	Close the DetailsRform and open the Navigate form

Table 33. DetailsRForm - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
BD_lbx	Details_BD_qry	SELECT DISTINCT BD_tbl.[Station ID], BD_tbl.[Station Name], BD_tbl.[Street Address], BD_tbl.[Fuel Type Code], BD_tbl.[BD Blends], BD_tbl.Contact, BD_tbl.Accessibility, BD_tbl.Availability, BD_tbl.[Card Payment options], BD_tbl.[Facility Type] FROM BD_tbl WHERE BD_tbl.[Station ID]=forms![NoFuelForm]!FullList_lbx.Value;	Selects various details from the BDTable after matching the Station ID with that of the list box on the NoFuelForm.
E85_lbx	Details_E85_qry	SELECT DISTINCT E85_tbl.[Station ID], E85_tbl.[Station Name], E85_tbl.[Street Address], E85_tbl.[Fuel Type Code], E85_tbl.[E85 Other Ethanol Blends], E85_tbl.Contact, E85_tbl.Accessibility, E85_tbl.Availability, E85_tbl.[Card Payment options], E85_tbl.[Facility Type] FROM E85_tbl WHERE E85_tbl.[Station ID]=forms![NoFuelForm]!FullList_lbx.Value;	Selects various details from the E85Table after matching the Station ID with that of the list box on the NoFuelForm.
HY_lbx	Details_HY_qry	SELECT DISTINCT HY_tbl.[Station ID], HY_tbl.[Station Name], HY_tbl.[Street Address], HY_tbl.[Fuel Type Code], HY_tbl.[Hydrogen Standards], HY_tbl.Contact, HY_tbl.Accessibility, HY_tbl.Availability, HY_tbl.[Card Payment options], HY_tbl.[Facility Type] FROM HY_tbl, MasterData_tbl, StationList_tbl, StationLocation_tbl WHERE HY_tbl.[Station ID]=forms![NoFuelForm]!FullList_lbx.Value;	Selects various details from the HYTable after matching the Station ID with that of the list box on the NoFuelForm.
LNG_lbx	Details_LNG_qry	SELECT DISTINCT LNG_tbl.[Station ID], LNG_tbl.[Station Name], LNG_tbl.[Street Address], LNG_tbl.[Fuel Type Code], LNG_tbl.[LNG Vehicle Class], LNG_tbl.Contact, LNG_tbl.Accessibility, LNG_tbl.Availability, LNG_tbl.[Card Payment options], LNG_tbl.[Facility Type] FROM LNG_tbl WHERE LNG_tbl.[Station ID]=forms![NoFuelForm]!FullList_lbx.Value;	Selects various details from the LNGTable after matching the Station ID with that of the list box on the NoFuelForm.

LPG_lbx	Details_LPG_qry	SELECT DISTINCT LPG_tbl.[Station ID], LPG_tbl.[Station Name], LPG_tbl.[Street Address], LPG_tbl.[Fuel Type Code], LPG_tbl.[LPG Nozzle Types], LPG_tbl.Contact, LPG_tbl.Accessibility, LPG_tbl.Availability, LPG_tbl.[Card Payment options], LPG_tbl.[Facility Type] FROM LPG_tbl WHERE LPG_tbl.[Station ID]=forms![NoFuelForm]!FullList_lbx.Value;	Selects various details from the LPGTable after matching the Station ID with that of the list box on the NoFuelForm.
CNG_lbx	Details_CNG_qry	SELECT DISTINCT CNG_tbl.[Station ID], CNG_tbl.[Station Name], CNG_tbl.[Street Address], CNG_tbl.[Fuel Type Code], CNG_tbl.[CNG Fill Type Code], CNG_tbl.[CNG Vehicle Class], CNG_tbl.Contact, CNG_tbl.Accessibility, CNG_tbl.Availability, CNG_tbl.[Card Payment options], CNG_tbl.[Facility Type] FROM CNG_tbl WHERE CNG_tbl.[Station ID]=forms![NoFuelForm]!FullList_lbx.Value;	Selects various details from the CNGTable after matching the Station ID with that of the list box on the NoFuelForm.
EV_lbx	Details_EV_qry	SELECT DISTINCT EV_tbl.[Station ID], EV_tbl.[Station Name], EV_tbl.[Street Address], EV_tbl.[Fuel Type Code], EV_tbl.[EV Network], EV_tbl.[EV Pricing], EV_tbl.[EV Connector Types], EV_tbl.Contact, EV_tbl.Accessibility, EV_tbl.Availability, EV_tbl.[Card Payment options], EV_tbl.[Facility Type] FROM EV_tbl WHERE EV_tbl.[Station ID]=forms![NoFuelForm]!FullList_lbx.Value;	Selects various details from the EVTable after matching the Station ID with that of the list box on the NoFuelFuelForm.
Back2Nofuel_btn	deltemp_qry	DELETE * FROM temp_tbl;	Deletes all values from temp table
NavigatefrmDetR_btn	Searchinsert_qry	INSERT INTO Search_tbl SELECT * FROM temp_tbl;	Inserts temp table values into Search table

