

Dreams, Risks and Realities:

*An Economic Analysis of
Plans to Dam Alaska's Susitna River*

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INTRODUCTION AND SUMMARY

The Alaska chapter of Trout Unlimited contracted with Erickson & Associates to analyze the opportunity costs of a decision by the state to build a proposed Susitna-Watana Hydroelectric Project (hereinafter “Susitna”). The organization asked me to report on the policy issues confronting the state as it considers the opportunities and risks of major investments in the multi-billion dollar project. My principal findings are summarized below:

The Alaska Energy Authority has underestimated the costs to build Susitna.

The Alaska Energy Authority (AEA) estimates it will cost \$5.2 billion to build the project. This estimate excludes important costs, such as \$880 million in new transmission facilities required to move Susitna power through or along the routes of existing transmission facilities. Also excluded are yet-to-be-negotiated costs of leasing or purchasing the Native lands on which much of the project will sit.

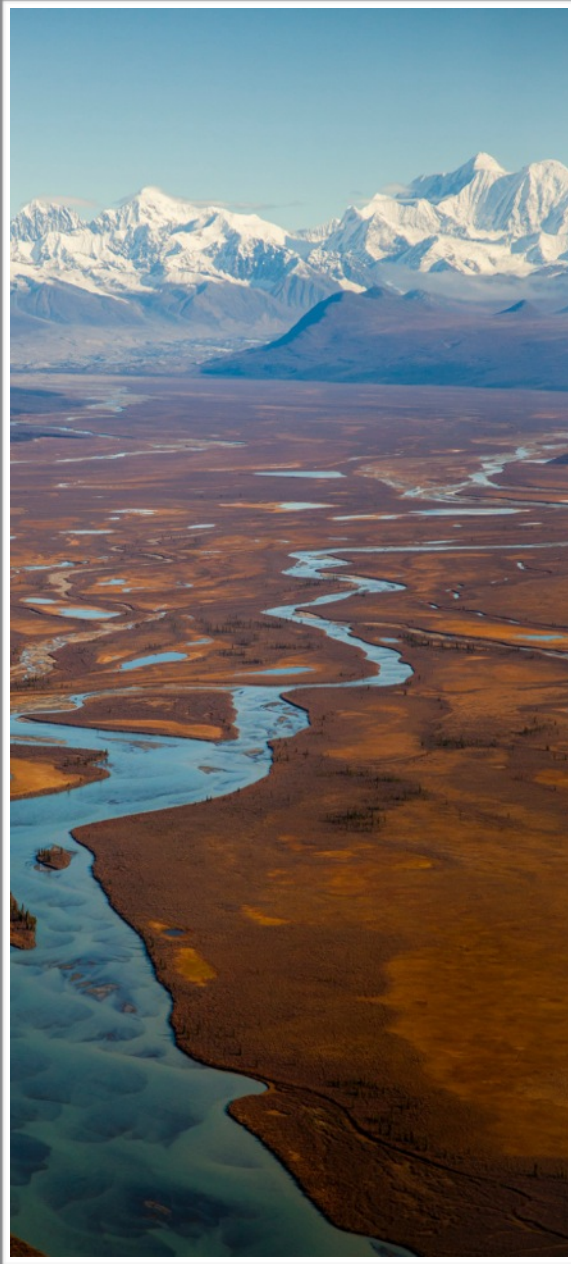
“ A well-documented history of projects managed by AEA and its predecessor, the Alaska Power Authority, shows a consistent pattern of underestimated costs. ”

A well-documented history of projects managed by AEA and its predecessor, the Alaska Power Authority, shows a consistent pattern of underestimated costs. There is rich literature documenting cost overruns and their causes for large engineering projects. There is nothing in AEA’s Susitna proposal to suggest the agency has changed its estimating practices to avoid its pervasive pattern of underestimation. (See pages 13-15.)

The Alaska Energy Authority has underestimated the project’s operating costs.

Even if AEA’s construction cost estimate proves accurate, the project pencils out only within a limited range of carefully chosen assumptions. AEA doesn’t include in its projected operating costs any payments to Cook Inlet regional Native corporations. The corporations own the land on which the dam, much of the reservoir, access roads and power transmission towers will sit, and will undoubtedly seek a share of the revenue stream or other form of payment for use of their lands.

Two successive studies by University of Alaska economist Steve Colt demonstrated how sensitive the projected cost of Susitna power is to AEA’s changing assumptions about interest rates. The reduced rate AEA now uses in its calculations, 5 percent, is exceedingly optimistic



given the state of capital markets, project risks, and the absence of a state commitment to pay off the debt if the project can't do so. More likely, AEA would have to borrow money at a higher interest rate, which would translate to higher-than-projected costs.

Another key assumption, AEA's energy demand forecast, is based on projections of past trends, with little or no examination of economic factors such as long-term price elasticity, and changes in the intensity of energy usage. For example, AEA's consultants ignored potential reductions in power requirements from improved energy efficiency and demand management. (See pages 17-19.)

The proposed in-state gas pipeline project and Susitna hydro project compete for the same market.

An underlying question has always been whether there is enough market demand for two large energy projects to co-exist. To reduce natural gas shipping costs, promoters of a 500-million-cubic-feet-per-day gas pipeline from the North Slope – a so-called bullet line – assume their gas would capture half the Railbelt demand for electric energy.¹ AEA's analysis of Susitna's financial feasibility assumes that Susitna would capture the other half. Both calculations assume substantial growth in aggregate and per-capita energy consumption.²

Independent experts disagree that there will be

¹ Alaska Gasline Development Corp., *Alaska Stand Alone Gas Pipeline/ASAP: Project Plan*, July 1, 2011 (p. 3-13).

² Alaska Gasline Development Corp., *supra*, states that the corporation relied for its demand projections on Northern Economics, *In-State Gas Demand Study*, January 2010. That study (p. ES3) forecasts the demand for natural gas (average annual) without hydroelectric is forecast to grow from 195 MMcfd in 2009 to 250 MMcfd in 2024, a compounded annual growth rate of 4.8 percent. AEA's power demand forecast assumes large load growth, from 5,295 GWh in 2015, to 8,921 GWh in 2025, a compounded annual growth rate of 5.2 percent. See Black & Veatch for AEA, *Alaska Railbelt Regional Integrated Resource Plan Study*, Feb. 2010 (p. 6-12).

sufficient demand to make both a “bullet line” and a large-scale Susitna hydro project economic.³ Maximum scale is crucial for both, and a zero-sum game for both.

To finance the Susitna project with borrowed money, as AEA’s feasibility calculations assume, it will be necessary for Railbelt utilities to agree to purchase Susitna’s entire output. Even then, the project requires additional buyers, as yet unidentified, to be feasible.

So far there is no indication that the utilities have the financial strength to make a take-or-pay commitment. And should they make such a promise, it strains credulity to suggest the same utilities could then commit to fulfill half their energy requirements with bullet-line gas.

The state could induce or coerce local utilities to make financial commitments to Susitna, a gas line project, or both, but so far has shown little interest in such an exercise of power. (See page 20.)



Susitna will require substantial state assistance, draining the treasury of reserves needed to forestall a hard landing for the state budget and economy.

The Susitna hydro project does not survive any plausible market test, and AEA has acknowledged the project will require additional state aid. How much state support will be needed, and what form it might take, are open questions. AEA’s executive director said the state would at some future time determine “reasonable cost” of Susitna energy, and buy down the cost of the project to reach that target.

Alaska currently has more than \$14 billion in reserves available for appropriation. Even with big cost overruns, the state could build Susitna with cash.

³ For example, “Findings and Recommendations of the Alaska Energy Policy Task Force,” AEA (December 2003); Mark Foster for AEA, “Railbelt Generation Options,” paper delivered AEA 2007 Railbelt Energy Technical Conference, Nov. 27, 2007; and Robin O. Brena for AEA, “Railbelt Electrical Grid: Regulatory Factors,” paper delivered AEA 2007 Railbelt Energy Technical Conference, Nov. 27, 2007.

But building Susitna with state money carries risks and opportunity costs. Depletion of the state's cash reserves is sure to lower the state's bond rating. This would raise the costs of borrowing for projects large and small, including those financed by Alaska local governments.

“ The Susitna hydro project does not survive any plausible market test, and AEA has acknowledged the project will require additional state aid. ”

There are also competing needs for the state's reserves. Whatever money the state invests in Susitna will be unavailable for other state policy priorities. Perhaps most importantly, use of the state's cash to finance Susitna competes with the alternative of using the reserves to forestall a hard landing for the state budget and economy.

