net zero building in the arctic

multi-generational housing for kivalina

klaus mayer philippe amstislavski alan mitchell

the snowhaus
@mayer_klaus

RHIZOFORM LLC

Analysis North

ALASKA CENTER for Appropriate Technology


Barrow
Chukchi Sea
Kivalina
RUSSIA
Arctic Circle
Nome
Fairbanks
ALASKA
Anchorage
0 100
MILES
Bering Sea

Instagram

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whitehouse FOLLOW

15.2k likes 7h

whitehouse This is Kivalina Island, an Arctic town that's already receding into the ocean because of rising sea levels. For many Alaskans, it's no longer a question of if they have to relocate – but when. There aren't many other places in America that have to deal with questions of relocation right now. But there will be. What's happening here is America's wake-up call. -bo

view all 222 comments

keepingupwiththejoneses2015 Scary and sad.

haley_stephens @maryreynolds9

debbiefrio It's also happening on The Vineyard!

stoveinstaller Disconcerting and sad for the folks involved

vaughnhanson A wake up call indeed

Log in to like or comment. ooo

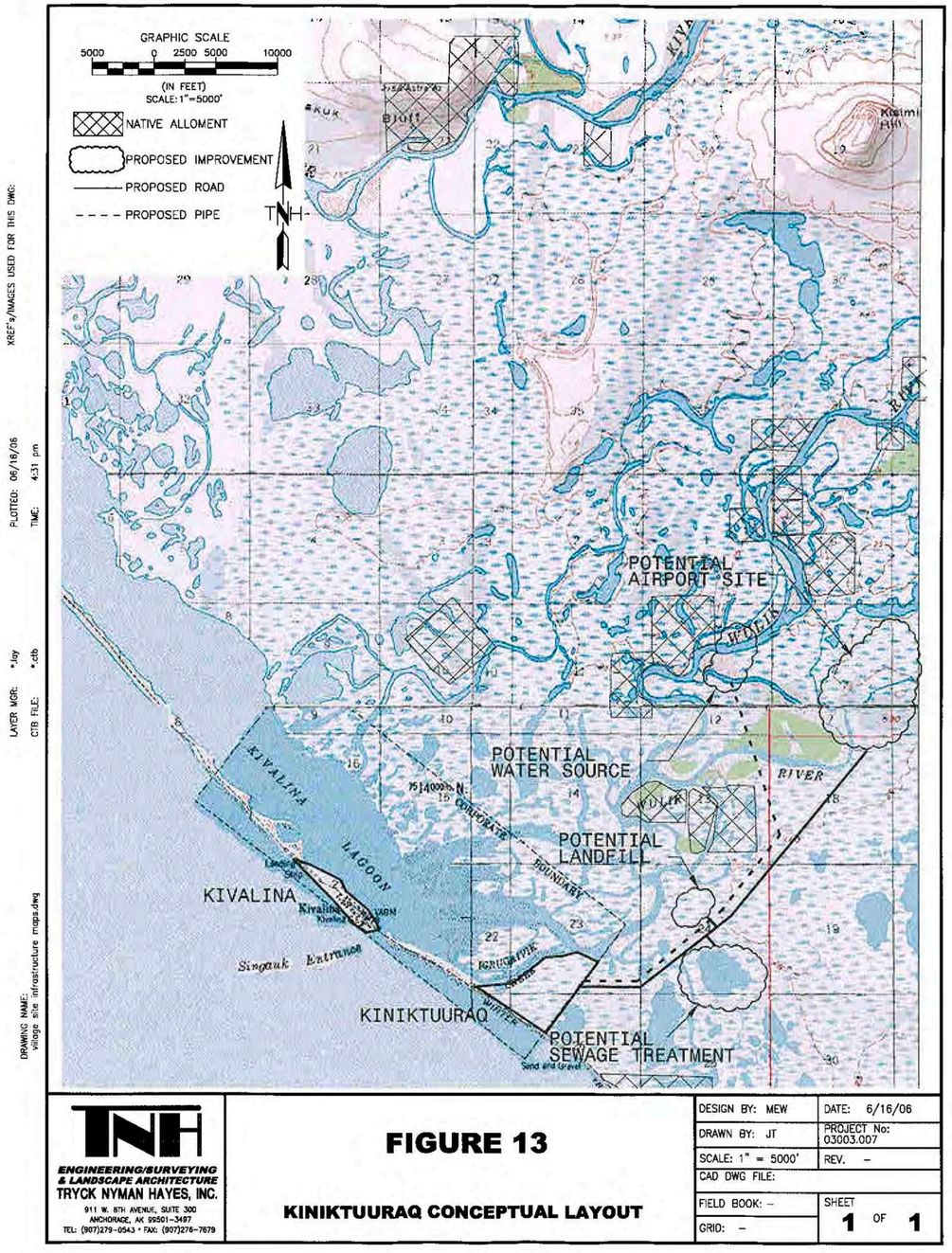
Source:International Permafrost Association, 1998. Circumpolar Active-Layer Permafrost System (CAPS), version 1.0.

US Army Corps of Engineers
Alaska District

RELOCATION PLANNING PROJECT MASTER PLAN

Kivalina, Alaska

JUNE 2006



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ANCHORAGE, AK 99501-3497
TEL: (907)279-0543 • FAX: (907)276-7679

FIGURE 13

KINIKTUURAQ CONCEPTUAL LAYOUT

DESIGN BY: MEW	DATE: 6/16/06
DRAWN BY: JT	PROJECT No: 03003.007
SCALE: 1" = 5000'	REV. –
CAD DWG FILE:	
FIELD BOOK: –	SHEET 1 OF 1
GRID: –	


KIVALINA LAGOON
20. City Bingo Hall
21. Community Hall
22. Alaska Village Electric
23. AVEC Tank Farm
24. Epiphany Church
25. Post Office
26. City Hall/IRA Office
27. City Storage
28. Public Safety/City Jail
29. GCI Phone Module
30. Friends Church Cabin
31. IRA Council Storage
32. Heavy Equipment Storage
33. DOT Hangar
PLAT 2000-6
U.S. SURVEY NO. 5582
U.S. SURVEY NO. 4008
U.S. SURVEY NO. 2246
CHANNEL STREET
BERING STREET
NORTH STREET
MUNICIPAL RESERVE
MUNICIPAL 6 RESERVE
MUNICIPAL 8 RESERVE
CITY BOUNDARY
Community M
KIVALINA
67° 43' 41" N 164° 32' 06"
Township 27 North, Range 26 W
U.S.G.S. Quadrangle "NOATAK
KOTZEBUE RECORDING DI
LEGEND
Residential Building
MAP NOTES

RE-LOCATE KIVALINA

Get Involved

In Northwest Alaska, the Inupiaq whaling community of Kivalina, home to around 470 people, is facing imminent relocation. The need for viable futures is urgent. Previous relocation efforts in Kivalina have stalled, leaving the community looking for alternatives. Re-Locate is a collective of ethnographic artists from around the world working with Kivalina to initiate a community-led and culturally specific relocation.

Re-Locate is building artistic and web-based platforms that intend to make the social, political, and environmental issues related to relocation visible to global audiences; support community discussion and exchange; locate, connect, and educate new relocation partners; create spaces where people in Kivalina can share original media about local ways of life; develop an infrastructure for managing local to global networks of support; host collaborative design processes that synthesize project knowledge into culturally specific planning and architecture; contribute to global efforts shaping the discourse on climate displacement; and develop practices for working in partnership with climate-displaced communities worldwide.

ALASKA DESIGN FORUM

WOCHENKLAUSUR

Problem Solving Through Networking

Kivalina (USA) * 2012 * Alaska Design Forum * 12 weeks

The inhabitants of Kivalina, a small island situated in the arctic circle in northwestern Alaska, live endangered by erosion caused by climate change, without running water or waste disposal. To address these issues WochenKlausur teamed up residents with experts from all over the world. Together they now work on implementing solutions for specific problems i.e.: developing an alternative water infrastructure.

While an intense on-site research with talks to residents as well as with city and tribal officials WochenKlausur identified several urgent problems, the approximately 400 residents have to worry about:
* Their living space, surrounded by water, is limited and narrow: On an average its about 15 people living in extended-family households that are not bigger than 70 m².
* Toilets are not available. Used are so-called honeybuckets: plastic buckets with a toilet seat. There is no running water. Water is drawn off from the central water tank (five gallons are 25 ct). The reservoir is refilled once per year in the ice-free months, when the community has the needed money available for it and the Wulik river from where the water is being collected is free of turbidity which happens to be increasingly rare. In addition the world-largest zink mine discharges into the water shed of the Wulik river. In summer 2012 a big storm ruined the existing pipe-system and flooded the local landfill.
* Disposal of all waste is up to the residents as well. Situated in the north of the village there is a growing non-managed landfill. Even though people's endeavours are great a lot simply remains in town, even leaking bags with human waste.
* People still do traditional hunting and fishing, a local store provides canned and frozen food. Access to green vegetable is limited and expensive.
* Endangered by global climate change causing their land to be washed away the residents of Kivalina are in need of relocation. However this seems quite unlikely in the moment as the legal situation is complex and unclear.

