

Current Situation of Hydrogen Energy and Fuel Cell Industry in Shanghai, China

-Government Promotion Policies and Business ECO-system in China

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WUHAN Fighting!!

頑張れ武漢!!

武汉加油



**Hydrogen Energy
and Fuel Cell Enterprises
in HUBEI - WUHAN**



**氢能泡泡
Hydrogen POP**



**山川异域
风月同天
中日联心
共筑氢能**

武汉理工大学

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东风特汽(十堰)专用车有限公司

武汉扬子江汽车集团有限公司

武汉开沃汽车

湖北三环集团

武汉众宇动力系统科技有限公司

湖北葛化中极氢能源有限公司

颐发(湖北)新能源科技有限公司

东深新能源科技(湖北)有限公司

湖北金凰实业集团

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湖北海亿氢能科技有限公司

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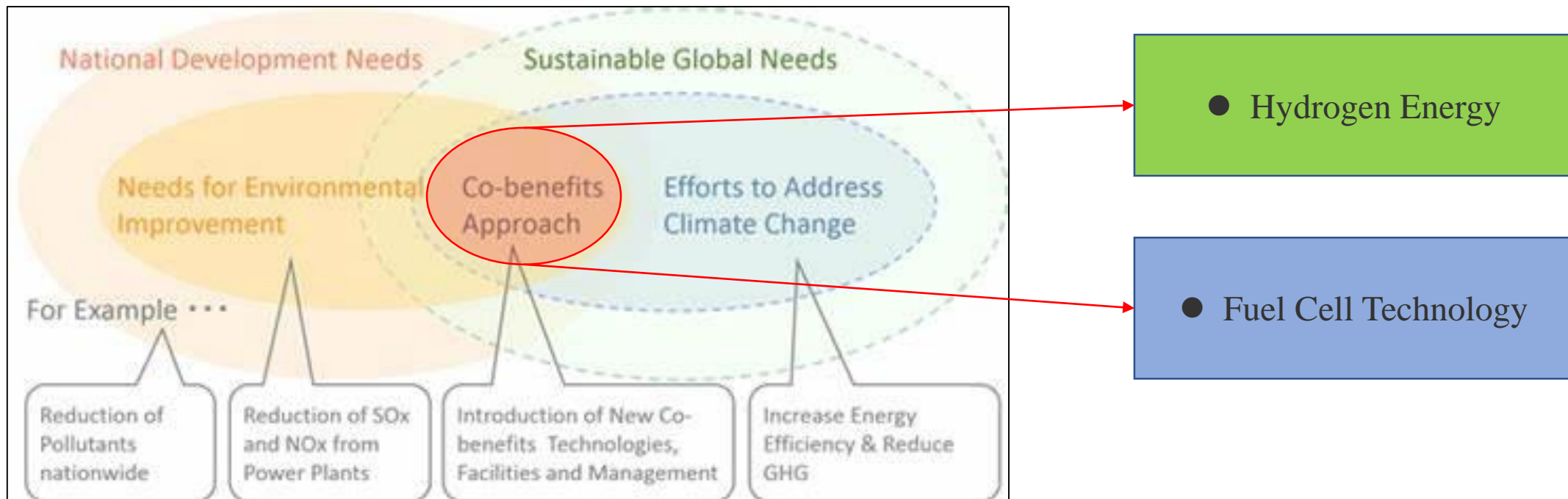
Introduction



一般社団法人 海外環境協力センター
Overseas Environmental Cooperation Center. Japan

OECC is a semi-public organization bringing together a wide range of members, including consulting firms, manufacturing companies, local governments and multi-stakeholder associations. To helping realize a global sustainable society, OECC is implementing research, studies, and capacity building in the field of environment and development cooperation with developing countries.

OECC is undertaking a number of cooperation projects between Japanese and Chinese national/local government to promote introducing Japanese advanced co-benefits approach such as hydrogen energy and fuel cell technology to response CO2 and air pollutants emission issues in China.



