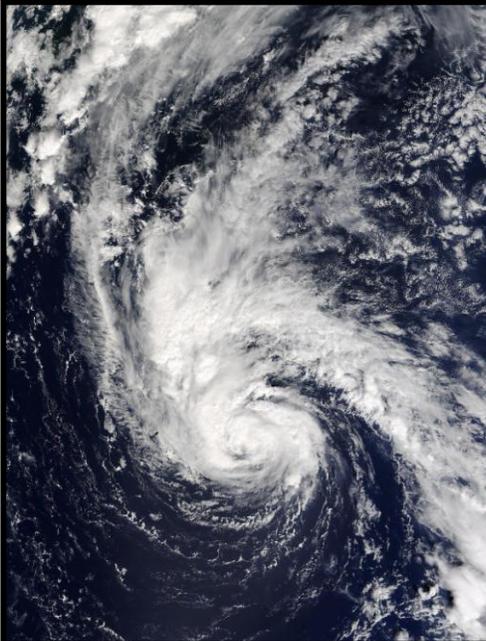




**HRM Climate SMART Community Action Guide to
Climate Change and Emergency Preparedness**

November 2010



ACKNOWLEDGEMENTS

The Halifax Regional Municipality (HRM) is pleased to offer this update to the **HRM Climate SMART Community Action Guide to Climate Change and Emergency Preparedness** (original: September 2006). The original document was a practical guide made possible through the generous funding of Natural Resources Canada's (NRCan) Climate Impact and Adaptation Program (CCIAP), the Federal of Canadian Municipalities (FCM) Green Fund, and the Nova Scotia Department of Energy (DOE). The Nova Scotia Department of Environment, and Environment Canada's Atmospheric Science Division, Atlantic Region, provided their technical and resource support to bring the guide to fruition. Technical advice and professional content development was provided by participating member agencies of the ClimAdapt network www.climadapt.com. In the development of the original document, the Lake Echo Volunteer Fire Station participated in a focus group that helped validate the benefits and practicality of the guide. Inspiration for the development of this guide came from the UNESCO/CDERA Community Emergency Plan, and Family Emergency Plan <http://www.cdera.org/preparedness/>.

The 2010 update serves to ensure the information included in the Guide is up-to-date and accurate based on the current state of global climate change and new technologies. It has been led by HRM's Sustainable Environment Management Office (SEMO), in consultation with HRM's Emergency Management Organization (EMO). HRM established the SEMO office to serve as the corporate lead for sustainability and environmental policy, strategy, reporting, and performance monitoring. Since its establishment in fall 2004, SEMO has taken an integrated systems approach to the environment, focusing on clean land, energy, air and water. The SEMO office also coordinates internal and external education and awareness programs. For more information on SEMO please visit www.halifax.ca/environment/semo.

Project Partners:



LETTER FROM THE MAYOR

Halifax Regional Municipality



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Climate Change is one of the most important issues facing our Municipality today. The Halifax Regional Municipality has taken a leadership role on climate change mitigation and adaptation, receiving both national and international recognition. Climate SMART (Sustainable Mitigation and Adaptation Risk Toolkit) produced a number of tools and studies that will help us work together to adapt to climate change and its impact in our region.

This update to the Climate SMART Community Action Guide to Climate Change and Emergency Preparedness was undertaken as a collaborative effort between our Sustainable Environment Management Office and our Emergency Management Organization. The current update further enhances the great work we've done and provides us with the latest information on the developments of global climate change.

Responding to climate change is everyone's responsibility. This Guide will serve as an important resource for all and includes simple steps to reduce our environmental impact, on how to adapt, prepare for and respond to climate change within our many communities.

Respectfully, I remain

*Peter Kelly
Mayor*



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INTRODUCTION

Why a HRM Climate SMART Community Guide to Climate Change?

One of the greatest challenges facing HRM and the world is from global climate change.

The Global Climate is warming and that warming will result in accelerated sea-level rise and other consequences such as changes in storm intensity and possibly frequency, with serious implications for coastal residents and stakeholders (IPCC, 2007).

Note: The International Panel on Climate Change (IPCC) is a scientific, interdisciplinary body that was established in 1988 by the World Meteorological Association (WMO) and the United Nations Environment Program. It provides decision-makers and others with an objective source of information about climate change. Its role is to assess the latest scientific, technical and socio-economic literature produced worldwide relevant to understanding the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation.

The IPCC regularly publishes its findings in reports that are reviewed and approved by experts and governments from around the world. The IPCC recently released its Fourth Assessment Report, Climate Change: 2007 and will be releasing its Fifth Assessment Report in 2014.

Source: Government of Canada, Climate Change Website www.climatechange.gc.ca

In response to concerns caused by **Global Climate Change**, *the impacts of the predicted changes in climate which are partially associated with climate variability brought about from increased emissions of Green House Gases (GHGs)*, HRM initiated **Climate SMART** (Sustainable Mitigation and Adaptation Risk Toolkit) in 2005. The Climate SMART initiative is an ongoing, leading edge partnership between HRM, the Province of NS, the Government of Canada, and private companies. Its goals are to develop and maintain management and planning tools in preparation for climate change impacts and to develop strategies to reduce practices that contribute to global warming in the first place – primarily by reducing GHG emissions. The original Community Action Guide and this update are part of this initiative. HRM recognizes the importance of preparedness in dealing with the impacts of climate change and through this



initiative is being proactive in its mission to protect citizens and municipal assets from climate change impacts.



Throughout history, Nova Scotians have experienced several extreme weather events. In particular, between March 2003 and February of 2004 Nova Scotia experienced three separate 50-100 year storm events, including severe spring flooding in

March 2003; Hurricane Juan in September of that same year; followed by a major winter storm nicknamed “White Juan” in February 2004. In 2007 HRM was hit by post-tropical storm Noel and in 2009 Hurricane Danny brushed south, causing huge waves along the coast. Most recently, in September of this year, Nova Scotia was hit by Hurricane Earl.

Climate Change is expected to produce greater variability in weather and possibly more extreme storms which in turn will increase the difficulty of protecting coastal zones from potential impacts. The recent weather events in HRM discussed above support existing predictions stating that storms may become more frequent and intense as a result of climate change. Globally averaged mean water vapour, evaporation and precipitation are also projected to increase (IPCC 2007). This will impact HRM with more frequent and higher intensity precipitation events.

