

# Seasonal Storage Cost

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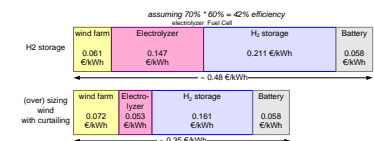
## Abstract

A set of cost models building on the basic models for storing renewable energy to cope with seasonal variations and on the dynamics of the systems and the environment.

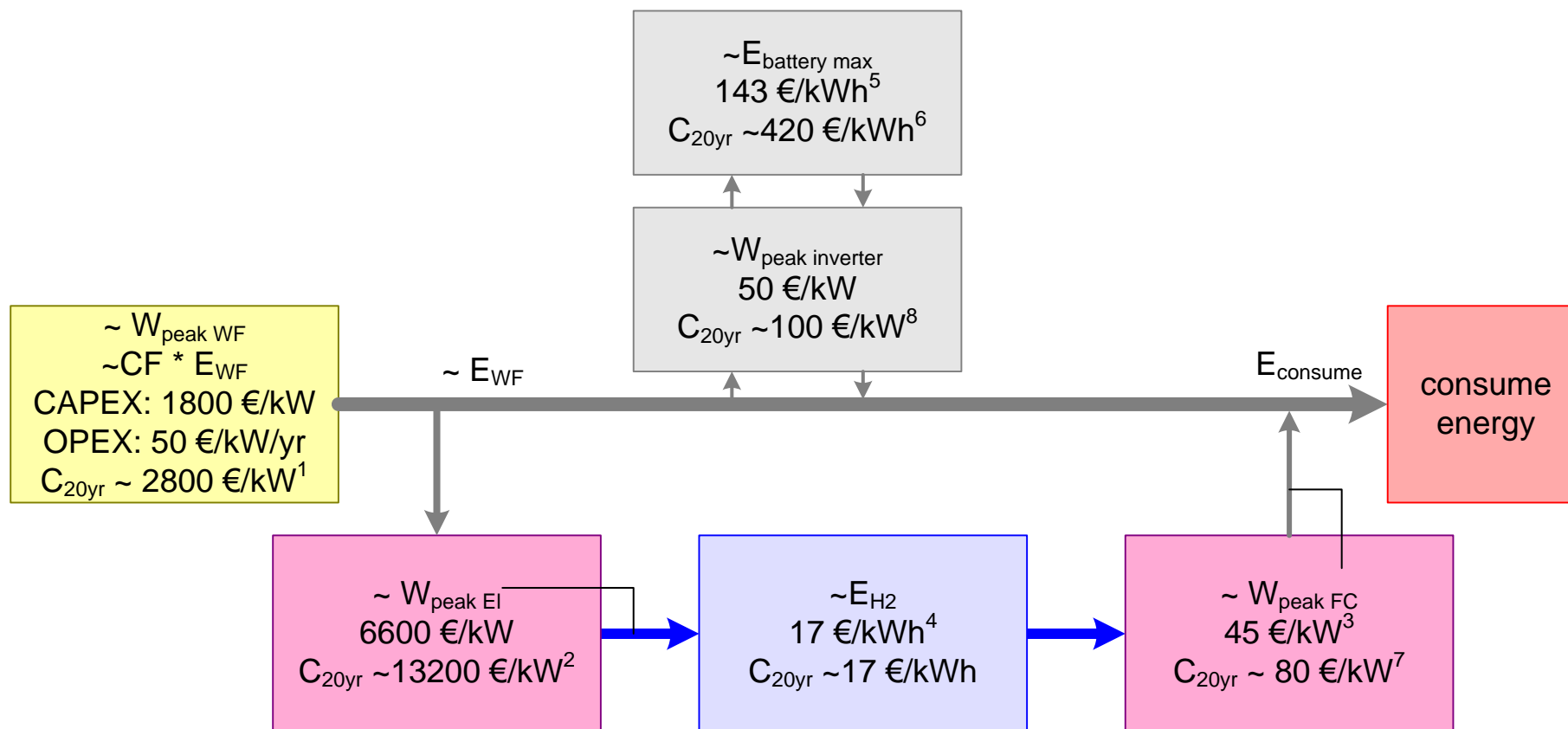
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# Cost Model; Guestimates, 2019 data



<sup>1</sup> [https://www.pbl.nl/sites/default/files/downloads/pbl-2019-costs-of-offshore-wind-energy-2018\\_3623.pdf](https://www.pbl.nl/sites/default/files/downloads/pbl-2019-costs-of-offshore-wind-energy-2018_3623.pdf)