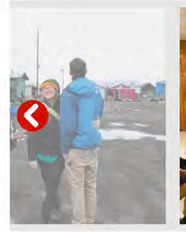
In response to these and to the several construction deficiencies on private and public buildings on-site, WochenKlausur found so called "Agents of Change", experts who are now sharing their knowledge and resources with the little arctic town of Kivalina. Together with the village they are developing alternatives and implement them on-site. To assist communication the online platform relocate-ak.org was created. A curatorial team coordinate the work of all Agents of Change and address more when needed.
The Agents of Change are among others:
The [applied] Foreign Affairs Lab who is working on water supply, distribution and consumption systems in the village to identify problems and find alternatives for the existing and future village locations.
Katherine Ball, a US-based artist who engages with the youth in Kivalina to open and run a community garden.
Students from the Centre for Research Architecture, Goldsmith University, aim to create a physical model of the village in order to illustrate the complex legal and political relationships in play to make them understandable and questionable.
Architecture Without Borders Austria is designing a new re-location centre in Kivalina where re-location will be planned by the village and its collaborators. The design process itself will create an opportunity for the village and related agencies to see how buildings in Kivalina can be designed more specifically to reflect climate, site, and social life in the village.

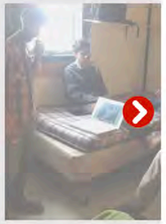
WIEN KULTUR

Nisan Almog, Claudia Eipeldauer, Hannah Öllinger, Alon Schwabe

The Center for Impact at CCA

Programs + | About + | The IMPACT Fund + Our Partners | News





KVAK TV

KVAK TV uses storytelling to address pressing local themes of isolation, location, and cultural shifts in the isolated community of Kivalina, Alaska

Project Overview:

KVAK TV is a youth-oriented media project that stands for Kivalina, Alaskan Television. The project uses storytelling to address pressing local themes of isolation, location, and cultural shifts in Kivalina. The tiny coastal village is threatened by rising sea levels that are a result of climate change, and relocation is an imminent reality for Kivalina residents.

KVAK's youth focus is a direct response to Kivalina demographics: over 50% of its population is under the age of 25. The village's geographical isolation creates many challenges for its youth, including high suicide rates. In response to these conditions, KVAK TV partnered with The Alaskan Design Forum to use social media and television programming as a means for Kivalina youth to connect with the outside world and to relieve feelings of isolation. KVAK TV hosted a series of after school workshops to instruct youth on camera and interviewing techniques, and provided an equipment library for use outside of workshops.

Partner
Alaska Design Forum

Discipline
Multidisciplinary

Issue
Digital Media
Environment / Natural Systems
Youth

Semester/Year
Summer 2012

Program
Impact Awards

WOCHENKLAUSUR

Since 1993 the artist group WochenKlausur has been developing concrete proposals aimed at small, but effective improvements to socio-political deficiencies. Proceeding even further and invariably translating these proposals into action, artistic creativity is no longer seen as a formal act but as an intervention into society.

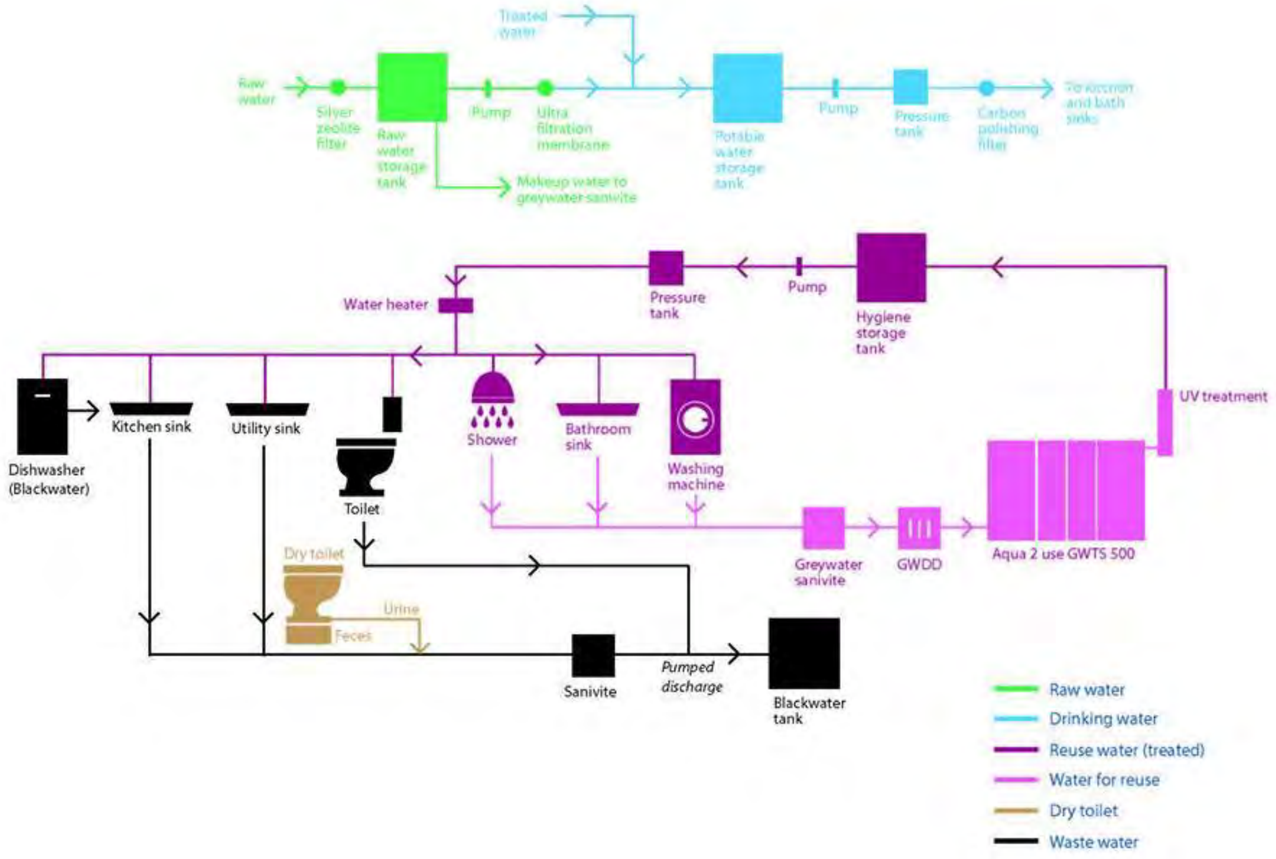
CCA

California College of the Arts

THREEDEGREES WARMER


Thank you,
Mr. Steven


PRINCESS


Treated water
Raw water
Silver zeolite filter
Raw water storage tank
Pump
Ultra filtration membrane
Makeup water to greywater sanivite
Potable water storage tank
Pump
Pressure tank
Carbon polishing filter
To kitchen and bath sinks
Water heater
Pressure tank
Pump
Hygiene storage tank
UV treatment
Dishwasher (Blackwater)
Kitchen sink
Utility sink
Toilet
Shower
Bathroom sink
Washing machine
Dry toilet
Urine
Feces
Greywater sanivite
GWDD
Aqua 2 use GWTS 500
Sanivite
Pumped discharge
Blackwater tank
Raw water
Drinking water
Reuse water (treated)
Water for reuse
Dry toilet
Waste water


KIVALINA
BIOCHAR

Re-Locate Kivalina
July 16, 2015 ·

RE-LOCATE RECEIVES 2015 ARTPLACE AMERICA GRANT

$500,000 Grant Will Fund Village-Based Territorial Planning Process in KIVALINA, ALASKA

Anchorage, Alaska – Re-Locate announced today that it is among 38 recipients of ArtPlace America's 2015 National Grants Program. ArtPlace, one of the nation's largest philanthropies dedicated to creative placemaking, is investing $500,000 in Kivalina, Alaska, to further integrate arts and culture into the field of community planning and development. Re-Locate will work to co-create a village-based territorial planning process with individuals, families, and institutions in Kivalina that makes visible and brings action to their strategies and plans for relocation and for a world where particular subjectivities and cultural practices can endure and flourish. ArtPlace selected Re-Locate from a pool of nearly 1,300 applicants. Three Degrees Warmer, a nonprofit climate justice organization, will serve as Re-Locate's fiscal sponsor.