Spending in fiscal year 2015 is expected to be about \$7 billion, against general fund revenue of \$5 billion. Anticipated deficits are expected to be balanced by drawing down the state's reserves.⁴

The director of the Legislative Finance Division, David Teal, projects the state's cash reserves will be exhausted by fiscal year (FY) 2024:

“Then you are going to have a very hard landing. That scenario, of course, is predicated on the state's reserves not being used for any other purpose.”⁵ (See pages 9, 20-21)

In the alternative, the state could borrow the money. Alaska has an AAA bond rating, the highest rating for a state government, and has relatively modest general obligation debt. The bond markets would likely respond favorably to a general obligation bond issue to help finance Susitna.

Borrowing money to finance either of the gas lines or Susitna also has costs in terms of other infrastructure and economic development opportunities foregone, and creates long-term repayment obligations.

⁴ See Scott Goldsmith, “Maximum Sustainable Yield: A Fiscal Road Map for Alaska,” presentation to the [Alaska] Senate Finance Committee, March 19, 2013 (p. 2).

⁵ “Teal offers gloomy outlook,” *Alaska Budget Report*, Jan. 31, 2014 (p. 1-4).

Construction of Susitna is currently the only practical plan for meeting the state’s official target of “50 percent of its electric [power] from renewable and alternative energy sources by 2025.”

The state adopted the goal in 2010.⁶ The next-largest proposed hydro facility under recent evaluation is the Chakachamna project. Assuming no increase in Alaska electric power consumption between 2011 and 2025, the combined output of existing renewable power sources and a newly constructed Chakachamna would still leave the state 11 percentage points short of the 50-percent-from-renewables goal. (See page 22.)

Susitna is projected to reduce Alaska’s human-caused carbon dioxide (CO₂) atmospheric emissions by less than 3 percent annually.

Susitna would displace combined-cycle natural gas fired generation, which emits CO₂ into the atmosphere. Increased CO₂ and methane emissions resulting from Susitna’s construction, including the manufacture of cement, would be offset in 13 months of operation. (See page 23.)



⁶ Chapter 82, Session Laws of Alaska 2010.

HISTORY & BACKGROUND

Early proposals

The idea of building a massive hydroelectric project on the Susitna River is not new. In 1950 the federal Bureau of Reclamation released a reconnaissance report identifying a potential dam site on Susitna River, deep in the Talkeetna Mountains, approximately 120 miles north of Anchorage. The bureau suggested such a facility “would be a strong inducement to a heavy industry such as aluminum or chemicals.”⁷ In the 1960s, that project was eclipsed by rival proposals by the Army Corps of Engineers to harness the Yukon River, with a dam at Rampart in central Alaska, or a tunnel diverting the river’s headwaters across the Canadian border to a generation plant in northern Southeast Alaska.⁸

By the mid-60s it was clear that Congress had lost its appetite for financing hydro projects whose only justification was speculative projections of power needs. Neither the Yukon projects nor any other large Alaska generation projects, including Susitna, proceeded beyond preliminary studies.⁹

The early Alaska hydro studies sat largely untouched until the late 1970s. Completion of the trans-Alaska pipeline in 1977 brought commercial oil production from the massive Alaska North Slope (ANS) reserves. In 1979 the fall of the Shah of Iran and manipulation by the OPEC cartel produced a dramatic rise in world oil prices.

⁷ Bureau of Reclamation, “District Manager’s Reconnaissance Report on Susitna River Basin, Alaska,” June, 1953, as described in “Report of the Commissioner of Reclamation, Devil’s Canyon Project, Alaska,” March 1961 (p. 54).

⁸ Steve Haycox, “Susitna dam proposals date back to territorial days,” *Anchorage Daily News*, March 13, 2014. Ernest Gruening, one of Alaska’s first two U.S. senators, was the leading advocate for federal authorization of the Rampart project, as he recounts in *Many Battles: The Autobiography of Ernest Gruening* (1973). Opposition to the Rampart project played a key role in birthing the environmental movement as it is known today. See Paul Brooks, “The Plot to Drown Alaska,” *The Atlantic*, May 1965 (p. 53-59).

⁹ The Bureau of Reclamation’s much smaller Eklutna project near Anchorage, and Snettisham project near Juneau did receive congressional approval and were constructed with federal financial assistance. See Claus-M Naske and William Hunt, for the University of Alaska Institute of Water Resources, *The Politics of Hydroelectric Power in Alaska: Rampart and Devil Canyon--A Case Study*, Jan. 1978 (p. 48-57).

Rising crude oil prices soon propagated downstream into higher consumer prices in Alaska for heating oil and motor fuel, creating political pressure for relief. Officials expected the cost of electric power to rise as well.¹⁰

Another result of the 1979 events was a hitherto unimagined deluge of oil money flooding state coffers.¹¹ This presented the state with a second problem: what to do with all the money.

Alaska's approach to both problems was shaped in part by a perception – stronger then than today – that absentee interests had exploited Alaska's fur, fisheries and minerals resources, leaving few lasting benefits for residents. Alaska resolved to use a significant share of the oil windfall to build hydroelectric generation projects that would be immune to oil price gyrations over which Alaskans have no control, providing a source of clean low-cost power for future generations of Alaskans.

The state proposed and set about building multiple hydro facilities: four small (17- to 22-megawatt) projects collectively known as the Four-Dam Pool, a larger 120-megawatt Bradley Lake project on the Kenai Peninsula, and a three-dam 3000-megawatt Susitna project. In 1983 the state, through the Alaska Power Authority (APA, predecessor of the Alaska Energy Authority, AEA), applied for a Federal Energy Regulatory Commission (FERC) license to commence constructing Susitna.



¹⁰ In 1982, 61 percent of Alaska's utility electric power was from natural gas-fired generators, with 13 percent from oil. Institute of Social and Economic Research, *Alaska Electric Power Statistics (With Alaska Energy Balance)*, 2003 (p. 61).

¹¹ Alaska petroleum revenue jumped from \$442 million in fiscal 1978 to \$2.3 billion in fiscal 1980, a five-fold increase. Alaska Dept. of Revenue, *Revenue Source Book, 1982-1985*, Sept. 1982 (p. 9).

The first unraveling

As early as 1982, crude oil prices had begun to slip, bringing down pump prices for heating oil and motor fuel. This reduced political pressure for government action to bring down fuel prices. Falling crude prices also reduced the flow of oil money into the state treasury, causing state officials to reexamine long-term spending commitments.

In the early 1980s – in contrast to today – Cook Inlet natural gas producers lacked the localized monopoly power to control and raise prices above market-clearing levels.¹² Abundant supplies of Cook Inlet natural gas in relation to the limited local and export demand caused real prices to decline. “As a consequence of the large gas surplus, Anchorage area electric and gas utilities [were] able to purchase gas on long-term contracts at low cost in a buyer’s market,” federal regulators observed.¹³

Because natural gas-fired generation was the principal alternative to Susitna power, the declining real price of gas presented a major challenge to Susitna’s promoters. The state responded in 1985 with a downsized two-dam proposal and amended its FERC license application accordingly. APA’s plans for a further scaling back were preempted in March 1986, when a political decision was reached to withdraw the application due to the expected availability of low-cost gas-fired electricity, the declining price of oil, and its impact on the State budget.¹⁴

After spending \$227 million on the project, APA announced that the scheme was not financially feasible, but held out hope that conditions might change.¹⁵ The authority, looking ahead to that possible future, prepared an extensive index and bibliography of documents.¹⁶

Unlike Susitna, the five smaller hydroelectric projects initiated in the early 1980s were completed, but all experienced major cost overruns. None could be accurately characterized as economically successful. All faced electricity markets in which electric energy from oil or natural gas was far cheaper than APA had forecast. All required some combination of state

¹² Gregg Erickson, “Natural Gas and Electric Power: Alternatives for the Railbelt,” Legislative Affairs Agency, March 1981 (p. 35).

¹³ Federal Energy Regulatory Commission, Appendix B, Draft Environmental Impact Statement Susitna Hydroelectric Project, FERC 7114, May 1984 (p. 4)

¹⁴ Harza-Ebasco Joint Venture, “Susitna Basin Plan Update Study,” Feb. 7, 1986 (p. 2).

¹⁵ Alaska Center for Energy and Power, <http://energy-alaska.wikidot.com/new-hydro-projects>.

¹⁶ AEA, *Pre-application Document: Susitna-Watana Hydroelectric Project*, September 2011, v. 1 (p. ES-2).

subsidy, grant funding, or loan forgiveness to make the power they produced salable to local utilities.

