A REPORT

CLIMATE CHANGE AND IDAHO: RECOMMENDED LEGISLATIVE ACTIONS FOR MITIGATION

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For presentation to
All members of the Idaho Legislature

May 7, 2007

EXECUTIVE SUMMARY

Early in January, our graduate social work class began discussions about global warming and climate change. We quickly concluded that climate change was of paramount importance as an ecological, economic, and social justice issue. We then dedicated our semester to a study of the issues surrounding climate change and to an investigation of appropriate state-level responses to climate change that could be implemented in Idaho. This Report is a synthesis of our semester-long investigation and inquiry.

We first studied the phenomena of global warming and climate change. We quickly discovered that our most respected scientific bodies have concluded unequivocally that global warming is happening and that humans are contributing to increasing global temperatures by worldwide consumption of fossil fuels and destruction of forests. We learned about rises in global temperatures and the correlation between human activity and temperature increases.

We studied the impacts of climate change on both global and local levels. We learned of global projections of decreased agricultural yields as the frequency of droughts and floods increases. We learned of rising sea levels resulting in contamination of fresh ground water by coastal salt water, further stressing human areas already potentially impacted by drought. We learned of changes to fish habitats that are expected to threaten several marine mammal and bird species with extinction. We learned of areas of rapid urbanization that will be vulnerable to problems with sanitation and a shortage of clean water. We learned of the potential human health risks of death, disease, malnutrition, and injury caused by environmental changes due to global climate change.

We looked at Idaho and at the potential impacts of climate change on our own local communities. We read about the threats to our many species of trout and salmon as our rivers are continually threatened with pollution, development, and rising water temperatures. We read about the potential decrease in snow packs and spring runoffs, which could lead to devastating effects for our farmers, our fish, and our outdoor enthusiasts. We read about potential fire dangers and loss of biodiversity in our acclaimed Idaho forests. We read about potential dire economic consequences as our ski resorts trim their seasons and our farmers find themselves with less ability to irrigate their crops.

The calamitous consequences of unmitigated global climate change are daunting, but we were heartened to learn that Idaho and other states had looked at the crisis and had recognized that states have the ability—and the imperative—to take action. States nationwide have implemented legislation to combat climate change. States have passed policies aimed at improving energy production and efficiency; they have provided for clean car and truck programs to reduce harmful emissions; they have made available to their citizens financial incentive programs that can be used to offset

the financial investments necessary to implement eco-friendly technologies; and they have put into place programs that advocate for and track greenhouse gas pollution reduction.

We studied what states across our country are doing to decrease the negative impacts of global climate change, and based upon that study, we recommend that the following policies be implemented in Idaho so that we, too, can do our part.

Recommendations

1. The Idaho Legislature, in collaboration with the Office of the Governor, should appoint a State of Idaho Climate Change Advisory Commission to

    a. assess the potential impacts and costs of climate change to the economy of Idaho;

    b. inventory emissions of greenhouse gases in Idaho;

    c. develop an Idaho state plan with recommendations for comprehensive, equitable, and cost-effective remedial actions for reducing and/or sequestering greenhouse gases;

    d. assess progress in the reduction of greenhouse gases in Idaho;

    e. explore opportunities for research on mitigation and adaptation to climate change in Idaho;

    f. educate the public about climate change; and

    g. explore economic opportunities involved in various policy options for reducing greenhouse gas emissions.

2. Adopt a renewable portfolio standard modeled after Colorado, Montana, and Nevada, with a target of 20% of energy from renewable sources by 2015, with an emphasis on new and clean renewable sources and no loopholes for hydrocarbon sources.

3. Implement an energy conservation program that improves the energy efficiency in agriculture and in commercial and industrial buildings.

4. Implement an energy efficiency program that supports energy-efficient construction in new housing and commercial developments.

5. Adopt a Public Benefit fund, generation money from electric and gas utility consumers. The Fund would be best used to support programs for renewable energy research and development, low-income energy

assistance, as well as improving energy efficiency in residential and commercial developments.

6. Encourage consumers to be involved in Green Pricing and Net Metering. This could be accomplished through tax incentives and legislation that would allow for fewer restrictions on amounts that can be saved through net metering.

7. Use more combined heat and power (CHP) on Idaho's farms and at waste water treatment plants.

8. Adopt the Super Ultra-Low Emission Vehicles (SULEV) standards, which will significantly reduce emissions in Idaho.

9. Encourage increased use of alternative fuels as another way to reduce the state's impact on climate change and to encourage a cost-efficient alternative to gasoline. One way to do this would be to implement individual tax credits for the use of alternative fuels and the purchase of Alternative Fuel Vehicles.

10. Establish a Public Facility Efficiency Energy Program that would offer no-interest loans to update and remodel public buildings with energy efficient designs.

11. Establish a Recommissioning Program that would offer consultation and advice regarding energy efficient measures to those wishing to remodel historical buildings.

12. Expand Idaho's existing low-interest biomass loans program to reduce harmful emissions and raise production of renewable energy by encouraging and facilitating the implementation of anaerobic digesters on Idaho's dairy farms.

13. Weatherize all homes at all income levels. One way to increasing the number of homes that are weatherized is through educating residents of Idaho of the benefits and incentives, both financial and environmental, of weatherization. Another important act would be to increase the LIHEAP Income Eligibility Level in Idaho to at least 200% of the Federal Poverty Level, thus making more families eligible for full assistance.

14. Increase carbon sequestration with the planting of new forests on poorly stocked forest lands.

15. Implement practices associated with nutrient management, such as direct seeding.

16. Produce and use biomass energy sources. Current potential biofuels already produced in Idaho include corn, wheat, canola, and barley.

17. Plant new forests on marginal croplands

18. Increase use and production of ethanol.

All that we, a group of interested students—and Idahoans, learned throughout our semester of study and discussion is reported below. We offer this Report as citizens of the great state of Idaho who respect and appreciate the unique opportunities afforded to us by living in such a geographically diverse and natural resource-rich state. We offer this Report as citizens concerned for the future economic and ecological health of our state. And we offer this Report as the current generation of Idahoans who want to preserve our state so that it can be appreciated and enjoyed by all future generations. We hope that our elected officials will use the information in this report to start a dialogue about climate change and to implement responsible state-level legislation that will help all the citizens of Idaho do their part to combat this serious problem.
We hope that Idaho's policy makers will recognize and protect the trust that we, the citizens of Idaho, have given them and that they will work to save our state.

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I. Introduction

When the Frank Church Institute invited Al Gore to keynote its January 2007 Boise State University Conference, Global Warming: Beyond the Inconvenient Truth, the prospect of 10,000 Idahoans turning out to listen to Gore probably seemed somewhat less likely than the Boise State Broncos winning the Fiesta Bowl.

Nonetheless, the Broncos won and, when 700 tickets for the Gore event were distributed in less than 10 minutes after the box office opened, his keynote was relocated to the university's 10,000 seat basketball arena. After distributing 785 more tickets to students and reserving 2,000 for students away for the holidays, all available tickets were snapped up at $5 each in less than 6 hours. Lines at two box office locations were estimated at over 500 hundred persons each. Global warming had become a hot topic in Idaho.

Although the Idaho Legislature is beginning to address the implications of global warming generated climate change, Idaho lags behind many other states in state level actions designed to reduce the emissions of greenhouse gases that contribute to global warming.

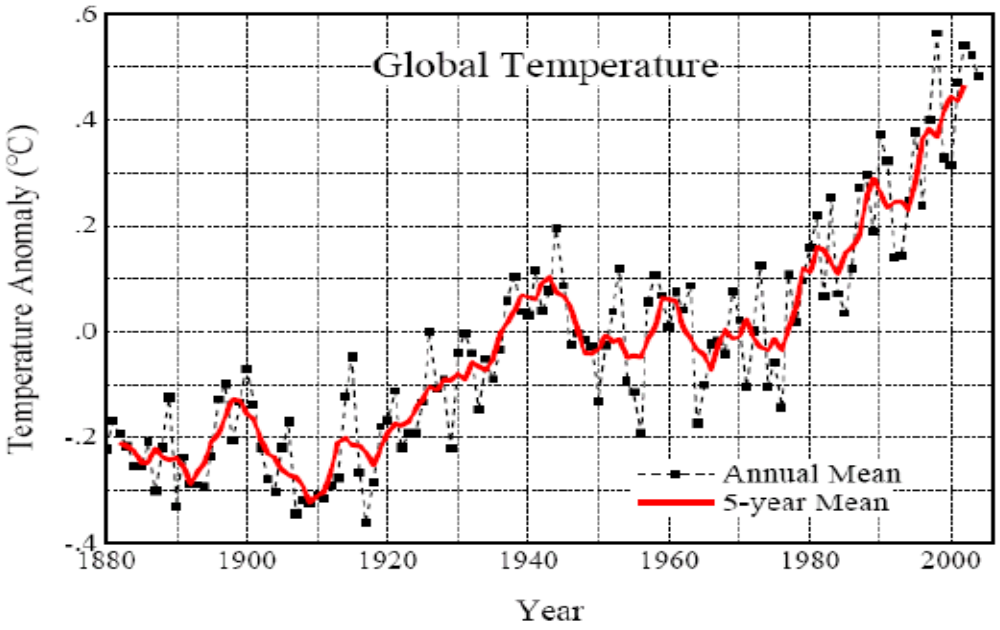
This briefing paper begins by discussing the causes of global warming; the growing scientific consensus that global warming is occurring and is being affected by human activity; and the global implications of climate change for weather, the economy, farming and ranching, forestry, employment, leisure and recreation, and human health and well-being. The paper then addresses the implications of global warming for Idaho and the Pacific Northwest and discusses actions being taken in other states to reduce greenhouse gas emissions. It concludes with a set of recommendations to the Idaho Legislature for policy consideration in Idaho.

II. Global Warming and Climate Change

Our world is getting hotter. This fact is not in question. Our most respected scientific bodies have concluded unequivocally that global warming is happening and that humans are contributing to increasing temperatures by worldwide consumption of fossil fuels and destruction of forests. The most recent scientific consensus statement is "Climate Change 2007," a report by the United Nations Intergovernmental Panel on Climate Change. *Volume One: The Physical Science Basis* represents six years of work by 600 authors from 40 countries. It was reviewed by 620 expert reviewers and representatives of 113 governments. *Volume Two: Impacts, Adaptation and Vulnerability*, the work of more than 450 lead authors and 800 contributing authors from 131 countries, was reviewed by more than 2500 scientific experts before its release on April 6, 2007. *Volume Three: Mitigation of Climate Change* will be released on May 7, 2007.[1]

[1] Intergovernmental Panel on Climate Change (2007). Retrieved on April 1, 2007, from http://www.ipcc.ch/

Although the earth has experienced periods of heating and cooling in the past that have affected the climate and the planet's ability to sustain various forms of life, global warming is occurring currently at previously unprecedented rates as a consequence of release of human-generated greenhouse gases into the atmosphere. The following graph shows that 16 of the hottest years recorded worldwide have occurred since 1980.



http://www7.nationalacademies.org/ocga/testimony/Global_Climate_Change_Policy_and_Budget_Review-1.gif retrieved March 29, 2007

This increase in global temperatures is positively related to the increase in greenhouse gas emissions since the Industrial Revolution. Scientists are increasingly confident that the release of greenhouse gasses is a significant cause for the dramatic increase in global temperatures since the 1980's.

To understand how humankind can be contributing to this increase in global warming, it is important to understand how the earth regulates temperature. Life exists on earth because our planet has the ability to block and sustain heat. The earth is wrapped in a blanket of carbon dioxide and other "greenhouse gases"—methane, nitrous oxide, and water vapor—that affect how much solar radiation is trapped on earth and how much is reflected back into space. The sun sends solar energy to earth, warming the planet and making life possible. The problem is that while some solar radiation is essential, too little or too much creates difficulties. Without this carbon blanket the sunny side of the earth would be too hot and the night side too cold to sustain life.[2] If the carbon blanket becomes too heavy, increased warming can have

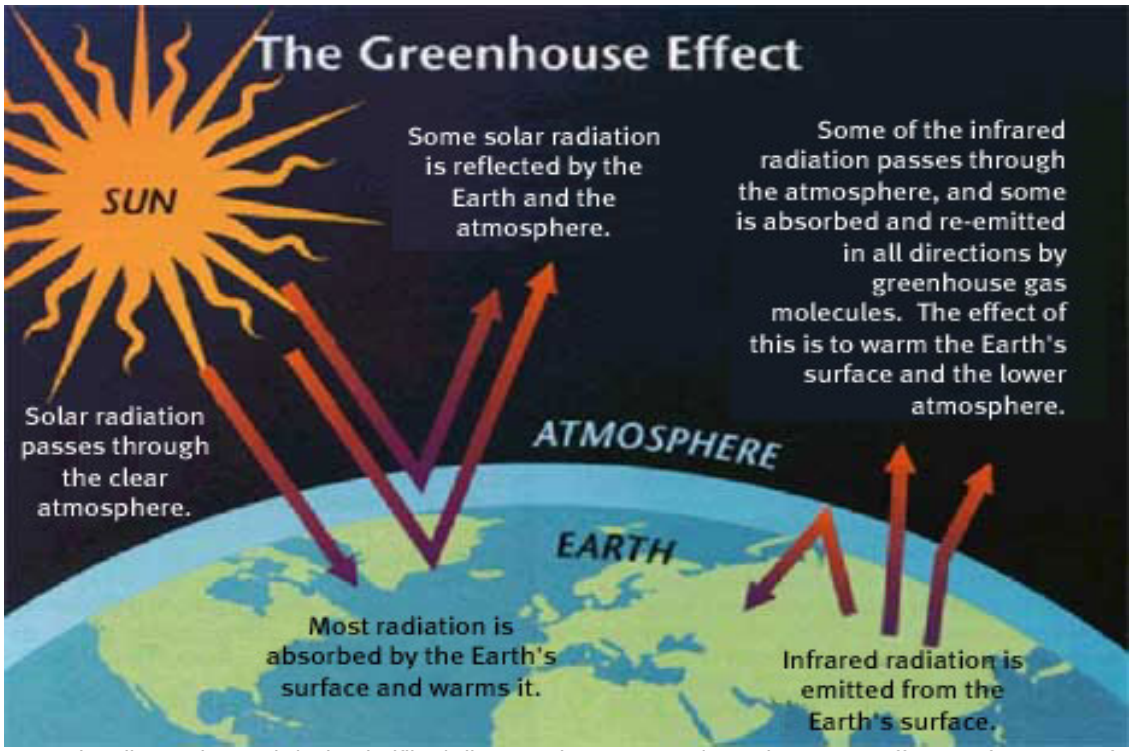
[2]Idaho Soil Conservation Commission (2003, February). *Carbon sequestration on Idaho agricultural and forest lands* (ID). Boise, ID: Ferguson, D.F. Retrieved on March 15, 2007, from http://www.scc.state.id.us/PDF/Carbon%20Sequestration/IDAHO%20SEQUESTRATION%20REPORT.pdf

negative impacts on weather and melt polar ice masses, causing rising sea levels to flood lowland population centers and significant portions of the world's arable land.

