Environmental Science Institute
The University of Texas at Austin
Austin's Power: Green Power is Clean and Renewable
Mark Kapner

This file contains suggestions for how to incorporate the material from this CDROM into curriculum using the Texas Essential Knowledge and Skills for Science.

§112.2. Science, Kindergarten.

(K.3) **Scientific processes.** The student knows that information and critical thinking are used in making decisions. The student is expected to:

(C) explain a problem in his/her own words and propose a solution. [Ask students to explain problems with gas and coal]

(K.9) **Science concepts.** The student knows that living organisms have basic needs. The student is expected to:

(C) identify ways that the Earth can provide resources for life. [Students can discuss what Earth's resources are used for energy production]

(K.10) **Science concepts.** The student knows that the natural world includes rocks, soil, and water. The student is expected to:

(B) give examples of ways that rocks, soil, and water are useful. [Have students talk about hydro-electric power (slides 2 and 11) and how water is used in other energy productions]

§112.3. Science, Grade 1.

(1.2) **Scientific processes.** The student develops abilities necessary to do scientific inquiry in the field and the classroom. The student is expected to:

(D) construct reasonable explanations and draw conclusions

(E) communicate explanations about investigations [Students can state their favorite energy and give a good reason for their answer.]

(1.3) **Scientific processes.** The student knows that information and critical thinking are used in making decisions. The student is expected to:

(C) explain a problem in his/her own words and identify a task and solution related to the problem. [Have students explain a problem about electricity and non renewable resources today and discuss solutions]

(1.10) **Science concepts.** The student knows that the natural world includes rocks, soil, and water. The student is expected to:
(C) identify how rocks, soil, and water are used and how they can be recycled [Discuss how water is used in production of electricity and how is put back into the environment, slides 2,11,18-21]

§112.4. Science, Grade 2.

(2.3) **Scientific processes.** The student knows that information and critical thinking are used in making decisions. The student is expected to:

(C) explain a problem in his/her own words and identify a task and solution related to the problem. [Have students find a problem with electric production today and propose a solution]

(2.10) **Science concepts.** The student knows that the natural world includes rocks, soil, water, and gases of the atmosphere. The student is expected to:

(B) identify uses of natural resources. [Students can discuss how resources can be used and how they are used for energy production]

§112.5. Science, Grade 3.

(3.2) **Scientific processes.** The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

(C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence [Have students debate about what energy is the best and why]

(E) construct simple graphs, tables, maps, and charts to organize, examine and evaluate information.

(3.8) **Science concepts.** The student knows that living organisms need food, water, light, air, a way to dispose of waste, and an environment in which to live. The student is expected to:

(D) describe how living organisms modify their physical environment to meet their needs such as beavers building a dam or humans building a home. [Have students talk about the changes humans have made to produce energy. Mining of coal, building of dams, etc.]

(3.11) **Science concepts.** The student knows that the natural world includes earth materials and objects in the sky. The student is expected to:

(A) identify and describe the importance of earth materials including rocks, soil, water, and gases of the atmosphere in the local area and classify them as renewable, nonrenewable, or inexhaustible resources. [Have students classify each energy from the slides]

§112.6. Science, Grade 4.

(4.2) **Scientific processes.** The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

(C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence [Have students talk about what power they like and the evidence for their statement]

(E) construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information. [Slides 7,17,37, have students use the information to make their own maps or graphs]

(4.11) **Science concepts.** The student knows that the natural world includes earth materials and objects in the sky. The student is expected to:

(C) identify the Sun as the major source of energy for the Earth and understand its role in the growth of plants, in the creation of winds, and in the water cycle. [Students should explain how the sun creates the wind for wind power, how solar power works, and how the water cycle helps produce hydro power.]

§112.7. Science, Grade 5.

(5.2) **Scientific processes.** The student uses scientific methods during field and laboratory investigations. The student is expected to:

(C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence [Have a debate where students give good reasons and explanations to what energy should be used in the future]

(E) construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate information. [Have them chart information (using a computer if possible) from the slides and give a prediction for the distant future on energy use and what source is used.]

(5.8) **Science concepts.** The student knows that energy occurs in many forms. The student is expected to:

(A) differentiate among forms of energy including light, heat, electrical, and solar energy

(5.11) **Science concepts.** The student knows that certain past events affect present and future events. The student is expected to:

(C) identify past events that led to the formation of the Earth's renewable, non-renewable, and inexhaustible resources.[Students can go over events that made resources renewable, non-renewable, and inexhaustible and why they will affect our future energy needs]

§112.22. Science, Grade 6.

(6.2) **Scientific processes.** The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using equipment and technology;

(C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence;

(E) construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.
[Have students form a question about energy, debate about it in a group discussion and have them do projects where they must have evidence using a graph, table, map, or chart to support their statements.]

