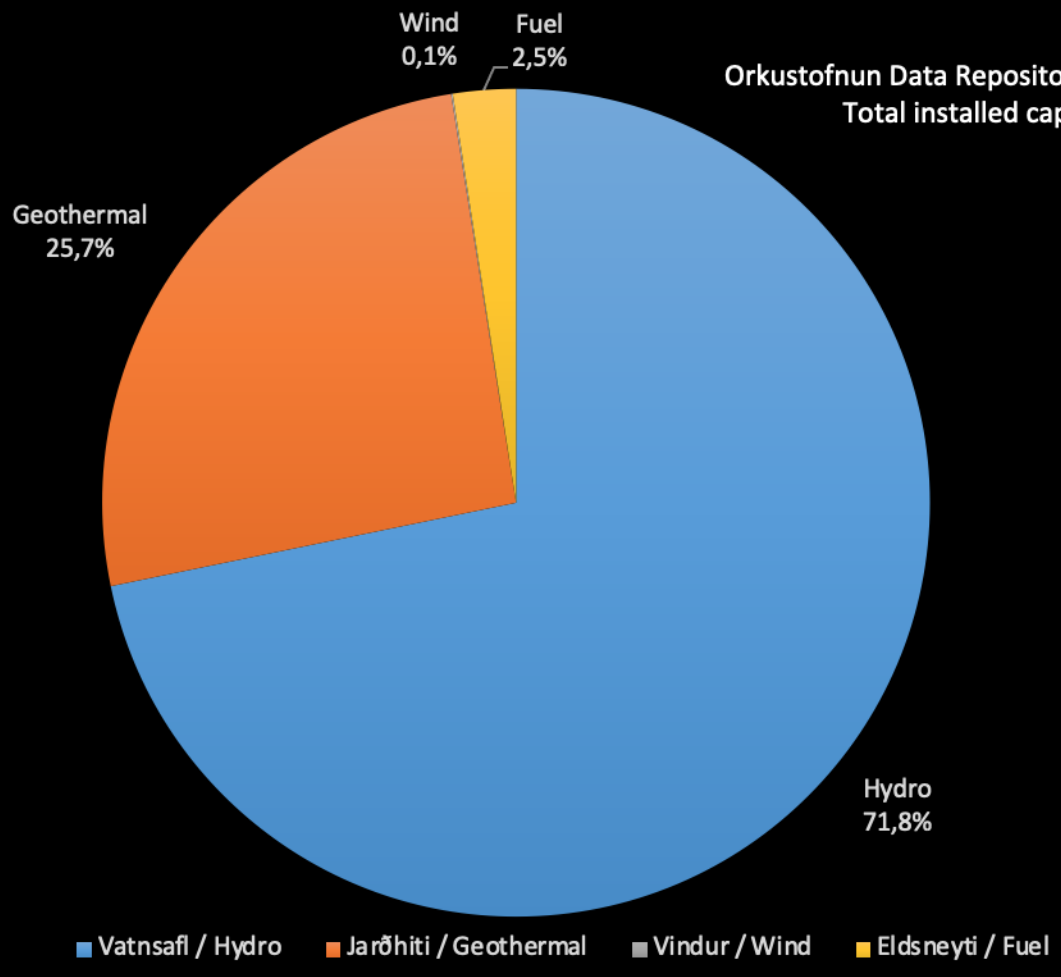
Insights into the Icelandic Energy Market

