BI Concepts, Tools and Applications

Exercise # 2: Worldwide Carbon Emissions Scenario

Learning Objectives:

In this exercise, you will gain hands-on experience using the features of MicroStrategy Desktop 10.8. You will refine and analyze data to acquire sophisticated insights into business practices through various hypothetical scenarios for demonstrating the features of Desktop. Additionally, you will learn recommended best practices for creating effective, compelling data visualizations.

Desktop Overview:

MicroStrategy Desktop provides instant access to data to create interactive dashboards to display and explore business data. Using simple, interactive visualizations and pre-defined, presentation-quality formatting, users can quickly display the data in a visually-striking, interactive dashboard, creating data-driven stories in a short time. MicroStrategy Desktop is a client application, and it allows users to import data from many different sources, including local files, databases, a Google drive, Facebook, and more.

In Desktop, **datasets** provide the data displayed in a dashboard. Users import data into a new dataset or add the data to an existing dataset. Once the data has been imported, users can select multiple tables to create a single, multi-table dataset. Users create a dataset from a single source, or combine different multiple types of data into a single dataset.

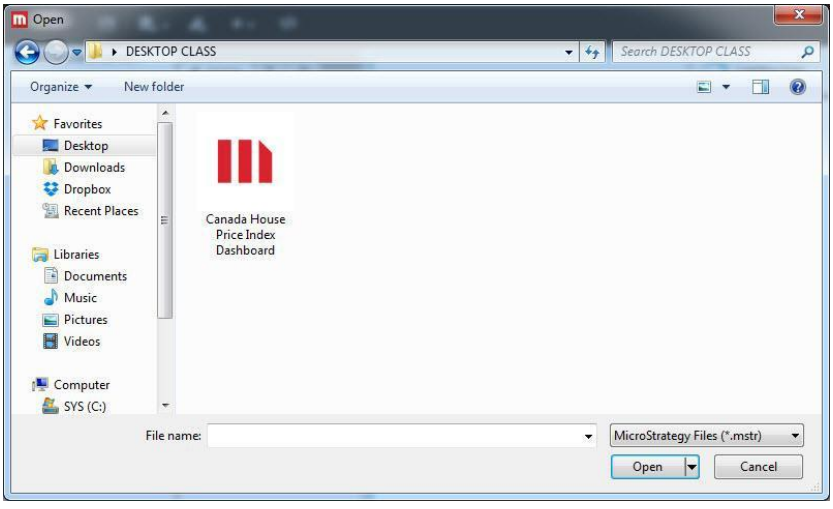
After importing data, users add visual representations of the data to make the data easier to interpret. Users import data directly into MicroStrategy Desktop for use in creating dashboards. Users can import data from many different data sources, such as an Excel file or a database, or by using the results of a custom database query.

First Look at Desktop Features:

This activity provides users with a very basic introduction to the features and functions of MicroStrategy Desktop. Users will examine a Desktop dashboard complete with datasets, visualizations, attributes, and metrics. The object of this activity is to familiarize users with the various elements of the dashboard, so we will use a relatively simple scenario. The dashboard is entitled **Canada Price House Index**. This dashboard charts the average house price in some major metropolitan areas in Canada over a series of years.

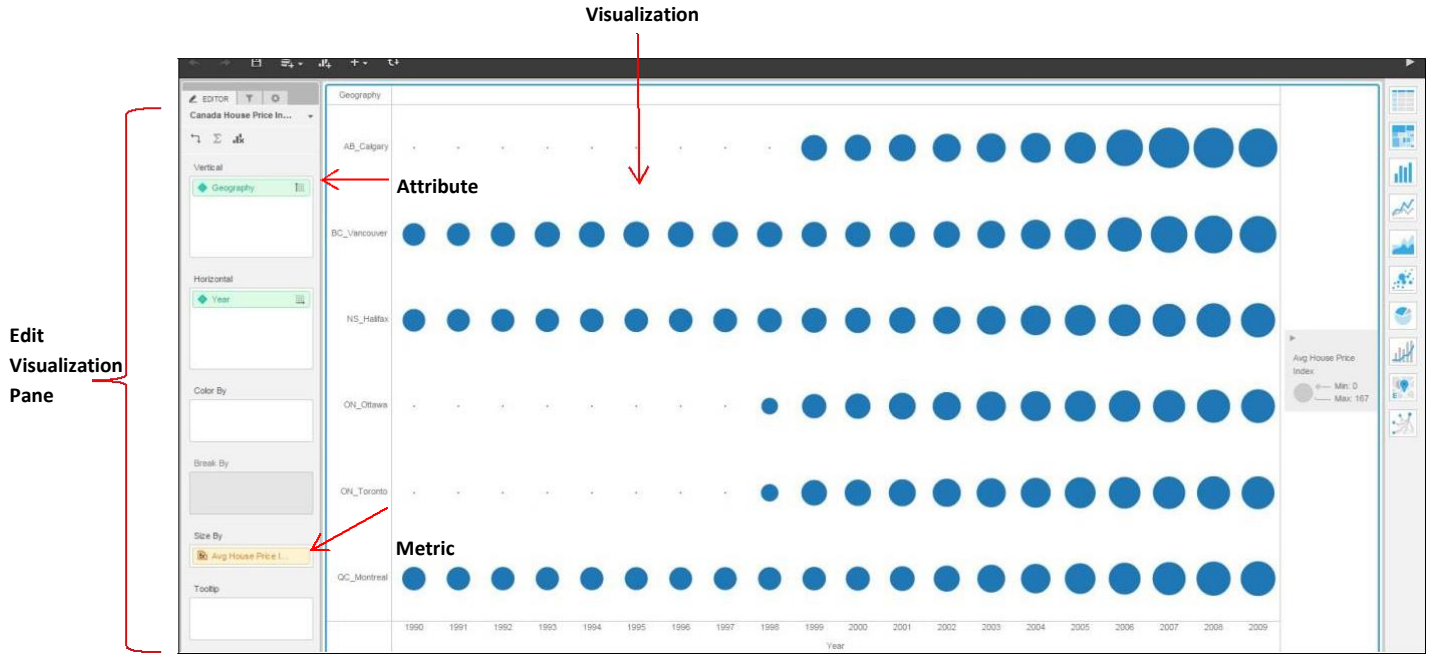
1. To begin with, open a new dashboard in Desktop. A **dashboard** is an interactive display users create to showcase and explore business data. The empty desktop will look like this:

2. Locate the **Canada House Price Index** dashboard file and open it:



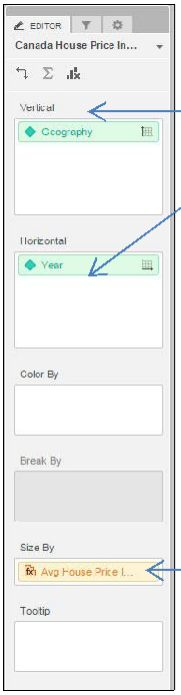
Once the dashboard loads, take some time to examine the individual features.

