Landscapes

SUSTAINABILITY TRENDS AND INNOVATION IN COMMUNITIES, COUNTRIES AND CULTURES.

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SUSTAINABLE COMMUNITY SNAPSHOT

Communities large and small in all regions of British Columbia are in the forefront when it comes to the development of green technologies. With approximately 70 per cent of Canada's fuel cell sector located in Metro Vancouver, according to the Asia Pacific Business Centre, it could be assumed, mistakenly, that green technology only has a home in the big city.

The following snapshots from around BC demonstrate the diversity in the sustainability industry. Near Dawson Creek, two wind parks generate some 300 megawatts of electricity, enough to provide the annual power for 34,000 homes in the area. More than 100 turbines will be involved in a major offshore wind energy project between Prince Rupert and Haida Gwaii. The strait of water between the communities is the location of some of the strongest winds in Canada and the project is expected to generate enough electricity to meet the needs of 130,000 homes.

The Village of Houston has installed a geothermal heat pump that helps keep the community ice rink functioning year round as well as maintaining the temperature of the community swimming pool. In the Cariboo, a waste water treatment system turns sewage into clean water to support wildlife in Gaglardi Park while in Fernie, BC, a company called Green Rose Recycling has equipment that tears up old asphalt, reprocesses it on the spot and repaves the road using renewable resources that have already been paid for and harvested once.

The Jim Pattison Centre for Excellence in Sustainable Building Technologies located in Penticton walks the walk in terms of motivating its students for real world careers in renewable technology. The solar lighting and other eco-friendly infrastructure in the facility have been left fully exposed so that during the course of study, students can look anywhere in the building and see practical examples of the field they hope to enter.

From solar-powered traffic signals in Victoria to a company in Ladner that makes fuel pellets from the straw beds used by horses, BC communities are putting a green foot forward.

THE GREENING OF SPORTS

For all of their association with nature and the great outdoors, organized sports have moved farther and farther away from their green roots over the years. Air-conditioned stadiums, artificial turf, chemically treated ice in hockey rinks and manufactured snow on ski hills are a few examples of this drift. But there is a greener side of the sports story evolving.

Turf grass is grass produced with a factory-like discipline. It covers an area in the United States roughly the size of the state of Nebraska and much of it is used on golf courses. Oddly enough, some of the best grass is grown in the desert where temperatures routinely reach 40 degrees Celsius. This is because there is no rain and the growers can meet the water requirements through controlled irrigation systems, meaning they are not required to deal with a major threat to turf grass, namely too much water. Therefore, it arrives at its ultimate destination in stronger condition, needs less water and chemicals and lasts longer,

Major league football is not generally associated with the delicate sentiments of ecological preservation. However, teams like the Patriots, Giants and Redskins among others got an offer they couldn't refuse by the largest manufacturer of solar panel systems. In return for free installations the company got to use the names of the teams in its advertising and promotion. In return, the football teams not only received free installation, but also enough electrical power to supply over 50 per cent of the needs of restaurants and stores in the stadiums.

It is a case of going green and getting American greenbacks, a selling point for many businesses.

SCIENCE AND THE CITY

At the Massachusetts Institute of Technology (MIT), a program called the CityScience Initiative brings top students in the leading scientific disciplines to the challenge of linking urban growth strategies with leading technologies.

According to the academic leaders of the program, the cities of the future will have to recapture some of what was best about the cities of the past. By this they mean cities as they were organized before the automobile. Everything needed for human life was within one or two kilometers of where people lived. The goal of CityScience is to help make modern cities recreate these attributes without the other aspects of those ancient cities which included black plague, open sewers and pestilence. The CityScience professors are practical, not overly romantic.

One of their inventions is something that can be referred to as the folding car. They point out that today the average car is only used seven per cent of the time, so the current allocation of parking space for the other 93 per cent of the time is a waste of scarce land resources. The folding car is designed to meet that problem. When it arrives at the curb, the driver steps out of one door located in the front of the car and at the push of a button the car folds into itself to occupy less than half the space it does while in motion. Called the "CityCar", it has independently-controlled electrical robotic wheels, and sensors in the headlights that can detect pedestrians who may not themselves detect the silent car approaching. The next evolution of the folding car will be the driverless car that can be summoned by computer and take the occupant to his destination, folding itself, upon arrival, into a space about one-fifth the size required for a conventional car. It will also locate available parking through a computer link, thus dealing with a problem identified by Ford Motor Company researchers who found that 30 per cent of the driving time in a city spent looking for parking.

European countries including Spain are looking at taking the working concept into production as early as next year.

Folding cars cannot in themselves be an answer to city congestion problems, which is why the 27 interconnected research groups at the facility are also looking at where people live. The CityScience researchers see a link between the lack of affordable housing for young people and the stagnation of innovation. Quite simply, they fear that society will suffer loss of progress if young people cannot afford a place to live because young people are the generators of innovation. They dismiss the idea of so-called "micro units" advocated by many local governments as the solution. The young researchers in the program, who typify the type of innovators that every city would crave, contend that young people do not want to live in "little boxes in the sky."