"While the strategies and projects these resources will activate and materialize are only part of the latest developments in Kivalina's multi-generational struggle to relocate—a persistent need the community continues to live with and skillfully act on every day—they do mark a turn toward Kivalina-based decision making, voluntary partnership, local history, and political exchange. Artplace funding and support for this turn, one that we've imagined with Kivalina while living and making together over the past 4 years, is fitting and timely. We are tremendously grateful."

INDIGENOUS HOUSING CANADA 2017

IDEAS COMPETITION

PURPOSE

To raise awareness of Indigenous Housing in Canada and improve opportunities available to design, deliver and maintain housing for remote access Indigenous Canadians

DEADLINE

Tuesday, November 14, 2017 2:00pm CST

AWARDS

$5,000 / $3,000 / $2,000

For details see awb-winnipeg.com

awb architects without borders CANADA

Alaska Housing FINANCE CORPORATION

January 17, 2018

My Fellow Alaskans:

Alaska Housing Finance Corporation (AHFC) is pleased to present the 2018 Alaska Housing Assessment.

This report offers a snapshot of housing characteristics across the state and focuses AHFC and other partners in work to achieve positive outcomes. It provides data that informs resource allocation, program management and evaluation decisions.

The assessment follows a similar assessment published in 2014. The 2018 Alaska Housing Assessment highlights current challenges related to housing, affordability, energy use and structural conditions from a statewide, regional and community perspective. It also forecasts future housing need based on estimated population changes, including aging Alaskans.

To summarize changes between 2014 and 2018, challenges for housing continue:

- Overcrowding impacts rural Alaska, with more than half of all households in some areas overcrowded;
- The statewide percentage of overcrowded homes is twice the national average;
- Nearly 79,000 households spend more than 30 percent of their income on costs related to housing;
- Approximately 14,600 housing units are energy inefficient, burdening residents with high costs. Significant progress has been made thanks to state investment in the weatherization and home energy rebate programs that improved 5,210 housing units between the time the reports were published;

Information reported for the first time in the 2018 Alaska Housing Assessment:

- Broadly, the current rate of construction in housing is insufficient to keep pace with Alaska's projected population;
- Demand for senior facility beds is increasing with the population of people older than the age 65 expected to double by 2030.

I would like to thank our partners who contributed to this assessment, especially Cold Climate Housing Research Center in Fairbanks for their research and authorship.

AHFC's mission is to provide Alaskans access to safe, quality and affordable housing. We remain committed to our work and we hope this assessment proves a useful resource for others working with us overcoming Alaska's housing challenges and improving the quality of life for Alaskans across the state.

I encourage you to read the following summaries and findings, and visit the housing profiles at www.ahfc.us for more about the quality of Alaska's housing. With any comments or questions, please contact Jimmy Ord in our Research & Rural Development department at jord@ahfc.us or 330-8446.

