Global Warming: A Framework of Science, Economics, Law, and Policy

Briefing for Oregon State Senate Judiciary Committee

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February 16, 2007

I. Science

Summary - Human activities emit large amounts of heat-trapping gases, such as carbon dioxide and methane, into the atmosphere, causing global warming.[ii] Fossil fuel use is the main source of these gases. Since pre-industrial times, carbon dioxide has climbed to a present level exceeding any in the past 650,000 years. Carbon dioxide lingers in the atmosphere for centuries. As a result of rising temperatures, the Polar ice cap, Greenland, and nearly all glaciers in the world are melting. While it is too late to avoid the damage already underway as a result of past carbon emissions, most scientists believe that we can still thwart planet-altering levels of global warming by curbing our greenhouse gas emissions. The mandate is two-fold: 1) reduce greenhouse gas emissions 80% below 1990 levels by 2050;[iii] and 2) reverse the trajectory of greenhouse gas emissions in the short term (no later than 10 years from now).[iv]

A. The role of greenhouse gas emissions in global warming

B. Natural effects of global warming (not exhaustive)

1. crop failures/famine
2. sea level rise
3. flooding
4. drought
5. wildfire
6. hurricanes
7. species extinctions
8. decreased snowpack
9. landslides
10. heat waves
11. disease vectors
12. tornados

C. Required action (two-fold)

1. Reduce greenhouse gas emissions 80% by 2050 *and*
2. Reverse the trajectory of greenhouse gas emissions within 10 years

II. Economics

Summary: The costs of not addressing atmospheric heating vastly exceed the costs of investing in carbon-free infrastructure now. Legislatures will spend more money in disaster response and broken infrastructure by failing to avert temperature rise. The private sector will experience greater losses and uncertainty in a world characterized by climate instability. While the transition to a carbon-free economy entails considerable cost, such an economy will provide efficiencies that will boost private sector economic growth.

A. Overriding principles

1. Inaction costs more than action.[v]
2. Public sector investment choice: carbon-free infrastructure or increased disaster response

B. Climate heating impacts to Oregon[vi]

III. Law

Summary: State legislatures hold natural assets in trust for their citizens.[vii] The trust includes air, waters, and other natural assets necessary for human welfare and survival. The beneficiaries of this trust are all generations of citizens.[viii] Legislators may not abdicate their responsibility to manage the trust for the benefit of future citizens.[ix] As trustees, they hold the duty to defend the trust against injury and restore damaged assets.[x] States, for example, have protected their air trust by bringing nuisance lawsuits against polluters[xi] and by passing legislation. The atmosphere encompassing the Earth is an asset held by all sovereign nations and states as co-tenant trustees. Each co-trustee has the duty not to waste the commonly held asset.[xii] As a sovereign co-trustee, the State of Oregon shares the affirmative responsibility of restoring the trust by meeting the two-part carbon reduction mandate (section I.C. above).

A. Legal principles

1. Trust responsibility to protect the atmosphere
2. Shared responsibility of co-tenants to prevent waste to the atmosphere

B. Procedural challenges to implementing the mandate over time

1. Oversight
2. Enforcement

IV. Policy

Summary – The climate crisis presents a historic challenge for state legislatures – a challenge made difficult because government failed to act in a precautionary way in response to scientific warnings issued years ago. Society now faces a more abrupt transition to meet the two-fold mandate. The Oregon Strategy for Greenhouse Gas Reductions, developed by the Governor's Advisory Group on Global Warming, sets forth measures to meet the two-fold mandate,[xiii] but its implementation requires legislation. In evaluating climate change policy, State officials must have their eyes firmly on the quantitative reduction goals. Progressive approaches to policy making are dangerous, as "near compliance" with Nature's mandate is not enough.[xiv]

A. Long-term goal strategy: wedges

The long-term goal of 80% carbon reduction by 2050 foresees a major transition from our carbon-dependant infrastructure to a primarily carbon-free infrastructure. Policy analysts conceptually break the required reduction down into "wedges" – discrete actions that accomplish an emission reduction from available technology.[xv] Ultimately, the wedges selected by Oregon must add up to a total carbon reduction of 80% before 2050. Legislatures must be prepared to accelerate these restructuring initiatives in response to accelerated global climate destabilization.

