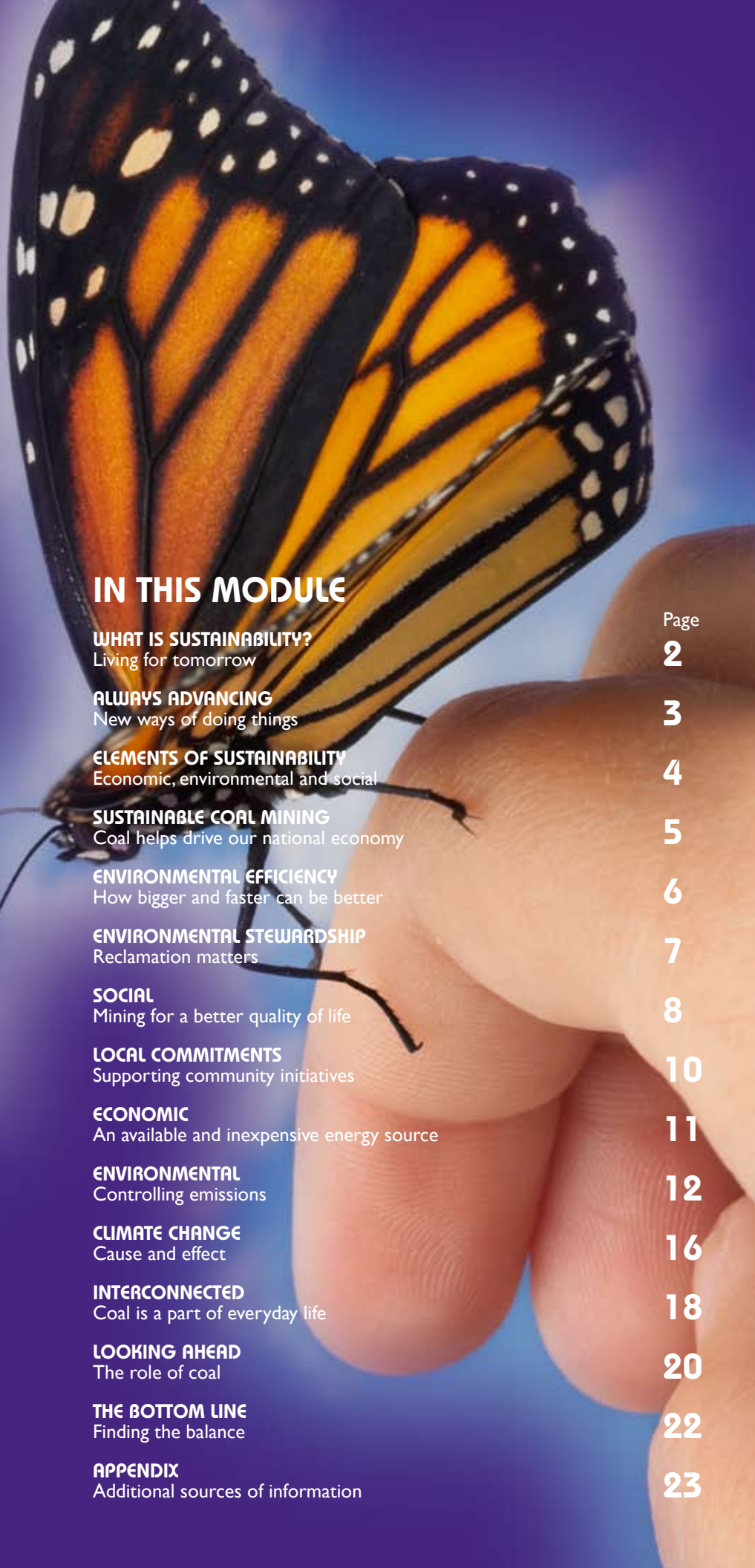
COAL

SUSTAINABILITY



IN THIS MODULE

WHAT IS SUSTAINABILITY?

LIVING FOR TOMORROW

Sustainability is a hot topic these days among the business and scientific communities and also throughout the general public. So how do we define this term? In 1987, the Brundtland Commission defined it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This is a good simple definition. In this module we will explore it further.