Sincerely,

adaptation to a changing arctic

- high tech - low tech approach
- use local building material

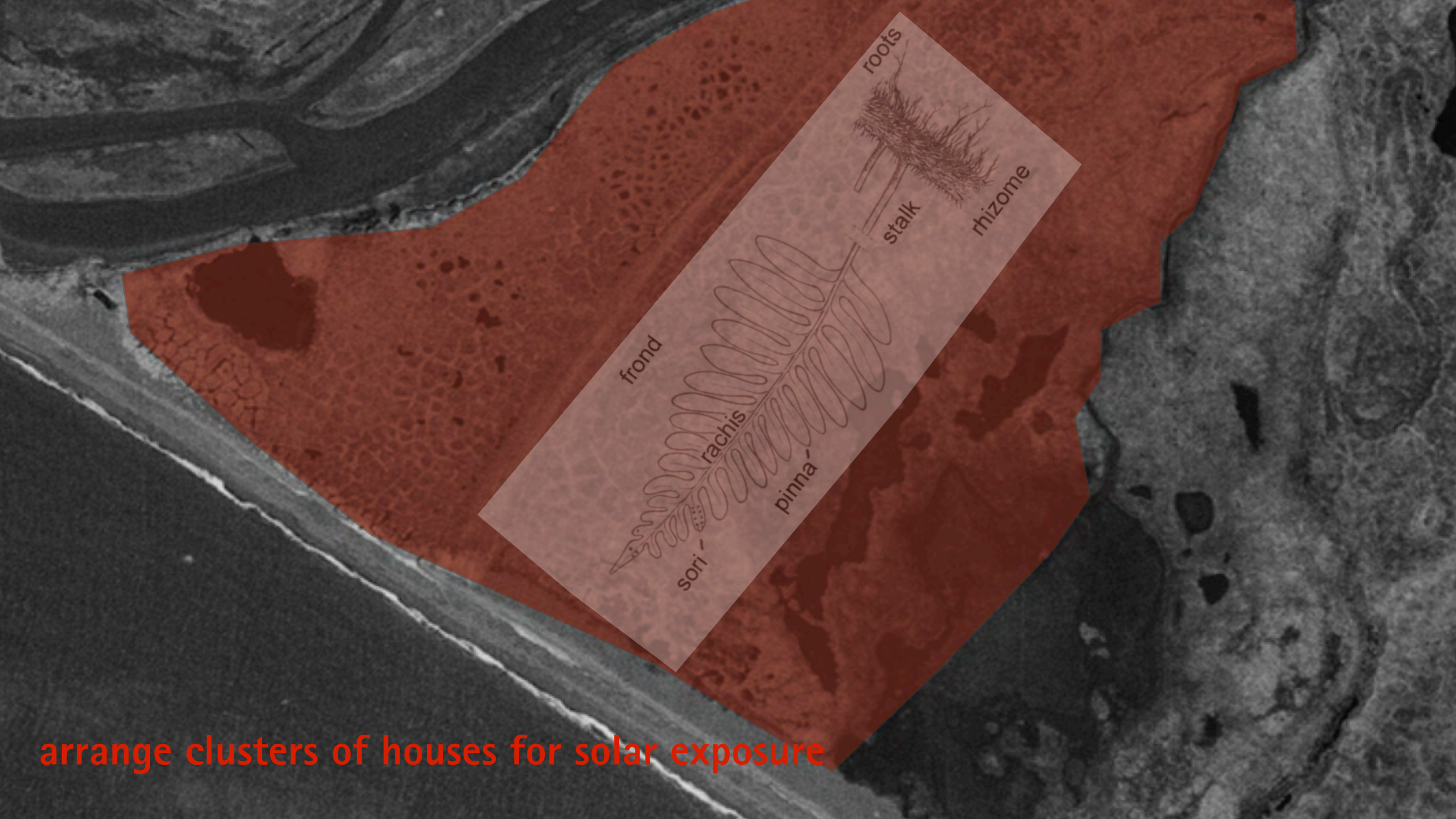
sustainability

- net zero energy design
- improve indoor climate
- incremental housing ideas

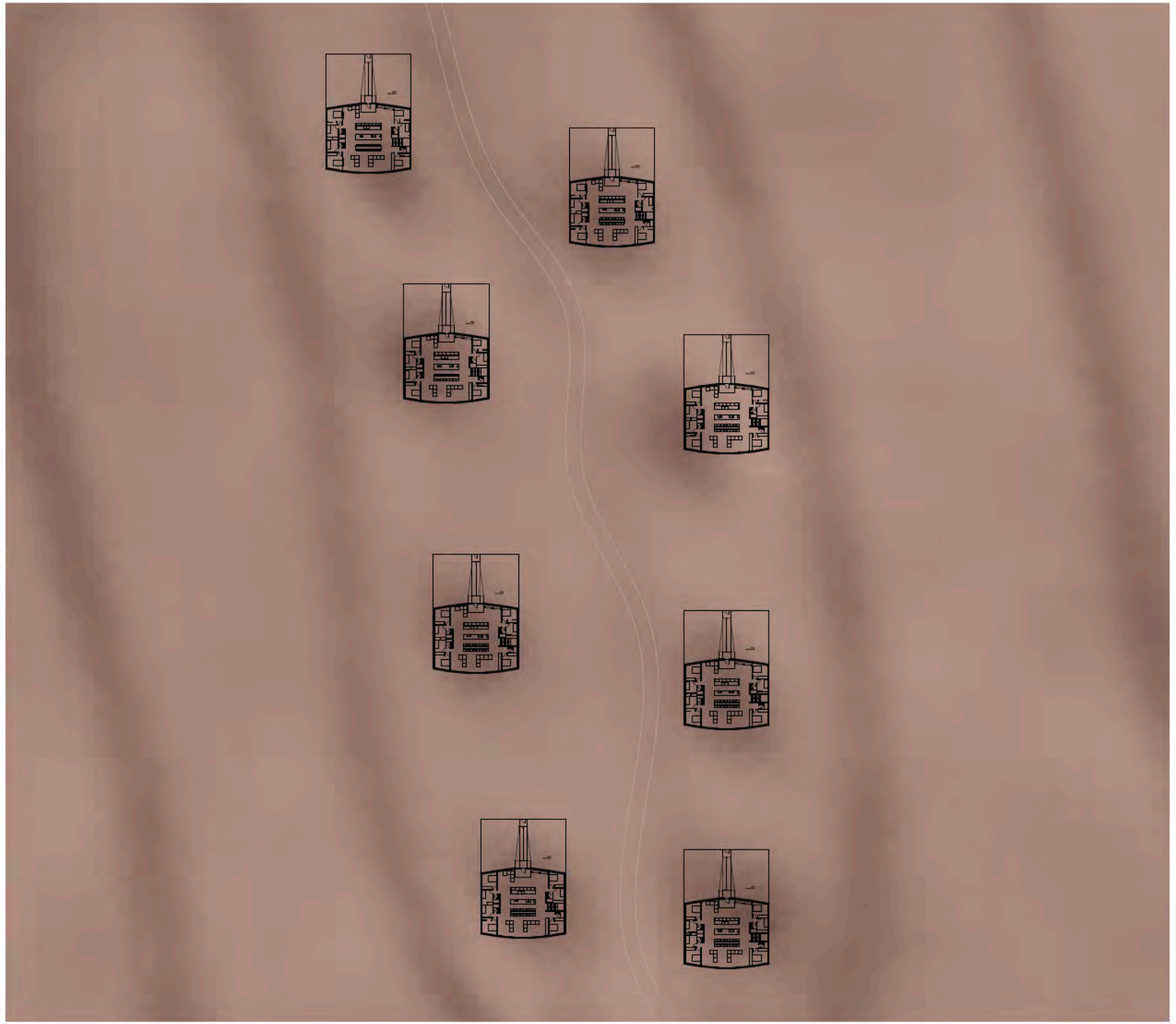
new design framework

- multi-generational housing
- integrate cultural aspects


kivalina could extend to kiniktuuraq with “rialto" bridge



arrange clusters of houses for solar exposure



clusters oriented for solar exposure and snow drift

1 site plan not to scale

N

kvl housing

the snowhaus
637 fairbanks street
anchorage, ak 99501
www.klausmayer.com

revisions

15% not for construction

site plan

02 26 2018

A 0.1

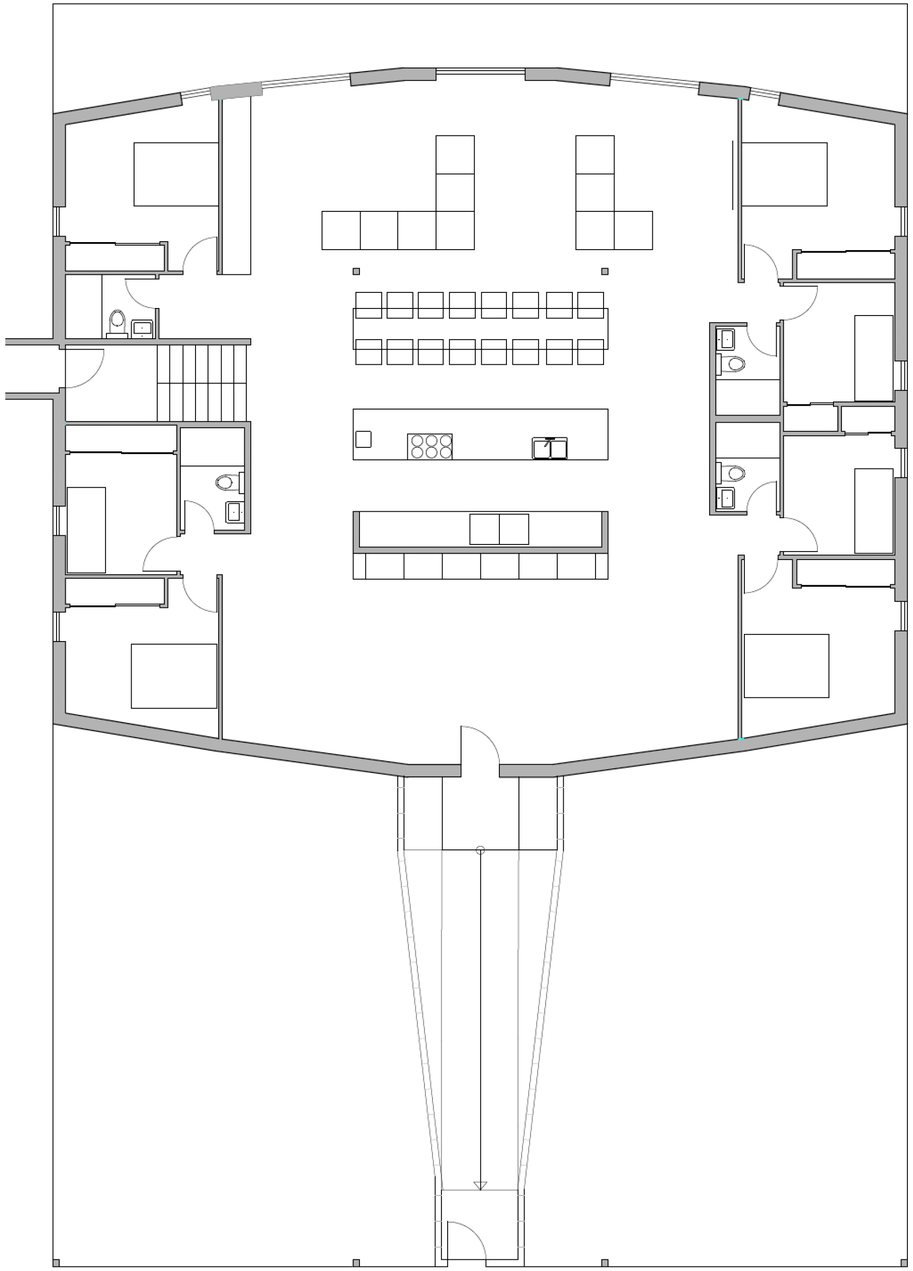
multi-generational building floor plan:

communal kitchen is the heart of the building

private rooms at perimeter

outside entry for storage of subsistence food

covered outdoor area for storage, and work related to subsistence

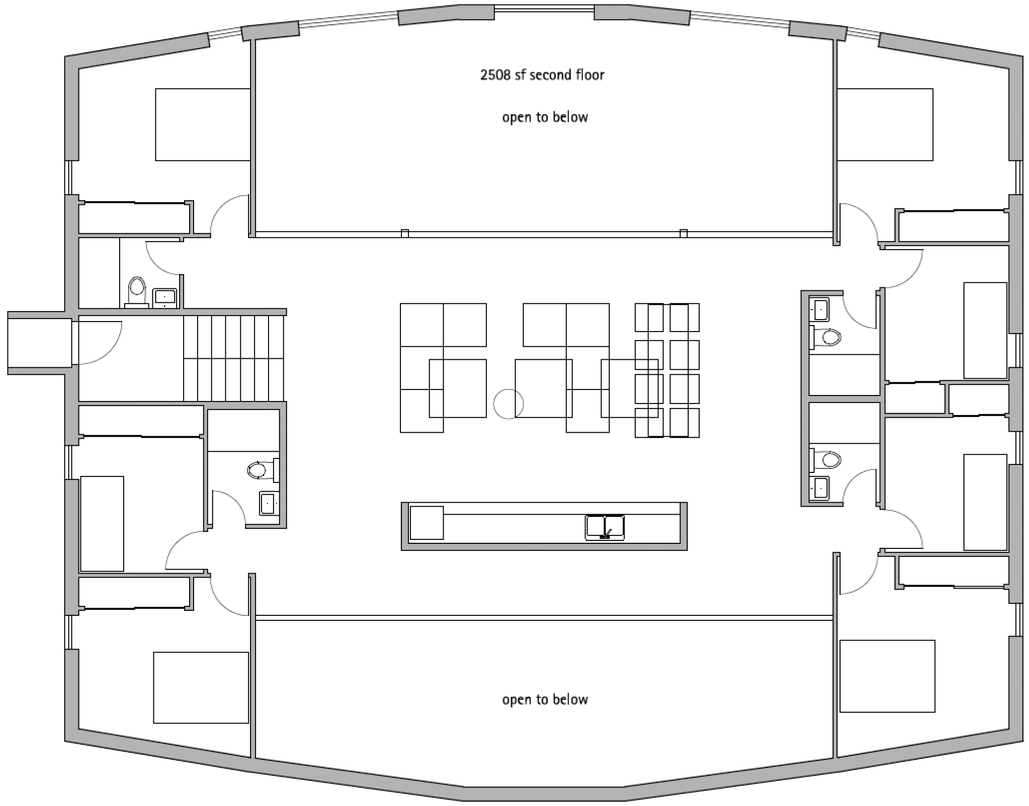


common space promotes multi-generational integration

skylights for daylighting deep floor plan

greater efficiencies by sharing all the services within one building

build to passive house standards

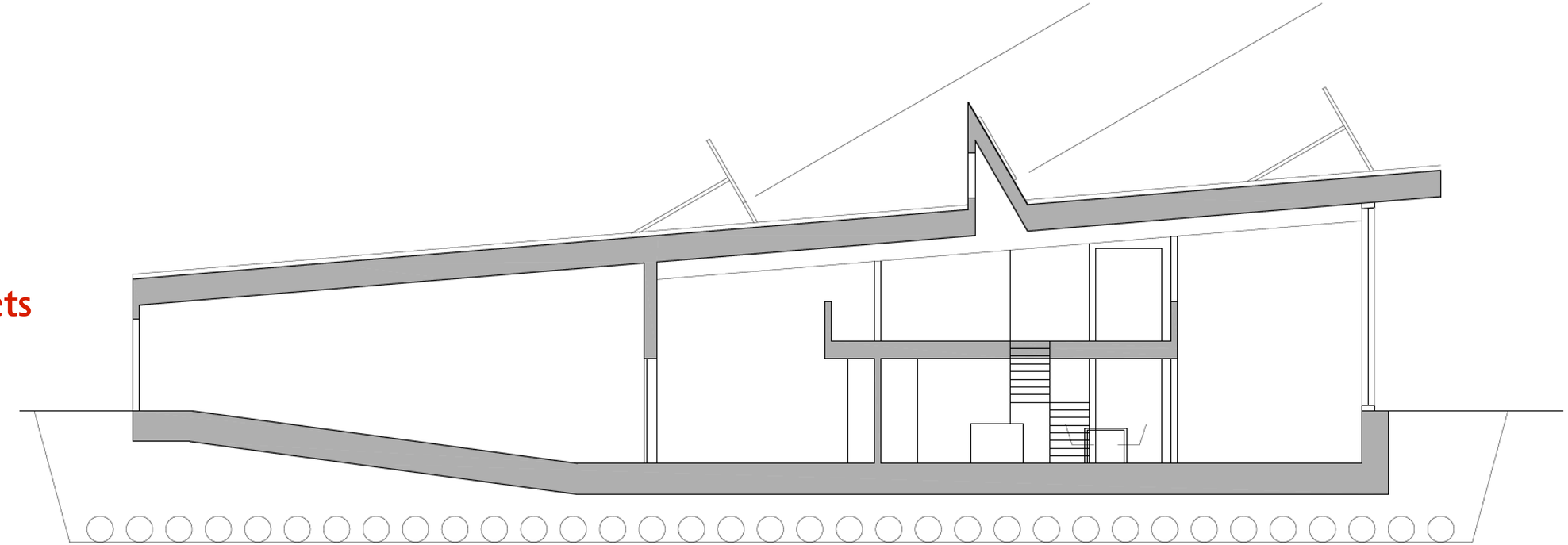


urine-diverting dry toilets
rainwater collection

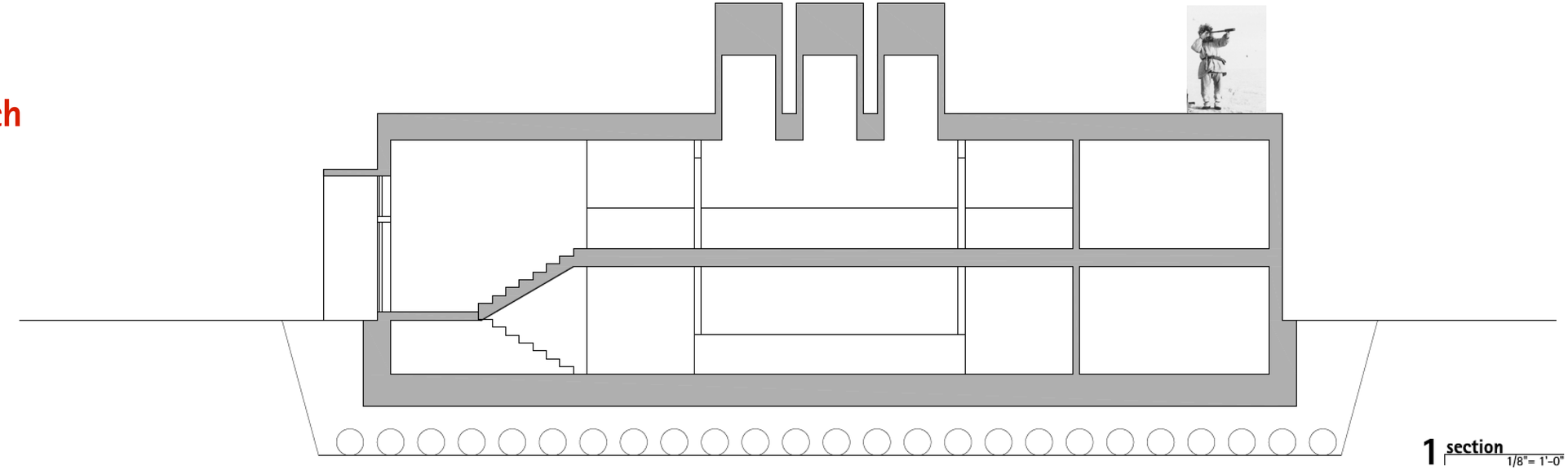
low energy appliances

ground coupling

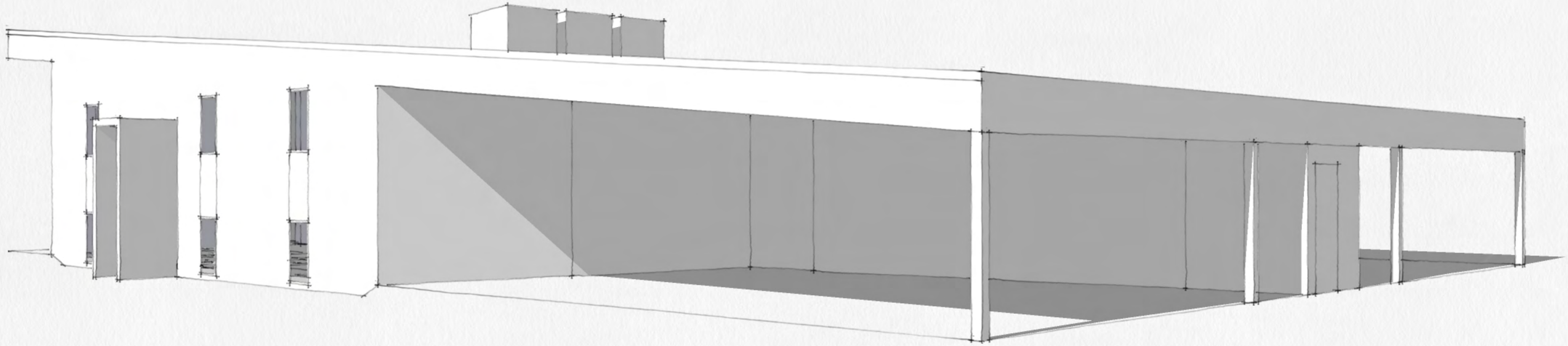
walls 12" r-5 per inch
roof 24" r-5 per inch
under slab 24" r-5 per inch
windows r-11
doors r-8

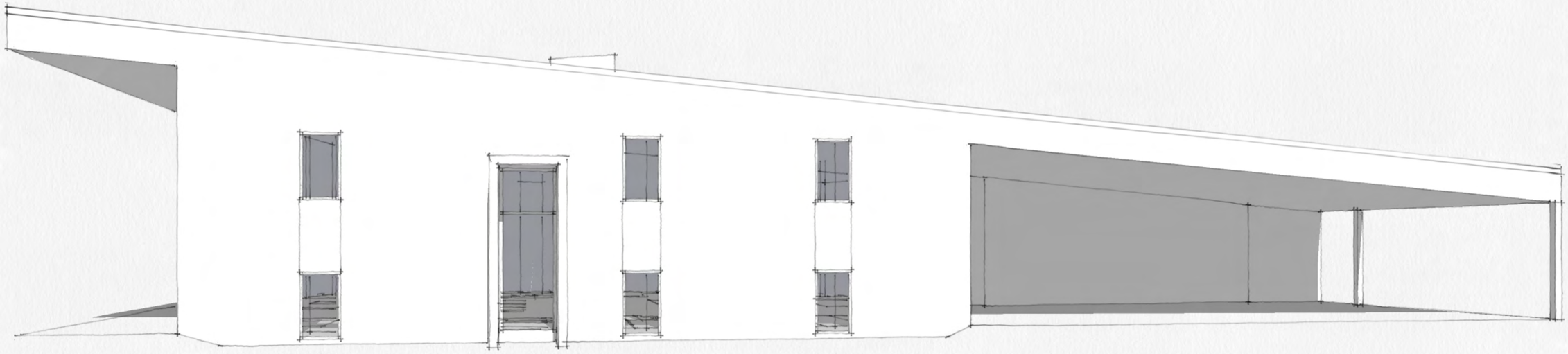


2 section 1/8"= 1'-0"

