# Hywind
# Status and plans

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# Hywind Demo - concept verified

- In operation since September 2009
  - Cumulative production 15 GWh
- Capacity factor of >45% 2011 year to date
- Actual movements confirmed simulation model
- Floater motions have no negative impact on turbine performance
- Access and inspection confirmed to be satisfactory



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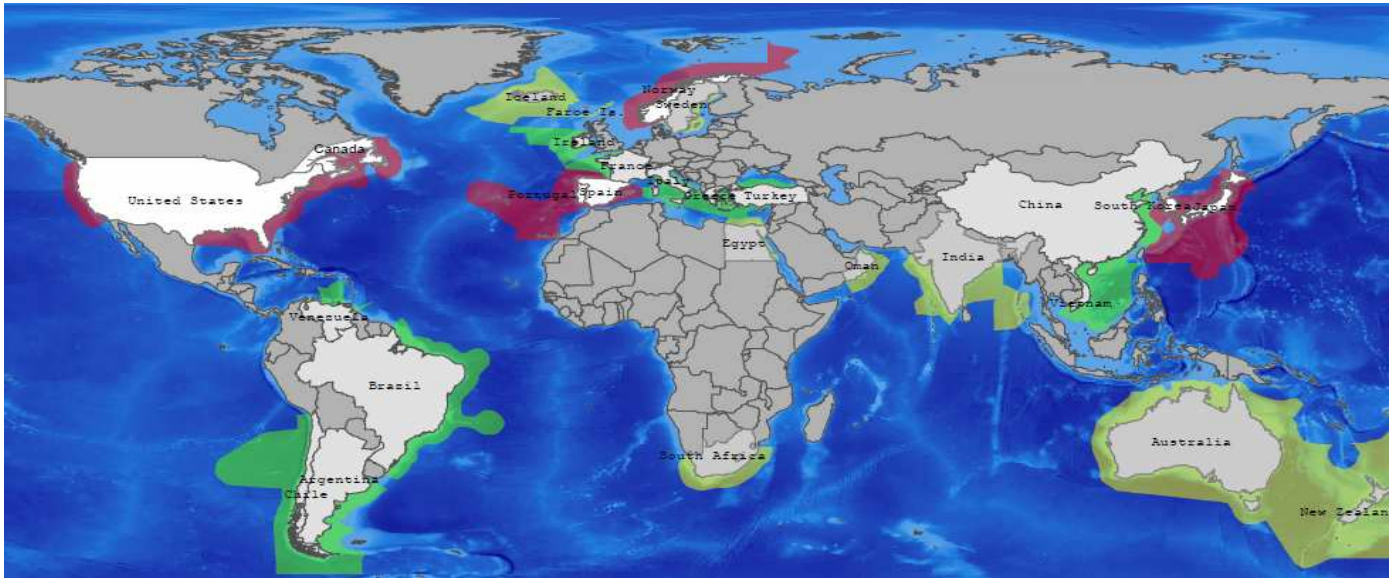
# Opening new markets with floating wind

- Key characteristics for attractive markets
  - Deep waters close to shore
  - Good wind conditions
  - Electricity demand
  - Regulatory and commercial framework
  - Grid connection

Near to medium term markets:
UK, US, Spain, Japan



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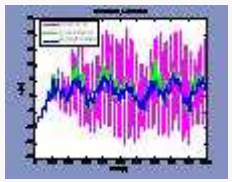
# From Idea to Commercial Parks

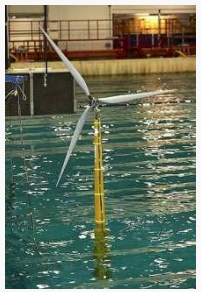
- The technical concept is now considered proven
- Currently work on establishing pilot parks to demonstrate improvements and open markets (<5 years)
- Large parks 500-1000MW is the end game objective (<10 years)

→ **Industry engagement and support from governments is driving the timelines for commercial deployment**