The alternative they are working on is the transformable "CityHome", much like the folding car. With its robotic walls, it can change a 300 square foot room, with the click of a mouse or hand held app into a kitchen and dining area, a bedroom and clothes storage area, or an entertainment area. Furniture moves into the walls as the functionality of the room changes but still preserves the feeling of space. The designers emphasize that it is not a cost prohibitive option while the alternative of a city losing its best and brightest is a far heavier cost for society to bear.

Another initiative involves food in a bag. Not to be confused with stale sandwiches, this refers to growing food in a bag. Through a process called aeroponic farming, city dwellers should be able to grow their own vegetables in bags containing nothing more than a mist of water and nutrients. The researchers say that their goal is to have people grow food on a "substantial scale" in their own homes. The aeroponic growing system uses 98 per cent less water and 60 per cent less fertilizer than growing in soil. The prototype, designed and operating on campus, produces 12 harvests a year under LED lights.

The CityScience focus also extends to streetscapes. They advocate the concept of lower buildings along the street with higher buildings set farther back. The architects believe that this encourages interaction among people and a reduced dependence on cars.

All of these efforts have led to growing partnerships with developing countries that will be facing massive urbanization in the coming decades and do not want to repeat historic mistakes.

BIKE POWER

In some cities integrating bikes into transportation planning has been a cause of controversy and, in some cases, confrontation. Some of the worst examples have involved massive expenditures of taxpayers' money, losses to small businesses and complaints about lack of consultation.

In the wider picture, bike usage in cities around the world is expanding exponentially and many cities have avoided problems of cost and confrontation.

In New York City, a new urban bike program launched last summer put 10,000 bikes on the street supported by 600 bike service stations. None of this cost the taxpayers one dime because the entire cost of $41 million was advanced by Citigroup, in return for sponsorship rights. The sponsorship model was adopted from Europe where it has wide application. In New York, the annual cost for borrowing a bike is $95 compared to $70 in London, England and about $40 in Paris.

Unlike New York however, European bike programs have required large subsidies from taxpayers.

In China, traffic congestion and massive urban expansion has brought about a return to using bikes which were, until recent years, the main form of transportation for citizens. In some Chinese cities, about 50 per cent of the population commutes by bike. The largest reported bike sharing program in the world is in the city of Wuhan China, where 70,000 bikes are made available to the commuting public. The expanding growth of bicycle usage in China has, in turn, made China the world's largest manufacturer of bikes. The country currently produces two-thirds of the world's supply.

Globally, in 2013, about 150 million bikes will be manufactured around the world, which is about twice the number of cars that will be made. Bike sharing programs worldwide can be found in 450 cities, an 800 per cent increase in five years.

BY-PRODUCTS ALARM

CHINA faces a delicate balance between the energy demands of the growing middle class and the growing environmental activism which is part of that same middle class culture.

A recent example involved protests against building a refinery in the city of Kunming to process oil. While residents have no objection to increased availability of much needed gasoline, large protests were mounted against the production of a by-product called PX. The by-product is important in the production of textiles and plastics but hundreds of supporters gathered to protest the production of PX based on its perceived danger to health. According to US government reports, high exposure to PX can result in severe problems to the respiratory system. In China, high levels of smog and airborne pollutants already challenge respiratory health so any additional threat is not welcomed by many.

NEW THINKING, NEW CITIES

In the next 25 years, China will move 300 million people to new urban environments. To put that in context, it is equivalent to taking the entire population of the United States and in the next 25 years, building new cities in which they can reside. That also means making the cities attractive for people to want move there.

It is estimated that the cost of performing this massive urban shift will be $160 trillion which is about 10 times the size of America's annual economy.

One of the concerns of urban planners looking at this challenge is that China cannot reach its goals of sustainability if it pursues a car-driven culture similar to that in North America and Europe. The Chinese leaders recognize this but also recognize that a growing middle class of 250 million people puts a high value on car ownership.

Then there is the challenge of less land per capita. Currently, in Chinese cities, the average building height is 10 stories whereas in North America it is two stories. Putting 300 million people in cities consisting of apartment towers surrounded by freeways is not an option the Chinese government wishes to embrace.

There are cultural dimensions to the Chinese urban planning challenge.

Traditional Chinese society was what is called a "walkable" society. People were within walking distance of their daily needs, their friends and their social engagements. Until as recently as 25 years ago, 60 per cent of commuting in China was done by bicycle. Now that figure is closer to 15 per cent.

One of the advantages of planning new cities is the ability to fit all of the parts together from the outset. For example, the new city of Chenggong will have 1.5 million people. Of these, 500,000 will live in the central part of the city and will be divided among 200,000 residents and 300,000 employees. The plans call for an assortment of building heights ranging from four stories to 30 stories rather than a solid concentration of 30 storey apartment blocks. This type of flexible planning will allow the same amount of people to live in the same space but with the added bonus of parks and green space as well as the ability to walk among friends and neighbours.

BIRTH DEFECTS AND ENVIRONMENTAL RISK

A study by the Harvard School of Public Health called Nurses' Health Study II suggests that a mother's exposure to high levels of certain types of air pollutants such as metals and diesel particles increased the risk of autism by an average of 30 to 50 per cent.

