Brenwynne Grigg

From:	Bill Leighty [redacted]
Sent:	Thursday, April 30, 2020 2:03 PM
To:	Economic Stabilization
Cc:	Mila Cosgrove; Brenwynne Grigg
Subject:	Suggestions, as requested on "Juneau Afternoon" 29th
Attachments:	AssemblyLetter-HollandCriterion-23Apr19.pdf; CarryingCapacity-Juneau-FGS-EconAnal-25Apr19.xlsx

https://beta.juneau.org/assembly/economic-stabilization

Economic Stabilization Task Force Members, 30 April 20 PM

Thank you for serving. I heard Ken and Max on the 29 April "Juneau Afternoon" asking for public input for consideration at your 30 April meeting. Please see my several suggestions, below, proceeding from my co-authored and personally-authored 10-minute "Innovation Shorts" presentations at JEDC's annual Innovation Summit in 2018, 2019, and 2020. Videos and titles:

- 2018 https://vimeo.com/287808196 " Elevator Juneau: Escaping Sea Level Rise "
- 2019 https://vimeo.com/318869809 " Should Juneau Accommodate 1.5 million Cruise Ship Visitors per Year ? "
- 2020 https://vimeo.com/373679728 " Cruise Ships and Climate Change: Juneau's Bargain for New Hydroelectricity-powered Shoreside Infrastructure to Benefit Everyone "

The above are related to my 14 Nov 19 panel presentation at the American Society of Mechanical Engineering annual International Mechanical Engineering Congress and Exposition: https://vimeo.com/373679728 " Designing “CarFree” Cities to Welcome Millions Fleeing Rapid Sea Level Rise, Within a Few Decades "

They are also related to my April 2019 memo to the CBJ Assembly, attached, based on my 2018 JEDC Innovation Summit Q&A with John Binkley. The attached Excel file is related to the memo.

We should all consider the sudden COVID disaster as a harbinger of, and rehearsal for accommodating, the more slowly advancing, but probably more destructive, consequences of increasing concentrations of the several anthropogenic greenhouse gases (GHG's) in Earth's atmosphere, which -- if unchecked, unmitigated -- will inflict upon Earth's living and other natural systems the increasing dangers we rhetorically aggregate as "the climate change crisis":

- Global Climate Change, generally warming and changing precipitation

- Loss of life, property, and agricultural productivity from an increasing number and severity of major weather-driven events
- Rapid sea level rise
- Ocean acidification
- Species extinctions
- Violent human conflict

These anthropogenic GHG's are carbon dioxide (CO2), methane (CH4), and nitrous oxide (NO), primarily from production and use of fossil fuels.

Therefore, in contemplating Juneau's "stabilized", and perhaps "sustainable", economic and social future, we should evaluate our options in the context of our responsibility and opportunity to accelerate the near-total decarbonization and de-GHG-emission of the entire human enterprise, beyond the electricity and energy and transportation sectors, to embrace all human activity.

1. Cruise ship visitors: We should now be helping the cruise ship industry design a new business model, based on heavy investment in GHG-emission-free transportation: both the cruise ships and all shoreside infrastructure.

This is related to my April 2019 memo to the CBJ Assembly, attached, based on my 2018 JEDC Innovation Summit Q&A with John Binkley, captured in the JEDC video of the Summit.
The cruise ship industry's present flawed model brings ever-increasing numbers of passengers (pax) on low-priced tours, depositing them upon host communities. Juneau and other SE AK communities should assert our monopolist status -- there's only one Juneau, one Hoonah, one Tongass -- requiring the industry to invest heavily in renewable-energy-driven ships and shoreside equipment, preventing "global climate change" and improving the visitation experience, for visitors and residents. This will significantly increase the industry's costs, which they must include in higher per-pax cruise prices, reducing pax volume. This is what SE AK communities probably want:

- Fewer pax per day and per year, with more money to spend on higher-quality shoreside experiences;
- A new CO2-emission-free shoreside transportation infrastructure based on battery-electric or hydrogen-fueled fuel cell electric buses or fixed-guideway (rail) systems. A Juneau rail system would probably use hydrogen-fueled fuel cell electric drive rolling stock, similar to the Alstom "Coradia Ilint" operating in Europe, to avoid the costly and unattractive overhead-catenary-wire system: https://www.alstom.com/our-solutions/rolling-stock/coradia-ilint-worlds-1st-hydrogen-powered-train https://www.alstom.com/press-releases-news/2020/3/alstoms-hydrogen-train-coradia-ilint-completes-successful-tests

This new shoreside transport system must be available for all visitors and resident to use, at appropriate fares and fees, year-round. It will enable (2) and (3), below. It will help the MGVC / MGRA planning and implementation.

The industry is now badly damaged. Now is the time for Juneau, and others, to convince it to recover in a new, more benign, higher-quality business model of greater benefit to the host communities, and to Earth.
Help the industry recover stronger, rather than trying to revert to the old, doomed business model. See attached DRAFT Excel model.

2. Other visitors: Airline and marine visitors and Juneau residents will enjoy, and help pay for, the same new transport system in (1), year-round. These visitors generally stay longer and spend more.
If Juneau residents could avoid owning and operating half of the ~ 25,000 light duty vehicles (cars, pickups, SUV's) now in use, at an average total cost of ~ $ 8,000 per vehicle per year, that would be ~ $100 million per year in personal after-tax income saved. Suppose a third of that would be dedicated to paying for the new transport system.

3. Refuge Juneau. See the 2018 Innovation Summit "short" video, above. The new ground transport infrastructure in (1) and (2) will allow Juneau to triple its population within a benign and smaller per capita footprint on Earth.
We cannot offer many of these migrants work or careers; they must bring their own wealth and work as their contribution to a place on the SE AK "elevator".

4. Harvesting and monetizing SE AK's stranded renewable energy resources for transportable fuels, including cruise ship fuel. Motivated by JEDC's Renewable Energy Cluster Industry Working Group, of which I am co-chair, with Alec Mesdag. Many stranded hydro and other renewable energy resources in SE AK could produce CO2-emission-free, carbon-free transportable fuels: hydrogen and / or anhydrous ammonia.

ABB, HDF, and Ballard Power Systems are collaborating on such systems for large cargo ships, perhaps for retrofits. Cruise ships could probably be similarly modified.

https://www.electrive.com/2020/04/09/abb-hdf-team-up-on-fuel-cell-sysems-for-ships/

https://newatlas.com/marine/hydrogen-ships-fuel-cell-marine-abb/

https://new.abb.com/news/detail/5360/abb-and-ballard-power-systems-to-jointly-develop-zero-emission-fuel-cell-power-plant-for-shipping-industry

5. Pioneer thin shell concrete "dome" structures for shelter, storage, clinics and classrooms, and housing. See our proof-of-concept scale model project from 2009: https://alaskaappliedsciences.com/thin-shell-concrete-structures/ We have not found a market for this construction system, so have not invested in CAD, tooling, and manufacturing of sets of concrete forms by which builders could construct these in remote locations.
Don Kubley has developed a fine Juneau-based dome structure company, Intershelter. Their approach is quite different.

Juneau could pioneer advancement and commercialization of the thin-shell concrete system, but at

the small scale for which we have the tooling in place. At this scale, the structures are "shelter", not "housing".
We might build a few of them as shelters for the unfortunate people among us, locating them at the "homeless camp", or camps, wherever they might be. That might provide the experience and visibility by which to propel this concept to commercialization, within AK and beyond.

6. Small concrete domes, built at sea level, indoors or out, could be helicoptered to deploy an all-season back country shelter system, for visitors and Juneau folks. The outdoors athletes and hikers among us have advocated this for many years. It might emulate the Swiss Alpine Hut system.

7. USA may need a new "Works Progress Administration, "WPA", as in the 1930's, to recover from our present Depression. Perhaps some of the above could be included. Juneau could lead, innovate, and propagate to benefit all Earth, long-term. Our Congressional delegation could help.

I believe the above concepts are consistent with the interests and good work of the CBJ Commission on Sustainability, Renewable Juneau, 350 Juneau, Interfaith Power and Light, SEACC, Southeast Alaska Land trust, and others.

I have participated in many planning processes in my 48 years as a Juneau resident and small business owner.

The future cost of capital is likely to increase, the consequence of our emergency cash generation.

Thank you for your consideration. Best wishes in your important work.

Bill Leighty
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Bill Leighty [redacted]

MEMORANDUM 28 Dec 18 Revised: **23 Apr 19**
From: Bill Leighty [redacted]
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=PLAlO15Tss01PBnflkNbYVPORf34v7Ur1U&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

Bill Leighty [redacted]

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=DlM9Lvoikyo

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:

Bill Leighty [redacted]

- 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, surplusing 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.

Bill Leighty [redacted]

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 hydroelecticity 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 it 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 it 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.

Bill Leighty [redacted]

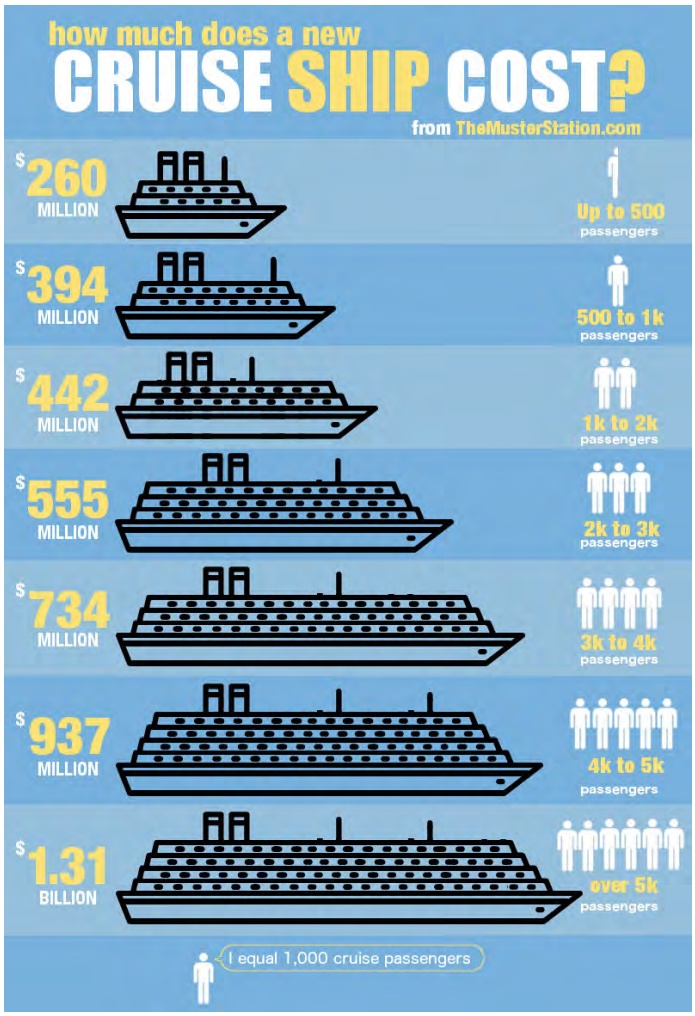


Figure 1. If the cruise ship industry can invest hundreds of millions per ship, it should gladly invest $ 100 million or more in shoreside infrastructure -- primarily for ground transportation systems -- by which to establish and perhaps increase Juneau's "carrying capacity" for total Summer and daily 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 CO2, 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.

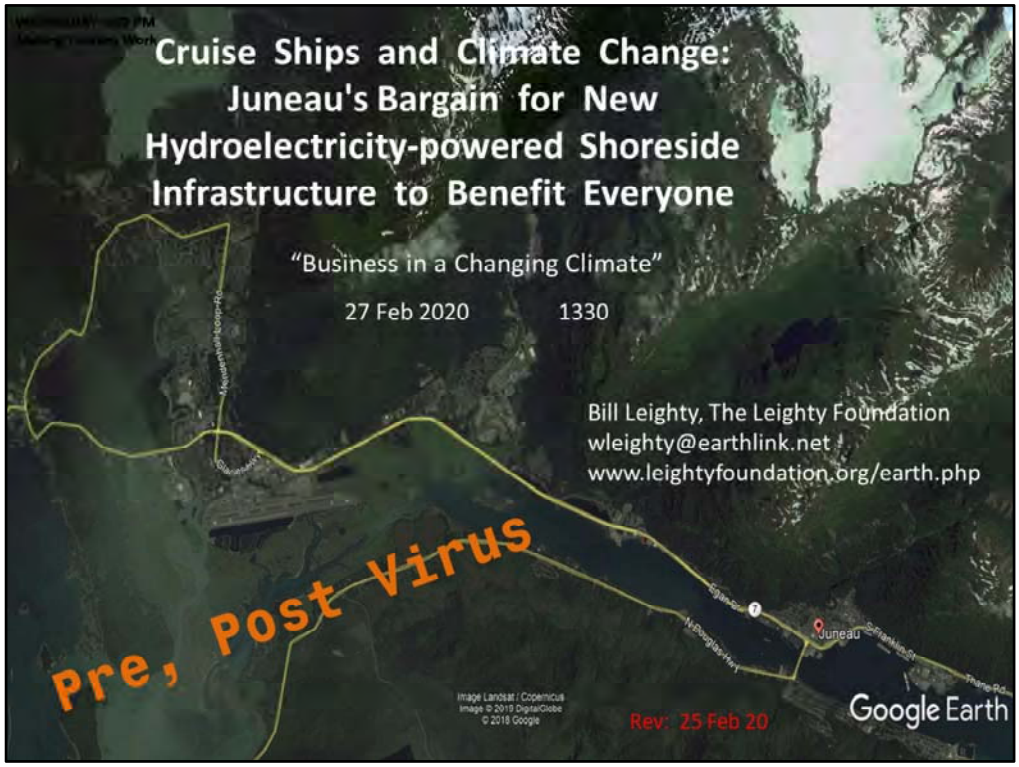
Figure 2. "Eco-star" helicopter by Eurocopter Model EC130 T2
https://en.wikipedia.org/wiki/Eurocopter_EC130
Standard in Hawaii, Grand Canyon
About $ 3 million each
"Quiet Technology"
Standard seating = pilot + 6 pax , one more pax than A-star copters currently used in Juneau: fewer flights are needed; perhaps less fuel / pax.

Memo by: Bill Leighty [redacted]

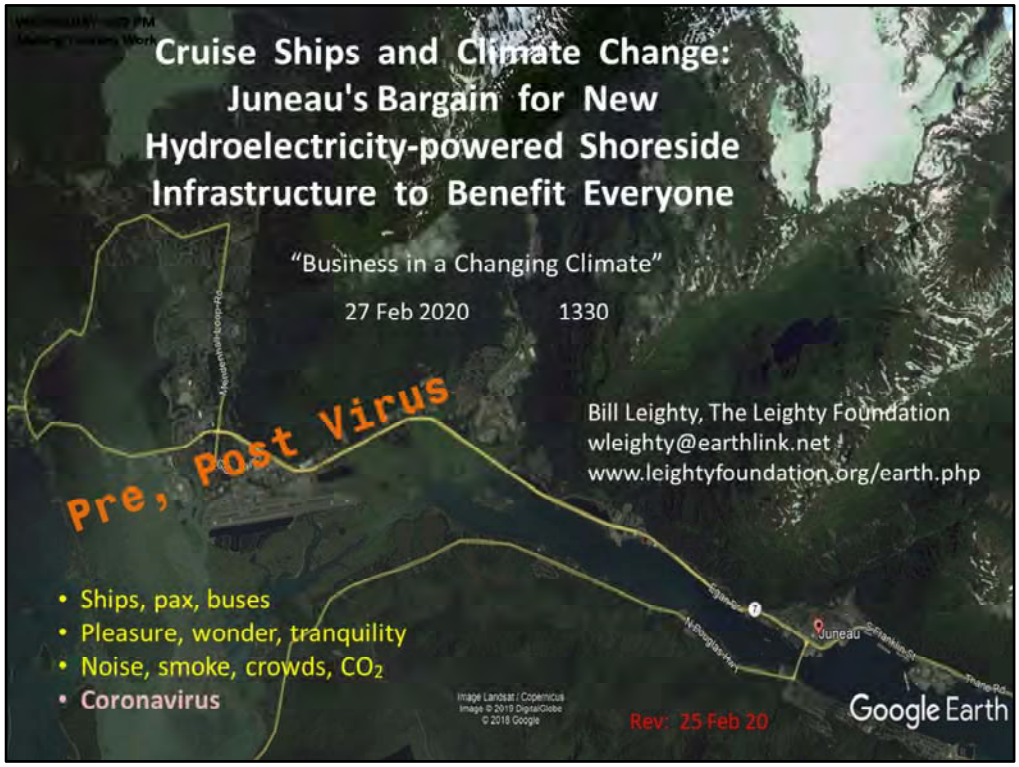
"Business In a Changing Climate", 27 Feb, 1330

47 individual cruise ships visiting in 2020

25 are large	(> 2,000 pax each)	@ $ 500 M capex each =	$ 12.5 B
22 are smaller (<)		@ $ 10 M capex each =	$ 2.5 B
Total ships capital deployed in Juneau, by cruise ship industry, in 2020			$ 15.0 B



"Business In a Changing Climate", 27 Feb, 1330



"Business In a Changing Climate", 27 Feb, 1330

Multi – WIN Innovation Challenge

Invest in hydropowered shoreside infrastructure

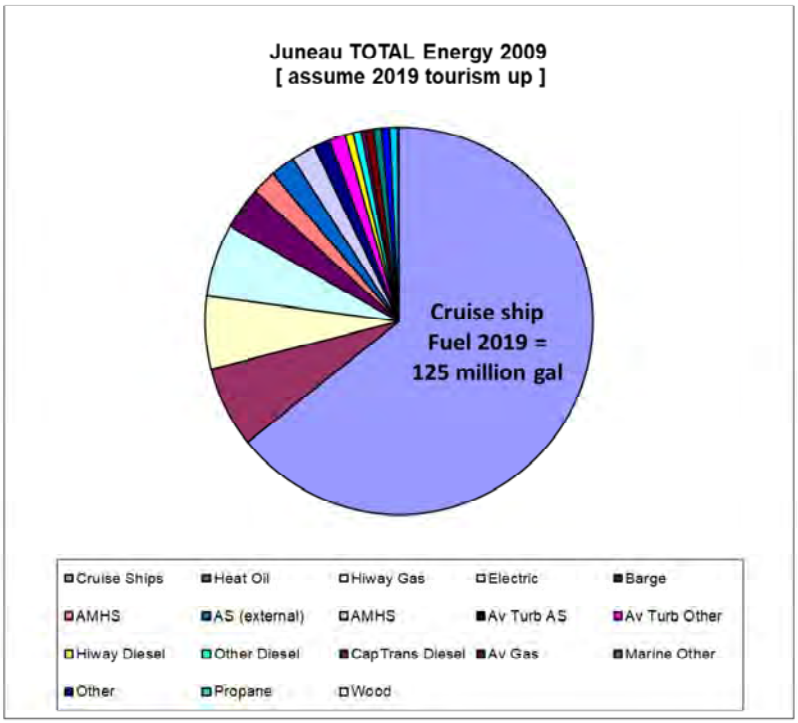
- Visitors – ALL
- Residents
- Visitor industry:
  - Cruise ship companies
  - Airlines
  - AMHS
  - Shoreside companies
  - CBJ; Community
- Earth: Species, systems

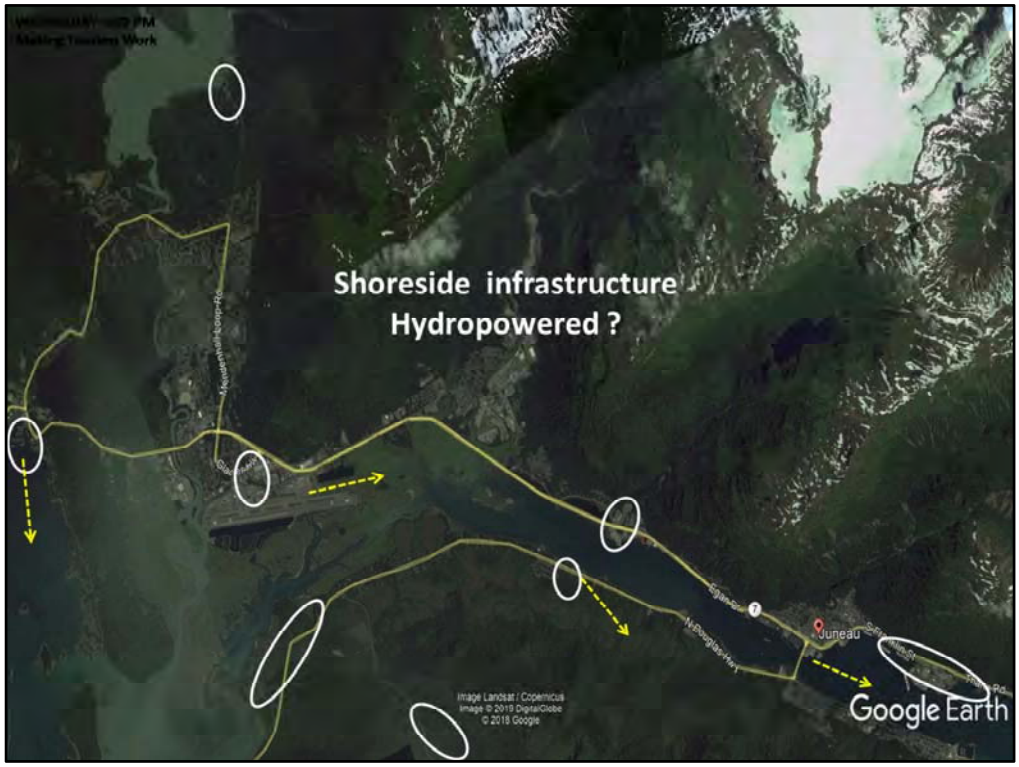
Innovation
Not litigation

Prepare Juneau for Sea Level Rise -- Refuge City

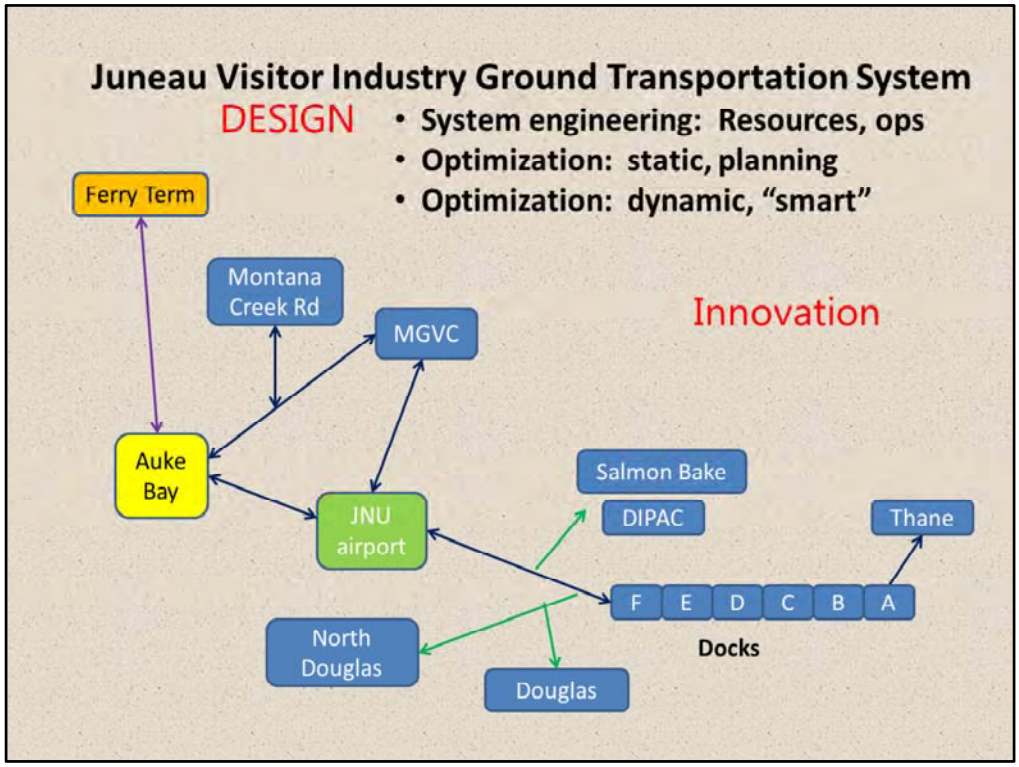
2018: " Elevator Juneau ..." https://vimeo.com/287808196

2019: " Accommodate 1.5 million ? " https://vimeo.com/373679728


Juneau TOTAL Energy 2009
[assume 2019 tourism up]
Cruise ship
Fuel 2019 =
125 million gal
Cruise Ships
Heat Oil
Hiway Gas
Electric
Barge
AMHS
AS (external)
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
CapTrans Diesel
Av Gas
Marine Other
Other
Propane
Wood



"Business In a Changing Climate", 27 Feb, 1330


Juneau Visitor Industry Ground Transportation System
DESIGN
• System engineering: Resources, ops
• Optimization: static, planning
• Optimization: dynamic, "smart"
Innovation
Ferry Term
Montana Creek Rd
MGVC
Auke Bay
JNU airport
Salmon Bake
DIPAC
Thane
F
E
D
C
B
A
Docks
North Douglas
Douglas

Assembly: " Visitor Industry Task Force "

Manage: Bargain → Distributed Creativity

Five Nuisances, to:

- Residents
- Visitors: cruise ship, airline
- Earth: Other creatures; systems

1. Buses: noise, smoke, congestion, isolation
2. Aviation: Helicopter, fixed-wing noise, visual
3. Marine: noise, traffic, smell, isolation
4. Trails, beaches
5. CO_2 emission:
   - GCC danger
   - CBJ "Climate Action Plan"

Cruise ship business success

- Raise large capital
- Safe
- Customer satisfaction
- Profitable
  - Marine
  - Shoreside: excursions, shopping
- Offload external costs at ports
- Minimize costs
  - Fuel
  - Labor
  - Ports: fees, other

Diamond Princess

- 2,670 passengers
- 1,100 crew
- 3,770 total

Launched	2004
Cost	$ 500 million
Builder	Mitsubishi, Japan
Cost / pax	~ $ 200,000

Cruise Ship Capital Cost

Royal Caribbean Cruises

- Symphony of the Seas (2018)
- Harmony Of The Seas
- Wonder Of The Seas (2021)

Cost	**$ 1.35 billion**
Passengers	**5,518 – 6,370**
Crew	**2,394**
Cost / pax	**~ $ 200,000**

Symphony of the Seas is the second of four identical Oasis-class cruise ships (currently world's largest passenger liners), together with its sisterships Harmony OTS (2016), Wonder OTS (2021) and TBN OTS (2023). The Royal Caribbean Symphony ship exceeds in size the original Oasis-class vessels Oasis OTS and Allure OTS and has building cost of USD 1,35 billion (2016 shiporder rates).

https://www.cruisemapper.com/ships/Symphony-Of-The-Seas-1730

Symphony of the Seas is the second of four identical Oasis-class cruise ships (currently world's largest passenger liners), together with its sisterships Harmony OTS (2016), Wonder OTS (2021) and TBN OTS (2023). The Royal Caribbean Symphony ship exceeds in size the original Oasis-class vessels Oasis OTS and Allure OTS and has building cost of USD 1,35 billion (2016 shiporder rates).

https://www.cruisemapper.com/ships/Symphony-Of-The-Seas-1730

Cruise ship business model flawed

Innovation

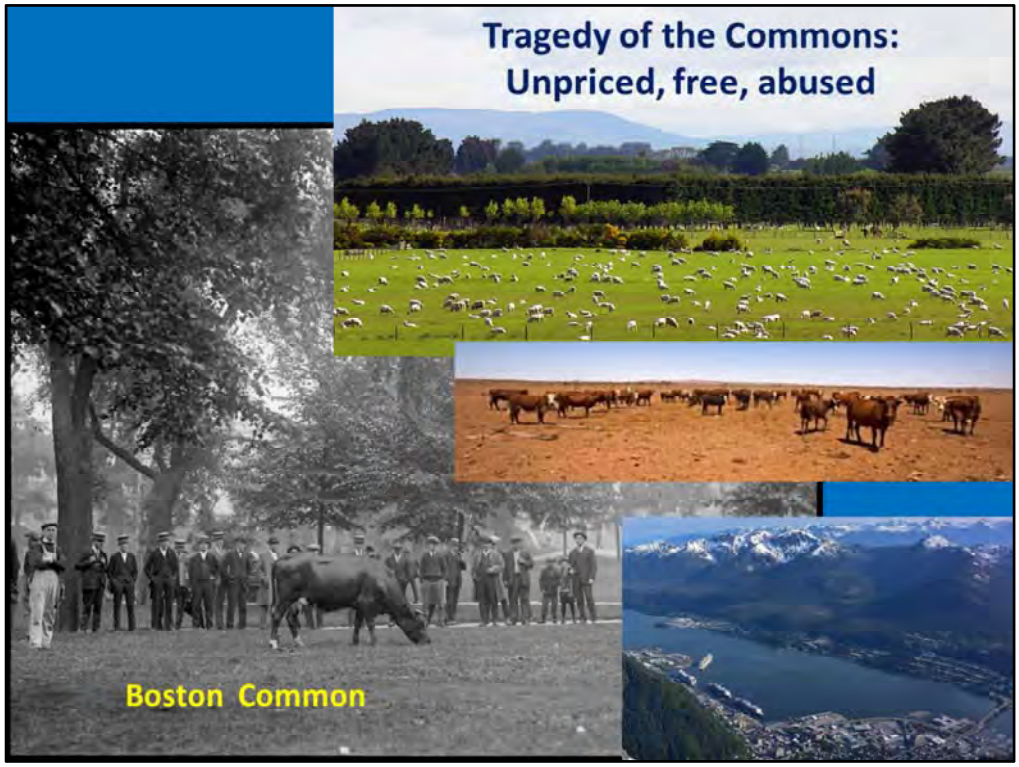
- Growth to equilibrium of dissatisfaction; unconstrained
- Tragedy of the Commons
- Inflict external costs on ports
- Energy intensive; No carbon pricing
- Incongruous invaders
  - Visitors isolated – bubbles
  - Residents suffer
- **Underinvest in shoreside infrastructure**

Innovation Challenge
Juneau, SE AK, world

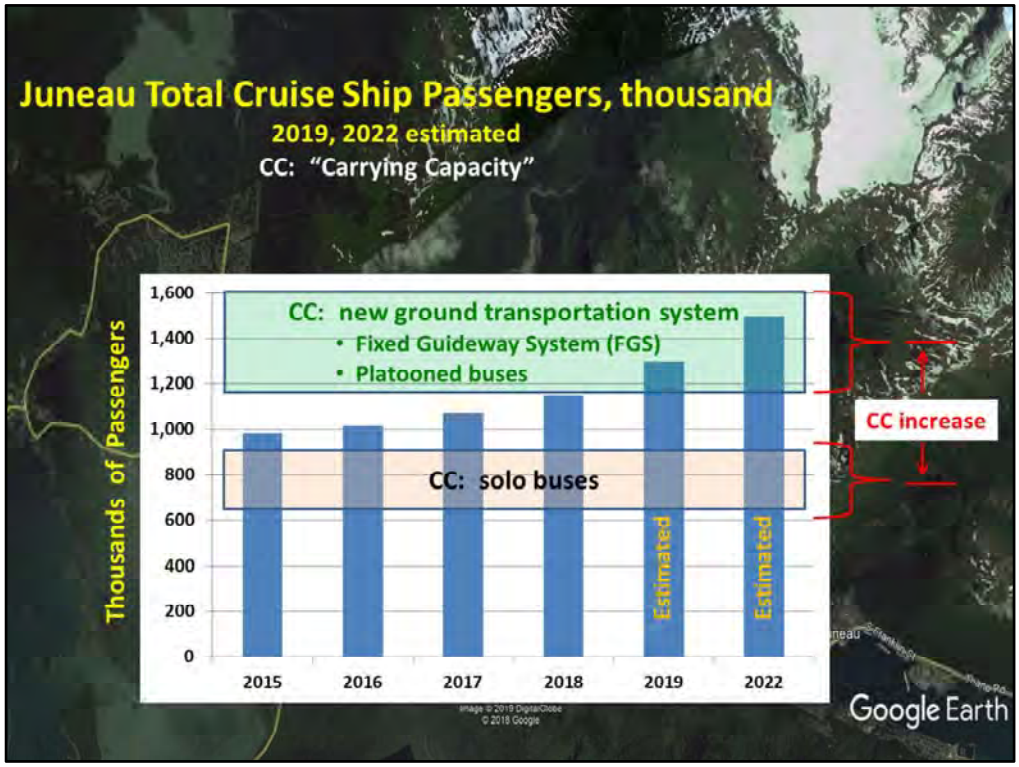
Multi-WIN Bargain via "Participatory Creativity"

collaboration
Not litigation

1. Limit cruise ship pax / year
2. Increase Carrying Capacity (CC)
3. Minimize nuisances, dangers
4. Climate Change obligations
5. Shoreside off-season
   "stranded assets"


Tragedy of the Commons:
Unpriced, free, abused
Boston Common

Thank you. We all want an energy system for Earth which is equitable, accessible, and affordable for all humans. And it must be sustainable, with net-zero carbon dioxide (CO2) emissions to prevent further global warming. The only income our spaceship Earth has is radiant energy from the sun – which we call “renewable” – and some matter from meteorites and comet dust.


Juneau Total Cruise Ship Passengers, thousand
2019, 2022 estimated
CC: "Carrying Capacity"
Thousands of Passengers
1,600
1,400
1,200
1,000
800
600
400
200
0
CC: new ground transportation system
• Fixed Guideway System (FGS)
• Platooned buses
CC: solo buses
CC increase
Estimated
Estimated
2015
2016
2017
2018
2019
2022
Google Earth

A


Innovation
Opportunity: Public Private Partnership
• Aside from "Judge Holland criterion"
• Increasing CC is win for all ?
• Already beyond CC ?
• CBJ declares so ? Limits cruise ship pax 2022
• People of Juneau, CLIA Alaska, CBJ, USFS agree:
• CC increase plan
• Capex investment plan
• New ground transport system
• "Quiet Technology" copters
• Boats
• Execute
• Increase cruise ship profitability: pax optimum ?
Juneau
Google Earth

A

Assembly "Visitor Industry Task Force"
How to manage ?