Concept

***2001***

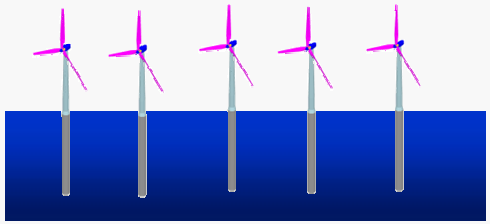


Model test

***2005***

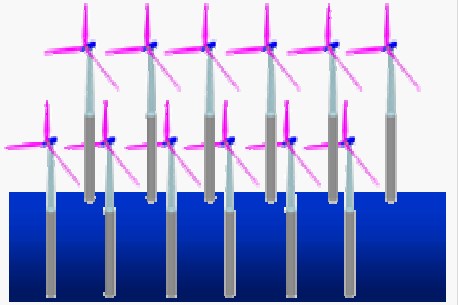
Full-scale prototype

***2009***



Pilot Park, 3-6 turbines

***<5 years***



Large Parks, 500-1000MW

***<10 years***



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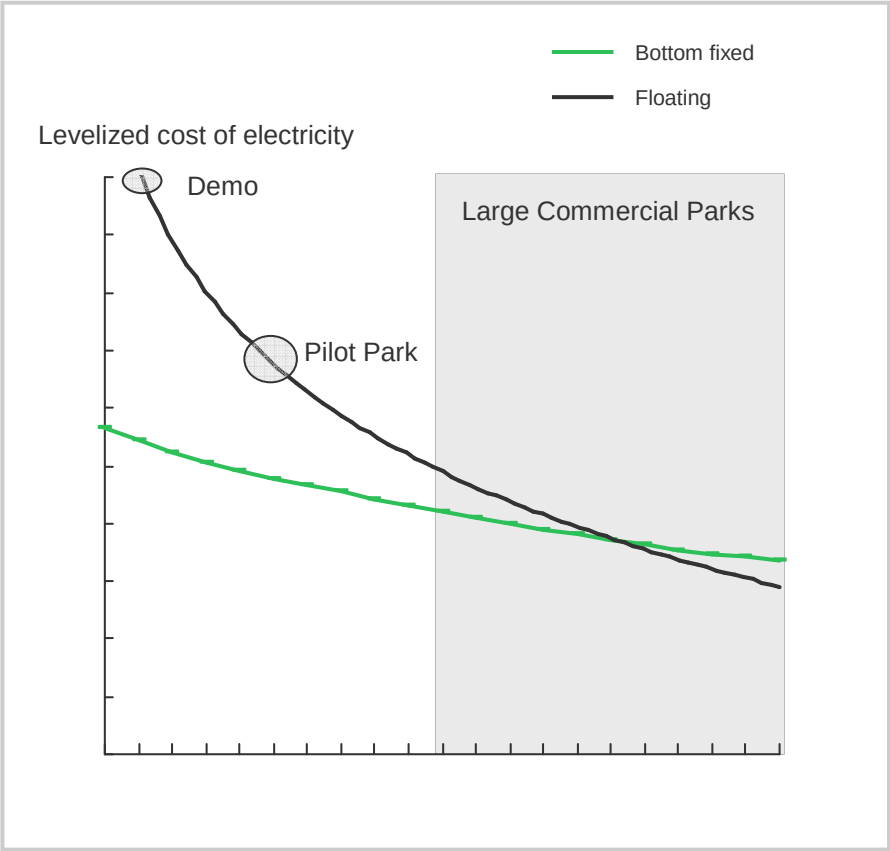
# Floating wind has potential to be cost competitive with bottom fixed offshore wind

- More rapid learning and cost reduction effects than bottom fixed
  - Scaling effects
  - Nearshore assembly
  - Easier installation
  - Transferable learning effects
  - Better yield
  - Operationally more robust



# Conclusion

- Floating wind is technically ready for commercial deployment
- Floating wind opens significant markets with good wind conditions and fewer constraints
- Governments and the industry need to work together to make floating wind happen



