

MEMORANDUM 28 Dec 18 Revised: 23 Apr 19
From: Bill Leighty wleighty@earthlink.net 907-586-1426
Subject: Juneau cruise ship passenger "carrying capacity" (CC); ground transportation improvements

22 Apr 19

Assemblymembers, Juneau Citizens, and Friends,

Here's video and other context by which we may explore the Subject and prepare for the 23 April "Cruise Ship Tourism" meeting at ANB Marie Peratrovich Hall:

A. JEDC Innovation Summit 2018, "Visitor Products" industry panel, 22 Feb:

https://www.youtube.com/watch?v=ga_8mNhyIHI&list=PLAIO15Tss01PBnflkNbYVPORf34v7Ur1U&index=11&t=2846s

Scroll to 44:15 minutes for Q&A conversation with John Binkley, President, Cruise Lines Industry Association Alaska, about:

- "Carrying capacity", with prospects for ~ 1.3 million cruise ship passengers in 2019
- Juneau's responsibility for increasing that carrying capacity, to accommodate more cruise ship visitors: planning and capital expenditures (capex) and operating expenses (opex)
- Maintaining Juneau's quality of life for its residents, while maintaining Juneau's reputation as an attractive destination for all visitors, arriving by cruise ship, airline, or AMHS, for whatever length of stay

B. Interview with Captain Jim Coon, founding family of Trilogy Excursions, Maui, on how that island has dealt with "carrying capacity". August, 2018, at the Coon family cabin at Killisnoo, near Angoon:

<https://vimeo.com/286103842>

The second-generation Coon family was born and raised in Ketchikan. With their parents, they, founded Trilogy Excursions in Hawaii, on Maui, in 1973. www.sailtrilogy.com

C. Kate Troll and Bill Leighty "Innovation Short" at the JEDC Innovation Summit, February 2018:

<https://vimeo.com/287808196>

"Elevator Juneau: Escaping Sea Level Rise"; video also includes "Model for a Domestic Heat Pump Program", by Stuart Cohen, Interfaith Power and Light

D. Bill Leighty panel presentation at JEDC Innovation Summit, 20 Feb 19: "Should Juneau

Accommodate 1.5 million Cruise Ship Visitors per Year?" <https://vimeo.com/manage/318869809>

E. Future: I videorecorded about 30 min of South Franklin vehicle and foot traffic, in August 2018, which might facilitate discussion of traffic management, infrastructure improvements, and modal changes in the context of the Holland criterion, below. This has not been edited to a useful length and quality; I could do so, if requested. I will submit the raw video files to Pat Race, Lucid Reverie, for potential use in "Blueprint Downtown".

F. Related: My talk to Juneau World Affairs Council, 12 May 2015, "Arresting Climate Change:

Transforming the World's Largest Industry" <https://vimeo.com/127890670>

G. Slide presentation (attached to email on this subject; and by request):

CBJ-Energy-Brief-21 Dec 18-Leighty.pptx

H. Please consider the companion DRAFT Excel file:

CarryingCapacity-Juneau-FGS-EconAnal-5Feb19.xlsx

This is followup to my 28 Dec 18 memo on this subject, with reference to the Excel file DRAFT analysis, to be sent with this memo, which is a template for describing and analyzing apparent options for the Community of Juneau and its CBJ, for:

- Analyzing, declaring, and implementing Juneau's "carrying capacity" (CC) for annual total cruise ship passenger arrivals;
- Improving Juneau's ground transportation to allow increasing that declared CC for cruise ship passenger annual total, perhaps for several alternatives;
- Gathering the capital (capex) necessary for building these ground transportation alternatives, expecting that those who annually benefit most will invest the most;
- Allocating the operating expense (opex) of improved ground transportation among the several seasons and beneficiary parties;
- Estimating financial benefits to all parties, as simple gross ROI.

My strategy in the 28 Dec memo and attached Excel analysis, for consideration by the People of Juneau, CBJ, cruise ship industry, and balance of visitor industry:

- Use the CLIA Alaska lawsuit and Judge Holland decision to motivate us all to think beyond "passenger fee revenue" to what the cruise ship industry needs to succeed in Juneau during their 4-month Summer season, mid- to long-term, in ground transportation and other infrastructure
- Consider how the Community of Juneau may benefit from those investments, year-round, achieving its goals under:
 - Juneau Climate Action & Implementation Plan - 2011
 - Juneau Renewable Energy Strategy - 2018
 - Juneau Comprehensive Plan, as revised and updated
 - Several cluster industry working group action plans, as organized by JEDC
 - Several citizen-organized and CBJ advisory groups: JCOS, Renewable Juneau, 350.org, Interfaith Power & Light, ICLEI membership, "Blueprint Downtown" (CDD), et al
 - Alaska Climate Action Network -- <http://www.akclimateaction.org/>
 - Various strategies and "innovation shorts" presented at the several JEDC "Innovation Summits"
- Aside from the "passenger fee" revenue generation scheme, strategize shared investment in major infrastructure improvements to allow increasing Juneau's "Carrying Capacity" (CC) to an agreed and implemented or enforced cap approaching 1.5 million cruise ship passengers per year
- Recognize that the cruise ship industry, as the primary economic beneficiary of major ground transportation capex, should be the principal investor.
- Present an initial DRAFT Excel template for this analysis, encouraging others to build on it or replace it with an improved template.

Please see video discussing "The Commons" metaphor used by Garrett Hardin in the attached article, by David Bollier, Schumaker Center for a New Economy, delivered at "Prairie Festival", The Land Institute, Salina, KS. <https://www.youtube.com/watch?v=DIM9Lvoikyo>

<https://landinstitute.org/> <https://landinstitute.org/news-events/prairie-festival/>

A companion file is the article from *Science*, Dec 1968, to which I referred at an Assembly meeting: Garrett Hardin, "The Tragedy of the Commons".

