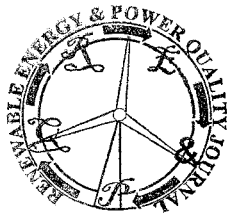


# CORNICE MODULAR WIND COLLECTOR © FOR COLLECTION AND AMPLIFICATION OF THE VERTICAL WIND COMPONENT IN BUILDINGS FOR GENERATION OF SMALL WIND ELECTRIC ENERGY

J.C. Sáenz-Díez Muro<sup>1</sup>, J.M. Blanco Barrero<sup>1</sup>, E. Jiménez Macías<sup>1</sup>, J. Blanco Fernández<sup>2</sup>, M. Pérez de la Parte<sup>2</sup>



<sup>1</sup> Department of Electrical Engineering

<sup>2</sup> Department of Mechanical Engineering

E.T.S.I.I., La Rioja University

c/Luis de Ulloa, 20. 26004. Logroño (Spain)

Phone/Fax number:+0034 941 299477, e-mail:

[juan-carlos.saenz-diez@unirioja.es](mailto:juan-carlos.saenz-diez@unirioja.es)

[juan-manuel.blanco@unirioja.es](mailto:juan-manuel.blanco@unirioja.es)

[emilio.jimenez@unirioja.es](mailto:emilio.jimenez@unirioja.es)



## Abstract

The generation of small wind electric energy in urban spaces in general and buildings in particular has an indisputable potential for practical applications. Notwithstanding, up until now, advances in this field have been less than expected.

In order to take advantage of small wind energy, research in buildings requires the construction of a scale model for wind tunnel simulation. The difficulties regarding the construction of scale models and the availability of wind tunnels have slowed down a great deal this kind of research.

New CDF (COMPUTATIONAL FLUID DYNAMICS) software techniques have made it possible to do research in buildings for small wind energy exploitation. A virtual scale model of the building under study is developed utilizing CAD. Subsequently, the model created with CAD is inserted into the CFD software and a simulation is conducted as if in a virtual wind tunnel.

Considering the results obtained from research conducted with CFD software as well as from experimental validations in a wind tunnel, the research groups in La Rioja University known as "Modeling simulation and optimization of electrical industrial and automated fabrication systems" and "Integral Design Group" have designed an optimization system for collection of small wind energy in buildings, for electric production through renewable sources.

## Keywords

Small Wind Energy, Urban Small Wind Energy, Renewable Electric Energy, Sustainable Buildings.

## Introduction

The operating principle of the optimization system for collection of small wind energy in buildings is based in the collection of ascending wind on building facades, at their upper part (cornice), in order to make use of it to generate electric energy produced by wind energy.

The wind as it hits on buildings produces a detachment of the limit layer at the cornice which, although it causes an increase in the speed above the mentioned limit layer, it also creates big turbulences underneath it, making it difficult to collect wind energy on roofs of buildings and requiring an increase of the height at which collection takes place in order to go above the limit layer, also demanding more height as the wind generator gets placed farther from the cornice on the roof. [See Fig.1 and Fig.2].

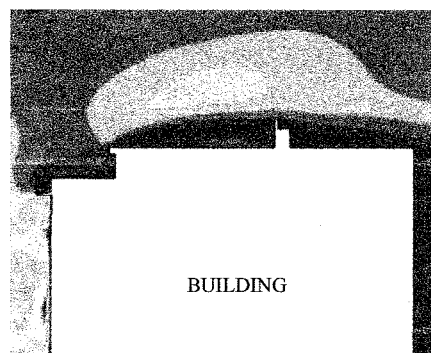


Fig.1 Contours of Velocity Magnitude (m/s)