Another impact being felt in HRM is sea level rise (SLR). In 2009 HRM partnered with Natural Resources Canada (NRCAN), the Province of Nova Scotia (NS), the Halifax Port Authority, the Waterfront Development Corporation, Dalhousie University and the Applied Geomatics Research Group (AGRG) on a study that examines the potential future effects of sea level rise and storm surges in Halifax Harbour. Relative sea level rise has risen at 3.2 ± 0.13 mm/year since 1920 through a combination of regional subsidence and local SLR. The study used digital ground elevation mapping, trends in sea level rise, climate change science, and various storm events to point to potential effects on harbour front properties. The most plausible scenario for planning purposes at this time indicates that relative sea level rise to the year 2100 is



estimated at 0.73m above current water level. This is based on using the upper limit of IPCC projections for accelerated global mean SLR in Halifax Harbour. Using the 0.73 m prediction, if we then factor in a storm event (storm surge) having a 50-year return period (1.74 m), the resultant water level is 2.67 m, excluding wave run-up. Further studies are currently being undertaken in consultation with other levels of government and universities to enhance this information. For more information on the Sea Level Rise Study please visit <http://halifax.ca/climate>.

Projecting Extreme Water Levels:

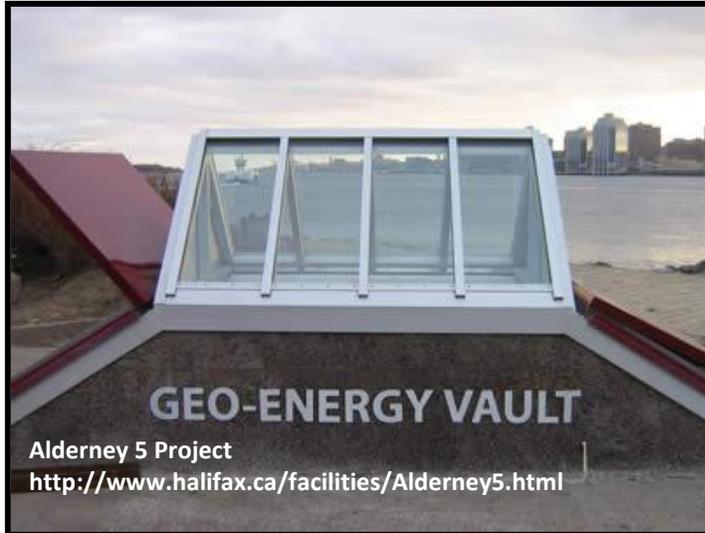
Key components for projecting extreme water levels are:

- ***Rising mean sea level*** - a rise in the surface of the sea due to increased water volume of the ocean and/or sinking of the land.
- ***Land subsistence***- is the motion of a surface (usually, the Earth's surface) as it shifts downward relative to a fixed reference point such as sea-level.
- ***Storm surge (including tide-surge interaction)***- Storm surge is an offshore rise of water associated with a low pressure weather system, typically a tropical cyclone. Storm surges are caused primarily by high winds pushing on the ocean's surface. The wind causes the water to pile up higher than the ordinary sea level.
- ***Wave run-up***- the ultimate height reached by waves after running up the beach and coastal barrier.
- ***Harbour seiche***- is a standing wave (a wave that remains in a stationary position) in an enclosed or partially enclosed body of water (i.e. Halifax Harbour).

The Halifax Regional Municipality (HRM) is committed to becoming a healthy, sustainable, and vibrant community. Halifax Regional Council has identified environmental, social and economic sustainability as an overarching priority. HRM is moving forward with sustainable land use planning through our Regional Planning process and other initiatives such as **HRMbyDesign**. For more information on planning in HRM please visit:

<http://www.halifax.ca/capitaldistrict/RegionalCentreUrbanDesignStudy.html> or
<http://www.halifax.ca/regionalplanning/index.html>.

HRM is involved in a number of initiatives that will better prepare our community to adapt to climate change. For example, as part of the Atlantic Canada Adaptation Solutions project (ACAS) which is part of the Canadian Regional Adaptation Collaborative (RAC) initiative, HRM has partnered with academics and other levels of government to develop a systems based approach to climate change adaptation for Halifax Harbour. Examples of projects that will be undertaken as part of this initiative include completing a land use vulnerability matrix for Halifax Harbour.



As one of the first cities in Canada to become a member of the Federation of Canadian Municipalities (FCM) Partners for Climate Protection Program, HRM has established a Corporate Greenhouse Gas Emission Reduction Plan that targets a 20% reduction from 2002 Greenhouse Gas (GHG) levels by 2012. New targets and commitments are now being developed for 2020 and 2050. Not only does HRM's corporate sustainability philosophy improve the local environment, it realizes significant cost savings thus having a double

benefit for residents. Over the last 5 years almost \$7 million has been invested in energy efficiency initiatives which have resulted in savings of over \$1.2 million. This gives an ROI (overall return on investment) on HRM taxpayer dollars of 18.75%. HRM's GHG reduction plan is working on all levels, economic, social and environmental.

HRM is also in the process of updating the plan, developed in 2006, challenging and supporting the HRM community to reduce GHGs generated by residents, commuters, businesses and industry by 20% below 2002 levels by 2012. These plans include the HRM's Corporate GHG emissions reduction plan and the Community GHG emissions reduction plan. For more information visit: <http://www.halifax.ca/environment/greenhousegases.html>.

HRM recognizes that effective action to address this global problem can only be achieved through a consolidated effort by all stakeholders, including public and private sectors, community groups, and individual citizens. This *Community Action Guide to Climate Change and Emergency Preparedness* has been developed as a tool to help the HRM community minimize climate change and adapt to our changing climate.

Key IPCC (2007) Findings on Coasts:

- Coasts will be exposed to increasing risks
- Impacts of climate change are compounded by human activities
- Costs of adaptation are less than inaction.

What Can WE Do?

As residents and businesses in HRM we need to:

- **Mitigate:** Reduce the Greenhouse Gas Emissions that cause climate change and its unwanted impacts.
- **Adapt:** We can be prepared for changes in our climate by taking steps that will help us to cope with likely impacts.

This guide addresses both Mitigation and Adaptation as these measures are complimentary and need to be implemented simultaneously.

This guide is meant to compliment existing Provincial and Municipal disaster preparedness and response resources. **Please note that emergency response is the responsibility of local authorities such as the local fire department, Nova Scotia Community Services, HRM Emergency Management Operations (EMO), the Red Cross, the Provincial Emergency Management Office (EMO), Police (Halifax Regional and RCMP), and other community authorities.** However, the community must be prepared to respond to emergency events until help arrives from local authorities. Communities can also assist when and where Provincial and Municipal EMO resources are stretched thin, as was the case during Hurricane Juan. Events like this are likely to **increase in frequency as a result of global climate change!**



What Are the Key Elements of the Climate SMART Community Action Guide to Climate Change?

