



European Wind Integration Study (EWIS) Towards a Successful Integration of Wind Power into European Electricity Grids

**EWIS Concluding Discussion
13th April 2010, Brussels**

**Quantification of Costs and Benefits
Mr. Thomas Meister**



Overview

- Main Findings**
- Benefits of adding wind power to the system**
- Integration Costs**
- Adding 29 cross-border grid reinforcements → “Enhanced Network”**
- Support Costs**
- Storage as efficient mitigation measure ?**



Main findings¹

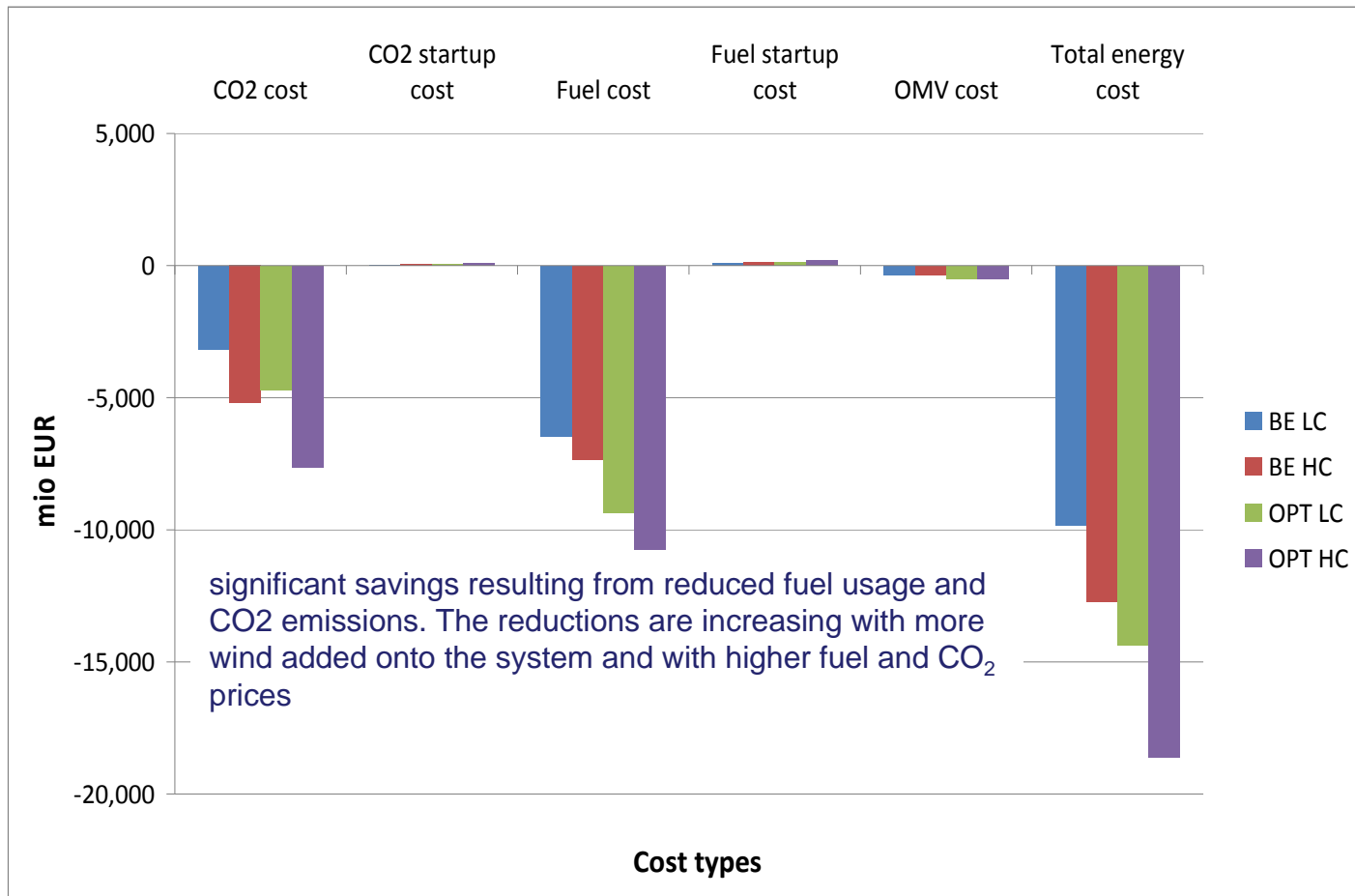
- ❑ **Benefits** due to reduced CO₂-emission and fossil fuel usage are **significant**
 - reduction in operational costs ~ 20B€/yr
- ❑ **Integration Costs** are **relatively small** compared to benefits ~ 770M€
- ❑ Imminent and continuing **need for grid reinforcements** as these levy congestions and introduce welfare gains !
 - indicative cost for necessary internal grid reinforcements ~ 10,5B€
 - 29 cross-border grid reinforcements : indicative cost ~12,3B€
: indicative benefit ~1,95B€/yr

