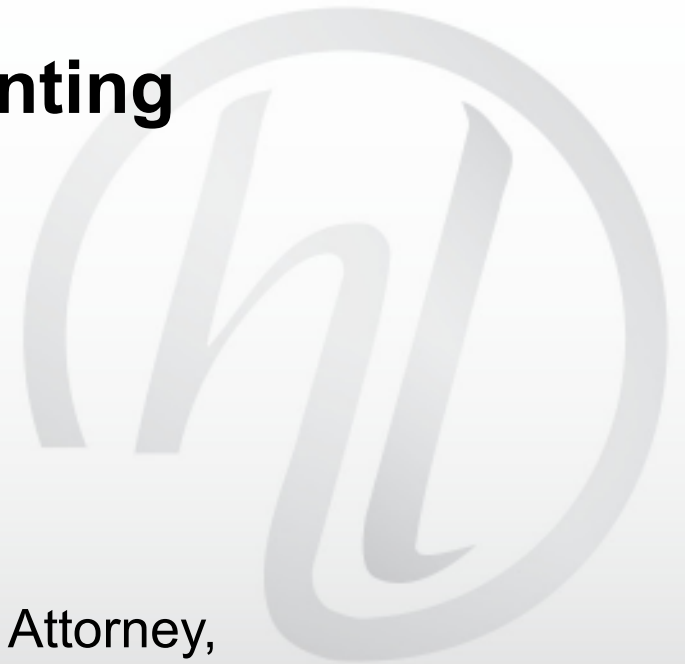



Clean/Green Technology Patenting

Dr. Achim Krebs – NL and European Patent Attorney,
European Trade Mark and Design Attorney (Partner)



A thin red line starts horizontally from the left edge of the slide and curves upwards and to the right towards the top right corner.

*“... in this world nothing can be said to be certain,
except **death and taxes.**”*

Benjamin Franklin, in a letter to Jean-Baptiste Leroy in 1789.

*Had he lived today, he probably would include **intellectual property** in his limitative listing...*

Disclaimer

- The following report and is neither inclusive nor comprehensive.
- None of the contents present a legal or otherwise explicit opinion, but are the personal observations of the presenter.
- The presented data is entirely based on published patent documents, and has not been filtered to provide any particular bias

Introduction

- Background of the Study
- Methodology
- Results
- Questions and comments

Background

Assumptions:

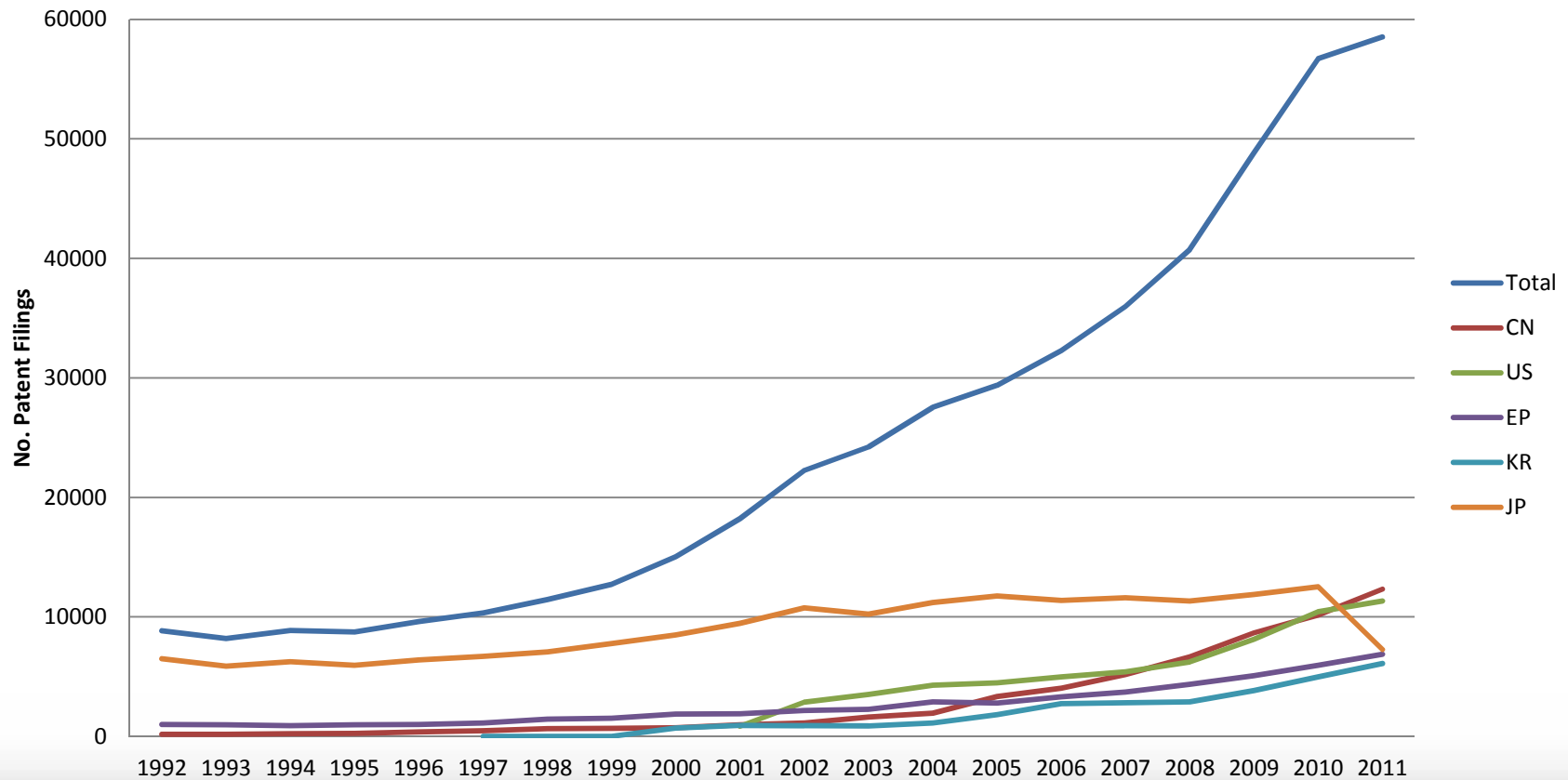
- Can we measure growth of Green/clean technology?
- Patenting is the rule, rather than the exception
- Patent laws typically require filing in the location of the inventors (e.g. US, CN, DE)
 - Published patent applications should therefore represent a useful representation of technology developments and activities in the area.
 - Clear trends on appropriation of the technologies visible?
 - Who owns our future green technology?