LNGinsert Macro	insertLNG_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsRForm!LNG_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
LPGinsert Macro	insertLNG_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsRForm!LPG_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
BDinsert Macro	insertBD_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsRForm!BD_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
HYinsert Macro	insertHY_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsRForm!HY_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
CNGinsert Macro	insertCNG_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsRForm!CNG_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table

EVinsert Macro	insertEV_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsRForm!EV_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.
E85insert Macro	insertE85_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!DetailsRForm!E85_lbx.Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.

EVDetailsForm

This form appears when a user selects to request information about an EV station. With the option to return to the previous page and another to travel to the selected station, this form gives the user comprehensive information about the station.

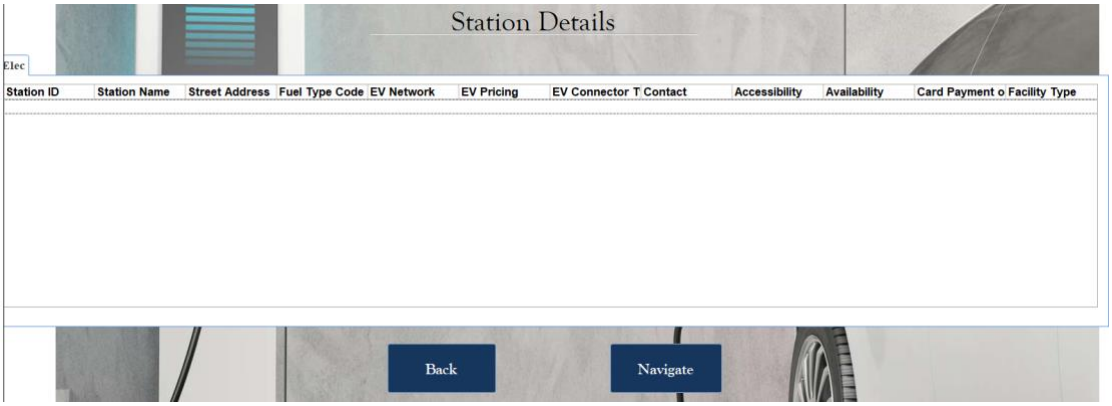
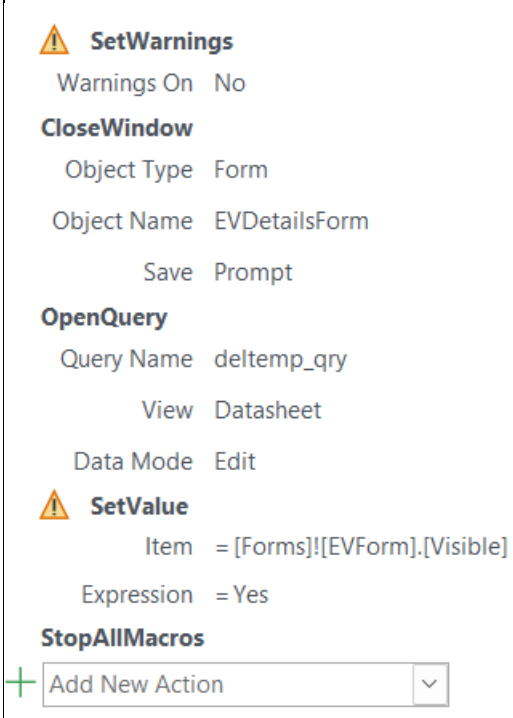
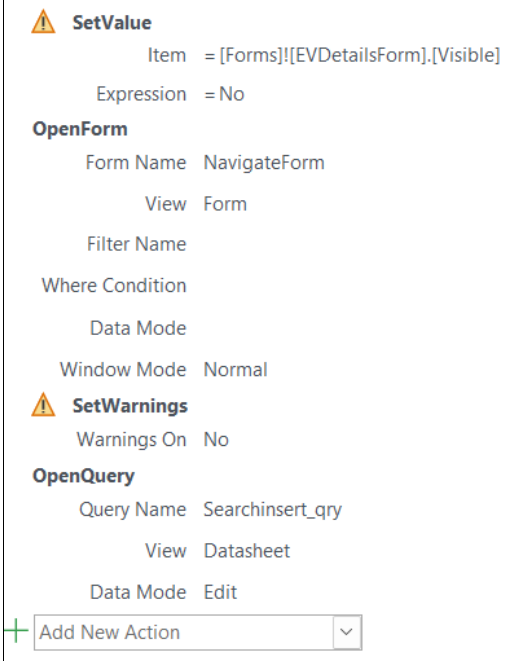


