Curriculum for a Sustainable Future:

A proposal to increase environmental and energy literacy in Alberta students

2nd edition

October 2020

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Executive Summary

What should K - 12 students in Alberta learn about environment, climate, and energy? This document captures the community's best thinking when it comes to answering this question.

Now more than ever, Alberta's over 700,000 K-12 students need to be prepared for their future – a future in which they will face many challenges as they strive for reliable and affordable energy, a healthy and diverse environment, and economic prosperity. For decades Albertans have wrestled with this - witness the tension between the many commitments to reduce greenhouse gas emissions by governments and corporations and Alberta's current economic struggles. The complexity of dealing with the pressing need to reduce greenhouse gas emissions, to meet increasing energy demand, to be responsible stewards of nature and our environment, and to provide economic prosperity is something that Albertans continuously deal with. At the same time, federal and provincial governments are responding to the recommendations of the Truth and Reconciliation Commission, several of which emphasize the importance of land, water, and the environment in Indigenous cultures, and engage with historical and contemporary issues related to land and environmental rights and protection. **Alberta's students deserve to be prepared for dealing with all these complex and interconnected issues - and they want to engage as active citizens.**

In 2010, the Alberta Council for Environmental Education (ACEE) began this work by creating an Environmental Education Framework (with support from Alberta Education). Then in 2014, ACEE created a multi-stakeholder Education Task Force with representation from industry, non-governmental organizations, and the expert teaching community - including government observers from Alberta Education. They used the framework and interviews with 35 opinion leaders to develop the first version of the Curriculum for a Sustainable Development in November, 2014 that outlined what students need to learn to be environmentally and energy literate.

Since 2014, ACEE has continued to steward this all-important process, and has created over a dozen versions of this document, updating it as new information and new thinking helps inform best curriculum practice. **The energy and climate change landscape is changing quickly so in early 2020 we used workshops and on-line surveys to engage experts and stakeholders in the energy and education sector** to capture their best thinking, resulting in this 2nd edition.

The purpose of this document is to assist Alberta Education in Alberta's K-12 curriculum development. **Hundreds of passionate and well-informed professionals helped create this document; now is a critical time to ensure Alberta students benefit from a curriculum that prepares them for their future**. We believe that Alberta's students must develop new understandings of complex natural and energy systems and the interconnections between energy, environment, society and economy.

The government of Alberta has recognized this in policy: the 2020 Ministerial Order on Student Learning states, "Students will demonstrate an understanding of economic development and entrepreneurship, and will recognize the responsibility we share for environmental stewardship and sustainability."

Energy and environment topics are intertwined and **must** be taught in an integrated context across subjects and disciplines; teaching these topics in disciplinary 'silos' does not prepare students for dealing with the complexity and interconnections of energy, environment, society and economy.

What's Next

The 2nd edition will be delivered to Alberta Education to support its work on new curriculum; and we'll continue to share this information with education leaders and stakeholders to ensure that the content in this document is infused into new curriculum, along with the support needed for teachers to teach this content. We will also demonstrate the need for this education by sharing the evidence we've gathered through recent youth polling and focus groups. For more information or to learn more, please visit https://www.abcee.org/curriculum-development or contact Kathy Worobec - kathy@abcee.org

Section 1 - How the Curriculum for a Sustainable Future was Created

The Curriculum for a Sustainable Future was developed in 2014 by an Education Task Force. The Alberta Council for Environmental Education (ACEE) acted as the Secretariat for the Education Task Force. In 2015, ACEE presented the document to Alberta Education (Minister and the curriculum development team). People have been encouraged to continue to provide feedback and ACEE has updated the document from 2015 to 2020. Outlined below is an overview of the significant update and process used in 2020 to create the 2nd edition as well as the process used to create the first CSF in 2014 and subsequent updates.

1.1 The purpose and process for the 2nd edition

When the Curriculum for a Sustainable Future (CSF) was first created, there was not much information on energy literacy, and the energy landscape is quickly changing. In March 2020, ACEE held workshops with energy and education professionals to refine an Alberta Energy Literacy Definition and develop key ideas for 'what students need to learn about energy'. This work was needed to ensure the CSF includes the foundational pieces for energy literacy. It was also time to ensure the concepts of environmental literacy and sustainability were updated and demonstrate the interconnections between environmental, energy and climate literacy. The goal is to continue to ensure that new Alberta curriculum provides opportunities to ensure Alberta students are environmentally and energy literate. This document will be shared with Alberta Education (from the Minister to those working on curriculum development).

After the March workshops, ACEE created a summary 'what we heard' document and shared with participants. They were also invited to become a reviewer to assist with updating the CSF. The reviewers were asked to help create an Alberta Energy Literacy Definition and Key Concepts (Appendix A) that was then used to inform and update the information in this version of the CSF. The reviewers engaged in this process from May to September 2020. ACEE used a consensus model to ensure revisions accommodated reviewers feedback in a respectful and inclusive manner. ACEE was the final decision-maker (if consensus could not be reached) and final editor of the document.

Reviewers

- Alexandrea Vandal, BEd, University of Alberta
- Cleo Reece, Keepers of the Athabasca
- Diana Kurila, Teacher, Calgary Board of Education
- Emma Gammans, Natural Step/Energy Futures Lab
- Hanna Thai, Canadian Parks and Wilderness Society (CPAWS), Southern Alberta
- Jackie Seidel, Associate Professor, Werklund School of Education, University of Calgary
- James Van Leeuwen, Southwest Alberta Sustainability Community Initiative
- Jennifer D'Aoust, Energy Efficiency Alberta
- Jessica Bates, Teacher, Calgary Board of Education
- Jinny Toffelmire, City of Okotoks
- Margaret Matheson, Teacher, Calgary Board of Education
- Melanie Hoffman, King's University Centre for Visualization in Science

ACEE would like to thank the reviewers for their insights, input and support of this important work. It ensures the content represents a diverse set of views on these topics.

