**Exploring Energy Independence Overview**

**PBL Overarching Question**: How can Virginia become energy independent?

**PBL Description**: This PBL addresses concepts of energy, energy transformation, renewable and non-renewable energy sources, and energy production in Virginia. This PBL addresses the performance expectation 4 PS3-2 and reinforces disciplinary core ideas PS3.A Definitions of Energy and PS3.B Conservation of Energy and Energy Transfer and the lesson shared focuses on the scientific practice of planning and carrying out investigations.

**Question Map:** The question map (Figure 2) identifies the questions students need to answer to solve the problem. They drive the development of specific lessons.

**Unit Overview:** Below is an outline of the unit, as classroom tested, with the lesson topic, primary activities with resources, and safety considerations.

Lesson 1: Introduce Problem

Primary Activities: Introduce the scenario, Brainstorm Questions, Develop Question Map

Lesson 2: What is Energy? Part 1

Primary Activities: Introduction to the forms and types of energy, Begin Energy Transformation Lesson (KWL, reading/anticipation guide, intro to tool, and considering variables)

Lesson 3: What is Energy? Part 2

Primary Activities: Conduct Energy Transformation Investigation (design and conduct investigation, share results)

Safety Considerations: Students should be reminded that the lamps get hot and to be careful.

Lesson 4: How much energy does Virginia use?

Primary Activities: Introduction to sources of energy, reading on energy sources

Homework: How do we use energy? (Students collect data at home)

Lesson 5: What energy sources are available in each region of Virginia? Part 1

Primary Activities: Renewable/Non-renewable Activity (Students sort materials and pictures of materials based an introduction to these terms.)

Lesson 6: What energy sources are available in each region of Virginia? Part 2

Primary Activities: Learning how energy sources produce energy and which are common in Virginia (Map with sources by region)

Lesson 7: What energy sources are available in each region of Virginia? Part 3

Primary Activities: Student research into impact of extracting and using different energy sources. Students have a template to fill in that has websites to check.

Lesson 8 and 9: Developing a Final Plan and Model

Primary Activities: Developing Plan

Lesson 10: Performance Assessment

Primary Activities: Sharing their plan with the panel

Assessment Rubric for Student Energy Plans

Useful websites:

<https://www.eia.gov/state/?sid=VA>

<http://www.virginiaplaces.org/energy/index.html>

<http://www.cpalms.org/Public/PreviewResourceLesson/Preview/46550>