Here is the completed dashboard with its individual elements labeled:



Find the graph at the center of the dashboard. This graph is visualization**.** **Visualizations** are interactive displays that users create to showcase and explore business data. Users add visual representations of the data to the dashboard to make data easier to interpret, perform manipulations on the data to customize which information to display, and to provide a logical flow to the dashboard.

The panel on the left contains the **metrics** and **attributes** used in the dashboard:

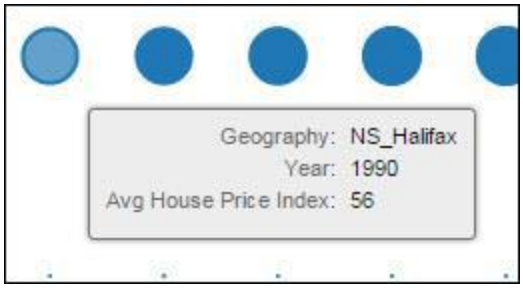


Attributes are data levels defined by the system architect and associated with one or more columns in a data warehouse lookup table. Here, the attributes are **Geography** and **Year**. These attributes enable users to create a framework for numerical data.

A **metric** is a business calculation defined by an expression built with functions, attributes, or other metrics. Users determine which metrics will generate the visualization in the dashboard. Here, the metric is the **average house price in Canada**, which users analyze with the attributes of **Geography** and **Year**.

In this scenario, the user wants to display the relationship between average house prices over a period of nineteen years (from 1990 to 2009) in major metropolitan areas in Canada. That relationship is expressed as a circle graph. Each dot reflects the average house price in a particular location during a specific year.

3. Hover over the first dot in the NS_Halifax line:



According to the information, the average house price index rating in Halifax in 1990 was 56.

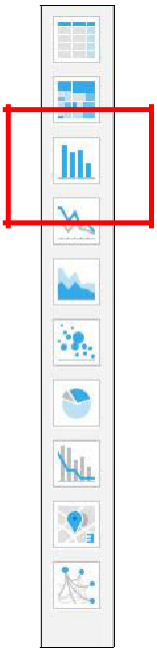
Q: What is the insight suggested by this analysis?

Clearly, the housing price index varied over the period of years charted in the visualization. However, the overall trend suggests that housing prices went up the majority of years in most of the metropolitan areas included in the analysis.

Q: Why did the user select a circle graph for this visualization?

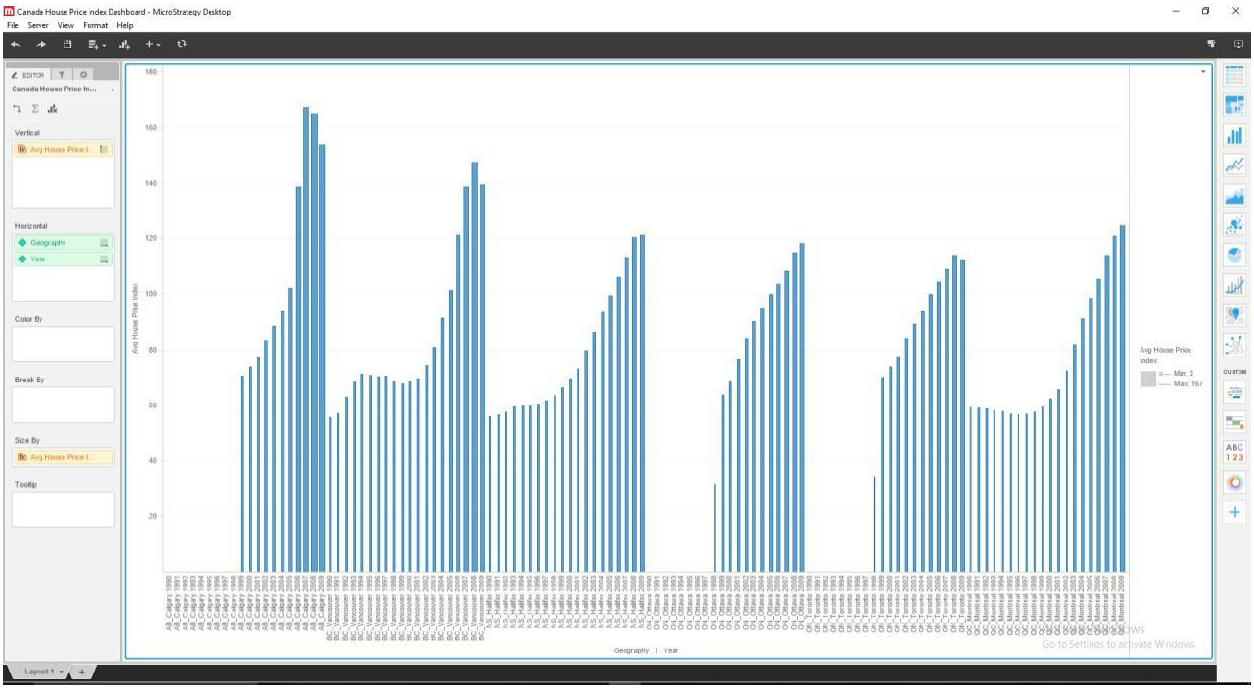
The circle graph is a simple interface with bold colors that allows a viewer to quickly understand large discrepancies. However, the discrepancies here are relatively minor. For example, the difference in the average housing price index in Halifax from 1990 to 1991 only increases by a factor of 1. If a user needs to understand quickly the overall trajectory of housing prices, a circle graph might not be the best choice for visualization. To a viewer who needs to understand the data quickly, the difference in circle circumference might not be readily apparent. What other possibilities are there? Look at some of the other options for visualizations located in the panel on the right side:

There are a variety of options for creating visualizations, including graphs, heat maps, bar graphs, line charts, area charts, bubble charts, and pie graphs.



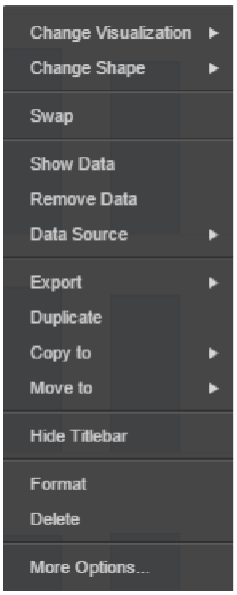
Which of these might be the best visualization mode for the current scenario?

4. Click the Bar Chart function. Once the user has clicked the Bar Chart button, the visualization will look like this: (If Geography goes into Break By move it over Year in Horizontal).



The bar chart provides a better way of understanding the relationship between the metrics and attributes in this scenario. Here, users can quickly ascertain how the Housing Price index has fluctuated over the years in pertinent housing markets.