(cfr. ENTSO-E 10YNWDP estimating 28B€ grid investments needed over next 5 years)

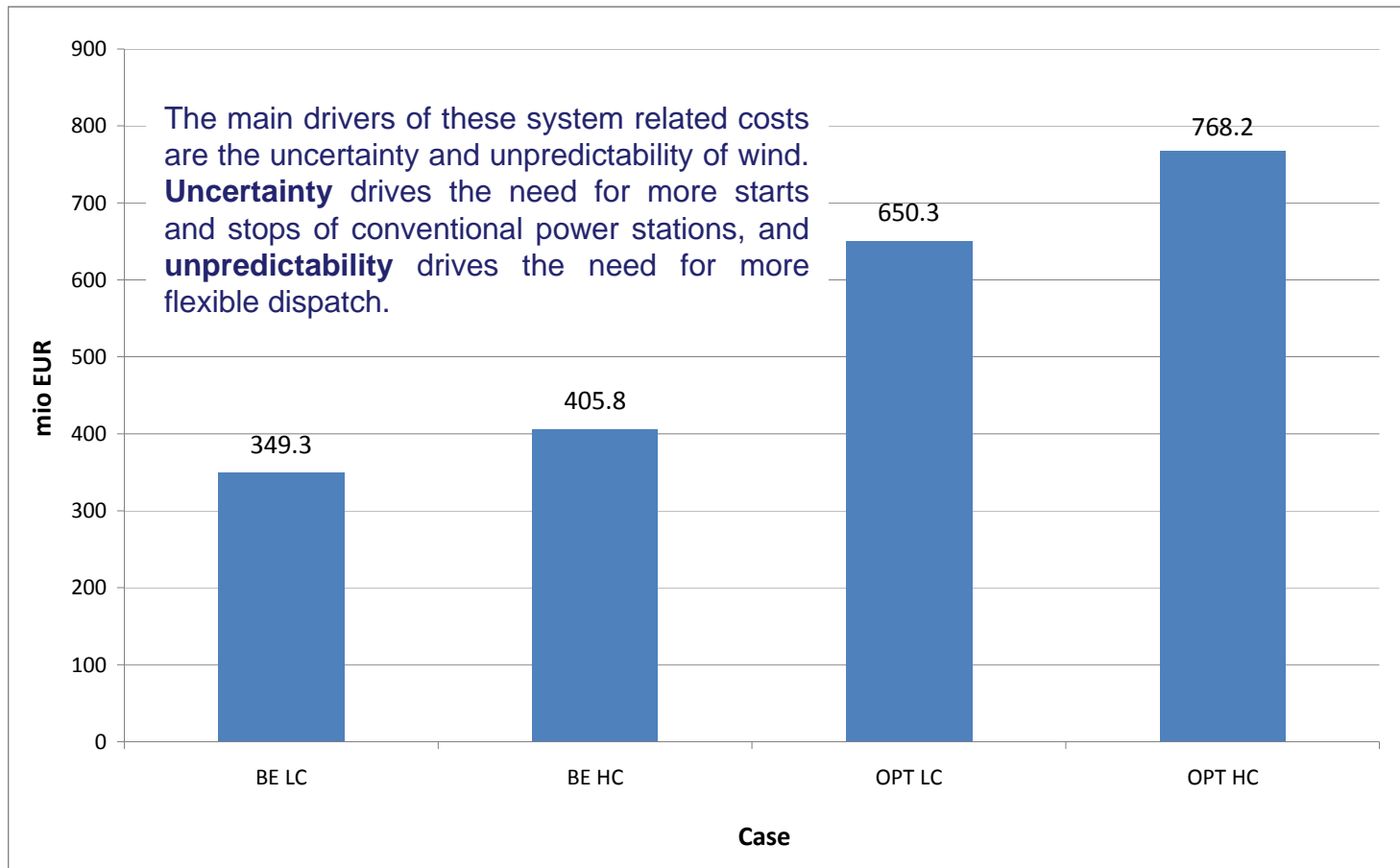
- ❑ **Significant support** to wind energy in order to achieve 2020 target

