

# MODULE CURRICULUM AND ASSESSMENT STANDARDS:

## SECTION D: INTRODUCTORY LEVEL

The following pages define the curriculum and assessment standards for the introductory level of Energy and Mines.

Introductory level modules help students build daily living skills and form the basis for further learning. Introductory modules are developed for students who have no previous experience in the strand.

Module learner expectations define the competencies a student must demonstrate to achieve success in a module. Assessment standards define the criteria and conditions to be used for assessing the competencies defined in the module learner expectations.

Specific learner expectations provide a detailed framework for instruction to help students build the competencies defined in the module learner expectations. Additional information and suggestions for instruction are provided in the Notes column; teachers may wish to use this space to record their ideas for instruction or student projects.

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**MODULE ENM1010: OVERVIEW OF ALBERTA GEOLOGY**

<b>Level:</b>	Introductory
<b>Theme:</b>	Social and Cultural Perspectives
<b>Prerequisite:</b>	None
<b>Module Description:</b>	Students describe the nature and origin of Alberta’s energy and mineral resources, explain their significance in society, and identify related career opportunities.

**Module Parameters:** Access to geological maps available from relevant government agencies and professional associations (e.g., Natural Resources Canada, Alberta Geological Survey, Alberta Energy Utilities Board).

Access to samples of hydrocarbon bearing rocks and/or minerals available from local industry.

Access to a science laboratory, an outdoor geological site where earth layers are exposed (e.g., river bank, recovery site) and a museum of natural history (e.g., Tyrrell Museum).

**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"> <li>describe the nature and origin of Alberta’s energy and mineral resources within the North American geological context</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a geological time chart for North America that illustrates:               <ul style="list-style-type: none"> <li>relative geological eras and time</li> <li>major atmospheric and life events.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Criteria: Geological Time Charts, ENM1010–1</i></p> <p><i>Standard</i>  <i>Complete time chart to a standard of 1 on the rating scale</i></p>	50

**MODULE ENM1010: OVERVIEW OF ALBERTA GEOLOGY** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• constructing drawings/models that depict:               <ul style="list-style-type: none"> <li>– the formation and current topography of the western sedimentary basin in relation to Alberta</li> <li>– vertical cross-sections of northeastern, central and southern Alberta, each showing hydrocarbon-bearing formations, mineral deposits and surface resources.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Criteria: Diagrams and Technical Drawings, ENMDRA</i>            Our Petroleum Challenge, Into the 21st Century (pp. 26–27)</p> <p><i>Standard</i>  <i>Complete drawings/models to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• identifying and mapping:               <ul style="list-style-type: none"> <li>– four nonrenewable sources of energy in Alberta</li> <li>– six metallic and/or nonmetallic minerals found in Alberta.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Task Checklist for Mapping, ENMMAP</i></p> <p><i>Standard</i>  <i>Complete mapping activities to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• conducting laboratory and/or field-based investigations that determine:               <ul style="list-style-type: none"> <li>– physical characteristics of three hydrocarbon-bearing rocks and six metallic/industrial minerals</li> <li>– porosity and permeability of hydrocarbon-bearing rock structures.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Lab Investigations: Rock Structures, ENM1010–2</i></p> <p><i>Standard</i>  <i>Perform investigations to a standard of 1 on the rating scale</i></p>	

**MODULE ENM1010: OVERVIEW OF ALBERTA GEOLOGY** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>explain the social, economic and environmental significance of energy and mineral resources in Alberta</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>given current news articles on two energy and/or mineral developments, an analysis of the impacts of each development on the environment and people who live there. <i>Assessment Tool</i> <i>Issue Analysis: Impacts of Energy/Mineral Development, ENM1010-3</i> <i>Standard</i> <i>Analyze the impacts of two energy/mineral developments to a standard of 1 on the rating scale</i></li> <li>given a specific energy or mineral resource, a presentation or report that describes:               <ul style="list-style-type: none"> <li>major uses of the resource within Alberta's residential, commercial, industrial and transportation sectors</li> <li>how development of the resource has affected social/cultural values, historical development/settlement and economic viability within a region of Alberta. <i>Assessment Tool</i> <i>Presentations/Reports: Introductory Level, ENMPRE-1</i> <i>Standard</i> <i>Achieve a minimum rating of 1 on the rating scale for Presentations/Reports</i></li> </ul> </li> </ul>	<p>30</p>
<ul style="list-style-type: none"> <li>identify career opportunities relevant to the field of geology</li> </ul>	<ul style="list-style-type: none"> <li>given current resources on career opportunities within the field of geology, completing a research project on one or more related careers. <i>Assessment Tool</i> <i>Career Search: Introductory Level, ENMCAR-1</i> <i>Standard</i> <i>Conduct research to a standard of 1 on the rating scale</i></li> </ul>	<p>20</p>
<ul style="list-style-type: none"> <li>demonstrate basic competencies.</li> </ul>	<ul style="list-style-type: none"> <li>observations of individual effort and interpersonal interaction during the learning process. <i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></li> </ul>	<p>Integrated throughout</p>

**MODULE ENM1010: OVERVIEW OF ALBERTA GEOLOGY (continued)**

Concept	Specific Learner Expectations	Notes
<p>Alberta's Energy and Mineral Resources</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• define and compare renewable and nonrenewable energy resources</li>   <li>• describe and locate on a map known reserves of nonrenewable energy resources in Alberta; e.g.:               <ul style="list-style-type: none"> <li>– oil</li> <li>– natural gas</li> <li>– coal</li> <li>– nuclear fuels</li> </ul> </li>   <li>• describe and locate on a map the major types of minerals found in Alberta; e.g.:               <ul style="list-style-type: none"> <li>– metallic</li> <li>– nonmetallic</li> </ul> </li>   <li>• identify and describe the physical characteristics of basic hydrocarbon bearing rocks; e.g.:               <ul style="list-style-type: none"> <li>– dolomite</li> <li>– limestone</li> <li>– sandstone</li> <li>– shale</li> </ul> </li>   <li>• identify and describe the physical characteristics of metallic and nonmetallic minerals; e.g.:               <ul style="list-style-type: none"> <li>– coal</li> <li>– copper</li> <li>– iron</li> <li>– limestone</li> <li>– magnesium</li> <li>– sulphur</li> </ul> </li>   <li>• draw or construct a historical account of the western sedimentary basin that explains Alberta's current topographical features</li>   <li>• draw or construct a vertical cross-section of any part of Alberta showing the location of hydrocarbon-bearing formations, mineral deposits and surface resources.</li> </ul>	<p>Contact Natural Resources Canada and request its map (produced annually) of energy and mineral developments in Canada.</p> <p>Request the <i>Mineral Deposits and Occurrences in Alberta</i> map available from Alberta Geological Survey.</p> <p>For example, gold, iron, sulphur, peat, quartz, salts, sodium sulphates, limestone, sand and gravel.</p> <p>Collect, identify and display rock and mineral samples.</p> <p>The historical account can encompass topography prior to the formation of the Rocky Mountains, and also present land features established as a result of the last ice age.</p>