In a perceptive 2003 analysis of the five hydro projects and eight other large development investments initiated during the first oil windfall, between 1978 and 1985, economist Ginny Fay found that none of the 13 projects came close to fulfilling the promises of their promoters. Fay identified shared characteristics that contributed to the problematic decisions.

1. A belief that new infrastructure will in itself produce economic development;
2. A belief that a project would generate its own demand (“build it and they will come”);
3. A disregard of market tests in determining economic and financial feasibility;
4. A belief that conditions that made for easy financing (low interest rates, high oil prices, an Alaska senator chairing the U.S. Senate Appropriations Committee) would continue indefinitely; and
5. Influence on project planning and feasibility studies by interests that stood to benefit from a decision to build.¹⁷

Fay summed the state’s costs on the 13 projects at \$1.3 billion. Had that money been invested at an average annual return of 8 percent (close to the target nominal return set by the trustees of the Alaska Permanent Fund Corporation), the sum would have grown to \$6.4 billion in 2003, the year of her study. She continued:

“What would be considered ‘wasted’ is \$6.4 billion, or the opportunity cost of all the direct expenditures of these projects, minus project benefits. ... Given the costs to build these systems and the low cost of in-place alternative generation capacity in the Railbelt, the benefits are small. ... It is safe to say that most of the \$6.4 billion could have been saved or put to better uses.”¹⁸

In 2014, the nominal value of that hypothetical fund would be \$15.4 billion.

¹⁷ Ginny Fay, for the Alaska Conservation Alliance, *A History of Alaska’s Mega Projects*, 2003 (p. 2).

¹⁸ Ginny Fay, for the Alaska Conservation Alliance, *A History of Alaska’s Mega Projects*, 2003 (p. 4).

Susitna Reborn

Efforts to rationalize power planning and generation

When Fay was doing her research in 2003 she noted that institutional memories of the state's megaproject missteps had been selectively forgotten.¹⁹ From a demographic standpoint, a majority of Alaskans alive today have no personal memory of the 1980s megaprojects.²⁰ Neither do government and utility officials have much incentive to look back on the projects' problematic history. It was against this background that the Susitna project reemerged in the past decade. In broad terms, what happened was a replay of the late 1970s and early 1980s.

Starting in 2003, rising energy prices once again began squeezing household budgets. The declining real price of natural gas – which contributed to sinking the first Susitna effort in 1986 – continued through 2000, but then reversed. Between 2004 and 2009 Alaska consumers saw natural gas prices increase by 90 percent. Electricity prices rose by 20 percent.²¹

Moreover, the state received a second and even larger oil windfall. Total annual petroleum revenue nearly quadrupled, from \$2.1 billion in fiscal 2004 to \$10.0 billion in fiscal 2008.²²

In 2007 AEA commissioned Black & Veatch, an international engineering consultant based in Kansas, to study Railbelt energy needs over the next 30 years. The initial report side-stepped the central question of whether Railbelt needs would be better met by hydro or natural gas-based generation, focusing instead on the efficiencies it said would flow from more centralized planning and management of generation and transmission. Continued lack of a centralized institutional structure would make it difficult to raise the \$2.5 billion to \$8.1 billion needed over the next 30 years for new and replacement electric power infrastructure.²³

¹⁹ When Fay attempted to ascertain how much money was spent on the Susitna project, AEA officials claimed the agency was not involved with the project. Fay, p.11

²⁰ Fifty percent of Alaskans now alive were either unborn or younger than 21 in 1980. Alaska Dept. of Labor, Demographics Section, "Age by Sex, 2010-2013.xls," no date. Some of those old enough to remember came to Alaska after the first round of megaprojects had played itself out.

²¹ ISER, *Alaska Energy Statistics, 2011*, December 2013 (p. 53, 15) (Citing U.S. Energy Information Administration, *State Energy Data System*).

²² Alaska Dept. of Revenue, *Revenue Sources Book*, December 2010 (p. 90). Rising oil prices and a revised oil tax system both played a role in the increase. The new "ACES" tax, adopted in November 2007, shifted more of the risks and benefits of petroleum price changes to the state.

²³ Black & Veatch, for AEA, *Alaska Railbelt Electrical Grid Authority (REGA) Study*, (Sept. 2008). A draft report was circulated to legislators in February 2008.

Nothing in this finding was new. For more than 30 years a parade of consultants, legislative energy task forces, and AEA and utility officials had told Alaska policymakers that centralized Railbelt generation and transmission was an essential prerequisite to achieving future Railbelt power at the lowest cost.²⁴

“During the next 20 years the lowest possible energy costs will not be approached unless there is substantial realignment of the decentralized and largely uncoordinated decision-making that has guided Railbelt power development in the past,” was the conclusion of a 1981 study.²⁵ Unless some entity was empowered to bring the Railbelt’s generation and transmission facilities under common control, new and replacement generation facilities would be burdened with escalating financing costs. The ability to finance any large generation project with borrowed money would become problematic.

Nothing came of these recommendations, largely because the six Railbelt utilities,²⁶ essential partners in any such centralization, resisted any level of joint action beyond voluntary coordination.

Would the response to the February 2008 Black & Veatch study be any different? There were hopeful signs. In April, the legislature appropriated \$2.5 million to prepare an “integrated”



²⁴ For example, “Findings and Recommendations of the Alaska Energy Policy Task Force,” AEA (December 2003); Mark Foster for AEA, “Railbelt Generation Options,” paper delivered AEA 2007 Railbelt Energy Technical Conference, Nov. 27, 2007; and Robin O. Brena for AEA, “Railbelt Electrical Grid: Regulatory Factors,” paper delivered AEA 2007 Railbelt Energy Technical Conference, Nov. 27, 2007..

²⁵ Gregg Erickson for the [Alaska] Legislative Affairs Agency, *Natural Gas and Electric Power: Alternatives for the Railbelt*, March 1981 (p. 2, 40-41).

²⁶ Anchorage Municipal Light & Power, Chugach Electric Association, Golden Valley Electric Association, Homer Electric Association, Matanuska Electric Association, and the City of Seward Electric System.

power plan for the Railbelt. In signing the appropriation Gov. Sarah Palin wrote that AEA would take the lead on preparing the “unified” plan, which she said would be the “key component of the Statewide Energy Plan.”²⁷ Black & Veatch was awarded a contract to prepare the new plan.

Later in 2008, while Palin was immersed in her vice-presidential campaign, AEA began negotiations with the Railbelt utilities. Negotiations continued after Palin returned to Alaska, but agreement on centralizing the planning and financing of Railbelt generation remained elusive.

In March 2009, Joe Balash, then a Palin aide, told reporters that the governor was unlikely to approve any more money for Railbelt generation schemes while the integration plan was still pending. He suggested that further state assistance to the utilities might be hard to justify if the utilities were unable to develop a unified plan and institutional structure to carry it out.²⁸

A few days later the Palin administration moved ahead on its own, introducing legislation to establish a “Greater Railbelt Energy and Transmission Corporation” (often abbreviated as GRETC). In her transmittal letter Palin contended that the restructuring would enable the utilities to provide Railbelt consumers “adequate, reliable, safe, and stable electric power and transmission services, at the lowest feasible long-term cost.”²⁹

In testimony to a legislative committee Railbelt utilities took differing positions on the bill, but all agreed that it had serious flaws. Lorali Carter, manager of government and corporate communications for Matanuska Electric Association, said the proposed centralization had been too watered down: “We look at the voluntary aspect of this as the possible deal breaker. ... A 10-year transition plan means it might not happen at all.”

Jim Posey, manager of Anchorage Municipal Light and Power (ML&P) took the opposite view, emphasizing the need to be very cautious about moving into a new business structure that could “endanger the unique circumstances not shared with other Railbelt utilities that allow ML&P to effectively serve its ratepayers.”³⁰

Mark Johnson, general counsel of Chugach Electric Association, the state’s largest electric utility, criticized the decision to give the Regulatory Commission of Alaska oversight authority over GRETC, saying regulation would impose “significant” costs on consumers and raise concerns with lenders, increasing the costs of financing new facilities.³¹

²⁷ Legislative Finance Division, *FY 2009 Summary of Appropriations*, August 2008) (p. 151; [p. 5 of Gov. Palin’s signing letter on HCS CSSB 221(FIN) am H, Chapter 29, SLA 2008]).

²⁸ *Alaska Budget Report*, “Policymakers struggle toward energy vision,” March 12, 2009.

²⁹ Gov. Sarah Palin, “Transmittal letter to Senate President Gary Stevens on SB 143,” March 5, 2009, p. 1.

