



Emerging Tech Webinar Series

# CleanTech: Follow the Money and the Patents

# Before We Get Started...



## Recording

A link to the recording and slides will be emailed to all registrants.



## Questions

Type in the question box and we will answer in real time or during the Q&A.



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# Today's Presenters...



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Schwegman  
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Woessner

# Business Intelligence

# Climate Tech Verticals



Infrastructure



Food, Agriculture & Land Use



Mobility & Transport

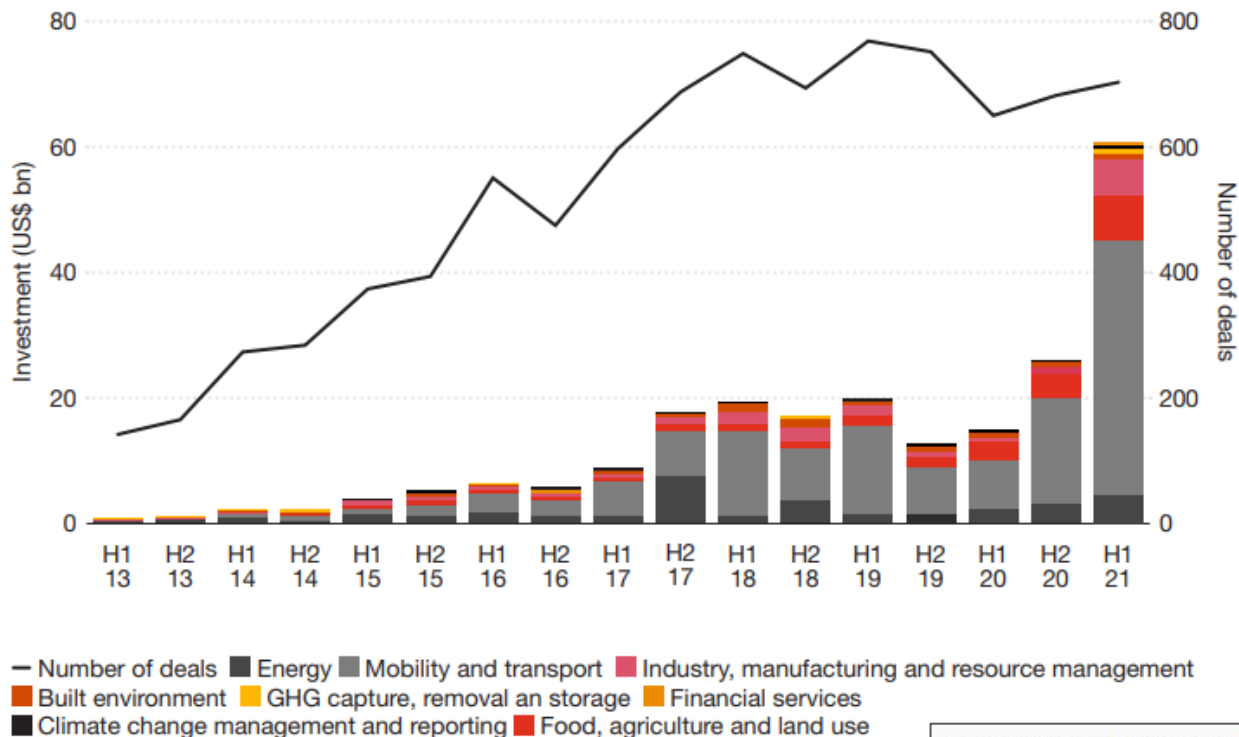


Energy



Heavy Industry

## Investment into climate tech start-ups and number of deals

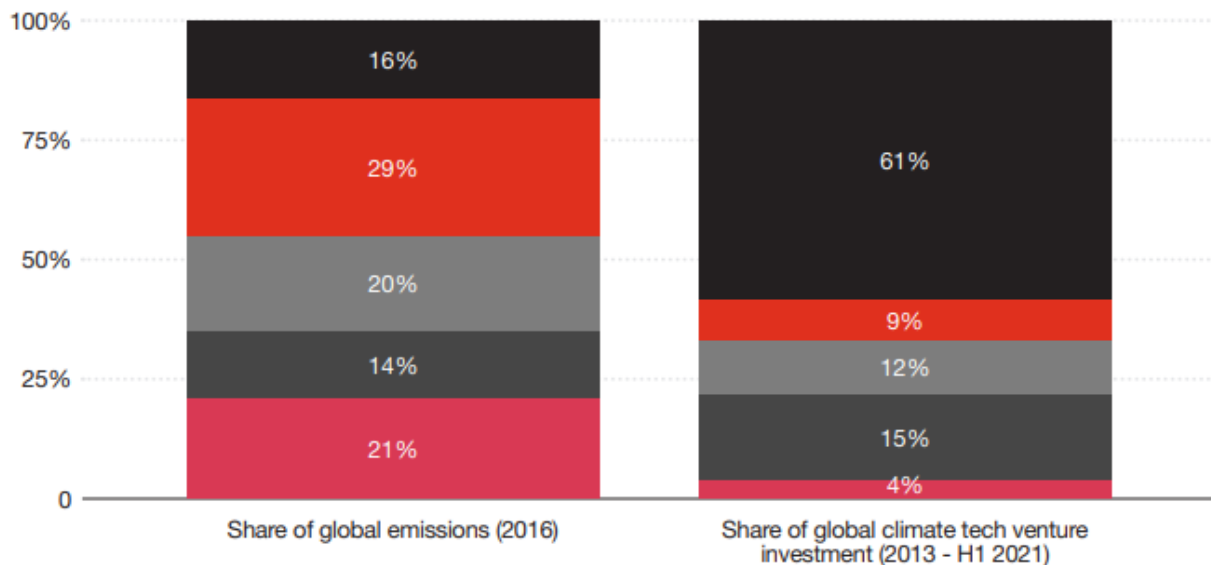


Source: PwC State of Climate Tech 2021, analysis of Dealroom data

### Investments in Climate Tech are increasing

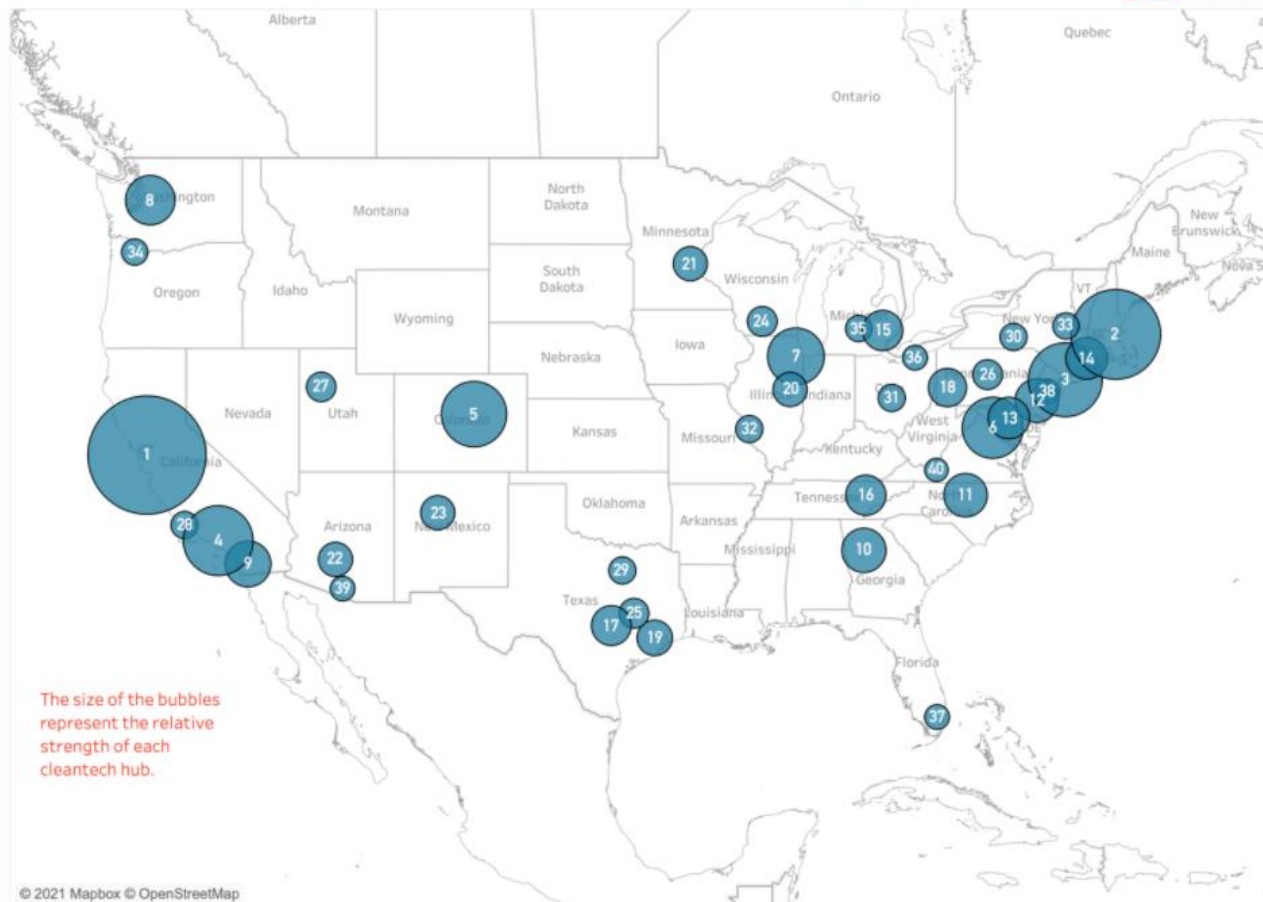
VC funding is up by 122% from 2015-2020 in transportation and logistics.

## Share of global emissions and climate tech venture investment by challenge area



■ Mobility ■ Industry and Manufacturing and Resource Management  
■ Food and Agriculture ■ Energy ■ Built Environment

**Source:** PwC State of Climate Tech 2021, analysis of Dealroom data. **Note:** Emissions data is allocated to the end sector associated with emissions. For example, energy use associated with mobility is allocated to Mobility & Transport rather than Energy. Likewise, no emissions are allocated directly to Financial Services.





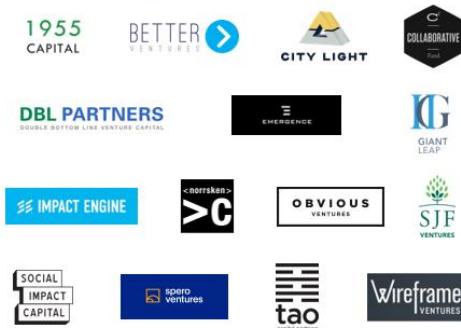
## Climate-general



## Climate-vertical specific



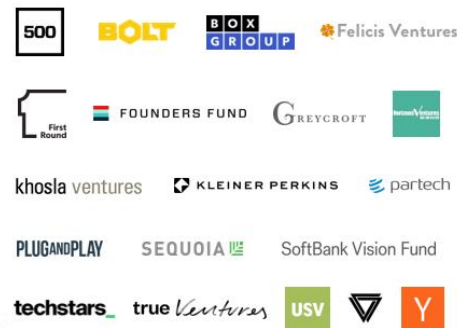
## Impact



## Deeptech



## Generalist



# Breakthrough Energy Ventures's Investments

105 Investments

Date	Company	Amount	Round	New?	Co-Investors	Sources
12/1/2021	<a href="#">Commonwealth Fusion Systems</a>	\$1,800M	Series B	No	Bill Gates, Coatue Management, DFJ Growth ...	13
7/28/2021	<a href="#">Redwood Materials</a>	\$700M	Series C	No	Amazon, Baillie Gifford & Co., Capricorn Inves...	4
7/19/2021	<a href="#">Pivot Bio</a>	\$430M	Series D	No	Bunge Ventures, Continental Grain, Data Colle...	11
7/19/2021	<a href="#">Nature's Fynd</a>	\$350M	Series C	No	1955 Capital, ADM Alliance Nutrition, Balyasn...	4
10/11/2021	<a href="#">Energy Storage Systems</a>	\$308M	PIPE	No	BASF Venture Capital, Fidelity Investments, K...	3
6/16/2021	<a href="#">Motif FoodWorks</a>	\$226M	Series B	No	AiiM Partners, BlackRock, CPT Capital, Gener...	6
6/30/2021	<a href="#">Turntide Technologies</a>	\$225M	Convertible Note	No	Captain Planet, CPP Investments, JLL Spark, ...	5
7/22/2021	<a href="#">Form Energy</a>	\$200M	Series D	No	ArcelorMittal, Capricorn Investment Group, C...	6
9/22/2021	<a href="#">Lilac Solutions</a>	\$150M	Series B	No	Lowercarbon Capital, Mercuria Energy Tradin...	10
4/30/2020	<a href="#">Pivot Bio</a>	\$100M	Series C	No	Alan Cohen, Bunge Ventures, Codon Capital, ...	14

