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KiteGen Research

High Altitude Wind Generation

Dossier: HAWE IP rights ownership world overview



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-TECHNICAL-

DOCUMENT*

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History

List revisions of the document and brief description of what's new

Date	Update
2014 03 28	First issue
2014 05 02	Rev 01

Referenced documentation

List referenced documentation

Reference	Code	Title
		ANNEX 1: List of HAWE relevant patent, chronological order (filing date)

Introduction

This document may be open access.

Scope

This document is aimed to make an overview on the SOA on IP protection of HAWE related technologies on a world basis.

Glossary

List key terms and useful abbreviations and acronyms with description

Term	Description
HAWE	High Altitude Wind Energy
IP	Intellectual Property
SOA	State Of the Art

Overview

Presently there are more than a hundred seventy patents worldwide related to the HAWE concepts and technologies. Much more, if we consider the elapsed ones, the pending ones and, presumably, those that escaped from our search. Without any consideration on their intrinsic technical relevance or value, the big majority of them is owned by European and US companies. Among them, the player with the biggest number of patents is far long by the Italian Company Kite Gen Research S.r.l.

The following data are mainly based on a web search on present HAWE technologies and players and the relative patents. An effort has been made in considering only “mother” patents, with no regard to their extensions or duplication whatsoever.

There may be some missing or misrepresenting data, particularly:

- as far as recently filed patents is concerned;
- related to the availability granted by some private IP rights owners to companies active in HAWE, whereas not publicly declared or known;
- due to the fragmentation and complexity of the world’s IP rights protection system world and sometime to the difficulty to distinguish between doubled/extensions/mother patents, etc;
- in relation to some processes or controversies related to the validity of some patents, still subject to further investigations by Authorities.

Nevertheless we consider the results representative anyway, since it’s unlikely that these data may substantially change the scenario hereunder depicted.

Detailed topics**Topic 1**

The data collected are relative to the patents filed after the 1990. There are some patents filed before, but their enforceability and/or present value is lacking or questionable.

In these last 24 years after a timid growth of the studies (and a few number of following patents) on HAWE in the 90's and early 2000', a substantial increase of activities in the field has been registered from the middle of the 2000 decade ahead, leading to a more and more evident run of an everyday increasing number of players to exploit the high altitude wind energy.

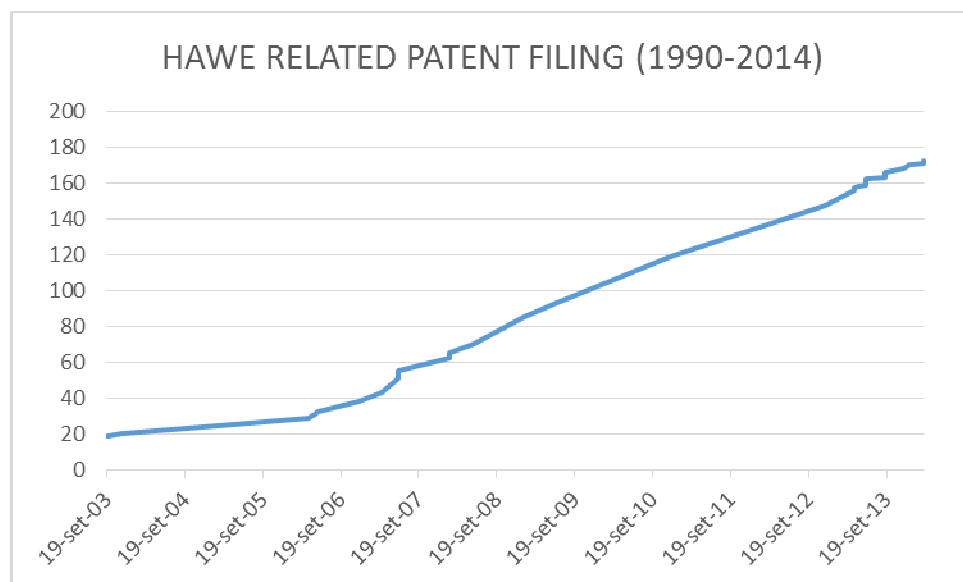


Fig. 1 HAWE Related patent filing 1990-2014

The graph describes the filed patents – related to HAWE - independently by the fact that the correspondent IP rights are owned by a company or by a private person. It expresses more or less the same slope depicted in the next image, related to the increasing number of the players (companies, R&D centers, Universities) active in the HAWE worldwide.

