

# **New Grid Access Solutions**

for offshore wind farms

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# Abstract

Today grid access solutions for offshore wind farms with AC and DC are proven technologies. Unlocking the potential for offshore wind-power within the wider energy mix remains dependent upon being able to innovate and reduce the levelized cost of energy. Siemens goal is to help our customers achieve the goal of reducing the Levelized Cost of Energy to 9,5 ct/kWh.

The new grid access concepts presented here are a major contribution reaching this target.

# Results



AC equipment attached to WTG

The new DC platform is of similar

#### size & weight as today's AC platforms

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#### Objectives

The new solutions have been designed considering the wind farm as an holistic asset including grid access. By doing so Siemens can utilise synergies to ensure the lowest cost solutions can be realised for the grid access. By fully utilizing the potential of the wind farm as an integrated system, Siemens new grid access solutions are providing substantial savings in space, weight, OpEx and CapEx.



The substantial reduction of DC topside volume and weight is achieved by using a compact DC switchgear (left) and a Diode Rectifier Unit (right)

## Methods

On the AC Side we utilize the weight carrying capabilities of the new generation of large offshore turbines to install the AC transmissions equipment. On the DC side we use the capabilities of a full converter machine to dramatically simplify the AC to DC conversion equipment by moving from voltage source converters to diode rectifiers connected in series. The approach is open for the WTGs of any supplier. For a full converter machine only a control software update is required.

## Conclusions

### New grid access solutions leads to:

Costs for 1200MW

- Reduced costs for operation and maintenance as well as implementation by a small and compact design
- Earlier return of investment by shortened project execution time

New DC grid access topology



New AC grid access topology

- High flexibility by a modular design, distributed platforms and the opportunity of stepwise platform installations
- High reliability, high personal safety and low maintenance efforts by using encapsulated and robust high voltage equipment
- Environmental friendliness by fire safe, biodegradable insulation
- On the DC side transmission capacities of up to 1200MW are feasible.
  Transmission losses are reduced by approximately 20%.
- The figure below shows the old and new break even distance between AC and DC for 1200 MW transmission capacity. Smaller power ratings are economically viable only if the distance to shore is small (<80km).</li>





The new AC solution is ready for commercial use today.

The new DC solution will be launched by Siemens officially in 2016.



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**Current DC**