**MODULE ENM1010: OVERVIEW OF ALBERTA GEOLOGY** (continued)

Concept	Specific Learner Expectations	Notes
<p>Economic, Environmental and Social Significance</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• identify and describe major energy and mineral use sectors in society; e.g.:               <ul style="list-style-type: none"> <li>– residential</li> <li>– commercial</li> <li>– industrial</li> <li>– transportation</li> </ul> </li> <li>• explain how the energy and mineral industries influence the local and national economy</li> <li>• describe the flow of energy and mineral resources between Canada and other nations; e.g.:               <ul style="list-style-type: none"> <li>– import partners</li> <li>– export partners</li> </ul> </li> <li>• identify and describe environmental issues associated with the development of Alberta’s energy and mineral resources.</li> </ul>	<p>Consider applications of:</p> <ul style="list-style-type: none"> <li>• renewable and nonrenewable energy</li> <li>• metallic, nonmetallic and structural materials.</li> </ul> <p>Conduct a personal inventory of energy and mineral use.</p> <p>Discuss trends in energy/mineral markets, and competition from raw material substitutes.</p> <p>Research Canada’s contribution to the world energy supply.</p> <p>Obtain the <i>Canadian Minerals Yearbook</i> (available from Natural Resources Canada).</p> <p>Consider the impact of energy/mineral industries on material and conservation goals, and other quality of life factors.</p>
<p>Career Opportunities</p>	<ul style="list-style-type: none"> <li>• research career opportunities and the range of occupational opportunities within the field of geology; e.g.:               <ul style="list-style-type: none"> <li>– professional</li> <li>– technical</li> <li>– labour-based</li> </ul> </li> <li>• gather employment statistics within one or more employment sectors; e.g.:               <ul style="list-style-type: none"> <li>– types of careers</li> <li>– number of workers</li> <li>– employment trends</li> </ul> </li> <li>• predict career opportunities and trends from employment statistics.</li> </ul>	<p>Contact the “Career Information Hotline” (Alberta Advanced Education and Career Development).</p> <p>See the National Occupational Classification System (NOC) in Section H: Linkages/Transitions.</p> <p>Plan for individual/group research and presentations.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> <li>• information interviews</li> <li>• work study/work experience</li> <li>• job shadowing.</li> </ul> <p>Make predictions about energy/mineral industries in the future, and resulting careers.</p>



## MODULE ENM1020: NONRENEWABLE RESOURCES

**Level:** Introductory

**Theme:** Technology and Applications

**Prerequisite:** None

**Module Description:** Students examine general applications of exploration, recovery and production, refining, and reclamation technologies within a nonrenewable energy or mineral industry; and they identify related career opportunities. Potential areas of investigation include conventional crude oil, oil sands, natural gas, coal, nuclear fuels, metallic minerals, nonmetallic minerals and structural materials.

**Module Parameters:** Access to a science laboratory and a local energy/mineral industry.

Access to resource maps available from government agencies and professional associations (e.g., Natural Resources Canada, Alberta Geological Survey, Alberta Energy Utilities Board).

Access to community-based interpretive centres/museums (e.g., Energeum, Fort McMurray Oil Sands Interpretive Centre).

Off-campus learning may support the development of knowledge and skills in exploration, production, refining and/or reclamation practices; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Module:** CTR1210 Personal Safety (Management) [Career Transitions Strand]; recommended for off-campus learning

**Note:** Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific exploration, recovery, refining and/or reclamation sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information regarding student safety.

**MODULE ENM1020: NONRENEWABLE RESOURCES** (continued)

**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"> <li>describe the formation and development of a nonrenewable energy or mineral resource in Alberta</li> <li>explain basic exploration, recovery and production, refining, and reclamation practices within a nonrenewable energy or mineral industry</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a presentation or report (written, oral or multimedia) on the formation and development of a nonrenewable energy or mineral resource. Report to include:               <ul style="list-style-type: none"> <li>a map outlining distribution of the resource throughout Alberta</li> <li>drawings, models and/or flow charts that depict basic geological processes and structures responsible for the formation of the resource</li> <li>a list of 25 or more products and/or services derived from the resource</li> <li>a timeline that outlines major social, economic and environmental factors/events affecting development of the resource in Alberta.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Presentations/Reports: Introductory Level, ENMPRE-1</i>  <i>Task Checklist for Mapping, ENMMAP</i>  <i>Assessment Criteria: Diagrams and Technical Drawings, ENMDRA</i>  <i>Assessment Criteria: Flow Charts, ENMFLO</i></p> <p><i>Standard</i>  <i>Achieve a minimum rating of 1 on the rating scale for Presentations/Reports and related mapping/drawing/charting activities</i></p> <ul style="list-style-type: none"> <li>flow charts that illustrate basic stages and steps in resource exploration, recovery and production, refining and reclamation for a nonrenewable energy or mineral resource.</li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Criteria: Flow Charts, ENMFLO</i></p> <p><i>Standard</i>  <i>Complete flow charts to a standard of 1 on the rating scale</i></p>	<p>40</p> <p>50</p>

**MODULE ENM1020: NONRENEWABLE RESOURCES** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• identify career opportunities relevant to a nonrenewable energy or mineral industry</li> <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• through laboratory and/or field-based investigations, identifying principles of science and technology used in at least one area of industry exploration, production, refining or reclamation.</li> </ul> <p><i>Assessment Tool</i>  <i>Lab Investigations: Introductory Level, ENMLAB-1</i>  <i>Observation Checklist for Field-based Investigations, ENMOBS</i></p> <p><i>Standard</i>  <i>Conduct lab investigations to a standard of 1 on the rating scale <u>and/or</u> complete all sections of the observation checklist for field-based investigations</i></p> <ul style="list-style-type: none"> <li>• given current resources on career opportunities in a nonrenewable energy or mineral sector, completing a research project on one or more related careers.</li> </ul> <p><i>Assessment Tool</i>  <i>Career Search: Introductory Level, ENMCAR-1</i></p> <p><i>Standard</i>  <i>Conduct research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <p><i>Assessment Tool</i>  <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>10</p> <p>Integrated throughout</p>