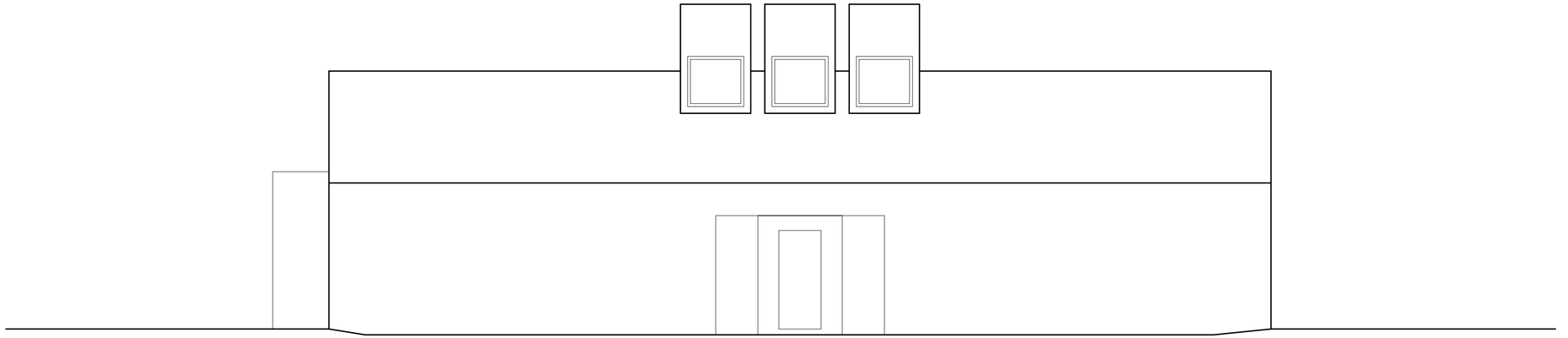


1 section 1/8"= 1'-0"

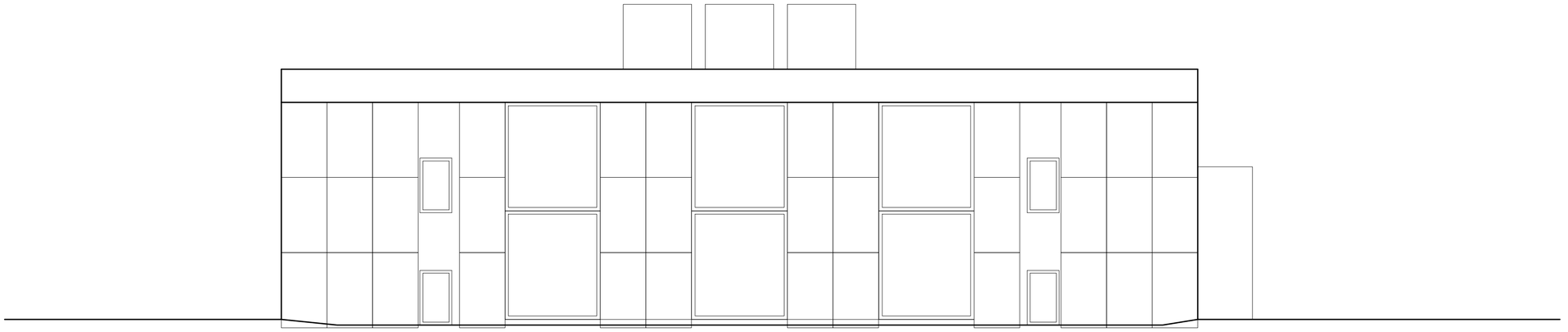




envelope study for concept ideas - large roof overhangs



2 north elevation
1/8"=1'-0"



envelope study for concept ideas - large openings south -no windows north

1 south elevation
1/8"=1'-0"

kvl housing
the snowhaus
673 fairbanks street
anchorage, ak 99501
www.klausmayer.com