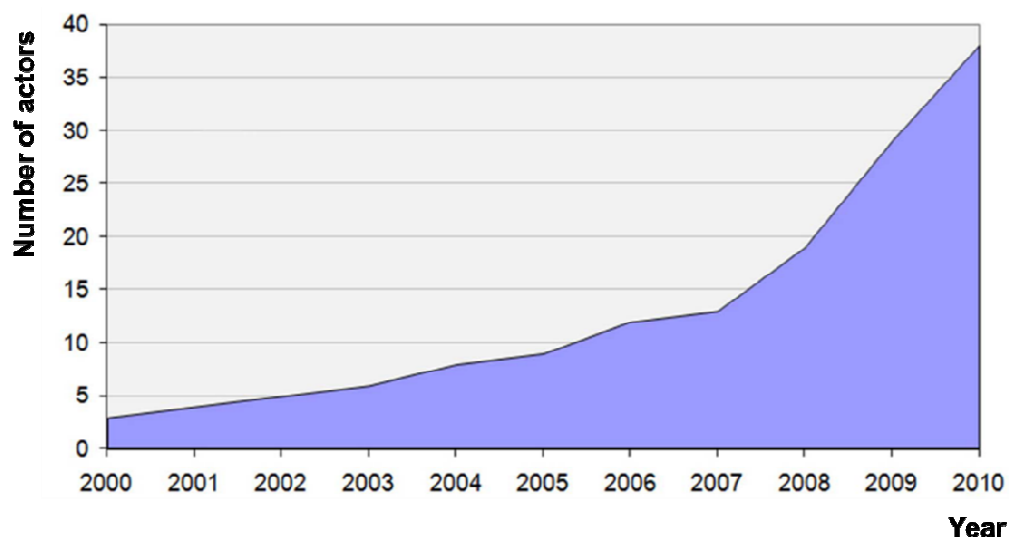


Fig. 2 HAWE Players worldwide 2000-2010

Nowadays the Country where the biggest number of valid patents is owned is USA, followed by Italy and China, then, a bit by far, Germany, United Kingdom and Netherlands.