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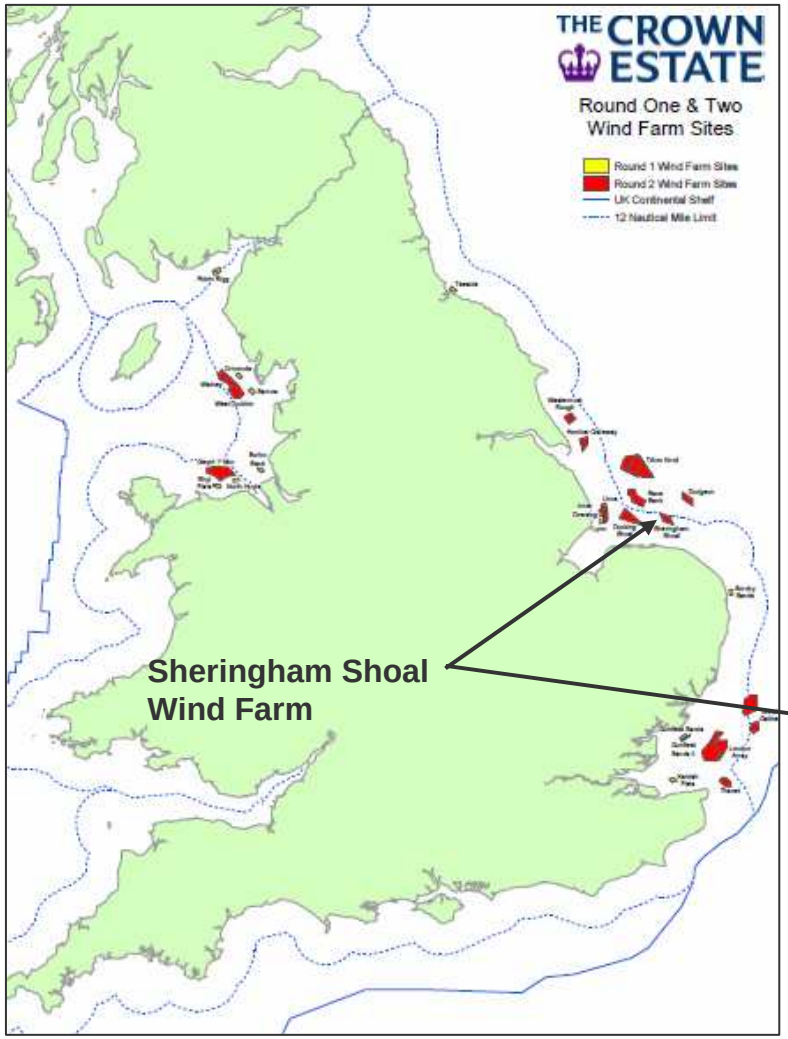
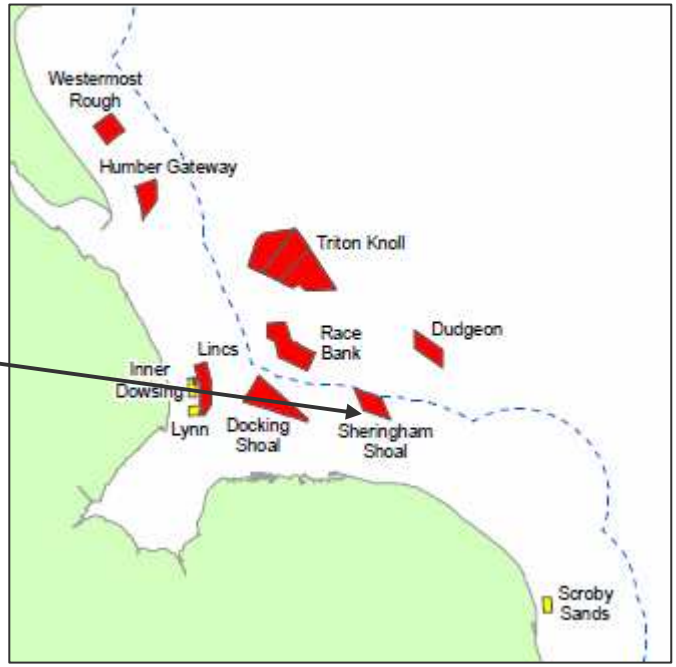
# Additional information on Statoil’s offshore wind activities and Hywind

