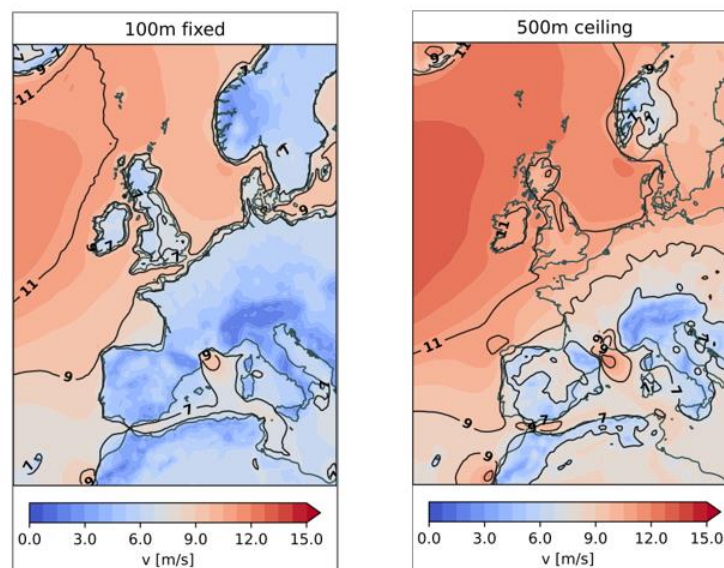


Airborne Wind Europe 

Airborne Wind Energy Country Mapping

The situation for Airborne Wind Energy development
in selected European countries in terms of resources, policies,
stakeholders and opportunities

Draft - July 2022



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Quote as: *Airborne Wind Europe 2022, Country Mapping. Petrick K. et al, Interreg NWE - MegaAWE project.*

Content

Content	2
1 Germany.....	4
1.1 Summary.....	4
1.2 AWE potential.....	4
1.3 Energy policies and support.....	4
1.4 Regulation and permitting	5
1.5 Key policy stakeholders	6
1.6 AWE stakeholders	7
1.7 Opportunities.....	8
2 Ireland.....	9
2.1 Summary.....	9
2.2 AWE potential.....	9
2.3 Energy policies	10
2.4 Regulation and permitting	10
2.5 Key policy stakeholders	2
2.6 AWE stakeholders	2
2.7 Opportunities.....	3
3 Spain.....	5
3.1 Summary.....	5
3.2 AWE potential.....	5
3.3 Energy policies	6
3.4 Key policy stakeholders	6
3.5 Regulation and permitting	7
3.6 AWE stakeholders	7
3.7 Opportunities.....	8
4 France	9
4.1 Summary.....	9
4.2 AWE potential.....	9
4.3 Energy policies and support.....	9
4.4 Regulation and permitting	10
4.5 Key policy stakeholders	10
4.6 AWE stakeholders	10
4.7 Opportunities.....	11
5 UK	12
5.1 Summary.....	12
5.2 AWE potential.....	12
5.3 Energy policies and support.....	12
5.4 Regulation and permitting	13
5.5 Key policy stakeholders	13
5.6 AWE stakeholders	13
5.7 Opportunities.....	14
6 The Netherlands	15
6.1 Summary.....	15
6.2 AWE potential.....	15
6.3 Energy policies and support.....	15
6.4 Regulation and permitting	16
6.5 Key policy stakeholders	16
6.6 AWE stakeholders	16

6.7	Opportunities.....	17
7	Norway	18
7.1	Summary.....	18
7.2	AWE potential.....	18
7.3	Energy policies and support.....	18
7.4	Regulation and permitting	19
7.5	Key policy stakeholders	20
7.6	AWE stakeholders	20
7.7	Opportunities.....	21
8	Italy.....	22
8.1	Summary.....	22
8.2	AWE potential.....	22
8.3	Energy policies and support.....	22
8.4	Regulation and permitting	23
8.5	Key policy stakeholders	23
8.6	AWE stakeholders	23
8.7	Opportunities.....	23
9	Switzerland.....	25
9.1	Summary.....	25
9.2	AWE potential.....	25
9.3	Energy policies and support.....	25
9.4	Regulation and permitting	26
9.5	Key policy stakeholders	26
9.6	AWE stakeholders	26
9.7	Opportunities.....	26
10	USA	28
10.1	Summary.....	28
10.2	AWE potential.....	28
10.3	Energy policies and support.....	29
10.4	Regulation and permitting	29
10.5	Key policy stakeholders	29
10.6	AWE stakeholders	30
10.7	Opportunities.....	30
11	Country Assessment	31
12	Annex - Template for Country X	32
12.1	Summary.....	32
12.2	AWE potential.....	32
12.3	Energy policies and support.....	32
12.4	Regulation and permitting	32
12.5	Key policy stakeholders	32
12.6	AWE stakeholders	33
12.7	Opportunities.....	33

1 Germany

1.1 Summary

Germany has good wind potential which it could significantly increase with AWE. The wind sector and the aviation sector are well developed. AWE has not been recognised in renewable policies yet – but if the government started supporting AWE, other countries may follow.

1.2 AWE potential

1.2.1 Wind resources

AWE would provide nearshore and offshore conditions across all Germany except the very South close to the Alps.

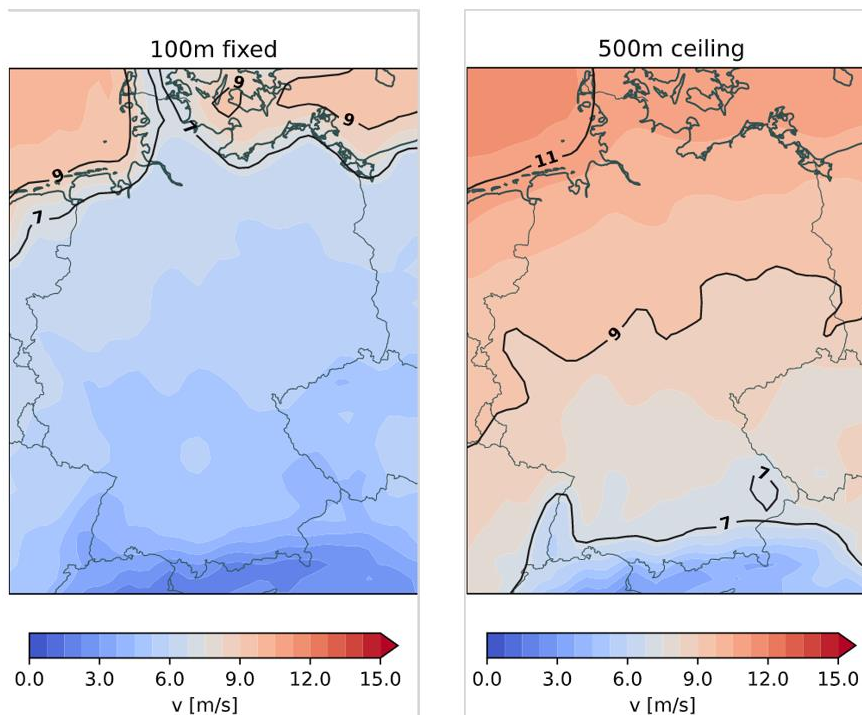


Figure 1: Wind resource potential Germany

1.2.2 Site availability

Germany is in general quite densely populated but there are also many rural areas with few inhabitants. Detailed site analysis is required.

1.2.3 Roll-out opportunities

- Nearshore repowering
- AWE farms in sparsely populated in North and Eastern Germany
- First single or few systems in Southern and Western Germany

1.3 Energy policies and support

1.3.1 Renewable Energy legislation

The key RE law is the EEG. As per 6/2022 AWE is not considered in the law.

- AWE is not mentioned in the EEG.
- Turbines up to 750kW and pilot wind power plants are exempt from tenders, i.e. they receive the remuneration of the last round of tenders. AWE could fall under the corresponding regulations.

- **Innovation tenders:** At the moment, AWE plants could probably only participate in innovation tenders in combination with other technologies. This makes AWE development even more difficult, as combined projects have an increased complexity. Innovation tenders could be extended for AWE plants that participate "alone". However, this would mean that in a few years AWE systems would have to find a new regulation, as they may then no longer be considered a "real innovation" and should rather fall under the regular EEG.
- **Pilot wind turbines:** Although AWE turbines could be considered pilot wind turbines, they would only be able to be considered as such for a limited period of time, as commercial wind turbines would no longer fall into this category. For a larger number of plants, it would otherwise have to be proven again and again that "essential innovations that go far beyond the state of the art are tested". In addition, the legislature obviously did not have AWE systems in mind, since e.B. terms such as "rotor diameter", "hub height" and "tower types" are used.

In June 2022 the minister, state secretaries and various public servants received a letter by AWEurope asking for personal support to include AWE in the next revision of the EEG (planned end of 2022) and the NECP. The effort to get AWE already into the latest revision ("Osterpaket") was not successful.

1.3.2 NECP

No mentioning of AWE in NECP. Letters were sent to ministry departments in charge to include AWE in next NECP.

The remuneration of the last round of tenders (Anzulegender Wert) is at 6,18 ct€/kWh (BNetzA).

1.3.3 R&D / Investment support

There is a national programs for R&D support, e.g. Energieforschungsprogramm through which also AWE projects have been financed.¹

There are also regional support programs of the *Bundesländer*.

1.3.4 Revenue support

There is no special remuneration for AWE, see also above under RE legislation.

1.4 Regulation and permitting

1.4.1 Permitting

Currently, two types of approval procedures are practiced in Germany for AWE plants:

- a) Immission law approval procedure according to BImSchG and according to 4. BImSchV for wind turbines over > 50 m. According to § 1, paragraph 6 of the 4. BImSchV, those plants require a permit insofar as they serve research, development or testing [...] on a pilot plant scale.
- b) Individual permits on the basis of a building permit or an airspace permit, whereby BauGB, LBO, BauNVo, Aviation Act (LuftVG), Aviation Ordinance (LuftVO) and the General Administrative Regulation for the Marking of Aviation Obstacles AVV) apply. For flight authorisations, see Chapter **Error! Reference source not found.**

In both process paths, AWE has not yet been considered as an independent technology. They are therefore treated partly as obstacles, partly as drones or unmanned aerial vehicles, kites or wind turbines, leading to inconsistencies and uncertainties on the part of both the licensing authorities and project developers.