- The guide **provides information** on climate change and its risks.
- The guide **suggests actions** we can all take to reduce GHG emissions that cause climate change.
- The guide provides the **knowledge and the steps** to help us organize our neighbourhoods to prepare for extreme weather events.
- The guide will **help us to develop** a Climate Smart Community Action Plan.
- The guide will **help you provide valuable information to EMOs and HRM** to help them better respond to your community in an extreme event situation.

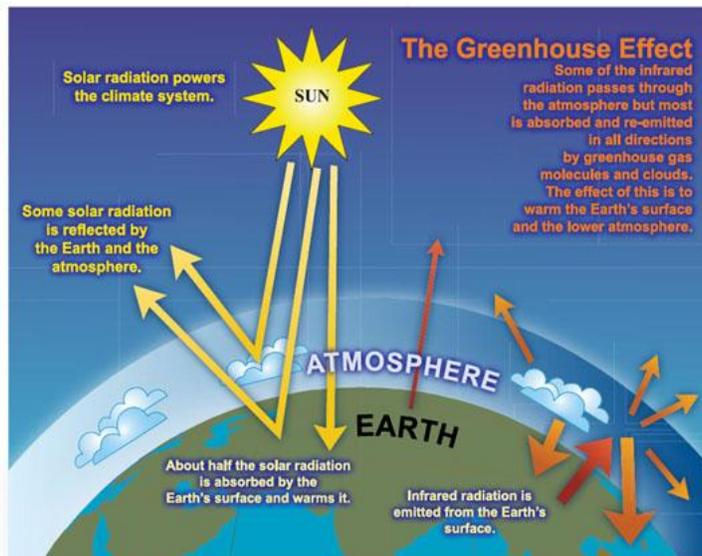
Realistically, because of considerable maritime risk from climate variability and extreme weather events, the HRM community will not be able to adequately respond to these threats without incorporating risk management (“adaptation”), emergency preparedness and response, and GHG emission reduction (“mitigation”) actions into our regular activities. That means while the municipal organization has to consider all these things, so do you, the members of the community. Individuals must work together to create action, and to ensure that collectively we are prepared to handle climate change impacts in a way that is going to protect our communities.

Partners in this initiative strongly urge you to study this guide:

- **to ensure that you are personally prepared for an event; and**
- **to equip yourselves with some tips and minimum risk skills and practices to make your home, community and surrounding environment a safer, more resilient and more climate ‘adaptive’ place to live.**

What is Climate Change?

As you can see from the image below, a natural “blanket” of gases protect the earth from the sun’s more harmful rays, and act like a greenhouse by trapping heat and keeping the earth at a temperature suitable for sustaining human, plant and animal life. This process is called the **Greenhouse Effect**...



What Are Greenhouse Gases?

These are gases caused by the burning of fossil fuels (petroleum, coal) as well as agricultural and industrial activities. GHGs include carbon dioxide, methane, nitrous oxide, and chlorine-based gases. These gases affect our ozone layer and remain in the atmosphere for hundreds of years after they have been emitted.

However, while the greenhouse effect occurs naturally, carbon dioxide and other gases generated by human activity (called Greenhouse Gases or GHGs) are thickening this “blanket” of gases so that the Earth is warming up. This is **Global Warming**.

The warming of the atmosphere is projected to drive other climate factors such as extreme weather events; therefore the term **Climate Change** is being increasingly used to describe the full effects of increased GHGs in the atmosphere.

Why Should We Be Concerned About Global Climate Change?

By the end of the present century, the increase in average temperatures in some regions of Canada, particularly far north, could be as much as 7°C. That may not sound like a big difference, but when we consider that today's average global temperatures are only about 5°C more than they were during the last Ice Age we realize that even small changes can have a major impact. In North America that 5°C change in global average temperatures was enough to melt the vast sheets of ice that once covered much of the continent.

Source: Government of Canada Climate Change Website

As a result of global warming, **glaciers have been melting, sea levels have risen, and climate zones are shifting.** While warmer temperatures may sound like good news here in the cool Maritime climate, climate change is more than a warming trend. Increasing temperatures will lead to changes in many aspects of weather. Some regions will experience more extreme heat, while other may cool slightly. Flooding, drought and intense summer heat could result. Violent storms and other extreme weather events could also result from the increased energy stored in our warming atmosphere. Such climate change could have far-reaching and unpredictable environmental, social and economic consequences.

- Climate change may cause severe weather events – hurricanes, thunderstorms, ice storms, hail, floods and droughts – to occur more often and be more intense.
- Changes in wind and weather patterns can change the amount of plant pollen and mould spores in the area, making conditions worse for people with allergies.
- As climate change brings warmer weather to high latitudes, warmer weather diseases and pests – like the West Nile Virus and the Japanese Beetle – will follow.
- Changes to our ecosystem may make the outbreak of water-borne diseases more likely, and hotter weather may cause more outbreaks of illnesses at lakes and beaches.



- As climate changes pushes temperatures higher we can expect more smog days. More smog and more air pollution will cause increases in respiratory problems. The very young and elderly, and those with chronic lung diseases, such as asthma, are at the greatest risk.



- Lakes and rivers can become contaminated from storm sewer overflows and contaminants picked up and carried by storm runoff during heavy rainstorms and floods.
- Higher temperatures, if not balanced by higher precipitation, would lead to greater evaporation of our lakes and rivers. This could result in lower flows of water that could, in turn, lead to an increase in water-borne diseases and to poor water quality due to increase concentrations of pollutants.

- As temperatures warm, the oceans will expand and ice caps and glaciers will melt, releasing much more freshwater into our oceans, causing sea levels to rise. Canadian research suggests that sea levels in Halifax Harbour could rise by 73cm or more by 2100. Storm surges will be able to flood areas never before flooded. Low-lying coastal areas will be the most threatened.



- The majority of the Atlantic Coast of Nova Scotia, including HRM is highly sensitive to rising sea levels. The most sensitive areas are low-lying salt marshes, barrier beaches, and lagoons. Higher sea levels will cause increase erosion, smaller or disappearing beaches, and flooding of coastal freshwater marshes, and will affect coastal homes, cottages, bridges, wharves, breakwaters and roads.
- Sea-level rise will also increase the risk of saltwater intrusion into wells near the coast.
- Fish, including valuable commercial species such as salmon and cod are very sensitive to temperature. Changes in water temperatures in the oceans, lakes and rivers would likely impact fish growth, health and distribution, with potentially serious impacts on commercial and recreational fishing.
- Climate change may increase the range and extend of organisms responsible for toxic algae blooms such as red tides requiring closure of fishing areas.