**MODULE ENM1020: NONRENEWABLE RESOURCES** (continued)

Concept	Specific Learner Expectations	Notes
History, Formation and Use	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• describe major historical events in the development of a nonrenewable energy or mineral resource in Alberta; e.g.:               <ul style="list-style-type: none"> <li>– logistics of exploration</li> <li>– problems/issues in development</li> <li>– boom and bust cycles</li> <li>– technological advances</li> </ul> </li> <li>• show the resource on a map of Alberta</li> <li>• describe basic geological processes and structures responsible for resource formation</li> <li>• identify and describe products and by-products derived from the resource; e.g.:               <ul style="list-style-type: none"> <li>– fuel</li> <li>– nonfuel</li> </ul> </li> <li>• explain how the resource has influenced both the people and the economy of Alberta; e.g.:               <ul style="list-style-type: none"> <li>– economic benefits</li> <li>– material products and services</li> <li>– employment</li> </ul> </li> <li>• identify environmental issues resulting from the use of nonrenewable resources; e.g.:               <ul style="list-style-type: none"> <li>– greenhouse gases</li> <li>– acid deposition</li> <li>– resource depletion</li> </ul> </li> <li>• research forecasts regarding future resource supply and demand, and options for ensuring a sustainable future; e.g.:               <ul style="list-style-type: none"> <li>– using less</li> <li>– finding alternative sources.</li> </ul> </li> </ul>	<p>Discuss social, economic and environmental issues affecting resource development.</p> <p>Focus attention on:</p> <ul style="list-style-type: none"> <li>• concept of geologic time</li> <li>• rock and mineral formation</li> <li>• important elements of Alberta geography</li> <li>• theory of plate tectonics.</li> </ul> <p>Products and by-products may include:</p> <ul style="list-style-type: none"> <li>• space and water heating</li> <li>• heat for industrial purposes</li> <li>• fuels for transportation</li> <li>• electricity</li> <li>• petrochemicals</li> <li>• metallic/nonmetallic materials.</li> </ul> <p>Discuss resource ownership/royalties and subsequent benefits to society.</p> <p>Involve students in high interest research activities; e.g.:</p> <ul style="list-style-type: none"> <li>• gold panning/slucing</li> <li>• rock/mineral collecting</li> <li>• potential cottage industry.</li> </ul>
Nonrenewable Resource Technology	<ul style="list-style-type: none"> <li>• describe basic exploration techniques used within a nonrenewable energy or mineral industry in Alberta; e.g.:               <ul style="list-style-type: none"> <li>– topographical features</li> <li>– drilling techniques</li> <li>– seismic operations</li> </ul> </li> </ul>	<p>Plan field trips into the community.</p> <p>Involve knowledgeable persons from local business and industry.</p>

**MODULE ENM1020: NONRENEWABLE RESOURCES** (continued)

Concept	Specific Learner Expectations	Notes
<p>Nonrenewable Resource Technology (continued)</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• describe basic recovery and production technologies used within the industry; e.g.:               <ul style="list-style-type: none"> <li>– service rigs</li> <li>– chemical processes</li> <li>– strip mining</li> </ul> </li> <li>• describe basic refining and manufacturing techniques used within the industry; e.g.:               <ul style="list-style-type: none"> <li>– cracking and fractionating</li> <li>– smelting and milling</li> </ul> </li> <li>• describe basic reclamation technologies used within the industry; e.g.:               <ul style="list-style-type: none"> <li>– exploration/process area restoration</li> <li>– strip mine restoration.</li> </ul> </li> </ul>	<p>Describe current techniques used to prevent/minimize environmental impact:</p> <ul style="list-style-type: none"> <li>• H<sub>2</sub>S gathering and storage</li> <li>• cooling pits for waste water</li> <li>• liners for storage tanks.</li> </ul> <p>Identify strategies used to recover a nonrenewable resource in the most effective, efficient and beneficial manner.</p>
<p>Career Opportunities</p>	<ul style="list-style-type: none"> <li>• research career opportunities associated with the development of a nonrenewable energy or mineral resource; e.g.:               <ul style="list-style-type: none"> <li>– resource exploration</li> <li>– recovery and production</li> <li>– refining and manufacturing</li> <li>– reclamation</li> </ul> </li> <li>• interpret employment statistics within one or more employment sectors; e.g.:               <ul style="list-style-type: none"> <li>– type of careers</li> <li>– number of workers</li> <li>– employment trends</li> </ul> </li> <li>• predict career opportunities and trends from employment statistics</li> <li>• research education and training requirements for employment within one or more career areas.</li> </ul>	<p>Contact the “Career Information Hotline” (Alberta Advanced Education and Career Development).</p> <p>See the National Occupational Classification System (NOC) in Section H: Linkages/Transitions.</p> <p>Invite local business/industry representatives to explain:</p> <ul style="list-style-type: none"> <li>• the human resource/personnel structure of a resource company</li> <li>• service departments and related occupations.</li> </ul> <p>Predict future industry trends and career opportunities</p> <p>Assess current employment opportunities in a chosen field.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> <li>• information interviews</li> <li>• work study/work experience</li> <li>• job shadowing.</li> </ul>



**MODULE ENM1050: RENEWABLE RESOURCES**

**Level:** Introductory

**Theme:** Technology and Applications

**Prerequisite:** None

**Module Description:** Students demonstrate applications of one or more renewable energy technologies, examine the contributions of each to sustainable energy development, and identify related career opportunities. Potential areas of investigation include solar, hydro, wind, tidal, biomass and geothermal energy, as well as energy generated from waste.

**Module Parameters:** Access to relevant government, industry and community resources (e.g., Alberta Energy, Alberta Environmental Protection, Energy Efficiency Association of Alberta, Pincher Creek Development and Information Centre, Biomass Energy Institute, Canadian Wind Energy Association, Solar Energy Society of Canada, Small Power Producers Association of Alberta).