Major economic segment

- **Juneau monopoly: act like it; bargaining power**
- **Limit supply: price & profit up, volume down**
- **Marginal cost = marginal revenue**

Five Nuisances, to:

- Residents
- Visitors: cruise ship, airline, other
- Earth: Other creatures; systems

1. Buses: noise, smoke, congestion, isolation
2. Aviation: Helicopter, fixed-wing noise, visual
3. Marine: noise, traffic, smell, isolation
4. Trails, beaches: crowding, damage
5. CO_2 emission: GCC danger, CBJ "Climate Action Plan"

Innovation Challenge:
Hydropowered Shoreside Infrastructure

- Bus
  - Coach: 50 – 60 pax
  - Minibus: 15 – 30
  - Vans, taxis: 6 – 15
- Fixed guideway
  - Light rail
  - Streetcar rail
  - Hybrid rail
  - Bus – on – track
- Marine
  - Whalewatch
  - Other
- Aviation
  - Airlines
  - Helicopter
  - Fixed wing: Floatplane, others
  - Mil: USCG, other
  - Other

- **Displace fossil fuels**
- **Meet CBJ Climate Action Plan**
- **Quiet**
- **Serve all visitors & locals**
- **All seasons, all year**

Multi – WIN Innovation Challenge

Invest in hydropowered shoreside infrastructure

Capex need:

• "Quiet Technology" helicopters	@ $ 3.1 M each	25	$ 75 M
Less trade-in	@ $ 1.1 M each		$ (28 M)
• Coaches, BEV or FCV	@ $ 800,000 each	80	$ 64 M
• Minibus, van	@ $ 100,000 each	80	$ 8 M
• Whalewatch, other boats	@ $ 800,000 each	30	$ 24 M
Total			**$ 143 M**

Total ships capital deployed in SE AK **$ 12.3 Billion** **1 %**

- Increase Carrying Capacity (CC)
- Reduce Nuisance Impacts
- Increase profitability at lower volume
- Limit annual total cruise ship pax
- Cruise ship industry capitalizes
- Hydropowered shoreside infrastructure
- **Head tax = $ 100: annual revenue = $ 140 million**

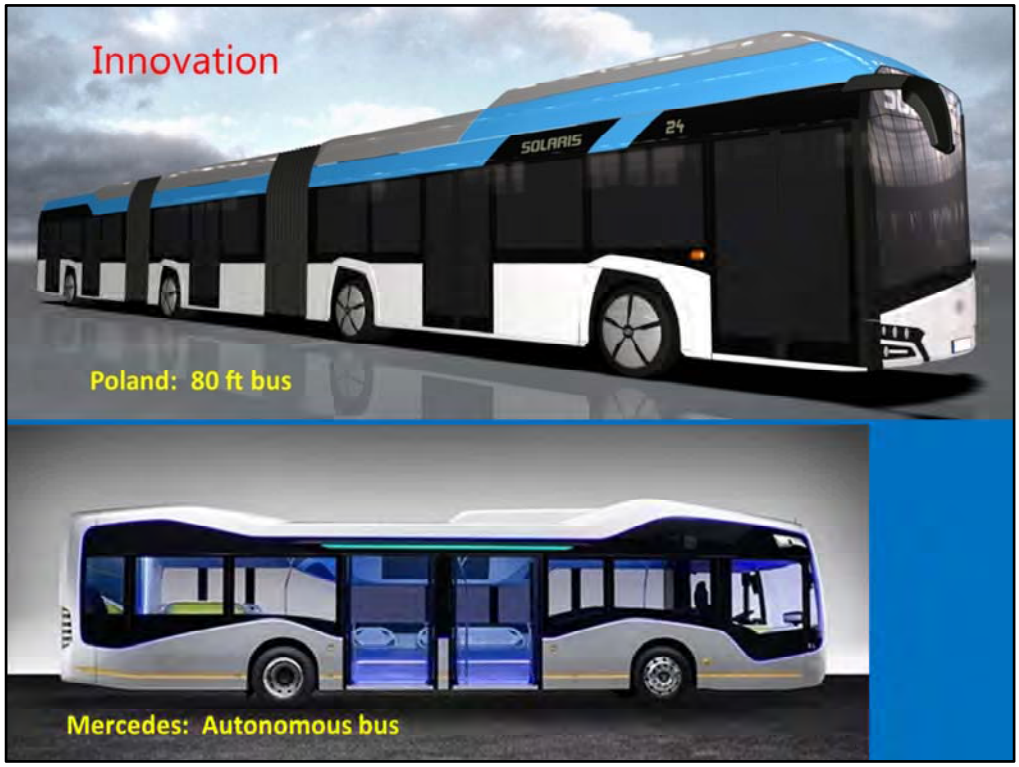
Innovation
Not litigation

Innovation

"Quiet Technology"
Increase CC by reducing nuisance:
Replace all copters

Airbus EC130 "Eco-Star"
~ $ 3 million

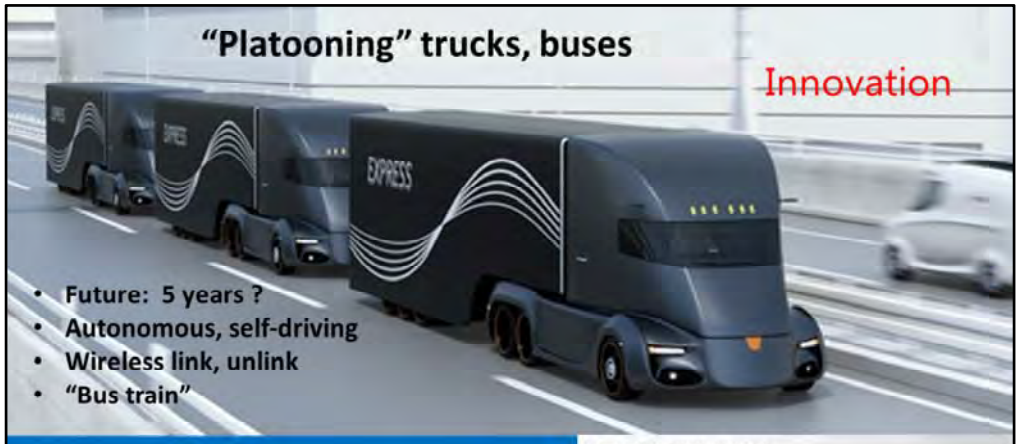
Juneau: 20 @ $ 3m = $ 60m


Innovation
SOLARIS
24
Poland: 80 ft bus
Mercedes: Autonomous bus

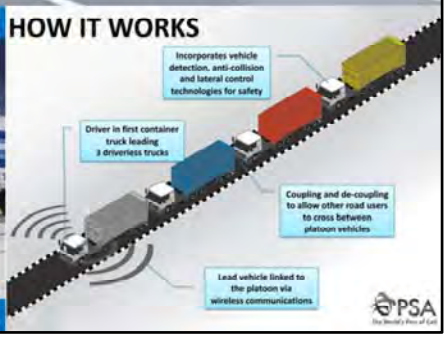
China autonomous bus-train
https://phys.org/news/2018-09-trackless-trams-ready-rail.html
https://www.citylab.com/transportation/2017/11/can-we-just-call-this-a-bus/545189/
https://www.youtube.com/watch?v=5gHfZkKe6Jo
Read more at: https://phys.org/news/2018-09-trackless-trams-ready-rail.html#jCp

"Platooning" trucks, buses

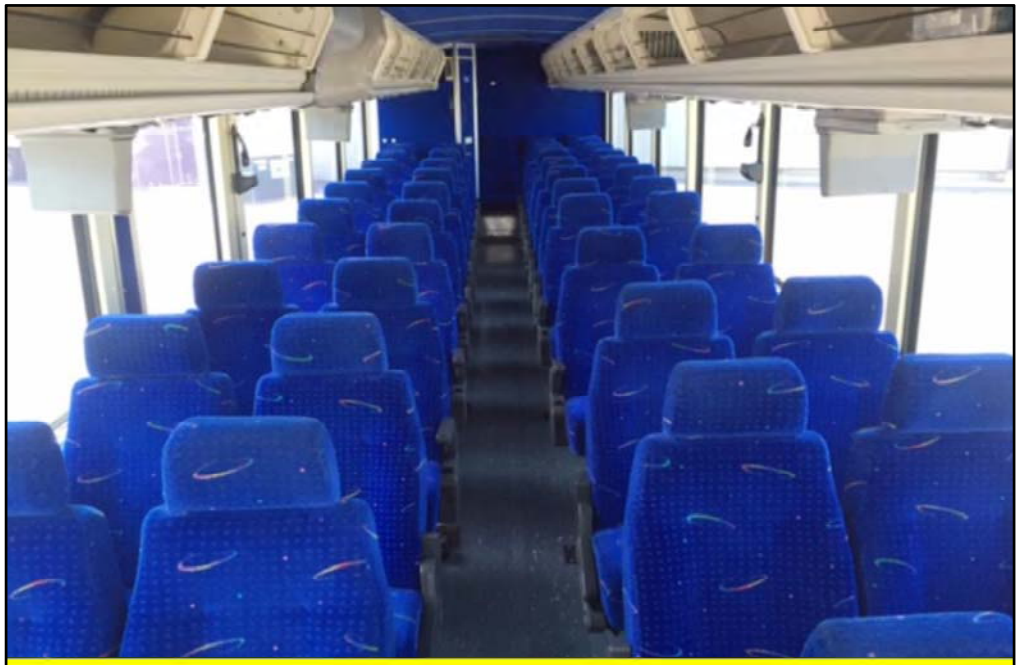
Innovation



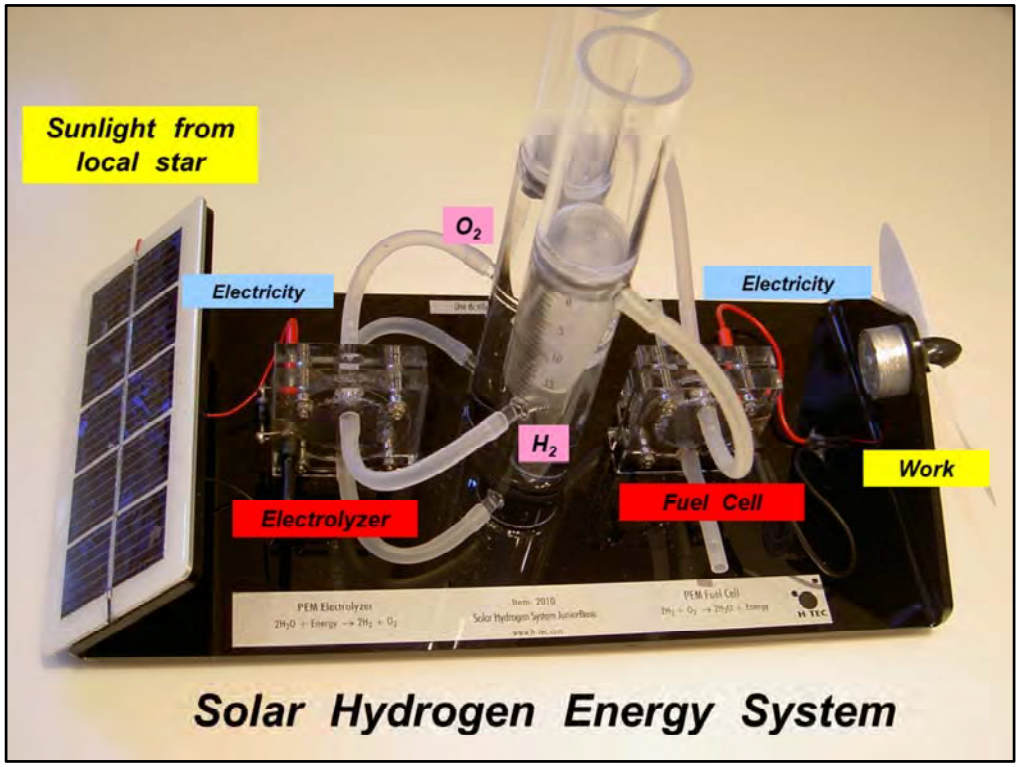
- Future: 5 years ?
- Autonomous, self-driving
- Wireless link, unlink
- "Bus train"




Innovation
Zero Emission Hydrogen Fuel Cell Bus
1190
element
Hydrogen Fuel Cell Bus



Typical “coach” bus interior, 48 – 54 seats


Sunlight from local star
O_2
Electricity
Electricity
H_2
Work
Electrolyzer
Fuel Cell
Solar Hydrogen Energy System

Multi – WIN Innovation Challenge

Invest in shoreside infrastructure

Bargain: Distributed Creativity

Fixed-guideway Transit System

- Light Rail
- Streetcar
- Hybrid

- Never seriously considered in Juneau
- $ 366 M ?
- Prepare Juneau for Sea Level Rise Refuge City

https://vimeo.com/287808196

https://vimeo.com/373679728

Fixed Guideway System (FGS)

- Light Rail Transit (LRT)
- Streetcar
- Hybrid: LRT – Streetcar
- Bus Rapid Transit (BRT)

Innovation

Alstom Hydrogen-fueled, Fuel Cell Train

- No overhead wires
- 200 mile range
- 20 minute fueling
- Hydroelectric-source Hydrogen fuel: Zero Emission Vehicle (ZEV)

Sprinter Light Rail Transit (LRT)

Fixed Guideway System (FGS) COSTS: CAPEX

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS Capital Expense (CAPEX)			$ million Each		$ million Total
Rolling stock:	40	cars	3		120
Track, double:	15	miles	3		45
Stations, ordinary:	20	stations	2		40
Station, Mode chang	1	stations	20		20
Maintenance barn:	1		40		40
Hydrogen fueling sta	1		50		50
Controls + crossing s	1		10		10
Personnel training: ops, maintenance			2		2
Design, planning, consulting			4		4
Contingency			35		35
ROW purchase			0		0
Grade-separated intersections			0		0
Total Capex, gross, FGS				**$ million**	**366**

Multi – WIN Innovation Challenge

Invest in shoreside infrastructure

Bargain: Distributed Creativity

Fixed-guideway Transit System

- Light Rail
- Streetcar
- Hybrid

- Never seriously considered in Juneau
- $ 366 M ?
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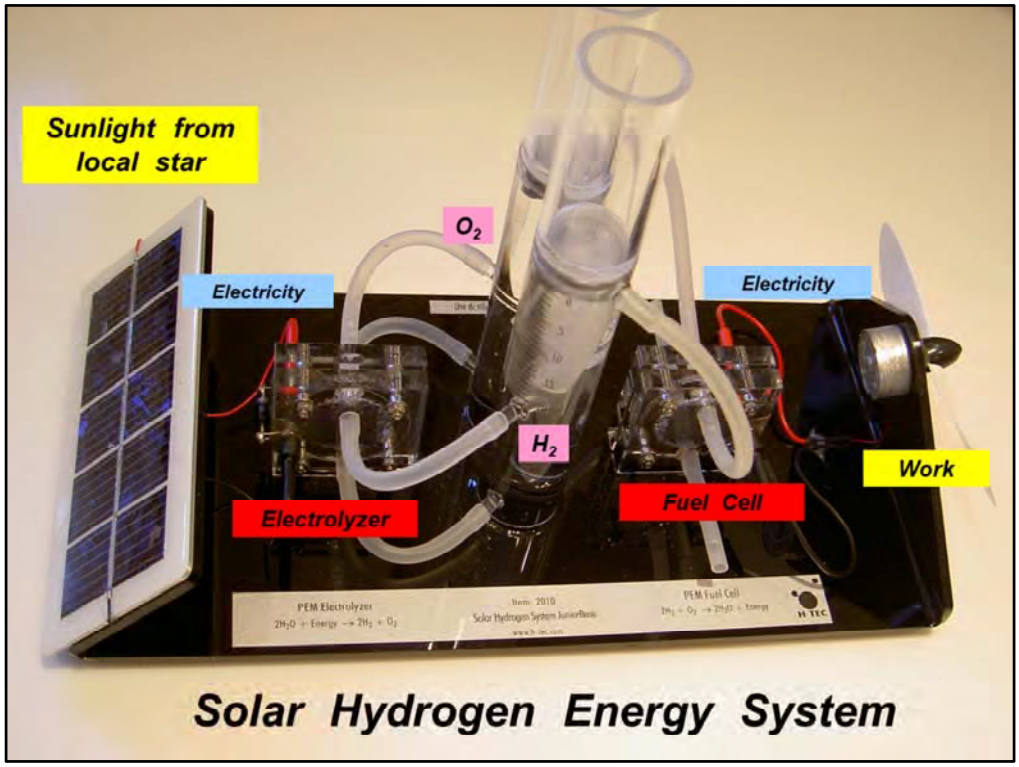
Light Rail Transit (LRT)
Fixed Guideway System (FGS)

Norway: Hydrogen fueled ferry "NORLED"
Hydropowered


Sunlight from local star
O_2
Electricity
Electricity
H_2
Work
Electrolyzer
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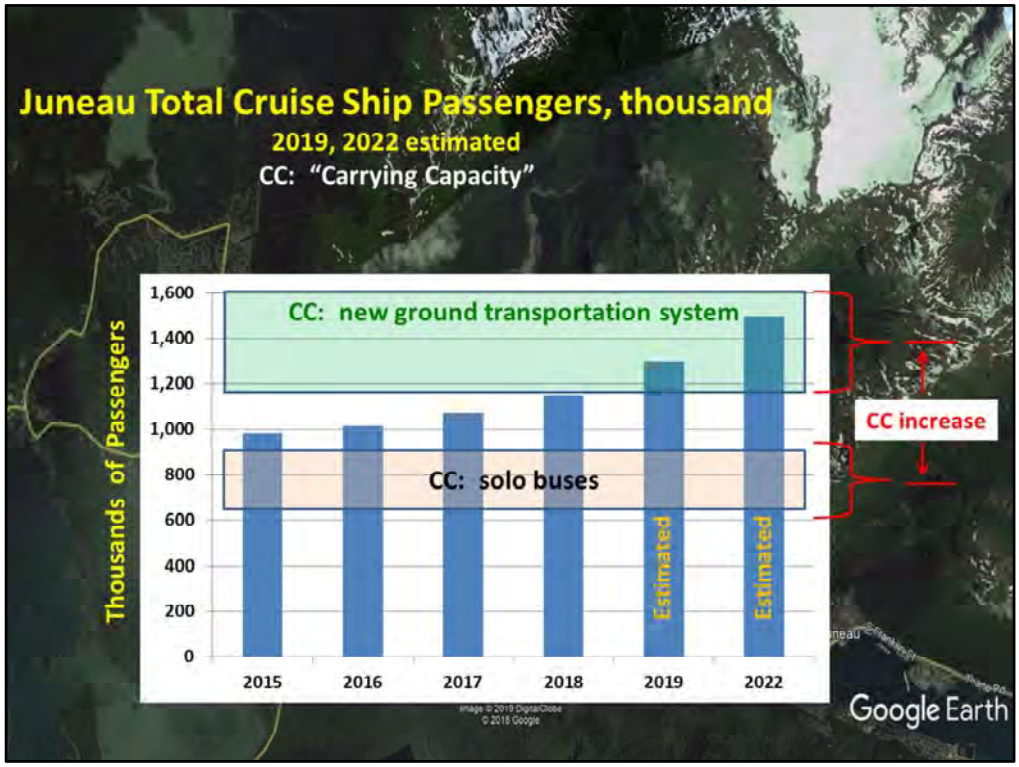
Solar Hydrogen Energy System


Juneau Total Cruise Ship Passengers, thousand
2019, 2022 estimated
CC: "Carrying Capacity"
Thousands of Passengers
1,600
1,400
1,200
1,000
800
600
400
200
0
CC: new ground transportation system
CC: solo buses
CC increase
Estimated
Estimated
2015
2016
2017
2018
2019
2022
Google Earth

A

Multi – WIN Innovation Challenge

Invest in hydropowered shoreside infrastructure

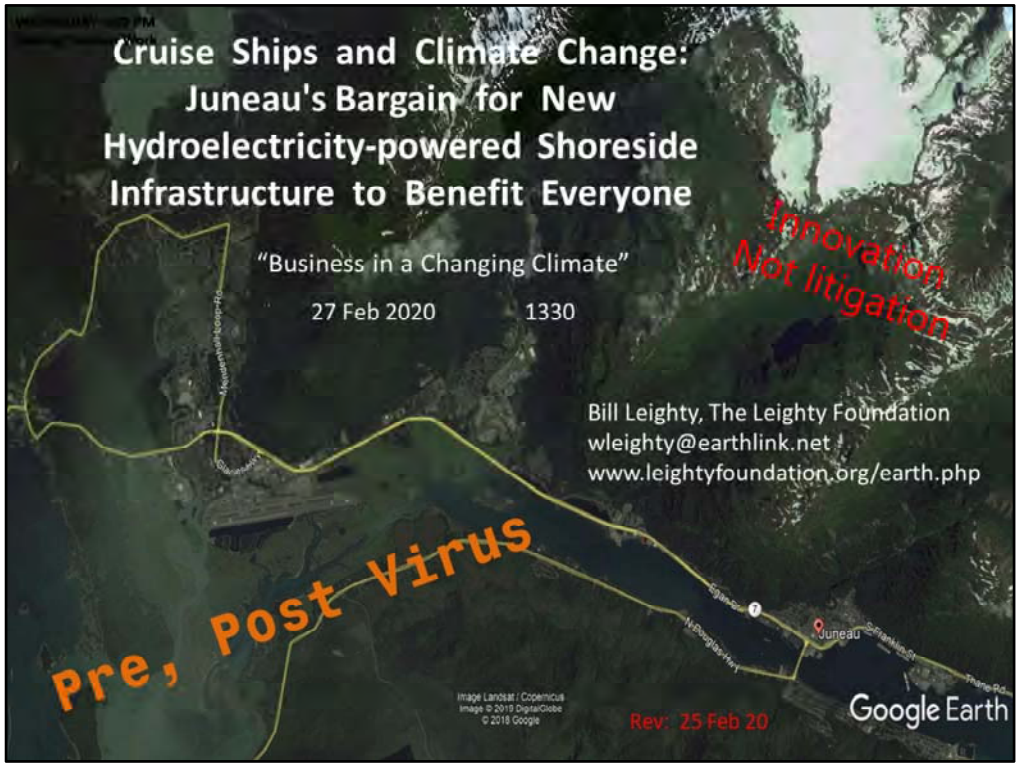
- Visitors – ALL
- Residents
- Visitor industry:
  - Cruise ship companies
  - Airlines
  - AMHS
  - Shoreside companies
  - CBJ; Community
- Earth: Species, systems

Innovation
Not litigation

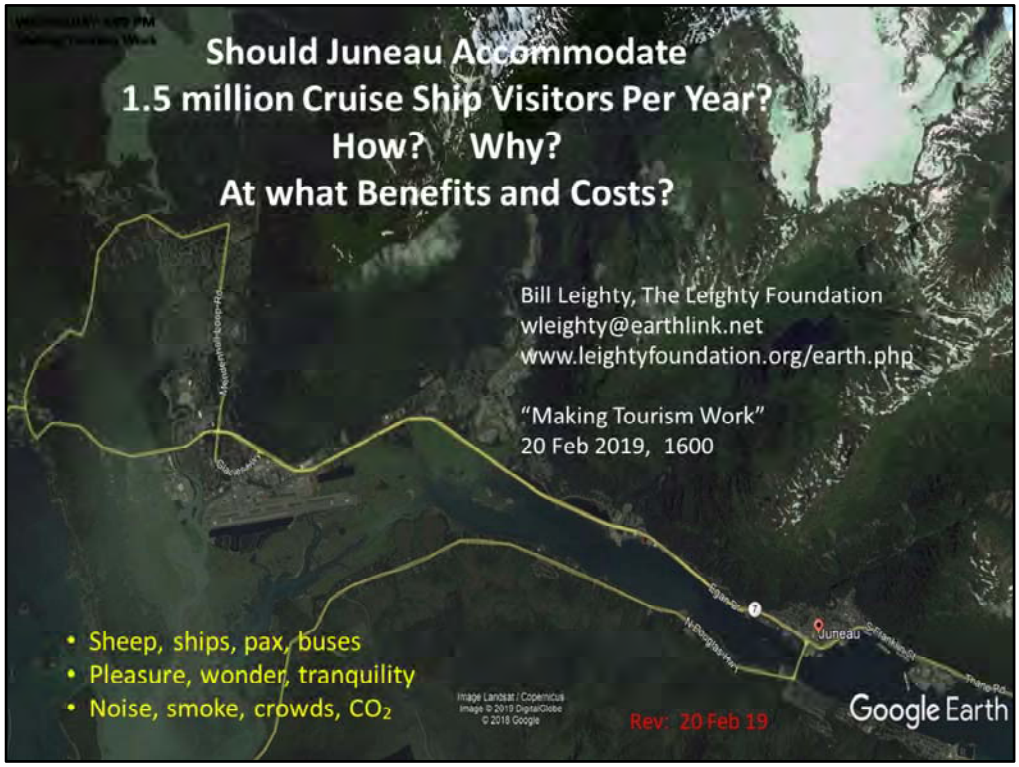
Prepare Juneau for Sea Level Rise -- Refuge City

2018: " Elevator Juneau ..." https://vimeo.com/287808196

2019: " Accommodate 1.5 million ? " https://vimeo.com/373679728



"Business In a Changing Climate", 27 Feb, 1330



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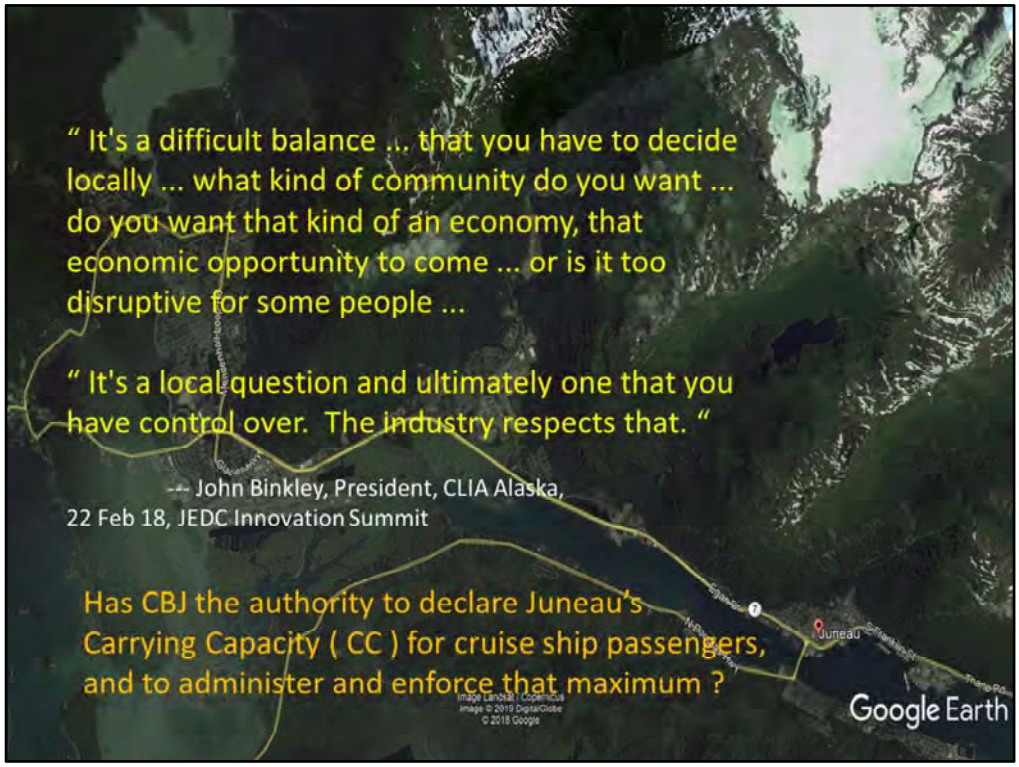
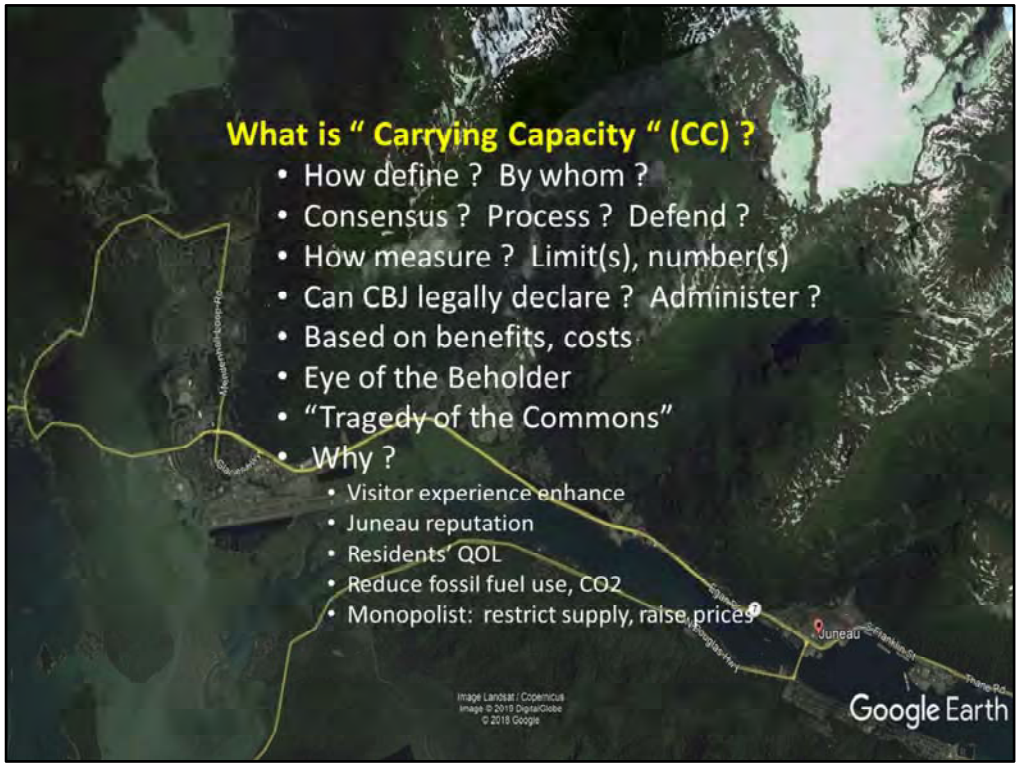
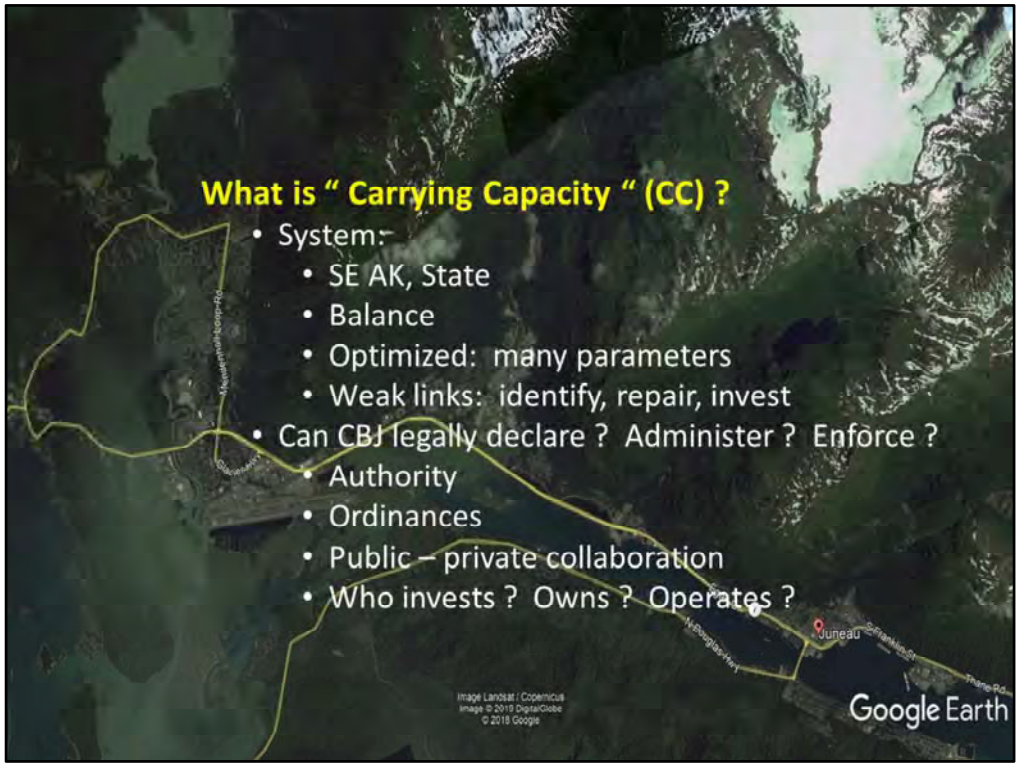

" It's a difficult balance ... that you have to decide locally ... what kind of community do you want ... do you want that kind of an economy, that economic opportunity to come ... or is it too disruptive for some people ...
" It's a local question and ultimately one that you have control over. The industry respects that. "
-- John Binkley, President, CLIA Alaska,
22 Feb 18, JEDC Innovation Summit
Has CBJ the authority to declare Juneau's Carrying Capacity (CC) for cruise ship passengers, and to administer and enforce that maximum ?
Juneau
Google Earth

A


What is " Carrying Capacity " (CC) ?
• How define ? By whom ?
• Consensus ? Process ? Defend ?
• How measure ? Limit(s), number(s)
• Can CBJ legally declare ? Administer ?
• Based on benefits, costs
• Eye of the Beholder
• "Tragedy of the Commons"
• Why ?
• Visitor experience enhance
• Juneau reputation
• Residents' QOL
• Reduce fossil fuel use, CO2
• Monopolist: restrict supply, raise prices
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

A


What is " Carrying Capacity " (CC) ?
• System:
• SE AK, State
• Balance
• Optimized: many parameters
• Weak links: identify, repair, invest
• Can CBJ legally declare ? Administer ? Enforce ?
• Authority
• Ordinances
• Public – private collaboration
• Who invests ? Owns ? Operates ?
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

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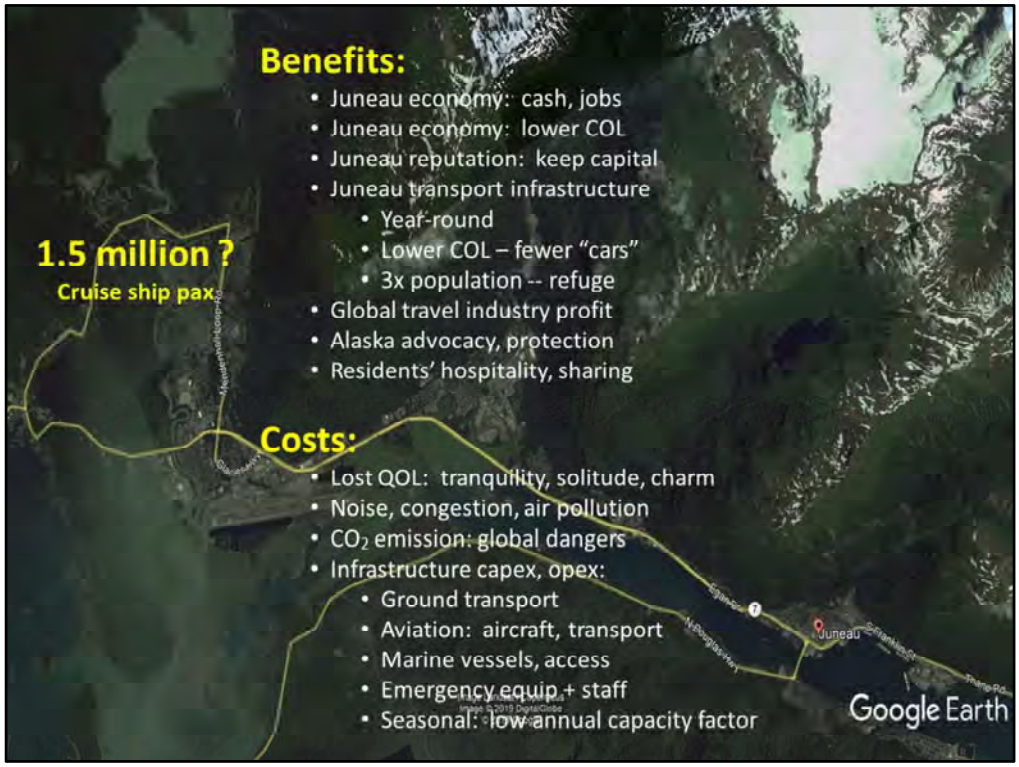
Summer Tourism Carrying Capacity (CC)
Goals
• Reduce fossil fuel use
• Visitor pleasure
• Juneau's reputation
• Residents' QOL, tolerance
Sectors
• Cruise ships
• Independents
• Airline
• AMHS
Detractions
• Buses (all sizes), vans, taxis:
• Noisy
• Smelly
• Smoky
• Too fast
• Too many
• Congestion, traffic
• Rude
• Old + ugly
• Helicopters:
• Noisy
• Constant
• Ubiquitous
• Fixed-wing av:
• Noisy
• Constant
• Ubiquitous
• Tour boats:
• Noisy
• Too many
• Hurried
• Rude
• Trails: crowded ?
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2019 Google
Google Earth


Benefits:
• Juneau economy: cash, jobs
• Juneau economy: lower COL
• Juneau reputation: keep capital
• Juneau transport infrastructure
• Year-round
• Lower COL – fewer "cars"
• 3x population -- refuge
• Global travel industry profit
• Alaska advocacy, protection
• Residents' hospitality, sharing
1.5 million ?
Cruise ship pax
Costs:
• Lost QOL: tranquility, solitude, charm
• Noise, congestion, air pollution
• CO_2 emission: global dangers
• Infrastructure capex, opex:
• Ground transport
• Aviation: aircraft, transport
• Marine vessels, access
• Emergency equip.+ staff
• Seasonal: low annual capacity factor
Juneau
Google Earth

A


"[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, CLIA Alaska, 22 Feb 18, JEDC Innovation Summit
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

A


DESIGN
Juneau
Google Earth
Juneau Visitor Industry Ground Transportation System

A

B

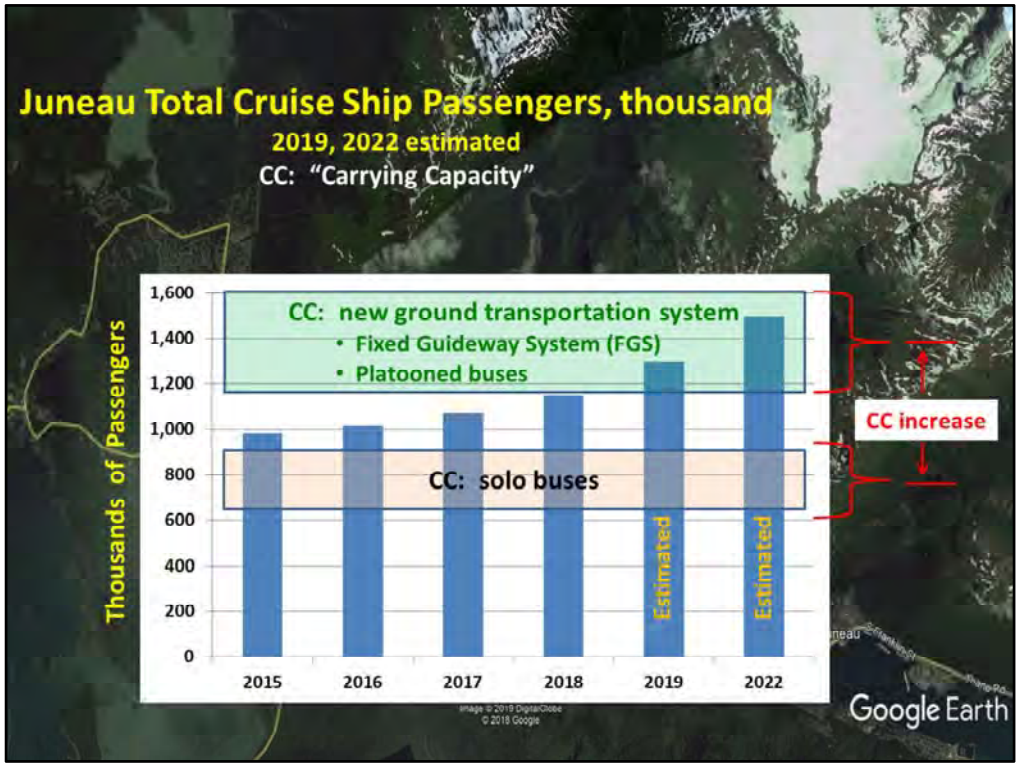
F

C

D

E

"Solo buses": MCI "Coach" ~ 50 seats + baggage under high floor
Need the baggage level ?