The comparison was made on a national study that compared women who had lower rates of exposure. The study involved over 22,000 women in areas across the United States where the US Environmental Protection Agency had measured the presence of 14 pollutants.

Another study at the University of California suggested a similar link between household pesticides and autism but the researchers have stated that more study is required.

Medical researchers have monitored what appears to be a rise in Autism Spectrum disorders in the US. An eight year study from 2000 to 2008 of children of eight years of age and under, found an incidence in the year 2000 of Autism Spectrum of one in every 150 children while in 2008 it was one in every 88.

BIRDS AND MAN

In 2004, when the first pair of storks was spotted building a nest in England in more than 600 years, bird watchers in the country were swept with enthusiasm. Unfortunately, the nest-building attempt failed, the storks left and no storks have been seen since.

The birds, which in myth are associated with childbirth, have a long and influential history with mankind. Their preference for nesting in tall buildings rather than trees shows a compatibility between man and bird that is not an anomaly. Many bird species today, for example, thrive in proximity to agriculture, to the chagrin of farmers down through the ages who have watched their avian neighbours eat their newly sown seeds.

CARBON FOOTPRINT CASTLE

While much of society is moving towards the most efficient use of land for housing development, there are some opulent exceptions. The largest house in the United States is located in Windermere, Florida and is called Versailles after the famous castle in France.

At 90,000 square feet, the house is comparable to 50 standard subdivision bungalows. It contains 10 kitchens, 22 bathrooms and 13 bedrooms. The property includes a baseball field, an underground parking garage than can hold 20 cars, two movie theatres and a roller skating rink.

The link between storks and babies is not the only myth. In ancient Greece, it was believed that storks looked after their grandparents and thus the Greeks passed a law that people should do the same thing. In Egyptian hieroglyphics, the symbols for the word soul and the word stork were the same.

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TECHNOLOGY AND FOOD

Modern combines, the large farm machines that harvest thousands of hectares, can now operate 24 hours a day guided by satellites and have more onboard computer equipment than some commercial airplanes. This is the type of technology that is needed to respond to a global demand for food that is expected to double by the middle of the century when the world population is at nine billion. To put the challenge in context, experts contend that mankind will have to produce as much food in the next 30 years as has been produced in the last 10,000.

The data collection capabilities of new farm equipment go far beyond satellite communication. The machines continuously detect moisture levels, density of soil, protein levels in harvested products and can even communicate with the dealer when they need maintenance.

One of the contentious areas in modern farming relates to genetically modified food(gmf). But the genetically modified horse has long left the barn. In the past 15 years, there has been a 100 fold increase in genetically modified crops and last year developing nations bypassed industrialized nations in terms of gmf production.

The US Department of Agriculture has been monitoring the yield of corn per acre since the end of the Civil War. At that time, in 1865, the yield was about 25 bushels per acre and remained basically flat until the 1940s when it began a slow climb. In 2012, the yield was 160 bushels per acre.

While technology will continue to change farming the most dominant factor remains largely out of the control of farmers. That factor is weather.

THE IDEA MAN

The Black Eyed Peas *is the name of a musical group that has sold 60 million records and grossed over $100 million on its last tour. But for one of its members, William Adams, known by the stage name of Will.I.Am, ideas may be a greater claim to fame than music.*

Adams has contracts with companies such as Intel and Coca Cola, but not merely to lend his name to their products as some celebrities do.

Rather he is paid to create products.

One of his creations with Coke is a concept called Ekocycle. Ekoc, it will be noted, is Coke spelled backwards. The idea is to use Coke's marketing power to promote recycling. This involves having products tagged and branded, based on the number of recycled Coke containers used in production of the product. Some of the participants so far include Levi Jeans and a company called Casemaker that makes accessories for cell phones.

Any money that Adams makes for his inventive efforts goes to his charities.

Some musicians in the $100 million a year earning category supplement their incomes by lending their names to products they barely understand.

A few actually invent and donate.

THE FUTURE OF GLASS

To the growing list of smart products including smart phones and smart meters can now be added smart glass. The glass can be computer controlled to turn cloudy for both privacy and to block out the sun's rays while conserving energy. Developers forecast that very soon a typical office window will also be able to turn into a touch screen for video conferencing or PowerPoint presentations.

One type of window glass on the market already has the ability to change colours. The glass is lined with layers of ceramic coatings that are less than one-fiftieth the thickness of a human hair. A tiny voltage can pass through this layer which allows the glass to change colour. Reversing the voltage clears the glass.

RECYCLED OIL SPILLS

Leftovers from one of the largest oil spills in recent times have found their way into one of the most energy efficient cars produced today.

General Motors purchased the oil soaked booms from the oil spill from the British Petroleum disaster in the Gulf of Mexico. Oil booms come in two varieties, hard and soft, and the soft ones were purchased by GM because they contain recyclable material. In total, GM purchased 120,000 booms stretching for over 400 metres. Once brought ashore, the booms are put into what resembles a giant washing machine on the back of a truck where the spin cycle separates the salt water and the oil. The resulting fluffy residue is packed into plastic bags and sent for a densification process, which means melting down the material, including the plastic bags, into a product that looks similar to popcorn.