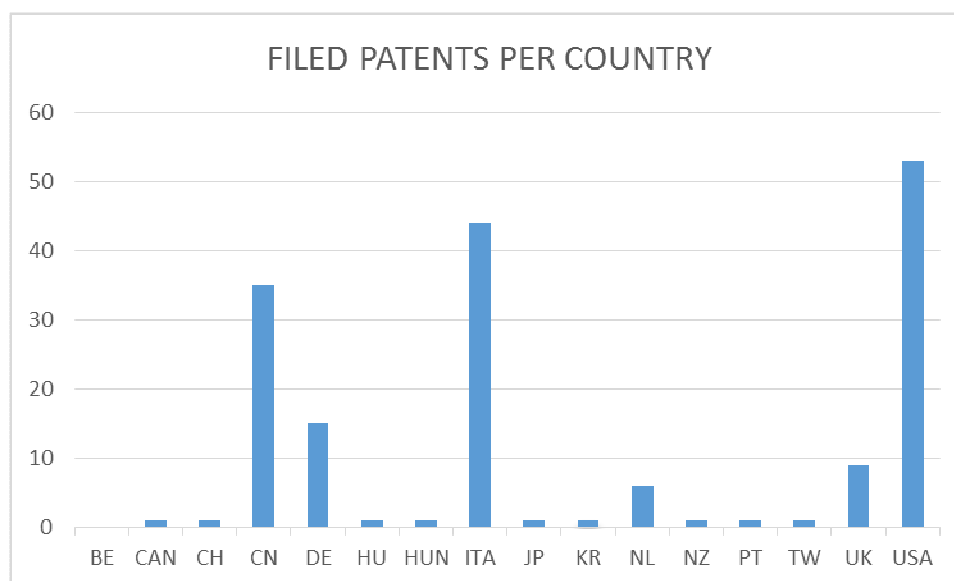


Fig. 3 Filed patents per Country 1990-2014

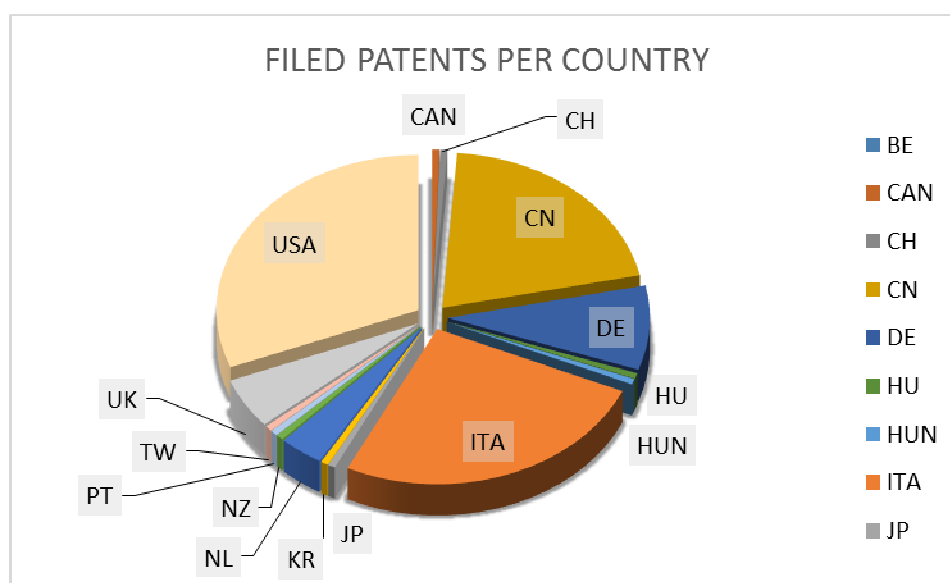


Fig. 4 Filed patents per Country 1990-2014

On a geographical perspective, the earlier patents have been filed by American and European player (especially US, Italian and Dutch). Lately, Chinese have begun to file a significant number of patents.

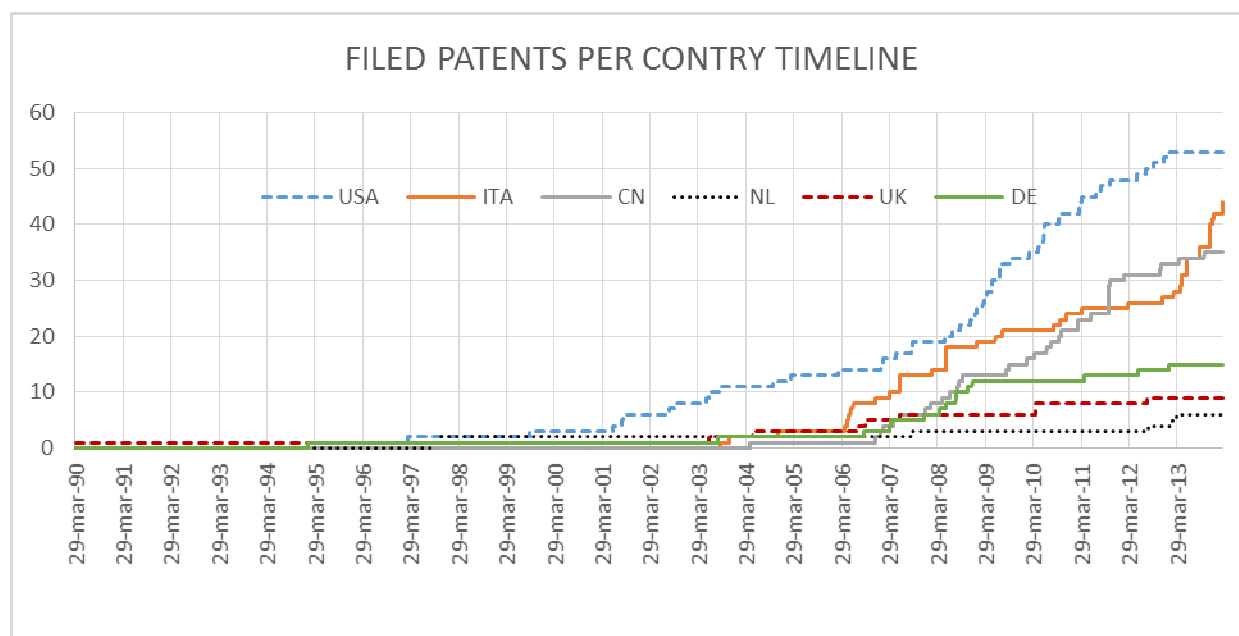
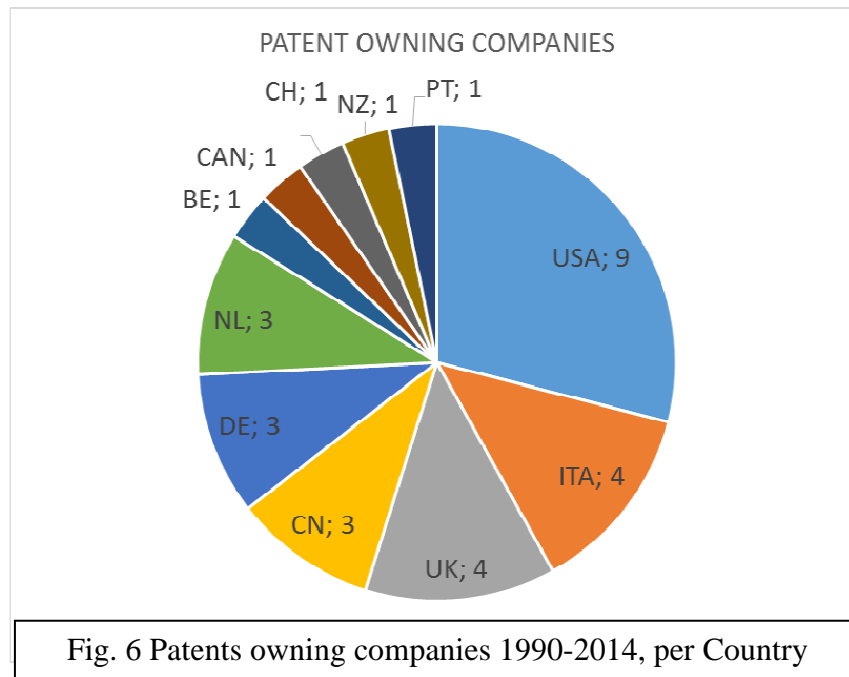