**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"> <li>describe applications of renewable energy technology</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>identifying and mapping sources of renewable energy on a map of Alberta. <i>Assessment Tool</i> <i>Task Checklist for Mapping, ENMMAP</i> <i>Standard</i> <i>Complete mapping activities to a standard of 1 on the rating scale</i></li> <li>given a specific energy need, constructing a drawing/model of a renewable energy system to meet that need. The drawing/model must address:               <ul style="list-style-type: none"> <li>component parts and principles of operation</li> <li>efficient use of resources</li> <li>human and environmental safety.</li> </ul> <i>Assessment Tool</i> <i>Project Assessment: Technology Design, ENMTEC</i> <i>Assessment Criteria: Diagrams and Technical Drawings, ENMDRA</i> <i>Standard</i> <i>Complete the design <u>and</u> drawing/model to a standard of 1 on the rating scale</i> </li> </ul>	<p>60</p>

**MODULE ENM1050: RENEWABLE RESOURCES** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>explain current and potential contributions of renewable energy to sustainable energy development</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a concept test in which the student demonstrates knowledge of renewable energy resources and systems currently used in Alberta. Test items to address the use of hydroelectric, solar, hydro, wind, tidal, biomass and geothermal energy, and energy generated from waste.</li> </ul> <p><i>Assessment Tool</i> Energy Sources/Applications/Alternatives (<i>Instructor's Manual</i>)</p> <p><i>Standard</i> Response indicating 60% mastery</p> <ul style="list-style-type: none"> <li>a presentation or report on basic principles of sustainable energy development. Report to address:           <ul style="list-style-type: none"> <li>definitions and examples of sustainable energy development</li> <li>benefits and difficulties related to the use of renewable and nonrenewable energy</li> <li>the role of alternative energy options, energy efficiency and conservation lifestyles in achieving sustainable energy development</li> <li>a comparison of sustainable energy development in Alberta and another part of the world.</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>Presentations/Reports: Introductory Level, ENMPRE-1</i></p> <p><i>Standard</i> Achieve a minimum rating of 1 on the rating scale for <i>Presentations/Reports</i></p>	<p>30</p>

**MODULE ENM1050: RENEWABLE RESOURCES** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• identify career opportunities relevant to renewable energy development</li> <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• given a current issue regarding use of a renewable and/or nonrenewable energy technology:               <ul style="list-style-type: none"> <li>– identifying social, economic and environmental perspectives relevant to the issue</li> <li>– developing a plan for dealing with the issue that furthers sustainable energy supply.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Issue Analysis: Sustainable Energy Development, ENM1050–1</i></p> <p><i>Standard</i>  <i>Analyze the issue <u>and</u> develop a plan for dealing with the issue to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• completing a research project on one or more career opportunities in renewable energy development.</li> </ul> <p><i>Assessment Tool</i>  <i>Career Search: Introductory Level, ENMCAR–1</i></p> <p><i>Standard</i>  <i>Conduct research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <p><i>Assessment Tool</i>  <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>10</p> <p>Integrated throughout</p>

**MODULE ENM1050: RENEWABLE RESOURCES** (continued)

Concept	Specific Learner Expectations	Notes
<p>Renewable Energy Technology</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• identify and describe renewable energy sources currently used in Alberta; e.g.:               <ul style="list-style-type: none"> <li>– hydroelectric</li> <li>– solar</li> <li>– wind</li> <li>– biomass</li> <li>– geothermal</li> <li>– energy from waste</li> </ul> </li> <li>• show on a map regions of the province that use renewable energy technologies</li> <li>• describe renewable sources of energy not currently used in Alberta</li> <li>• design and/or construct a renewable energy technology</li> <li>• demonstrate one or more applications of renewable energy technology.</li> </ul>	<p>Research/debate the statement—“there is no such thing as renewable energy.”</p> <p>Which renewable energy sources have the greatest potential for use in Alberta? Why?</p> <p>Compare active and passive solar systems.</p> <p>Explain applications of wind energy:</p> <ul style="list-style-type: none"> <li>• electricity generation</li> <li>• water pumping.</li> </ul> <p>Design, construct and test technologies used to perform specific tasks.</p> <p>Plan and design a community that uses renewable energy as a supplement to energy needs.</p>
<p>Sustainable Energy Development</p>	<ul style="list-style-type: none"> <li>• define sustainable energy development</li> <li>• compare the role of renewable and nonrenewable energy technologies in sustainable energy development</li> <li>• identify factors that determine the feasibility of renewable energy development; e.g.:               <ul style="list-style-type: none"> <li>– social and economic</li> <li>– geological</li> <li>– technological</li> <li>– environmental</li> </ul> </li> <li>• compare and contrast use of renewable energy in Alberta with other parts of the world in supplementing energy supply</li> <li>• assess potential impacts of renewable energy development on the environment.</li> </ul>	<p>Explain the meaning of the phrase “soft energy path”; e.g.:</p> <ul style="list-style-type: none"> <li>• least-cost energy strategy</li> <li>• efficient energy use</li> <li>• sustainable energy path.</li> </ul> <p>What factors enable renewable resources to be an effective supplement to energy needs in specific areas of Alberta, Canada and other parts of the world?</p> <p>Conduct research on:</p> <ul style="list-style-type: none"> <li>• the use of wind energy in Quebec or Minnesota</li> <li>• energy diversification in Europe</li> <li>• the development of remote solar and micro-hydro systems in South America.</li> </ul>

**MODULE ENM1050: RENEWABLE RESOURCES** (continued)

Concept	Specific Learner Expectations	Notes
Career Opportunities	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• research career opportunities relevant to renewable energy development; e.g.:               <ul style="list-style-type: none"> <li>– resource exploration</li> <li>– recovery and production</li> <li>– engineering and design</li> <li>– resource management</li> </ul> </li> <li>• interpret employment statistics within one or more employment sectors; e.g.:               <ul style="list-style-type: none"> <li>– types of careers</li> <li>– number of workers</li> <li>– employment trends</li> </ul> </li> <li>• predict career opportunities and trends from employment statistics</li> <li>• research renewable energy development in the future, and resulting career opportunities.</li> </ul>	<p>Contact the “Career Information Hotline” (Alberta Advanced Education and Career Development).</p> <p>See National Occupational Classification System (NOC) in Section H: Linkages/Transitions.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> <li>• information interviews/field visits</li> <li>• work study/work experience</li> <li>• job shadowing.</li> </ul> <p>Plan for individual/group research and presentations.</p>



## MODULE ENM1060: CONSUMER PRODUCTS & SERVICES

**Level:** Introductory

**Theme:** Technology and Applications

**Prerequisite:** None

**Module Description:** Students examine the basic techniques involved in developing consumer products and/or services within an energy or mineral industry, and they identify related career opportunities.

