Efficient Installation of Offshore Wind Farms

- Lessons learned from Nysted Offshore Wind Farm

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Siemens Wind Power

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Introduction

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- Introduction to Nysted Offshore Wind Farm
- Logistics
- Flow of components at base harbour
- Pre-assembly at base harbour
- Test at base harbour
- Time schedule, critical path and buffer system
- Installation
- Criteria for success
- Result

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Nysted Wind Farm

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- Location

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Nysted Wind Farm

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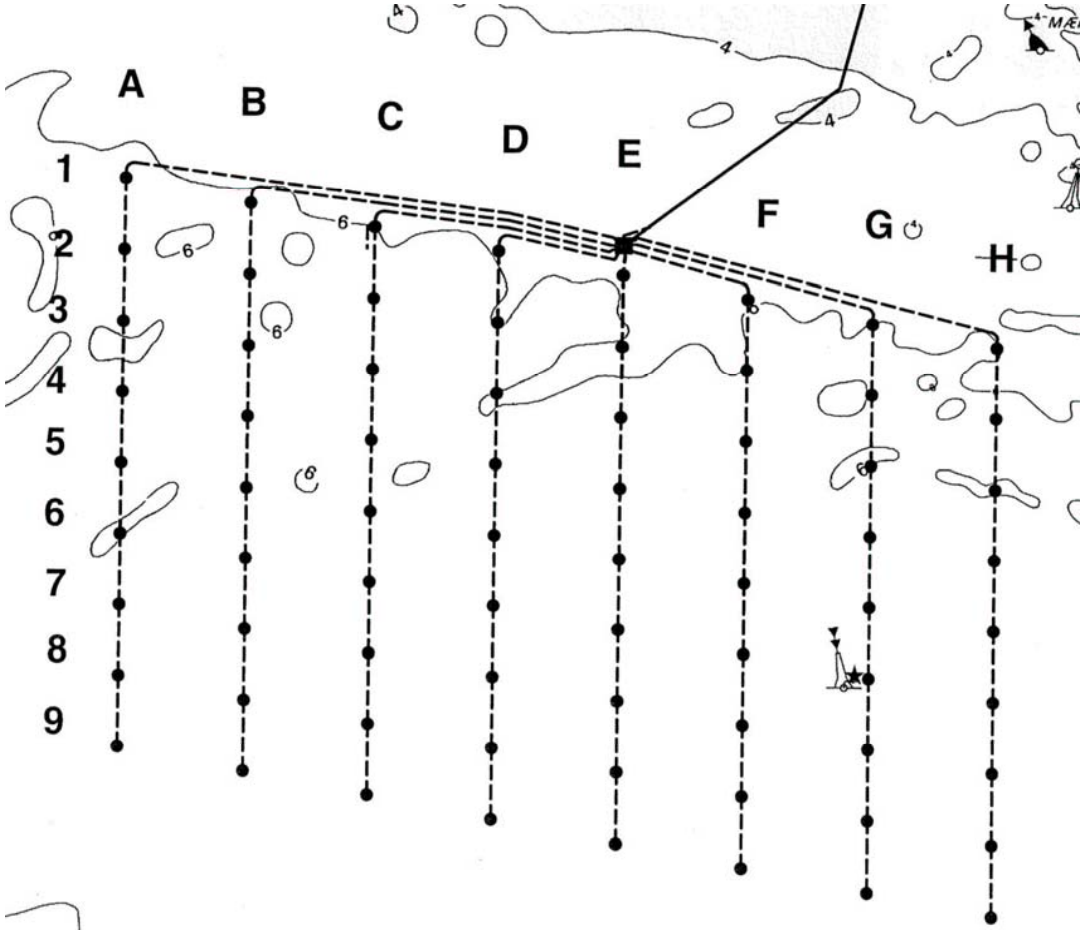
- Location
- Park layout