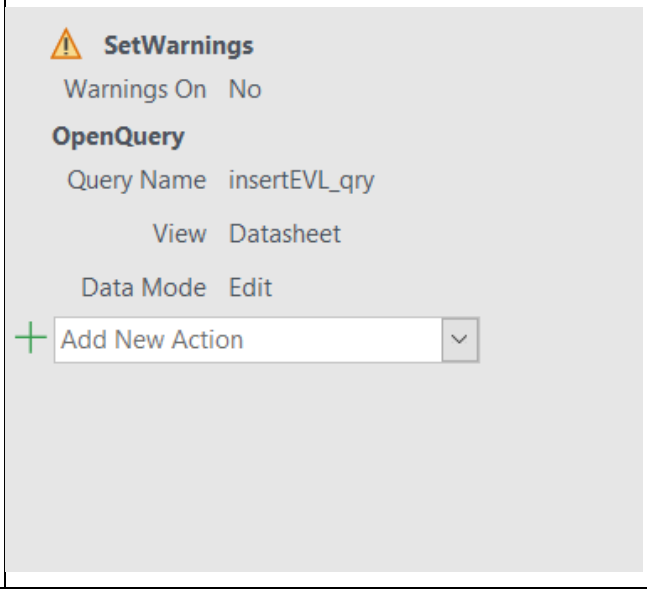
Figure 21. EVDetailsForm

Table 34. EVDetailsForm - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
EVDetailsForm	Form	N/A	N/A	N/A
EVLDetails_lbx	List box	Details_EVL_qry	EVLinsert	After Update
BackfrmEVDet_btn	Button	N/A	BackfrmEVDet	On Click
NavigatefrmEV_btn	Button	N/A	NavigatefrmEV	On Click

Table 35. EVDetailsForm - Attached Macros & Description

Object Name	Attached Macro	Description
Back2EVfrmEVDet_btn	**BackfrmEVDet macro** 	Close the EV Details Form and open the EV Form
NavigatefrmEV_btn	**NavigatefrmEV macro** 	Close the EV Details Form and open the Navigate form

