A novel method to optimize electricity generation from wind energy

E.E. Vogel, G. Saravia, S. Kobe, R. Schumann, R. Schuster

PII: S0960-1481(18)30375-6
DOI: 10.1016/j.renene.2018.03.064
Reference: RENE 9933

To appear in: Renewable Energy

Received Date: 21 October 2016
Revised Date: 25 February 2018
Accepted Date: 24 March 2018


This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
A novel method to optimize electricity generation from wind energy

E.E. Vogel\textsuperscript{a,b,e}, G. Saravia\textsuperscript{a}, S. Kobe\textsuperscript{e}, R. Schumann\textsuperscript{e}, R. Schuster\textsuperscript{d}

\textsuperscript{a}Department of Physics, Universidad de La Frontera, Casilla 54-D, Temuco, Chile
\textsuperscript{b}Center for the Development of Nanoscience and Nanotechnology, Chile
\textsuperscript{c}Institut für Theoretische Physik, Technische Universität Dresden, D-01062 Dresden, Germany
\textsuperscript{d}D-35759 Driedorf, Germany
\textsuperscript{e}Corresponding author: eugenio.vogel@ufrontera.cl

HIGHLIGHTS
• Data recognizer w1zip is used to anticipate favorable periods of wind energy
• The method can also be used to analyze wind energy production
• Data from all German turbines during 2010-2017 is used in this study
• A protocol for mixing wind energy with conventional sources is proposed
• Protocol indicators are tested on monthly basis during the eight-year period

Abstract
We present and discuss a new technique based on information theory to detect in advance favorable periods of wind activity (positive ramps) for electricity generation. In addition, this technique could also help in the analysis of plant operation and management protocols design. Real data from wind power plants in Germany is used; this information is freely available in the internet with reliable registers every 15 minutes. A simple protocol to mix such wind energy production with electricity coming from conventional sources is proposed as a way to test the proposed algorithm. The eight-year period 2010-2017 is analyzed looking for different behaviors in wind activity. The first five years (2010-2014) are employed to calibrate the method, while the remaining three years (2015-2017) are used to test previous calibration without any further variation in the tuning possibilities described below.

Thus, the proposed protocol is tried on under different seasonal wind conditions. Both the algorithm and the general protocol could be adjusted to optimize performances according to regional conditions. In addition, this algorithm can also be used in retrospective studies to adjust productivity to operational conditions.
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ویرایششده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات