ADLS TECHNOLOGY – FROM INTERNATIONAL TO NATIONAL IMPLEMENTATION

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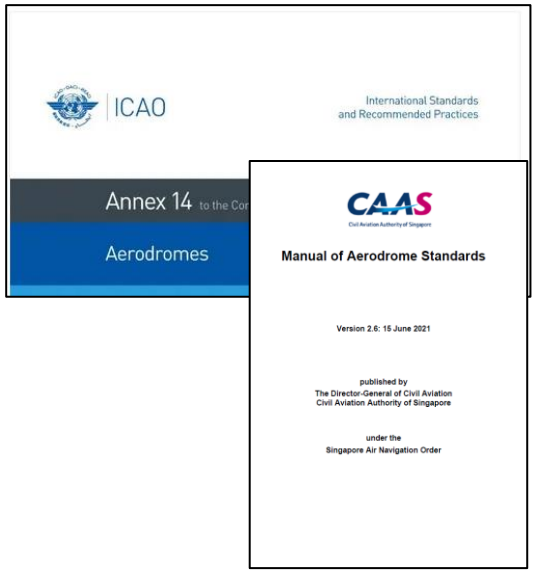
Wind EUROPE

Get permitting right

Lighting and marking requirements across Europe



International Civil Aviation Organisation (ICAO)

Reference document: ANNEX 14

Provides Standards and Recommended Practices (specifications) that prescribe the marking and lighting of wind turbines

Each country sets his own rules

Countries across Europe have added a series of national requirements on top of ICAO's recommendations

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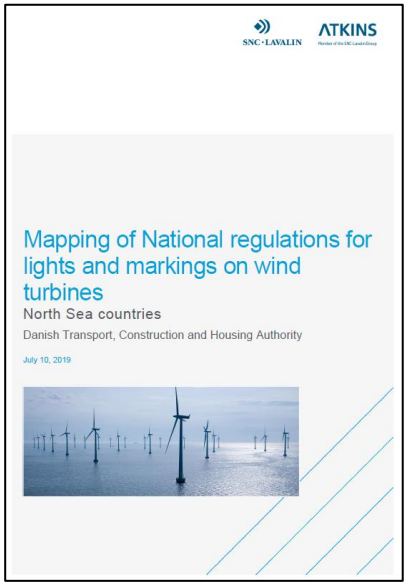
Lighting and marking requirements across Europe



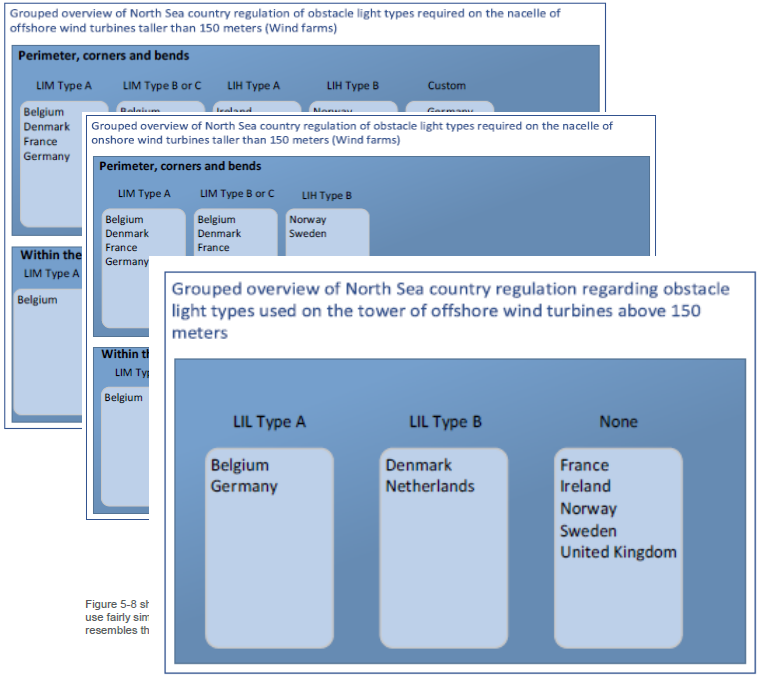


Figure 5-10 - Grouped overview of North Sea country regulation requiring obstacle lighting on offshore wind turbine towers above 150 meters

Onshore and Offshore;

Below and above 150m;

Wind turbines and wind farms;

Turbine, nacelle and blade lights.

Lighting and marking requirements across Europe

The mapping highlights the following overall points:

- National requirements for obstacle lights and markings vary and are implemented with **a more detailed consideration than current international recommendations;**
- The rules for markings and lightning of wind turbines have been established at different times over a period from 2005 and until today;
- The requirements regarding the positioning of lights on individual wind turbines are quite similar across the North Sea countries
- **There is no overall trend concerning the requirements in the national regulations regarding the type of lighting and its brightness, positioning, control and adjustability**
- Only a few countries have requirements for red/orange paint-based marking of wind turbine towers, wings and nacelle

Aviation Detection Lighting Systems

visible aviation lights only to be illuminated when an aircraft is within a volume bounded from the perimeter of a group of turbines.

