

MODULE ENM3050: SUSTAINABLE ENERGY (THE POWER & POTENTIAL)

Level: Advanced

Theme: Technology and Applications

Prerequisite: ENM2050 Renewable Energy Technology

Module Description: Students examine opportunities for planning renewable energy development and conserving conventional energy for its ideal use.

Module Parameters: Access to relevant government, industry and community resources.

Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> identify alternatives and consequences associated with current issues involving energy supply and demand 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> analyzing two or more current issues regarding energy supply and demand at local and global levels. Analysis to address social, economic, environmental and technological perspectives. <p><i>Assessment Tool</i> <i>Issue Analysis: Energy Supply and Demand, ENM3050-1</i></p> <p><i>Standard</i> <i>Analyze each issue to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> completing a research project on applications of renewable and nonrenewable energy technology in sustainable energy development. Research to address: <ul style="list-style-type: none"> benefits and obstacles related to the use of renewables and nonrenewables the role of alternative energy options, energy efficiency and conservation lifestyles in achieving sustainable energy development. <p><i>Assessment Tool</i> <i>Research Process: Sustainable Energy Development, ENM3050-2</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p>	<p>20</p>

MODULE ENM3050: SUSTAINABLE ENERGY (THE POWER & POTENTIAL) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • describe the benefits and obstacles associated with demand-side energy management • present a plan for sustainable energy development • explain career opportunities relevant to energy planning and development 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • developing and implementing a demand-side energy management awareness and information campaign within the school and/or community. Campaign to include: <ul style="list-style-type: none"> – an outline of conservation and efficiency measures that can be implemented – promotional materials, including posters, handbills, videotaped commercials and/or information programs – a plan for action. <p><i>Assessment Tool</i> <i>Assessment Criteria: Energy Management Campaign, ENM3050–3</i></p> <p><i>Standard</i> <i>Develop and implement the campaign to a standard of 3 on the rating scale</i></p>	<p>30</p>
	<ul style="list-style-type: none"> • developing and presenting a plan for sustainable energy development within one sector of society. Plan may be developed as a paper, display or video presentation, and should include: <ul style="list-style-type: none"> – goals, objectives and benefits of the development – development details, including site and technological requirements, processes and supply/distribution networks – a strategy for monitoring development outcomes and resolving potential conflicts/issues. <p><i>Assessment Tool</i> <i>Presentations/Reports: Advanced Level, ENMPRE–3</i></p> <p><i>Standard</i> <i>Develop and present the plan to a standard of 3 on the rating scale for Presentations/Reports</i></p>	<p>30</p>
	<ul style="list-style-type: none"> • completing a research project on one or more career opportunities in energy planning and development. <p><i>Assessment Tool</i> <i>Career Search: Advanced Level, ENMCAR–3</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 3 on the rating scale</i></p>	<p>20</p>

MODULE ENM3050: SUSTAINABLE ENERGY (THE POWER & POTENTIAL) (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Energy Supply and Demand</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> examine social, economic and environmental perspectives regarding conventional energy supply describe recent applications of technology in conventional energy development research forecasts regarding future energy supply and demand, and options for ensuring a sustainable energy future describe applications of renewable energy in supplementing conventional energy sources. 	<p>Discuss issues relevant to the development of conventional energy supplies; e.g.:</p> <ul style="list-style-type: none"> How much? How fast? <p>Consider trends regarding energy conservation, efficiency and “conservation lifestyles.”</p> <p>Research technologies designed to:</p> <ul style="list-style-type: none"> improve recovery rates lessen environmental impacts. <p>Discuss/assess options such as:</p> <ul style="list-style-type: none"> using less finding alternative sources. <p>Discuss current and/or emerging applications of renewable energy; e.g.:</p> <ul style="list-style-type: none"> domestic/industrial heating transportation.

MODULE ENM3050: SUSTAINABLE ENERGY (THE POWER & POTENTIAL) (continued)

Concept	Specific Learner Expectations	Notes
Demand-side Energy Management	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe basic principles of demand-side energy management • evaluate benefits and obstacles associated with demand-side energy management • suggest advantages of demand-side energy management over supply-side energy management in planning future energy development • describe ways in which society can support and/or adapt to demand-side energy management; e.g.: <ul style="list-style-type: none"> – change people’s habits to save energy and reduce waste – use design and technology to increase energy efficiency. 	<p>Demand-side management focuses attention on how energy is used; e.g.:</p> <ul style="list-style-type: none"> • controlling need • levelling consumption • developing energy alternatives • saving conventional sources for their ideal use. <p>Consider factors such as:</p> <ul style="list-style-type: none"> • energy efficiency and conservation • environmental quality • energy costs. <p>Discuss common barriers to demand-side management; e.g.:</p> <ul style="list-style-type: none"> • lack of awareness of long-term benefits • low energy prices • lack of energy standards for buildings, vehicles, etc.
Sustainable Energy Development	<ul style="list-style-type: none"> • provide a definition and examples of sustainable energy development • suggest a rationale for sustainable energy development that addresses social, economic and environmental perspectives • compare the roles of renewable and nonrenewable technology in sustainable energy development • cite examples of sustainable energy path development that involve least-cost combinations and efficient use of both conventional and nonconventional energy sources • propose changes in current social values and political structures that may facilitate sustainable energy development 	<p>Contact the Pincher Creek Development and Information Centre (formerly the Southwest Alberta Renewable Energy Initiative) for current information on sustainable energy development in Alberta.</p> <p>Sustainable energy path development involves matching the “quality” of the energy <u>provided</u> to the “quality” of the energy <u>required</u>.</p> <p>Consider changes required in:</p> <ul style="list-style-type: none"> • consumer practices • government policy • technology.

MODULE ENM3050: SUSTAINABLE ENERGY (THE POWER & POTENTIAL) (continued)

Concept	Specific Learner Expectations	Notes
Sustainable Energy Development (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • develop and present a plan for sustainable energy path development that includes: <ul style="list-style-type: none"> – supply-side management solutions – demand-side management solutions • evaluate the plan on the basis of predicted social, economic and environmental consequences. 	<p>The plan might involve:</p> <ul style="list-style-type: none"> • wind farms • photovoltaic development • geothermal development • hydrogen development • hydro development.
Career Opportunities	<ul style="list-style-type: none"> • research careers and the range of occupational opportunities that involve energy planning and development e.g.: <ul style="list-style-type: none"> – engineering – technical and support services – environmental management • evaluate current employment opportunities based on employment statistics • research trends in energy planning and development, and future career opportunities. 	<p>Plan for individual/group research and presentations that address:</p> <ul style="list-style-type: none"> • job description • employment market • education/training • wage expectations. <p>Contact the “Career Information Hotline” (Alberta Advanced Education and Career Development).</p> <p>See the National Occupational Profiles (NOC) in Section H: Linkages/Transitions.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> • information interviews • work study/experience • job shadowing.