Juneau Total Cruise Ship Passengers, thousand
2019, 2022 estimated
CC: "Carrying Capacity"
Thousands of Passengers
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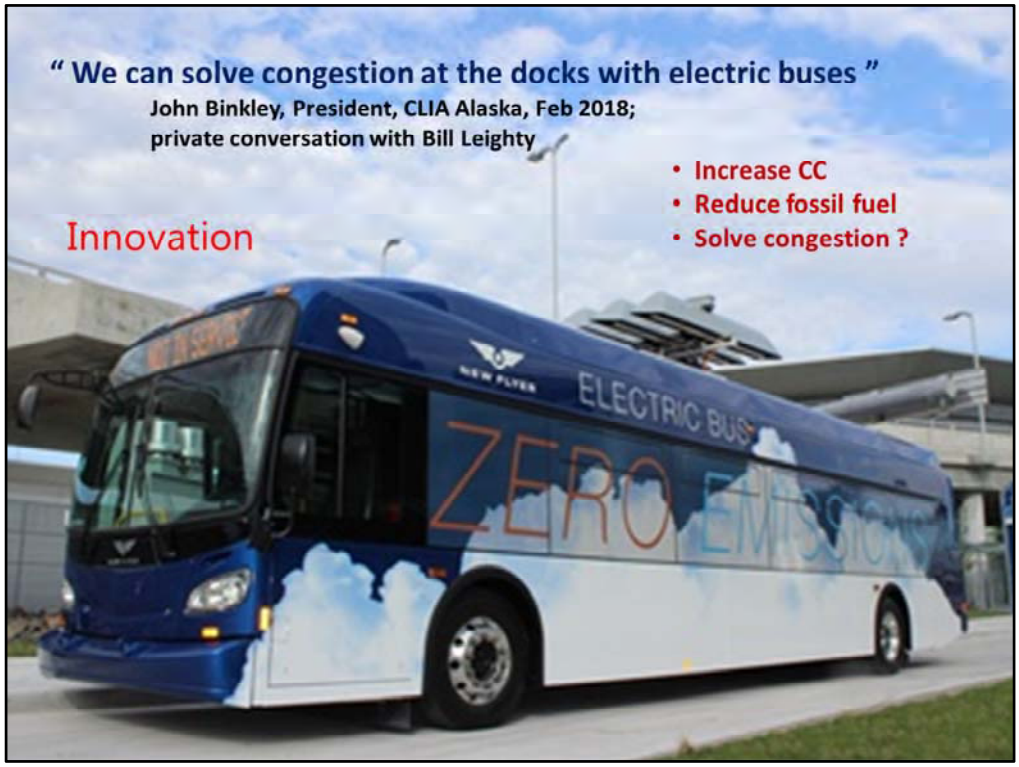
1,400
1,200
1,000
800
600
400
200
0
CC: new ground transportation system
• Fixed Guideway System (FGS)
• Platooned buses
CC: solo buses
CC increase
Estimated
Estimated
2015
2016
2017
2018
2019
2022
Google Earth

A



18 Feb 19: Tom Wagner, MCI: Estimated price for an electric coach (BEV) price $900 K -$1M, with FCV bus at $ 1.3M-$1.4M

Glen Naylor, New Flyer: Prices are for transit bus
Probably 175 mile range for your operation.
Probably 36 seats
No plans for a 55 seat transit bus
With an 8 hour window you can probably only charge 3 buses.
It seems likely that future FC and BEV buses may be similar enough in price that infrastructure is more important. This depends a lot on FC bus volumes growing substantially which is a risk to this forecast.

18 Feb: my request --

My presentation for the 2019 Juneau Economic Development Council (JEDC) "Innovation Summit" is 20 Feb at 1600 AST. Please help me with a clarification, from our last week's phone call:

We estimated "electric bus" (BEV) price, as $ 800 K, with FCV bus at $ 1,200 K: Is that for the "coach" MCI style or low-floor, or for either ? Is the drive train about the same ?

• Is that for 175 mile range in Altoona "city" service ? In our "tourist" service, we would be making fewer stops, but traveling at highway speed, 50 - 65 mph, not faster. Would our range be > 175 miles ? I think a maximum day for Juneau tourism would be 5, 30 mile trips, so that should be adequate range.

• What is the coach-style (2+2+aisle) seating capacity of this size bus ? If < 50 - 55, which seems standard for our old MCI coaches, the backbone of our ground transport service, will you have 50 - 55 pax BEV bus available soon ? At what price ?

• We estimated charging infrastructure cost, for BEV, at $ 150 K per "charger", which could be configured to charge up to 5 buses plugged into it, sequentially. If our overnight out-of-service time

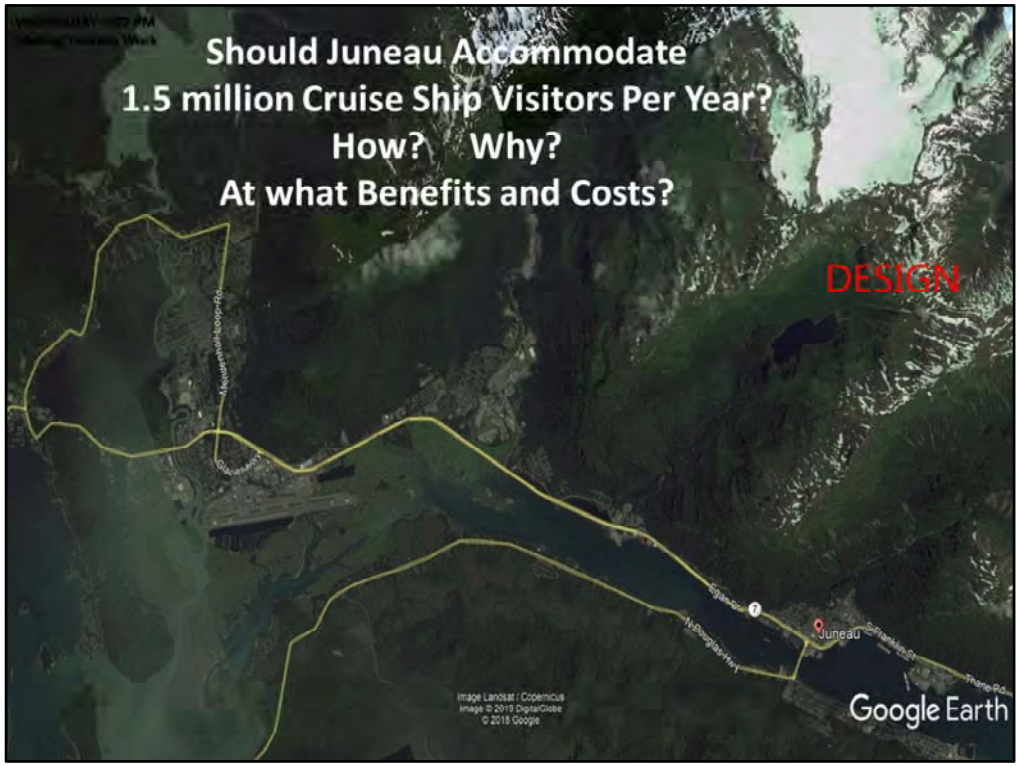
is 6 to 8 hours, could we fully charge 5 buses in that time ? So charging capex is $ 30 K per bus ?

• Will BEV and FCV price probably converge, in a few years, so that recharging or refueling logistics and infrastructure choice (capex, energy supply cost and CO2-emission-free) is more important than capex for the bus ?

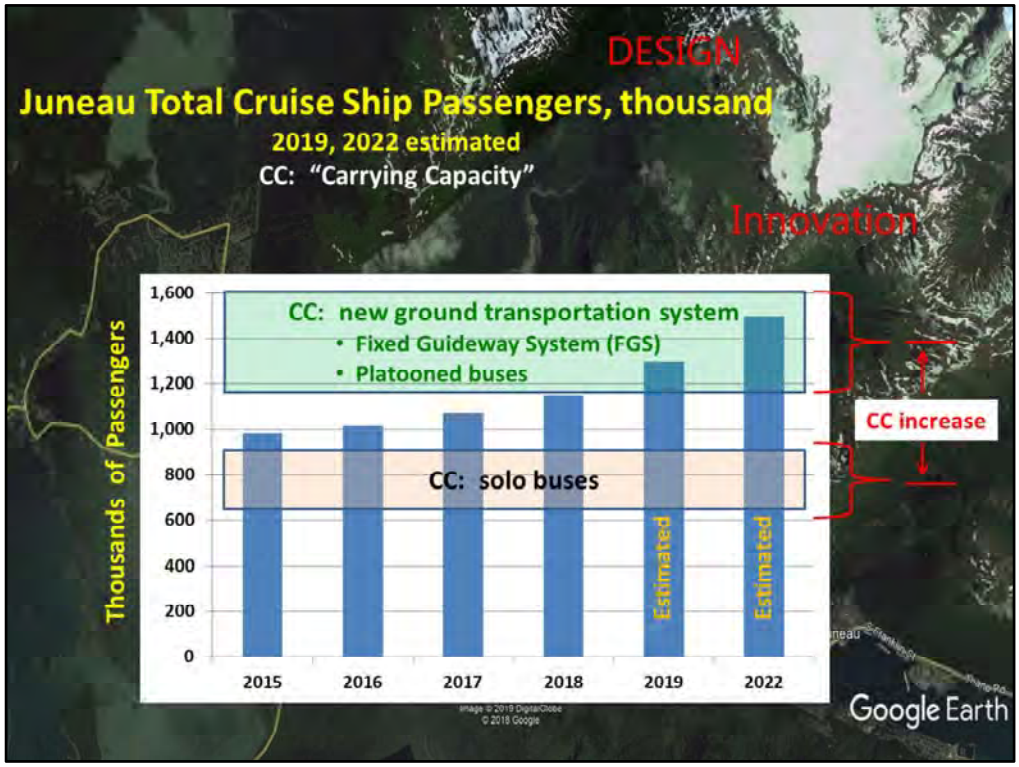
As we said on the phone call, we have little use for "coach" baggage space in Juneau service, except for wheelchairs, so is low-floor bus with single door our best choice for planning assumptions ? $ 800 K for 50-55 pax, "coach" style seating ?


New Flyer Low-floor Battery Electric Vehicle (BEV)
~ $ 800,000, 50 pax, 175 mile range "city" duty
Plus ~ $ 30 – 50,000 charger per bus
Replace 80 Juneau old diesels:
80 @ $ 830,000 = $ 66 million
ELECTRIC BUS
ZERO EMISSIONS


Replace 80 Juneau old diesels:
80 @ $ 830,000 = $ 66 million
MCI Reliability Driven
MCI Battery High-floor "Coach" Electric Vehicle (BEV)
~ $ 800,000, 50 pax, 175 mile range "city" duty


Should Juneau Accommodate
1.5 million Cruise Ship Visitors Per Year?
How? Why?
At what Benefits and Costs?
DESIGN
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

A


DESIGN
Juneau Total Cruise Ship Passengers, thousand
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CC: "Carrying Capacity"
Innovation
CC: new ground transportation system
• Fixed Guideway System (FGS)
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CC: solo buses
CC increase
Thousands of Passengers
1,600
1,400
1,200
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800
600
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2015
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2017
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2019
2022
Estimated
Estimated
Google Earth

A

Fixed Guideway System (FGS) COSTS: CAPEX

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS Capital Expense (CAPEX)			$ million Each	$ million Each
DEDUCTIONS AND SAVINGS: private and public				
Diesel "MCI" 50-60 pax "hiway" tour buses NOT replaced	60	buses	0.8	48
New parking structures not needed	3	garages	10	30
Parking lots surplused; land recovered to develop	10	acres	3	30
Highways projects not needed; fed funds repurposed	5	years	8	40
Deploy surplus FGS rolling stock "Outside" 7 months	20	cars	1	20
Total capex deductions and savings, gross, consequent of FGS			**$ million**	**148**

CAPEX REDUCTIONS: private and public	$ million
USDOT grant, FTA (Fed Transit Admin); theoretical; very uncertain	50
USFS USDA grant for MGVC improvement, CC increase	10
Private investment, misc: airlines, shore excursions	20
Other	0
Total capex reductions	**80**

NET CAPEX REQUIRED FOR FGS: beyond replace all buses: BEV or FCV	**$138**	**$ million**
Cruise ship industry share, residual, balance	**$138**	**$ million**
NET CAPEX DEFICIENCY	**$0**	**$ million**

Fixed Guideway System (FGS)

- Light Rail Transit (LRT)
- CC = 1.5 million

COSTS: OPEX

Bill Leighty estimate

FGS Operating Expense (OPEX) $ millions		
SUMMER 4 MONTHS, CRUISE SHIP INDUSTRY ALLOCATION		
FGS labor: drivers (operators)		10
FGS electric energy		10
FGS maintenance		5
FGS other		5
FGS subtotal		30
Cruise ship car host, hostess labor		10
Total cruise ship industry allocation		**40**
SUMMER 4 MONTHS, CBJ ALLOCATION "CAPITAL TRANSIT"		
FGS labor: drivers (operators)		2
FGS electric energy		1
FGS maintenance		1
FGS other		1
FGS subtotal		5
Less % "head tax" from CBJ	30	per cent
(Assume X million @ $ 8)	1.5	3.6
CBJ share, net of "head tax" summer 4 months		**1.4**
OTHER 8 MONTHS, CBJ ALLOCATION "CAPITAL TRANSIT"		
FGS labor: drivers (operators)		3
FGS electric energy		3
FGS maintenance		3
FGS other		2
FGS subtotal		**11**

Fixed Guideway System (FGS) BENEFITS – A

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

Innovation

FGS OPEX BENEFITS, SUMMER 4 MONTHS, CRUISE SHIP INDUSTRY: incremental margin increase						
0.6	million pax/yr CC increase @	$500	margin per pax =	$ million	300	Total gross margin
	Less opex, cruise ship share			$ million	40	
	Net total annual incremental margin increase			$ million	260	
	Simple annual ROI on total cruise ship industry capex			per cent	140	
240	short tons CO2 not emitted from burning diesel in "hiway" MCI buses; diesel buses replaced by FGS					
	Note: average 40 buses / day @ 30 miles / day x 100 days per summer = 120,000 miles per summer;					
	@ 5 mpg, = 24,000 gal diesel / summer @ 20 lbs CO2 / gallon = 480,000 lbs CO2 = 240 short tons CO2/yr					

Fixed Guideway System (FGS) BENEFITS – B

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS JUNEAU PUBLIC BENEFITS, PER 12 MONTHS			
1	$ million	Estimated Capital Transit Opex savings: fewer vehicles (bus, railcar), fewer drivers	
1	$ million	Estimated savings in school bus transportation	
36	$ million	Estimated savings, after-tax expense; need fewer private-owned light duty vehicle (LDV's)	
		6,000 fewer LDV's @ $6,000 total annual cost = $36 million	
1	$ million	Estimated savings in snow removal	
1	$ million	Vacant garages converted to rental housing (small, inexpensive units): "affordable"	
10	$ million	Health care costs reduction; walk more; healthier; health insur premiums lower	
0	$ million	Other	
50	$ million	Total annual Juneau benefits	
		Simple annual ROI on total FGS capex, before adjustments	**14** per cent
		Simple annual ROI on adjusted total FGS capex	**36** per cent
	Juneau population = 32,000		
$1,563	Average cash saving per person, after tax, per year		

Fixed Guideway System (FGS) BENEFITS – C

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS TOTAL ANNUAL PUBLIC AND PRIVATE BENEFITS			
Cruise ship industry, net	$260	million	
Juneau, private and CBJ	$50	million	
Total	$310	million	
Simple annual ROI on total FGS capex, before adjustments			85 per cent
Simple annual ROI on adjusted total FGS capex			225 per cent

Fixed Guideway System (FGS) BENEFITS – D

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS OPEX BENEFITS, SUMMER 4 MONTHS, CRUISE SHIP INDUSTRY: incremental margin increase

0.6	million pax/yr CC increase @	$500	margin per pax =	$ million	300	Total gross margin
	Less opex, cruise ship share			$ million	40	
	Net total annual incremental margin increase			$ million	260	
	Simple annual ROI on total cruise ship industry capex			per cent	140	
240	short tons CO2 not emitted from burning diesel in "hiway" MCI buses; diesel buses replaced by FGS					
	Note: average 40 buses / day @ 30 miles / day x 100 days per summer = 120,000 miles per summer;					
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FGS JUNEAU PUBLIC BENEFITS, PER 12 MONTHS

1	$ million	Estimated Capital Transit Opex savings: fewer vehicles (bus, railcar), fewer drivers			
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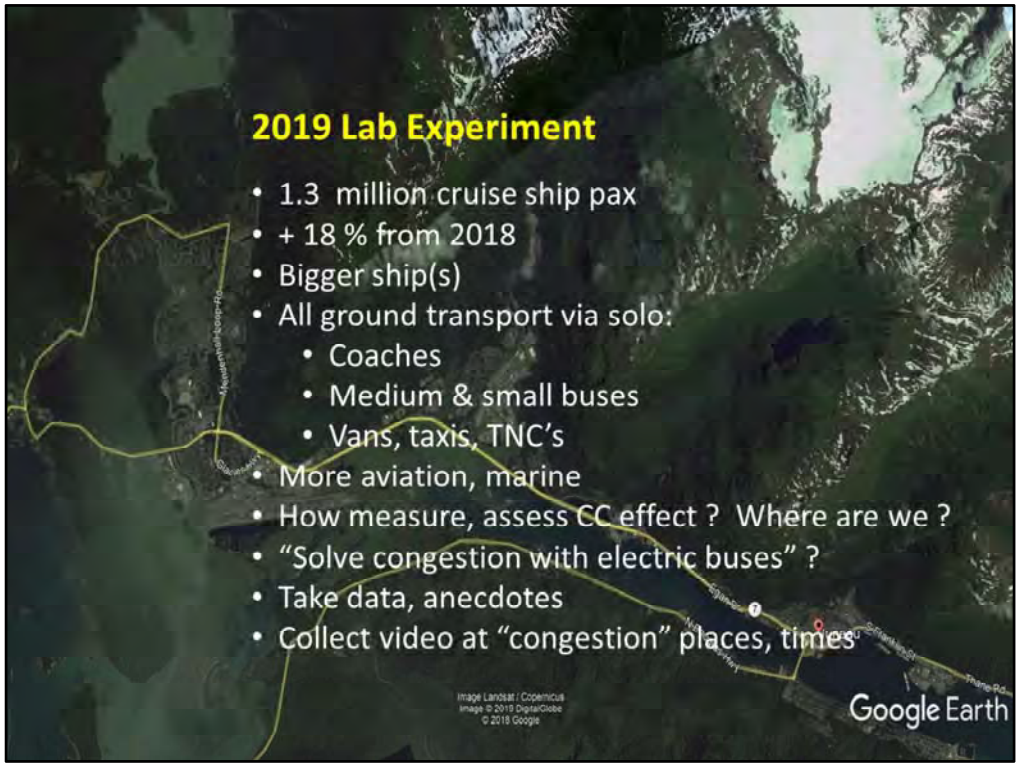
		6,000 fewer LDV's @	$6,000 total annual cost =	$36	million
1	$ million	Estimated savings in snow removal			
1	$ million	Vacant garages converted to rental housing (small, inexpensive units): "affordable"			
10	$ million	Health care costs reduction; walk more; healthier; health insur premiums lower			
0	$ million	Other			
50	$ million	Total annual Juneau benefits			
		Simple annual ROI on total FGS capex, before adjustments		14	per cent
		Simple annual ROI on adjusted total FGS capex		36	per cent
	Juneau population =	32,000			
$1,563	Average cash saving per person, after tax, per year				

FGS TOTAL ANNUAL PUBLIC AND PRIVATE BENEFITS

Cruise ship industry, net	$260	million
Juneau, private and CBJ	$50	million
Total	$310	million

Simple annual ROI on total FGS capex, before adjustments	85	per cent
Simple annual ROI on adjusted total FGS capex	225	per cent


2019 Lab Experiment
• 1.3 million cruise ship pax
• + 18 % from 2018
• Bigger ship(s)
• All ground transport via solo:
• Coaches
• Medium & small buses
• Vans, taxis, TNC's
• More aviation, marine
• How measure, assess CC effect ? Where are we ?
• "Solve congestion with electric buses" ?
• Take data, anecdotes
• Collect video at "congestion" places, times
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2019 Google
Google Earth

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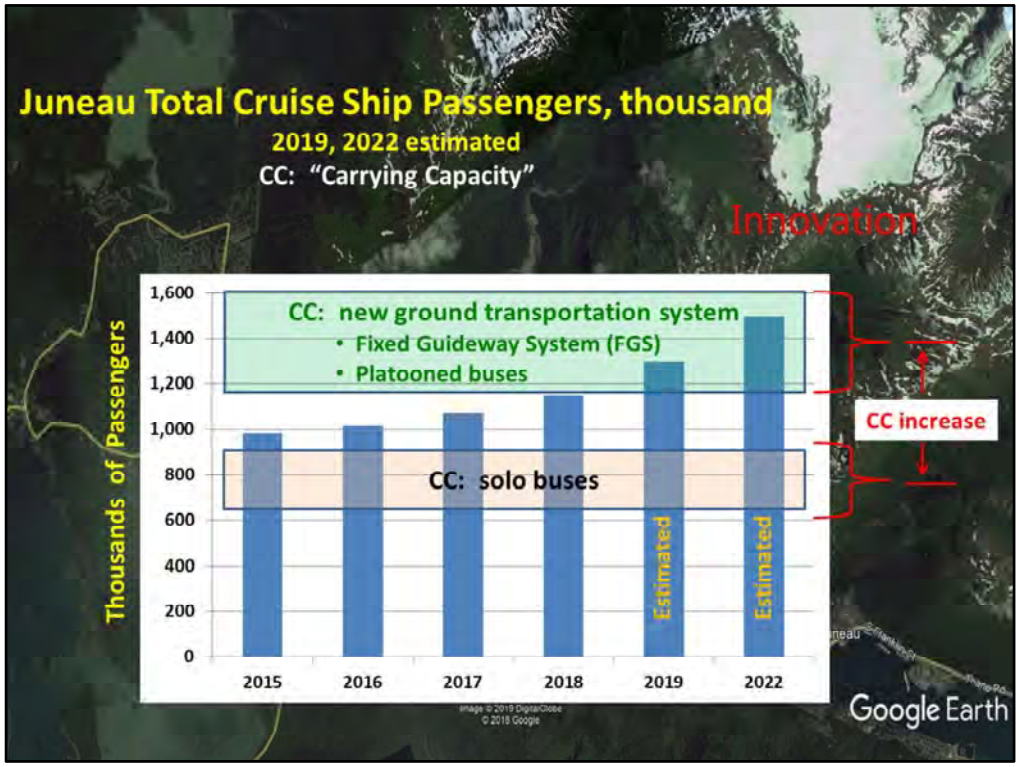
Juneau Total Cruise Ship Passengers, thousand
2019, 2022 estimated
CC: "Carrying Capacity"
Innovation
CC: new ground transportation system
• Fixed Guideway System (FGS)
• Platooned buses
CC: solo buses
CC increase
Thousands of Passengers
1,600
1,400
1,200
1,000
800
600
400
200
0
2015
2016
2017
2018
2019
2022
Estimated
Estimated
Google Earth

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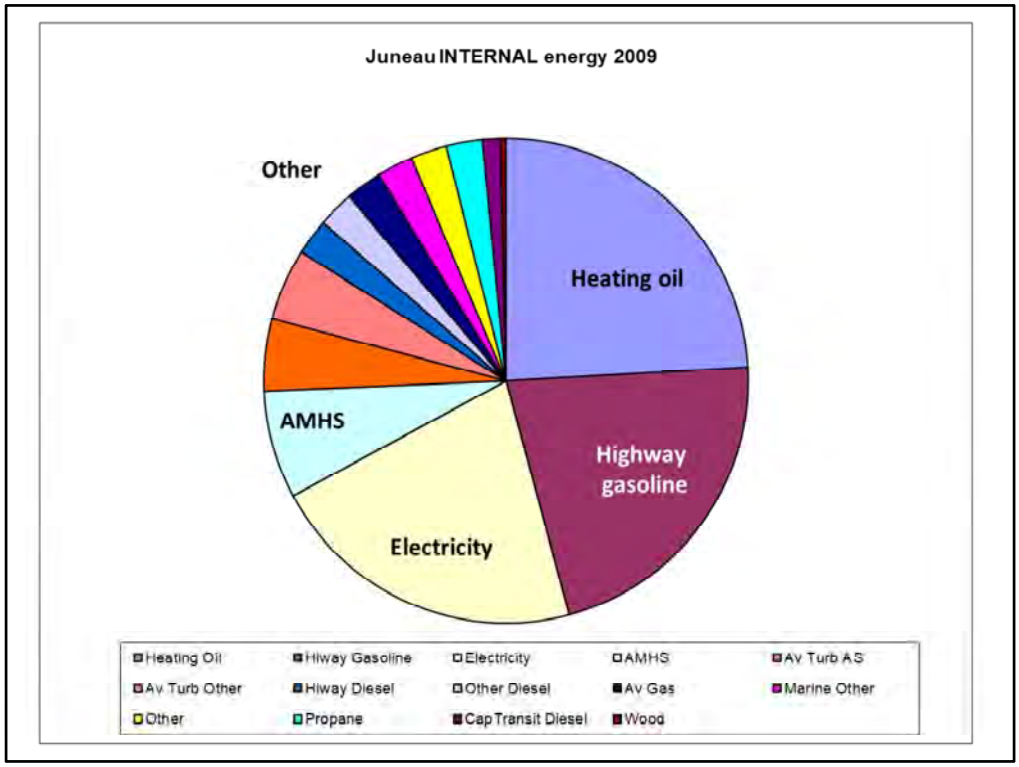
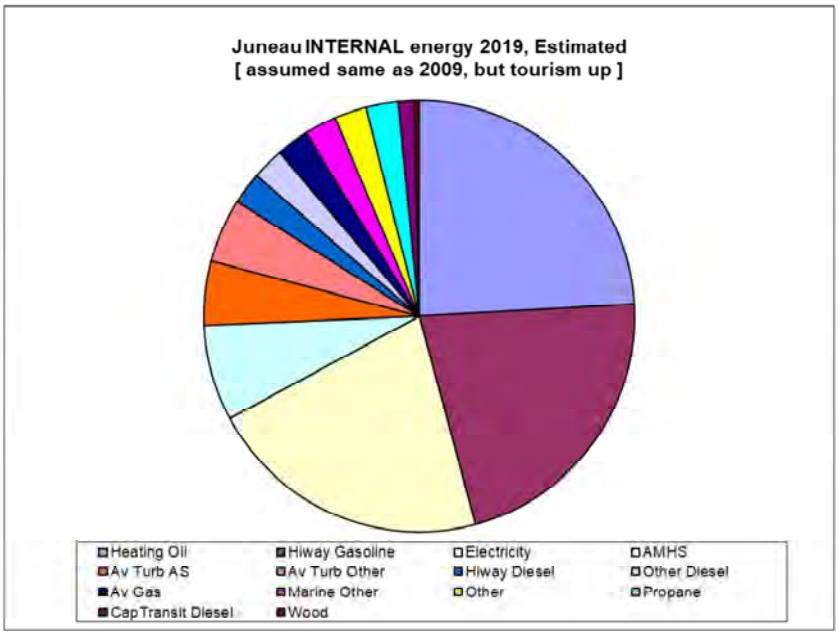
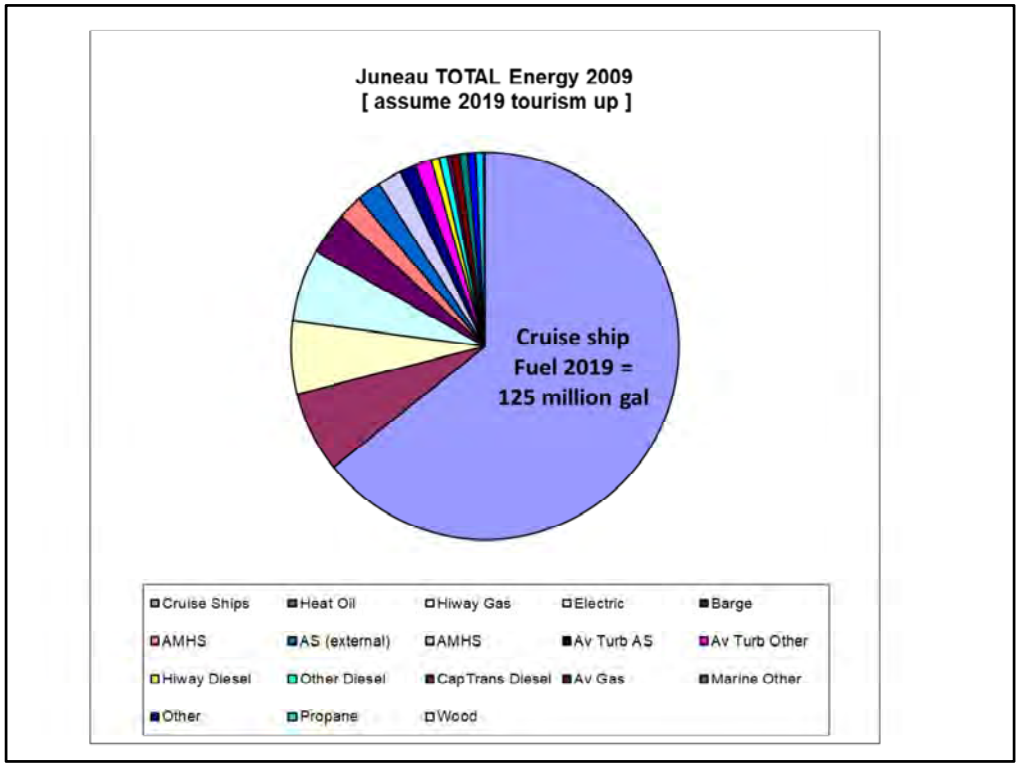
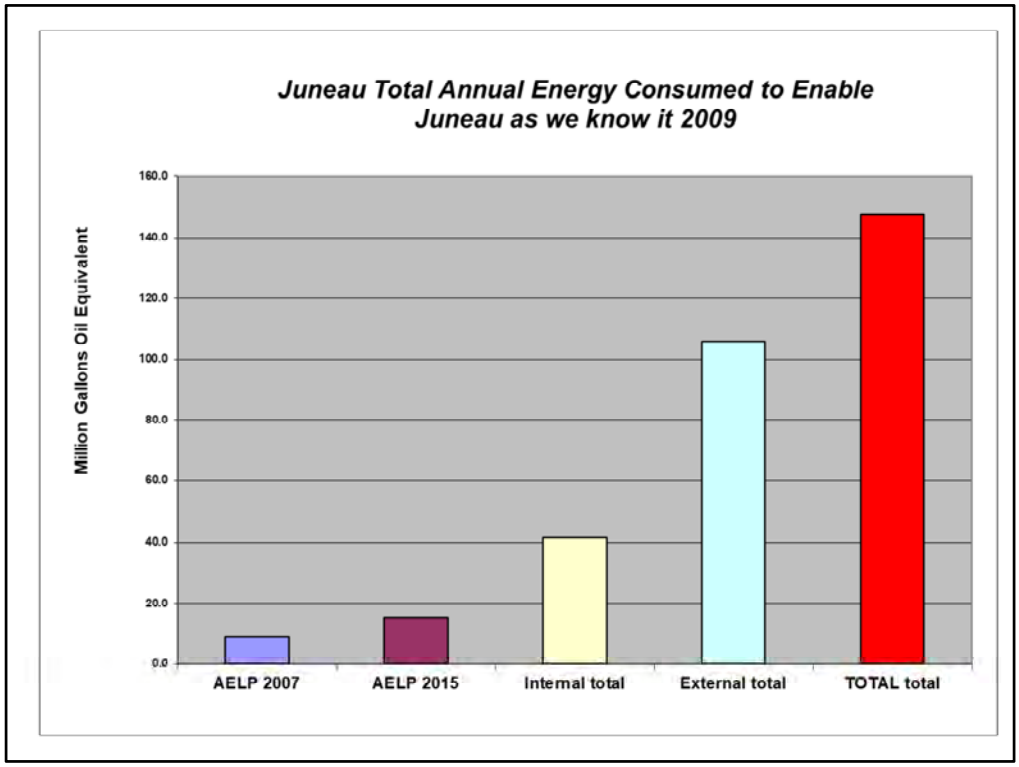
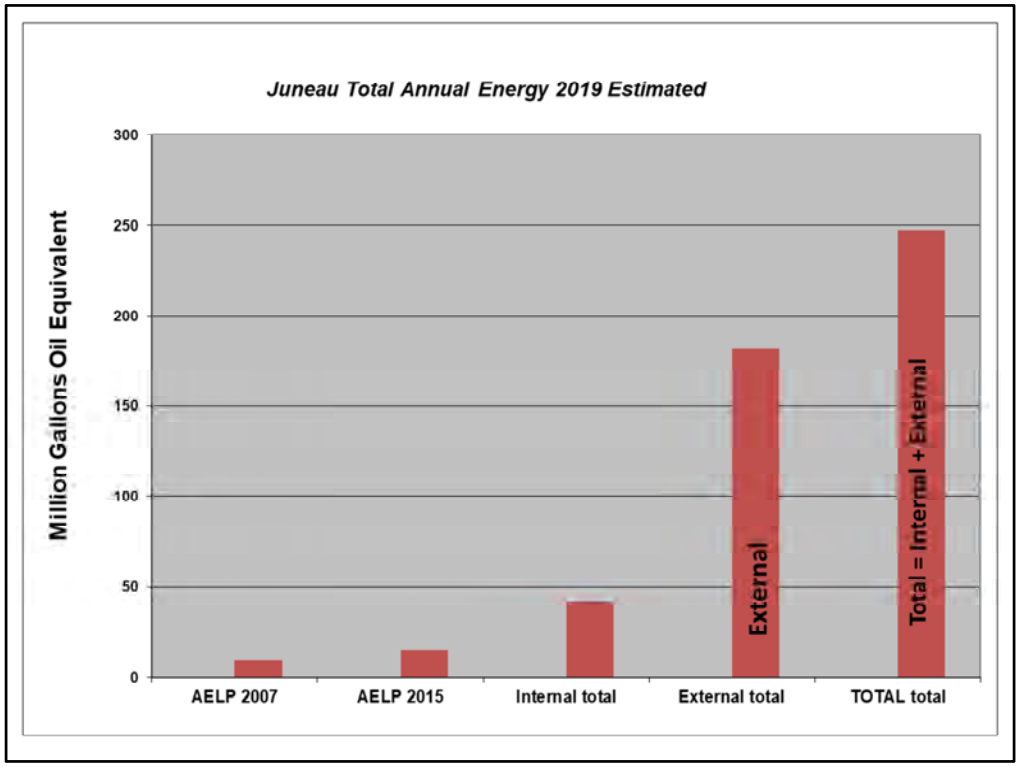