# Energy Impact Partners's Investments

78 Investments

Date	Company	Amount	Round	New?	Co-Investors	Sources
10/28/2021	<a href="#">Dragos</a>	\$200M	Series D	No	AllegisCyber Capital, BlackRock, Canaan Part...	4
7/22/2021	<a href="#">Form Energy</a>	\$200M	Series D	No	ArcelorMittal, Breakthrough Energy Ventures, ...	6
12/8/2020	<a href="#">Dragos</a>	\$110M	Series C	No	AllegisCyber Capital, Canaan Partners, DataTr...	6
9/15/2021	<a href="#">Arcadia</a>	\$100M	Series D	No	BoxGroup, Camber Creek, Drawdown Fund, G...	6
9/12/2019	<a href="#">Trifacta</a>	\$100M	Series E	Yes	ABN AMRO Ventures, Accel, BMW i Ventures, ...	14
9/11/2020	<a href="#">Form Energy</a>	\$76M	Series C	Yes	Breakthrough Energy Ventures, Capricorn Inv...	3
9/2/2021	<a href="#">Corelight</a>	\$75M	Series D	Yes	Capital One Growth Ventures, Falcon Fund, an...	9
2/8/2019	<a href="#">ecobee</a>	\$61M	Series C - III	No	Amazon Alexa Fund, Evergy Ventures, Export ...	2
3/6/2018	<a href="#">ecobee</a>	\$61M	Series C	Yes	Amazon Alexa Fund, Energy Ventures, Export ...	3
8/24/2021	<a href="#">Urbint</a>	\$60M	Series C	No	American Electric Power, Blue Bear Capital, E...	4

# S2G Ventures's Investments

122 Investments






Date	Company	Amount	Round	New?	Co-Investors	Sources
12/17/2021	<a href="#">Future Meat Technologies</a>	\$347M	Series B - II	No	ADM Capital, ADM Ventures, Bits x Bites, Eme...	6
3/29/2021	<a href="#">LIVEKINDLY</a>	\$200M	Series C	Yes	Rabo Corporate Investments, The Rise Fund, ...	2
10/29/2020	<a href="#">Benson Hill Biosystems</a>	\$150M	Series D	No	Argonautic Ventures, Caisse de depot et plac...	10
9/23/2019	<a href="#">sweetgreen</a>	\$150M	Series I	Yes	D1 Capital Partners and Lone Pine Capital	11
8/10/2021	<a href="#">Greenlight Biosciences</a>	\$105M	PIPE	No	BNP Paribas, Continental Grain, Cormorant A...	1
6/16/2020	<a href="#">Greenlight Biosciences</a>	\$102M	Series D - IV	No	Baird Venture Partners, Continental Grain, Cor...	4
2/3/2021	<a href="#">Good Eggs</a>	\$100M	Series E	No	Benchmark, DNS Capital, Finistere Ventures, ...	3
4/13/2021	<a href="#">Hazel Technologies</a>	\$70M	Series C	No	Asahi Kasei Ventures, Jordan Park Group, Pa...	4
7/31/2018	<a href="#">Apeel Sciences</a>	\$70M	Series C	No	Andreessen Horowitz, Breakthrough Energy V...	4
1/29/2018	<a href="#">Ripple Foods</a>	\$65M	Series C	No	Euclidean Capital, Fall Line Capital, Goldman ...	3

# SOSV Climate Tech 100 Startups

## value grows by 44% in 5 months

COMPANY NAME ▾	CATEGORY ▾	(3) FUNDING Crunchb... ▾	FOUNDED ▾	HQ ▾
Perfect Day	Food	\$361,500,000	2014	USA
Upside Foods (fka MEMP...)	Food	\$181,100,000	2015	USA
NotCo	Food	\$115,000,000	2015	CHL
Geltor	Food	\$114,300,000	2015	USA
Formlabs	Manufacturing	\$103,700,000	2011	USA
MycoWorks	Manufacturing	\$62,000,000	2013	USA
Clara Foods	Food	\$56,800,000	2015	USA
Endless West	Food	\$33,700,000	2015	USA
Mori	Food	\$32,000,000	2016	USA
New Wave Foods	Food	\$20,300,000	2015	USA
JUMP Bikes (acquired)	Transport	\$15,100,000	2010	USA
R-Zero	Buildings Systems	\$15,000,000	2020	USA
Hyasynth	Manufacturing	\$14,100,000	2014	CAN
Carma	Transport	\$14,100,000	2007	USA
Pili	Manufacturing	\$12,100,000	2015	FRA
SmartAC	Buildings Systems	\$10,000,000	2020	USA
Novoloop	Manufacturing	\$7,400,000	2015	USA
VoltStorage	Energy	\$7,300,000	2016	DEU
Clarity	Buildings Systems	\$7,100,000	2013	USA
New Age Meats	Food	\$7,000,000	2018	USA
Joywell Foods	Food	\$6,900,000	2014	USA
Protera Biosciences	Food	\$5,600,000	2018	USA
Wasteless	Food	\$5,200,000	2016	ISR

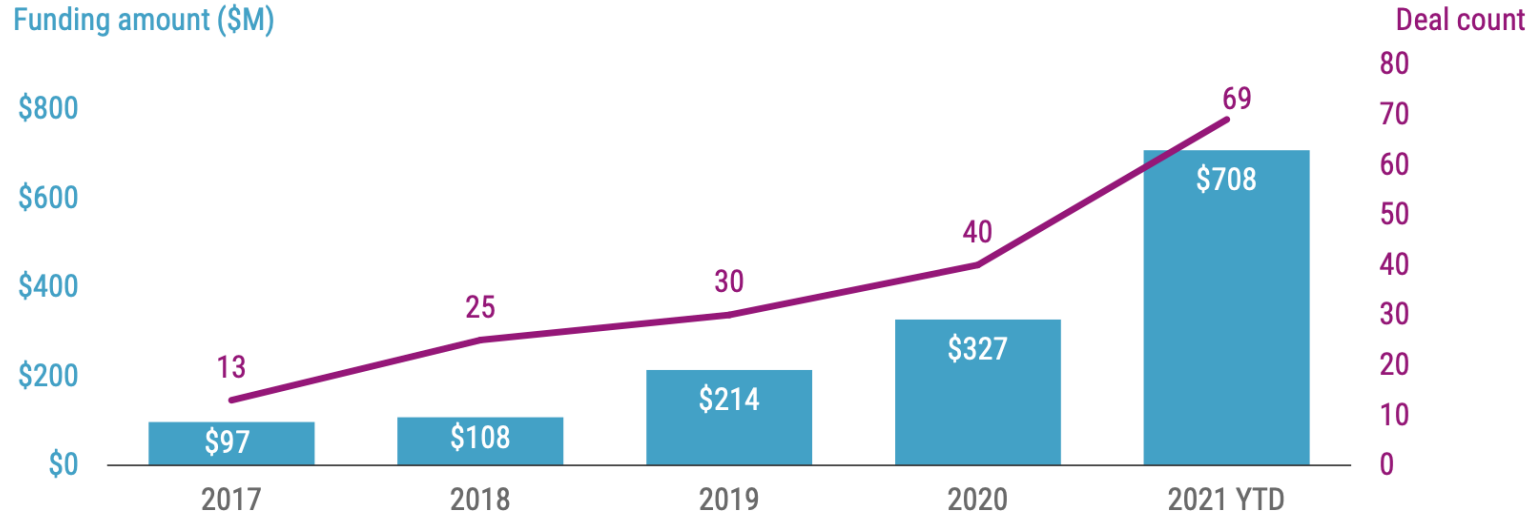
# Watchlist

Company	Description	Country
	Developer of a predictive building automation system that addresses HVAC, lighting and equipment control requirements	United States
	Developer of microbe-powered technology to improve agriculture productivity	United States
	Manufacturer of sustainable cement and concrete	United States
	Developer of predictive analytics software for batteries	Germany
	Provider of charging stations offering free charging to drivers and advertising space for brands and businesses	United States

SPOTLIGHT: CARBON CAPTURE, UTILIZATION, AND STORAGE (CCUS)

## Carbon capture, utilization, and storage funding has more than doubled since 2020

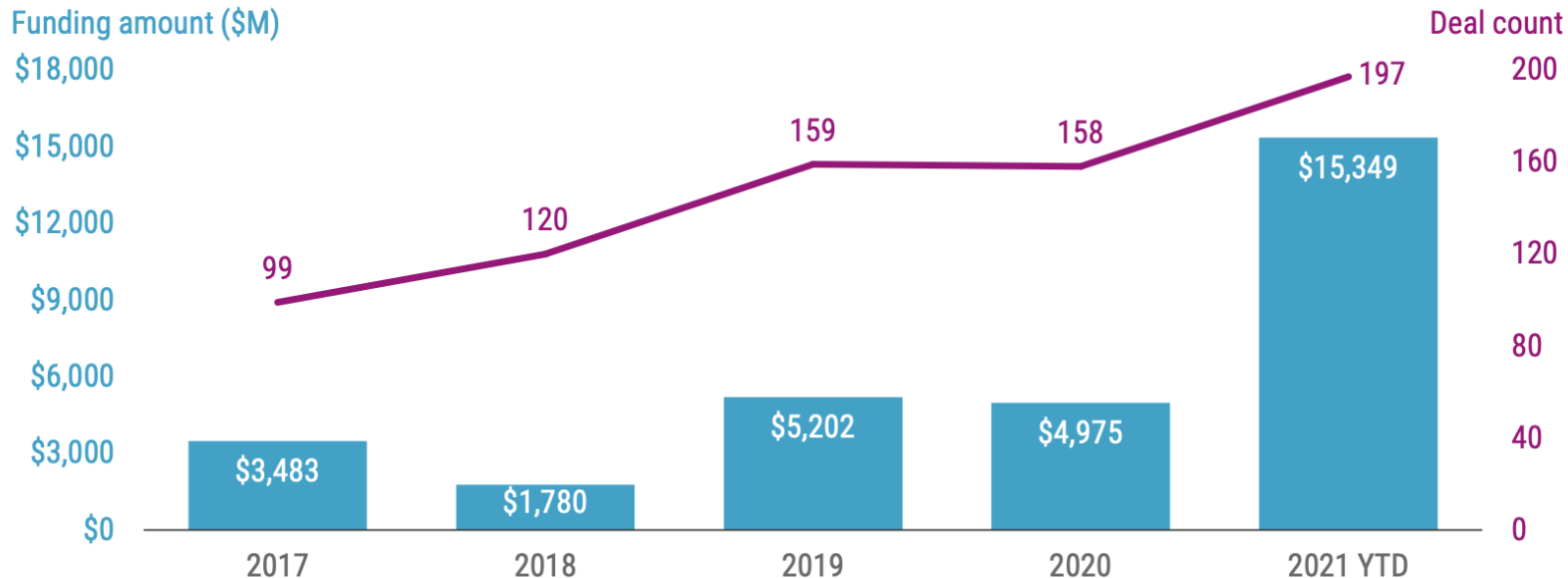
Disclosed deals & equity funding, 2017 – 2021 YTD (9/23/21)



## SPOTLIGHT: ENERGY STORAGE

# Energy storage investment is reaching record highs

Disclosed deals & equity funding, 2017 – 2021 YTD (9/23/21)





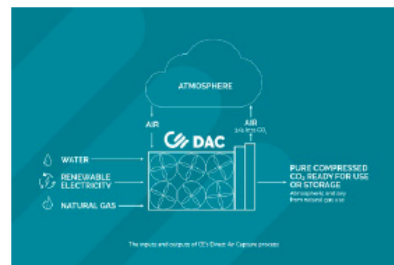
## HIGHLIGHT #1: DIRECTLY CAPTURING EMISSIONS

# Direct air capture companies start to sell carbon credits



**Latest Round:** Corporate Minority (01/28/2021) **Amount:** Undisclosed

**About:** **Climeworks** recently started up its Orca facility, the world's largest direct air capture plant, capturing 4,000 tons of CO<sub>2</sub> annually. The company has announced several new clients in 2021 so far, including Swiss Re, The Economist Group, and Microsoft. Climeworks was also selected as part of Microsoft's carbon removal portfolio, receiving funding from the software giant's Climate Innovation Fund.



**Latest Round:** Grant – II (06/26/2019) **Amount:** \$19M

**About:** **Carbon Engineering** is working on planning and building a large-scale direct air capture plant (0.5–1M tons annually) in the UK, in collaboration with Storegga. The company also started selling carbon offset credits in 2021, with Shopify as its first customer. The offsets will come from a plant being built by 1PointFive, which is utilizing Carbon Engineering's tech.

