

**Data Title:** Statistical Review of World Energy

Description: The BP energy charting tool is a database that allows users to interrogate data, create charts and download reports from the Statistical Review of World Energy (BP, 2021).

Link for access:

<https://www.bp.com/en/global/corporate/energy-economics/energy-charting-tool-desktop.html>

**Lesson Enhancement:**

Although I only recently discovered this database, I can see how it will enhance my teaching of the topic Energy Production with my grade 12 students. The first obvious way that I see this data enhancing my teaching of this topic is by offering current information to my students. As the authors of one of the textbooks that we use to teach this topic noted “Textbooks are of necessity out-of-date! They represent the position on the day that part of the book was completed” (Homer and Bowen-Jones, 2014, pg.311). In fact in an investigation about the topic Energy Production the authors informed the readers that “...the examples here are to give you some insight into the type and quantity of data that are available to you” (Homer and Bowen-Jones, 2014, pg.311). They go on to suggest that “You should search for the latest tables and graphs using the source information printed with the graphs” (Homer and Bowen-Jones, 2014, pg. 311). Having access to this data gives the students the ability to review the latest information available.

I am always looking for new and innovative ways to use technology during the teaching of the Physics course. After reviewing the literature on teacher planning and the use of digital technology, Harris et al. (2010) concluded that effective planning was primarily organized by learning activities and content goals. Moreover, they recommended that teachers should begin with their learning goals and activities in a content area and then select and use digital tools to help them and their students meet the learning goals. During the topic Energy Production, an essential idea that I must communicate to the students is that the world has an ever increasing demand for fossil fuels and that there is a finite quantity of fossil fuels on the planet. The BP energy charting tool has a menu that will allow us to select a vast range of data types which can be narrowed down to just the fossil fuels such as oil, coal and natural gas. We could potentially then have a discussion on oil production and consumption in the world. I can show the students beautiful interactive maps of oil production and consumption around the world filtered by regions such North America or Europe. The tool also allows me to filter and look at oil

production and consumption by groups such as OPEC or OECD. Hence, having access to this data allows me to reach my content goal of informing the students about the demand for and use of fossil fuels with the aid of technology which is utilized in a meaningful manner.

A recent lesson on the 5E Instructional Model has served to remind me of just how powerful this model can be in helping me to deliver great lessons to my students. During the exploration phase of this model learners can explore questions and conduct preliminary investigations (Bybee et al. ,2006). I think that another way that this data will enhance my teaching is by giving me current information that my students can use during the exploration phase of a future lesson. For instance, I could place the students into groups and ask each group to bring a different piece of data to a class discussion. Furthermore, the students can be asked to investigate the current trends in fossil fuels usage or solar energy usage in South America. They can also be asked to compare energy consumption at the time the book was published as opposed to updated information available using the BP energy charting tool.

During our discussion on the widespread use of fossil fuels the topic eventually leads to another essential idea that the students must consider, that idea being the use of fossil fuels and their contribution to global warming. Another wonderful feature of this tool is that students can see interactive charts, maps and graphs showing world averages of carbon dioxide production and then look at how regions and even individual countries' production of carbon dioxide compares to the world averages. Referring back to the 5E Instructional Model I could use this data at the engagement phase of a lesson to spark the students' curiosity and elicit prior knowledge about global warming. Furthermore, this data could be used to introduce students to the current debate among scientists about global warming. After introducing the students to the debate about global warming, this could segue into the class looking at how the debate about global warming shows the difficulties that arise when scientists cannot agree on the interpretation of the data. Such a discussion would allow me to address the tenets of the Nature of Science which speaks to the fact that Science knowledge is based on empirical evidence and Scientific Knowledge is Open to Revision in Light of New Evidence.

### **Personal feelings about using data:**

I have always had some difficulty in finding an appropriate use of data in my physics class. I think this difficulty stemmed from the limited view I had of just how to implement data in physics. I am not opposed to using data, but in physics most of my attention tends to be on looking at relationships between quantities. In most instances from my

experience I did not need a database to look at these relationships. I tend to use databases only when I teach the topic of Astrophysics, since during this topic I find a lot of connected data which is when I find the database to be most useful. I have found that beyond this topic when I have tried to use them I find myself using the database mainly to stress some physics theory. However, after our recent lesson on the use of data in the classroom I have now expanded my view on how I can use it. One of the main ideas I gained from our recent class was how useful data can be when implemented into any of the phases of the 5E Instructional Model. I learned that it can be used to get my students engaged with a new topic, or it can be used as a part of an exploration activity. I think I am now more equipped to properly utilize data in my classroom and gain from the advantages that come from using data in class.

### **Interdisciplinary contexts:**

During this topic we look at the fact that as human societies continue to expand and develop there is a constant need for energy. Therefore the data that this source has offers much room for interdisciplinary discussion with disciplines related to business as we could discuss energy prices. According to the website market data is updated every 20 minutes (BP, 2021). Physics students and business students could easily use this tool to discuss and debates topics related to energy needs and how this need affects governments, the economies of countries and the poverty faced by many people in the world.

The topic of Energy Production also involves us looking at alternative forms of energy that are currently being utilized in the world. The BP energy charting tool has a menu that will allow us to select other data types such as nuclear, hydroelectric, biofuels and renewables, and show the production and consumption of these alternative forms of energy around the world filtered by regions, groups or individual countries. This opens the door for interdisciplinary activities with math as we could compare different energy sources to see how efficient they are.

Yet another interdisciplinary activity that this data offers is one where students in Design class can conduct research to find even more effective, new forms of energy for humans. The data here can be a rich source from which they can begin answering questions that would lead them to engage in the engineering design cycle to come up with new and better forms of energy for human needs.

## References

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