¹ <https://www.foerderdatenbank.de/FDB/Content/DE/Foerderprogramm/Bund/BMWi/nichtnukleare-forschungsfoerderung-energiewende.html>

1.4.2 Airspace regulation

- *Note: information is largely based on: "220207_FGW_IG-AW-Airspace_concepts air risk mitigation_DRAFT"*
- The national regulations to be taken into account are the Aviation Act (LuftVG), the Aviation Ordinance (LuftVO) and the General Administrative Regulation on the Marking of Obstacles to Aviation (AVV).
- According to § 14 LuftVG, the construction of buildings or installations on natural or artificial elevations with a height of more than 100 m requires a permit from the competent state aviation authority. In addition, according to § 25 LuftVG, all aircraft, including unmanned aerial vehicles, require a permit from the aviation authority for take-offs and landings outside of airfields. The permit can also be linked to certain regulations (certain day and night marking, times, etc.). It is also possible to close airspace to air traffic or restrict transit.
- The BMDV considers AWES to be obstacles in a legal assessment of 2021.
- **Kites in the LuftVO:** The flying kites with a rope length of 100 m or more requires a permit from the highest aviation authority of the country (§ 19 LuftVO). In addition, the retaining rope of the kite must be marked with red and white flags every 100 m (§ 20 Abs. 1 LuftVO). At night, white and red flashing lights must be attached to the rope at equal intervals. These requirements are not possible for AWE systems to comply with, as they are not realistically feasible both technically and economically.
- **Marking of rope-shaped obstacles (AVV, in Part 2, paragraph 3):** Rope-shaped obstacles above 100m shall be identified by spherical markings with a diameter of 60 cm and a maximum distance of 30 m from each other. The lighting of rope obstacles can be prescribed by the authorities, but is not technically specified (Art. 1, Part 2, para. 3.3, AVV). This type of marking is also not feasible for AWE systems.
- By means of the **demand-oriented night marking ("BNK" system)**, wind turbines are only to be fired when an airborne object comes into the immediate vicinity, the so-called effective range of the turbines. This might also be applied to AWE systems. According to the AVV, this is the "airspace extending around each obstacle within a radius of at least 4.000 metres and extending from the ground to a height of not less than 600 metres (2.000 feet) above the obstacle" [Annex 6, para. 1, AVV].
- Luftfahrt Bundesamt - Betriebsgenehmigungen (lba.de):
https://www.lba.de/DE/Drohnen/Betriebsgenehmigungen_LUC/Betriebsgenehmigungen_LUC_node.html

1.5 Key policy stakeholders

1.5.1 Parliamentarians

The parliamentarians have to propose changes to the EEG. Parliamentarians dealing with energy issues are members of the Ausschuss für Klimaschutz und Energie².

Parliamentarians were invited to three webinars by AWEurope (one in 2021, two in 2022). Interest was shown by several parliamentarians across the parties but their activities on how to bring AWE forward are not known.

There is no parliamentarian strongly supporting AWE.

1.5.2 Ministry of Energy – BMWK

In the ministry there are departments dealing with the following:

- **EEG:** An employee referred to the parliamentarians. No comments regarding AWE in the EEG were given.

² <https://www.bundestag.de/klimaschutz#>

- **Innovation:** In general knowledgeable about AWE and in favour. Project proposals are in general welcome.

1.5.3 Other national ministries

Ministry for Research, Ministry for Environment were not contacted yet. But in the end they are not in charge.

Ministry for Mobility (Verkehrsministerium) is relevant for aviation-related issued.

1.5.4 Regional / local public administration

German AWE developers have been in contact with local or regional policy makers and public administration (Schleswig-Holstein, Brandenburg, Bavaria).

1.6 AWE stakeholders

1.6.1 OEMs

There are four AWE developers, Skysails Power being the one company that it globally furthest advanced.

- EnerKite
- kiteKRAFT GmbH
- SkySails Power
- Oceanergy

1.6.2 IEA Task 48 Participants

A number of stakeholders, especially research institutions organised already in the Task 48:

Research institutions / Universities:

- DLR e. V. Institut für Faserverbundleichtbau und Adaptronik
- LUH - Leibniz Universität Hannover, Institut für Antriebssysteme und Leistungselektronik
- MSH Medical School Hamburg GmbH
- HM - Hochschule für angewandte Wissenschaften München, Fakultät für Elektrotechnik und Informationstechnik
- IMTEK - Institut für Mikrosystemtechnik, Lehrstuhl für Systemtheorie, Regelungstechnik und Optimierung Albert-Ludwigs-Universität Freiburg
- Invent GmbH
- Technische Universität Berlin Fakultät Verkehrs- und Maschinensysteme Hermann-Föttinger Institut für Strömungsmechanik (ISTA)
- Teut Windprojekte GmbH
- Hochschule Flensburg Wind Energy Technology Institute (WETI)
- Omexom Renewable Energies Offshore GmbH
- Universität Bonn Physikalisches Institut
- Universität Stuttgart
- RWTH Aachen, Institut für Flugsystemdynamik
- RWE Renewables GmbH

1.6.3 Other (potential) stakeholders / clients

Interest in AWE shown

- EE.SH Netzwerkagentur Erneuerbare Energien
- Silence Aircraft GmbH
- FGW e.V.
- Stiftung OFFSHORE-WINDENERGIE
- CWD Center for Wind Power Drives an der RWTH Aachen

Potential clients / developers

- RWE Renewables: RWE has a team dedicated to AWE. Cooperation with selected AWE developers is on-going. RWE is actively looking for an AWE test site in Germany.
- EnBW: Is involved in a publicly funded project with Skysails³.
- UNIPER: Is following developments in the AWE sector.

1.7 Opportunities

1.7.1 Test sites

Current test sites:

- Klixbüll, Schleswig-Holstein (Skysails): Extensive testing around the clock, grid connected system exporting power
- Xxx, Brandenburg (Enerkite): Occasional testing, no grid connection
- Xxx, Bavaria (kiteKraft): Occasional testing, no grid connection

Planned sites:

- RWE is actively looking for an own AWE test site in Germany.
- RWTH Aachen is developing a drone flight center where AWE could potentially fly as well.
- A joint test site would Ideally be placed in Northern Germany with good wind potential. Logistically easy to reach for all German companies. Potentially in conjunction with DLR, energy utility or other.

1.7.2 Commercial sites

Not available yet.

1.7.3 Industry & Jobs

Highly qualified know-how in electronics, control technology, software development, mechanical engineering, material development, etc.

³ <https://www.skypower100.de/english/the-project-partners/>

2 Ireland

2.1 Summary

Ireland has an extremely high wind resource potential, the topography allows for onshore demonstration and commercial use, and there is the enormous offshore potential. Being a rather small country, it may also be easier to get political support as fewer people are involved in decision making than in other countries.

2.2 AWE potential

2.2.1 Wind resources

Ireland has excellent wind conditions both onshore and offshore. In terms of wind resources, basically any location in Ireland would be suitable for AWE.

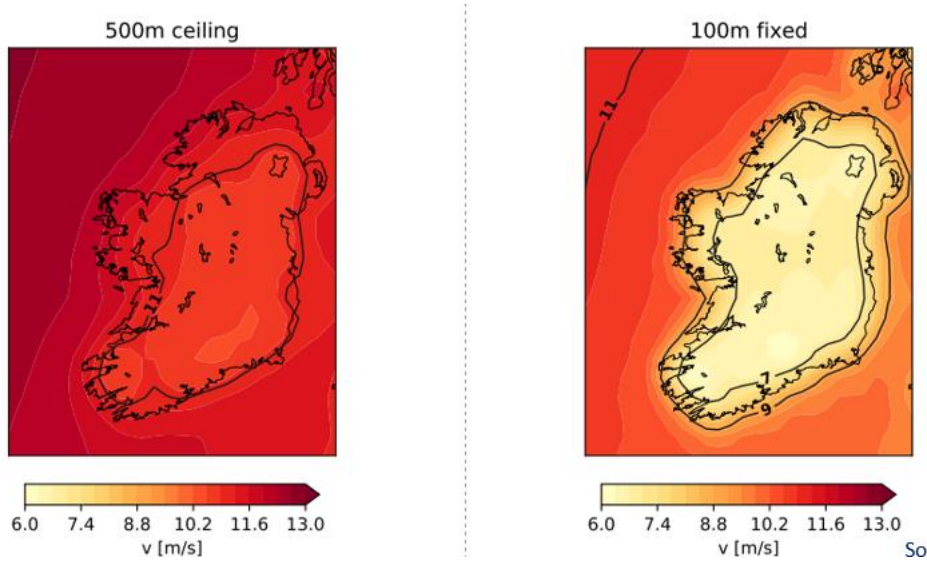


Figure 2: Wind resources in Ireland up to 500m. Source: Uni Bonn

2.2.2 Site availability

Ireland is in general sparsely populated with many rural areas with few inhabitants. However, villages and farms are quite spread out. Detailed site analysis is required.

Nearshore and offshore locations: Blue Wise Marine has identified suitable sites, see figure below.

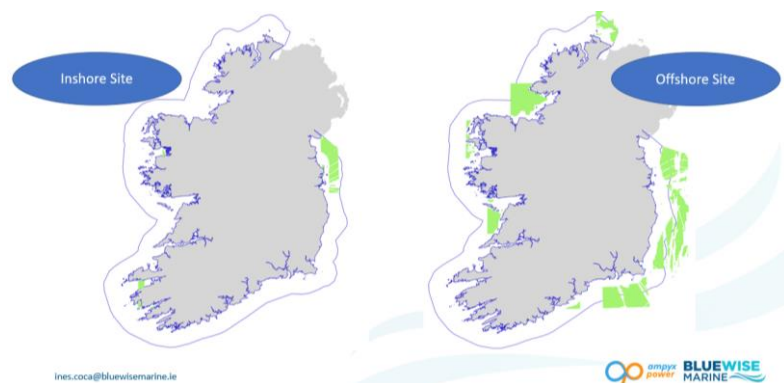


Figure 3: AWE-suitable Inshore and offshore sites (preliminary results). Source: BlueWise Marine 2022

2.2.3 Roll-out opportunities

- Remote farms
- Sparsely populated areas

2.3 Energy policies

2.3.1 Renewable Energy Legislation

AWE is not considered in the Irish RE legislation and regulation.