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Nysted Wind Farm

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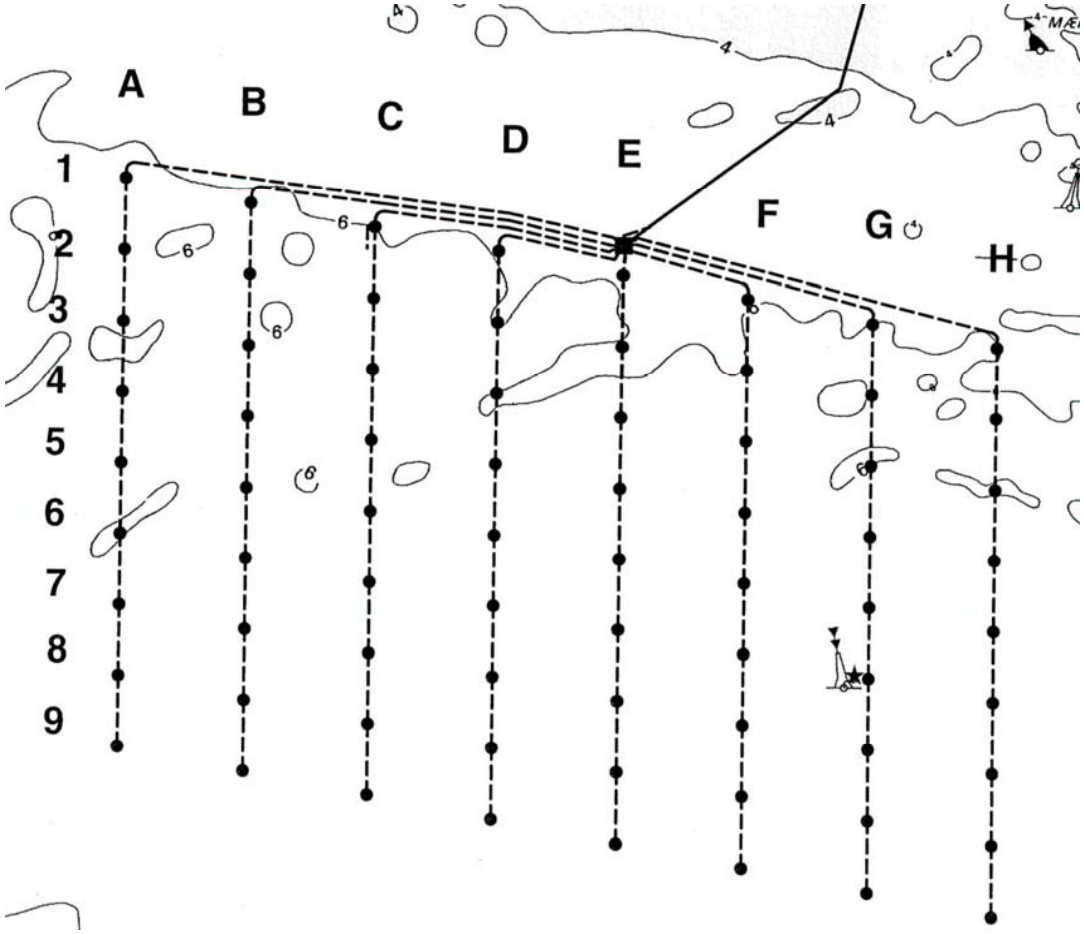
- Location
- Park layout
- Wind Turbine
  - 72 x 2.3 MW



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Nysted Wind Farm

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- Location
- Park layout
- Wind Turbine
  - 72 x 2.3 MW
- Water depth
  - 6.0 m – 9.5 m

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Nysted Wind Farm

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- Location
- Park layout
- Wind Turbine
  - 72 x 2.3 MW
- Water depth
  - 6.0 m – 9.5 m
- Foundation concept

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Nysted Wind Farm

SIEMENS

- Location
- Park layout
- Wind Turbine
  - 72 x 2.3 MW
- Water depth
  - 6.0 m – 9.5 m
- Foundation concept
- Installed from May to July 2003

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Port of Nyborg – base harbour

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- Location

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Port of Nyborg – base harbour

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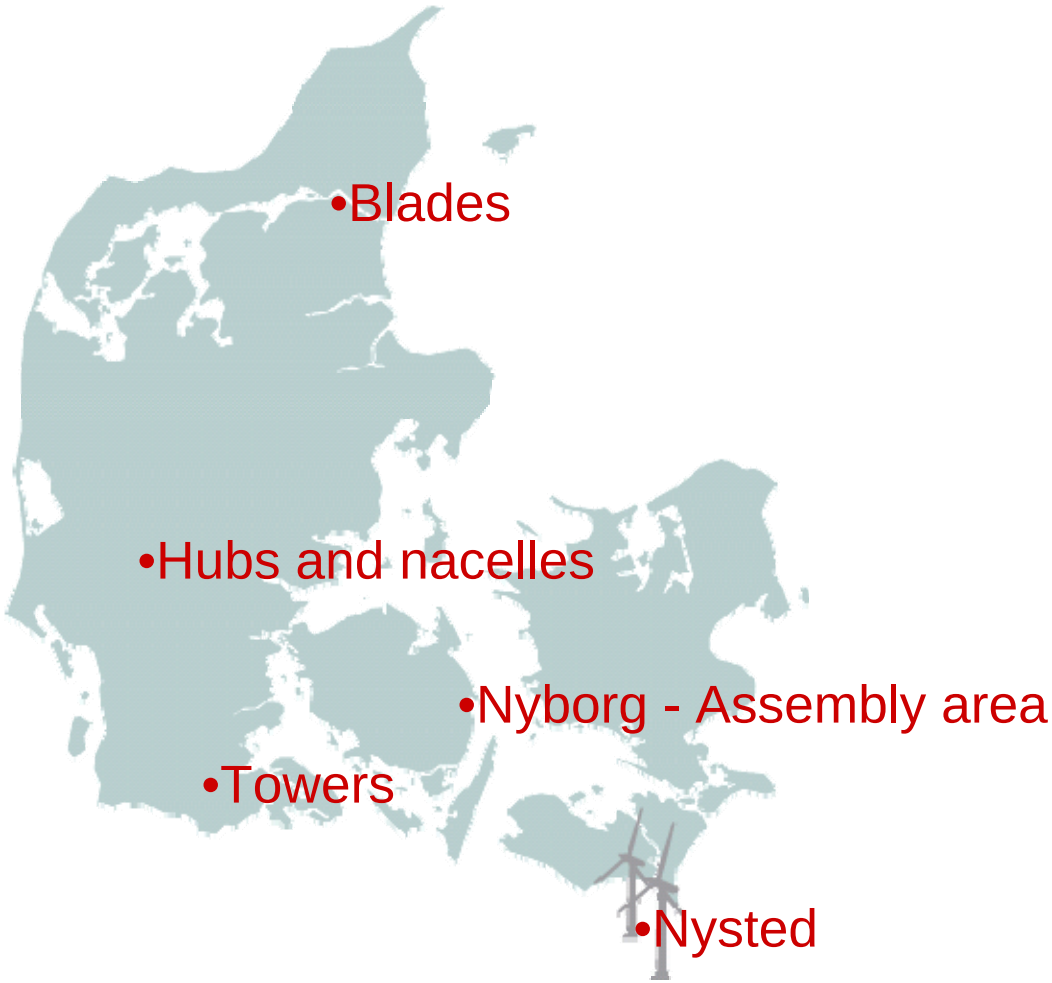
- Location
- Purpose
  - Logistics centre
  - Buffer