During the relatively brief time that life has existed on earth, the composition of the carbon blanket has gone through natural cycles affecting the earth's thermostat and warming or cooling our planet within a temperature range hospitable to life as we know it. Cycles of warming and cooling are directly correlated with the amount of carbon dioxide in the atmosphere. Changes in the level of carbon dioxide are directly correlated to the coming and going of ice ages, to the rise and fall of ocean levels.

The climate cycles that the earth has experienced in the past have led some to believe that the current period of warming is part of the earth's natural cycle of warming and cooling. However, the predominant perspective of the global scientific community is that the fossil fuels we burn and the forests we clear are increasing atmospheric carbon dioxide at rates our planet cannot sustain without dire consequences. Today's carbon blanket contains 25% more carbon dioxide than has ever before existed during the past 650,000 years.

As a consequence, more of the sun's energy is trapped by our atmosphere, increasing temperatures throughout the globe. Some areas, including polar regions, are increasing in temperature faster than others. Rising temperatures are melting the polar icecaps and raising sea levels. Since open seas and bare land reflect less radiation back into space than do ice and snow, even more heat is absorbed by the earth and we are creating a feedback cycle that speeds up the warming process.



http://www.combatclimatechange.ie/uploadedfiles/Climate_Change_Facts/greenhouse%20effect%20from%20safeclimate%20site.jpg retrieved March 25, 2007.

Ralph J. Cicerone, Ph.D., President, National Academy of Sciences, spoke to the U.S. Senate Committee on Commerce, Science, and Transportation Subcommittee on Global Climate Change and Impacts on July 20, 2005 on behalf of the scientific community. Dr. Cicerone stressed the important need for action at all levels. "The task of mitigating and preparing for the impacts of climate change," he said,

> will require worldwide collaborative inputs from a wide range of experts, including natural scientists, engineers, social scientists, medical scientists, those in government at all levels, business leaders and economists. Although the scientific understanding of climate change has advanced significantly in the last several decades, there are still many unanswered questions. Society faces increasing pressure to decide how best to respond to climate change and associated global changes, and applied research in direct support of decision making is needed.[3]

Idaho is part of the global community and must become part of the global solution. We cannot ignore the problem and hope that others will fix it for us. Idaho has already been affected by global warming and climate change and will continue to be impacted in the future. It is in our best interest to acknowledge this fact and to do our best to mitigate any future consequences.

III. Global Impacts and Implications

The potential impacts of climate change are varied and possibly severe. These impacts are generally understood to fall into several common categories: agriculture and forest products; freshwater systems and resources; coastal and marine systems and resources; industry, settlement, and society; human health; and ecosystems.

A. Agriculture and Forest Products

As the temperature continues to rise globally, some short-term affects appear to be positive. However, in the long term, the results will begin to change. Crop productivity is projected to increase slightly at mid to high latitudes with local mean temperature increases of up to 1-3°C depending on the crop, but to then decrease beyond that in some regions.[4] At lower latitudes, especially in seasonally dry and tropical regions, crop productivity is projected to decrease at even small local temperature increases (1-2°C), which would increase risk of hunger.[5] Food shortages,

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[3] *Climate change science and research: Recent and upcoming studies from the National Academies: Hearing before the Subcommittee on Global Climate Change and Impacts Committee on Commerce, Science, and Transportation, U.S. Senate,* 109th Cong., 1st Sess. (2005) (testimony of Ralph J. Cicerone). Retrieved on April 1, 2007, from http://www7.nationalacademies.org/ocga/testimony/Global_Climate_Change_Policy_and_Budget_Review.asp

[4] Intergovernmental Panel on Climate Change: Working Group II contribution, Fourth Assessment Report (2007). *Climate change 2007: Climate change impacts, adaptations and vulnerability. Summary for policymakers.* Retrieved on April 13, 2007, from www.ipcc.ch/SPM13apr07.pdf

[5] Ibid.

water scarcity, heat waves, floods, and migration of millions of people will occur across Asia as a result of climate change. Rajendra Pachauri, chairman of the UN climate panel, said in a press conference: "What we project is substantial decreases in cereal production in Asia and there will be unfavorable impacts on rain-fed wheat in south and southeast Asia."[6] Pachauri said the impact in a country like India, where almost 70% of the workforce is dependent on agriculture, would be very serious, with mass migration of rural communities to already overburdened towns and cities.[7] Increases in the frequency of droughts and floods are projected to affect local production negatively.[8] There are various studies, with various predictions, as to what will happen globally with the effects of climate change and its effects on agriculture. There appears to be a consensus, however, that there will be certain areas—specifically those closer to the equator—that will be more negatively affected. What happens to the agricultural economy in a given region, county, or country, will depend on the interplay of the set of dynamic factors specific to each area.

Globally, commercial timber productivity rises modestly with climate change in the short- to medium-term, with large regional variability around the global trend.[9] However, in North America, disturbances from pests, diseases, and fire are projected to have increasing impacts on forests, with an extended period of high fire risk and large increases in area burned.[10] Global warming trends may shift the stronghold of the timber industry from temperate regions such as North America, the former Soviet Union, China, Australia, New Zealand and parts of Europe—areas that currently supply 77% of the world's industrial timber—to regions with subtropical climates, such as South America, Africa and Asia-Pacific.[11]

B. Freshwater Systems and Resources

Global climate change is expected to have numerous repercussions for freshwater resources and ecosystems in the United States and globally. Changes in river runoff are expected to vary depending on geographical area. By 2050, annual average river runoff and the availability of fresh water is expected to increase 10 to 40 percent in high latitudes and some wet tropical areas, while decreasing 10 to 30 percent in mid-latitude dry areas and dry tropics.[12] This would result in greater frequency of river flooding in the former regions, and contribute to drought conditions in the latter areas. Some of these latter areas already experience significant water stress, and potential

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[6] Dawn: the Internet Edition. *Warming to cause drought, floods and hunger to Asia.* Retrieved April 11, 2007, from http://www.dawn.com/2007/04/11/top6.htm
[7] Ibid.
[8] Intergovernmental Panel on Climate Change: Working Group II contribution, Fourth Assessment Report (2007). *Climate change 2007: Climate change impacts, adaptations and vulnerability. Summary for policymakers.* Retrieved April 13, 2007, from www.ipcc.ch/SPM13apr07.pdf
[9] Ibid.
[10] Ibid.
[11] Wagner, H. (2002). *Warming temperatures may freeze North American timber industry.* Ohio State Research News. Retrieved April 11, 2007, from researchnews.osu.edu/archive/timber2.htm
[12] Intergovernmental Panel on Climate Change: Working Group II contribution, Fourth Assessment Report (2007). *Climate change 2007: Climate change impacts, adaptations and vulnerability. Summary for policymakers.* Retrieved April 11, 2007,from www.ipcc.ch/SPM13apr07.pdf

impacts to agriculture and human habitation are significant.[13] Changes in weather patterns are expected to exacerbate these trends, causing drought at times, and stronger storms with greater likelihood of severe flooding in others.[14] Similarly, the amount of water supplied from glaciers and melting snow pack is anticipated to decline, thus reducing water supply to areas situated near mountain ranges; currently one-sixth of the world's population resides in such areas.[15]

Another freshwater issue associated with global climate change is the anticipated impact on wetlands, both inland and coastal. Rising sea levels will result in contamination of fresh ground water by coastal salt water, further stressing human areas already potentially impacted by drought.[16] Furthermore, wetlands serve as habitats for a diverse array of species with limited ability to adapt to ecological changes. These species serve as important links to other aquatic and land ecosystems, and changes to their ecosystem are anticipated to have widespread and largely unpredictable effects on coastal and marine fisheries.[17] In inland water systems, rising temperatures are anticipated to cause an increase in frequency and duration of harmful algae blooms.[18] The combined result of these phenomena is an increased probability of species extinction and loss of biodiversity, with anticipated economic as well as ecological impacts.[19]

Lastly, increased global temperatures are expected to result in widespread melting of permafrost in Alaska and similar areas globally; this will result in massive release from the ground of methane and carbon dioxide, further exacerbating the problem of increasing concentrations of greenhouse gases in the environment.[20]

C. Coastal and Marine Systems and Resources

Global warming and climate change will result in higher sea levels, higher sea temperatures, and decreases in sea ice.[21] The result will be changes to the ecology and structures of coastal and marine environments and significant impacts on the goods and services they produce.[22]

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[13] Ibid.
[14] Ibid.
[15] Ibid.
[16] Intergovernmental Panel on Climate Change. (2001). *Climate change 2001: Impacts, adaptation and vulnerability.* Retrieved April 10, 2007, from www.grida.no/climate/ipcc_tar/wg2/index.htm
[17] Poff, N.L., Brinson, M.M., & Day, J.W. (2002). A*quatic ecosystems and global climate change: Potential impacts on inland freshwater and coastal wetland ecosystems in the United States.* Pew Center on Global Climate Change. Retrieved April 14, 2007, from www.pewclimate.org/global-warming-in-depth/all_reports/aquatic_ecosystems/index.cfm
[18] Ibid.
[19] Ibid.
[20] Ibid.
[21] Intergovernmental Panel on Climate Change. (2001). *Climate change 2001: Impacts, adaptation and vulnerability.* Retrieved April 10, 2007, from www.grida.no/climate/ipcc_tar/wg2/index.htm
[22] Ibid.

One anticipated result of these changes is a significant increase in coastal flooding.[23] By 2080 “many millions” more people globally may be subjected to such flooding; areas that currently suffer tropical storms, whose severity is expected to increase due to global climate change, will be particularly impacted.[24] The largest number of people will be impacted in the large deltas of Africa and Asia, and the areas most vulnerable to catastrophic impact will be small islands.[25] Unfortunately, due to their limited capacity for adaptation, developing nations will suffer greater hardship than developed nations.[26] Additionally, seawater infusion into groundwater supplies could precipitate greater water stress in areas potentially affected by drought conditions resulting from snowmelt reduction and changes in precipitation patterns.[27]

Effects on fishing and coastal ecosystems will be complex. Changes to fishing, shrimping, and clamming ranges are expected; species capable of migration and greater adaptation may survive, but less mobile and adaptable species could suffer extinction.[28] New combinations of predators, prey, diseases, and competition make these patterns difficult to predict, but it is anticipated that many species would find survival difficult.[29] Changes to fishing habitats and migratory patterns are expected to make global fishing stocks, many already under significant stress, more difficult to manage, and these changes could also negatively impact overall amounts of global fishing stock.[30] Additionally, such changes are expected to threaten several marine mammal and bird species with extinction.[31] Changes to sea temperature and salinity are expected to impact global phytoplankton ecology, which serves as an important link in the global marine food chain; these changes could have profound impacts on worldwide marine ecology and the fishing industry.[32]

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[23] Intergovernmental Panel on Climate Change: Working Group II contribution, Fourth Assessment Report (2007). *Climate change 2007: Climate change impacts, adaptations and vulnerability. Summary for Policymakers.* Retrieved April 11, 2007, from www.ipcc.ch/SPM13apr07.pdf

[24] Ibid.

[25] Ibid.

[26] Ibid.

[27] Intergovernmental Panel on Climate Change. (2001). *Climate change 2001: Impacts, adaptation, and vulnerability.* Retrieved April 10, 2007, from www.grida.no/climate/ipcc_tar/wg2/index.htm

[28] Kenney, V.S., Twilley, R.R., Kleypas, J.A., Cowan, J.H., & Hare, S.R. (2002). *Coastal and marine ecosystems & global climate change: Potential effects on U.S. resources*. Pew Center on Global Climate Change. Retrieved April 13, 2007, from www.pewclimate.org/global-warming-in-depth/all_reports/coastal_and_marine_ecosystems/index.cfm

[29] Ibid.

[30] Intergovernmental Panel on Climate Change. (2001). *Climate change 2001: Impacts, adaptation, and vulnerability.* Retrieved April 10, 2007, from www.grida.no/climate/ipcc_tar/wg2/index.htm

[31] Intergovernmental Panel on Climate Change: Working Group II contribution, Fourth Assessment Report (2007). *Climate change2007: Climate change impacts, adaptations and vulnerability. Summary for policymakers.* Retrieved April 11, 2007, from www.ipcc.ch/SPM13apr07.pdf

[32] Kenney, V.S., Twilley, R.R., Kleypas, J.A., Cowan, J.H., & Hare, S.R. (2002). *Coastal and marine ecosystems & global climate change: Potential effects on U.S. resources*. Pew Center on Global Climate Change. Retrieved April 13, 2007, from www.pewclimate.org/global-warming-in-depth/all_reports/coastal_and_marine_ecosystems/index.cfm

Lastly, coastal wetlands, including marshes and mangroves, are expected to be negatively impacted by rising sea levels.[33] Mangroves and marshes are critical to coastal ecosystems, providing a range of nutrients and serving as nurseries for marine organisms; their inundation is expected to have important consequences for global coastal and marine ecosystems.[34]

D. Industry, Settlement, and Society

While the socioeconomic costs of climate change will vary widely by location, generally the greater the change in local climate, the greater the cost will be.[35] However, particular communities are likely to be more affected by climate change due to geography, dependence on local natural resources, and a lack of financial resources.[36]

Settlements in coastal and river flood plains are likely to be among the most vulnerable to flooding and the extreme weather of tsunamis, hurricanes, and cyclones.[37] Not only will these natural disasters destroy the commercial infrastructure, but local industries that are dependent on climate-sensitive resources, such as subsistence farming and tourism, will be negatively affected. For example, common vacation sites such as beaches, islands, and ski resorts will suffer.[38] The impact of climate change will even spread to those economic sectors and settlements not directly affected, particularly due to human migration.[39]

In addition, areas of rapid urbanization will be vulnerable, due to problems with sanitation and a shortage of clean water.[40] Poor communities will be especially affected, because of limited adaptive capacities and their dependency on climate-sensitive resources such as local water and food supplies.[41] Africa, for example, is predicted to be the continent most negatively affected by climate change.[42] Sadly, while wealthy countries are responsible for a greater portion of the greenhouse gases

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[33] Intergovernmental Panel on Climate Change: Working Group II contribution, Fourth Assessment Report (2007). *Climate change 2007: Climate change impacts, adaptations and vulnerability. Summary for policymakers.* Retrieved April 11, 2007, from www.ipcc.ch/SPM13apr07.pdf

[34] Kenney, V.S., Twilley, R.R., Kleypas, J.A., Cowan, J.H., & Hare, S.R. (2002). *Coastal and marine ecosystems & global climate change: Potential effects on U.S. resources*. Pew Center on Global Climate Change. Retrieved April 13, 2007, from www.pewclimate.org/global-warming-in-depth/all_reports/coastal_and_marine_ecosystems/index.cfm

[35] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf

[36] Ibid.