Consider how Bollier's insights, in references above, apply to Juneau's deliberations on cruise ship "Carrying Capacity" (CC), on large-scale tourism, and on Alaska's economy and lifestyle.

David Bollier, activist, scholar, and blogger who is focused on the commons as a new paradigm for re-imagining economics, politics, and culture. He pursues this work as Director of the Reinventing the Commons Program at the Schumacher Center for a New Economics and as co-founder of the Commons Strategies Group, an international advocacy project.
<https://centerforneweconomics.org/>

Bollier has co-organized pioneering international conferences and strategy workshops on the commons, and consults regularly with diverse activists and policy experts in the US and Europe. His blog, Bollier.org, is a widely read source of news about the commons, and his book *Think Like a Commoner: A Short Introduction to the Life of the Commons* (2014), has been translated into six languages. He and coauthor Silke Helfrich will publish *Free, Fair and Alive: The Insurgent Power of the Commons* in spring 2019. Bollier's other books include *Patterns of Commoning* (2015) and *The Wealth of the Commons* (2012), both with co-editor Silke Helfrich; *Green Governance* (2013), co-authored with the late Professor Burns Weston; and *Viral Spiral* (2009), *Brand-Name Bullies* (2005), and *Silent Theft* (2002). In 2012, Bollier received the Bosch Berlin Prize in Public Policy from the American Academy in Berlin for his work on the commons.

The current state of affairs, CBJ vis-a-vis CLIA Alaska, may at last provide the opportunity and impetus for re-examining the question, "Light Rail for Juneau ?" as perhaps "Fixed Guideway for Juneau ?", although the two may be practically synonymous.

But, an attractive alternative to fixed guideway systems (FGS), based on permanently-installed rails or other tracks, may soon be available. The major bus manufacturing companies offering Battery Electric Vehicle (BEV) and hydrogen-fueled Fuel Cell Vehicle (FCV) buses today will have autonomous, self-driving, electric drive train buses available in about 4 to 5 years. For Juneau's cruise ship industry, these could be assembled in "trains" of any number of electronically-linked buses, about a meter apart, by which we could significantly increase Juneau's CC for cruise ship visitors:

1. These buses could vary in capacity; most would be 50+ pax "coaches", as we now know them;
2. The downtown docks could be reconfigured to replace parallel bus stalls with a single, or probably two lanes, parallel to each other and to the docks, where "bus trains" would quickly load disembarking cruise ship passengers onto buses identified by shore excursion ("shorex") destination;
3. Each bus has a driver-guide, well-trained, as all are now;
4. These bus trains would make a U-turn, as necessary, at the rock dump, upon arriving or departing the docks, to depart the downtown area for a variety of shorex destinations;
5. Beginning at the bridge intersection, buses begin to "decouple", under driver-guide control, proceeding to off-Egan destinations;
6. The final "bus train" destination is MGVC, which has been reconfigured to most efficiently and hospitably accommodate this transportation mode;
7. Passengers returning to downtown docks from MGVC might be told to " Take any bus; they are all going downtown", or " You are on a combo tour; check your next destination on your combo ticket and wait for a bus going there ";
8. As buses converge toward downtown, they reconnect as autonomously connected and driven "bus trains" to unload parallel to the downtown docks and repeat the process;
9. These buses and bus trains are quiet, composed of zero-emissions vehicles (ZEV's) running on hydropower via battery charging or hydrogen fueling;
10. Bus fossil fuel consumption would be largely eliminated, saving combustion of XX,000 gallons per year, preventing consequent emission of 20 x (XX,000) pounds per year of CO₂;
11. Details for the above strategy must be well conceived and planned by expert consultants;

12. CC will consequently be increased by eliminating bus nuisances of noise, exhaust, and traffic congestion -- the latter assuming that "bus train" nuisance is less than that of a fleet of independently-driven buses;
13. The capex and opex costs of increasing MGVC CC will be reduced from that apparently necessary to implement the present DRAFT USFS Master Plan for MGVC / MGRA.

This bus replacement and autonomous "bus train" strategy might allow Juneau to formally declare that our total annual cruise ship passenger CC has increased from 0.9 to 1.4 million, if the people of Juneau agreed. This bus strategy would apparently obviate the need to consider an FGS for Juneau, except that:

1. The same buses and / or rolling stock (train cars) could be used year-round in Juneau, to relieve Juneau residents of the capex and opex of owning and operating many of our current fleet of light duty vehicles -- cars, SUV's, vans, pickups;
2. FGS features fixed stations, which attract adjacent high-density residential, other development;
3. FGS rail-based systems require little or no snow removal;
4. Bus systems require roadway maintenance, especially winter snow removal;
5. FGS rail-based trains require only one driver, for a train of many cars; an autonomous "bus train" may similarly require only one operator, not necessarily trained as a "guide";
6. As Juneau becomes a refuge for millions fleeing sea level rise; we may wish we had the extra transit capacity an FGS might provide;
7. CBJ would need to arrange with the owners of the new buses and / or FGS to operate some of these assets year-round, for the benefit of residents and other visitors. Will the owners of new, costly, BEV and / or FCV buses, equipped for autonomous operation, leave them stranded in Juneau eight months per year, or will they barge all or most of them to other faraway service ?

The incremental 500,000 pax, at a presumed estimated average margin of \$ 500 each, are worth \$ 500 x (500,000) = \$ 250 million per year to the cruise ship industry in incremental margin. Properly managed by the industry, this bus replacement and other CC upgrades could be paid for in a single year's operation at the higher CC. Note that declaring Juneau's cruise ship CC today, with today's ground transportation system, strategy, and equipment, as 0.9 million also declares that we are now operating beyond CC, delivering a suboptimal Summer experience to both visitors and residents.