MINIMIZING IMPACTS

Sustainability is about reducing the impact of our activities without sacrificing our quality of life. It is searching for a realistic balance between our needs and finding the best ways to meet them. This means making intelligent decisions with the information available to us while continuing to improve our process into the future.

SMART SOLUTIONS

For example, in the 1970s, the automobile industry introduced catalytic converters to the cars they were producing. This new technology, combined with improved engine design and the phasing out of lead in gasoline, resulted in a dramatic reduction in smog.

ALWAYS ADVANCING

NEW WAYS OF DOING THINGS

Industry and science are continuing the search for innovative ways to refine coal technologies. Such improvements have already led to a downward trend in emissions for many decades. Mining continues to benefit from the economies of scale. Coal transportation systems are squeezing more productivity out of each litre of fuel. And in the power sector, greater plant efficiencies are lowering the environmental impact for each unit of electricity produced. The coal industry also continues to mitigate its environmental footprint while providing a reliable, affordable and secure energy source to steel, cement and electricity industries.

This ongoing process of research, development and application of new technologies is aimed at addressing the challenges of sustainable development.

FROM PROTOTYPE TO STANDARD: GENESEE 3'S SUCCESS

Genesee 3 (G3), the third unit at the Genesee Generating Station in Alberta, is the first facility of its kind anywhere in Canada. Equipped with $90 million in clean air technologies, G3 features the first-time use of a supercritical boiler to produce electricity more efficiently than traditional coal-fired generation.

G3 sets a new standard for efficiency and environmental performance. Compared to average Alberta coal plants, G3 reduces SO_2* emissions by 77%, and NOx* emissions by 54%. CO_2* emissions are 18% lower. Fabric filters stop 99.9% of particulate matter from reaching the atmosphere.

* See Glossary

ELEMENTS OF SUSTAINABILITY

ECONOMIC, ENVIRONMENTAL AND SOCIAL

THE 3 - LEGGED STOOL

One approach to defining sustainability involves the concept of a three-legged stool. Three components - economic, environmental and social - are needed to support overall stability. If one of the legs becomes too weak, everything collapses. Any long-term solution requires a properly balanced approach from the beginning.

IN THE FOLLOWING PAGES YOU WILL SEE HOW THE COAL INDUSTRY IS ADDRESSING THESE THREE ELEMENTS IN ORDER TO ENSURE SUSTAINABLE OUTCOMES.

SUSTAINABLE COAL MINING

COAL HELPS DRIVE OUR NATIONAL ECONOMY

In 2006, the Canadian economy was the eighth largest in the world. Much of this economic strength was enabled by the performance of our natural-resource industries. They include mining, petroleum extraction, fishing, hunting and forestry.

As part of the mining sector, coal makes a significant contribution to our economy. With Canada being a trading nation, the country benefits from its coal-for-steel mining operations because most of this coal is exported around the world. Coal mined for power plants contributes to stable and affordable electricity prices in Alberta, Saskatchewan and Nova Scotia.

In an average year, coal enriches Canada's economy by over $5 billion. It offers stability to rural communities through industry-related jobs while providing the steel, cement and electricity necessary to sustain urban infrastructure and growth. This is the industry's direct contribution to the country's GDP*.

Coal also contributes indirectly to the economy. By purchasing mining equipment, selling coal to electrical power generating plants or paying for transportation costs, the industry increases the economic activities of the suppliers of these goods and services. As a result, more jobs are created, more taxes are generated and our economy is that much stronger.

Directly and indirectly, coal is helping to sustain Canada's economy.

More information about the impact of coal on the economy can be found in the Economics module of the Coal Kit.

* See Glossary

ENVIRONMENTAL EFFICIENCY

HOW BIGGER AND FASTER CAN BE BETTER

As coal technologies advance we are able to do things in faster and more efficient ways. We can now use less raw coal to make a tonne of clean coal product. This helps to conserve our natural resources, which is beneficial environmentally, economically and socially.

For example, newer railway cars made of aluminum are lighter than previous models, yet they can still hold the same volume of coal. This means that by using these more efficient cars, one locomotive can haul more coal using the same amount of fuel.

Like trains, trucks and other vehicles used on mine sites have become more productive. Mining trucks have increased significantly in size allowing them to move more earth and coal with each trip.