- Climate change may increase the risks to forests in Nova Scotia. For example, warmer winter temperatures may allow invasive insects, such as the gypsy moth, to become more pervasive, while warmer, drier summers would increase the threat of forest fires. Forest type may also be affected by climate change. As temperatures increase, our boreal forest may gradually be replaced by temperate forests.



- Higher temperatures, dryer soil and increase insect infestation are expected to reduce crop yields.
- **To read more about climate change impacts expected in the HRM area and Atlantic Canada Visit:**

<http://www.halifax.ca/climate/index.html>

http://adaptation.nrcan.gc.ca/assess/2007/pdf/ch4_e.pdf.



Moving Forward in Response to Climate Change

How Do We Deal With Climate Change?

- **BE INFORMED** about the risks from climate change!
- **TAKE ACTION** to reduce green house gas emissions that contribute to climate change!
- **ORGANIZE** ourselves and our neighbourhoods to prepare for extreme weather events and climate related emergencies!

Dealing with climate change involves taking the following seven steps to mitigate our impacts and adapt to the changes we are experiencing.

Mitigation: **REDUCE GREENHOUSE GAS EMISSIONS**

Step One: Inventory sources of GHG emissions in your homes and communities

Step Two: Reduce our GHG emissions

Adaptation: **MANAGE THE RISKS AND PREPARE FOR CLIMATE RELATED EMERGENCIES**

Step One: Be Aware of how our community may be at risk from climate change

Step Two: Know our vulnerabilities and resources

Step Three: Minimize our risks through adaptation actions

Step Four: Prepare a Climate SMART Action Plan to address climate related emergencies. It should address what to do BEFORE, DURING and AFTER

Step Five: Publicise, test & evaluate the Climate SMART Community Action Plan

WE CAN BE CLIMATE SMART!!!!

Mitigation: REDUCE GREENHOUSE GAS EMISSIONS

Mitigation refers to strategies or measures that reduce the causes of climate change primarily through the reduction of greenhouse gas emissions.

The average Canadian consumer generates over 20 tonnes per year in greenhouse gases from driving our cars, heating our homes and using electricity (David Suzuki Foundation: The Science of the Challenge).

Climate change and air quality problems (e.g., smog, acid rain) are largely caused by the same activity – namely, the burning of fossil fuels. In fact, burning fossil fuels such as coal, oil, gasoline and natural gas is the source of the majority of GHG and air pollutants. Reducing the use of fossil fuel helps to combat both climate change and air pollution, while achieving other benefits. Burning less fossil fuel will also help to protect biodiversity, save money, address energy security issues and save our non-renewable fossil fuels for more critical future needs.

We can do our part to mitigate or lessen climate change by taking actions to reduce our Greenhouse Gas Emissions. This can be achieved in two steps:

STEP ONE: Inventory Sources of GHG Emissions in your Homes and Communities

Think about what you do at home, and in your community that creates GHG emissions. We contribute to greenhouse gas emissions in various ways every day.



Examples of Greenhouse Gas Sources Include:

- **Transportation and Travelling:** including gas/diesel powered engines – which are found in cars, trucks, ATVs, snowmobiles, boats, planes, trains etc.
- **Energy Use:** including home heating and cooling using oil or gas furnaces and hot water tanks, electric baseboard heating systems and air conditioners.
- **Fuelled appliances:** including BBQs, camping stoves and gas lights, which use propane, butane or other gases/fuels.

- **Electric appliances and equipment:** including stoves/ovens, microwaves, refrigerators, computer equipment, televisions, light fixtures, washers and dryers.



- **Water Use:** when you waste water you are using energy (to pump the water to the treatment plant), chemicals (for treating the water coming in and the waste water you are producing) and fuel and labor to get the treatment chemicals to HRM.



- **Burning Garbage:** don't burn garbage, it is illegal. Manage waste properly as outlined by HRM Solid Waste Resources <http://www.halifax.ca/wrms/>.

- **Purchasing non-Local Food and Products:** food and products are often shipped from other provinces, countries and continents. It takes a lot of GHGs to get those products to our homes.



How Can You Inventory or Calculate the GHGs You Produce?

There are plenty of tools online to calculate your GHG emissions. Please see some examples below:

<http://www.ecoaction.gc.ca/tools-outils-eng.cfm>

<http://www.onelesstonne.ca/>

http://www.zeroghg.ca/carbon_calculators.html

<http://www.safeclimate.net/calculator/>

All these tools are a great way to start inventorying what you are contributing to our atmosphere in terms of GHG emissions. They also provide a means of thinking about what you can do to reduce these emissions as outlined in Step Two below.

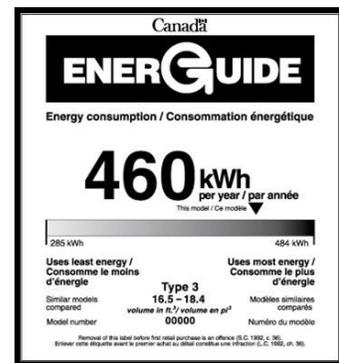
STEP TWO: Reduce Greenhouse Gas Emissions

Think about and make commitments to reducing the GHGs you are producing. Reducing GHG emissions means: conserving energy, using energy more efficiently and using greener forms of energy.

There are many things we can do to reduce the GHG emissions we produce both individually and as a community, examples include:

- Use the information provided by two national programs when purchasing energy-using products to ensure they are the most energy efficient:

- **EnerGuide** compares the energy efficiency of products, including but not limited to different models of household appliances.
- For some of these products **ENERGY STAR**® goes one step further and identifies those models that meet or exceed premium levels of energy efficiency. The **ENERGY STAR**® symbol may even appear on an **EnerGuide** label, therefore you can be sure that the product is among the most energy efficient available.



- When building or renovating your home, choose an **ENERGY STAR**® home, windows, sliding glass doors; install a new energy efficient furnace. To find out more information about saving energy at home and **ENERGY STAR**® please visit http://www.energystar.gov/index.cfm?c=products.pr_save_energy_at_home.



- If available, switch from oil to natural gas for heating and appliances. At a minimum have your furnace checked and maintained annually so that it operates as efficiently as possible.



- Install programmable thermostats and turn down the temperature by two degrees (this will save approximately 500 pounds of carbon dioxide per year, and save you money!).
- Keep blinds, curtains and windows closed during the day in summer. This helps keep your home cooler.
- Ensure you have proper caulking and weather stripping around doors and windows.



