

Climate Change Report to the CRD Environment Committee

Committee Chair Vic Derman

Rationale

In January 2016, CRD Board Chair Barb Desjardins asked the Environment Committee to provide a report detailing how the region should respond to climate change. The Board Chair's request is opportune. Recent evidence suggests that climate change is accelerating and poses an ever growing, potentially critical, threat to human society and all species on our planet.

Only three years ago, generally accepted estimates indicated a maximum sea level rise by 2100 of about 33 centimetres or 1/3 of a metre. By 2015, these estimates had been revised to indicate a rise of about 1 metre. Recently, study of the West Antarctic ice sheet revealed deterioration at a much more rapid pace than expected causing researchers to suggest sea level rise of 2 metres by century's end. A subsequent review of this data by the National Oceanic and Atmospheric Administration, a U.S. governmental agency in the Department of Commerce, concluded that a near 3 metre rise could be expected, quite possibly by 2050 – 2060 as described in the following quote:

“ . . . In a presentation at the Risk Management Society's [RIMS 2016 conference](#) in San Diego April 12, a top scientific official with the National Oceanic and Atmospheric Administration said that recent, as-yet-unpublished data from Antarctica suggests that sea levels could rise three meters — almost ten feet — by the middle of the century.

*Margaret Davidson, NOAA's senior advisor for coastal inundation and resilience science and services, told conference attendees that **"the latest field data out of West Antarctic is kind of an OMG thing."** Davidson said that data shows sea level rise could reach three meters by 2050 or 2060, a much steeper rise happening far sooner than even the most catastrophic scenarios currently available in peer-reviewed journals and the far more conservative estimates published by the Intergovernmental Panel on Climate Change. That steep a rise in sea level would put significant parts of many California cities underwater in just two or three decades. . . .”*

These projections have yet to be fully reviewed and accepted by the broader scientific community. Nevertheless, if correct, they suggest a **catastrophic** outcome if serious mitigation does not occur **very** quickly. Severe environmental damage would almost certainly result. Equally alarming are the potential fiscal and social impacts. A three metre rise would eliminate, or put at severe risk, hundreds of trillion dollars of assets. Protecting them would be extremely expensive if it were possible at all. Meanwhile society would likely face hundreds of millions of “sea rise refugees” as low lying coastal areas were inundated or became otherwise unlivable.

Another metric is equally alarming. Delegates at the recent Paris conference on climate change agreed that society cannot exceed an **absolute maximum** of 2 degrees Celsius (C) warming without risking run away climate change. However, the conference also agreed that keeping warming to 1.5 degrees C would better limit damage and provide a much greater margin of

safety. Subsequently, a researcher at Concordia University created a “climate change clock” to indicate when these targets might be reached. His answer: Without a substantial increase in efforts to mitigate, 1.5 C will be reached in about 15 years (2031) with 2.0 degrees being reached in about 26 years (2042). These dates suggest very short time lines to accomplish the paradigm shift that all communities, including our own, may well face. To date, our responses to global warming could best be characterized as incremental and slow. Given the likelihood we are facing an increasingly **urgent** crisis, we must consider the need for an immediate and much more massive response.

Responding to Climate Change in our Region

Mitigation

In the Capital Region, roughly 55% of greenhouse gases (GHG's) are related to transportation with about 35% related to buildings and about 9% related to waste streams. There are a number of initiatives that can mitigate these emissions.

1. Compact Land Use (A Truly Compact Region)

Urban form as determined by land use decisions is probably the biggest single determinant of GHG production. Compact land use, characterized by more people living close to the urban downtown and employment core, can dramatically reduce GHG emissions in a number of ways. With compact land use, transportation needs can be substantially reduced since residents will generally face shorter travel distances to reach what they need or desire. Compact land use can further reduce energy requirements since “less sprawling” infrastructure takes less energy to build, operate, maintain and ultimately replace. Since such infrastructure is also considerably less expensive, it frees up the “regional wallet” and allows for increased investment in other mitigation initiatives. Finally, compact land use reduces pressure on rural and wilderness areas which generally operate as a “carbon sink” around urban cores. This contribution needs to be recognized, valued and preserved.

