Wind Pumped Hydro Storage

Suðuroy, Faroe Islands

Oslo, 31 October 2013

Jarðfeingi - **Bjarti Thomsen**

Content

Hydro - Wind intermittancy

Energy storages

Norconsult Suðuroy study

Alternative installations

Stand – alone

?

Renewable energy: hydro, wind, sun, sea.

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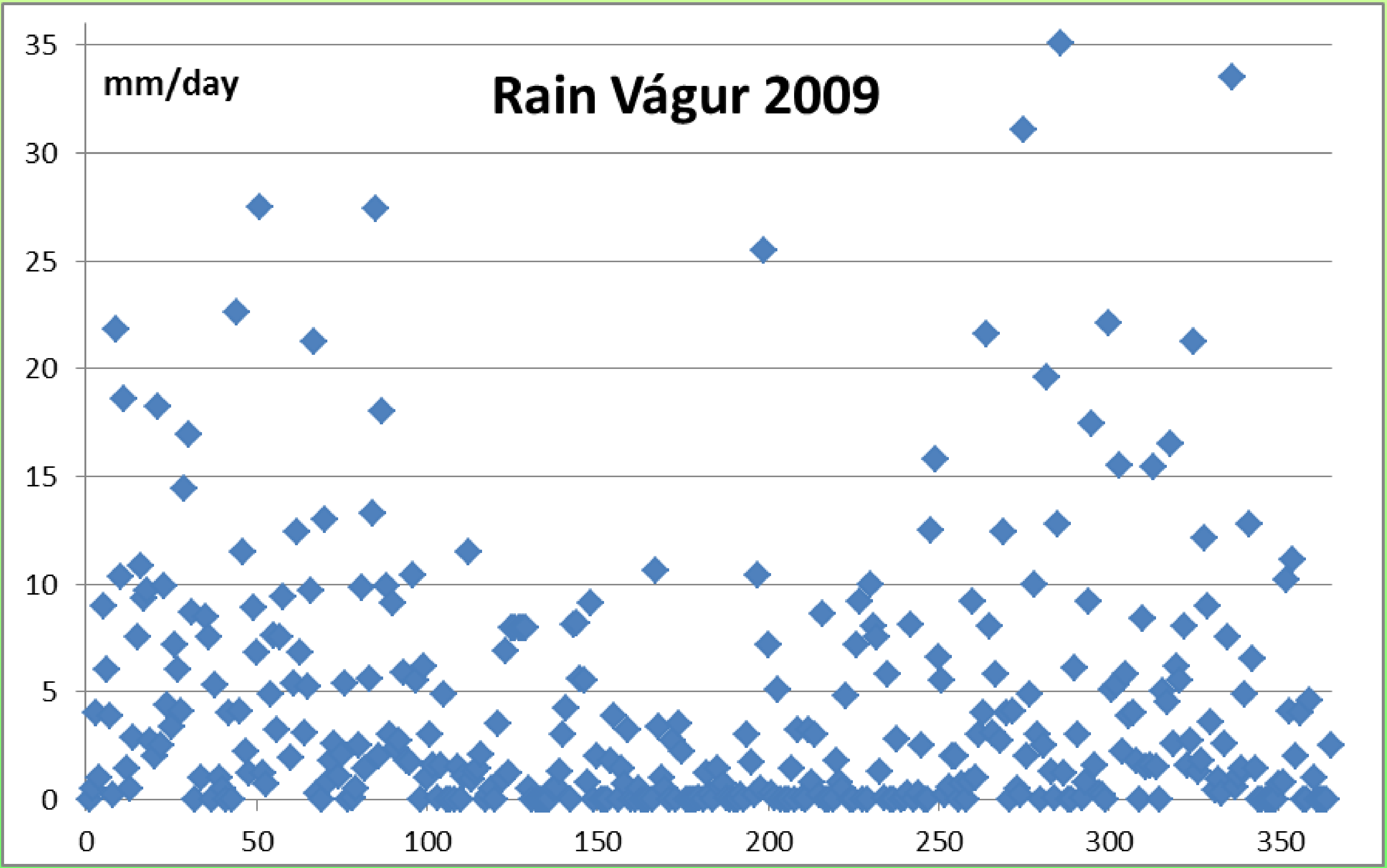

Sum: 1516 mm in 2009

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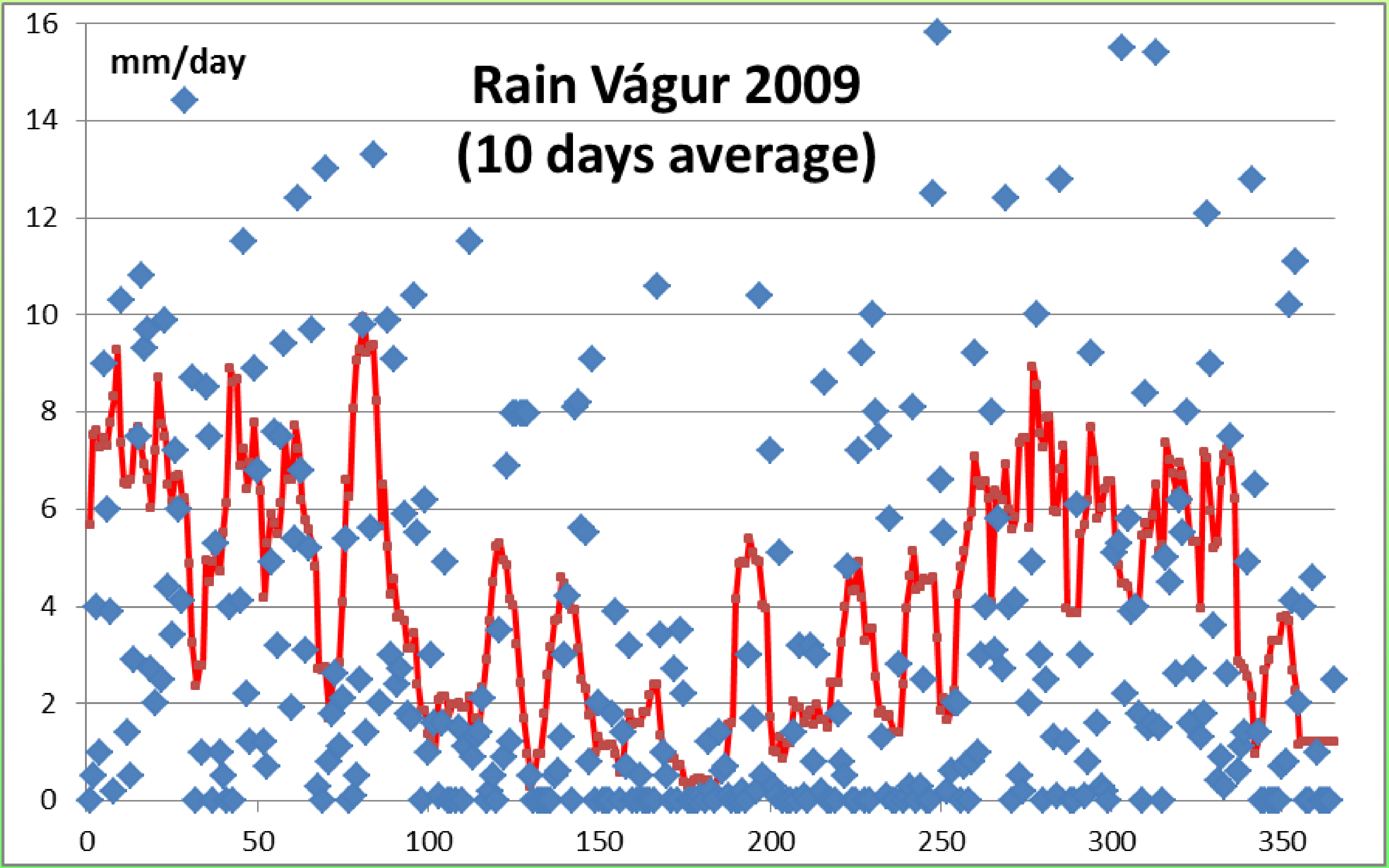