2.3.2 NECP

No mentioning of AWE in NECP. However, in May 2022, SEAI was in general positive to include it.

2.3.3 R&D / Investment support

Some programs exist, e.g. from SEAI.

2.3.4 Revenue support

There is no special remuneration for AWE. According to DECC, AWE systems could get the wholesale market price for electricity exported to the grid if

- the operator has a licence which can be applied for at [Commission for Regulation of Utilities Water and Energy - CRU Ireland](#); for systems in the few 100 kW range there should be a straight-forward process
- The grid connection has been granted by EirGrid.

Price levels can be found at: <https://www.semopx.com/>

As of 2022, there is no support scheme for renewable systems between 50 kW and 1 MW – DECC is looking into that but do not expect it to be available in the next 2-3 years. DECC was not sure though if the de minimis threshold of 1 MW is meant by system – so AWE farms may exceed this threshold with various systems in a wind park and then become potentially eligible for special support.

For DECC and Eirgrid, AWE was quite new.

2.4 Regulation and permitting

2.4.1 Permitting

The permitting process for a AWE test site is lengthy as it requires a large amount of documentation including:

- | | | |
|--|---|----------------------------|
| • Archaeologist Report | • Noise Monitoring | • Site Access Details |
| • Dept Culture, Heritage And Gaeltacht | • Location Map | • Site Layout, Access Plan |
| • Design Stage Report | • Ornithology Assessment | • Traffic Management Plan |
| • Discharge Documentation | • Photomontage | • Waste Management Plan |
| • Environment Section | • Planning And Environmental Report Incl. | |
| • Inland Fisheries Ireland | • Reinstatement Program | |
| • Noise Impact Assessment | • Report On Existing Culvert | |
| | • Road Design Office | |

The planning application details of the County Mayo website are publicly available.⁴

⁴ <https://www.eplanning.ie/MayoCC/AppFileRefDetails/20713/0>

2.4.2 Airspace regulation

IAA : <https://www.iaa.ie/general-aviation/drones>

Steps to take towards AWES permit to fly:

- Registration of AWES kites
- Request restricted airspace
- SORA assessment, determine SAIL category
- If SAIL III, Design Verification approval (e.g. via EASA)
- (Ireland specific) Operational documents approval via DUTO (declared UAS training organization), <https://www.iaa.ie/general-aviation/drones/rpas-training-facilities>

In March 2022, AWEurope provided input to the planned policy framework for unmanned aircraft systems (UAS) in Ireland. It was requested to consider AWE systems as future airspace users and special type of UAS – i.e. “tethered UAS” – in the Irish UAS policy framework and to involve the AWE sector in its development.

2.5 Key policy stakeholders

2.5.1 Parliamentarians

No support of parliamentarians has been sought to date.

2.5.2 Ministry / DECC

DECC has been informed about AWE but as of 2022 has not been actively supporting the sector. The Minister for Energy was foreseen to be at the ground breaking event at the test site in County Mayo early 2022 but the event was cancelled (for now) due to Covid and project delays/changes.

2.5.3 Other ministries / agencies

SEAI is supportive of AWE. The former IEA Wind Chair opened the Task 48 Kick-off meeting in October 2021. Two recent SEAI research calls specifically included the topic of AWE.

2.5.4 Regional / local public administration

n/a

2.6 AWE stakeholders

2.6.1 AWE OEMs

No Irish AWE OEMs.

2.6.2 IEA Task 48 Participants

- SEAI
- Blue Wise Marine
- MaREI Research Centre, University College Cork
- NUI Galway
- University College Galway
- University of Limerick
- RWE Ireland

2.6.3 Other potential stakeholders

The following list provides an overview of organisations that were identified and invited to a webinar in January 2022. However, many of them did not attend.

Agency

Blue Wise Marine

Association	Local stakeholder
DRAI	Bangor Erris Mayor
Irish Farmers Association	Military
Irish Wind Farmers Association	Irish Air Corps
ISEA	Ministry
Renewable Energy Ireland	DECC IE
Wind Energy Ireland	Public authorities
Charity	CRU (Commission of Regulation for Utilities)
Feasta	Environmental Protection Agency
Green foundation Ireland	Irish Aviation Authority
Consultancy	Mayo County Council
Carbon Tracking Ltd.	SEAI
Energy coops Ireland	Public funding authority
Distribution networks	Failte Ireland
ESB Networks	Irish Development Agency
Energy Community	Uni/Research
Tipperary Energy Agency	ESRI Economic & Social Research Institute
Energy supplier	GMIT
Community Power	IERC International Energy Research
Electric Ireland	Irishrail
SSE Eirtricity	MaREI Research Centre, University College Cork
Environmental NGOs	NUI Galway
Bat Conservation Ireland	Science Foundation Ireland
BirdLife	UCC
ClimateCare.ie, Faesta	UCD - ESIPP.ie
Coillte	University College Galway
Friends of the Earth	University of Limerick
Good Energies Alliance Ireland	Utilities
Greenpeace	RWE
National Parks and Wildlife	RWE Ireland
National Trust for Ireland	Supplier
Island communities	A-techSYN
CFOAT	DSO/TSO
Clean EU Islands	EirGrid
(blank)	ESB Group
Local Authority	
County Councillor	
udaras na gaeltachta	

2.7 Opportunities

2.7.1 Test sites

RWE test site in Mayo County (Bangor Erris) will be going operational in summer 2022. It will be the first test site in Europe where 24/7 AWE operation will be possible (*final permitting not yet granted as of July 2022*).



Figure 4: Area of the test site in Bangor Erris (peat field)

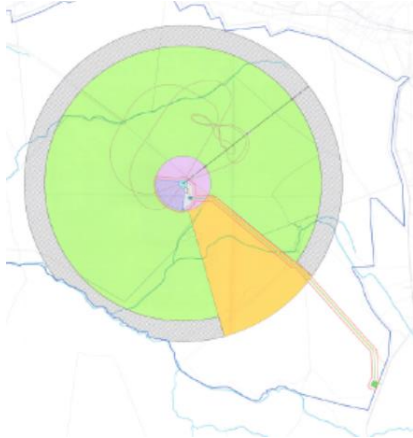


Figure 5: Map of RWE AWE test site. Source: RWE 2021

2.7.2 Commercial sites

Not available yet.

2.7.3 Industry & Jobs

- Software development
- Jobs at test and commercial sites: operations, tourism, etc.
- Later: Offshore expertise

3 Spain

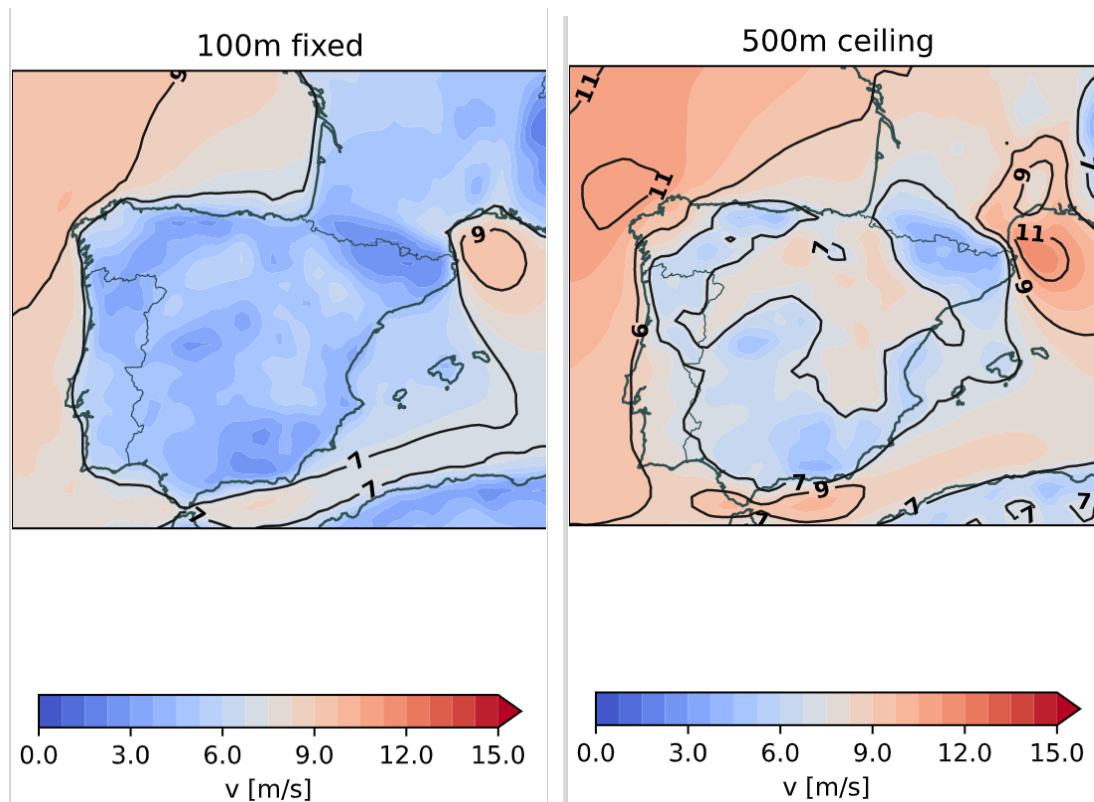
3.1 Summary

Spain has very good wind conditions in large parts of the peninsula, on the islands and offshore and it has vast areas with very low population, providing ample opportunities for AWE test and commercial operation. AWE deployment on the Canary Islands is already be competitive as it can substitute diesel use. Spain has not only a thriving wind industry with lot of expertise and experience in wind projects but also a highly competitive aviation engineering sector.