Coal cleaning and processing technologies are also evolving all the time. A new process for cleaning coal used in the Elk Valley removes more impurities while wasting less coal.

ENVIRONMENTAL STEWARDSHIP

RECLAMATION MATTERS

Only a very small percentage of Canada's land is used for mining and it is important to remember that this is only a temporary use of the space. For example, only 0.03% of British Columbia's total landmass is used for mining of any sort.

A detailed explanation of the various types of mining can be found in the Technology module of the Coal Kit.

Long before the actual coal extraction begins, we start to plan for a process that will have minimal long-term impact. Mining companies employ environmental engineers, geologists, biologists and other environmental professionals to aid the planning process. This involves studying the current state of the land and developing strategies to ensure the area is returned to a state of productivity that is equal to or better than before the development of the mine. Each mine site is different, so each reclamation* plan is unique. Mining companies are required to report on their reclamation plan and progress to the government.

More information about reclamation can be found in the Environment and Evolution modules of the Coal Kit.

* See Glossary

SOCIAL

MINING FOR A BETTER QUALITY OF LIFE AND COMMUNITY

It has been said that "good fences make good neighbours". But for the coal industry, being a good neighbour is about removing the barriers between itself and its neighbours. Usually referred to as stakeholders, they include local communities, First Nations, environmental groups and all levels of government.

All interested parties are consulted before any mining begins. And discussions are continued throughout the lifetime of the mine. The objective is to adjust the plans and the activities of the mine in order to minimize its impacts on the surrounding communities and on the environment. To this end, many mining companies have adopted the Mining Association of Canada's Towards Sustainable Mining Initiative.

PLANTING BY SCOUTS AT FORDING RIVER AND GREENHILLS OPERATIONS

2005 marked the eleventh year of tree planting by the Elkford Boy Scouts at the Fording River or Greenhills mine sites. The Scouts assist with the Reclamation Revegetation Program and Elk Valley Coal helps them out with their fund-raising for Scouts Canada. So far, the Scouts have planted 14,000 conifer and deciduous seedlings at various dormant spoil locations around both mine sites. All of these seedlings were grown at Fording River's onsite tree nurseries.

Scout leaders organize the event with Elk Valley Coal Corporation's environmental personnel. The crew works hard and at the same time learns about reforestation and reclamation at the mine sites. The Scouts have shown a keen interest in the reclamation program and are eager to revisit the previous years planting site to see how much the seedlings have grown. The survival rates of the new plants are in the 90% range, which pleases everyone.

The day of planting ends with a presentation of Elk Valley Coal Corporation's donation to the Scouts followed by a picnic and a visit to the greenhouse.

MEETING THE NEEDS AND PRIORITIES OF LOCAL COMMUNITIES IS AN IMPORTANT PART OF THE MINING PROCESS.

BUILDING COMMUNITIES

Mining companies make many contributions to the local quality of life. Property and business taxes, salaries and company procurement all stimulate and support the local economy. Companies also often support local sports teams, clubs and events. Many major community projects have received funding from these organizations.

Located near the western border of Alberta, Grande Cache Coal (GCC) has revitalized the town of Grande Cache where mining had ceased until recently. While they are excited to be having a positive impact on the economy, the company is dedicated to ensuring that any effect they have on the local environment is positive as well. GCC has programs in place for protection of both caribou and mountain goats.

GCC supports various programs of the Aseniwuche Winewak Nation of Canada and Métis organizations. The company is establishing a new program of performance monitoring with their aboriginal community neighbours. This will involve sponsoring "environmental monitors" selected by the community, who will work with GCC's environmental staff outside of the ordinary boundaries of regulatory compliance. Results will contribute to the development and refinement of environmental management programs.

Other community outreach programs GCC supports include the local Grande Cache Parade Day and the Grande Cache Youth Justice Committee.

LOCAL COMMITMENTS

SUPPORTING COMMUNITY INITIATIVES

The Canadian Coal Discovery Centre will be a large interpretive facility dedicated to illustrating the importance of coal - culturally, historically and economically. The Centre will be located in Sparwood, B.C. in the Elk Valley area of the Rocky Mountains. The Elk Valley thrives on the successful operations of the open pit coal mining industry, which employs over 3,000 people locally.