**Module Parameters:** Access to a relevant processing, refining, manufacturing or service industry.

Off-campus learning may support the development of knowledge and skills in processing, refining and/or manufacturing practices; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Module:** CTR1210 Personal Safety (Management) [Career Transitions Strand]; recommended for off-campus learning

Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific processing, refining and/or manufacturing sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information regarding student safety.

**MODULE ENM1060: CONSUMER PRODUCTS & SERVICES** (continued)

**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"> <li>describe the range of consumer products and services derived from energy and mineral resources</li> <li>explain the processes used to develop a consumer product or to provide a related service</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a presentation or report (written, oral and/or multimedia) that describes:               <ul style="list-style-type: none"> <li>three or more consumer products/services derived from each of the following: oil, gas, coal, petrochemicals, metallic minerals, industrial minerals, decorative stone, sand and gravel</li> <li>applications of renewable and nonrenewable energy in producing electricity and heat energy for domestic and industrial use.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Presentations/Reports: Introductory Level, ENMPRE-1</i></p> <p><i>Standard</i>  <i>Achieve a minimum rating of 1 on the rating scale for Presentations/Reports</i></p>	40
	<ul style="list-style-type: none"> <li>flow charts that illustrate basic stages and steps in developing a consumer product or providing a related service.</li> <li>through laboratory and/or field-based investigations, identifying principles of science and technology used in developing an energy or mineral product.</li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Criteria: Flow Charts, ENMFLO</i></p> <p><i>Standard</i>  <i>Complete flow charts to a standard of 1 on the rating scale</i></p> <p><i>Assessment Tool</i>  <i>Lab Investigations: Introductory Level, ENMLAB-1</i>  <i>Observation Checklist for Field-based Investigations, ENMOBS</i></p> <p><i>Standard</i>  <i>Conduct lab investigations to a standard of 1 on the rating scale <u>and/or</u> complete all sections of the observation checklist for field investigations</i></p>	50

**MODULE ENM1060: CONSUMER PRODUCTS & SERVICES** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• identify career opportunities relevant to an energy or mineral processing, refining or manufacturing industry</li> <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• completing a research project on one or more career opportunities within an energy or mineral industry.</li> </ul> <p><i>Assessment Tool</i>  <i>Career Search: Introductory Level, ENMCAR-1</i></p> <p><i>Standard</i>  <i>Conduct research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <p><i>Assessment Tool</i>  <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p style="text-align: center;">10</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Consumer Products and Services</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• identify and describe a range of consumer products or services derived from nonrenewable energy resources; e.g.:               <ul style="list-style-type: none"> <li>– oil, gas and coal</li> <li>– oil, gas and coal by-products</li> <li>– petrochemicals</li> </ul> </li> <li>• identify and describe a range of consumer products and services derived from mineral resources; e.g.:               <ul style="list-style-type: none"> <li>– metallic and nonmetallic minerals</li> <li>– art and decorative stone</li> <li>– sand and gravel</li> </ul> </li> </ul>	<p>Prepare tree charts, collages and bulletin board displays.</p> <p>Collect samples of consumer products.</p> <p>Contact Alberta Energy to obtain copies of:</p> <ul style="list-style-type: none"> <li>• <i>Alberta's Energy and Mineral Resources</i></li> <li>• <i>Energy in Alberta.</i></li> </ul> <p>Brochures entitled "Aggregates" and "Aggregates and Our Environment" are available from the Alberta Sand and Gravel Association.</p>

**MODULE ENM1060: CONSUMER PRODUCTS & SERVICES** (continued)

Concept	Specific Learner Expectations	Notes
Consumer Products and Services (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• explain the role of renewable and nonrenewable energy resources in producing electricity and heat energy; e.g.:               <ul style="list-style-type: none"> <li>– space and water heating</li> <li>– heat for industrial processing</li> <li>– fuels for transportation</li> </ul> </li> <li>• given a specific energy or mineral resource, provide reasons for maintaining, increasing or decreasing current production levels</li> <li>• predict factors that may influence energy and mineral industries in the future; e.g.:               <ul style="list-style-type: none"> <li>– alternative energy sources</li> <li>– material substitutes</li> <li>– market competition and change.</li> </ul> </li> </ul>	<p>Ask resource persons from a local utility company to discuss domestic and industrial applications of electricity and heat energy.</p> <p>Keep a journal of media articles relevant to recent developments in the energy or mineral industries.</p>
Product Development	<ul style="list-style-type: none"> <li>• identify and describe the basic steps involved in developing a consumer product or providing a related service; e.g.:               <ul style="list-style-type: none"> <li>– resource exploration</li> <li>– recovery and production</li> <li>– processing/refining</li> </ul> </li> <li>• describe industry strategies for ensuring the quality of the product or service; e.g.:               <ul style="list-style-type: none"> <li>– quality indicators</li> <li>– control measures</li> <li>– regulation and legislation</li> </ul> </li> <li>• identify methods used to transport, store and market the product or service</li> <li>• describe reclamation needs and practices within the industry; e.g.:               <ul style="list-style-type: none"> <li>– land restoration</li> <li>– water and soil treatments</li> </ul> </li> <li>• describe facilities and equipment essential to developing the product or service; e.g.:               <ul style="list-style-type: none"> <li>– design features</li> <li>– operation and maintenance</li> <li>– safety.</li> </ul> </li> </ul>	<p>Prepare flow charts/diagrams.</p> <p>Plan visits to local industry. Ask resource persons from local industry to explain steps involved in product development.</p> <p>Consider related health issues.</p> <p>Identify determinants of regional commodity processing.</p> <p>Research the impacts of energy/mineral development on environmental factors.</p>