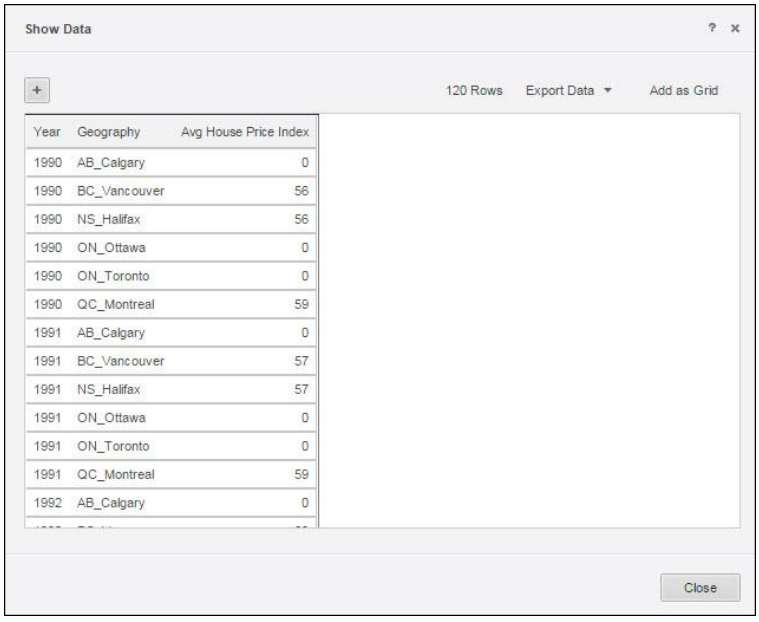
5. Select the down arrow located in the upper right hand corner of the dashboard. The following pulldown menu will appear:



The first items on this menu allow the users to change the visualization itself. For example, by selecting the first menu option under the Change Visualization option, the user could change the visualization from a chart to a graph. The second option allows users to change the shape of the objects contained in the visualization (for example, here the user could change the bars in the chart into squares). Now look at the next set of options. These functions pertain to the data used to construct the dataset, which is the basis of the visualization.

6. Click Show Data.

The following window will appear:



Year	Geography	Avg House Price Index
1990	AB_Calgary	0
1990	BC_Vancouver	56
1990	NS_Halifax	56
1990	ON_Ottawa	0
1990	ON_Toronto	0
1990	QC_Montreal	59
1991	AB_Calgary	0
1991	BC_Vancouver	57
1991	NS_Halifax	57
1991	ON_Ottawa	0
1991	ON_Toronto	0
1991	QC_Montreal	59
1992	AB_Calgary	0

This window allows the user to review the data used to construct the visualization. Data collection is a vital element of the Desktop visualization process. Users can import data from a file, such as an Excel spreadsheet or a text file, directly into MicroStrategy Desktop to create a dashboard. Data can be imported from files in a selected folder, URL, or file URI scheme. For example, users can import data from external files, such as Microsoft Excel, text, or CSW files. The imported file must be in one of the following formats: .xls, .xlsx, .txt, and .csv. Additionally, users can import data from files on a computer or a shared location using a Windows file path. All visualizations are based on data uploaded from various sources.

In the present case, this data has already been uploaded from its source and **wrangled**, or cleaned up. To demonstrate the process without having to create a new dataset, we're going to clear the current dashboard, export the data to the local computer, and upload it again to recreate the visualization. The goal is to familiarize users with the basic functions and ensure they have the skills to upload data when the time comes to create original datasets.

7. Select the Export Data function at the top of the window. Here, the user can export information as an excel file, a pdf, or as data.
8. Save the information to the dashboard as a data file using the Export Data drop down menu:

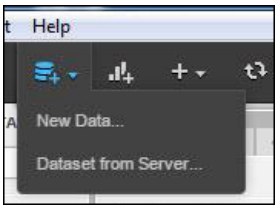
9. When saving the file to the local computer, name it FILE 1. Close the **Show Data** window.

10. Let's create a new Dashboard. In the top left click on **File** and select **New**, when prompted to save changes made to the Canada House Price Index, select **Don't Save**

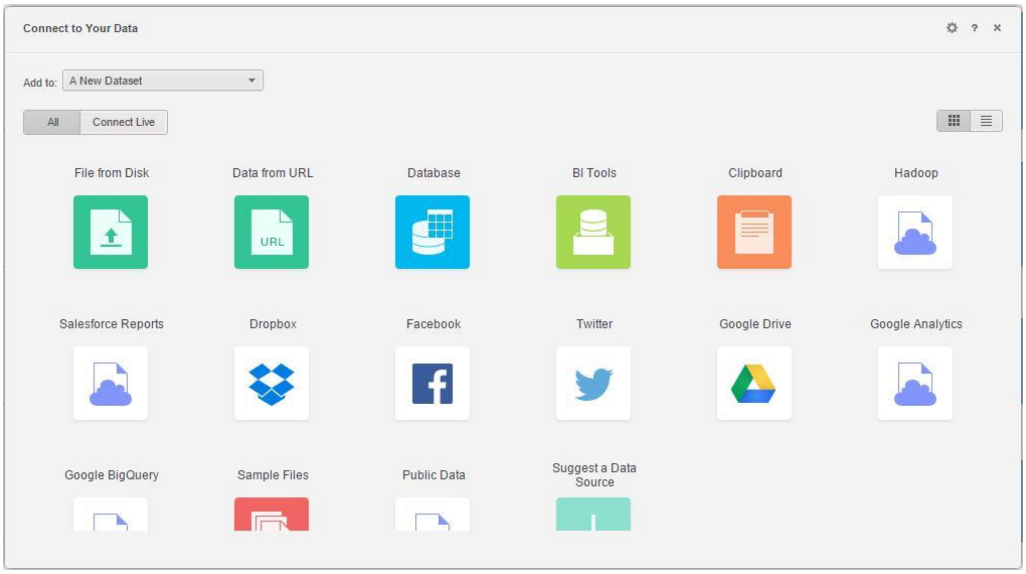
    This will clear the dashboard. Now the user is ready to import data.

11. To begin, click the Add Data button on the Desktop homepage:

12. Select the New Data function from the menu:



The user will see the Connect to Your Data window:

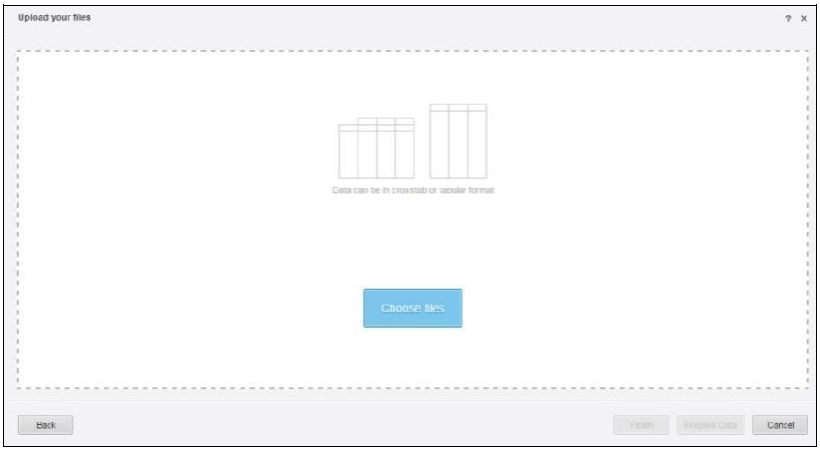


When importing data into Desktop, use the Data Connection menu to select the source and type of data that will form the basis of the analyses.