Elk Valley Coal, which mines primarily in the mountains of southeastern British Columbia, has donated heavily to areas such as wildlife management, local projects, and hospitals.

TRAINING AND EDUCATION

Modern coal mining is a high-tech enterprise. The planning and development of mine sites, and the operation of mining equipment, requires a skilled and well-trained workforce.

Coal mining companies often support local colleges by helping to design training programs, sponsoring scholarships and hiring some of the graduates. For example, Sherritt International Corporation, a developer of coal as an energy source, donated $1 million to the Northern Alberta Institute of Technology.

Employees of mining companies also receive ongoing skills and safety training. Canadian coal mines are among the safest in the world.

ECONOMIC

AN AVAILABLE AND INEXPENSIVE ENERGY SOURCE

In the last few years, the cost of energy has received an increasing amount of attention. Our society is dependent on the availability of inexpensive and plentiful resources - especially electricity. Coal is an abundant, affordable source of power.

Because it is found in over 70 countries throughout the world, coal meets the requirements of energy security. No single country or small collective of nations can control the coal market. The world has an ample supply of coal and its distribution means prices can't be artificially inflated.

The energy mix is just that: a blend of resources to meet society's changing needs. Affordable, reliable energy means making the best use of available resources. Sometimes this means relying on sources other than coal. Quebec, for example, is rich in hydropower* and therefore does not require coal for electricity generation. But where coal is plentiful, such as Alberta and Saskatchewan, it's the obvious choice.

In Canada, 17% of our electricity generation comes from coal-power, whereas in the United States it is over 50%. Many people don't realize that coal is already the number one source of electricity in North America, and that the technology we use to generate coal-fuelled electricity is improving at a dramatic pace.

Different provinces use different sources of energy for electricity generation, each making use of what is available. Alberta, Saskatchewan, Ontario, New Brunswick and Nova Scotia all get a significant amount of their electricity from coal.

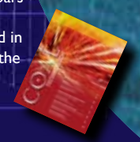
In Canada, the top source of electricity generation is hydropower.

MANUFACTURING & CONSTRUCTION

When you think about coal consumption it's easy to just think about electricity, but it can be used in many other ways.

Coal is used extensively in the manufacturing of both steel and cement, which in various ways forms the backbone of our physical environment. Many of our buildings are constructed using steel girders and even more of them rely on concrete. Beyond construction uses, steel is used to make cars, appliances, pipelines and many other items. Even things that aren't made of steel are often manufactured using steel machinery.

More information about coal's role in steel and cement manufacturing can be found in the Technology module of the Coal Kit.



* See Glossary

ENVIRONMENTAL

CONTROLLING EMISSIONS: THE ROLE OF TECHNOLOGY

Clean Coal Technologies are being developed to reduce and even eliminate the release of pollutants. Current applications are effectively improving combustion technologies that increase efficiency and reduce a variety of emissions.

Emissions* can have a negative impact on the environment. They include sulphur oxides (SO_2), nitrogen oxides (NOx), particulate matter (fly ash and boiler slag) and some heavy metals (copper, chromium, lead or mercury). Carbon dioxide (CO_2) is another emission the coal industry is currently making an effort to manage.

Mining companies and the end users of coal are constantly looking for ways to reduce or eliminate these by-products. The following is a list of new advances that make coal a cleaner, more efficient resource.

TECHNOLOGIES FOR REDUCING EMISSIONS

Low sulphur coal: This coal, which is produced in Western Canada, tends to be lower in sulphur so burning it releases fewer emissions.

Pre-washing: This process washes sulphur out of the coal before it reaches the burner. Pre-washing can reduce sulphur emissions by 50%.

Scrubbers: Just as many people install water filters to their taps to remove bad tastes and smells from their drinking water, these devices literally scrub the emissions from exhaust fumes before they can enter the atmosphere. Scrubbers can remove as much as 95% of SOx emissions, and 90% of NOx emissions, and remove almost all particulate matter[1].

Recycling of burning by-products (fly ash, bottom ash, boiler slag and exhaust residues): These combustion products can be recycled into useful products such as cement, soil stabilizers, fertilizers, gypsum and lime. In fact, many new power plants use coal ash in the cement of their own foundations.

