Sustainability and Circular Economy
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LIGHTWEIGHT BIO-BASED AND CIRCULAR MATERIAL INNOVATIONS FOR VERTICAL AXIS WIND-TURBINES

In 2017 STANDFORD-Professor for Mechanical Engineering Mr. DABIRI showed in a study that there might be a number of benefits for Vertical Axis Wind-Turbines (1). As also new developments in sustainable battery storage materials (2,3) and construction within architecture can be found (4,5) the smaller and silent vertical axis wind-turbines might become an interesting research field in terms of bio-based materials and circular concepts for small-scale and decenteral power-production e.g. in cities.

EXISTING EU FUNDING FOR VERTICAL AXIS WIND-TURBINES

The EU is already funding enterprises like swiss AGILE WIND POWER (6) within HORIZON 2020 and polish ANEW INSTITUTE within EUROPEAN STRUCTURAL AND INVESTMENT FUND (7) that came up with new large Vertical Axis Wind-Turbines. As one can find also small Vertical Axis Wind-Turbines enterprises in Europe like WINDSIDE from Finland (8), that is already working and shaping this technology since the year 1982, KLIUX ENERGIES from Portugal (9) or LUVSIDE from Germany (10), this might give the opportunity to foster this technology with new lightweight, bio-based and circular material innovation approaches.

LIGHTWEIGHT, BIO-BASED AND CIRCULAR MATERIAL INNOVATIONS

At present within the project *«Re-Wind»* of four universities from the United States and Europe, including the UNIVERSITY COLLEGE CORK in Ireland, is looking out for ways how to deal with used windblades, as their materials cannot be used in circular ways (11). As *«Elium»*, a liquid thermoplastic resin of french enterprise ARKEMA, shows there are first working concepts available on how to re-use materials also from windblades (12). As scientists of INSTITUTE OF NATURAL MATERIALS of TU DRESDEN work on a wide range of new lightweight bio-based materials for construction, e.g. prepregs for thermoplastic processing methods (13), also within the MERGE-Platform (14), this might open up the opportunity to bring bio-based lightweight-innovations also to Vertical Axis Wind-Turbines. As the windblades for vertical rotors have a much smaller scale than conventional rotors this could be an interesting field of applied research, also for further developing the technology of Vertical Axis Wind-Turbines.

BENEFITS FROM MATERIAL INNVOATIONS OF VERTICAL AXIS WIND-TURBINES

Bringing in new technologies of lightweight construction, bio-based and circular materials, as well as 3D-printing (15) to Vertical Axis Wind-Turbines, could help to foster the strength of this technology. As vertical rotors are silent and have far less components this might be a valuable research field to this mostly untapped wind-energy technology. As mentionend before, new approaches for decentreal battery-technology and also Power-to-Heat might offer possibilties for mature and technically stable Vertical Axis Wind-Turbines, by bringing in a wide range of bio-based and circular material lightweight innovations. So enterprise WINDSIDE from Finland, whose small turbines are installed worldwide, starting at wind-speed of 2m/second, have shaped a new large rotor that is able to feed energy to the grid. New sustainable circular materials and technologies for production could be introduced to working concepts like this to enrich decentral fabrication and energy production, for example in cities.

LINK REFERENCES

1 - UNIVERSITY STANDFORD (Link: Article), 2 - CMBLUE ENERGY AG (Link: Website), 3 - CEEC, UNIVERSITY OF JENA (Link: Website), 4 - ICD, UNIVERSITY OF STUTTGART (Link: Website), 5 - ITKE, UNIVERSITY OF STUTTGART (Link: Website), 6 - AGILE WIND POWER (Link: Website), 7 - ANEW INSTITUTE (Link: Website), 8 - WINDSIDE (Link: Website), 9 - KLIUX ENERGIES (Link: Website), 10 - LUVSIDE (Link: Website), 11 - RE-WIND (Link: Website), 12 - ELIUM, ARKEMA (Link: Website), 13 - INSTITUTE OF NATURAL MATERIALS, TU DRESDEN (Link: Website), 14 - MERGE, TU CHEMNITZ (Link: Website), 15 - UNIVERSITY OF MAINE (Link: Website)