¹: assuming high fuel and CO₂ prices and ca. 185GW wind capacity installed in 2015

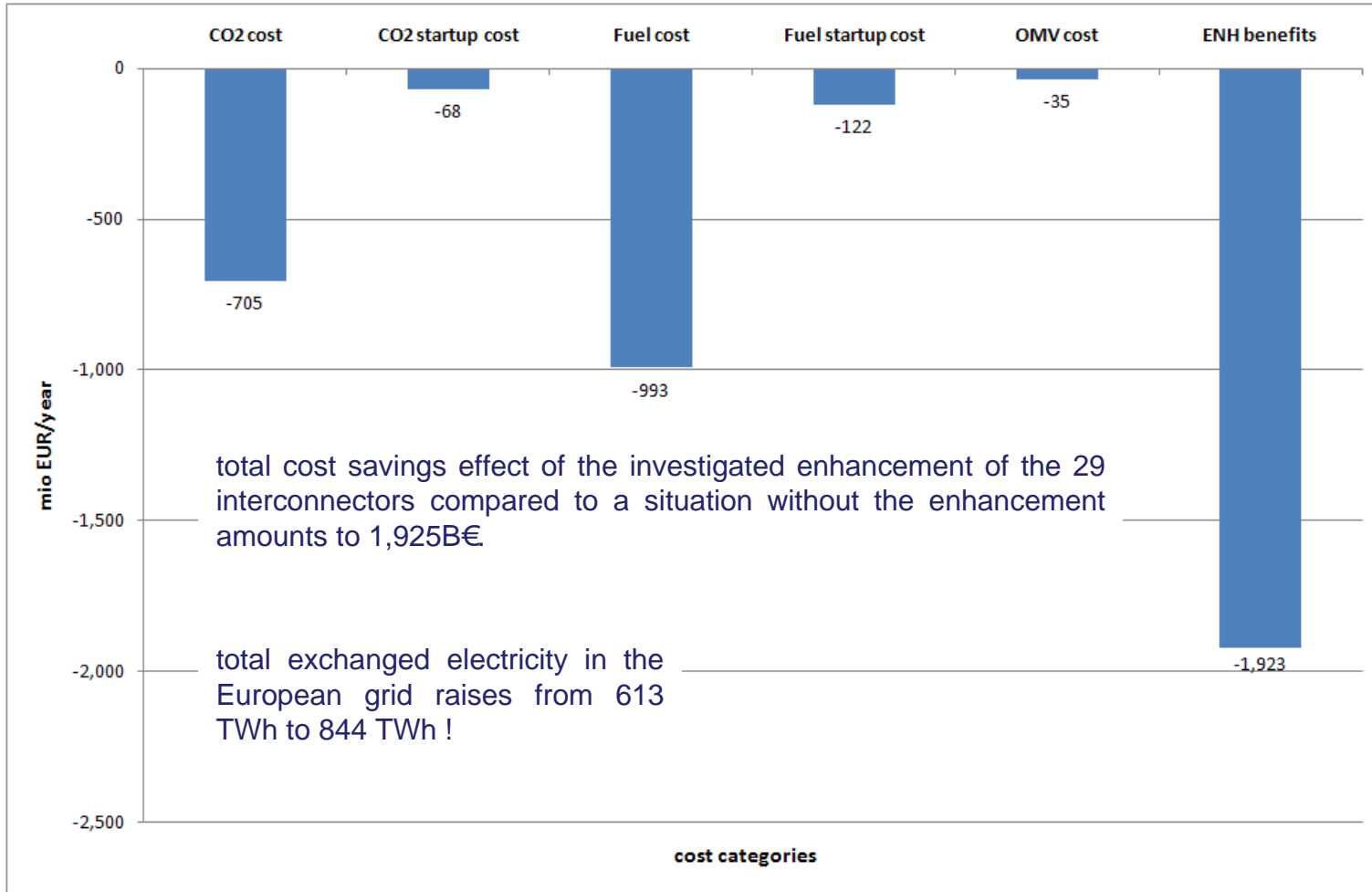
Benefits of adding wind power to the system