- Switch standard incandescent light bulbs to more efficient **ENERGY STAR**[®] qualified compact florescent or LED light bulbs.
- Select the no heat option on your dishwasher's drying cycle.
- Turn off lights and electrical equipment when you don't need it.

- Take public transit; walk, bike and take the bus/ferry wherever possible
- Purchase fuel-efficient vehicles. NRCAN has the following site to help you make your decision when purchasing a car
http://oee.nrcan.gc.ca/transportation/personal/choose_vehicle.cfm.



FACT: A car that averages 8 liters/100km, rather than one that gets 12 litres/100km could save 2 tonnes of GHGs per year (based on a savings of 4 liters/100km and an average of 20000 kms travelled per year).

- Don't idle – when you let your vehicle idle longer than 10 seconds you burn more fuel than you would restarting the engine. Even during our cold winters a vehicle needs no more than 30 seconds of idling to “warm-up” – driving your car warms it up! For more information on idling check the following websites:
http://www.halifax.ca/environment/Reduced_Idling.html
<http://www.drivewiser.ca/>
- Dirty oil can cost you 12% more in gas, while a dirty air filter will cost you up to 10% more in gas. Taking your vehicle into a trusted mechanic at regularly scheduled intervals

ensures your vehicle is consistently driving efficiently (DrivewiseR, Clean Nova Scotia, 2010). Maintain your vehicle properly – a poorly maintained vehicle can increase fuel consumption by up to 50 percent and GHGs by even more.

- Every two PSI (pounds per square inch) that your tire is underinflated costs 1% more gas. That may not seem like a lot, but remember, that’s just for one tire. If all your tires are underinflated by two PSI, then you are needlessly wasting 4% of your gas. Make sure you consult the sticker on the driver’s door jamb or the owner’s manual for your vehicle’s correct tire pressure rating. **NEVER** use the rating on the sidewall of the tire. Also, make sure you check your car’s tire pressure when the tires are cold. When they are warm, you do not get an accurate reading (DrivewiseR, Clean Nova Scotia, 2010).



For more tips on Driving and Vehicle Maintenance visit:

<http://www.drivewiser.ca/>

<http://oee.nrcan.gc.ca/transportation/personal/index.cfm>

- Grow a healthy lawn naturally, and preserve/plant trees. Green areas act as “carbon sinks” – trees other plants and soil soak up carbon in woods, roots, leaves and soil. By providing shade to homes and backyards, trees also have a natural cooling effect. For information on maintaining your lawn sustainably please visit: <http://www.halifax.ca/pesticides/documents/Sus.Lands.capingsignoff.pdf>



- Water conservation is linked to energy use. Typically, 15 percent of an energy bill goes to the heating of water. If you’re keeping an older hot water appliance, insulate the heater itself and at least the first metre of piping. The insulating prevents the loss of valuable energy into thin air. If you’re planning to buy or rent a new water heater, here’s a tip that could save you up to \$100 per year: Bigger isn’t necessarily better. Look at ways to reduce your hot water use. A low-flow showerhead can cut your water use in a shower by more than 30 percent. Fix leaky taps and install tap aerators that provide the same pressure with less water flow. Using low flow taps and toilets and replacing your showerhead with a low-flow model can save 127 kilograms of GHGs/year. For more information on water conservation in your home :

<http://oee.nrcan.gc.ca/residential/personal/water-conservation.cfm?attr=4>



- Start replacing fossil-fuel dependent devices with solar-powered ones, such as solar garden lights and solar powered camping generators.
- When considering a vacation be sure to reflect on how your transportation choice will affect the environment. Did you know that Air Travel produces more than twice the GHG emissions per passenger-km produced by other modes of travel? (www.greenlearning.ca)
- Make the choice for green, clean electricity for your home or business. To learn more visit: www.bullfrogpower.com
- **For more tips on how to conserve energy, cut greenhouse gas emissions and save money:**

Natural Resources Canada's Office of Energy Efficiency website:

<http://oee.nrcan.gc.ca/english/index.cfm>

Conserve Nova Scotia Energy Saving Tips <http://www.conservens.ca/in-the-home/energy-savings-tips.asp>

Adaptation: TAKING ACTION TO REDUCE THE RISKS FROM CLIMATE CHANGE IMPACTS

The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as “Adjustment in natural or human systems to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities”. In other words, adaptation involves the implementation of measures to increase the resilience, or the ability to withstand shocks, of natural or human systems to the direct or indirect effects of a changing climate.

We can do our part to Adapt to Climate Change by taking action to help communities and ecosystems cope with changing climate conditions. Adaptation measures come in many forms and include changing how we build homes and develop properties. Adaptation also includes emergency planning. The following four steps describe how your community can adapt to climate change and be prepared for climate related emergencies.



We can do our part to adapt to climate change impacts through five steps:

STEP ONE: Be Aware of How Your Community May be at Risk from Climate Change

A Hazard is...

A situation with the potential for human injury or death, damage to property, damage to the environment, or some combination of these.

From: HRM Master Emergency Plan

To understand which specific natural and human hazards can create an emergency in our local community, we need to:

- **Be familiar with the damage** (impacts from past emergencies associated with natural weather events). **Identify specific areas, buildings or activities** that during past weather events have been affected by emergencies, such as:

- Hurricanes and winter storms
- Storm surge
- Flooding
- Downed trees and power lines
- Severe coastal erosion (undermining)
- Sewage overflows
- Water supply contamination
- Forest Fire



- **Be familiar with climate change projections and expected extreme weather.**
- **We need to know our community;** we need to involve a wide range of residents and business operators from our neighbourhoods in planning for emergencies.

STEP TWO: Know your Vulnerabilities and your Resources

Vulnerabilities: To determine the potential vulnerabilities in your community, answer the following questions:

- **Are there specific residents that are especially vulnerable to weather emergencies?**
 - Elderly neighbours?
 - Single parent families?
 - Neighbours who are disabled or less mobile?
 - People who live far removed from other neighbours?
- **Are there specific residents/buildings/facilities that are particularly exposed to hazards?**
 - In low lying areas and at risk from flooding?
 - Near lakes/rivers and at risk from flooding?
 - On the coast and at risk from storm surge?
 - In exposed high elevation areas and at risk from wind and lightning?
 - Located along forested/grassland areas and at risk from fire?
 - Rely on shallow or coastal wells that may be impacted from severe weather events such as torrential rains, flooding and storm surges?
 - Road with large trees located next to overhead power lines that may be brought down by high winds, ice storms or hurricanes?