This material then goes to another processing facility where it is blended with old car tires, plastic garbage and recycled bottles, all of which become air baffles, for the General Motors Volt. These fit over the radiator and help keep the car cool. The resulting product is sent to General Motors for assembly in Detroit. In total, 25 per cent of the material surrounding the cooling system of the energy efficient Volt originates from an oil spill in the Gulf of Mexico.

CONSERVATION GADGETS

Rising crime rates have made the home security industry a major sector in North America. Now the industry sees a major expansion opportunity in using its security know-how to address energy conservation challenges.

The following are some examples of gadgets that are already available and in use.

Internet connected cameras in all rooms of the house allow somebody who may be on the other side of the world the ability to check every room.

Wired houses can send messages to the owner's cell phone warning of temperature changes or break-ins.

Doors can be automatically opened at scheduled times during the week to admit trades people or housekeepers.

Small scanners under water tanks can detect leaks and turn off the water supply.

Room cameras can also be linked to the heating system to turn down the temperature in empty rooms or turn on all household lights in the event of a break-in.

Flat paneled screens can give the homeowner an instant readout on all functions including energy use. Utilities have found that energy conservation improves if homeowners have a real-time understanding of their energy use.

If all of this is not enough, there are now sprinkler systems connected to the internet that monitor weather satellite data and turn on the sprinklers in response to dry conditions or turn them off if there is a forecast of rain.

CARS OF THE FUTURE

One of the courtesies extended by Google to important visitors to its corporate headquarters in California is to have them picked up at their hotels by a driverless car. Google has seven such cars that have logged over 300,000 kilometres without an accident.

The company is not pursuing the concept for the sake of novelty. It contends that the vast majority of car accidents are caused by human error, much of which would be eliminated with the driverless car. Also, driverless cars will be able to travel closer together, to pre-programmed destinations, which would reduce both congestion and energy use.

Driverless cars function like data farms on wheels. While in motion, the car continuously collects information that is stored in onboard computer systems. This means the more kilometers it drives the more "road intelligence" it has accumulated. Front-mounted cameras can detect traffic lights and obstacles as well as pedestrians, while radar and laser sensors detect moving objects and allow the car to yield in time. If the car drives down the same street twice, it memorizes the street thereby increasing the ability to distinguish potential obstacles.

A rotating laser rangefinder on the roof continuously creates a 360 degree 3D map, that "informs the car" what is going on around it in a radius of 60 metres.

Over half of the seven billion people in the world are now living in cities and that number is expected to increase substantially in the next decade.

The search for automobile innovation to meet that challenge has become a driving force in Silicon Valley.

BUILDING BRIDGES FROM LANDFILL

When a bridge collapsed on the Interstate in Washington this year, it brought attention to the fact that in the United States about 80,000 bridges are considered obsolete and in need of substantial repairs. This has spawned a wave of innovation. At Rutgers University technology was already developed and shared that uses recycled plastic bottles to build beams to replace the steel beams in bridges.

The process starts with large volumes of plastic bottles for soap, milk and other products being collected. The next step is to put the materials into an industrial shredder that turns them into a by-product called "snowflakes". The next step involves heating the flakes to a temperature where they can be molded into precise I-beam shapes for different applications. It takes about 16 plastic bottles to make one kilogram of I-beam using this process.

Although lightweight, the plastic beams are strong. The ones used at army bases in the USA can easily handle military tanks weighing 60 tons.

A GLOBAL CLIMATE NEEDING INVESTMENT

While the focus of business is generally on the investment climate, there is a new field of business that can be called investment in the climate. Much of this investment comes from high technology companies based in California's Silicon Valley and elsewhere. The drivers behind these investment concepts are people such as Microsoft's Bill Gates, who are motivated by the recognition that since 1990, in spite of global protocols and environmental campaigns, global emissions have risen by 40 per cent.

Some high tech innovators who have changed the world with information technology, hope to bring some of this expertise to the global climate challenges.

Some of the ideas on the drawing board (or to be accurate, computer screen) stretch the imagination. One, for example, involves a 100 metre long hose that would float in the atmosphere tied to balloons and spray tiny particles into the stratosphere to block the sun's rays. Not as farfetched as it sounds, the concept is called Solar Radiation Management and can involve injecting particles of seawater into marine clouds.

Some of the leading minds involved in the pursuit of technological solutions for climate change worry as much about the international political challenge as the technical peaks that need to be climbed. For example, one of the questions posed is, "How do the 196 countries in the world decide what the temperature of the world should be and who gets to make the final decision?"

Another area of scientific inquiry involves the use of carbon dioxide or $C0^2$, as it is commonly known. While much concern surrounds the role of $C0^2$ in climate change, it is often forgotten that it has a potential for high commercial value. Carbon combined with hydrogen can make gasoline or diesel fuel or it can be fed to algae with the same results. The strongest demand currently for $C0^2$ is from oil companies who pump it into reservoirs in order to force out what is called stranded oil. According to some scientists, the ideal balance in this process would be to keep this type of $C0^2$ underground so that it would balance out the emissions from burning the very oil that it pushes to the surface.

