Managing GHG Reduction and Reengineering of the Communication Process

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Abstract

GHG management involves risk assessment, use of the best technologies available as well as best practices, resource allocation, and remediation and mitigation initiatives. Strategies, in turn, must incorporate green energy use, programs for population reduction, increased research and monitoring, and a drop in consumption. Petroleum subsidies, estimated at 40 billion dollars annually, should be steered towards GHG reductions and the creation of an independent Web site dedicated to this issue. Current remediation techniques are too limited, and have yet to be sufficiently tested. Finally, an independent World Environment Agency would need to be founded as a means of counterbalancing today's economically driven worldwide institutions.

Keywords: GHG, Internet, mobilization, consumption, population, energy, democracy

Résumé

La gestion des GES implique la reconnaissance des risques, les meilleures technologies disponibles, les meilleures pratiques, l'allocation des ressources et la remédiation et mitigation. Les stratégies doivent prévoir l'utilisation des énergies vertes et de programmes de réduction de la population, augmentation de la recherche et surveillance et diminution de la consommation. Les techniques de remédiation sont limitées et trop peu testées. Les subventions pétrolières, estimées à 40 milliards de dollars annuellement, devraient être dirigées à la réduction des GES et un site Internet indépendant. Finalement, la création d'une agence mondiale de l'environnement est requise pour faire contrepoids aux institutions mondiales orientées vers la croissance de l'économie.

Mots clés : GES, Internet, mobilisation, consommation, population, énergie, démocratie

1. Introduction

This presentation will refer to two main approaches:

- Managing greenhouse gas (GHG) reduction as an engineering project;
- Reengineering of the communication process.

To begin with the engineering project analogy, the GHG reduction Education and Strategy program would include the following steps:

- Risk assessment;
- Best available technologies and best practices;
- Resources allocation;
- Remediation and mitigation;

Technology is still limited and population should not count on it to resolve our GHG reduction challenge. Instead, communication strategies should focus on managing a worldwide plan.

2. Engineering project analogy

2.1 Risk assessment

Achieving an equilibrium is a goal both in personal life and business practice. It also applies to the environment. The risks of actual GHG emission surplus leading to climate changes are now based on advance computer simulations, worldwide monitoring and scientific researches.

The main consequences of a failure to effectively reduce GHG in the atmosphere would take the form of a loss of control of our climate. These few figures below illustrate how we are already engaged in a set of out of balance problems:

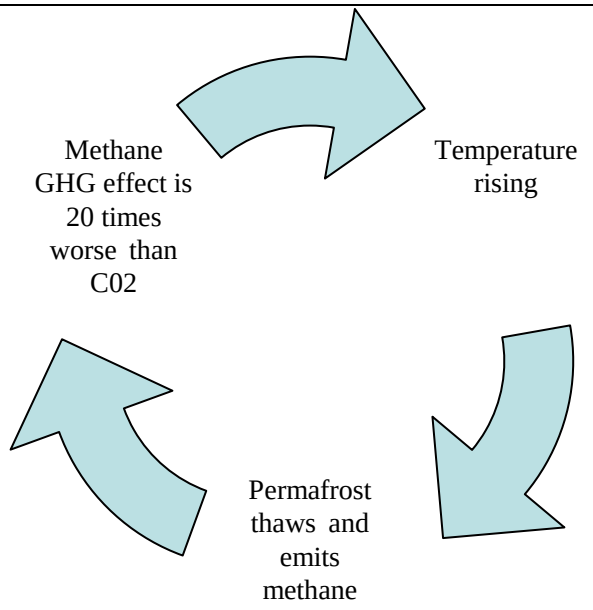

Figure a: Permafrost carbon feedback

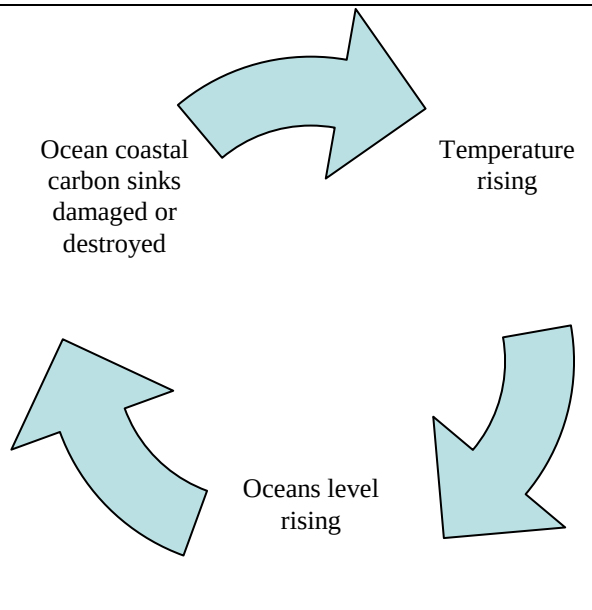

Figure b: Feedback loop of oceans rise, carbon sinks flood and temperature

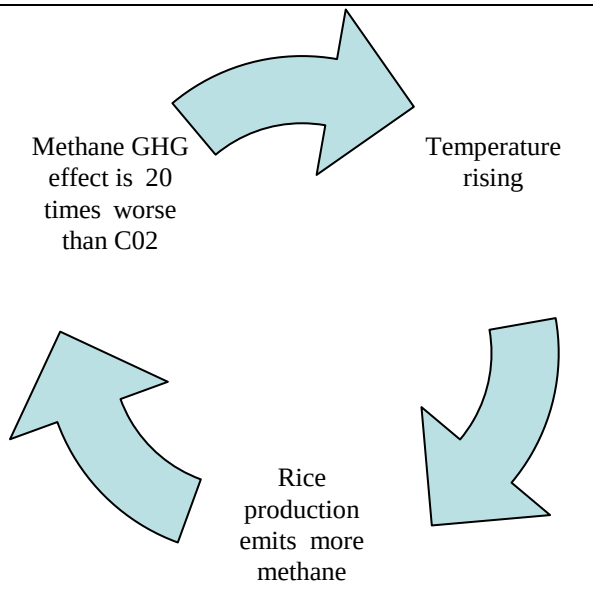

Figure c: Feedback loop of rice production, methane and temperature

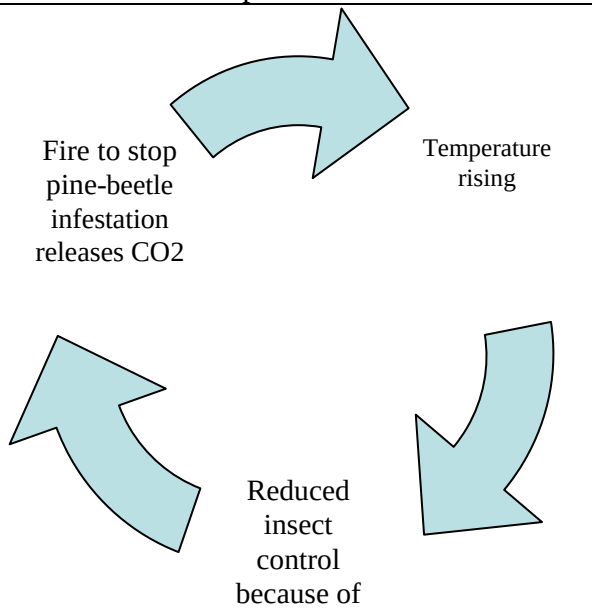

Figure d: Feedback loop of insect control, fire to reduce infestation and temperature

As good project managers, we should have a “worst case scenario” plan addressing the release of large amounts of methane and CO_2 from the frozen permafrost.

Permafrost consists of an active layer of up to two metres in thickness, which thaws in summer and refreezes in winter, and the permanently frozen soil found underneath this top layer. Permafrost contains approximately 1,700 gigatonnes (Gt) of carbon in the form of frozen organic matter, which is nearly twice as much carbon as that currently present in the atmosphere [1]. If the permafrost thaws more extensively, the organic matter will decay, potentially releasing large amounts of CO_2 and methane into the atmosphere. International Permafrost Association (IPA) observations indicate that large-scale permafrost thawing may have already started, and could persist for decades or even centuries after anthropogenic greenhouse gas emissions have stopped [1].

The science on the potential impacts of warming permafrost is relatively new and has not yet been included in climate change modelling [1]. Thus, the current goal of GHG reduction does not take this additional source of greenhouse gas emissions into account.

One of the ultimate possible consequences of loosing control over the climate is to have GHG in amount Earth experienced 56 millions years ago, when deep frozen thick ice near the Arctic Baffin Island was replaced by swamps and CO_2 acidified oceans dissolved the shells [2].