Accommodating the new CC of 1.4 million pax per year might require procuring 50 to 80 new BEV or FCV buses, all capable of autonomous "bus train" operation. BEV "coach" buses now cost ~ \$ 800,000 each. Four years from now, when the Juneau industry buys its BEV or FCV fleet and eliminates most of ground transportation fossil fuel combustion, these "coaches" will probably cost ~ \$ 600,000 each (bus industry estimates). That's an investment for 80 buses of up to 80 x (\$ 600,000) = \$ 48 million. As presented in the previous paragraph, the cruise ship industry, independent of the CBJ passenger per capita tax, should be able and eager to make that investment, either directly or by providing financing to the several bus fleet operators and individual bus owners ?

BEV or FCV buses ? The electric charging infrastructure for a complete bus fleet will be very costly: perhaps \$ 30,000 to \$ 60,000 per bus, including utility company substation and other assets. The electrolysis plant required to produce hydrogen fuel from hydroelectricity might cost less, including utility substation, in total or allocated per bus, but a major fuel company might invest in that infrastructure in order to sell hydrogen fuel profitably. Four years hence the relative advantages of BEV and FCV buses for Juneau service should be more apparent, assisting our aggregate investment decision..

See Figure 2, last page. Helicopter noise is the other salient limitation on Juneau's cruise ship CC. The present fleets should be replaced by the Eurocopter HC130 T2, standard in Hawaii and Grand Canyon because of their "quiet technology". At about \$ 3 million each, replacing Juneau's fleets totaling about 20

"ships" needed for CC of 1.4 million pax = 20 x (\$ 3 million) = \$ 60 million less ~ \$ 20 million sale of existing fleets = \$ 40 million net. The cruise ship industry should be eager to help with this investment.

Thus, total investment in new ground and air transportation infrastructure and equipment required to increase Juneau's CC for cruise ship tourism total pax to ~ 1.4 million is approximately:

- Replace all buses with BEV or FCV buses \$ 48 million
- Electric charging or hydrogen fueling infrastructure for fleets \$ 4 million
- Replace helicopter fleets with "quiet technology" \$ 40 million
- Equip all docks with access to shore power for all hotel loads \$ 6 million
- Miscellaneous shoreside infrastructure modifications \$ 10 million
- Consulting, design, other soft costs \$ 2 million
- Total \$ 110 million

REVIEW: The principal actors will be hard-pressed to achieve a CC of 1.3 million cruise ship pax in 2019, with bus transportation. Replacing the smelly, old, fossil-fueled, "MCI" highway tour buses with battery electric vehicle (BEV) or hydrogen fueled fuel cell vehicle (FCV) buses will clear and quiet the air, but will not solve the congestion problem at downtown docks nor at MGVC. FGS and / or LRT will not be panaceas, but may allow achieving a summer cruise ship season CC of 1.3 million total pax.

Principal actors:

- The People of Juneau, as individuals and as numerous organizations and affinity groups
- CBJ
- CLIA Alaska and their constituent companies
- Many other members comprising the balance of the Juneau, SE AK, and Alaska visitor industry

The bargaining opportunity for all of the above actors proceeds from the CC problem, aside from the "pax head tax" controversy and lingering confusion following the Judge Holland decision:

If the cruise ship industry wants to bring 1.3 million, or more, pax to Juneau in the summer season, it will need to invest the majority of the capital cost (capex) to build a hydroelectric-powered, adequately-geographically-extensive FGS -- probably LRT or streetcar or a hybrid -- of adequate pax capacity and operational frequency, to increase Juneau's CC from nominally about 0.9 million to about 1.3 million.

If CBJ, via Assembly and Manager, is visionary and brave enough, after an encouraging initial professional transportation planning study, it will soon adopt an ordinance requiring the replacement of all fossil-fueled visitor industry buses, of all sizes, with hydroelectricity-powered buses, either BEV or FCV. However:

- This will not increase Juneau's present 0.9 million (nominal: my proposal for discussion purposes) total summer cruise ship pax, but will allow Juneau to make a major step toward achieving our presumed, estimated, CC of about 0.9 million pax; we should debate whether we are at 0.9, now;
- This bus replacement will not achieve a consensus 1.3 - 1.5 million CC; visitor experience quality -- across the visitor spectrum -- will decline, as will Quality Of Life (QOL) for Juneau's residents;
- I think we can avoid that latter-case decline, increase CC and QOL, and make progress in our renewable energy and "climate change" goals, only by building and faithfully using an FGS system.

Thus, our proposal to the cruise ship industry should be, enforceable by ordinance: Either:

- Replace all ground transportation vehicles with hydropowered, CO2-emission-free vehicles, probably BEV's or FCV's, and enjoy the permanent, enforced, cruise ship passenger annual total CC of 0.9 million, OR
- Build an adequate hydropowered FGS so that we may increase the said CC to 1.4 or 1.5 million by replacing almost all visitors' ground passenger-miles in Juneau, now via highway vehicles, with FGS passenger-miles.

Let the cruise ship industry, and its other visitor industry colleagues, figure out how to do that.

Juneau and its CBJ need to behave as unabashed monopolists, to protect and enhance the many values of Juneau, physical and social, natural and aesthetic, together comprising "community". A monopolist restricts supply in order to increase price. We, Juneau, have a monopoly on Juneau: it is unique, and uniquely blessed in geography, resources, and caring people. Therefore, by establishing and enforcing CC, we are restricting the supply of visits allowed by cruise ship passengers, to protect the Commons, to prevent "The Tragedy of the Commons", as Hardin called it in 1968, and as David Bollier elaborates upon it, above.

