

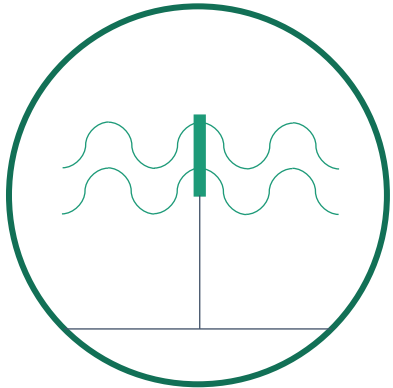
EWA introduction

Merits of energy from water in the energy transition

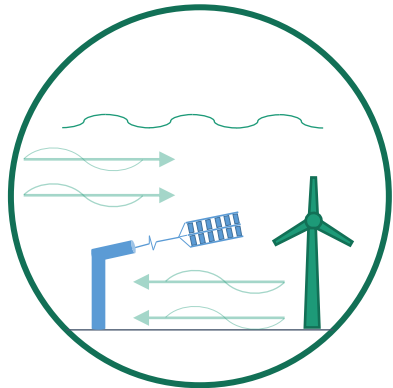
Maarten Berkhout (EWA)

Offshore experience, Den Helder, 10 Sep 2024

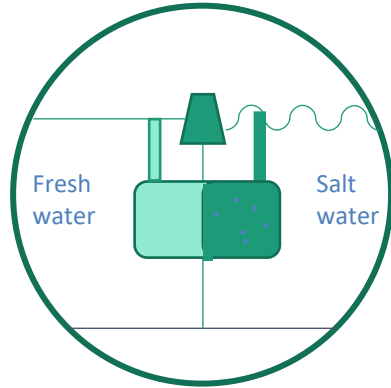
Energy from water technologies



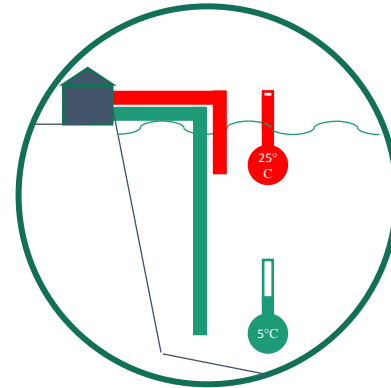
Wave energy



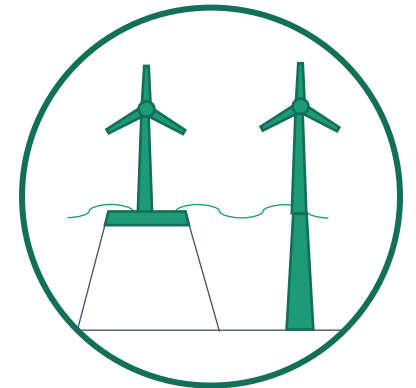
Tidal energy



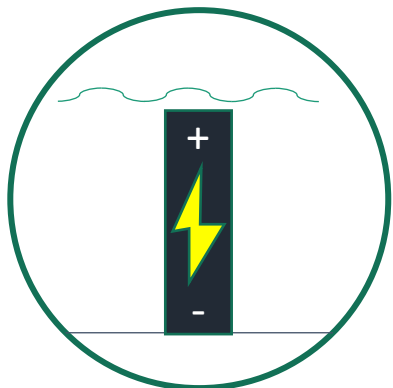
Salinity gradient



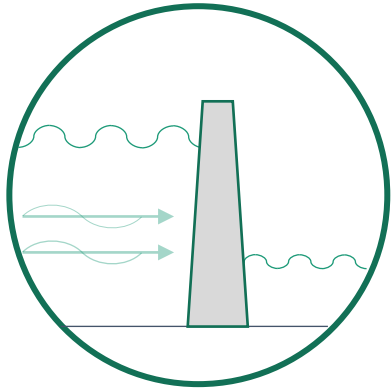
OTEC



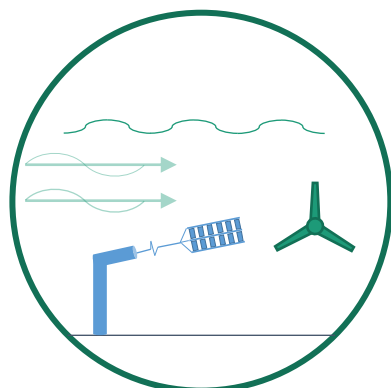
Offshore wind



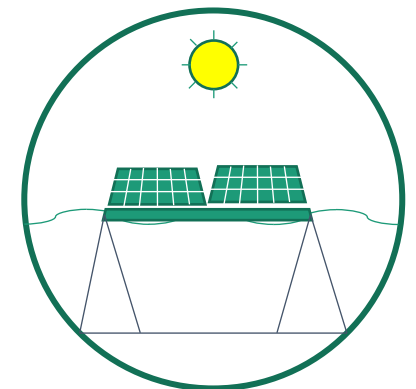
Energy storage



Hydro (river)



Ocean current



Floating solar

Energy transition challenges

- **Energy security**

- Local generation of energy