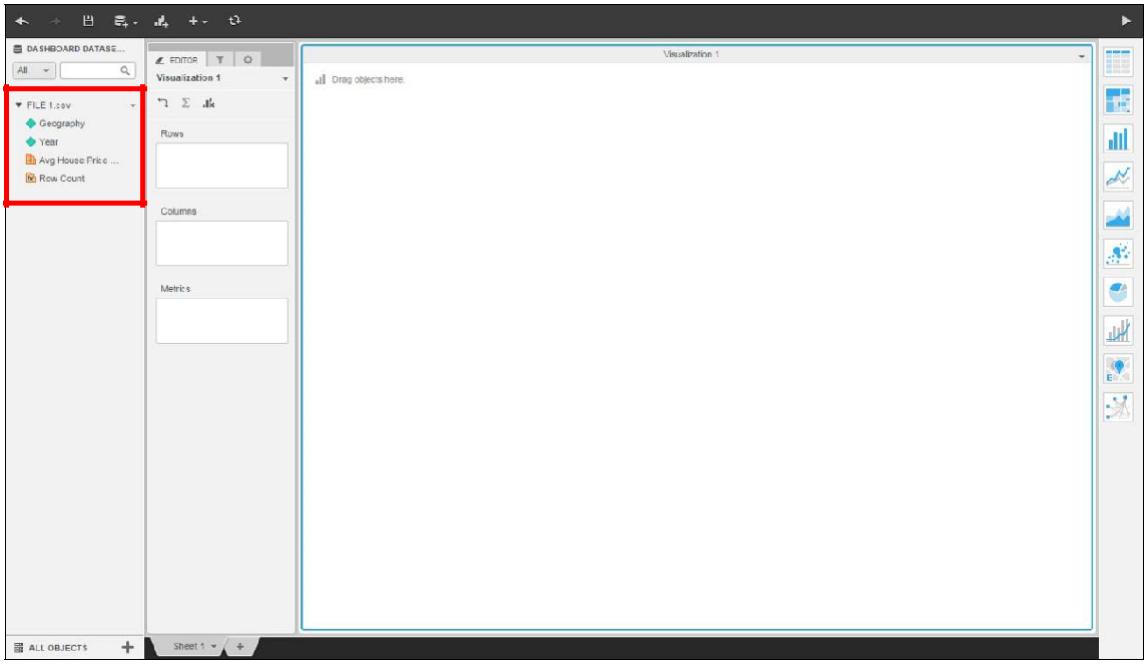
13. Select the **File From Disk** button, since FILE 1 is saved on the local computer.

Users can import data from a disk, a website, a database, and a variety of other options. For this exercise, the user is going to select File From Disk. This function allows users to import Excel, CSV and text files from the local machine.

14. Click the button. The Upload Your File window will then appear:



15. Select the Choose Files button and locate FILE 1 on the local computer.
16. Open FILE 1. Since this data has already been prepared, the user can simply click **Finish** once the file has been selected.
17. Now that the data has been imported, the metrics and attributes should appear on the left hand side of the dashboard.



18. To create the visualization, drag and drop the attributes in the Rows box, the Metrics in the Metrics box, and the Column names in the Columns Box:

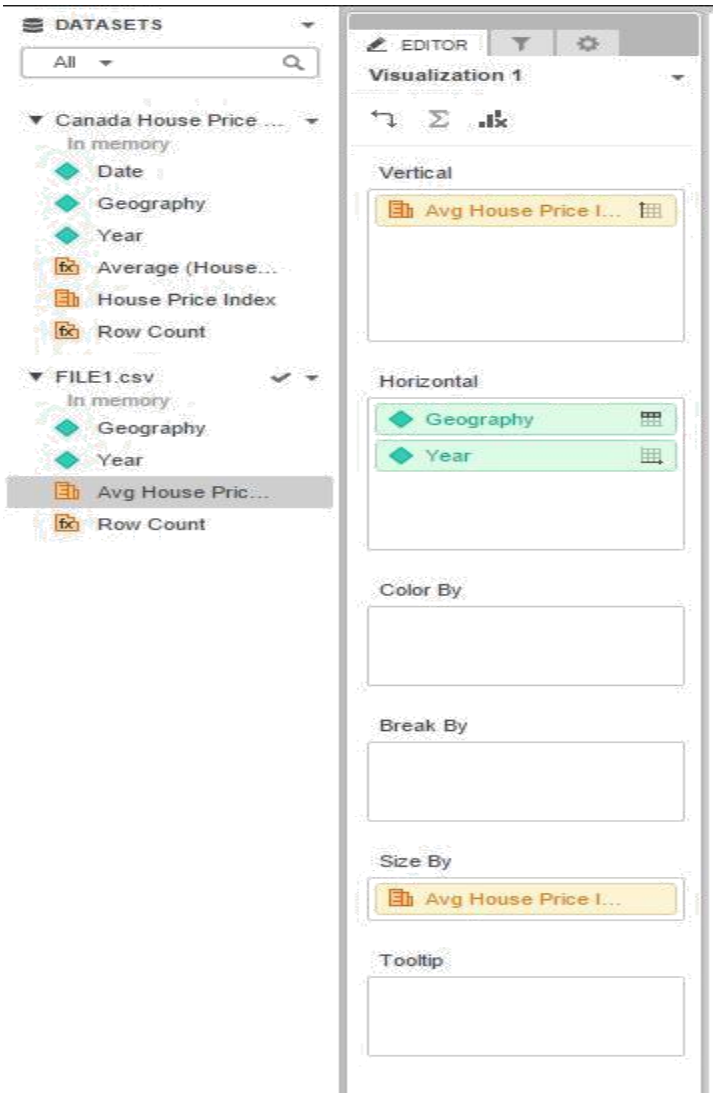
This resulting graph in the visualization pane will look like this:

Geography	Year	Avg House Price Index
AB_Calgary	1990	171
AB_Calgary	1991	173
AB_Calgary	1992	179
AB_Calgary	1993	186
AB_Calgary	1994	189
AB_Calgary	1995	188
AB_Calgary	1996	187
AB_Calgary	1997	189
AB_Calgary	1998	255
AB_Calgary	1999	397
AB_Calgary	2000	417
AB_Calgary	2001	439
AB_Calgary	2002	477
AB_Calgary	2003	518
AB_Calgary	2004	559
AB_Calgary	2005	600
AB_Calgary	2006	682
AB_Calgary	2007	750
AB_Calgary	2008	782
AB_Calgary	2009	770
BC_Vancouver	1990	171
BC_Vancouver	1991	173
BC_Vancouver	1992	179
BC_Vancouver	1993	186
BC_Vancouver	1994	189
BC_Vancouver	1995	188
BC_Vancouver	1996	187
BC_Vancouver	1997	189
BC_Vancouver	1998	255
BC_Vancouver	1999	397
BC_Vancouver	2000	417
BC_Vancouver	2001	439
BC_Vancouver	2002	477
BC_Vancouver	2003	518
BC_Vancouver	2004	559
BC_Vancouver	2005	600
BC_Vancouver	2006	682
BC_Vancouver	2007	750