3.2 AWE potential

3.2.1 Wind resources

AWE will provide offshore conditions in central and Northern Spain.



3.2.2 Site availability

Spain has large areas of sparsely populated rural areas which to a good extent coincide with good wind resources. Detailed site analysis is required.

3.2.3 Roll-out opportunities

- Canary Islands
- Navarra
- Castilla y León
- Castilla La Mancha
- Aragón
- Galicia
- Maybe: Southern Andalucía.
- Offshore especially on Northern Coast

3.3 Energy policies

3.3.1 Renewable Energy Legislation

AWE is not considered in Spanish legislation and regulation.

There is an individual and collective self-consumption scheme in place that could be potential of interest for AWE, e.g. using an AWE system for an energy community in a rural area. As remuneration for exported electricity has gone up above 20 ct/kWh, this could potentially be an economically viable case.

3.3.2 NECP

No mentioning of AWE in NECP.

3.3.3 R&D / Investment support

Programs exist and could be potentially used for AWE, see also under “agencies”.

3.3.4 Revenue support

There is no special remuneration for AWE. Renewable capacity is in general tendered in auctions. AWE is not foreseen in those. Participation of AWE in those is questionable.

3.4 Key policy stakeholders

3.4.1 Parliamentarians

Parliamentarians have not been contacted yet.

3.4.2 Ministry of Energy

The ministry has not been contacted yet.

3.4.3 Other ministries / agencies

Other ministries (like Ministry of Science and Innovation) have not been contacted yet.

CENER: From Website⁵: *The National Renewable Energy Centre of Spain (CENER) develops applied research in renewable energies, and provides technological support to companies and energy institutions in six areas, among them wind.*

CENER runs experimental wind farms⁶, and could thus be a partner for developing AWE test sites in Spain.

CDTI: From Website⁷: *The Centre for the Development of Industrial Technology (CDTI) is a Public Business Entity, answering to the Ministry of Science and Innovation, which fosters the technological development and innovation of Spanish companies. It is the entity that channels the funding and support applications for national and international R&D&i projects of Spanish companies. The CDTI thus seeks to contribute to improving the technological level of the Spanish companies.*

CDTI is National Contact Point for Horizon Projects. There has been contact, they are aware of AWE, without giving specific support yet.

CIEMAT: From Website⁸: *The CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas) is a public research body assigned to the Ministry of Science and Innovation under the General Secretariat for Research, focusing on energy and environment and the technologies related to*

⁵ <https://www.cener.com/en/what-is-cener/>

⁶ <https://www.cener.com/areas-de-investigacion/energia-eolica/infraestructuras-y-recursos-tecnicos/parque-experimental-de-alaiz/disponibilidad-de-posiciones-en-el-parque-experimental-de-alaiz/>

⁷ <https://www.cdti.es/index.asp?MP=6&MS=797&MN=3>

⁸ <https://www.ciemat.es/portal.do?NM=2&IDM=283>

them. It has offices in several different regions of Spain, and its activity is structured around projects which form a bridge between R&D&I and social interest goals.

The Spanish IEA Wind Exco member is working at CIEMAT, however, no financial support has been given to Task 48.

IDAE: The Spanish Government's Institute for the Diversification and Saving of Energy⁹ promotes also renewables. Up to now, there is no active support for AWE but they are aware of the technology (referring to CDTI though).

3.4.4 Regional / local public administration

There has been contact with public administration on the Canary Islands as well as the Energy Agency of Navarra.

3.5 Regulation and permitting

3.5.1 Permitting

So far there is no experience with AWE permitting in Spain.

3.5.2 Airspace regulation

It is assumed that drone regulation will apply for AWE.

AESA: <https://www.seguridadaerea.gob.es/en/ambitos/drones>

3.6 AWE stakeholders

3.6.1 AWE OEMs

- someAWE Labs (development of prototype but not a real OEM)
- UC3M (development of prototype but not a real OEM)

3.6.2 IEA Task 48 Participants

- CT Ingenieros
- Siemens Gamesa
- someAWE Labs
- UC3M

3.6.3 Other (potential) stakeholders / clients

The following organisations were invited to AWE webinar(s) in Spain and the Task 48 kick-off meeting. Some of them attended.

Association

AEE
Airborne Wind Europe
APPA
Basque Energy Cluster

AWE developer

someAWE

Education Center

USURBILGO LANBIDE ESKOLA

Energy Agency

Agencia Andaluza de la Energía
Agencia insular de energía de Tenerife,
Fundación Canaria
CIEMAT
Ente Vasco de Energía
IDAE
Institut Català d'Energia
Instituto Enerxético de Galicia

⁹ www.idae.es/

Engineering Company / OEM

Ingeteam
 INTA
 Kimua Group
 Maxon
 RDT Ingenieros
 SENER Energía
 Tecnalía
 Wind Sled

Ministry

Mineco

Uni/Research

CDTI
 Parque Científico UC3M
 UC3 Madrid
 UC3M
 Universidad de Cádiz
 UPM

Univ. Zaragoza

Iniversidad de Zaragoza

Wind park operators

Siemens Gamesa
 Siemens Gamesa (SGRE ST& CA FRP RTG)

3.7 Opportunities

3.7.1 Test sites

There is no test site in Spain but activities have started to identify some. In June 2022 various AWEurope members sent Letters of Intent to the Canary Island administration (Sociedad Canaria de Fomento Económico S.A. – PROEXCA).

3.7.2 Commercial sites

No commercial sites yet

3.7.3 Industry and jobs

- Airspace industry
- Drone industry
- Developed renewable energy industry

4 France

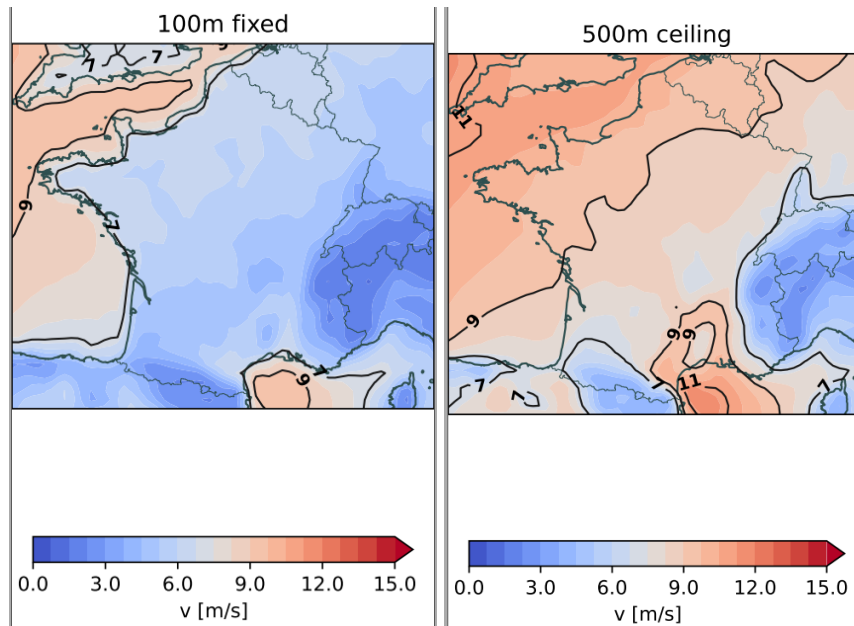
4.1 Summary

France has a large AWE potential on- and offshore and open areas for deployment. There are some AWE actors in France but there is no specific

4.2 AWE potential

4.2.1 Wind resources

AWE can provide offshore conditions across entire France except in the Pyrenees and Alpes.



4.2.2 Site availability

France has many rural areas with open space and few inhabitants.

4.2.3 Roll-out opportunities

- Oversea territories
- Islands
- Offshore/nearshore
- Rural areas

4.3 Energy policies and support

4.3.1 Renewable Energy legislation

France has different RE support schemes in place (FiT, FiP, tenders)¹⁰, it needs to be checked though which ones would apply for AWE.

4.3.2 NECP

No mentioning of AWE in NECP.

¹⁰ <https://www.res-legal.eu/search-by-country/france/tools-list/c/france/s/res-e/t/promotion/sum/132/lpid/131/>

4.3.3 R&D / Investment support

Info potentially relevant for AWE to be checked.

4.3.4 Revenue support

There is no special remuneration for AWE.

4.4 Regulation and permitting

4.4.1 Permitting

Info potentially relevant for AWE to be checked.

4.4.2 Airspace regulation

Info potentially relevant for AWE to be checked.

4.5 Key policy stakeholders

4.5.1 Parliamentarians

Not contacted yet.

4.5.2 Ministry of Energy

Not contacted yet.

4.5.3 Other national ministries / agencies

The French IEA Wind Exco member is at IFP Energies Nouvelles and aware of AWE. However, France does not support Task 48.

Ministry for Research, Ministry for Environment were not contacted yet.

4.5.4 Regional / local public administration

- Bretagne region is interested in AWE, especially offshore (through MegaAWE project partner Bretagne Développement Innovation). A study on AWE potential and possible sites has been commissioned (due by end of 2022).
- AD'OCC - Agence Régionale de Développement Economique, Région Occitanie/Pyrénées-Méditerranée (Montpellier) is MegaAWE project partner and interested to promote AWE as part of the offshore strategy

4.6 AWE stakeholders

4.6.1 OEMs

- WindFisher (Grenoble)
- A few companies focusing on kites in the shipping sector

4.6.2 IEA Task 48 Participants

- France is not supporting Task 48 at this stage.

4.6.3 Other (potential) stakeholders / clients

- Engie: Interest and support of AWE for several years. Participates in project "Aquila" under the Innovation Fund.¹¹

¹¹ <https://www.laborelec.com/aquila-project/>

- Aerospace Valley¹²: A webinar was held in June 2021 for its members.¹³

4.7 Opportunities

4.7.1 Test sites

Not available yet. The BDI study (see above) may provide ideas and options for potential sites in Brittany.

4.7.2 Commercial sites

Not available yet.