In fact, 2.5 millions years ago, sea levels were 15 meters above actual. James Hansen director of the Goddard Institute of the NASA warns us that this sea level could be seen in the future if there is too much carbon released in the atmosphere [3].

Actually, as the Greenland Ice Sheet melts, sea level rises. Scientists estimate that if it was entirely melted, sea level would rise 7 meters. Approximately one-third of the world population lives in or near the coastal zone, so it could result in billions of refugees [4].

Risks are heavily documented and need to be addressed with a proper plan of actions.

2.2 Best available technologies and best practices

When it comes to the best available technologies, one of the main components of the education and strategy is to let it known clearly and strongly *that technology is not the main response to our challenge,* considering the limited time left to make major changes.

2.2.1 Best available technologies

A combination of many clean energy sources and energy efficiency that would reduce anthropogenic GHG production to zero is probably the best that we can do. We have to give ourselves this first goal. Possibly, it could even not be enough to avoid the worst scenario. Temperature has already increased and methane and CO_2 from the Arctic is probably already at work against this goal. A second goal would be the increase the amount of plant, trees and seashore ecosystems to pump excess CO_2 that is stocked in the atmosphere.

The estimated effect to add fifty percent more trees, which is a huge effort, would lower the global temperature of approximately 0.3°C [5].

Some of the *Best Available Technologies* that produce energy need to be implemented at large. The Intergovernmental Panel on Climate Change [6] says that we are actually technically in power to produce 80% of the world's energy with green ones. Solar energy are used both at domestic scale to personal household needs and large energy production plants totalizing 100 gigawatts [7]. Winds mills are also effective. Wind has sufficient power to give hundred times the world primary energy needs [8]. CETO type sea tide energy is a high efficiency, low investment, low operation cost, low ecosystems damage and definitely needs to be further used. Named after a Greek sea goddess, CETO wave power converter is the first to be fully submerged and to produce high pressure water from the power of waves. By delivering high pressure ashore, the technology allows zero-emission electricity to be produced [9].

The International Energy Agency has made the following economic forecast: every additional dollar invested in clean energy can generate three dollars in future fuel savings by 2050. Unfortunately, ninety percent of the technologies that hold potential for energy and CO_2 emissions savings are failing to meet the deployment objectives needed to achieve the necessary transition to a low-carbon future [10].

2.2.2 Best practices

Additional to the best available energy production technologies, that need to be put on a short term agenda, we also need to implement some *methods or programs* that are described as the *Best Practices*.

Amongst the best practices, a few would give results that can match sustainability needs:

1- Population reduction;
2- Increased research and monitoring programs;
3- Consumption reduction.

Education and strategy regarding population is a highly sensitive topic. Population growth is at the base of most economic systems.

Population reduction programs have been proven successful in Kerala, India poorest and most populous region where birth rate is 1.73 children, compared to 1.66 in Canada [11]. The program that Kerala's family planners put in place was simple and effective. In comparison, the birth rate is 60% below the rate for poor countries in general [12]. Back in time, in 1979, China total fertility rate was 2.8 while Kerala's was 3 [13].

Population reduction should not be targeted only for poor countries. In a matter of equity and, over all, global worldwide efficiency, population reduction should also be encouraged in countries where the GHG contribution per inhabitant in equivalent tons of CO_2 is high, like the United States of America and the Canada. This should be carefully planned to have enough tax contributors to run social security programs properly.

Research and monitoring programs should be given sufficient resources.

Monitoring has proven us:

- That the air temperature has increased by 0.8° C above preindustrial level [14];
- That the humidity in air has increased by 4 % average in the past 25 years [15].

However, monitoring is actually not in place for GHG emission from the permafrost. We have this major risk that is not yet weighted accurately.

Research programs should definitely get much more of our efforts, considering the threats that stand in front of humans in a not so far future. Research subjects are various and unlimited. Here are a few examples:

- Would there be a secure way to have methane partially transformed in the melted permafrost, to reduce GHG emissions?
- How can we rapidly restore a carbon sink devastated habitats?
- Would there be a way to grow a biological carbon sink in municipal waste water?
- How can we reduce food waste by conservation methods, logistic, etc.? (Food waste actually produces methane in landfills.)