2. Complete Communities

Complete communities, with very close, local access to much of what residents need and want, can also reduce transportation need and energy use. It should be noted, however, that while dispersed density nodes are more desirable than general sprawl, they still involve substantial transportation needs with many trips made between nodes. This situation requires expensive transportation infrastructure and uses more energy. In addition, other infrastructure required to service diverse density nodes is more expensive to build, operate and ultimately replace than infrastructure for density clustered around the primary urban core. Dispersed density nodes **are** better than

typical sprawl patterns but they do not provide as much benefit as a truly compact community concentrated around a central core. In our region, the Shelbourne Valley, the Douglas Corridor, the Fort Street Corridor and corridors between The City of Victoria and Esquimalt offer excellent opportunities to develop expanded complete communities in close proximity to the downtown core.

3. Reduced Use of Fossil Fuel Energy

For energy use, as for transportation needs, conservation should come first (avoided energy use as fuel). As described prior, energy needs can be further reduced through land use decisions resulting in a truly compact regional form. Energy needs can be further reduced through improvements in building envelopes and orientation (passive solar design) as well as through improved efficiency of equipment for heating, cooling, lighting and entertainment. Energy use that can't be avoided should increasingly be serviced by renewable energy sources such as solar and wind. Moving to these sources could provide the added benefit of a distributed and potentially more resilient grid. Finally, incentive programs such as "pay as you go" residential solar installations (The utility pays **all** up-front costs which the resident pays back from savings) should be created to encourage the necessary shift in energy sourcing. Pay as you go is a very powerful tool that could also be used for energy retrofits to existing buildings.

4. Transportation energy needs

Transportation energy use can be best addressed by committing to a compact region containing complete communities close to the central core. Such a pattern substantially reduces transportation need and encourages alternate transportation modes such as cycling and walking which are distance dependent. Since distances are shorter with compact land form, cycling and walking become more feasible. In addition, more compact land use makes serving residents with good public transit economically more viable.

A shift to preferred modes can also be stimulated by providing infrastructure that makes these modes, safe, comfortable, direct and competitive to use. Attempts should be made to give preferred modes a "competitive advantage" over single occupancy vehicles. Furthermore, the region and its local governments should actively promote a "cultural shift" that sees alternate modes become an accepted, respected and desired choice (e.g. Copenhagen and Amsterdam with cycling).

For those who must continue to utilize the auto, fuels other than fossil carbon (bio-fuels, electricity and hydrogen) need to become the norm. Finally, the shift to priority modes can be accelerated through incentive and an appropriate travel demand management program (TDM) utilizing measures such as increased parking rates for

single occupancy vehicle (SOV) commuters who park their car downtown all day while at work. Pricing road use is another TDM measure that is becoming more common.

5. Waste Streams and Energy Use

While it is largely out of the region's control, reducing the amount of waste produced (e.g. excessive packaging) should be a priority. The region should be proactive in advocating to other levels of government for necessary changes and establish reduction of waste as the highest priority in the hierarchy of "Reduce – Reuse – Recycle" (3 R's). The region should also be proactive in advocating for product design that aims to make implementing the 3 R's easier and more effective.

Wherever possible, "waste" that can't be eliminated should be re-used or used as a fossil carbon use replacement (resource). Solid waste, for example, could be turned into heat and gas. Using waste as a resource could significantly reduce regional GHG emissions. Finally, both liquid and solid waste systems should be designed to minimize net energy requirement for pumping, treatment, transportation and processing.

6. Supporting Infrastructure

Committing to a compact region that requires less extensive supporting infrastructure (roads, water, sewer, stormwater, street lighting etc.), is the best way to reduce energy required to provide these services. However, new technologies such LED street light heads can further reduce energy use for operation while also reducing needs for maintenance and replacement. The region should provide incentives for conversion to more efficient technologies and should advocate to other levels of government for their support. The region could also look at future opportunities for water re-use and rainwater collection as a way of reducing energy used in the distribution system.

7. Natural Capital – The Value of Nature in Providing services

For far too long, we have ignored the value of "infrastructure services" that nature can provide. By removing atmospheric carbon, for example, carbon sinks such as the urban forest and adjacent rural forests are extremely important to GHG mitigation. The urban forest, in particular, provides many other benefits such as cooling and stormwater retention and cleansing. It is likely that a handling stormwater through enhanced natural systems could be cheaper, less energy intensive and more effective than the "pipe to the ocean" approach that we have long used. Every effort should be made to retain and enhance natural infrastructure opportunities in our region.

8. Encourage Local Agriculture

Encouraging local rural and urban agriculture is unlikely to result in substantial **local** GHG mitigation. However, there are GHG emissions associated with transporting

“cheap” food from distant locations. Replacing imported food could reduce emissions on a global basis while helping to provide for food security and regional resilience.