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Port of Nyborg – base harbour

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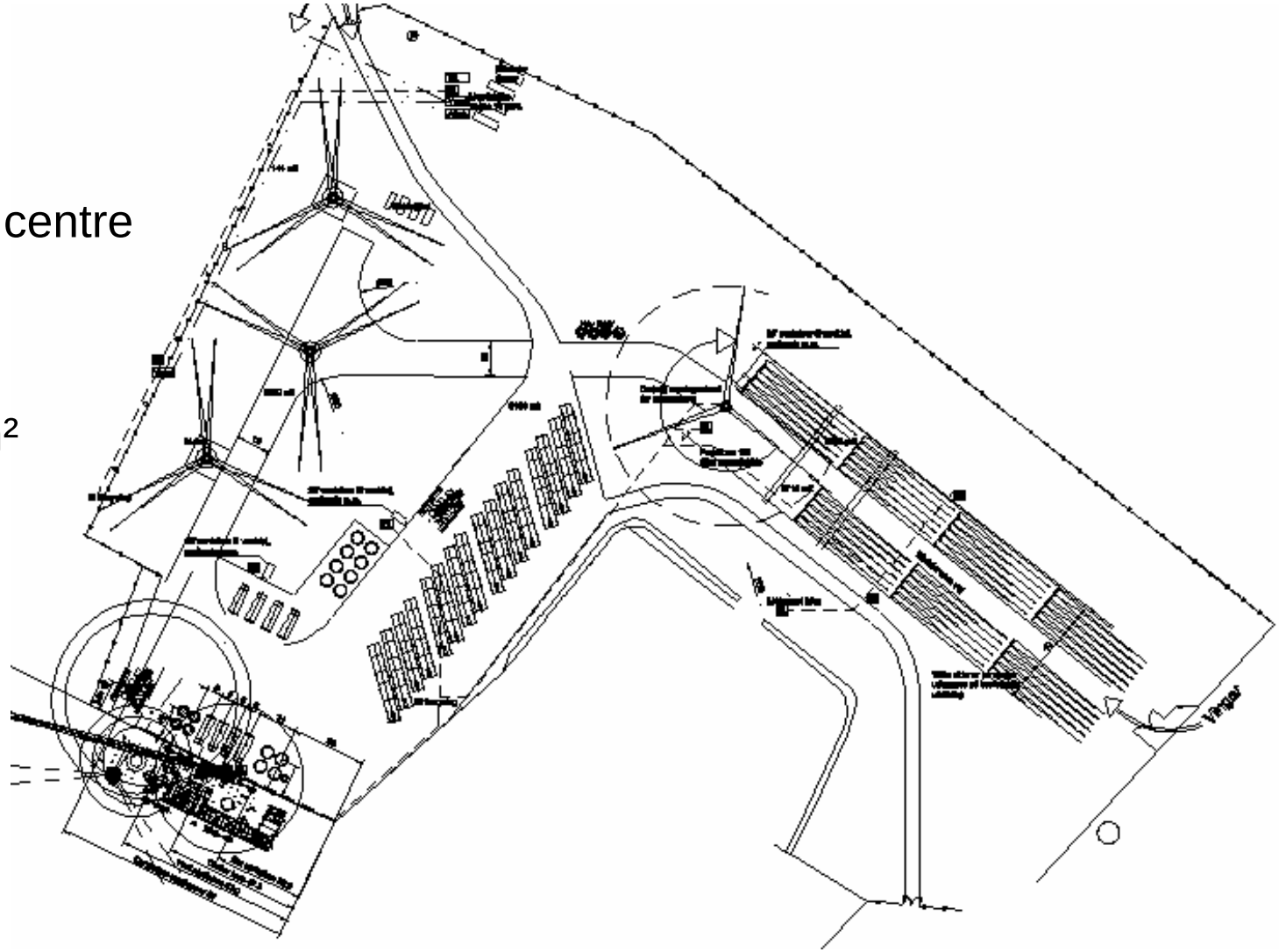
- Location
- Purpose
  - Logistics centre
  - Buffer
- Arrangement
  - 60,000 m²