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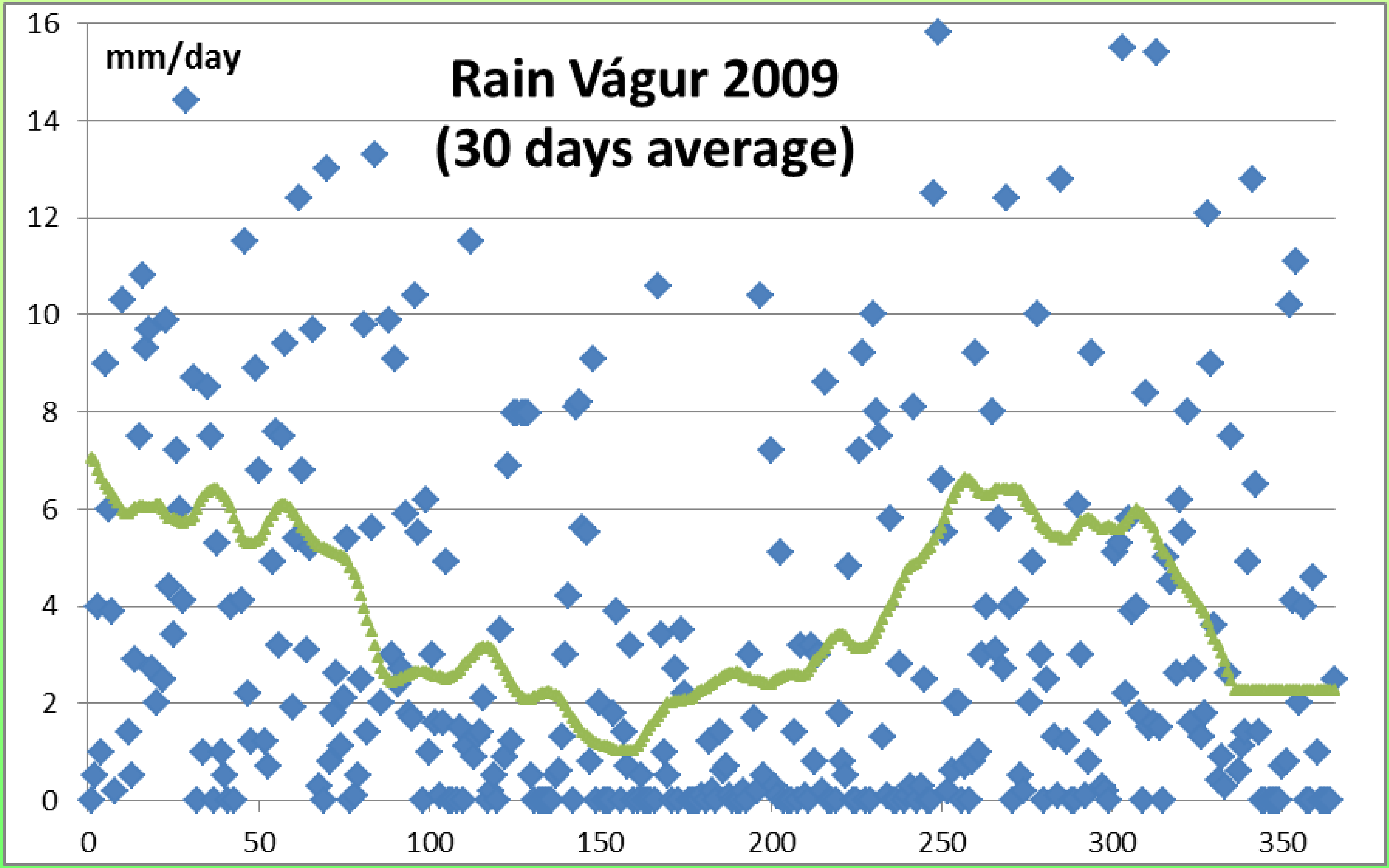

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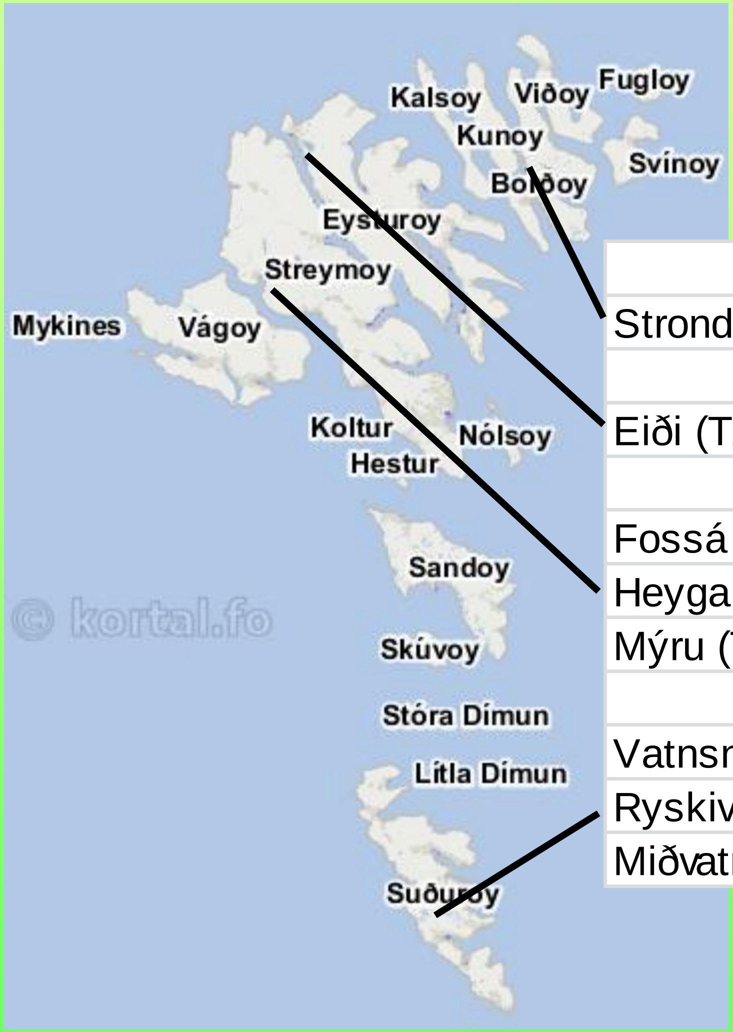
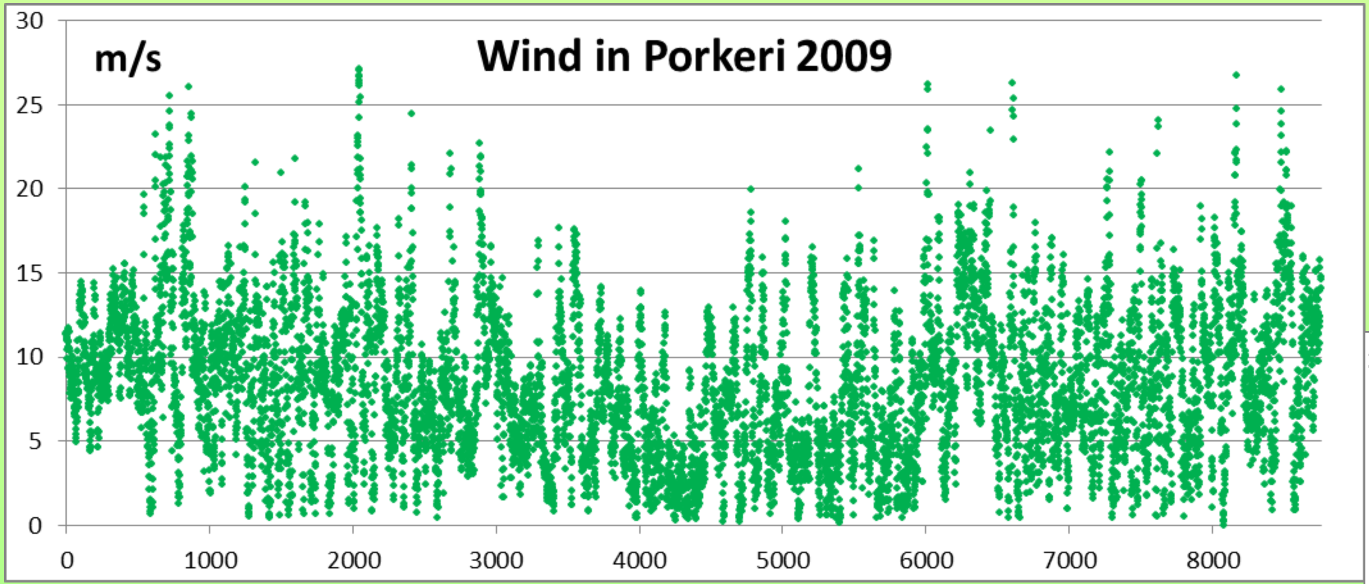
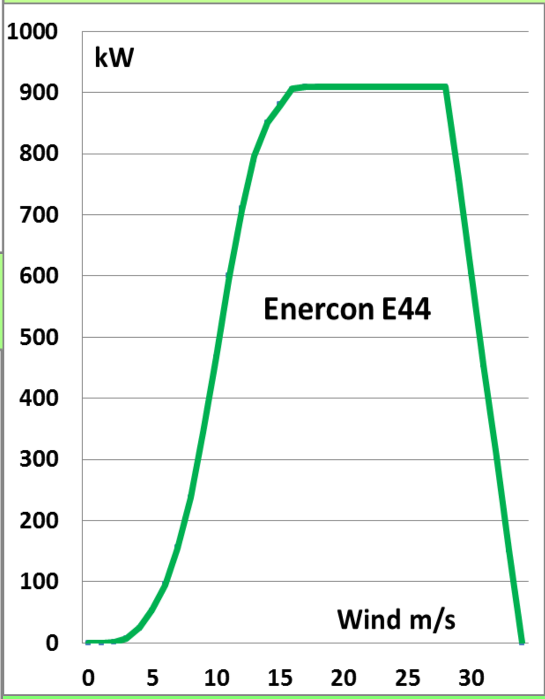
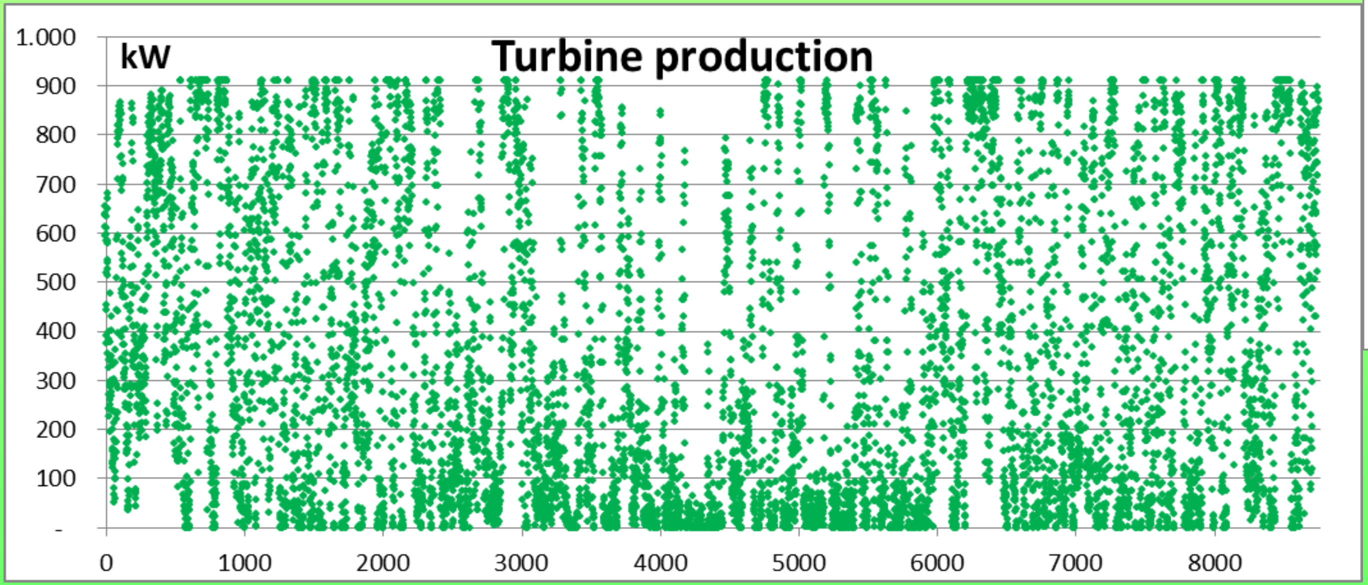
Faroese hydro power