Integration Costs

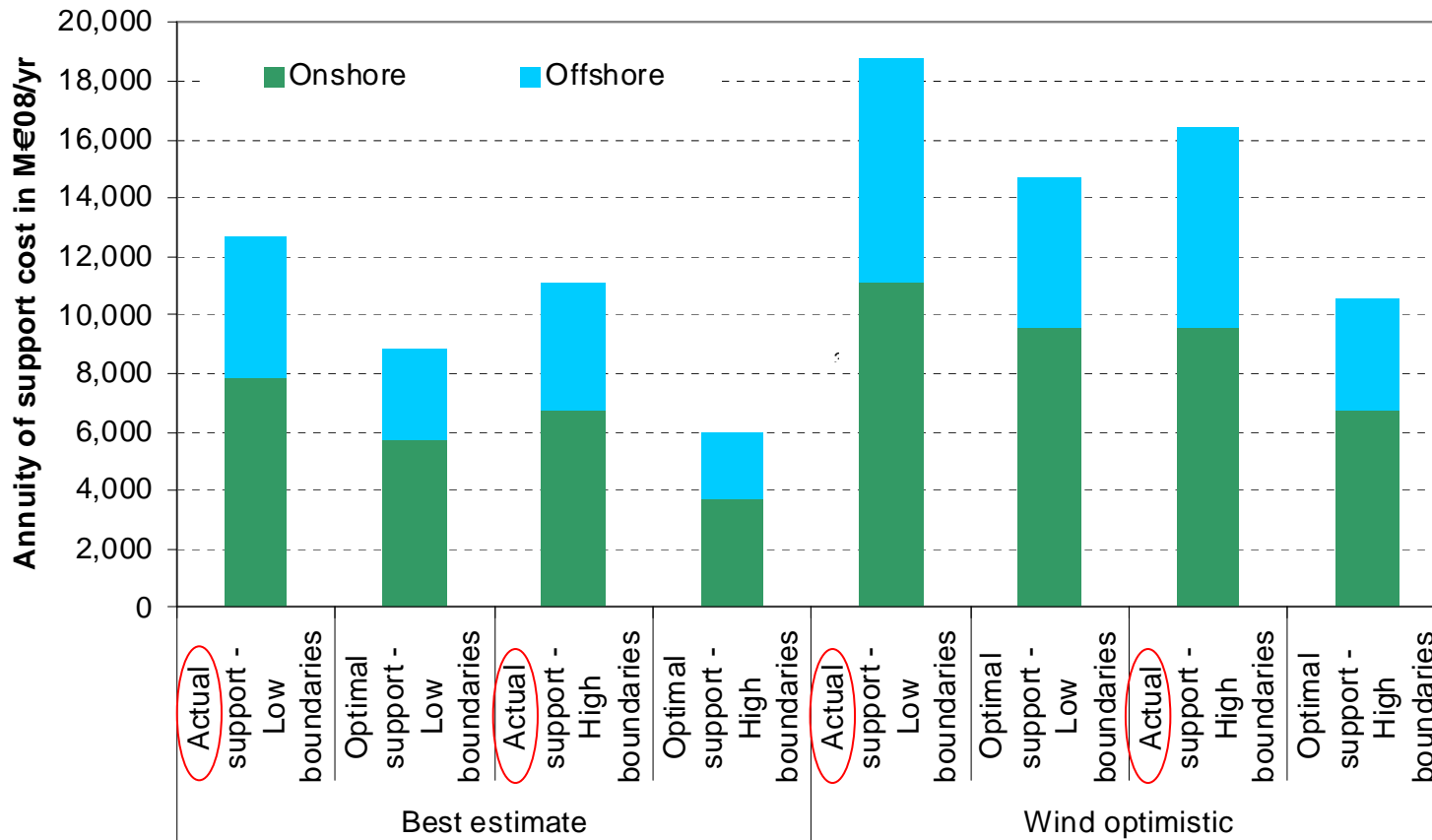


Adding 29 cross-border reinforcements ...