³⁰ Minutes of the Senate Energy Committee hearing on SB 143, March 19, 2009.

³¹ Mark Johnson, “GRETC Regulatory Status,” March 29, 2010 (p. 6-7).

Negotiations continued after Palin resigned in July 2009, and through the 2010 legislative session under her successor, Sean Parnell. Insurmountable problems remained, however, especially the demand by the larger utilities that GRETC be exempt from state regulatory oversight. The legislation died at the end of the 2010 legislative session.

Was the failure of Palin’s reorganization effort considered a major setback? Did legislators and Parnell administration officials begin planning a more aggressive effort to bring the utilities together – one that might have offered larger financial incentives and made more aggressive use of statutory mandates?

No. Officials figuratively shrugged it off. Sen. Lesil McGuire, then chair of the Senate Energy Committee, said the administration had made a laudable effort, but she didn’t consider the failure surprising. “Every governor in years past, regardless of party, has failed to bring the utilities together.”³²

Resurrection

There was broad agreement that integration of Railbelt generation and transmission assets was essential to affordable bond financing of any large new generation and transmission project. But financing woes largely disappeared if the state provided most of the construction money and committed to cover cost overruns. This was the financing scheme favored by Railbelt utilities, and tacitly by the project’s principal advocates in the legislature and the state administration.

The utilities said that regardless of what happened with GRETC, they did not have the resources to secure financing or commit to take-or-pay contracts for any large power transmission or generation projects.³³



³² Minutes of the Senate Resources Committee hearing on SB 143, Mar. 25, 2010.

³³ Minutes of the Senate Resources Committee hearing on SB 143, Mar. 24, 2010; Alan Bailey, “Who will foot the transmission bill?,” *Petroleum News*, Oct. 13, 2013.

The first on-the-record statement by current AEA officials that the project would require state grant money came at a 2011 legislative hearing on a bill by Parnell to authorize the Susitna project, reorganize AEA and give it additional powers – including the power of eminent domain. Rep. Mike Doogan, an Anchorage Democrat, asked Executive Director Sara Fisher-Goad what the state would have to do in order for the dam to produce power from Susitna at a reasonable cost.

Fisher-Goad said the state would determine “reasonable cost” in the future and buy down the cost of the project to reach that target.

“Your expectation is that this project is not ever going to pencil on its own?” Doogan asked.

“Yes,” Fisher-Goad responded.

“So, at some point the legislature is going to be asked to pay down the costs at some undetermined level to provide affordable power?”

Fisher-Goad agreed. She referred to a November 2010 report from the project’s financial advisor, Seattle-Northwest. “In their opinion, it would be very difficult for a project of this size to recover its costs through [power sales] revenue.” She said AEA expects to ask for grant assistance as it did when the Bradley Lake hydroelectric project was built, funded 50 percent by the state, and 50 percent by loans that were to be paid off by ratepayers.^{34 35}

Recently disclosed e-mails between AEA and the U.S. Dept. of Agriculture (USDA) officials indicate AEA has considered applying for federally subsidized loan for 50 percent of the project cost through USDA’s Rural Utility Service. A condition of such a loan would be a state commitment to cover any cost overruns.³⁶

In February 2010, AEA released the “Alaska Railbelt Regional Integrated Resource Plan,” prepared by Black & Veatch under the \$2.5 million contract approved in 2008.³⁷ The consultants

“ AEA expects to ask for grant assistance as it did when the Bradley Lake hydroelectric project was built, funded 50 percent by the state, and 50 percent by loans that were to be paid off by ratepayers ”

³⁴ Recording of House Finance April 12, 2011 hearing on HB 103, [hfin_1406.mp3](http://www.legis.state.ak.us/basis/get_complete_bill.asp?session=27&bill=HB103), available from http://www.legis.state.ak.us/basis/get_complete_bill.asp?session=27&bill=HB103 ; see also, Minutes of the House Finance Committee hearing on HB 103, April 12, 2011 (p. 7).

³⁵ In the end, the loan money for Bradley also came from the state, and most of those loans were forgiven. Ginny Fay for the Alaska Conservation Alliance, *A History of Alaska’s Mega Projects*, 2003 (p. 12).

³⁶ Eric Marchegiani, USDA, “Financing and remaining RUS funds from FY 2011,” e-mail to Wayne Dyok, AEA, Nov. 10, 2011.

³⁷ Black & Veatch for AEA, *Alaska Railbelt Regional Integrated Resource Plan Study*, Feb. 2010.

concluded that a dam on the Susitna River would be the cheapest way to produce energy in the long-term, and would enable the state to generate 50 percent of its electricity from renewable sources by 2025, a goal Gov. Palin enunciated in January of 2009.

In April 2010 legislators wrote the 50-percent target into state law as non-binding intent language: “It is the intent of the legislature that ... (2) the state receive 50 percent of its electric generation from renewable and alternative energy sources by 2025.”³⁸

That same month the Legislature appropriated \$10 million to AEA to evaluate the Susitna project against a proposed large hydro proposal on Chakachamna Lake west of Anchorage – and start designing and permitting the best project.³⁹

Sometime in late 2010 Gov. Parnell declared Susitna the winner. Early in 2011, at a legislative hearing, AEA’s Bryan Carey reported that Susitna had won the evaluation hands-down. He said Susitna was a simpler project, with fewer environmental impacts than Chakachamna, and could produce more power at a lower per-kilowatt-hour cost. A new dam-building technique using roller-compacted concrete could reduce costs even further. Moreover, Carey contended, only Susitna would allow the state to meet a goal to generate 50 percent of its electricity from renewable resources by 2025.⁴⁰

Most legislators were supportive.

“Twenty years from now, when they look back at this Legislature, I don’t want to be the one who says, ‘If we’d only built Susitna,’” said Rep. Craig Johnson, Republican of Anchorage. “I talked to legislators [who served] in the ‘80s, and that’s their only regret – that they didn’t pull the trigger at the time.”⁴¹

But when it came time to back up their support with appropriations, some legislators voiced reservations. “Is there an opportunity for the Legislature to pull the plug on this at any time?” asked Rep. Mark Neuman, a Wasilla Republican, citing the dam’s [then-estimated] \$4.5 billion price tag. “That’s [enough to build] an in-state [gas] pipeline.”⁴² AEA’s Sara Fisher-Goad assured him lawmakers would always retain the power to stop financing the project.

³⁸ HB 306, “An Act declaring a state energy policy,” which became Ch. 82 SLA 10.

³⁹ SB 230, which became Ch. 43 SLA 10 (sec. 7; p. 19).

⁴⁰ “Legislators welcome new Susitna hydro proposal,” *Alaska Budget Report*, Feb. 3, 2011 (p. 2).

⁴¹ “Legislators welcome new Susitna hydro proposal,” *Alaska Budget Report*, Feb. 3, 2011 (p. 5).

⁴² “Scaled-back Susitna bill primed for House passage,” *Alaska Budget Report*, April 15, 2011 (p. 6).

Appropriations for the Susitna project from fiscal year (FY) 2009 through FY 2015 totaled \$192.1 million.⁴³ ⁴⁴ Each Susitna appropriation meant that amount wasn't available for some other capital project. In the context of annual capital budgets during that period ranging from \$700 million to \$2.0 billion of state money, the Susitna appropriations, averaging under \$30 million a year, did not raise significant concern about lost opportunities.

More serious was the issue of regional equity in energy prices. In February 2011, then-Senate Finance Committee Co-chair Lyman Hoffman, a Democrat representing a vast but sparsely populated district in western Alaska, expressed reservations about Susitna.

“The question I have is, what about the rest of the state?” Hoffman pointedly noted that the governor is supposed to represent all of Alaska. “Where is his proposal to address the \$1.15 a kilowatt-hour [now being paid] in [the western Alaska community of] Lime Village?”⁴⁵

Hoffman and his Senate Finance co-chair, Sen. Bert Stedman of Sitka, in 2011 devised a capital budget plan tying together \$400 million-worth of energy projects statewide – including \$66 million the governor requested for Susitna. The Senate capital budget bill declared all the energy appropriations void if the governor vetoed any.

That proposal died, but not before it incensed Susitna proponents. House Finance Co-chair Bill Stoltze, a Chugiak Republican, told a reporter:

“For me personally, Susitna – how many times has it been blackmailed, and now here it is again in another Senate bill. That’s visceral for me right now. ...



⁴³ Appropriations from FY 2009 through FY 2014 totaled \$172.1 million: AEA, *Susitna-Watana: Report to the Legislature, 2014*. January 2014 (p. 19); the Legislature appropriated an additional \$20 million in the 2014 session: Legislative Finance Division, *FY 2015 Summary of Appropriations*, August 2014 (p. 222; p. 87 of Ch. 18 SLA 14).