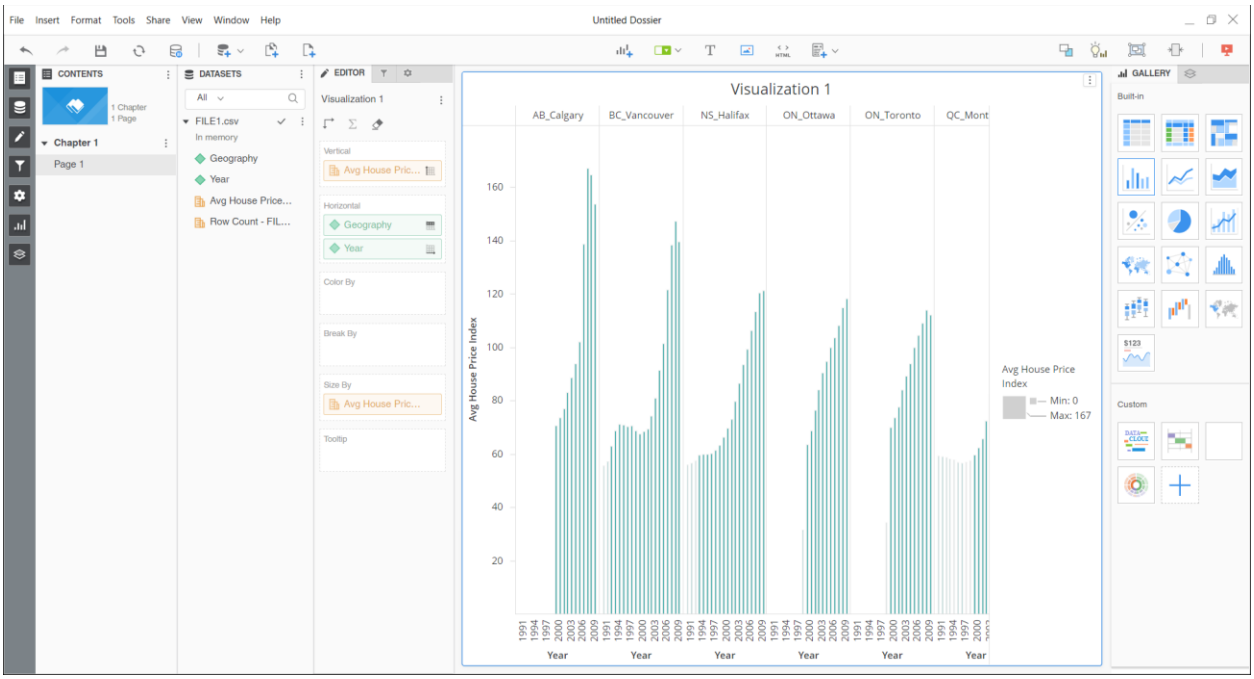
Now the user is ready to change the visualization to whatever format is required for the purpose. In this case, users are recreating the bar chart they started out with at the beginning of this activity.

19. Select the Bar Chart function on the Visualizations menu on the right hand side:

Now Pull the Year attribute into the Horizontal section and then add the Avg House Price Index metric into the Size By section of the Editor. The resulting editor section should look something similar to the below image:



This will generate the bar graph. If the user has followed the procedure correctly, it should resemble exactly the bar graph we started with:



Remember that the bar graph mode is by no means the only way of visualizing the data in this particular scenario. However, the bar graph offers an aesthetically pleasing depiction of insights gleaned from an analysis of relationships in the data. Now that users have uploaded a dataset and used it to create a visualization, they have a preliminary understanding of some of the principal features of MicroStrategy Desktop.

Exercise: Worldwide Carbon Emissions Scenario

For this exercise, users will design a new dashboard to analyze worldwide, energy-related carbon dioxide emissions data for the past twenty years. The data used in the exercise comes from the US Energy Information Administration office (http://www.eia.gov).

1. To begin, delete the FILE 1 dataset in the Dataset panel. Click on the drop-down arrow next to the FILE1 in the Dataset panel and click delete.
2. Next click Add Data on the Desktop homepage.

Import Data using Database:

For Database users (Oracle or SQL Server):

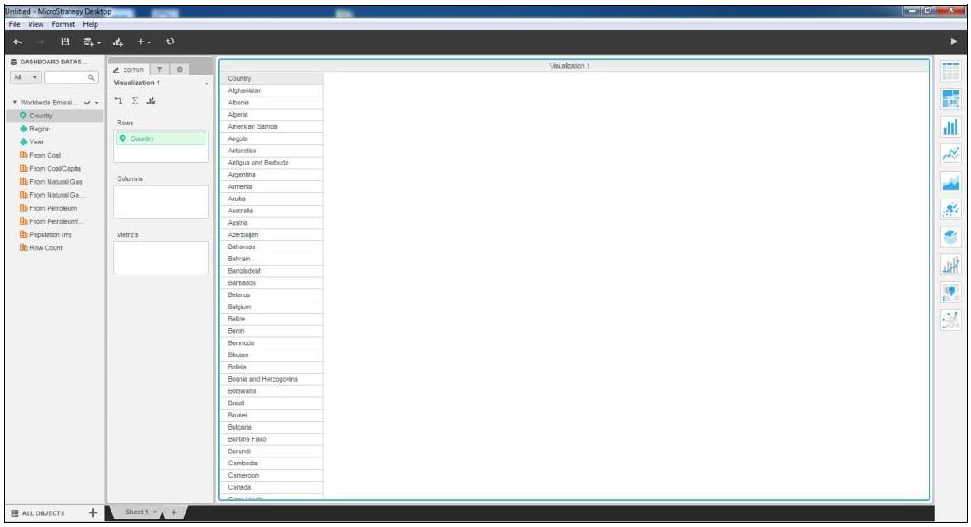
3. Select the New Data option, and click Database.
4. Select Pick Tables
5. Select your Data Source
6. Select **Worldwide Emissions**
7. Click Finish
8. Select Import as an In-Memory Dataset
   Continue to step 13

For Excel users:

9. Select the New Data option, and click File from Disk.
10. Select Choose Files
11. Select **Worldwide Emissions 1990-2010.xlsx**