[37] Intergovernmental Panel on Climate Change. (2001). *Climate change 2001: Impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.grida.no/climate/ipcc_tar/wg2/307.htm

[38] Ibid.

[39] Ibid.

[40] Ibid.

[41] Ibid.

[42] MSNBC News Services. (2007, April 6). Experts warn warming will harm society, nature. Retrieved April 14, 2007, from www.msnbc.msn.com/id/17953433/

that are causing climate change,[43] poor countries are likely to be hit harder by the effects.[44]

E. Human Health

There are a variety of current and projected health impacts due to climate change, depending on region and location, economic infrastructure, healthcare infrastructure, and education infrastructure.[45] The extreme weather and climate events associated with climate change such as heat waves, floods, fires, storms, and droughts pose risks to human health such as death, disease, and injury.[46] The projected increase in flooding is expected to lead to increased risk of drowning, diarrheal disease, respiratory diseases, skin diseases, and post-traumatic stress disorders.[47] Flooding is also expected to lead to increased risk of hunger and malnutrition in developing countries.[48] There is also an increased risk of death from heat waves as a consequence of the thermal stress associated with climate change.[49] Populations at especially high risk of death due to heat waves are the elderly, the chronically sick, the very young, and the socially isolated.[50]

Synergies and interactions between the effects of climate change and environmental quality are expected to pose risks for human health.[51] The health risks posed by heat waves in urban environments are significantly exacerbated by poor air quality and air pollution.[52] There is an increased risk of heart-related mortality in Europe due to increasing temperatures.[53] As a result of rising global temperatures, there has already been a documented increase in allergenic pollen levels in North America,[54] which may adversely affect the health of people with allergy and respiratory conditions. Higher concentrations of ground-level ozone due to climate change are projected to lead to an increased prevalence of cardio-respiratory diseases.[55] Finally,

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[43] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf
[44] Ibid.
[45] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf
[46] Ibid.
[47] Ibid.
[48] Ibid.
[49] Ibid.
[50] Ibid.
[51] Ibid.
[52] Working Group II of the Intergovernmental Panel on Climate Change. (2001). *Summary for policy makers: Climate change 2001: Impacts, adaptation and vulnerability*. Retrieved April 6, 2007 from http://www.grida.no/climate/ipcc_tar/wg2/index.htm
[53] Ibid.
[54] Ibid.
[55] Ibid.

heat waves are expected to lead to increased risk of water quality problems with adverse consequences for human health.[56]

There is a risk for increased incidence of infectious disease as a result of global warming.[57] Spatial changes in infectious disease vectors have already been documented as a result of increasing temperatures.[58] Results of predictive model studies indicate that there will be an increase in geographic range of potential transmission of malaria and dengue, two vector-born infections.[59] Mixed effects of climate change on the range of transmission potential of malaria in Africa have been documented.[60] There are projected increases in morbidity and mortality in diarrheal disease associated with floods and droughts in east, south, and southeast Asia.[61] There is also an increased risk of water and food born infectious diseases due to droughts.[62]

The changes in agriculture, crop yield, and fisheries as a consequence of climate change pose risks for increased food insecurity, hunger, and malnutrition. Malnutrition can lead to impaired child development and decreased adult activity.[63] The risk of hunger is projected to be very high in several developing countries due to effects of climate change and changes in crop yield.[64] In dry and tropical regions at lower altitudes, where crop yields are expected to decrease with global temperature increases, there is increased risk for food insecurity, hunger, and malnutrition.[65] Semi-arid and arid regions in Africa are especially vulnerable to climate change as it impacts food production, leading to greater food insecurity and malnutrition.[66]

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[56] Working Group II of the Intergovernmental Panel on Climate Change. (2001). *Summary for policy makers: Climate change 2001: Impacts, adaptation and vulnerability*. Retrieved April 6, 2007, from http://www.grida.no/climate/ipcc_tar/wg2/index.htm.
[57] Ibid.
[58] Ibid.
[59] Working Group II of the Intergovernmental Panel on Climate Change. (2001). *Summary for policy makers: Climate change 2001: Impacts, adaptation and vulnerability*. Retrieved April 6, 2007, from http://www.grida.no/climate/ipcc_tar/wg2/index.htm
[60] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf
[61] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf
[62] Ibid.
[63] Working Group II of the Intergovernmental Panel on Climate Change. (2001). *Summary for policy makers: Climate change 2001: Impacts, adaptation and vulnerability*. Retrieved April 6, 2007, from http://www.grida.no/climate/ipcc_tar/wg2/index.htm
[64] Ibid.
[65] Ibid.
[66] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf.

F. Ecosystems

Climate change and global warming pose serious negative implications for the earth's ecosystems.

1. Overall Implications for Species Survival and Biodiversity

"A global assessment of data since 1970 has showed that it is likely that anthropogenic warming has had a discernible influence on many physical and biological systems".[67] One shocking implication of climate change for the ecosystem is that up to 30% of the earth's species will be at increased risk for extinction.[68] Climate change is projected to lead to a significant loss of biodiversity in several sites globally.[69] As a consequence of global temperature increases, the ranges of many plant and animal species are shifting upward toward the North Pole.[70] The very nature of earth's rhythms is altering as a consequence of global climate change, as evidenced by the earlier timing of spring events such as bird migrations, egg-laying, and leaf unfolding.[71]

2. Arctic Ecosystems

Arctic ecosystems are already experiencing the impacts of global climate change, as reductions in thickness and extent of glaciers and ice sheets are resulting in changes in natural ecosystems—with negative consequences for many species and organisms. Changes in arctic biosystems, including sea-ice biomes, are leading to adverse consequences and serious survival risks for predators high in the food chain,[72] such as polar bears.

3. Marine Ecosystems and Coastal Wetlands

The global climate change trends in rising water temperatures, changes in ice cover, salinity, and oxygen levels of oceans[73] pose serious implications for marine ecosystems and coastal wetlands. The increased changes in coastal and marine ecosystems will affect organisms' metabolisms, species ranges, and species

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[67] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf

[68] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf

[69] Ibid.

[70] Ibid.

[71] Ibid.

[72] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf

[73] Ibid.

interactions.[74] Changes in marine life, including changes in range and abundance of algal, plankton, and fish populations in high-latitude seas, are already documented.[75] The documented increased acidity of oceans[76] is expected to have negative consequences for marine shell-forming organisms and dependent species.[77] Changes in oceanic circulation patterns are projected to affect nutrient and oxygen availability to marine organisms, as well as to alter regional oceanic and land temperatures and the geographic distributions of marine species.[78] Increasing oceanic temperatures also leads to increased coral mortality and stress due to coral bleaching.[79] The increased oceanic temperatures will also lead to an increased risk of coral mortality as the coral becomes more susceptible to the deadly impacts of pollution, predation, and disease.[80] As sea levels rise due to the effects of climate change, there will be a loss of coastal wetland ecosystems,[81] the migration inland of coastal wetland ecosystems,[82] and the loss of mangroves due to increased flooding of coastal areas.[83]

4. Forests and Woodlands

Forests and woodlands are also impacted by climate change. The projected impacts of global climate change on North American forests due to changes in temperature and precipitation include the following: forest location, composition, productivity, tree species migration.[84] It is also projected that climate change will lead to the gradual replacement of tropical forests by savannah in eastern Amazonia, with concomitant significant losses in biodiversity and in species extinction[85].

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[74] Pew Center on Global Climate Change. (2002). *Press release: New report: Climate change threatens the future of marine ecosystems*. Retrieved April 15, 2007, from http://www.pewclimate.org/press_room/sub_press_room/2002_releases/pr_marine.cfm

[75] Ibid.

[76] Ibid.

[77] Ibid.

[78] Pew Center on Global Climate Change. (2002). *Press release: New report: Climate change threatens the future of marine ecosystems*. Retrieved April 15, 2007, from http://www.pewclimate.org/press_room/sub_press_room/2002_releases/pr_marine.cfm.

[79] Pew Center on Global Climate Change. (2004). *Press release: Coral reefs and global climate change*. Retrieved April 15, 2007, from http://www.pewclimate.org/press_room/sub_press_room/february13.cfm

[80] Ibid.

[81] Ibid.

[82] Pew Center on Global Climate Change. (2002). *Press release: New report: Climate change threatens the future of marine ecosystems*. Retrieved April 15, 2007, from http://www.pewclimate.org/press_room/sub_press_room/2002_releases/pr_marine.cfm

[83] Working Group II of the Intergovernmental Panel on Climate Change. (2001). *Summary for policy makers: Climate change 2001: Impacts, adaptation and vulnerability*. Retrieved April 6, 2007, from http://www.grida.no/climate/ipcc_tar/wg2/index.htm

[84] Pew Center on Global Climate Change. (2003). *Press release: New report: Climate change poses challenges for U.S. forestry*. Retrieved April 15, 2007, from http://www.pewclimate.org/press_room/sub_press_room/pr_feb2603.cfm

[85] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf

5. Freshwater Lakes and Rivers

The warming of lakes and rivers in many regions, affecting the water quality and thermal structure is a major impact of climate change.[86] Consequences of this warming include range changes and earlier migration patterns of fish in river systems,[87] as well as an increase in the abundance of algal and zooplankton populations in high latitude and high altitude lakes,[88] which will lead to impacts on freshwater ecosystems at many levels of the food chain. There are also projected decreases in freshwater availability in the large river basins of south, central, east, and southeast Asia.[89]

6. Mountains

Mountain ecosystems face many risks associated with the impacts of global climate change and increasing global temperatures. The risks faced by mountain ecosystems include increased ground instability and rock avalanches,[90] greater risk of floods due to melting glaciers,[91] glacier retreat, and increased snow melt. As a result, mountain ecosystems face the threat of extensive loss of species and biodiversity.[92]

IV. Impacts and Implications for Idaho

The impacts of global warming and climate change will be experienced on a state and local level throughout Idaho.

A. Freshwater Resources

Idaho's many streams are host to several species of trout and salmon. These species have been threatened in the past years because of "dams, water diversions, pollution, and development."[93] Climate change will have an extreme impact on Idaho streams and the fish that inhabit them. Idaho stands to lose up to 34% of its trout and salmon by 2030 due to the effects of climate change.[94] Idaho's streams are extremely susceptible to temperature change, with potential damaging effects on fish habitats. According to a study done by the Defenders of Wildlife and The Natural Resources

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[86] Ibid.
[87] Ibid.
[88] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf
[89] Ibid.
[90] Working Group II Contribution to the Intergovernmental Panel on Climate Change. (2007). *Climate change 2007: Climate change impacts, adaptation and vulnerability.* Retrieved April 14, 2007, from http://www.ipcc.ch/SPM6avr07.pdf.
[91] Ibid.
[92] Ibid.
[93] O'Neal, K. (2002). *Effects of Global warming on trout and salmon in U.S. streams.* Retrieved, April 14, 2007, from www.defenders.org.
[94] Ibid.

Defense Council, with a 1.8 to 1.9 degree Fahrenheit increase in July temperatures, a projected loss of up to 72% of trout in the Rocky Mountain region would result.[95]

Climate inconsistency affects the numbers of salmon in Idaho streams through changes in water temperature, the amount of food available in streams and competition for that food. Warmer temperatures would increase winter flooding and decrease summer and fall stream flows. Higher seasonal temperatures could jeopardize Idaho's populations of salmon and other cold water fish.[96]

B. Goods and Services

Idaho, as a part of the Pacific Northwest (PNW), has a climate and ecology "largely shaped by the interactions that occur between seasonally varying atmospheric circulation patterns and the region's mountain ranges."[97] Two-thirds of the precipitation for this region occurs from October to March when the region is on the "receiving end of the Pacific storm track."[98] From late spring to early fall, the Northwest is generally fairly dry. With the predictability of the climate trends, it becomes easier for researchers to calculate future climate changes.[99]

Temperatures have warmed about 1.5 degrees Fahrenheit in the 20th century. According to the Climate Impacts Group, we can "expect warming to continue as a result of climate change, with a likely warming rate of about .5 degree Fahrenheit."[100] There are significant implications for Idaho's natural and human resources that depend on climate temperatures.[101]

Mountain snow pack is the main source of water in Idaho. "In most PNW river basins…snow – rather than man-made reservoirs – is the dominate form of water storage, storing water from the winter and releasing it in spring and early summer, when economic, environmental, and recreational demands for water throughout the region are greatest."[102] The warming climate has a profound effect on snow pack and, therefore, on water resources available to Idaho.[103]

Future climate impacts of global warming in Idaho will include lower snow accumulation in winter, higher winter stream flows, earlier spring snowmelt, earlier peak spring stream flow, and lower summer stream flows.[104] Snow pack provides Idaho's rivers and streams with water for multiple uses. The water is used by farmers to irrigate

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[95] Ibid.
[96] Climate Impacts Group. (1995-2007). *About Pacific Northwest climate.* Retrieved, April 14, 2007, from http://www.cses.washington.edu/cig/pnwc/pnwc/shtml
[97] Ibid.
[98] Ibid.
[99] Ibid.
[100] Ibid.
[101] Ibid.
[102] Ibid.
[103] Ibid.
[104] Ibid.

their crop during the mostly dry and warm spring and summer months; fish depend on the temperature and volume of water pouring into their habitats; and recreation activities during the winter and summer months are heavily impacted by the decreasing snow pack. Changes in snowmelt will result in significant negative impacts in these areas essential to Idaho's economy.

C. Food, Fiber, and Forest Products

The forests of Idaho also are at extreme risk from climate change. Idaho has both upper and lower timberline forests throughout the state. Both types of forest face threats to tree growth as a result of climate variation. The upper and lower timberlines are most likely to "show strong direct effects of climatic variation on tree growth, since they are closer to their physiological limits and, therefore, more prone to stress at these locations."[105] The upper timberline is affected directly by the climate variations during the cool phase which produces a higher snow pack which limits the growing factor. The lower timberline forests are competing for water with the surrounding grasses and shrubs. Too much drought increases the competition and stunts ponderosa pine growth.