**MODULE ENM1060: CONSUMER PRODUCTS & SERVICES** (continued)

Concept	Specific Learner Expectations	Notes
Career Opportunities	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• research career opportunities within an energy or mineral processing, refining or manufacturing industry; e.g.:               <ul style="list-style-type: none"> <li>– processing and refining</li> <li>– manufacturing</li> <li>– reclamation</li> <li>– transportation</li> <li>– marketing</li> </ul> </li> <li>• interpret employment statistics within one or more employment sectors; e.g.:               <ul style="list-style-type: none"> <li>– types of careers</li> <li>– number of workers</li> <li>– employment trends</li> </ul> </li> <li>• predict career opportunities and trends based on employment statistics.</li> </ul>	<p>Plan for individual/group research and presentations.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> <li>• information interviews</li> <li>• work study / work experience</li> <li>• job shadowing.</li> </ul> <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>



## MODULE ENM1090: FUNDAMENTALS OF RECYCLING

**Level:** Introductory

**Theme:** Management and Conservation

**Prerequisite:** None

**Module Description:** Students examine opportunities to recycle natural and manufactured materials, and they present the results of research on one or more recycling systems.

**Module Parameters:** Access to government-, industry- and/or community-sponsored recycling facilities and systems.

Access to a science laboratory.

Off-campus learning may support the development of knowledge and skills in recycling practices; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

**Supporting Module:** CTR1210 Personal Safety (Management) [Career Transitions Strand]; recommended for off-campus learning

Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific recycling sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information regarding student safety.

### 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"> <li>present a rationale for waste reduction through recycling, and describe trade-offs that occur through the recycling process</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>negotiating and debating the benefits and costs (from both economic and environmental perspectives) of recycling an organic or inorganic material (e.g., rubber, plastic, paper, earth product). Negotiation and debate to address:               <ul style="list-style-type: none"> <li>problems associated with the generation of wastes at local and global levels</li> <li>both small- and large-scale options for waste reduction through reducing, reusing, recycling and recovering.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Negotiation and Debate: Introductory Level, ENMNEG-1</i></p> <p><i>Standard</i>  <i>Address criteria in negotiation/debate to a standard of 1 on the rating scale</i></p>	20

**MODULE ENM1090: FUNDAMENTALS OF RECYCLING** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• identify opportunities to recycle organic and inorganic materials, and describe the resulting products that may be developed</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• identifying and locating recycling facilities and systems currently used in Alberta.</li> </ul> <p><i>Assessment Tool</i> <i>Task Checklist for Mapping, ENMMAP</i></p> <p><i>Standard</i> <i>Identify recycling facilities/systems on a map of Alberta to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• through laboratory and/or field-based investigations, identifying principles of science and technology used in recycling an organic or inorganic material (e.g., glass, metal, cellulose, petrochemical).</li> </ul> <p><i>Assessment Tool</i> <i>Lab Investigations: Introductory Level, ENMLAB-1</i> <i>Observation Checklist for Field-based Investigations, ENMOBS</i></p> <p><i>Standard</i> <i>Conduct lab investigations to a standard of 1 on the rating scale <u>and/or</u> complete all sections of the observation checklist for field-based investigations</i></p> <ul style="list-style-type: none"> <li>• a concept test in which the student demonstrates knowledge of: <ul style="list-style-type: none"> <li>– recyclable materials (e.g., organic, inorganic)</li> <li>– recycling systems (e.g., cogeneration, methane capture).</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>Energy Sources/Applications/Alternatives (Instructor's Manual)</i></p> <p><i>Standard</i> <i>Response indicating 60% mastery</i></p>	<p>50</p>

**MODULE ENM1090: FUNDAMENTALS OF RECYCLING** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• describe one or more recycling systems</li>   <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• planning and implementing a home, school or community project for recycling an organic or inorganic material.</li> </ul> <p><i>Assessment Tool</i>  <i>Task Checklist: Planning and Implementing a Recycling Project, ENM1090-1</i></p> <p><i>Standard</i>  <i>Plan and implement the recycling project to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• completing a research project on one or more recycling systems.</li> </ul> <p><i>Assessment Tool</i>  <i>Research Process: Recycling Systems, ENM1090-2</i></p> <p><i>Standard</i>  <i>Complete all components of research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <p><i>Assessment Tool</i>  <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>30</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Principles of Recycling</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• describe societal trends in the consumption of material goods and generation of waste material</li> <li>• research problems and alternatives associated with the disposal of waste materials at local and global levels</li> <li>• explain the four Rs as an environmental hierarchy of options for conserving resources and reducing pollution: <ul style="list-style-type: none"> <li>– reduce</li> <li>– reuse</li> <li>– recycle</li> <li>– recover</li> </ul> </li> </ul>	<p>Gather media articles (or use the Internet). Obtain statistics regarding trends in waste generation at local and global levels.</p> <p>Compare and contrast recycling with reusing a familiar product.</p> <p>Discuss “packaging” as the largest component of waste.</p>

**MODULE ENM1090: FUNDAMENTALS OF RECYCLING (continued)**

Concept	Specific Learner Expectations	Notes
Principles of Recycling (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• illustrate how recycling involves taking apart a used product and using the material it contains to make a new product</li> <li>• identify potential benefits and costs associated with the recycling of used materials; e.g.:               <ul style="list-style-type: none"> <li>– use of energy and other natural resources</li> <li>– impact on pollution, litter and the environment</li> <li>– cost related to collecting and processing materials</li> </ul> </li> <li>• analyze economic and environmental trade-offs that occur through the recycling of a natural or manufactured material (e.g., rubber, plastic, paper, earth product).</li> </ul>	<p>Identify common examples of recycling in nature.</p> <p>Conduct research on the benefits and costs of a familiar recycling system. Negotiate and debate the trade-offs while assuming the roles of different stakeholder groups.</p> <p>Plan and implement a strategy for recycling a waste product.</p>
Opportunities for Recycling	<ul style="list-style-type: none"> <li>• identify major categories and examples of recyclable materials, and potential products that can be developed from these materials:               <ul style="list-style-type: none"> <li>– organic (e.g., plant material, paper, soil)</li> <li>– inorganic (e.g., glass, metal, petrochemical)</li> </ul> </li> <li>• explain recycling systems that have the potential to reduce energy consumption and/or waste generation; e.g.:               <ul style="list-style-type: none"> <li>– cogeneration</li> <li>– methane capture</li> <li>– use of waste heat</li> </ul> </li> <li>• explain that the viability of a recycling system may depend upon the extent to which revenues from the sale of the recycled product or service offset the costs associated with collecting and processing raw materials</li> <li>• identify and locate recycling facilities and systems currently used in Alberta</li> <li>• identify a strategy for personal involvement in the recycling of an organic or inorganic material (e.g., glass, metal, cellulose, petrochemical).</li> </ul>	<p>Consider opportunities for recycling household items such as:</p> <ul style="list-style-type: none"> <li>• glass jars</li> <li>• scrap metal</li> <li>• tin cans</li> <li>• newspapers</li> <li>• motor oil</li> <li>• waste plant material.</li> </ul> <p>Prepare flow charts/diagrams of these and other recycling systems.</p> <p>Ask a resource person from a local industry to discuss economic factors that impact recycling policies.</p> <p>Locate major recycling facilities/systems on a map of Alberta.</p> <p>Sample community recycling projects are provided in “Somebody... Should Do Something About This!” (a resource binder available from Alberta Energy).</p>