- Use of regional (EU) technology
- Limit use of critical raw materials and/or recycle these for 100%

- **Price volatility ('capture rate') and curtailment**

- Decreasing revenues from intermittent @ increasing penetration levels
- 100% carbon free energy requires full system cost optimization
- Value-adjusted LCOE (VALCOE) comparison needed instead of standard LCOE

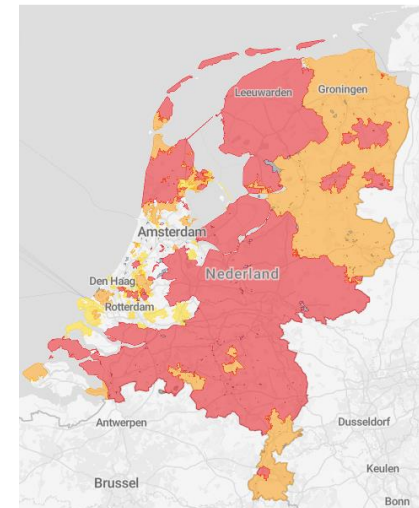
- **Spatial limitations**

- Limit spatial footprint
- Leverage land and sea resources to decrease land use

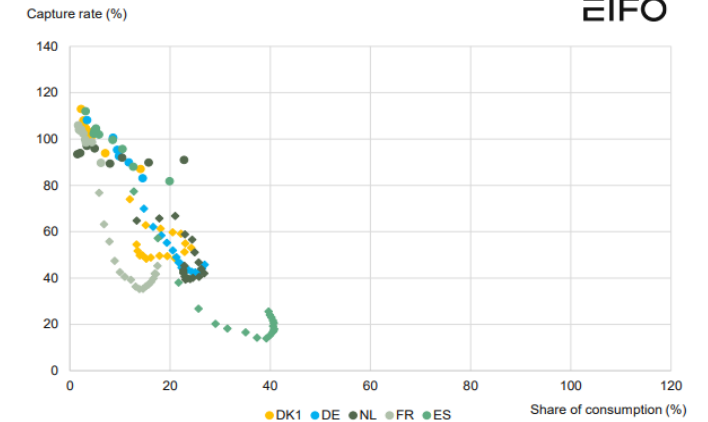
- **Grid congestion**

- Cable Pooling only effective with uncorrelated resources
- Local generation reduces grid expansion requirements

<https://capaciteitskaart.net/beheermederland.nl>
Capaciteitskaart teruglevering elektriciteitsnet



