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Natural Gas Workbook

Executive Summary

Transfuels LLC is a company building up the U.S. Natural Gas Infrastructure. We build Liquefied Natural Gas (LNG) stations, thus allowing diesel Semi-Trucks to switch to natural gas. There are two problems we are facing as we build LNG stations. A) The price of Natural Gas is relatively volatile and fluctuates around the U.S. and B) We must build our stations close enough to a liquefaction plant to guarantee supply.

This Workbook is designed to facilitate 5 simple processes

1. Log into a secure website using credentials and extract daily natural gas data
2. Use simple tools to compare daily gas prices to historical prices to assist in portfolio management
3. Email reports indicating that the status of Pricing updates
4. Geocode Longitudinal and Latitudinal Coordinates of addresses
5. Use addresses to locate the nearest Liquefied Natural Gas supply point and indicate feasibility.

All Five of these functions can be located under the Natural Gas Tab. They are fairly simply to use and will save my company lots of time when planning where to build their next station as well as when to change their natural gas portfolio.

Platts Gas Data

In order to minimize our fixed costs as well as mitigate risk, we have a natural gas portfolio. Simply stated, we buy natural gas futures in order to lock up prices, thus eliminating the risk of large swings in daily Natural gas prices. We buy a costly subscription to Platts Gas Daily in order to analyze the daily gas prices and speculate as to future prices. Platts website is private, so you must have an account to do so. Rather than going through the tedious process of logging on and getting the daily spot prices and comparing them to previous data, I wrote a macro to help assist in the process.

Module 1 is dedicated to getting the Data off the website. To do this I utilize Professor Allen's agent to Log into Platt's website and extract the table holding the data. The macro sustains a secure connection with the website until the data is retrieved. Once the table is pasted into a new worksheet in the workbook, the macro

finds the correct data in the table and pastes onto Sheet 1 with all previous spot prices. The new worksheet is deleted and the macro is finished. In addition, throughout the process of the macro, I use a userform to show the user the status of the data extraction process.

Once the Data is uploaded into the daily spot price table, It is necessary for us to do analysis of the prices. Mainly we are comparing any drops in prices, looking for areas we can improve our portfolio. To assist in the analysis process, I wrote a very simple userform that will assist the user in identifying any price drops on a daily and weekly basis. Depending on what button is pressed, the macro will loop through the data and highlight either the prices that have dropped from the previous day's prices, or prices that are lower than the previous 5 days. If there is a consistent drop in prices for a specific pipeline, it might be an indicator that it's time to update that portion of our portfolio.

Lastly, it is pertinent to our company that we are keeping track of daily spot prices around the U.S. If we don't update our spot prices daily, we will be underutilizing our subscription, and will have to enter the data in by hand (beyond tedious). To consistently update my supervisor, I have created a simple message that will inform them that the data has been uploaded for a certain day. By inputting a simple email address etc. and pressing the Send Report button on the Natural Gas Ribbon it will send an email reporting the data retrieval. Although the message is very simple, it saves me a lot of time and let's my boss know I'm doing what he asked.

Station Location

The second main problem as stated before is to find plausible locations to build natural gas facilities. Stations cannot be more than 250 miles from the nearest supply source or else logistics costs cut too much into the LNG's margin. Our company uses Google Earth Pro to give a rough sketch of how far a certain parcel of land is from its nearest supply source. In order to create radius layers for google earth using a third party website, each point must be geocoded to find it's Latitude and Logitudinal coordinates. Rather than having go onto a website and plug in the data for certain address, I thought it would be nice to a geocoder built into the spreadsheet.

When you click on the find LatLong button on the Natural gas ribbon, a handy userform appears. By plugging the Address into the userform and clicking Geocode you will receive the Latitude and longitudinal coordinates for that address. This userform references the Google Maps geocoding api. The VBA simply takes the information you input, parses it, references the xml from the api, and extracts the Latitude and longitudinal values.

The find nearest supply button of the Natural Gas Tab does exactly what it says. When Transfuels contemplates about building a new location, the first question is

always where's the nearest supply. Straight distances aren't good enough, we need to know the distance via road. In order to find this out, we references Google's Distance Matrix api. Similar to the last explanation, we input the address, indicate what type of supply type and region we are interested in, and press Geocode. Because Google limits the amount of pings you're allowed per day, we don't want to look up any unnecessary data. The userform used to reference the api mandates that you specify supply type and region in order to decrease the number of distances it will look up and will not allow you to proceed if you have not specified.

After referencing the API this macro will generate a report on a New Worksheet showing all the supply points of the selected type and within the selected region. It also highlights the nearest supply point and gives you the distances in both miles and hours traveled. This is will be one of the most useful tools to my work, as I will be able to quickly indicate which station locations are feasible options as well as where to draw LNG supply from.

Implementation Documentation

1. Getting Platts Data
    a. Logged onto a secured website using Professor Allen's Agent
    b. Maintain connection throughout interaction
    c. Extract data from website to new worksheet
    d. Plug selected data into Daily spot prices table
    e. Utilizes userform to provide updates

2. Analyzing Data
    a. Creates toggle's that Highlight drops of prices compared to the previous day or weekly average
    b. Recalculates average every time new data is entered

3. Sending Messages
    a. Emails report's indicating that the table has been updated to individuals on the list.
    b. Taken from professor Allen's in class example.

4. Geocoding Addresses
    a. Created a userform that parses input into compatible format with Googles geocoder api.
    b. Navigates googles xml response and extracts latitudinal and longitudinal coordinates

5. Finding Nearest Supply Locations
    a. User form that mandates specific information be input.
    b. Takes input & parses to a compatible format to reference Googles Distance Matrix API.
    c. Navigates Googles XML response of Distances via road and hours needed to travel between coordinates.
    d. Creates new worksheet with selected types of plant within the region as well as distances. Highlighting the closest supply point.

Learning & Difficulties encountered.

Learning

1. Learned how to create secure connection with secure websites
2. Learned how to extract tables onto new page and how to manipulate data
3. Learned how to use userforms as a means to document process or give status updates.
4. Learned how to use Professor Allens agent to make web surfing much easier
5. Learned how to use userforms to create highlight toggles for analysis
6. Learned how to use VBA to automate sending messages
7. Learned how to create a special Ribbon with pictures to run macros
8. Learned how to create complex UserRibbons to reference Internet API's
9. Learned how to parse and scrub inputs to make compatible for api referencing
10. Learned how to create a userform that mandates the user enter in all required information
11. Learned how to make a Workbook that works for you.

Difficulties

1. Struggled at first to use excels internet controls before learning how to use the agent.
2. Struggled to define all variable and use correct references to each object
3. Wanted to send an email indicating all the different pipelines prices changes yet wasn't able to figure out how to write a letter that would adequately express my intent.

All help for this project was given directly from Professor Allen or referenced from the Internet.