Michigan Science Content Expectations – Grade 7 for MEECS Energy Resources Unit

X = Addresses/Supports DRAFT MARCH 2008

		1. Energy Use in Michigan Then and Now	2.Michigan's Energy Resource Mix	3. Generating Michigan's Electricity	4. Non-renewable Energy Choices and Impacts	5. Renewable Energy and Michigan	6. Energy Conservation and Efficiency: Leaks and Lights	7. Using a Product's Life Cycle	8. Leaving Smaller Footprints
	GRADE 7								
Science	**S.IP.M.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.**								
	S.IP.07.11 Generate scientific questions based on observations, investigations, and research.	X	X	X	X	X	X	X	X
	S.IP.07.12 Design and conduct scientific investigations.			X	X	X	X		X
	S.IP.07.13 Use tools and equipment appropriate to scientific investigations.			X	X	X	X		X
	S.IP.07.14 Use metric measurement devices in an investigation.			X		X	X		X
	S.IP.07.15 Construct charts and graphs from data and observations.			X			X		X
	S.IP.07.16 Identify patterns in data.	X	X	X	X	X	X		X
	S.IA.M.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.								
	S.IA.07.11 Analyze information from data table and graphs to answer scientific questions.	X	X	X	X	X	X	X	X
	S.IA.07.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.	X	X	X	X	X	X	X	X
	S.IA.07.13 Communicate and defend findings of observations and investigations.			X	X	X	X	X	X
	S.IA.07.14 Draw conclusions from sets of data from multiple trials of a scientific investigation to draw conclusions.			X			X		X
	S.IA.07.15 Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.								X
	S.RS.M1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.								
	S.RS.07.11 Evaluate the strengths and weaknesses of claims, arguments, and data.				X	X	X		X
	S.RS.07.12 Describe limitations in personal and scientific knowledge.				X	X	X		X
	S.RS.07.13 Identify the need for evidence in making scientific decisions.				X	X	X	X	X
	S.RS.07.14 Evaluate scientific explanations based on current evidence and scientific principles.				X	X	X		X
	S.RS.07.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.	X	X	X	X	X	X	X	X
	S.RS.07.16 Design solutions to problems through technology.				X	X	X	X	X
	S.RS.07.17 Describe the effect humans and other organisms have on the balance of the natural world.	X		X	X	X	X	X	X
	S.RS.07.18 Describe what science and technology can and cannot reasonably contribute to society.			X	X	X		X	X
	S.RS.07.19 Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.	X							
	Physical Science - Energy								
	P.EN.M.4 Energy Transfer – Energy is transferred from a source to a receiver by radiation, conduction, and convection. When energy is transferred from a source to a receiver, the quantity of energy before transfer is equal to the quantity of energy after the transfer.								
	P.EN.07.43 Explain how light energy is transferred to chemical energy through the process of photosynthesis.		X			X			
	Earth Science – Earth Systems								
	E.ES.M.4 Human Consequences-Human activities have changed the land, oceans, and atmosphere of the Earth resulting in the reduction of the number and variety of wild plants and animals sometimes causing extinction of species.								
	E.ES.07.41 Explain how human activities (surface mining, deforestation, overpopulation, construction and urban development, farming, dams, landfills, and restoring natural areas) change the surface of the Earth and affect the survival of organisms.				X	X			X
	E.ES.07.42 Describe the origins of pollution in the atmosphere, geosphere, and hydrosphere, (car exhaust, industrial emissions, acid rain, and natural sources), and how pollution impacts habitats, climatic change, threatens or endangers species.			X	X	X	X	X	X

Michigan Science Content Expectations – High School
for MEECS Energy Resources Unit