Gwen Holdmann & Erlingur Gudleifsson
Alaska Center for Energy and Power

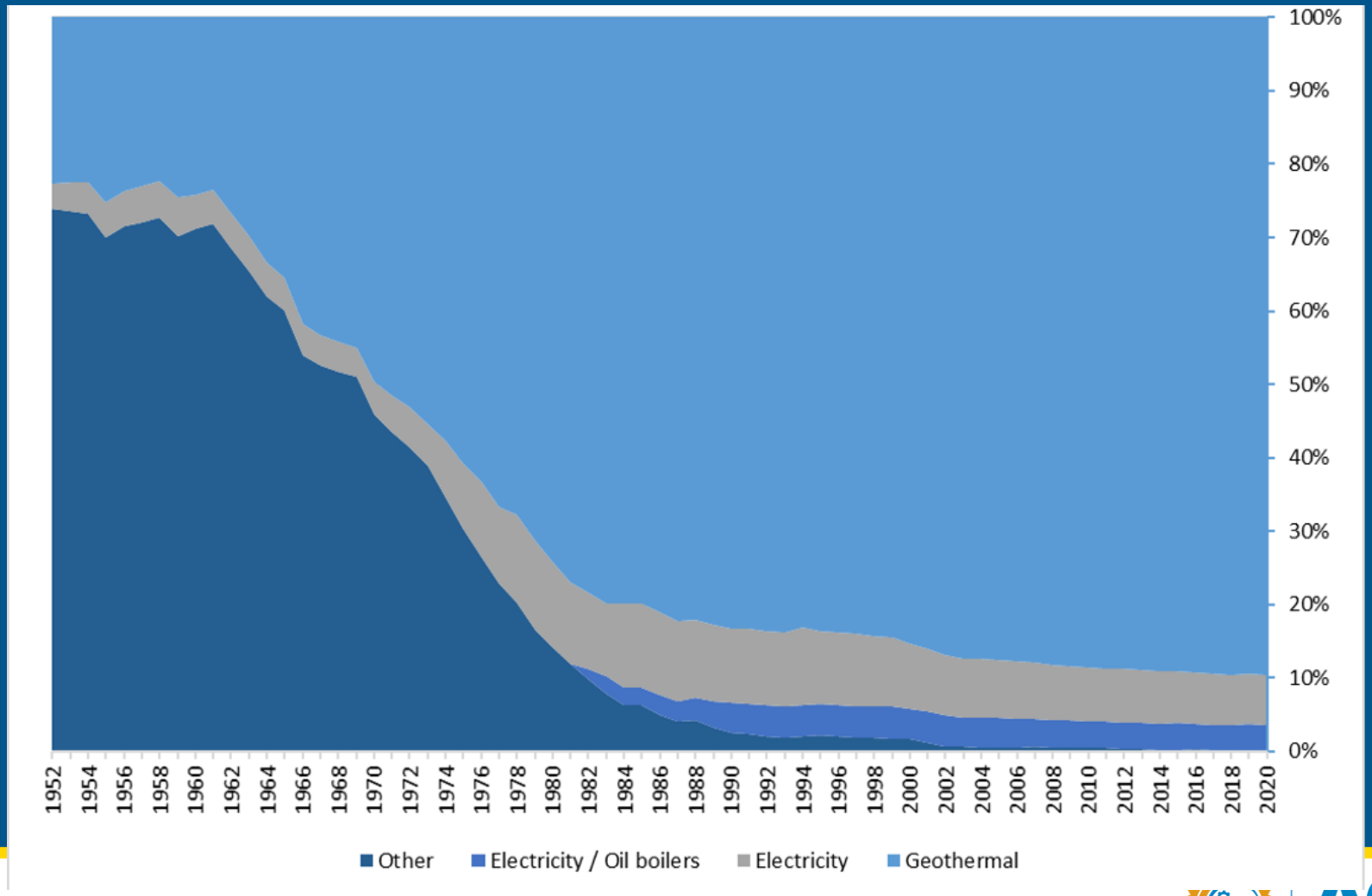
ACEP
Alaska Center for Energy and Power

Installed Capacity by Source (2020)