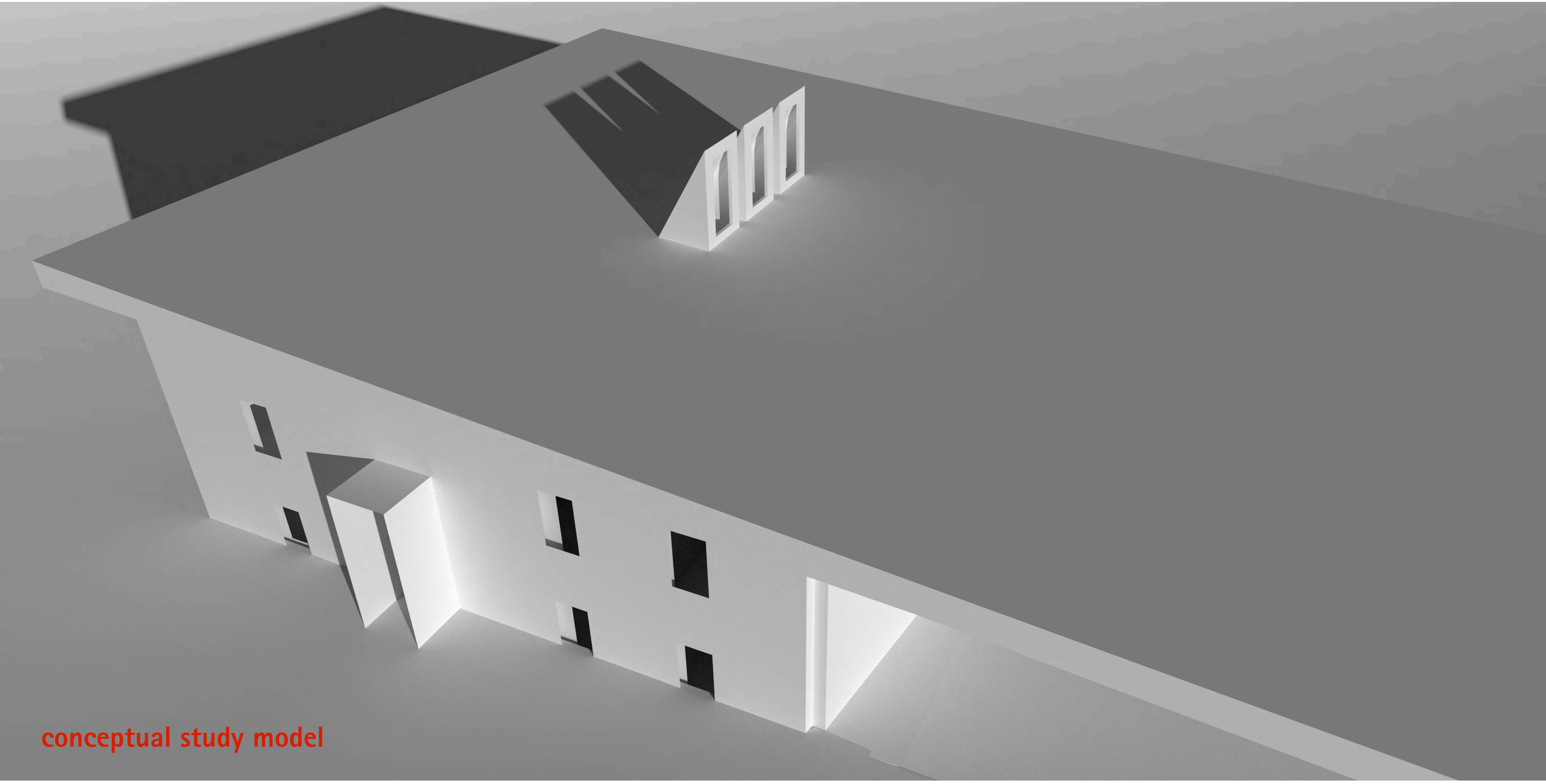
revisions

concept design

elevations

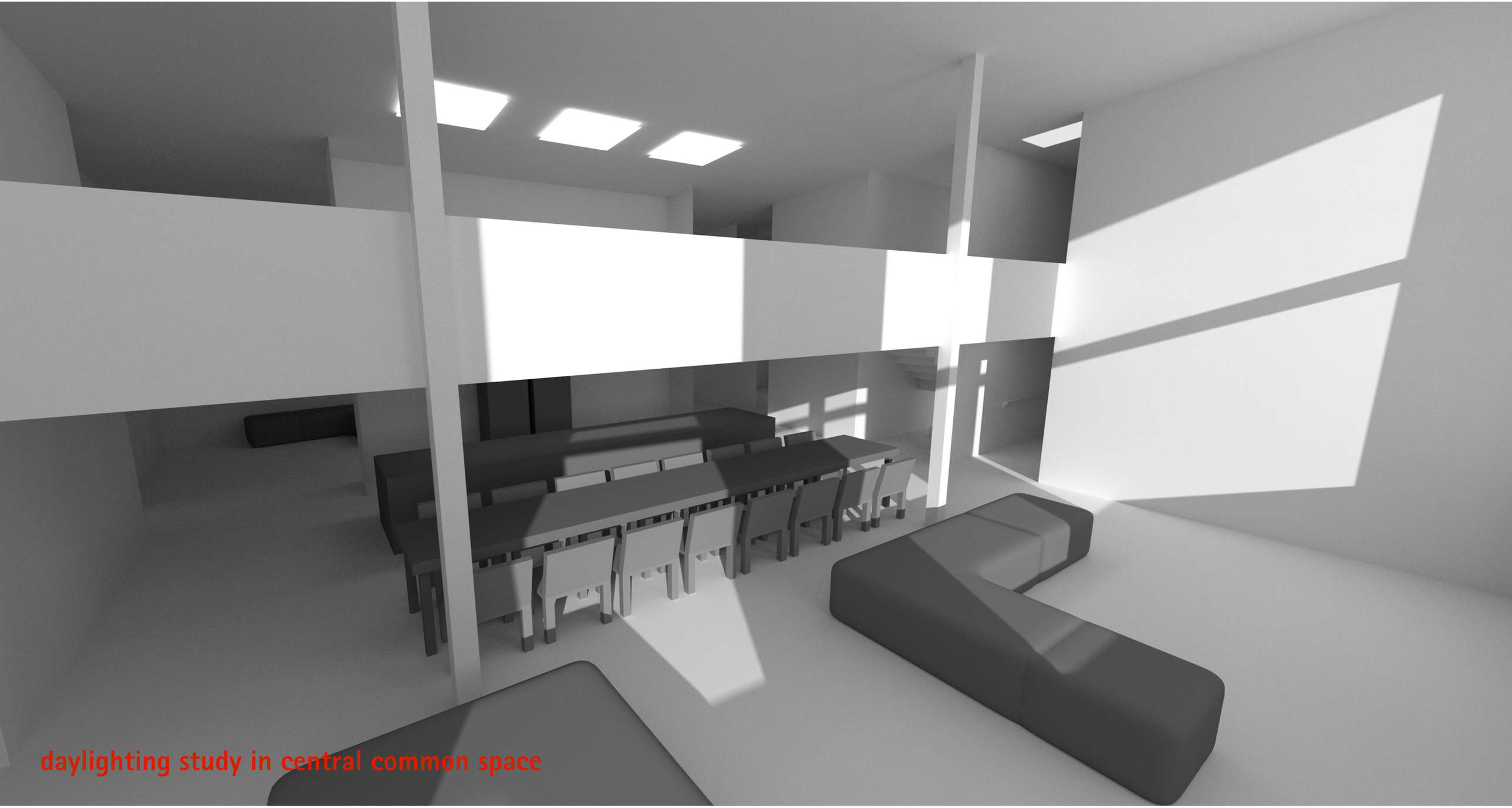
02 27 2018

A 3.2



conceptual study model

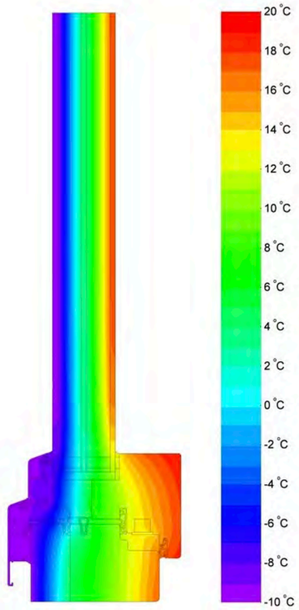
daylighting study in central common space



daylighting study in central common space

mycelium building block local building material - low tech aspect

Fig. 8 Manufacturing process mycelium and waste-based materials



$$U_{f,A,B} = \frac{\frac{\Phi}{\Delta T} - U_p \cdot b_p}{b_f} = \frac{\frac{8.894}{30.000} - 0.649 \cdot 0.336}{0.113} = 0.695\ W/(m^2 \cdot K) = 0.122\ Btu/(h \cdot ft^2 \cdot F)$$

Mechanical Ventilation Heat Recovery Unit

novus (F) 300

Device version:

- ☐ LEFT
- ☐ RIGHT
- ☐ Mounting position HORIZONTAL

Operating Instruction
Please keep next to the MVHR uni

Status: 09.10

Components suitable for Passive House Dr. Wolfgang Feist

passive house –high tech aspect

PAUL WÄRMERÜCKGEWINNUNG

Paul Wärmerückgewinnung GmbH
August-Horch-Straße 7
08141 Reinsdorf
Germany
Tel.: +49(0)375 - 303505 - 0
Fax: +49(0)375 - 303505 - 55

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AC-300P/156-72S
AC-305P/156-72S
AC-310P/156-72S

www.axitecsolar.com

AXITEC
high quality german solar brand

Vertrieb durch:

CE

Elektrische Daten (bei Standard-Testbedingungen (STC) Einstrahlung 1000 Watt/m² mit Spektrum AM 1.5 bei einer Zelltemperatur von 25°C)

Typ	Nennleistung Pmpp	Nennspannung Umpp	Nennstrom Impp	Kurzschlussstrom Isc	Leerlaufspannung Uoc	Modul Wirkungsgrad
AC-300P/156-72S	300 Wp	36,73 V	8,18 A	8,71 A	45,48 V	15,41 %
AC-305P/156-72S	305 Wp	36,85 V	8,28 A	8,81 A	45,50 V	15,67 %
AC-310P/156-72S	310 Wp	37,02 V	8,39 A	8,89 A	45,52 V	15,93 %

Aufbau

Vorderseite	3,2 mm gehärtetes, reflexarmes Weißglas
Zellen	72 polykristalline Hochleistungszellen 156 mm x 156 mm (6")
Rückseite	Verbundfolie
Rahmen	40 mm silber eloxierter Aluminiumrahmen

Mechanische Daten

L x B x H	1962 x 992 x 40 mm
Gewicht	22,5 kg mit Rahmen

Anschluß

Anschlussdose	Schutzklasse IP65 (3 Bypassdioden)
Leitung	ca. 1,0 m, 4 mm²
Stecksystem	Stecker/Buchse IP67

Grenzwerte

Systemspannung	1000 VDC
NOCT (nominal operating cell temperature)*	45°C +/-2K
Max. Belastbarkeit	2400 N/m²
Rückwärtsbestromung IR	13,0 A
Zulässige Betriebstemperatur	-40°C bis +85°C

(Es dürfen keine ext. Spannungen größer Uoc am Modul angelegt werden)

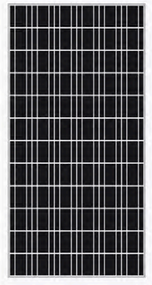
*NOCT, Bestrahlungsstärke 800 W/m²; AM 1,5; Windgeschwindigkeit 1 m/sec; Temperatur 20°C

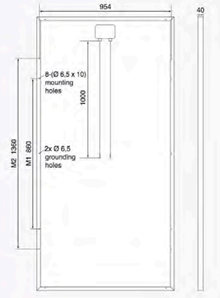
Temperaturkoeffizienten

Spannung Uoc	-0,30 %/K
Strom Isc	0,04 %/K
Leistung Pmpp	-0,42 %/K

Schwachlicht (Beispiel AC-300P/156-72S)

I-U Kennlinie	Strom	Spannung
200 W/m²	1,69 A	34,55 V
400 W/m²	3,30 A	35,42 V
600 W/m²	4,93 A	35,70 V
800 W/m²	6,48 A	36,21 V
1000 W/m²	8,18 A	36,73 V