Solar power capture rates declines strongly with production



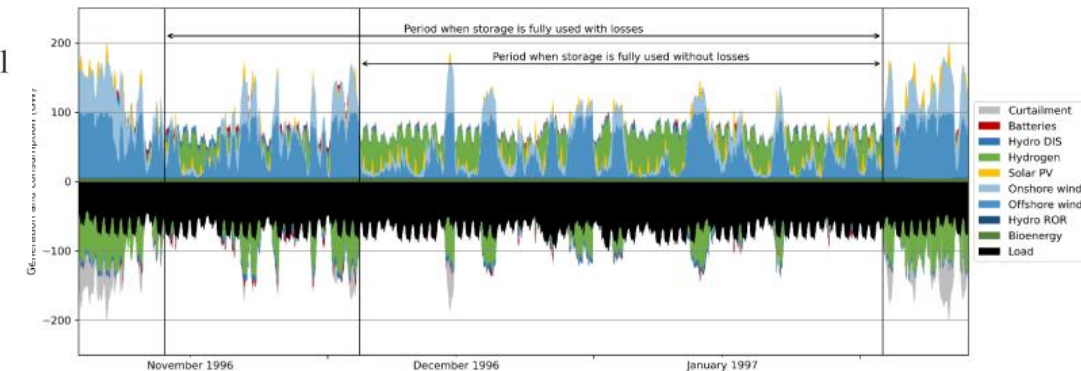
Note: Round markers = historical data. Square markers = Forecast data (S&P Global).
Source: ENTSOE via Macrobond, S&P Global (forecasts).

S. 8

ANDRÉ DERLEMAN 01 juli 2024, 16:00

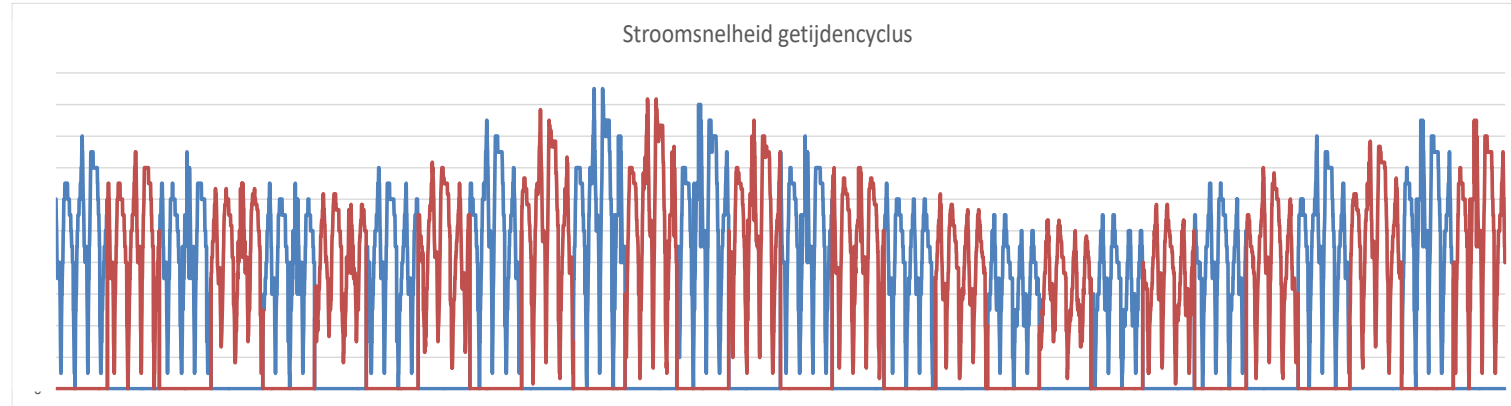
Nederland had in tweede kwartaal 6 dagen kunnen draaien op weggegooide groene stroom

In Nederland wordt zoveel groene stroom opgewekt met zonnepanelen en windturbines, dat de prijs van elektriciteit steeds vaker negatief is en wind- en zonneparken worden uitgeschakeld. In de afgelopen drie maanden ging hierdoor 1.700 gigawattuur aan groene stroom verloren, net zoveel als heel Nederland in zes dagen verbruikt. Daarmee hadden we 350 miljoen kubieke aardgas kunnen besparen.