Fig. 5 USA, ITA, CN, NL, UK, DE filed patents 1990-2014 timeline

A last consideration may be done about the subjects involved in filing patents. The (provisional) total of 172 patents filed within the mentioned period can be attributed to around 90 different

subjects. Among those, 31 appear to be companies while the remaining ones appear to be private persons. Considering the mentioned distribution among Countries, companies appear to be more “active” in USA, the Country with the highest number of operating (?) companies in the field of HAWE, while in China most patents appear to be owned by private persons (most likely the inventor). Nevertheless it must be considered that these sort of assumptions may be misleading, due to the difficulty to know the real and updated ownership/usage of a patent.



The following map illustrates the present patent situation, with regard to Countries involved worldwide (only Countries that gather at least 3 patents are considered). Dimension of the green bubbles is proportional to the number of patents owned by seated companies or private persons.



Fig. 7 Patents filed per Country 1990-2014, Visual map

A bigger detail on the patent owners can be provided by leaving aside the single patents owned by private persons and considering just the ones owned by companies or R&D centers. The first map is related to American players. Location of the players is indicative. Dimension of the green bubbles is proportional to the number of patents owned by the company.



Fig. 8 Patents filed in North-America 1990-2014, Visual map

The following map is related to European players. The green bubbles have been downscaled (1/3 compared to the world/USA scale) in order to allow their deployability on the European map.