B. Short term goal strategy: carets

Long-term restructuring is not enough. The upward trajectory of carbon emissions must also reverse within a decade. A "caret" is a symbol used to make quick insertions to existing text; visually, it reflects an upward trajectory reversing downward: Legislators must insert various "carets" into the existing carbon infrastructure in short measure to reverse our climbing trajectory of carbon emissions.[xvi] They must carefully monitor the effectiveness of the carets to ensure that the necessary trajectory reversal happens within a decade.[xvii]

C. Policy tools (not exhaustive)

1. carbon emission regulation
2. carbon tax
3. cap and trade schemes
4. public transportation
5. renewable energy
6. forest protection
7. land use measures
8. moratoria on coal plants

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[ii] For a full explanation of global warming dynamics, *see* Union of Concerned Scientists, Frequently Asked Questions About Global Warming, http://www.ucsusa.org/global_warming/science/global-warming-faq.html.

[iii] *See* United Nations Framework Convention on Climate Change, Statement of UNFCCC Executive Secretary, summarizing UN's Intergovernmental Panel on Climate Change (IPCC) report (Feb. 2, 2007); California Global Warming Solutions Act of 2006 (goal of 80% reduction from 1990 level by 2050); Oregon Strategy for Greenhouse Gas Reductions, developed by the Governor's Advisory Group on Global Warming 7 (Dec. 2004); Governor of New Jersey, Executive Order #54 (statewide goal of 80% greenhouse gas reduction by 2050), available at http://www.state.nj.us/governor/news/news/approved/20070213a.html.

[iv] Jim Hansen, *The Threat to the Planet*, THE NEW YORK TIMES REVIEW 12 (July 13, 2006)("[W]e have at most ten years – not ten years to decide upon action, but ten years to alter fundamentally the trajectory of global greenhouse emissions."). Hansen, the leading climate scientist for NASA, warns that, if existing increases of carbon emissions (2% a year) continue for even another decade, temperatures will rise five degrees Fahrenheit during this century, which in turn could cause an 80-foot rise in sea level: "In that case, the United States would lost most East Coast cities: Boston, New York, Philadelphia, Washington, and Miami; indeed, practically the entire state of Florida would be under water. Fifty million people in the US live below that sea level. . . ." *Id* at 13.

[v] THE STERN REVIEW ON THE ECONOMICS OF CLIMATE CHANGE (Cambridge Press, Jan. 2007).

[vi] For information, *see* Climate Impacts Group, http://www.cses.washington.edu/cig/.

[vii] Illinois Central Railroad v. Illinois, 146 U.S. 387, 455 (1892) ("[T]he decisions are numerous which declare that such property is held by the State, by virtue of its sovereignty, in trust for the public."); Geer v. Connecticut, 161 U.S. 519, 525-29 (1896) (detailing ancient and English common law principles of sovereign trust ownership of air, water, sea, shores, and wildlife and stating: "[T]he power or control pledged in the State, resulting from this common ownership, is to be exercised, like all other powers of government, as a trust for the benefit of the people."). For sources and materials on the public trust doctrine, *see* JAN G. LAITOS, SANDRA B. ZELLMER, MARY C. WOOD, & DAN H. COLE, NATURAL RESOURCES LAW Chapter 8.II (West Publishing, 2006).

[viii] *See* Geer v. Connecticut, *supra*: "[T]he ownership of the sovereign authority is in trust for all the people of the State, and hence by implication it is the duty of the legislature to enact such laws as will best preserve the subject of the trust and secure its beneficial use in the future to the people of the State. . . . ").