	m3	Height (m)	MW	hours
Strond (T1)	38.000	224	1,4	14
Eiði (T1+T2+T3)	17.000.000	149	21,1	269
Fossá (T1+T2)	4.960.000	222	6,3	375
Heyga (T1)	2.110.000	108	4,9	100
Mýru (T1)	4.110.000	239	2,4	878
Vatnsnes (T2)	700.000	180	2	135
Ryskivatn (T1)	425.000	240	1	218
Miðvatn (T1)	600.000	240	1	307







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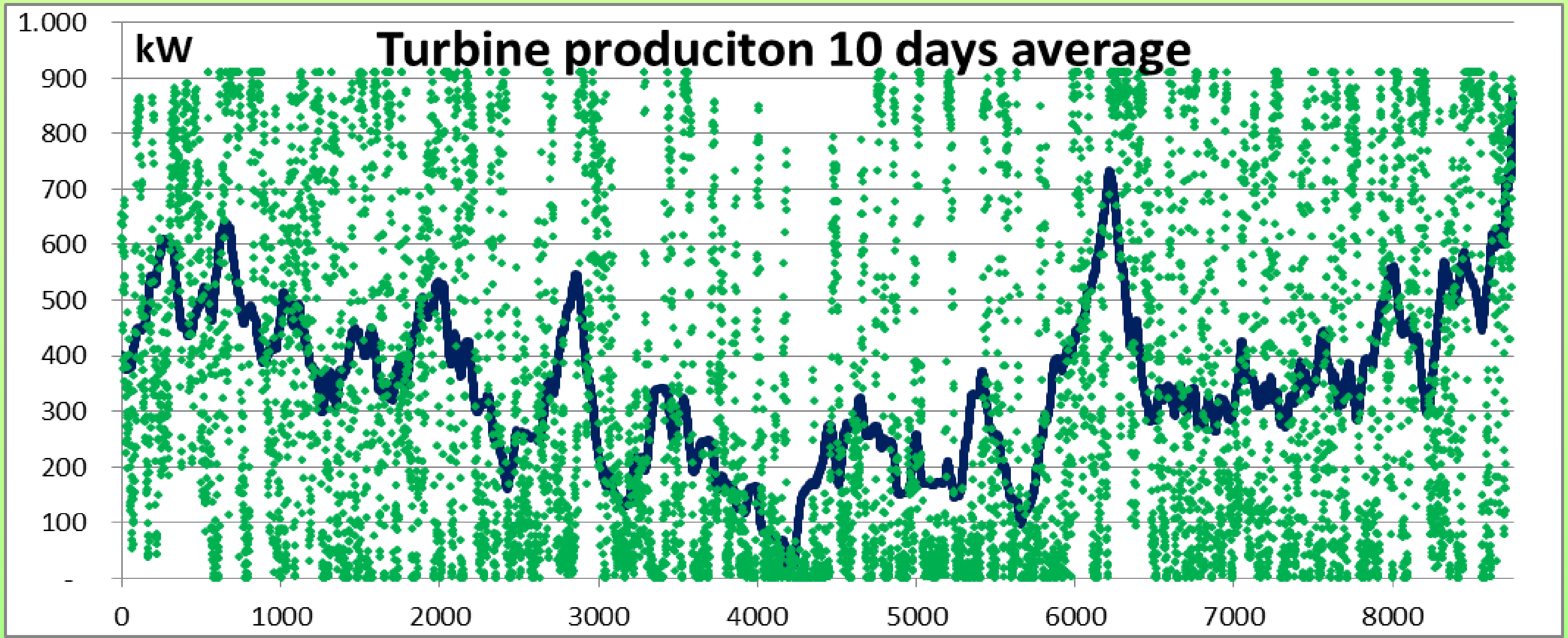