Fluidized bed combustion (FBC): In this process, coal is mixed with a sorbent*. The mix is then suspended on jets of air giving it the same properties as a fluid. By suspending the mixture the coal remains in the burning chamber longer, and can be burned at a lower temperature than traditional methods. FBC can reduce SOx emissions by 95% and NOx by as much as 90%.

Gasification: In this process coal is exposed to high-temperature steam and oxygen, which forces a synthetic gas out. This gas is then burned in efficient turbines similar to those used for natural gas. Exhaust from the first turbine is used to drive a second turbine, increasing overall efficiency. Already in commercial use in the US and widely used in other countries like South Africa, plants using gasified coal as a fuel source are reporting 98% reductions in SOx, an 80% lower NOx emission rate than is currently required, and a 20% decrease in CO_2 emissions. Because the turbines burn a purified gas, particulate matter is not an issue - there is essentially none released. In addition to being made into a gas, coal can also be made into a liquid fuel.

Artificial Intelligence Software: This software is used to monitor the burners in generation plants. It learns to make a plant more efficient by optimizing electrical output and minimizing emissions.

* See Glossary

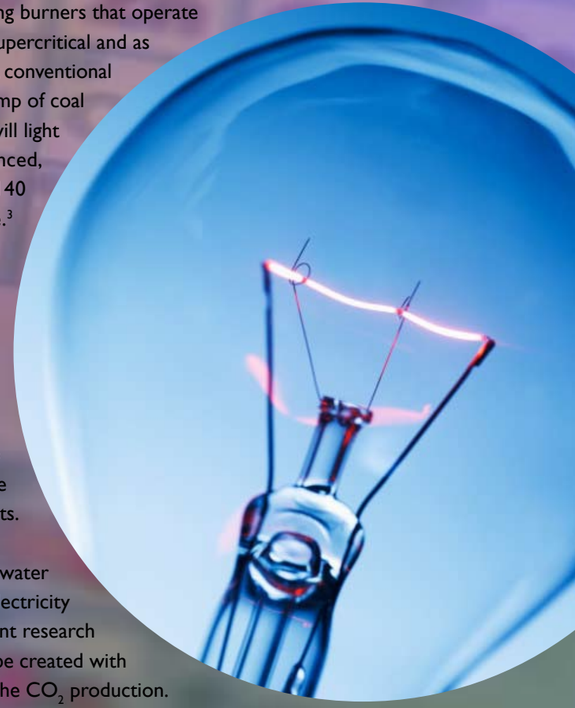
[1]Source: US Department of Energy, 2002

Meeting the sustainable development challenge is an ongoing process and the strong commitment to research and advancement of new technologies by the coal industry ensures that coal will be well placed to meet this challenge.

TECHNOLOGIES FOR REDUCING CO_2

Carbon sequestration: When carbon is sequestered it is held away from the atmosphere. One of the most promising options for the future is carbon capture and storage (CCS). Carbon capture and storage technologies allow emissions of carbon dioxide to be removed from the exhaust stream from coal combustion or gasification and sequestered in such a way that they do not enter the atmosphere. There are a number of storage options for CO_2 with geological storage offering the most potential. Geological features considered for CO_2 storage include deep saline aquifers, unminable coal seams and depleted oil and gas fields. Combined, these options are estimated to offer a total capacity of over 11,000 Gigatonnes of CO_2. Storage of CO_2 can also have an economic benefit in the form of Enhanced Oil Recovery (EOR). This process essentially will 'push' oil out of underground strata. A good example of this is the Weyburn Enhanced Oil Recovery project in Weyburn, Saskatchewan[2], injecting around 5000 tonnes of CO_2 per day which would otherwise have been released into the atmosphere.

(Ultra) Super-critical steam plants: These are thought to be one of the most practical means of both reducing emissions and using coal more efficiently. Building burners that operate at higher temperatures can increase efficiency up to 20% for supercritical and as much as 45% for ultra supercritical steam plants. For example, conventional coal-fuelled plants make enough energy from a golf-ball-sized lump of coal to light a 100-watt light bulb for 75 minutes. New power plants will light the bulb for 90 minutes with the same piece of coal, and advanced, high-efficiency technologies will keep the bulb alight for 140 minutes or more.[3]



An excellent example of this improved technology can be found in Unit 3 at the Genesee Generating Station (approximately 70 km southwest of Edmonton, Alberta). The Genesee 3 unit uses supercriticalsteam turbines that are 18% more efficient than conventional coal-fired power plants, meaning they generate more electricity but use less coal to do so. Additionally, by adding low NOx burners, exhaust scrubbers and fabric filters to significantly reduce emissions, G3 is leading the way toward the next generation of cleaner coal plants.