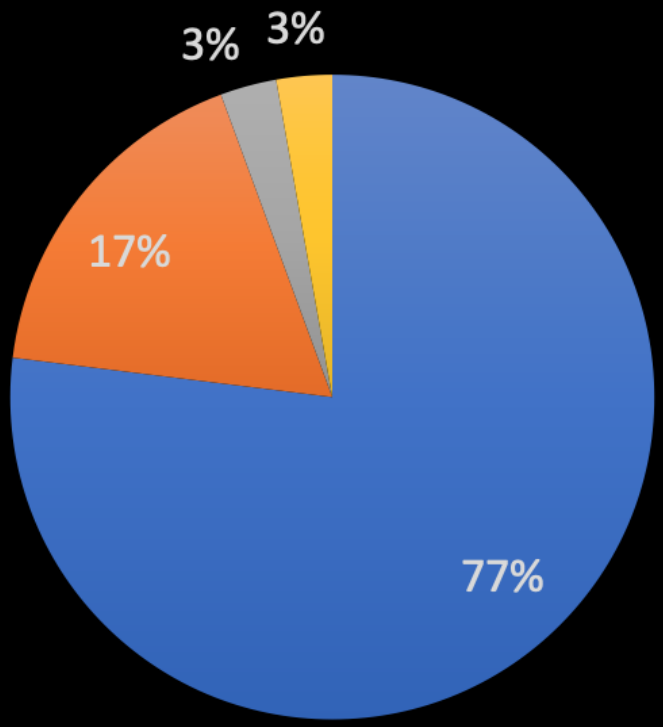
ACEP
Alaska Center for Energy and Power

Space Heating by Energy Source – Iceland 1952-2020



Iceland Electricity Sales/Production

Iceland Total Production 19.8 GWh
Population = 372,000



Alaska Statewide 6.5 GWh
Population = 732,000

ACEP
Alaska Center for Energy and Power

ACEP
Alaska Center for Energy and Power

ACEP
Alaska Center for Energy and Power

Ring Grid/Railbelt Grid Comparison

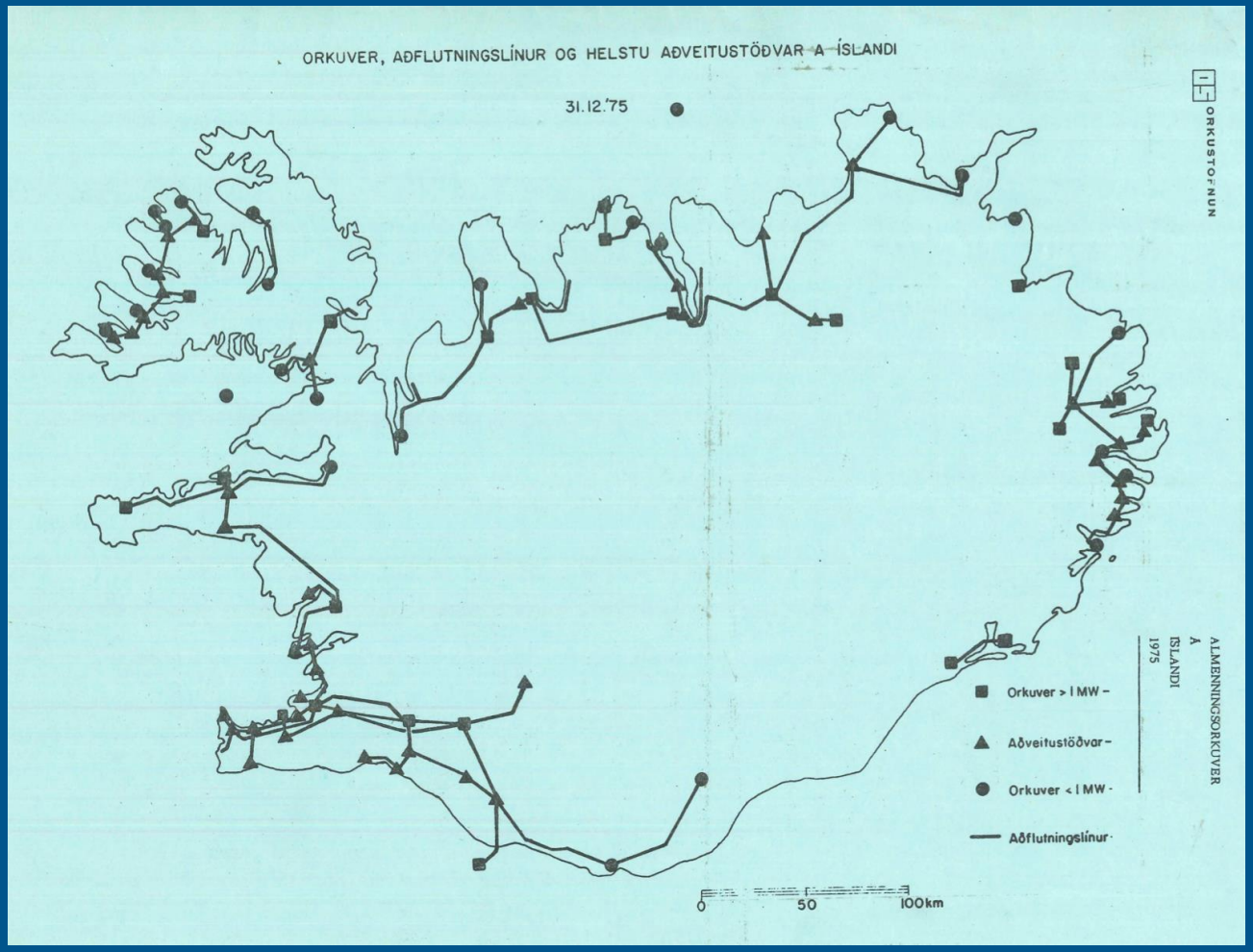
	Installed capacity	Annual sales	Length	Per capita sales
	[MW]	[GWh]	miles	[MWh/capita]
Railbelt Grid	2,000	4,400	~650	845 MWh/capita
Ring Grid	2,900	19,100	~2000	51.6 MWh/capita

Ring Grid/Railbelt Grid Comparison

	Installed capacity	Annual sales	Length	Per capita sales
	[MW]	[GWh]	miles	[kWh/year]
Railbelt Grid	2,000	4,400	650	845 kWh/yr
Ring Grid	2,900	19,100	2000	51,620 kWh/yr

On a per capita basis, Iceland produces and sells 6 times more electricity than the Railbelt grid