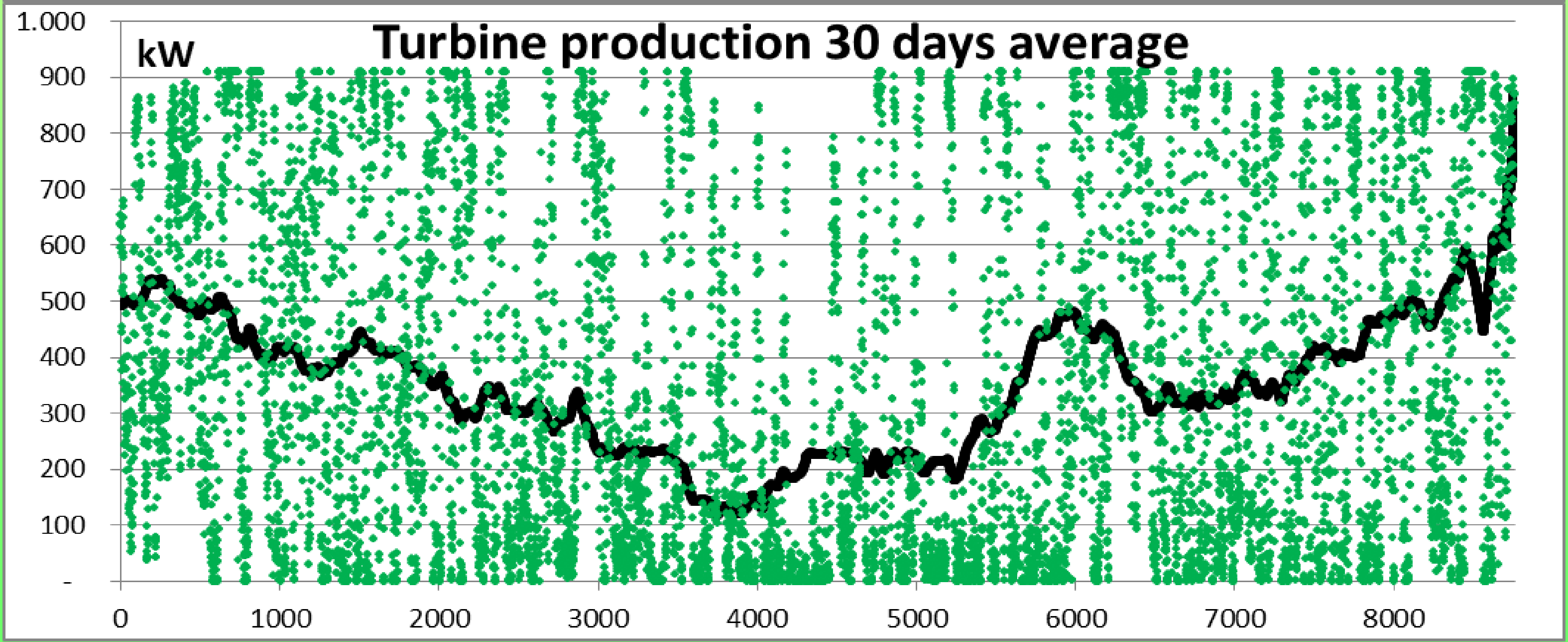

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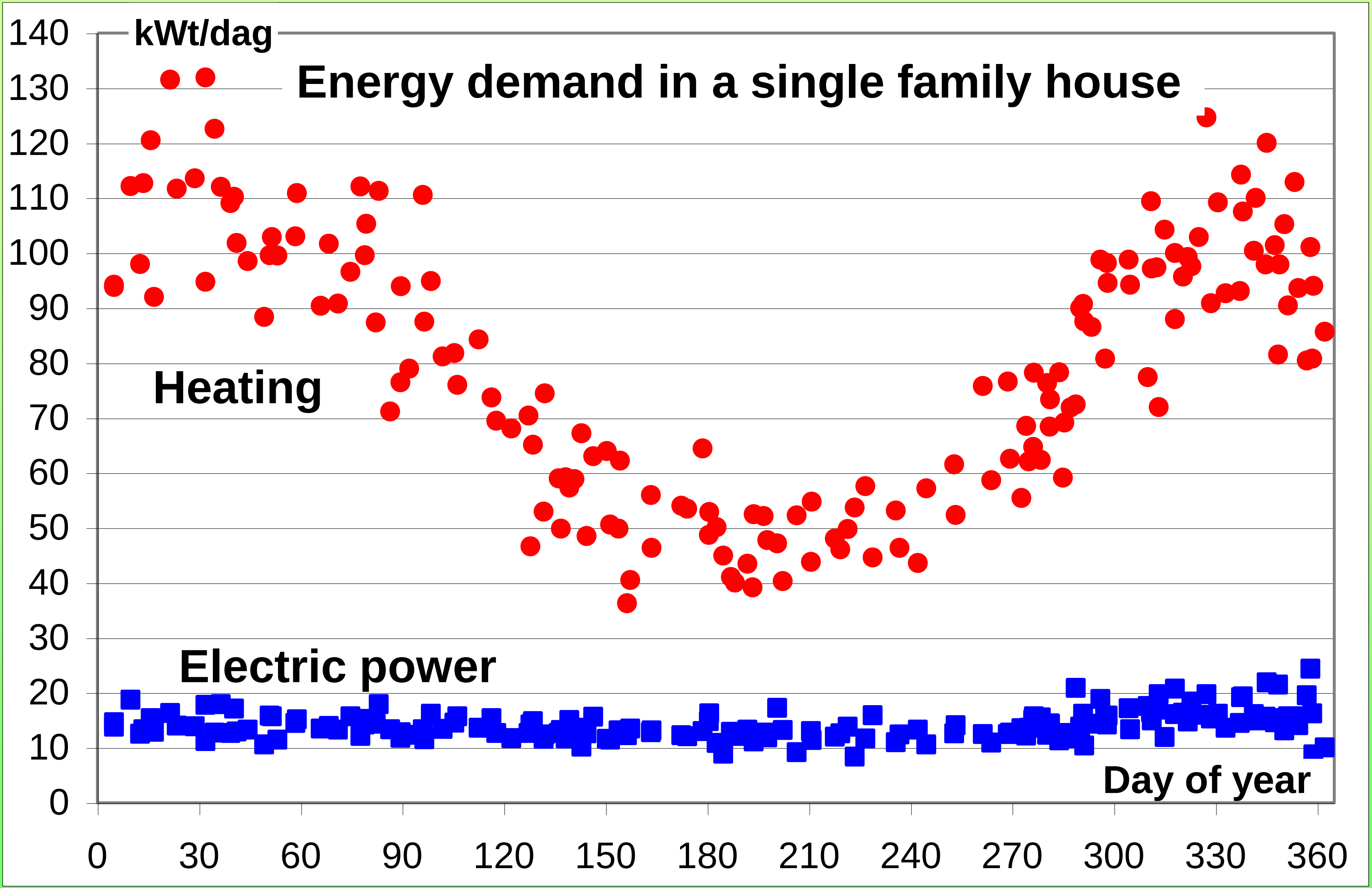
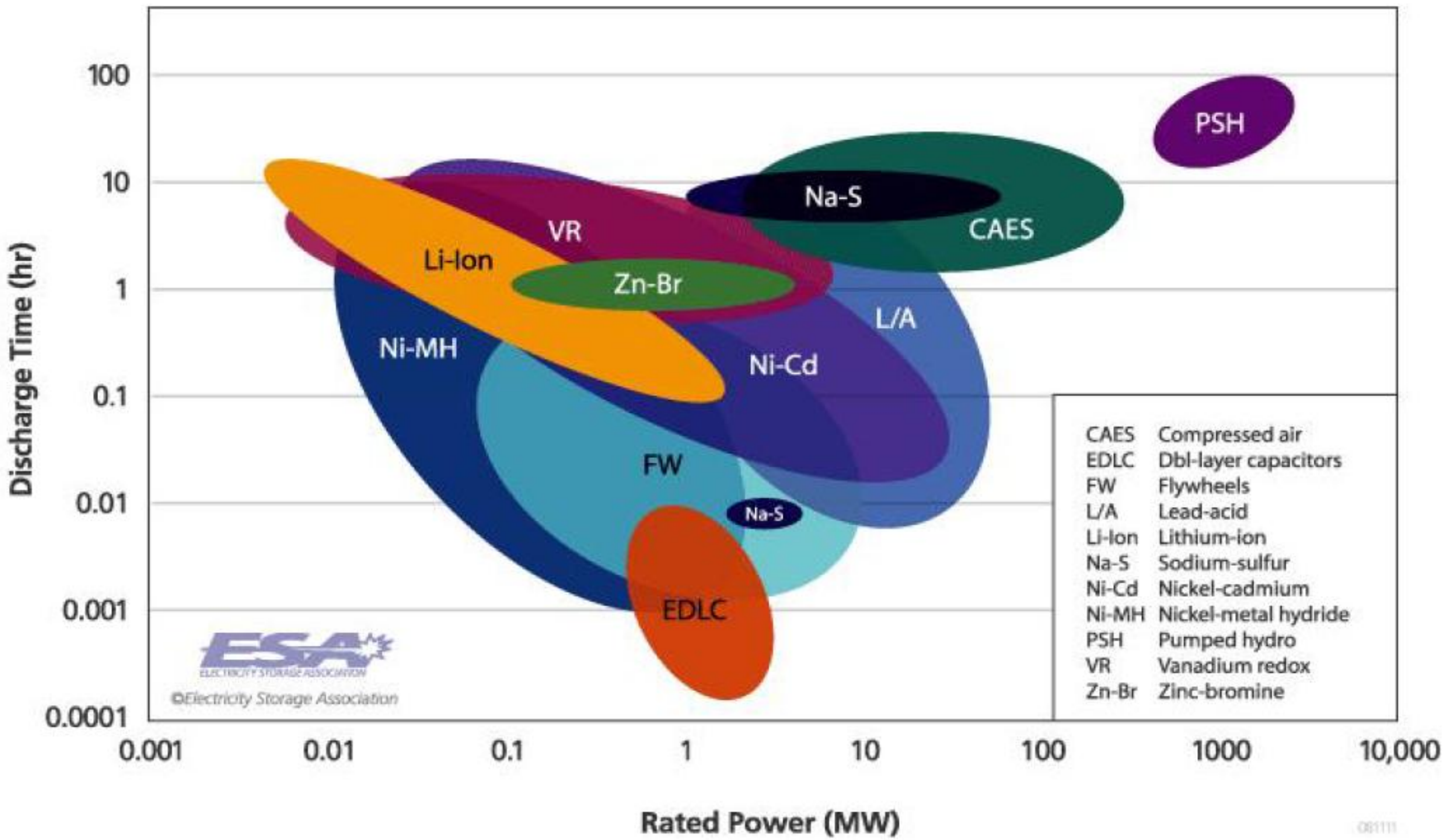