Port of Nyborg – base harbour

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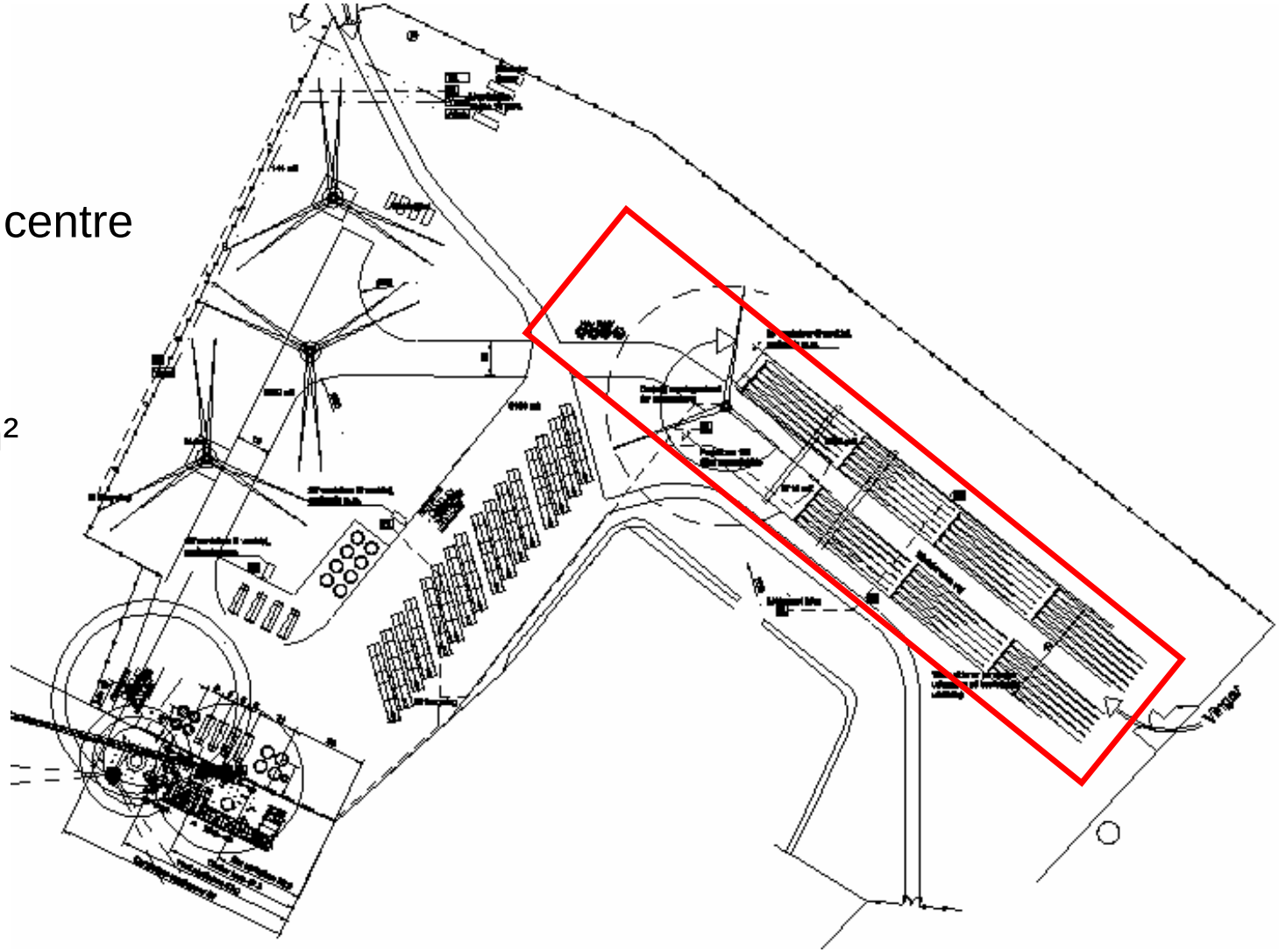