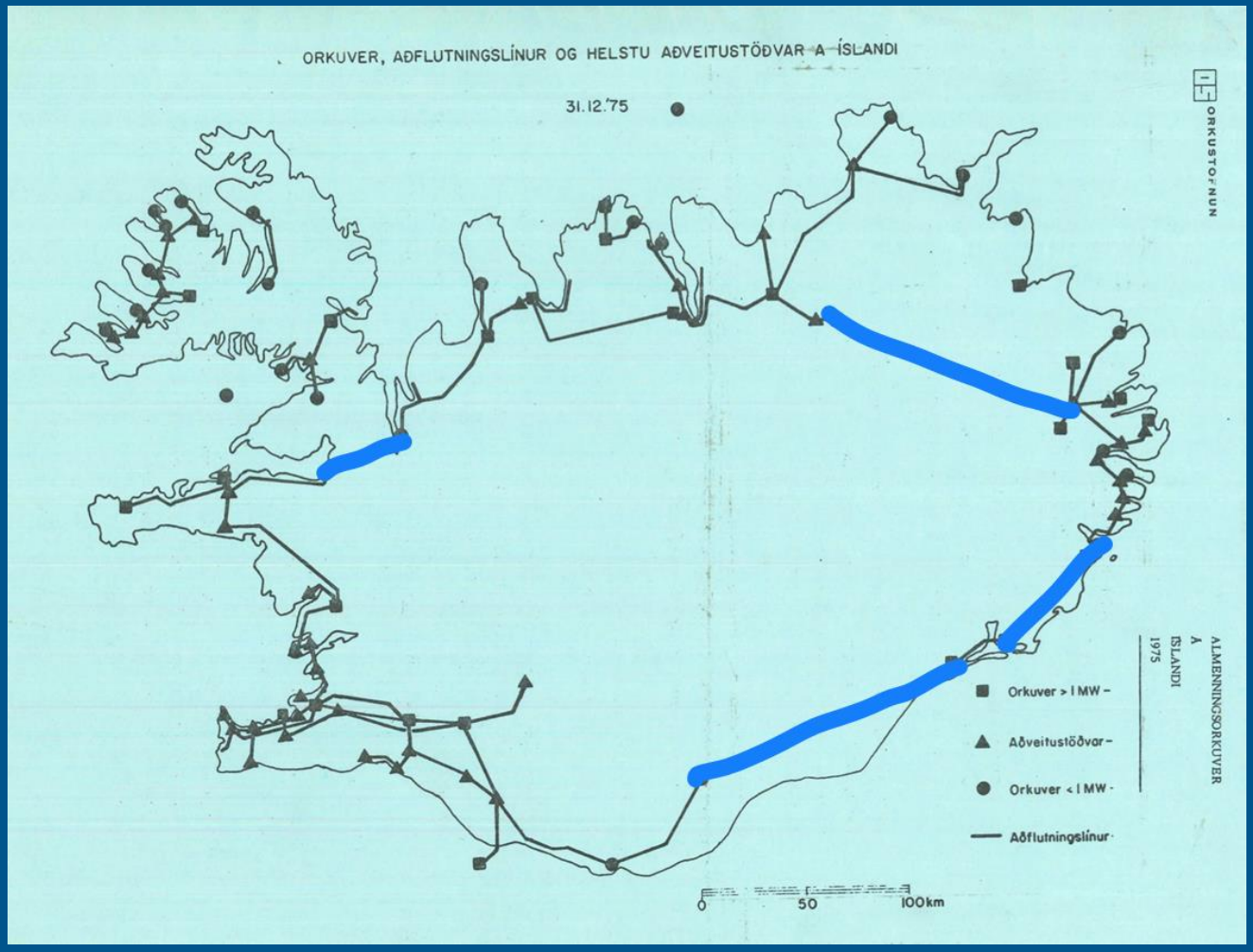
“Closing the Gap”



Iceland circa 1975 had 4 independent non-interconnected generation “regions”