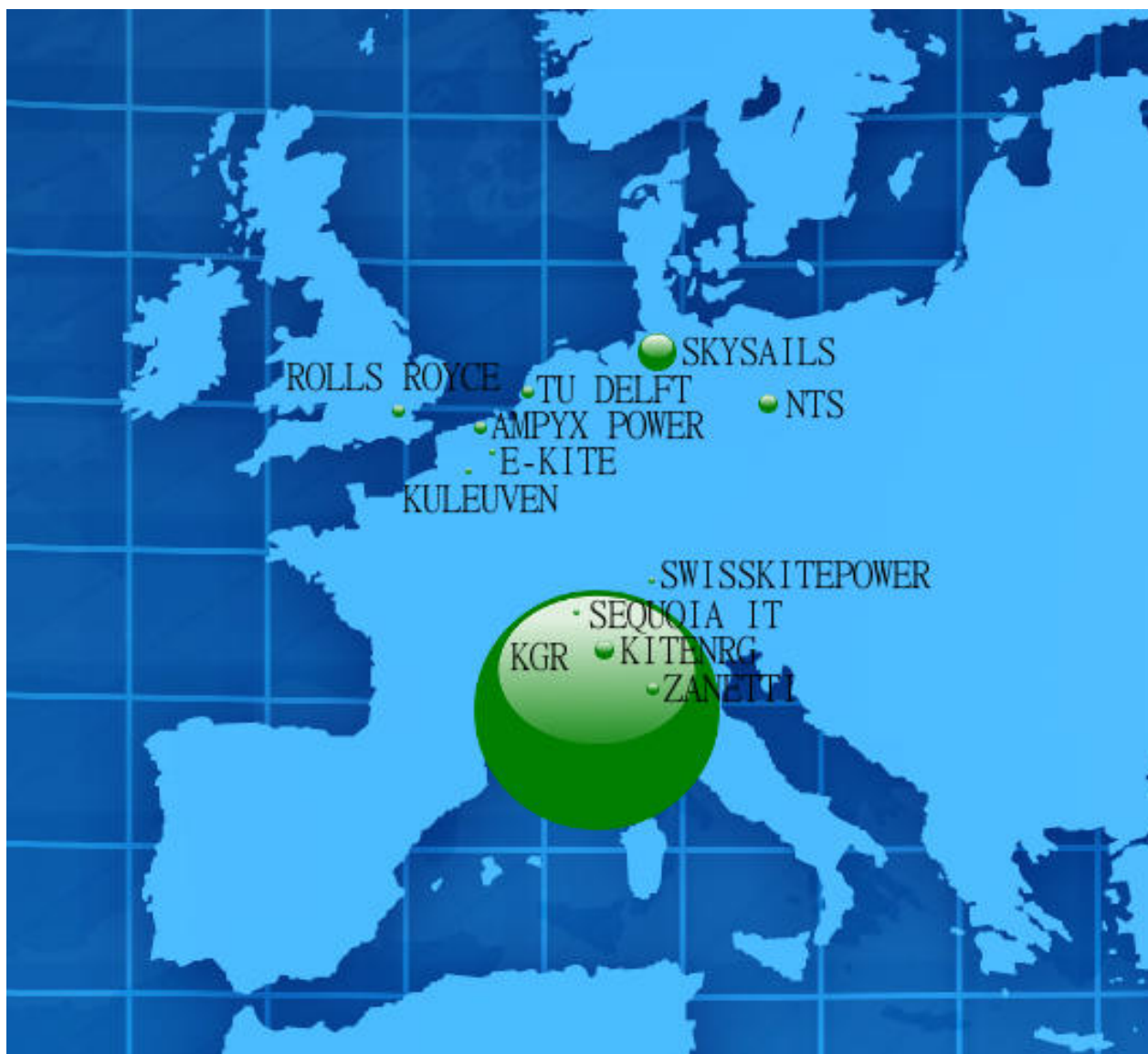


Fig. 9 Patents filed in Europe 1990-2014, Visual map

The graph in the following page illustrates the number of valid filed patents owned by each player.