Juneau INTERNAL energy 2009
Other
Heating oil
AMHS
Highway gasoline
Electricity
Heating Oil
Hiway Gasoline
Electricity
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
Av Gas
Marine Other
Other
Propane
Cap Transit Diesel
Wood

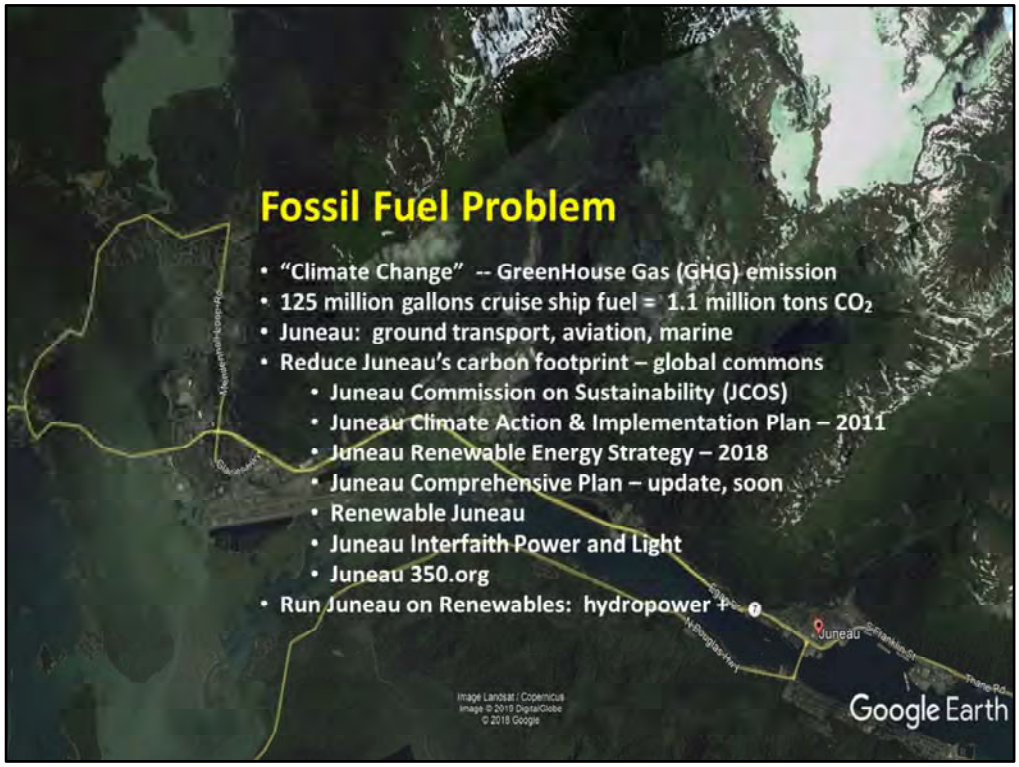

Juneau INTERNAL energy 2019, Estimated
[assumed same as 2009, but tourism up]
Heating Oil
Hiway Gasoline
Electricity
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
Av Gas
Marine Other
Other
Propane
Cap Transit Diesel
Wood


Juneau TOTAL Energy 2009
[assume 2019 tourism up]
Cruise ship
Fuel 2019 =
125 million gal
Cruise Ships
Heat Oil
Hiway Gas
Electric
Barge
AMHS
AS (external)
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
CapTrans Diesel
Av Gas
Marine Other
Other
Propane
Wood


Juneau Total Annual Energy Consumed to Enable Juneau as we know it 2009
Million Gallons Oil Equivalent
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
AELP 2007
AELP 2015
Internal total
External total
TOTAL total

Energy


Juneau Total Annual Energy 2019 Estimated
Million Gallons Oil Equivalent
300
250
200
150
100
50
0
External
Total = Internal + External
AELP 2007
AELP 2015
Internal total
External total
TOTAL total



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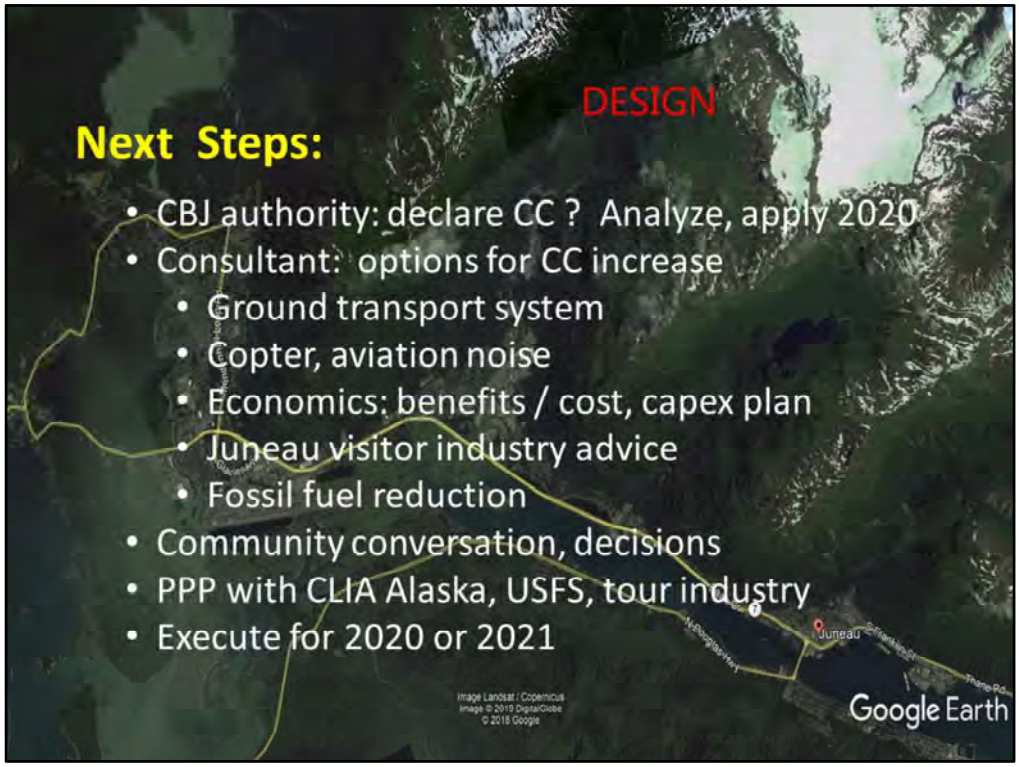
125 million gal cruise ship fuel / Summer Alaska season x (20 lbs CO2 / gal) = 2,500 million lbs CO2 / (2,000 lbs per ton) = 1.1 million tons CO2 total cruise ship fleet


DESIGN
Next Steps:
• CBJ authority: declare CC ? Analyze, apply 2020
• Consultant: options for CC increase
• Ground transport system
• Copter, aviation noise
• Economics: benefits / cost, capex plan
• Juneau visitor industry advice
• Fossil fuel reduction
• Community conversation, decisions
• PPP with CLIA Alaska, USFS, tour industry
• Execute for 2020 or 2021
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

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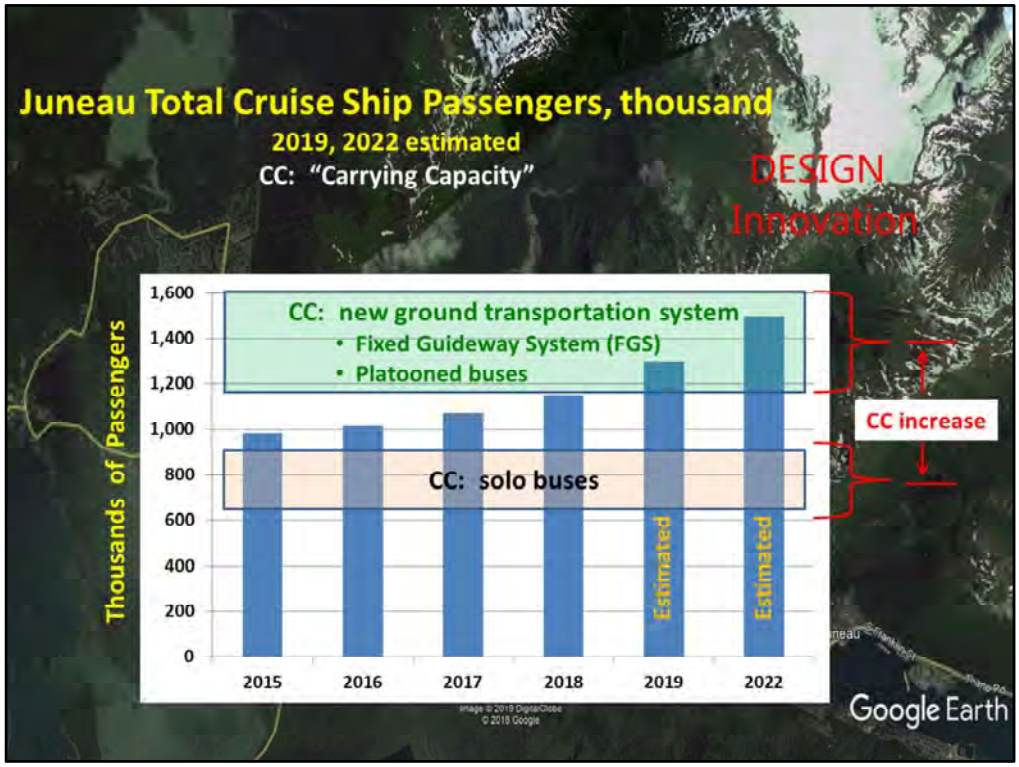
Innovation
Opportunity: Public Private Partnership
• Aside from "Holland criterion"
• Increasing CC is win for all ? Except Earth ?
• Already beyond CC
• CBJ declares so; limits cruise ship pax 2020
• People of Juneau, CLIA Alaska, CBJ, USFS agree:
• CC increase plan
• Capex investment plan
• New ground transport system
• "Quiet Technology" copters
• Other:
• Execute
• Increase cruise ship pax
Juneau
Google Earth

A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Thousands of Passengers
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CC: new ground transportation system
• Fixed Guideway System (FGS)
• Platooned buses
CC: solo buses
CC increase
Estimated
Estimated
2015
2016
2017
2018
2019
2022
Google Earth

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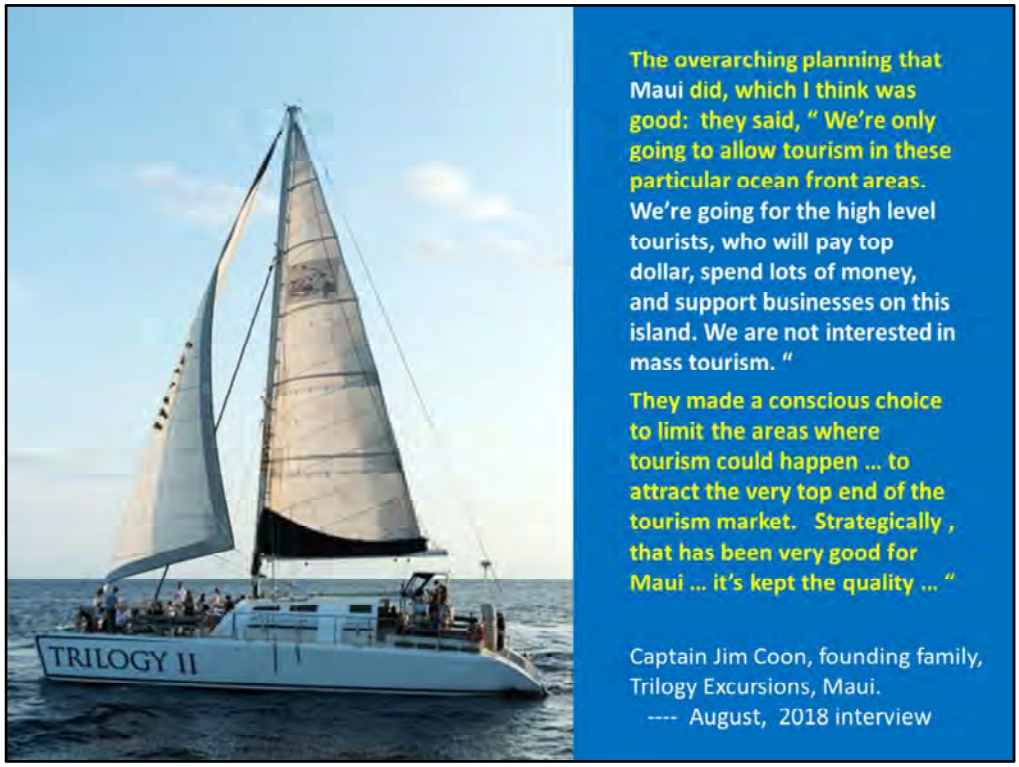
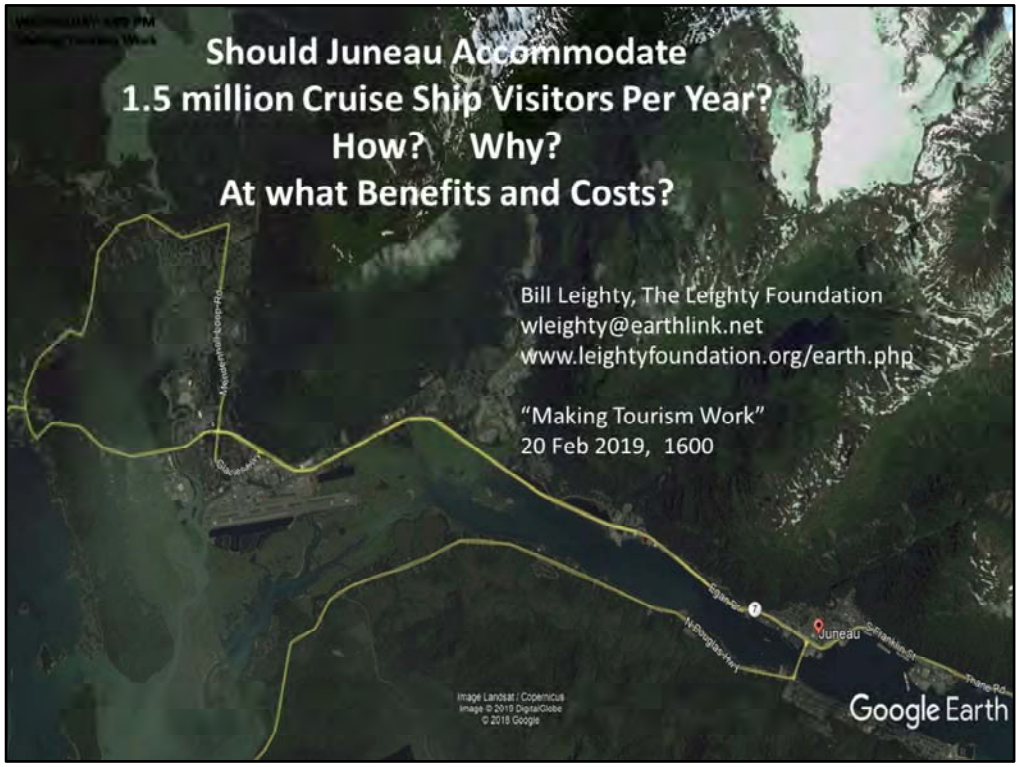


Quoting Captain Jim Coon, founding family, Trilogy Excursions, Maui, in August 2018 interview: "The State [of Hawaii] in the early 1980's saw that ocean tourism was increasing very rapidly. They said, "We're going to cap the operators to those operating now".
That has kept the ocean tourism industry from just going completely viral. The number of harbor permits has not increased appreciably since 1984.
Following Alaska's lead on [limited entry fishing] permits, we made these permits transferable. Without that, we could not have had an ocean tourism industry.
We were the early stewards of the environment … the state was doing a terrible job.
We realized early on that stewardship of the environment was absolutely vital in maintaining a product that we could share with our guests.
The Ocean Tourism Coalition, of which I am a founder, and president, was, and still is, very influential inn the legislature.

The overarching planning that Maui did, which I think was good: they said, "We're only going to allow tourism in these particular ocean front areas. We're going for the high level tourists, who will pay top dollar, spend lots of money, and support businesses on this island. We are not interested in the mass tourism. "
They made a conscious choice to limit the areas where tourism could happen … to attract the very top end of the tourism market. Strategically , that has been very good for Maui … it's kept the quality … "


Should Juneau Accommodate
1.5 million Cruise Ship Visitors Per Year?
How? Why?
At what Benefits and Costs?
Bill Leighty, The Leighty Foundation
wleighty@earthlink.net
www.leightyfoundation.org/earth.php
"Making Tourism Work"
20 Feb 2019, 1600
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

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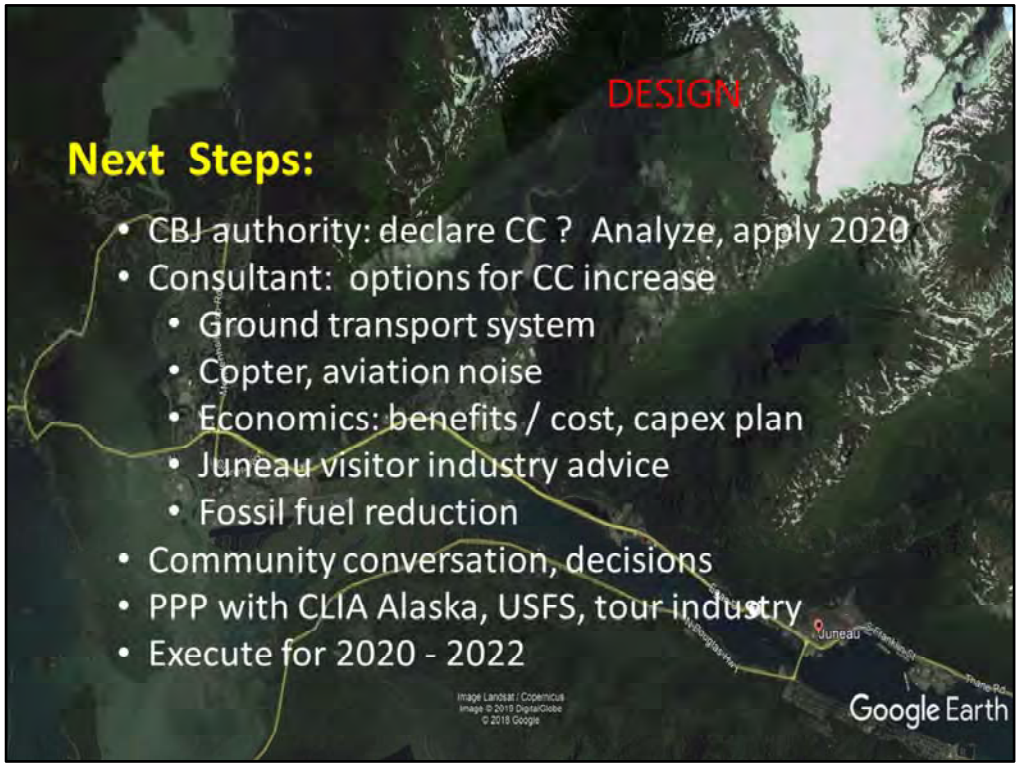
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• Execute for 2020 - 2022
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

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Thank you. We all want an energy system for Earth which is equitable, accessible, and affordable for all humans. And it must be sustainable, with net-zero carbon dioxide (CO2) emissions to prevent further global warming. The only income our spaceship Earth has is radiant energy from the sun – which we call “renewable” – and some matter from meteorites and comet dust.


"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, CLIA Alaska, 22 Feb 18, JEDC Innovation Summit
Juneau
Google Earth

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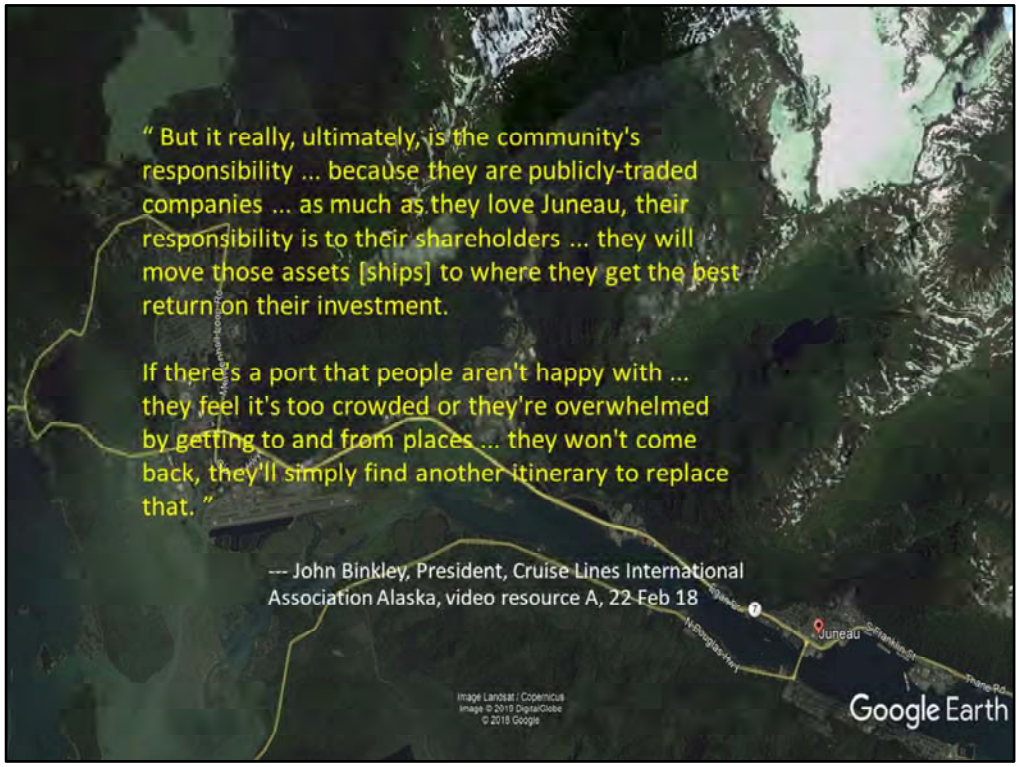
" But it really, ultimately, is the community's responsibility ... because they are publicly-traded companies ... as much as they love Juneau, their responsibility is to their shareholders ... they will move those assets [ships] to where they get the best return on their investment.
If there's a port 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. "
--- John Binkley, President, Cruise Lines International Association Alaska, video resource A, 22 Feb 18
Juneau
Image Landsat / Copernicus
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

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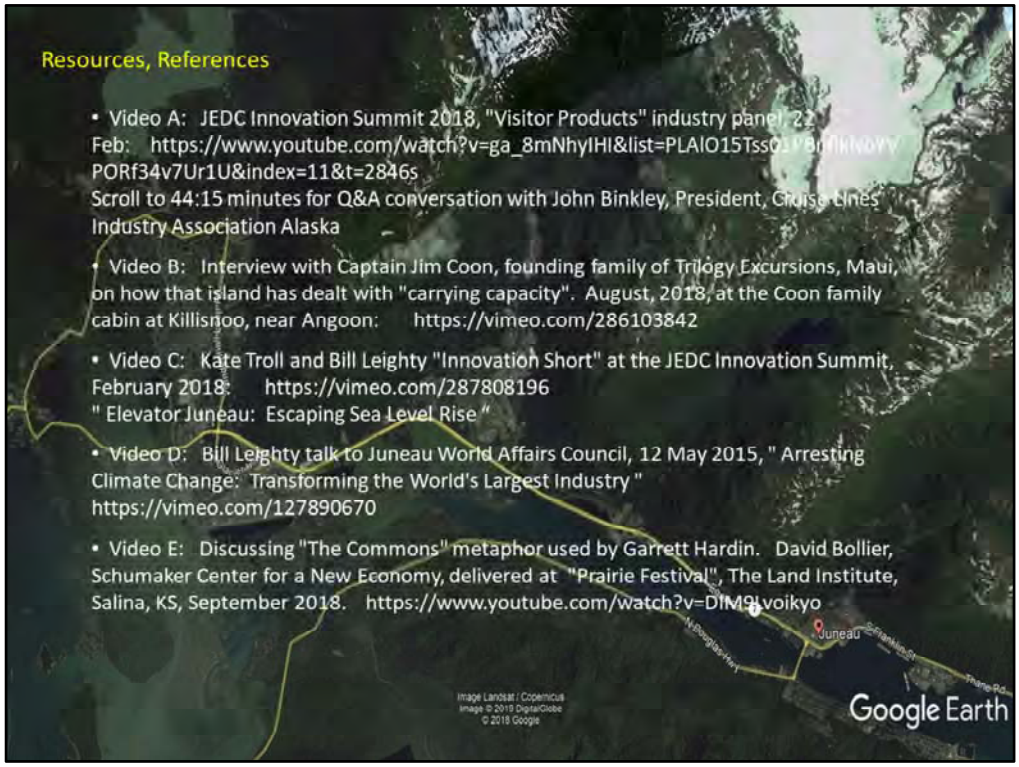
Resources, References
• Video A: JEDC Innovation Summit 2018, "Visitor Products" industry panel, 22 Feb: https://www.youtube.com/watch?v=ga_8mNhyIHI&list=PLAlO15Tss0
PORf34v7Ur1U&index=11&t=2846s
Scroll to 44:15 minutes for Q&A conversation with John Binkley, President, Cruise Lines Industry Association Alaska
• Video 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
• Video 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 D: Bill Leighty talk to Juneau World Affairs Council, 12 May 2015, " Arresting Climate Change: Transforming the World's Largest Industry "
https://vimeo.com/127890670
• Video E: Discussing "The Commons" metaphor used by Garrett Hardin. David Bollier, Schumaker Center for a New Economy, delivered at "Prairie Festival", The Land Institute, Salina, KS, September 2018. https://www.youtube.com/watch?v=DIM9Ivoikyo
Juneau
Google Earth

A

Topic: Business in a Changing Climate

1. Presentation title

Cruise Ships and Climate Change:
Juneau's Bargain for New Hydroelectricity-powered Shoreside Infrastructure to Benefit Everyone

2. Presentation Description

A. Outlining and advocating a strategy by which Juneau might succeed in encouraging the cruise ship industry, and perhaps also the airline industry, to invest in:
1. A hydroelectricity-powered shoreside infrastructure for ground, marine, and a portion of aviation transportation, for the benefit of all Juneau visitors and residents, year round;
2. Complete replacement of the tourism helicopter fleet with "quiet technology" helicopters.

B. Present an analysis of Juneau's ability -- via CBJ or other entities -- to assess and administer and enforce a "carrying capacity" for the visitor industry, based upon:
1. The capacity and quality of Juneau's shoreside transportation infrastructure;
2. Compliance with the goals of the CBJ's established Juneau Climate Action Plan and Juneau Renewable Energy Strategy; recognize that Southeast Alaska and Alaska tourism is very energy-intensive;
3. Juneau's potential as an energy-efficient and materials-conserving community as a better Capital City and as a refuge for those fleeing the Lower 48's salient problems with congestion and traffic, droughts and fires and floods and severe weather, and rapid sea level rise.

3. Why would this session be valuable to attendees? What can attendees expect to learn?

1. Juneau's potential as an energy-efficient and materials-conserving community as a better Capital City and as a refuge for those fleeing the Lower 48's salient problems with congestion and traffic, droughts and fires and floods and severe weather, and rapid sea level rise.
2. Juneau's authority and limits thereto for administering and enforcing "carrying capacity" within and upon the visitor industry, especially the cruise ship industry.
3. Potential long-term economic and social benefits to Juneau of Juneau's success in bargaining for new hydroelectricity-powered shoreside infrastructure to benefit everyone.

Business in a Changing Climate

Cruise Ships and Climate Change:
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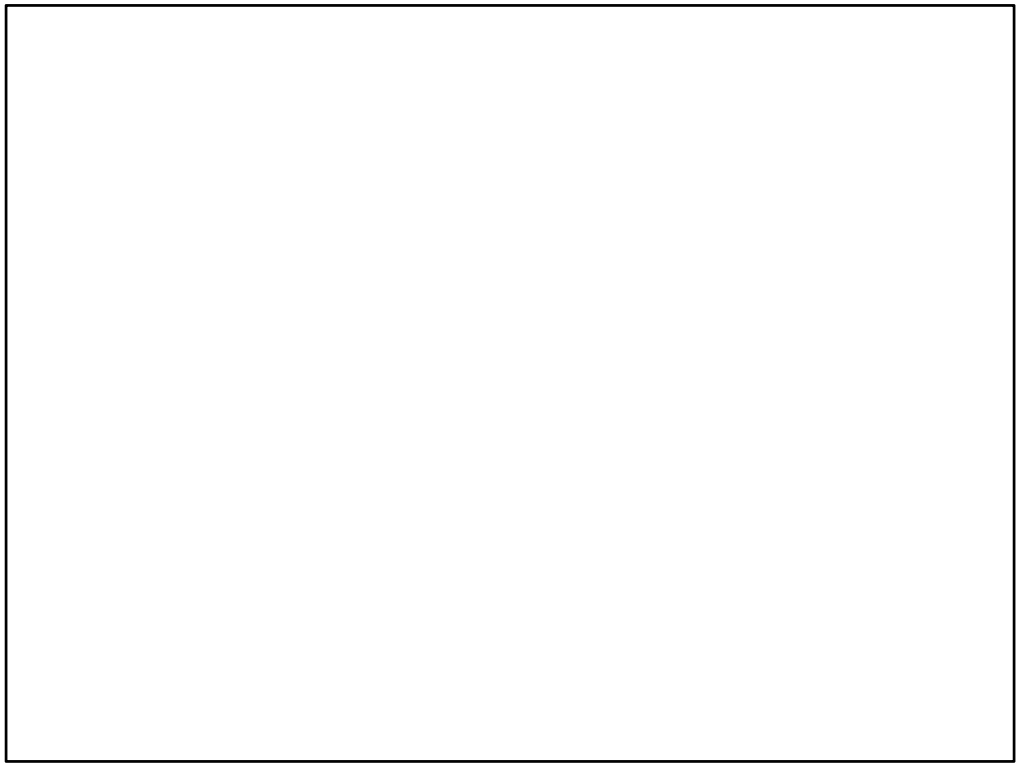


WEDNESDAY 4:00 PM
Making Tourism Work

Should Juneau Accommodate 1.5 million Cruise Ship Visitors Per Year? How? Why? At what Benefits and Costs?