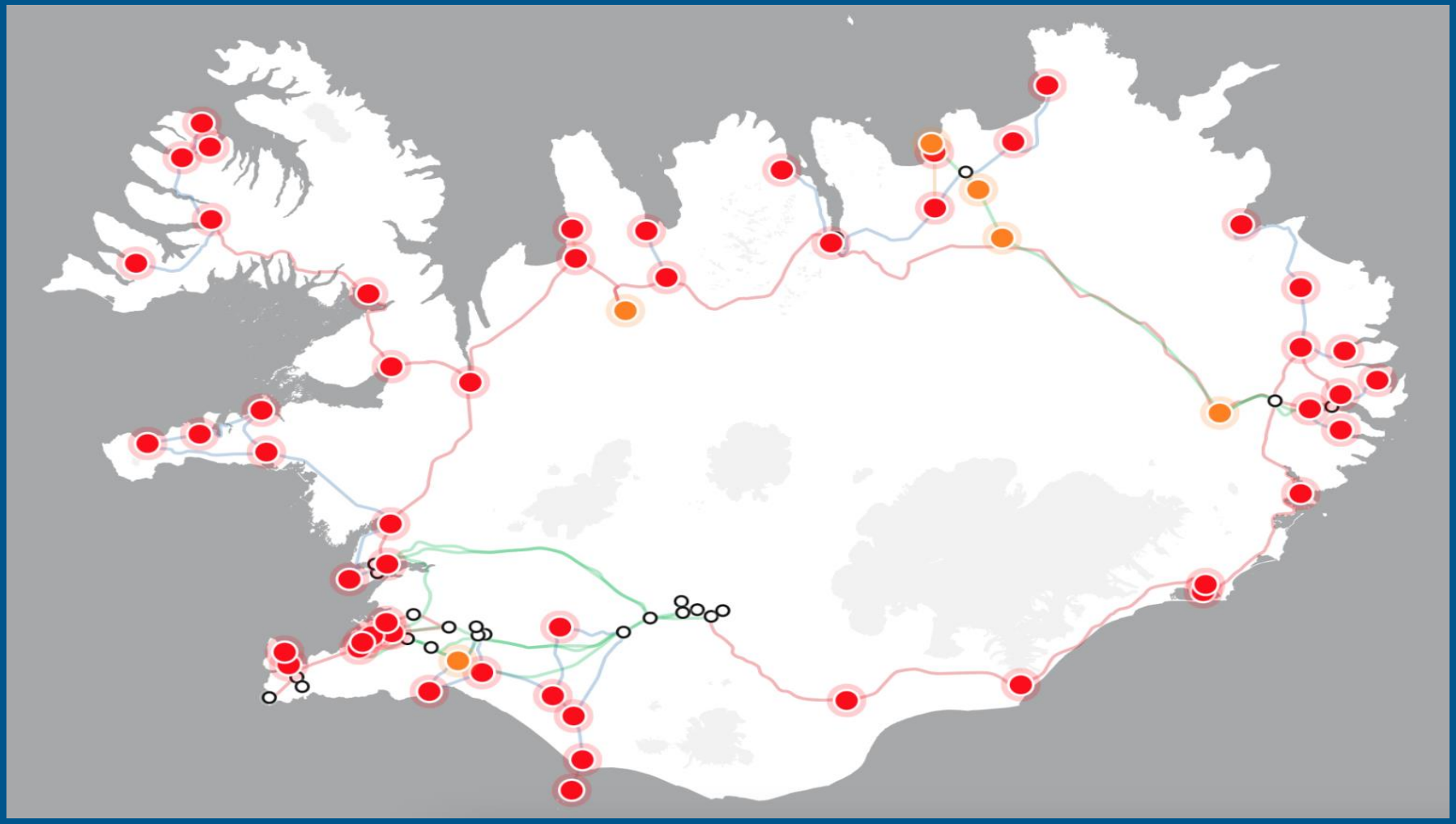
ACEP
Alaska Center for Energy and Power

“Closing the Gap”



Transmission interconnections completed in 1984

TSO Grid and Generation Stations (2023)

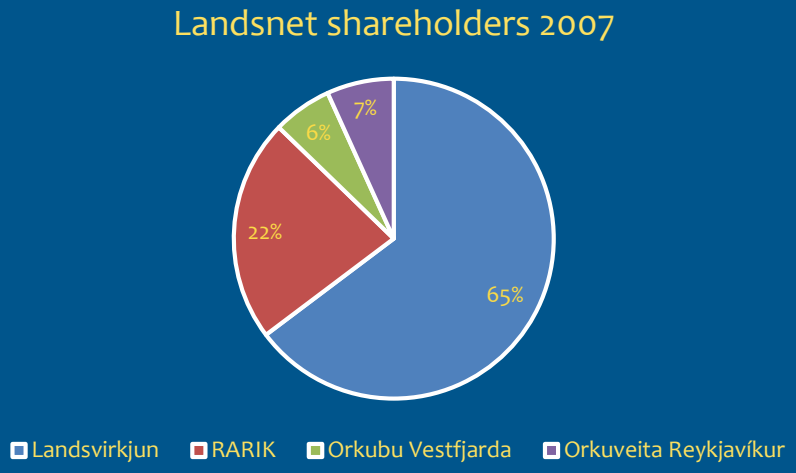


Unbundling G&T Assets

Required by EU Policy – 3 stages over a decade

Landsvirkjun

LANDSNET



Transmission assets primarily owned by Icelandic state (through Landsnet);

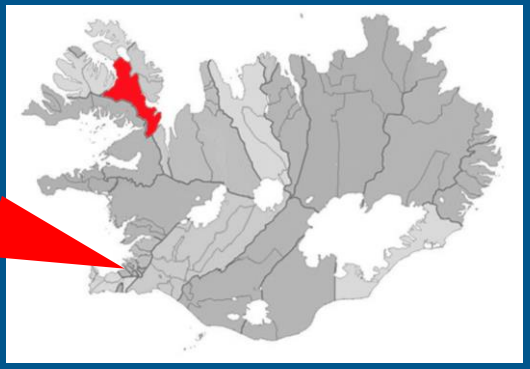
maintains generation and distribution ownership diversity

ACEP
Alaska Center for Energy and Power

Consumer Energy Price Structure (Iceland)

	Energy price (general)	Energy price (general)	Energy price (heating)	Energy price (heating)	Heating discount
	kr/kWh	*cents/kWh*	*kr/kWh*	*cents/kWh*	%
Straumlind	6,98	**4,99**	6,25	**4,46**	10,5%
N1 Rafmagn	6,98	**4,99**	6,25	**4,46**	10,5%
Orkubú Vestfjarða	7,50	**5,36**	6,72	**4,80**	10,4%
Orka Heimilanna	7,30	**5,21**	6,54	**4,67**	10,4%
Fallorka	8,67	**6,19**	7,56	**5,40**	12,8%
Orkusalan	9,16	**6,54**	7,68	**5,49**	16,2%
HS Orka	9,24	**6,60**	7,79	**5,56**	15,7%
Orka náttúrunnar	9,18	**6,56**	8,04	**5,74**	12,4%