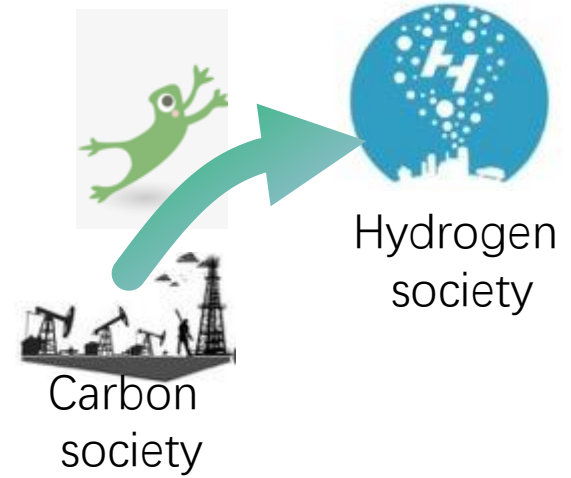
Introduction



上海绿青蛙科技有限公司
Shanghai Green Frog Technology Co., Ltd. (SH Green Frog)

SH Green Frog is focusing on **building the bridge for promoting the hydrogen energy and fuel cell technology and business cooperation between China and Japan**. The idea comes the leapfrogging from to realizing carbon society towards to hydrogen society.

SH Green Frog providing multi-latitudes consulting services, including information platforms **氢能泡泡(Hydrogen POP)** and **SHAHGHAI-OSAKA Hydrogen Energy Industry Cooperation Platform**, technological capacity building, marketing survey, business/ technology cooperation matching (e.g. establishing pilot project in China), international trading and cost down solution to adapt Chinese and Japanese relevant standard.



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氢能泡泡
Hydrogen POP



上海-大阪氢能合作平台
大阪-上海水素協力
プラットフォーム



Mainstream Driving for Introducing Hydrogen Energy in China

Mainstream Driving for Introducing Hydrogen Energy in China

- China is the world's largest importer of crude oil and natural gas.
 - 70% Crude oil rely on import.
 - 45% Natural Gas rely on import.
- Energy security mitigation is one of the most important driving factors for introducing hydrogen energy in China. Requesting to improve diversity of energy recourses and higher self-sufficiency.

- China is the world's biggest CO2 emission contributor.
 - 10 billion CO2e emission in 2018(+2.3%:2017) :76% CO2 from Coal consumption
- * U.S. 5.4 billion CO2e emission
 - Ambitious CO2 mitigation target until 2030 for Paris Agreement:
 - Achieve peak CO2 emission around 2030
 - lower CO2 emissions per unit of GDP by 60 to 65 percent from 2005 level(2018 GDP 6.6% growth rate 6.6%),
 - increase non-fossil fuels in the energy mix to around 20 percent
- China needs more low/zero carbon energy such as hydrogen to support green growth.

Mainstream Driving for Introducing Hydrogen Energy in China

- China is the world's strictest environmental administration for improving PM2.5 air pollution.
 - 2012 《大气污染防治行动计划》 :Action plan for air pollution control 2013-2017:
 - ✓ Planning Target: Reducing PM.25 25% at Beijing Area(2013-2017)
 - ✓ Actual Result: Beijing PM2.5 89.5 $\mu\text{g}/\text{m}^3$ in 2013→ **PM2.5 58 $\mu\text{g}/\text{m}^3$ in 2017**
(China air quality standards of PM2.5 annual mean: level 1: 15 $\mu\text{g}/\text{m}^3$ (same as Japan), **level 2: 35 $\mu\text{g}/\text{m}^3$**)
 - 2018 《蓝天保卫战三年行动计划》 : Three year action plan of blue sky defense 2018-2020
 - ✓ Planning Target: Reducing PM.25 15% at Beijing Area(2018-2020)
 - ✓ Key Region (Beijing, Shanghai...) start to implement China 6th phase emission limitation for light duty and diesel heavy-duty vehicles in 2019