1.2 The Process from 2014 to 2020

In April 2014, ACEE convened a multi-stakeholder Education Task Force to help prepare Alberta students to create a sustainable future, providing information to Alberta Education to help inform their work on curriculum. The Education Task Force sought answers to the following questions:

1. What do Alberta students need to learn to create a sustainable future?
2. What should they learn if they are to become more energy literate and environmentally literate?

The Education Task Force was an independent and autonomous group of Albertans that sets its own goals, processes and findings. The Education Task Force represented the following sectors: K-12 educators (40%) environmental non-profit organizations (40%), industry (20%), and three government observers. ACEE supported the Education Task Force, acting as Secretariat; and Felicity Edwards of the CSE group facilitated the Education Task Force, designing the process and facilitating meetings.

The Education Task Force used the following process to create subject specific learning outcomes:

- Completed a desktop study and 40 Opinion Leader Interviews
- Analyzed data to create key themes from the interviews
- Used the desktop study and key themes to identify essential or critical elements that students need to learn
- Identified the best subject fit for these elements
- Developed key concepts for the essential elements
- Organized the key concepts by subject (science, social studies and wellness)
- Created learning outcomes for each key concept, organized by subject and grade levels

In November 2014, ACEE submitted the Curriculum for a Sustainable Future to the Minister of Education. A meeting with Alberta Education's curriculum developers was held in January 2015 and

ACEE presented a summary of the work of the Education Task Force and the document to over 25 curriculum developers.

From January 2015 to January 2020, additional updates were made to the document as people were encouraged to review the document and provide feedback, most of these were minor revisions. In 2017, Doctor Gregory Lowan-Trudeau, professor in the Werklund School of Education at the University of Calgary, reviewed the document to incorporate connections and content for Indigenous perspectives.

Section 2 - Key Concepts and Outcomes to Prepare Students for a Sustainable Future

This section outlines what it means to be environmentally and energy literate and identifies the key concepts and outcomes that students need to learn to create a sustainable future. Having an energy and environmentally literate citizenry allows for the dialogue, decisions and choices needed to achieve a sustainable future. Energy and environmental literacy are an outcome of energy and environmental education.

2.1 Creating a sustainable future: environmental and energy literacy

In the original Curriculum for a Sustainable Future, the Education Task Force created the definition of environmental and energy literacy. The 2020 reviewers used the Alberta Energy Literacy definition to revise and update the definition of an environmentally and energy literate person.

An environmentally and energy literate person will:

- Know and understand
    - we are part of our environment
    - natural systems and processes
    - how energy and matter flows and changes, and the relevance of energy conservation and efficiency to energy systems and processes
    - how energy systems have and are evolving and why
    - why we need energy, how we produce energy, and the benefits and costs to ourselves, our communities and the environment
    - different energy forms, how each is used locally and globally, the lifecycle of each energy form, and how we measure energy
    - interconnections of natural systems
    - interconnections and impacts of environment, society and economy

- Utilize a variety of skills
    - systems thinking
    - critical thinking
    - problem solving
    - creativity
    - analysis
    - communication
    - dialogue to find commonality among different perspectives including Indigenous perspectives
    - collaboration
    - facilitation
    - cooperation
- Take personal and collective action
    - continually evaluate their own attitudes regarding the environment and energy
    - make choices shaping their own life regarding their energy use and environmental impacts
    - work collectively to shape decisions regarding energy, environment, society and economy

2.2 What is a Key Concept, Learning Outcome and Skills?

The **key concepts** outline what students, by the end of grade 12, should know and be able to do. Key concepts represent the 'big ideas' that give meaning and importance to information/knowledge and make sense of our interconnected world and life beyond the classroom. It helps to develop understanding by offering opportunities to link, review and use their knowledge in broad contexts. In this way, awareness of key concepts can help deepen learners' knowledge and understanding.

A **learning outcome** outlines the knowledge and abilities that students need to acquire.

Skills encompass the knowledge, competencies and abilities to perform specific tasks. Skills are developed through experience as well as study. Skills cover a wide range from life skills to job skills. Skills development should be incorporated across all grades and subjects in an age-appropriate manner.

Teachers need to choose pedagogical approaches that build skills as well as achieve the learning outcomes for students to have a full grasp of the key concepts.

2.3 Proposed Key Concepts and Student Learning Outcomes

To promote the interdisciplinary connections, the reviewers agreed that the key concepts should be organized by theme instead of subjects (how they were organized in the first version of the CSF).

There are four themes with key concepts identified for each theme:

1. We Depend on Our Environment
2. Energy in Our Lives
3. Our Energy, Environment and Climate Evolution
4. Our Sustainable Future

For each key concept, learning outcomes have been developed to show a progression from K-12. For each learning outcome, the subject(s) that it best aligns with has been identified - science (Sc), social studies (Soc St) or wellness (W). The key concepts and learning outcomes can also be used in other subjects such as language arts, math, and arts. Career & Technology Foundations (grades 5 to 9) and Career & Technology Studies (grades 10 to 12) also provide many opportunities through the Natural Resources pathway.

The progression from K-12 has been identified by division levels - Div - I (grades K to 3), II (grades 4 to 6), III (grades 7 to 9), IV (grades 10 to 12).

Skills required to be environmentally and energy literacy have also been identified after the four themes. These should be incorporated across all grades and subjects in an age-appropriate manner.