Consumer Pricing – bottom line

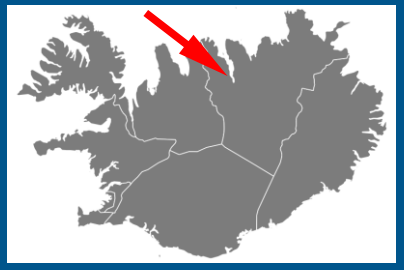


		Example 1	Example 2
Energy unit price	cent/kWh	4,02	4,02
VAT		0,97	0,97
Total	cent/kWh	4,99	4,99
Wheeling cost	cent/kWh	10,78	4,66
Equalizing fee	cent/kWh	0,29	0,29
Gov. subsidy	cent/kWh	-3,93	
VAT		1,71	1,19
Total	cent/kWh	8,86	6,14
Total cost	cent/kWh	13,84	11,12
	ISK/kWh	19,38	15,57

Example 1 = rural area;
Example 2 = urban area

ACEP
Alaska Center for Energy and Power

Electrical prices: Industrial Customer



Small commercial example: Construction company; 150-200 MWh annual sales

Electricity bill brake down

Usage	Qty	Unit	Unit price	Unit	Total (USD)	VAT	Total w. VAT (USD)
Energy (general)	14.114	kWh	4,99	cent/kWh	704,79	24%	873,94
Total usage	14.114	kWh			704,79		873,94

Transmission

Usage	Qty	Unit	Unit price	Unit	Total (USD)	VAT	Total w. VAT (USD)
Connection fee (general)	31	Days	2,32	USD/day	71,93	24%	89,20
Transmission (general)	14.114	kWh	4,51	cent/kWh	636,14	24%	788,81
Equalizing fee	14.114	kWh	0,29	cent/kWh	41,33	24%	51,25
Total usage					749,41		929,26

To be payed per month (USD)	1.803,21

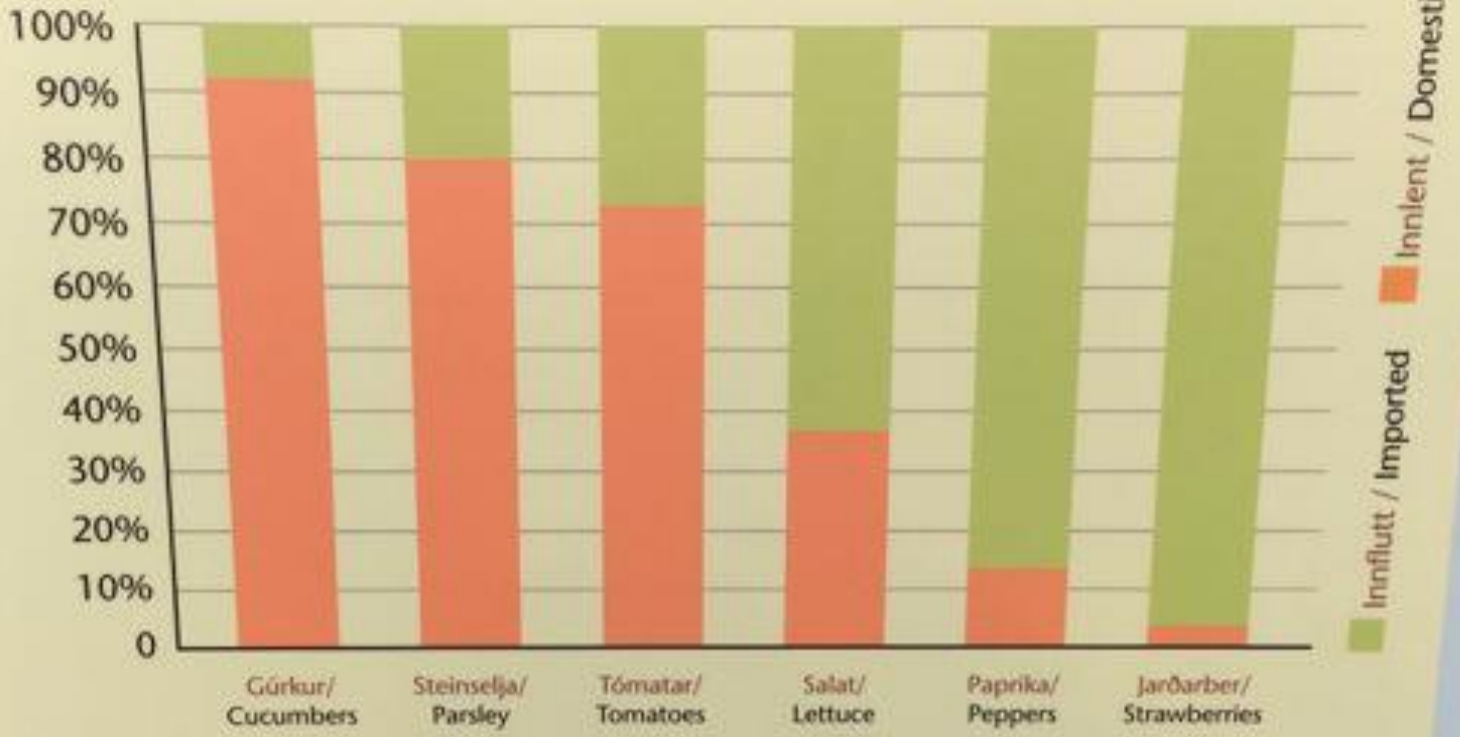
Average price (cent/kWh)	12,78

ACEP
Alaska Center for Energy and Power


FRIÐHEIMAR
Velkomin

Hlutdeild innlendrar framleiðslu í framboði á Íslandi 2010

Participation of domestic production available in Iceland 2010



Megnið af þeim gúrkum sem íslenskir neytendur leggja sér til munns er innlend framleiðsla, eða rúm 90%. Um 75% af tómötum á markaðnum er innlend framleiðsla en einungis lítið brot af jarðarberjunum.