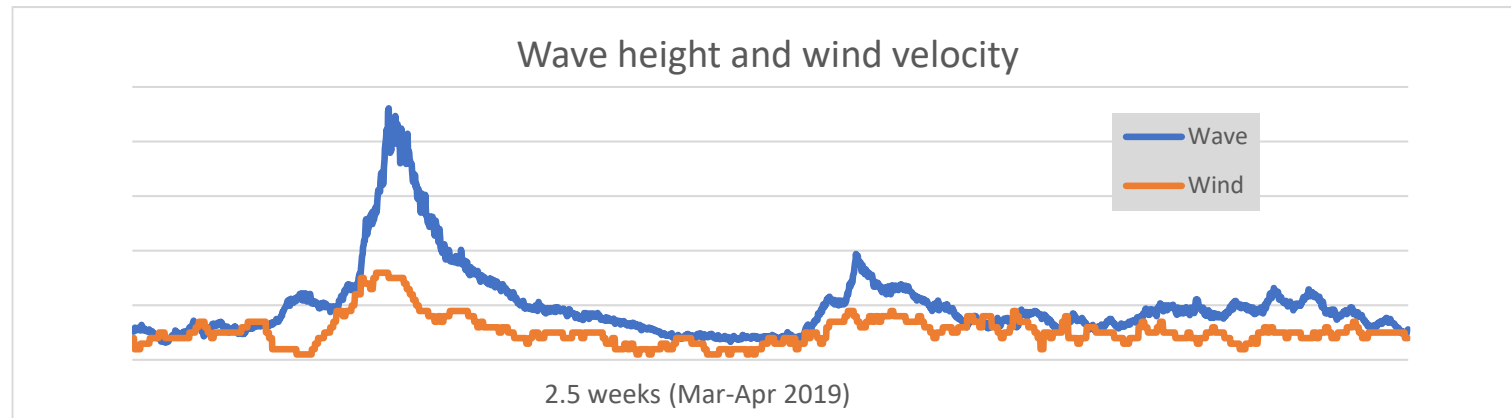


Availability energy from water

Tidal



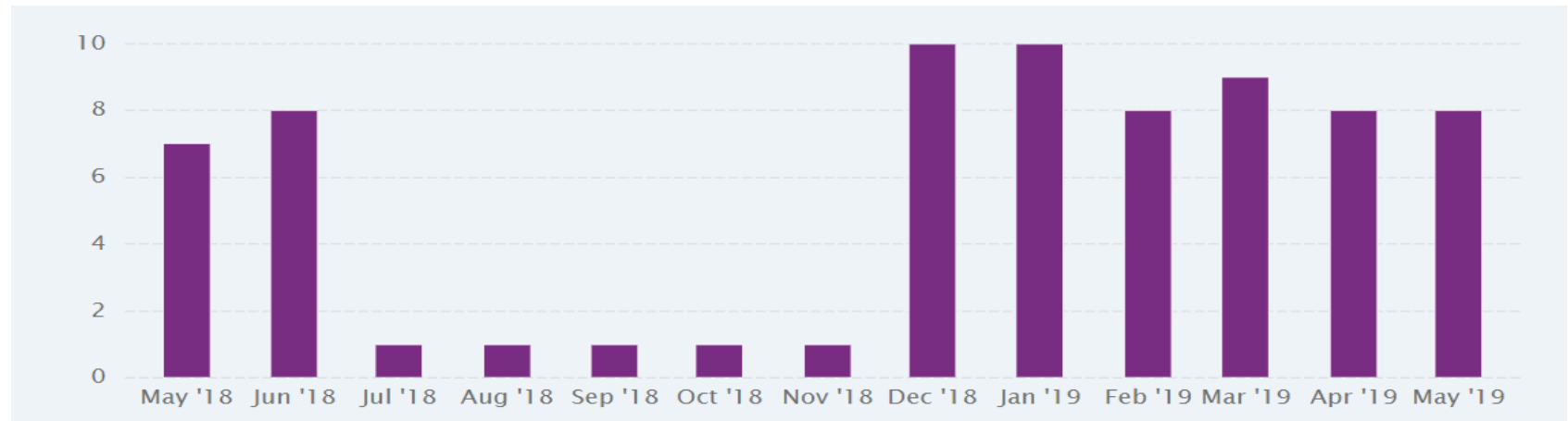
Wave



- Time lag
- Swell

Availability energy from water

Hydro river



Reversed
Osmosis
(OTEC)



