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Assessing Floating PV Potential on inland water bodies in Netherlands

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Background

By 2050, the Netherlands could reach 200 GWp solar, including 25 GWp on inland waters.

52,000 ha of shallow waterways offer strong FPV potential.

The Water Framework Directive (WFD) ensures water quality and ecosystem protection in all EU water bodies.

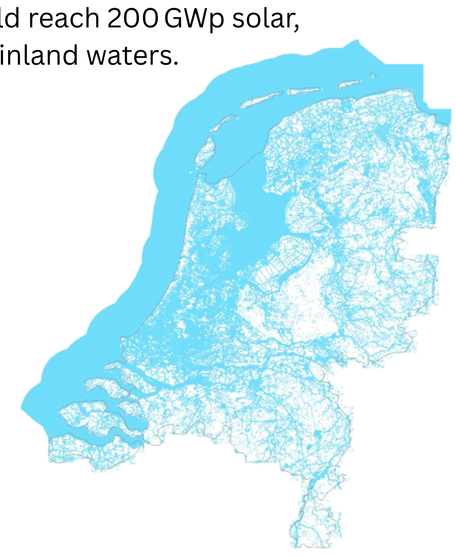


Figure 1: Dutch Water Bodies Overview

FPV Suitability Matrix

WFD Group	Examples	Suitability
Artificial lakes & reservoirs (M11, M14, M22, M23)	Sand pits, drinking-water basins, shallow clear lakes	**High-Suitability** (calm, artificial, good depth & access)
Deep buffered lakes (M16, M17, M20, M21, M24)	Large/deep quarry lakes, IJsselmeer zones	**Conditional**, feasible but risks (stratification, waves, Natura2000)
Canals and ditches (M01-M06, M10, R04-R06)	Polder ditches, regional canals, small rivers	**Conditional,** possible in secondary/artificial canals, avoid shipping lanes
Peat & acid lakes/ditches (M09, M12, M13, M25-M29)	Vennen, peat bog lakes	**Not suitable**, ecologically sensitive, excluded by water boards
Rivers (fast or tidal) (R07-R16, O2)	Main rivers, tidal arms	**Not suitable,** high currents, navigation, Natura2000
Transitional / Coastal Waters (M30–M32, K01–K03)	Sheltered basins like Grevelingen and Haringvlietand Estuaries like West and, Oosterscheld,	**Conditional** for sheltered basins. **Not suitable** for tidal/estuaries: strong currents, and high ecological sensitivity.

Suitability Parameters

Water Depth

Preferred Shallow (2-3m) Can be lower with low water variation

Wave Conditions

Low wave category preferred. Large lakes with waves >1m require a special system

Grid Proximity

Should be in proximity to the grid or high-load consumer. Ideal distance < 5km to minimise costs

Area

Depends on FPV capacity and structure. Literature states approximately 1ha for 1MWp, but many Dutch FPV plants have an average of 0.5-0.6ha/MWp

Environmental

Avoid ecologically sensitive areas; stricter rules apply to Natura2000 waterbodies.

Navigational and other uses

Shipping routes must be avoided.

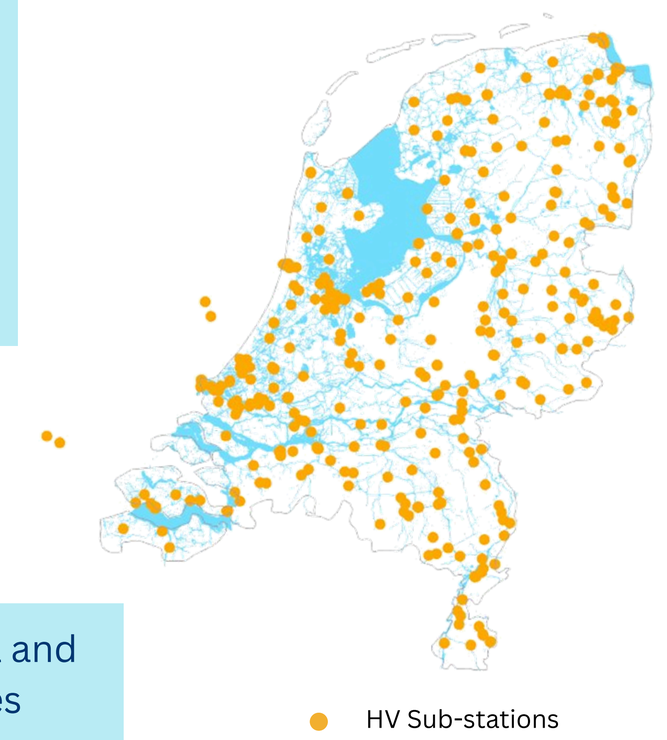


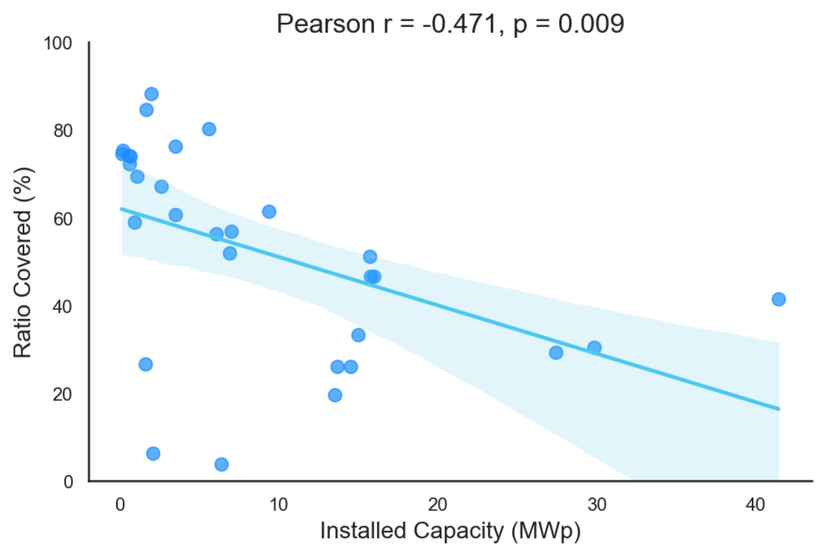
Figure 2: Conditional and Suitable Inland Water Bodies in the Netherlands in conjunction with HV sub-stations

Discussion

Small projects (<1MWp) : appear to over-cover small ponds/man-made water bodies (60–75%).

Large projects (>1MWp): tend to be on bigger lakes, so % coverage is lower, even if absolute capacity is higher (average: 47.5%)

Pearson correlation: -0.471, p-value: 0.009
(< 1MW) Pearson correlation: -0.718, p-value: 0.108
(>1MW) Pearson correlation: -0.359, p-value: 0.084



To achieve 25 GWp, the Netherlands would need less than **35% of inland water surfaces** covered with FPV, assuming 0.7 ha per MW and 52,000 ha of shallow inland water ways.

Highest Potential
Sand and Quarry Lakes: Large, human-made lakes with suitable depth, already altered for human use, making FPV technically and commercially viable

Drinking Water Reservoirs: Suitable for FPV integration, offering benefits like reduced evaporation and improved water quality

Future Work

Multi-criteria analysis of water bodies to identify the most suitable sites.

Considering LV/MV stations and nearby industrial demand.

References

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