

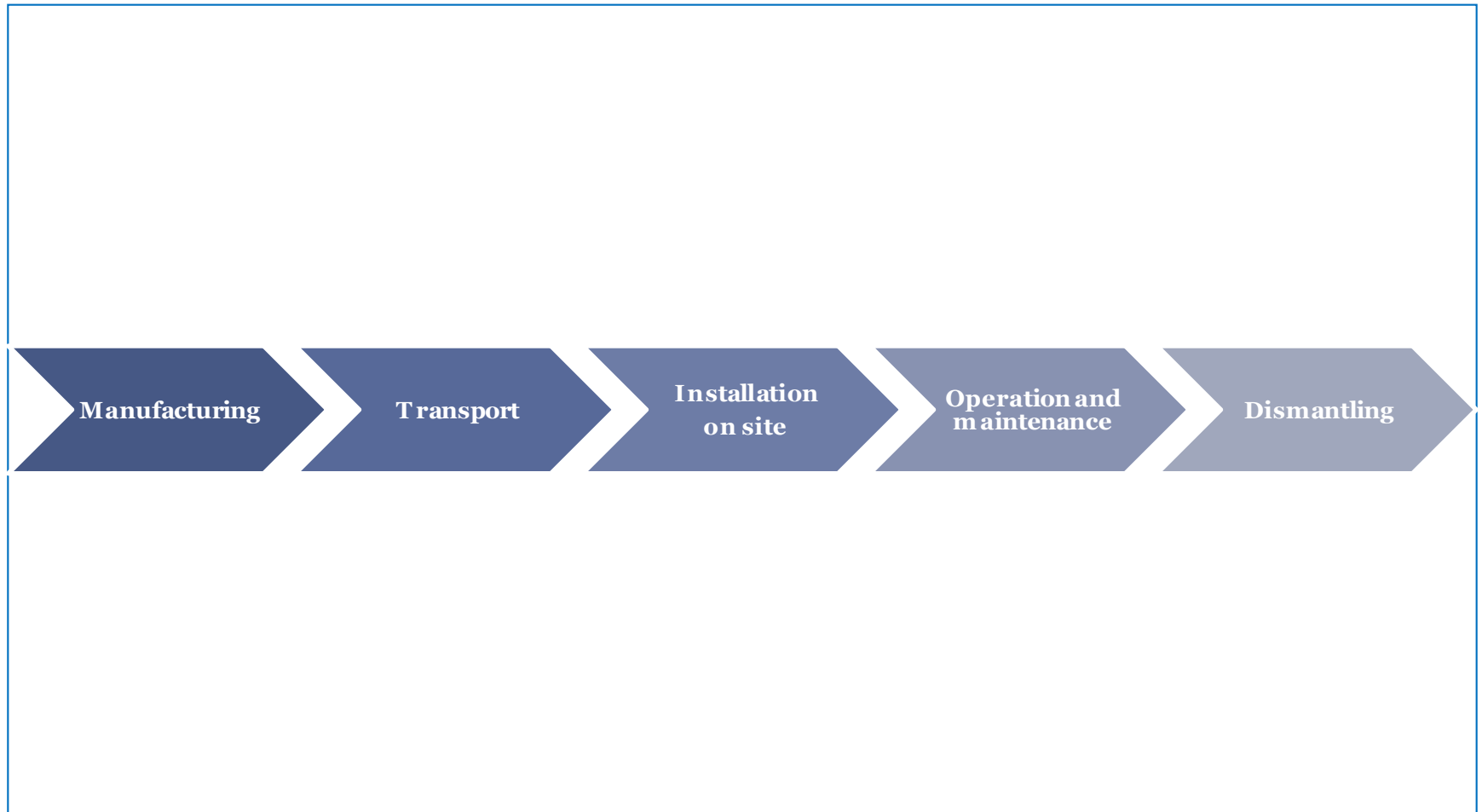
Bird & Bird

OFATE Conference: Dismantling and Recycling of Wind Turbines - From Design to End of Life