4.7.3 Industry & Jobs

- Airspace industry: New products and markets where French airspace technology, knowledge and experience are needed: Automation and Controls, Safety, Models, Systems and Components, Manufacturing, etc.
- Sailing industry
- Deployment in regions.

¹² <https://www.aerospace-valley.com/>

¹³ https://www.youtube.com/playlist?list=PLITrUuNIT-G9uB_uGr4MQ4V-IdOPVEhZI

5 UK

5.1 Summary

The UK has excellent wind conditions both on- and offshore. Space in rural areas would in general be available (subject to approval by local stakeholders, military, etc.). The support scheme (CfD) could be extended to AWE. Test sites, e.g. in Scotland or on the islands, should be investigated. There are opportunities for the wind/offshore and aviation industry.

5.2 AWE potential

5.2.1 Wind resources

AWE would provide nearshore and offshore conditions across all UK. The offshore potential increases further.

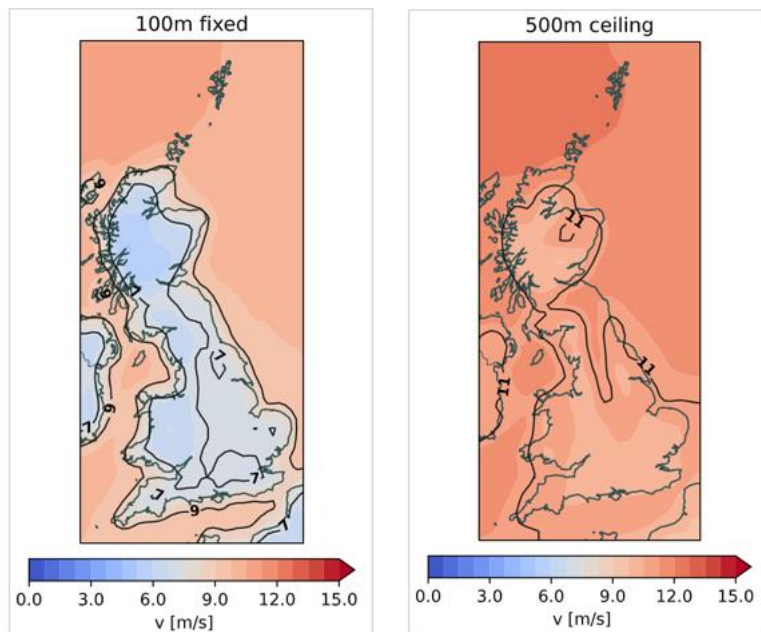


Figure 6: Wind resource potential UK

5.2.2 Site availability

UK has large areas of sparsely populated rural areas. Detailed site analysis is required.

5.2.3 Roll-out opportunities

- Rural areas
- Offshore repowering

5.3 Energy policies and support

5.3.1 Renewable Energy legislation

UK's RE support scheme is based on Contracts-for-Difference (CfD). AWE has not been considered so far.

Within the latest round, Pot 2 for „Less-established technologies“ included the £75 million total, thereof £20 million ringfenced funding for tidal stream and £24 for floating offshore wind projects

5.3.2 NECP

No mentioning of AWE in NECP.

5.3.3 R&D / Investment support

Programs exist:

- Innovate UK – has funded e.g. KPS in the past

5.3.4 Revenue support

There is no special remuneration for AWE.

5.4 Regulation and permitting

5.4.1 Permitting

KPS had some AWE testing going on, information on permitting can potentially be retrieved.

5.4.2 Airspace regulation

Info still to be gathered.

5.5 Key policy stakeholders

5.5.1 Parliamentarians

Not contacted yet.

5.5.2 Ministry of Energy

BEIS is in charge. They may know AWE.

5.5.3 Other national ministries

Ministry for Research, Ministry for Environment were not contacted yet.

5.5.4 Regional / local public administration

Windswept & Interesting has been in contact with the Shetland Island authorities.

5.6 AWE stakeholders

5.6.1 OEMs

- Windswept

5.6.2 IEA Task 48 Participants

Task 48 is supported by UK through ORE Catalpult.

- ORE Catalpult: Is also partner in MegaAWE project
- University of Strathclyde
- Windswept

5.6.3 Other (potential) stakeholders / clients

Agency	Aviation Authority
EMEC	NATS
Association	Consultancy
GWEC	BVG Associates
Renewable UK	Wood PLC
Aviation	Energy supplier
BAE Systems	SPR

SSE
Environmental NGOs
BirdLife
Friends of the Earth
Greenpeace
Investment Funds
Green Investment Bank
Local Authority
CNE Siar
Shetland Islands Council
Military
MOD
National electricity grid
National Grid
Public authorities

BEIS
Crown Estate
Public funding authority
Energy Systems Catapult UK
Highlands & Islands Enterprise
ORE Catapult
Scottish Development International
Supplier
Parkburn
Uni/Research
University of Strathclyde
Utilities
RWE
ScottishPower Renewables

5.7 Opportunities

5.7.1 Test sites

- Shetland Islands (Windswept and Interesting) – to be checked if an official site is used.
- KPS used to test prior to going out of business

5.7.2 Commercial sites

Not available yet.

5.7.3 Industry & Jobs

New products and markets where UK airspace technology, knowledge and experience are needed: Automation and Controls, Safety, Models, Systems and Components, Manufacturing, etc.

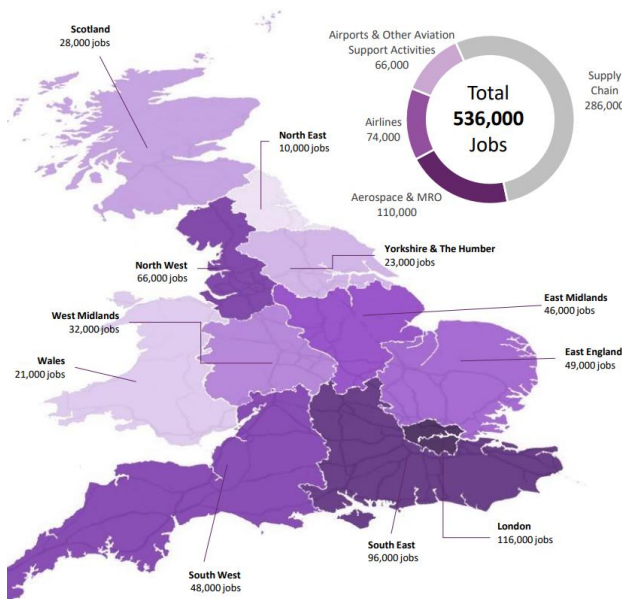


Figure 7: Current jobs in UK Aviation industry. Source: Airlines UK 2021

6 The Netherlands

6.1 Summary

The Netherlands have excellent on- and offshore conditions. However, being a densely populated country, the potential onshore sites for AWE are limited. Offshore potential as well as potential on (overseas) islands is large. There are two Dutch OEMs, and TU Delft is one of the leading AWE research institutes. Certain government entities have been supportive.

6.2 AWE potential

6.2.1 Wind resources

AWE can significantly increase the on- and offshore wind potential of The Netherlands.

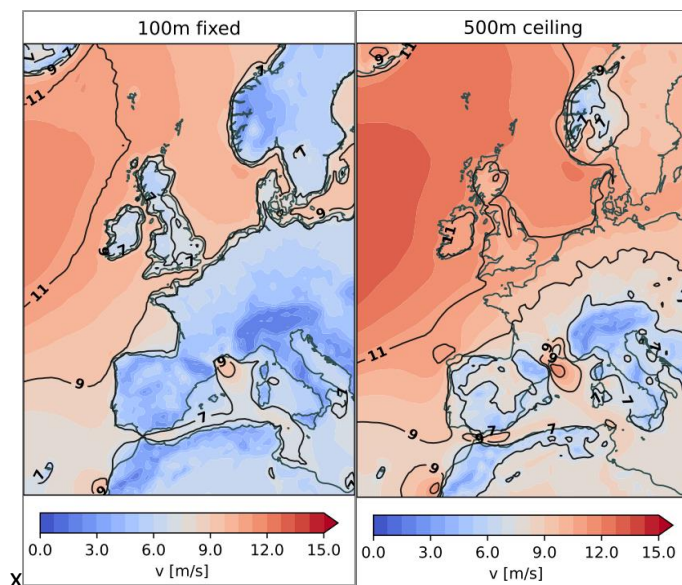


Figure 8: Wind resource potential of The Netherlands¹⁴

6.2.2 Site availability

Onshore sites are potentially limited given the high population per km². A detailed study needs to be carried out.

6.2.3 Roll-out opportunities

- Dutch North Sea Islands
- Overseas islands (Aruba, etc.)

6.3 Energy policies and support

6.3.1 Renewable Energy legislation

Legislation needs to be checked. At this stage, AWE is not considered.

6.3.2 NECP

No mentioning of AWE in NECP.

¹⁴ Specific map for NL still needs to be produced.

6.3.3 R&D / Investment support

AWE companies and research activities have been funded through various programs, e.g. through RVO.

6.3.4 Revenue support

There is no special remuneration for AWE.

6.4 Regulation and permitting

6.4.1 Permitting

Kitepower and Ampyx may have information on permitting.

6.4.2 Airspace regulation

In the past it is was possible to work with the law "kabelvliegers" (<https://wetten.overheid.nl/BWBR0007094/2014-12-12>). It is now also replaced by the EU Implementation Regulation 2019/947.

The Dutch National Authority is ILenT (inspection aviation and transport) of the Dutch Ministry of Infrastructure and water management <https://english.ilent.nl/themes/r/rpas-remotely-piloted-aircraft-systems-drones>; ILenT, <https://www.ilent.nl/onderwerpen/drones/categorie-specifiek>.

Lighting and Marking of wind turbines is described under: <https://www.nlr.org/wp-content/uploads/2018/02/Obstacle-Lighting-of-Onshore-Wind-Turbines.pdf>

6.5 Key policy stakeholders

6.5.1 Parliamentarians

Not contacted yet.

6.5.2 Ministry of Energy

To be checked.

6.5.3 Other national ministries

Ministry of Economic Affairs / RVO is supporting Task 48 and has been also very supportive in having AWE considered into the Horizon Europe program.