It took over a century and billions of dollars for individuals, industries and national economies to put an estimated trillion tons of $C0^2$ into the atmosphere.

The financial magnitude of the challenge involved in keeping it out of the atmosphere may well be on a similar scale.

The data required to feed the knowledge requirements of world internet users comes in little portions called bytes. Every month, the number of bytes of data used is 28 quintillion, which is the number 28 followed by 18 zeros. When a computer user puts in an information request, it first flows to a server farm and then is dispatched to where it has to go to get the answer. There are close to 8 million server farms in the world and half of them are in North America. They are massive users of energy and the result is often a high temperature working environment.

Like farming of old, this type of farming is hot work. As a result, the employee dress code at many server farms is often closer to what people would wear at a summer bar b que.

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FIRST NATIONS IN THE CITY

According to government statistics, about 60 per cent of aboriginals in Canada live in urban environments, where the survival challenges are different, but every bit as demanding as they are closer to nature.

A number of initiatives have been established to help First Nations youth acquire the career skills they need to achieve their dreams in an urban setting.

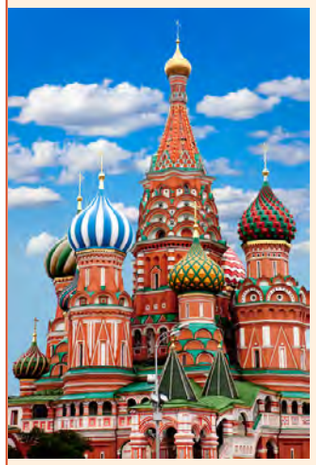
The Squamish Nation Trade Centre offers a variety of trade programs in cooperation with Kwantlen Polytechnic University, Vancouver Community College, and the Industry Training Authority. Among these, the Carpentry Foundations stream offers 24 weeks in class and six weeks on-the-job training where students get an overview of the construction sector as well as hands-on training in all aspects of carpentry apprenticeship. The Water Damage Remediation Technician program offers four weeks of class work combined with two weeks of on-the-job training to teach the skills needed for success in the field of Water Damage Remediation. Upon completion, students can find positions in the growing property damage restoration industry.

The Access to Transportation Trade Certificate

is a program designed to train students for entry into the automotive repair industry.

The Aboriginal Community Career Employment Services Society (ACCESS) offers urban aboriginal youth a range of support services including computer and internet access, career planning, interview & job search techniques, as well as employment wage subsidies. Under its Trades Program, ACCESS provides orientation and support for students through full apprenticeship programs. Another program entitled Blade Runners is targeted for at-risk youth between 19 and 30 years of age and reports that over 77 per cent of participants are placed in employment after completion. Organizers credit this high success rate to a screening process that identifies motivated youth and job coaching that supports the youth selected through the job search and orientation process.

MODERATION AND SURVIVAL



According to the United Nations, the population of Russia by 2050 will drop to 116 million people, a loss of nearly the entire population of Canada in a little over 30 years. Oliver Bullough, the author of "The Last Man in Russia" believes there is a strong link between the population decline in Russia and alcohol abuse.

He reports that between 1940 and 1980 the production of alcohol tripled in Russia. Bullough contends that this was a key reason behind the decline in population, which started in 1960 when the number of children fell below the replacement level.

When Mikhail Gorbachev took power in Russia in the 1980s, he closed 90 per cent of Moscow's alcohol shops as well as distilleries. The results were impressive. In 1986, the country saw the most births since 1962 and the Gorbachev government also claimed to have prevented 400,000 deaths per year.

When the Soviet Union collapsed in 1991, the Gorbachev policies related to alcohol were abandoned. The numbers, in terms of human mortality, are bleak. In the first 16 years of capitalism, 22 million Russians were born and 35 million died. According to the Russian State Statistic Committee, today there are 24 million Russians in their twenties and in 10 years there will be 14 million, a drop of 40 per cent. Life expectancy has also declined and is now 69 years, about 10 years behind North America.

In Bullough's view, the most critical measurement of sustainability is the ability to sustain human life. Like the ancient Greeks, he believes the secret to that type of sustainability is moderation.

NEW CHALLENGE FOR OLD TRIBE

When the Aboriginal tribes in Montana faced General George Custer in 1876 in what is called the Battle of Little Big Horn, nobody could have predicted they would face a very different fight today. Now the Crow Tribe in Montana is fighting for the opportunity to be part of a developing coal industry. Opposition to their ambitions comes from as far away as the Lower Mainland of British Columbia, where interest groups and municipalities have expressed their opposition to coal trains from Montana entering Vancouver ports.

The Montana coal is a product of climate change. Huge coal beds were formed 50 million years ago when the state of Montana ,which currently gets bitter winters, was a lush tropical swamp. But plans to ship the coal have been swamped with protests. South of Vancouver, at Cherry Point Washington, more than 100,000 people sent in opposing comments by internet.

Last year, the Crow Tribe signed an agreement allowing companies to develop up to 1.4 billion tons of coal on reservation land. According to Crow Tribe Chief, Darrin Old Coyote, "Asia is going to get their coal somewhere and continue to grow."