**MODULE ENM1090: FUNDAMENTALS OF RECYCLING (continued)**

Concept	Specific Learner Expectations	Notes
Recycling Systems	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• research the products and/or services provided by an industry involved in recycling</li> <li>• describe inputs to processing within the industry; e.g.:               <ul style="list-style-type: none"> <li>– commodity inputs/raw materials</li> <li>– financial resources</li> <li>– human and natural resources</li> <li>– technology</li> </ul> </li> <li>• explain major stages and steps in recycling the waste material; e.g.:               <ul style="list-style-type: none"> <li>– collecting and sorting</li> <li>– processing/product formation</li> <li>– transportation and storage</li> </ul> </li> <li>• explain techniques used to control quality within the recycling industry; e.g.:               <ul style="list-style-type: none"> <li>– inspection/sorting of raw materials</li> <li>– product quality and uniformity</li> </ul> </li> <li>• describe transportation and storage requirements, and their impact on industry location and recycling costs</li> <li>• identify environmental standards and concerns that affect the recycling industry; e.g.:               <ul style="list-style-type: none"> <li>– water, soil and air quality</li> <li>– use of energy and other resources</li> </ul> </li> <li>• identify and explain current legislation that affects the recycling industry</li> <li>• describe factors that affect the economic viability of recycling; e.g.:               <ul style="list-style-type: none"> <li>– collecting, sorting, processing and transportation costs</li> <li>– potential market for the product or service</li> <li>– relative cost of waste disposal by other means</li> </ul> </li> <li>• compare and contrast the recycling facility with a similar facility operating in another area of Alberta, Canada or the world.</li> </ul>	<p>See the research strategies provided in “Focus on Research.”</p> <p>Conduct research on a local recycling industry; e.g.:</p> <ul style="list-style-type: none"> <li>• Dominion Glass Company (Redcliff)</li> <li>• Papercycle of Alberta (Edmonton)</li> <li>• Ipsco Steel Sales Ltd. (Regina).</li> </ul> <p>Request information on current recycling programs from Alberta Environment (Waste Management Branch).</p> <p>Loan-free films/videos available from the National Film Board of Canada include:</p> <ul style="list-style-type: none"> <li>• <i>Waste Not, Want Not: The Recycling Imperative</i></li> <li>• <i>Renewable Society: The Vital Option.</i></li> </ul> <p>Explore potential linkages with the Legal Studies strand (e.g., modules on environmental law).</p> <p>Compare local, national and international approaches to recycling.</p>



**MODULE ENM1100: CONSERVATION CHALLENGE**

**Level:** Introductory

**Theme:** Management and Conservation

**Prerequisite:** None

**Module Description:** Students examine relationships between energy and mineral development and the environment, and they propose individual and shared actions that foster environmental stewardship.

**Module Parameters:** Access to government, industry and community organizations responsible for sustainable energy/mineral development (e.g., Natural Resources Canada, Alberta Energy, Alberta Environmental Protection, Alberta Research Council, Alberta Energy and Utilities Board, Alberta Oil Sands Technology and Research Authority, Petroleum Communication Foundation).

**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"> <li>describe ways in which energy or mineral development may affect the environment</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>completing a research project on the environmental impacts of an energy or mineral development.  <i>Research to address:</i> <ul style="list-style-type: none"> <li>land use practices</li> <li>soil, water and air quality factors</li> <li>waste/emission control</li> <li>impact on wildlife and natural habitat</li> <li>site reclamation practices</li> <li>compliance with environmental policy.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Research Process: Environmental Impacts, ENM1100-1</i></p> <p><i>Standard</i>  <i>Complete all components of research to a standard of 1 on the rating scale</i></p>	<p>25</p>

**MODULE ENM1100: CONSERVATION CHALLENGE** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>identify trends in the consumption of an energy or mineral resource, and explain the objectives of a conservation strategy</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>graphs constructed to illustrate consumption patterns and trends within each of Alberta’s residential, commercial, industrial and transportation sectors.</li> </ul> <p><i>Assessment Tools</i>  <i>Assessment Criteria: Graphs, ENMGRA Alberta in the Global Energy Spectrum, Alberta Energy Information Centre Energy Alberta 1996, Alberta Energy and Utilities Board</i></p> <p><i>Standard</i>  <i>Construct each graph to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>developing and presenting a conservation strategy for an energy or mineral resource. Strategy to address: <ul style="list-style-type: none"> <li>– definitions and examples of conservation and preservation</li> <li>– a rationale for conservation of the resource</li> <li>– a plan for action, based on reduced consumption, energy alternatives and/or material substitutes</li> <li>– supporting agencies and/or structures.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Criteria: A Conservation Strategy, ENM1100–2</i></p> <p><i>Standard</i>  <i>Develop and present the conservation strategy to a standard of 1 on the rating scale</i></p>	<p>25</p>

