



## Grade 6 Physical Science: Type of Energy

(Submitted by Mónica Zuñiga, 2017, while serving as Science Teacher at Colegio Interamericano de Guatemala)

<b>Tool(s) used:</b>	<ul style="list-style-type: none"> <li>• Sustainability Compass</li> <li>• Causal Loop Diagrams</li> <li>• Systems Mapping</li> <li>• Game "The Power of 1 Node"</li> </ul>
<b>Purpose of using tool:</b>	<ul style="list-style-type: none"> <li>• Generating Questions</li> <li>• Synthesizing Thinking</li> <li>• Guiding Discussion</li> </ul> <p><b>Overview:</b></p> <p>During this new phase of teaching students about systems and sustainability, I introduced the Causal Loop Diagram to represent how using non-renewable energy affects other areas. These loops were created by students after analyzing the use of non-renewable energies using the Sustainability Compass tool. After they created the loop, the replaced non-renewable energy and used renewable energy and created to new relations among the nodes. After doing this, students were discussing about the power of changing one node, and the effect it could have. A great discussion took place after this.</p>
<b>Context of lesson/case study:</b>	Physical Science
<b>Participants (# and description):</b>	Grade 6 students, Science class
<b>Topic, Theme, or Key Understanding of unit/project:</b>	Types of Energy
<b>Length of unit/project:</b>	2 weeks
<b>Resources/materials &amp; setting required:</b>	Materials: posters, post it, crayons or markers Settings: team work, groups of 4
<p><b>Lesson Plan/Description of the Project:</b></p> <p><b>Goal:</b> Analyze the impact of using renewable and non-renewable energy, using the Compass Education's tool and Causal Loop Diagrams.</p> <p><b>Previous knowledge needed</b> Content: forms of energy, non-renewable energy. Skills:</p> <ul style="list-style-type: none"> <li>• Analyzing problems using the Sustainability Compass tool.</li> <li>• Structure of a loop diagram (arrows show relation, nodes represent events of situations, opposite and same relations)</li> </ul> <p><b>Directions:</b></p> <ol style="list-style-type: none"> <li>1. Make groups of four and ask them to analyze the impact of using non-renewable energy with the Sustainability Compass tool.</li> </ol>	





2. Selecting nodes: After analyzing the situations using the Compass tool, students are asked to choose 8-12 facts, events, or situation from their Compass tool. Each of those becomes a node.
3. Students write the facts on post its, the node “non-renewable energy” is written in a different colour.
4. Students create the Causal Loop Diagrams, the use arrows to show cause and effect. When they are done with the diagram they start identifying same and opposite relations. They analyze the situation and draw conclusion.
5. Ask students to replace the node “non-renewable energy” with renewable energy. The arrows should not be changed but new relations will be identified. Some same relations will become an opposite relation and the other way around. Let students discuss about what they see.
6. Changing one node: Students are called to a circle and some debriefing takes place. After this each student get a paper with a number on it. All get a 1 except one. This student gets a 2. The instruction is: “meet a peer and whisper your number. If the other person has a higher number you become that number. If the person has the same or lower number you keep your number” Let the students meet some people and stop the game after 30 seconds.
7. Debrief about the game. Start by dividing them by their original number they got. They will realize all were 1, except for one student. Then, ask them to divide by the number they are now; most of them will be a 2. Let them analyze the situation.
8. “The power of changing one node” Have students write a short reflection about this.

### Reflection

#### Plusses:

- I was surprised! Students did really well and were able to discuss the problem in depth. I can tell you that the game made a difference; they were able to understand the power of one node can have in a system. During the activities students developed social skills, team work skills and became aware of the importance of using renewable energies.
- Using the Causal Loop Diagrams was very useful, because they pictured the effects and replacing the node and playing the game enhanced analysis and reflection. They loved the game!

#### Challenges:

- I am sure I am doing the unit again! I will add a review of causal loops after they are done with the Sustainability Compass tool. Even when the model was visible some groups struggled with that.
- I will also add a time where they can visit other groups to analyze and check their diagrams so they notice that even when the nodes are different, the effects of using non-renewable energy are the similar.

#### Suggestions for other practitioners and educators:

Go for it! It's incredible what students can do with this tool!