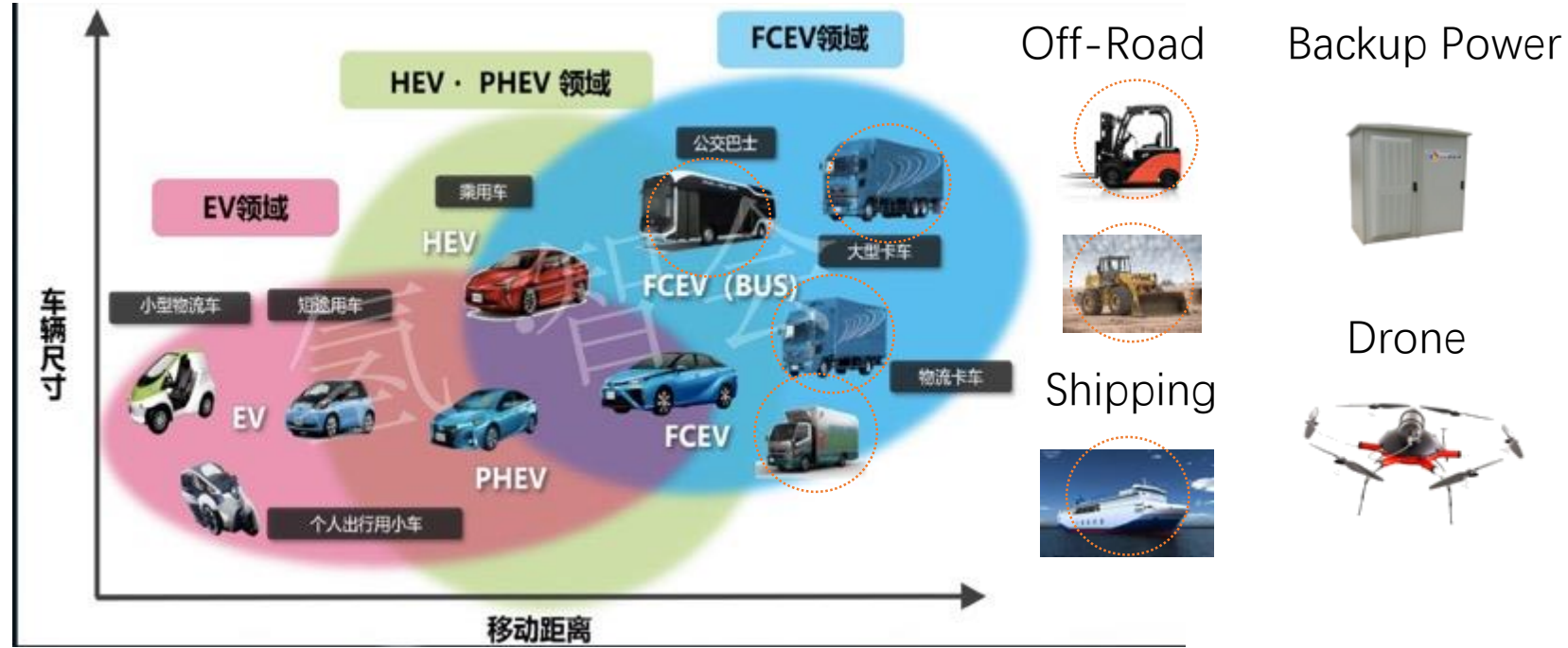
Mainstream Driving for Introducing Hydrogen Energy in China

- China is the world's strictest environmental administration for improving vehicle air pollution.
 - 2018.6 《交通运输部关于全面加强生态环境保护坚决打好污染防治攻坚战的意见》 :Opinions of the Ministry of transport on strengthening the protection of ecological environment in an all-round way and firmly fighting against pollution
 - 2019.1 《柴油货车污染治理攻坚战行动计划》 :Action plan for diesel truck pollution control
 - ✓ Replacing the old and high air pollutant emission diesel truck, shipping, off road machine by new energy types(LNG、 electric).