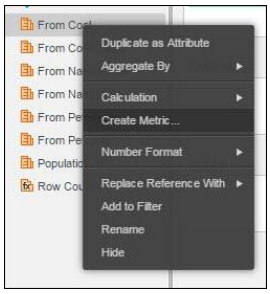
12. Click Finish

13. Create a grid using the Country attribute:

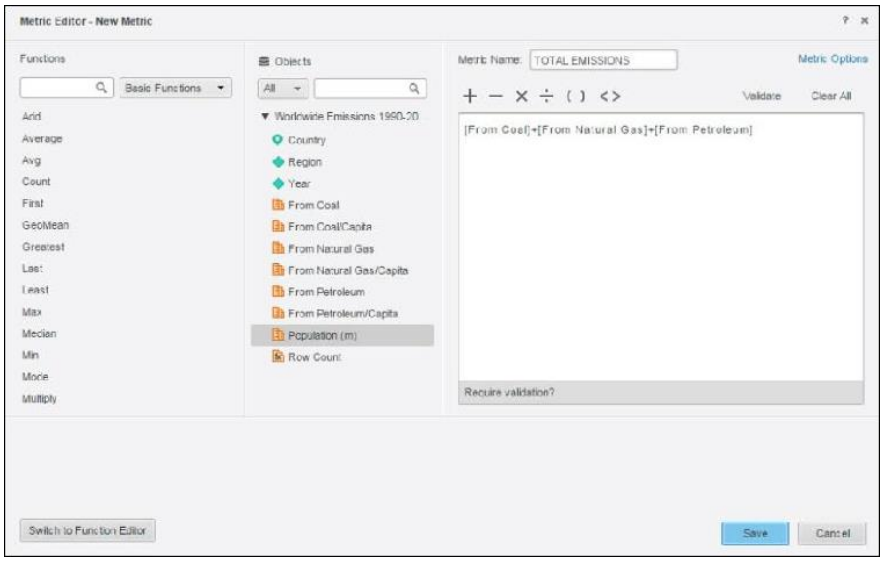


Since this dataset does not contain a metric for Total Emissions, users will create this metric by adding together the emissions generated by all of the energy sources available. Users will also create a derived metric for Emissions per Capita, defined as Total Emissions divided by Population (m).

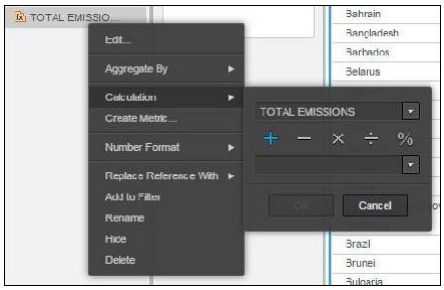
14. In the Dashboards Datasets pane, point to the **From Coal** metric, right mouse click and click Create Metric:



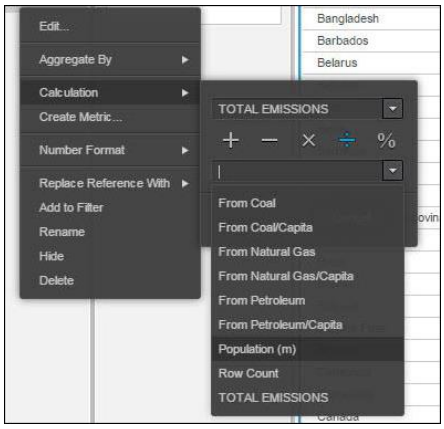
15. On the bottom left of the window, click Switch to Formula Editor.
16. From the Available Objects list, double click **From Coal**.
17. In the Formula Window, clear existing formula content and type +. Repeat the process until the following formula is complete: [From Coal] + [From Natural Gas] + [From Petroleum]



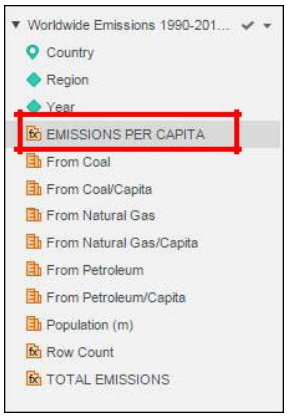
17. Click on Validate,
18. Click on Metric Name: and enter TOTAL EMISSIONS.
19. Click Save.
20. In the All Objects pane, point to TOTAL EMISSIONS and right-click.
21. Select Calculation:



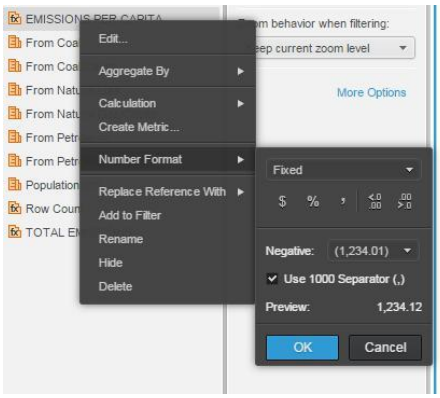
22. Click the divide function. In the second drop down menu, select Population (m).



23. Click OK. Rename the derived metric as EMISSIONS PER CAPITA:



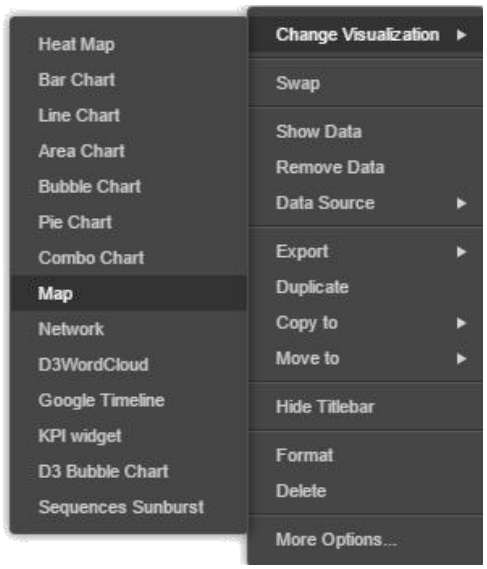
24. Change the Number format to fixed (no decimal) for EMISSIONS PER CAPITA



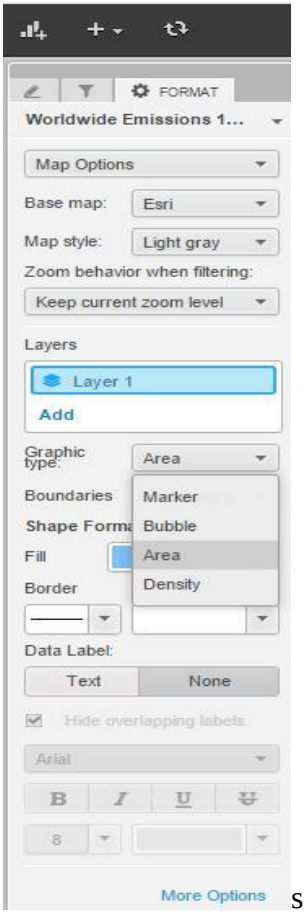
25. Now save the Dashboard. Under the File drop down menu, click Save. Save the Dashboard as Worldwide Emissions Analysis I. Do not delete the unused Data Objects. If you get a dialog while saving to delete objects, continue the exercise and Save later.

Now the user is ready to create a new visualization.