Consumption reduction needs to address both energy efficiency and products consumption.

1- Energy efficiency could actually be accounted by the ISO 50001 norm, which is getting more largely used.

However, personal cars are a discouraging example of people going in the opposite way. In 2005-2010, in Quebec, bigger cars and light trucks number have increased [16]:
1750 to 1999 kg -> + 45%
2000 to 3000 kg -> + 68 %
3000 to 4000 kg -> + 828 %

CO_2 emission caps and reduction are getting in place in some US states and Canada provinces and it has been proven successful in countries like Sweden. A fair cap and a *fair pricing* over CO_2 would increase the amount of valuable reduction projects. In May 2012, in Canada, one of the first CO_2 removal project related to a coal power plant was abandoned because CO_2 credits (revenues) were estimated too low [17]. CO_2 Cap and Trade is definitely part of energy efficiency solutions, but CO_2 pricing needs to strongly encourage CO_2 reduction.

2- Consumption reduction

Fewer goods require fewer raw materials and less transportation fuels. Consumption reduction would be achieved through:

- Education towards consumption reduction of goods, leading people to purchase what is a real need;
- Having people paying the real price, a price that reflects real costs;
- Reducing debts, that are in fact borrowing future resources;
- Having information available to choose goods and services that has a smallest carbon footprint, using certifications, eco-labels, and carbon disclosure programs.

2.3 Resources allocations

We have time, money, and human resources in limited quantity. But, time is actually the most limited, even for the most optimistic climate change scenario. James Hansen, director of the

Goddard Institute of the NASA, believes that “evidence shows with reasonable clarity that the level of additional global warming that would put us into dangerous territory is at most 1°C [18].

Since time is extremely limited, the project will need more money and human resources in that short term.

Insurance companies are at the heart of climate change damages. 2011 weather disasters cost an estimated 150 billions worldwide, a roughly 25% increase from the previous year [15]. And this is only money, it does not account for precious life lost.

Infrastructure cost in permafrost areas need also to be taken in account. For example, climate change could add US$6.1 billion to the bill of future costs for public infrastructure in the US state of Alaska between now and 2030 [1].

Most world organisations estimate cost to reduce GHG to be less than what we actually have to pay for its consequences. The Economic Development Cooperation Organization estimates inaction cost to 14% of world average consumption, but reduction to only 5.5% [19].

One the other side, one of the major issues is actual petroleum subsidies. The International Energy Agency estimates it to 40 billions dollars annually [20].

In short, petroleum subsidies money should now be directed to GHG reductions.

2.4 Remediation and mitigation

This last step in the project management is used to find ways to reduce or prevent problems and inconvenience. In our case, there are GHG already accumulated in the atmosphere and increased air temperature. A remediation plan is due. But, it should never be seen as a solution to the global problem. Remediation techniques are far too limited and most of them have never been tested.

A few countries have formed scientists groups to work on what they call geoengineering or climate remediation. One of the remediation projects they suggested would deliver particles to the stratosphere at concentrations sufficient to reflect sun radiation enough to reduce Earth temperature. Actually, this is not reducing GHG amount. This kind of projects gains and losses are hard to evaluate: Would these particles block sun rays and slow down photosynthesis, leading to less CO_2 absorption?

One of the most important recommendations of one of these scientists group, the US Bipartisan Policy Center Task Force on Geoengineering is to create an advisory commission that would debate governance and risk-based decisions, dealing with issues like public engagement, transparency, and interaction with other nations [21].

This recommendation is a good introduction to the second part of this presentation.

3. Reengineering of the communication process

We all know that the GHG reduction worldwide challenge implies worldwide concerted efforts. This means that we need to have a structured planning of our communications and employ experts in social sciences, network technologies and more.

3.1 Analysis of actual mobilization

Actual communication and education strategies toward GHG reduction is not getting the results we need. The majority of the population could lead the democracy, particularly if we use Internet as an informative, survey and voting tool. We would need to address these simple questions in order to initiate a serious process:

- Why don't we listen to scientists regarding GHG and climate changes?
- Which life style could be promoted to set up a few clear goals toward our future?

The majority, the democracy, is not mobilized. Quite a lot of actions inhibitors need to be accounted in the strategy planning. For example:

- Freedom – The population is reluctant to constraints;
- Equity – The population wants to have no more constraints than other people;
- Being concerned – It is easier for people to rely on the scientific, business or politic elites than to rely on themselves;
- Leadership – The community leadership needs to be stronger than resistance to change;
- Understanding – The population in general does not weight risks, impacts, and few have a long term vision.