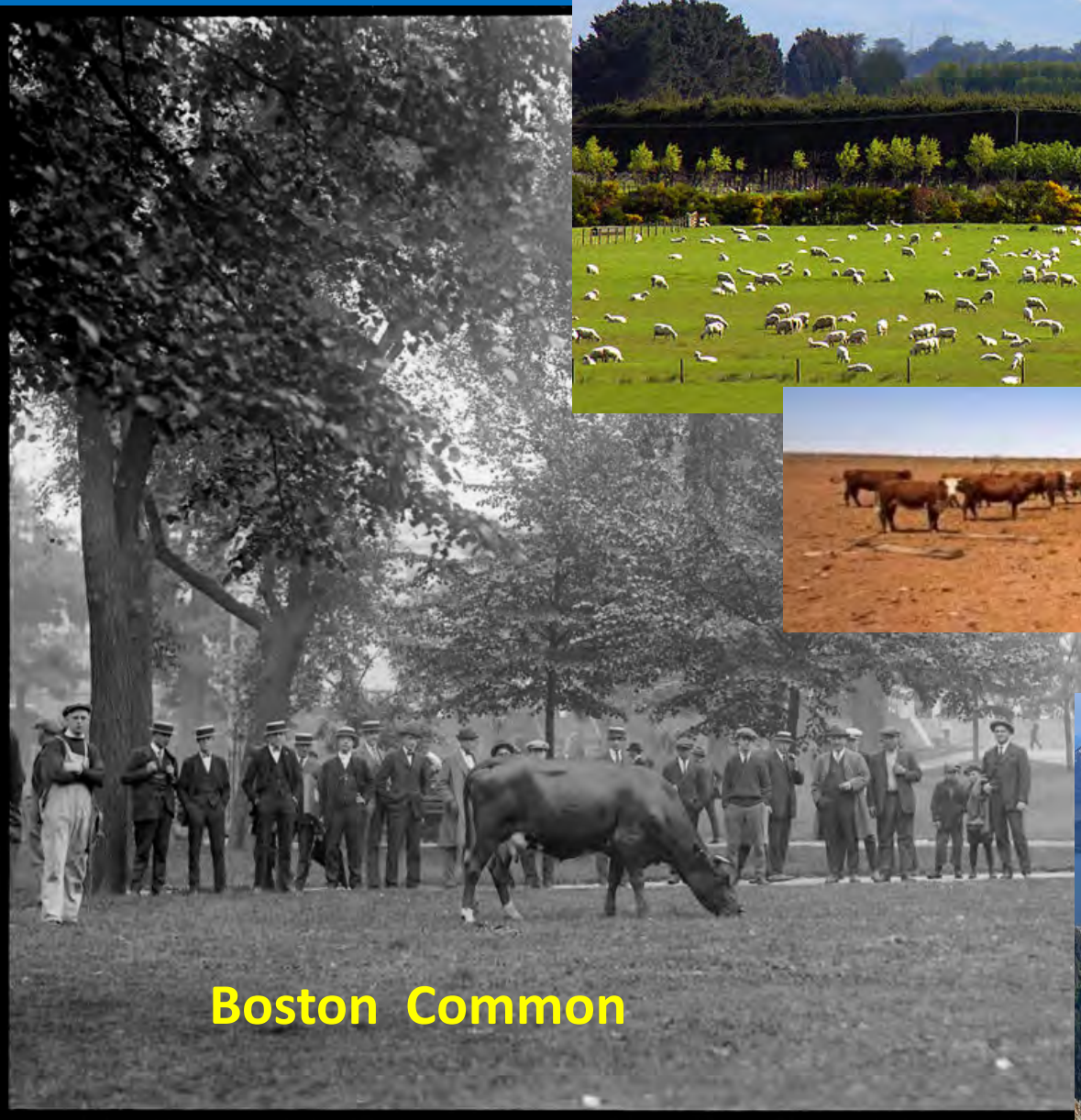
Bill Leighty, The Leighty Foundation
wleighty@earthlink.net
www.leightyfoundation.org/earth.php

"Making Tourism Work"
20 Feb 2019, 1600

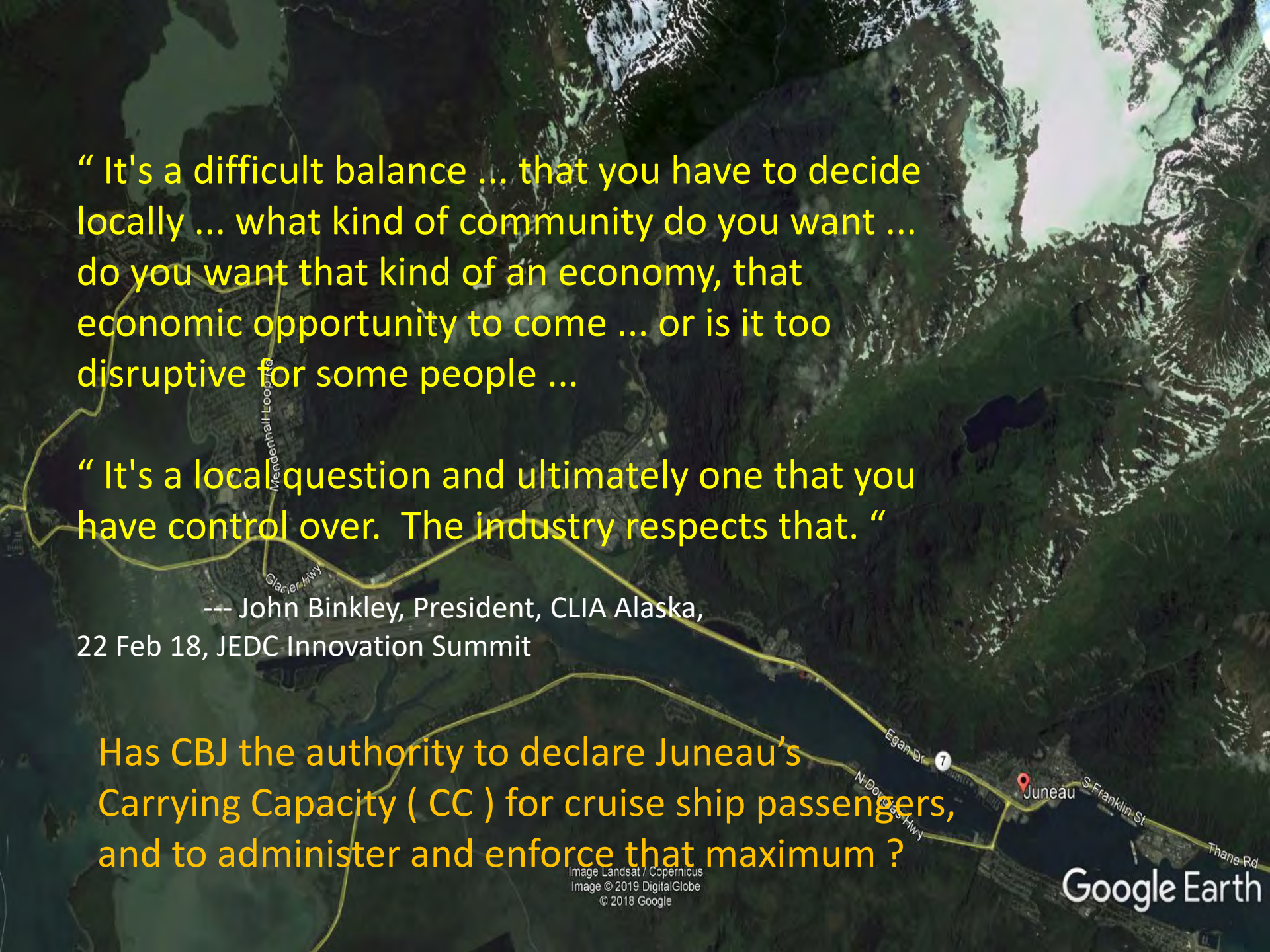
- Sheep, ships, pax, buses
- Pleasure, wonder, tranquility
- Noise, smoke, crowds, CO_2

Rev: 20 Feb 19

Tragedy of the Commons: Unpriced, free, abused



Tragedy of the Commons



" 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. "

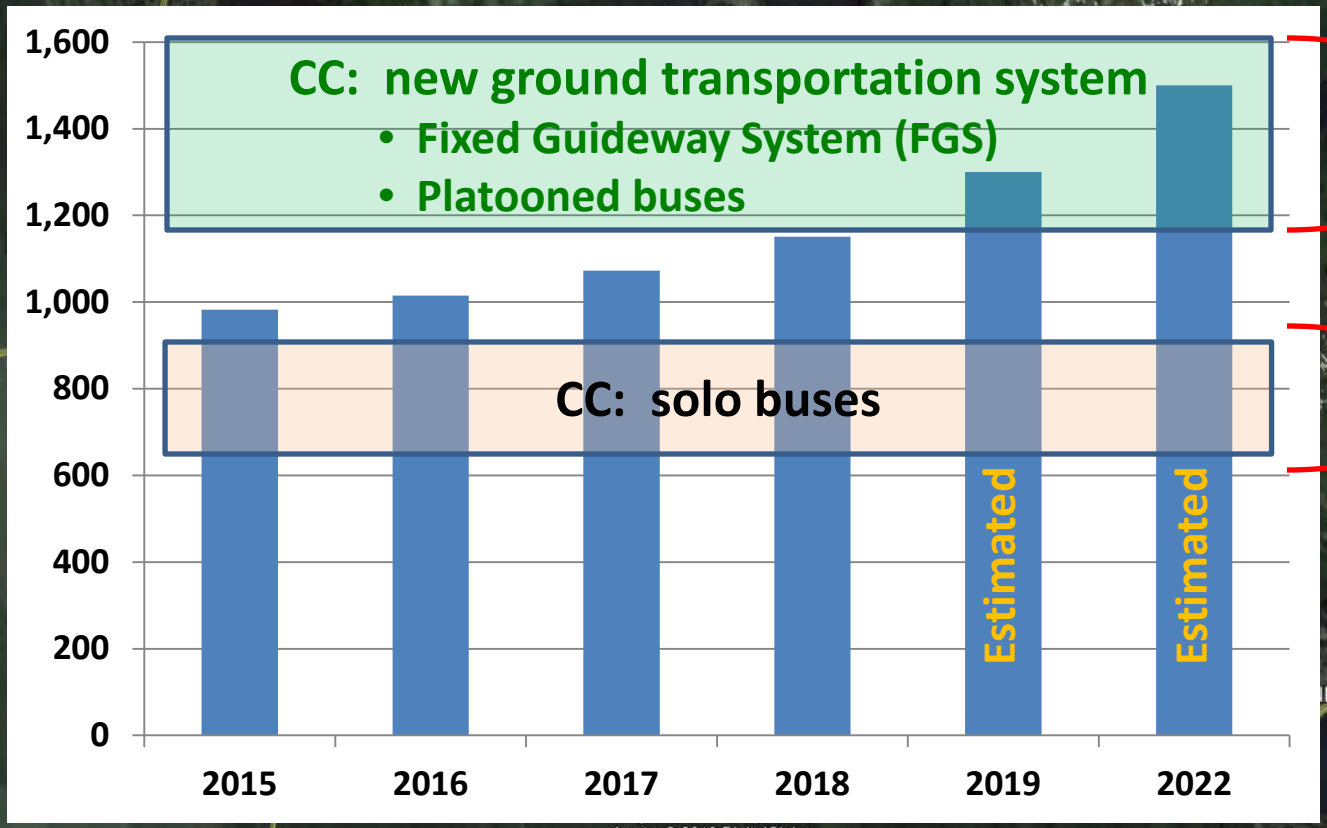
--- John Binkley, President, CLIA Alaska,
22 Feb 18, JEDC Innovation Summit

Has CBJ the authority to declare Juneau's Carrying Capacity (CC) for cruise ship passengers, and to administer and enforce that maximum ?

Juneau Total Cruise Ship Passengers, thousand

2019, 2022 estimated

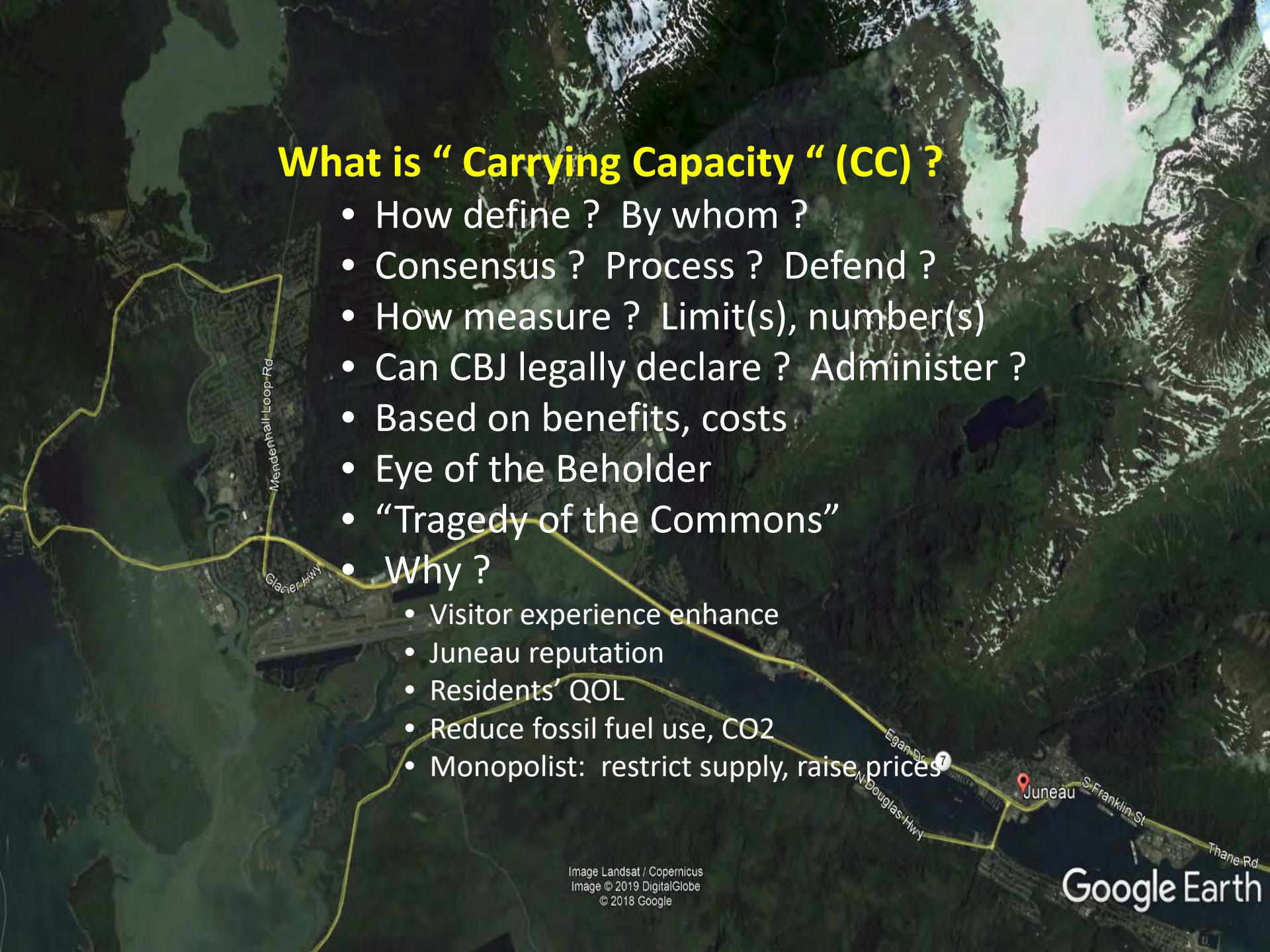
CC: "Carrying Capacity"



INNOVATION

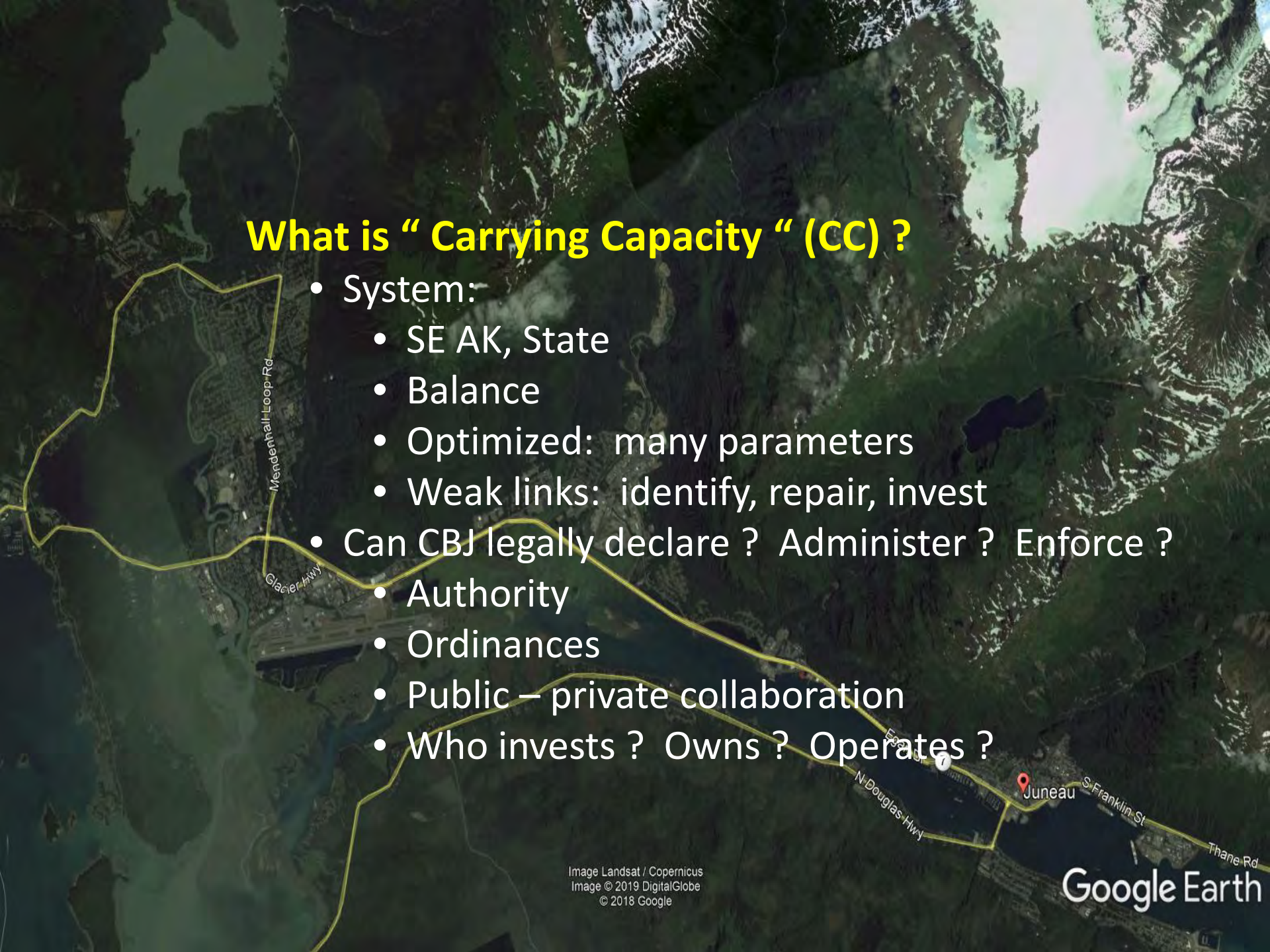
Opportunity: Public Private Partnership

- Aside from “Judge Holland criterion”
- Increasing CC is win for all ?
- Already beyond CC ?
- CBJ declares so; limits cruise ship pax 2020
- People of Juneau, CLIA Alaska, CBJ, USFS agree:
  - CC increase plan
  - Capex investment plan
    - New ground transport system
    - “Quiet Technology” copters
    - Other:
  - Execute
- Increase cruise ship pax, profitability



What is " Carrying Capacity " (CC) ?

- How define ? By whom ?
- Consensus ? Process ? Defend ?
- How measure ? Limit(s), number(s)
- Can CBJ legally declare ? Administer ?
- Based on benefits, costs
- Eye of the Beholder
- "Tragedy of the Commons"
- Why ?
  - Visitor experience enhance
  - Juneau reputation
  - Residents' QOL
  - Reduce fossil fuel use, CO2
  - Monopolist: restrict supply, raise prices



What is " Carrying Capacity " (CC) ?

- System:
  - SE AK, State
  - Balance
  - Optimized: many parameters
  - Weak links: identify, repair, invest
- Can CBJ legally declare ? Administer ? Enforce ?
  - Authority
  - Ordinances
  - Public – private collaboration
  - Who invests ? Owns ? Operates ?

Summer Tourism Carrying Capacity (CC)

Goals

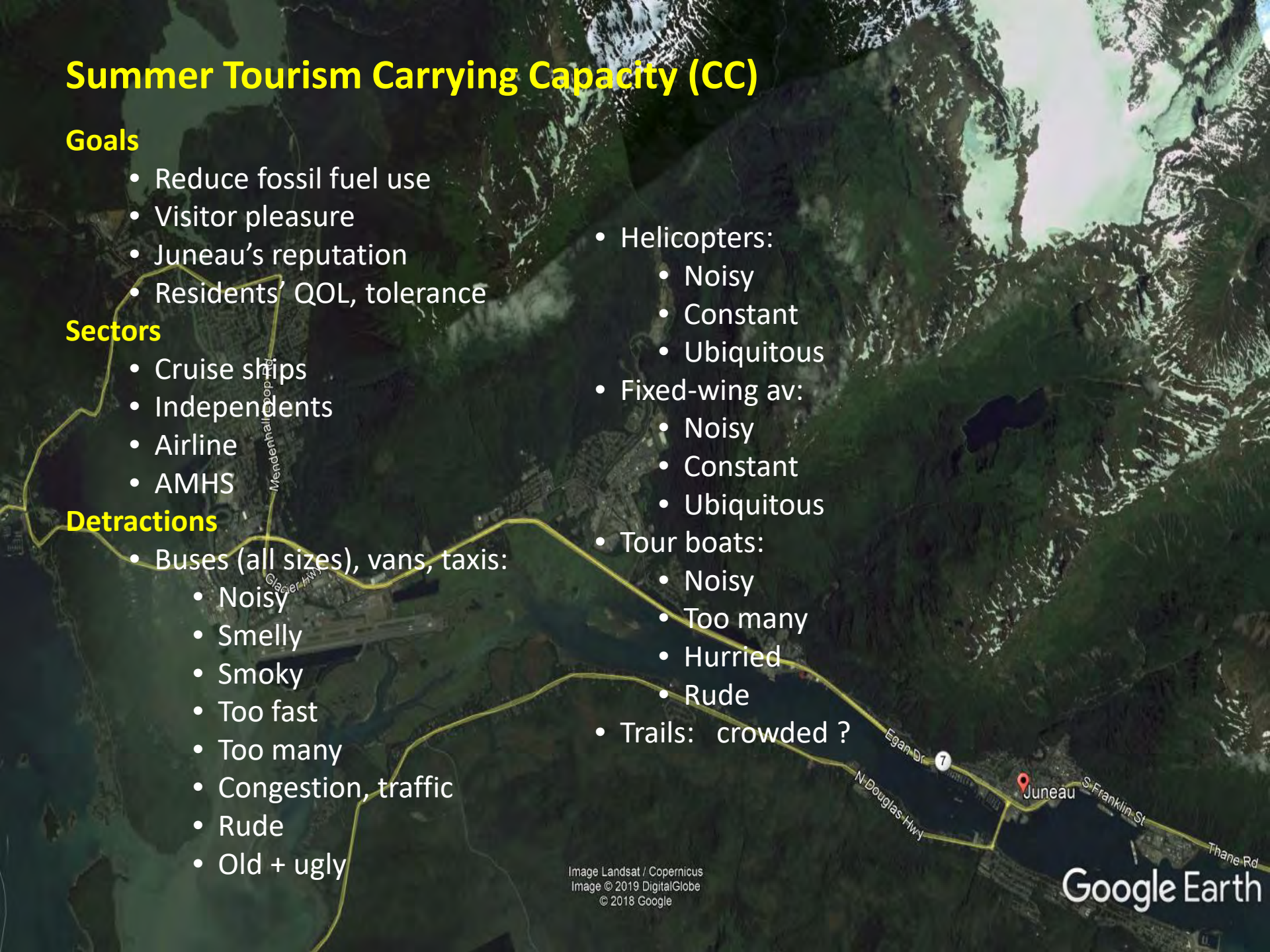
- Reduce fossil fuel use
- Visitor pleasure
- Juneau's reputation
- Residents' QOL, tolerance

Sectors

- Cruise ships
- Independents
- Airline
- AMHS

Detractions

- Buses (all sizes), vans, taxis:
  - Noisy
  - Smelly
  - Smoky
  - Too fast
  - Too many
  - Congestion, traffic
  - Rude
  - Old + ugly
- Helicopters:
  - Noisy
  - Constant
  - Ubiquitous
- Fixed-wing av:
  - Noisy
  - Constant
  - Ubiquitous
- Tour boats:
  - Noisy
  - Too many
  - Hurried
  - Rude
- Trails: crowded ?

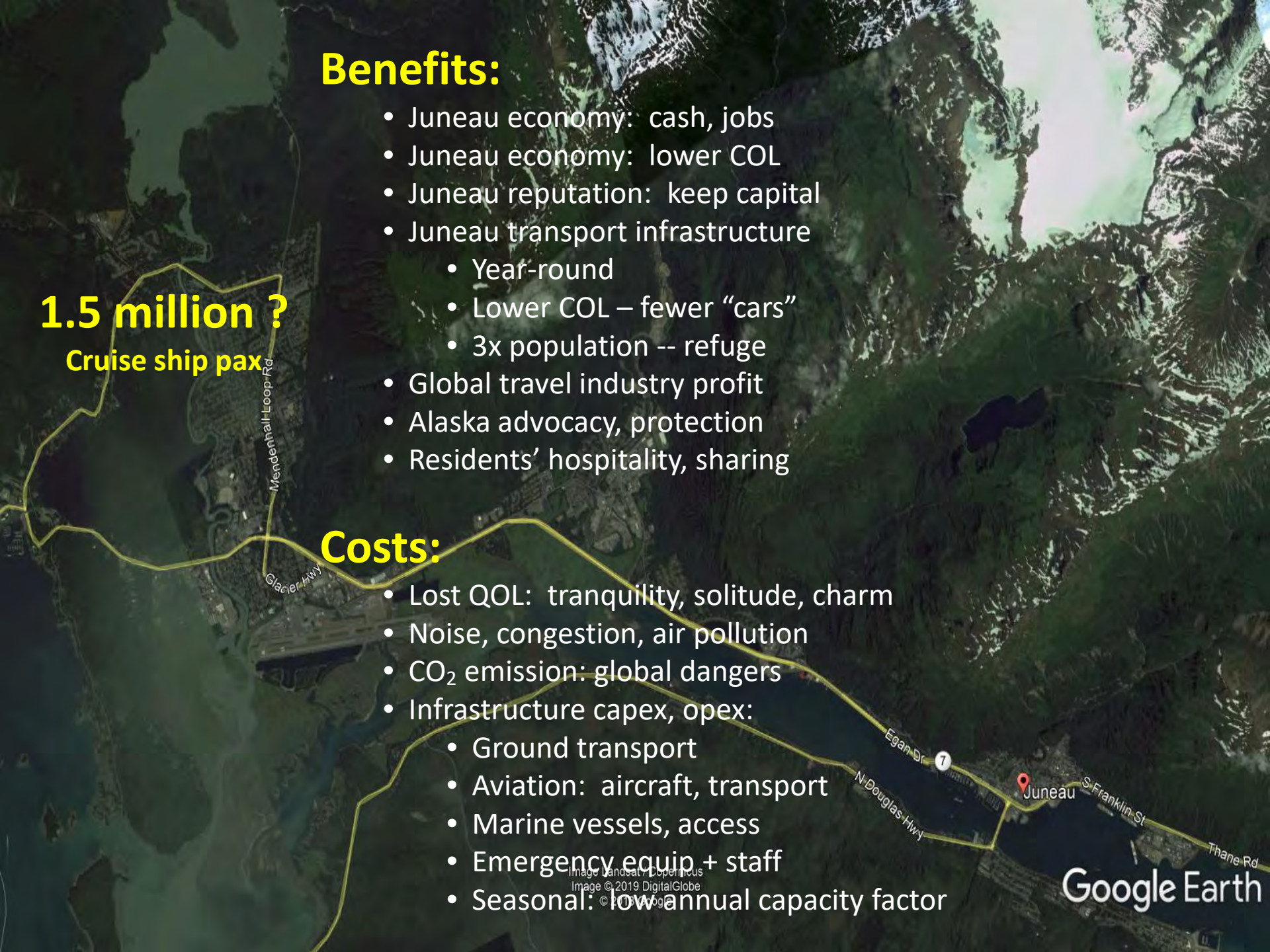


INNOVATION

“Quiet Technology”
Increase CC by reducing nuisance:
Replace all copters

Airbus EC130 “Eco-Star”
~ $ 3 million

Juneau: 20 @ $ 3m = $ 60m



Benefits:

- Juneau economy: cash, jobs
- Juneau economy: lower COL
- Juneau reputation: keep capital
- Juneau transport infrastructure
  - Year-round
  - Lower COL – fewer "cars"
  - 3x population -- refuge
- Global travel industry profit
- Alaska advocacy, protection
- Residents' hospitality, sharing

1.5 million ?

Cruise ship pax

Costs:

- Lost QOL: tranquility, solitude, charm
- Noise, congestion, air pollution
- CO_2 emission: global dangers
- Infrastructure capex, opex:
  - Ground transport
  - Aviation: aircraft, transport
  - Marine vessels, access
  - Emergency equip + staff
  - Seasonal: low annual capacity factor

"[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 ... "

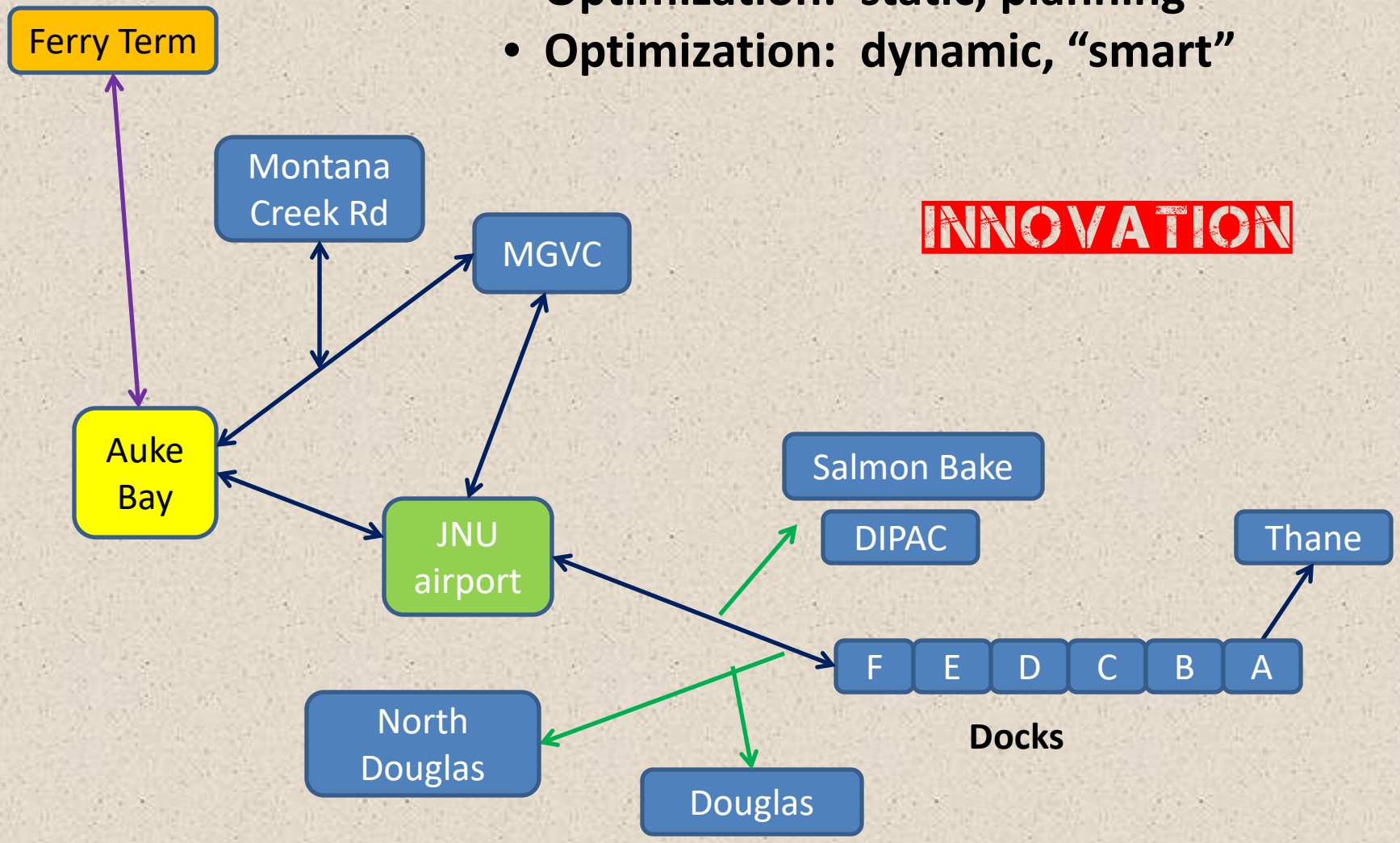
"As the industry grows, it may be that if Juneau is not able to maintain that level of satisfaction, they'll find other communities or destinations to go to, around Alaska."

--- John Binkley, President, CLIA Alaska,
22 Feb 18, JEDC Innovation Summit

Juneau Visitor Industry Ground Transportation System

DESIGN

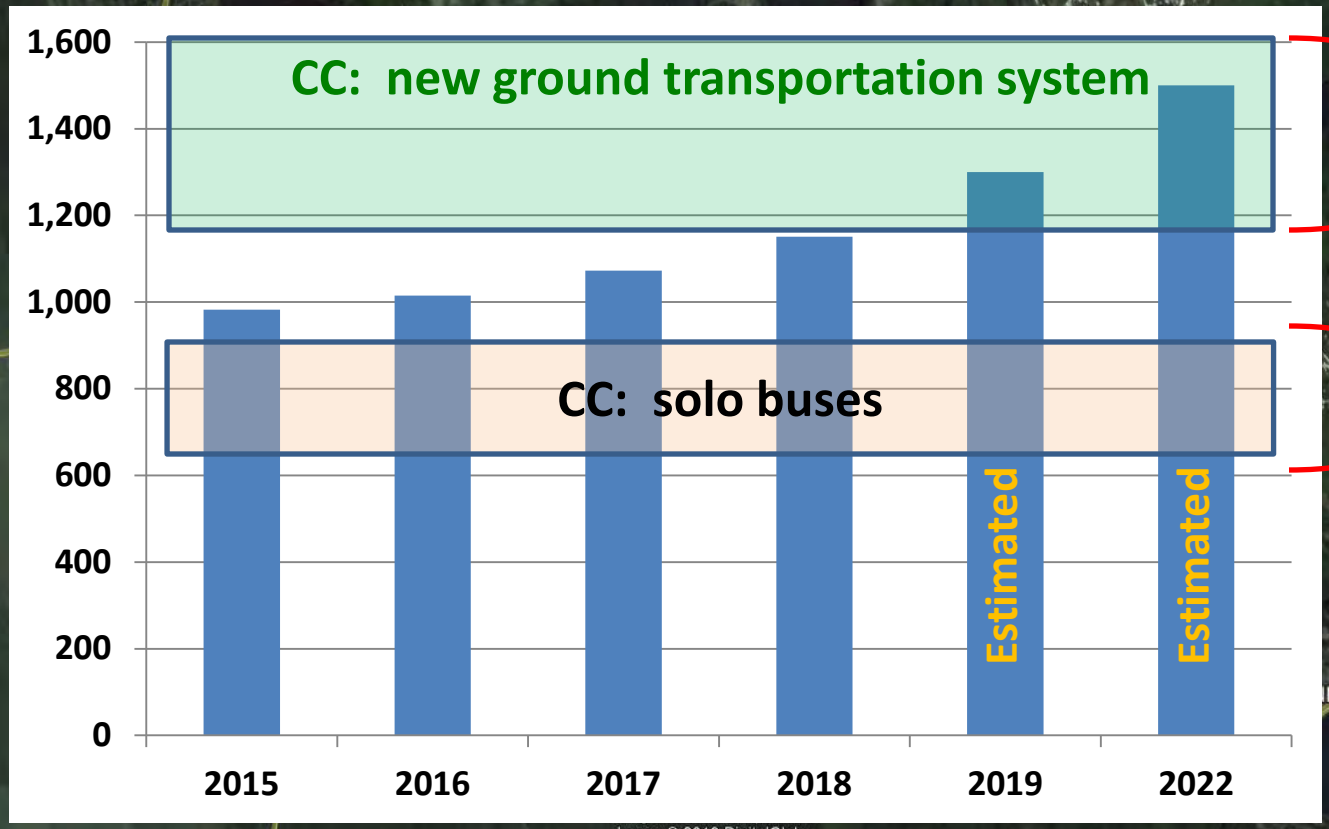
- System engineering: Resources, ops
- Optimization: static, planning
- Optimization: dynamic, “smart”