# CleanTech IP Analytics

# CleanTech Classifications

## Y02: TECHNOLOGIES OR APPLICATIONS FOR MITIGATION OR ADAPTATION AGAINST CLIMATE CHANGE

CPC Subclass	Class Title
Y02A	TECHNOLOGIES FOR <b>ADAPTATION TO CLIMATE CHANGE</b>
Y02B	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO <b>BUILDINGS</b> , e.g. <b>HOUSING, HOUSE APPLIANCES OR RELATED END-USER APPLICATIONS</b>
Y02C	<b>CAPTURE, STORAGE, SEQUESTRATION OR DISPOSAL OF GREENHOUSE GASES [GHG]</b>
Y02D	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN <b>INFORMATION AND COMMUNICATION TECHNOLOGIES [ICT]</b> , I.E. INFORMATION AND COMMUNICATION TECHNOLOGIES AIMING AT THE REDUCTION OF THEIR OWN ENERGY USE
Y02E	REDUCTION OF GREENHOUSE GAS [GHG] EMISSIONS, RELATED TO <b>ENERGY GENERATION, TRANSMISSION OR DISTRIBUTION</b>
Y02P	CLIMATE CHANGE MITIGATION TECHNOLOGIES IN THE <b>PRODUCTION OR PROCESSING OF GOODS</b>
Y02T	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO <b>TRANSPORTATION</b>
Y02W	CLIMATE CHANGE MITIGATION TECHNOLOGIES RELATED TO <b>WASTEWATER TREATMENT OR WASTE MANAGEMENT</b>

# EPO Tech Category Breakdown

Source: [Patents and the Energy Transition](#) (Published: April 2021)

Low-carbon energy supply	Wind		Y02E10/70/LOW
	Solar	Solar PV	Y02E10/50/LOW
		Solar thermal	Y02E10/40/LOW
		Other solar	Y02E10/60
	Other renewables	Geothermal energy	Y02E10/10/LOW
		Hydro	FY02E10/20/LOW
		Marine	Y02E10/30/LOW
		Other	Y02E10/00
	Technologies for the production of fuel of non-fossil origin	Biofuels	Y02E50/10
		Fuel from waste	Y02E50/30
		Other	Y02E50/00
	Combustion technologies with mitigation potential		Y02E20/00/LOW
Enabling and cross-cutting energy systems (enabling technologies)	Energy generation of nuclear origin (electricity)		Y02E30/00/LOW
	CCUS		Y02C20/00/LOW
	Batteries		Y02E60/10
	Hydrogen and fuel cells		Y02E60/30/LOW
	Other		Y02E60/00
			Y02E60/13 OR
			Y02E60/14 OR
			Y02E60/16 OR
			Y02E70/00/LOW OR
			Y02E60/60 OR
			Y02E40/00 or Y02E40/10, 20, 30, 40, 50, 60
	Smart grids		Y04S

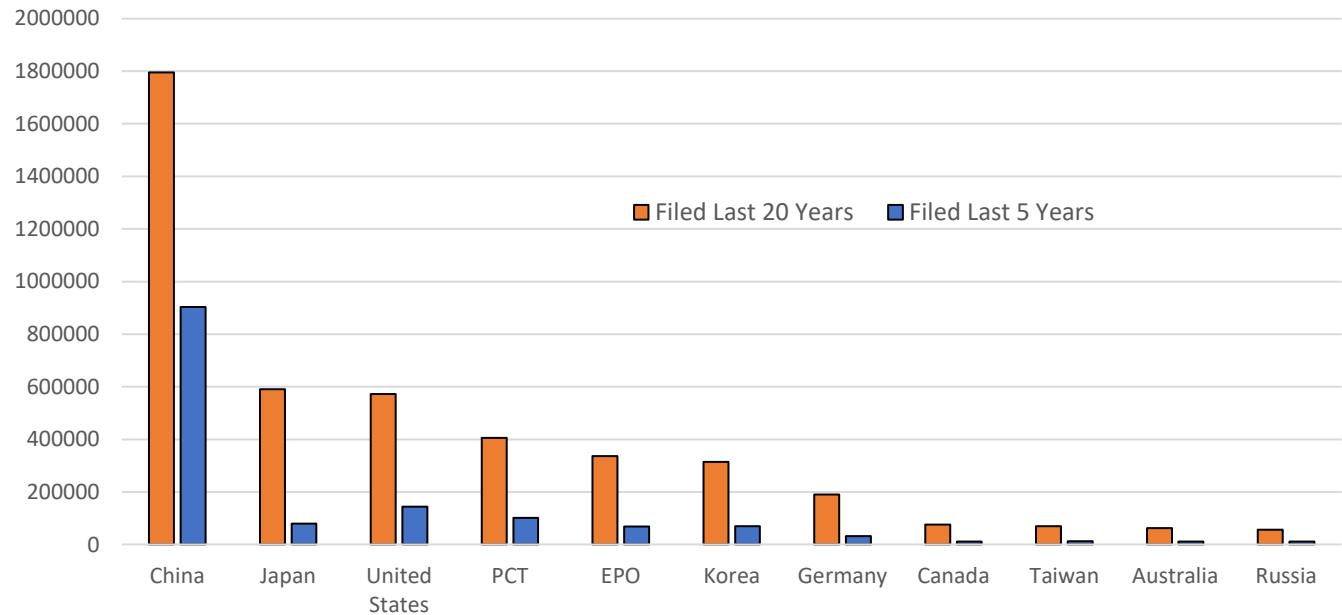
# EPO Tech Category Breakdown (continued)

Energy substitution and efficiency in end use (end-use technologies)	Buildings		Y02B
	Production/chemical and oil refining		Y02P20/00/LOW OR Y02P30/00/LOW
	Production/metal and minerals processing		Y02P10/00/LOW OR Y02P40/00/LOW
	Production/other	Agriculture	Y02P60/00/LOW
		Consumer products	Y02P70/00low
		Other production	Y02P80/00/LOW OR Y02P90/00/LOW
	Transportation/ electric vehicles and EV infrastructure	EV and infrastructure	Y02T10/60/LOW OR Y02T10/92 OR Y02T90/10/LOW
		Fuel cells for road vehicles	Y02T90/40/LOW
	Transportation/other road technologies		Y02T10/00 OR Y02T10/10/LOW OR Y02T10/80, 82, 84, 86, 88, 90 OR Y02T90/00
	Other transportation/ aeronautics, maritime and railways	Aeronautics	Y02T50/00/LOW
		Maritime and waterways	Y02T70/00/LOW
		Railways	Y02T30/00
	Computing and communication		Y02D10/00 OR Y02D30/00/LOW

# Geographic Breakdown



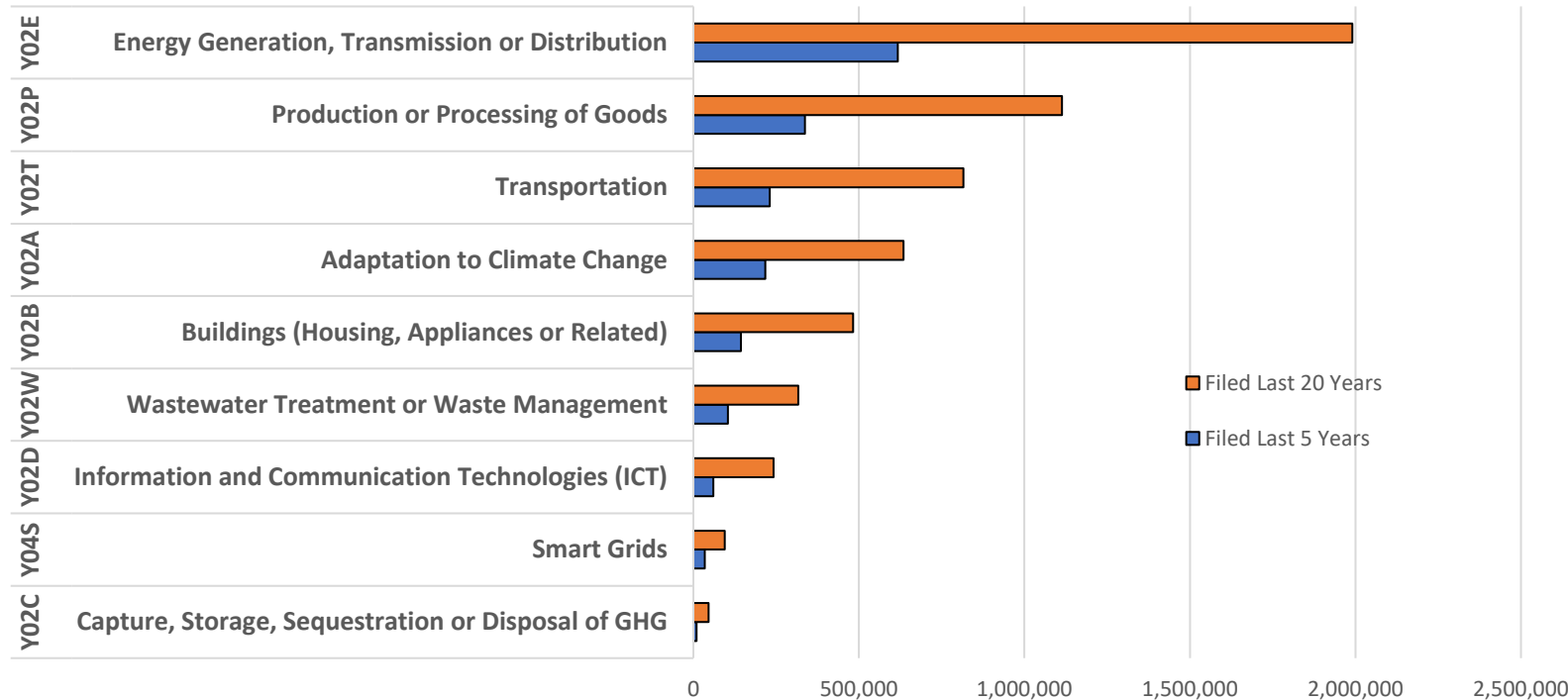
Geographic Breakdown: Y02 Classification Filings



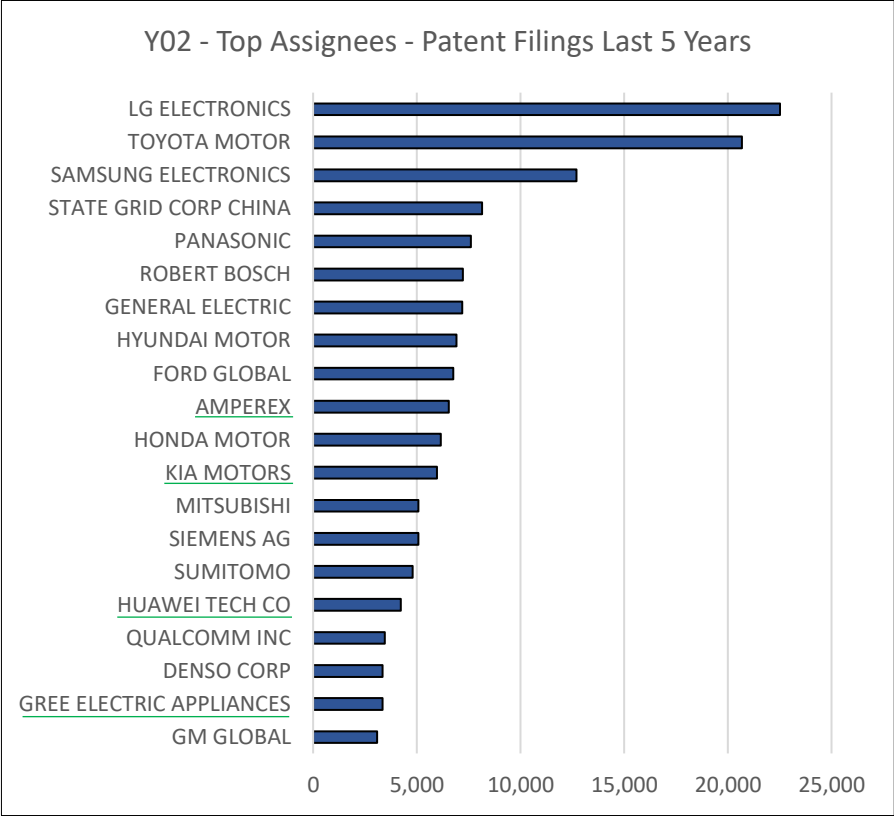
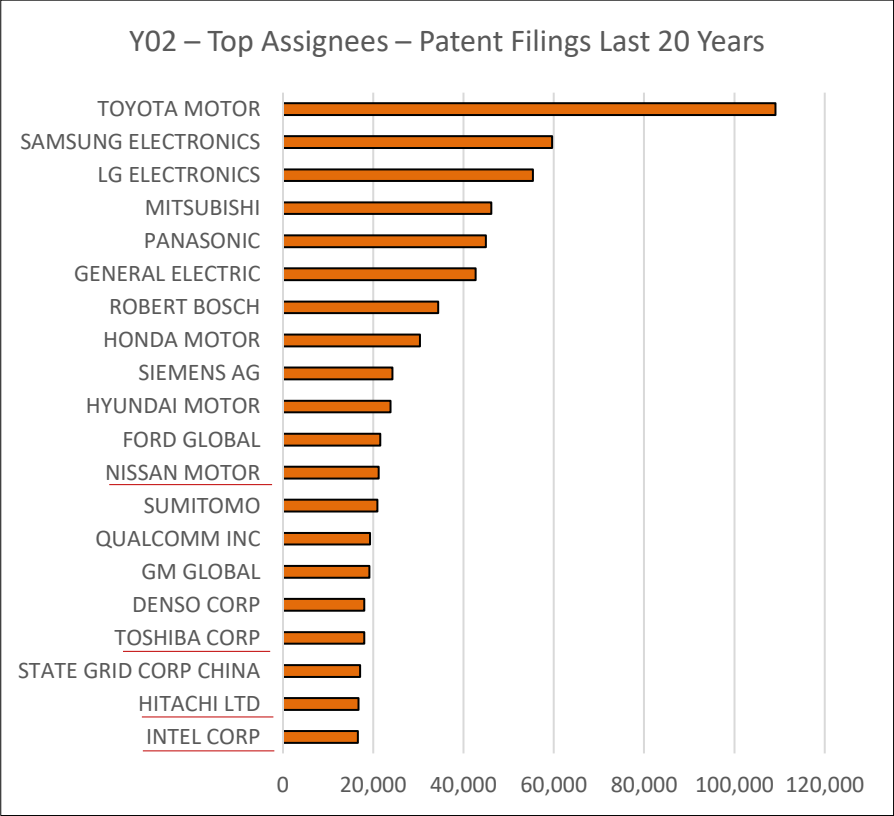
# Subclass Breakdown