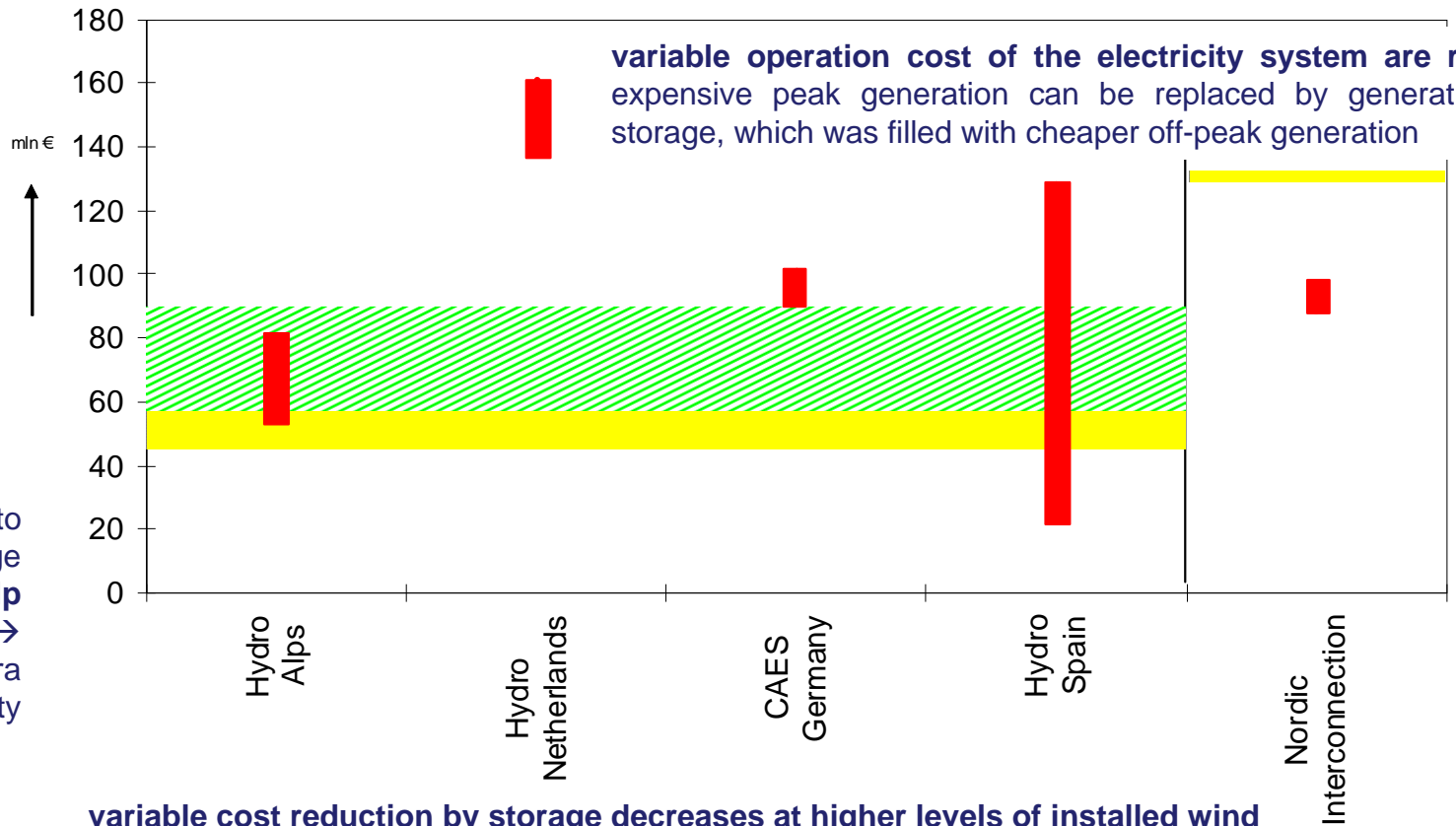
Support costs applied on 2015 capacities

Comparison of overall support cost for new installations (2008-2015) for different support, deployment and boundary condition scenarios



Storage as efficient mitigation measure ?

- Range of annual fixed cost per GW (investment and fixed O&M) for different storage options and for increasing interconnection capacity to Nordic region
- Range of operational cost savings (fuel, CO2, var O&M) per GW installed storage capacity in Reference scenario (mln €/year)
- Range of operational cost savings (fuel, CO2, var O&M) per GW installed storage capacity in scenario Wind Optimistic (mln €/year)



variable cost reduction by storage decreases at higher levels of installed wind capacity. This is caused by the fact that the difference in peak and of peak cost decreases in general if more wind is brought into the system

large scale pumped hydro storage appears **not economic in the Netherlands**, due to high capital cost. To a lesser extent this is **also true for the CAES in Germany**.

low capital cost to increase storage capacity in the **Alp region and Spain** → installation of extra storage capacity could be **beneficial**