Ministry for Research, Ministry for Environment have not been contacted yet.

6.5.4 Regional / local public administration

The local authority of the island of Schiermonnikoog was interested in using AWE (participation in EU Island competition with Kitepower).

6.6 AWE stakeholders

6.6.1 OEMs

- NewCo – former Ampyx Power [company name tbd]
- Kitepower/ enevate

6.6.2 IEA Task 48 Participants

NL supports Task 48 through Ministry of Economic Affairs / RVO.

- aenarete
- NewCo – former Ampyx Power [company name tbd]

- Kitepower/ enevate
- TNO Wind (formerly ECN)
- TU Delft

6.6.3 Other (potential) stakeholders / clients

- tbd

6.7 Opportunities

6.7.1 Test sites

- Breda Airport (former Ampyx)
- Xxx (Kitepower)
- Aruba (Kitepower during several weeks in 2021)

6.7.2 Commercial sites

Not available yet.

6.7.3 Industry & Jobs

Research, manufacturing, software and hardware development, engineering.

7 Norway

7.1 Summary

Norway is in quite a unique position to develop onshore and offshore AWE: scarcely populated country, good wind resource in large parts of the country and a highly skilled work force. Norway hosts with Kitemill one of the leading AWE developers.

7.2 AWE potential

7.2.1 Wind resources

Norway's wind potential increases significantly with AWE.

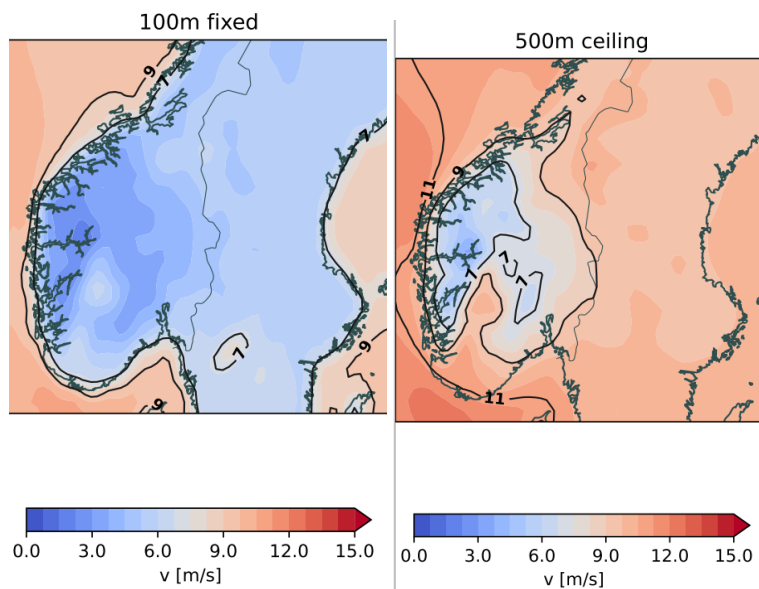


Figure 9: Wind resource potential Norway¹⁵

7.2.2 Site availability

Norway has large areas of sparsely populated rural areas. Detailed site analysis is required.

7.2.3 Roll-out opportunities

- Islands
- Backcountry

7.3 Energy policies and support

7.3.1 Renewable Energy legislation

Renewables receive revenue support through the Norwegian and Swedish Electricity Certificate System.¹⁶ The green certificates are technology-neutral: For the producer of RE, the cheapest technology is the best choice because it leads to higher margins.¹⁷ Therefore there is no incentive to go for innovative, new technologies like AWE.

¹⁵ Map needs to be extended to Northern Norway.

¹⁶ https://www.energimyndigheten.se/globalassets/fornybart/elcertifikat/sv-norsk-marknad/illustration_gemensammarknad_eng.pdf

¹⁷ <https://energimyndigheten.a-w2m.se/FolderContents.mvc/Download?ResourceId=136635>

7.3.2 NECP

No mentioning of AWE in NECP.

7.3.3 R&D / Investment support

Info from Kitemill

7.3.4 Revenue support

There is no special remuneration for AWE. In 2019, AWEurope proposed an “Innovation Bonus”: A producer would receive a certain amount per MWh produced from AWE on top of the certificate price. The certificate system as such would not be altered. Norway could issue these bonus payments independently from Sweden (but ideally Sweden would offer them, too).

NORWEA commented that the need for incentives to enable AWE should be brought forward to the Ministry of Trade, Industry and Fisheries.

7.4 Regulation and permitting

7.4.1 Permitting

Tbd – info from Kitemill

7.4.2 Airspace regulation

- **Freedom of movement:** In general aircraft, including UAVs, are free to fly in class G airspace without particular permission but must of course comply with operating rules and applicable certification regulations.
Authority policy is not to reserve airspace for particular users except in some cases for the military and the police. The approach is to see to that all potential users have access to information about air activity and that obstacles are marked and lighted so that pilots are able to avoid hazards.
- **Marking and lighting:** Regulation FOR-2014-07-15-980 on reporting, registration and marking of aviation obstacles (hereafter referred to as Marking reg). Regulation FOR-2015-11-30-1404 on UAVs (hereafter referred to as the UAV reg).
Permanent aviation obstacles higher than 60 m shall be marked. Erection shall be reported to CAA minimum 30 days in advance. Temporary obstacles higher than 15 m shall be marked (Marking reg § 4 and § 7). Kitemill has deviating approval for test flying at Lista airport in danger area D-257.
- **Kite:** (EU) 2019/947 is adopted in Norwegian regulation and a kite is considered to be a UAV. Marking and lighting will be part of a SORA for each operating scenario. According to transition regulation (UAV reg – RO3 Advanced) a typical AWE kite type aircraft would be subject to the following lighting rule when flying above 120 meters in non-controlled airspace and in any case if flying BLOS or in controlled airspace: Equipped with low intensity light, white, minimum 10 candela, flashing minimum 20/min. If flying in darkness the requirement would be the same as for manned aircraft (EU) 923/2012 SERA.3215 (UAV reg).
- **Support struts and anchoring devices:** If extending horizontally more than 90 meters from the obstacle, markers or lights (low intensity firm red) at attachment points and other points not more than 90 meters horizontally and 75 meters vertically between markers or lights (Marking reg § 12). For anchoring of balloons other rules apply.
- **Color marking:** Color marking shall in daylight be visible at a distance of minimum 1500 meters from every approaching angle. Except for wind turbines color marking shall be red or yellow, or a combination of red and white, or yellow and white. Except for wind turbines color marking shall be fluorescent. Details are given in an attachment. (Marking reg § 15 (1)).
- A wind power plant which consists of five or more wind turbines may, if approved by the appropriate authority, limit marking to the perimeter of the plant provided that the distance between the wind turbines which are marked is not greater than necessary for the sake

of aviation safety. It may be required that, additionally, the center- or the highest wind turbine shall be marked. If flashing lights are used at a wind power plant the lights shall flash simultaneously (Marking reg § 10 (2)).

- Wind turbines up to 150 meters shall be marked with medium intensity (2000 cd) obstacle lights type B (flashing red 20-60/min) or C (firm red). No requirement for lighting at intermediate levels (Marking reg § 17 (4)).
- Wind turbines which are 150 meters or higher shall be marked with high intensity (20 000 cd) obstacle lights type B (white flashing 40-60/min). No requirement for lighting at intermediate levels (Marking reg § 17 (5)). For obstacles which shall be marked with lights type B and C the intensity may be reduced in good visibility. In > 5 km to 600 cd and in > 10 km to 200 cd (Marking reg § 16 (10)).
- The regulation has opening **for automatic system activation of lighting** when aircraft are detected in the vicinity but there are no standard requirements for technology and neither any approved systems so far. Public opinion is pushing the licensing authority (NVE) about automatic systems as the wind power plant lighting is claimed to deteriorate living quality in neighbouring towns. The NVE seems in some cases to be in favour of making such systems a requirement for license to build but at the moment the civil aviation authority maintains that such a requirement can lawfully only be considered and applied when a plant is built. Thus, applications may be turned down based on consideration for the public interest and environment even if the applicant and the licensing authority agree on such a requirement. The civil aviation authority has published on their website that they are working on the matter.

7.5 Key policy stakeholders

7.5.1 Parliamentarians

tbd

7.5.2 Ministry of Energy

The Norwegian Water Resources and Energy Directorate (NVE) knows AWE but as it has not been part of the energy strategy yet, no further support is given.

7.5.3 Other national ministries / agencies

Ministry for Research, Ministry for Environment were not contacted yet.

- NORWEA: Knows AWE, has met with Kitemill. Sees opportunities in hybrid projects with conventional wind farms.

7.5.4 Regional / local public administration

tbd

7.6 AWE stakeholders

7.6.1 OEMs

- Kitemill

7.6.2 IEA Task 48 Participants

Norway is not Task 48 participant.

7.6.3 Other (potential) stakeholders / clients

- Diinef: Interested in hydraulic ground station; wanted to be involved in MegaAWE project.

7.7 Opportunities

7.7.1 Test sites

- Kitemill has its test site at Lista airport.
- A project under the European Innovation Fund foresees an AWE wind farm in Eastern Norway.¹⁸

7.7.2 Commercial sites

Not available yet.