kWt/dag
Energy demand in a single family house
Heating
Electric power
Day of year
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
30
60
90
120
150
180
210
240
270
300
330
360

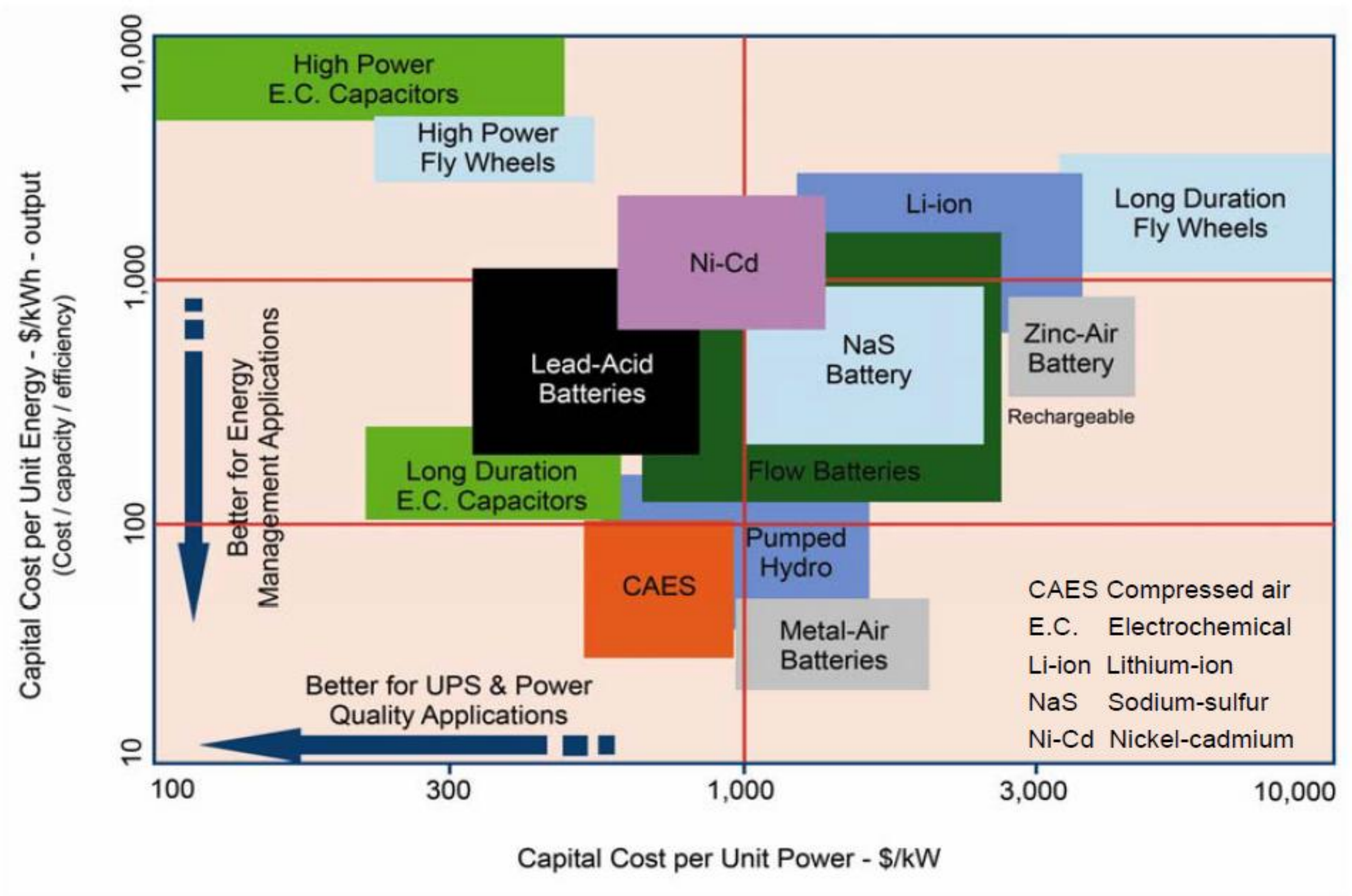
Figure 2. Storage Ratings by Technology Type



*Based on installed systems, as of November 2008.