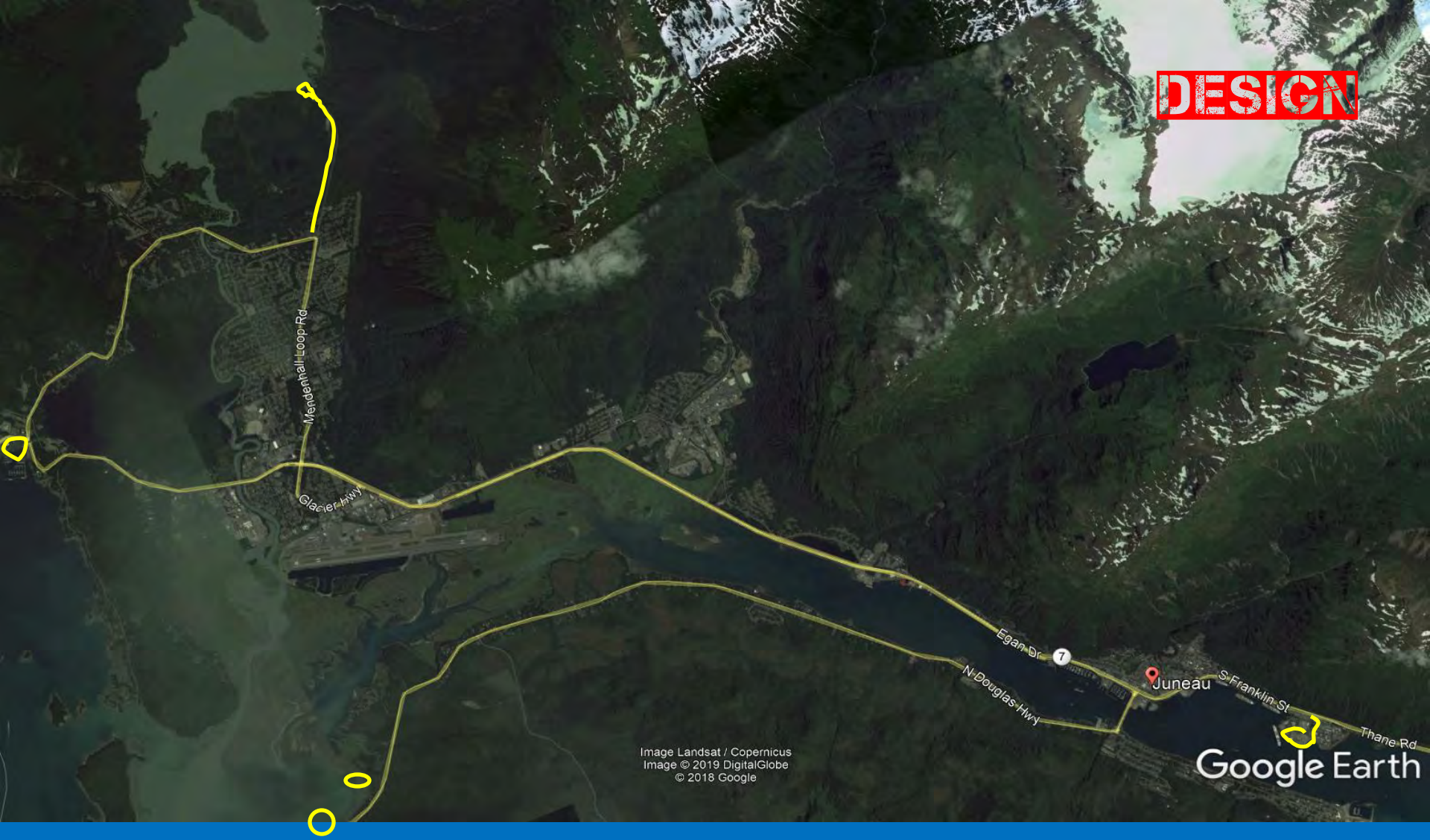


Juneau Total Cruise Ship Passengers, thousand

2019, 2022 estimated

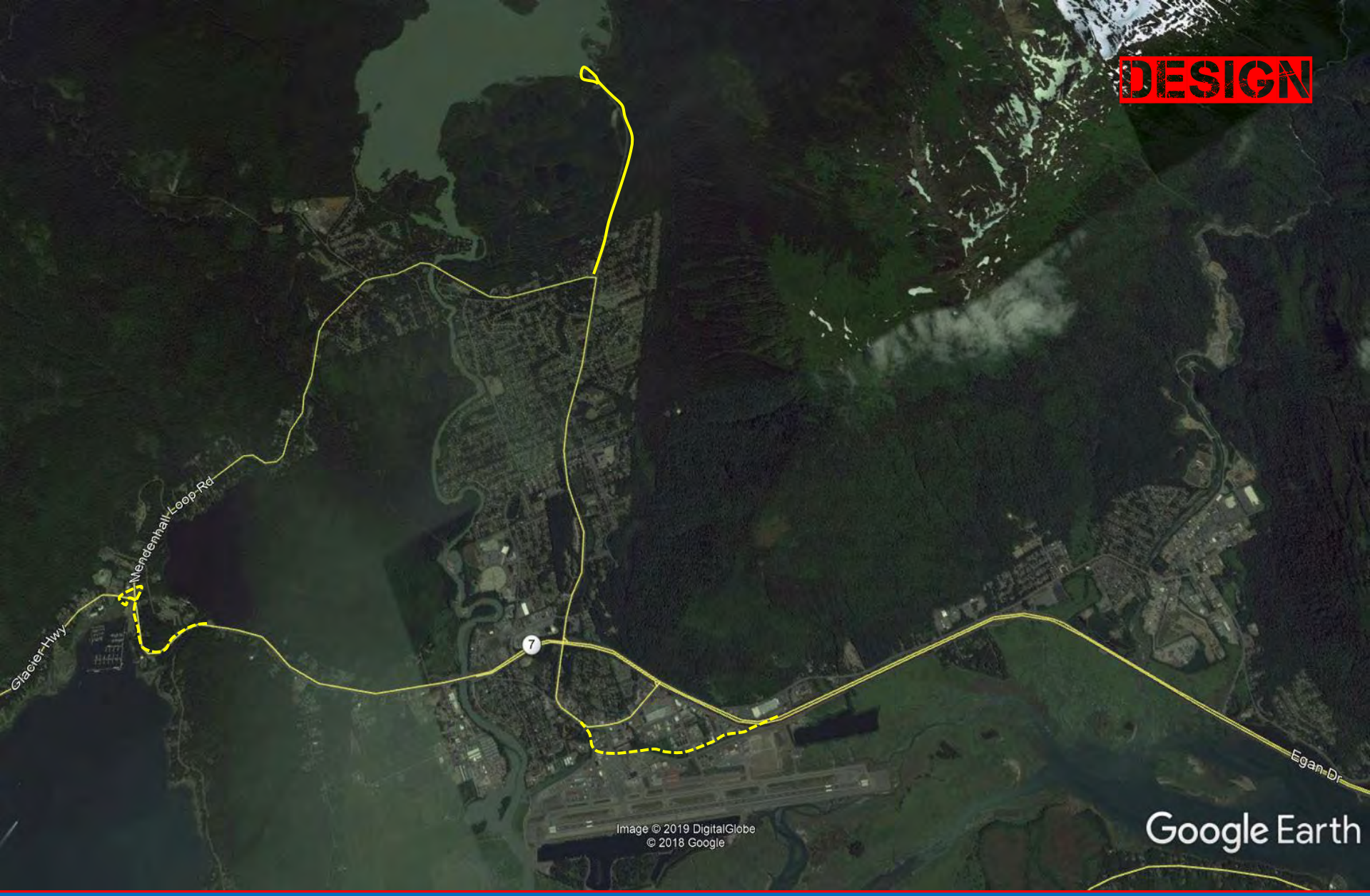
CC: "Carrying Capacity"

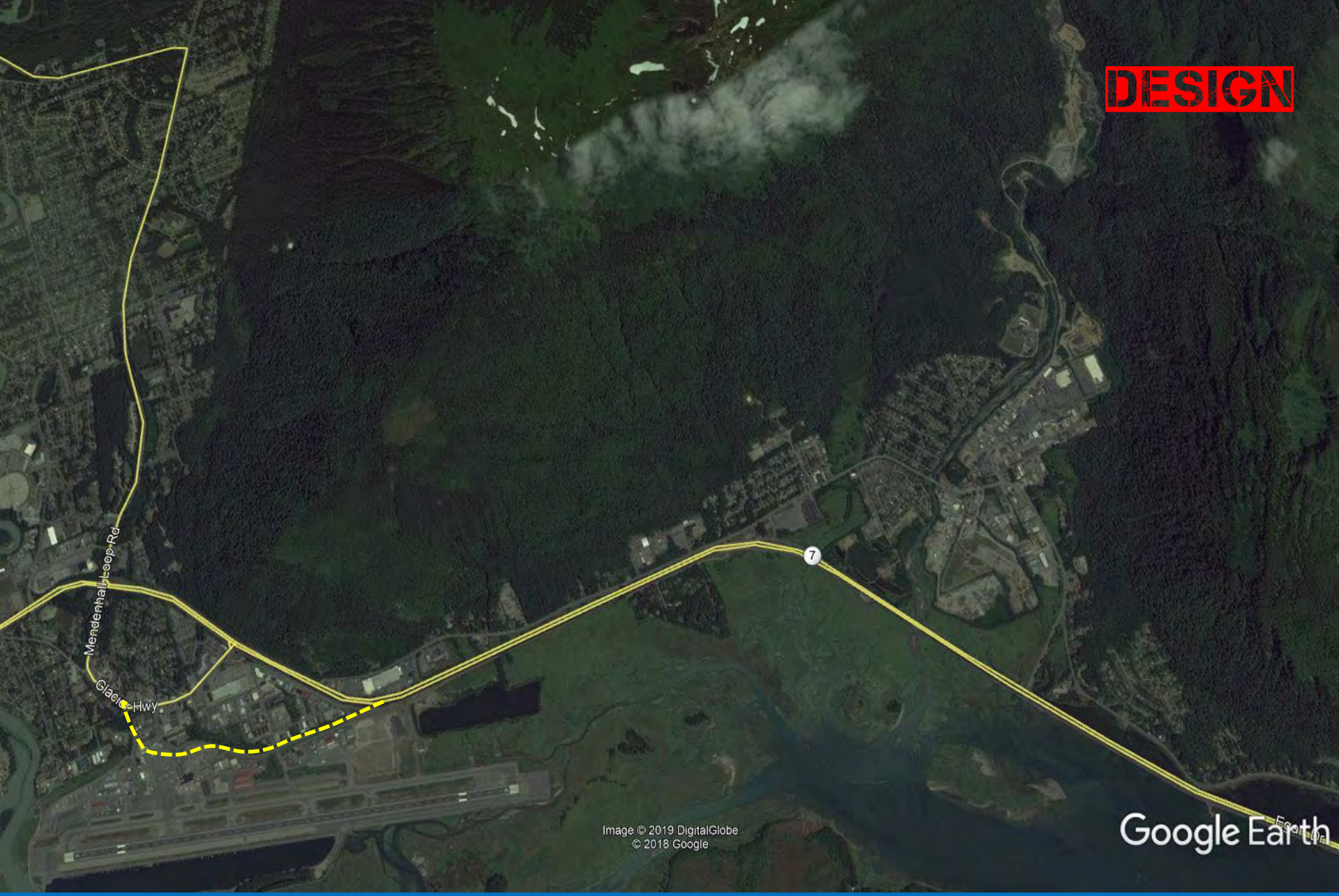




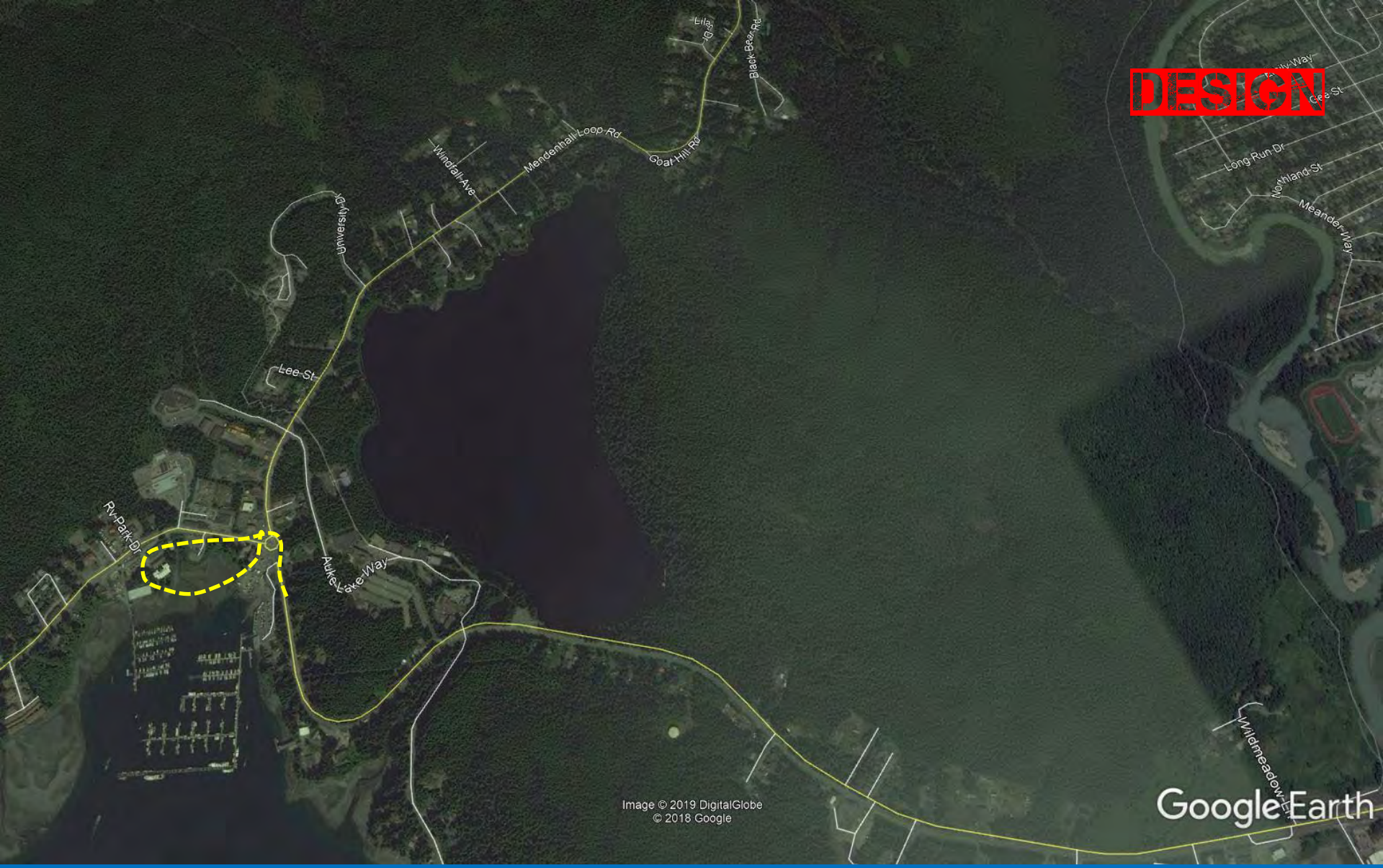
Juneau Visitor Industry Ground Transportation System


DESIGN
Calhoun Ave
W 8th St
Distin Ave
Village St
W Willoughby Ave
Willoughby Ave
W 3rd Ave
Whittier St
Egan Dr
Seward St
2nd St
N 3rd St
Dixon St
Front St
Shattuck Way
Gastineau Ave
7
S Franklin St
Thane Rd
Mill Rogers St
Jacobsen Dr
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth


DESIGN
Glacier Hwy
Mendenhall Loop Rd
7
Egan Dr
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth


DESIGN
Mendenhall Loop Rd
Glacier Hwy
7
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth


DESIGN
Photo Point Trail
E Glacier Trail
Glacier Spur Rd
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth


DESIGN
Black Bear Rd
Mendenhall Loop Rd
Goat Hill Rd
Windfall Ave
University Dr
Lee St
RV Park Dr
Auke Lake Way
Long Run Dr
Northland St
Meander Way
Wildmeadow Ln
Image © 2019 DigitalGlobe
© 2018 Google
Google Earth

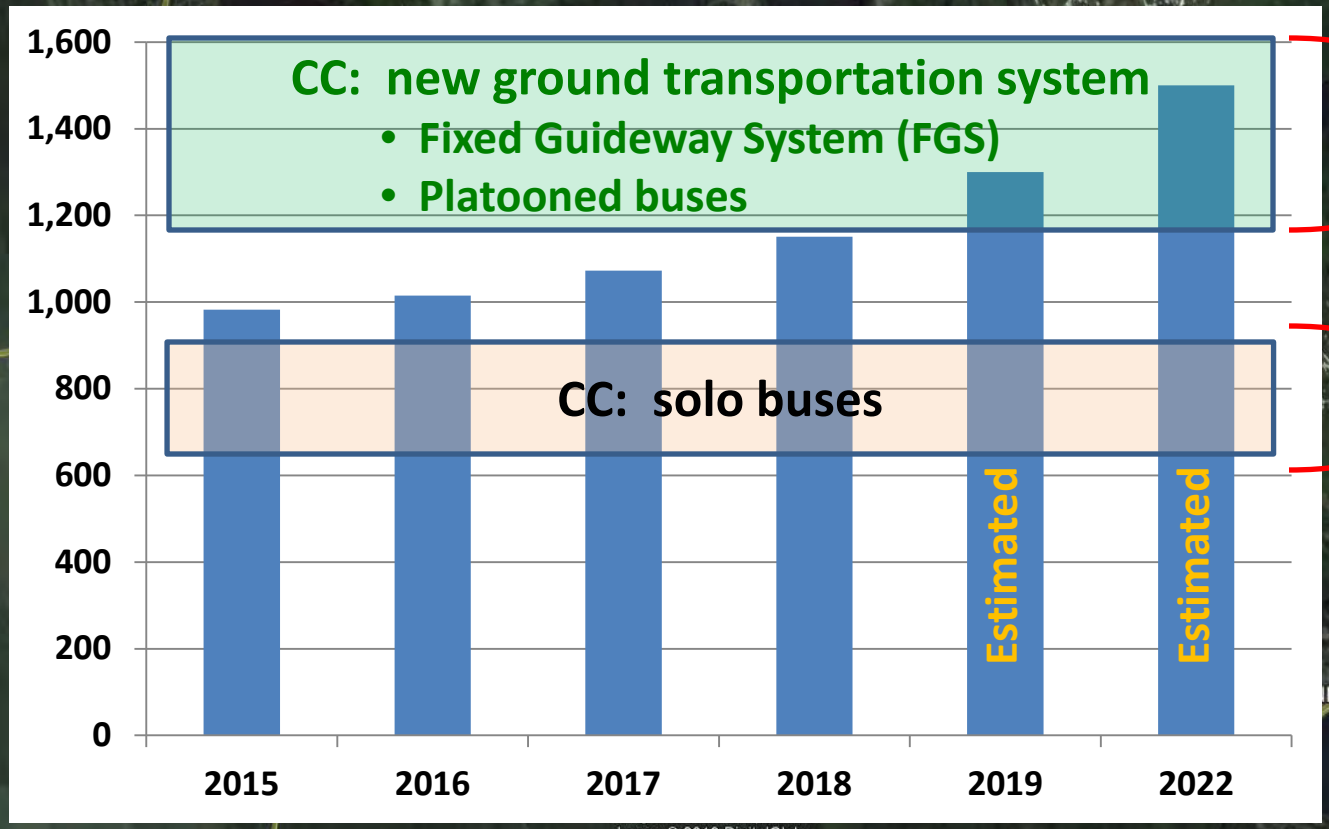
“Solo buses”: MCI “Coach” ~ 50 seats + baggage under high floor

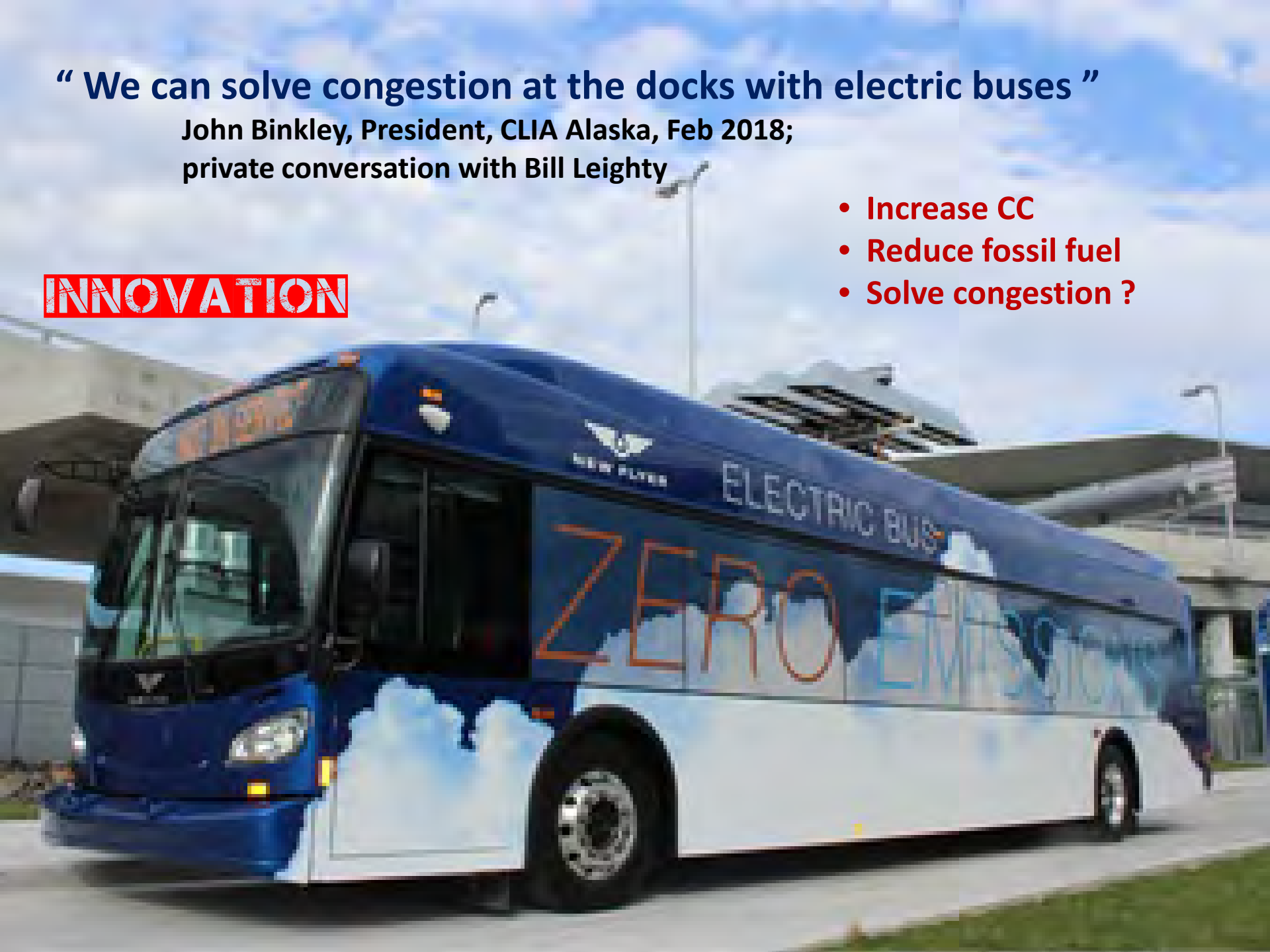
Need the baggage level ?

Juneau Total Cruise Ship Passengers, thousand

2019, 2022 estimated

CC: "Carrying Capacity"





" We can solve congestion at the docks with electric buses "

John Binkley, President, CLIA Alaska, Feb 2018;
private conversation with Bill Leighty

- **Increase CC**
- **Reduce fossil fuel**
- **Solve congestion ?**

INNOVATION

New Flyer Low-floor Battery Electric Vehicle (BEV)
~ $ 800,000, 50 pax, 175 mile range "city" duty
Plus ~ $ 30 – 50,000 charger per bus

Replace 80 Juneau old diesels:
80 @ $ 830,000 = $ 66 million

Replace 80 Juneau old diesels:
80 @ $ 830,000 = $ 66 million

MCI Battery High-floor "Coach" Electric Vehicle (BEV)
~ $ 800,000, 50 pax, 175 mile range "city" duty

Hydrogen Fuel Cell Bus

Typical “coach” interior, 48 – 54 seats

INNOVATION

Poland: 80 ft bus

Mercedes: Autonomous bus

“Trackless Tram” developed in Europe and China (CRRC Zhuzhou Institute)

Rubber-tired autonomous rail transit (ART) system.

Autonomous optical guidance system may be disabled by snow or water;

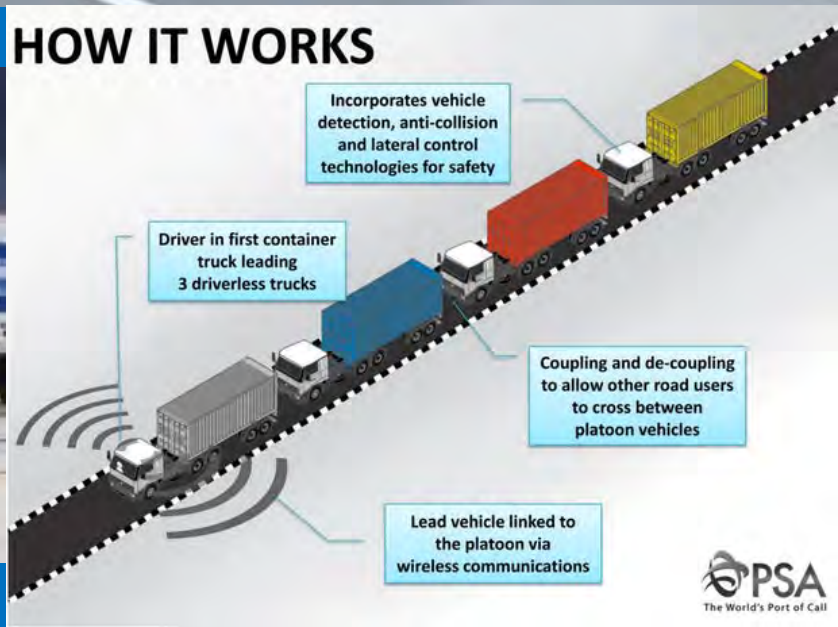
Perhaps summer-only use in Juneau.

One 3-segment vehicle; cannot release an autonomous vehicle to proceed to a different destination.

“Platooning” trucks, buses

INNOVATION

- Future: 5 years ?
- Autonomous, self-driving
- Wireless link, unlink
- “Bus train”



Light Rail Transit (LRT)
Fixed Guideway System (FGS)

Fixed Guideway System (FGS)

- Light Rail Transit (LRT)
- Streetcar
- Hybrid: LRT – Streetcar
- Bus Rapid Transit (BRT)

INNOVATION

Alstom Hydrogen-fueled, Fuel Cell Train

- No overhead wires
- 200 mile range
- 20 minute fueling
- Hydroelectric-source Hydrogen fuel: Zero Emission Vehicle (ZEV)

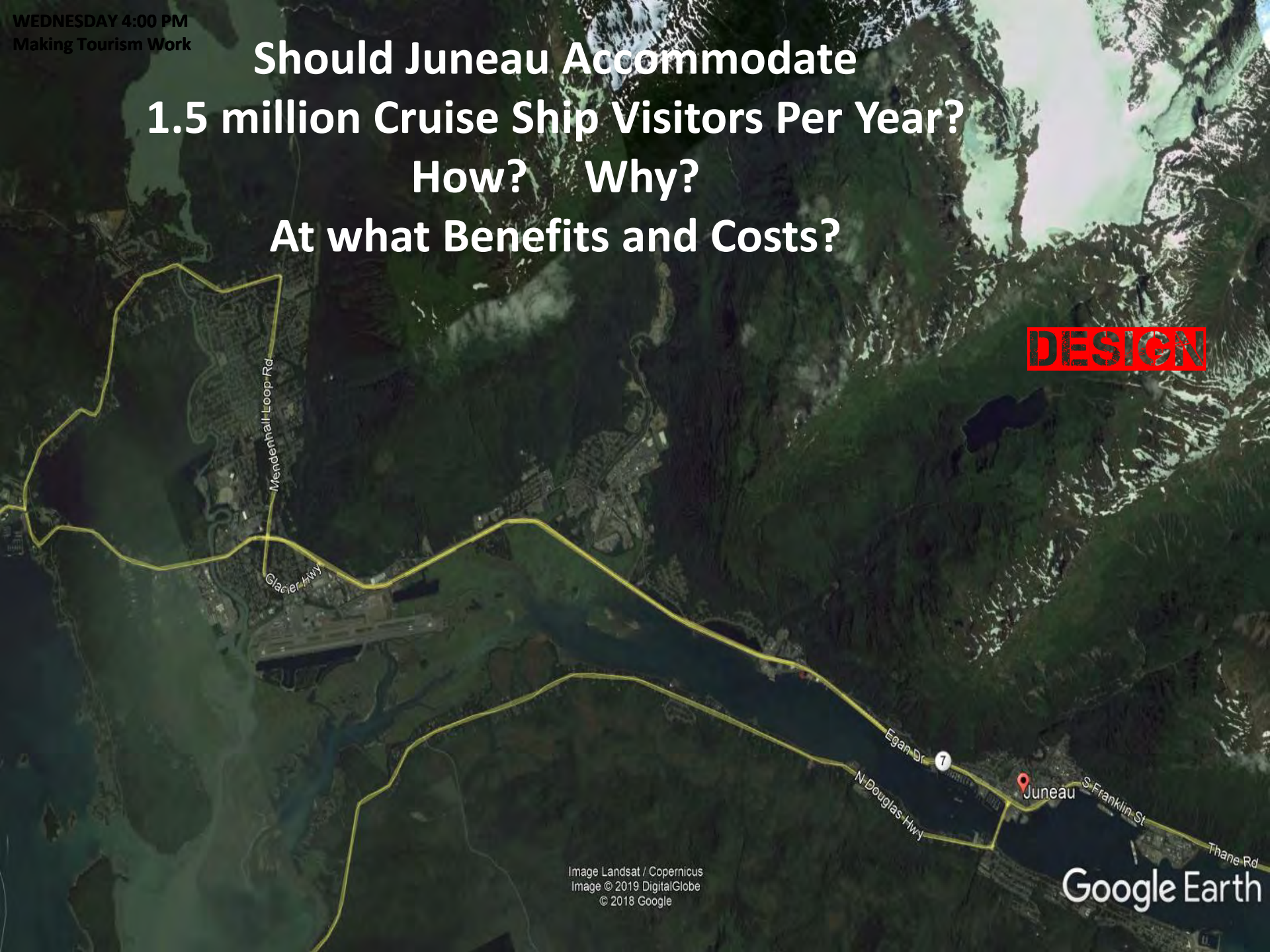
Sprinter Light Rail Transit (LRT)

WEDNESDAY 4:00 PM
Making Tourism Work

Should Juneau Accommodate 1.5 million Cruise Ship Visitors Per Year?

How? Why?

At what Benefits and Costs?



Fixed Guideway System (FGS) COSTS: CAPEX

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS Capital Expense (CAPEX)			$ million Each		$ million Total
Rolling stock:	40	cars	3		120
Track, double:	15	miles	3		45
Stations, ordinary:	20	stations	2		40
Station, Mode chang	1	stations	20		20
Maintenance barn:	1		40		40
Hydrogen fueling sta	1		50		50
Controls + crossing s	1		10		10
Personnel training: ops, maintenance			2		2
Design, planning, consulting			4		4
Contingency			35		35
ROW purchase			0		0
Grade-separated intersections			0		0
Total Capex, gross, FGS				**$ million**	**366**

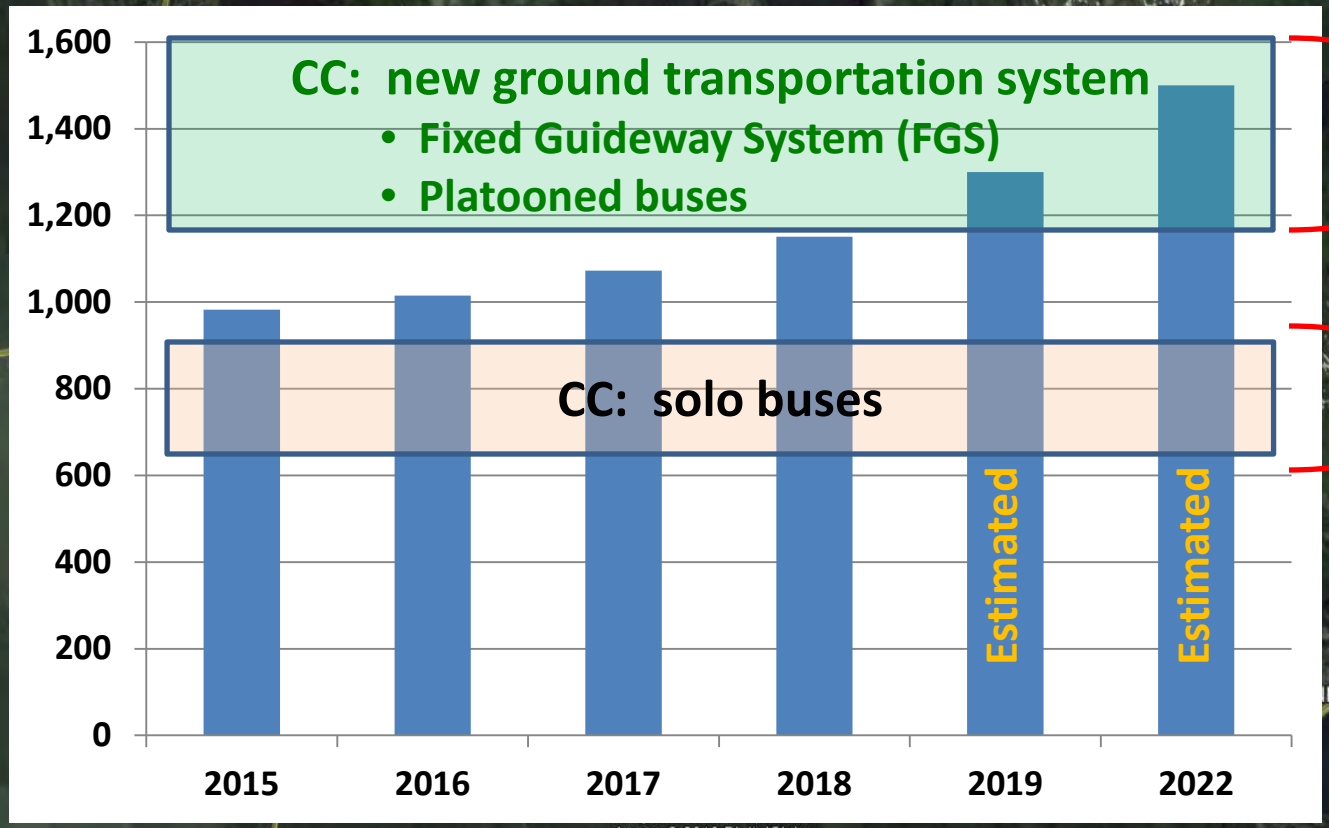
DESIGN

Juneau Total Cruise Ship Passengers, thousand

2019, 2022 estimated

CC: "Carrying Capacity"

INNOVATION



Fixed Guideway System (FGS) COSTS: CAPEX

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS Capital Expense (CAPEX)			$ million	$ million
DEDUCTIONS AND SAVINGS: private and public			Each	Each
Diesel "MCI" 50-60 pax "hiway" tour buses NOT replaced	60	buses	0.8	48
New parking structures not needed	3	garages	10	30
Parking lots surplused; land recovered to develop	10	acres	3	30
Highways projects not needed; fed funds repurposed	5	years	8	40
Deploy surplus FGS rolling stock "Outside" 7 months	20	cars	1	20
Total capex deductions and savings, gross, consequent of FGS			$ million	148

CAPEX REDUCTIONS: private and public	$ million
USDOT grant, FTA (Fed Transit Admin); theoretical; very uncertain	50
USFS USDA grant for MGVC improvement, CC increase	10
Private investment, misc: airlines, shore excursions	20
Other	0
Total capex reductions	$ million 80

NET CAPEX REQUIRED FOR FGS: beyond replace all buses: BEV or FCV	$138	$ million
Cruise ship industry share, residual, balance	$138	$ million
NET CAPEX DEFICIENCY	$0	$ million

Fixed Guideway System (FGS)

- Light Rail Transit (LRT)
- CC = 1.5 million

COSTS: OPEX

Bill Leighty estimate

FGS Operating Expense (OPEX) $ millions		
SUMMER 4 MONTHS, CRUISE SHIP INDUSTRY ALLOCATION		
FGS labor: drivers (operators)		10
FGS electric energy		10
FGS maintenance		5
FGS other		5
FGS subtotal		30
Cruise ship car host, hostess labor		10
Total cruise ship industry allocation		**40**
SUMMER 4 MONTHS, CBJ ALLOCATION "CAPITAL TRANSIT"		
FGS labor: drivers (operators)		2
FGS electric energy		1
FGS maintenance		1
FGS other		1
FGS subtotal		5
Less % "head tax" from CBJ	30	per cent
(Assume X million @ $ 8)	1.5	3.6
CBJ share, net of "head tax" summer 4 months		**1.4**
OTHER 8 MONTHS, CBJ ALLOCATION "CAPITAL TRANSIT"		
FGS labor: drivers (operators)		3
FGS electric energy		3
FGS maintenance		3
FGS other		2
FGS subtotal		**11**

Fixed Guideway System (FGS) BENEFITS – A

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

INNOVATION

FGS OPEX BENEFITS, SUMMER 4 MONTHS, CRUISE SHIP INDUSTRY: incremental margin increase						
0.6	million pax/yr CC increase @	$500	margin per pax =	$ million	300	Total gross margin
	Less opex, cruise ship share			$ million	40	
	Net total annual incremental margin increase			$ million	260	
	Simple annual ROI on total cruise ship industry capex			per cent	140	
240	short tons CO2 not emitted from burning diesel in "hiway" MCI buses; diesel buses replaced by FGS					
	Note: average 40 buses / day @ 30 miles / day x 100 days per summer = 120,000 miles per summer;					
	@ 5 mpg, = 24,000 gal diesel / summer @ 20 lbs CO2 / gallon = 480,000 lbs CO2 = 240 short tons CO2/yr					

Fixed Guideway System (FGS) BENEFITS – B

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS JUNEAU PUBLIC BENEFITS, PER 12 MONTHS								
1	$ million	Estimated Capital Transit Opex savings: fewer vehicles (bus, railcar), fewer drivers						
1	$ million	Estimated savings in school bus transportation						
36	$ million	Estimated savings, after-tax expense; need fewer private-owned light duty vehicle (LDV's)						
		6,000	fewer LDV's @	$6,000	total annual cost =	$36	million	
1	$ million	Estimated savings in snow removal						
1	$ million	Vacant garages converted to rental housing (small, inexpensive units): "affordable"						
10	$ million	Health care costs reduction; walk more; healthier; health insur premiums lower						
0	$ million	Other						
50	$ million	Total annual Juneau benefits						
		Simple annual ROI on total FGS capex, before adjustments				**14**	per cent	
		Simple annual ROI on adjusted total FGS capex				**36**	per cent	
	Juneau population =	32,000						
$1,563	Average cash saving per person, after tax, per year							

Fixed Guideway System (FGS) BENEFITS – C

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS TOTAL ANNUAL PUBLIC AND PRIVATE BENEFITS							
Cruise ship industry, net			$260		million		
Juneau, private and CBJ			$50		million		
Total			$310		million		
Simple annual ROI on total FGS capex, before adjustments						85	per cent
Simple annual ROI on adjusted total FGS capex						225	per cent