Theme 1 We Depend on Our Environment			
Key Concept	Learning Outcome	Subject	Div.
Humans are part of nature: we depend on ecosystems and on the network of interactions among organisms and within and among ecosystems.	I demonstrate respect towards all living things.	Sc	I
	I experience the components of local habitats that provide essential elements for all life including my daily living.	Sc	I
	I understand my role as an integral part of an ecosystem and the interconnections between humans and the natural environment in which we live.	Sc	II
	I describe how the choices I make impact the environment (air, land and water) and I make choices that have a positive environmental impact, locally and globally.	Sc	II
	I understand that healthy ecosystems provide the requirements that are essential to all life, such as fresh air, clean water, and fertile land.	Sc	III
		Sc	III

	I can identify, through various ways of knowing, the living and non-living components of my local ecosystem, and give examples of the way in which they are connected locally and globally.		
	I understand that there are various ways of viewing ecosystems – humans as part of ecosystems, we rely on ecosystems for our survival, Indigenous perspectives as sacred and life-giving.	Sc	IV
	I recognize the limits to the life-sustaining resources Earth can provide to support human life.	Sc/Soc St	IV
Earth's natural systems are constantly changing from both natural and human causes.	I experience and give examples of ways in which natural and human events have changed the land where I live (e.g. draining or restoration of a wetland, a beaver dam, forest harvest or tree planting).	Sc	II
	I describe the ways in which human activities (recreational, industrial, etc.) impact the environment – positively or negatively, and describe how these effects can be cumulative.	Sc	III
	I understand that ecosystems have a finite capacity to absorb human impacts before they change.	Sc	III
	I identify inputs, outputs, and positive and negative feedback loops within human and natural systems in my daily life, and demonstrate how changes to part of the system can affect the entire system.	Sc	IV
	I investigate how complex natural systems can change, and explore the causes of such changes.	Sc	IV
	I compare the rate of change of natural systems over time (e.g. millennia).	Sc	IV
Exploration, discovery and knowledge of the natural and built environment where we live develops a sense of place and supports locally-based stewardship and citizenship.	I discover and document the features of my local natural and built environment that make it special to me.	Soc St	I
	I explore and assess how the local environment to which I belong is essential to my life – land for food, resources for energy, clean air and water.	Sc	I
	I demonstrate citizenship and stewardship by developing ideas on how I can make positive environmental impacts in my community.	Soc St	II
	I design, plan, implement and assess a strategy to improve the health of my local environment – land, air or water.	Sc	III
	I explore and understand the longstanding presence and environmental understanding and practices of Indigenous peoples in my region.	Soc St	III
	I critically evaluate and compare the management and use of land and water in nearby places and in places such as provincial or national parks.	Soc St	IV

	I predict changes that will occur in my local environment and defend an argument for or against these changes.	Sc	IV
Direct experiences with nature develops emotional, mental, psychological, behavioural and physical well-being, a sense of wonder, and appreciation for natural beauty.	I explore a natural environment using my senses.	W	I
	I describe what I notice and feel when I am in nature.	W	I
	I express my view on the beauty and importance of nature.	W	II
	I demonstrate the skills necessary to enjoy nature safely in various kinds of weather conditions.	W	II
	I reflect upon the importance of the natural environment and outdoor living to my personal wellbeing and a healthy lifestyle.	W	III
	I develop interpersonal skills by practicing leadership in an outdoor environment.	W	III
	I create and implement a plan to spend time in nature for my personal well-being.	W	IV
Biological diversity varies according to geography and is essential for healthy ecosystems.	I see, touch and identify diversity in my own schoolyard/community and describe the value it provides for my community.	Sc	I
	I recognize that both cultural and biological diversity creates resilient and adaptable natural, social and economic systems.	Sc/Soc St	II
	I describe patterns of diversity over space and time.	Sc	III
	I understand that biological diversity includes species, genetics and habitat and that all three improve our quality of life and standard of living.	Sc	IV
	I demonstrate ways of preserving biological diversity locally and globally.	Sc	III-IV
Human life is reliant upon the health of our natural environment and this requires an ethic of respect, kinship and stewardship for the natural environment.	I demonstrate actions that reflect compassion, respect, kinship and stewardship for the environment and others (e.g. planting a pollinator garden, reducing and cleaning up litter).	W	I
	I understand that human health is reliant upon the health of the environment.	W	II
	I identify how the personal choices I make impact the environment, my health and that of others.	W	II/III
	I improve my personal health by spending time in nature.	W	I/II
	I predict the outcomes of increased environmental degradation on my personal health (e.g. water and air quality).	W	III
	I demonstrate actions that will improve the environment and my personal health.	W	III

	I work collaboratively to create and implement a plan to show respect, kinship and stewardship for the environment.	Sc/Soc St	IV
	I reflect on the relationship between empowerment, locus of control, and environmental citizenship.	Soc St	IV

Theme 2 Energy in Our Lives			
Key Concept	**Learning Outcome**	**Subject**	**Div.**
Energy sources and processes used to transform energy sources into usable energy in our daily lives; and how we consume and measure energy.	I understand energy is necessary to sustain life and is used to meet our needs and desires.	Sc	I
	I identify what produces, transports and stores energy in my home or community.	Sc	I/II
	I describe a variety of technologies that are used to create usable energy.	Sc	II
	I identify primary (sources) and secondary energy (electricity, heat, plastics, transportation fuel) used to meet our needs and desires.	Sc	II
	I understand the fundamentals of energy (forms, sources, properties, laws, processes, transformations).	Sc	III/ IV
	I calculate the measurement of energy consumption in different units (natural gas - gigajoules, electricity - kilowatt-hours, transportation fuels - litres/kilometre, food - kilocalorie).	Sc	III/ IV
	I estimate energy consumption over different time periods (daily, monthly, annually).	Sc	III/ IV
	I explore the principles of energy efficiency and conservation to reduce energy use and associated costs, and to calculate cost/benefit analysis.	Sc	III/ IV
	I identify the attributes of our energy systems that are important in meeting our energy demand.	Sc	IV
	I understand local and global energy sources and the regional differences in natural resources and energy use.	Soc St	III/ IV
	I develop an understanding of per capita energy use from local to global.	Soc St	III/ IV
	I analyze and compare energy sources based on a variety of factors such as efficiency, cost, impacts and amount of energy stored per unit volume or mass and strategize an energy future that considers economic, social and environmental impacts.	Sc	IV