EVLDetails_lbx	**EVLinsert** 	Opens the Query

Object Name	Query Name	Attached Query	Description
EVLDetails_lbx	Details_EVL_qry	SELECT DISTINCT EV_tbl.[Station ID], EV_tbl.[Station Name], EV_tbl.[Street Address], EV_tbl.[Fuel Type Code], EV_tbl.[EV Network], EV_tbl.[EV Pricing], EV_tbl.[EV Connector Types], EV_tbl.Contact, EV_tbl.Accessibility, EV_tbl.Availability, EV_tbl.[Card Payment options], EV_tbl.[Facility Type] FROM EV_tbl WHERE EV_tbl.[Station ID]=forms![EVForm]!EVL_lbx.Value;	Selects various details from the EVTable after matching the Station ID with that of the list box on the EVForm.
Back2EVfrmEVDet_btn	deltemp_qry	DELETE * FROM temp_tbl;	Delete all values from temp table
NavigatefrmEV_btn	Searchinsert_qry	INSERT INTO Search_tbl SELECT * FROM temp_tbl;	Insert Values into Search table from temp table
EVLinsert Macro	insertEVL_qry	INSERT INTO temp_tbl ([Station ID], State, [Fuel Type Code]) SELECT MasterData_tbl.[Station ID], MasterData_tbl.[State], MasterData_tbl.[Fuel Type Code] FROM MasterData_tbl WHERE MasterData_tbl.[Station ID]=Forms!EVDetailsForm![EVLDetails_lbx].Value;	Inserts values into temp table after matching Station ID of List box Selection with MasterData table.

NavigateForm

With the option to return to the previous page and another to travel to the selected station, this form gives the user comprehensive information about the station.

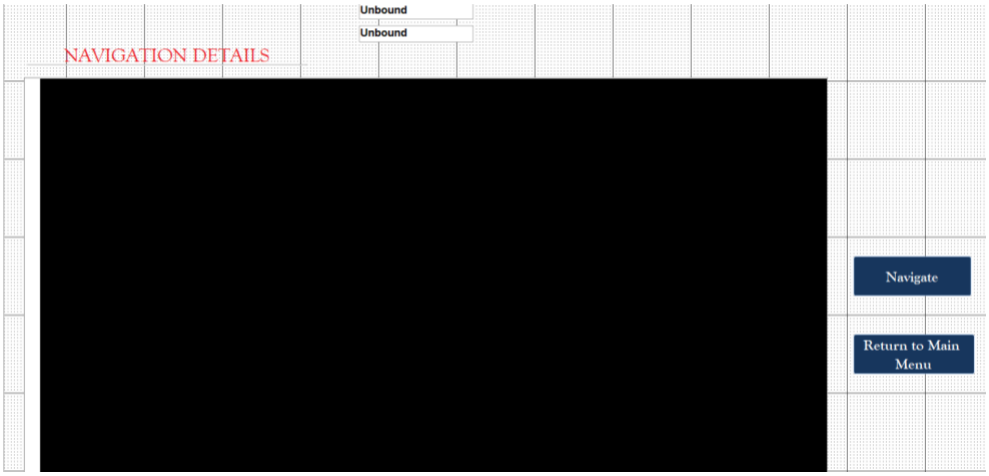


Figure 22. NavigateForm

Table 36. NavigateForm - Objects List & Description

Object Name	Control	Attached Queries	Attached Macros	Property
Navigate	Form	N/A	N/A	N/A
lstLatitude(hidden)	List Box	NavigateLat_qry	N/A	N/A
lstLongitude(hidden)	List Box	NavigateLng_qry	N/A	N/A
Navigate_btn	Button	N/A	VBA Procedure	On Click
ReturntoMain_btn	Button	N/A	Return	On Click
WebBrowserControl	Active X Control	N/A	N/A	On Click

Table 37. NavigateForm - Attached Macros & Description

Object Name	Attached Macro / Event Procedure	Description

Navigate_btn	**Event Procedure**
	`Option Compare Database`
	`Private Sub Navigate_btn_Click()`
	`  Dim lat As Variant`
	`  Dim lng As Variant`
	`  ' Get the latitude and longitude values from the selected item in the list box`
	`  lat = Me.lstLatitude.ItemData(1)`
	`  lng = Me.lstLongitude.ItemData(1)`
	`Dim url As String`
	`  url = "https://www.google.com/maps/place/" & lat & "," & lng`
	`  Me.WebBrowserControl.Navigate url`
	`End Sub`
		Makes Chart 3 visible when clicked