Increased forest fires are also a result of warmer temperatures. As vegetation competes for diminished water supply during warmer temperature months, heat coupled with drying vegetation creates a dangerous combination ideal for forest fires.[106]

Climate changes occurring in Idaho will ultimately result in changes in vegetation density and in species composition. Some vegetation populations that lack ability to adapt or disperse will become extinct. "Loss of biological diversity is likely if environmental shifts outpace species migration rates and interact with population dynamics to cause increased rates of local population extinction."[107]

D. Industry, Settlement, and Society

Idaho celebrates its many outdoor and year-round recreational opportunities—from fishing, hiking, and camping to a full spectrum of winter sports. However, with the increasing temperatures and loss of snow pack, these opportunities in Idaho could diminish with our natural resources. The economic loss is especially apparent. For example, according to one recent study, Sun Valley ski resort in Blaine, ID is projected to lose 10 skiing days by 2025 and 15 by 2050. Along the Rocky Mountains, ski resorts will lose up to 20 ski days by 2025 and 30 by 2050.[108] Financial implications of decreasing snow pack in Idaho could be substantial. "Resorts in the Pacific Northwest got a harbinger last season when a warm winter led to a 78 percent drop in skier visits."[109] Even a minor temperature change in the Pacific Northwest could prove fatal to

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[105] Ibid.
[106] Ibid.
[107] Ibid.
[108] Epstein, D. (2007). Muddy slopes. *Sports Illustrated 106*(11). Retrieved April 11, 2007, from http://sportsillustrated.cnn.com/2007/more/03/07/eco.snow/index.html
[109] Shaw, D. (2006). Global warming pushes ski industry downhill. *Grist magazine.* Retrieved, April 21, 2007, from http://www.alternet.org/envirohealth/31991/?page=1

the skiing industry. "Pacific Northwest ski areas are particularly vulnerable to climate change because base elevations tend to be low and winter temperatures hover around the freezing point."[110] With the projected losses in snow pack and skiing days, Idaho faces an immense financial hardship along with the environmental damages that climate change brings.

Agriculture is an important part of Idaho's economy. With shifts in climate, drought potential will diminish crop output significantly. Volatilities in climate create a poor environment for agriculture in Idaho. "Long-term fluctuations in weather patterns could have an extreme impact on agricultural production, slashing crop yields and forcing farmers to adopt new agricultural practices in response to altered conditions."[111] The economic strains on Idaho's farmers and ranchers would be extreme. Altering conditions of farming and ranching is an expensive process; many of Idaho's farmers and ranchers would be unable to cope successfully with the financial strains generated by climate change.

V. Idaho's Response to Climate Change

Reducing the impacts of global warming induced climate change will require concerted action at the international, national, state and local levels.

Idahoans have taken initial steps to address their contributions to greenhouse gas emissions and climate change and their responsibility for addressing the potential global warming climate crisis in Idaho. Actions that have been taken by business and by government are important first steps towards addressing these issues. However, there is still much more that can and must be done[112].

At the business level in Idaho, some utility companies have begun to offer "net metering" and/or "green pricing" programs to encourage the usage of renewable energy sources to power homes.[113] Idaho has also established energy codes for residential and commercial buildings to make them more eco-friendly.[114] Boise builders have won awards for their efforts in "green building". Boise's Banner Bank Building, opened in September of 2006, for example, is recognized as one of the most energy-efficient office buildings in the nation. The structure is one of less than twenty in the world to have earned the Platinum Certification from the U.S. Green Building Council, which is

[110] Goodman, J. (2005). Battered ski industry sweating for snowfall. *Seattle Times.* Retrieved April 21, 2007, from http://seattletimes.nwsource.com/html/localnews/2002586210_skiresorts27.html.
[111] Food and Agriculture Organization of the United Nations (1997). *Some effects of global warming on agriculture.* Retrieved on April 16, 2007, from http://www.fao.org/NEWS/FACTFILE/FF9721-E.HTM.
[112] Specific recommendations are presented throughout Section VI: State Responses to Climate Change and summarized in Section VII: Conclusions and Recommendations.
[113] Pew Center on Global Climate Change (n.d.). *What's being done in the states.* Retrieved on April 10, 2007, from http://www.pewclimate.org/what_s_being_done/in_the_states/ 2007
[114] Ibid.

the highest level of certification given out by the organization. The 11-story 190,000 square-foot building uses 60% less energy than a typical structure of the same size.[115]

The usage of ethanol biofuel by both businesses and individuals in Boise and other parts of the state has been gradually increasing. More gas stations are beginning to offer ethanol across the state. Initial offerings in Boise have come about at least in part due to a "feasibility project" promoted by a coalition of public and private interests including the Farm Bureau; the Idaho state departments of Environmental Quality, Agriculture, Transportation, and Water Resources; the City of Boise; the Ada County Highway District; Boise State University; General Motors; the Idaho Grain Producers Association; the National Ethanol Vehicle Coalition; and Stinker Stations.[116]

In 2006, Idaho's Treasure Valley signed on with the Clean Cities initiative, a program through the U.S. Department of Energy, that "advances the economic, environmental, and energy security of the United States by supporting local decisions to adopt practices that contribute to the reduction of petroleum consumption in the transportation sector."[117] The resulting Treasure Valley Clean Cities Coalition (TVCCC) includes Idaho's two largest cities, Boise and Nampa. Twenty-one companies, government agencies, and other organizations have signed a memorandum of understanding with TVCCC. Among that group are fuel suppliers, stakeholders that maintain fleets, organizations that deal with transportation issues, and agricultural interests.[118]

In addition, Hailey, Idaho and Boise City have signed the U.S. Mayors Climate Protection Agreement, the first step to becoming a "Cool City". Participating municipalities commit to reducing global warming gas emissions to 7% below 1990 levels by 2012.[119]

At the legislative level Idaho participates in the Clean and Diversified Energy Initiative of the Western Governor's Association and the Western Renewable Energy Generation Information System.[120] Title 22, Chapter 52 of the Idaho statutes discusses the findings of a Carbon Sequestration Advisory Committee. This committee found that Idaho had both the need and the potential to participate in programs leading to a decreased carbon footprint on the climate, such as carbon credit trading, alternative

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[115] Houglun, B. (2006, September 27). *Governor Risch participates in opening of Banner Bank Building: Governor applauds Banner Bank Buildings ecologically friendly construction.* Boise: Office of the Governor. Retrieved on April 26, 2007, from http://gov.idaho.gov/mediacenter/press/pr2006/prsept06/pr_115.html

[116] Capital Press Agricultural Newspaper. *Stinker gets first E85 ethanol outlet in Idaho.* Retrieved on April 10, 2007, from http://www.harvestcleanenergy.org/enews/enews_1204/enews_1204_Stinker.htm 2004

[117] U.S. Department of Energy (2007). *Clean Cities: About the program.* Retrieved on April 26, 2007, from http://www.eere.energy.gov/cleancities/about.html

[118] U.S. Department of Energy (2007). *Clean cities now: Coalition news.* Retrieved on April 26, 2007, from http://www.eere.energy.gov/cleancities/ccn/progs/story.php/WHATS_NEW/598/0/A

[119] Sierra Club (n.d.) *CoolCities: Idaho.* Retrieved on April 27, 2007, from http://www.coolcities.us/taxonomy_menu/2/28

[120] Pew Center on Global Climate Change (n.d). *What's being done in the states.* Retrieved on April 10, 2007, from http://www.pewclimate.org/what_s_being_done/in_the_states/

energy technologies, and improved carbon sequestration through better stewardship of Idaho lands and resources.[121]

Title 63, Chapter 36 of the Idaho Statutes establishes a sales tax rebate for the purchasing of "machinery and equipment used directly in generating electricity using fuel cells, low impact hydro, wind, geothermal resources, biomass, cogeneration, sun or landfill gas," as long as the purchaser develops a facility capable of producing at least 25 kilowatts of electricity.[122]

In 2005, the Idaho Legislature established the Idaho Energy Resources Authority ("IERA") for the purpose of promoting transmission, generation, and renewable energy development in the state and the region.[123]

In the 2007 Idaho legislative session, several pieces of legislation addressing climate change in Idaho were introduced. House Concurrent Resolution 14[124] stated findings of the Legislature and urged support of the enactment of:

> policies and programs to reduce Idaho's dependence on fossil fuels, accelerate the development of clean, economical energy resources and fuel-efficient technologies; and to support efforts of our local communities to exercise property stewardship and to take action aimed at reducing greenhouse gases.[125]

Idaho House Bill 177 proposed an income tax credit for capital investment in biofuel infrastructure, and House Bill 150 proposed a matched grant fund for retail fuel dealers to invest in infrastructure projects dedicated to providing biofuels.[126] House Bill 189 proposed a tax exemption for certain operating property and machinery used by wind energy producers in the state.[127]

The 2007 Idaho Energy Plan, released on January 26, 2007 in concordance with House Concurrent Resolution 62 is perhaps the most significant Idaho legislative action addressing climate change and energy issues to date.[128] The 2007 plan analyzing the

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[121] Idaho Statutes; Title22, Chapter 52. *Carbon Sequestration Advisory Committee*. Retrieved on April 10, 2007, from http://www3.state.id.us/cgi-bin/newidst?sctid=220520001.K n.d.
[122] Idaho Statutes; Title 63, Chapter 36. *Sales Tax.* Retrieved on April 10, 2007, from http://www3.state.id.us/cgi-bin/newidst?sctid=630360022QQ.K n.d.
[123] Idaho Legislative Council Interim Committee on Energy, Environment, and Technology. *2007 Idaho Energy Plan.* 2007. (p. 3) Retrieved on April 10, 2007 from http://www.idwr.idaho.gov/energy/energy_plan_-126.pdf
[124] Idaho Concurrent Resolution 14 did not leave committee.
[125] 2007 Idaho Legislature. *HCR014.* http://www3.state.id.us/oasis/HCR014.html 2007
[126] Northwest Biofuels Association. *Idaho legislative update.* Retrieved on April 10, 2007, from http://beta.nwbiofuels.org/idaho/ 2007
[127] 2007 Idaho Legislature. *HB189.* Retrieved on April 10, 2007, from http://www3.state.id.us/oasis/H0189.html 2007
[128] Idaho Legislative Council Interim Committee on Energy, Environment, and Technology. *2007 Idaho Energy Plan.* 2007. Retrieved on April 10, 2007, from http://www.idwr.idaho.gov/energy/energy_plan_0126.pdf

state's strengths and weaknesses in light of energy resources and needs was the first organized review of state-level energy issues in 25 years. In preparing its 2007 report, the Interim Committee on Energy, Environment, and Technology, composed of Idaho legislators and citizens, "undertook a comprehensive investigation of all of Idaho's energy systems and developed recommendations that will help achieve the Committee's objectives of ensuring a reliable, low-cost energy supply, protecting the environment, and promoting economic growth."[129]

The 2007 Idaho Energy Plan detailed the work of the subcommittees Generation Involving Renewables and Conventional Energy Sources, Conservation and Demand-Side Management, Siting Generation and Transmission, and Transportation Fuels, Natural Gas used for Heating and Distribution and Liquefied Natural Gas. In addition, the plan identified five objectives, eighteen policies, and forty-four actions focused on "developing specific policy direction for state agencies, energy companies, and consumers."[130] The committee took note of the "controversy over the environmental impacts of coal-fired generating facilities" and established "protection of Idaho's public health, safety and natural environment" as an objective.[131] The committee encouraged "utilities, and all Idaho energy producers, deliverers, and consumers to improve their preparedness by pursuing less carbon-intensive resources as part of a diversified resource portfolio."[132] The 2007 Idaho Energy Plan is an important step in the right direction, that—together with all the other actions and local initiatives taking place throughout the state—shows that Idaho is concerned about climate change and is committed to doing something about it.

VI. Other States' Legislative Responses to Climate Change

Individual states are taking a wide variety of actions addressing the deleterious effects of global climate change. State governments are taking the initiative in implementing climate change policies for many reasons, including a desire to protect the long-term economic stability of their states, to position themselves at the forefront of the markets opening up due to advancements in environmentally-friendly technologies, to improve air quality, to lessen traffic burdens, and to develop reliable energy sources.[133] State responses can be broadly categorized into five general action areas: improving energy production and efficiency, clean car and truck programs, financial incentives, tracking greenhouse gas pollution reduction, and carbon capture and sequestration.[134]

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[129] Ibid.
[130] Ibid.
[131] Ibid., p. 45.
[132] Ibid.
[133] Pew Center on Global Climate Change (2006). *Climate change 101: State actions.* Retrieved on April 19, 2007, from http://www.pewclimate.org/docUploads/101%5FStates%2Epdf
[134] National Wildlife Federation (n.d.) *State & regional programs to address global warming*. Retrieved on April 19, 2007, http://www.nwf.org/globalwarming/pdfs/StateActionsClimateChange.pdf

A. Improving Energy Production and Efficiency

There are a variety of programs available to encourage energy production from renewable sources and efficient use of energy, including combined heat and power (CHP), clean coal technology (CCT), net metering and net billing, green pricing, public benefit funds (PBFs), and renewable portfolio standards.

1. Energy Efficiency Programs

Energy efficiency measures can significantly reduce Green House Gas (GHG) emissions in the U.S., as most of the energy in the U.S. comes from GHG-emitting fossil fuels.[135] Measures to improve energy efficiency can be implemented in various ways, including energy efficient appliances such as washing machines and air conditioners, energy efficient lighting, energy efficient construction, and weatherization of homes and commercial buildings to conserve energy and increase efficiency in energy usage for heating and cooling.[136]

Programs to improve energy efficiency that are operated at the state level include financial incentives and tax incentives for the purchase of, and investment in, energy-efficient products and appliances, low-interest loans for energy efficient building projects in the private and public sectors, as well as energy efficiency and weatherization services such as insulation, safety inspections, and efficiency surveys provided for low-income households.[137] There is also a federal block grant program, the Low Income Home Energy Assistance Program (LIHEAP), which is designed to assist low-income households with energy efficiency and weatherization services.[138] According to the U.S. Department of Health and Human Services (2007), "Congress established the formula for distributing funds to states based on each state's weather and low income population."[139] (See "Financial Incentives," below.)

a. States that have Energy Efficiency Programs

The following states currently have Energy Efficiency Programs: California, Maryland, Indiana, Kentucky, Louisiana, New York, Oregon, Massachusetts, Washington, Illinois, and Connecticut.[140] All fifty states currently receive Low Income Home Energy Assistance Program (LIHEAP) grants each year to improve the energy efficiency of low-income households.[141]

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[135] Pew Center on Global Climate Change (2004). *Climate change activities in the United States: 2004 update*. Retrieved March 28, 2007 from http://pewclimate.org/docUploads/74241%5FUS%20Activities%20Report%5F040604%5F075445%2Epdf
[136] Ibid.
[137] Ibid.
[138] U.S. Department of Health and Human Services (2007). *Low income home energy assistance program*. Retrieved March 28, 2007, from http://www.acf.hhs.gov/programs/liheap/factsheet.html
[139] Ibid.
[140] Pew Center on Global Climate Change (n.d.). *State activities: Energy efficiency*. Retrieved March 28, 2007, from http://pewclimate.org/policy_center/policy_maker_s_guide/state_activities/state_efficiency.cfm
[141] U.S. Department of Health and Human Services (2007). *Low income home energy assistance program*. Retrieved March 28, 2007, from http://www.acf.hhs.gov/programs/liheap/factsheet.html

b. Exemplary State-Level Program

According to the Pew Center on Global Climate Change (2007):

> California's new energy conservation package illustrates the array of energy and climate solutions available to states. The legislation dedicates over $800 million to conservation initiatives and incentives, with the overall goals of reducing every Californian's energy consumption by 10 percent and saving at least 5000 megawatts (MW) during peak summer demand. It designates $105 million for clean distributed generation projects, $95 million for commercial demand-response systems and lighting reduction measures, $90 million for electric load reduction and energy efficiency programs in agriculture, and $75 million to augment existing rebates for consumers who replace their inefficient appliances. In commercial and, in some cases, industrial buildings, the legislation funds demand-responsiveness measures in heating, ventilation, and air-conditioning; high-efficiency lighting; reflective lighting and roofs; and improved shading. Also funded are low-interest loans for energy efficiency projects in schools and local jurisdictions, increased energy efficiency in state buildings, time-of-use meters, innovative peak load reduction programs, and a media and classroom education campaign.[142]

2. Combined Heat and Power (CHP)

Combined heat and power, also known as cogeneration, is the use of a heat engine or power station to generate electricity and useful heat simultaneously. CHP can approach an efficiency of 70 to 80%, over conventional plants' average efficiency of 30%.[143] However, CHP technology is not only used by power plants; many other heat-generating industries may produce electricity through CHP. For example, the CHP Partnership, a division of the Environmental Protection Agency (EPA), is currently promoting CHP in such diverse industries as dry ethanol production, hotel/casino, and waste water treatment.[144]

a. States That Have CHP

Since 2005, every state in the union has been generating some power through CHP[145]. Supplying 30% of the CHP-generated electricity in the nation, Texas is the

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[142] Pew Center on Global Climate Change (n.d.). *State Activities: Energy Efficiency*. Retrieved March 28, 2007, from http://pewclimate.org/policy_center/policy_maker_s_guide/state_activities/state_efficiency.cfm

[143] Texas Combined Heat and Power Initiative. (2007). *Twice the power at double the efficiency: Providing secure energy in Texas with CHP*. Retrieved March 29, 2007, from http://files.harc.edu/Sites/GulfCoastCHP/Initiative/WhitePaper.pdf

[144] CHP Partnership. (n.d.) *CHP project resources*. Retrieved March 29, 2007, from http://www.epa.gov/chp/project_resources/ethanol.htm.