Flows of energy and matter in systems.	I demonstrate flows of energy and matter in Earth's ecosystems including its water, carbon, nitrogen and sulphur cycles.	Sc	III/ IV
	I understand human energy systems - their purpose, reliability, resilience and interactions with other natural systems.	Sc	III/ IV
	I describe how energy systems are impacted by natural processes and human-made processes.	Sc	III/ IV
	I recognize the complexity of energy systems required to meet our energy demands.	Soc St	III/ IV
	I identify our role in energy systems - producer, consumer, citizen, change agent.	Soc St	III/ IV
Human energy systems have changed over time and will continue to change.	I identify how energy sources have changed over time and are often driven by societal need, invention, innovation and other factors (economics, accessibility, environment).	Sc/Soc St	II/III
	I explore the interconnections between energy use and environment, society and economy both historically and into the future.	Soc St	III/ IV
	I describe the drivers of global energy consumption.	Soc St	IV
	I consider the connections between energy demand and the impacts on Indigenous peoples including resource extraction, colonial expansion, land rights and treaties.	Soc St	II
	I describe some of the drivers of Alberta's energy resource development (e.g. ingenuity, economy, and resource accessibility).	Soc St	II
Our food energy choices and systems have implications for our health and the health of others; and economic, social and environmental impacts.	I identify the places my food comes from.	Soc St	I
	I explore different ways of analyzing the food choices I make – nutritional, health, cost, environment, economic.	Soc St/W	II
	I compare the economic, social/health and environmental impacts of a variety of food choices and production methods (e.g. local, importing, organic, biotechnology, natural, processed).	Soc St	III
	I articulate the ways that we can meet our food needs for a growing human population in more sustainable ways (e.g. innovations and lifestyle changes).	Sc	III
	I explore food systems in the context of population growth, urbanization, and globalization to achieve poverty reduction, food security and nutrition.	W/Soc St	IV

Theme 3 Our Energy, Environment and Climate Evolution			
Key Concept	**Learning Outcome**	**Subject**	**Div.**
Impacts of our energy choices on the environment, society and quality of life (health, knowledge and standard of living) at both the local and global level.	I recognize that energy choices have immediate and long-term consequences both locally and globally.	Soc St	II
	I recognize that our energy choices need to consider the environmental (land, air, water, climate, biodiversity), social (equity) and quality of life (long and healthy lives, knowledge, and standard of living) impacts equally.	Soc St	III
	I consider the implications for my standard of living and personal lifestyle choices in a world in which the quality, quantity and cost of energy will vary.	Soc St	IV
	I consider my personal energy use decisions in relation to the impacts on our environment, society and quality of life and estimate my carbon footprint.	Sc/Soc St	II/III
	I understand life cycles and cost/benefit analysis of products and processes to make choices about energy sources, energy consumption and our energy future.	Sc	IV
	I understand the tensions between environmental, societal and economic impacts and the processes used in making decisions regarding natural resource extraction, production, distribution and consumption.	Soc St	IV
Economic prosperity from energy resource development will change over time and can have positive and negative social and environmental impacts.	I compare Alberta's energy resource use over time with its economic prosperity, societal/cultural impacts and environmental impacts.	Soc St	II
	I identify Alberta's opportunities and responsibilities in meeting Alberta's energy demand and providing energy to the world.	Soc St	III
	I explore economic models and how they have changed over time.	W/Soc St	III
	I identify various economic models from linear to circular economic models.	W/Soc St	IV
	I explore the various provincial and federal regulations that govern the development and production of energy resources and evaluate the need for both provincial and national energy strategies.	Soc St	IV
	I describe how we meet our energy requirements by developing strategies around energy security, supply and demand, technical efficiency, energy conservation and other innovations.	Soc St	IV
	I give examples of how commodity prices can create 'boom and bust' cycles and can contribute to global fiscal inequality.	Soc St	IV

Our production and consumption of carbon-rich fossil fuels along with other industrial and agricultural activities create a variety of greenhouse gases, which are changing the Earth's atmosphere.	I differentiate between weather and climate and the role each plays in my daily life.	Sc	II
	I understand the role climate plays in healthy ecosystems both locally and globally.	Sc	II
	I describe the greenhouse effect and understand the contribution of various gases to our atmospheric conditions.	Sc	II/III
	I describe how addition of greenhouse gases to our Earth system leads to climate change that affects human and natural communities around the world.	Sc	II/III
	I understand that science is a process that continues to evolve and that Indigenous ways of knowing and continued research lead to greater understanding of environmental issues.	Sc/Soc St	III
	I understand the relative greenhouse gas emissions contributed by different sources, uses, and jurisdictions.	Sc/Soc St	IV
	I describe the factors that create my local climate, how climate change might affect it, and how global climate change is already affecting and will continue to affect my life and the life of others (e.g. by comparing current temperature, precipitation or seasonal phenomena with historical data).	Sc/Soc St	IV
	I understand how climate change is influencing human endeavours such as international development and conservation.	Sc/Soc St	IV
	I understand climate adaptation and mitigation and engage in actions that help my school and community be more climate resilient.	Sc/Soc St	IV
	I articulate and show evidence for my understanding of climate change, and create a personal code of practice that is consistent with this position.	Sc/Soc St	IV