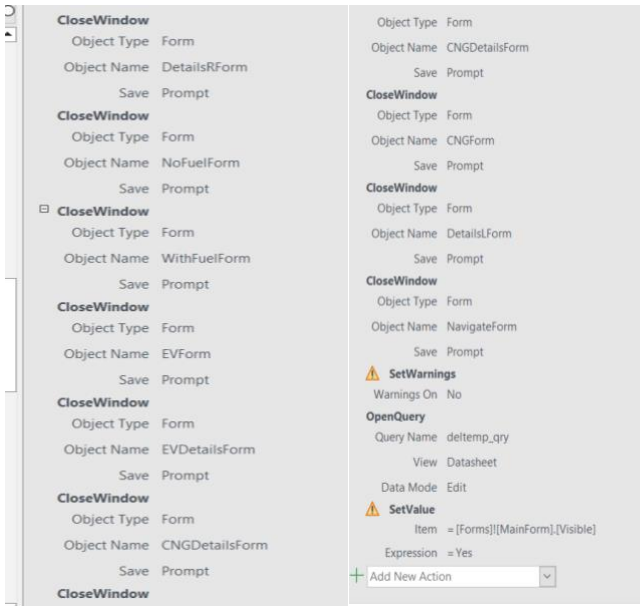
ReturntoMain_btn	**Return** 	Close all forms on Customer side of the app except the Main form which is made visible. Also opens the del_temp query.

Table 38. NavigateForm - Attached Queries & Description

Object Name	Query Name	Attached Query	Description
lstLatitude	NavigateLat_qry	SELECT MasterData_tbl.Latitude FROM MasterData_tbl, temp_tbl WHERE MasterData_tbl.[Station ID]=temp_tbl.[Station ID];	Selects the Latitude from Master table where station id is same as the temp table.
lstLongitude	NavigateLng_qry	SELECT MasterData_tbl.Longitude FROM MasterData_tbl, temp_tbl WHERE MasterData_tbl.[Station ID]=temp_tbl.[Station ID];	Selects the Longitude from Master table where station id is same as the temp table
Return Macro	Deltemp_qry	DELETE * FROM temp_tbl;	Empties the temp table

PowerBI Dashboard

The PowerBI link opens the dashboard. The executive can examine the data in a scenic format on the dashboard, which was produced using the dataset used to construct the app. Various slicers are also available for a more detailed perspective.