⁴⁴ Legislative Finance Division, *FY 2014 Summary of Appropriations*, August 2013 (p. 241; p. 105 of Ch. 16 SLA 13).

⁴⁵ “Parnell goes all-in,” *Alaska Budget Report*, Feb. 3, 2011 (p. 3).

“We’ve been pretty patient,” Stoltze continued. “Now when it’s [a project] for our region, for Anchorage and the Interior, it’s held hostage again for other regional projects.”⁴⁶

The scuffle hints at long-simmering regional tensions over affordable energy. But as population has shifted to the state’s urban centers, the Railbelt has gained political power. Despite grumbling from some rural lawmakers, Parnell won approval in 2011 of legislation designed to allow Susitna to progress. Parnell also obtained prompt legislative approval of money he periodically requested for Susitna, including the \$65.7 million balance of the Railbelt energy fund in 2011,⁴⁷ \$92.5 million in 2013,⁴⁸ and \$20 million in 2014.⁴⁹

Yet even Parnell has found some of AEA’s requests excessive. In October 2014 AEA submitted its FY 2015 budget to Parnell, asking for a further \$110 million. Parnell cut that to \$10 million, noting that environmental studies needed for the federal license could not be completed until the authority obtained access from the Native corporations that own much of the land on which the Susitna project will sit. Until then, only the smaller amount could be justified.⁵⁰

Further investigation by Parnell’s Office of Management and Budget revealed that appropriations for Susitna had exceeded outlays, allowing AEA to accumulate a large cash cushion. Only \$20 million of the \$110 request was actually needed to finance AEA’s FY 2015 proposal.^{51 52}

The key land access permits Parnell cited when he cut AEA’s \$110 million request were finally obtained on April 14, just days before the end of the 2014 legislative session. The legislature approved the \$20 million in Parnell’s revised request.⁵³

⁴⁶ “Stoltze: Susitna ‘blackmail’ doesn’t sit right,” *Alaska Budget Report*, April 15, 2011 (p. 14-15).

⁴⁷ SB 46, which became Ch. 5 FSSLA 11.

⁴⁸ Legislative Finance Division, *FY 2014 Summary of Appropriations*, August 2013 (p. 241; p. 105 of Ch. 16 SLA 13).

⁴⁹ Legislative Finance Division, *FY 2015 Summary of Appropriations*, August 2014 (p. 222; p. 87 of Ch. 18 SLA 14).

⁵⁰ “Gov., lawmakers seek cheap life-support plan for Susitna,” *Alaska Budget Report*, Feb. 15, 2014 (p. 1).

⁵¹ “Gov., lawmakers seek cheap life-support plan for Susitna,” *Alaska Budget Report*, Feb. 14, 2014 (p. 1-4).

⁵² The proclivity of agencies promoting large hydro-electric projects to request more funds than needed, and to squirrel away the excess, has a long history. See Guy Martin, “Hydro projects: history of decision by neglect,” *Anchorage Daily News*, April 24, 1983 (p. m-2).

⁵³ “Susitna-Watana: \$2.5 million buys Native access permits,” *Alaska Budget Report*, April 16, 2014 (p. 4-5).

Capital crunch

Fueled by rising oil revenue, state appropriations for capital projects grew for several years, reaching a near record of \$2.0 billion in FY 12. In FY 12 Alaska spent \$3,943 per resident on capital projects, more than 12 times the national average.⁵⁴

As the 2014 session began, the state Dept. of Revenue issued a new forecast telling legislators to expect 29 percent less revenue in the coming fiscal year, FY 2015, and a comparable drop in FY 2016.⁵⁵

With capital spending so out of line with national norms, it's not surprising that cuts in capital spending have been the principal budget adjustment tool used to deal with periods of reduced revenue.

But in January 2014, David Teal, the long-serving director of the non-partisan Legislative Finance Division, warned legislators that the capital budget is less flexible than it used to be. One reason, he said, is that recent capital budgets contain phased projects, with few receiving full financing, or even a commitment for full financing later. He listed six big projects moving forward with appropriations for only part of the required money.⁵⁶

Teal posed a rhetorical question: "Do you decide to pull the plug on those projects now, or after you've committed another couple of hundred million dollars to them? It's not an easy choice."

Teal noted that other large projects are waiting to be initiated, such as a liquefied natural gas export project backed by Gov. Parnell. In addition, projected budget shortfalls may eat away at the state's reserves.⁵⁷ Competing megaprojects, falling oil revenue, and a prolonged period of anticipated deficits demand that lawmakers carefully scrutinize and prioritize investments.

⁵⁴ Capital outlay from U.S. Census Bureau, *2012 Census of Governments: Finance – Survey of State Government Finances*, Jan. 23, 2014 (Table 54). Population from U.S. Census Bureau, *Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2013*.

⁵⁵ Alaska Dept. of Revenue, *Revenue Sources Book: Fall 2013*, Dec. 2013 (p. 7).

⁵⁶ The six projects are Susitna, a Fairbanks liquefied natural gas project, a pipeline from the North Slope to deliver natural gas to the Railbelt, a bridge-causeway across Knik Arm, a new the state library, archives and museum, and multiple projects at University of Alaska campuses.

⁵⁷ "Teal offers gloomy outlook," *Alaska Budget Report*, Jan. 31, 2014 (p. 1-4).

MAIN FINDINGS

Construction costs

The Alaska Energy Authority has likely underestimated the costs to build Susitna.

Engineers and planners specializing in cost estimating generally agree that construction cost estimates should state, as a percentage, plus and minus, the range of uncertainty surrounding the estimate. Estimates should also reveal the type of estimate being offered. For example, users of estimates generally understand a “preliminary estimate” to be based on a general design concept, prepared in advance of the design, and with an estimated accuracy of plus-or-minus 30 percent.⁵⁹ AEA has not given a range of uncertainty for its estimate, nor stated the type of estimate it has provided.

In 2012 AEA said its “initial project estimate” for the Susitna project was \$4.5 billion.⁶⁰ In its January 2013 report to the Legislature, the authority said it had “commissioned an independent cost estimate to provide a higher degree of confidence to stakeholders about anticipated costs.” AEA said the independent estimate was within 9 percent of the original estimate. “This is considered to be positive for a project of this scope,” AEA claimed.⁶¹ The authority did not make the results of the study public.

“This history raises further doubt about the reliability of AEA’s Susitna estimate and the transparency of its process.”

In its January 2014 report to the legislature, AEA issued the following statement: “After two cost estimates and a third independent cost estimate, project costs remain \$5.19 billion.”⁶² [Emphasis added.] Contrary to AEA’s suggestion that its Susitna estimate is unchanged, the \$5.19 million estimate represents an increase of 15 percent from the agency’s previously published \$4.5 billion price tag.

This history raises further doubt about the reliability of AEA’s Susitna estimate and the transparency of its process.

⁵⁸ U.S. Dept. of Energy, “Industry best practices in cost estimating,” March 2011 (p. 9).

⁵⁹ American Society of Professional Estimators, *Standard Estimating Practice*, 6th edition, 2004 (p. 121–134).

⁶⁰ AEA, *Report to the Legislature*, January 2012 (p. 20).

⁶¹ AEA, *Report to the Legislature*, January 2013 (p. 4).

⁶² AEA, *Report to the Legislature*, January 2014 (p. 6-7).

Best practices for megaproject cost estimating

Since the 1970s the Government Accountability Office, an independent agency of the U.S. Congress, has published best practices for estimating costs of major capital projects. According to the guidelines, a good estimate will have documented (1) the purpose of the estimate; (2) who prepared it; (3) the estimating methodology and rationale used to derive each element of cost; (4) the data sources for each cost element and how the data were manipulated for comparability; (5) ground rules and assumptions underlying the estimate; (6) the major uncertainties in the estimate; (7) the sensitivity of costs to the major uncertainties; (8) steps used to develop the estimate such that an analyst unfamiliar with the program can recreate it and produce the same result; and (9) the after-the-fact accuracy of previous estimates prepared for similar purposes for similar projects. This documentation should be provided along with the estimate.⁶³

AEA has not explained its estimating methodology, released documents showing how it reached its estimates, nor made public the consultants' evaluations.⁶⁴

“ AEA has not explained its estimating methodology, released documents showing how it reached its estimates, nor made public the consultants' evaluations. ”

There is evidence that AEA did not follow a rigorous estimating methodology. In the course of evaluating the effect of the project on greenhouse gas emissions I asked AEA for an estimate of the amount of cement or concrete the dam will require.