Theme 4 Our Sustainable Future			
Key Concept	**Learning Outcome**		**Div.**
Imagining and creating a sustainable future requires an understanding of the evolution (over time) of economic, societal and environmental impacts and the role of decision-making and action at the personal, local, national and global level.	I compare the different roles people play in my community and the interconnections between the roles.	Soc St	I
	I plan and implement a project that helps my community.	Soc St	I
	I articulate some of the ways in which my personal lifestyle and consumer choices impact the environment.	Sc/Soc St	II
	I create and implement a personal action plan to reduce my environmental footprint for long-term benefits.	Sc/Soc St	II
	I collaborate with others in my school or community to implement an action plan to create a positive impact on the environment.	Sc/Soc St	II
	I understand that the Earth's resources and natural environment provide for all our economic and societal needs and are finite..	Soc St	III
	I compare and evaluate different culturally, philosophically and politically-driven development paradigms and perspectives, such as economy versus environment; limits to growth; and sustainable development.	Soc St	IV
	I understand and give examples of how the environment, society, and economy are interrelated and interdependent.	Soc St	III/ IV
	I use innovation and ingenuity to outline a preferred sustainable future and identify the technology and policy innovations required to achieve this future.	Soc St	IV
Energy and climate change policies need to consider the impacts on the environment, society and the economy.	I understand the services governments provide and that voting can be used to make decisions.	Soc St	I
	I describe how policies affect the health of ecosystems and communities.	Soc St	II
	I understand the various levels of government and the role each plays in developing policy related to energy and climate change.	Soc St	III
	I articulate political processes affecting energy and climate change decisions.	Soc St	IV
	I understand the role and the potential of policy to influence energy choices and to reduce greenhouse gas emissions.	Soc St	IV
	I understand the social, economic, political, and environmental dimensions related to climate change.	Soc St	IV

	I explore and articulate various stakeholder perspectives including Ingenous perspectives in relation to climate change.	Soc St	IV
	I create an innovative energy policy idea that will create just and equitable energy, reduce environmental impacts and contribute to our quality of life.	Soc St	IV
	I assess different energy policies for their effectiveness in creating just and equitable energy, their environmental impacts and economic impacts.	Soc St	IV
	I create and defend an energy or climate change policy for my region that meets the needs of various interests and positions of different stakeholders and understand the global connections of the policy.	Soc St	IV
	I determine, recommend, and propose strategies that address climate change (adaptation and mitigation) in my community, province, country, or internationally.	Soc St	IV
Cultural, biological, social, and economic diversity creates resilience and must be respected and valued.	I understand that Indigenous peoples have developed and maintained a unique relationship with the land and bring different ways of knowing that contribute to our natural and cultural heritage.	Soc St	II
	I examine and describe how Indigenous peoples are connected to the land.	Soc St	I/II
	I understand that diversity in all its forms should be valued and respected.	W/Soc St	I/II
	I describe examples of how diverse values and perspectives create differing viewpoints that can create tension, and create innovative and robust solutions.	Soc St	IV
	I understand how Treaties and land use negotiations with Indigenous peoples influence energy and environmental policy, and how working collaboratively to honour all perspectives is beneficial to creating a sustainable future.	Soc St	IV
Quality of life is a subjective term that is influenced by many factors including: democratic rights, health, education, environment, social conditions and programs, community, personal well-being, economy and employment.	I recognize how my needs and rights are intertwined with the needs and rights of other living things.	W	I
	I distinguish between my needs and my wants and identify factors that influence my needs, wants and rights.	W	II
	I compare and identify the various factors that influence my quality of life.	W	II/III
	I analyze and compare the different tools used for measuring quality of life.	W	IV
	I demonstrate the value of the many factors that influence quality of life and the interconnections between the different factors.	W	IV

Skills/Competencies to be Developed Across all Themes and all Subjects	
Key Concept	**Learning Outcome**
Collaborative and facilitation skills are essential to resolve conflicts, solve complex problems, and create good solutions and decisions.	I contribute to a group or community project.
	I contribute to a group or community project that requires research and agreement on an action.
	I explore and apply various interpersonal and group processes to accomplish decision-making in group projects.
	I develop and practice the skills of empathy, kindness, active listening, cooperation, facilitation, and collaboration to accomplish group decision-making and group projects.
	I use a risk management strategy to identify solutions to complex problems that may be ambiguous and surrounded by uncertainty.
	I understand that everyone learns and communicates in different ways and that these need to be considered and valued in group processes.
Systems thinking to describe and understand the forces and interrelationships that shape the behaviour of systems.	I observe how elements within systems change over time, generating patterns and trends.
	I understand the role of feedback loops in systems and the causality of actions on a whole system (not just the parts).
	I can articulate the interdependence between components of dynamic systems (e.g. our industrial energy system), and how they interact (both positively and negatively) with other systems, such as societal and environmental systems.
	I can describe the different scales of systems (e.g., molecular process vs. global atmospheric consequences; local actions and their global impacts).
Critical thinking and problem-solving to determine credibility of information, analysis of information, identification of bias, navigation of ambiguity and identifying trends.	I identify problems and identify solutions that address the environment, society and economy for current and future generations.
	I explore creating solutions that are 'win/win' or 'yes/and' instead of 'either/or' or 'win/lose'.
	I assess credibility and bias of information and understand my own own biases.
	I analyze information to gather additional knowledge, to identify trends, to develop new ideas or solutions, and to identify cause and effect relationships.
	I am aware of future career opportunities and can make a plan to pursue my career interests.