7.7.3 Industry & Jobs

- Further development of AWE OEM.
- Deployment on- and offshore
- Supply chain

¹⁸ <https://www.kitemill.com/projects>

8 Italy

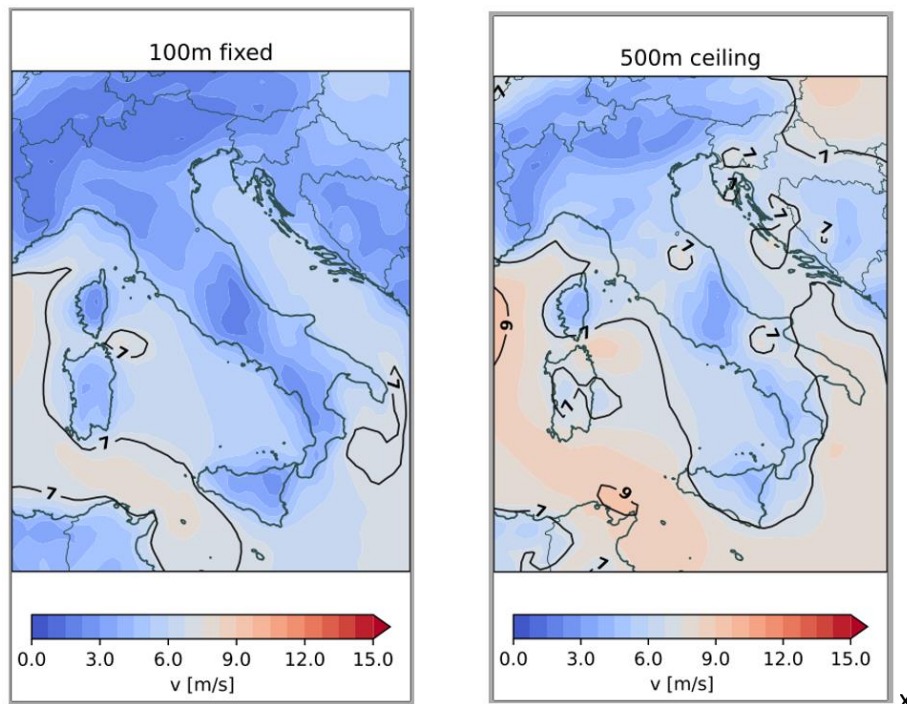
8.1 Summary

Italy has good wind conditions only in certain areas, AWE sites would need to be investigated. Italy is supportive of AWE; it has with Polimi a leading university active in the sector and with Kitenergy also an AWE developer.

8.2 AWE potential

8.2.1 Wind resources

In general, the wind resource potential in Italy is not so high, with AWE more locations show good conditions.



8.2.2 Site availability

There are sparsely populated areas in Italy. It needs to be investigated closer where they coincide with good wind conditions.

8.2.3 Roll-out opportunities

- Sardinia
- Parts of Southern Italy
- Specific locations in other parts of the country

8.3 Energy policies and support

8.3.1 Renewable Energy legislation

AWE is currently not considered in Italian legislation or regulation.

8.3.2 NECP

No mentioning of AWE in NECP.

8.3.3 R&D / Investment support

tbd

8.3.4 Revenue support

There is no special remuneration for AWE.

8.4 Regulation and permitting

8.4.1 Permitting

tbd

8.4.2 Airspace regulation

tbd

8.5 Key policy stakeholders

8.5.1 Parliamentarians

Not contacted yet.

8.5.2 Ministry of Energy

tbd

8.5.3 Other national ministries

Ministry for Research, Ministry for Environment were not contacted yet.

8.5.4 Regional / local public administration

xxx

8.6 AWE stakeholders

8.6.1 OEMs

- Kitenergy

8.6.2 IEA Task 48 Participants

Italy supports Task 48 through RSE S.p.A

- Kitenergy
- Politecnico di Milano
- Engie

8.6.3 Other (potential) stakeholders / clients

- Enel Green Power: Has been following AWE, yet without specific support yet

8.7 Opportunities

8.7.1 Test sites

- Xxx (Kitenergy)

8.7.2 Commercial sites

Not available yet.

8.7.3 Industry & Jobs

Research, hardware and software development, supply chain.

9 Switzerland

9.1 Summary

Wind resource potential is limited in Switzerland but AWE may be of interest in certain mountainous or remote areas. There are two Swiss AWE developers (TwingTec and Skypull). Switzerland is leading in U-Space activities.

9.2 AWE potential

9.2.1 Wind resources

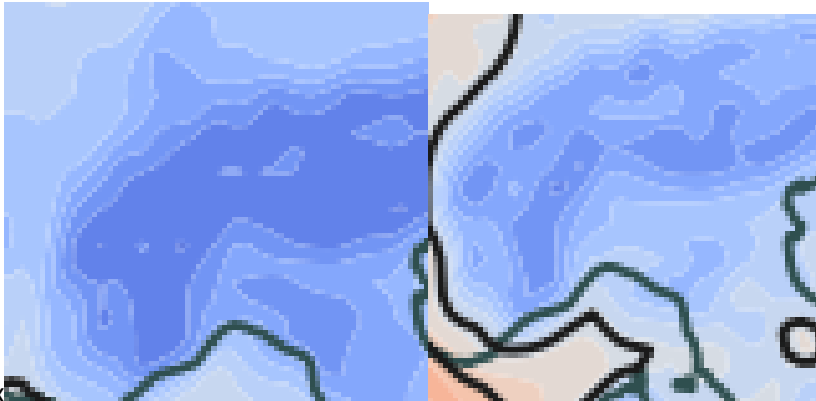


Figure 10: Wind resource potential of Switzerland¹⁹

9.2.2 Site availability

Limited sites

9.2.3 Roll-out opportunities

Tbd

9.3 Energy policies and support

9.3.1 Renewable Energy legislation

tbd

9.3.2 NECP

No mentioning of AWE in NECP.

9.3.3 R&D / Investment support

There has been grants for AWE development, e.g. xxx

9.3.4 Revenue support

There is no special remuneration for AWE.

¹⁹ Specific map for NL still needs to be produced.

9.4 Regulation and permitting

9.4.1 Permitting

Both Swiss OEMs should have information.

9.4.2 Airspace regulation

Both Swiss OEMs should have information.

Swiss FOCA and others are leading in U-Space related activities.

9.5 Key policy stakeholders

9.5.1 Parliamentarians

tbd

9.5.2 Ministry of Energy

Swiss Federal Office of Energy is aware and supportive of AWE, e.g. through Task 48.

9.5.3 Other national ministries

Ministry for Research, Ministry for Environment were not contacted yet.

9.5.4 Regional / local public administration

tbd

9.6 AWE stakeholders

9.6.1 OEMs

- TwingTec
- Skypull

9.6.2 IEA Task 48 Participants

Switzerland supports Task 48 through the Swiss Federal Office of Energy.

- EPFL
- ETH Zürich
- PSI
- Skypull SA
- Swiss Federal Office of Energy
- Swiss FOCA
- UASolutions

9.6.3 Other (potential) stakeholders / clients

- tbd

9.7 Opportunities

9.7.1 Test sites

- Xxx (TwingTec)
- Xxx (Skypull)

9.7.2 Commercial sites

Not available yet.

9.7.3 Industry & Jobs

Hard- and Software development

10 USA

10.1 Summary

The US has large wind potential on- and offshore as well as potential sites for AWE. There are research activities ongoing and there are a few AWE developers. There is few political support at this stage. NREL elaborated a detailed report on AWE in 2021.²⁰

10.2 AWE potential

10.2.1 Wind resources

The US has a large wind potential:

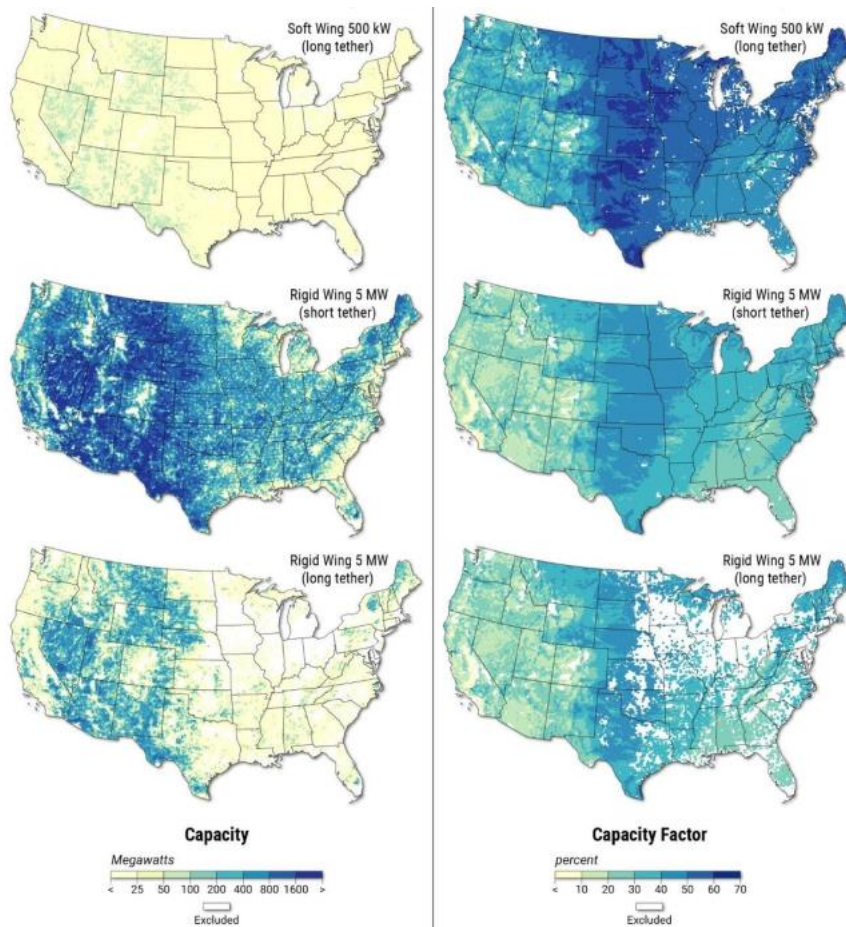


Figure 26. Capacity (left) and capacity factor (right) maps for select AWE technologies.