Montana has more coal than any other state in the USA but Chief Coyote and the coal companies have a selling job ahead of them. The governors of both Washington State and Oregon have opposed further coal transport by train until climate change effects have been assessed. Aboriginal tribes in Washington State are on record as opposing having coal shipped by train through their territories. One tribe in the forefront of the opposition is the Tulalip Tribe, owners of a major casino resort just south of Vancouver. Chief Coyote counters that because his tribe is far from any major population centre "gaming is not going to solve our problems." While the average income level for tribe members is $21,000 per year, for the 75 members currently working for a coal company the average annual income is $62,000.

With no other attractive employment prospects, Chief Coyote perhaps is wondering how he will balance the needs of his community with the concerns of his neighbours.

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According to the International Energy Agency, the global use of coal will increase by 40 per cent over the next 25 years. The high demand countries in this growth include China and India, both of which are dealing with rapid urbanization and economic development. The Agency also notes that 1.5 billion people in the world presently have no access to electric power, which hampers their ability to deal with basic requirements such as sanitation, clean drinking water, and hunger. Coal is expected to bridge this problem in a major way.

With over 400 coal plants under construction in China and India today, there is much speculation on the global impacts should the 1.5 billion people who do not have access to energy choose to adopt coal as their energy of choice.

EARTH FREE TOMATOES

The process of growing vegetables in nutrient-rich water has been used for centuries, although large-scale greenhouses are a relatively modern development. The process, called hydroponic farming is a $600 million industry in North America and greenhouses can be found from the high Arctic to the desert. Still, hydroponic farming only represents one per cent of the vegetable market.

Hydroponic farms can produce as much as 30 times more tomatoes per acre than land-based farms. The resulting products are marginally more expensive, but producers believe that advances in energy-efficient lighting will flatten the price.

FISH TALES

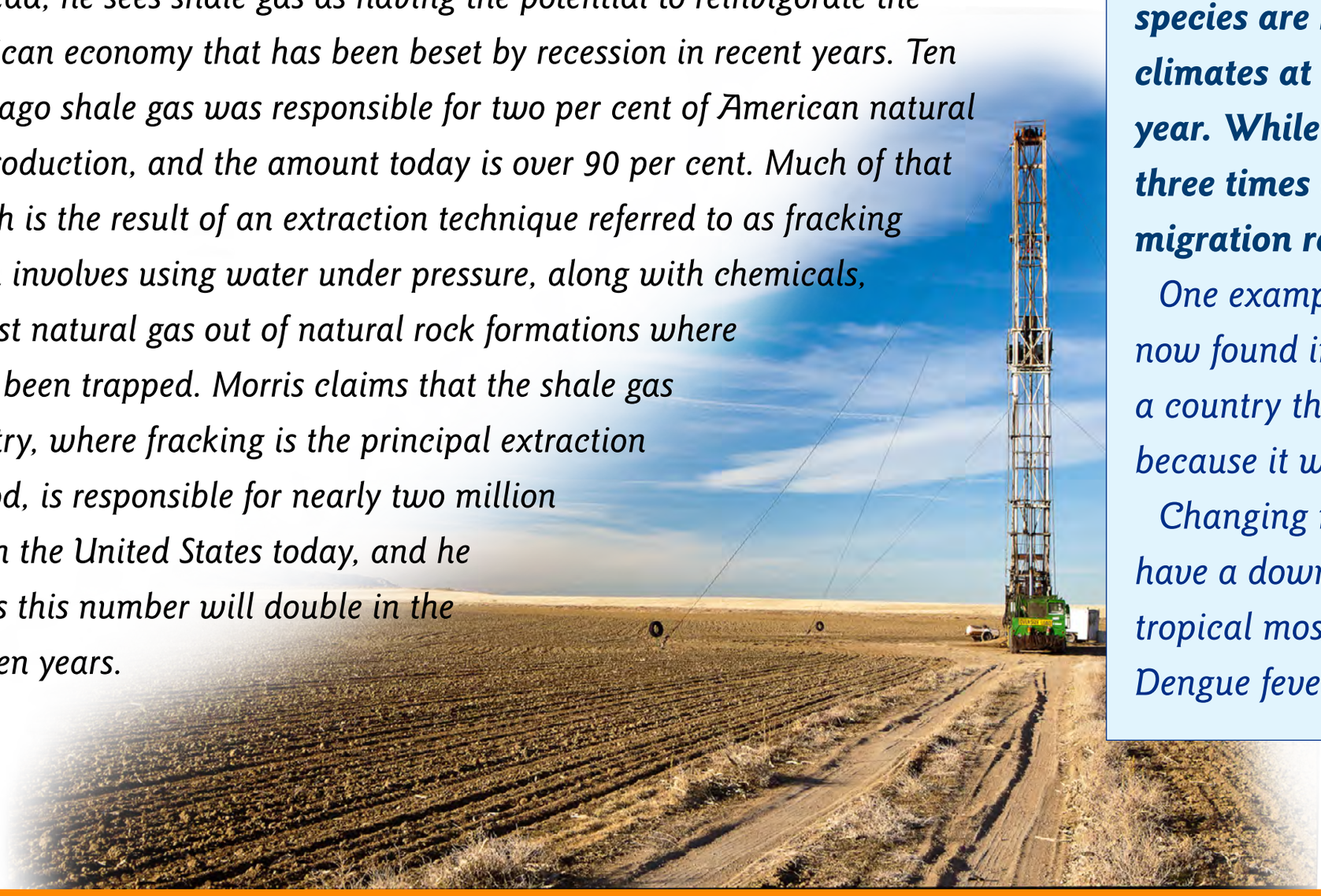
FARMED FISH has surpassed beef in world food consumption. In British Columbia, the aquaculture industry is a major player in this global industry.