Communication skills that respect different perspectives including Indigenous and local knowledge that help build commonality.	I understand different perspectives and embrace a variety of values regarding energy use and energy sources to bridge the gap in the energy conversation.	
	I develop two-eyed seeing for finding commonality between Indigenous perspectives (specifically local perspectives) and non-Indigenous perspectives (multi-culture).	
	I foster an attitude of connectedness, inclusion, problem-solving, hopefulness, agency vs complacency.	
Stewardship, kinship and citizenship action skills.	I assess lifestyle choices and utilize technological advancements in daily life to reduce my environmental impact.	
	I contribute to the protection, conservation and remediation of our environment.	
	I develop kinship with our environment that demonstrates reciprocity (mutual benefit).	
	I understand our relationship with energy systems.	
	I explore methods for motivating individual action and options for collective action.	
	I feel confident to take action to support my vision of a sustainable future.	

Section 3 - Teaching and Learning Resources

There are many resources available to Alberta teachers to support these key concepts. The Alberta Council for Environmental Education has a Resource Hub identifying the many resources. Teachers can search by grade, subject, topic and resource type.

https://www.abcee.org/hub

There are over 125 organizations that provide resources for teachers and we've provided a list of these organizations with a link to their Resource Hub profile to easily see the programs they offer.

https://www.abcee.org/environmental-education-providers

One of the tenets of excellent teaching in the classroom is to encourage students to engage in critical thinking. **We invite teachers to apply these same critical thinking skills when using resources found on the Hub or elsewhere by asking questions such as the following:**

1. Is this resource based on a credible source of information?
2. Who authored the work? Why?
3. Who funded the work?
4. What biases might be present? Are there any hidden agendas or interests?
5. What are the underlying assumptions or narratives? What are these based on?
6. Are the right questions being asked?
7. Are multiple perspectives presented, and are these perspectives honest and explicit?

The North American Association for Environmental Education (NAAEE) **describes six guidelines for excellent environmental education (EE) materials:**

- Fairness and accuracy - EE materials should be fair and accurate in describing environmental problems, issues, and conditions, and in reflecting the diversity of perspectives on them.
- Depth - EE materials should foster awareness of the natural and built environment, an understanding of environmental concepts, conditions, and issues, an awareness of the feelings, values, attitudes and perceptions at the heart of environmental issues, as appropriate for different developmental levels.
- Emphasis on skills building - EE materials should build lifelong skills that enable learners to address environmental issues.
- Action orientation - EE materials should promote civic responsibility, encouraging learns to use their knowledge, personal skills, and assessments of environmental problems and issues as a basis for environmental problem solving and action.
- Instructional soundness - EE materials should rely on instructional techniques that create an effective learning environment.
- Usability - EE materials should be well designed and easy to use.

Section 4 - Classroom Field Testing

In October 2014 , we worked with teachers, schools, and school divisions and parents to test the efficacy of the learning outcomes, document their use of relevant teaching and learning resources, outline the teaching strategies they used, identify authentic assessment approaches (see Section 5), capture student learning through digital storytelling, and create exemplars of what this looks like in classrooms. We worked with 13 classroom teachers, who assured us that this document's content is 'classroom-ready' and adds value to teaching and learning. Their lesson plans, assessment, and videos as well as other learning stories are captured at:
https://www.abcee.org/inspiring_stories

We are indebted to former school principal and consultant Deb Rougeau-Bell for her work in capturing these 13 classroom stories..

Section 5 - Assessment

Effective teaching practices use assessment to improve learning and to guide teaching. The Canadian Education Association in its 'What did you do in school today?' First National Report in 2009 listed "using assessment to improve learning and to guide teaching" as one of the five effective teaching practices.

"Research in the field of assessment for learning clearly indicates that effective teachers intentionally design assessments into their practice that enable students to think deeply about their own learning….Moreover, effective teachers provide students with opportunities not only to learn but also to articulate questions such as these:

- How are you going to show or demonstrate what you have learned?
- What shape can your demonstrations take that would enable other students and the teacher to describe what you have found?"

Assessment "for, as and of learning" takes many different forms. These use both summative and formative assessments and focus more on authentic assessments.

5.1 Authentic Assessment

A variety of assessment tools are used for authentic assessment. We describe below various authentic assessment tools, and some examples of each tool.

Rubrics – a rubric is often used to evaluate a student's performance on a task. It identifies the expectations for the task and describes levels of student progress. A variety of descriptions can be used to demonstrate student progress from "not yet apparent" to "well developed," or ""emergent" to "proficient," or "beginning" to "accomplished". Examples:

- "Education and the Environment", Gerald A. Lieberman – pg. 204 – Seven Generations Charter School Critical-Thinking and Problem-Solving Rubric
- "The Guide to Education for Sustainability" Shelburne Farms' Sustainable School Project – pg. 41 – K-4 Education for Sustainability Rubric – progression from member, participant, citizen, leader

Journals – written or digital journals can be used to capture experiences and reflections, allowing students to freely express their thoughts and responses. Having students review their journals to examine their own thinking, interactions, exercises and writing can be used for both self-assessment and classroom assessment. They can be an important source of information to assess student learning. Examples:

- Nature Journals – Antonella Bell, Devonian Gardens
- Journal Coding assignment – EduTopia - http://www.edutopia.org/blog/student-journals-efficient-teacher-responses

Multi-media explanations – students create multi-media explanations to demonstrate their understanding

Self-assessment – students evaluate their own work according to criteria such as a rubric or focusing question. Students reflect on the quality of their work, judge the degree to which it reflects explicitly stated goals or criteria, and revise accordingly. Examples:

- Two stars and a wish – students identify two things they really liked about their work and one thing they would like to improve
- Thumbs Up or Thumbs Down – students use a thumbs up "I've got it", thumb and finger to create a circle "I'm Okay" to thumbs down "I'm stuck"
- 3, 2, 1 – students identify 3 things they've learned, 2 questions they still have, and 1 insight they've had

Solution reviews – students show work in progress to their peers, teachers and other community members

Performance tasks or assessment – students demonstrate knowledge, skills and strategies by creating a response or a product (e.g. community action project, conducting research and writing a report, developing a character analysis, debating a character's motives, creating a mobile of important information learned, dramatizing a favorite story). They allow for the observation of skills during performance and assess proficiency in carrying out steps in developing a product.