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Science	**EARTH SCIENCE**								
	E1.1 Scientific Inquiry								
	E1.1A Generate new questions that can be investigated in the lab or field.			X			X		X
	E1.1B Evaluate the uncertainties or validity of scientific conclusions…						X		X
	E1.1C Conduct scientific investigations using appropriate tools and techniques.			X	X	X	X		X
	E1.1D Identify patterns in data and relate to theoretical models.	X	X	X	X	X	X	X	X
	E1.1E Describe a reason for a given conclusion using evidence from an investigation.			X	X	X	X		
	E1.1f Predict what would happen if variables, methods, or timing were changed.			X					X
	E1.1g Based on empirical evidence, explain and critique the reasoning used to draw a scientific conclusion.			X			X		
	E1.1h Design and conduct a systematic scientific investigation.			X			X		
	E1.1i Distinguish between current consensus on scientific explanations and emerging questions that active researchers investigate.				X	X			X
	E1.2 Scientific Reflections and Social Implications								
	E1.2A Critique whether specific questions can be answered through scientific investigations.			X			X		X
	E1.2B Identify and critique arguments about personal or scientific issues based on scientific evidence.				X	X	X	X	X
	E1.2C Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.								X
	E1.2D Evaluate scientific explanations in a peer review process or discussion format.	X	X	X	X	X	X	X	X
	E1.2f Critique solutions to problems, given criteria and scientific constraints.						X	X	X
	E1.2g Identify scientific tradeoffs in design decisions and choose among alternative solutions (e.g. best management practices, resource quantity and quality trade-offs).				X	X	X	X	X
	E1.2k Analyze how science and society interact from a historical, political, economic, or social perspective.	X	X		X	X	X	X	X
	E2.2 Energy in Earth Systems								
	E2.2.2A Describe the Earth's principal sources of internal and external energy (e.g. radioactive decay, gravity, solar energy).					X			
	E2.2B Identify differences in the origin and use of renewable (e.g., solar, wind, water, biomass) and nonrenewable (e.g., fossil fuels, nuclear [U-235]) sources of energy.		X		X	X			
	E2.2.C Describe natural processes in which heat transfer in Earth occurs by conduction, convection, and radiation.					X			
	E2.4 Resources and Human Impacts on Earth Systems								
	E2.4A Describe renewable and nonrenewable sources of energy for human consumption (electricity, fuels), compare their effects on the environment, and include overall costs and benefits.		X		X	X			X
	E2.4d Describe the life cycle of a product, including the resources, production, packaging, transportation, disposal, and pollution.							X	

	Michigan Science Content Expectations – H.S. (continued) for MEECS Energy Resources Unit X = Addresses/Supports DRAFT MARCH 2008	1. Energy Use in Michigan Then and Now	2.Michigan's Energy Resource Mix	3. Generating Michigan's Electricity	4. Non-renewable Energy Choices and Impacts	5. Renewable Energy and Michigan	6. Energy Conservation and Efficiency: Leaks and Lights	7. Using a Product's Life Cycle	8. Leaving Smaller Footprints
	BIOLOGY								
	BI.1 Scientific Inquiry (see Earth Science Scientific Inquiry HSCE above)								
	BI.2 Scientific Reflection and Social Implications (see Earth Science Scientific Reflection and Social Implications HSCE above)								
	B3.4 Changes in Ecosystems								
	B3.4C Examine the negative impact of human activities.	X			X	X	X	X	X
Science	**B3.4 x Human Impact**								
	B3.4D Describe the greenhouse effect and list possible causes.				X				
	B3.4E List the possible causes and consequences of global warming.				X				X
	CHEMISTRY								
	CI.1 Scientific Inquiry (See Earth Science Scientific Inquiry HSCE above)								
	CI.2 Scientific Reflection and Social Implications (see Earth Science Scientific Reflection and Social Implications HSCE above)								
	P3.p1 Conservation of Energy								
	P3.p1A Explain that the amount of energy necessary to heat a substance will be the same as the amount of energy released when the substance is cooled to the original temperature.			X	X	X			
	P3.p2 Energy Transfer								
	P3.p2.A Trace (or diagram) energy transfers involving various types of energy including nuclear, chemical, electrical, sound, and light.		X	X					
	PHYSICS								
	PI.1 Scientific Inquiry (See Earth Science Scientific Inquiry HSCE above)								
	PI.2 Scientific Reflection and Social Implications (See Earth Science Scientific Reflection and Social Implications HSCE above)								
	P3.8x Electromagnetic Force								
	P3.8b Explain how the interaction of electric and magnetic forces is the basis for electric motors, generators, and the production of electromagnetic waves.			X					
	P4.1 Energy Transfer								
	P4.1A Account for and represent energy into and out of systems using energy transfer diagrams.		X	X			X		
	P4.2 Energy Transformation								
	P4.2B Name devices that transform specific types of energy into other types (e.g., a device that transforms electricity into motion).			X	X	X	X		
	P4.10 Current Electricity - Circuits								
	P4.10A Describe the energy transformations when electrical energy is produced and transferred to homes and businesses.			X					
	P4. 10x Current Electricity – Ohm's Law, Work, and Power								
	P4.10i Compare the energy used in one day by common household appliances (e.g., refrigerator, lamps, hair dryer, toaster, televisions, music players.)						X		