The wild fishery remains strong in many parts of the world, including Alaska where fishing and energy industries have often locked horns (or fins). Every year the 9,000 fishers in Alaska catch over 200 million wild salmon on their way to spawn in the state's rivers. The Alaska fisherman gets 95 cents for each pound of salmon caught. The same pound of salmon sells for 20 dollars per pound in the US mainland and 60 dollars per pound in some of the better US restaurants.

DOUBLE SIDED ENERGY COIN

One of the leading American thinkers on energy and the economy, Charles Morris, is a big fan of developing shale gas. However he is not sold on the idea of exporting liquefied natural gas to Asia. In a recent interview, Morris dismissed the second option as one that would turn the United States into "a raw material colony for the Asian industrial juggernaut."

Instead, he sees shale gas as having the potential to reinvigorate the American economy that has been beset by recession in recent years. Ten years ago shale gas was responsible for two per cent of American natural gas production, and the amount today is over 90 per cent. Much of that growth is the result of an extraction technique referred to as fracking which involves using water under pressure, along with chemicals, to blast natural gas out of natural rock formations where it has been trapped. Morris claims that the shale gas industry, where fracking is the principal extraction method, is responsible for nearly two million jobs in the United States today, and he claims this number will double in the next ten years.



CLIMATE MIGRATION

A study at the University of Texas has found that climate change is changing migration patterns. Specifically, the study shows that 2,000 species are heading north for cooler climates at the rate of one mile per year. While that may seem slow, it is three times as fast as the historical migration rates.

One example is the egret, which is now found in abundance in England, a country that it avoided historically because it was too cold.

Changing migration patterns can have a downside. In the state of Florida, tropical mosquitoes carrying the deadly Dengue fever have taken up residence.

CARBON FOOTPRINTS AND FLOWERS

Fresh cut flowers, an agricultural commodity that is disposed of within days of purchase, represent a 14 billion dollar global industry, about the size of BC's forest industry.

About 98 per cent of the world's cut flowers are shipped by air, after first being chilled before being loaded onto planes. The energy use associated with refrigeration plus air travel means that the small bouquet of flowers, that usually originates in South America or Africa has a hefty carbon footprint. The air transportation is often more than a one-way trip. For example, the largest florist market in Holland covers an area as large as 400 soccer fields where flowers are purchased by brokers and shipped out again by air to other destinations.

One of the alternative options being examined in the industry is using ships, but the logistics of the business make this a difficult option.

BUSINESS IS HUMMING

The almond business in California is a seven billion dollar a year industry that depends on visitors to survive. The visitors in question are European honeybees that are shipped by the billions to the central parts of the state beginning each February. About 65 per cent of all commercial honeybees in the United States are rented by California almond growers for prices up to $155 a hive. They are said to be the most efficient insect pollinators but also a delicate species.

About 10 years ago, honeybees started dying off at twice the usual rate and scientists called the ailment" Collapsed Colony Disorder (CCD)". Scientists determined that the bees, which fly five kilometres from the hive in any direction, will bring contaminants back to their home that they may have found while browsing elsewhere.

These contaminants are responsible for the disorder and less likely to occur if hives are situated far from pollutant locations.

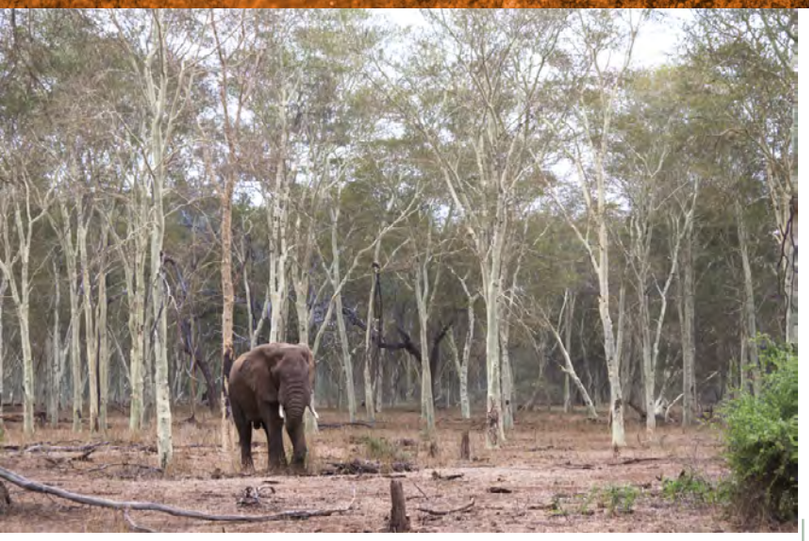
A SALUTE TO CONSERVATION

With over 72,000 buildings and six million hectares of land in its holdings, the United States Navy is looking at cost savings through adopting modern energy saving technologies. The thinking behind the move is that using such technologies as geothermal, solar and tidal power can reduce operating costs enough to offset cuts in military spending.