Methodology

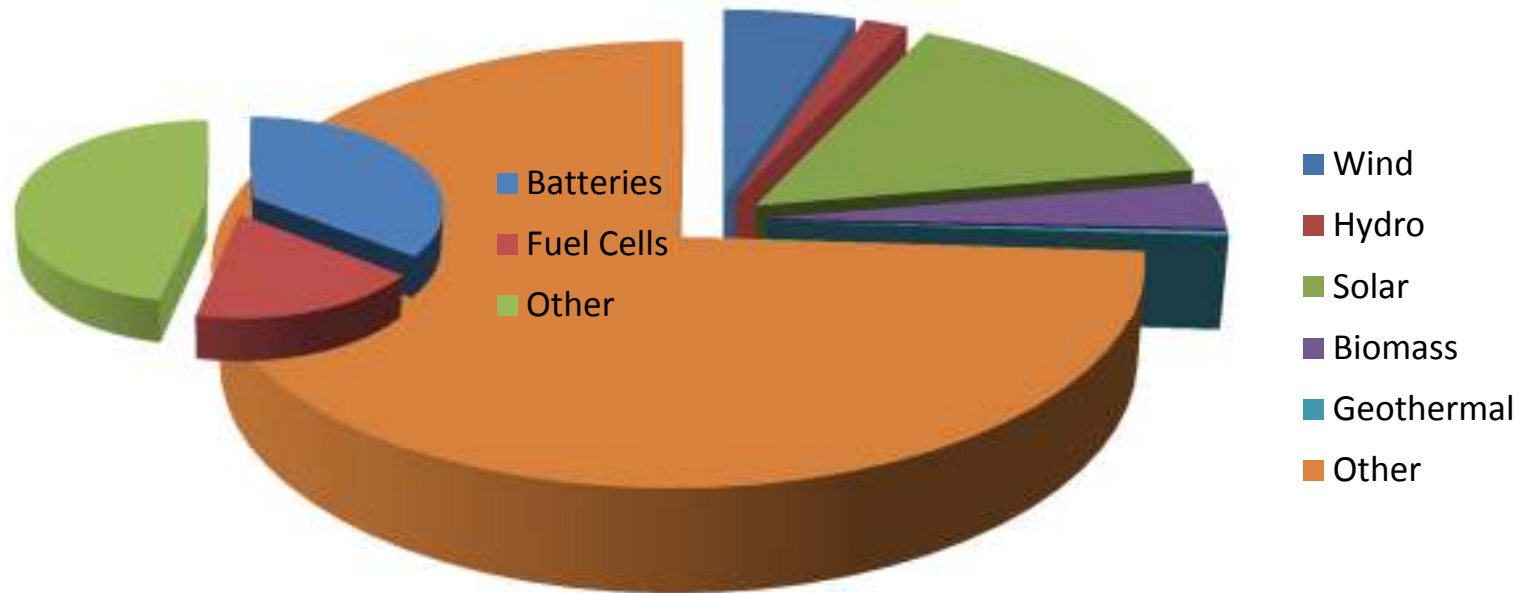
- Sectors Searched:
 - Wind: turbines
 - Hydro: marine, wave, tidal
 - Solar: thermal, PV, TPV, artificial photosynthesis
 - Biomass: Biofuels, Gasification
 - Geothermal
- The Y02E – category employed by the EPO was used (defined for “Climate change mitigation technologies relating to energy generation, transmission, and storage”).
- Keyword Search in the data set to reduce from 200.000+ to a mere and “manageable” 90.000 documents.
- We avoided bias by not manually selecting sub-categories