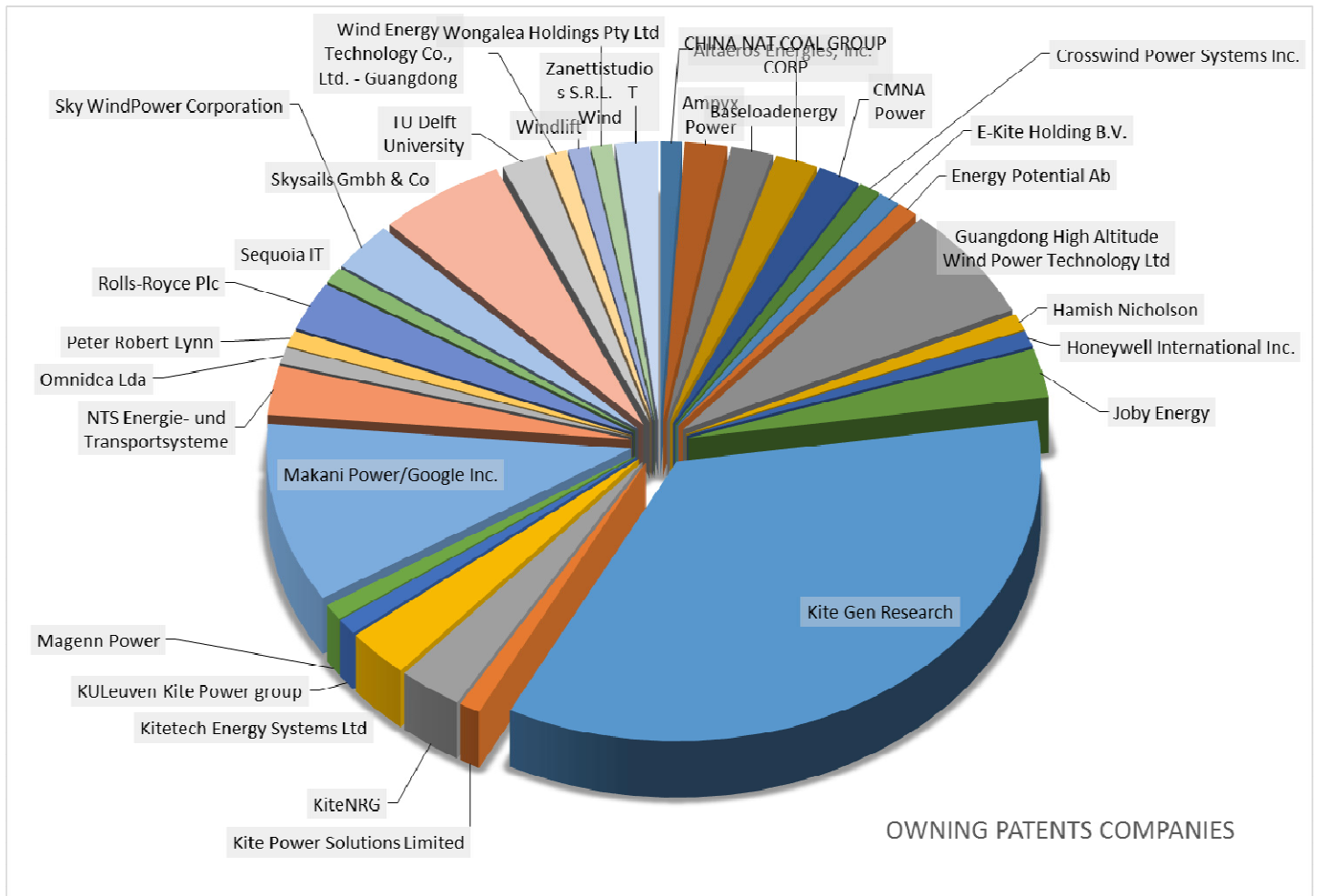


Fig. 10 Filing patents companies 1990-2014, per number of owned patents

As from the above graph, Kite Gen Research srl owns the big majority of HAWC filed patents (38), followed (by far) by US Makani Power (14).

On the next page there is the list of the patent owners/inventors on the basis of which the above considerations have been made. All patents considered are reported in Annex.

