Clean Energy Alaska 2035

By Russell Stigall

It's the year 2035 and Alaska is home to many miles of coniferous forests, net-busting catches of wild salmon, good wages, interesting work, fall hunts and one-of-a-kind cultures. Alaska 2035 sounds like a good place to live.

As in most times, 2035 Alaska is a mix of enormous natural beauty and the evidence of man's creative drive to test boundaries and overcome challenges. If Alaska is as bountiful a quarter century from now as it is today, how was this bounty achieved and paid for? A good start was the passage of clean energy legislation in the spring of 2010.

Some History

The passage of Senate Bill 220, the Alaska Sustainable Energy Act, and House Bill 306, the State Energy Policy, marked a turning point in Alaska's years-long progress on renewable energy and energy efficiency.

As little as five months before the bills were passed into law, it was by no means certain that Alaska would act in time to realize its full potential in the clean energy economy – or even provide its residents with home-grown energy! Dated electrical generation strategies, Cook Inlet's dwindling stockpiles natural gas, the volatility of fossil fuel prices and impending carbon costs were sparking debate about diversifying Alaska's energy portfolio. Yet there was no plan for where Alaska wanted to go, or how it was going to get there. Coal-fired power plants can operate for 50 years or more and hydroelectric projects routinely outlive the century mark - the energy decisions Alaskans made in the young millennium's first decade are still affecting the Alaska of 2035.

With strong energy efficiency provisions to ensure wise energy use, as well as the Emerging Energy Technology Fund promoting innovation, Alaska is closer than ever to achieving our vision of a sustainable energy future. Together, the state's Energy Policy and Sustainable Energy Act set the goals and created the incentives that we needed to get to where we are today.

The Railbelt Elecricity Efficiency Landscape (REEL) Report, released in 2010, conservatively estimated that at least a $1 billion in economic activity and 10,000 jobs could come from a growing clean energy economy by 2025. This kind of sustainable development, as well as the natural riches of Alaska's natural gas reserves and the construction of the Trans-Alaska Oil Pipeline, made our state a leader in energy innovation. Alaska's citizens own the state's resources; through smart and measured development we have been their beneficiaries.

With all the money saved on fuel through energy efficiency measures, Alaskan families can afford a well-deserved vacation. Their destinations might include a trip along the Inside Passage to Juneau, the Kenai Peninsula, Fairbanks, Chena Hot Springs, Denali and Arctic Alaska. Let's follow one of these journeys, and along the way we'll see what's changed – and what's stayed the same – since these landmark pieces of legislation were passed.

Inside Passage to Juneau

Boarding the newest Alaska Class Ferry in Bellingham, the M/V Tileston, it is already apparent that this vacation isn't going to cost many carbon credits. Lighter, faster and fuel efficient, these ferries can burn diesel, natural gas, and hydrogen. The modern ferries offer all the amenities of the past including a solarium, where one can unroll a sleeping bag and watch the world pass by.

Along the way the Tileston takes on fuel at a remote fueling station. The stations are powered by local resources, tidal, wave, hydro, geothermal, biomass, converting hydrogen and carbon into synthetic gas and liquid fuels. International

cruise ships and the local commercial fishing fleet also use these remote stations. Alaska's fishing fleet is among the most efficient in the world thanks to low-interest loans made possible by House Bill 20, passed in 2010.

The ferry glides quietly past Vancouver, Prince Rupert and into the Dixon Entrance. Several small communities have their own windmills, but less noticeable are the many tidal and wave power stations. The narrow channels of the Inside Passage make the area ideal for harnessing the power of tides with machines that work like underwater wind turbines that produce at exceptional volumes due to the higher density of water. The area can meet gigawatts of demand.

Passing Ketchikan, Wrangell, and Petersburg, we find Sitka, Alaska's first zero-carbon city. The hydroelectric city of Juneau is the final destination on the M/V Tileston.

Juneau

Many Juneau residents have switched to electric cars, but you don't worry about transportation – the Southeast Alaska Regional Transit Authority makes sure there is a hydrogen-powered bus pulling up to the wharf as soon as you arrive.

Juneau enjoys distributed energy systems with several small hydroelectric projects and vertical wind turbines. Island communities tap into micro hydro, solar, tidal, wave and wind energy. Heat transfer pumps keep schools, pools, and municipal buildings warm through the wet, windy winters.