Fixed Guideway System (FGS) BENEFITS – D

Bill Leighty estimate

- Light Rail Transit (LRT)
- CC = 1.5 million

FGS OPEX BENEFITS, SUMMER 4 MONTHS, CRUISE SHIP INDUSTRY: incremental margin increase							
0.6	million pax/yr CC increase @	$500	margin per pax =		$ million	300	Total gross margin
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0	$ million	Other					
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		Simple annual ROI on adjusted total FGS capex				**36**	per cent
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Cruise ship industry, net		$260	million				
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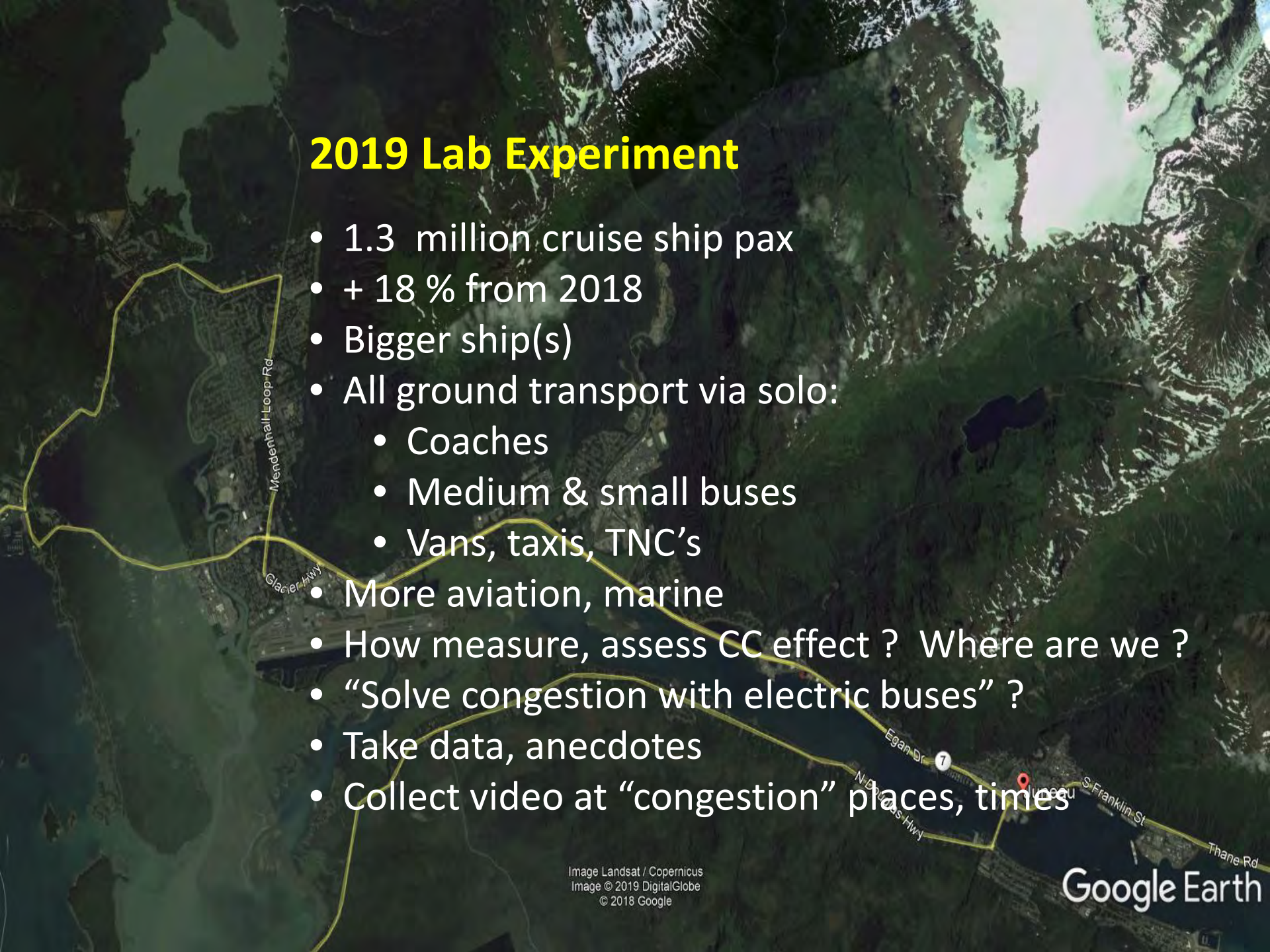
Total		$310	million				
Simple annual ROI on total FGS capex, before adjustments					**85**	per cent	
Simple annual ROI on adjusted total FGS capex					**225**	per cent	

2019 Lab Experiment

- 1.3 million cruise ship pax
- + 18 % from 2018
- Bigger ship(s)
- All ground transport via solo:
  - Coaches
  - Medium & small buses
  - Vans, taxis, TNC's
- More aviation, marine
- How measure, assess CC effect ? Where are we ?
- "Solve congestion with electric buses" ?
- Take data, anecdotes
- Collect video at "congestion" places, times

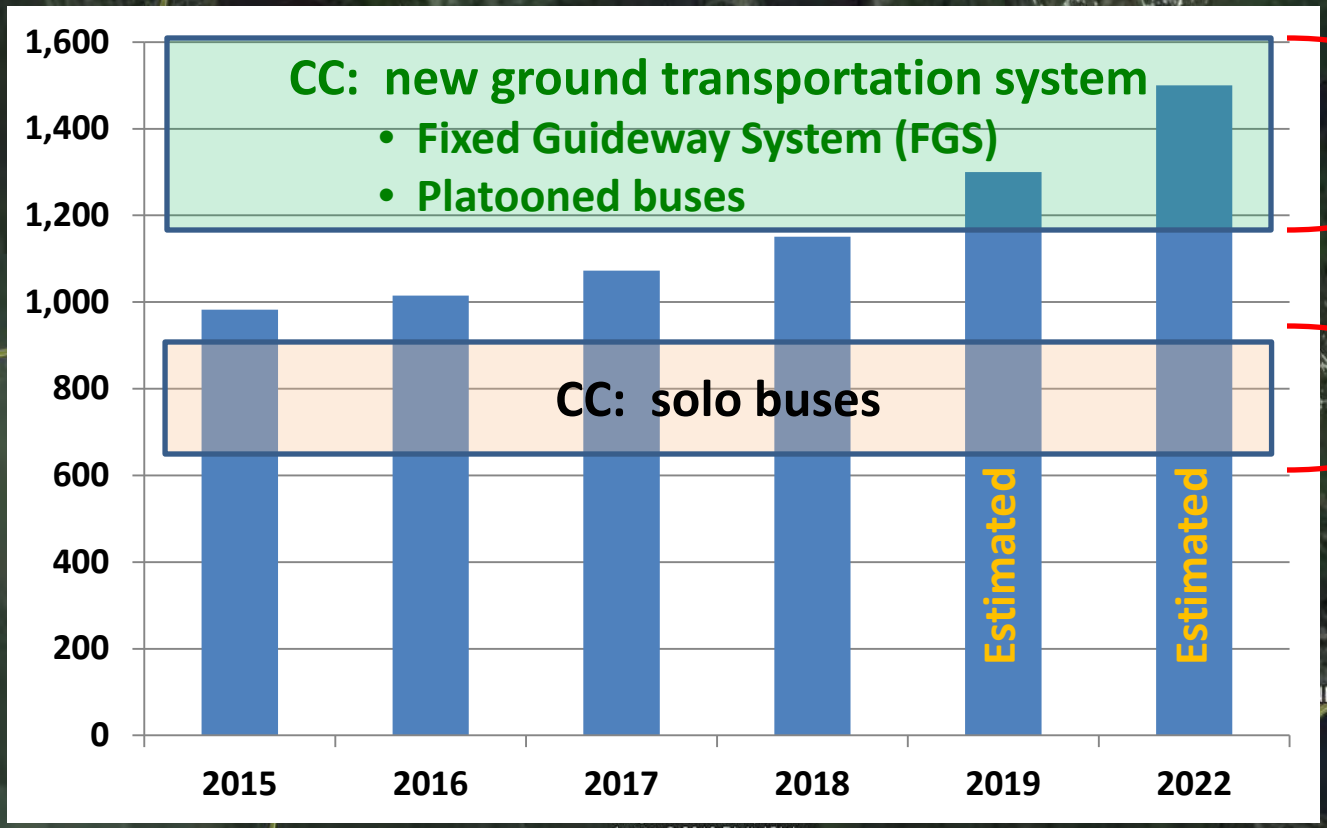


Juneau Total Cruise Ship Passengers, thousand

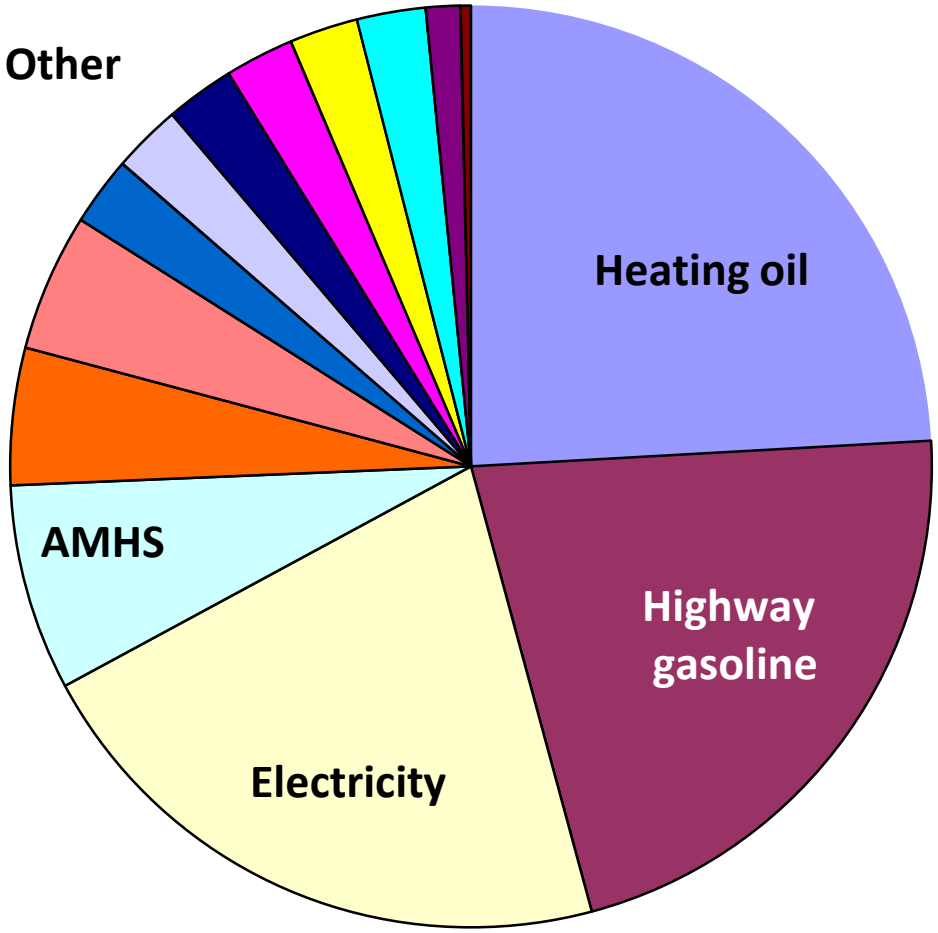
2019, 2022 estimated

CC: "Carrying Capacity"

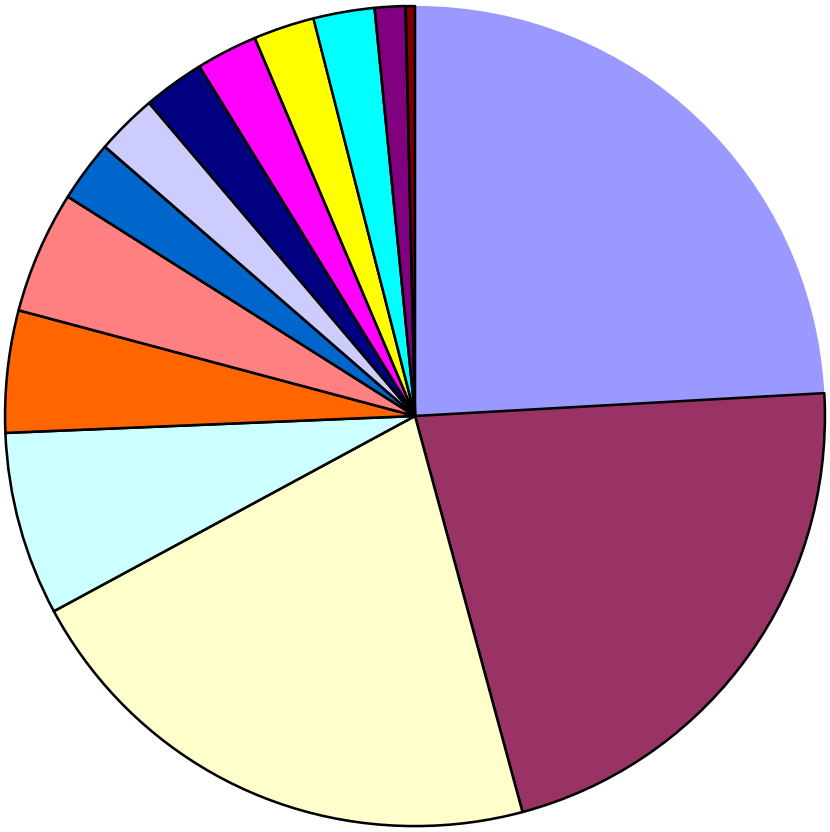
INNOVATION



Juneau INTERNAL energy 2009

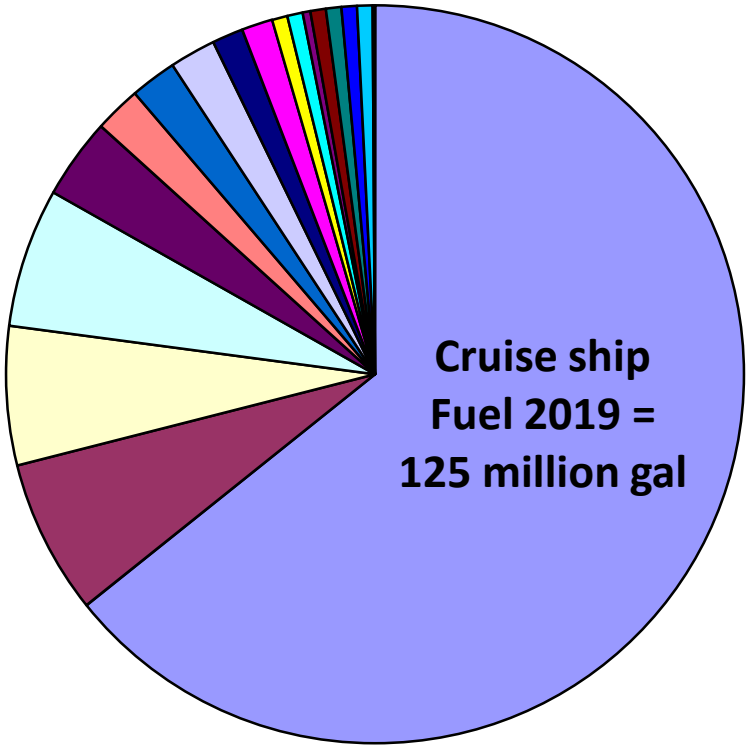


Juneau INTERNAL energy 2019, Estimated
[assumed same as 2009, but tourism up]



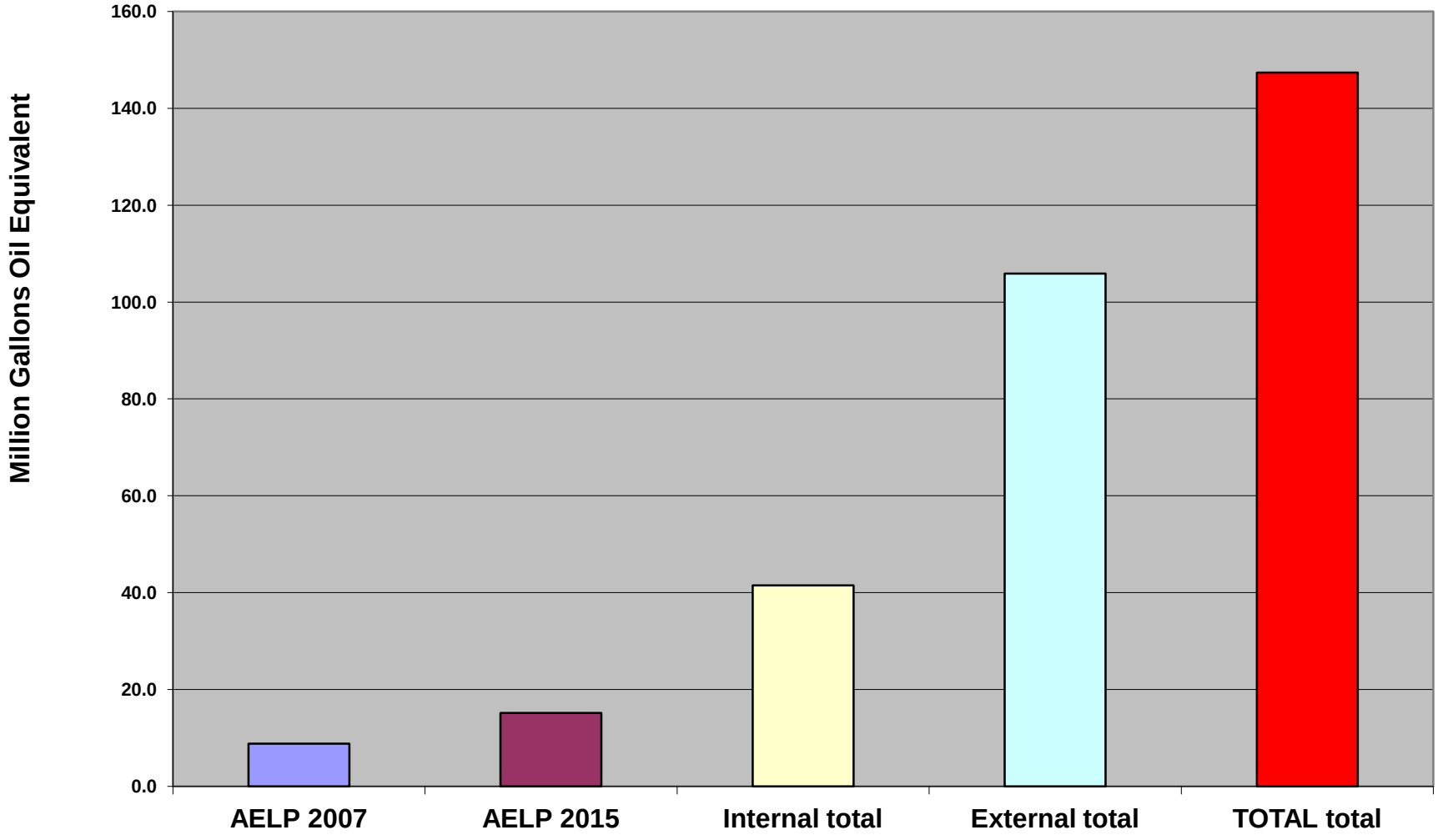
Heating Oil
Hiway Gasoline
Electricity
AMHS
Av Turb AS
Av Turb Other
Hiway Diesel
Other Diesel
Av Gas
Marine Other
Other
Propane
CapTransit Diesel
Wood

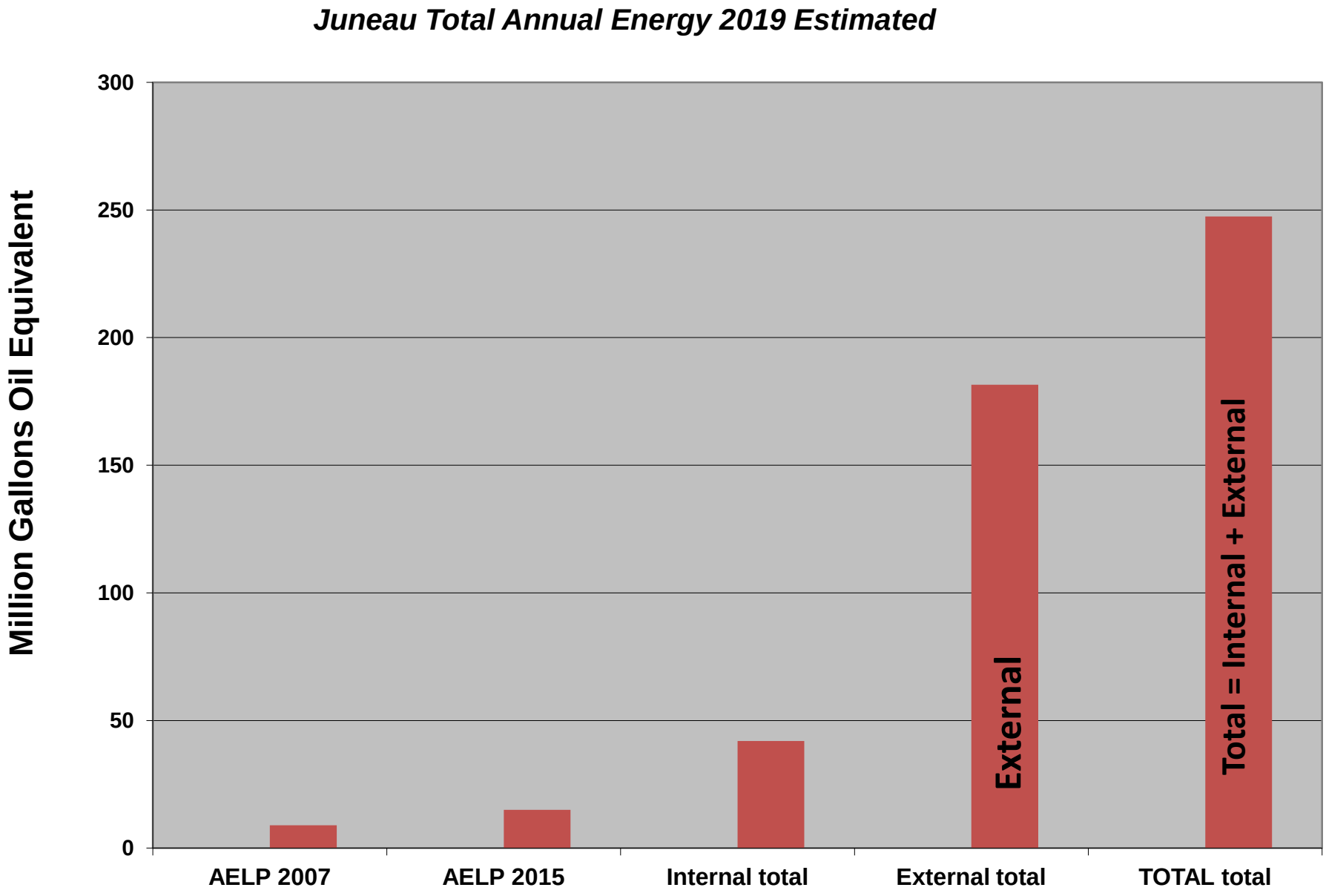
Juneau TOTAL Energy 2009
[assume 2019 tourism up]



Cruise Ships	Heat Oil	Hiway Gas	Electric	Barge
AMHS	AS (external)	AMHS	Av Turb AS	Av Turb Other
Hiway Diesel	Other Diesel	CapTrans Diesel	Av Gas	Marine Other
Other	Propane	Wood		

Juneau Total Annual Energy Consumed to Enable Juneau as we know it 2009




Juneau Total Annual Energy 2019 Estimated
Million Gallons Oil Equivalent
300
250
200
150
100
50
0
External
Total = Internal + External
AELP 2007
AELP 2015
Internal total
External total
TOTAL total

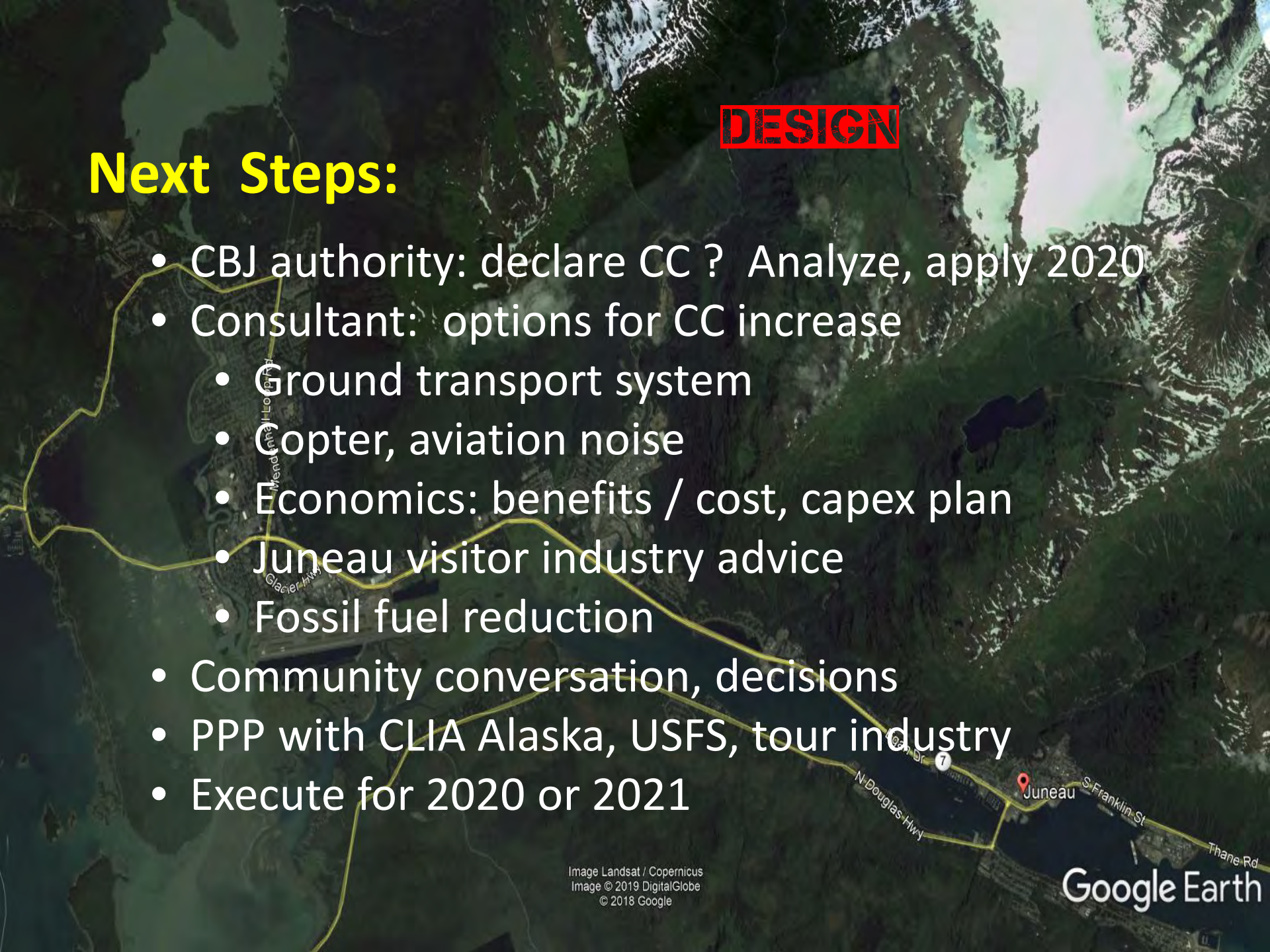
Fossil Fuel Problem

- "Climate Change" -- GreenHouse Gas (GHG) emission
- 125 million gallons cruise ship fuel = 1.1 million tons CO_2
- Juneau: ground transport, aviation, marine
- Reduce Juneau's carbon footprint – global commons
  - Juneau Commission on Sustainability (JCOS)
  - Juneau Climate Action & Implementation Plan – 2011
  - Juneau Renewable Energy Strategy – 2018
  - Juneau Comprehensive Plan – update, soon
  - Renewable Juneau
  - Juneau Interfaith Power and Light
  - Juneau 350.org
- Run Juneau on Renewables: hydropower +

DESIGN

Next Steps:

- CBJ authority: declare CC ? Analyze, apply 2020
- Consultant: options for CC increase
  - Ground transport system
  - Copter, aviation noise
  - Economics: benefits / cost, capex plan
  - Juneau visitor industry advice
  - Fossil fuel reduction
- Community conversation, decisions
- PPP with CLIA Alaska, USFS, tour industry
- Execute for 2020 or 2021



INNOVATION

Opportunity: Public Private Partnership

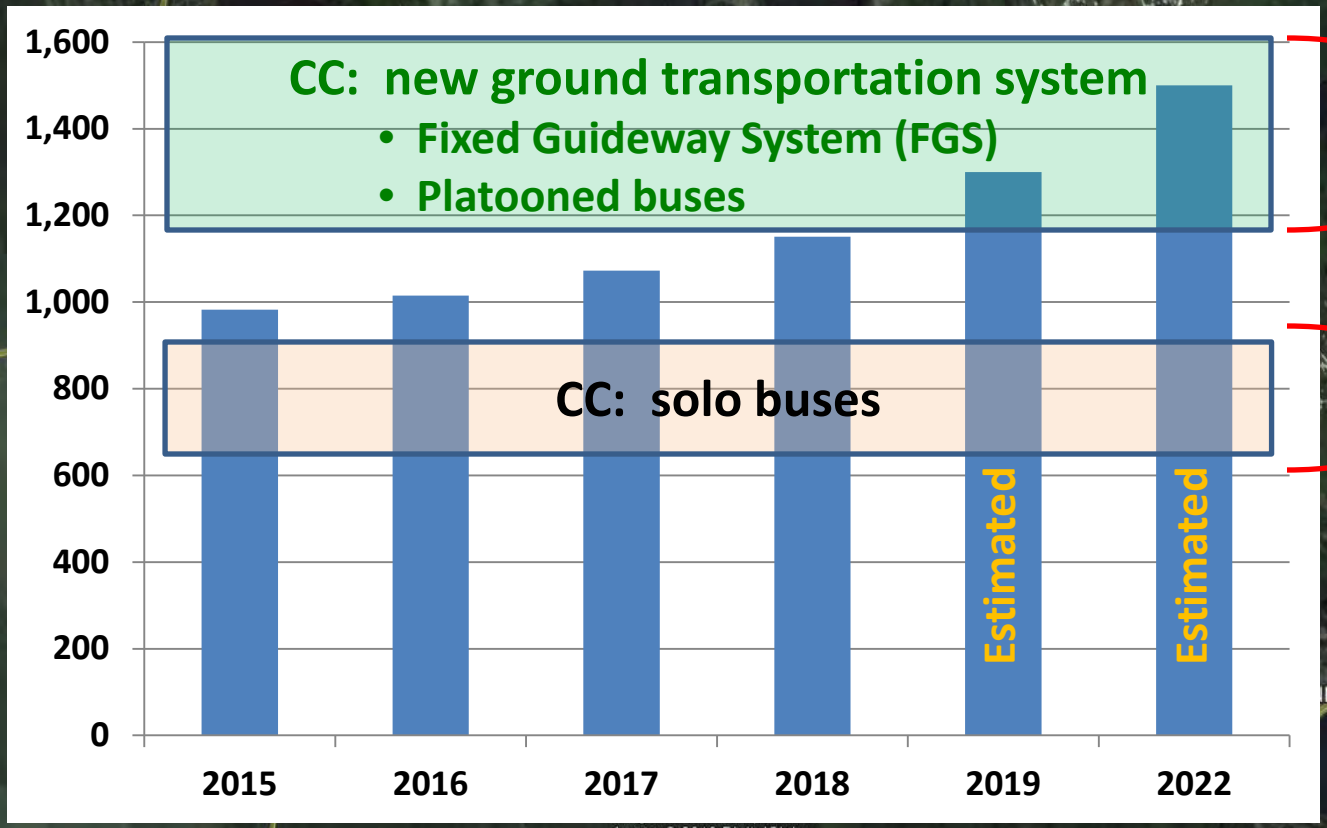
- Aside from “Holland criterion”
- Increasing CC is win for all ? Except Earth ?
- Already beyond CC
- CBJ declares so; limits cruise ship pax 2020
- People of Juneau, CLIA Alaska, CBJ, USFS agree:
  - CC increase plan
  - Capex investment plan
    - New ground transport system
    - “Quiet Technology” copters
    - Other:
  - Execute
  - Increase cruise ship pax

Juneau Total Cruise Ship Passengers, thousand

2019, 2022 estimated

CC: "Carrying Capacity"

DESIGN INNOVATION



The overarching planning that Maui did, which I think was good: they said, " We're only going to allow tourism in these particular ocean front areas. We're going for the high level tourists, who will pay top dollar, spend lots of money, and support businesses on this island. We are not interested in mass tourism. "

They made a conscious choice to limit the areas where tourism could happen … to attract the very top end of the tourism market. Strategically , that has been very good for Maui … it's kept the quality … "

Captain Jim Coon, founding family, Trilogy Excursions, Maui.

---- August, 2018 interview

WEDNESDAY 4:00 PM
Making Tourism Work

Should Juneau Accommodate 1.5 million Cruise Ship Visitors Per Year? How? Why? At what Benefits and Costs?