- **Are there any sensitive natural environments in our neighbourhood that are vulnerable to weather emergencies?**
 - Wetland/Pond that received storm runoff (water flows may be excessive or contaminated during torrential rains, hurricanes, etc.)?
 - Lakes, rivers, coastal areas that receive treated or untreated sewage discharge (where contaminants may spread to adjacent properties during storm surges, flooding)?
 - Saltmarsh with nesting birds, which may be inundated by storm surge?
 - Beach with nesting birds, which may be inundated by storm surge?

Resources: What is our capacity to face an emergency, adapt to it to reduce our risk, and prevent future damage?

A resource inventory informs us of the availability of community resources in an emergency. It also helps us determine: where the risks are; our ability to organize; what information is available; and how prepared we are to respond to emergencies.

Community Resources:

Places, things and people that can be used to prepare for and respond to emergencies.

To understand your potential capabilities for dealing with emergency events, answer the following questions:

- What **volunteer base** do we have? (How many individuals, what skills and equipment do they have?)
- What **resources do we have available for managing a Climate SMART Community Action Plan** (i.e. office space/equipment, meetings areas, neighbourhood website, community association, community council)?
- What **potential safe places** are there within and near our community (i.e. churches, schools, community centres)?
- What kind of **equipment is available for sharing** within our community (i.e. sump pumps, chain saws)?
- Are we able to **assemble basic emergency kits** for volunteers?
- What **other useful resources** do we have in the community for responding to climate change related emergency events (i.e. Do we have a local Joint Emergency Management Team)?

STEP THREE: Minimize Risks Through Adaptation Actions

We can minimize our risk of personal injury and property damage by taking action to adapt to Climate Change:

Tips for Minimizing risks:

- Don't build in high-risk locations such as low areas prone to flooding and coastal areas vulnerable to storm surge and erosion.
- Remove dead, damaged or dying trees and replant with new trees.
- Plant local varieties of trees, shrubs and flowers to reduce incidents of invasive pests and exotic species that may be more tolerant to changing climate regimes.
- Support green belts, parks and conservation areas in your neighbourhood, support the urban forest around us in HRM – all these places act as carbon sinks which absorb greenhouses gases and are an integral part of our natural stormwater management system.
- Ensure the timely reporting of and professional removal of any tree limbs from overhead power and telephone lines.
- Where possible, bury electrical and telephone cables underground on the property when building a new home.
- Organise community re-forestation activities to minimize erosion, flash floods and landslides.
- Recognize the value of water catchment areas, such as swales, wetlands, streams and ponds on your property – they handle stormwater flows.



Prevent stress to natural ecosystems so that they may be more resilient to floods, droughts, storms, and infestation:

- Do not discharge untreated sewage from homes and cottages into coastal areas, rivers or streams.
- Use natural fertilizers to reduce pollution of coastal areas and freshwater.
- Don't remove vegetation and trees from coastal areas, which are subject to impacts from climate change, such as erosion.



Adapt to increased risk for disease (West Nile in the future) from a northward drift of tropical parasites:

- Remove cans, bottles, old tires or other articles in your garden that may collect water and become breeding grounds for mosquitoes.

Adapt to risks to water supplies from storm events and from a changing climate:



- Water gardens in the morning or evening to reduce evaporation.
- Respect water conservation orders.
- Recycle water – 'grey water' from sinks can be used to water gardens, get a rain barrel and collect rain water to water garden.
- Mend leaking water pipes; turn off water taps when not in use.
- If drinking water is supplied from a well, install a water treatment system.

STEP FOUR: Prepare a Climate SMART Community Action Plan

Plan what your community will do to prepare for and respond to climate related emergencies.

The foundation of good emergency preparedness for any province or Municipality lies with its citizens. If individuals and families take the time to plan and prepare for potential emergencies in their communities, it helps responding agencies address the crisis much more effectively (Public Safety Canada, 2009).

Prepare a Climate SMART Community Action Plan using this guide.

A Climate SMART Community Action Plan has three phases:

1. **Before** the Emergency
2. **During** the Emergency
3. **After** the Emergency



PHASE 1: BEFORE the Emergency – PREPARE!

1. Establish a Climate SMART Community Action Team made up of Community Volunteers

- Define the skill set available from your volunteers.
- Select a leader.
- Assign responsibilities.
- Assemble a list of team members, with contact information, and distribute amongst the group.
- Develop communication protocols (email, cell phones, order of contact).
- Determine support resources available to the team (administrative, support from local community associations, meeting place, website access).
- Become educated on liability issues – understand what a volunteer should and shouldn't do in the event of an emergency.
- Become informed about emergency response agencies – who will be in charge, what each agency does (see Phase 2 – During the Event).
- Make contact with the local first response agency (likely the local Fire department) and your local Joint Emergency Management Team, if there is one in your area, to inform them of the Community Action Plan and Team. Involve them in its development and provide them with any information you gather.

2. Identify Risks and Hazards in our Community

In order to quickly identify areas at risk during weather emergencies, we need to develop a Risk Map for our community. A risk map is simple and easy to prepare:

- Use a map of your community that shows all the streets by name as well as major environmental features such as lakes, rivers and wetlands (this can be a purchased map or hand drawn, or a combination. The Municipality can supply you with a map of your area upon request). The map should be complete.
- Identify particular properties and areas that are at risk and note the reason why.
- Update the map regularly if new roads are built.
- Ideally the map would be available to volunteers via e-mail or on a community website. Otherwise make colour copies and distribute. All volunteers should have a copy.
- A copy should be provided to the first responders in your community and the municipality.

A property may be at risk if:

- The bottom floor of the house is less than 5 metres above high tide.
- It is prone to flooding.
- The shoreline is eroding.
- There are large, dead or dying trees near the house or nearby power lines.
- The resident(s) are ill, elderly, have limited mobility, are single parents, etc.

Note: if you are interested in undertaking such an exercise, contact the Sustainable Environment Management Office for more information on how HRM can help 490-6028.

3. Identify Community Resources

VOLUNTEERS

Identify a list of community individuals willing and able to assist the Climate SMART Community Action Team to respond in emergency situations. A list of names, addresses and contact numbers should be developed and maintained and accessible to several lead volunteers.

SAFE PLACES

List and show on a **Resources Map** any green spaces, parking lots and community centres/arenas that could function as temporary emergency shelters /evacuation areas. The HRM Emergency Management Organization will identify these for particular emergencies and put public service announcements on all local media.

FLOODING EQUIPMENT

Develop a list of sump pumps available in your neighbourhood, for residents to borrow in the event of an emergency.