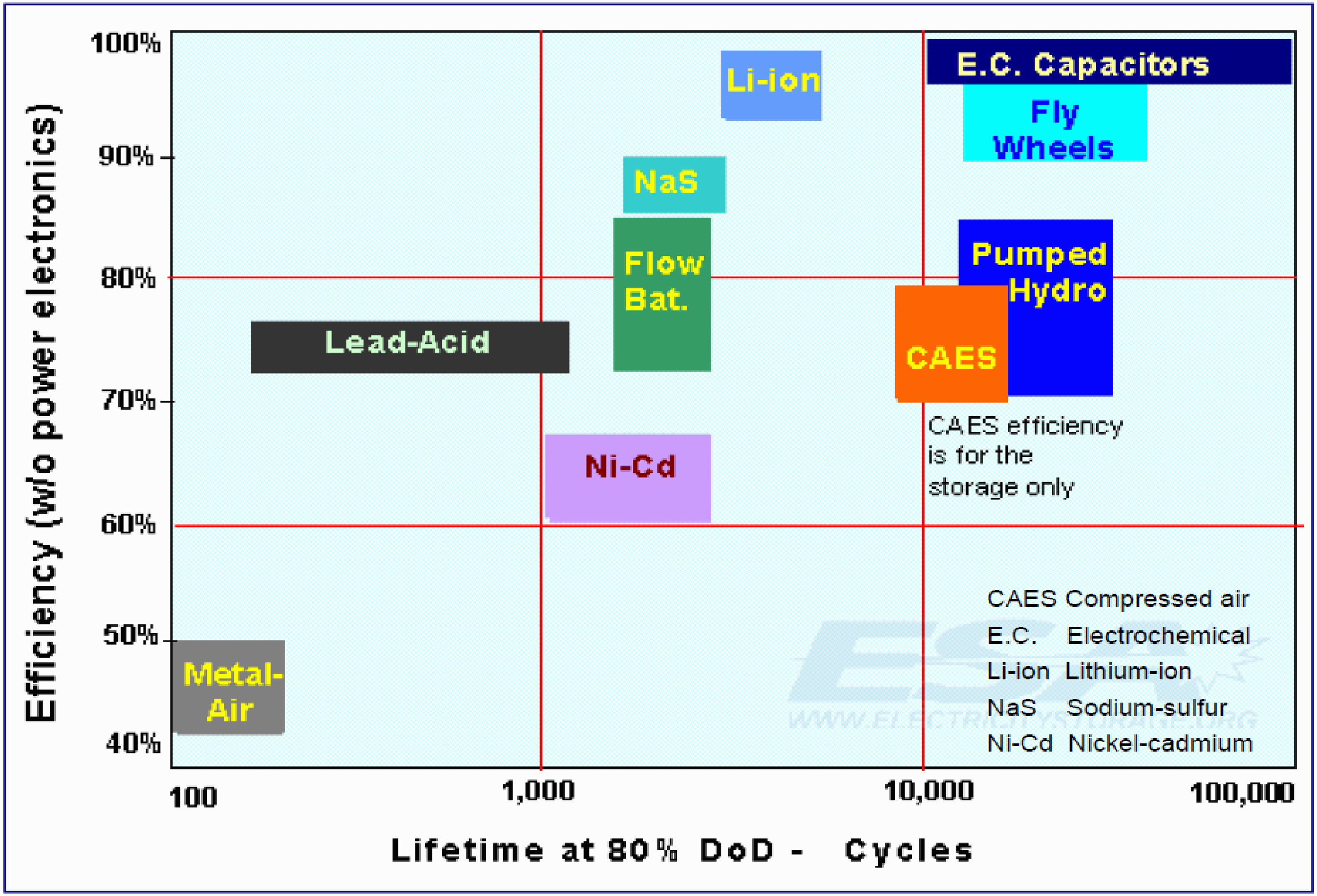
Source: Electricity Storage Association.

Figure 3. Storage Capital Costs by Technology Type

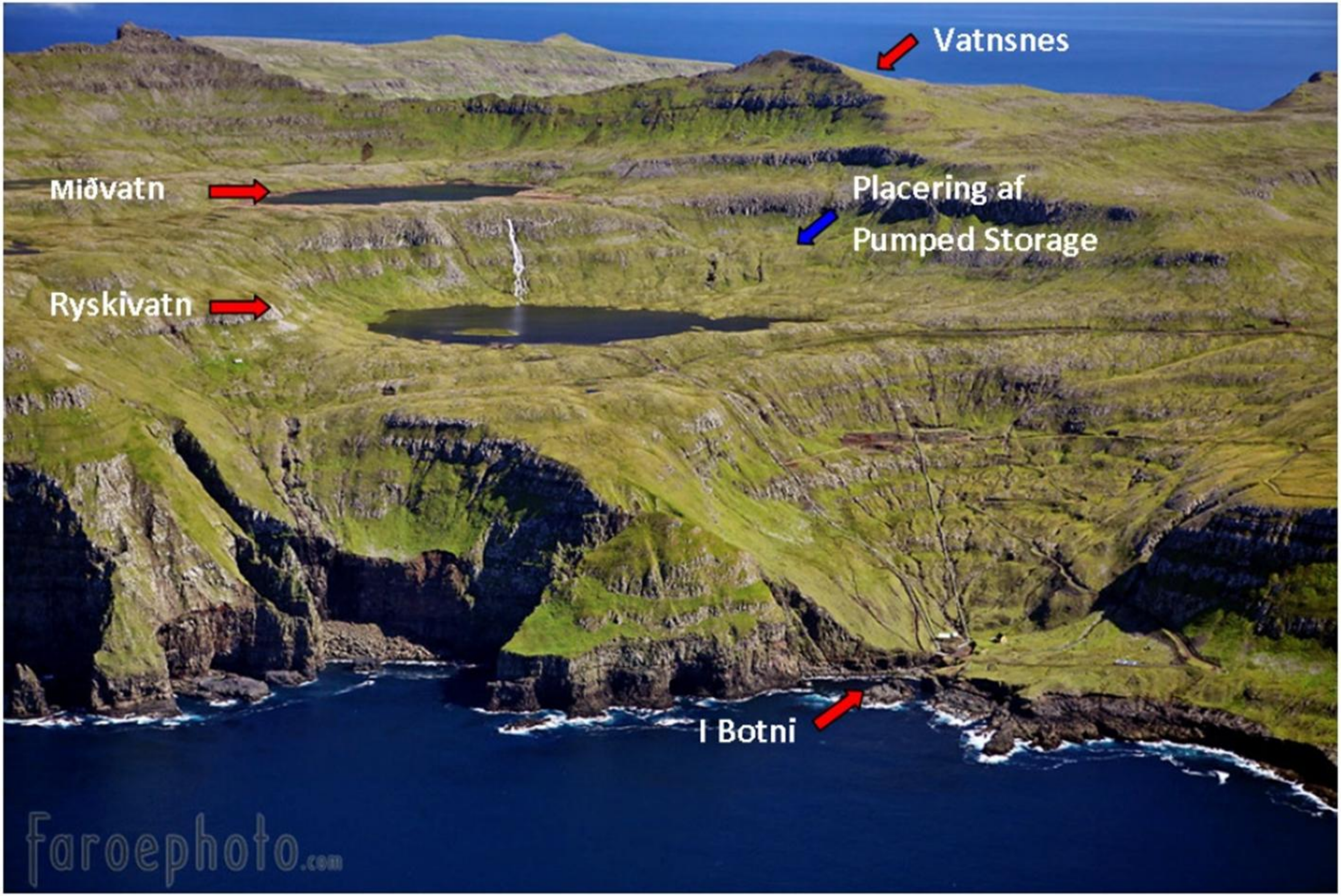


Source: Electricity Storage Association.

Figure 4. Storage Efficiency and Lifetime by Technology Type



Source: Electricity Storage Association.


Vatnsnes
Miðvatn
Placering af
Pumped Storage
Ryskivatn
I Botni
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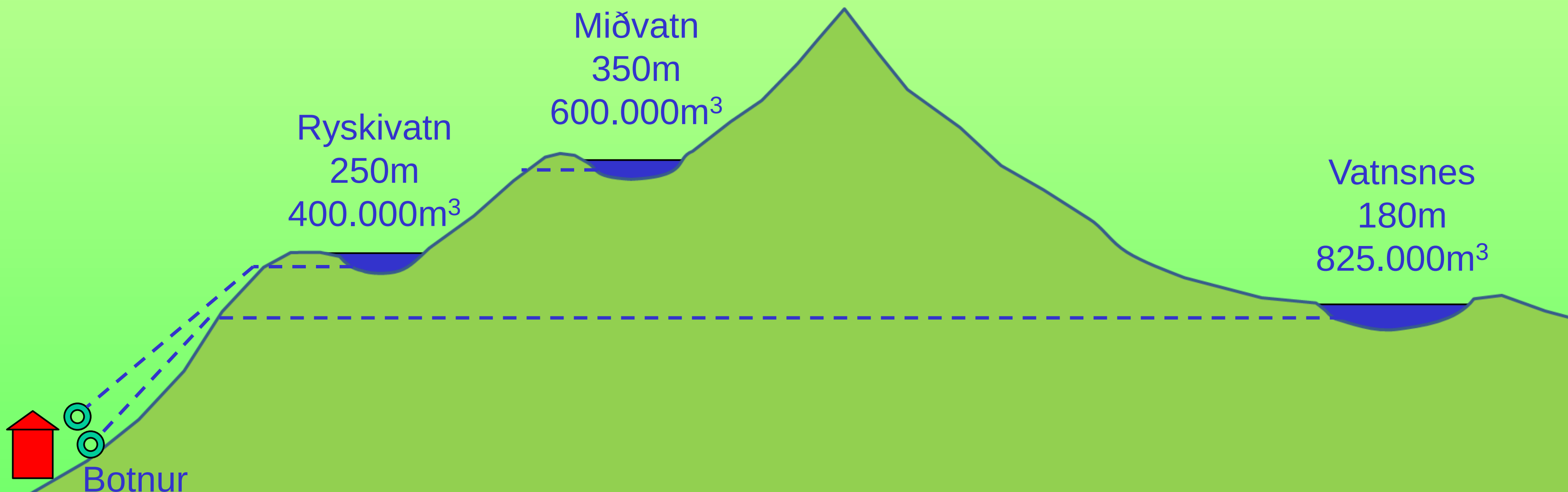