Cruise prices will go up, as demand bids up the prices of limited ship berths in Juneau. Our wealthier visitors will be willing to also pay more for B+B, VRBO, outfitter and guide providers. The ratio of independent travelers to cruise ship travelers will probably increase. This will lift all boats, improving prospects for all visitor sectors, but unfortunately raising some prices for Juneau residents.

Some ships will need to go elsewhere, in Alaska or in the world, or not sail at all -- saving fossil fuel, helping save Earth-as-we-know-it, from the several "climate change" dangers. This is consistent with Juneau's Assembly-adopted "Juneau Climate Action & Implementation Plan".
http://www.juneau.org/sustain/climate-action-plan/documents/CAP_Final_Nov_14.pdf

"As the industry grows, it may be that if Juneau is not able to maintain that level of satisfaction, they'll find other communities or destinations to go to, around Alaska."

--- John Binkley, President, Cruise Lines Int'l Association Alaska, video resource A, 22 Feb 18

It's a complicated situation. We need stalwart CBJ leadership and the insights of economists to inform them. And, first, we need to invest in professional help for a "transportation systems options analysis", or some such initial consultant product, to keep us on track, prevent arguments and blind alleys. We're all in this together, so should share the cost of this consultation. We could also urge Juneau residents, officially or informally, to attend one or more of several annual "rail" conferences.

Please see the companion DRAFT Excel file: CarryingCapacity-Juneau-FGS-EconAnal-5Feb19.xlsx

" Juneau Fixed Guideway Transit System (FGS) for increasing cruise ship visitor Carrying Capacity (CC), reducing CO2 emission and cost of living (COL) "

Please make this template you own; rename the file to begin your modeling "case" development, to launch and encourage this important discussion.

Should we soon have a public forum at UAS or Centennial Hall, with an expert panel or two, lots of Q+A, followed by worktables and harvesting the results ? Co-sponsored by Assembly, COS, CLIA Alaska, JEDC, others ? As an extension of "Blueprint Downtown" ? Introduce it at the JEDC "Innovation Summit" ? Many small teams could design their version of the ideal FGS, by colored marker and notes

on a Juneau area map, for group presentation. That would get the ball rolling, unless legal or other showstoppers to this whole concept emerge soon.

Potentially related to cruise ship CC: If we want development on West Douglas Island, it should be accessed via a tunnel under West Juneau, extending straight from the roundabout. The LCC of the tunnel will probably be less than the LCC for the North Douglas road extension, saving much fossil fuel, driving time, and traffic danger.

This may allow the USCG to move their dock, and perhaps allow NOAA - NMFS to move their facilities, to West Juneau, surplus the extant fed dock for CBJ to buy, to repurpose for many uses, including medium-size cruise ships.

Such a West Juneau tunnel and road to West Douglas tidewater would not completely replace the function and value of a Second Crossing, but could delay it for many years. I've no idea of the capex and opex comparisons between these alternatives. The North Douglas pioneer road should be maintained as a recreational trail, and not extended.

28 Dec 18

Assemblymembers, Juneau Citizens, and Friends,

This is followup to my appearance in "non-agenda items" at the 17 Dec Assembly meeting, where I briefly addressed contexts 1 and 2, below: the "Holland criterion" and "climate change". Please see the following video and slides references to define the "community conversation" I suggested we now need, and that the Assembly should either initiate and lead, or should request others to lead:

DISCUSSION CONTEXTS FOR ANALYSIS, COMMUNITY AND INDUSTRY DISCUSSION:

I spoke briefly during "non-agenda items" at the 17 Dec 18 Assembly meeting to:

- Encourage beginning a community conversation now about Juneau's present opportunities and obligations in the following contexts
- Suggest several investments relevant to the conversation in video resource A, above, that might meet the "Holland criterion"

Contexts:

1. The Judge Holland criterion, as reported in the Empire: "**Does the expenditure provide a service to a vessel ?**" Extracted from the Judge's 35-page opinion, which includes: " The proper question as to each category of expenditure [by the CBJ] is: Does the expenditure provide a service to a vessel ? If the answer is yes, the expenditure is constitutional. If the answer is no, the expenditure is unconstitutional under the Tonnage Clause." And, "... municipalities can only spend the revenue from those fees on 'endeavors that facilitate the marine operations of plaintiffs' members' vessels.' " Does this apply to both port entry and use fees and per-passenger fees ?
2. Juneau's need to understand and manage its carrying capacity for visitation, via all industry sectors (cruise ship, airline, AMHS), especially in Summer, for the benefit of both Juneau residents and visitors, to maintain -- and share -- a high quality of life and experience for all, for the long term.
3. Our growing recognition that continuing to dump carbon dioxide (CO₂), methane (CH₄) and other greenhouse gases (GHG's) into Earth's atmosphere is an emergency that needs immediate and extensive mitigation (prevention, by emissions reduction) as well as adaptation (lifestyle changes; moving uphill and inland, as sea level rises; growing different crops; repelling new pest and disease migrations and invasions). Our growing recognition, by Juneau Commission on Sustainability (JCOS), 350.org, Renewable Juneau, Interfaith Power and Light, Juneau Audubon, JEDC's Renewable Energy Seed Cluster Industry Working Group, SEACC, and others, that Juneau, as a community of persons, business, and government, needs to share in -- or better, lead -- that GHG emissions reduction.
4. See Juneau energy economy slides, also attached: Our recognition that Juneau's "internal" energy economy still relies on burning ~ 30 million gallons per year of liquid fossil fuels: about one-third highway gasoline, one-third heating oil, one-third "other": marine, aviation, construction, other). This is in addition to our hydroelectricity, which supplies almost all of our electric energy.
5. Our recognition that Juneau's "external" energy economy is much larger: ~ 100 million gallons per year to fuel cruise ships, airlines (Alaska and Delta, who buy most of their fuel Outside), freight barges (AML, Samson), and AMHS, needed to support Juneau-as-we-know-it.
6. The continuing study of options for the Mendenhall Glacier Recreation Area and Visitor Center (MGVC), via USFS contracts and public input, especially for carrying capacity management and increase.