Development of Clean Tech patenting

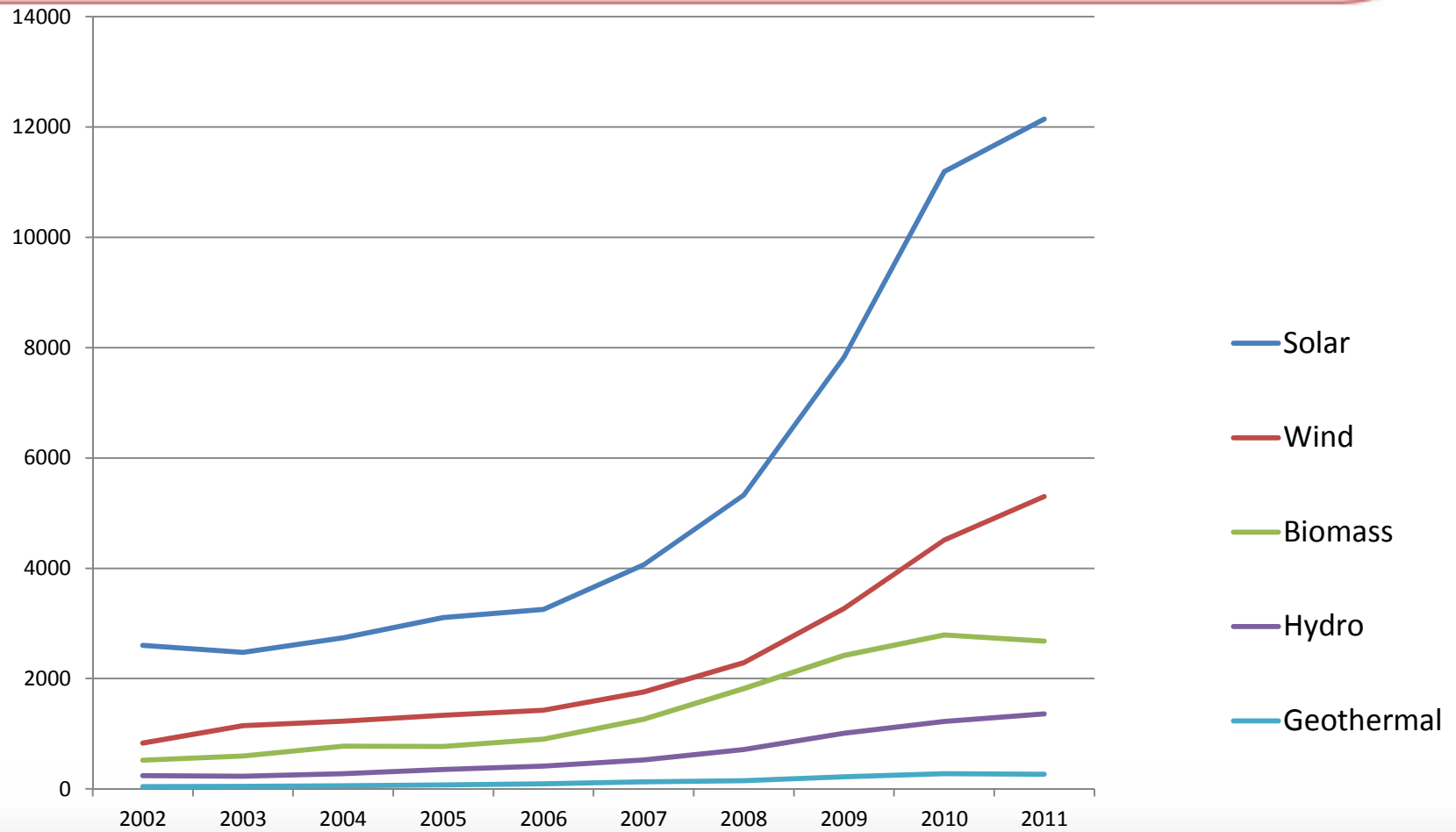
Green Tech Filing Trends



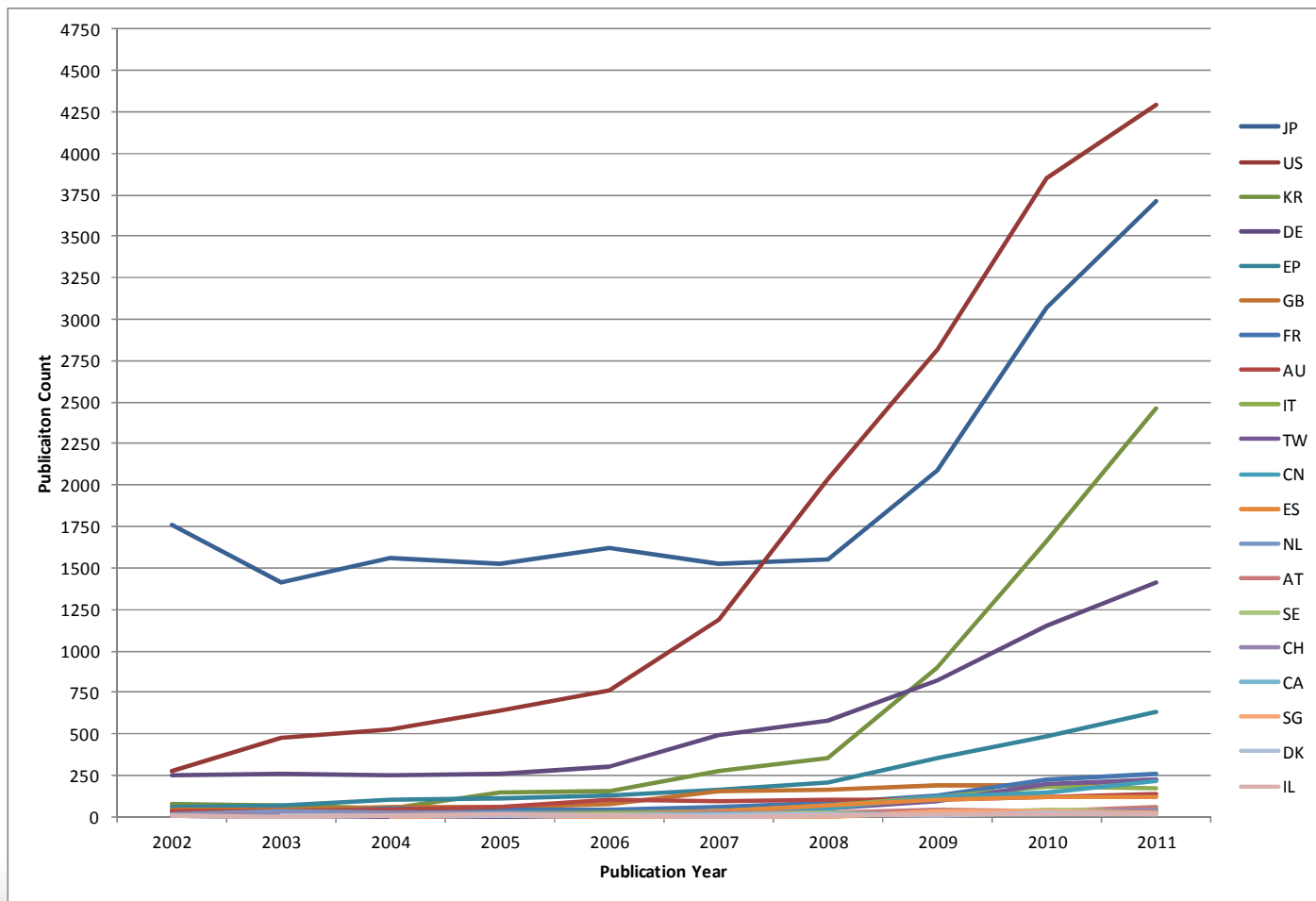
Green Tech Sector Breakdown



Per Technology Sector



Solar – Origin of Technology by Priority



Top 20 Filers – 1992-2011 Solar

Company	Publication Count
CANON KK	1984
SHARP KK	1888
SANYO ELECTRIC CO	1744
KYOCERA CORP	1218
MITSUBISHI HEAVY IND LTD	614
MITSUBISHI ELECTRIC CORP	546
MATSUSHITA ELECTRIC IND CO LTD	530
KANEGAFUCHI CHEMICAL IND	488
GEN ELECTRIC	378
SAMSUNG ELECTRONICS CO LTD	345
SONY CORP	344
DU PONT	341
FUJI ELECTRIC CO LTD	330
LG ELECTRONICS INC	321
KANEKA CORP	319
DAINIPPON PRINTING CO LTD	298
SEKISUI CHEMICAL CO LTD	289
FUJIKURA LTD	286
APPLIED MATERIALS INC	272
FUJI PHOTO FILM CO LTD	253
SAMSUNG SDI CO LTD	245