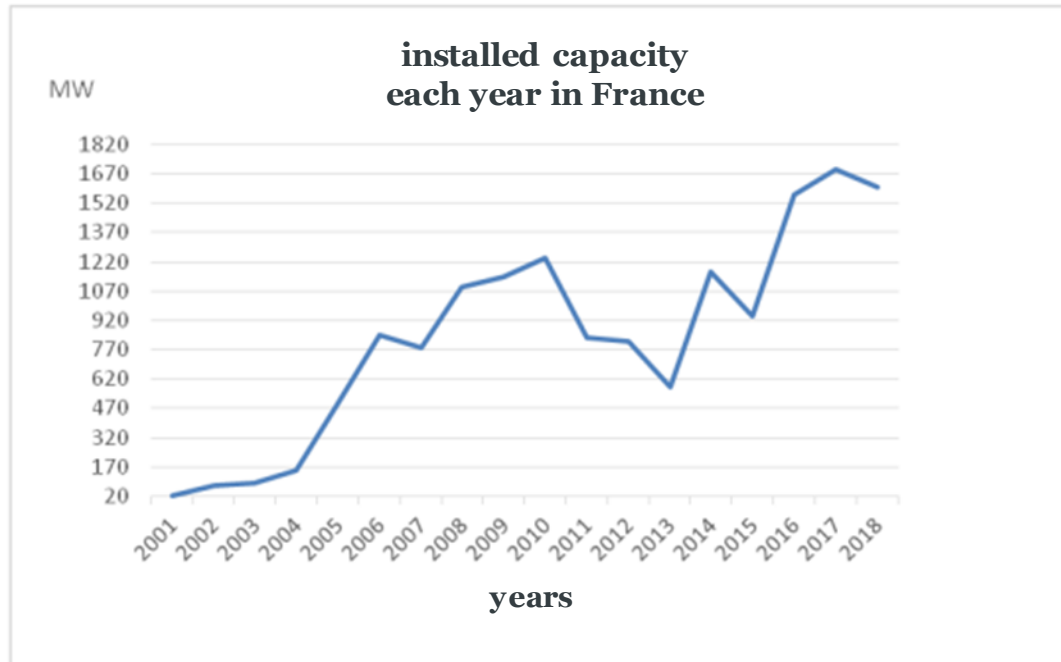
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Wind project life



Yearly installed capacity



Titre : évolution de la puissance éolienne installée chaque année (MW)

Source : Source Données et études statistiques, tableau de bord éolien, MTES de 2018, jusqu'en 2015, puis Observatoire de l'éolien 2018 de Bearingpoint pour 2016 et 2017, en enfin Le journal de l'éolien onshore et offshore pour 2018

Lifetimes of Wind Turbines and Dismantling Schedules

The timetable for the dismantling of wind turbines in the coming years will depend on the choices made by the operators at the end of the feed-in tariff validity period (15 years for wind turbines until 2016/ 20 years for 2017 CFD and tender procedure):

- Either continue operations despite the increasing maintenance costs, by selling electricity at the market rate or signing short term Corporate PPA's,
- Or, to dismantle the installation definitively and eventually to install more efficient wind turbines on the same site (repowering).

dismantling rate at year 15	dismantling rate at year 20	dismantling rate at year 25
30 %	80 %	100 %

What does dismantling involve?

- Dismantling wind turbines generators
- Remove the cables within 10 meters of the wind turbine
- Recycle or recover the different components of the wind turbine
- Remove the delivery station and any buildings assigned to the operation
- Excavate the foundation to a depth depending on the soil conditions and use of the land
- Restore soil in accordance with its original use

What does dismantling involve in terms of materials to be treated?

Flux sortants en k tonnes	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Béton	3	15	12	26	35	69	167	294	363	459	607	713	419	438	301	425	342	566	613	581
Acier	1	3	3	6	8	16	40	64	89	113	142	166	95	99	64	107	86	143	155	147
Fonte	0	1	1	1	2	3	8	13	19	24	31	36	21	22	14	20	16	27	29	27
Cuivre	0	0	0	0	0	0	1	1	2	3	3	4	3	3	1	2	2	3	3	3
Aluminium	0	0	0	0	0	0	1	2	2	2	3	3	2	2	2	2	1	2	3	2
Composite	0	0	0	1	1	2	4	7	9	12	15	17	10	10	7	10	8	13	14	14
Total	4	19	16	34	46	90	221	381	484	613	801	939	550	574	389	566	456	754	817	774

Titre : Par matière, masses annuelles issues du démantèlement des éoliennes terrestres

Source : Ademe jusqu'en 2015, et mission sur la base de données Observ'ER à partir de 2015

Evolution of the end-of-life fleet and dismantling market potential in France and Germany to 2035 (cumulative GW)



(source: ADEME)

Regulatory Framework

European regulatory framework

- Directive 2018/2001 of the Parliament and of the Council of 11 December 2018 on the promotion of energy from renewable sources (RED II) only minor references to circular economy;
- Directive 2008/98/EC of 19 November 2008 on waste – general principles: prevention/ reutilization/ recycling/other valuation/ elimination - but no specific regime for wind turbines;
- European Guidelines on State Aid, environmental protection and energy for the period 2014/2020 – no specific prescriptions with respect to dismantling/ recycling.