7. Funding: State of Alaska fiscal limitations; federal funding opportunities; revenues available from per-passenger cruise ship fees levied by the CBJ @ \$ 8.00 total per passenger, estimated at \$ 10.4 million in 2019, subject to the "Holland criterion".

8. CBJ's ongoing " Blueprint Downtown " project via CDD.

9. CBJ's obligations, via its several resolutions and ordinances, relevant to energy supply and to preventing dangerous "climate change" consequences: global warming, sea level rise, ocean acidification, species extinctions, and violent human conflicts over natural resources:

- Juneau Renewable Energy Strategy: CBJ Resolution 2808
- A Resolution Adopting Greenhouse Gas Reduction Goals: CBJ Resolution 2502:
- Juneau Climate Action & Implementation Plan, Nov 2011; A Resolution Adopting the Juneau Climate Action Plan: CBJ Resolution 2593:
- CBJ joins ICLEI (Local Governments for Sustainability), www.iclei.org, March 2007: CBJ Resolution 2397
- Comprehensive Plan
- 2008 Transit Development Plan

10. Juneau's potential to accommodate thousands of Internally Displaced Persons (IDP's) fleeing sea level rise within a few decades, enhancing our need for, and complete utilization of, a much higher-capacity public transit system, to serve higher-density urbanization. References:

- Video C, above
- www.carfree.com

Perhaps JEDC will include the above discussion contexts in its Feb 2019 Innovation Summit. Should JEDC invite John Binkley, and perhaps others from the cruise industry and major airlines, for a continuation of the "Visitor Products" panel from Innovation Summit 2018, in the above contexts ? Do the above contexts urge us to pay special attention to Juneau's carrying capacity (CC) and transportation modal mix and consequent infrastructure, especially as motivated by the first two ?

THREE CANDIDATE INVESTMENT CONCEPTS:

At the 17 Dec Assembly meeting I quickly proposed several candidate investments of per-passenger cruise ship fees that might meet the "Holland criterion" and address the "carrying capacity" discussions in A and B, above:

1. Electrify all downtown cruise ship docks so that any, perhaps all, ships can operate on hydropower from AEL&P or other utility sources while in port. This may enable a CBJ ordinance requiring cruise ships to do so, on an acceptable implementation schedule.

Capital expenditure (capex) estimate(s) may be available. Consistent with 9, above.

The necessary high-capacity substations could also be used to charge BEV buses and / or to produce hydrogen fuel for FCV buses and / or for FCV FGS rolling stock -- light rail, streetcar, or hybrid.

2. Replace all fossil-fueled buses, beginning with the largest and oldest fleets and vehicles, with buses energized by Juneau's diverse hydroelectricity supply, as Battery Electric Vehicles (BEV's) or as hydrogen-fueled, fuel cell hybrid electric vehicles (FCHEV's or simply FCV's).

This capex would be about 60 buses @ \$ 800,000 each = \$ 48 million, at today's prices for BEV and FCV buses. Capex for charging infrastructure, as electricity or hydrogen systems, would be additional and

significant.

3. Replace most cruise ship tourism buses with a hydroelectricity-powered fixed-guideway transit system (FGS) -- probably light rail or streetcar or a hybrid:

- Extending from the furthest cruise ship dock (AJ), connecting all downtown docks, to the Mendenhall Glacier Visitor Center and the airport (JNU), perhaps also to Auke Bay;
- Right-of-way (ROW) along the Old Glacier Highway rather than the Egan Drive median;
- Useful and available, at all times, for the public as well as those on ticketed tours, from cruise ships and elsewhere. Cars on every train for public use;
- Railcar branding available to preserve ship and passenger identity, if required;
- Shared ROW in streets, in many places; separated ROW where feasible and economical;
- Fueled by hydrogen made from hydroelectricity, so that overhead wires and their support poles are not needed:
 - <https://www.alstom.com/press-releases-news/2018/9/world-premiere-alstoms-hydrogen-trains-enter-passenger-service-lower>
 - <https://www.shell.com/energy-and-innovation/the-energy-future/future-transport/hydrogen.html>

Such an FGS would probably cost > \$ 200 million, but would provide so many valuable benefits that the benefit / cost ratios, for both capex and opex, might be very favorable and justify the investment.

A public-private funding collaboration of CBJ and the cruise ship companies, perhaps via CLIA Alaska, might carefully evaluate and accomplish this.

Juneau has never seriously considered an extensive fixed guideway transit system, either via CBJ or Alaska DOTPF. We have no credible research or analysis to guide us.

CONVERSATION TOPICS FOR COMMUNITY AND INDUSTRY: (Please excuse redundancy)

A. Do these three investment concepts above meet the "Holland criterion" ? Probably these three, and other candidate investments, must be considered *ad hoc* unless and until guidance is established by experts from government and industry, to prevent costly mistakes in applying the criterion.

The cruise ships' mission is to bring passengers to and from their several itinerary ports so that the passengers may disembark for shore excursions, shopping, and other forms of exploration and recreation. Are the ships "served" in this mission and purpose by providing efficient and pleasant ground transportation to attractions that are not generally available by walking ?