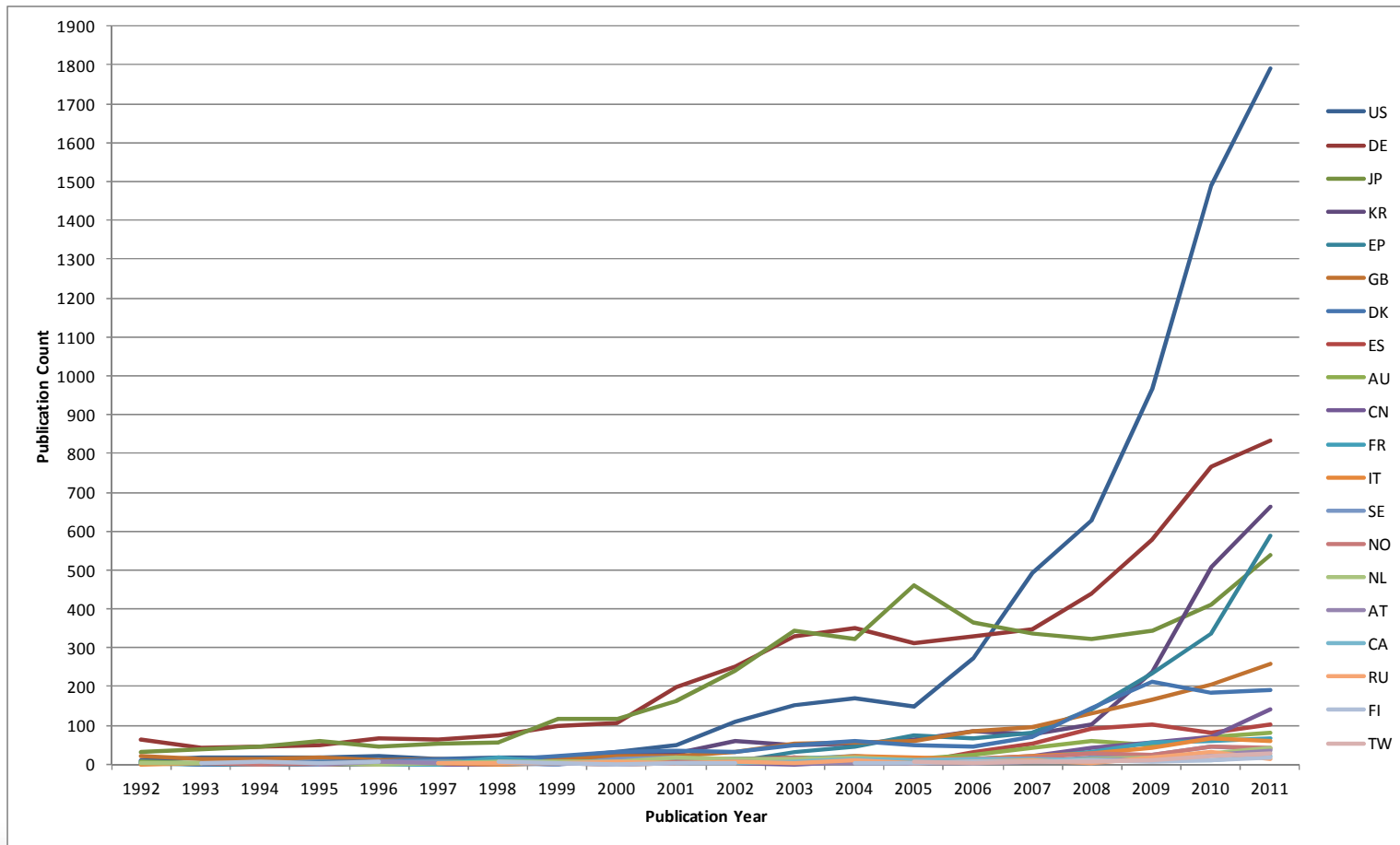
OEM – Power Supply

Traditional printing/
imaging companies

Chemicals

- Top patenting companies are not among the top PV producers
- Wide spread of technology areas