MEANS OF TRANSPORTATION

Develop a list of residents and business operators willing to transport equipment and/or people (to hospital, safe places) when those in need are not able to provide transportation themselves in an emergency.

BASIC FIRST AID EQUIPMENT

Assemble basic first aid kits available to volunteers who will act in emergency situations.

COMMUNITY ORGANIZATIONS

Develop and maintain a list of contacts (names and phone numbers) of agencies that may provide assistance to your community during emergencies. This may include the local Fire Department, Ground Search and Rescue, Red Cross, Salvation Army, Food Banks, and community associations such as ratepayers associations, Rotary or Lions Clubs, cultural and religious associations. Contact the local fire department to prioritize the list of contacts for your neighbourhood.

4. Identify the Actions to be taken by the Climate SMART Community Action Team

This may include:

- Practicing emergency response measures/plans before any emergency event.
- Meeting to identify areas/people at risk (using the Risk Map prepared in advance) once a weather warning is issued.
- Contacting at risk individuals to confirm their risk and to offer assistance. *For example, should the team check on an elderly neighbour? Set times to check-in; provide contact numbers they need to call if they require assistance.*
- Contacting sump pump owners who have volunteered to share their equipment, to be on stand by when flooding is expected.
- Arranging transport of people and/or equipment, if necessary. Actions may be specified for particular events such as hurricanes, power outages (particularly in winter time), flooding, storm surge, forest fires etc.

5. Inform the Community of the Climate SMART Community Action Plan

This should also include education on individual preparedness.

See the following list for recommendations on the contents of an emergency kit.

Individual Emergency Pack and Equipment

You should encourage everyone in your community to have emergency supplies available for times of power outages, severe weather emergencies or evacuation.

- Water (at least two Litres per person per day). Use small bottles that can be carried in case of an evacuation order.
- Camping Stove, Cooking Fuel
- First Aid Kit
- Wind-up or Battery Powered Flashlight and Extra Batteries
- Candles and Candleholders, waterproof matches (remember to be careful of fire, electric candles are also available for purchase, and would be the safest option.
- Matches or Lighter
- Battery Operated or Wind-up Radio and Extra Batteries
- Cell Phone for Communication
- Food that won't spoil, non-perishable, including canned and dried foods and energy bars. It is Smart to plan for a food supply for at least 72 hours.
- Manual Can opener
- Cash (small bills) and change (for pay phones)
- Personal Emergency Plan
- Contact List of Emergency Services
- Extra Warm, Dry Clothing
- Extra Keys for your car and house
- Medications, prescription medications, important documents, infant formula, pet food, special items for family members with disabilities or special needs, or any other items necessary to personalize your kit

The Nova Scotia Emergency Management Office website contains valuable information for individual preparedness. <http://emo.gov.ns.ca/content/individuals>.

HRM EMO website contains additional information related to individual preparedness <http://www.halifax.ca/EMO/household.html>.

The Public Safety and Emergency Preparedness Canada website provides a guide containing information on what you can do during the first 72 hours of an emergency (2009) - <http://www.getprepared.gc.ca/fl/pub/ep-gd-prprtn-eng.pdf>

Tip: If using a back-up generator, have it installed by a professional and operate it according to the manufacturer's directions, in order to avoid other hazards such as fire and carbon monoxide inhalation.

PHASE 2: During the Emergency – RESPOND!!!

Emergency Response is the responsibility of organizations and authorities, such as the **local fire department, HRM Emergency Management Operations (EMO), Halifax Regional Police, the RCMP, 911, the Red Cross, the Salvation Army and Nova Scotia Community Services**. A list of these agencies and contacts is provided at the end of this guide.

These agencies have the responsibility, training and resources to:

- Issue orders for evacuation and inform the community.
- Identify safe places for evacuation.
- Provide emergency response and first aid.
- Deal with downed power lines.
- Clear streets of downed trees and debris.
- Identify which water supplies are contaminated and which are safe.

BUT....

The community can be prepared to assist when and where the EMO resources are stretched thin and until help arrives.

During the Emergency the Climate SMART Community Action Team should initiate their Climate SMART Community Action Plan:

- The Team should briefly confer to assign and confirm responsibilities and availability of Team Members
- Establish contact with local emergency response agencies.
- In consultation with emergency management authorities, identify meeting points and temporary community shelters to be available during the emergency. **Systematically communicate with your neighbours:**

- Provide information on emergency procedures underway during an emergency.
 - Identify anyone requiring assistance.
 - Encourage residents to keep young children at home during the emergency.
 - Encourage residents to stay off the roads during the emergency to keep emergency routes clear for emergency and clean up vehicles.
- Team members to maintain regular communication amongst themselves.
 - Provide Assistance to residents in need:
 - Transport to safe places or medical facilities.
 - Arrange for temporary shelter and/or food supply within the community.
 - Locate and if necessary transport emergency supplies or equipment available in the community.
 - Provide a preliminary damage assessment to local authorities.

PHASE 3: After the Emergency –REHABILITATION AND RECOVERY

We can't avoid natural disasters, but we can minimize their impact and damage! Recovery, involves two things, Rehabilitation and Restoration.

REHABILITATION

During this Phase, you can help to re-establish critical services and meet the needs of the affected community.

Rehabilitation actions may include the following:

- Organize Neighbourhood Action Teams to assist with basic rehabilitation tasks such as helping to clear debris from houses and properties. ***Please note that large trees and trees against or near power lines pose a very real and significant danger and require removal by qualified individuals. Please contact HRM Transportation and Public Works or Nova Scotia Power in these situations.***
- Conduct an assessment of local community damage and basic community needs, and report to the appropriate local authority.

RECONSTRUCTION

Reconstruction is the process of restoring structures and environment affected by the event to their original state.

Reconstruction actions may include:

- Cleaning up your own property and adjacent areas.
- Volunteering your support to municipal and community organizations in their efforts to repair/reconstruct local community buildings, facilities and green spaces.
- Helping to set-up community-based neighbour-to-neighbour support groups to help victims overcome post-traumatic stress syndrome.
- Respect emergency public service announcements (tune into Community Information Radio 107.7 FM), and pay particular attention to emergency curfews and traffic restrictions.

STEP Five: Publicize, Test and Evaluate the Action Plan

To Test and Evaluate the Community Action Plan:

- Inform your community about the plan.
- Provide information on the plan (perhaps through a community meeting).
- Hold a realistic emergency simulation. This will show you:
 - The plan's effectiveness;
 - What works or needs changing to be effective;
 - Who knows and remembers what.