[145] Energy Information Administration (EIA). (n.d.) *Net generation by state by type of producer by energy source*. Retrieved March 29, 2007, from http://www.eia.doe.gov/cneaf/electricity/epa/generation_state.xls

leader.[146] Other top producers are California, New York, New Jersey, and Michigan, respectively.[147]

b. Exemplary State-Level Program

Over the past 3 years, Oregon has developed an active, integrated plan to support CHP. The plan includes governor-led action plans and strategies, revised public utility commission ground rules for CHP, and financial incentives from state agencies and statewide non-profits.[148]

3. Clean Coal Technology (CCT)

Clean Coal Technology refers to a set of processes to decrease the pollution of coal use and to improve its efficiency; these steps may be used together or separately. *Coal washing* removes unwanted matter so that the coal burns more efficiently. Another way to increase coal's efficiency is through *gasification*, the practice of burning coal to produce "syngas". The syngas is then used to drive turbines to produce electricity or used as a fuel for transportation. *Low NOx burners* restrict oxygen in the combustion chamber so that the coal burns at a lower temperature and releases less nitrous oxide, a greenhouse gas. Finally, *carbon capture and storage (CCS)* is the practice of trapping carbon dioxide deep underground in unused coal fields, saline aquifers or oil fields.[149]

a. States that have CCT

Illinois established a $25 million fund to promote clean coal technology.[150] Kentucky's Pioneer Energy Project is one of the largest projects participating in the federal government's Clean Coal Technology Program (CCTP).[151] The states of Pennsylvania, West Virginia, and Mississippi are each funding coal gasification

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[146] United States Combined Heat & Power Association (2007). *Texas forms CHP initiative* [Reprinted from the Energy Central Business Wire, Houston]. Retrieved March 29, 2007, from http://uschpa.admgt.com/news_regional.htm

[147] Energy Information Administration (EIA). (n.d.) *Net generation by state by type of producer by energy source*. Retrieved March 29, 2007, from http://www.eia.doe.gov/cneaf/electricity/epa/generation_state.xls

[148] Northwest CHP Application Center. (2006). *CHP initiative and policy efforts in the Northwest*. Retrieved March 29, 2007, from http://www.chpcenternw.org/NwChpDocs/ChpEffortsInTheNw_05_2006.pdf

[149] BBC News. (2005). *Clean coal technology: How it works.* Retrieved March 29, 2007, from http://news.bbc.co.uk/1/hi/sci/tech/4468076.stm

[150] National Governor's Association. (2000). *State strategies for supporting clean energy technologies*. Retrieved March 29, 2007, from http://www.nga.org/cda/files/000414ENERGY.pdf

[151] Ibid.

projects.[152] Wyoming is also attempting to secure federal funds for the construction of a coal gasification plant.[153]

b. Exemplary State-Level Program

The Montana legislature is currently considering a "green energy" bill that includes incentives to use clean coal technology. In addition, the governor is working on a partnership to construct a coal gasification plant to take advantage of the 533 million tons of coal the state acquired from federal land.[154]

4. Net Metering and Net Billing

"Net Metering" is a simplified method of metering the energy consumed and produced at a home or business that has its own renewable energy generator. Possible systems include, but are not limited to, a system utilizing solar energy or wind generation.[155] Under net metering, excess electricity produced by these systems will spin the existing home or business meter backwards, effectively banking the electricity until it is needed by the customer. This system will provide the consumer with full retail value for all the electricity that the system produces.

Under existing federal law, Public Utilities Regulatory Policies Act (PURPA),[156] utility customers can use the electricity they generate with a wind turbine to supply their own lights and appliances, offsetting electricity they would otherwise have to purchase from the utility company at the retail price.[157] If excess energy is produced and the utility company does not allow for net metering, the utility company can buy the energy back from the producer at a wholesale and reduced price. This causes the need for a second meter that is installed at the customer's expense.

a. States That Have Net Metering

As of February of 2007, forty-one states offered either full or partial net metering programs.[158] Eighteen states were offering net metering on a statewide basis.[159] The

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[152] Appalachian Regional Commission (ARC). *Non-renewable energy innovation: Research to support the Appalachian Energy Initiative.* Retrieved March 29, 2007, from http://www.arc.gov/images/reports/2006/energy/arc_nonrenewable_energy_full.pdf

[153] Associated Press. (2006, July 18). Proposals sought for coal to gas: Wyoming bidding for federally sponsored demonstration project. *Billings Gazette*. Retrieved March 30, 2007, from http://www.billingsgazette.net/articles/2006/07/18/news/wyoming/40-coal.txt

[154] Gransbery, J. (2005, August 2). Schweitzer wants to convert Otter Creek coal into liquid fuel. *Billings Gazette*. Retrieved March 30, 2007, from http://www.billingsgazette.com/newdex.php?display=rednews/2005/08/02/build/state/25-coal-fuel.inc

[155] American Wind Energy Association (2006). *What are "net billing" & "net metering?"* Retrieved on March 4, 2007, from website: http://www.awea.org/printit/print.php

[156] Pub. L. No. 95-617, 92 Stat. 3134 (1978) (codified at 16 U.S.C. ss 796, 824a-3, 824i-k (1994)).

[157] Ibid.

[158]Database for State Incentives for Renewables & Efficiency (n.d.) *Net metering rules.* Retrieved on March 31, 2007,

programs vary by state and utility company and are governed by the public utility commissions in the various states.

b. Net Metering in Idaho

Idaho does not have statewide net-metering rules. However, each of the state's three investor-owned utilities—Avista Utilities, Idaho Power, and Rocky Mountain Power—has developed a net-metering tariff that has been approved by the Idaho Public Utilities Commission (PUC). The framework of the utilities' net-metering programs is similar in that each utility: (1) offers net metering to customers that generate electricity using solar, wind, hydropower, biomass, or fuel cells; (2) limits residential systems to 25 kilowatts; (3) limits aggregate net-metered capacity to 0.1% of the utility's retail peak generation in 2000; and (4) restricts any single customer from generating more than 20% of the aggregate capacity of all net-metered systems.[160]

For residential and small commercial customers, net excess generation (NEG) is credited at the Idaho Power's retail rate and carried forward to the next month. For large commercial and agricultural customers, NEG is credited at 85% of the utility's avoided-cost rate and carried forward to the next month.[161]

Under Idaho Power's net-metering tariff, the customer is responsible for "all costs associated with any Company additions, modifications, or upgrades to any Company facilities that the Company determines are necessary as a result of the installation of the Generation Facility in order to maintain a safe, reliable electrical system."[162]

5. Green Pricing

Green pricing is an optional service through which customers can support a greater level of investment by their electric utility in renewable energy. These customers will choose to pay a premium on their electric bill to cover the incremental cost of the additional renewable energy. [163]

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http://www.dsireusa.org/library/includes/seeallincentivetype.cfm?type=Net&currentpageid=2&search=Type&EE=1&RE=1

[159] Ibid.

[160] Database for State Incentives for Renewables & Efficiency (n.d.) *Idaho incentives for renewable energy*. Retrieved on March 31, 2007, http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=ID01R&state=ID&CurrentPageID=1&RE=1&EE=0

[161] Ibid.

[162] Ibid.

[163] Swezey, B & Bird, L. (2001). *Utility green-pricing: What defines success?* National Renewable Energy Library.

a. States That Have Green Pricing

As of July of 2005, thirty-five states were offering green pricing programs with five of the states making these programs mandatory.[164]

b. Green Pricing in Idaho

All major utility companies are currently offering green pricing in Idaho; however, the premium rate varies greatly among providers.[165]

c. Exemplary State-Level Program

Austin Energy in Texas offers a green pricing program that as of December 2005 was the number one rated program of its kind in the nation.[166] GreenChoice offers customers the option to choose electricity from clean, renewable sources. This Austin Energy initiative is the most successful utility-sponsored green power program in the nation with 665 million kWh in subscriptions.[167]

6. Public Benefit Funds (PBFs)

Public Benefit Funds (PBFs) are state-controlled funds generated either by a small surcharge levied on consumer electricity usage, or through specified contributions from energy companies.[168] The surcharge is often either a percentage of each kilowatt hour used or a flat fee.[169] PBFs are commonly used to support a range of energy efficiency and renewable energy programs, including weatherization programs and renewable energy research and development, as well as other energy programs such as retrofit incentive programs and energy bill assistance for low-income households.[170] The programs supported by PBFs vary by state and are prioritized according to each state's needs.[171]

a. States that have Public Benefit Funds

Currently, the following 23 states have adopted Public Benefit Funds: Arkansas, Arizona, California, Connecticut, Illinois, Massachusetts, Maryland, Maine, Michigan,

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[164] Pew Center on Global Climate Change (2005). *States with green pricing programs.* Retrieved on March 31, 2007, http://www.pewclimate.org/what_s_being_done/in_the_states/west_coast_map.cfm
[165] U.S. Department of Energy (2007). *Green pricing: Utility programs by state.* Retrieved on March 31, 2007, http://www.eere.energy.gov/greenpower/markets/pricing.shtml?page=1
[166] U.S. Department of Energy (2007). *Green pricing: Top ten utility green power programs.* Retrieved on March 31, 2007, http://www.eere.energy.gov/greenpower/markets/pricing.shtml?page=3
[167] Austin Energy (n.d.). *Energy efficiency: GreenChoice*® Retrieved on March 31, 2007, http://www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Choice/index.htm
[168] Pew Center on Global Climate Change (2006*). States with public benefit funds*. Retrieved March 27, 2007, from http://pewclimate.org/what_s_being_done/in_the_states/public_benefit_funds.cfm
[169] Apollo Alliance (n.d.). *Public benefit funds*. Retrieved March 27, 2007, from http://www.apolloalliance.org/strategy_center/model_financing_strategies/pbfs.cfm
[170] Ibid.
[171] Ibid.

Montana, New Hampshire, New Jersey, New Mexico, Nevada, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Virginia, Vermont, and Wisconsin.[172] According to the Pew Center on Global Climate Change (2007), "Publicly managed clean energy funds from twelve of these states have formed the Clean Energy States Alliance to coordinate public benefit fund investments in renewable energy.[173] The Clean Energy States Alliance is composed of funds in California, Connecticut, Illinois, Massachusetts, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, and Wisconsin."[174]

b. Exemplary State-level Program

Montana's Universal Systems Benefit Program (a Public Benefit Fund) generates funds from electric and natural gas utility consumers to support programs for energy efficiency improvements and relief from high utility bills for individuals, groups, and businesses.[175] According the Pew Center on Global Climate Change (2004), "The program resulted in 4,500 tons of CO_2-equivalent (CO_2e)[4] reductions from 1999 to 2000."[176]

7. Renewable Portfolio Standards

A renewable portfolio standard, or RPS, is a state-level policy requiring a certain percentage of electricity generated by utilities to be generated from renewable energy sources. These are typically graduated programs, starting off with requirements between 1% to 5 % and requiring increasing percentages of renewables with a goal of 4% to 20 % in 10 years.[177] Two concepts are central to the implementation and effectiveness of renewable portfolio standards: renewable-energy credits and definitions of renewable energy.

Renewable-energy credits are tradable commodities, with each credit certifying that one kilowatt-hour of electricity has been generated by a renewable energy source. To be in compliance with an RPS target, a power generator can produce compliant energy, purchase credits, or use a combination of the two. The credit system introduces flexibility into the policy and allows investors and generators a wide range of options for compliance. [178]

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[172] Ibid.
[173] Pew Center on Global Climate Change (2006*). States with public benefit funds*. Retrieved March 27, 2007, from http://pewclimate.org/what_s_being_done/in_the_states/public_benefit_funds.cfm
[174] Ibid.
[175] Pew Center on Global Climate Change (2004). *Climate change activities in the United States: 2004 update*. Retrieved March 28, 2007 from, http://pewclimate.org/docUploads/74241%5FUS%20Activities%20Report%5F040604%5F075445%2Epdf
[176] Ibid.
[177] Energy Justice Network. (n.d.). *Promoting green energy: The free market approach vs. the public policy approach.* Retrieved March 29, 2007, from www.energyjustice.net/rps/
[178] American Wind Energy Association. (1997). *The renewable portfolio standard: How it works and why it's needed.* Retrieved March 29, 2007, from www.awea.org/policy/rpsbrief.html

The definition of renewable energy in any RPS will have a critical impact on whether it is an effective tool for limiting greenhouse gas emissions. Definitions vary in various laws, proposed legislation, and industry certification definitions, but most RPS policies do not have strong requirements for clean renewables such as wind and solar energy.[179] More problematic is that some policies stretch the definition of renewable energy to include outdated hydroelectric plants, dirty biomass combustion, and even fossil fuels like coal-bed methane and waste coal.[180]

a. States that have Renewable Portfolio Standards

The following states have adopted binding percentage-based renewable portfolio standards; target dates and target percentages of renewable energy appear in parenthesis. Arizona (15% by 2025), California (20% by 2017), Colorado (10% by 2015), Connecticut (10% by 2010), District of Columbia (11% by 2022), Delaware (10% by 2019), Hawaii (20% by 2020), Massachusetts (4% by 2009), Maryland (7.5% by 2019), Maine (10% by 2017), Minnesota (25% by 2025), Montana (15% by 2015), New Jersey (6.5 % by 2008), New Mexico (20% by 2020), Nevada (20% by 2015), New York (24% by 2013), Pennsylvania (18% by 2020), Rhode Island (15% by 2020), Washington (15% by 2020), and Wisconsin (2.2% by 2011).[181]

b. Exemplary State-Level Program

In four of its last five legislative sessions (1997, 2001, 2003, 2005), Nevada has overwhelmingly passed RPS legislation.[182] The state now requires that 20% of its electricity come from renewable sources by 2015. The RPS incorporates an energy credit system, makes broad use of solar and other clean sources, and enjoys widespread support across the Nevada political spectrum.[183]

8. Recommendations For Improving Energy Production & Efficiency in Idaho

- Adoption of a renewable portfolio standard modeled after Colorado, Montana, and Nevada, with a target of 20% of energy from renewable sources by 2015, with an emphasis on new and clean renewable sources and no loopholes for hydrocarbon sources.