Wind- Top 20 Priority Countries

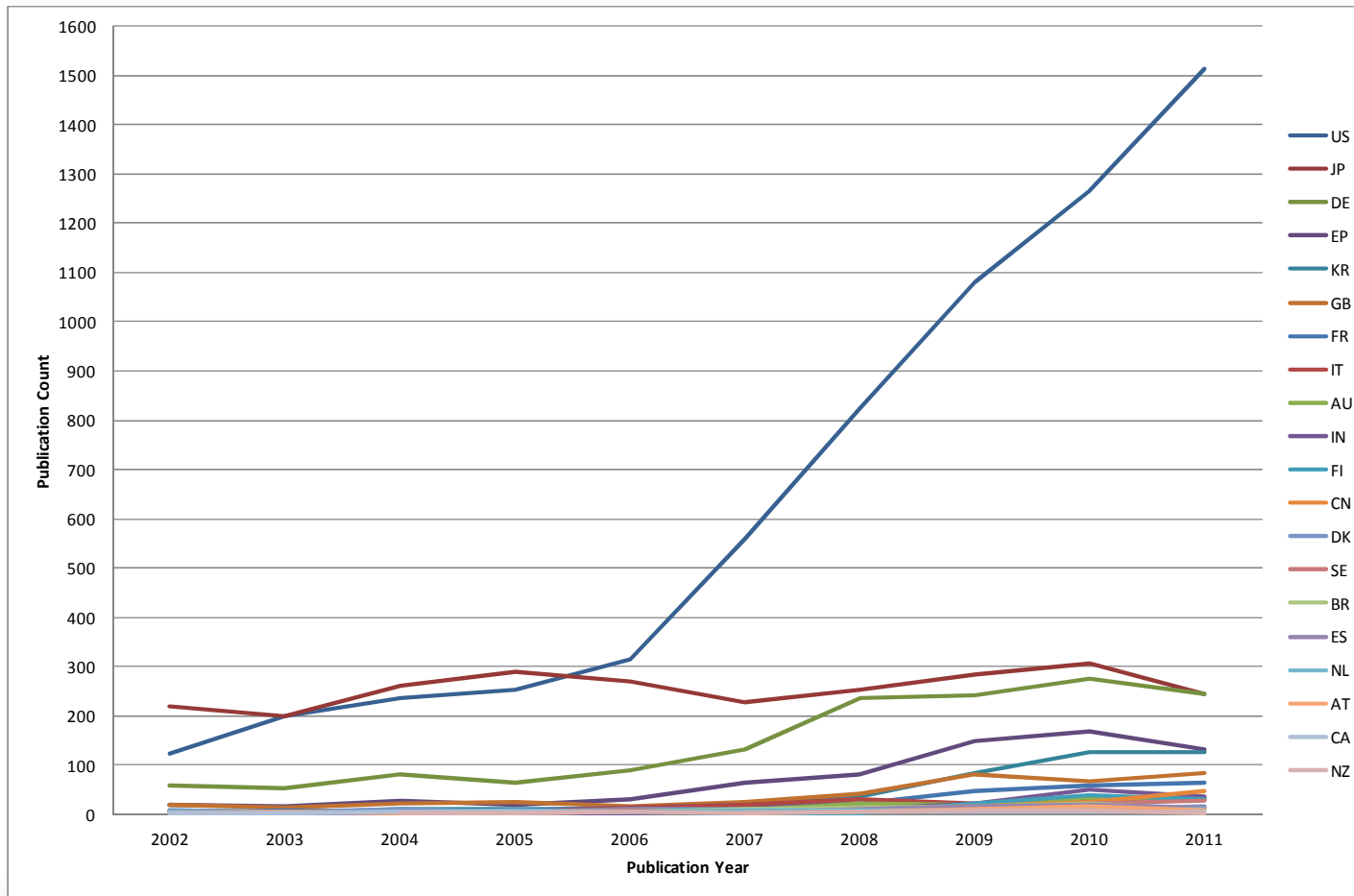


Top 20 Filers – 1992-2011 Wind

Company	Publication Count
GEN ELECTRIC	1188
MITSUBISHI HEAVY IND LTD	722
VESTAS WIND SYS AS	644
WOBLEN ALOYS	638
SIEMENS AG	412
REPOWER SYSTEMS AG	374
NORDEX ENERGY GMBH	299
LM GLASFIBER AS	144
NTN TOYO BEARING CO LTD	111
FUJI HEAVY IND LTD	105
WON IN HO	86
GAMESA INNOVATION & TECH SL	86
HITACHI LTD	79
AERODYN ENG GMBH	66
HANSEN TRANSMISSIONS INT	66
SHINKO ELECTRIC CO LTD	59
BOSCH GMBH ROBERT	57
EBARA CORP	56
MATSUSHITA ELECTRIC IND CO LTD	52
SKF AB	52

- Top 8 wind-energy patent owners collectively have filed about 16 per cent of all wind technology patents
- Representing about 70 per cent global market share in wind turbines
- Prolific IP battle ground, involving the “usual suspects”
- New entrants from China