[ix] *See* Illinois Central, *supra* (discussing public water assets): "[T]he abdication of the general control of the State over [waterways] is not consistent with the exercise of that trust which requires the government of the State to preserve such waters for the use of the public. . . . The ownership [of waterways] . . . is a subject of public concern to the whole people of the state. The trust with which they are held, therefore, is governmental and cannot be alienated." *Id.* at 452-53.

[x] Am. Jur. 2d Trusts, 76 Am. Jur. 2d Trusts §§ 656, 443 ("[I]t is within the power and duty of a trustee to . . . preserve and protect the trust property against loss, dissipation, or diminution . . . .").

[xi] *See, e.g.*, Georgia v. Tennessee Copper Company, 206 U.S. 230, 238 (1907)("This is a [nuisance] suit by a state for an injury to it in its capacity of quasi-sovereign. In that capacity the state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its. . . inhabitants shall breathe pure air. . . . It is a fair and reasonable demand on the part of a sovereign that the air over its territory should not be polluted on a great scale . . . by the act of persons beyond its control . . . ."). The state of California has brought a nuisance suit against major auto manufacturers for their contribution to global warming. *See* http://ag.ca.gov/newsalerts/cms06/06-082_0a.pdf?PHPSESSID=20c8f0f203ec80c47644276aae5437de (complaint).

[xii] The term "waste" means "neglect or misconduct resulting in material damage to or loss of property." JOSEPH SINGER, PROPERTY LAW: RULES, POLICIES, AND PRACTICES 555 (Aspen Publishers, 4d). Waste is a spoil or destruction of "corporeal hereditaments," *Lytle v. Payette-Oregon Slope Irr. Dist.*, 175 Or. 276, 288,152 P.2d 934

(1944). "Ill husbandry, carried to such extent as materially injures the rights of [the] reversioner, constitutes waste." *Id.*, at 288 (citing 67 C.J., Waste, § 12).

[xiii] The Oregon Strategy, *supra*, sets the following goals:

1. By 2010, arrest the growth of Oregon's greenhouse gas emissions and by 2020, achieve a 10 percent reduction below 1990 greenhouse gas levels.
2. By 2050, achieve a "climate stabilization" emissions level at least 75 percent below 1990 levels.

[xiv] *See* Robert H. Socolow & Stephen W. Pacala, *A Plan to Keep Carbon In Check*, SCIENTIFIC AMERICAN 1 (Sept. 2006) ("Humanity can emit only so much carbon dioxide into the atmosphere before the climate enters a state unknown in recent geologic history and goes haywire."); Mark Lynas, *Why We Must Ration the Future* NEWSTATESMAN (Oct. 23, 2006)("Let me put it simply: if we go on emitting greenhouse gases at anything like the current rate, most of the surface of the globe will be rendered inhabitable within the lifetimes of most readers of this article. We must reduce our emissions by 90 per cent or so within three or four decades if we are to have any chance of avoiding this looming catastrophe.").

[xv] SCIENTIFIC AMERICAN, *supra*, at 1. The designers of the wedge concept use the term to mean a standard unit reduction of carbon emissions per year, but the concept is useful in a more general manner to mean various actions that add up to the total "pie" of necessary carbon reduction.

[xvi] California's recently proposed bill banning incandescent light bulbs is an example of a caret. A fee on carbon emissions is another caret. Moratoria on forest logging, or on new coal-fired plants, are other examples.

[xvii] For example, certain biofuels measures, while touted as solutions, may be inadequate to meet the carbon reduction mandate. *See, e.g.*, Paul Krugman, *The Sum of All Ears*, NEW-YORK TIMES NEWS SERVICE (Jan. 30, 2007). Wedges and carets are available through all sectors. For policy guidance on carbon reduction strategy geared to the state level, *see* The Center For Climate Strategies, http://www.climatestrategies.us/.