- Implementation of an energy conservation program that improves the energy efficiency in agriculture and in commercial and industrial buildings.

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[179] Energy Justice Network. (n.d.). *Promoting green energy: The free market approach vs. the public policy approach.* Retrieved March 29, 2007, from www.energyjustice.net/rps/
[180] Ibid.
[181] U.S. Department of Energy. (2006). *States with renewable portfolio standards.* Retrieved on March 29, 2007, from www.eere.energy.gov/states/maps/renewable_portfolio_states.cfm
[182] Pew Center on Global Climate Change (2006). *Race to the top: The expanding role of U.S. states renewable portfolio standards*. Arlington, VA: Rabe, B.G. Retrieved March 29, 2007, from www.pewclimate.org/global-warming-in-depth/all_reports/race_to_the_top/index.cfm
[183] Ibid.

- Implementation of an energy efficiency program that supports energy-efficient construction in new housing and commercial developments.

- Adoption of a Public Benefit Fund, generating money from electric and gas utility consumers. The fund would be best used to support programs for renewable energy research and development, low-income household weatherization assistance, as well as improving energy efficiency in residential and commercial developments.

- It is recommended that the state of Idaho and the utility companies conducting business in Idaho make it more desirable for their consumers to be involved in Green Pricing and Net Metering. This could be accomplished through tax incentives and legislation that would allow for fewer restrictions on amounts that can be saved through net metering.

- Greater use of combined heat and power (CHP) on Idaho's farms and at waste water treatment plants.

B. Clean Car and Truck Programs

Another area in which states can and have taken action to address climate change is the implementation of laws and policies regarding clean car and truck programs.

1. Vehicle Emissions: What are they?

Emissions are substances emitted into the air by motor vehicles including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide.[184] The main contributors to pollution from vehicles are: carbon monoxide (CO), hydrocarbons (HC), oxides of nitrogen (NOx), and particulate matter (PM). Accordingly, these are the noxious pollutants emissions standards are designed to regulate.[185]

Carbon monoxide (CO) is a colorless, odorless gas, which results from incomplete combustion of fuel. It is a poisonous gas that impairs the flow of oxygen to the brain and other parts of the body. *Hydrocarbons* (HC) are volatile organic compounds resulting from unburned or incompletely burned fuel. They react in the atmosphere with oxides of nitrogen (NOx) in the presence of sunlight to form smog. They are toxic, as well as carcinogenic. *Oxides of nitrogen* (NOx) are byproducts of fossil fuel combustion (primarily NO and NO_2) resulting from the combination of oxygen and nitrogen at high temperatures. These compounds react in the atmosphere in the presence of sunlight to form ozone. The can also cause eye irritation and impair lung

[184] Emissions and pollutant definition retrieved on April 25, 2007 from, http://www.rst2.edu/ties/acidrain/northamericanmotors/glossary.htm
[185] Clean Car Campaign (n.d.). *Emissions*. Retrieved on April 25, 2007, from http://www.cleancarcampaign.org/emissions.shtml

functioning. NOx also causes acid rain and damages aquatic environments. *Particulate matter* (PM) consists of fine airborne particles which cause lung trouble, shortness of breath, worsening of respiratory disease and heart conditions, lung damage, and cancer.[186]

Emissions are determined by two different means. The first is a common measurement system for American emission standards, which is the mixed-standard unit of grams per mile. Another way to determine vehicle emissions is to use the vehicle's "greenhouse gas score." The Environmental Protection Agency defines the greenhouse gas score as a reflection of the

> exhaust emissions of carbon dioxide (CO_2), a greenhouse gas, and one of the biggest by-products of engine combustion. The score allows you to compare the expected amount of greenhouse gas emissions for different vehicles. The scoring is from 0 to 10, where 10 is the best because it represents the lowest amount of greenhouse gases. The Greenhouse Gas Score is determined by the vehicle's estimated fuel economy and its fuel type. The lower the fuel economy, the more carbon dioxide is emitted as a by-product of combustion. The amount of carbon dioxide emitted per gallon of fuel burned varies by fuel type, since each type of fuel contains a different amount of carbon per gallon.[187]

After vehicle emissions scores are obtained, the vehicles are placed in differing tiers based on their scores. This serves as the point of departure for various state policies and standards for the regulation of vehicle emissions.

2. Vehicle Emissions Categories[188]

There are two tier standards upon which vehicles may currently fall. Tier 1 is the minimum national exhaust emission standard for non-methane hydrocarbons (NMHC), oxides of nitrogen (NOx), and carbon monoxide (CO). Tier 2 is a much stricter emission standard than Tier 1. It includes light-duty vehicles such as pickup trucks, SUV's and minivans. It was adopted by California, and eleven other states including Arizona, New York, Maine, New Jersey, Vermont, Massachusetts, Oregon, Washington, Rhode Island, Connecticut, and Pennsylvania.[189]

Currently, all new vehicles for sale in the United States (outside of California, New York, and Massachusetts) are certified to meet the Tier 1 Federal emissions

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[186] For more information on air pollutants, see U.S. Environmental Protection Agency, *What are the six common air pollutants?* Available at http://www.epa.gov/oar/urbanair/6poll.html
[187] U.S. Environmental Protection Agency (2006). *Green vehicle guides.* Retrieved on April 25, 2007, from http://www.epa.gov/greenvehicle/about.htm
[188] Clean Car Campaign (n.d.). *Emissions*. Retrieved on April 25, 2007, from http://www.cleancarcampaign.org/emissions.shtml
[189] Ibid.

standard set by the U.S. Environmental Protection Agency (EPA).[190] Again, Tier 1 limits the amount of HC, CO, NOx, and PM coming from a vehicle's tailpipe and leaking from its fuel system.

Subsequently, the National Low Emissions Vehicle regulations categorize vehicles into four groups based on their emission scores.[191] These include: Low Emission Vehicle (LEV), Super Ultra Low Emission Vehicle (SULEV), Transitional Low Emission Vehicle (TLEV), and Ultra Low Emission Vehicle (ULEV). In order to be certified, LEV vehicles must meet stringent emission levels for non-methane organic gases, oxides of nitrogen, and carbon monoxide on emissions certification tests. LEV is also a California standard, about twice as stringent as Tier 1 for smog-forming emissions. SULEV is a California standard that established stringent emission standards for the same aforementioned gases and pollutants. SULEV has even tougher standards than ULEV and is about 95% more stringent than Tier 1 for smog-forming emissions. SULEV standards are the cleanest emission standards that a gasoline vehicle can meet. SULEV represents the current state-of-the-art in emissions control and is a substantial leap forward compared to the current federal standard. Transitional Low Emission Vehicle (TLEV) is also a California standard about 20% more stringent than Tier 1 for smog forming emissions. This also regulates the amounts of pollutant gases of NMOG, NOx, and CO. Lastly, Ultra Low Emission Vehicle is another California standard 65% more stringent than Tier 1.

3. National Low Emission Vehicle Program

The National Low Emission Vehicle program is a voluntary clean car program that is designed to reduce smog and other pollution from new motor vehicles.[192] On December 16, 1997, the U.S. Environmental Protection Agency finalized the regulations for the National LEV program.[193] Because it is a voluntary program, it could only come into effect if agreed upon by the northeastern states and the auto manufacturers. The EPA received notifications from all the automakers and relevant states opting into the program. As a result, starting with model year 1999 and nationally in model year 2001, new cars and light-duty trucks will have met tailpipe standards that are more stringent than the EPA could have required under the law.

[190] Ibid.
[191] Ibid.
[192] U.S. Environmental Protection Agency (2006). *National low emission vehicle program and Ozone Transport Commission (OTC) LEV*. Retrieved on April 25, 2007, from http://www.epa.gov/otaq/lev-nlev.htm
[193] Ibid.

4. California's Greenhouse Gas Law

In response to what California identified as an inadequate vehicle emissions program, it has adopted its own greenhouse gas law.[194] The Pavley Law requires passenger vehicles, light trucks, and other vehicles primarily used for noncommercial personal transportation to achieve "maximum feasible and cost effective reduction" of greenhouse gasses. The regulations will apply to any vehicles manufactured in model year 2009 and thereafter. The Pavley Law envisions the reductions occurring through adoption of standards segmented into weight classes or through the company deciding for itself what mix of vehicles to produce in order to meet the standard. In addition, Attribute-Based Standards would be based on vehicle attributes thought to correlate with CO2 equivalent emissions, such as horsepower, dimensions, or weight.

5. Alternative Fuels

Alternative fuels are not a new idea. In 1995, an estimated 246,855 alternative fuel vehicles were in use in the United States.[195] As the interest in creating more environmentally friendly transportation options increases, more people are looking to alternative fuel sources as a way to alleviate the global warming crisis, as well as to combat the increasing demand for oil.[196] By 2003, the number of alternative fuel vehicles used in the United States had doubled to 510,805; the number is expected to continue to increase.[197] Alternative fuels refer to a variety of fuels that are not fossil fuels and include ethanol, natural gas, propane, hydrogen, biodiesel, electricity, methanol, and p-series fuels. Many of these alternative fuels have the advantage of being able to "generally reduce harmful pollutants and exhaust emissions," as well as be produced domestically and "derived from renewable sources."[198] Several states—including Idaho—have programs that promote alternative fuel use through tax credits. Other states and counties are also using alternative fuels in public vehicles such as school buses, taxis, and heavy-duty long-haul trucks.[199] All of these programs should be examined as possible options for Idaho and other states.

The term alternative fuels typically refers to any fuel substance that is not a fossil fuel or any other conventional fuel such as petroleum or coal.[200] Biodiesel is one of the more well-known alternative fuels. It is manufactured from a variety of domestic

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[194] State Environmental Resource Center (2004). *California's motor vehicle emissions program: Should your state adopt it?* Madison, WI. Retrieved on April 25, 2007, from http://www.serconline.org/pdf/EmissionsBooklet8-5.pdf

[195] Energy Information Administration (2004). *Estimated number of alternative-fueled vehicles.* Retrieved April 19, 2007, from http://www.eia.doe.gove/cneaf/alternate/page/datatables/aft1-13_03.html

[196] Alternative Fuel information from http://www.fueleconomy.gov/feg/current.shtml

[197] Energy Information Administration (2004). *Estimated number of alternative-fueled vehicles.* Retrieved April 19, 2007, from http://www.eia.doe.gove/cneaf/alternate/page/datatables/aft1-13_03.html

[198] U.S. Department of Energy (2006). *Alternative fuels.* Retrieved on April 19, 2007, from http://www.eere.energy.gov/afdc/altfuel/altfuels.html

[199] U.S. Department of Energy (2007). *Fleet applications and Niche markets.* Retrieved on April 19, 2007, from http://www.eere.energy.gov/afdc/apps/afvinfo_niche.html

[200] California Energy Commission (2005). *Transportation energy: A student's guide to alternative fuel.* Retrieved on April 19, 2007, from http://www.energyquest.ca.gov/transportation/index.html

products including animal fats, vegetable oils, and recycled restaurant grease[201] and has several advantages over other fuels. Biodiesel can be mixed with diesel and substituted for traditional petroleum diesel in normal engines. Biodiesel is not only easily accessible, it is also efficient in reducing carbon dioxide emissions. "Neat biodiesel" fuel, fuel that is 100% biodiesel, drastically reduces carbon dioxide emissions by 75% compared to traditional diesel. Even a small amount of biodiesel is effective. A blend of 20% of biodiesel and 80% diesel still reduces carbon dioxide emissions by 15%. Biodiesel also "produces fewer particulate matter, carbon monoxide, and sulfur dioxide emissions (all air pollutants under the Clean Air Act)."[202] In Idaho, licensed motor fuel distributors who include agricultural products or other waste products in their fuel do get a tax deduction. However, they are only allowed to deduct up to 10% of the volume of the fuel, even if there is a high percentage of biodiesel blended in the fuel.[203]

Propane is another popular alternative fuel. There is already an existing infrastructure of pipelines and processing plants, and approximately 3,000 facilities in the United States offer propane for sale. Propane fuel produces a lower number of ozone-forming emissions, and tests on "light-duty, bi-fuel vehicles have demonstrated a 98% reduction in the emissions of toxins."[204] Propane is not only an environmentally-safe fuel—it is less expensive than gasoline as well. The cost of a gallon of propane is usually less than gasoline, making it a cost-effective choice for public vehicles. Many alternative fuel vehicles (AFV) purchased for public use, such as buses and taxis, use propane for its low cost. Evaluations of AFV used by public businesses and agencies show the positive effects of using propane fuel for their vehicles as alternatives to diesel and gasoline.[205]

There are many other types of alternative fuels including hempseed oil fuel, P-series fuels, ethanol, and gasoline blends. There are many states that are currently offering incentives to promote use of these alternative fuels, including many of Idaho's neighboring states.[206] Washington has five different tax deductions and incentives, as well as a state regulation that requires at least 2% of the diesel sold in Washington to be biodiesel by December 1, 2008. Washington currently encourages all state agencies to use a fuel blend of 20% biodiesel in their vehicles, and the state has passed a regulation that "20% of the diesel used by state agencies must be biodiesel beginning on June 1, 2009."[207]

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[201] U.S. Department of Energy (2006). *Alternative fuels: Biodiesel.* Retrieved on April 19, 2007, from http://www.eere.energy.gov/afdc/altfuel/biodiesel.html
[202] U.S. Department of Energy (2005). *Biodiesel benefits.* Retrieved on March 28, 2007, from http://www.eere.energy.gov/afdc/altfuel/bio_benefits.html
[203] U.S. Department of Energy (2007). *Idaho incentives and laws.* Retrieved on March 29, 2007, from http://www.eere.energy.gov/afdc/progs/view_all.cgi?afdc/ID/0
[204] U.S. Department of Energy (2005). *Propane benefits*. Retrieved March 28, 2007, from http://www.eere.energy.gov/afdc/altfuel/prop_benefits.html
[205] U.S. Department of Energy (2006). *Alternative fuel vehicle fleets and niche markets for school buses.* Retrieved on March 28, 2007, from http://www.eere.energy.gov/afdc/apps/afvinfo_schoolbuses.html
[206] U.S. Department of Energy (2007). *All state incentives and laws.* Retrieved on March 29, 2007, from http://www.eere.energy.gov/afdc/progs/all_state_summary.cgi?afdc/0
[207] Ibid.