9. Pay Close Attention to Embedded Energy and Life-Cycle Energy Costs

Embedded energy is the energy involved in creating and transporting the material or product been utilized. An electric car, for example, has the advantage that, in operation, it does not use fossil carbon for fuel. It may, however, involve more embedded energy in its creation. In the case of materials, wood may have a substantially reduced “carbon footprint” in comparison to concrete. When making purchasing decisions or decisions about material to be utilized, care should be taken to insure that embedded energy disadvantages do not overwhelm operational advantages of the product or material been considered. Finally, the carbon costs of end of life disposal or recycling should be considered as well. Having said all of this, the “fossil carbon cost” of operation remains a very important life cycle consideration.

10. Fossil Carbon – Price to reflect ALL Costs

Climate change is primarily caused by excessive use of fossil carbon. Unfortunately, the market price of gasoline and other fossil carbon products generally reflects only the cost of obtaining, refining and distributing them. The environmental costs of using these products have not been adequately represented. Ensuring that end price reflects the real costs of using fossil carbon is potentially a **very** important option in the mitigation toolkit. The region and other local governments should advocate strongly for appropriate taxation of fossil carbon use that reflects the environmental costs of using it.

While there are other opportunities for GHG reduction, these 10 initiatives are key to an effective mitigation plan.

Implementation Steps

1. Designing a mitigation strategy absolutely needs to begin with an in depth debate on the question of **urgency**. If the situation is urgent, then it is inappropriate to plan for 10 or 20 or 30 years down the road in a manner that suggests incremental progress over an extended period of time. Instead, we would need an immediate and much more massive response, essentially, a paradigm shift in how we do things. Furthermore, any debate on urgency should be informed by consideration of what is at risk. An urgent situation presents the possibility of massive, possibly fatal, damage to all aspects of human society. We must question whether it is reasonable to take such a risk even if there is only a 20% – 30% likelihood of catastrophic results. Given the draconian nature of the possible outcome, it is reasonable to assert that the precautionary principle

should prevail. Finally, there is the question of leadership. It is unlikely that the challenge of climate change will be met without a very significant effort on the part of communities around the world. There is no good reason why our region should not be among those who lead this effort, especially since the measures needed to combat climate change are likely consistent with goals to create a more sustainable, attractive and livable region.

2. Once a decision on urgency has been reached, it will inform targets, dates and actions necessary to address the issue. Targets and dates are fairly easy to accomplish, however, agreement on how to best mitigate GHG reduction (RGS and other documents have to be involved) will also need to be established. Accomplishing that agreement will not be easy. Committing to a truly compact regional land form, for example, should be an obvious choice but it may be unpalatable to some politicians. Hopefully, a sense of urgent common purpose will prevail. In the end, an encompassing implementation plan needs to be created.
3. Establishing a climate change “lens” is an important part of creating an implementation plan and carrying it out. Mechanisms must be established to insure that planning and goals actually control decision making. All relevant planning, decision making and subsequent action will need to flow through the lens. Planning documents such as the RGS must be **strongly** shaped by the climate lens.
4. The CRD needs to insure that internal decision making and action are also consistent with the climate change lens. To their credit, CRD staff are already working on such mechanisms.
5. The CRD should work with member local governments, stakeholders such as BC Hydro, organization such as UBCM and FCE, and/or other levels of government to implement the following as the core of a mitigation strategy:
 - a. an agreement to plan for a truly compact regional form involving complete communities in close proximity to the downtown core.
 - b. a comprehensive program to reduce energy needs through conservation and increased efficiencies.
 - c. Regulation to require much higher standards for building envelopes, along with incentives to retrofit and increase the energy efficiency of existing stock
 - d. incentive programs designed to speed the transition to renewable energy.
 - e. a commitment to substantially increased funding for priority transportation modes with the goal of creating new infrastructure that provides priority modes with a “competitive advantage.” (This should be built around recognition that a compact