Y02 Subclass Comparison: CPC Categorization

Worldwide Filings



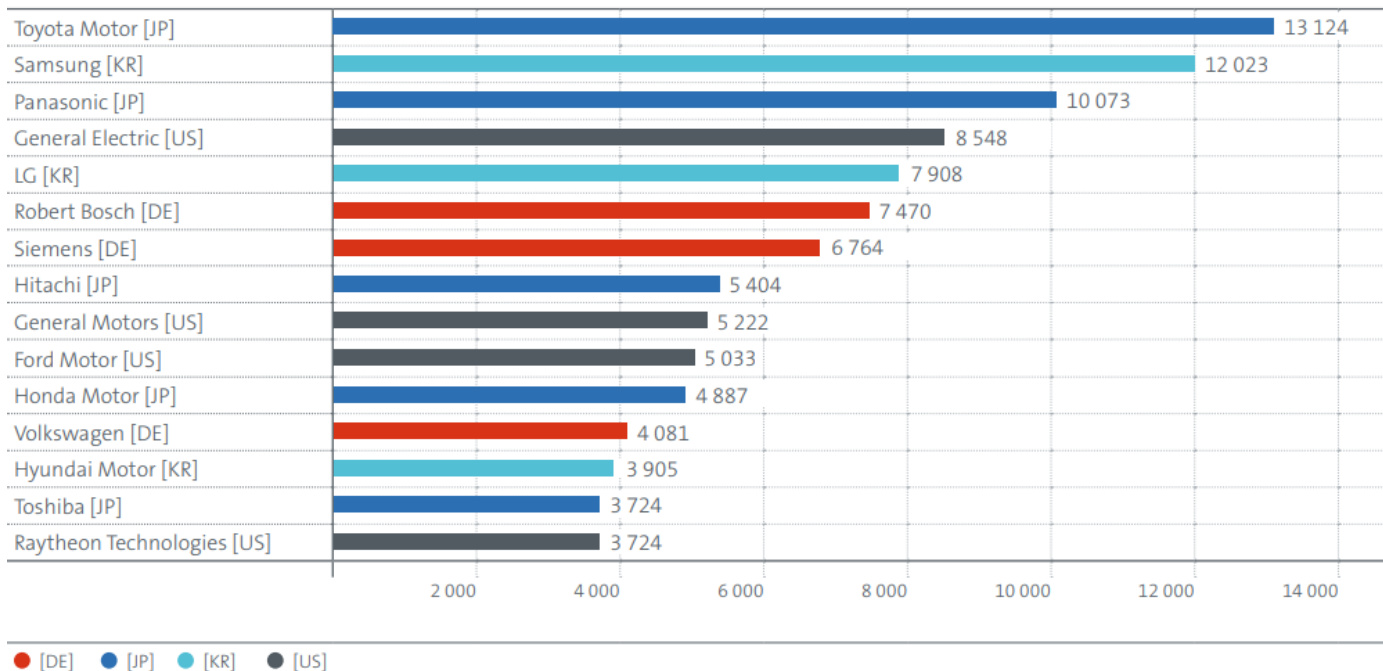
# Top Applicants – Y02 - Worldwide





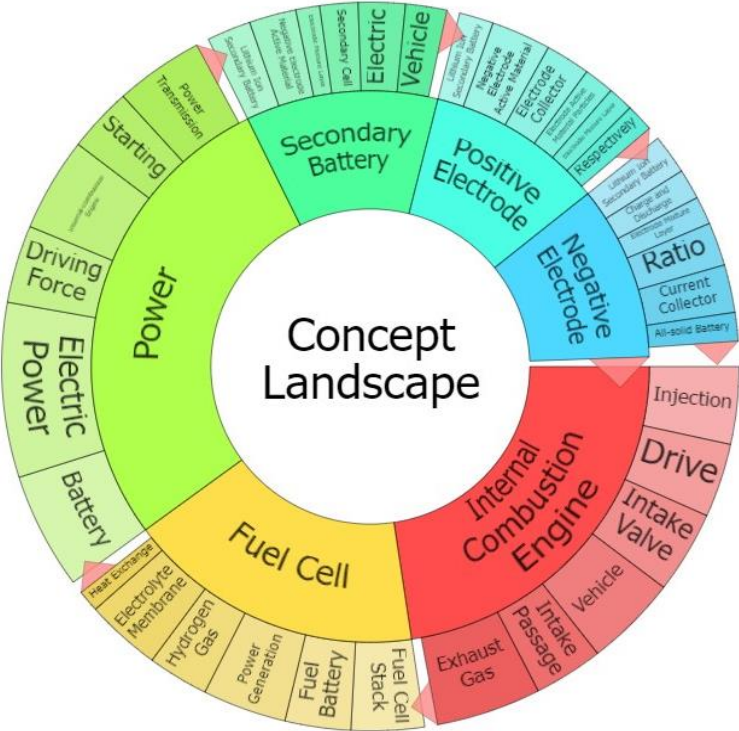
# Top Applicants (EPO)