If apparently so, options 2 and 3, above, should soon be considered by a collaboration of CLIA Alaska, CBJ, and others, in the several contexts above, to begin the process of interpreting and applying the Holland Criterion.

Crafting an MOU on interpreting the Holland criterion should be a priority for this collaboration, which applies to all USA ports. Perhaps an ad hoc Alaska-specific MOU may be agreed sooner than a USA-wide one. Both the cruise industry and the ports need this certainty so that allowed expenses and investments may be imagined in correct contexts, designed, and built to " ... provide a service to a vessel".

Such MOU's could embrace mutually-beneficial investments beyond the port visitation and per-head fees included in the Holland criterion. Shoreside improvements in Juneau and Alaska should not be hostage to lengthy national debate on Holland criterion interpretation.

B. Would the three concepts above improve Juneau's carrying capacity, as explored in A and B, above ? What is the NPV of such improvement ? How best to "internalize" the benefits and costs of carrying capacity into the prices paid by passengers, the fees paid by the cruise ship companies, and the investment of those fees ?

C. How shall we determine Juneau's carrying capacity, especially for cruise ship tourism ? How shall we apply this limit; what are CBJ's powers for such limitation ? What should we learn from others, who have found and applied such a limit ? Shall we emulate Maui, which strategized to attract and emphasize higher-value, higher-priced tourism, accommodating fewer people, in order to prosper within their carrying capacity ?

If Juneau concludes that it is at, or approaching, or beyond visitor industry carrying capacity, what courses and procedures are available to CBJ to:

- Increase our visitor carrying capacity;
- Limit cruise ship and passenger access before unrestrained visitation damages Juneau's reputation as a destination and as a fine place to live ?

"Foundational, is the reputation of Juneau ... it's extremely high ... visitors love it ... that will drive the industry itineraries and where they put their ships. If Juneau wants to be the lead port in Alaska, and really one of the premier destinations in the world ... it must maintain that high level of experience."

"It's a difficult balance ... that you have to decide locally ... what kind of community do you want ... do you want that kind of an economy, that economic opportunity to come ... or is it too disruptive for some people ... It's a local question and ultimately one that you have control over. The industry respects that. "

--- John Binkley, President, Cruise Lines Int'l Association Alaska, video resource A, 22 Feb 18

D. Concept 2, above, would result in quieter high-volume visitor traffic, and zero CO2 emission, but would do little to ease the congestion problem at both ends of the visitor dumbbell: downtown cruise ship docks and MGVC.

This argues for the Concept 3 FGS and / or a limit on total average seasonal cruise ship passenger visitation. Juneau's carrying capacity depends, to significant extent, upon the nature and capacity of the ground transportation system handling the visitor sector's summer peak. Shall CBJ and the cruise industry collaborate on a comprehensive FGS feasibility study, including such a system's qualification under the Holland criterion ? By conventional thinking, Juneau is too small to justify a new FGS at capex probably > \$ 200 million. But the aggregate future benefits may justify the costs, to those who build it.

For example:

Assume Juneau's 2019 carrying capacity for cruise ship passengers is 1.0 million, which we will probably exceed in 2019 by about 0.3 million, with an unfortunate degradation in quality of experience for both visitors and residents. Rather than CBJ limitation of future cruise ship access to 1.0 million, if that carrying capacity could be increased to 1.5 million, the incremental annual aggregate gross margin for the cruise industry, assuming \$ 1,000 per passenger, would be \$ 500 million. This would justify large investments by the cruise ship industry in carrying capacity infrastructure, in several Alaska ports, both within and beyond the "Holland criterion".

E. Whose responsibility is the planning and investment explored above ? Have we precedents for significant investments by the cruise industry in shoreside infrastructure to increase a port's carrying capacity, to " ... provide a service to a vessel" ? Consider these examples of potential cruise industry investment:

1. The "AJ dock", aka "Princess dock", built in 2004: how was that financed ? Who owns it ?
2. Norwegian Cruise Line Holdings LTD partnership with Huna Totem Corp to build a new pier at Icy Strait Point, to be built in 2019 - 20.
3. Future infrastructure improvements to mitigate congestion at MGVC will probably need to be paid for by a public-private partnership; USDA - USFS funds will probably be inadequate or unavailable.
4. Juneau-based tour bus fleet and maintenance buildings.

These are costs of doing business for the cruise industry, and must be included in passenger ticket prices. If the cruise industry and other sectors of the visitor industry want to increase profitability via increased passenger arrivals in Juneau, they must help pay for the shoreside infrastructure needed to accommodate them well, by fees to "provide a service to a vessel" or via other arrangements.

"But it really, ultimately, is the community's responsibility ... because they are publicly-traded companies ... as much as they love Juneau, their responsibility is to their shareholders ... they will move those assets [ships] to where they get the best return on their investment. If there's a port that people aren't happy with ... they feel it's too crowded or they're overwhelmed by getting to and from places ... they won't come back, they'll simply find another itinerary to replace that."

"[The cruise ship companies] are not looking at it (carrying capacity) ... they're not saying, there's a lot of people coming into Juneau, what are we going to do to fix that problem ... "

"As the industry grows, it may be that if Juneau is not able to maintain that level of satisfaction, they'll find other communities or destinations to go to, around Alaska."

--- John Binkley, President, Cruise Lines Int'l Association Alaska, video resource A, 22 Feb 18

Juneau must learn from and avoid examples of communities which did not take responsibility for recognizing, managing, and limiting their visitor carrying capacity: they became notorious "tourist traps" and lost business, especially that of wealthier travelers.