AEA responded: “We don't have a firm and exact figure as we continue to work with the Board of Consultants [to] refine the dam design and optimize safety. Our original estimate was about 5 million cubic yards of concrete.”⁶⁵

Institutional bias in cost estimates

Institutional biases in estimating the costs of large construction projects have been documented for years.⁶⁶

⁶³ Government Accountability Office, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, March 2009.

⁶⁴ Susitna River Coalition, Letter to Rep. Wes Keller, Sept. 24, 2014 (p. 4).

⁶⁵ Emily Ford, AEA director of communications, E-mail message to Gregg Erickson, Jan. 31, 2014.

⁶⁶ For an historical review of cost overruns going back to the 19th century, see Myron Kaplan, “Keeping Engineering Within Budget,” *Technology Review*, January 1976.

In 1973, the first study to rigorously address the frequency and potential causes of cost overruns surveyed 66 large transportation projects; it found persuasive statistical evidence that underestimation was pervasive and largely independent of projects sponsor or geographic location. The statistical evidence on causes was more ambiguous.⁶⁷

A landmark 2002 study published in the *Journal of the American Planning Association* examined a sample of 258 large infrastructure projects worth \$90 billion and representing a range of project types, geographic regions, and historical periods. Like the 1973 study, the 2002 analysis found strong evidence that cost estimates used to decide whether such projects should be built are highly and systematically underestimated. But the study broke new ground in concluding, based on a peer-reviewed statistical analysis, that the underestimation is “explained by strategic misrepresentation, that is, lying.”⁶⁸

Risk factors

A recent synthesis of megaproject cost studies identified five reasons for the failure of energy megaprojects and the inaccuracy of the estimates on which the projects were premised:

- Stakeholder involvement, which tends to fragment project design and implementation;
- Vulnerability to corruption;
- Incentive for sponsors to oversell benefits;
- Complexity, which tends to increase exponentially with project size; and
- The ability of sponsors to externalize (and hence omit) costs.⁶⁹

Involvement of multiple stakeholders tends to fragment project design and implementation.

The misalignment of interests between the state and the six Railbelt electric utilities that will buy Susitna power has already complicated the planning for the project and is likely to increase financing costs.⁷⁰

⁶⁷ Leonard Merewitz, “Cost Overruns in Public Works,” in Niskanen, Hansen, Havemann, Turvey, & Zeckhauser (eds.), *Benefit Cost and Policy Analysis*, 1973 (p. 277–295).

⁶⁸ Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl, “Underestimating Costs in Public Works Projects: Error or Lie?” *Journal of the American Planning Association*, Summer 2002.

⁶⁹ Benjamin Sovacool & Christopher Cooper, *Governance of Energy Megaprojects: Politics, Hubris, and Energy Security*, 2013 (p. 65-66). Two of these factors, increased vulnerability to corruption and the incentive for sponsors to oversell benefits, are not likely to affect cost estimates, but could well apply to other aspects of Susitna.

⁷⁰ See p. 7, this report.

Obtaining access for environmental fieldwork from the Native corporations that own much of the land on which the project will sit has proven costly and caused expensive delays;⁷ acquiring building rights is sure to be more costly and difficult.

Assuring continued political support for the project is likely to require costly linkages with project or program spending to provide benefits other parts of the state.⁷²

Complexity increases with project size.

A large dam project like Susitna is complicated, but does not generally have the key attribute of a “complex system,” that is, many reciprocal dependencies between tightly coupled subsystems and processes which interact unpredictably. Yet the magnitude of Susitna raises design issues that are as yet unsettled; for example, will it be possible to connect or disconnect any one of the three 200 MW generators now planned without unbalancing the entire Railbelt electric grid?

AEA is considering large-scale use of “roller-compacted concrete,” a technique only recently applied to construction of concrete gravity dams. By using a special low-water-content concrete, possibly with the substitution of fly ash for some of the cement, the technique speeds construction and saves money.

Whatever novel or proven construction methods are used, the Susitna dam would be one of the highest of its type in the world, sited at the highest latitude, and with a design that is as yet incomplete. Each of these factors is likely to be associated with underestimated costs.

“Other neglected costs include the costs of providing fish passage around the dam”

The ability of sponsors to externalize costs contributes to lowball estimates.

In preparing its cost estimates AEA has externalized – that is, assumed that someone else will pay – important costs, including an estimated \$889 million in upgrades to the Railbelt’s power transmission lines that would be necessary to move Susitna power to markets.⁷³

71 See p. 11-12, this report.

72 See p. 11, this report.

⁷³ James Cote, David Burlingame and Kelly Ridge, *Susitna Hydro Transmission Study*, Electric Power Systems for AEA, October 22, 2009; see also, Alan Bailey, “Who will foot the transmission bill?,” *Petroleum News*, Oct. 13, 2013.

Other neglected costs include the costs of providing fish passage around the dam,⁷⁴ and land acquisition or rights.⁷⁵

Cost overruns on every large AEA project

A well-documented history of cost overruns on projects managed by AEA and its predecessor, the Alaska Power Authority, suggests a consistent pattern of underestimating costs. Of AEA's large projects, Bradley Lake hydro had the lowest cost overrun, at 34 percent. The Healy Clean Coal overrun was 100 percent.⁷⁶ There is nothing in AEA's Susitna proposal to suggest the agency has learned from its history.⁷⁷

Or perhaps agency officials have learned a larger lesson: that there is little fallout for strategic misrepresentation. Did any energy executive's career suffer from the 100 percent cost overrun on the Healy Clean Coal generation facility? It's unlikely. AEA's cost estimates concern the future, and "there are no facts about the future, only conjectures, estimates, guesses, and predictions."⁷⁸ The public expects and overlooks misrepresentation in commercial advertising. It is much the same with energy project cost estimates. Characterizing such misrepresentation as "lying" may be unduly harsh.⁷⁹

AEA's lowballed cost estimates increase the chances that the project will be built. It. Even if suspect, the underestimated project cost increases the calculated economic benefits, which provides essential political cover for project supporters in elected office.

⁷⁴ Susitna River Coalition, Letter to Rep. Wes Keller, Sept. 24, 2014 (p. 3).

⁷⁵ See p. 12, this report.

⁷⁶ Ginny Fay, for the Alaska Conservation Alliance, *A History of Alaska's Mega Projects*, 2003; Lois N. Epstein, P.E., *Easy to Start, Impossible to Finish*, 2010. For discussion of Fay's 2003 analysis and the history Alaska Power Administration cost estimates in the first unraveling of the Susitna project, see p. 5-6, this report.

⁷⁷ Wayne Dyok, AEA's project manager for Susitna, worked as assistant manager and chief hydraulic engineer "for six years on the Alaska Power Authority's (now AEA) Susitna Hydroelectric Project in the 1980s." AEA News Release. "Alaska Energy Authority Hires Project Manager," Oct. 20, 2011.

⁷⁸ Dan Ward, "There Are No Facts About the Future: Musings on Requirement Stability, Cost Estimates, and Weather Forecasts," *Defense AT&L*, Nov.-Dec. 2009 (p. 25). Ward credits the title phrase to EDS Corporation's Jeff Walker.

⁷⁹ See Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl, "Underestimating Costs in Public Works Projects: Error or Lie?" *Journal of the American Planning Association*, Summer 2002.

Imposing career-stifling penalties on officials responsible for bad cost forecasts could in theory counteract the incentive to lowball a forecast, but such penalties are impractical.⁸⁰ Commissioning truly independent reviews of cost forecasts has been successful elsewhere, but to my knowledge has rarely been done in Alaska. AEA’s “independent” review of its Susitna estimate was not made public, and the consultant was selected and paid by AEA.

In the near term, a professional independent third-party review of AEA’s estimating methodology and procedures would be helpful, provided the funding is sourced outside of AEA’s budget, and the consultant chosen free of AEA involvement. Absent that, the only practical option is to work with the estimates AEA provides.

By using sensitivity analysis, for example, it is possible to analyze how much difference it makes if AEA’s forecast is too low by any given percentage.⁸¹ In the case of Susitna, the two power cost modeling studies published by the University of Alaska Professor Steve Colt show the dramatic impact minor changes in assumptions have on expected power costs.⁸² Running Colt’s model (which has been made available to the public) with a 30 percent higher construction cost would likely mean substantially higher power costs, and render the project uneconomic even with 100 percent debt financing at the unrealistic 5 percent rate Colt used based on AEA’s optimistic assumptions.