Montana also has several financial incentives for both individuals and businesses, as does Oregon.[208] Oregon also includes tax credits for individuals who purchase alternative fuel vehicles (AFV) or hybrid electric vehicles (HEV), and credits for people to convert existing vehicles to the use alternative fuels. For further discussion of different alternative fuels and state incentives, the U.S. Department of Energy: Energy Efficiency and Renewable Energy's website outlines the different alternative fuels, how they are created, benefits, and further publications and information, as well as what other states are doing.[209]

6. Recommendations for Clean Car and Truck Programs in Idaho

- Idaho should adopt the Super Ultra-Low Emission Vehicles (SULEV) standards. If this standard is adopted, vehicle emissions will be reduced by between 76 and 97% from current levels. This can be achieved through improved engine and catalytic-based control technologies. This standard applies to both passenger cars and light-trucks. Achieving the full benefit of SULEV emissions control technologies requires the use of low-sulfur fuel, which is currently required in California.[210] The Clean Car Campaign suggests that these specific emission reductions are one of the cheapest pollution control options available. According to federal law, other states may not adopt their own new vehicle standards; however, Section 177 of the Clean Air Act allows them to adopt California standards rather than the federal program. If states wish to adopt the California standards they are required to do so at least two years before the model year to which they apply. In addition, the states' standards must be identical to California's. Fortunately, Idaho is eligible to adopt California's Greenhouse Gas Program. If Idaho chooses to adopt the program it will be required to establish the entire auto emissions program, including the low emissions vehicle (LEV) program for pollutants as well as California's greenhouse gas standards.[211]

- Idaho should encourage increased use of alternative fuels as another way to reduce its impact on climate change and to encourage a cost-efficient alternative to gasoline. Fuels such as biodiesel and propane are very cost-efficient, and Idaho should look into requiring public vehicles such as buses and taxis, as well as state agency vehicles to use alternative fuel sources. Idaho also currently offers incentives to fuel distributors and businesses,[212] but should pass further legislation that offers more tax incentives for individuals—not just fuel distributors—to not only use alternative fuels, but also purchase alternative fuel

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[208] Ibid.
[209] U.S. Department of Energy (2006). *Alternative fuels.* Available at http://www.eere.energy.gov/afdc/altfuel/altfuels.html
[210] Clean Car Campaign (n.d.) *Emissions.* Retrieved on April 19, 2007, from, http://www.cleancarcampaign.org/emissions.shtml
[211] State Environmental Resource Center (2004). *California's motor vehicle emissions program: Should your state adopt it?* Madison, WI. Retrieved on April 25, 2007, from http://www.serconline.org/pdf/EmissionsBooklet8-5.pdf
[212] U.S. Department of Energy (2007). *State & federal incentives & laws.* Retrieved on April 25, 2007, from http://www.eere.energy.gov/afdc/progs/all_state_summary.cgi?afdc/0

vehicles (AFV) similar to the program in Oregon.[213] With the cost of gasoline fluctuating daily and often increasing, finding environmentally-friendly fuel sources that save Idaho individuals and businesses money should be a priority.

C. Financial Incentives

Another area in which state governments can use policy and legislation to encourage smart climate change action is with the implementation of financial incentive programs. Many states address climate change issues not only through technological solutions, but also by offering financial incentive programs to interested citizens and those doing business within its borders. Financial incentive programs run the gamut from Nevada's rebate to qualified purchasers of Energy Star appliances to Washington State's governor signing an executive order calling for a statewide initiative on climate change. Other forms of financial incentives include production incentives, corporate tax incentives, rebate programs, grant programs, and industry recruitment incentives.

1. Idaho's Financial Incentive Efforts

The State of Idaho currently offers some financial incentive programs. These programs include personal deductions, such as Idaho Code § 63-3022B, Deduction of Insulation of Residences, which provides for a tax deduction for the complete cost of installation of insulation on existing buildings built before 1976. Another personal deduction is found in Idaho Code § 63-3022C, Deduction for Alternative Energy Device at Residence, which provides for a 40% deduction for wind, solar, geothermal, and certain biomass energy devices used for electricity generation. Idaho also provides for a sales tax exemption found in Idaho Code § 63-3622QQ, Equipment used in Alternative Method of Generation of Electricity. Under this section, purchasers of certain machinery used in alternative energy production can apply for a rebate of the sales tax on such purchases. Idaho Code § 67-8901 provides the opportunity for independent renewable energy producers to apply for financing through the Idaho Energy Resources Authority. The state also offers low-interest loans through the Idaho State Department of Water Resources to residential and non-residential customers for implementation of energy efficient programs.

2. Indiana's Low-Interest Loan Program

Many other states have successfully implemented climate change-friendly financial incentive programs. In Indiana, for example, the Energy Division of the Indiana Department of Commerce offers no-interest loans of up to $100,000 through the Public Facility Efficiency Energy Program (PFEEP).[214] Indiana Efficiency Loan funds help schools, political subdivisions, and public libraries to identify and implement energy

[213] Ibid.
[214] Pew Center on Climate Change (2004). *Climate change activities in the United States: 2004 update.* Arlington, VA. Available at http://www.pewclimate.org/docUploads/74241%5FUS%20Activities%20Report%5F040604%5F075445%2Epdf

efficiency improvements in their existing facilities and to design energy efficiency measures into their new facilities. In 1990, statewide legislation set a waste reduction goal for the state of 50 percent by January 1, 2001. The Recycling Market Development Board was developed in response to this legislation. PFEEP is handled in house by 2.25 full time employees paid from the dedicated fund. The Energy Policy Division provides support staff as needed and absorbs the program's administrative costs in its general operating budget. During the first year, the program accrued 4,584 MMBtu in energy savings and over 400 tons of CO_2 reductions. The state predicts that these savings will increase as the program grows. The buildings that are eligible for PFEEP are vacant, unused, buildings that are not heated or cooled, and school stadiums.[215] PFEEP provides funding for many types of projects, including insulation projects, energy efficient electrical motors, lighting retrofits, and energy management systems.

3. Utah's Recommissioning Program

Another useful example is found in a Utah power utility's Recommissioning Program.[216] Like most states, Utah faces tensions between growth and development and maintaining the integrity of historical buildings. In an effort to address this tension—and to do so in an environmentally conscious manner—Rocky Mountain Power offers innovative options to environmentally friendly customers. Recommissioning is a process whereby an existing building is restored to the original operating performance with regard to structural and electrical elements. The various technological advancements that were not available during original construction can be installed in the historical buildings, optimizing energy output and minimizing unnecessary usage. Rocky Mountain Power currently offers a free recommission analysis to its customers in an effort to lower energy cost in existing and developing business structures. Rocky Mountain Power's program also provides the opportunity for businesses to work with engineers to acquire knowledge for additional energy saving techniques. A building check up through Rocky Mountain Power's recommissioning program can save a user up to 15% in energy costs.

While the Recommissioning Program in Utah is operated by a public utility, this same sort of service could easily be offered by a state agency. In a state such as Idaho, with a rich historical past and a booming, vibrant future, such a service could be crucial in directing our growth in environmentally-friendly and yet also historically-sensitive ways.

4. Wisconsin's Anaerobic Digestion Energy Systems Loan Program

Yet another example of a successful state financial incentive program is Wisconsin's effective use of a low-interest loan program to aid dairy farms in the

[215] Public Facility Energy Efficiency Program (PFEEP) Loan Guideline information Retrieved on March 23, 2007, from http://www.state.in.us/icpr/webfile/formsdiv/50446.pdf
[216] Rocky Mountain Power (n.d). *Recommissioning*. Retrieved on March 23, 2007, from http://www.utahpower.net/Article/Article50117.html

implementation of anaerobic digestion energy systems—biomass converter systems that dispose of animal waste while at the same time creating renewable energy.[217]

At its simplest, "anaerobic digesters convert the energy stored in organic materials present in manure into biogas."[218] This biogas is clean, renewable energy. Use of anaerobic digestion energy systems produces benefits in many areas, including odor and fly control, pathogen control, disposal, valuable byproducts, and environmental.[219] Anaerobic digesters aid in controlling climate change in many ways, especially by eliminating methane emissions and by reducing CO_2 emissions by replacing coal-fueled electric generation. Electricity generated from an anaerobic digester can be used to power individual farms or be sold into the grid. Farmers can also supplement their incomes by selling unused electricity generated by the digesters. It is estimated that a 1500 cow dairy farm could produce enough renewable electricity to power 330 homes.[220]

Like Wisconsin, Idaho has many dairy farms. The implementation of anaerobic digesters on Idaho dairy farms would benefit the farmers and all the citizens of the state by managing waste, lowering harmful emissions, and potentially offering a new source of electricity from a renewable energy source.

5. Colorado's Energy $aving Partner Program

Finally, the state of Colorado has had success with its Energy $aving Partner program (E$P).[221] E$P's goal is to provide safe, cost-effective energy conservation services to low-income single-family houses, mobile homes, and multifamily units. Eligibility is open to both homeowners and renters. E$P offers comprehensive, computerized energy audits for eligible residents. These audits include the following: attic, wall and crawlspace insulation, air leakage reduction, forced-air furnace efficiency assessment, tune-ups, repair/replacement, combustion appliance safety inspection/efficiency checks, high-efficiency lighting survey and other safety inspections. These services are free to qualified renters and home owners. During the years 2000-2001, approximately 3,400 Coloradan homes were weatherized. Each home experienced an average energy consumption reduction of 20 to 25 percent.[222]

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[217] Pew Center on Global Climate Change (n.d.). *Tinedale Farm Anaerobic Digestion Energy System*. Retrieved on March 26, 2007, from http://www.pewclimate.org/states.cfm?ID=26

[218] Midwest Rural Energy Council (n.d.). *Anaerobic digestion and bio-gas.* Retrieved March 27, 2007, from http://www.mrec.org/anaerobicdigestion.html

[219] Focus on Energy (2002). *Farm Energy from Manure: Fact Sheet*. Retrieved March 27, 2007, from http://www.focusonenergy.com/data/common/dmsFiles/W_RB_MKFS_Farm%20energy%20from%20manure.pdf

[220] Associated Press. (2005, January 18). Vermont cows help power 330 homes: Manure-to-electricity project is first to reach grid. *MSNBC*. Retrieved March 30, 2007, from http://www.msnbc.msn.com/id/6838687/

[221] Colorado's program follows the federal Weatherization Assistance Program. This federal program was created in 1976, and is managed by the Department of Energy (U.S. DOE). Its aim is to reduce heating and cooling costs for low –income families.

[222] The federal program has worked to weatherize over 70,000 homes since it's beginning in 1976.

Colorado has eight agencies and six satellite offices to provide weatherization services to every single county in the state. The Governor's Office of Energy Management and Conservation administers Colorado's statewide program. The Department of Energy, the Low-Income Home Energy Assistance Program and Xcel Energy funds the E$P program. Between the years 2000-2001, the estimated operating costs were estimated to be over $9 million.

According to the Department of Energy, the overall goal of weatherization is to reduce the burden of energy prices on the disadvantaged. The Bush Administration has made weatherization a priority, even recommending to Congress that it authorize budgets sufficient to weatherize 1.2 million homes between 2002 and 2010.[223] Currently, the income eligibility level for participation in the Low-Income Home Energy Assistance Program (LIHEAP) in Idaho is 150% of the Federal Poverty Level.[224] This means that a family of four making over $30,000 a year would *not* qualify for assistance in weatherization of their home.

LIHEAP pays a portion of Idaho's low-income energy costs through Community Action Agencies. Payment is made to the energy suppliers and vendors. A federal grant from the U.S. Department of Health and Human Services funded the SFY 2006 program with $11.8 million and served 33,967 households in Idaho. The state of Idaho, through legislative appropriation, provided an additional $3.7 million in funding for energy assistance; an additional benefit to all household receiving LIHEAP assistance.[225] Idaho Power currently provides financial assistance to Idaho and Oregon Community Action Partnership (CAP) agencies to help cover the cost for weatherization of electrically heated homes for qualified customers who own or rent their homes.[226] Avista Utilities provides efficient, reliable electricity and natural gas to residents in North Idaho. Those with qualifying incomes can receive weatherization (insulation and air sealing) or heating system improvement through Avista Utilities and their community action agency.[227]

Weatherization is not only helping the low-income residents of Idaho by opening up the process to more households and by lowering monthly payments, it also aids all of Idaho's citizens by decreasing the actual demand for energy. Weatherization should be an accessible option for all Idahoans. While there are some weatherization programs geared toward low-income residents in the state, the citizens of Idaho would benefit

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[223] U.S. Department of Energy (2006). *Weatherization Assistance Program Goals and Metrics*. Retrieved on March 26, 2007 from, http://www.eere.energy.gov/weatherization/prog_goals.html

[224] U.S. Department of Health and Human Services (2007). *LIHEAP clearinghouse: Idaho.* Retrieved April 7, 2007, from http://www.liheap.ncat.org/profiles/Idaho.htm

[225] Idaho Department of Health and Welfare (n.d.). *Facts, Figures, and Trends: 2006-2007*. Retrieved March 27, 2007, from http://www.healthandwelfare.idaho.gov/DesktopModules/DocumentsSortable/DocumentsSrtView.aspx?tabID=0&ItemID=6687&MId=10576&wversion=Staging

[226] Idaho Power (n.d.). *Weatherization assistance for qualified customers*. Retrieved April 25, 2007, from http://www.idahopower.com/pdfs/customerservice/Weatherization_05.pdf

[227] Avista Utilities (n.d.). *Limited Income Programs*. Retrieved on April 25, 2007, from http://www.avistautilities.com/account/ltd_income.asp

from expanding the programs to help even more of our citizens to weatherize their homes. One important way of doing this would be to look to Colorado's success with their E$P program and to establish a similar program of our own.

The preceding examples are just a sampling of financial incentive programs that states nationwide have implemented to encourage positive action in controlling the detrimental affects of global—and local—climate change.

6. Recommendations for Financial Incentive Programs in Idaho

- Establish a Public Facility Efficiency Energy Program that would offer no-interest loans to update and remodel public buildings with energy efficient designs.

- Establish a Recommissioning Program that would offer consultation and advice regarding energy efficient measures to those wishing to remodel historical buildings.