Appendices

Appendix A - Energy Literacy Definition and Key Concepts

In March 2020, the Alberta Council for Environmental Education (ACEE) held workshops with energy and education professionals to seek ideas on refining an Alberta Energy Literacy Definition and to develop key ideas for 'what students need to learn about energy'. That work was compiled into a 'what we heard' document and used to create this draft of the Alberta Energy Definition as well as Key Concepts for what students need to learn about energy.

From May to August of 2020, ACEE worked with 12 reviewers to further refine this definition and the key concepts. This information was used to update the key concepts and student learning outcomes in the Curriculum for a Sustainable Future.

Background: This definition originated from the Environmental Protection Agency's Energy Literacy Framework.

Link to the Environmental Protection Agency's Energy Literacy Framework (2017) - (https://www.energy.gov/eere/education/energy-literacy-essential-principles-energy-education

Another reference - US Global Change Research Program - Climate Literacy Framework (2009) - https://downloads.globalchange.gov/Literacy/climate_literacy_highres_english.pdf

Definition:

Energy literacy is understanding the forms, properties, role and impacts of energy in our lives and in the world with the ability to think critically, creatively and constructively relating to real-world human energy systems.

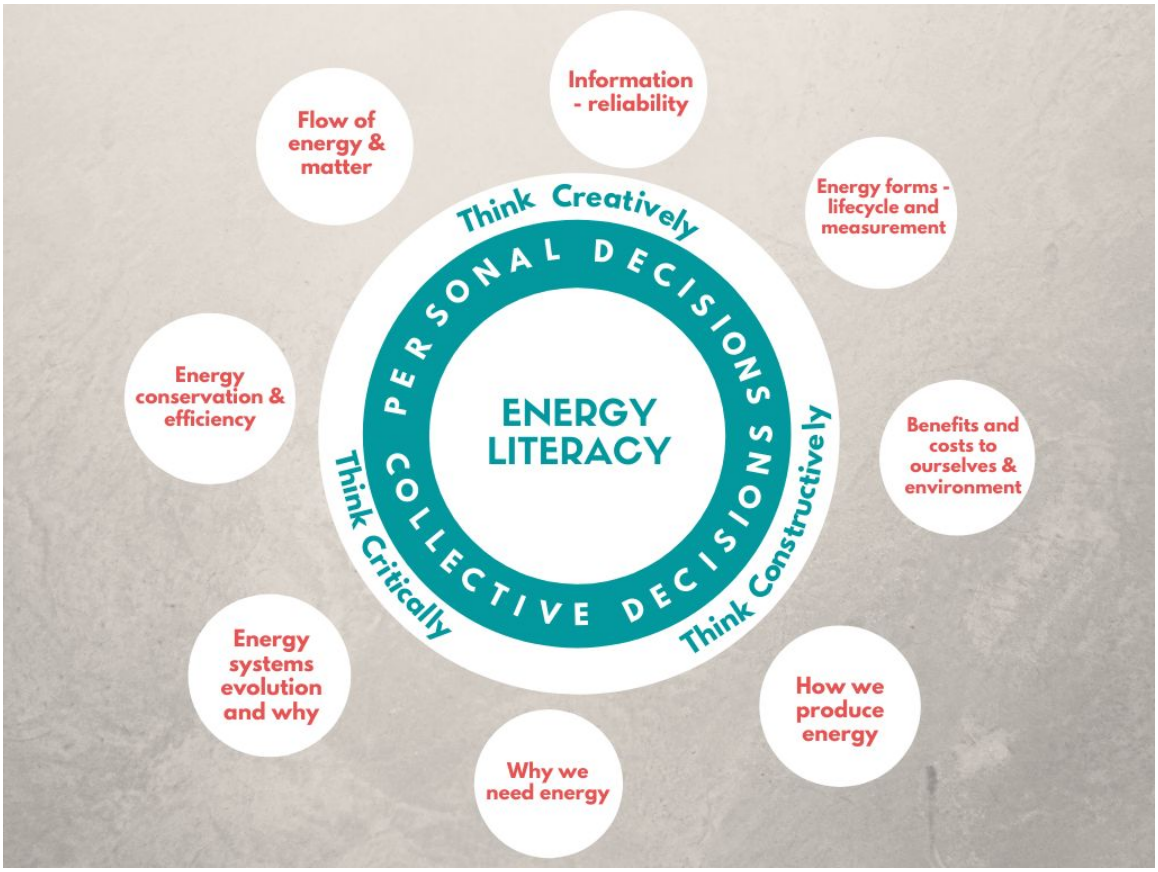
An energy-literate person can think critically, creatively and constructively about:

- How energy flows and changes, and the relevance of energy conservation and efficiency to energy systems and processes.
- How energy systems have and are evolving and why.
- How we produce energy and why we need energy; and the benefits and costs to ourselves, our communities and our environment.
- Different energy forms, how each is used locally and globally, the lifecycle of each energy form, and how we measure energy.
- Information pertaining to energy and energy systems, and the reliability of information sources.

In order to:

- Make personal energy use decisions based on an understanding of impacts and consequences on our economy, society and environment.

- Create collective decisions regarding our energy choices and use of energy that are beneficial for the economy, society and the environment.



Energy Key Concepts

The Energy Key Concepts outlines what students need to learn to be energy literate. The key concepts outline what students, by the end of grade 12, should know and be able to do. Key concepts represent the 'big ideas' that give meaning and importance to information/knowledge and transfer to other topics, fields and life beyond the classroom. It helps to develop understanding by offering opportunities to link, review and put knowledge into context. In this way, awareness of key concepts can help deepen learners' knowledge and understanding. The details under each key concept will help outline student learning outcomes (the specifics about what students need to know and be able to do).

