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Renewable Metal Fuels - ReMeF

Innovative approach for the long-term storage of heat and electricity

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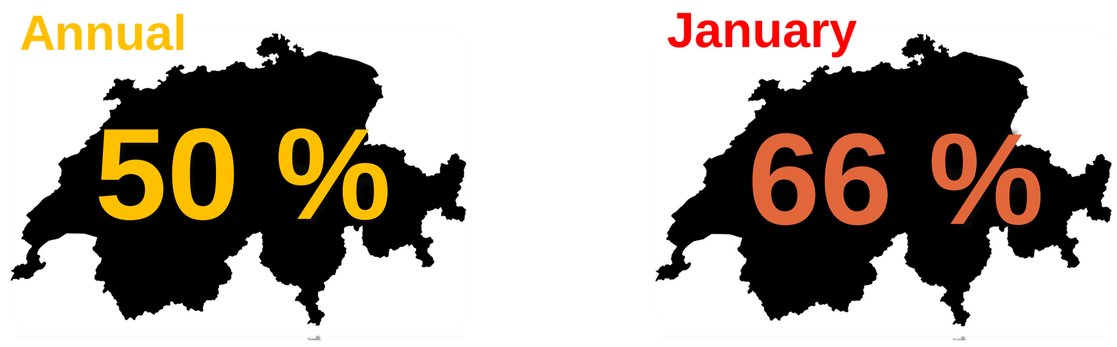
Goals

1. What role could ReMeF play in covering winter peaks (heat & electricity) in the Swiss building stock for the security of supply?

2. Can ReMeF eliminate the need for other peak power options like fossil fuels or hydrogen?

Problem

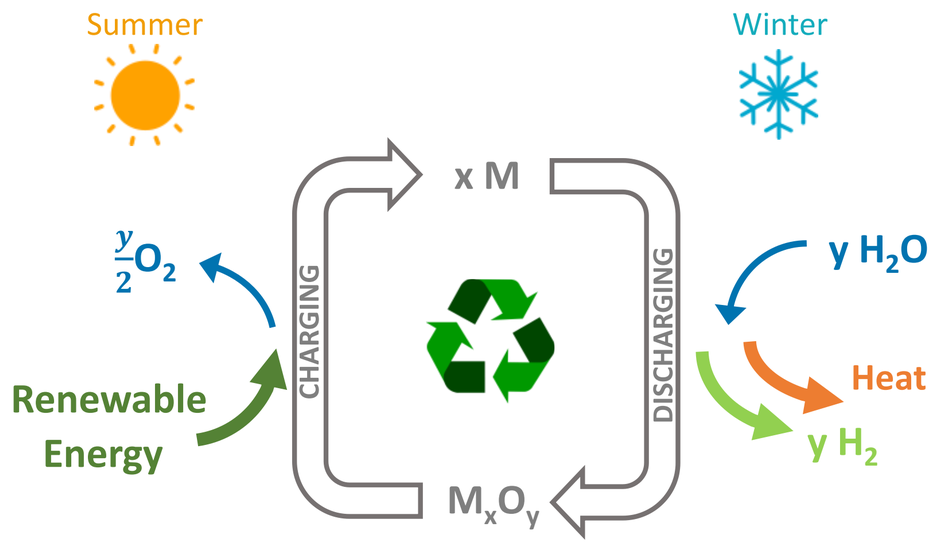
Swiss final energy demand for heat



9 TWh of winter electricity import in 2050

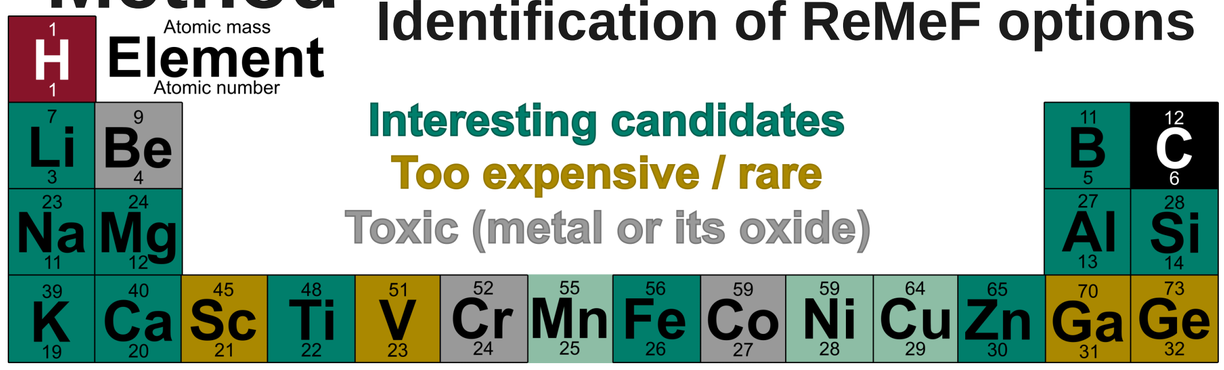
Introduction

Renewable Metal Fuels as seasonal energy storage concept



Method

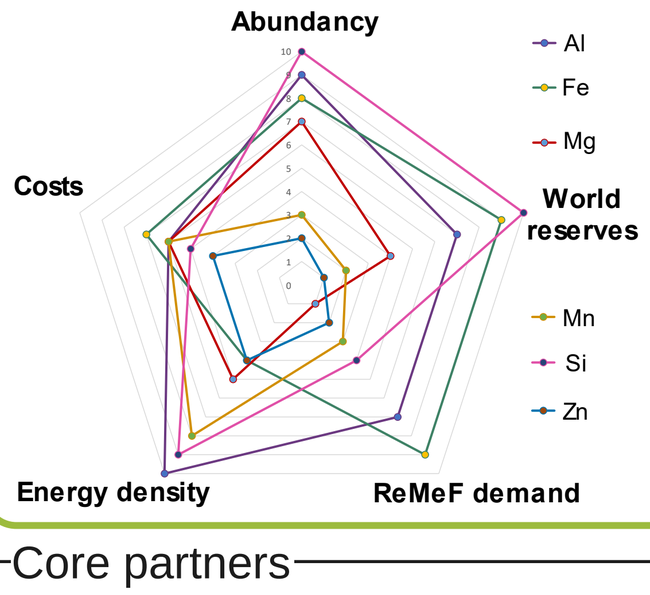
Identification of ReMeF options



Source: Bergthorson et al. 2018 - https://doi.org/10.1016/j.pecs.2018.05.001

- High availability of the metal
- Low cost of the raw material
- High achievable energy storage density
- Safety in handling (not explosive or too reactive)
- High potential for closing the material cycle
- Good reactivity during activation (power density)
- Simple and, if possible, loss-free storage

Results



	Points	Rank
Aluminium	8	1
Iron	7	2
Magnesium	5	4
Mangan	5	4
Silicon	7	2
Zinc	4	6

Conclusions

Advantages of ReMeF as long-term storage:

- Extremely high volumetric storage density
- Raw material abundant and not critical for aluminium, iron and silicon
- Estimated ReMeF production increase of world production feasible
- No storage losses and simple and safe transport / storage

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