Top 15 applicants in LCE technologies, 2000-2019



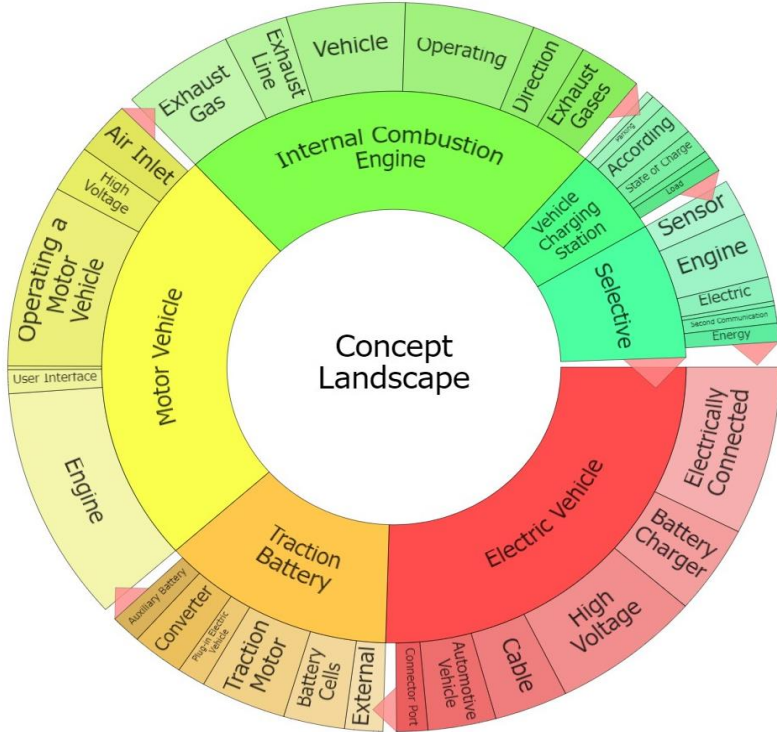
# Toyota – Y02 – Concept Landscape

Toyota WW Y02 Portfolio



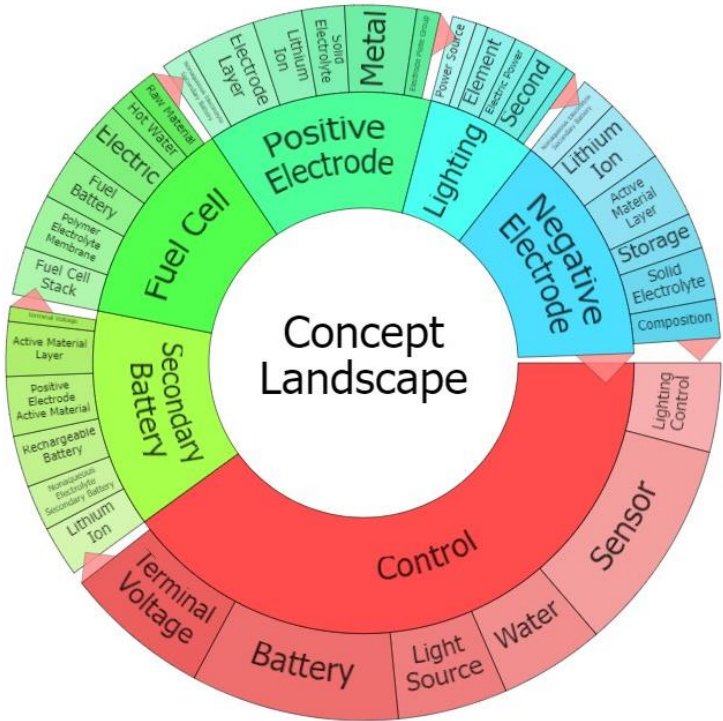
# Ford – Y02 – Concept Landscape

Ford WW Y02 Portfolio

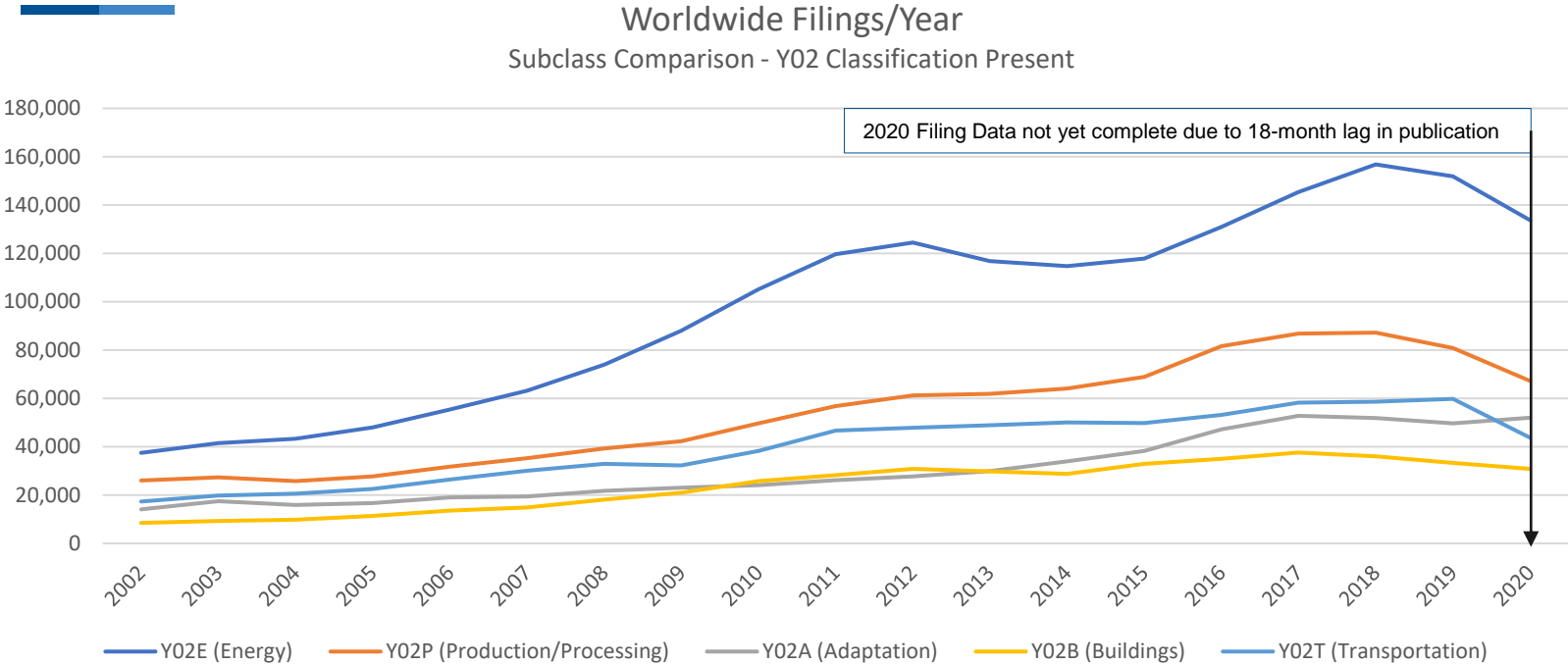


# Samsung – Y02 – Concept Landscape

Samsung WW Y02 Portfolio

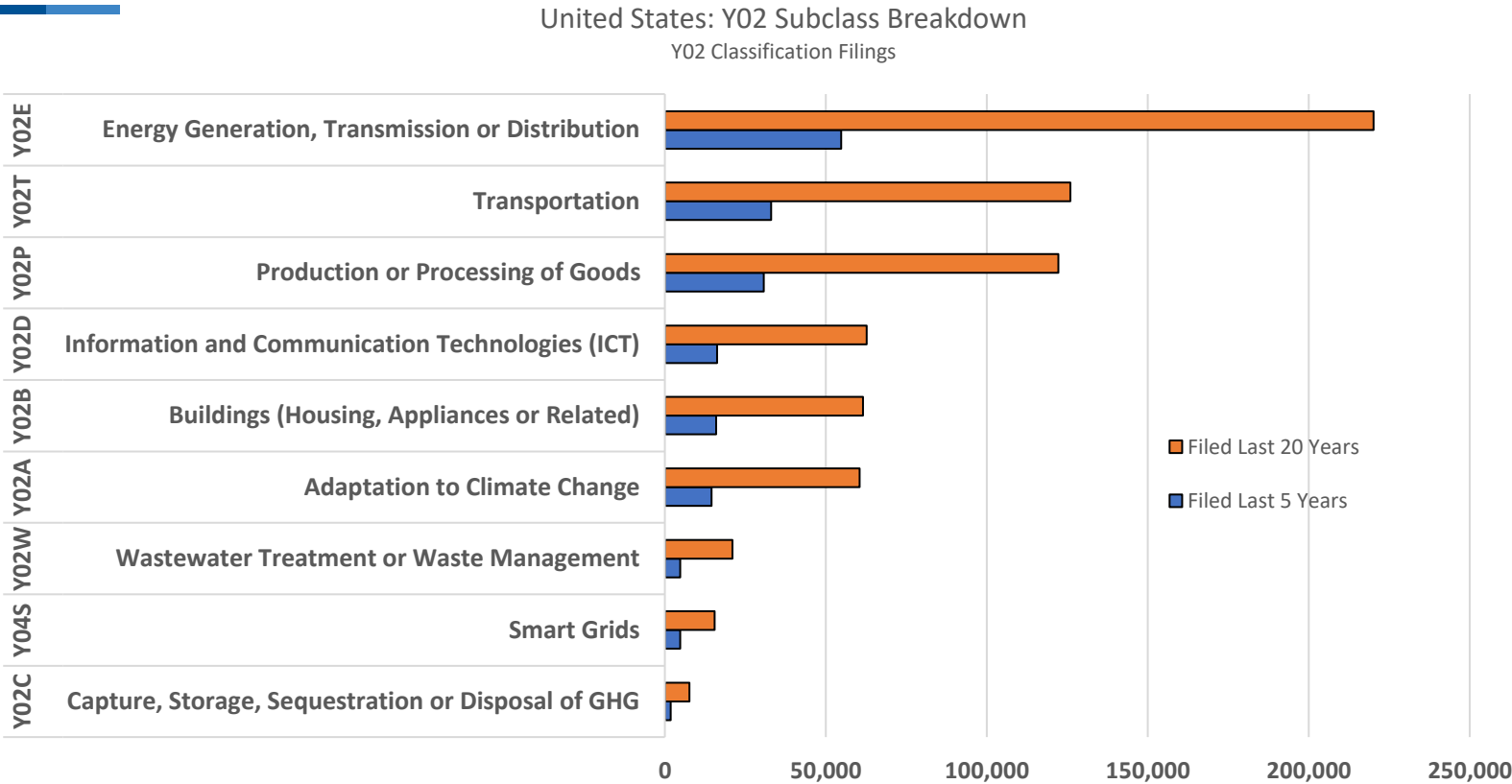


# Worldwide Filings/Year – Subclass Breakdown



# Y02 – US Patent Analytics

# US Subclass Breakdown

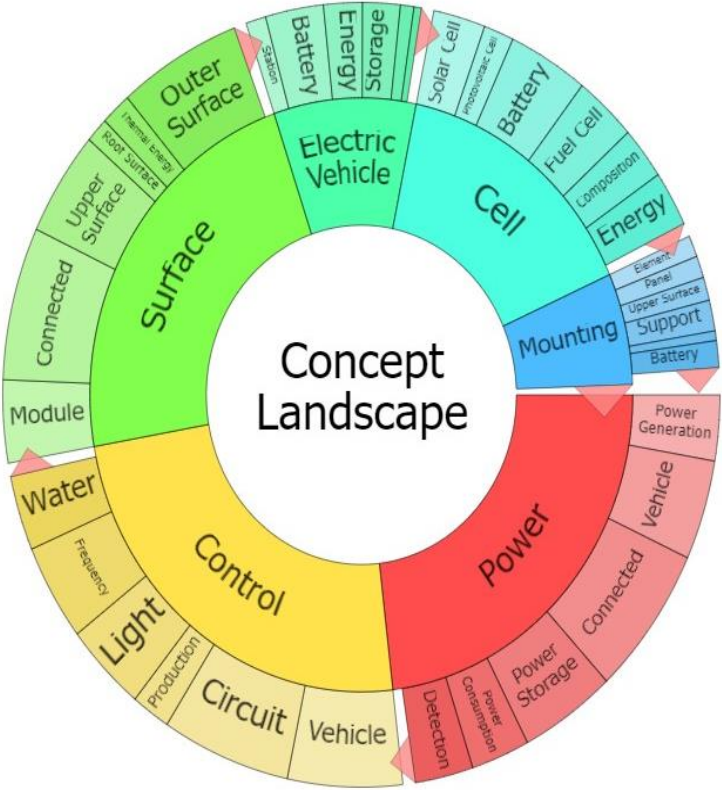


# US Complete Class Breakdown

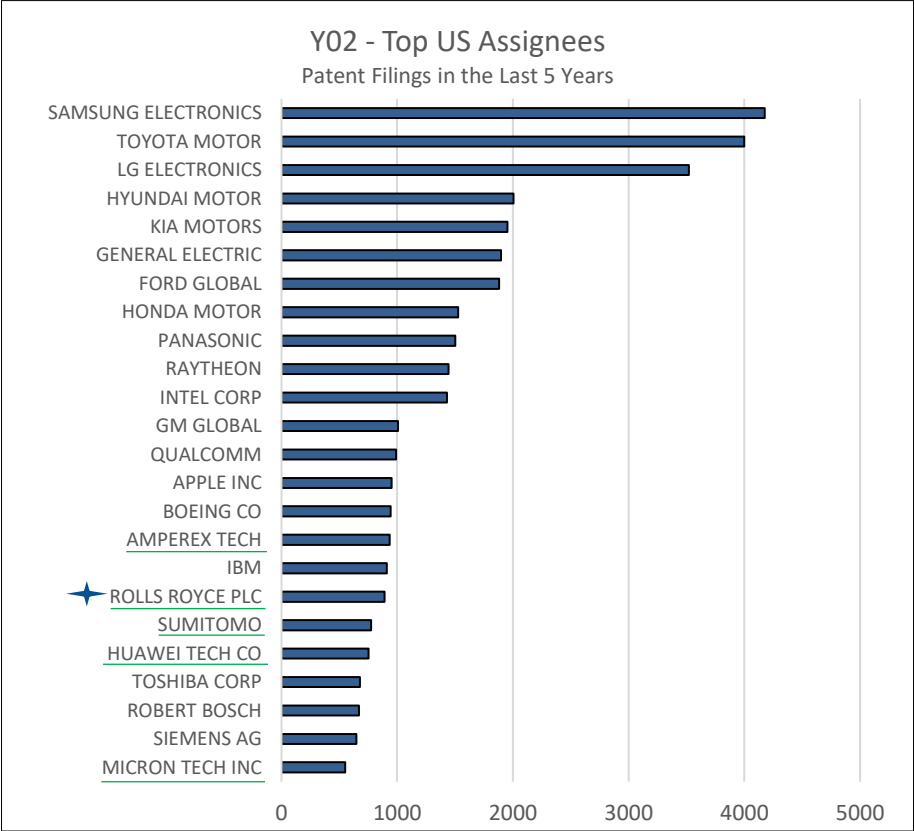
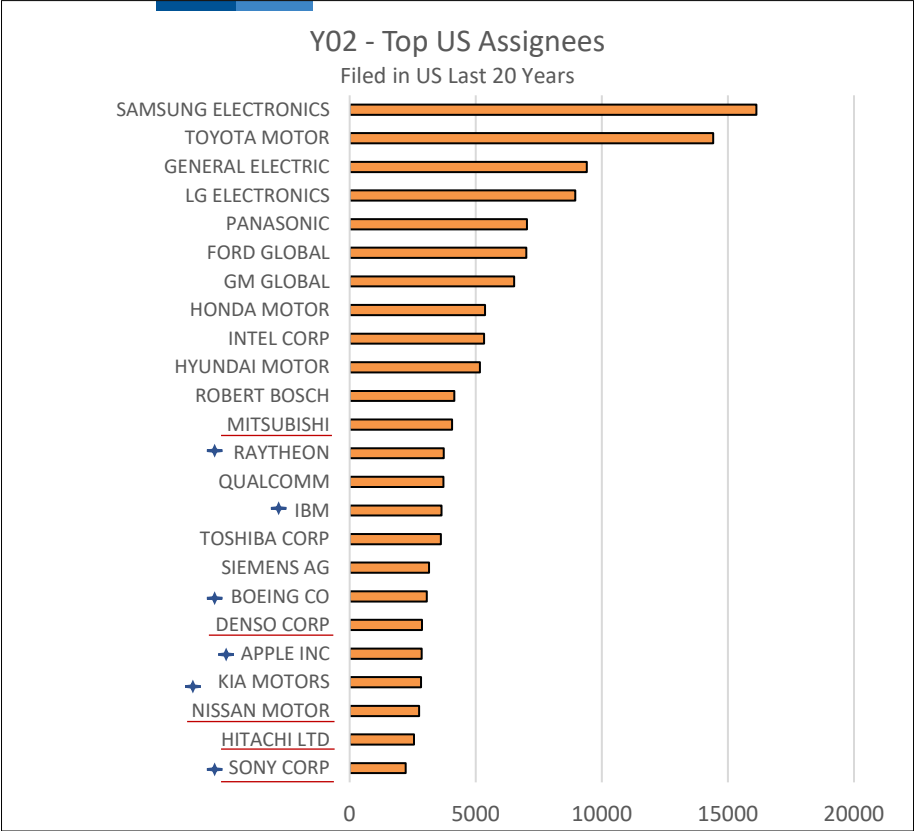
CPC Class	Class Title	Patents/Pubs
Y02E60/10	<b>Energy storage using batteries</b>	70,656
Y02P70/50	Climate change mitigation technologies in the production process for final industrial or consumer products > <b>Manufacturing or production processes</b> characterised by the final manufactured product	44,980
Y02T10/70	Road transport of goods or passengers > <b>Energy storage systems for electromobility</b> , e.g. batteries	35,215
Y02E60/50	<b>Hydrogen technology</b> > <b>Fuel cells</b>	32,077
Y02D10/00	<b>Energy efficient computing</b> , e.g. low power processors, power management or thermal management	28,878
Y02D30/70	<b>Reducing energy consumption in communication networks</b> > in wireless communication networks	28,246
Y02T10/12	Internal combustion engine [ICE]based vehicles > <b>Improving ICE efficiencies</b>	27,918
H01M10/0525	PROCESSES OR MEANS, e.g. BATTERIES, DIRECT CONVERSION OF CHEMICAL ENERGY INTO ELECTRICAL ENERGY > Lithium-ion-accumulators > <b>Rocking-chair batteries, i.e. with lithium insertion or intercalation in both electrodes; Lithium-ion batteries</b>	22,644
Y02A50/30	TECHNOLOGIES FOR ADAPTATION TO CLIMATE CHANGE > in <b>human health protection</b> , e.g. against extreme weather > Against vector-borne diseases, e.g. mosquito, fly, tick or waterborne diseases whose impact is exacerbated by climate change	22,355
Y02T10/7072	Electromobility specific <b>charging systems</b> or methods for <b>batteries, ultracapacitors, supercapacitors or double-layer capacitors</b>	18,984
Y02E10/50	Energy generation through <b>renewable energy sources</b> > <b>Photovoltaic [PV] (Solar) energy</b>	17,551
Y02T50/60	Aeronautics or air transport > <b>Efficient propulsion technologies, e.g. for aircraft</b>	16,817
H01M10/052	<b>Lithium-ion accumulators</b>	16,104
Y02T10/40	Internal combustion engine [ICE]based vehicles > <b>Engine management systems</b>	15,676
Y02T10/62	<b>Hybrid vehicles</b>	13,686
Y02E10/72	<b>Wind energy</b> > Wind turbines with rotation axis in wind direction	13,286