PATENT OWNER /INVENTOR	TYPE	COUNTRY	PATENTS OWNED
Alexander Bolonkin	PRIVATE	USA	1
Altaeros Energies, Inc.	COMPANY	USA	1
Ampyx Power	COMPANY	NL	2
Bakkum Theodorus Istvan Van	PRIVATE	NL	1
Baseloadenergy	COMPANY	USA	2
Bellacera; John D.	PRIVATE	USA	1
Benjamin Tigner	PRIVATE	USA	1
Bryan William Roberts	PRIVATE	USA	1
Bryan William Roberts,	PRIVATE	USA	1
CHINA NAT COAL GROUP CORP	COMPANY	CN	2
Claas GÜNTHER,	PRIVATE	DE	1
CMNA Power	COMPANY	USA	2
Crosswind Power Systems Inc.	COMPANY	CH	1
Dae-Bong Kim	PRIVATE	KR	1
Dennis John Gray	PRIVATE	USA	1
Dennis Lee Kucmerowski	PRIVATE	USA	1
Doug Selsam	PRIVATE	USA	1
E-Kite Holding B.V.	COMPANY	NL	1
Endre ÖRI	PRIVATE	HUN	1
Energy Potential Ab	COMPANY	DE	1
Fuli Li	PRIVATE	CN	1
Gabor Dobos	PRIVATE	HU	1
Gary Dean Ragner	PRIVATE	USA	1
Gaylord G. Olson	PRIVATE	USA	4
Gu Junyao	PRIVATE	CN	1
Guangdong High Altitude Wind Power	COMPANY	CN	7
GUOXING LI	PRIVATE	CN	1
Hamish Nicholson	COMPANY	UK	1
Harald Eilers	PRIVATE	DE	1
Ho Xuan	PRIVATE	CN	1
Honeywell International Inc.	COMPANY	USA	1
Howard G. Carpenter	PRIVATE	USA	1
Huang Jinlun	PRIVATE	CN	2
Jian Dai	PRIVATE	CN	1
JINLUN HUANG	PRIVATE	CN	2
Joby Energy	COMPANY	USA	3
JoeBen Bevirt	PRIVATE	USA	2
John Kirby	PRIVATE	UK	1
Joonbum Byun	PRIVATE	USA	1
Jorn Huibregt Baayen, Ulrich Notger Heinz	PRIVATE	DE	1
Kǎ luó	PRIVATE	CN	1
Kingsley Gordon Bruce	PRIVATE	USA	1
Kite Gen Research	COMPANY	ITA	37
Kite Power Solutions Limited	COMPANY	UK	1
KiteNRG	COMPANY	ITA	3
Kitetech Energy Systems Ltd	COMPANY	UK	3
KULeuven Kite Power group	COMPANY	BE	1
Lee Jun Pin	PRIVATE	CN	1
Li Fuli	PRIVATE	CN	1
Li Jianmin	PRIVATE	CN	2
Li Qingxing	PRIVATE	CN	1
LIN CHANG-KUANG	PRIVATE	TW	1
Luigi Adriano Giacalone	PRIVATE	ITA	1
Lynn Potter	PRIVATE	USA	1
Magenn Power	COMPANY	CAN	1
Makani Power/Google Inc.	COMPANY	USA	11
Manfred Dr Baumgaertner	PRIVATE	DE	1
Mario A. GARCIA-SANZ	PRIVATE	USA	1
Moshe Meller	PRIVATE	USA	2
Ning Dai	PRIVATE	CN	2
Norbert L. Osborn	PRIVATE	USA	1
NTS Energie- und Transportsysteme	COMPANY	DE	3
Nykolai Bilaniuk	PRIVATE	USA	1
Omnidea Lda	COMPANY	PT	1
Patrick D. Kelly	PRIVATE	USA	1
Peter Robert Goodall	PRIVATE	USA	1
Peter Robert Lynn	COMPANY	NZ	1
PLACHT RUDOLF	PRIVATE	DE	1
Richard J. Serrano	PRIVATE	USA	1
Rolls-Royce Plc	COMPANY	UK	3
Sequoia IT	COMPANY	ITA	1
Shi Yan Dong	PRIVATE	CN	1
Sky WindPower Corporation	COMPANY	USA	3
Skysails Gmbh & Co	COMPANY	DE	6
Stephen J. Janicki	PRIVATE	USA	1
TONEAKI YASUNOBU	PRIVATE	JP	1
TU Delft University	COMPANY	NL	2
Wáng Guànyì	PRIVATE	CN	1
Wind Energy Technology Co., Ltd. - Guangdong	COMPANY	CN	1
Windlift	COMPANY	USA	1
Wongalea Holdings Pty Ltd	COMPANY	USA	1
Yang Bing	PRIVATE	CN	1
Yuge Ping	PRIVATE	CN	1
Yunzuo Chen	PRIVATE	CN	1
Zanettistudios S.R.L. - T-Wind	COMPANY	ITA	2
Zhao Kai	PRIVATE	CN	1
Zhōu Chūnfā	PRIVATE	CN	1
Zhou Ning	PRIVATE	CN	1

Conclusions

On the total of 172 patents worldwide relevant to the HAWE worldwide, US players own the relative majority of them (about the 31%), followed by Italian players (26%) and Chinese ones (20%). On the same total of 172 patents approx. 22% are owned by Kite Gen Research, which is thus the Company with the biggest number (37) of filed “mother” patents worldwide, followed by the US company Makany Power, endowed with 11 patents and then by Skysails GmbH, with 6 patents.

Reviews

Distribution list of the document. Reviewers will read, comment and sign

Role	Name	Date	Signature
General Director			
Technical Director			
Task Manager			
Other role			

ANNEX 1: List of HAWE relevant patent, chronological order (filing date)