Unit Title	Let's Rock and Coal!
Grade Level	Middle School (6-8)
Unit Goal	Explore the rock cycle and how rocks are used to produce electrical energy.
Unit Objectives	1. Develop a model to describe the cycling of Earth's materials and the flow of energy through various natural systems that drive this process. 2. Use their model to explain how Earth's natural processes resulted in the storage of energy resources over time. 3. Investigate and describe some of the energy resources and careers that we have in Iowa. 4. Use a model to identify and explain the challenges involved in obtaining, generating, and maintaining resources that provide electricity in Iowa.
Focus Standard	MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
Supporting Standard	MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surfaces at varying time and spatial scales. MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
Phenomenon	Where does your electricity come from? (2nd comic under construction)
Total Time	5-9 class periods
Developers	Jennifer Brown, Mallory Wills, Jeanine Piatz,

Lesson 1 Engage 1 Day	Lesson Goal Answer the question: What energy sources are providing our electricity in Iowa? Lesson Objectives 1. Students will analyze a natural phenomenon to look for patterns and as a source to generate questions. 2. Students will use background knowledge to begin developing a model that explains a natural phenomenon. Lesson Summary After presenting the phenomenon, students will start by building a model of where they think electricity comes from. Then they will make questions for a Driving Question Board (DQB). Materials Needed ● Chart paper and sticky notes Prep Before Class ● Screenshot the maps to incase the website stops working ● Download MISO video if YouTube is blocked at school Daily Assessment/ Homework ● Initial model of where energy comes from ● Driving questions board Resources (1) Revised Lesson 1: Engage_.docx
Lesson 2 Explore 2-3 Days	Lesson Goal Answer the questions: Can we burn all rocks or just some types? How are these rocks made? Lesson Objectives 1. Students will be able to analyze and interpret data from real time maps to identify electricity sources and generation in Iowa. 2. Students will be able to identify types of fossil fuels, renewable energy sources, and nonrenewable energy sources. 3. Students will be able to investigate careers in electricity fields. Lesson Summary Students are introduced to the rock cycle through various activities and begin to make the connection between coal and electrical energy. Materials Needed ● Internet access ● Handouts ● Different types of coal ● Station posters or display names for rock cycle stations ● Printed and folded dice for each rock cycle station (depending on class size you might want three dice per station) ● If using chocolate for the Chocolate Rock cycle: per class: Hot plate, multiple heavy books; per group: 10 chips x 3 different types of color (suggested is milk chocolate, white chocolate, and butterscotch), plastic knife and paper plate, sheet of aluminum foil large enough to wrap completely around the 30 chips. Also make sure to have something to transport the foil packages from the hot plate back to the student desks.

	Prep Before Class ● Screenshot the maps to in case the website stops working ● Download MISO video if YouTube is blocked at school ● Have videos ready ● Print and assemble rock cycle dice game ● Set up chocolate rock cycle lab Daily Assessment/ Homework ● Discussion questions ● Rock cycle lab sheet Resources (2) Revised Lesson 2: Explore.docx Folder of activities https://drive.google.com/drive/folders/1PxATmPq86d_k9MD7vu0-WIaqEzNdwrP7?usp=sharing
Lesson 3 Explain 2 Days	Lesson Goal Answer the questions: What kind of rock is coal? How is that different from other rocks? Lesson Objectives 1. Students will be able to use a model to explain how the formation of coal was driven by Earth's natural processes. 2. Students will be able to explain how energy from the Sun and Earth's hot interior drive the processes that cause different types of coal in different geographical locations. 3. Students will be able to identify stages of the rock cycle and the geological processes driving the changes. Lesson Summary Students will explore coal more fully and start exploring the different types of resources (renewable and nonrenewable). Materials Needed ● Articles for students ● Google slides ● Different types of coal and safe way to burn or video Prep Before Class ● Set up coal burning demo or load video ● Check to make sure videos load for powerpoint Daily Assessment/ Homework Venn diagram that is within the video on the powerpoint Resources (3) Revised Lesson 3: Explain.docx Folder of resources: https://drive.google.com/drive/folders/1LVB-sKgA-cMY2HrULS-WMDfNVCEilLId?usp=sharing
Lesson 4 (optional) Elaborate 1 Day	Lesson Goal Answer the questions: We have coal in Iowa and used to mine it. Why don't we mine it anymore? Lesson Objectives 1. Students will be able to use a model to identify and explain why coal mining is no longer prominent in Iowa.

	2. Students will be able to identify the various challenges related to Iowa providing reliable electricity sources. 3. Students will be able to investigate various career options related to electricity generation in Iowa. 4. Students will be able to identify and explain the impact mining for energy resources has across various Earth systems. Lesson Summary Students explore Iowa's history with mining coal and look at careers and methods of coal mining. Materials Needed ● Internet access ● Handouts ● Chocolate chip cookie lab materials -different kinds of toothpicks, cookies, timers Prep Before Class ● Check videos still work ● Set up cookie lab Daily Assessment/ Homework ● Coal mining worksheet ● Cookie lab worksheet Resources (4) Revised Lesson 4: Elaborate.docx Folder of resources: https://drive.google.com/drive/folders/1-DoYjtI6lxL5HHSf4BE3ulq396wnbKxP?usp=sharing
Lesson 5 Evaluate 1-2 Days	Lesson Goal Complete the assessment Lesson Objectives Students will be able to apply what they learned about the rock cycle to explain the formation of natural gas and how it is extracted/transported. Lesson Summary Students will complete an assessment to diagram the rock cycle. Materials Needed Handouts Prep Before Class Have handouts ready Daily Assessment/ Homework Rock cycle model Resources Fossil Fuels and the Rock Cycle Assessment_.docx
External Resources and Citations	Some Readings and labs- www.need.org