School Electricity Usage Activity

You will need:

* Copies of (access to) your school electricity bills – a year’s worth if you can get it
* Information on renewable energy installations at your school – size/ electricity generating capacity of installations, and any data available on the amount of electricity generated
* Calculator or computer with Excel

How much electricity does your school use? Graph the usage each month for a year. Do you notice any patterns in the usage?

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Total |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

How much electricity does your renewable energy system generate? Graph the generation each month for a year. Do you notice patterns in the generation?

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Total |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

How big is your renewable energy system? What is its potential generating capacity if it were generating electricity 24-7? What percentage of its total capacity is it actually generating (This percentage is called the capacity factor)?

|  |  |  |  |
| --- | --- | --- | --- |
| System size/capacity | Potential generation (x8760h) | Amount generated | Capacity Factor |
| *EX: 4.8 kW* |  *42,048 kWh* |  *10,500 kWh* |  *24.97 %* |
|  |  |  |  |

Do you think the capacity factor of your renewable energy system is normal? Why or why not?

If you wanted to meet all of your school’s electricity demand (usage) with renewable energy, how big of a system would you need?

* Calculate the total electricity your school uses in a year
* Using the capacity factor percentage above (or an average capacity factor for your area), calculate the total system size that you would need to provide the same quantity of electricity from a renewable energy system

Would this system necessarily meet the school’s total demand at all times? Does this matter?

Extension activity: If your school uses 100% electricity from the electric utility, can you find out what the mix of sources (e.g. coal, nuclear, natural gas, renewables) is? (you could use the state averages from the Energy Information Administration State Electricity Profiles)

How many megawatt-hours (MWH, or 1000 kWh) of electricity does your school use in a year?

Each source of energy has water use, land use, or pollution of some sort associated with it. For generating one MWH of electricity from each of the following sources, find out how much water is used and how much carbon dioxide is emitted. Also try to find how much land is taken up for one megawatt of generating capacity.

|  |  |  |  |
| --- | --- | --- | --- |
| Source of electricity | Water use/MWH | CO2 emissions/MWH | Land use/MW |
| Coal |  |  |  |
| Nuclear |  |  |  |
| Natural Gas |  |  |  |
| Wind |  |  |  |
| Solar Photovoltaic |  |  |  |
| Concentrating Solar |  |  |  |

If your school were powered by 100% coal, nuclear, natural gas, wind, solar photovoltaic, or concentrating solar power, how much carbon dioxide emissions would your electricity usage generate? How much water would it use?

|  |  |  |
| --- | --- | --- |
| Source of electricity | Annual water use | Annual CO2 emissions |
| Coal |  |  |
| Nuclear |  |  |
| Natural Gas |  |  |
| Wind |  |  |
| Solar Photovoltaic |  |  |
| Concentrating Solar |  |  |