Image created by Billy Roberts, NREL

Figure 11: Wind resource potential for AWE in the US. Source: NREL 2021

10.2.2 Site availability

NREL studies site availability:

²⁰ <https://www.nrel.gov/docs/fy21osti/79992.pdf>

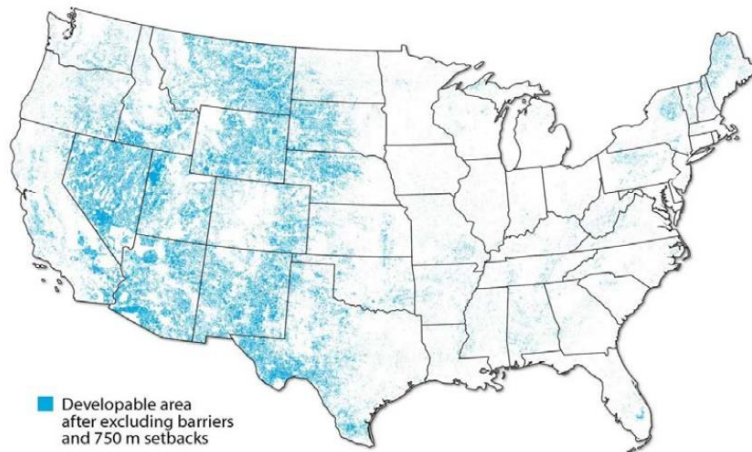


Figure 12: Developable areas for AWE considering all exclusions and a 750-m setback requirement from civil infrastructure. Source: NREL 2021

10.2.3 Roll-out opportunities

- Remote areas, farms

10.3 Energy policies and support

10.3.1 Renewable Energy legislation

To be checked

10.3.2 NECP

No mentioning of AWE in NECP.

10.3.3 R&D / Investment support

To be checked

10.3.4 Revenue support

There is no special remuneration for AWE.

10.4 Regulation and permitting

10.4.1 Permitting

Tbd – check NREL report

10.4.2 Airspace regulation

FAA considers AWE as obstacle (see also Makani reports)

Tbd – check NREL report

10.5 Key policy stakeholders

10.5.1 Parliamentarians

tbd

10.5.2 Ministry of Energy

DoE supports AWE to a certain extent but not very actively as of today, e.g. there is no specific budget for AWE activities.

10.5.3 Other national ministries

Ministry for Research, Ministry for Environment were not contacted yet.

10.5.4 Regional / local public administration

tbd

10.6 AWE stakeholders

10.6.1 OEMs

- WindLift
- ...

10.6.2 IEA Task 48 Participants

The US supports Task 48 through NREL.

- Colorado State University
- UC
- North Carolina State University
- NREL
- SNL
- UCSB
- University of Dayton
- University of Washington
- Windlift
- Worcester Polytechnic Institute

10.6.3 Other (potential) stakeholders / clients

- tbd

10.7 Opportunities

10.7.1 Test sites

- Xxx (Windlift)
- ...

10.7.2 Commercial sites

Not available yet.

10.7.3 Industry & Jobs

Aviation industry, software and hardware development, deployment.

11 Country Assessment

Country	DE		IE		ES		FR		UK	
	Score	Comment	Score	Comment	Score	Comment				
AWE potential										
Wind resource onshore	4	Good in Northern and Eastern Germany	5	High potential	3	High potential in several regions	4	High potential in several regions	4	High potential
Wind resource offshore	3	Some potential	5	Very high potential, incl. floating	4	High potential Northern Coast	4	High potential Northern Coast	5	Very high potential, incl. floating
Sparsely populated land	3	Rather high persons/km2 but rural areas exist	4	Rather low population/km2	4	Rural areas with few persons/km2	3	Rural areas with few persons/km2	3	Sparsely populated areas available
Roll-out opportunities (first sites)	3	Rural areas in Northern and Eastern Germany	4	E.g. self-consumption of farms	5	Especially on islands and rural areas	3	Especially on islands and rural areas	4	Islands, remote areas
Government policies										
General RE/wind policy	5	Current government favours RE strongly	2	No support scheme for <500 kW	5	Government favours RE	3	Government not clearly favouring RE	3	Government not clearly favouring RE
Concrete AWE policy	1	Not existent	1	Not considered	1	Not considered	1	Not considered	1	Not considered
R&D / investment support	3	Program in general available	4	SEAI is supportive	3	Programs in general available	2	Programs in general available	3	Programs in general available
Revenue support	1	Not for AWE	1	no, DECC is planning something for small scale	1	Not for AWE	1	Not for AWE	1	Not for AWE
Regulation & Permitting										
Airspace regulation	2	AWE role not clear yet, regions can have own	4	Potentially favourable because done on nation	0	Probably using drone regulation	0	Probably using drone regulation	0	Probably using drone regulation
Permitting processes	2	Not harmonised	3	lengthy	0	to be checked	0	to be checked	0	to be checked
Key policy stakeholders										
Parliamentarians	2	Partially informed, no strong supporters yet	1	Not yet involved	1	Not yet involved	1	Not yet involved	1	Not yet involved
Ministry of Energy	2	Informed, minister could be in favour	2	Minister informed	2	Minister informed	1	Not clear if AWE is known	2	AWE probably known, not much support
Other national ministries /agencies	1	Not yet involved	1	Not yet involved	1	Not yet involved	1	No support yet	3	ORE Catapult active
Regional/local administration	2	Partial support where test sites are	2	County Mayo support	2	County Mayo support	2	Britanny	2	Maybe Shetland Islands
AWE stakeholders										
AWE developers/OEMs	4	3 companies, one leading	1	no Irish developer	2	aweSOME, UC3M develop prototypes	2	WindFisher	3	Windswept
IEA Task 48 participants	4	Approx. 15 institutions with interest	3	several participants	3	several participants	1	none	3	several participants
Other stakeholders / clients	3	RWE, EnBW potential clients	3	RWE Ireland	1	none	1	none	3	Strathclyde, Parkburn, etc.
Opportunities										
Test sites	3	3 OEMs with test sites, more investigated	4	County Mayo (RWE test site)	1	not yet	1	not yet	2	Windswept (?)
Commercial sites	1	not yet	1	not yet	1	not yet	1	not yet	1	not yet
Industry & jobs	4	In wind and aviation industry	3	SW development, deployment	4	In wind and aviation industry	3	Aviation industry	3	Aviation industry, offshore, deployment
Total Score										
Average	2.7		2.7		2.4		1.9		2.6	

Country	NO		NL		IT		CH		US	
	Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
AWE potential										
Wind resource onshore	4	High potential	3	Generally good potential	3	Medium potential	2	Low wind potential	4	Large wind potential overall
Wind resource offshore	5	Very high potential, incl. floating	4	Good offshore potential	3	Only in certain areas	2	Only in certain areas	4	Large wind potential overall
Sparsely populated land	4	Rather low population/km2	2	Densely populated	3	Sparsely populated areas available	2	Few areas, also due to mountains	4	Many remote areas
Roll-out opportunities (first sites)	4	E.g. self-consumption of farms	2	On a few (overseas) islands	3	Sardinia, remote areas	2	Sardinia, remote areas	4	Remote areas
Government policies										
General RE/wind policy	3	Government not clearly favouring RE	3	Government not clearly favouring RE	3	Government not clearly favouring RE	3	Government not clearly favouring RE	3	Government not clearly favouring RE
Concrete AWE policy	1	Not considered	1	Not considered	1	Not considered	1	Not considered	1	Not considered
R&D / investment support	2	Programs in general available	3	Programs in general available	2	Programs in general available	2	Programs in general available	2	Programs in general available
Revenue support	1	Not for AWE	1	Not for AWE	1	Not for AWE	1	Not for AWE	1	Not for AWE
Regulation & Permitting										
Airspace regulation	0	Probably using drone regulation	3	Using drone regulation but not easy	0	Probably using drone regulation	0	Probably using drone regulation	2	FAA considers AWE obstacle
Permitting processes	0	to be checked	0	to be checked	0	to be checked	0	to be checked	0	to be checked
Key policy stakeholders										
Parliamentarians	1	Not yet involved	1	Not yet involved	1	Not yet involved	1	Not yet involved	1	Not yet involved
Ministry of Energy	2	AWE probably known, not much support	3	Certain support but not across all entities	2	AWE probably known, not much support	3	Some support, e.g. Task 48	2	Only support on Task 48, no AWE budget
Other national ministries /agencies	1	No support yet	2	Certain support	0	to be checked	0	to be checked	3	NREL in favour but no budget
Regional/local administration	3	Around current and future test site	2	some support	0	to be checked	0	to be checked	0	to be checked
AWE stakeholders										
AWE developers/OEMs	3	Kitemill	4	Kitepower and NewCo (former Ampyx)	3	Kitenergy	4	TwingTec, Skypull	3	WindLift
IEA Task 48 participants	1	none	4	With TU Delft and others	3	Several, incl. Polimi	3	Several, incl. Swiss FOCA, PSI	3	Several, incl. Universities
Other stakeholders / clients	1	none	3	Soome suppliers	0	to be checked	0	to be checked	0	to be checked
Opportunities										
Test sites	3	Lista, East Norway	2	Two test sites but not so good	2	Kitenergy (?)	2	TwingTec, Skypull (?)	2	WinLift site (?)
Commercial sites	1	not yet	1	not yet	1	not yet	1	not yet	1	not yet
Industry & jobs	3	Various industries	3	Various industries, research	3	Various industries, research	3	Various industries, research	3	Various industries, research
Total Score										
Average	2.4		2.5		2.3		2.1		2.5	

12 Annex – Template for Country X

12.1 Summary

XXX

12.2 AWE potential

12.2.1 Wind resources

X

12.2.2 Site availability

XXX

12.2.3 Roll-out opportunities

- XXX

12.3 Energy policies and support

12.3.1 Renewable Energy legislation

XXX

12.3.2 NECP

No mentioning of AWE in NECP.

12.3.3 R&D / Investment support

X

12.3.4 Revenue support

There is no special remuneration for AWE.

12.4 Regulation and permitting

12.4.1 Permitting

XXX

12.4.2 Airspace regulation

XXX

12.5 Key policy stakeholders

12.5.1 Parliamentarians

XXX

12.5.2 Ministry of Energy

- XXX

12.5.3 Other national ministries

Ministry for Research, Ministry for Environment were not contacted yet.

12.5.4 Regional / local public administration

xxx

12.6 AWE stakeholders

12.6.1 OEMs

- xxx

12.6.2 IEA Task 48 Participants

- x

12.6.3 Other (potential) stakeholders / clients

- xxx

12.7 Opportunities

12.7.1 Test sites

- xxx

12.7.2 Commercial sites

Not available yet.

12.7.3 Industry & Jobs

xxx