



FACTS ALASKA

A M E R I C A N S E C U R I T Y P R O J E C T

Pay Now, Pay Later: Alaska

In the last 50 years, temperatures in Alaska have risen at over twice the rate of the rest of the United States.¹

The area of Alaskan forests burned by fires is expected to double by 2050 and triple or even quadruple by the end of the century, a result of increasing temperatures and less precipitation.²

Alaska has massive wave power. Its southern coast alone can potentially produce 1,250 TWh per year³—more than 184 times Alaska's current total net electricity generation.⁴

Admittedly, the effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision. Informed scientific and economic projections, as we have used in our research, however, allow us to see that Alaska faces significant losses in industries crucial to its economy if no action is taken.

Moreover, data shows Alaska is poised to benefit from the research, development, and distribution of renewable energy technologies. Alaska already supplies 24% of its energy needs with hydroelectric power, and investment in biomass resources is encouraging.⁵ These resources fulfill a growing, but still negligible, portion of Alaska's energy needs.⁶ Energy production costs are expected to drop with greater employment of wind power,⁷ and federal tax incentives for making the conversion have been put in place.⁸ Should we fail to take action against climate change, Alaskans have much to lose.

Pay Later: The Cost of Inaction

In 2008, roughly 50% of Alaskans worked in an industry that relied on their state's abundant natural resources, including fishing, mining, tourism, and agriculture.⁹

The Alaskan livelihood is contingent upon the preservation of its environment and investment in its renewable energy resources. Climate change could pose significant challenges not only to Alaska's industries, but also to the lifestyles of its people and the health of its forests, oceans, and animals.

Climate change will not have a solely negative effect on Alaska, however. Warmer temperatures could attract more tourists and would extend the growing season.¹⁰ Some findings show that melting permafrost could decrease construction costs, and melting sea ice in the north could open up new shipping routes.¹¹

However, these potential benefits could likely be offset by the increasingly negative effects of climate change.¹² For example, additional days of warm temperatures would be accompanied by increased precipitation, drought, an increase in pests and forest fires, and a reduction of soil moisture caused by melting permafrost. Moreover, 85% of the state lies upon the layer of permafrost projected to melt at an increasing rate over the coming decades, causing damage and increasing costs.¹³ Despite the uncertainty of climate change's effects on Alaska, it is clear that the state faces potentially huge setbacks and has much to gain by investing in clean energy.

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Thawing Permafrost

Melting permafrost is expected to add between \$3.6 and \$6.1 billion to

Alaska's public infrastructure costs in the next 20 years.¹⁴ Permafrost, the layer of earth that remains frozen throughout the year, is the foundation on which Alaska's infrastructure is built (including the Trans-Alaska Pipeline System, TAPS)—and it is thawing. As a result, roads, water and sewer infrastructure, landing strips, and TAPS will require significant additional maintenance.¹⁵

TAPS covers 800 miles as it runs from Prudhoe Bay on the northern coast to Valdez in the south, and almost half rests upon permafrost.¹⁶ Certainly, at some future date, investment in renewable energies would negatively affect North Slope oil production and an industry that generates 35% of the Alaskan gross state product.¹⁷ Problems already exist, however; **between 1970 and 2002, the number of days hospitable to oil drilling and exploration were nearly cut in half due to the thawing permafrost.**¹⁸ By late century, strains on the industry are likely to be significantly worse; for example, Seward Peninsula is projected to be largely thawing or permafrost-free by this time.¹⁹

Forests

Climate change could be both a benefit and a detriment to Alaskan forests. In recent years, warmer temperatures have increased the length of growing season by 20%, heightening productivity and expanding forests into the Alaskan tundra. In other areas, however, moisture stress has reduced productivity; the lowest rates occurred during the last decades of the 20th century.²⁰ Moreover, warmer temperatures attract an increase in pests. In particular, drought-weakened trees will be more vulnerable to beetles, which live longer and reproduce faster in warmer

temperatures.²¹ **In 1992, spruce bark beetles damaged over 2.3 million acres of Kanai Peninsula forests. Causing immense damage to the native ecosystems, this would have cost \$332 million in lost paper and timber products in commercial forests.**²²

Warmer and drier summers—and trees killed by pests—will make Alaska's 129 million acres of forests more susceptible to fire damage.²³ **In 1996, a single fire burned 37,000 acres and caused \$80 million in direct damages.** An increase of this magnitude will directly affect Alaska's timber resources, and the additional carbon emissions from fires and the disappearance of trees that absorb carbon will exacerbate climate change.²⁴ **Harming the forestry sector and natural ecosystems—not to mention Alaskan air quality—the area affected by forest fires in Alaska and throughout the North American boreal forests is expected to double by 2050 and perhaps quadruple by 2100.**²⁵

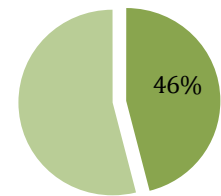
The timber industry employed 63,000 full- and part-time Alaskans and brought in \$617 million in timber receipts in fiscal year 2009.²⁶