Hydrogen separation: This process converts a mixture of water and coal into pure hydrogen. Using hydrogen to generate electricity decreases emissions and increases efficiency. In fact, current research predicts that more than double the energy per unit of fuel will be created with less than half of the CO_2 production.

Fuel cell hybrids: By combining technologies such as hydrogen separators, heat exchangers and others, CO_2 emissions can be reduced by over 70%.

[2]Source: Clean Coal Today - Issue 63 - Summer 2005
[3]Source: US Department of Energy

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HELPING TO MOVE SOCIETY FORWARD

Coal has been part of the energy mix since before the Medieval Period, moving into broad use around the time of the Industrial Revolution. A key ingredient in the inventions and advances that changed society was coal.

As we improve technologies our ability to use coal more efficiently improves as well. For example, steam-powered machines changed the face of manufacturing, while steam engines reduced transportation time for goods. These vehicles were powered by coal.

One of the technologies that is widely used to improve efficiency is coal gasification*. It involves crushing the coal into a powder and heating it in the presence of steam and oxygen to produce a gas. After the sulphur content of the gas and other impurities are reduced, the gas can be used as a fuel or further processed and concentrated into a chemical or liquid fuel[4].

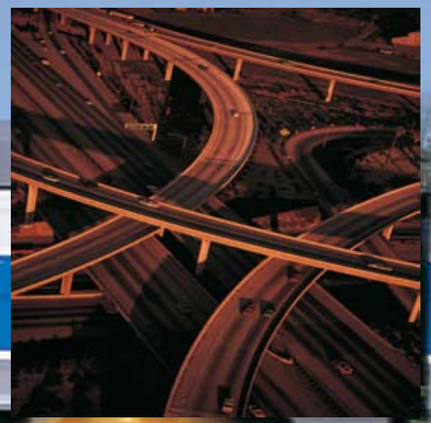
* See Glossary

[4]Source: Colorado School of Mines

In the past century, we have cycled through many generations of technologies to clean up how coal is used, and in the past decade the speed of innovation has increased tremendously. The G3 supercritical facility at Genesee uses the most advanced coal-fired generation in Canada.

Since G3 went on-line, Alberta has updated emissions requirements to be more strict, meaning that every new coal plant must be as advanced and clean as G3. Even with these new, tougher regulations, G3 still manages to come in well below the allowable limits. In fact, while significantly reducing NOx, SO_2, and particulate matter, its owners - EPCOR and TransAlta - have also committed to reducing and offsetting CO_2 emissions down to the level of a natural gas combined cycle generating unit. This means G3's CO_2 emissions are offset by an additional 52% over the 18% already gained when compared to other coal plants in the province.

Because coal is an essential part of the energy mix, both in Canada and throughout the world, governments and industry are constantly researching and developing newer and smarter ways to use coal. G3 takes an important leap forward, and already industry is busy working on the next advancement. The Canadian Clean Power Coalition is actively studying clean coal technologies to assess coal's role in Canada.



THINGS HAVE CHANGED A LOT SINCE THE INDUSTRIAL REVOLUTION. WE USE COAL VERY DIFFERENTLY NOW.

CLIMATE CHANGE

CAUSE AND EFFECT

A great deal of discussion has occurred about the relationship between fossil fuel emissions and their impact on global climate change. In recent years, atmospheric levels of CO_2 and other emissions have increased, and are believed to be contributing to a rise in worldwide temperatures. Since these gases are said to enhance the greenhouse effect, they are typically referred to as greenhouse gases* (GHGs). While the principal GHG is water vapour, the GHG that scientists are primarily concerned with is CO_2.