**MODULE ENM1100: CONSERVATION CHALLENGE** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>propose personal and shared actions that foster conservation and responsible use of an energy or mineral resource</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>maintaining a journal of lifestyle practices that affect an energy or mineral resource, inferences regarding the potential impact of each practice on the resource, and ideas for environmental citizenship. Each journal entry to involve reflection on:               <ul style="list-style-type: none"> <li>needs versus wants</li> <li>consumerism</li> <li>use of leisure time</li> <li>conservation ethics.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Reflection Guide for Environmental Responsibility/Citizenship, ENMREF Guide to Inferences: Personal Impact on Resources, ENM1100–3</i></p> <p><i>Standard</i>  <i>Complete 10 journal entries; address criteria for reflection to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>given a current issue regarding societal use of an energy or mineral resource, negotiating and debating the issue while assuming the role of one or more stakeholder groups.</li> </ul> <p><i>Assessment Tool</i>  <i>Negotiation and Debate, ENMNEG–1</i></p> <p><i>Standard</i>  <i>Address criteria in negotiation/debate to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> <li>a proposal (oral, written or visual) that suggests one personal action and one leadership role in relation to resource conservation and environmental citizenship.</li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Criteria: Proposal for Environmental Action, ENMPRO</i></p> <p><i>Standard</i>  <i>Complete each proposal to a standard of 1 on the rating scale</i></p>	<p>50</p>

**MODULE ENM1100: CONSERVATION CHALLENGE** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a personal contract expressing commitment to five or more lifestyle practices that foster responsible use of an energy or mineral resource.                     <p><i>Assessment Tools</i> A Primer on Environmental Citizenship, <i>Environment Canada</i> Sample Conservation Contract, ENM1100–4</p> <p><i>Standard</i> Complete all parts of the “Conservation Contract”</p> </li> <li>a letter written to a management official expressing support or concern regarding an energy or mineral development, and critique of the response received.                     <p><i>Assessment Tool</i> <i>Assessment Criteria: Letters of Support or Concern, ENMLET</i></p> <p><i>Standard</i> Complete the letter to a standard of 1 on the rating scale</p> </li> <li>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> </li> </ul>	<p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Environmental Impact</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>identify environmental factors related to the extraction, processing and use of an energy or mineral resource; e.g.:                     <ul style="list-style-type: none"> <li>land use practices</li> <li>soil, water and air quality</li> <li>wildlife habitat and natural areas</li> </ul> </li> <li>research and make predictions regarding environmental change at global levels caused by resource development</li> </ul>	<p>Discuss the impact of transportation corridors on rural and/or native villages, wildlife and other development projects.</p> <p>For example,</p> <ul style="list-style-type: none"> <li>deforestation</li> <li>acid deposition</li> <li>greenhouse effect.</li> </ul>

**MODULE ENM1100: CONSERVATION CHALLENGE** (continued)

Concept	Specific Learner Expectations	Notes
Environmental Impact (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• identify short- and long-term benefits and costs related to the extraction, processing and use of an energy or mineral resource</li> <li>• explain strategies that enable an energy or mineral industry to protect the environment; e.g.:               <ul style="list-style-type: none"> <li>– waste/emission control</li> <li>– soil, water and air quality sampling</li> <li>– wildlife/habitat protection</li> <li>– site reclamation</li> <li>– compliance with environmental policy</li> <li>– research and development.</li> </ul> </li> </ul>	<p>Research an environmental “success story” within an energy or mineral industry.</p>
A Conservation Strategy	<ul style="list-style-type: none"> <li>• identify demands placed on an energy or mineral resource in Canada and Alberta; e.g.:               <ul style="list-style-type: none"> <li>– residential</li> <li>– commercial</li> <li>– industrial</li> <li>– transportation</li> </ul> </li> <li>• explain patterns and trends in consumption and use of the resource</li> <li>• provide justification for conservation of the resource; e.g.:               <ul style="list-style-type: none"> <li>– declining reserves</li> <li>– environmental impact</li> </ul> </li> <li>• describe major aspects of conservation in relation to the resource; e.g.:               <ul style="list-style-type: none"> <li>– using less</li> <li>– relying more on alternatives or substitutes</li> </ul> </li> <li>• identify specific goals of departments and agencies involved in the conservation of the resource; e.g.:               <ul style="list-style-type: none"> <li>– local</li> <li>– national</li> <li>– international</li> </ul> </li> <li>• relate specific energy or mineral conservation practices to the resource saved and subsequent benefits to society.</li> </ul>	<p>Consider:</p> <ul style="list-style-type: none"> <li>• sustainable development</li> <li>• economic diversification/expansion</li> </ul> <p>Compare/contrast philosophies of conservation and preservation.</p> <p>Discuss the benefits of relying more on energy alternatives/material substitutes, and conserving nonrenewable resources for their ideal use and less damage to the environment.</p> <p>Identify and explain current legislation pertinent to the recycling industry.</p>

**MODULE ENM1100: CONSERVATION CHALLENGE (continued)**

Concept	Specific Learner Expectations	Notes
<p>Personal and Shared Actions</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• explain how personal attitudes, actions and lifestyles may affect an energy or mineral resource; e.g.:               <ul style="list-style-type: none"> <li>– conservation ethic</li> <li>– energy use practices</li> <li>– housing and transportation choices</li> </ul> </li> <li>• plan and conduct a school-wide campaign to increase awareness of economic, social and environmental perspectives regarding our use of energy</li> <li>• debate an issue regarding the impacts of lifestyle on an energy or mineral resource; e.g.:               <ul style="list-style-type: none"> <li>– conduct research</li> <li>– develop a position</li> <li>– participate in debate</li> </ul> </li> <li>• propose personal strategies for using an energy or mineral resource which foster the attainment of social, economic and environmental goals; e.g.:               <ul style="list-style-type: none"> <li>– personal actions</li> <li>– leadership roles</li> </ul> </li> <li>• establish consensus regarding a local issue involving the development and/or use of an energy or mineral resource; e.g.:               <ul style="list-style-type: none"> <li>– conduct research</li> <li>– generate alternatives</li> <li>– agree to a workable solution</li> </ul> </li> <li>• identify constructive ways in which individuals can influence public decisions that affect an energy or mineral resource; e.g.:               <ul style="list-style-type: none"> <li>– voting</li> <li>– lobbying</li> <li>– seeking office</li> <li>– supporting compatible interest groups.</li> </ul> </li> </ul>	<p>Compile a personal inventory of material possessions/daily practices that affect an energy or mineral resource.</p> <p>Distinguish between “needs” and “wants” as reflected through an inventory of consumption.</p> <p>Invite a community member to moderate the debate.</p> <p>Consider:</p> <ul style="list-style-type: none"> <li>• recycling and reusing</li> <li>• reducing</li> <li>• transportation alternatives.</li> </ul>