(6.3) **Scientific processes.** The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;

(6.9) **Science concepts.** The student knows that obtaining, transforming, and distributing energy affects the environment. The student is expected to:

(A) identify energy transformations occurring during the production of energy for human use such as electrical energy to heat energy or heat energy to electrical energy [Have students go over how hydro power, thermal power works, slides 11,18-22,31-36]

(B) compare methods used for transforming energy in devices such as water heaters, cooling systems, or hydroelectric and wind power plants [Have students compare different methods of capturing wind, solar, bio energy, slides 11-37]

(C) research and describe energy types from their source to their use and determine if the type is renewable, non-renewable, or inexhaustible.

§112.23. Science, Grade 7.

(7.2) **Scientific processes.** The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using equipment and technology;

(C) organize, analyze, make inferences, and predict trends from direct and indirect evidence;

(E) construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data. [Have students propose a project on two energies, compare and contrast, predict how they will be used in the future, how much of it will be used and etc. Apply a graph or chart to show the predictions.]

(7.3) **Scientific processes.** The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;

(7.14) **Science concepts.** The student knows that natural events and human activity can alter Earth systems. The student is expected to:

(C) make inferences and draw conclusions about effects of human activity on Earth's renewable, non-renewable, and inexhaustible resources. [Students can look at the rate of consumption of resources, what resources are used and what affect the resources cause on the Earth]

§112.24. Science, Grade 8.

(8.2) **Scientific processes.** The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting and using equipment and technology [Have students think of an energy sources that could be used that are not being used today or any potential new power sources.]

(C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence

(E) construct graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate data.
[Have students apply their ideas and compare/contrast their findings to today's resources.]

(8.3) **Scientific processes.** The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;

(D) evaluate the impact of research on scientific thought, society, and the environment [How may current research on new resources for power change our current use of resources?]

(8.14) **Science concepts.** The student knows that natural events and human activities can alter Earth systems. The student is expected to:

(C) describe how human activities have modified soil, water, and air quality.[Students can look at present conditions and think of how to change the present activities, if they think they need to be changed]

§112.42. Integrated Physics and Chemistry.

(6) **Science concepts.** The student knows the impact of energy transformations in everyday life. The student is expected to:

(C) analyze the efficiency of energy conversions that are responsible for the production of electricity such as from radiant, nuclear, and geothermal sources, fossil fuels such as coal, gas, oil, and the movement of water or wind [Students can compare the energy efficiency for non renewable and renewable sources, slides 14,16,25,30,37]

(D) investigate and compare economic and environmental impacts of using various energy sources such as rechargeable or disposable batteries and solar cells [Slides 4, 18-30]

§112.44. Environmental Systems.

(3) **Scientific processes.** The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information [Students can think of ideas for projects on energy and the environment]

(5) **Science concepts.** The student knows the interrelationships among the resources within the local environmental system. The student is expected to:

(A) summarize methods of land use and management [Students can think about how the city and state will manage land for new energy, slide 17,21,32,33,38]

(C) document the use and conservation of both renewable and non-renewable resources [Have students find out what main sources we use for power, find today's rate of use and make predictions using data and valid sources]

(D) identify renewable and non-renewable resources that must come from outside an ecosystem such as food, water, lumber, and energy

(E) analyze and evaluate the economic significance and interdependence of components of the environmental system [Students can look at the economic significance of the types of resources, slide 38 for reference]

(7) **Science concepts.** The student knows the relationship between carrying capacity and changes in populations and ecosystems. The student is expected to:

(C) evaluate the depletion of non-renewable resources and propose alternatives [Students can do a project on finding alternatives and what possible effects the alternative might have]

(8) **Science concepts.** The student knows that environments change. The student is expected to:

(A) analyze and describe the effects on environments of events such as fires, hurricanes, deforestation, mining, population growth, and municipal development [Have students show effects of mining and burning gas and coal for power and affects from reusable resources, refer to slide 9]

(B) explain how regional changes in the environment may have a global effect [How may the changes in Austin power affect the environment? Look at the ozone problem. Slide 9]

(C) describe how communities have restored an ecosystem [Students can look at how Austin is the leader in using renewable sources and if the projected rate is kept, how that may affect the environment, slides 6-8, 37-38]

§112.49. Geology, Meteorology, and Oceanography.

(9) **Science concepts.** The student knows the role of natural energy resources. The student is expected to:

(B) analyze issues regarding the use of fossil fuels and other renewable, non-renewable, or alternative energy resources

(C) analyze the significance and economic impact of the use of fossil fuels and alternative energy resources. [Have a field trip to a dam or power facilities and to discuss the long term effects of gas and coal power. Tie in what is happening in current events that might cause a push for other power sources. Have students do detailed projects on any energy of their choice]