Alle Maße in mm

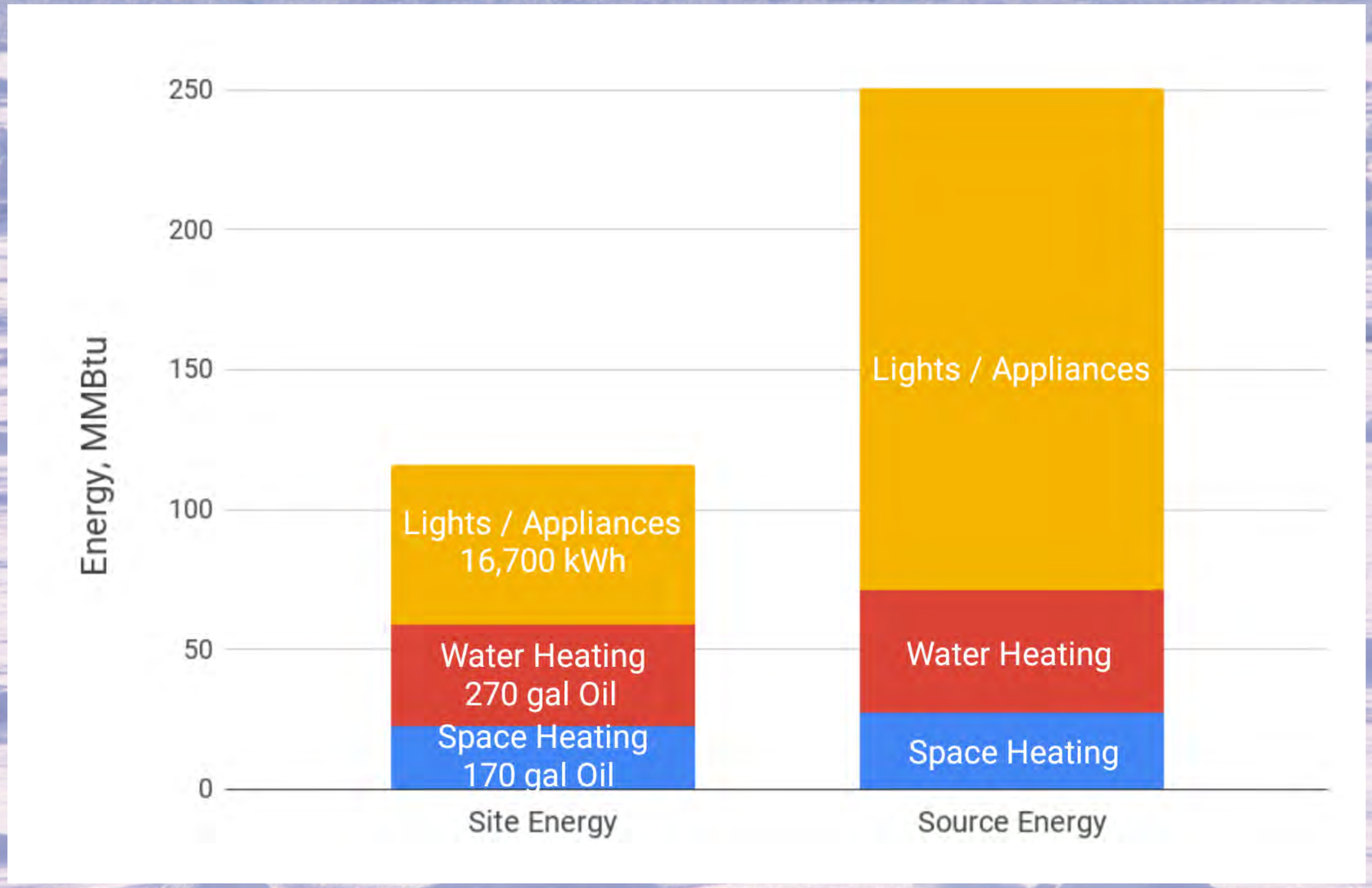
renewable technologies used presently in region

wind energy kotzebue

heat pump kivalina

solar pv kivalina

Modeled Energy Use



Building Thermal Characteristics

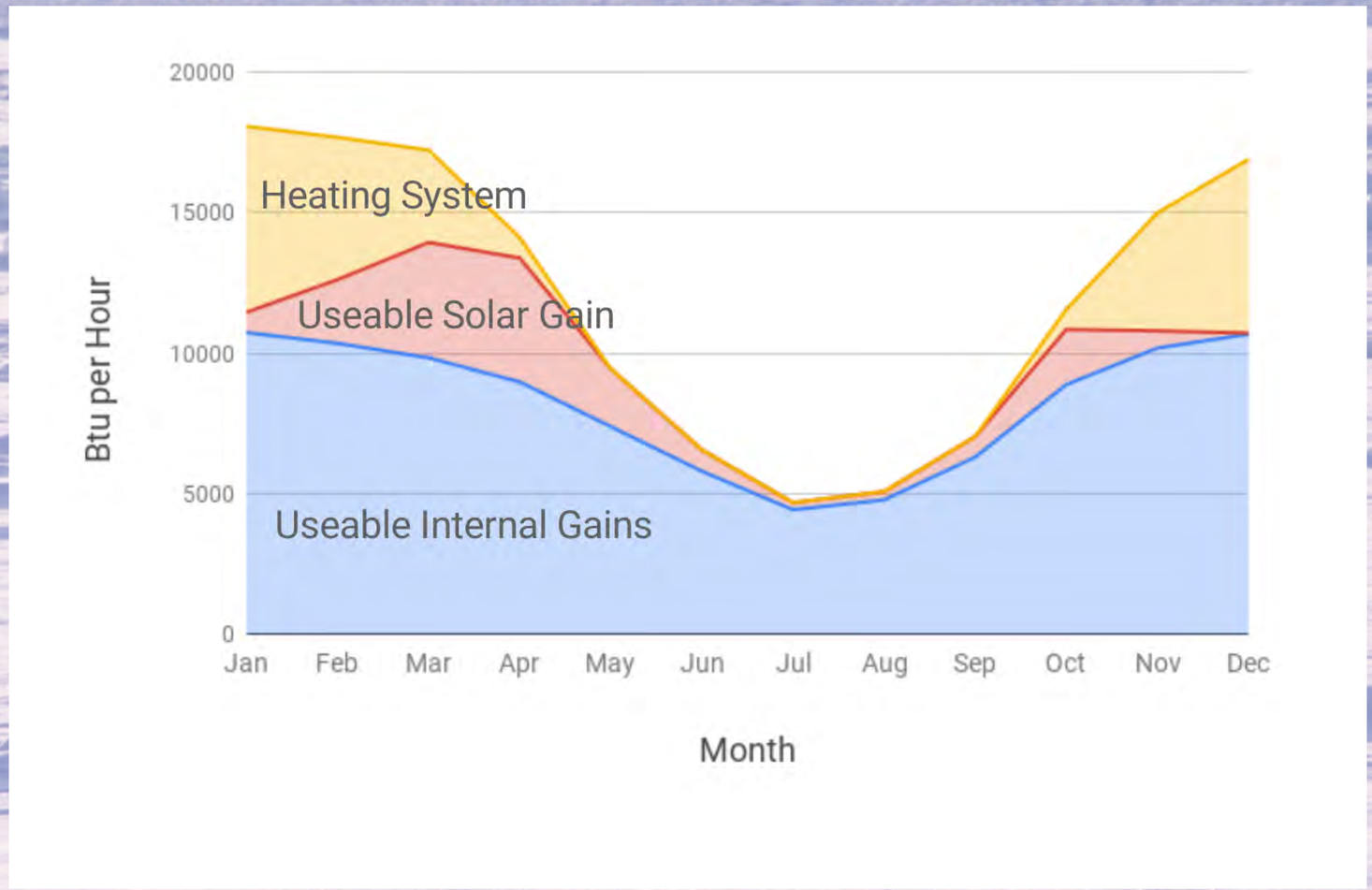
Shell R-Values
Walls: R-60
Under Slab: R-120
Roof: R-120
Windows: R-8.4 (Zola)

Heat Recovery Ventilator, Efficiency = 84% (Zehnder)

Building Airtightness: 0.4 ACH at 50 Pascals

Oil Heating Efficiency: 85%

Monthly Space Heating Energy Flows



Options for Net Zero Building

Solar	Wind
36 Panels on South Wall, 320 Watts each Panel + 51 Panels on Roof, tilted at 60 degrees, 320 Watts each Panel Annual Production = 23,800 kWh Source Energy = 256 MMBtu	Viking 25 kW Wind Turbine Annual Production = 50,000 kWh @ 12 mph Annual Average Wind Source Energy = 537 MMBtu Enough for Two Net Zero Energy Buildings

case study- building design construction manufacturing long term testing

mycelium building blocks “produced” and installed by local labor = big savings in cost of project

bio-material can play important role in the circular economy that will benefit this project and can be scaled up for other building types and locations in alaska and beyond.

building design addresses overcrowding, indoor climate and social-economic issues (affordability, child care and education,ect.)

indigenous housing competition team

the snowhaus – klaus mayer – architect
arête – seth andersen – structural engineer
energy engineering – michael hauke – mechanical engineer
analysis north – alan mitchell – energy analyst
rhizoform – philippe amstislavski – bioengineer
dtu – pernille bengtsen – special advisor