Port of Nyborg – base harbour

SIEMENS

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  - Logistics centre
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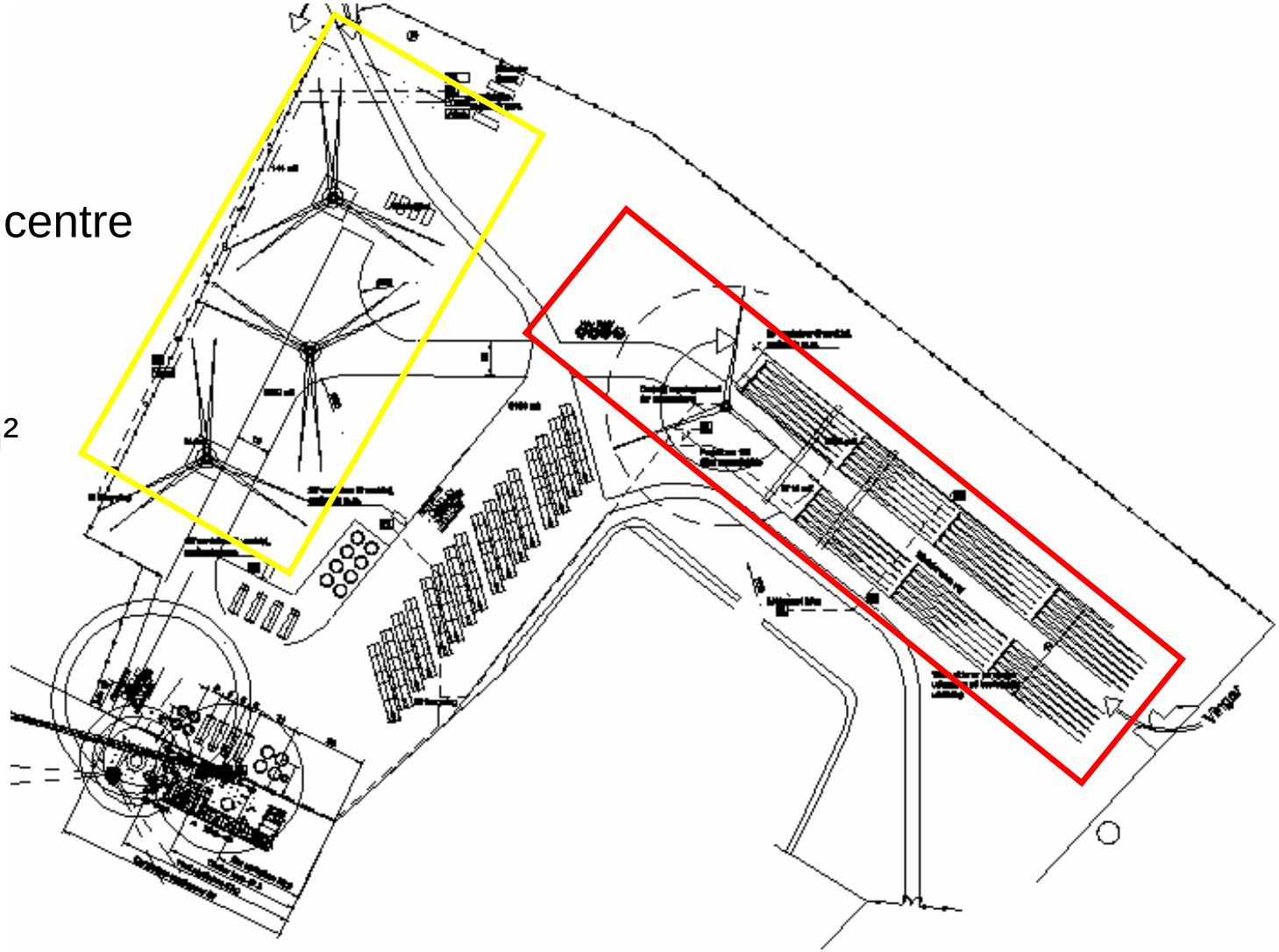