Coastal Communities under Stress

Warmer temperatures will cause sea ice to break up earlier and form later in the season. The likely reduction in this buffer will allow increased storm activity—induced by the warmer temperatures and lower atmospheric pressure—to have an even more damaging effect, exposing coastal regions to erosion for longer periods of time. The rate at which Alaska's northeastern coast is eroding has already doubled over the last 50 years.²⁷ Often coastal commu-

nities—home to 46% of Alaska's population²⁸—must choose between relocation and the construction of expensive infrastructure, the efficacy of which is uncertain. **The U.S. Army Corps of Engineers estimates a \$30-50 million price tag for each Alaskan village that needs to be relocated, though no funds have yet been appropriated.**²⁹ **Other estimates place costs as high as \$400 to \$450 million per village.**³⁰ **Alaska is home to 160 such villages, at least 6 of which are already planning to relocate.**³¹

Alaskan Population Projected to be Directly Affected



Source: *The Wilderness Society*³²

Threats to Fishermen

Alaska's \$2.8 billion fishing industry employs more than 20,000 people.³³ **The effects of climate change could reduce fishery production by as much as 50%, costing local economies millions of dollars.** Some fisheries could disappear, others could arise. For instance, cod could migrate to colder waters.³⁴ Sea life is the source of subsistence for many indigenous peoples in Alaska; negative effects on the industry threaten not only their lifestyle and health,³⁵ but would increase their cost of living. Replacing

harvested food with purchased food would cost between \$1,800 and \$3,800 per person, 13-77% of community per capita income in the region.³⁶

The 2006 pink salmon harvest yielded 40 million fewer fish than expected, due to warmer waters.³⁷ Alaska boasts exceptional fisheries, including the world's largest, found in the Bering Sea. These fisheries are dependent on plankton blooms, which are sensitive to changes in the seasonal recession of the sea ice.³⁸ Local Alaskan economies could lose millions each year as a result.³⁹

Furthermore, storms have with increasing frequency affected shipping activity and impaired fishing operations during the autumn months of the recent past. Storms are expected to become more severe as temperatures rise, pressure falls, and increased moisture feeds storms in the Arctic Ocean.⁴⁰

Pay Now: The Benefits of Taking Action

Given this uncertainty about the potential damage to its lands, resources and people, Alaskans should secure their economy by investing in sustainable, renewable energy. Alaska meets 17.3% of its energy needs with hydroelectric resources. While hydroelectric power is clean and its capacity is being exploited,⁴¹ Alaska has significant renewable resources that remain untapped, including sawmill waste, fish oil, and garbage. **Projects are underway in towns such as Craig, Alaska where a boiler created to burn sawmill waste will save the city approximately \$120,000 per year in heating costs, as well as displace approximately 19,000 gallons of oil and 33,000 gallons of propane.**⁴²

Potential geothermal resources are attracting increasing attention in Alaska; drilling projects have already begun in Unalaska, Akutan, and Mt. Spurr. A resort at Chena recently expanded its geothermal generation from 400 kW (which yielded savings of approximately \$450,000 per year) to 680 kW. The \$2.1 million project will pay for itself in less than five years.⁴³

Alaska has more coastline than the other 49 states combined, and is in a position to use ocean power—wave and tidal energy—to generate electricity. Alaska's southern coast has the potential to generate an estimated 1,250 TWh per year,⁴⁴ more than 184 times the state's current total net electricity generation.⁴⁵ Wind resources could also provide an estimated 5% of the Railbelt's electricity; significant additional wind resources could be located throughout the state, especially on the coasts and in the western part of the state.⁴⁶

The Alaska Energy Authority's Alternative Energy and Energy Efficiency section directs or finances 47 projects throughout Alaska with a budget of \$63.9 million.⁴⁷ **Furthermore, one recent study found for every \$1 million invested in clean energy, 16.7 jobs are created, in contrast to 5.3 jobs created by an equivalent investment in fossil fuels.**⁴⁸ Alaska certainly has the room and the incentive to expand its investment, research, and development of the renewable energy sector.



Major Electric Power Plants (>=100 MW)		Renewable Energy Potential
Coal Mine, Surface	Coal	Biomass (>= 60 tons/sq km/yr)
Coal Mine, Underground	Geothermal	Geothermal (>= 80 milliwatts/m2)
Natural Gas Hub	Hydroelectric	Solar (>= 6.0 kWh/m2/day)
Petroleum Refinery	Natural Gas	Wind (>= 3 Power Class)
Oil Import Site	Nuclear	Other Renewable
Oil Seaport	Petroleum	
Electricity Transmission Line (>= 345 KV)	Solar	
Natural Gas Flow (1 mile band width = 100 million cubic feet/day)	Wind	
Oil and Gas Active Leases	Wood	

Conclusion

Alaska must consider action on climate change not just in terms of cost, but also in terms of opportunities. If we give Alaska's population, businesses, and investors clear and consistent signals by properly offering initiatives and cultivating demand, investment and innovation in renewable technologies will follow.

Alaskans will have to pay for the effects of climate change. The only remaining question is whether they will pay now, or pay later and run the risk of paying significantly more.

(Endnotes)

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