<sup>2</sup> using 10 k\$ for 1 KG H<sub>2</sub> in 24 hrs, 33.33kWh/Kg H<sub>2</sub>, and 0.92 €/€, 30000 hrs ~ = 10 years <https://pv-magazine-usa.com/2020/03/26/electrolyzer-overview-lowering-the-cost-of-hydrogen-and-distributing-its-productionhydrogen-industry-overview-lowering-the-cost-and-distributing-production/>

<sup>3</sup> <https://www.energy.gov/eere/fuelcells/fact-month-april-2018-fuel-cell-cost-decreased-60-2006>

<sup>4</sup> <https://energypost.eu/the-lowdown-on-hydrogen-part-1-transportation/>

<sup>5</sup> <https://www.greencarcongress.com/2019/12/20191204-bnef.html>

<sup>6</sup> 1000 full cycles, let's assume 7 years,

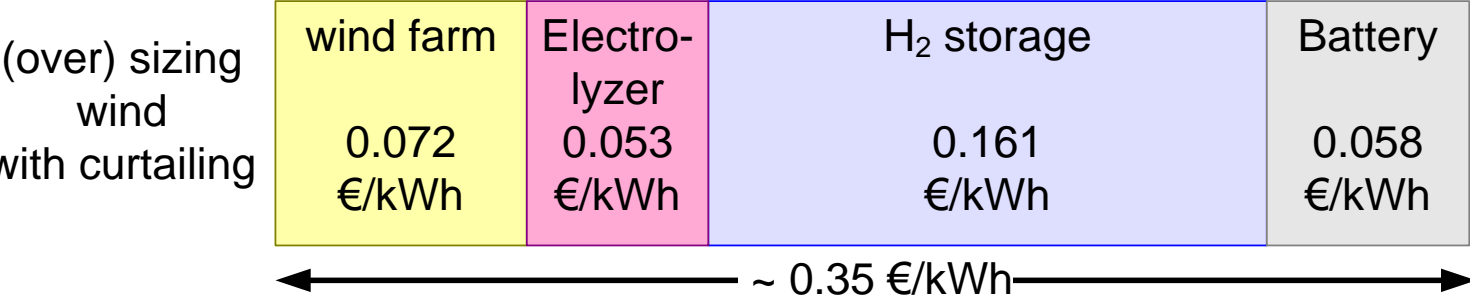
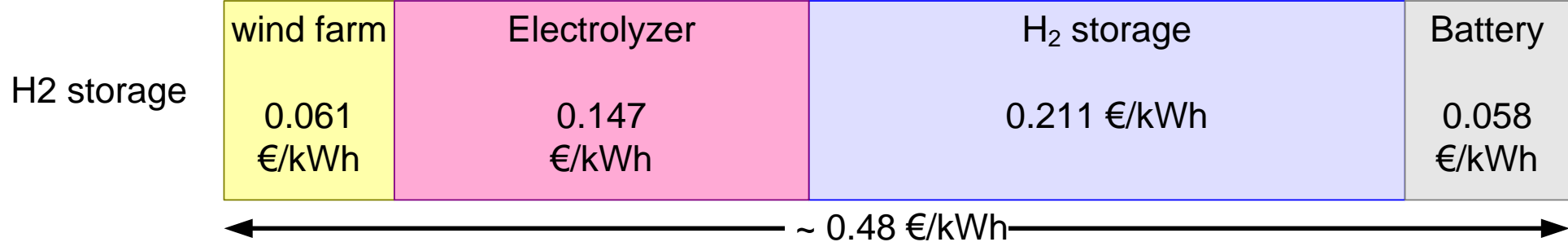
<https://www.forbes.com/sites/arielcohen/2020/12/30/teslas-new-lithium-ion-patent-brings-company-closer-to-promised-1-million-mile-battery/>

<sup>7</sup> 40000 hours at -35 °C to 40 °C, ~12 years [https://en.wikipedia.org/wiki/Fuel\\_cell](https://en.wikipedia.org/wiki/Fuel_cell)

<sup>8</sup> assuming 10 years <https://www.nrel.gov/docs/fy19osti/72399.pdf>

# Energy Cost; Curtailment is Lower in Cost!

assuming 70% \* 60% = 42% efficiency  
 electrolyzer Fuel Cell



# Energy Cost as Function of H2 Size