The coal industry recognizes GHG emissions is an issue and continues to search for new and innovative ways to improve not only existing coal technologies but to develop new cleaner coal technologies. Technologies such as gasification and carbon capture and storage are being developed to mitigate coal's environmental footprint while still providing a reliable, affordable and secure energy source.

The Canadian coal industry is committed to operating in an environmentally responsible manner, and to continuously searching for ways to reduce or eliminate what impact it may have associated with the mining and use of coal. Meeting the needs of increased global energy consumption, while at the same time reducing emissions of greenhouse gases, is one of the greatest challenges facing the coal industry today.

As we study and learn more about global climate change, it becomes apparent that the answers aren't simple. While it is not clear the full impact climate change might have on Earth, everyone - industry, government, societies and individuals - must examine and monitor the environmental, economic and social aspects of their energy use.

It is possible, and entirely reasonable, to continue utilizing fossil fuels with improved technology while we continue to develop new sources of energy. In its efforts to reduce emissions, the coal industry continually works with all interested stakeholders including local, provincial, federal and international governments and environmental groups.

Research has shown that reducing emissions can decrease human impacts on the environment, improve quality of life and lead to improved economic efficiencies. Therefore, the main objective of new energy policies should be aimed at consistent and stable emissions reduction, within the overall framework of maintaining intact ecosystems and a flourishing human society.

Photo Courtesy of Statoil

Carbon capture and storage is feasible. Carbon dioxide extracted from gas production on Statoil's Sleipner West field in the Norwegian North Sea is stored 1,000 metres below ground instead of being released to the air. The process, in use since 1996, sequesters about 2,800 tonnes of CO_2 every day.

We all play an important role in the reduction of greenhouse gas emissions. You can be more efficient with your energy use by using more energy efficient light bulbs or by simply turning off your computer or TV when not in use.

* See Glossary

IT IS NOT A QUESTION OF WHETHER WE WILL USE COAL, BUT HOW CAN WE USE COAL BETTER.

INTERCONNECTED

COAL IS A PART OF EVERYDAY LIFE

The building you live in, the vehicle you ride in and the electricity you use are all directly related to coal or steel. In addition to these products, coal is used to make many other items we encounter in our daily lives.

For example, when you go into the kitchen for breakfast, you are surrounded by coal. Coal is used to make steel, so coal is used in the stove, microwave oven, steel pots and pans, cutlery, toaster and every other item containing steel.

In fact, more than 170 tonnes of hard coking coal - an essential ingredient in the production of steel - is needed to produce the steel to make the tower to support the 80 metre rotor blades of a wind turbine that generates electricity.

Coal by-products are also found in perfume, medicine, plastics, bleach and fertilizers.

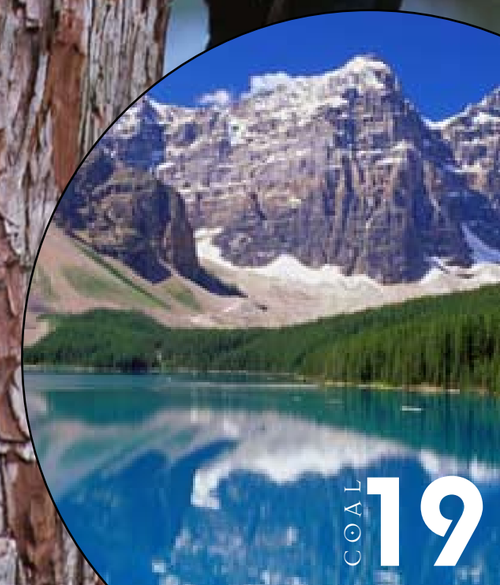
It is evident that society relies on the availability of affordable energy and consumer goods. Neither of these can be readily provided without coal.

More information about the different uses for coal can be found in the Technology module of the Coal Kit.

ENSURING PARTICIPATION

TransAlta's Whitewood Mine is a prime example of cooperation in reclamation. Working with the Alberta Fish & Game Association, the company created the Wabumun Whitewood Conservation Properties, a 373 hectare conservation area that includes 173 hectares of reclaimed mining lands.

The site will be used for wildlife and habitat conservation, education and recreation. The diverse wildlife living on the land includes white-tailed deer, mule deer, moose, elk, ruffed grouse, ducks, geese, woodpeckers, songbirds and a variety of fish in East Pit Lake.