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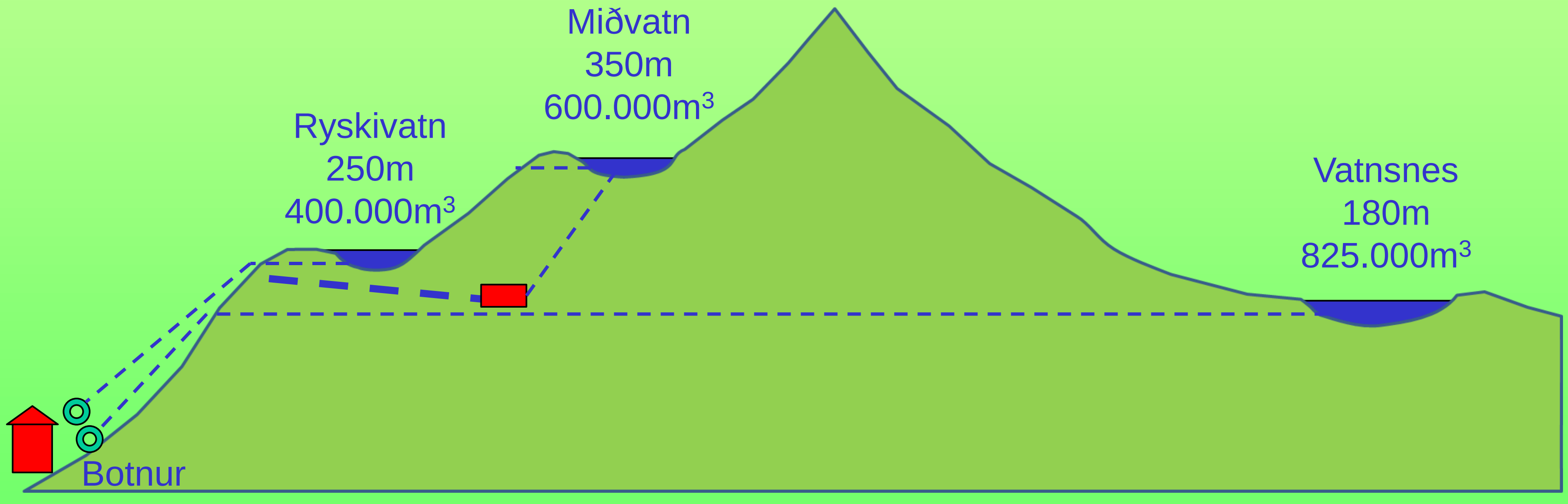
	NOK
Civil work	46 159 685
Mechanical	25 475 000
Electrical	13 550 000
Misc.	8 365 000
total	**93 549 685**



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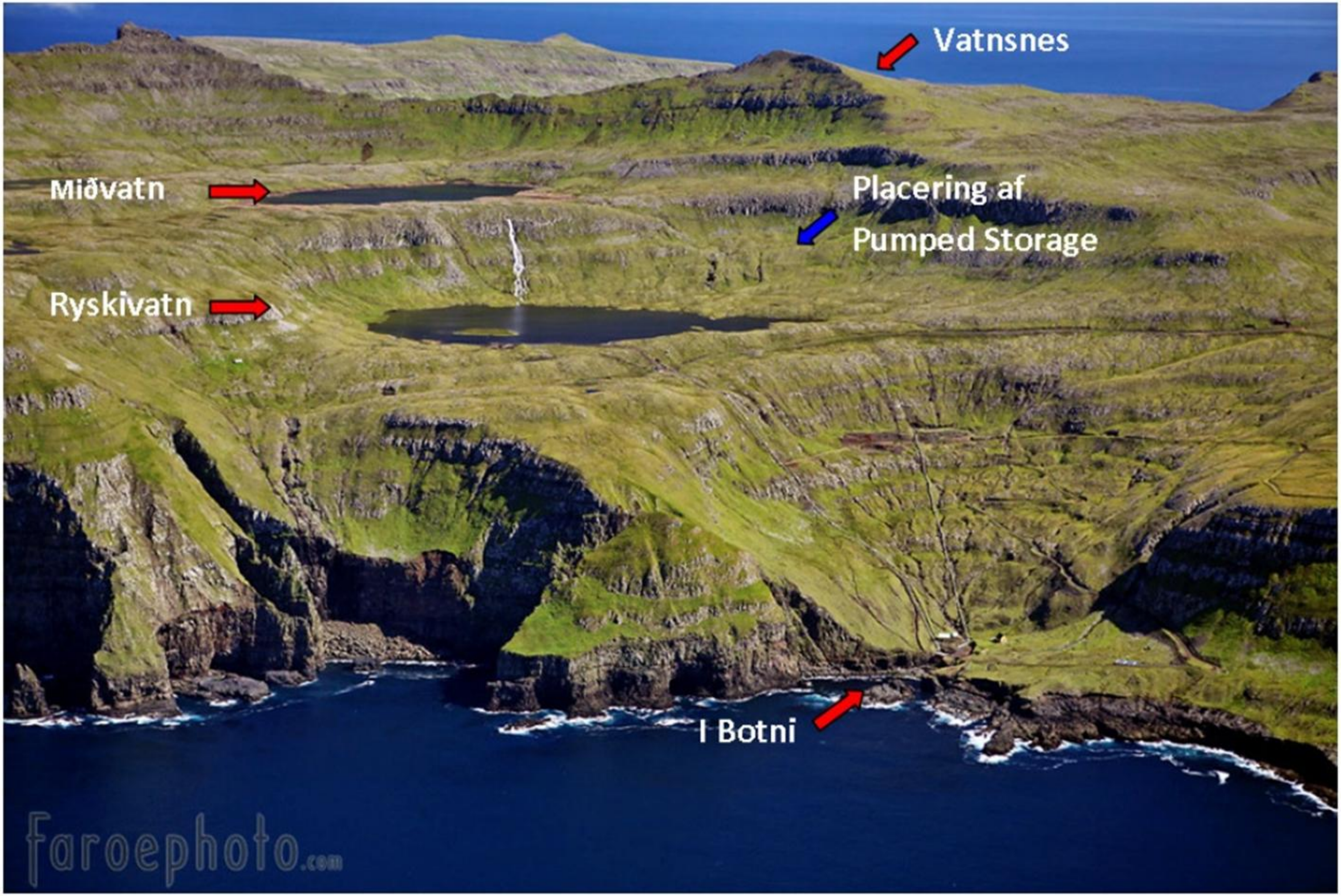
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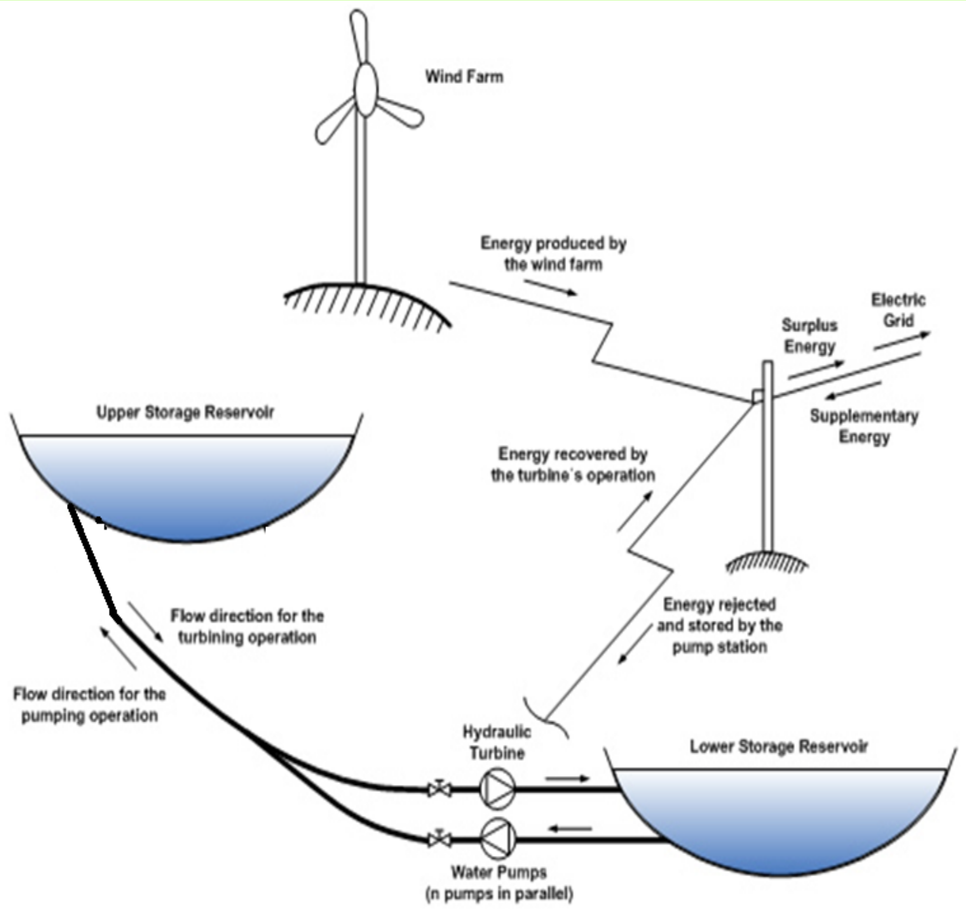
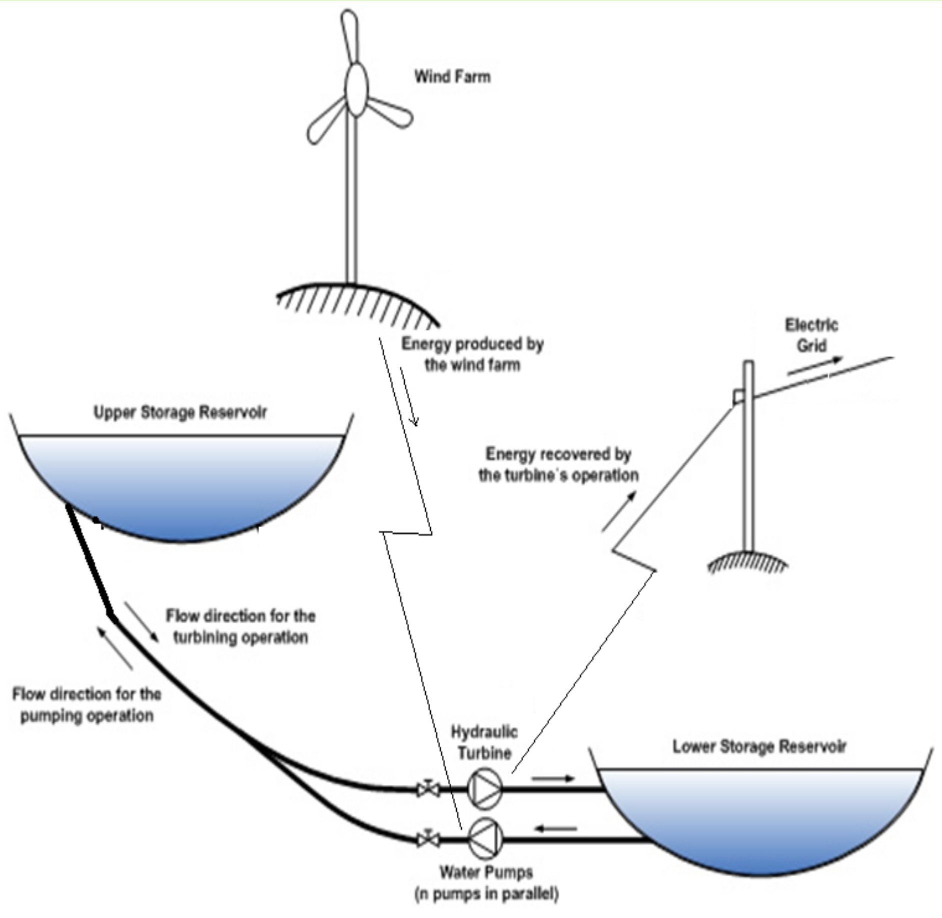
Grid connected