Actual education groups are doing a great job, but separately. Population is solicited from many groups, resulting in:

- A part of the population feels it is participating "enough";
- Another part of the population could feel discouraged, since results are never a *total* success;
- The rest would think that the groups are "in charge", leaving their individual participation meaningless.

People are asking questions; actually they get answers that fall in two categories: opinions and facts. Wikipedia and other worldwide tools do well in information data base. There are also health related websites that gets good connections with the population. Based on these information successes, now our education strategy needs to get an independent Internet site dedicated to our GHG challenge. Hopefully, this site would be cloned to another site for our other environmental challenges.

3.2 Internet communication

We must get organized. Information – transparent and verified, on a Citizen Worldwide Board could be centralized so we can communicate and work as a team.

Obviously, this is a key component of the strategy. However, most of the information needed is already accounted separately. Furthermore, this work would easily fit in some consequent budget to address our challenge.

3.2.1 Information display

The first suggestion would be to create a section classified by alphabetical order which would include information on the subject and a graph representing personal impact on GHG reduction.

The second suggestion would be to have a board that illustrates actual previsions, monitoring and results. Trust is a part of the mobilization plan, so transparency should never be put aside. Consequently, this board would show sensitive information of: Predicted sea rises, future results of a monitoring campaign of methane permafrost emission, sea acidity level, oil subsidies reduction, results of trees GHG compensation programs, airplane and ship businesses CO_2 reduction, and so on. Population needs to know what is going wrong and their progress toward the goals.

3.2.2 Carbon footprint display

A section of the Board would display the businesses efforts toward the GHG reduction challenge. This would give them some more pressure to perform. Actually, many businesses have adhered to some sort of GHG calculation and display. Even some financial institutions are taking steps to reduce their carbon footprint. But, this information is hard to find. The Board could be helpful for that. Consumers would be aware of this source of information. In fact, consumers would be proud of their green choices.

3.2.3 Linking

Most websites usually have a section for links to other web sites. Actually, really effective groups like green business alliances need to boom worldwide. Likewise, this is possible that independent associations would form and would exchange information to spread their improved practices to other communities. Professional associations could form a branch dedicated to that information exchange. Only independent verified associations are worth to be included in this link page, since it must be kept away from companies that have other interests than GHG reduction.

3.2.4 Designing the Internet site to specific initiatives

We could even add to our Citizen Worldwide board some complementary modules. Middle and low revenues workers are often facing financial constraints. Financial incentives would be an aspect of the strategy that should not be neglected. The citizen Board could include some well designed plans to help people know what they could save or what they could earn, for example:

- Are people interested to know how much they gain- both in their carbon foot print and personal budget, by switching to no or little beef consumption? It is probably worth trying to display this kind of information.
- Would it be possible to have initiatives to earn specially designed CO_2 credits for a group of people who could demonstrate special efforts towards a few targets? Actual tax systems permit equivalent tax reduction program for other purposes.

Globally, the Citizen Worldwide Board would be a bottom-up initiative, coming from the population, to form a democratic movement.

3.3 World Environment Agency

Democracy shall also ask for an independent World Environment Agency. Some influent people have already asked for it. However, it probably would not be created until we realize that we all need a counter-balance to the economically driven present worldwide institutions. At this point, many economists are working to design new economic models that adjust to the reality of our finite resources and limited natural processes regeneration.

4. Conclusion

In conclusion, GHG represents risks that are largely documented and need to be addressed with a proper plan of actions. This includes using green energy, using the best technologies and best practices that includes population reduction, increased research and monitoring programs and consumption reduction. Furthermore, communication needs to make it clear that people involvement in democracy and major changes is a larger part of the solution than technology itself. A World Wide Internet site would be a tool of communication toward our goal to keep in control of our climate.

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6. Biography

Sophie Marcouiller is a chemical engineer graduated in 1997. She wants to add her voice as a member of the public who feels concerned about the environment. Staying informed about GHG risks and solutions is a passion for her. She strongly feels that the population needs to make a shift to get GHG reduction in much higher priority.

Recently, she has been elected at the board of the Réseau des ingénieurs du Québec.