Potential for reduction of visual impact = Increased social acceptance

Technology: Radar or Transponder-based

International level:

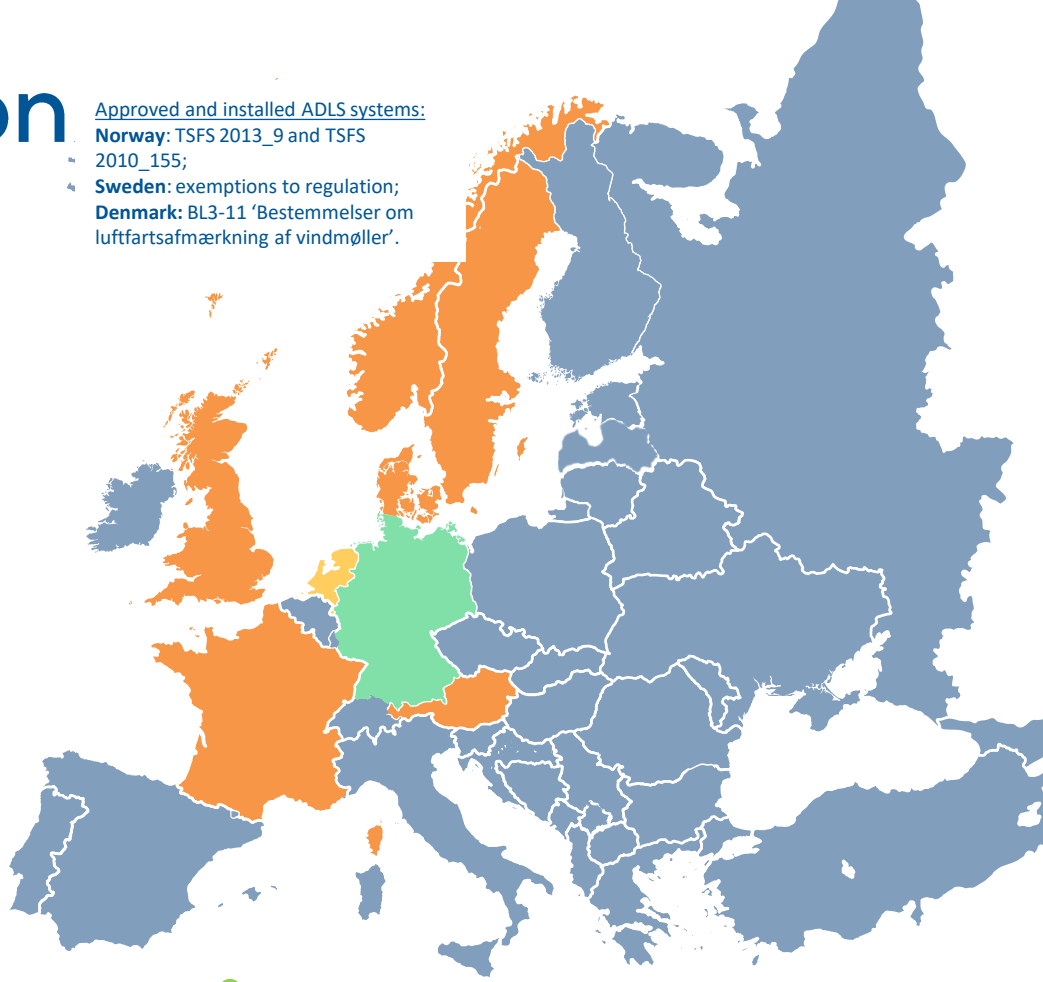
- ICAO: Aerodrome Design Manual - Part 4 - Visual Aids (Doc 9157 - Part 4)
- IEC 61400-29: Marking and lighting of wind turbines

Aviation Detection Lighting Systems

Approved and installed ADLS systems:
Norway: TSFS 2013_9 and TSFS 2010_155;
Sweden: exemptions to regulation;
Denmark: BL3-11 'Bestemmelser om luftfartsafmærkning af vindmøller'.

What do we need?

- Safety;
- Risk analysis;
- Technical requirements and standards;
- Increase knowledge (e.g. Radar data processing);
- Cost-effective solutions;



In the law. Outside Europe: Canada (CAR Standard 621, chapter 15) and USA (FAA AC 70/7460 – 1L, chapter 14)

Under testing or discussion (not exhaustive)

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Final considerations

- Identifying needs well in advance;
- Establish working groups or for a for discussion;
- Discuss and assess different options
- Sharing practices;
- Start demonstrators and pilot projects;
- Industry-produced material → lobbying
- Information gathering, publications, formal studies
- Prescriptive requirements vs **flexibility**