Most of the cucumbers consumed in Iceland are domestic, or about 90%. About 75% of tomatoes on the Icelandic market are domestic produce, but only a small fraction of strawberries.

Large commercial:

- Located in Reykjavik
- Steel Fabrication and Construction
- ~1200 MWh annual sales

Electricity bill brake down

Usage	Qty	Unit	Unit price	Unit	Total (USD)	VAT	Total w. VAT (USD)
Energy (general)	100.013	kWh	3,52	cent/kWh	3523,46	24%	4.369,10
Total usage	100.013	kWh			3523,46		4.369,10

Transmission

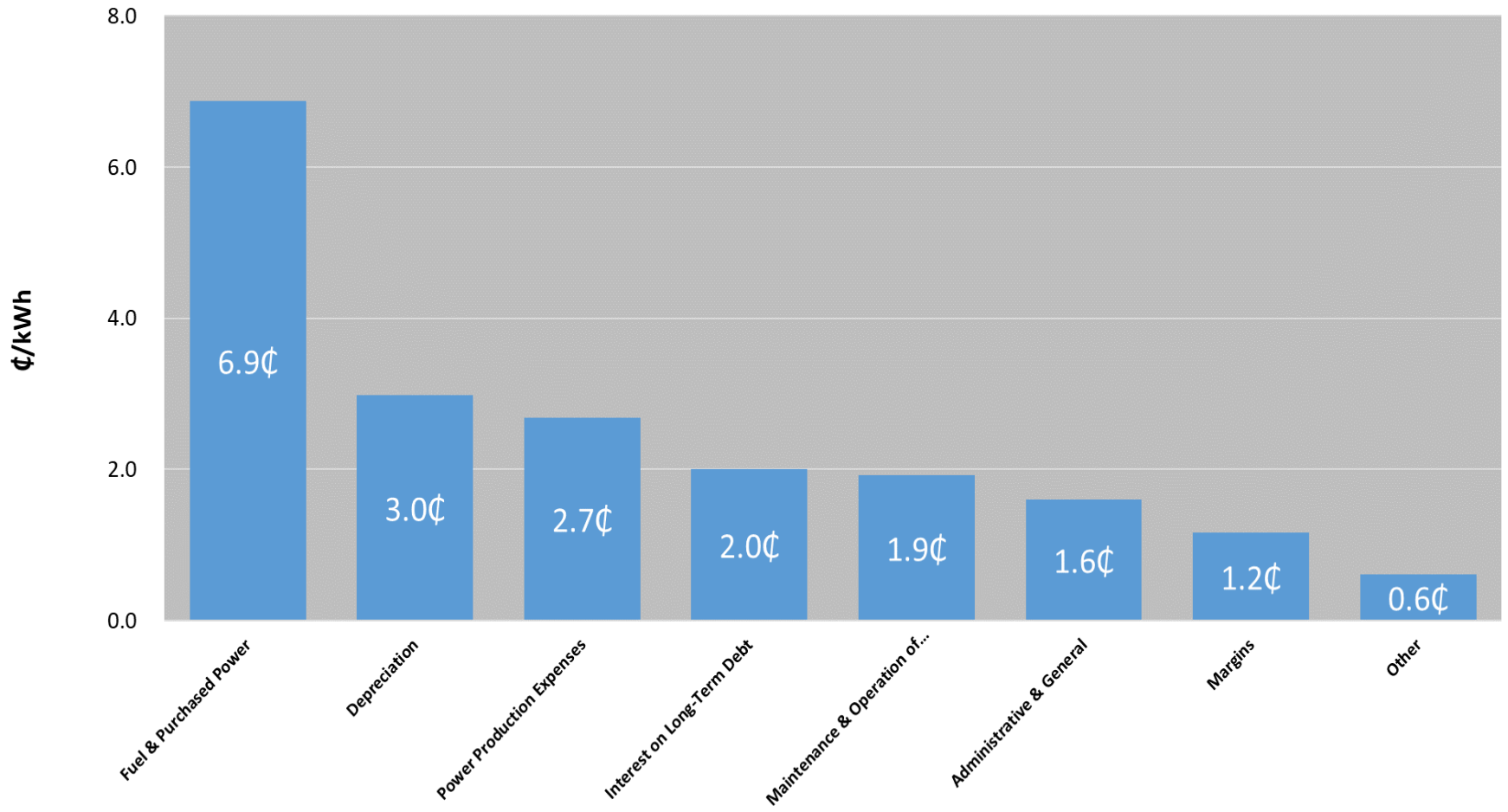
Usage	Qty	Unit	Unit price	Unit	Total (USD)	VAT	Total w. VAT (USD)
Connection fee (general)	28	Days	2,32	USD/day	64,97	24%	80,57
TSO fee	100.013	kWh	0,62	cent/kWh	623,37	24%	772,98
DSO fee	100.013	kWh	1,16	cent/kWh	1.159,80	24%	1.438,15
Equalizing fee	100.013	kWh	0,29	cent/kWh	292,90	24%	363,19
Total usage					2.141,03		2.654,88