Juneau is bustling with energy and communications businesses – remote micro-hydro refueling stations, tidal power projects, offshore wind farms, and biomass power projects including diesel from fish processing by-products.

One energy challenge that Alaska faces – a challenge that most states wish they had – is what to do with its many gigawatts of excess potential power. According to Alaska Energy Authority's Renewable Energy Atlas, "The total wave power flux on southern Alaska's coast alone is estimated at 1,250TWh per year." That's enough to power at least 10 New York Cities! Iceland tapped its geothermal and hydroelectric energy to power an aluminum smelter. Alaska went a different route and became a world center for electronic data storage and communication - now known as the "Cloud of the North". It all took off when Juneau won Google's 2010 high-speed data competition. Fiber optic cables traverse the ocean floor from the Pacific North West to Seward to Kodiak. The ArcticLink fiber optic line from Asia to Alaska to Europe places us in the center of hard-wired data and communications.

Alaska supplies reliably-priced clean green energy to massive server farms, which saves a one-third of the costs on cooling as water and air heat exchangers cool the hard drives and heat nearby homes and municipal buildings.

Fly to Anchorage International Airport

Unfortunately, there is no time to take a dip in Juneau's geothermal-warmed swimming pool. We're off to the airport to catch Flight 220 to Anchorage.

The jet airplane you take to Anchorage International Airport runs on synthetic kerosene made at a Fischer-Tropsch plant near Fairbanks. Out the window you see the signature curled wing tips that increase efficiency by about 4% and GE's newest GEnx turbofan engine that is as much as 15% more efficient than the one it replaces.

The plane may also be wider, with a lifting body design and low-power Organic Light Emitting Diode screens give passengers the sense of flying in an open cockpit…without the 500mph wind!

Flight 220 swings in over the Fire Island Wind Farm and the Ocean Renewable Power Corporation tidal power plant, landing in Anchorage.

The rental cars in Anchorage look about the same as others, but these compressed natural gas-electric hybrid cars are decedents of those first used in the state fleet.

Drive the scenic Seward Highway

On the drive to Seward, we might stop in Bird Creek to fill up on CNG and coffee. Along the way, we'd pass several small run-of-the-river hydroelectric plants from Girdwood to Moose Pass.

A new 215 kilovolt line takes wind, hydro and biomass energy from the Kenai Peninsula to the large load center of Anchorage & the Matanuska-Susitna Valley. With a secure supply of natural gas feedstock, Agrium in Nikiski is again manufacturing fertilizer and ammonia for fuel – in part due to natural gas legislation passed in 2010 (like House Concurrent Resolution 2, House Bill 369 and House Bill 280, among others)

Once in Seward, a good stop to make is the Alaska SeaLife Center. Walk inside and enjoy the warmth provided to by an industrial ocean water heat pump. Partially funded by an Emerging Energy Technology grant from the Denali Commission, the project harvests heat from the relatively stable temperature of Resurrection Bay waters.

That night, the hybrid gets plugged into the hotel's charging station, and a full iPhone charge can be ordered from Seward Energy Authority via the iCharge app. SEA's home page proudly announces that the growing city uses less energy today than it did 20 years ago.

Travel by high-speed train on the Alaska Railroad

Time to drive back in Anchorage to catch the TGV or Maglev train to Fairbanks. A nearly 400 mph cruising speed allows Anchorage residents to ride to their jobs in Fairbanks, or vice versa, in just under an hour.

Leaving Anchorage, the train passes Municipal Light & Power's natural gas turbine cooling tower with the familiar stack of steam, only smaller, as natural gas turbines have steadily become more efficient.

A few miles down the track we ride past the new SusitChamna large hydroelectric project and the Mount Spurr geothermal project. Lake Eklutna hydroelectric, which like Bradley Lake is 60-years old, is still going strong...just past middle age. These renewable projects and others around the state generate at least half of Alaskans' electricity.

Through your window, acres of barley and willows grown in the rich glacial soil of the Mat-Su stretch in the direction of Lazy Mountain. Harvested, this biomass joins timber waste and algae burned and gasified for heat and electricity all over Southcentral Alaska.

Passing through Denali National Park you see a sign touting the park's fleet of clean natural gas-powered buses. The buses were made possible by a spur off the Enstar natural gas pipeline that traverses a portion of the park along an existing corridor.

Fairbanks

Fairbanks has changed in the last 25 years. Air quality has drastically improved since the city switched to natural gas. The interior city is now also home to a thriving petrochemical industry. A natural gas liquefaction plant is the anchor customer for Fairbanks' gas pipeline.