F. Innovation: **"There's always opportunities to work with the cruise lines. They welcome innovation, they need innovation ... for the growth of the industry, new products, new ideas, new experiences, around the world. Be creative & persistent.... People are innovative, think about opportunities to move people more efficiently ... "**

--- John Binkley, President, Cruise Lines Int'l Association Alaska, video resource A, 19:50 min

G. CLIA Alaska suit against CBJ: **"We felt we need some bright lines ... over how the taxes that are collected on the ships that come into Juneau ... can be used and where they are used. [We] understand that there's infrastructure needs that the community has ... and you need to have a mechanism by which you can extract taxes from the visitors to be able to pay for those things. ... We hope to do it via the courts ... or we can do it by negotiation. "**

--- John Binkley, President, Cruise Lines Int'l Association Alaska, video resource A,

How may the Community of Juneau, and its CBJ, prudently and legally:

- Determine its carrying capacity for Summer visitation:, aggregate of cruise ships, airlines, AMHS
- Limit access to its ports and airport, if necessary, to operate within that carrying capacity
- Plan, design, build, and operate the infrastructure investments needed to achieve and perhaps increase its:
 - Carrying capacity
 - Quality of experience for visitors
 - Quality of life for its residents
 - Freedom from fossil fuel consumption

H. Current "Blueprint Downtown" study by CDD: How will potential major changes in transportation infrastructure, such as a new FGS (Concept 3, above) affect this planning, which must also be community planning? Should alternative scenarios be developed to help guide deliberations about carrying capacity:

- How to "... provide a service to a vessel" ?
- Whether Juneau wants to greatly increase its population by becoming a "refuge for IDP's" ?
- Setting aside the "Downtown" limitation to require community-wide planning, to embrace the many facets discussed in this memo, including a FGS serving most people and destinations.

I. Does Juneau want to greatly increase its population by becoming a refuge for thousands of internally displaced persons (IDP's) fleeing sea level rise, beginning in a few decades? (Video resource C, above) How do we plan for this, integrated with our obligations for managing visitor carrying capacity and for climate change mitigation? A FGS would facilitate the higher-density urbanization required, perhaps more elegantly and economically than a bus system could.

J. Cost to build new cruise ships: The companies should probably change their business model to allocate capital to shoreside improvements that are less costly than the ships but essential to long-term industry success, growth, and profitability: high benefit / capex ratio. This would be especially helpful for ground transportation within Juneau, where costly capex for replacement of fossil-fueled buses or a hydropowered FGS would have highest long-term NPV.

K. Replace extant fleets of well-worn, fossil-fueled, "tour buses" of several types with zero emission vehicle (ZEV) buses, BEV and / or hydrogen-fueled FCV, now about \$ 700 - 800,000 each, capex. By 2025, with modest cruise ship annual total passenger growth, probably 80 - 100 buses will be needed: total capex \$ 70 - 80 million, which would be a large fraction of the capex for an FGS, as discussed above.

Replacing all old diesel buses with hydroelectric-powered BEV's or FCV's will improve noise, air quality, and CO2 emission aspects of Juneau's primary ground transportation mode, but will not mitigate the congestion problems at the downtown docks and MGVC. This argues for serious consideration, with consultant help, of a FGS useful to all visitors and Juneau residents, year-round.

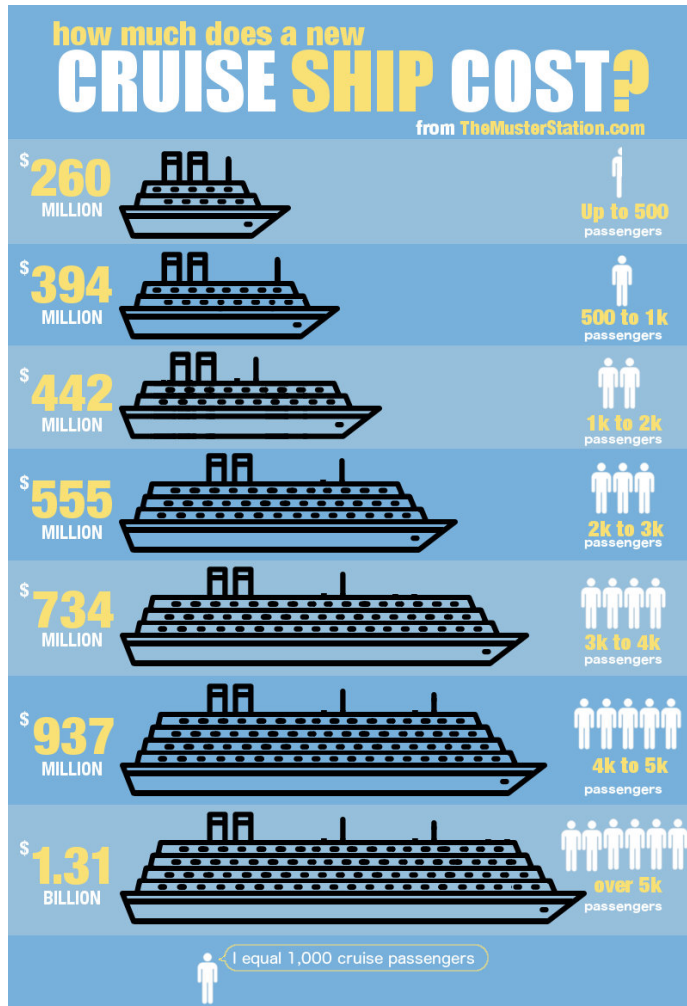


Figure 1. If the cruise ship industry can invest hundreds of millions per ship, it should gladly invest \$ 100 million or more in shoreside infrastructure -- primarily for ground transportation systems -- by which to establish and perhaps increase Juneau's "carrying capacity" for total Summer and daily peak passengers.