Port of Nyborg – base harbour

SIEMENS

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  - Buffer
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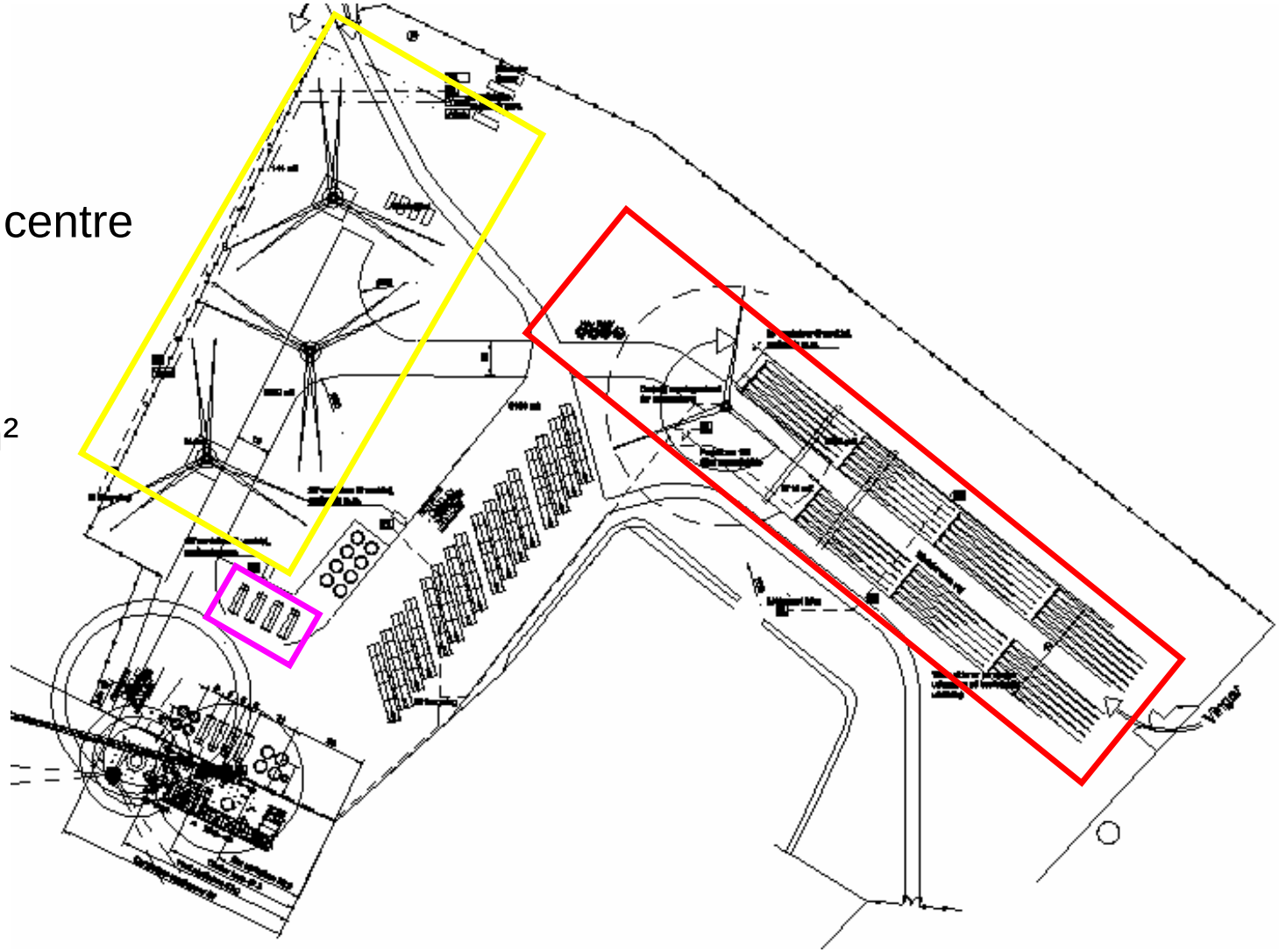

Port of Nyborg – base harbour

SIEMENS

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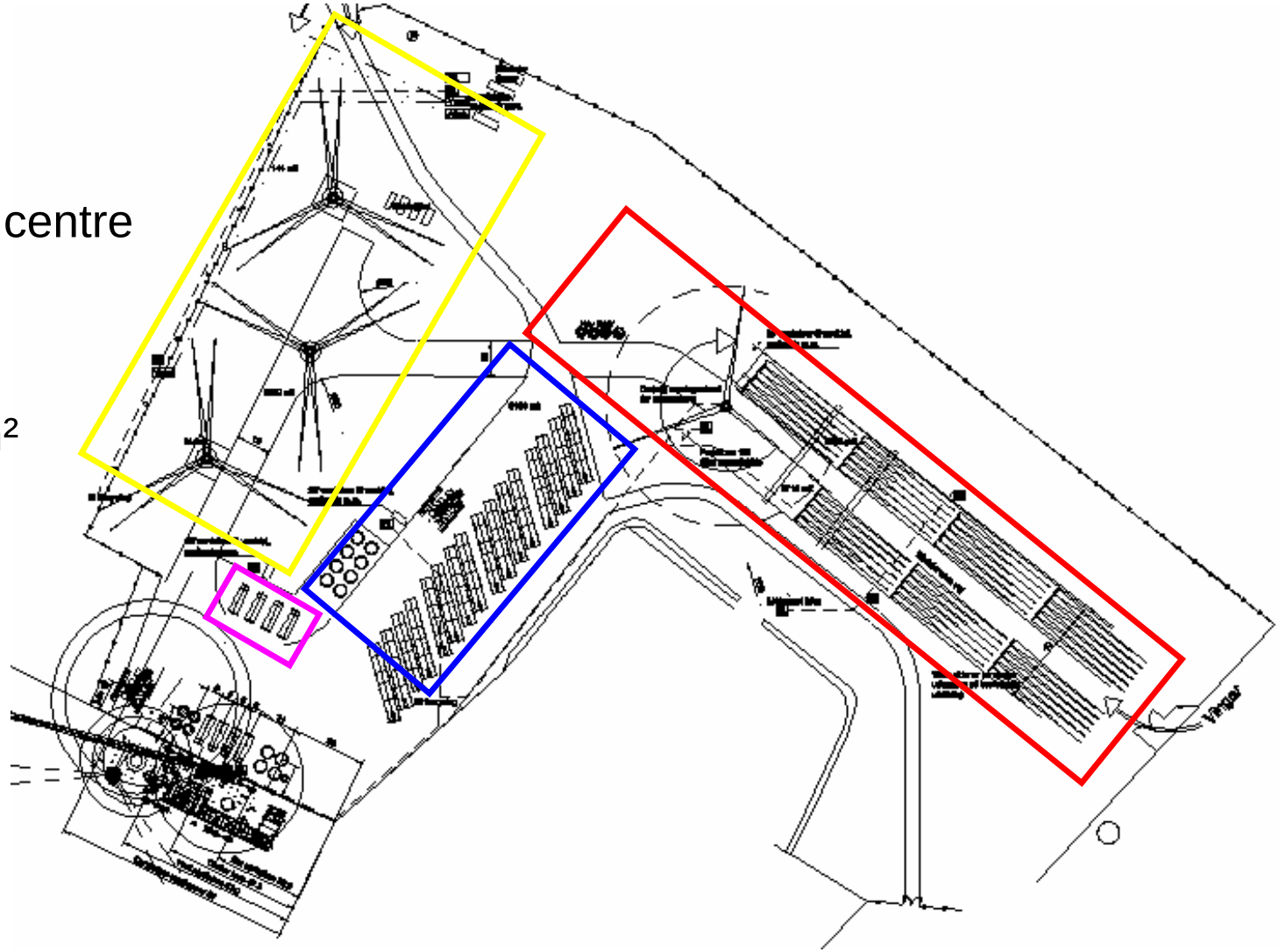