The conservation campaign has even gone to sea. This year the first aircraft to land on carriers under the power of biofuels were greeted with fanfare. Fuels made from a combination of an algae mixture and used cooking oil powered these planes. As one of the major drivers of US business, the American military is in a position to drive innovation in environmentally advanced technologies.

This may be a case where might meets right for the greater good.

NEW SOLUTIONS FROM OLD SOURCES



One of the key obstacles that has hampered economic development in Africa has been access to energy. Some creative solutions have come from unusual sources.

One oft-quoted example is the electric soccer ball. Soccer is immensely popular in Africa where not all small communities have continuous reliable electricity. The electric soccer ball has a small charging device inside that can be fully charged in two hours while children are playing soccer. Then, when the sun goes down, the soccer ball can be taken indoors and it can power a light bulb for up to three hours so that students can do their homework.

A traditional energy source used by Africans for millennia is biomass and it now turns out that this ancient fuel source is opening the door to greater partnership opportunities.

In Europe, for example, the demand for biomass resulting from renewal energy policies will increase by 50 per cent by 2020. The supply of such material is very limited in Europe, which opens the door for exports from Africa. Business experts agree that Africa has the potential to become the major source of biomass for the European market. A number of projects are currently underway such as the partnership between Denmark and Ghana. Rubber trees which are plentiful in Ghana have a lifecycle of 30 years after which they need to be replanted. The 30-year-old trees are exported as wood chips to Denmark and other European countries to be used as fuel.

Some critics of the program contend that nature should be left to take its course rather than harvest the mature trees for European energy needs. One analyst involved in the program commented that this type of debate points to the lack of global consistency on what sustainability actually means. In the final analysis, it will be up to Africans to determine the degree to which they want to benefit in the global drive for renewal energy.

RAINFOREST TRADEOFF

The country of Norway is hoping that its offer of one billion dollars to Indonesia in return for slowing the disappearance of its rainforests will bring about change.

Indonesia has a pristine area of rainforests and peat bogs the size of the state of Texas but the region is also the location for Indonesia's lucrative palm oil industry. Indonesia's palm oil industry has grown by 400 per cent in the last 20 years and now represents half of global production. The concern of countries like Norway is that the devastation of the rainforests will eliminate their value as a storehouse for greenhouse gases as well as threaten the survival of rare species like the Sumatran tiger.

The grant from Norway, that was made two years ago, was contingent upon Indonesia proving that its moratorium on clear cutting was having an effect on greenhouse gases. The Indonesian government responded that after two years, no accurate measurement tools exist to provide such data. In the absence of this kind of proof, Norway has withheld payment.

OIL FROM TREES

In Columbus, Mississippi, for the first time, crude oil is being manufactured from pine trees. Other communities hope this will be a second chance following the closure of hundreds of paper mills. Investors in the project include high technology entrepreneurs from Silicon Valley in California, who have invested over 16 billion dollars in developing clean energy projects over the last decade.

The process in Columbus is defined as a closed loop. The biomass used to produce the oil is taken from trees and other plants that are then replaced with new planting. The fibre is then taken to a nearby processing plant where the biomass is dried and ground, after which a machine called a reactor turns it into molecules that can be processed as fuel. The resulting mixture, after cooling, turns into oil and gas. The gas is used to produce electricity, which can be recycled back to the processing facility. The crude oil can go to refineries and then on to the car market.

The proponents of the technology are optimistic particularly because it will not generate the debate surrounding corn-based ethanol that some people saw as a waste of edible corn in a world where many inhabitants need food.

The company, KiOR, plans to replicate the process in communities across North America that have also experienced paper mill shutdowns but have a nearby forest resource. The company feels that once its production facilities are up to the required scale, it can produce oil for the same price as conventional oil. Unlike conventional oil, this oil will be sourced from replanted forests rather than forests lost in the time of the dinosaurs.

GROWING YOUR OWN OIL

In the deserts of New Mexico, the world's first algae farm to produce crude oil has opened. Called a "Green Crude Farm", it contains 70 ponds, each the size of a football field.

The ponds are used to grow algae: fast growing creatures that do not need to be fed and produce oil within their cell structure after being exposed to sunlight and carbon dioxide. They are quite comfortable in salty or brackish, dirty water that is hostile to any other species. The genetically engineered single cell creatures are deposited in the water and grow to maturity in five days. At that point, the algae are skimmed from the ponds and put through a chemical process, which separates the oil. Currently, the company can produce 100 barrels of oil a day and hopes to produce 10,000 barrels a day at this single facility in five years.

Although growing your own oil may sound farfetched at this point, the facility has attracted the financial support of some visionary entrepreneurs including Bill Gates.

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BRITISH COLUMBIA

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