Regulatory Framework

National (French) regulatory framework

- Law of 12 January 2010 establishing a national commitment to the environment - Article L 553-3 of the French Environment Code
- Dismantling and site rehabilitation under operators responsibility, if operating company is in default, additional responsibility of its parent company
- Article R. 553-1 à 8 of the French Environment Code (Decree of 23 August 2011)
- Ministerial order of August 26, 2011 for wind power generation facilities within the "ICPE" regulations
- Ministerial order of August 26, 2011 for the rehabilitation and the constitution of financial guarantees for wind power installations prior to start of operation

Regulatory Framework

Order of August 26th 2011

- Dismantling of wind turbines, delivery stations, cable within a radius of 10 meters around wind turbines and delivery stations;
- Excavation of foundations and replacement with land of comparable characteristics to the land in place in the vicinity of the facility to a minimum depth of 1 metre in the case of agricultural land/ 2 meters in forests;
- Rehabilitation of crane areas and access roads unless the owner of the land on which the facility is located wishes to retain these areas and/or roads;
- The landowner statement with respect to decommissioning is one of the documents that must be submitted in the application for decommissioning authorization.

Regulatory Framework

New proposal to modify Order of August 26th 2011

- Total excavation of foundations as a principle. Exception can be applied for by addressing a specific study to the prefect demonstrating the total removal will create a negative environmental results. However a minimum depth of 2 metres (instead of currently just 1 meter in the case of agricultural land).
- Rehabilitation of crane areas and access roads unless the owner of the land on which the facility is located wishes to retain these areas and/or roads.
- New calculation formula for the financial guarantees

Security & Risks

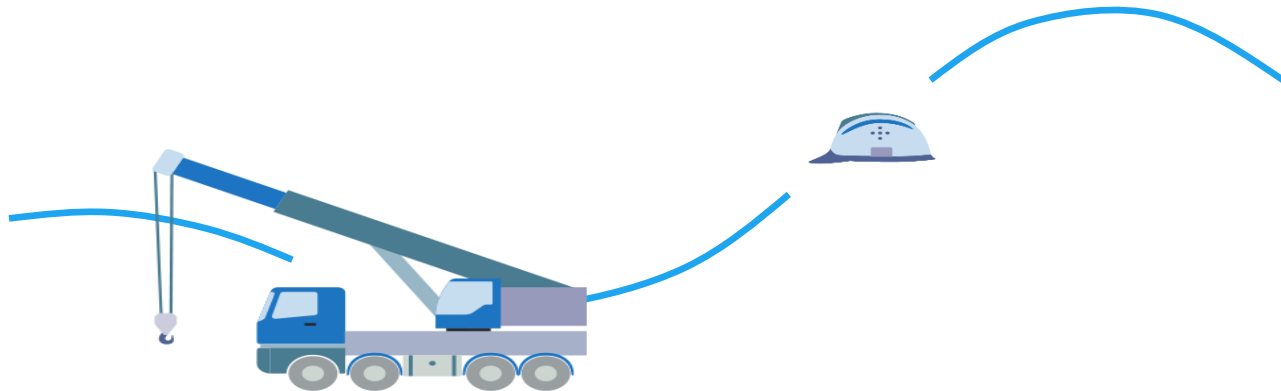
The potential risks during the construction and dismantling phases of the wind farm are more or less the same. The potential hazards during the construction phases are directly related to the handling operations with risks :

- Falling loads or tipping of handling equipment
- Crushing or impact related to the masses handled
- Security provisions for personnel
- Fire and polluting substances

Security & Risks

Safety measures

- Articles L4531-1 and seq. of the Labour Code – general safety principles to be observed
- Decree n°92-158 of 20 February 1992 (Prevention Plan)



Programmation pluriannuelle de l'énergie (PPE)

= *Multiannual Energy Programming (MEP)*

Specific measures for the promotion of onshore wind energy:

- Make it compulsory to recycle the materials used in the dismantling of wind turbines by 2023
- Promote the reuse of wind farms at the end of their life cycle in order to relocate more efficient machines

CGDD Presentation & Recommendations

- French Ministry requested in January 2019 to CGEDD (*Conseil Général de l'environnement et du développement durable and Conseil Général de l'économie*) to draft a report for the setting up of a recycling strategy for French Wind Industry.
- Report was presented in May 2019 and contained certain recommendations
- Add to the current fixed part of the financial guarantee of 50K€/wind turbine a variable part proportional in particular to the mass of the wind turbine (new and current wind turbines, fixed by decree)
- Impose two new objective circular economy criteria (mass efficiency and recyclability bonus) and an LCA (life cycle assessment) obligation in calls for tenders issued by the CRE for future facilities subject to authorisation.
- Carry out GIS (geographic information system) mapping of parks and applicable zoning that can prevent or limit repowering in these parks.
- Consult with operators to modify reclamation requirements by requiring full excavation of anchorages (new and existing wind turbines).

Conclusion

Thank you & Bird & Bird

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