Stand - alone





Conclusions

Hydro and Wind are highly intermittent energy sources

Energy storage is needed to counteract intermittency

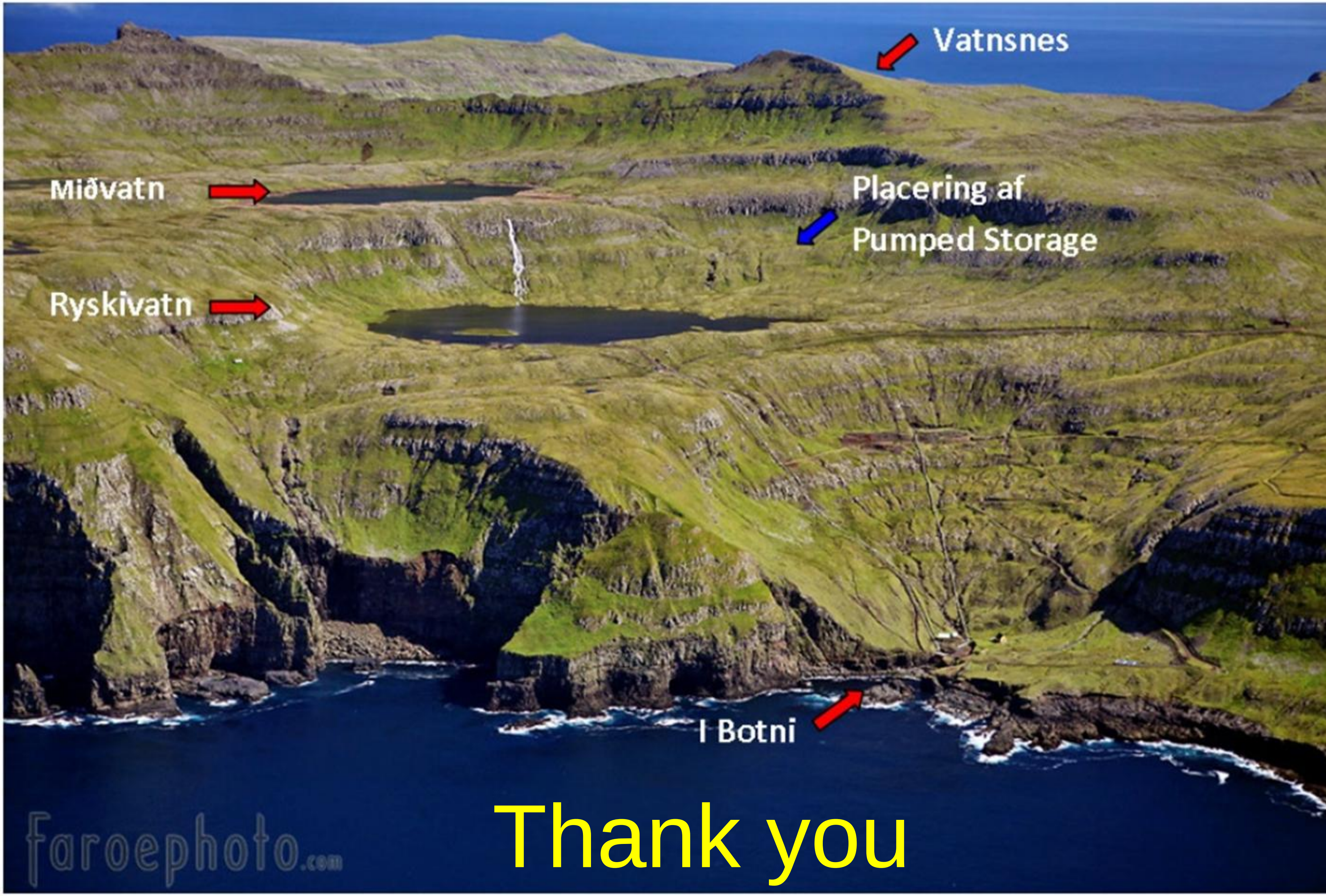
Perfect match between heating demand and renewables

Pumped Hydro is the most appropriate storage available

Suðuroy has pumped hydro opportunities

Investment need to be minimized to make it viable

Stand-alone wind - pumped hydro might support a weak grid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Thank you