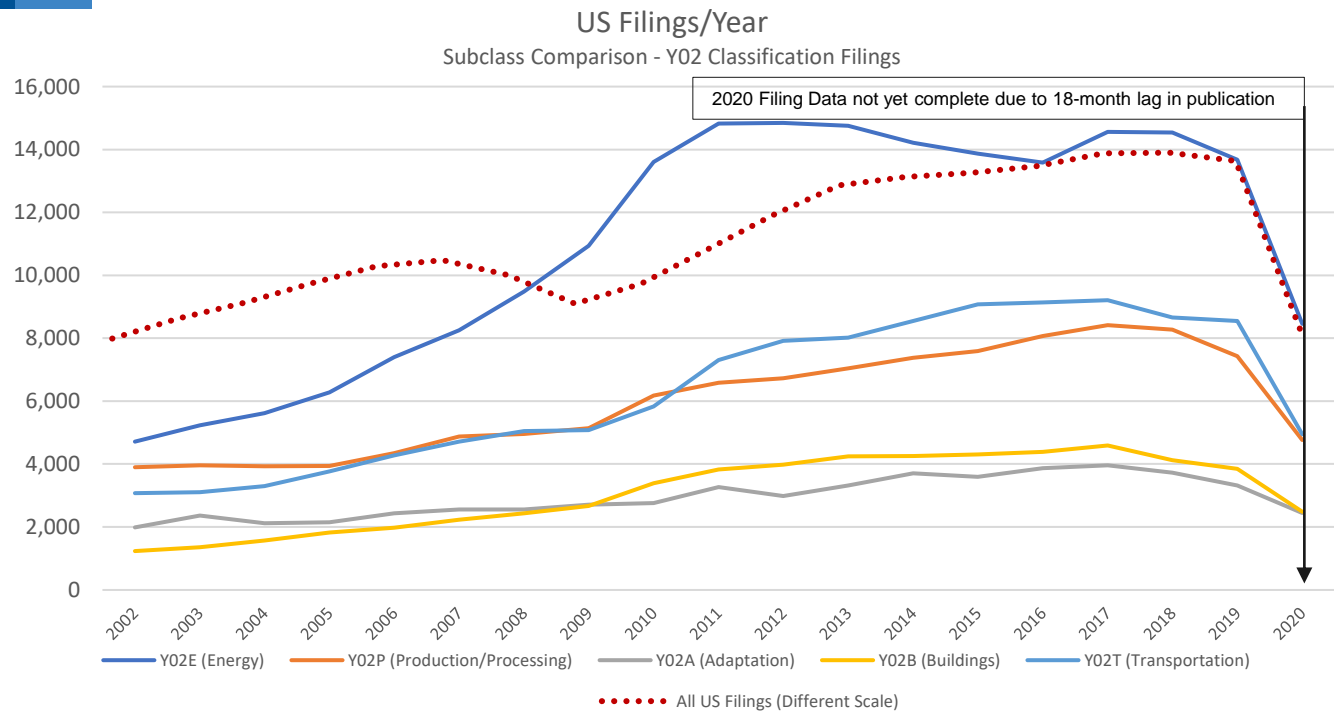
# Y02 Concept Landscape – US Filings – Last 5 Years



# Top Applicants – United States



# US Filings/Year – Subclass Breakdown

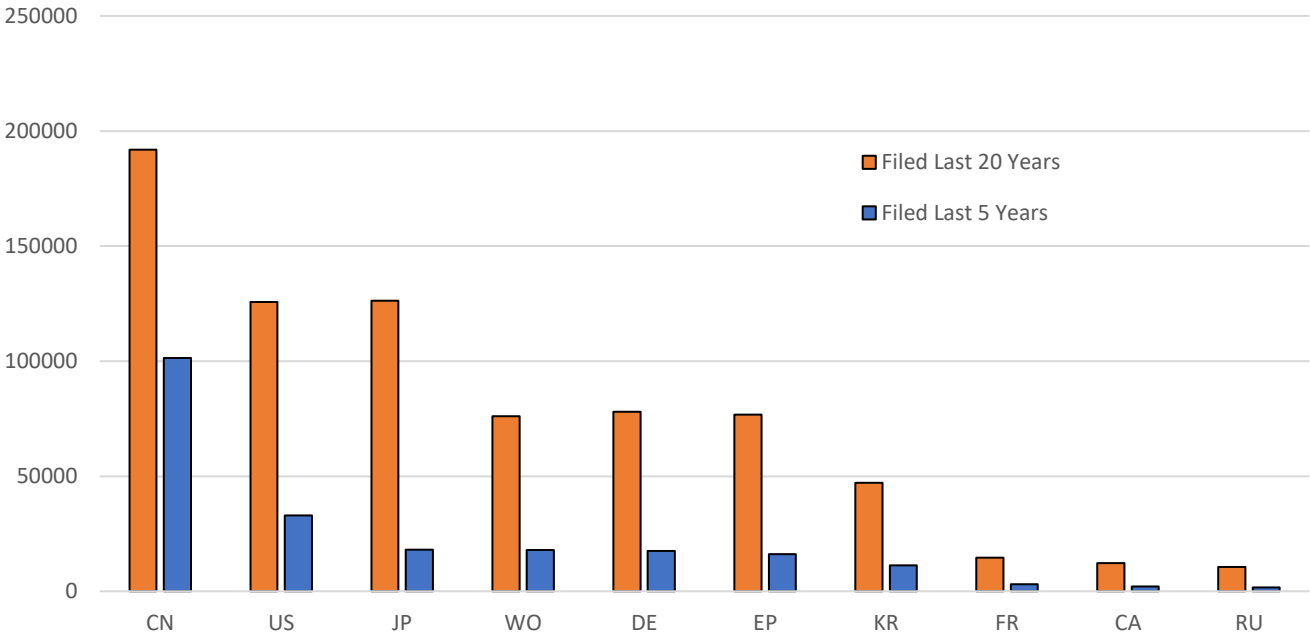


# Y02T: Transportation Patent Analytics

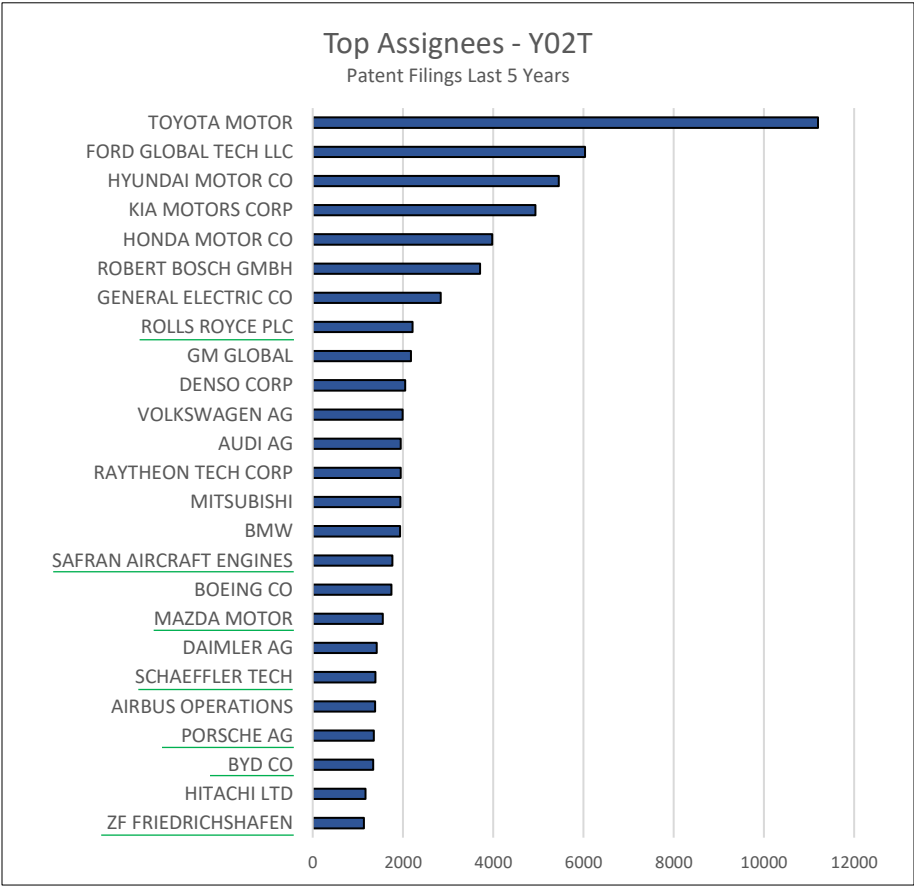
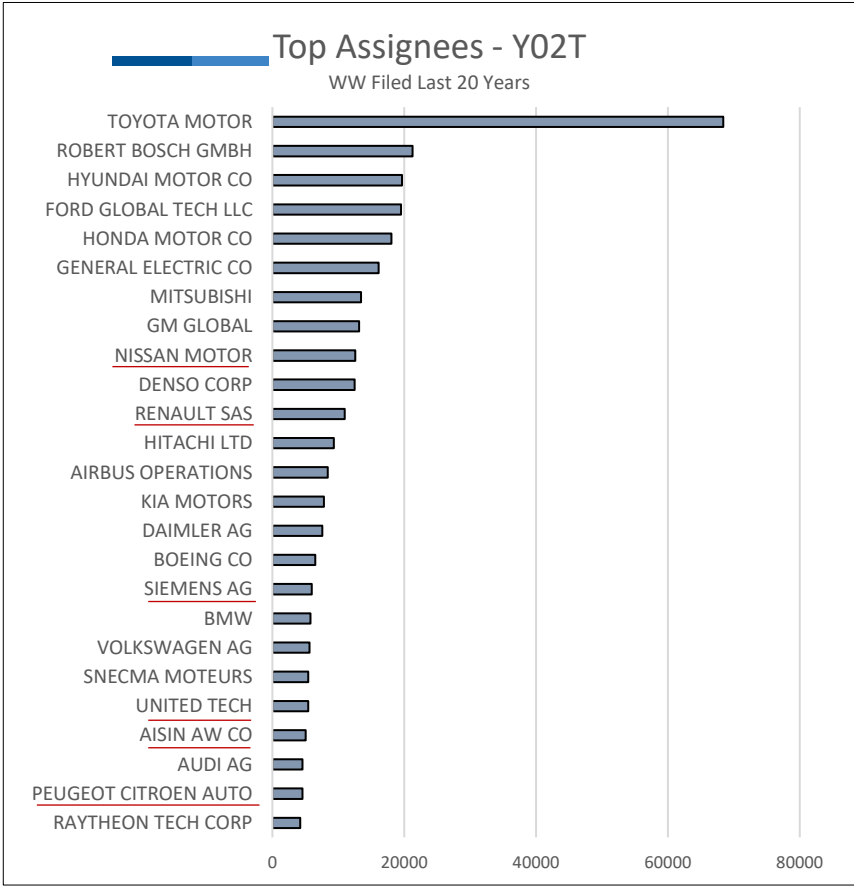
# Y02T – Geographic Breakdown



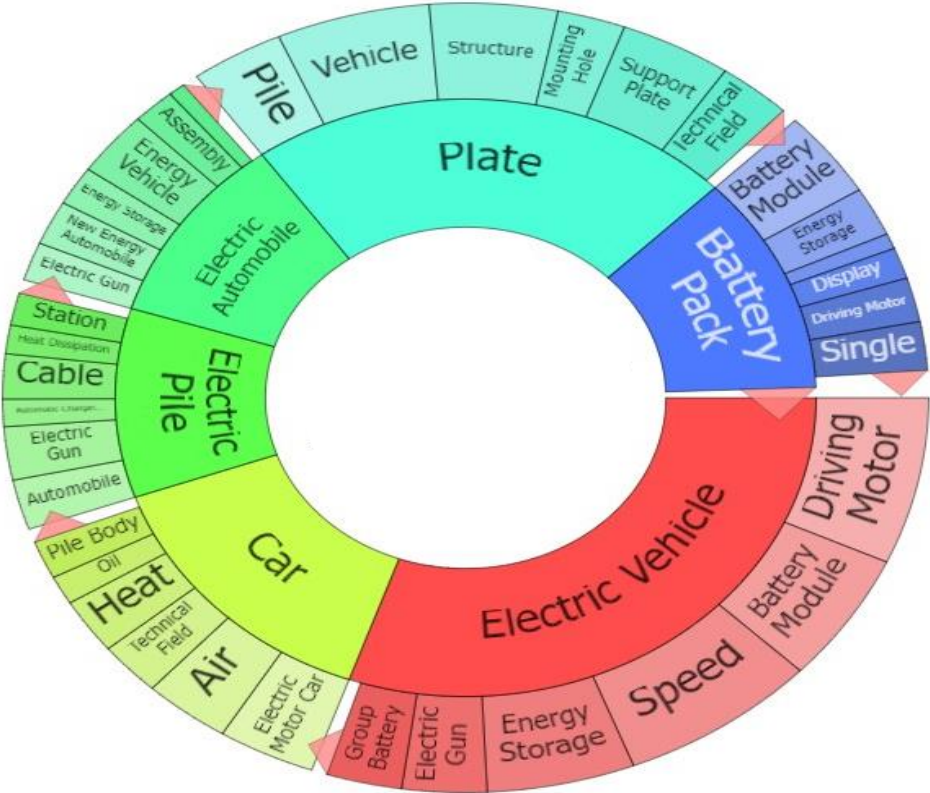
Geographic Breakdown: Y02T Classification