Port of Nyborg – base harbour

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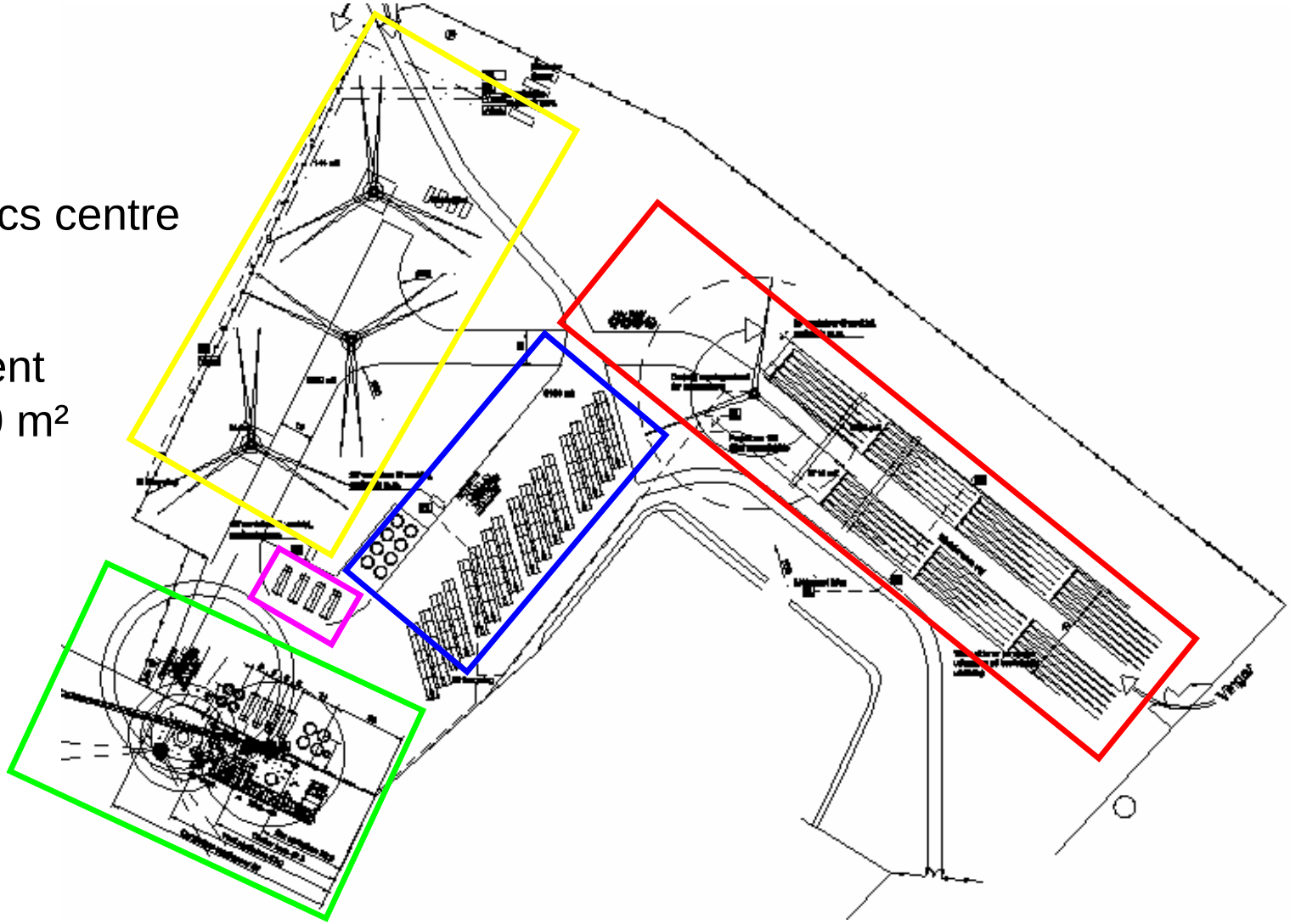

