

# Article 1: Roadmap

Our distillate has eight articles, each intended to be independent of the others, so that readers with particular interests can read selectively. The first article is this brief “Roadmap.” Article 2, “Key Concepts and Vocabulary,” introduces a few of the concepts widely used to discuss electricity in general and wind energy in particular. It is followed by two articles that discuss realizable and realized wind energy. Article 3, “The Wind Resource,” presents the Earth’s near-surface winds, as yet only very partially transformed into wind-powered electricity. Then Article 4, “Current Deployment, Markets, and Incentives,” discusses actually deployed wind power.

Articles 5 and 6 are the most technical and complement each other. Article 5, “The Single Wind Turbine: From the Wind to the Blades,” takes the reader to the site of a turbine in the field to learn about the turbine’s performance and the compromises between aerodynamic and structural objectives that

have resulted in today’s slowly twisted and tapered blades. Then the reader goes inside the tower to see the generator. Article 6, “The Single Wind Turbine: From the Blades to the Grid,” completes the sequence of energy transformations that lead from wind to marketable electricity, noting the evolution of the turbine’s components over the past few decades driven by modern power electronics.

Article 7, “Wind Farms,” reports on the challenges of building and operating a cluster of wind turbines cost-effectively while satisfying the demands of grid operators and the concerns of local communities for social and environmental impacts. Article 8, “Managing a Grid when Variable Wind is Prominent,” discusses how the capabilities of wind turbines have been evolving to contribute to grid stability. Article 8 includes a generalizable analysis of wind power’s variability based on the frequency of “lulls” of various lengths.