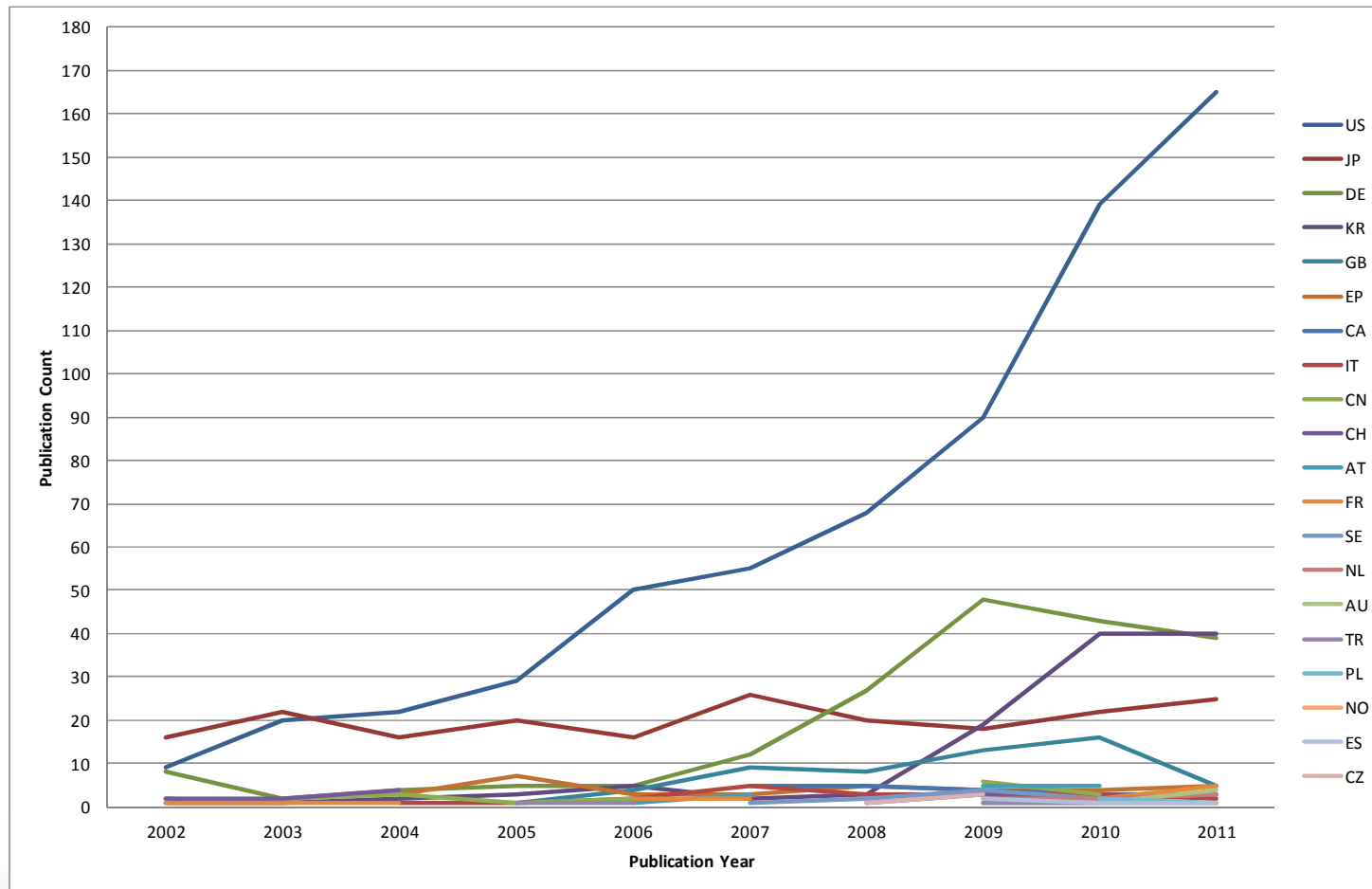
Biomass – Top 20 Priority Countries



Top 20 Filers – 1992-2011 Biomass

Company	Publication Count
MITSUBISHI HEAVY IND LTD	287
GEN ELECTRIC	208
EBARA CORP	189
TOSHIBA CORP	96
ISHIKAWAJIMA HARIMA HEAVY IND	94
XYLECO INC	62
UNIV CALIFORNIA	59
KURITA WATER IND LTD	58
TEXACO DEVELOPMENT CORP	57
NIPPON STEEL CORP	50
MITSUI SHIPBUILDING ENG	50
HITACHI LTD	49
KUBOTA KK	48
CENTRAL RES INST ELECT	46
FUJI ELECTRIC HOLDINGS	45
SIEMENS AG	40
DU PONT	40
BABCOCK HITACHI KK	36
SONY CORP	36
BIOCON INT HOLDING NV	35
IHI CORP	34