Bill Leighty, The Leighty Foundation
wleighty@earthlink.net
www.leightyfoundation.org/earth.php

"Making Tourism Work"
20 Feb 2019, 1600

DESIGN

Next Steps:

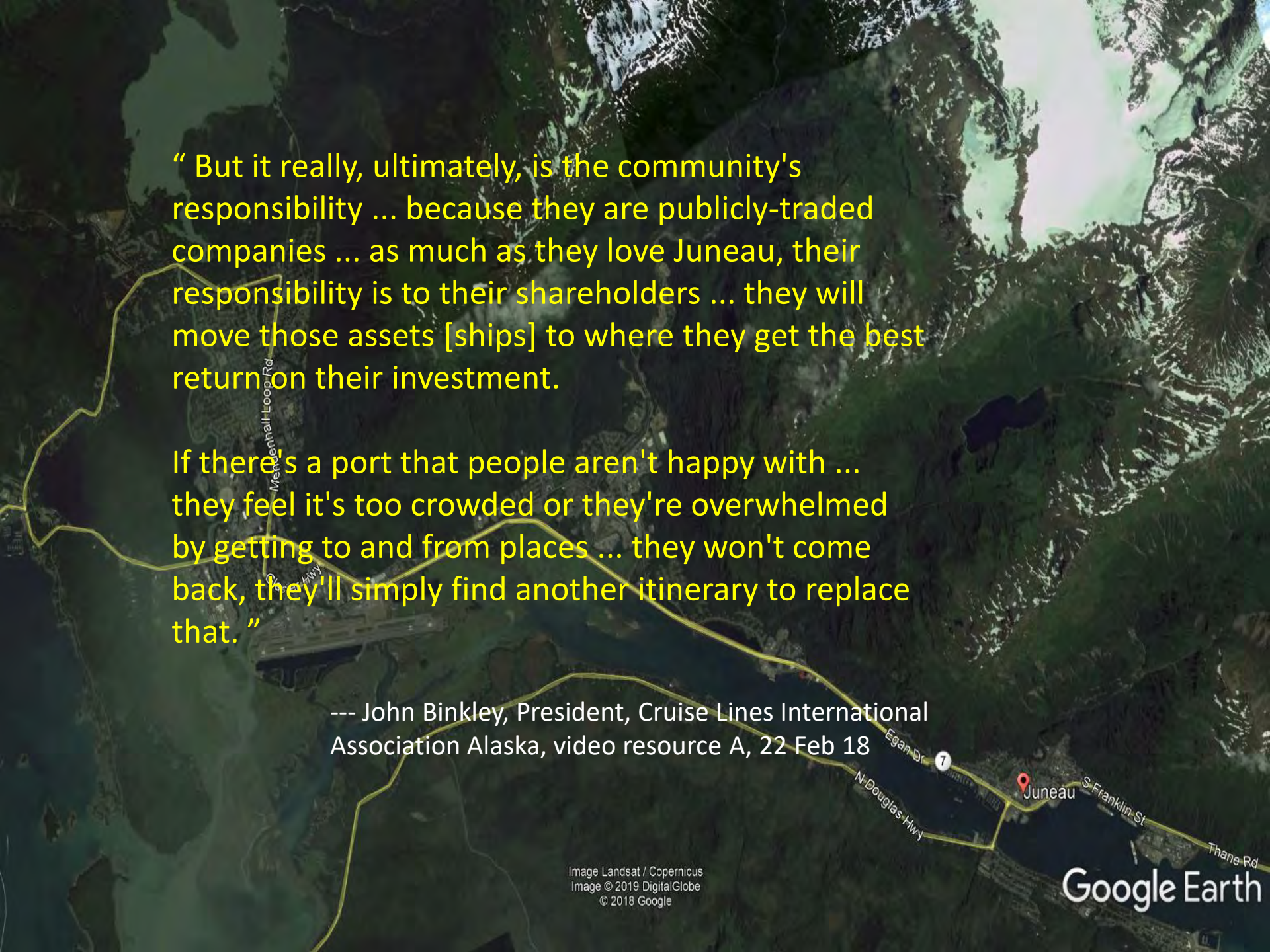
- CBJ authority: declare CC ? Analyze, apply 2020
- Consultant: options for CC increase
  - Ground transport system
  - Copter, aviation noise
  - Economics: benefits / cost, capex plan
  - Juneau visitor industry advice
  - Fossil fuel reduction
- Community conversation, decisions
- PPP with CLIA Alaska, USFS, tour industry
- Execute for 2020 - 2022

Global Commons

"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, CLIA Alaska,
22 Feb 18, JEDC Innovation Summit



“ 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. ”

--- John Binkley, President, Cruise Lines International Association Alaska, video resource A, 22 Feb 18

Resources, References

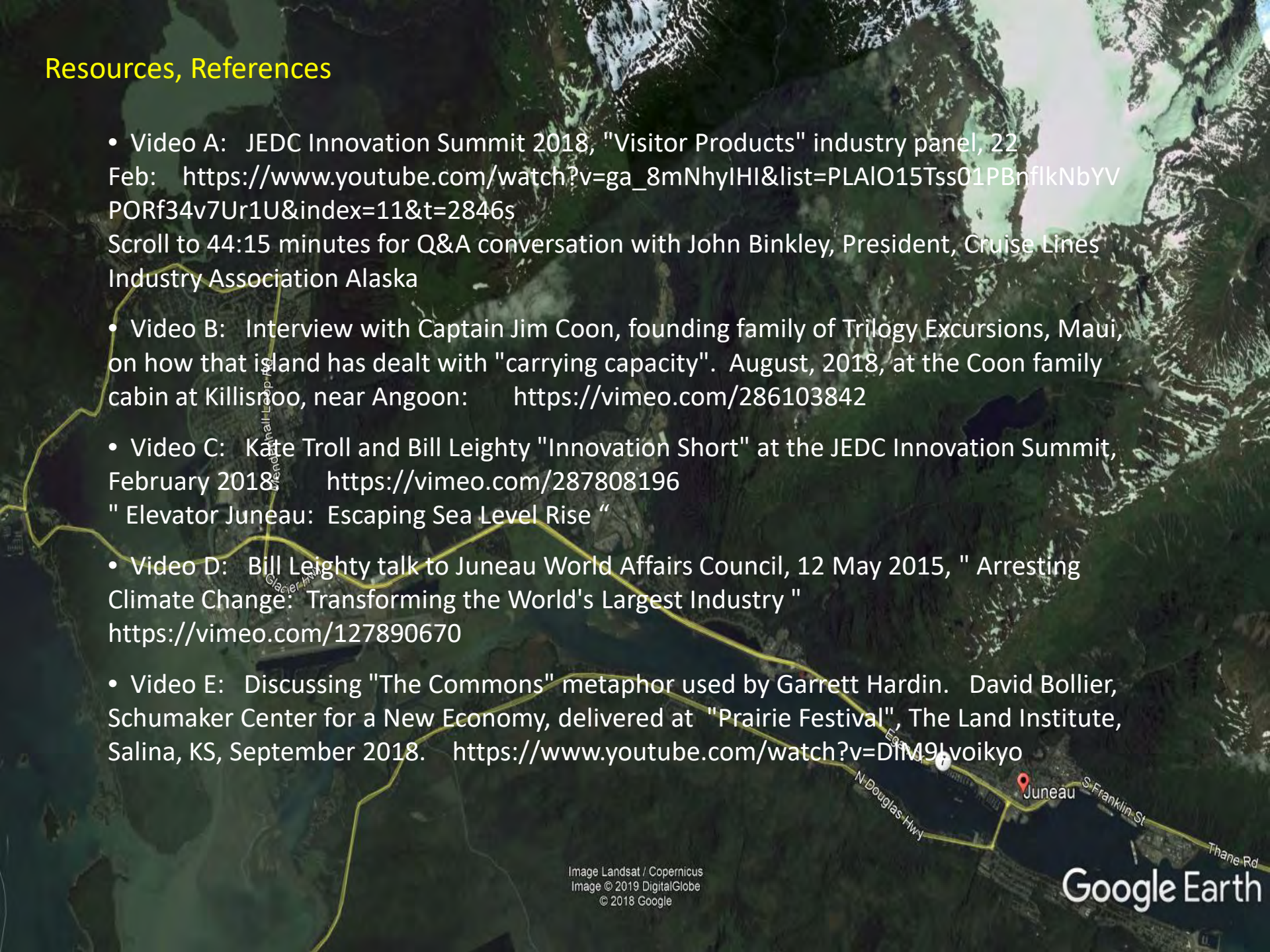
- Video A: JEDC Innovation Summit 2018, "Visitor Products" industry panel, 22 Feb: https://www.youtube.com/watch?v=ga_8mNhyIHI&list=PLAlO15Tss01PBnflkNbYVPORf34v7Ur1U&index=11&t=2846s
Scroll to 44:15 minutes for Q&A conversation with John Binkley, President, Cruise Lines Industry Association Alaska

- Video 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

- Video 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 D: Bill Leighty talk to Juneau World Affairs Council, 12 May 2015, " Arresting Climate Change: Transforming the World's Largest Industry "
https://vimeo.com/127890670

- Video E: Discussing "The Commons" metaphor used by Garrett Hardin. David Bollier, Schumaker Center for a New Economy, delivered at "Prairie Festival", The Land Institute, Salina, KS, September 2018. https://www.youtube.com/watch?v=DIlV49Ivoikyo



JEDC Innovation Summit 2018

Innovation Short

10 minutes

Juneau, Alaska 21 – 22 February

Refuge Juneau:
Opportunity Adapting to Global Sea Level Rise

- Kate Troll kate.troll@gmail.com
- Bill Leighty wleighty@earthlink.net

Refuge Juneau:
Opportunity Adapting to Global Sea Level Rise

May 1971

Refuge Juneau:
Opportunity Adapting to Global Sea Level Rise

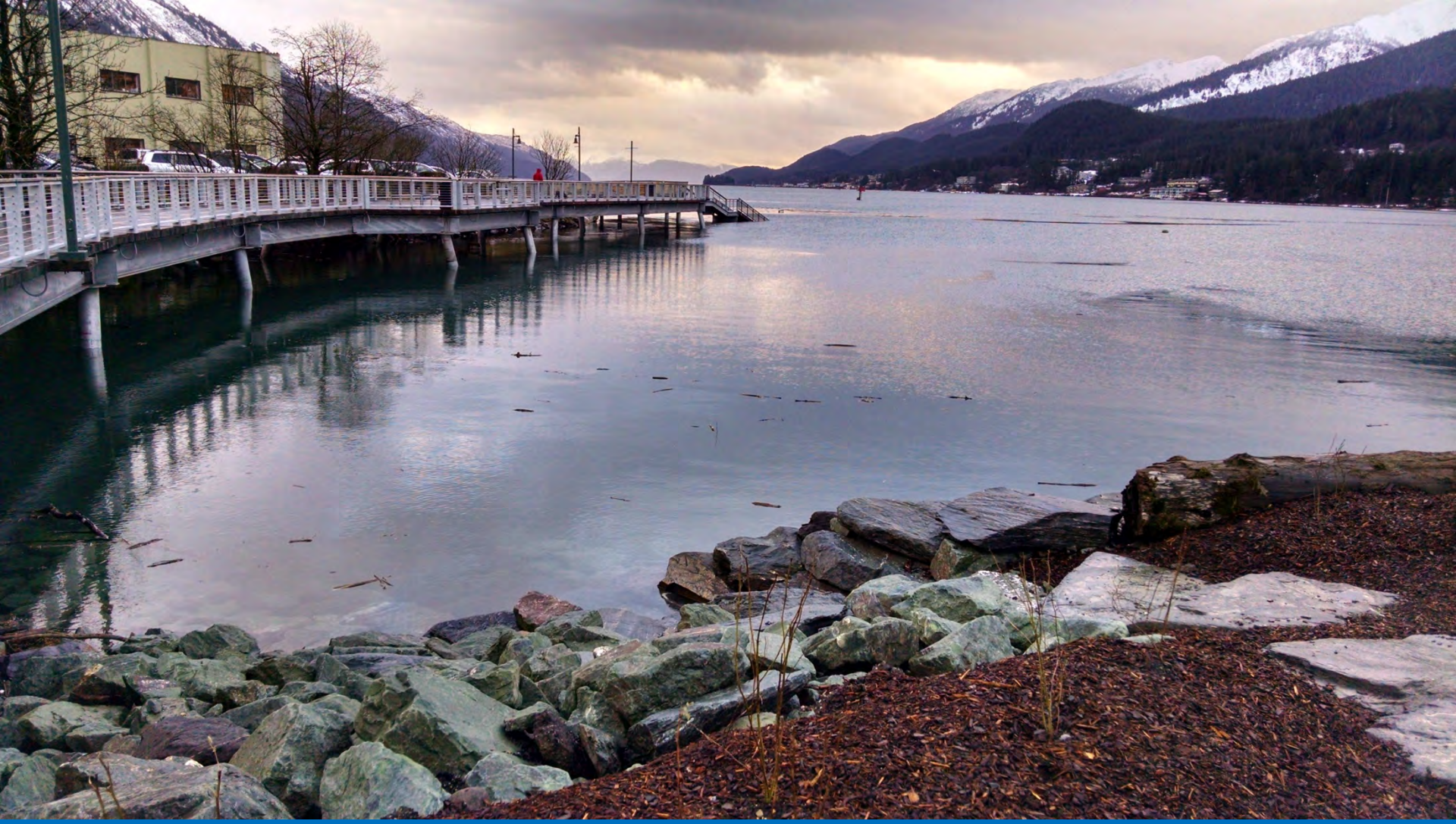
July, 2015 Mendenhall Glacier, Juneau, Alaska Bill Leighty, Nancy Waterman

July 2015

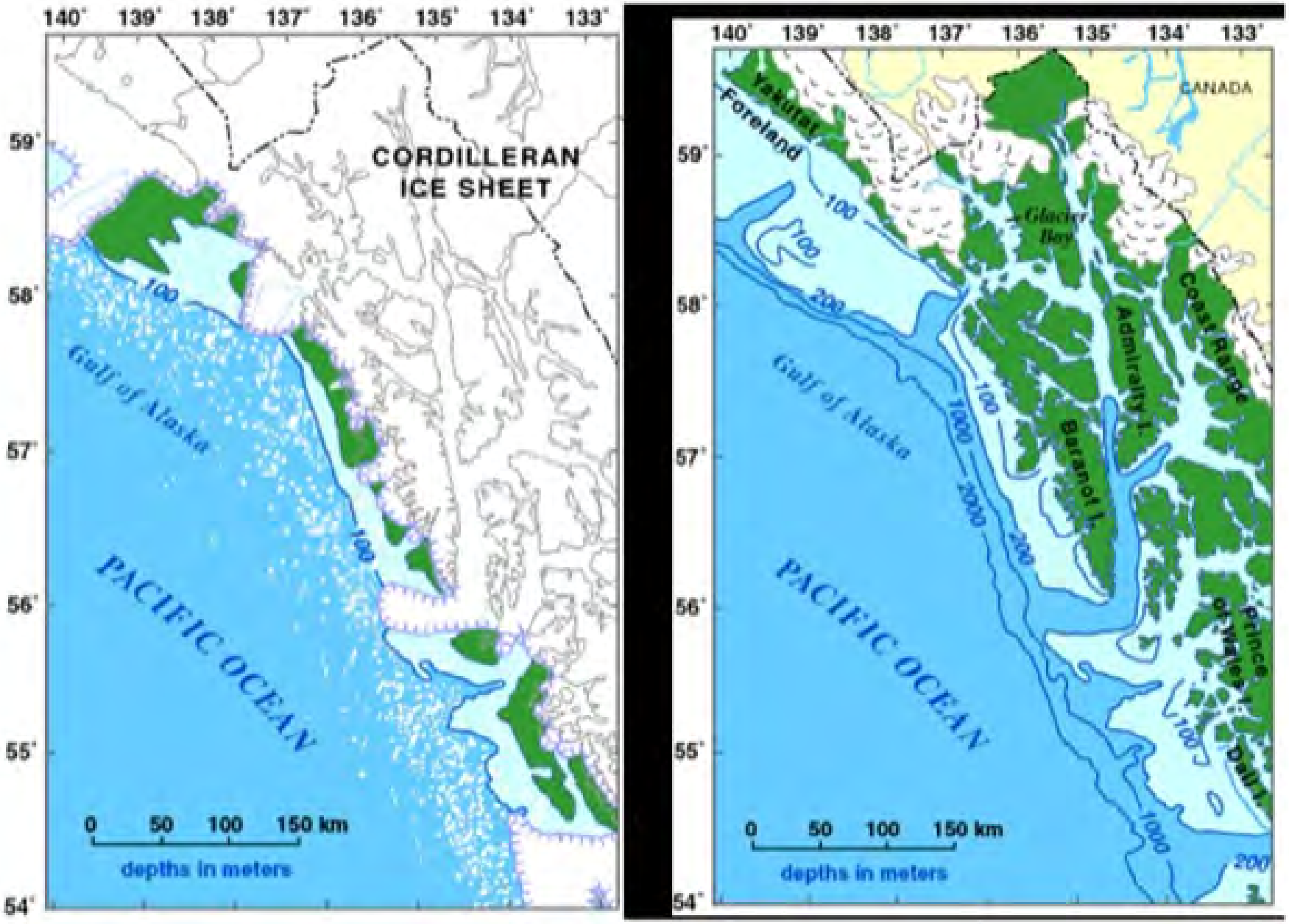
High tide, Juneau, AK: 20.3 ft, 1300 AST, 4 Dec 2017

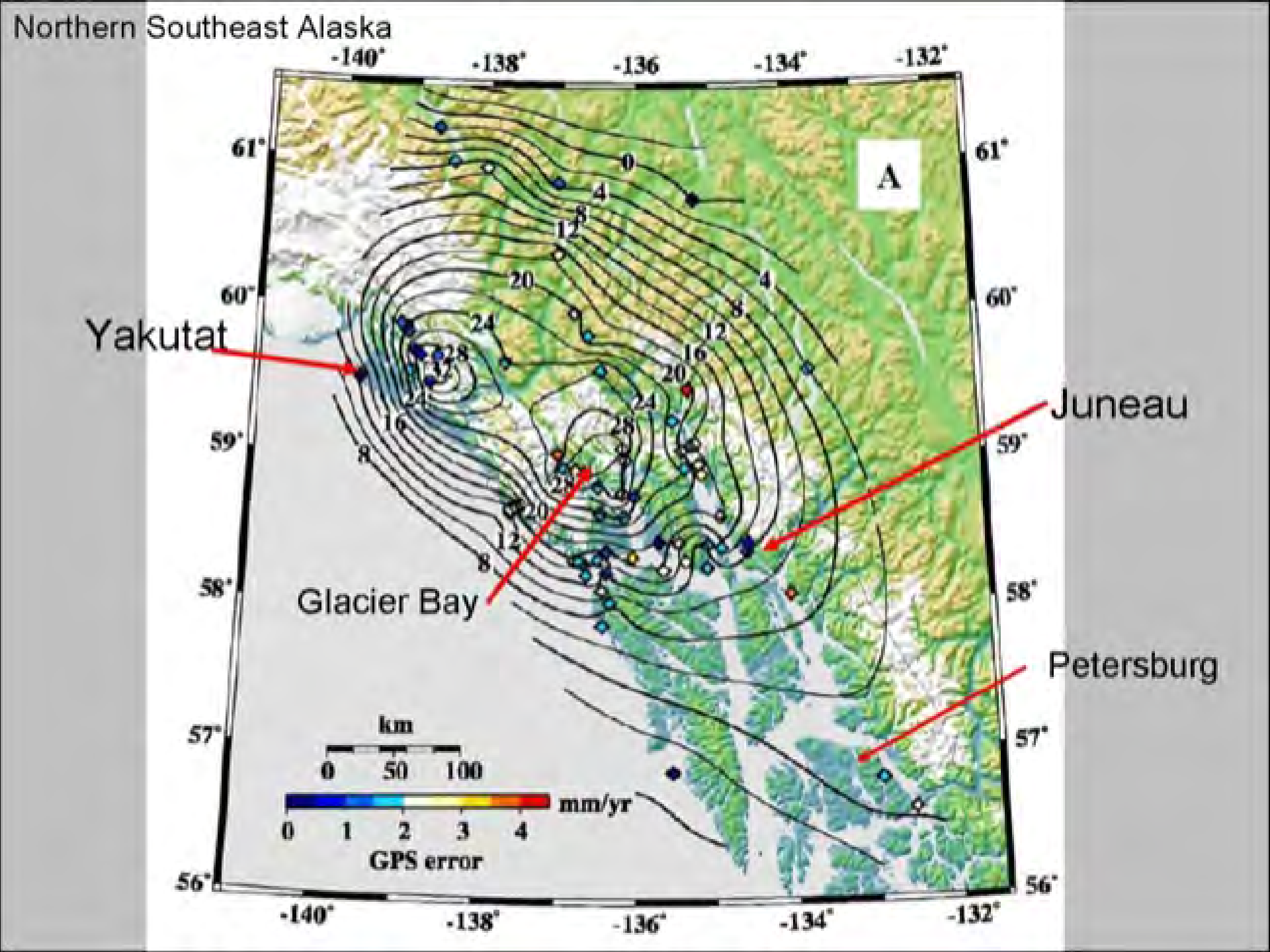
High tide, Juneau, AK: 20.3 ft, 1300 AST, 4 Dec 2017

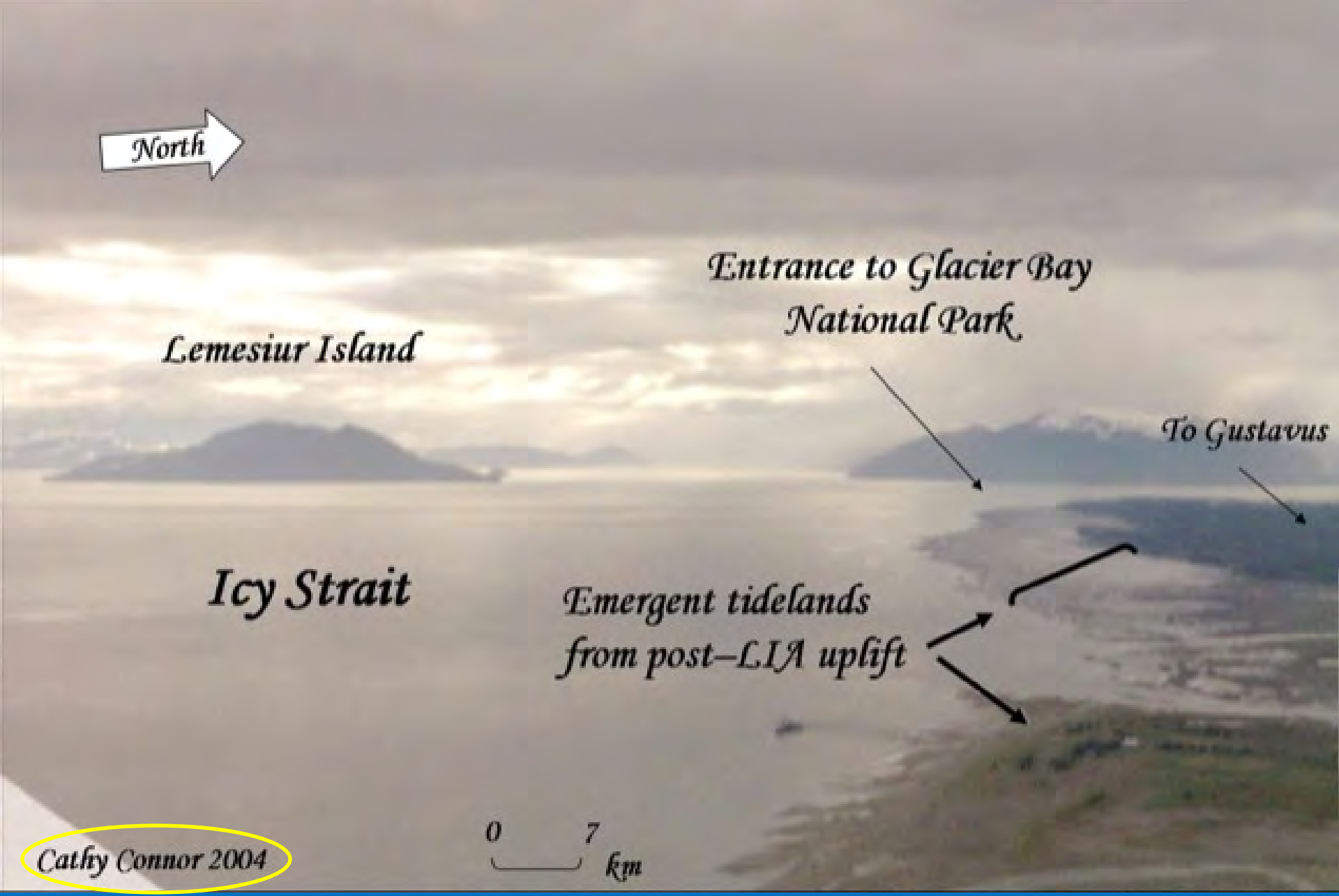
High tide, Juneau, AK: 20.3 ft, 1300 AST, 4 Dec 2017



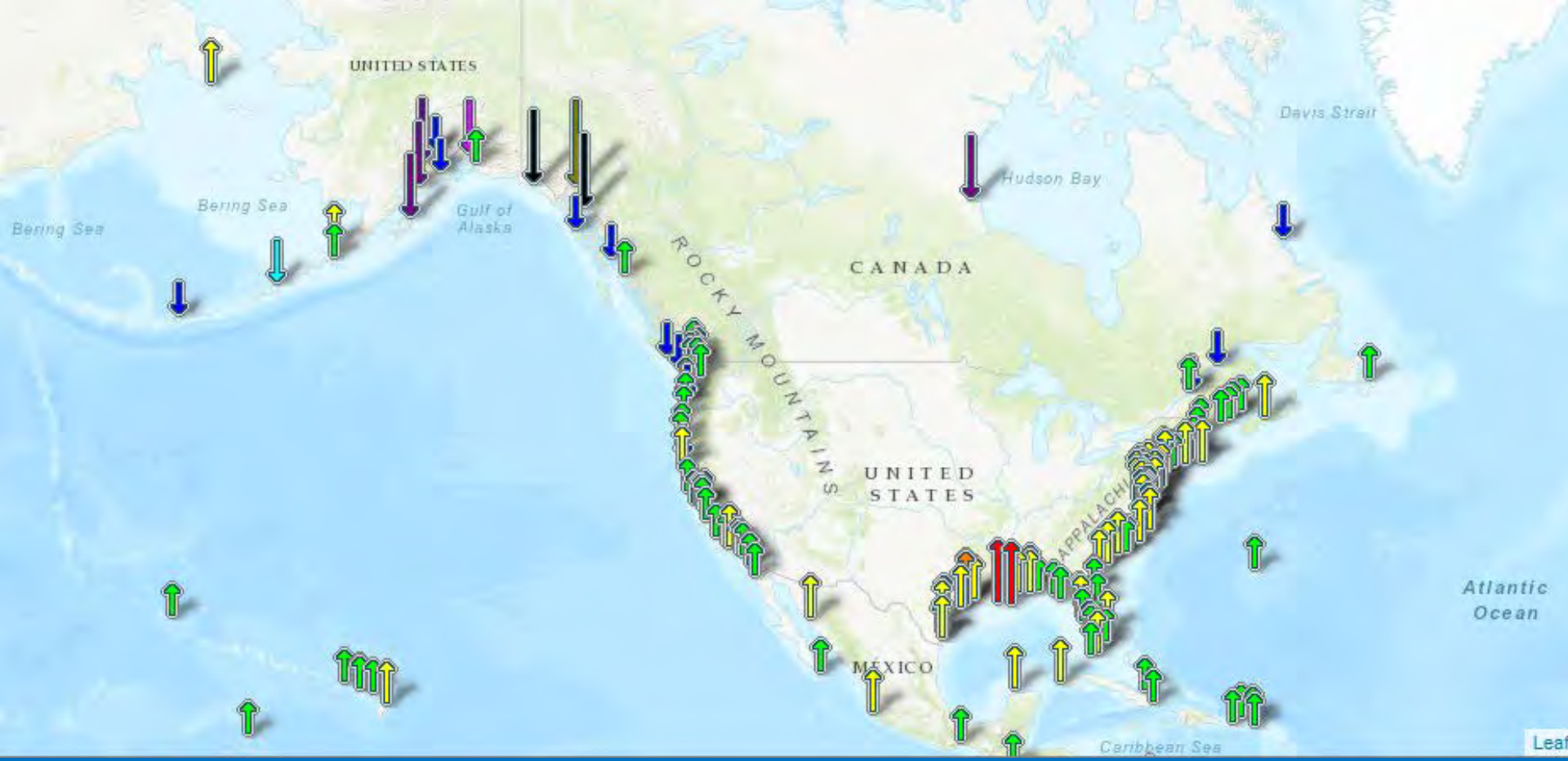
High tide, Juneau, AK: 20.3 ft, 1300 AST, 4 Dec 2017


140° 139° 138° 137° 136° 135° 134° 133°
59°
58°
57°
56°
55°
54°
CORDILLERAN
ICE SHEET
Gulf of Alaska
PACIFIC OCEAN
100
0 50 100 150 km
depths in meters
CANADA
Yakutat
Foreland
Glacier
Bay
Admiralty I.
Baranof I.
Coast Range
Prince
of Wales I.
Dall I.
200
1000
2000


Northern Southeast Alaska
-140°
-138°
-136
-134°
-132°
61°
60°
59°
58°
57°
56°
A
Yakutat
Juneau
Glacier Bay
Petersburg
km
0 50 100
mm/yr
0 1 2 3 4
GPS error

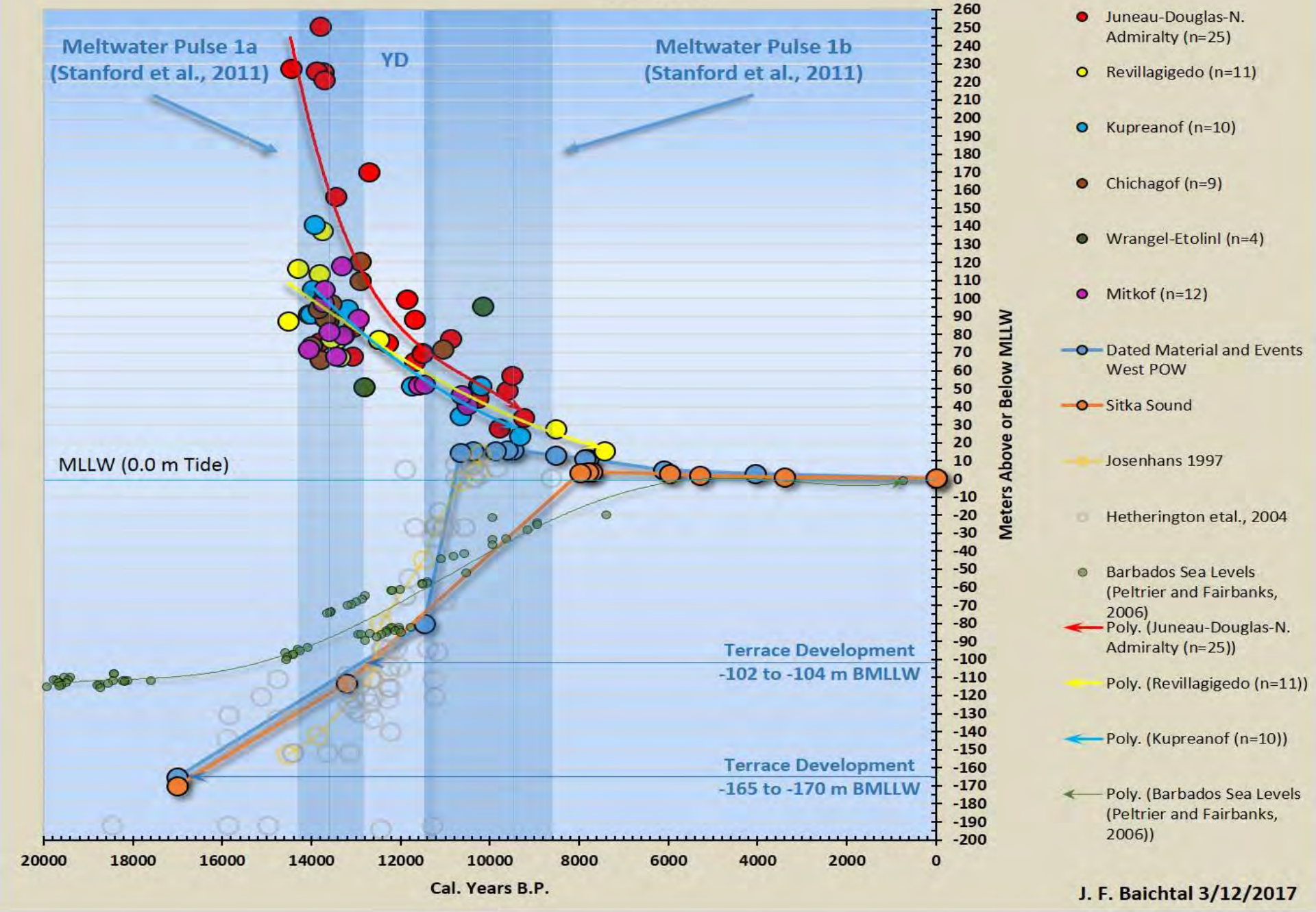


Glacier Bay, Icy Strait: Post Little Ice Age uplift


UNITED STATES
Bering Sea
Bering Sea
Gulf of Alaska
Davis Strait
Hudson Bay
CANADA
ROCKY MOUNTAINS
UNITED STATES
APPALACHI
Atlantic Ocean
MEXICO
Caribbean Sea
Leaf


Bering Sea
Gulf of Alaska
Peace
Edm
ROCK
ancouver
Seattle

Preliminary Sea Level Curves for Southeastern Alaska with Haida Gwaii Data and Global Sea Level



J. F. Baichtal 3/12/2017

Kate’s slides

Conclusions

1. When will it happen ? Can we prevent it ?
2. Does Juneau want to be a Refuge ?
3. For how many people, from where ?
4. Where would we put them ?
5. How provide them access ?
   - Community organization, topology
   - Mobility within
   - Access & Transport “outside”
   - Electronic: WWW, phone, entertainment
   - Homegrown: self-contained, autonomous
6. How provide enough energy:
   - Sources, uses, budget:
   - “Internal” : sources, uses
   - “External”: airline, barge, AMHS, cruise ships
7. What would they do? No jobs; bring money
8. Lower the cost of living, for all

NOTES 25 Jan 18 meeting with Bill + Kate - A 10 min total, 5 min each.

1. Segue from Bill to Kate: " Sea level's rising, Juneau's rising faster. What opportunities do you see, Kate ? "
2. "The Water Will Rise" book: reference. Excerpts ?
3. Juneau as refuge from more than sea level rise:
    a. Drought
    b. Fires: forest, brush, neighborhood
    c. Rising summer temps: dangerous in Palm Springs, Phoenix
    d. Hurricanes, tornadoes
    e. Tsunami
    f. Fresh water scarcity and contamination
    g. Terrorists
    h. Infrastructure hacking shutdown, damage
    i. Future: fossil energy source dependence
4. But Juneau unusually at risk for:
    a. Mudslides
    b. Food supply insecurity
    c. All supplies insecurity: almost everything is imported
5. Retired UA Chancellors: Ulmer, Pugh, Rogers. How help ? What to lose ? How help them help ? Topic(s) ?
6. Juneau advantages for Internally Displaced Persons (IDP's) and retirees:
    a. Modest cost-of-living: lower than Spokane, San Francisco, many other cities
    b. Fewer private cars needed: toward none (3 R's) (excellent transit)
    c. Case for extensive fixed-guideway, hydro-powered transport: LRT, streetcar, BRT. Tourists + locals
    d. Population shrinking
    e. Safe place: no road connection, hard for bad folks to hide, not attractive to many (weather, darkness)
    f. Music, arts, culture vibrant, mature: " Sixth in USA "
    g. Recreation, outdoors, of many kinds
    h. Good web connection: "Lone Wolf" entrepreneurs may fluorish
    i. Good airline connection to Seattle: 2 hrs, $ 350-400 RT

NOTES 25 Jan 18 meeting with Bill + Kate - B 10 min total, 5 min each.

7. Juneau retirement destination:
    a. no jobs, bring money
    b. No “co-housing” yet in Juneau (Scandinavia model)
    c. Not PSP nor Miami
    d. Health care: Bartlett good, but lacking (cath lab, etc.),
        a. evacuation flights;
        b. Will improve with population increase
8. Most-visited glacier (in world ?)
9. When, how to start promoting Juneau as retirement & refuge ?
    a. Do Juneau residents want to ?
    b. AARP, JEDC website, other. Juneau Convention & Visitors Bureau
    c. Rack card for tourist season
10. Make the case for extensive, hydro-powered, fixed-guideway transit: LRT, streetcar, BRT: tourists + locals
    a. Lower community cost of living: assume ~ 25,000 registered light duty vehicles (LDV’s) (cars, vans, SUV’s, pickups). Average annual cost of ownership = $ 8,000. Displace 1/3 with new transit = $ 65 million / year saving in personal after-tax income.
    b. What cost (capex, opex), who pays ? Primary value to cruise ship industry ? They pay ?
11. “ We’re still in “ CBJ, State of AK options
12. Juneau population decline.

NOTES 25 Jan 18 meeting with Bill + Kate - C 10 min total, 5 min each.

https://serc.carleton.edu/vignettes/collection/25106.html

1. Last Glacial Maximum (LGM). ~ 20,000 years ago, ice sheets up to 3 km thick, covered northern North America
2. Globally sea level was ~125 m lower but locally the glaciers loaded the crust resulting in sea level rise. As the climate warmed this ice began to disintegrate, flowing back into the world oceans, transferring its mass from the continents. The visco-elastic response of the formerly loaded crust was to rise up.
3. As sea level rose in the Early Holocene, these Alaska Natives probably experienced up to 2-3 meters of sea level rise in their life times. The flood was on.
4. Crustal uplift following deglaciation 12,000 to 10,000 year ago, lifted fjord-bottom silts with their iceberg dropstones and marine subfossils, up to 215 m above modern sea level in the Juneau area.
5. In the Juneau area, total uplift exceeded 300 m as a result of local loading by ice. During the mid Holocene warming 9,000-5,000 years ago, ice withdrew from sea level valleys and fjords. The Neoglacial marked the onset of cooling climate beginning about 5,000 years ago and glaciers began to readvance, filling Glacier Bay, and other coastal valleys. This icy pulse lasted through the mid-eighteenth century culminating in the Little Ice Age (LIA).
6. Over the past 250 years, in Glacier Bay, the loss of ~100 linear km of rapidly retreating ice has resulted in renewed uplift. The post-LGM pulse of uplift has largely subsided …..
7. Current rates of uplift will probably continue for several more centuries, keeping this part of Alaska temporarily safe from world-wide sea level incursion.
8. While northern Southeast Alaska is experiencing uplift, ongoing melt from Alaska's coastal glaciers has been contributing up to 7% to the total global sea level rise.