Theme 1 - Energy in our Lives

1. Energy sources, processes used to transform energy sources into usable energy in our daily lives and how we consume and measure energy.
    a. Energy is necessary to sustain life and is used to meet our needs and desires.

b. Primary uses of energy (heat, transportation, electricity, food) and secondary uses (plastics, chemicals, manufacturing, lifecycle) to meet our needs and desires.
c. Fundamentals of energy (forms, sources, properties, laws, processes, transformations).
d. Measurement of energy in different units (natural gas - gigajoules, electricity - kWh, transportation fuels - litres/kilometre).
e. Estimate energy consumption and carbon footprint in their own daily lives.
f. Principles of energy efficiency and conservation, how energy efficiency can reduce energy use and associated costs, and how to calculate costs/benefits analysis.
g. Local and global energy sources - regional differences in natural resources and energy use (per capita understanding).
h. Limits to the life-sustaining resources Earth can provide to support human life.

2. Flows of energy and matter in systems.
    a. Flow of energy and matter in Earth's ecosystems such as its water, carbon, nitrogen and sulphur cycles.
    b. Human energy systems - their purpose, reliability, resilience and interactions with other natural systems.
    c. Systems are impacted by natural processes and human-made processes.
    d. Complexity of energy systems - require a variety of energy sources to meet our needs
    e. Our role in energy systems - consumer, citizen, change agent

Theme 2 - Energy and Ingenuity or Our Energy Evolution

3. Human energy systems have changed over time and will continue to change.
    a. Energy sources have changed over time and are often driven by societal need, invention, innovation and other factors (economic, accessibility, environmental).
    b. Interconnections between energy use and environment, society and economy both historically and into the future.
    c. The driver's of global energy consumption.
    d. Energy's relation to economy, politics, and society.
    e. Energy and colonization - resource extraction, colonial expansion, land rights and treaties.
    f. Ingenuity, economics and resource accessibility has been a driver of Alberta's energy resource development.

4. Impacts of our energy choices on the environment, society and quality of life (economy and health) at both the local and global level.
    a. Energy choices have consequences - environmental (land, air, water, climate, biodiversity), social (equity), and quality of life (long and healthy lives, knowledge and standard of living).
    b. Energy choices need to consider all of the above impacts equally and also consider impacts for future generations both locally and globally.
    c. Personal energy use decisions have impacts on the environment, society and quality of life.

d. Understand life cycles of products and processes to make choices about energy sources and energy consumption.

Theme 3 - Our Energy Future

5. Assessing the diverse types of energy policies that are available to governments, their impacts and how they influence energy choices.
    a. Political processes affecting energy decisions.
    b. Role of regulation for energy industry and consumers.
    c. Role of axes or levies in influencing or driving energy choices.
6. Relationship between energy and equity - just and equitable energy transitions require diverse and accessible solutions developed by communities locally and globally.
7. Imagining the different energy futures based on their understanding of evolution of energy systems over time.
    a. Conducting life cycle and costs/benefits analysis of different energy futures.
    b. Understanding the attributes of energy systems that are important to meet our energy needs.
    c. The role of innovation and ingenuity to imagine and create our energy future.

Skills and Competencies Development

8. Critical thinking and problem solving to determine credibility of information, analysis of information, identification of bias, navigation of ambiguity, and identifying trends that assist with energy transitions.
    a. Ability to identify problems and identify solutions that address environment, society and economy for current and future generations.
    b. Assess credibility and bias of information and understand our own biases
    c. Analyzing information
    d. Identifying and assessing trends and their role in times of transition
    e. Career opportunities

9. Communication skills that respect different perspectives including Indigenous and local knowledge that help build commonality.
    a. Understand different perspectives and embrace a variety of values regarding energy use and energy sources to bridge the gap in the energy conversation.
    b. Attitude of connectedness, inclusion, problem solving, hopefulness, agency vs. complacency
    c. Working collaboratively with others to make decisions
    d. Our relationship with the energy system

10. Skills to take action
    a. Assess lifestyle choices and utilize technological advancements in daily life.
    b. Critically assess the purpose of energy uses in daily life and assess alternative options
    c. Understanding our relationship with energy systems.
    d. Methods for motivating individual action and options for collective action.
    e. Habits of mind/soft skills - instilling a sense of confidence in students relating to the future of energy

Appendix B - Energy and Education Professionals March 2020 Workshops - Organizations that participated

Alberta Council of Disability Services	Friends of Fish Creek
Alberta Innovates	FortisAlberta
Alberta Beverage Container Recycling Corporation	Grassroutes Ethnoecological Association
Battle River Watershed Alliance	Green Calgary
BluPlanet Recycling Inc.	GreenLearning Canada
Calgary Board of Education	Indigenous Engineering Inclusion/ University of Calgary
Calgary Catholic School Board	King's University - Centre for Visualization in Science
Canadian Energy Museum	Papillon Consulting Inc
Canadian Parks and Wilderness Society - Southern Alberta	People for Energy and Environmental Literacy
Capital Power	Society of Professional Engineers - Canadian Educational Foundation
City of Calgary	Southwest Alberta Sustainable Community Initiative
City of Edmonton	Strathcona Tweedsmuir School
Climate Outreach	Suncor Energy Foundation
Natural Step	Swallow-a-Bicycle Theatre
Eagle Point Blue Rapids Parks Council	Town of Okotoks
Edmonton Public Schools	University of Calgary
Energy Efficiency Alberta	University of Waterloo
ENMAX	Virtuoso Energy
Ever Active Schools	Wagner Natural Area Society

Appendix C - Reference Resources

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