The plant is an economic engine for Fairbanks. It produces a synthetic fuel that burns cleaner than diesel, for a lower price per gallon than distilling crude oil. Synthetic fuels from the Fairbanks plant are used by air cargo companies, Alaskan commuters, arctic shippers and the Department of Defense.

While eating breakfast in bed at the historic Exploration Inn, we read in the Daily News Miner that the plant just developed the ability to turn municipal waste into jet fuel.

The student population of the University of Alaska has increased over the years as the clean energy industry program draws students from Alaska and the world to study for careers in their home towns and villages.

U of A touts successes such as advances in cold weather biomass gasification, cold weather batteries and energy storage, and cold weather natural gas-powered vehicles. The new not-for-profit (and completely fictitious) corporation, Invisible Grid, markets rural electricity generation, storage and distribution technology to Third World governments and off-the-grid business and communities.

UAF and UAA are hotbeds for advanced renewable technology & research. Known for producing world-class scientists, researchers and technicians, the universities are particularly adept at adapting existing technology for remote, rugged and cold applications.

Golden Valley Electric Association has helped design and develop a new technique for energy generation and storage that hybridized existing solar-thermal collection and storage technology with ground-source heat-pumps. The system still heats the city of Anderson's public buildings.

Fairbanks rounds out its energy needs with barley biomass, deep hot rock geothermal, and wind from Healy and Chena Hot Springs. Bernie Karl's Chena Chillers produces 30 megawatts of power for the Railbelt. Karl is immortalized as the grandfather of low-temperature geothermal. His Chena Chillers are fitted to 80 percent of the spent oil wells in Texas and Alaska.

Fairbanks is also the beachhead for shipping natural liquids like propane to villages along the Tanana and Yukon Rivers.

Rich Cultures of Rural Alaska

A small electric Cessna takes us north to visit rural Alaska, which faced debilitating and unpredictable energy costs during the first decade of the millennium. People were sometimes forced to choose between food and heat. Luckily, wind turbines coupled with traditional diesel generators broke the strangle-hold of high fossil fuel prices. Projects from Point Lay to Wainwright helped save Alaska's rural cultures. Northwind Power developed wind turbines designed for Alaska's cold, dense air and extreme wind-speeds and climate. To decrease fossil fuel use even more, diesel generators were fitted with Organic Rankine Cycle Engines that recover waste exhaust heat from homes, schools and public buildings to produce electricity and even chill fresh fish. A similar technology was used to freeze an ice museum using Chena's hot springs.

While Alaska's native cultures were threatened by ultra-high energy prices in 2010, in 2035 communities and cultures are thriving around stable, reasonably-priced energy from hydrokenetic, wind, biomass, natural gas liquids and solar power. Electric snow machines and 4-wheelers take locals out hunting and joy riding.

The integration of these renewable power sources was made easier by installing energy saving technology like LED street lights. By building smart, energy efficient homes designed for remote location and inclement weather of the type pioneered by the Alaska Cold Climate Housing Center and the Yukon River Inter Tribal Watershed Council, rural Alaskan communities save money and have an easier time maintaining energy independence.

A trip down the Richardson Highway completes the return trip to Anchorage. Along the way, we could stop at the 2 megawatt run-of-river hydro project at Yerrick Creek. The Yerrick hydro project offsets diesel generation for the communities of Tok, Dot Lake, Tanacross, and Tetlin. This project was one of hundreds started with the help of Alaska's $300 million Renewable Energy Fund, founded in 2008.

Back in Anchorage, we look out through the fresh, clear air of Cook Inlet at the slow white sweep of the Fire Island wind tubines turning in the summer breeze. Looking back to the skyline of Anchorage, at the streetlights, cafes, and bars, we would realize that all these things are powered by the same abundant, renewable energy being developed and generated all over the state. This Alaska is ready for the future, in 2035 and beyond.

More Resources:

www.akvoice.org and www.acvoters.org

http://www.akenergyauthority.org/geothermal.html

http://www.akenergyauthority.org/programsalternativebiomass.html

http://www.akenergyauthority.org/programsalternativediesel.html

http://www.akenergyauthority.org/programsalternativehydroelectric.html

For more information, please contact Caitlin Higgins, Executive Director Alaska Conservation Voters / Alaska Conservation Alliance at (907) 258-6175 or caitlin@akvoice.org