# Sheringham Shoal Offshore Wind Farm




- Scira Offshore Energy Ltd.
- 50 years lease agreement with The Crown Estate



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# Wind Farm Highlights

Project Highlights

- Installed capacity 317 MW
- 35 km$^2$ wind farm 20 km off the coast
- Water depth 17m – 22m
- 88 wind turbine generators, each 3.6 MW
- Started delivering power to grid August 2011

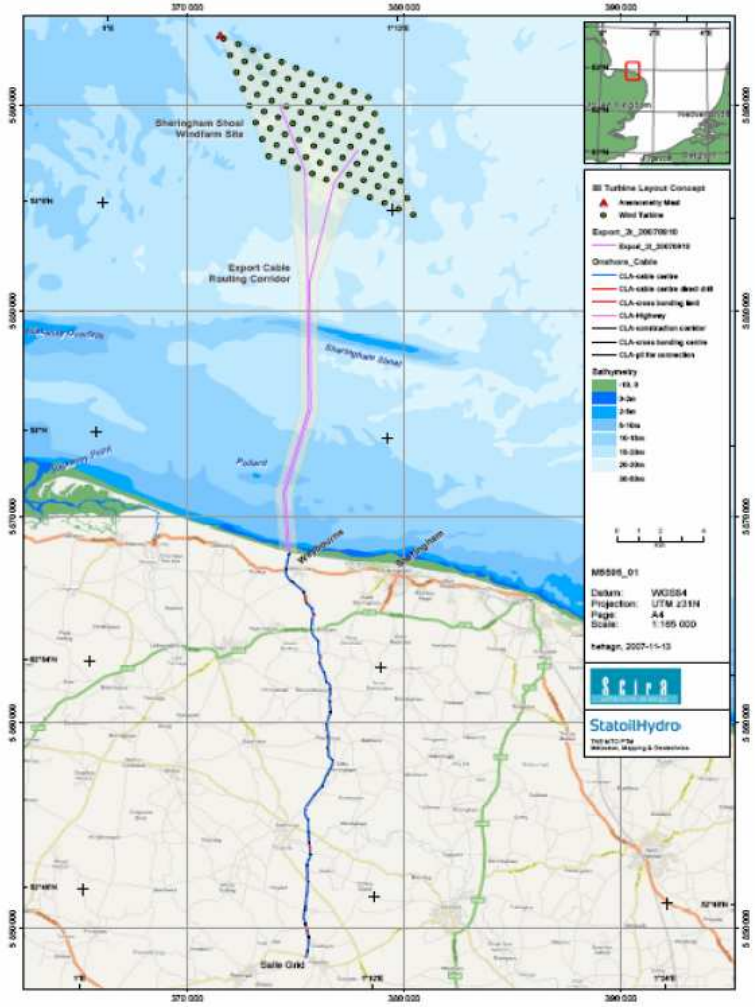


Fig. 1.1 Layout of Sheringham Shoal Offshore Wind Farm



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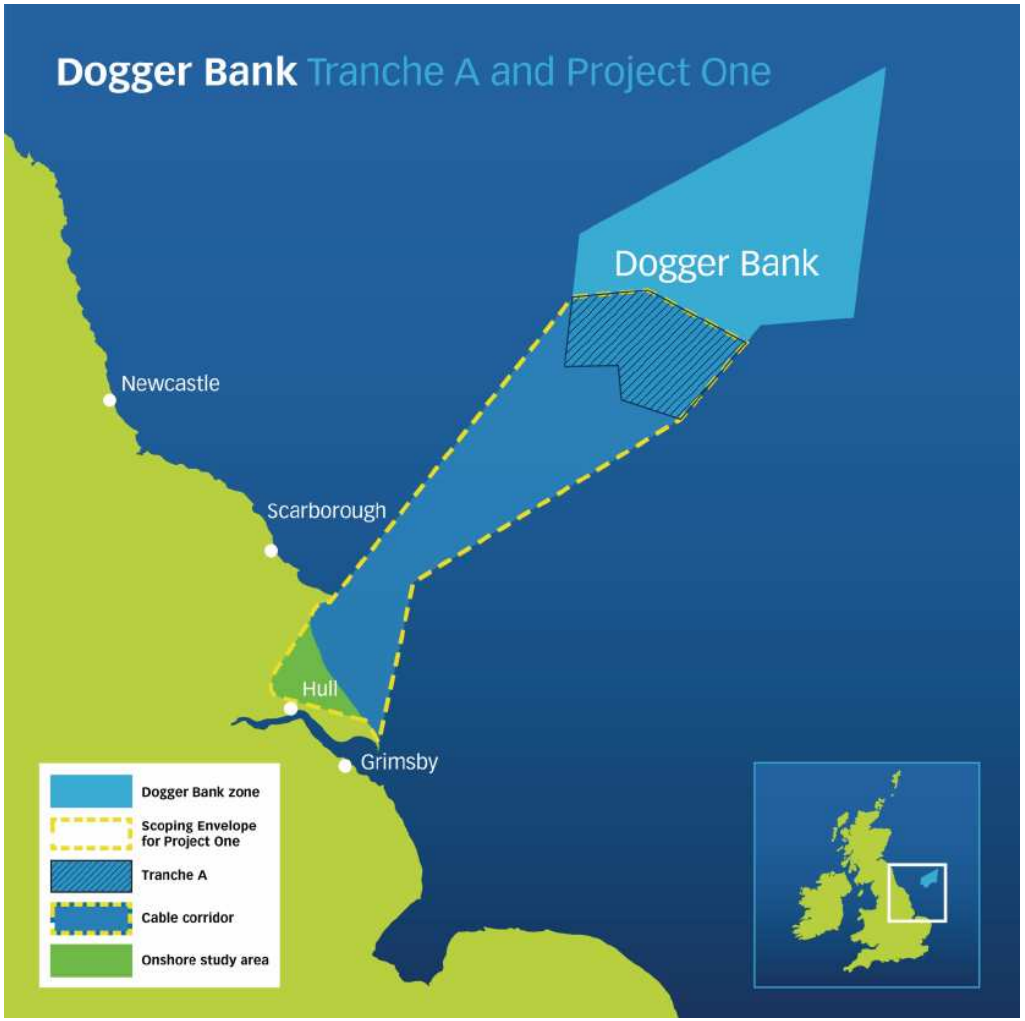
# Dogger Bank – Asset for growth

## DOGGER BANK KEY FACTS

- Target 9 GW production, potential to increase to 13 GW
- Area: 8660km$^2$ (3343 square miles)
- Distance from shore: 125-290 km (77-180 miles)
- Water depth: 18-63 m (59 to 206 ft)
- High wind speeds >10 m/s average wind speed across the zone



# Hywind II: evolution from Hywind Demo

- Optimized design through analysis of full scale Demo
  - Design margins reduced
  - Optimised substructure design (reduced draft and displacement)
  - Larger generator and rotor combined with lower weight
  - Operational robustness
- Lower development costs
  - Less material
  - Fabrication friendly and prepared for mass production
  - Easier installation
  - Learning effects