⁸⁰ If the project is not built, accuracy can never be determined; if it is built, enough years usually pass that most senior bureaucrats and politicians will have retired before completion; if a project is completed it has often evolved into something different from what was envisioned when the forecast was issued. For a good discussion of incentives for good forecasts, see “New Freakonomics Radio Podcast: The Folly of Prediction,” Sept. 14, 2011, transcript downloaded from <http://freakonomics.com/2011/06/30/the-folly-of-prediction-full-transcript/>

⁸¹ Chris Bernard, “How to Make a Forecast When You Feel Like You’re Being Asked to Guess: Sensitivity Analysis,” *Idealware*, March 22, 2012, downloaded from <http://www.idealware.org/print/2721>

⁸² Steve Colt, “Susitna-Watana Cost of Power Analysis: Discussion Paper,” Institute of Social and Economic Research, July 2012, and “Susitna-Watana Cost of Power Analysis: Revised Peer Review Draft,” June 26, 2013.

Operating costs

Economic feasibility of the Susitna project turns on questionable estimates of generation costs, power delivery costs and energy demand growth. Even if AEA's construction cost estimate is accurate, the project pencils out only within a limited range of favorable operating assumptions.

Securing the land

AEA doesn't include in its projected Susitna operating costs any payments to the regional Native corporations that own key lands under the proposed project. AEA could buy the land up front, in which case the cost would be added to the construction cost. More likely, however, rights will be granted under some sort of lease arrangement, in which case payments, most likely set as a percentage of power sales revenue, will become a part of the project's operating costs.

Neither AEA nor the landowners' negotiation team have revealed what the Native corporations are seeking. Knowledgeable sources have speculated that 15 percent of Susitna's monthly power sales revenue might be reasonable. What might be reasonable, however, is not easy to figure. If Susitna is not built, the lands in question have only minor commercial value for recreation and subsistence. If the landowners demand too large a share of the project's revenue, they could kill the project's economics. If AEA and the landowners are unable to reach an agreement, AEA could take the land using the eminent domain power the legislature granted the agency in 2011.⁸³ That would throw the question of valuing the land into the courts, which might also kill the project by creating a long period of uncertainty during which no one would know how much the power from Susitna would cost to produce.

This would not be the first time the value of Native American land used for a hydroelectric project has been the subject of difficult negotiations. In 1955, the Confederated Tribes of the Warm Springs Reservation signed an agreement with Portland General Electric Co. (PGE) authorizing the utility to build the 440-megawatt, three-dam Pelton hydroelectric project on the tribes' 1000 square miles of central Oregon desert. The tribes in 1996 filed a competitive application with the Federal Energy Regulatory Commission to take over the project's federal license when it expired in 2001. After four years of difficult negotiations the tribes and PGE agreed to become co-owners of the project, with the tribes having an initial one-third share. The tribes also received the right, over the term of the new license, to buy a controlling interest in the project. Currently the Warm Springs tribes receive 33 percent of the net revenue from the project.

⁸³ SB 42, which became Ch. 6 FSSLA 11. For more on the history of this legislation, see p. 10-11, this report.

Other operating costs

Costs of delivered power have proven to be highly sensitive to AEA’s interest rate assumptions. In 2012, University of Alaska professor Steve Colt calculated the delivered costs of Susitna power using AEA’s 2011 financing assumptions: 100 percent debt financing at 6 percent annual interest. That, along with AEA’s other assumptions, yielded an estimated power cost at the retail customer’s meter of “about 40 cents” per kilowatt-hour (kWh).

“By comparison, if natural gas is available to electric utilities in year 2024 at a price of about \$13 per million Btu, and neglecting potential carbon taxes, then the retail rate for power from a new conventional combined cycle gas turbine going online in 2024 would be about 21 cents per kWh.” Colt wrote.⁸⁴

AEA officials reacted to Colt’s findings by changing their assumptions and attacking Colt:

“Unfortunately, a recent publication by Dr. Steve Colt of the Institute of Social and Economic Research (ISER) has caused unwarranted concern regarding the expense of the project and the resulting cost of power to Railbelt ratepayers. However, Dr. Colt’s paper is based on a number of incorrect assumptions about Susitna-Watana Hydro’s ownership structure and fiscal framework that render his analysis fundamentally incorrect.”⁸⁵

The most significant “incorrect assumption” was the 6 percent interest rate, which AEA now revised to 5 percent. When Colt ran his model using AEA’s new assumptions, the result was dramatically different. The retail cost of power was lowered by 55 percent, to 18 cents per kWh.⁸⁶

“ The state’s gas pipeline projects and Susitna hydro project are competitors for the potential Alaska energy market and for state government financing. ”

⁸⁴ Steve Colt, “Susitna-Watana Cost of Power Analysis: Discussion Paper,” Institute of Social and Economic Research, July 2012 (p. 2).

⁸⁵ AEA, “Alaska Energy Authority Confident Susitna-Watana Hydro will provide Long-Term, Stable, and Affordable Energy,” News Release, Sept. 4, 2012.

⁸⁶ Steve Colt, “Susitna-Watana Cost of Power Analysis: Revised Peer Review Draft,” June 26, 2013 (p. 2).

In an economic environment where long-term high-yield (junk) bonds are returning yields approaching 7 percent,⁸⁷ and Federal Reserve policies point toward rising interest rates,⁸⁸ AEA's 5 percent interest rate is unrealistically low.

Another key assumption, AEA's energy demand forecast, is based on projections of past trends, provided by individual utilities in 2010, with little or no examination of economic factors such as population changes, long-term price elasticity, and changes in the intensity of energy usage. Most importantly, AEA's consultants largely ignored potential reductions in power requirements due to improved energy efficiency and demand management, and based the forecast on an aggregation of individual utility forecasts. "The load forecast does not include incremental [demand-side management/energy efficiency] programs not inherently included in the utilities' forecasts," consultant Black & Veatch found.⁸⁹

Competition for markets and state dollars

The state's gas pipeline projects and Susitna hydro project are competitors for the potential Alaska energy market and for state government financing. Competition for state aid is likely to become more intense as proposed natural gas pipeline projects reach maturity and spending cuts become necessary to prolong the life of the state's cash reserves. Unless oil revenue makes an unexpected return to levels not seen since 2010, sustaining the operating budget and forestalling a hard landing for the Alaska economy is likely to become the most formidable competitor for state dollars.

50 percent from renewable

In January of 2009 then-Gov. Sarah Palin released an AEA energy plan that targeted producing 50 percent of Alaska's electricity from renewable sources by 2025.⁹⁰ A year later the

⁸⁷ Bloomberg News, "Tepper Sees Junk Debt at Fair Value," October 1, 2014. According to the article, "U.S. junk bonds tumbled 2.1 percent last month and yields jumped to 6.5 percent from 5.7 percent in June as speculation grows that the Federal Reserve is closer to raising interest rates." <http://www.bloomberg.com/news/2014-10-01/tepper-says-u-s-stocks-interesting-as-junk-bonds-at-fair-value.html>

⁸⁸ AP News, "Fed keeps rates low, but brace for the inevitable," Sept. 18, 2014 (<http://townhall.com/news/politics-elections/2014/09/18/fed-signals-plan-to-keep-key-rate-at-record-low-n1893132>).

⁸⁹ Black & Veatch for AEA, *Alaska Railbelt Regional Integrated Resource Plan (RIRP) Study*, February 2010 (p. 6-1).

⁹⁰ "Palin releases 1,000-page report; lawmakers ask, 'Where's the plan?'" *Alaska Budget Report* Jan. 22, 2009 (p. 16).

Senate Energy Committee introduced legislation to make that target an official state policy. The measure passed in July 2010 without a single opposing vote.⁹¹

A 2010 consulting study for AEA found no practical path other than the Susitna project to meet the 50-percent-from-renewable goal.⁹² In 2011, the latest year for which statistics are available, Alaska utilities generated 6.6 million megawatt-hours of electricity, of which 21 percent (1.4 million) came from renewables.⁹³

AEA forecasts that the Susitna project would produce 2.8 million megawatt-hours of energy. In 2011, meeting the 50 percent goal would thus have required an additional 1.9 million megawatt-hours from renewables. Assuming a 1 percent annual growth rate, I calculate the amount needed from renewables in 2025 would be 2.2 million megawatt-hours, well within the capacity of Susitna.

Apart from Susitna, the next-largest proposed hydro facility under recent evaluation is the 320-megawatt facility proposed at Lake Chakachamna, near Mt. Spurr, an active volcano visible to the west from Anchorage. The Chakachamna project is being promoted by the village corporation for the Bering Sea community of St. Paul. It's designed to produce 1.6 million megawatt-hours of annual power. Even assuming no increase in Alaska electric power consumption between 2011 and 2025, the combined output of existing renewable power generation facilities and a newly constructed Chakachamna would leave the state 5 percentage points short of the 50 percent goal.