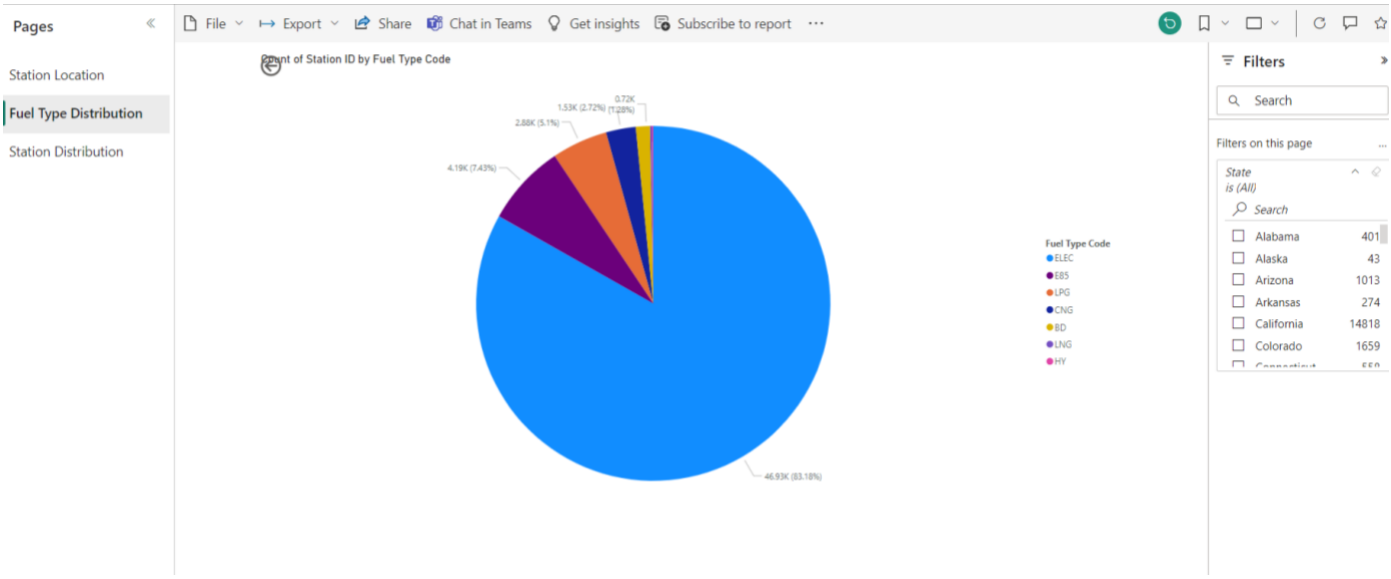


Figure 23. State wise Fuel Type Distribution Chart

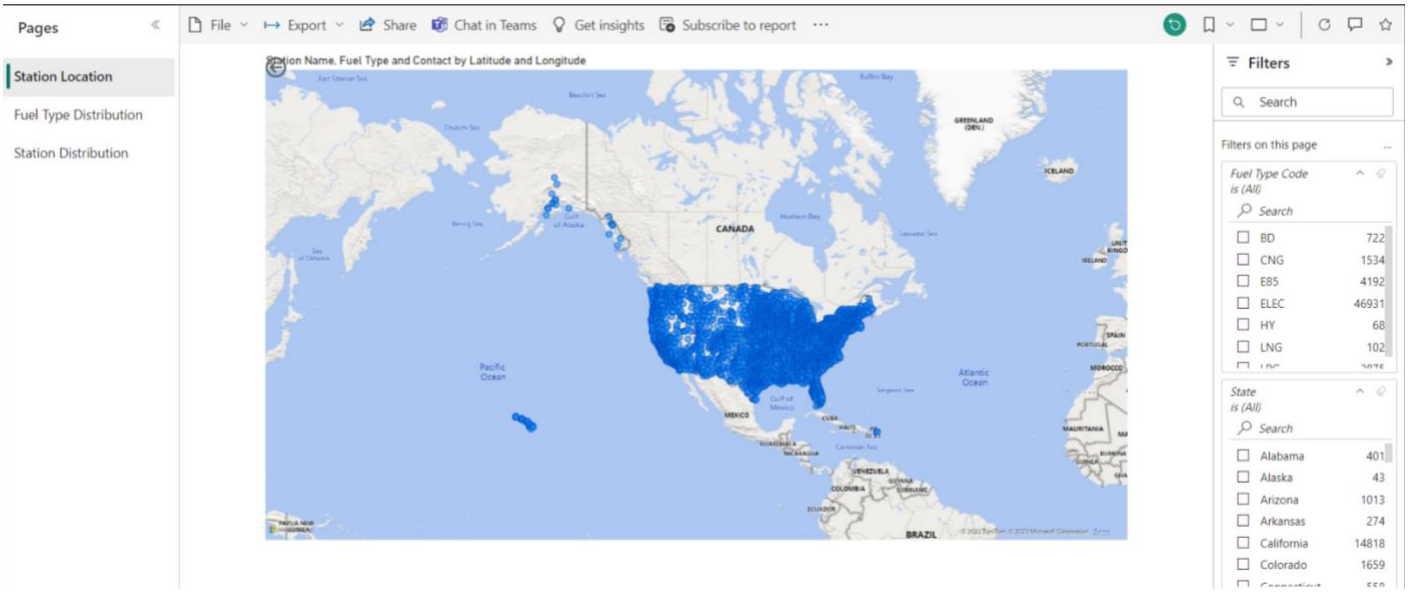


Figure 24. Fuel Station Locations Chart

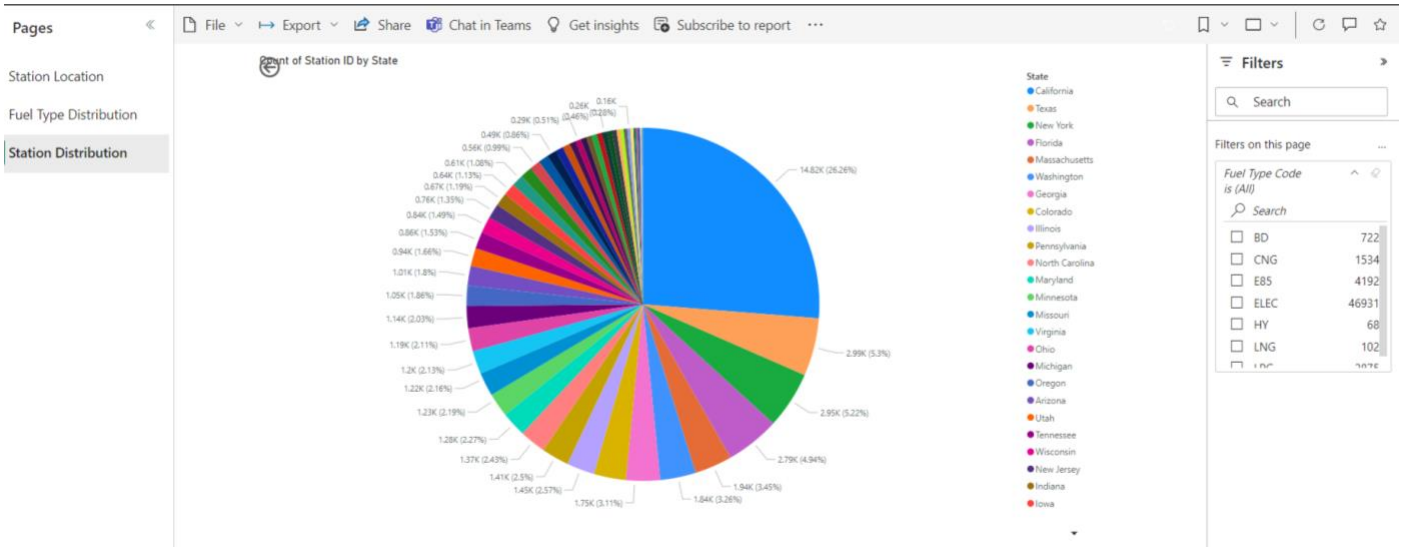


Figure 25. State wise Fuel Station Distribution Chart

Knowledge Nuggets

- In order to implement the navigate feature, we developed a VBA logic.
- In order to understand current trends in the use of alternative fuels, we have also produced a statistical analysis using a table comprising all search histories.
- To check credentials and approve or deny access, a button has been developed with an event process using VBA coding and logics. The information in the tables holding the names of executives and member/customer data was used to build this logic.
- Additionally, we created a PowerBI dashboard that enables executives to filter data using several slicers.

Future Directions

- **Separate Application:** The group will create separate software that can be used for operations and new customer registration and login..
- **Expansion to International Markets:** The initiative might be expanded to include details about alternative fueling facilities in other nations, giving customers access to a worldwide resource.
- **Integration with Mobile Applications:** Users may access information on alternative filling stations while on the go by integrating the database with mobile applications.
- **Real-Time Data Updates:** Real-time information on fuel availability and prices will be incorporated, enabling users to make more educated choices about where to refuel.
- **Integration with Environmental Data:** Users could access the database's environmental data integration to learn more about how various fuel types affect the environment.
- **Partnership with Fuel Providers:** To get more thorough and precise information about alternative fueling stations, the project team could collaborate with fuel suppliers.
- **User reviews:** Users will be able to provide evaluations and ratings to the project, which will enable others to make more educated decisions and encourage local companies that provide alternative fuels.
- **Integration with Smart City Initiatives:** The project team could collaborate with smart city efforts to urge local governments to adopt alternative fuels and sustainable energy practices.
- **Integration with Transit Systems:** In order to provide information on alternative filling stations close to transit hubs and stations, the database might be integrated with public transportation systems.
- **Integration with Urban Planning Initiatives:** In order to include information on alternative fueling stations in city planning and development, the project team can collaborate with urban planning efforts.
- **Implementation of Data Analytics:** The project team may utilize data analytics tools to examine user behavior patterns and trends in fuel consumption, giving them insights into how alternative fuels might be adopted.

- **Integration with Renewable Energy Sources:** To give consumers a thorough resource on sustainable energy solutions, the database might be connected with renewable energy sources, such solar or wind power.
- **Integration with Vehicle Telematics:** Drivers could get real-time information on the location and accessibility of alternative fueling stations by integrating the database with car telematics devices.