**Hywind Demo** **Hywind II**



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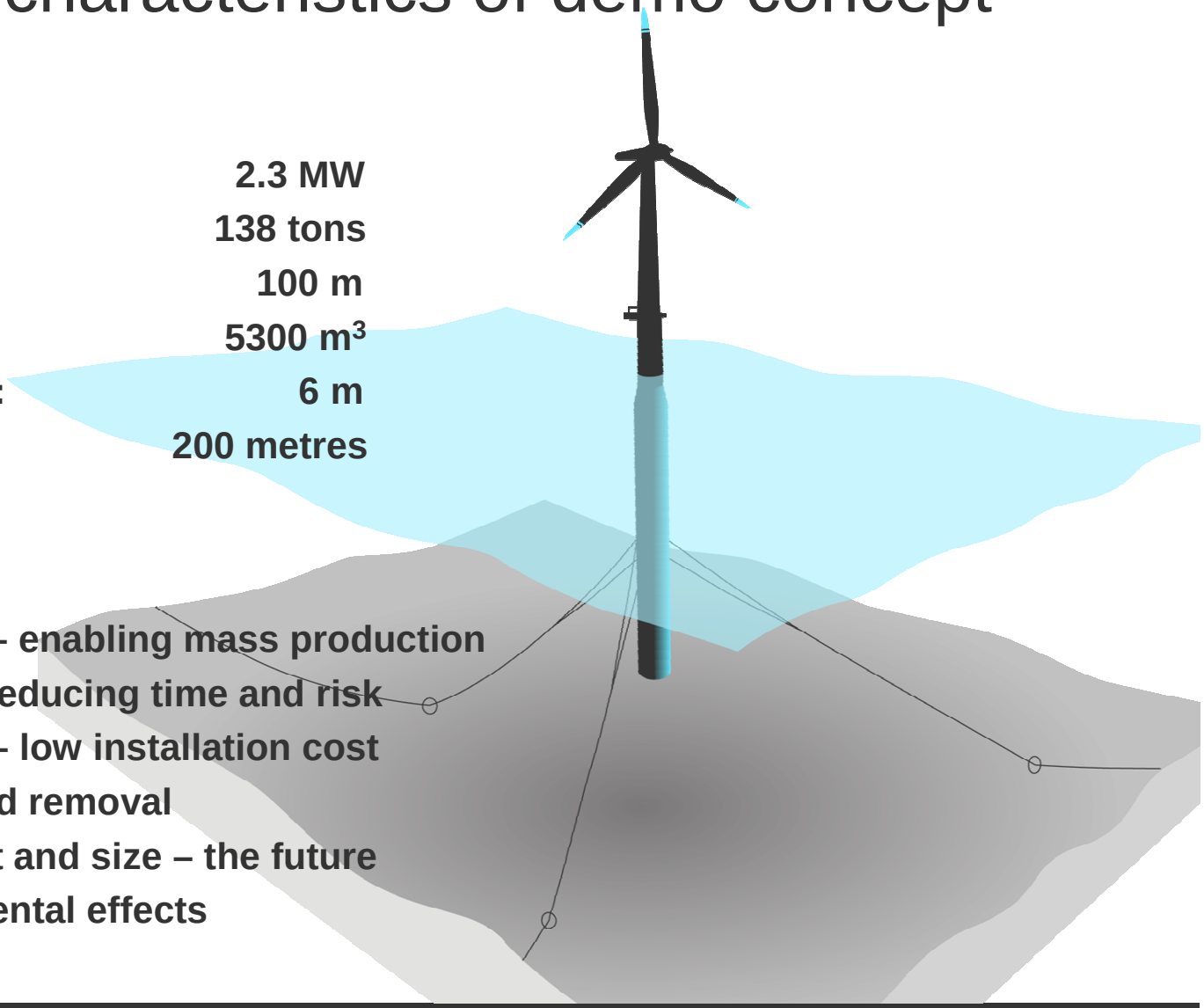
# Key data and characteristics of demo concept

**Main Data**

- **WTG:** **2.3 MW**
- **Turbine weight:** **138 tons**
- **Draft:** **100 m**
- **Displacement:** **5300 $m^3$**
- **Diameter at water line:** **6 m**
- **Water depth:** **200 metres**



**Key characteristics**

- **Floating substructure – enabling mass production**
- **Assembled inshore – reducing time and risk**
- **Traditional anchoring – low installation cost**
- **Flexibility – placing and removal**
- **Not sensitive to weight and size – the future**
- **Resistant to environmental effects**



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