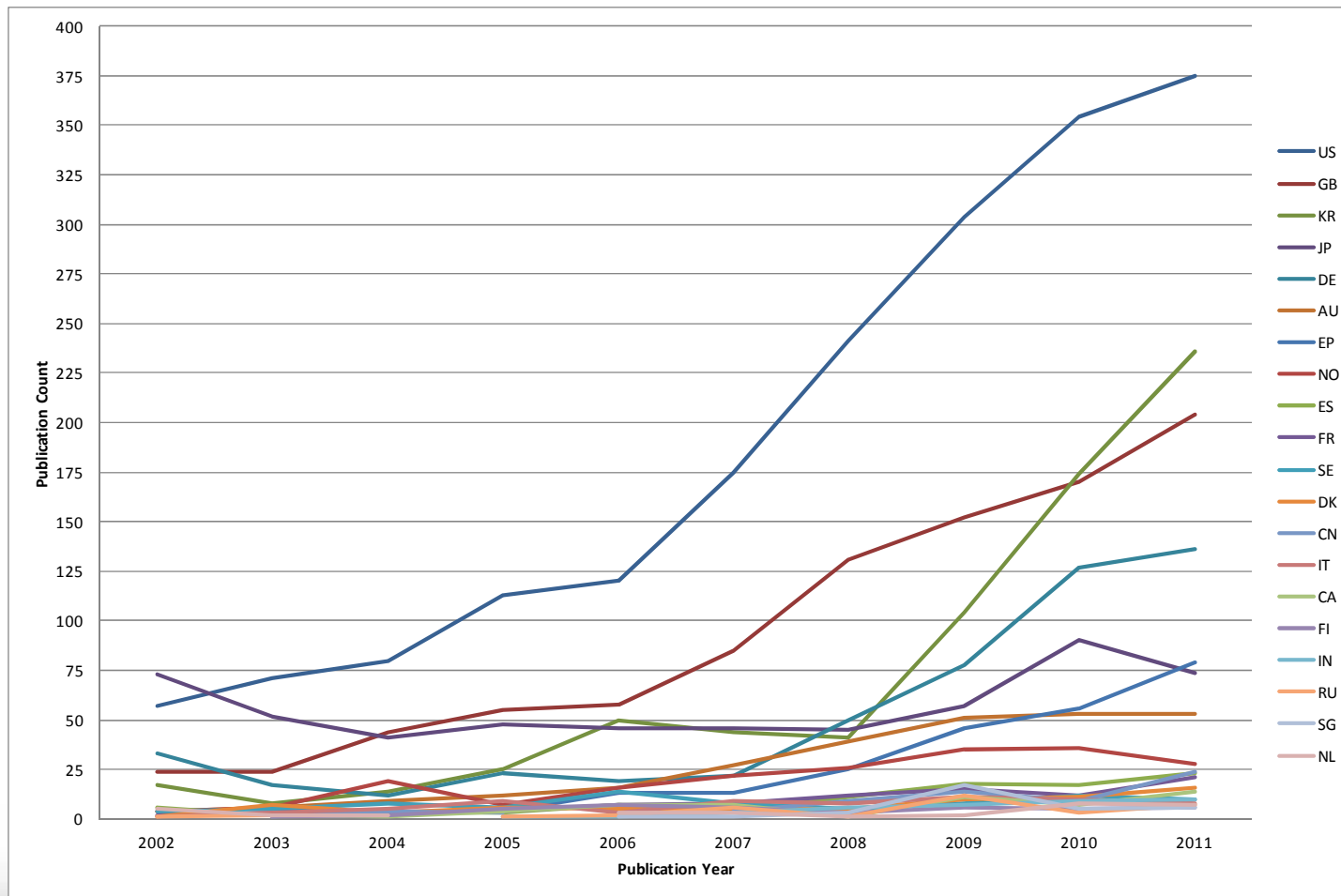
Geothermal – Top 20 Priority Countries



Top 20 Filers – 1992-2011 Geothermal

Company	Publication Count
GEN ELECTRIC	22
KOLON CONSTRUCTION CO LTD	20
NGK INSULATORS LTD	16
mitsubishi heavy ind ltd	16
TRACTO TECHNIK	15
RHEE SHIE WOO	14
TOSHIBA CORP	14
UNION OIL CO	13
TANIGAWA HIROYASU TANIGAWA KAZUNAGA	12
GREENFIELD ENERGY LTD	10
MITSUBISHI MATERIALS CORP	10
ORMAT TECHNOLOGIES INC	9
PARRELLA MICHAEL J	9
EARTH TO AIR SYSTEMS LLC	8
BLZ GEOTECHNIK GMBH	8
FAT SPANIEL TECHNOLOGIES INC	8
HARDIN JAMES R	8
CHUNG YONG HOON LEE HYUN JU	7
ORMAT IND LTD	7
REHAU AG & CO	7
EXERGY INC	7

Hydro –Top 20 Priority Countries



Top 20 Filers – 1992-2011 Hydro

Company	Publication Count
OCEAN POWER TECHNOLOGIES INC	86
VOITH PATENT GMBH	65
OPENHYDRO GROUP LTD	42
MITSUBISHI HEAVY IND LTD	34
ACCESS BUSINESS GROUP INT LLC	28
OPENHYDRO IP LTD	25
BOSCH GMBH ROBERT	23
GEN ELECTRIC	23
TOSHIBA CORP	19
ROTECH HOLDINGS LTD	18
MARINE CURRENT TURBINES LTD	18
HYDRA TIDAL ENERGY TECHNOLOGY	17
SIEMENS AG	17
PARK SEONG SOO	17
ROLLS ROYCE PLC	16
SEABASED AB	16
WOBEN ALOYS	15
LOCKHEED CORP	15
SEAPOWER PACIFIC PTY LTD	15
TIDAL GENERATION LTD	14
SWEDISH SEABASED ENERGY AB	14
WAVEBOB LTD	14
HONG MOON PYO	14
AQUAMARINE POWER LTD	14

SUMMARY: Trends (Part 1)

- Clean/Green Technology is growing strongly,
 - although economic crisis is visible
- Certain company/country clusters are clearly visible:
 - Top 10 reported locations of patent filing are primarily OECD countries
 - United States lead, followed by Germany, Japan, Denmark and South Korea.
 - China shows a strong growth curve
 - Patent/Technology ownership (of patent portfolios, data not shown) culminates in the US, JP and DE (and DK for Wind)

SUMMARY: Trends (Part 2)

- Certain technology areas are getting quite populated – an indication of maturity, or an arm's race in fast maturing technologies?
- Global players emerge with strong portfolios-
 - Not a playground for “single inventors”
 - Utility providers and OEM's are typically entering at proven technology stage (e.g. GE, Siemens, Bosch, Mitsubishi bridge areas)
 - Role of Academia and Start-Ups is increasing in early technologies

Thank you!

About Haseltine Lake and Presenter

- Leading firm of European Patent and Trademark Attorneys
- HQ in Bristol with offices in London, Munich, The Hague and Guangzhou (China), with 75 IP professionals and total headcount of 120.
- Advising and representing multinationals, SME's, university and research establishments, VC's and private equity – since 1850.
- Full range of IP and Strategy Advice, including dedicated IP analytics function.
- Me: Partner at HL, Chemistry and Life Science, formerly Portfolio Manager, Patent Attorney, Marketer, Scientist, all at RDS.

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