How serious state officials are about meeting the 50-percent target is unclear. Early in 2014 House Finance Co-chair Bill Stoltze expressed sentiments that were likely shared by colleagues. Speaking about the implausibility of investing in a natural gas pipeline while continuing to dribble money to keep the Susitna project alive, Stoltze said: "I almost wish we would stop pretending that we actually have a goal of a renewable resource of 50 percent, because every message we are getting is counter to that. Let's not deceive the public. If that's not the goal, I think there ought to be more candid and blunt discussion about what our real commitment is."⁹⁴

Whether Alaska meets its 50 percent target by 2025 has little direct economic significance if authorities continue allowing free use of the atmosphere as a dumping ground for greenhouse gasses. Burning natural gas to generate electricity produces about one-half metric ton of carbon

⁹¹ Ch. 82 SLA 10. Votes are recorded at http://www.legis.state.ak.us/basis/get_bill.asp?bill=HB%20306&session=26 .

⁹² Black & Veatch for AEA, *Alaska Railbelt Regional Integrated Resource Plan Study* (Feb. 2010) p. 9-2.

⁹³ ISER, *Alaska Energy Statistics, 2011* (December 3013), p 22. The renewable power is all from wind and water power.

⁹⁴ "Gov., lawmakers seek cheap life-support plan for Susitna," *Alaska Budget Report*, Feb. 14, 2014 (p. 4).

dioxide per megawatt-hour generated.⁹⁵ Carbon dioxide (CO₂) is the most ubiquitous of the greenhouse gasses.

The U.S. federal government estimates the social cost of CO₂ emissions at \$11 per metric ton in 2015.⁹⁶ Greenhouse gas-emission charges of one sort or another have been imposed in a number of countries and states. During the first nine months of 2014 the state of California charged roughly \$12 for each metric ton of CO₂ emitted to the atmosphere.⁹⁷ If that burden were passed through to Alaska consumers of natural gas-generated power, the effect would be quite small, adding 3-5 percent to Southcentral Alaska retail residential rates, i.e., about 0.6 cents per kWh.⁹⁸ Southcentral residential rates in 2011 ranged from 13 to 22 cents per kWh.⁹⁹

AEA has not prepared, or at least not published, estimates of the impact the Susitna project would have on Alaska greenhouse gas emissions.¹⁰⁰ My calculations indicate that the reduction would be 1.4 million metric tons per year, assuming Susitna power would displace

⁹⁵ U.S. Environmental Protection Agency, “How does electricity affect the environment,” May 22, 2014. The figure is the current U.S. average for gas-fired generation. Oil-fired generation averages 1672 lbs. per MWh. See <http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html> . See also, U.S. Energy Information Administration, “Voluntary Reporting of Greenhouse Gases Program Fuel Carbon Dioxide Emission Coefficients,” January 31, 2011 (p. 1).

⁹⁶ Interagency Working Group on Social Cost of Carbon, United States Government, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866*, November 2013 (p. 3). The calculation assumes a 5 percent social discount rate. Costs at lower discount rates and in later years are higher.

⁹⁷ “California Climate Dashboard,” Climate Policy Initiative, September 29, 2014. Downloaded from <http://calcarbondash.org/>

⁹⁸ $[(\$12/\text{metric ton CO}_2) * (1135 \text{ lbs. CO}_2/\text{MWh}) / (2206 \text{ lbs./metric ton})] / (1000 \text{ kWh/MWh}) = \0.006 per kWh.

⁹⁹ ISER, *Alaska Energy Statistics, 2011*, December 2013 (p. 8).

¹⁰⁰ According to AEA: “Detailed climate change and greenhouse gas studies are not being required by FERC for this Project. AEA will be summarizing the applicable information from Keyask Hydropower Limited Partnership’s (KHLP) 2012 climate study for their proposed Keyask Generation Project in northern Manitoba, Canada.” AEA, *Meeting Notes*, Social Sciences Technical Workgroup, September 11, 2013 (p. 2). It does not appear that AEA has summarized the Keyask studies.

power from combined-cycle natural gas-fired generation.¹⁰¹ ¹⁰² That is roughly half the CO₂ the Alaska electric power industry currently produces. To put that number in context, it is less than 3 percent of Alaska’s total human-caused annual CO₂ emissions.¹⁰³ However important it may be to shift Alaska power production from fossil fuels to renewable energy sources, such a shift would make only a tiny contribution to abating Alaska’s human-caused greenhouse gas emissions.



¹⁰¹ I use the CO₂ per MWh factors from U.S. Environmental Protection Agency, “How does electricity affect the environment,” May 22, 2014.

¹⁰² My calculations indicate that the increased greenhouse emissions resulting from Susitna’s construction – including the manufacture of cement – would be offset in 13 months of operation.

Based on data from a Manitoba Hydro study (*Life Cycle Greenhouse Gas Assessment Overview*, prepared for Keeyask Hydropower Limited Partnership, June 2012), and considering the thin soils of the land to be flooded by Susitna, the low temperature, relatively deep water and relatively small area of the proposed reservoir, I estimate the annual decomposition (to methane and CO₂) of organic material submerged under the Susitna reservoir would offset less than 2 percent of the equivalent annual greenhouse gas reduction due to the shift from natural gas to hydro.

¹⁰³ Alaska Dept. of Environmental Conservation, “Summary Report of Improvements to the Alaska Greenhouse Gas Emission Inventory,” January 2008 (p. 3). Human-caused emissions in Alaska were projected at 55.2 million metric tons in 2010. Industrial sources, mostly from oil production operations on the Alaska North Slope, account for 48 percent (26.4 million metric tons) of the Alaska total; transportation in Alaska produces 36 percent (19.6 million metric tons).

CONCLUSION

Alaska's economy has for years epitomized Paul Simon's a one-trick-pony.

*He's a one-trick pony
One trick is all that horse can do
He does one trick only
It's the principle source of his revenue.*

Paul Simon © 1980
From the lyrics to *One-Trick Pony*

For almost as many years, Alaska legislators, governors, and chambers of commerce have been committed to the proposition that the way to teach the Alaska pony new tricks is through large-scale investments in dams, causeways, bridges, port facilities, agricultural projects, rail extensions, gas pipelines, shipyards, icebreaking ferries, and so forth. In most cases, these government efforts have been unsuccessful, sometimes spectacularly so.

The Susitna project is very much in this tradition. In 1983, Guy Martin, former natural resources commissioner under Gov. Jay Hammond, and later assistant Secretary of the Interior for Land and Water, in an essay discussing the earlier Susitna dream, explained the trajectory of such projects.¹⁰⁴ The pattern plays itself out, regardless of whether the project is abandoned or finished, and regardless of whether it is ultimately discredited as a massive turkey or proven to be an economic winner. His cogent analysis remains relevant today.

According to Martin, the moment of conception of a project is likely to be attended by only a few project engineers working for a government agency, those in the business sector who will profit most from the project, their supporters in the legislature, and all-purpose boosters along for the ride.

“Following its unveiling by the sponsors, a project must be prepared to accept extreme and vocal minorities who either adore or abhor the project. Most of the public will understand neither the technical details nor the economics of the project, which are often dependent on assumptions about the future which cannot be tested.” This is a critical point for the project sponsors. They must organize and mount a campaign to mobilize popular support for the project.

“At this point project sponsors attempt to leverage whatever popular support they have mustered into an early commitment of funds.” Lawmakers and the governor are entreated to consider how the project will remind future generations of the wonderful good thing they accomplished when they built the project.

¹⁰⁴ Guy Martin, “Hydro projects: history of decision by neglect,” *Anchorage Daily News*, April 24, 1983 (p. m-2).



"Your people will remember you for the money you saved them by not building a pyramid."

New Yorker © 2004: used by permission

This is where Susitna is now. Had AEA's request last session for \$110 million been approved, the project might have reached what Martin described as "the magic moment – when the argument changes from 'a little more can't hurt,' to 'so much has been spent already that we can't turn back.'" Parnell's decision to let AEA have only \$20 million for Susitna means the key spending decision was put off. AEA will again approach that cusp in the 2015 session.

Susitna's magic moment could again be pushed into the future. But as Martin – writing 31 years ago – advised, "Don't bet on the outcome." A decision to delay has resulted in the eventual construction of many projects, "but it has also killed them as costs escalate, needs change, new constituencies grow, or the simple facts of the matter ultimately prove fatal."