# Y02T – Top Assignee Breakdown



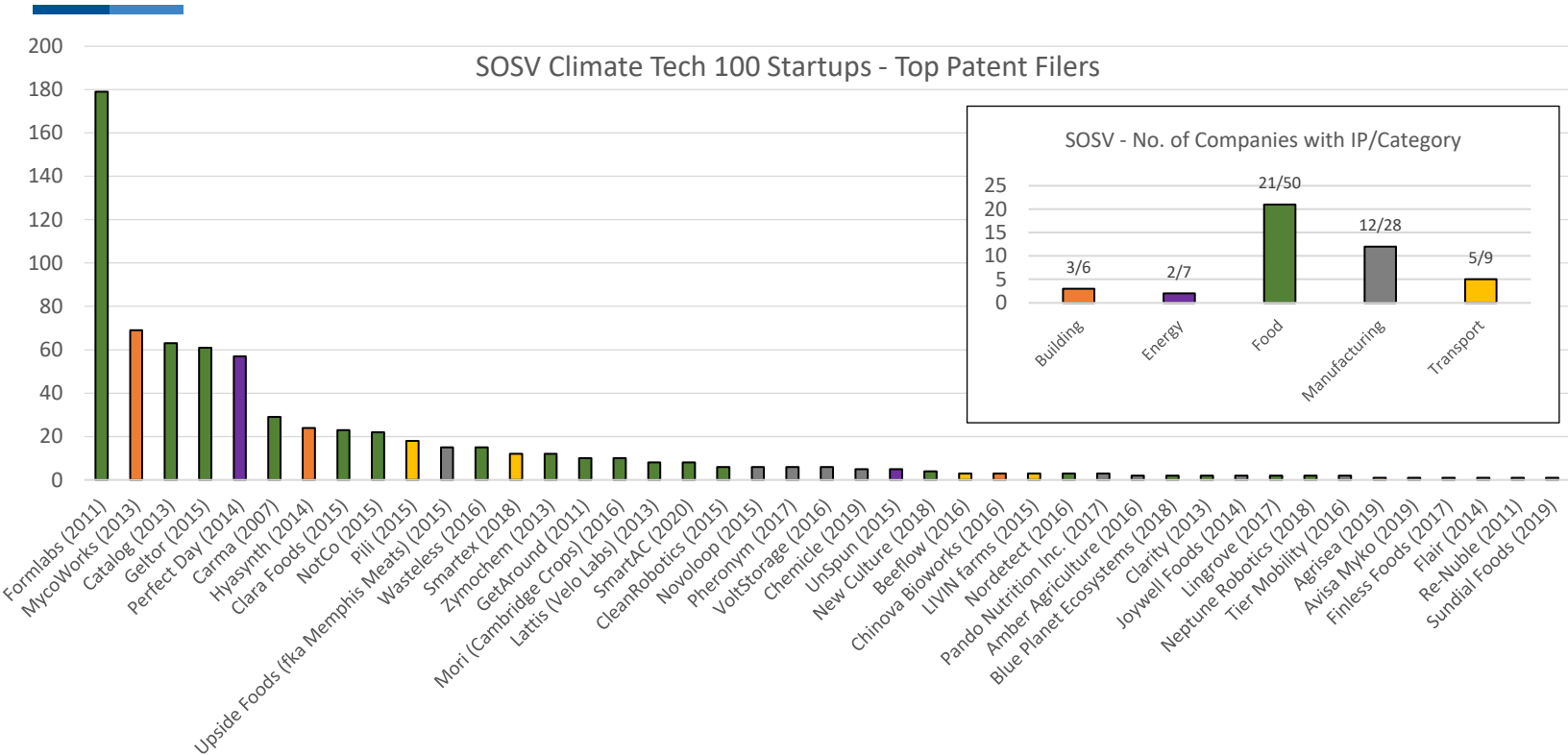
# Y02T – Concept Landscape – Patent Filings Last 5 Years



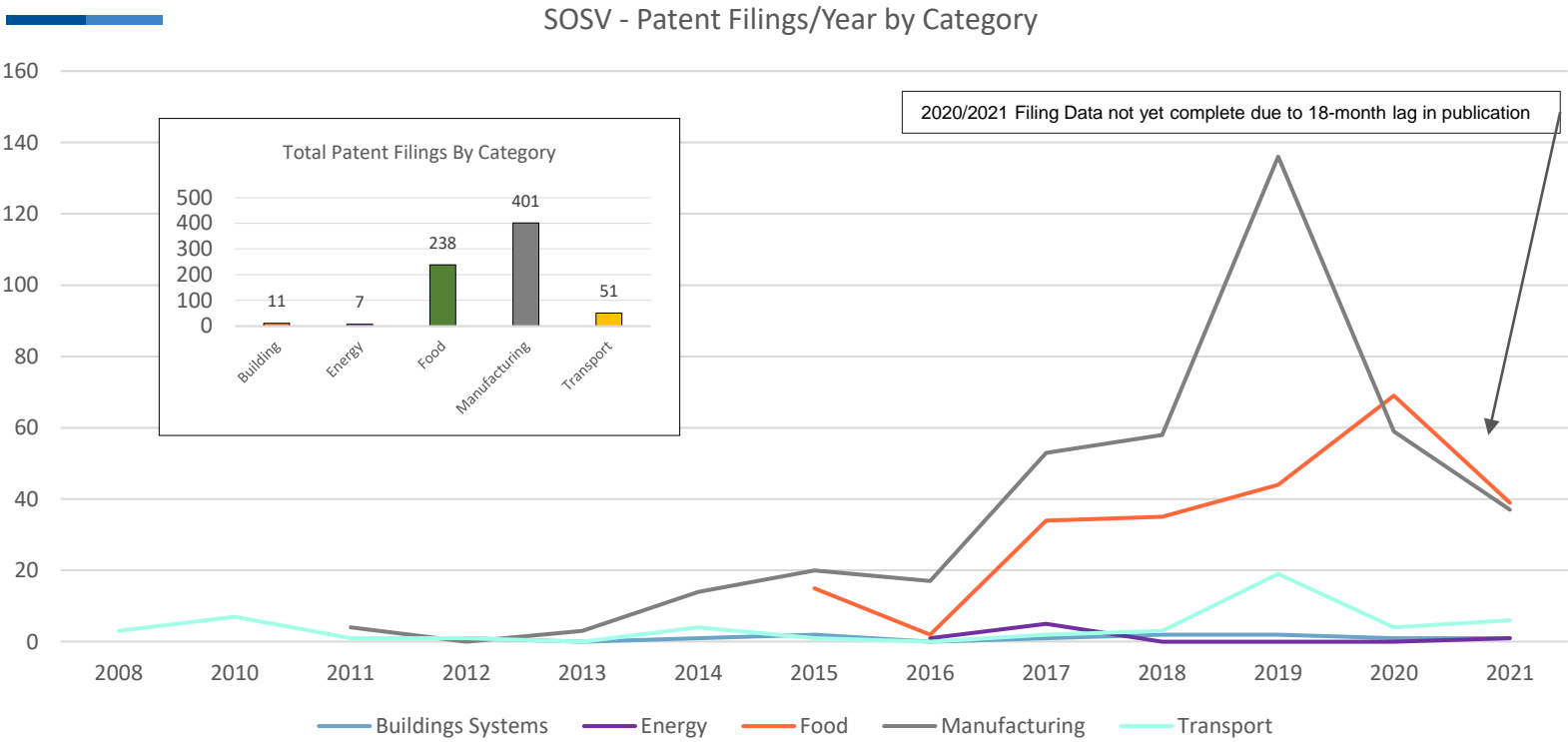
# SOSV Climate Tech 100 Startups Patent Analytics