Continuous baseload supply

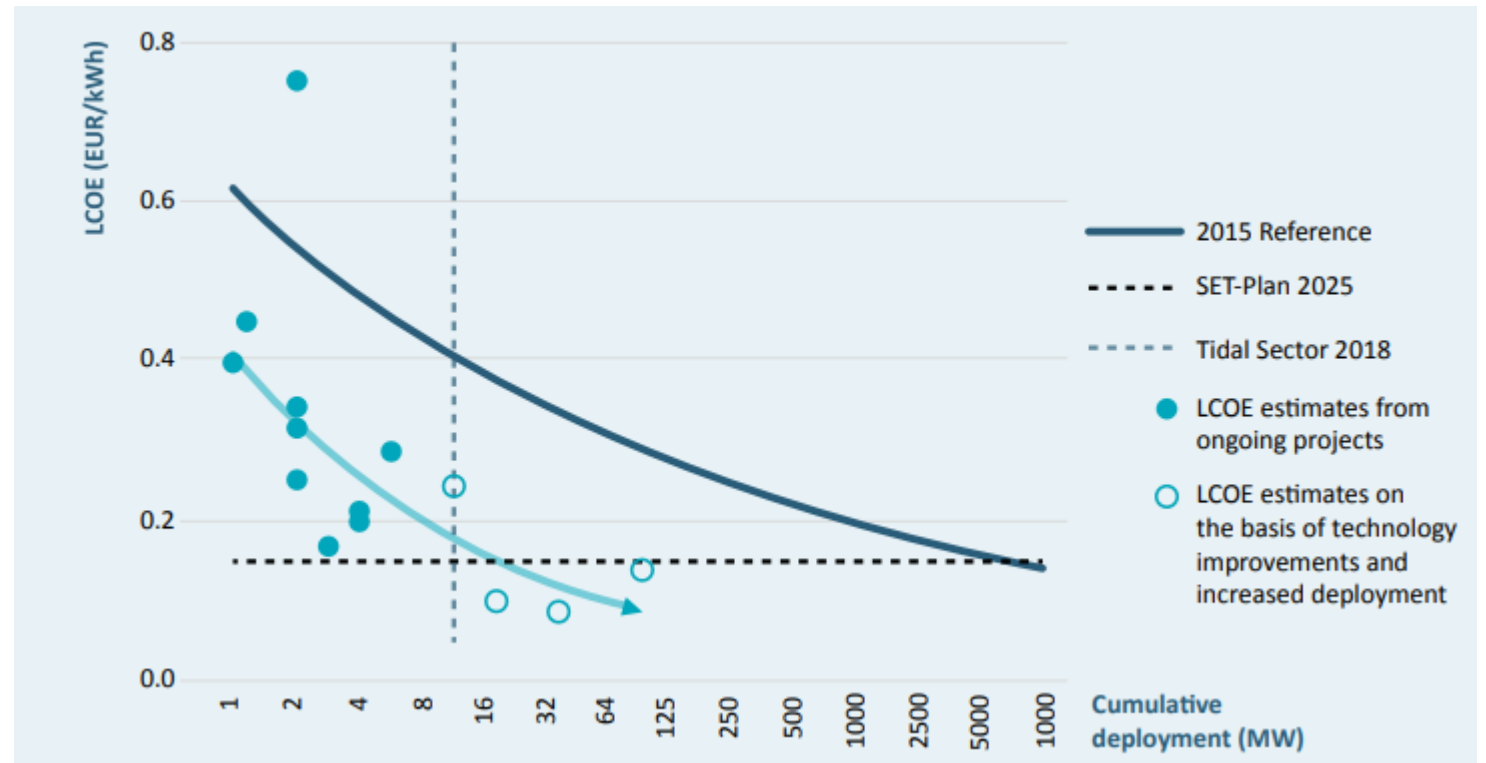
New technologies offer higher value and rapid cost improvements