To be payed per month (USD)	7.023,97

Average price (cent/kWh)	7,02

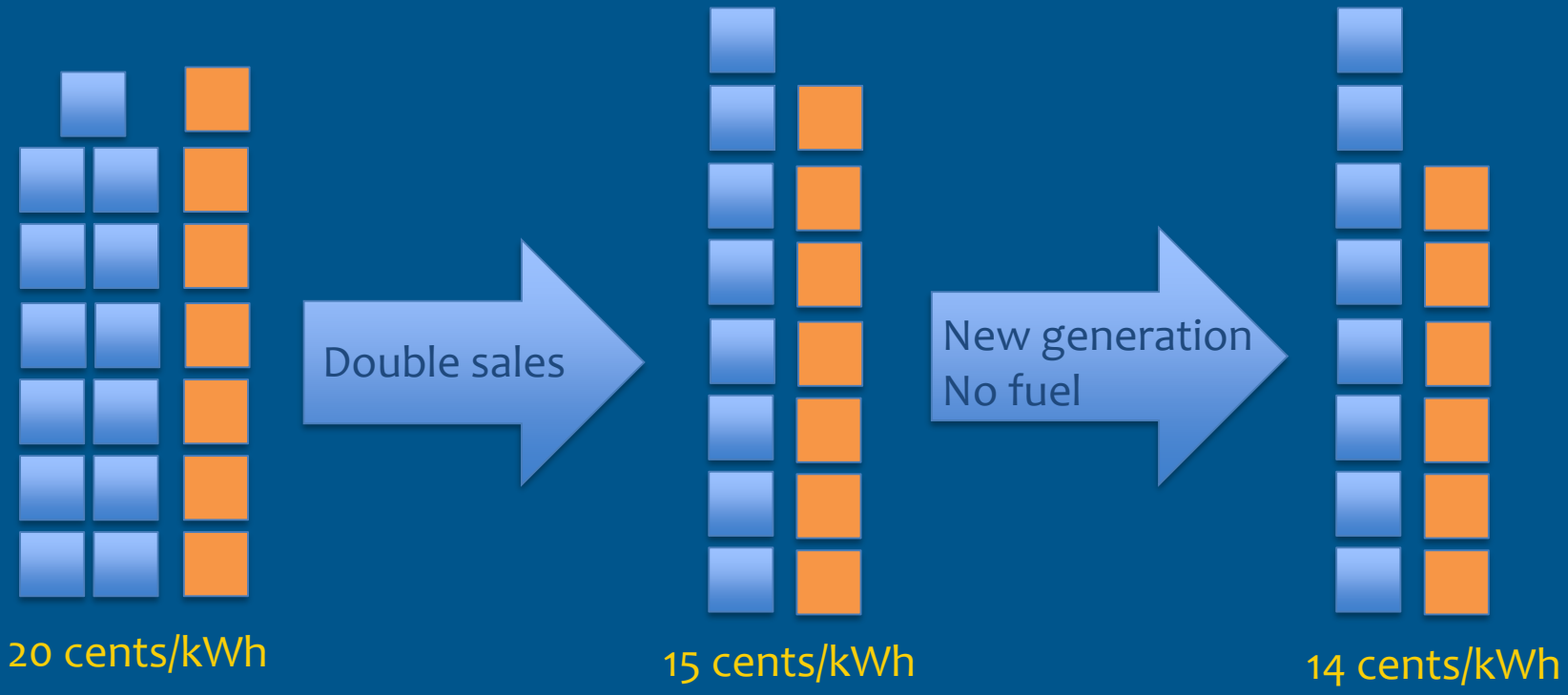
ACEP
Alaska Center for Energy and Power

Railbelt Utilities Cost per kWh (2021)



Economies of scale

Many caveats here!!!!



"Cheaper by the dozen" - https://www.uaf.edu/acep-blog/cheaper-by-the-dozen-reducing-alaskas-electricity-costs.php

Iceland's Policies (high level)

- Commitment to energy independence
- Industry partnerships to build up infrastructure
- Investment in transmission
- Subsidies for high-cost regions (heat and power)
- Iceland drilling fund – loan fund to reduce risk
- Iceland energy plan – selecting projects
- Hesitancy to develop intertie
- Investment in knowledge economy

Overseas Activities of Geothermal Companies

Thank you!

Gwen Holdmann
University of Alaska Fairbanks
Gwen.holdmann@alaska.edu

ACEP
Alaska Center for Energy and Power