- regional form, makes cycling and walking more feasible and attractive while making public transit more economically viable.
- f. a program to establish a “culture” of cycling. Copenhagen and Amsterdam provide excellent examples of how this can be accomplished.
 - g. incentives for conversion to more efficient “supportive infrastructure” technologies (e.g. LED street lights).
 - h. a TDM program designed to reduce single occupancy vehicle use.
 - i. Incentives to fuel vehicles with alternative to fossil carbon fuels.
 - j. programs to minimize waste including legislation requiring reduced packaging and product design that facilitates the 3 R’s.
 - k. programs to insure that residual waste is utilized as a resource in a manner that optimizes GHG mitigation.
 - l. adoption of an Integrated Resource Management (IRM) approach to handling waste streams when such an approach can reduce energy requirements for waste handling and optimize GHG mitigation from the waste sector.
 - m. an approach to all waste infrastructure projects designed to minimize energy requirements to build and operate said infrastructure. E.g. minimize pumping needs, trucking needs etc.
 - n. programs to preserve and enhance “natural infrastructure” such as the carbon sinks provided by the urban forest and surrounding rural and wilderness areas.
 - o. programs to insure that man-made infrastructure is consistent with and compatible with natural systems. Whenever possible, insure that natural systems are utilized to meet infrastructure needs in a sustainable manner. E.g. stormwater infrastructure
 - p. programs to preserve and enhance local agriculture. To the region’s credit, this is already underway but should be given greater emphasis.
 - q. programs to insure that “embedded” energy is a consideration in all purchases of products or materials.
6. The CRD should co-ordinate the creation of a “Where We Must Go As a Region” document and should insure that it is broadly available to the general public. The general public needs to be brought onside with efforts to mitigate GHG’s and needs to be made aware of the consequences of a failure to act.
 7. Finally, utilizing the power of the market through carbon pricing is one of the best ways to accomplish GHG mitigation. To be effective, such pricing will have to be considerably

more substantial than it is today. In the end, however, the cost of using fossil carbon should be reflective of the environmental damage it creates. The CRD and local governments should lobby other levels of government for taxation on fossil carbon use commensurate with the real costs involved.

Adaptation

Given the latency effect of atmospheric carbon, we will have to deal with serious climate change impacts even if an all-out effort to mitigate started today. Adaptation initiatives should include the following:

- Provide resources to insure estimates of climate change speed and impacts are as current as possible. Insure that staff and politicians are aware of latest projections even if they have not yet become mainstream. Estimates are changing rapidly (e.g. sea level rise). Since feedback loops will likely cause continued climate change acceleration estimates only a few years old may not be reliable.
- Provide resources to model the regional impact of climate change impacts such as sea level rise and extreme weather. Insure that such models are continuously updated with changing projections and model for various scenarios (e.g. model the impact of 1, 2 and 3 metre rises in sea level). Use model results to aid in decision making.
- Base decisions, especially concerning infrastructure, on a range of possible climate change scenarios. Recognize that feedback mechanisms will likely accelerate climate change and provide sufficient margin of error for such a possibility.
- Identify existing infrastructure under threat and plan to protect or re-locate it.
- Identify and plan to deal with environmental threats, e.g. chemical pollution, from existing that may be inundated.
- Include the likely financial costs of climate change adaptation, and mitigation, in projections for near, intermediate and long term regional financial requirements.
- Create a regulatory environment designed to avoid decisions that may increase the cost and difficulty of adapting. (e.g. Avoid allowing additional development in areas that may be impacted by sea level rise). Follow the precautionary principle and, once again, provide sufficient margin to allow for accelerated climate change.
- Where possible use natural systems to help with adaptation. For example, use natural holding areas and filtration to deal with storm water (more frequent large storms are expected). Additional holding areas could be created as “water features” in regional parks and other green space or rural areas. Such holding features could be receiving points for existing systems and could be designed with substantial extra capacity to deal with more frequent large storms.

- Promote local agriculture as a hedge against the possibility that current global food supply systems may be adversely affected as climate change progresses.

In Summary

Climate change today represents an increasing and likely critical threat to human society and the ability of our spaceship to sustain us. As “natural feedback loops” such as wildfires, permafrost melting and “melting” methane hydrates come into play, this threat has the potential to expand very rapidly. Think of the ripple moving through the fabric of society as a consequence of 2 to 3 million Syrian refugees. Multiply that by 100 and you are starting to approximate the societal dislocation resulting from a 2 to 3 metre rise in sea level. We have little choice other than to respond as quickly and appropriately as we can. Meeting the challenge of climate change will require a huge commitment from communities across the globe. There is no good reason why our region should not take a position of leadership in moving to deal with “the massive challenge of our age”.

Unquestionably, many of the decisions we must make will involve financial outlays. In some cases, they will be considerable. When deciding whether or not decisions being considered are “affordable”, the CRD and local governments should ask the question: *“What will be the cost to the planet and ultimately to us, if other local governments around the world were to join us in deciding that we simply can’t afford to respond”*. In all likelihood, we cannot afford not to.