Experience curve

- Learning effects and increased deployment drives cost down

VALCOE

- System integration cost
- Production profile: balancing, curtailment

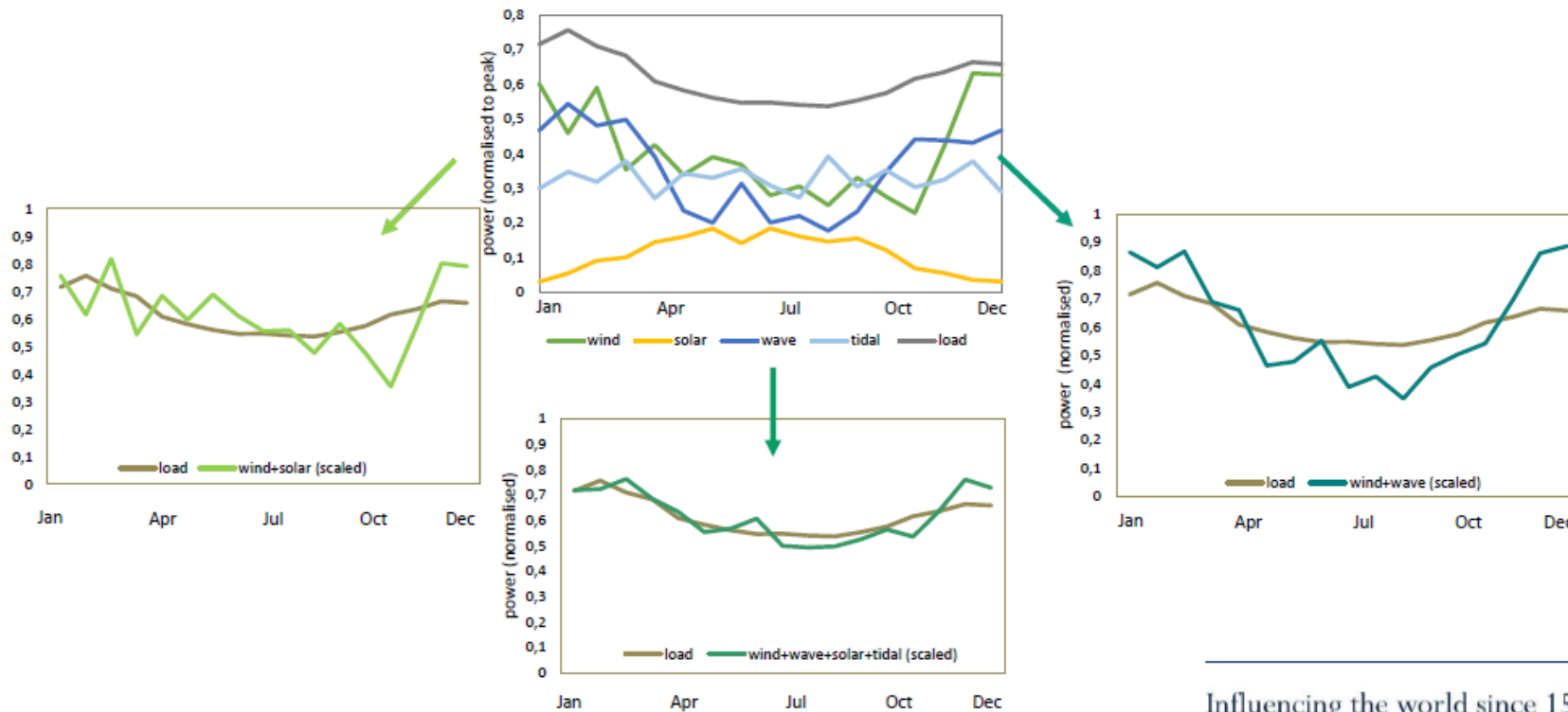


Inclusion of energy from water reduces total system costs



THE UNIVERSITY of EDINBURGH

2015 historical demand, wind and solar generation, wave and tidal stream resource (converted to power) for GB:



Influencing the world since 1583

Summarising

Energy from water solutions enable, 'other benefits', including:

- New locations and multi-use of locations
- More continuous supply and higher €/MWh revenues
- Lower (system) cost
- Sustainable jobs

EWA

Dutch
Energy from
Water
Association

<https://www.energieuitwater.nl/>