26. On the grid visualization pane, click the down arrow, and select Change Visualization.
27. In the Select Visualization pane, click Map:



28. In the properties window switch the Graphic type to Area



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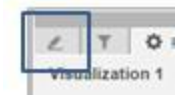
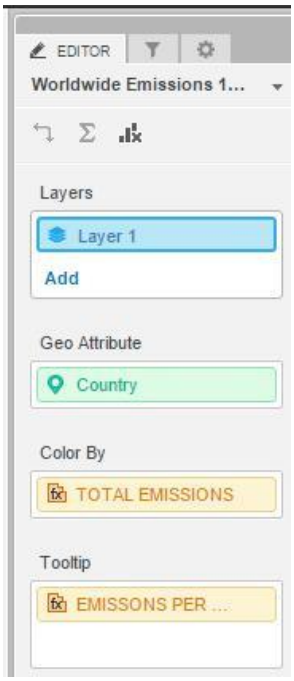
29. Click on the Editor Panel again

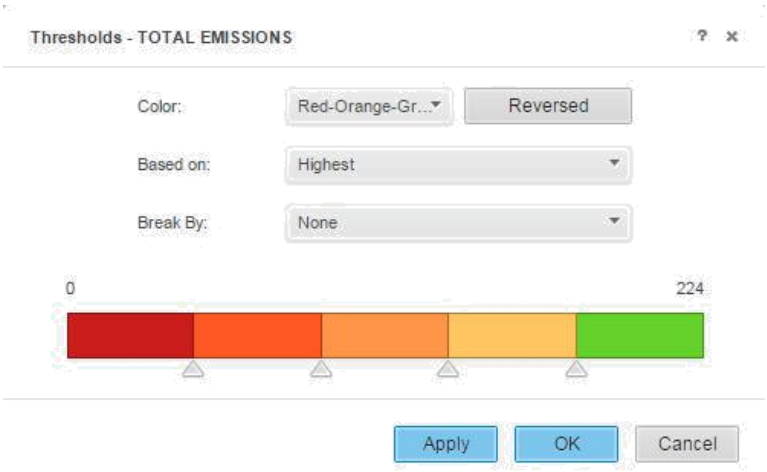


30. Drag the Country attribute to the Geo Attribute drop zone in the Edit Visualization pane.
31. Drag the Total Emissions metric to the Color By drop zone.
32. Drag the Emissions per Capita metric to the Tooltip drop zone:



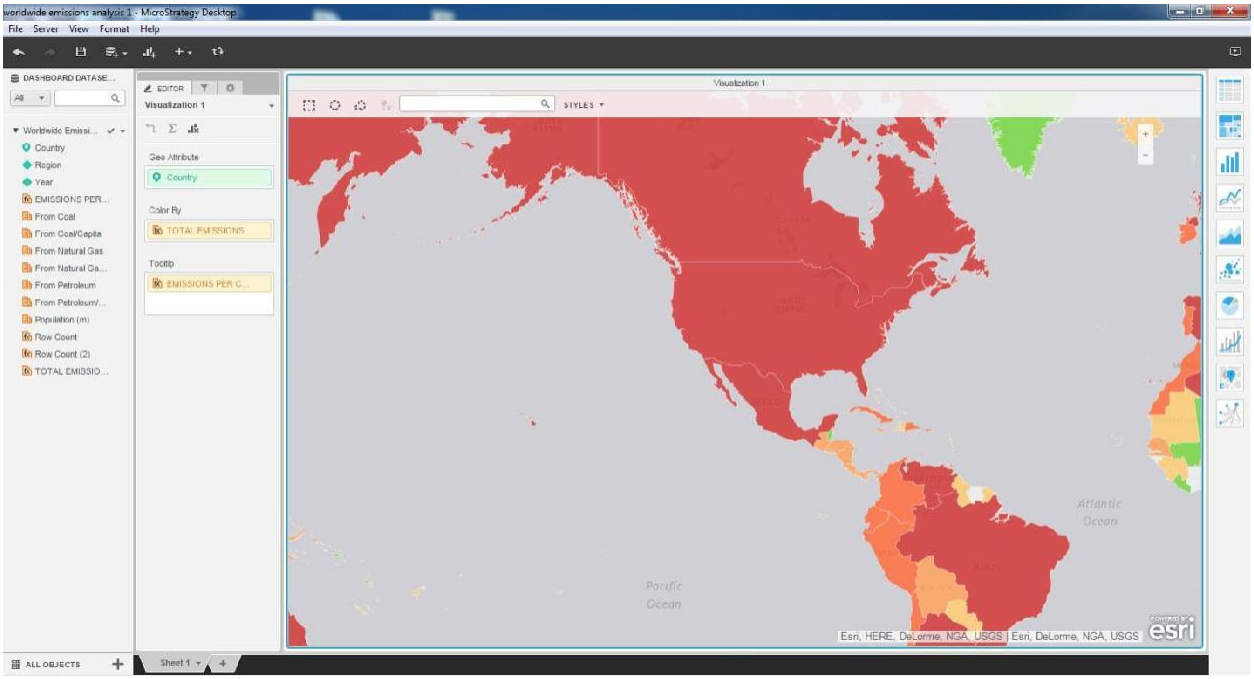
33. Right Mouse Click TOTAL EMISSIONS in the Color By drop zone and select thresholds:

34. On the Thresholds window, under the Based On drop down menu, select **Highest.**
35. On the Color drop down menu, select Red-Orange-Green OR Traffic Lights. Make sure that Green represents the lowest end of the spectrum, while Red represents the highest if not click on Reversed:



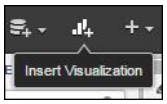
NOTE: The selection of color in a visualization is an important element of **visualization best practices**. In this case, the user is creating a visualization to represent different levels of carbon emissions in various locations. Viewers will naturally identify the color green as the most favorable emissions rating, because the color green is readily identifiable with environmentalism and ecologically sound practices. Likewise, the color red generally signifies the higher end of the spectrum in comparative analyses. Red is also associated with environmental hazards. When creating visualizations, consider how the viewer will relate to the color scheme and the overall appearance of the visualization. Are there ideas tied to the use of colors and imagery in specific situations?

36. Click Apply and OK. The dashboard should now look like this:



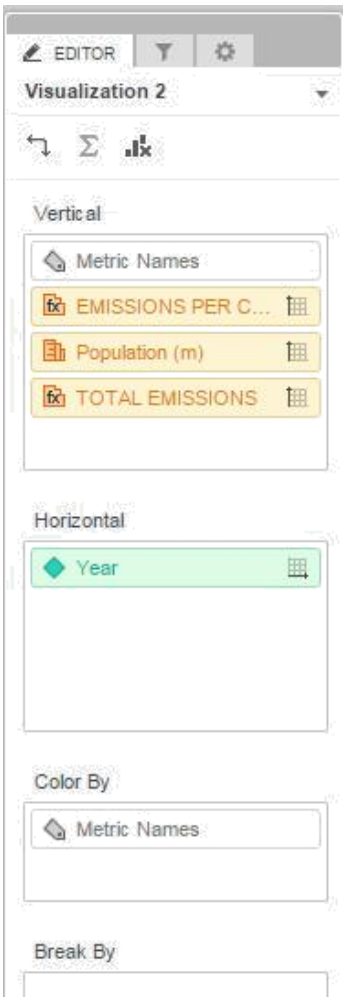
Now, the user will create a second visualization that will indicate yearly emissions data. In order to maximize the contrast of elements embodied in visualization best practices, the user will make the second visualization a **bar chart**:

1. On the dashboard toolbar, click Insert Visualization:



2. From the Visualization Gallery on the right select Bar chart

3. Drag the Emissions per Capita, Population (m), and Total Emissions metrics to the Vertical Axis drop zone.
4. Drag the Year attribute to the Horizontal Axis drop zone in the Edit Visualization pane
5. Drag Metric Names into the Color By section:

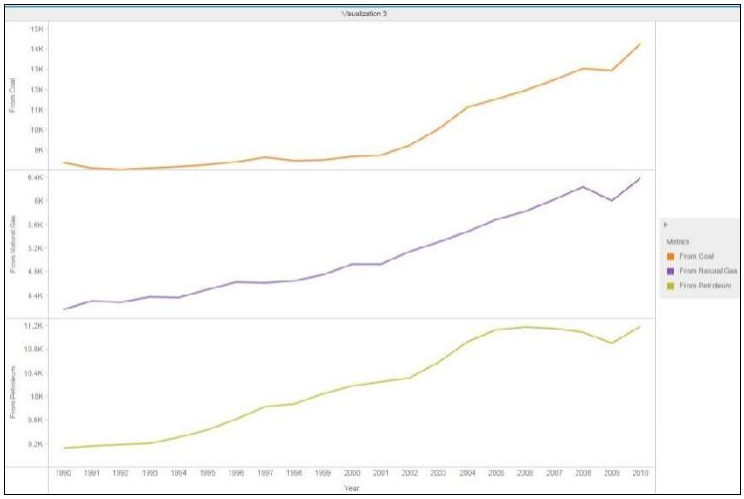


6. Maximize from the drop down menu in the visualization pane. The desktop should look like this:

7. On the same menu, click Restore to return to the original dashboard. Go ahead and save the dashboard.

Now, add a third visualization. To maximize the contrast with the first two visualizations, make the third visualization a Line Chart.

8. In the Visualization Gallery on the right select Line Chart.
9. Drag the Year attribute to the Horizontal axis drop zone.
10. Next, drag the From Coal, From Natural Gas, and From Petroleum metrics to the Vertical axis drop zone.
11. Drag Metric Names to the Color By drop zone.
12. Now maximize the third visualization. It should look like this:



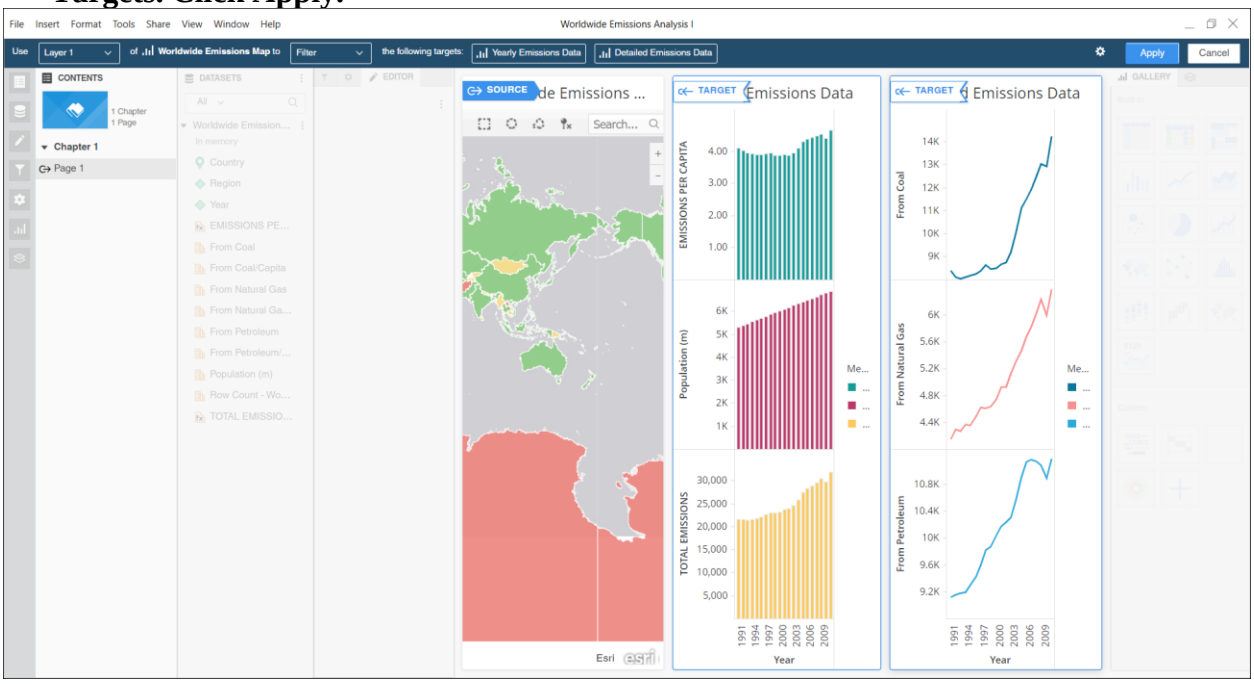
13. Click Restore to return to the main view of the dashboard.

The user has now created a dashboard with three visualizations.

14. Let's finish it up with some personalization and identification of the information Rename the visualizations by clicking on the down arrow at the top of each visualization and selecting the **Show Titlebar** option and double click on the heading itself.
    - Visualization 1 should be renamed **Worldwide Emissions Map.**
    - Visualization 2 should be renamed **Yearly Emissions Data**, and
    - Visualization 3 should be renamed **Detailed Emissions Data**. Save the dashboard. When complete, the dashboard should look like this:

Finally add a selector control, when selecting a country on the map to update the Yearly Emissions Data and Detailed Emissions Data

15. Select the drop down on the Worldwide Emissions Map; select **Create Contextual Link, click This Dossier. Click Yearly Emissions Data and Detailed Emissions Data as Targets. Click Apply.**

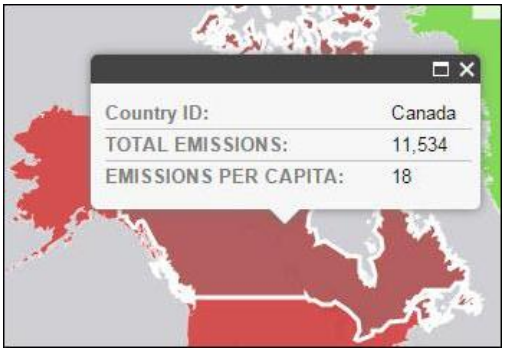


Test it by clicking on Argentina and notice how the bar chart and line chart updates To unselect, just click on Argentina a second time

Put the dashboard to the test by answering the following questions using the visualizations:

1. What is the emissions per capita of Canada?

Since the user needs a specific emissions statistic, simply click on Canada in Worldwide Emissions map for the answer:



Use the other two visualizations to acquire insight relating to long term changes and overall trends.

2. What is the overall trend in worldwide emissions?
3. Notice that overall emissions declined in 2009, the only year in the total number of years surveyed that indicates emissions decreases in all three emissions sources. Why is that? What broader socio-political context might explain this single yearly decrease?

Now select on Canada or USA and notice their changes in 2009 respectively