Computer Tool Introduction

Note: Slides mentioned begin on Slide 11 of "SUCCEED Computer tool presentation.pptx".

This slide shows you a screen shot of the computer tool. There are 5 different areas in the computer tool. I will walk you through each area and then we will work together to do a step-by-step exercise. Finally, you will get a chance to work with the tool on your own.

This is your build center. The 10 power plant types are on the left side of the build center. You can use the slider bars to increase or decrease the number of plants you want to build. The number of plants you build is shown to the right of the slider bars. Next to the number of plants is how many TWh those plants make. This screen shot shows that there is 6 Coal-to-gas option 2 plants. Since each of these plants make 5 TWh of electricity, 6 plants can make 30 TWh. As you change the numbers in the build center, the bar sizes in the graph to the right will also change. The graph shows how much electricity is made by each power plant type. The numbers below the graph are the electricity produced in terawatt-hours (TWh). The numbers above, and on the bars themselves show the electricity as a percent of the goal you are trying to reach. The coal plants make 30 TWh. This is half of your goal of 60 TWh. So the bar shows a 50%.

Notice that there is 1 nuclear plant making 7 TWh of electricity. This is shown as 12% on the bar graph. Even though there are 14 wind farms, they only make a total of 7 TWh of electricity. So 1 nuclear plant makes the same amount of electricity as 14 wind farms.

Also notice that the bar next to natural gas is split in two. You control the solid blue part of the bar (showing 8%) by using the slider bar for natural gas in the building center. The striped blue part of the bar shows the extra natural gas plants that are needed as backup for wind and solar power. Since it is not always windy or sunny, wind and solar power are less dependable for making electricity. Natural gas plants must be built to make up for times when it is not windy or sunny. You cannot use coal or nuclear plants to back up wind and solar because they cannot be turned on or off quickly like natural gas plants can. So, the only way to change the amount shown in the striped blue bar is to change the amount of wind and solar power.

There are restrictions on the number of some power plants you can build. For instance, only 3 biomass-and-coal plants can be built, and you can only get energy efficiency up to 20%. You also can't build all coal and natural gas plants, because they release too much CO2, you will get a CO2 warning if you go above the CO2 limit. Remember that when you build solar or wind, this will also increase the natural gas, so you may get CO2 warnings from the indirect CO2 emissions.

This is your Goal center. Your goal is to build enough power plants to reach 60 terawatt-hours (TWh) or 100%. The "Electricity Produced" box shows that the current combination makes 64.6 TWh of electricity. This is 108% of your goal. There is a red warning in this box telling you that your goal is reached. Once you reach 60 TWh (or 100%), the computer tool will alert you that the goal has been met. Each power plant makes a different amount of electricity. So, it may be hard to get a combination that hits 60 TWh on the nose. The computer tool allows you a little leeway. As long as you stay below 70 TWh, your combination will be accepted. Building more power plants than PA needs is not cost-efficient. The computer tool will warn you to take away some plants if your combination goes over 70 TWh.

Your other goal is to build a combination that releases 50% of the CO2 put out by the original plan. The graph in the "CO2 Released" looks at your combination's CO2. The blue bar shows the percent of CO2 in your combination relative to the original plan. The original plan would show CO2 at 100%. The less CO2, the shorter this bar. Overall, a shorter bar is better than a longer one. The graph will show a 0% if your combination makes (almost) no CO2. This screen shot shows a combination that releases 38% of the CO2 expected under the original plan. Your goal is to keep the CO2 released by your combination at 50% (or less) of the original plan. When the blue bar goes above the 50% limit, the computer will warn you to decrease CO2. To do this, cut down the amount of coal or natural gas in your combination. Remember that you can also cut down the amount of natural gas by reducing wind or solar.

This is the Impacts Center. It looks at some of the environmental impacts of your combination and compares them to the Original Plan. The first comparison shown is Water Use. The second is Land Use. Remember I told you that, the Original Plan uses 3,400 football fields of land. The combination in this screen shot uses 7,700 football fields. This is 126% more than the original plan. Notice that the land use numbers are shown in red. This is because it is color-coded. When your combination in much better than the original plan, the line will be colored green. Notice that the Health Costs line is green. This is because health costs are 98% less

than the original plan. When your combination is worse than the original plan, the line will be colored red. Notice that the land use line is red. When your combination's impact is close to that from the original plan, it will be colored yellow. This is the case for water use, which shows that your combination uses 1% less water than the original plan.

This is the Cost Center. It shows the increase in the cost of the average PA household's monthly electric bill. The numbers on the right side of the graph are the increased cost of electricity in dollars per kilowatt-hour. The numbers on the left side are the increase in the monthly bill for an average PA household if their electricity came from your combination. The numbers on the right are multiplied by 700 kilowatt-hours to get the monthly bill increase on the left.

Since experts are not certain about future electricity costs, each bar shows a range. The darker center of the bar (and the dollar value just to its left) show the most likely increase in monthly electric bill. The longer the shaded bar, the more uncertain experts are about the costs.

Notice that the most likely increase in monthly bill is $8 for the original plan and $12 for your combination. Look to the left of the graph. In blue writing, the tool tells you that your combination would increase this bill by $11.80. Remember the average monthly electric bill from your homework materials was $77. So, increasing by $11.80 would make your electricity bill 15% more expensive than what you pay now. Below this you see another percentage. Remember that when the cost of electricity goes up, the cost of everything else you buy will also go up. Here you see that everything else you buy will increase by 1% if we build this power plant combination.

The final area are your controls. The Reset button returns all of your power plants back to zero. There is also a review and save button. This button will do a final check that your combination has no errors and meets the two goals. If there is something wrong with your combination, the computer tool will give you a warning. You can go back to fix the problem. If there are no errors, the computer tool will save your combination. You can give your combination a name and it will show up in the box to the right. You can save up to 3 combinations, so that you can compare them.

Let's say you decided to name your combinations combo 1, 2 and 3, then the box would look like this. At this point, you could highlight any of the names, and press recall for the tool to pull it back up, you can also delete them. Let's say you like

these 3 combinations the best, but don't know which one to pick, you can hit the compare button and this screen will pop up.

Now each combo gets a different color. You can see an overview of all 3 here. The percentage of each power plant type are shown in these columns. For example, the blue combo 1 has 36% natural gas. then you can compare your 3 combos across CO_2 release, monthly electric bill, water use, land use and health costs. In all of these, shorter bars are better than longer bars. Notice that the dotted line on every graph points out what the value was for the original plan.