# SOSV Climate Tech 100 Start Ups – Top Patent Filers

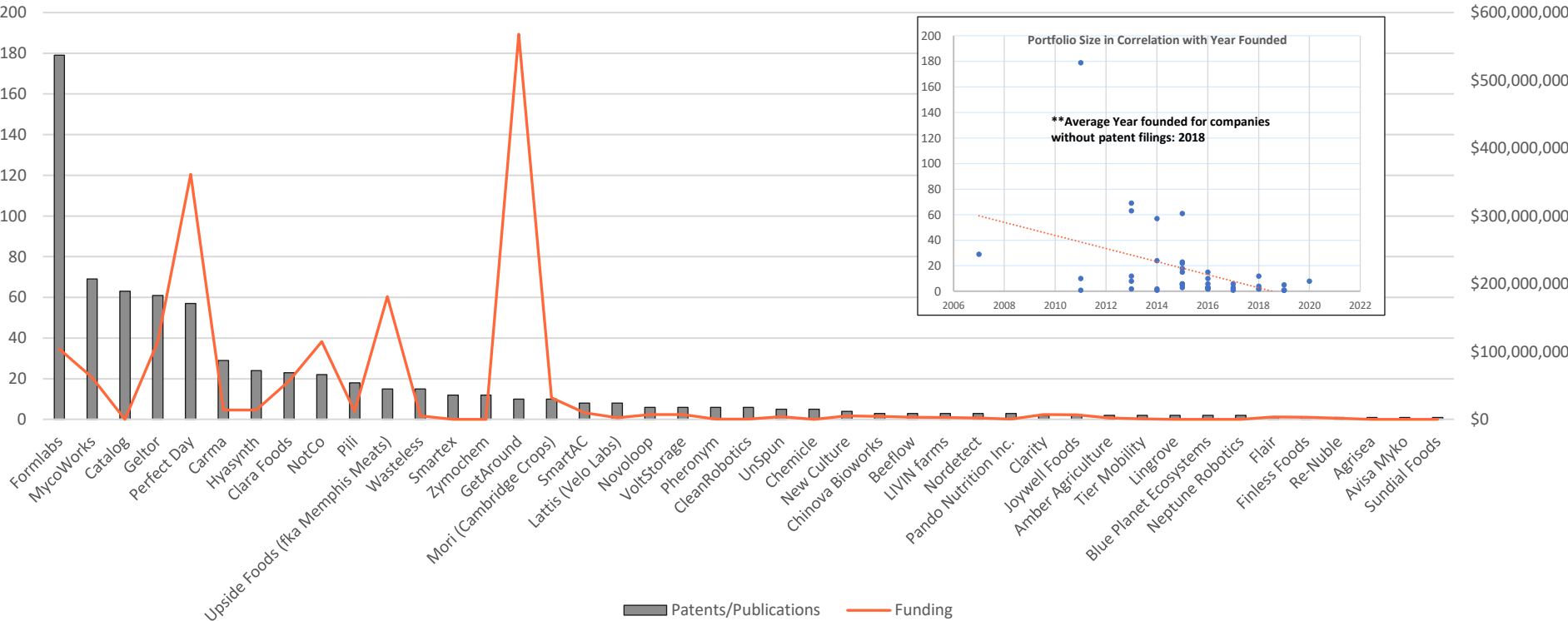


# SOSV Patent Filings/Year by Category

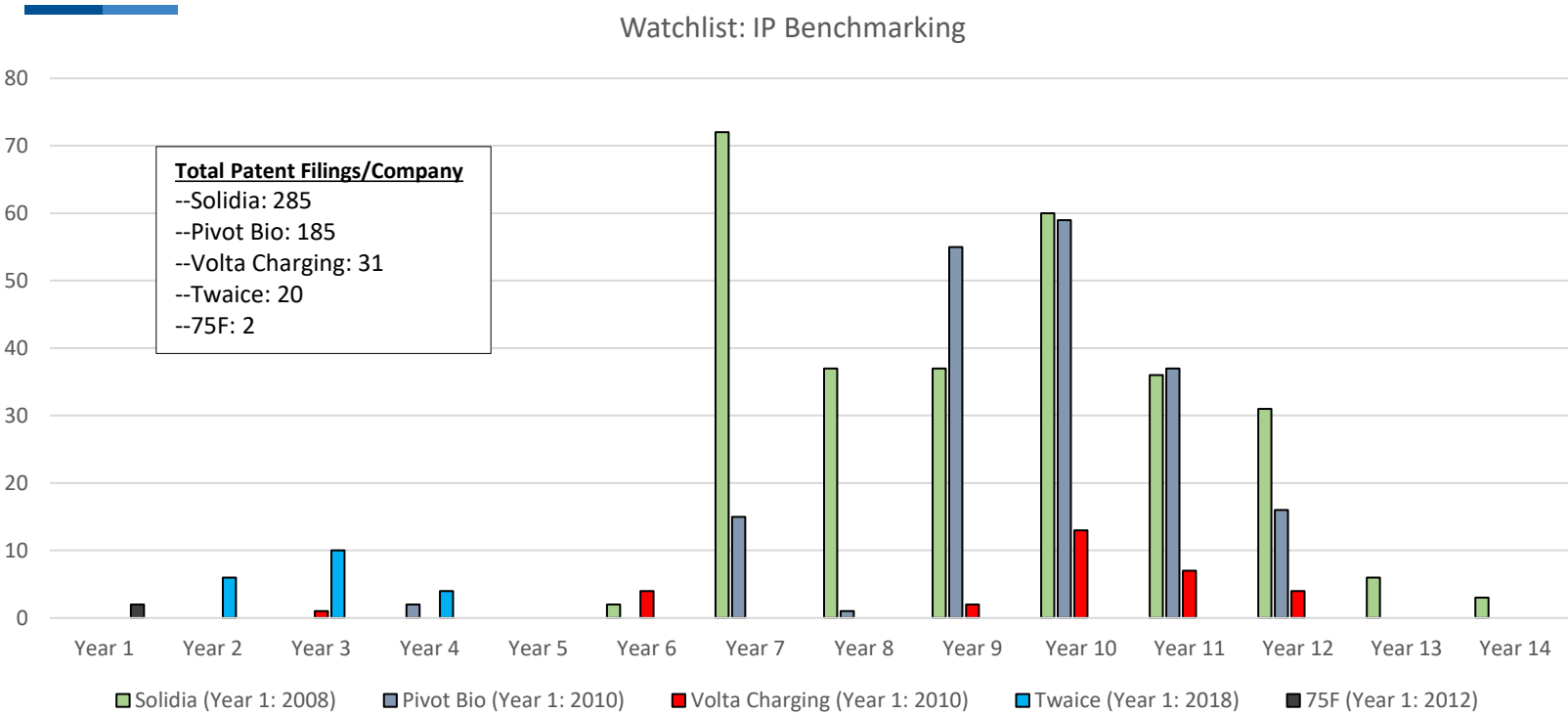


# SOSV Correlation Charting

Patent Portfolio Size in Correlation with Funding

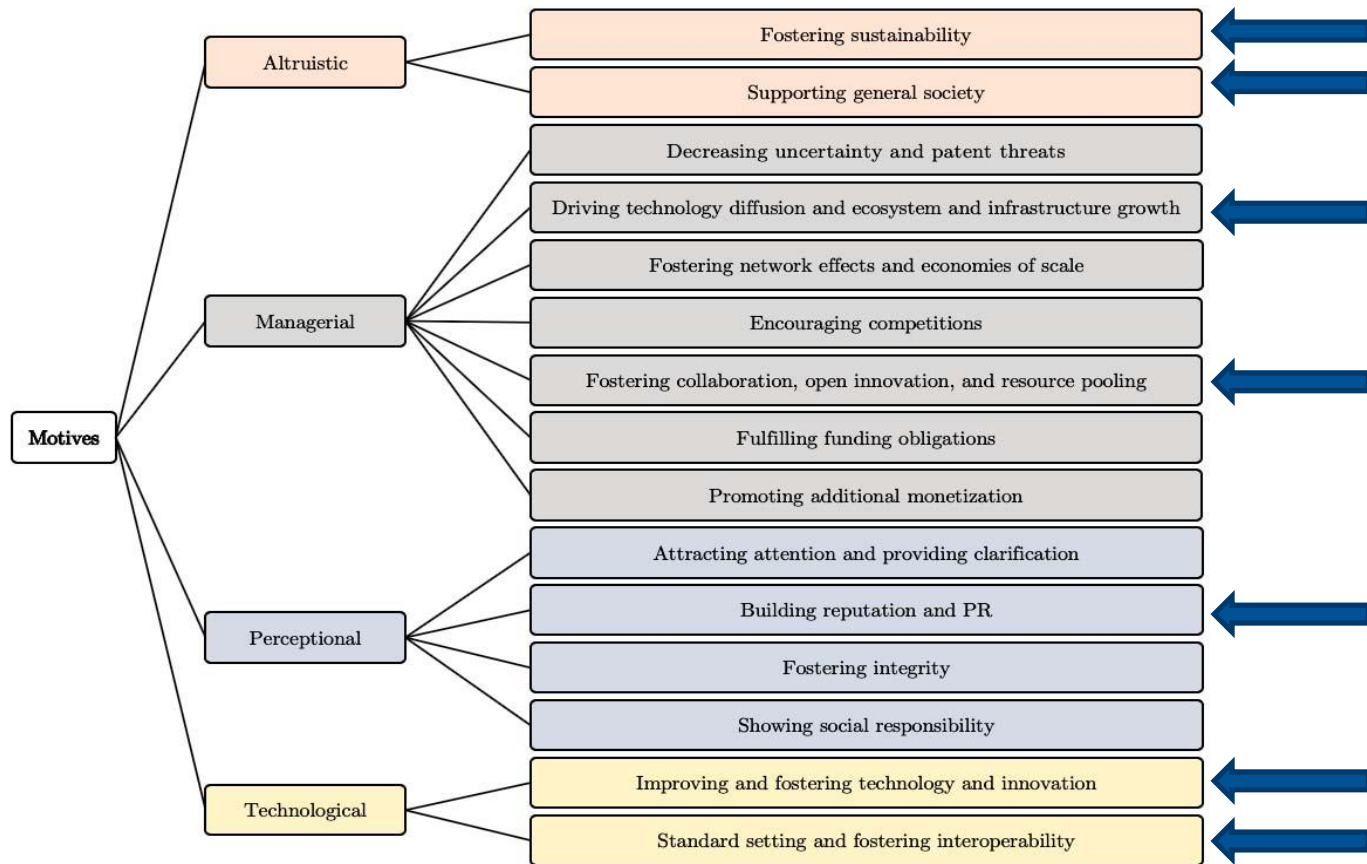


# Watchlist: IP Benchmarking



# Patent Pledges, Commons and Marketplaces

# MOTIVES FOR PLEDGES



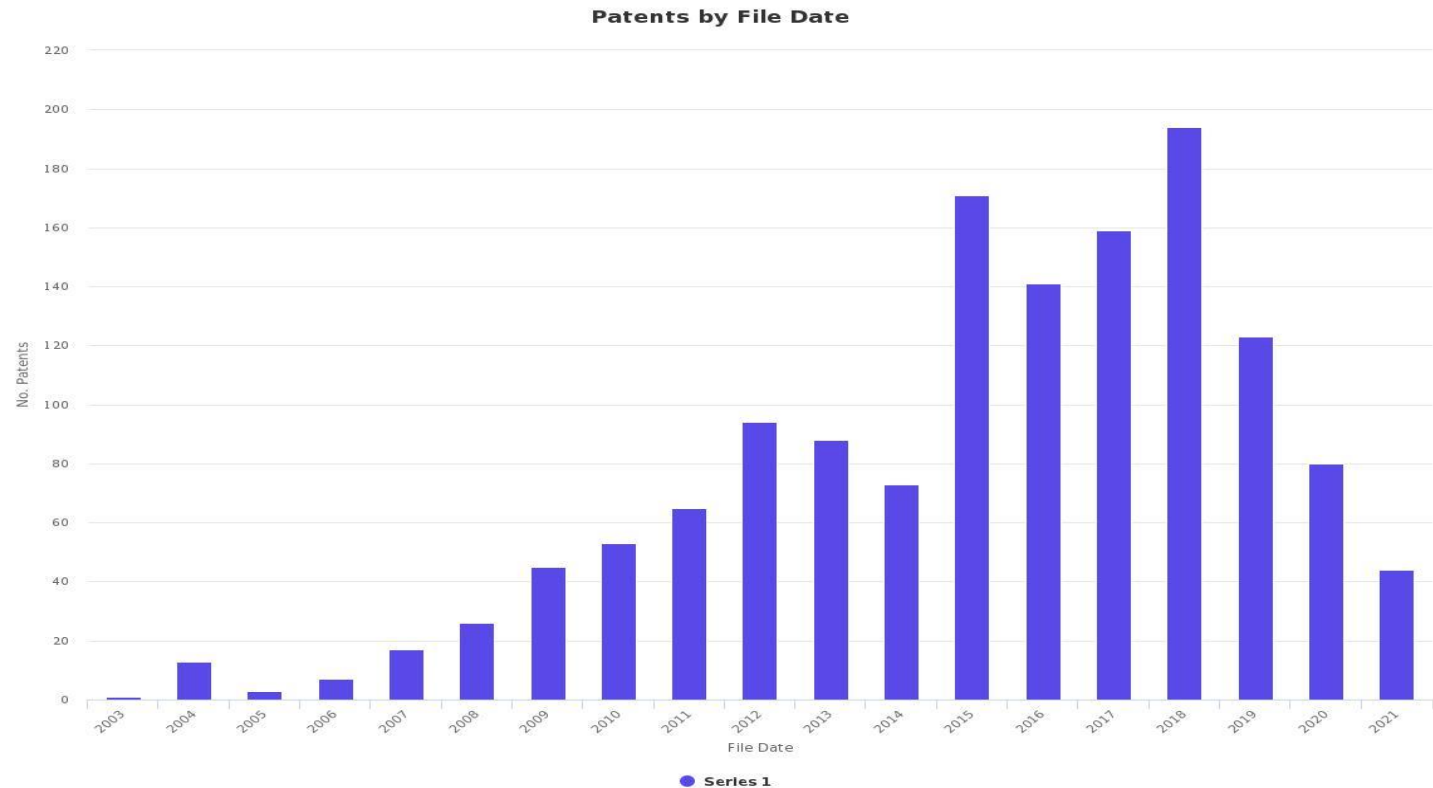
# Elon Musk: Tesla



## June 2014 – “All Our Patent Are Belong To You”

- Not initiate patent lawsuits against anyone who, **in good faith**, wants to use its technology
- Breach of “Good faith” =
  - **Asserted** ... any patent or other intellectual property right against Tesla or any patent right against a third party for its use of technologies relating to electric vehicles or related equipment;
  - **Challenged** ... any Tesla patent; or
  - **Marketed or sold any knock-off** product of a Tesla Product.

# Elon Musk: Tesla





# Initiatives



1.GREENXCHANGE

2.ECO-PATENT COMMONS

3.WIPO GREEN

# Initiatives: GreenXChange



- Launched at Davos, Switzerland in January 2010 by Nike, Creative Commons and Best Buy
- Provided a standardized patent license structure
- No longer active
- Nike = "have gained significant insights from this collaboration which continue to inform [their] strategy to bring sustainability innovations to scale".

# Initiatives: Eco-Patent Commons (EcoPC)



- 2008 initiative spearheaded by IBM, and ultimately joined by twelve additional firms.
- Created as a type of patent pool of green technology related patent
- Pledge of a patent to the Commons included an irrevocable covenant to not assert the patent against any third parties for methods or products utilizing the patented technology, as long as they provided environmental benefits.
- Never caught any traction and began to wind down in 2011, ceasing operation in the 2016

# Eco-Patent Commons (EcoPC)

Table 1: Firm Participation in the EcoPC

Firm	Date Joining EcoPC	No. Patents Pledged*
IBM	Jan. 14, 2008	29
Nokia	Jan. 14, 2008	1
Pitney Bowes	Jan. 14, 2008	2
Sony	Jan. 14, 2008	4
Bosch	Sept. 8, 2008	24
DuPont**	Sept. 8, 2008	11
Xerox	Sept. 8, 2008	13
Taisei	Mar. 23, 2009	2
Ricoh	Mar. 23, 2009	1
Dow	Oct. 20, 2009	1
Fuji Xerox	Oct. 20, 2009	2
Hewlett-Packard	July 1, 2010	3
Hitachi**	July 25, 2011	1

\* Priority patents (i.e., patent families).

## Initiatives: WIPO GREEN (Marketplace for Sustainable Tech)

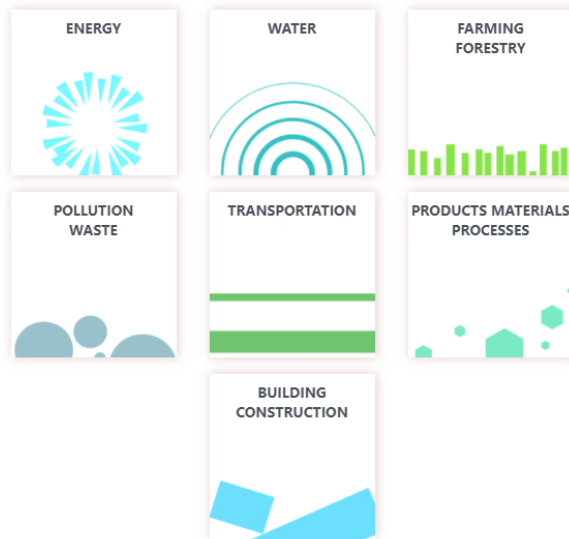


- Not a pooling arrangement – rather online marketplace for transactions between patent owners and green technology purchasers
- 3,800+ listed technologies, 100+ partners, and 700+ connections made

# Initiatives: WIPO GREEN (Marketplace for Sustainable Tech)

## WIPO GREEN Database of Innovative Technologies and Needs

The WIPO GREEN database is a free, solutions oriented, global innovation catalogue that connects needs for solving environmental or climate change problems with sustainable solutions. The database consists of user uploads of needs and solutions, green technology patents from the WIPO Patentscope database, imports from select partner organizations, and relevant knowledge material. AI-assisted auto-matching, user uploads tracing and alerts, full-text search for solutions based on long need descriptions, and the Patent2Solution search function for finding commercial applications of a patent, are some of the unique features of the database. Free registration is required for detailed record view and uploading.



Thank you for your interest.

# Questions?





These materials are for general informational purposes only. They are not intended to be legal advice, and should not be taken as legal advice. They do not establish an attorney-client relationship.