If Juneau's 2019 carrying capacity is 1.0 million ship passengers, which we will apparently exceed, increasing that to 1.5 million via shoreside infrastructure improvements is worth about \$ 500 million per year in incremental aggregate industry gross margin, at \$ 1,000 per passenger.

Sources: <https://themusterstation.com/cruise-ship-cost-to-build/>
<https://www.ozcruising.com.au/blog/how-much-does-a-cruise-ship-cost-to-build>

- \$ US 1.4 billion Oasis of the Seas
- \$ US 1.4 billion Allure of the Seas
- \$ US 560 million Carnival Splendour
- \$ US 250 million Carnival Fantasy class
- \$ US 150 million Royal Caribbean Monarch
- \$ US 150 million Royal Caribbean Majesty

L. Most important is our individual and collective responsibility to prevent the several dangers we include in "climate change". Consider Thwaites Glacier movement or collapse, Antarctica; Greenland melt: two aspects of the emergency caused by humanity's unrestrained burning of fossil fuels. Global sea level rise is caused by:

- Expansion of seawater with temperature increase, as in old mercury and red alcohol thermometers
- Melting of land-based glaciers, increasing water volume of the global ocean
- Bergs from land-based glaciers sliding into the sea, as adding ice cubes to your glass

<https://www.pri.org/stories/2018-05-01/just-how-unstable-massive-thwaites-glacier-scientists-are-about-find-out>
<https://www.rollingstone.com/interactive/feature-greenland-melting/>

<https://insideclimatenews.org/news/05122018/greenland-ice-sheet-melting-tipping-points-sea-level-rise-climate-change-arctic-warming>

M. How to reckon the benefit / cost ratios, and ROI and NPV merits, of ground transportation infrastructure improvements: capex = capital expense; opex = operating expense, Summer season

[See Excel file for an updated and improved analysis and template for further improvement]

Scenario A: Replace all fossil-fueled buses, over several years, with hydropowered buses, i.e. battery-electric vehicles (BEV's) or hydrogen-fueled fuel cell vehicles (FCV's) (\$ million, estimates)

| | | |
|-----------|--|--------------|
| Capex: | 60 buses @ \$ 800,000 per bus | \$ 48 |
| | Charging and / or hydrogen fueling infrastructure | \$ 14 |
| | Total capex | \$ 62 |
| | Capital recovery @ 12% annual | \$ 8 |
| Opex: | Energy | \$ 10 |
| | Drivers and other personnel | \$ 15 |
| | Maintenance, insurance, other | \$ 3 |
| | Total annual opex | \$ 28 |
| | Total annual opex + capital recovery | \$ 36 |
| Benefits: | Avoid future carbon pricing (tax) @ \$ 200 / MT CO ₂ , annual | \$ 5 |
| | Net annual costs - benefits, to cruise ships | \$ 31 |

Will these expensive buses be deployed elsewhere, outside Juneau's Summer visitor season ?

Scenario B: Replace all fossil-fueled buses, over several years, with a hydropowered FGS plus a few BEV or FCV buses (\$ million, estimates)

| | | |
|-----------|---|---------------|
| Capex: | Track and controls | \$ 120 |
| | Rolling stock (train cars) | \$ 120 |
| | Hydrogen fuel production and fueling system | \$ 20 |
| | Maintenance building | \$ 15 |
| | Total capex | \$ 275 |
| | Capital recovery @ 12% annual | \$ 33 |
| Opex: | Energy | \$ 12 |
| | Operators and other personnel | \$ 12 |
| | Maintenance, insurance, other | \$ 6 |
| | Total annual opex | \$ 28 |
| | Total annual opex + capital recovery | \$ 61 |
| Benefits: | Increases annual cruise ship carrying capacity to 1.5 million | \$ 500 |
| | Year-round public use by residents and all visitors: | |
| | Eliminate 8,000 private vehicles @ \$ 8,000 year | \$ 64 |
| | Avoid future carbon pricing @ \$ 200 / MT | \$ 14 |
| | Total annual benefits | \$ 578 |
| | Net annual benefits - costs, to cruise ships and others | \$ 517 |

How extensive is the FGS system track ? Does it include all downtown docks, JNU, MGVC, Old Glacier Highway, Loop Rd ?

The above is only an analytical framework; benefit and cost estimates are gross, unsupported.

SUMMARY: This memo explores an extraordinary and complex convergence of opportunities and threats; let's make the most of it, for the benefit of Juneau, our visitors, and Earth:

- Resolution of the CLIA Alaska lawsuit; the "Holland criterion";
- Prospects for increasing CC for annual total number of cruise ship passengers;
- Prospects for agreement with the cruise industry on paying for necessary shoreside investments
- Responsibility of the Community of Juneau, its organizations and citizens, for diverse and extreme modifications to our commerce and behavior for mitigation of, and adaptation to, the emergency of unrestrained CO2 emission from burning fossil fuels;
- Opportunities to significantly revise Juneau's transportation system for increased capacity, and savings in public and private costs, land, and energy;
- Opportunity to prepare Juneau as a refuge for those fleeing sea level rise in a few decades.

Thank you for your consideration. Please FWD as you wish, to those in your Rolodex that I may have missed. I have attached this file as an MSWord file for your convenience in markup or extracting and repurposing any parts of it; launch your own analysis and memo.



Figure 2. "Eco-star" helicopter by Eurocopter Model EC130 T2

https://en.wikipedia.org/wiki/Eurocopter_EC130

About \$ 3 million each

"Quiet Technology"

Standard seating = pilot + 6 pax , one more pax than A-star copters currently used in Juneau:

Standard in Hawaii, Grand Canyon