Port of Nyborg – base harbour

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- Location
- Purpose
  - Logistics centre
  - Buffer
- Arrangement
  - 60,000 m²
- Main tasks at harbour
  - Pre-assembly
  - Test
  - Quality control
  - Vessel loading

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Port of Nyborg – base harbour

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Port of Nyborg – base harbour

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Installation

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- Tower

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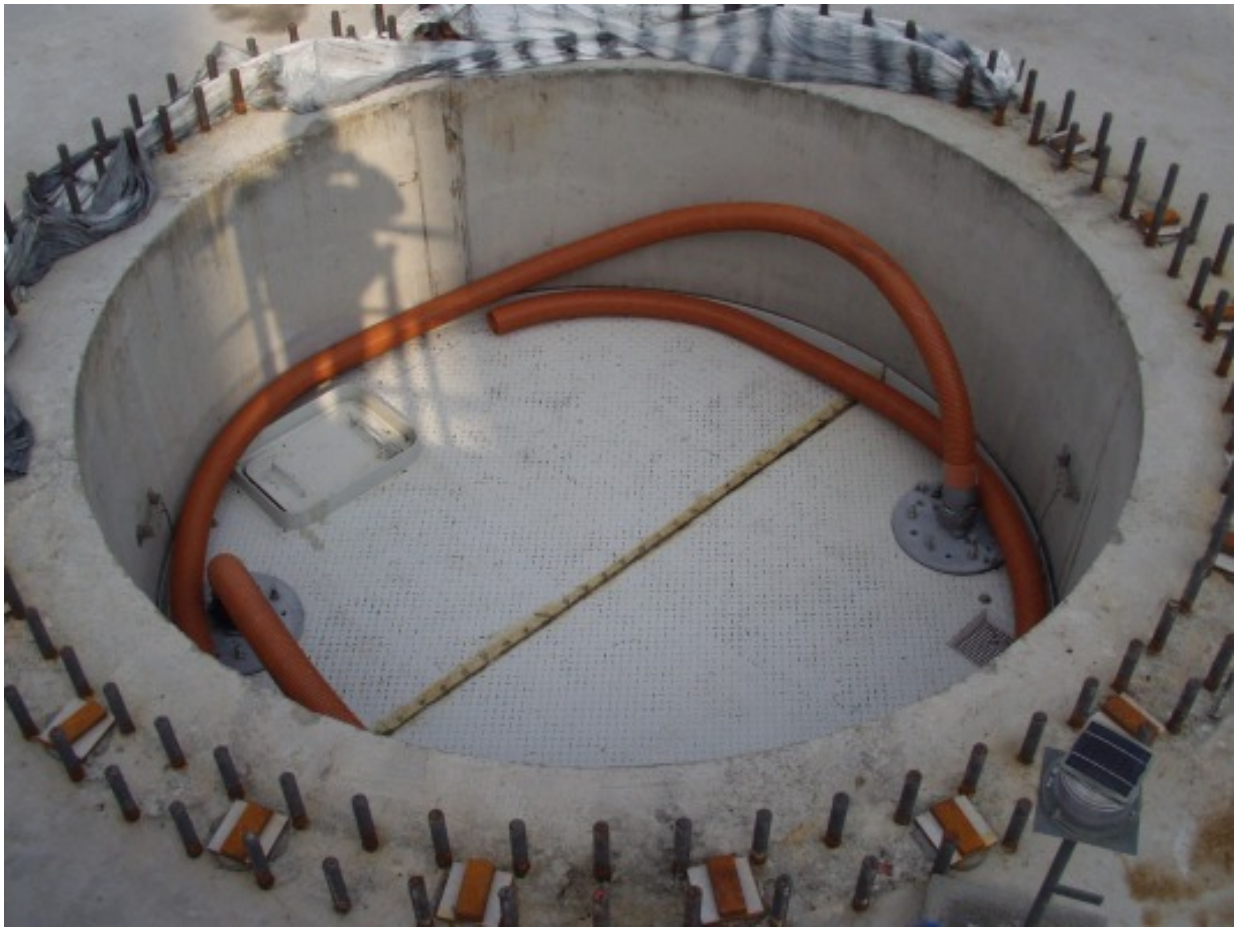
Installation

SIEMENS

- Tower



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Installation

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- Tower

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Installation

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- Tower
- Nacelle

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Installation

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- Tower
- Nacelle
- Rotor

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Commissioning

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- Starts after erection of the first turbine
- Procedure
  - Connecting power to the turbine
  - Test of sub-systems
  - Test of turbine functionality
  - Test of SCADA interfaces
  - Trial operation

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Conclusion

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- Successes
  - Quality control through out the project in co-operation with the client
  - Assembly at base harbour
  - Pre-tests at base harbour
  - Arrangement of installation vessel
  - Installation within time schedule
  - Take over one month ahead of schedule

- Lessons learned
  - Tests and detailed planning of all phases
  - Importance of efficient quality control at base harbour
  - Importance of pre-assembly and tests at base harbour
  - Importance of an efficient buffer system
  - Focus on commissioning works
  - Choice of season for installation and commissioning

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