THE INTELLIGENT USE OF COAL

LOOKING AHEAD

THE ROLE OF COAL

Coal has been a part of the Canadian economy and energy mix for many years. As our energy needs grow, coal will continue to keep society moving forward. The world's population is increasing, and the modernization of developing nations means that we will be counting on the energy and products made with coal more than ever. In 2000, the world used 400 quadrillion British Thermal Units (Btu*) and this is projected to increase to 702 quadrillion Btu by the year 2030.

The world has more coal than any other fossil fuel, and it is widely distributed, allowing for virtually every country to either mine it or import it. The availability of coal helps to keep its price lower and more stable than most of the other energy sources.

Renewable energy sources will play an important role as time goes on, but currently the only way that we can provide enough energy to meet society's needs is through the intelligent use of fossil fuels.

North America has 258 billion tonnes of proved reserves. At current production rates, this coal can provide us with energy for more than two centuries. Incorporating coal generation into long-term energy plans demonstrates responsibility to citizens and shareholders, offering a degree of predictability and confidence that other resources simply can't provide.

PART OF A BALANCED ENERGY MIX

Canadians rely on coal as part of a balanced energy mix. Coal, complemented by other energy sources like oil, natural gas, nuclear and alternative / renewable energy sources, plays a significant role in providing Canadians with electricity, heat and other essential services.

No energy source is perfect; each presents unique advantages and disadvantages. A healthy energy mix seeks to maximize the benefits while mitigating potential issues. The benefits of coal will be utilized in the future, while the shortcomings are continually being minimized through technological advancements and innovation.

Sustainability means creating a mix of sources that can meet growing energy needs with minimal environmental impact.

WITH THE BENEFITS OUTWEIGHING THE CHALLENGES, COAL CONTINUES TO PLAY A VITAL ROLE IN MODERN SOCIETY.

* See Glossary

THE BOTTOM LINE

FINDING THE BALANCE

There is no doubt that we will continue to rely on coal as a valuable part of the global energy mix.

So, in the context of sustainable development, the question is not whether coal will play a role, but rather how humanity can continue to enjoy the many economic and social benefits associated with its use, while at the same time reducing or eliminating environmental impacts.

Given that sustainability is about balance, the challenge for the coal industry is to find a way to retain coal's significant contributions to our standard of living while supporting a sustainable environment for the future.

COAL IS PLENTIFUL, AFFORDABLE, AND INCREASINGLY CLEAN AND WE CONTINUE TO DEVELOP MORE ADVANCED TECHNOLOGIES.

APPENDIX

ADDITIONAL SOURCES OF INFORMATION

There are a number of Canadian, American and International web sites about sustainability. To access current links to government/international agencies, industry and also to the research community/academia, please visit www.coal.ca

GLOSSARY

BRITISH THERMAL UNIT (BTU) - a unit used to measure quantity of heat, defined as the quantity of energy necessary to raise the temperature of 1 lb. of water 1° Fahrenheit.

CO_2 - carbon dioxide is a colourless, odorless gas formed by one atom of carbon and two atoms of oxygen.

COAL GASIFICATION - the process of converting coal into gas.

EMISSIONS - are what is "left-over" when coal or another fossil fuel is burned.

GDP (GROSS DOMESTIC PRODUCT) - the total value of final goods and services produced within a country or territory during a specified period.

GREENHOUSE GASES - are gases such as carbon dioxide (CO_2), water vapor, methane (CH_4), nitrous oxide (NO_2), and other trace gases which restrict the re-radiation of infrared heat back into the atmosphere.

HYDROPOWER - involves converting the natural flow of water into electricity.

NOX - formed when nitrogen (N_2) combines with oxygen (O_2) in the burning of fossil fuels.

RECLAMATION - the process of returning a mine site to its previous condition.

SORBENT - an absorbing compound that acts like a sponge.

SOX - a family of gases, including sulphur dioxide (SO_2) formed when sulphur, or fossil fuels containing sulphur, burn in air.

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MODULE 1: EVOLUTION
MODULE 2: ECONOMICS
MODULE 3: TECHNOLOGY
MODULE 4: ENVIRONMENT
MODULE 5: SUSTAINABILITY