Michigan Content Expectations – Grade 7-8 Social Studies for MEECS Energy Resources Unit

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Social Studies	**GRADE 7**								
	G2.2 Human Characteristics of Place								
	7-G2.2.2 Explain that communities are affected positively or negatively by changes in technology.	X			X	X			X
	P3.1 Identifying and Analyzing Issues, Decision Making, Persuasive Communication About a Public Issue, and Citizen Involvement								
	7-P3.1.1 Clearly state an issue as a question of public policy, trace the origins of the issue, analyze various perspectives, and generate and evaluate alternate resolutions…					X			
	P4.2 Citizen Involvement								
	7-P4.2.1 Demonstrate knowledge of how, when, and where individuals would plan and conduct activities intended to advance views in matters of public policy, report the results, and evaluate effectiveness					X			
	7-P4.2.2 Engage in activities intended to contribute to solving a national or international problem.					X	X	X	X
	7-P4.2.3 Participate in projects to help or inform others (e.g. service learning projects).					X	X	X	X
	G4.4 Forces of Cooperation and Conflict								
	7-G4.4.1 Identify and explain factors that contribute to conflict and cooperation between and among cultural groups (e.g., natural resources, power, culture, wealth).		X		X	X			X
	G5.1 Humans and the Environment								
	7-G5.1.1 Describe the environmental effects of human action on the atmosphere, biosphere, lithosphere and hydrosphere.	X			X	X	X	X	X
	7-G5.1.2 Describe how variations in technology affect human modifications of the landscape.		X		X	X			
	7-G5.1.3 Identify the ways in which human-induced changes in the physical environment in one place can cause changes in other places (e.g. cutting forests upstream can cause flooding downstream, building dams floods land upstream and permits irrigation downstream).				X	X			X
	G5.2 Humans and the Environment								
	7-G5.2.1 Describe the effects that a change in the physical environment could have on human activities and the choices people would have to make in adjusting to the change.				X	X			X
	G6.1 Public Discourse, Decision Making, and Citizen Involvement (P3, P4)								
	7-G6.1.1 Contemporary investigations – Conduct research on contemporary global topics and issues, compose persuasive essays, and develop a plan for action.					X			X
	C4.3 Conflict and Cooperation Between and Among Nations								
	7-C4.3.1 Explain how governments address national issues and form policies, and how the policies my not be consistent with those of other countries.				X	X			X
	7-C4.3.2 Explain the challenges to governments and the cooperation needed to address international issues.								X
	GRADE 8								
	P3.1 Identifying and Analyzing Issues, Decision Making, Persuasive Communication About a Public Issue, and Citizen Involvement								
	8-P3.1.1 Identify, research, analyze, discuss, and defend a position on a national public policy issue.					X	X		X
	P4.2 Citizen Involvement								
	8-P4.2.1 Demonstrate knowledge of how, when, and where individuals would plan and conduct activities intended to advance views in matters of public policy, report the results, and evaluate effectiveness					X			
	8-P4.2.2 Engage in activities intended to contribute to solving a national or international problem.					X	X	X	X
	8-P4.2.3 Participate in projects to help or inform others (e.g. service learning projects).					X	X	X	X