- Expand Idaho's existing low-interest biomass loans program to reduce harmful emissions and raise production of renewable energy by encouraging and facilitating the implementation of anaerobic digesters on Idaho's dairy farms.

- Idaho should strive for weatherization of all homes at all income levels. One way of increasing the number of homes that are weatherized is through educating residents of Idaho to the benefits and incentives, both financial and environmental, of weatherization. Another important act would be to increase the LIHEAP Income Eligibility Level in Idaho to at least 200% of the Federal Poverty Level, thus making a family of four with an income of $40,000 or less eligible for full assistance.

D. Tracking Greenhouse Gas Pollution Reduction

Another area in which states can implement climate change policy is in the area of tracking greenhouse gas pollution reduction.

1. Greenhouse Gas

In order for a state to plan for the reduction of its greenhouse gas (GHG) emissions, it is important to know the amount of GHG that is being produced by activities within its borders. State level inventories provide baselines for planning and for future reduction of GHG emissions. State level inventories also provide the data needed for participation in pollution "cap and trade" systems. Thirty-nine states and Puerto Rico have completed inventories of their total greenhouse gas emissions.

As of April 2007, the Pew Center on Global Climate Change identified 16 states—Alaska, Arkansas, Arizona, California, Florida, Illinois, Maryland, Montana, North Carolina, New Mexico, Oregon, South Carolina, Utah, Vermont, Washington, and

Wisconsin—with active climate legislative commissions or executive branch advisory groups.[228]

Such organizations assess the impacts and costs of climate change at the state level; inventory emissions of GHGs; develop state plans with recommendations for comprehensive, equitable and cost-effective remedial actions for reducing and/or sequestering GHGs; assess progress; explore opportunities for research on mitigation and adaptation to climate change; educate the public about climate change; and explore economic opportunities involved in various policy options.[229]

For example, on February, 16, 2007, Governor Mark Sanford of South Carolina established the Governor's Climate, Energy, and Commerce Advisory Committee. The committee is to consider the possible impacts of climate change on South Carolina and to recommend strategies for addressing it. Members will include up to 30 representatives from a number of business, energy, industry, government, and environmental groups, among others. The committee will consider building efficiency measures, GHG mitigation strategies, and other energy policy options that may present opportunities for SC. The committee's final recommended action plan is due to the governor by March 2008.[230]

In Montana, a Climate Change Advisory Council was established in April 2006 by the Department of Environmental Quality at the request of Governor Brian Schweitzer to recommend strategies to reduce and sequester GHG emissions, to promote economic growth, and to develop a Climate Change Action Plan by July 2007.[231]

In Oregon, a Climate Change Integration Group was appointed in June 2006 by the Governor to track the state's progress on GHG emission reductions and to explore new opportunities for research on the mitigation of, and adaptation to, climate change in Oregon and the Pacific Northwest.[232]

In Washington, a Washington Climate Change Challenge was initiated February 2007 by executive order directing the departments of Ecology and Community, Trade and Economic Development to lead a task force composed of representatives from business, community, and environmental groups in developing strategies for how Washington can achieve its climate goals.[233]

In New Mexico, a Climate Change Action Council was established in June 2005 by executive order to review and provide recommendations to the governor's office regarding climate change policy. A Climate Change Advisory Group also was

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[228]Pew Center on Global Climate Change (2007). *States with active climate legislative commissions and executive branch advisory groups.* Retrieved on April 25, 2007, from www.pewclimate.org/what_s_being_done/in_the_states/climatecommissions.cfm

[229] Ibid.

[230] Ibid.

[231] Ibid.

[232] Ibid.

[233] Ibid.

established in June 2005 by executive order to present a report to the Climate Change Action Council by December 2006 including proposals to achieve the New Mexico GHG emissions reduction targets and associated costs and benefits, an inventory of historical and forecasted GHG emissions in New Mexico and of existing and planned GHG emission reduction actions in the state, and findings on initiatives to create meaningful regional and national policy to address climate change.[234]

In California, a Climate Change Advisory Committee was established in 2004 by the California Energy Commission to provide advice and recommendations on a comprehensive equitable and cost-effective climate change strategy for the state. A Climate Action Team was established by executive order in June 2005 to implement global warming emission reduction programs and report on the progress made toward meeting state GHG emission reduction targets.[235]

As noted above, many other states and counties have initiated their own individual responses to climate change. Many states have developed a state-level inventory of green house gasses or committed to developing a state-level action plan to reduce greenhouse gas emissions. Idaho should join in this endeavor by producing a state-level action plan to reduce the effects of greenhouse gases on our environment.

Some other individual state efforts are listed below.[236]

• The Iowa State Energy Bureau's Building Energy Management Program promotes cost-effective energy management improvements in state buildings, schools, hospitals non-profit organizations, and local government facilities.

• In Minnesota, more stringent energy standards have been adopted for the new construction of residential dwellings and government offices.

• Oregon has increased the weatherization standards in the construction of low income homes.

• New York has recently established a public-private partnership to encourage and support schools in making their facilities more energy efficient (*Energy Smart Schools*).

• Colorado has established the *Colorado Green Program*, which assists builders and honors residents who construct homes that conserve natural resources and increase energy efficiency.

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[234] Ibid.
[235] Ibid.
[236] Idaho Soil Conservation Commission (2003, February). *Carbon sequestration on Idaho agricultural and forest lands.* Boise, ID: Ferguson, D.F. Available at http://www.scc.state.id.us/PDF/Carbon%20Sequestration/IDAHO%20SEQUESTRATION%20REPORT.pdf

• In Mecklenberg County, North Carolina all school buses have been converted to CNG vehicles.

• In Maryland, the Department of Transportation has replaced its fleet of diesel fuel shuttle buses at BWI with 20 new CNG vehicles. Also, the governor signed an executive order which formally expressed Maryland State Government's commitment to improve air quality and to comply with the clean fuel provisions of the *Clean Air Act Amendments of 1990* and the Energy Policy Act of 1992.

• The Georgia Governor's Office of Energy Resources is increasing energy and agricultural efficiency by facilitating six programs targeted to crop, poultry, and livestock producers. These programs conserve energy and save money in addition to reducing greenhouse gas emissions.

• The Missouri Department of Natural Resources has created a reforestation program designed to reduce heating and cooling needs with strategic landscaping, to arrest soil erosion, enhance natural water filtration, and remove carbon dioxide from the atmosphere. The program coordinator of this multifaceted project, called Operation TREE, must work to involve every division of the Department of Resources and encourage cooperation among other state agencies.

• The Alabama Broiler Litter Program, co-sponsored by the Science, Technology and Energy Division of the Alabama Department of Economic and Community Affairs and the USDA's Tennessee Valley Resource Conservation and Development Council, addresses energy conservation, reduces the landfill waste stream, promotes recycling, and improves agricultural productivity. In this program newspaper is shredded and blown over the poultry house floor, where it becomes matted and slick from droppings and moisture content. When the litter and paper is gathered from the floor, it is spread on crops as fertilizer, or is mixed with feed and is fed to livestock. The paper also acts as an insulator for the poultry house, thereby reducing energy needs.

These activities listed are examples of how Idaho could implement programs to address climate change and benefit our state, our nation and ultimately our planet.

2. Recommendations for Tracking Greenhouse Gases in Idaho

The Idaho Legislature in collaboration with the Office of the Governor should appoint a State of Idaho Climate Change Advisory Commission to 1.) assess the potential impacts and costs of climate change to the economy of Idaho, 2.) inventory emissions of greenhouse gases in Idaho, 3.) develop an Idaho state plan with recommendations for comprehensive, equitable and cost-effective remedial actions for reducing and/or sequestering greenhouse gases, 4.) assess progress in the reduction of greenhouse gases in Idaho, 5.) explore opportunities for research on mitigation and adaptation to climate change in Idaho, 6.) educate the public about climate change, and 7.) explore economic opportunities involved in various policy options for reducing greenhouse gas emissions.

E. Carbon Capture and Sequestration

One final area in which states can use legislation and state power to implement climate change policies is in the arena of carbon sequestration.

1. Definition

Carbon sequestration stores carbon in forested or agricultural lands. This causes the ground to store more than it naturally would, thus increasing the amount of carbon taken out of our atmosphere.

Cap and trade systems aim at reducing carbon dioxide emissions from power plants "while allowing companies to trade emission allowances so they can achieve their reductions as cost-effectively as possible."[237] In some instances additional flexibility is achieved by providing credits for reductions achieved outside the generation of electric power. The Northeast Regional Greenhouse Gas Initiative signed by the governors of Connecticut, Delaware, Massachusetts, Maine, New Jersey, New Hampshire, New York, and Vermont is an example of regional collaboration at the state level. Maryland is scheduled to join later this year.

Five states—Illinois, Nebraska, North Dakota, Oklahoma and Wyoming—have established advisory committees to investigate the potential for capturing and sequestering carbon.

Idaho has a large potential for carbon sequestration. The Idaho Soil Conservation Commission submitted a report, Carbon Sequestration on Idaho Agricultural and Forest Land, in 2003.[238] The Report included recommendations regarding practices of carbon sequestration that could be adopted by the state of Idaho. These practices would give the state the ability to increase carbon sequestration or reduce agricultural related emissions. Afforestation is the practice of planting new forests on poorly stocked forest lands. A large amount of the natural ability of soil to store carbon has been lost to agricultural production, thus nutrient management is the practice of sequestering carbon back into the soil through a variety of practices. Other practices that could help to sequester carbon in Idaho lands include the use of: biomass (cropland residues) energy sources; afforestation on marginal cropland; ethanol production and use; residue management (no-till, direct seed); biogas recovery; digesters; afforestation on non-stocked forest land; and reduced methane emissions from dairy livestock. About 63% of Idaho's land is public land, managed by federal agencies. Idaho has 23 million acres of forest land, which means that the government

[237] National Wildlife Federation (2007). *State and regional programs to address global warming.* Retrieved February 21, 2007, from http://www.nwf.org/globalwarming/pdfs/StateActionsClimateChange.pdf

[238] Idaho Soil Conservation Commission (2003, February). *Carbon sequestration on Idaho agricultural and forest lands.* Available at http://www.scc.state.id.us/PDF/Carbon%20Sequestration/IDAHO%20SEQUESTRATION%20REPORT.pdf

has the authority to affect significant positive change in the field of carbon sequestration.

Cost is the biggest barrier to implementing these practices. If costs are offset by supplemental income, through state, federal, or carbon market funds, then adoption would increase. The level of carbon sequestered or emission reduction should affect the level of funding. The Committee has forecasted that a carbon market would be practical within the state of Idaho, especially as Idaho ranks 5th in states for the most federal land.

2. Recommendations for Carbon Sequestration in Idaho

- Idaho can vastly increase carbon sequestration by planting new forests on poorly stocked forest lands.

- Our state can benefit from implementation of practices associated with nutrient management, such as direct seeding.

- Idaho can reduce its current carbon emissions with production and use of biomass energy sources. Current potential biofuels already produced in Idaho include corn, wheat, canola, and barley.

- Idaho can plant new forests on marginal croplands.

- Idaho can continue to increase its use and production of ethanol.

- Idaho can reduce the amount of methane production by adopting the practice of biogas recovery through use of digesters.

VI. Recommendations

19. The Idaho Legislature, in collaboration with the Office of the Governor, should appoint a State of Idaho Climate Change Advisory Commission to

    a. assess the potential impacts and costs of climate change to the economy of Idaho;

    b. inventory emissions of greenhouse gases in Idaho;

    c. develop an Idaho state plan with recommendations for comprehensive, equitable, and cost-effective remedial actions for reducing and/or sequestering greenhouse gases;

    d. assess progress in the reduction of greenhouse gases in Idaho;

    e. explore opportunities for research on mitigation and adaptation to climate change in Idaho;

    f. educate the public about climate change; and

    g. explore economic opportunities involved in various policy options for reducing greenhouse gas emissions.

20. Adopt a renewable portfolio standard modeled after Colorado, Montana, and Nevada, with a target of 20% of energy from renewable sources by 2015, with an emphasis on new and clean renewable sources and no loopholes for hydrocarbon sources.

21. Implement an energy conservation program that improves the energy efficiency in agriculture and in commercial and industrial buildings.

22. Implement an energy efficiency program that supports energy-efficient construction in new housing and commercial developments.

23. Adopt a Public Benefit fund, generation money from electric and gas utility consumers. The Fund would be best used to support programs for renewable energy research and development, low-income energy assistance, as well as improving energy efficiency in residential and commercial developments.

24. Encourage consumers to be involved in Green Pricing and Net Metering. This could be accomplished through tax incentives and legislation that would allow for fewer restrictions on amounts that can be saved through net metering.

25. Use more combined heat and power (CHP) on Idaho's farms and at waste water treatment plants.

26. Adopt the Super Ultra-Low Emission Vehicles (SULEV) standards, which will significantly reduce emissions in Idaho.

27. Encourage increased use of alternative fuels as another way to reduce the state's impact on climate change and to encourage a cost-efficient alternative to gasoline. One way to do this would be to implement individual tax credits for the use of alternative fuels and the purchase of Alternative Fuel Vehicles.

28. Establish a Public Facility Efficiency Energy Program that would offer no-interest loans to update and remodel public buildings with energy efficient designs.

29. Establish a Recommissioning Program that would offer consultation and advice regarding energy efficient measures to those wishing to remodel historical buildings.

30. Expand Idaho's existing low-interest biomass loans program to reduce harmful emissions and raise production of renewable energy by encouraging and facilitating the implementation of anaerobic digesters on Idaho's dairy farms.

31. Weatherize all homes at all income levels. One way to increasing the number of homes that are weatherized is through educating residents of Idaho of the benefits and incentives, both financial and environmental, of weatherization. Another important act would be to increase the LIHEAP Income Eligibility Level in Idaho to at least 200% of the Federal Poverty Level, thus making more families eligible for full assistance.

32. Increase carbon sequestration with the planting of new forests on poorly stocked forest lands.

33. Implement practices associated with nutrient management, such as direct seeding.

34. Produce and use biomass energy sources. Current potential biofuels already produced in Idaho include corn, wheat, canola, and barley.

35. Plant new forests on marginal croplands

36. Increase use and production of ethanol.

VII. Conclusion

It is known and nearly-universally accepted that climate change will have a lasting and potentially devastating impact on our entire planet. Through rigorous scientific study, scientists around the world have documented the effects that climate change has already wrought upon our planet, and they continue to warn against the environmental dangers and potential catastrophes that we and future generations of Idahoans continue to face.

As Americans—and as Idahoans—we have the opportunity, the resources, and the moral obligation to make the needed changes that will stop and even reverse the negative effects of human-generated climate change. Individual states throughout our nation are working to do their part to make the needed difference in this fight. Idaho has already implemented some programs designed to lessen our state's impact on climate change. This is a good start. But, we have more to do. We call upon the Idaho Legislature to act upon these concerns.