MODULE ENM2050: RENEWABLE ENERGY TECHNOLOGY

Level: Intermediate

Theme: Technology and Applications

Prerequisite: ENM1050 Renewable Resources

Module Description: Students define and explain the need for sustainable energy development, research one or more renewable energy technologies; e.g., hydro, wind, solar, tidal, biomass, geothermal, nuclear, hydrogen, ethanol, blended fuel, fuel cell, and construct a model of a renewable energy system.

Module Parameters: Access to a construction, fabrication, mechanics and/or science laboratory.

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
The student will: • explain the role of renewable energy sources in sustainable energy development	*Assessment of student achievement should be based on:* • a presentation or report on the role of alternative sources of energy in sustainable energy development. Report to provide: – a definition of sustainable energy development based on social, economic and environmental perspectives – a comparison of nonrenewable and renewable energy resources with respect to technological/ geological requirements, cost, environmental impact and sustainability – a survey of alternative sources of energy available in Alberta and Canada – forecasts regarding future energy supply and demand, and options for sustainability in the energy sector. *Assessment Tool* *Presentations/Reports: Intermediate Level, ENMPRE–2* *Standard* *Achieve a minimum rating of 2 on the rating scale for Presentations/Reports*	25

MODULE ENM2050: RENEWABLE ENERGY TECHNOLOGY (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
The student will:	*Assessment of student achievement should be based on:*	
• demonstrate applications of one or more renewable energy technologies	• given a specific energy need: – designing and constructing a model of an alternative energy system to meet that need. Design and model to address: • component parts and principles of operation • efficient use of resources • energy conversion and feedback systems • human and environmental safety – analyzing the energy system with respect to: • advantages/disadvantages and ability to meet identified needs • potential for current and future use in Alberta. *Assessment Tool* *Project Assessment: Technology Design, ENMTEC* *Assessment Criteria: Diagrams and Technical Drawings, ENMDRA* *Standard* *Complete the design <u>and</u> construct the model to a standard of 2 on the rating scale*	65
• describe career opportunities relevant to renewable energy development	• completing a research project on one or more career clusters in alternative energy development. *Assessment Tool* *Career Search: Intermediate Level, ENMCAR–2* *Standard* *Conduct research to a standard of 2 on the rating scale*	10
• demonstrate basic competencies.	• observations of individual effort and interpersonal interaction during the learning process. *Assessment Tool* *Basic Competencies Reference Guide and any assessment tools noted above*	Integrated throughout

Concept	Specific Learner Expectations	Notes
Sustainable Development	*The student should:* • compare and contrast nonrenewable and renewable sources of energy • identify environmental issues resulting from the use of nonrenewable energy • define and explain the need for sustainable energy development • research forecasts regarding future energy supply and demand, and options for ensuring a sustainable future • identify and describe renewable sources of energy supply; e.g.: – hydro production – wind and solar – biomass – geothermal – nuclear – hydrogen fuel • identify social, economic and environmental issues resulting from the use of renewable energy.	Research/debate the statement – "there is no such thing as renewable energy." For example: • greenhouse gases • acid deposition • resource depletion. Discuss the meaning of the phrase "soft energy path"; e.g.: • least-cost energy strategy • efficient energy use • sustainable energy path. Consider options such as: • using less • finding alternative sources. Which alternative energy sources have the greatest potential for use in Alberta? Why? Consider impacts of dam construction on: • agriculture • aesthetics • wildlife.
Renewable Energy Technology	• research the use of a renewable energy source in Canada and, if possible, use Alberta examples • construct diagrams and models of an energy system that involves use of a renewable energy source	Investigate and report on: • the technologies used • production methods • efficiency and power coefficient. Models/diagrams should clearly illustrate: • component parts • principles of operation • energy conversion • feedback systems.

Concept	Specific Learner Expectations	Notes
Renewable Energy Technology (continued)	*The student should:* • describe current and potential applications of renewable energy technology in Alberta and Canada	Research government policies supporting the development of renewable energy technology; e.g.: • Southwest Alberta Renewable Energy Initiative • Alberta Small Power Research and Development Program.
	• compare the renewable energy source/technology with conventional energy sources/technologies.	Consider advantages and disadvantages of the renewable energy technology, and its potential for use.
Career Opportunities	• research careers and the range of occupational opportunities that involve the development of renewable energy; e.g.: – engineering – technical and support services – environmental management	Plan for individual/group research and presentations that address: • job description • employment market • education/training • wage expectations. Contact the "Career Information Hotline" (Alberta Advanced Education and Career Development).
	• evaluate current employment opportunities based on employment statistics	See the National Occupational Profiles (NOC) in Section H: Linkages/Transitions.
	• research trends in renewable energy development, and future career opportunities.	Arrange/facilitate: • information interviews • work study/experience • job shadowing.