PLEASE REMEMBER:

Prevention and preparedness planning equip us for extreme weather and emergencies. They are the best community adaptation measures to reduce the risks associated with global climate change.

Climate Change Resources and Emergency Links

Please fill in the phone numbers for your community.

- **911** (Fire, Ambulance, Police)
- **Local Fire Department:** _____
- **HRM Emergency Management Organization:** <http://www.halifax.ca/emo/index.html>
 - For emergency dial 911
 - General inquiries, Mon – Fri, 8:30-4:30 490-5400
- For information on Climate Change, **HRM’s Sustainable Environment Management Office:** <http://www.halifax.ca/environment/sem.html>
 - 490-6028.
- **Nova Scotia Emergency Management Office:** <http://emo.gov.ns.ca/>
 - For emergency, dial 911
 - General inquiries 424-5620
 - Toll free 1-866-424-5620
- **Nova Scotia Power Inc. (NSPI):** <http://www.nspower.ca/en/home/residential/outageinformation/>
 - For outage information 24 hours a day 1-877-428-6004 (toll free)
- **HRM Transportation and Public Works:**
 - For trees down on roads, snow removal, sewage overflows, road flooding
 - HRM call Centre (490-4000)
- **Nova Scotia Community Services:** <http://www.gov.ns.ca/coms/department/EmergencyServices.html>
 - Community Services Emergency Social Services Program, General Inquiries: 902-424-8333
- **Canadian Red Cross:** <http://www.redcross.ca/article.asp?id=6420&tid=065>
 - Halifax Regional Service Centre 902-423-3680
- **Salvation Army:**
 - Maritime Divisional Headquarters 455-1201
 - Halifax Disaster/ Emergency Services 422-1598
- **Public Safety Canada:** <http://www.publicsafety.gc.ca/>

- Emergency Preparedness 426-2082
- **Environment Canada Climate Centre:**
 - <http://www.ec.gc.ca/ccmac-cccma/> - Climate Modelling
 - http://www.weatheroffice.gc.ca/canada_e.html (provides weather forecasts and warnings)
 - For weather reports (426-9090)
- **Halifax Regional Water Commission:**
 - The 24 hour emergency number is **490-6940**.

Reference Documents and Links

- HRM Climate SMART Information: <http://www.halifax.ca/climate/index.html>
- UNESCO/CDERA Community Emergency Plan, and Family Emergency Plan <http://www.cdera.org/preparedness/>
- ClimADAPT Website: <http://www.climadapt.com/>
- Climate Change Nova Scotia Website: <http://climatechange.gov.ns.ca/>
- Government of Canada, Climate Change Website www.climatechange.gc.ca
- Government of Canada EcoAction Tools and Calculators: <http://www.ecoaction.gc.ca/tools-outils-eng.cfm>
- One less Tonne will show the typical GHG reductions and energy savings options associated with each action you choose: <http://www.onelesstonne.ca/>
- Emissions Calculator: http://www.zeroghg.ca/carbon_calculators.html
- The SafeClimate carbon footprint calculator allows you to determine carbon dioxide emissions from major sources: home energy consumption and transportation by car and plane. <http://www.safeclimate.net/calculator/>
- From Impacts to Adaptation: Canada in a Changing Climate 2007 , *Chapter 4*, Atlantic Canada: http://adaptation.nrcan.gc.ca/assess/2007/pdf/ch4_e.pdf.
- HRM by Design: <http://www.halifax.ca/capitaldistrict/RegionalCentreUrbanDesignStudy.html>
- HRM Regional Planning: <http://www.halifax.ca/regionalplanning/index.html>

- Government of Canada, Climate Change Website www.climatechange.gc.ca
- Energy Star Webpage:
http://www.energystar.gov/index.cfm?c=products.pr_save_energy_at_home
- EnerGuide Website: <http://oee.nrcan.gc.ca/energuide/index.cfm>
- NRCan Decision Tool for picking a personal vehicle:
http://oee.nrcan.gc.ca/transportation/personal/choose_vehicle.cfm
- HRM Anti-Idling Info: http://www.halifax.ca/environment/Reduced_Idling.html
- **DriveWiser** is a fuel efficiency program for the province of Nova Scotia, Canada. We help drivers get from point A to point B using the least amount of fuel possible- saving you money and reducing your CO2 emissions: <http://www.drivewiser.ca/>
- HRM Pesticide Information:
<http://www.halifax.ca/pesticides/documents/Sus.Landscapingsignoff.pdf>
- Conserve Nova Scotia Energy Saving Tips: <http://www.conservens.ca/in-the-home/energy-savings-tips.asp>
- Natural Resources Canada's Office of Energy Efficiency website:
<http://oee.nrcan.gc.ca/english/index.cfm>
- HRM Solid Waste Resources: <http://www.halifax.ca/wrms/>
- Bullfrog Power: www.bullfrogpower.com

Other Useful Sites:

- Red Cross/Red Crescent Climate Centre: Preparedness for Climate Change, Implications for the International Federation of the Red Cross & Red Crescent Societies. A Study to assess the future impact of climatic changes upon the frequency and severity of disasters, and the implications for humanitarian response and preparedness. www.climatecentre.org; climatecentre@redcross.nl
- Intergovernmental Panel on Climate Change (IPCC): The IPCC website includes a vast array of reports on current scientific consensus on climate change, including the IPCC Fourth Assessment Report: Climate Change 2007 (AR4): www.ipcc.ch
- United Nations Framework Convention on Climate Change (UNFCCC): The UNFCCC is the international mechanism for negotiations on climate change:

www.unfccc.org

- RETScreen International Clean Energy Decision Support Centre: RetScreen seeks to build the capacity of community planners, decision-makers and industry to implement renewable energy and energy efficiency projects by; developing decision-making tools. Tools include: software, training materials, e-textbooks and case studies relating to wind energy, small hydro, biomass and solar air/water heat: www.retscreen.net
- World Meteorological Association: The WMO coordinates global scientific activity on issues like: weather prediction, climate change, depletion of the ozone layer, and air pollution. There are links to weather and climate forecasts, and a listing of National Weather Services: www.wmo.ch
- United Nations International Strategy for Disaster Reduction (UNISDR): The UN body that promotes disaster risk reduction: www.unisdr.org
- Provention Consortium: The Provention Consortium, currently based at the International Federation of the Red Cross/Red Crescent in Geneva, is a global coalition of governments, international organizations, academic institutions, private sector and civil society organizations dedicated to increasing the safety of vulnerable communities, and reducing the impact of disasters in developing countries: www.proventionconsortium.org
- www.novaweather.net. The website has reports and photos of major weather events and current weather information.