Until 2020,

- ✓ new energy city bus, taxi and logistics vehicle achieve 600 thousands.
- ✓ In the key cities (Beijing, Shanghai···) ,all city buses must be shifted to new energy.
- ✓ eliminate 1 million 3rd PEL diesel trucks in Beijing and Shaanxi region.
- Great big potential and needs for introducing hydrogen energy FCV(bus, logistics vehicle, heavy truck, shipping) in China.

Mainstream Driving for Introducing Hydrogen Energy in China



- ✓ Hydrogen energy and FCV will be the co-benefits approaches(一石二鳥) for enhancing CO2 and air pollutants emission reduction in China.
- ✓ Hydrogen energy and FCV industries will support the green economic growth of China.

Promoting Policies for Introducing FCV in China and Shanghai

Promoting Policies for Introducing FCV

● National Level Promoting Policies

Time	Polices	Key Points
2009	能源局发布《节能与新能源汽车示范推广财政补助资金管理暂行办法》	Subsidy:250-600 thousands CNY→FCV
2011	工信部、国家税务总局发布《中华人民共和国车船税法》	Tax free/half reduce : Vehicle and vessel usage license plate tax
2012	国务院出台《节能与新能源汽车产业发展规划（2012-2015）》	
2014	工信部、国家税务总局、财政部联合出台《关于免征新能源汽车车辆购置税的公告》	Tax free/half reduce : Vehicle and vessel usage license plate tax
	财政部发布《关于新能源汽车充电设施建设奖励的通知》	Subsidy: 4 millions CNY→above 200 kg/day hydrogen station
2015	财政部、科技部、工信部和发改委发布《关于16-20 年新能源汽车推广应用财政支持政策的通知》	Subsidy: During 2017-2020, subsidy for FCV remain unchanged.
2016	《能源技术革命创新行动计划（2016-2030 年）》、《能源技术革命重点创新行动路线图》、《十三五国家战略性新兴产业发展规划》	Target of FCV industry development: FCV mass production and scale up demonstration 2020

Promoting Policies for Introducing FCV

● National Level Promoting Policies

Time	Polices	Key Points
2016	工信部、财政部、科技部、发改委发布《新能源汽车推广补贴方案及产品技术要求》	Subsidy: Mileage > 300 km by FC 200 thousands CNY → passenger FCV (6000 CNY/kW: 10kW < FC < 30kW) 300,500 thousands CNY → commercial FCV (FC ≥ 30kW, > 30% of Motor Capacity)
2018	工信部、财政部、科技部、发改委发布《关于调整完善新能源汽车推广应用财政补贴政策的通知》	Subsidy: Mileage > 300 km by FC 200 thousands CNY → passenger FCV (6000 CNY/kW: 10kW < FC < 30kW) 300,500 thousands CNY → commercial FCV (① FC ≥ 30kW, FC > 30% of Motor Capacity, ② 30-40%: 0.8*SB, ③ 40-50%: 0.9*SB, ≥ 50%: 1*SB)
2019	工信部、财政部、科技部、发改委发布《关于进一步完善新能源汽车推广应用财政补贴政策的通知》	Subsidy: 2019.3.36-6.25 : 0.8*2018 SB, SB for FCV is under revising. Local government SB target should sift from FCV to HST.
	政府工作报告提出推动加氢设施建设; 补贴新政明确给予加氢站补贴。	Subsidy: arrange SB for HST.

Promoting Policies for Introducing FCV

- More than 30 province/cities released hydrogen energy industry developing plan and promoting polices

省市	政策名称	城市	政策名称
北京	关于调整《北京市推广应用新能源汽车管理办法》相关内容的通知	六盘水	《六盘水市氢能产业发展规划(2019-2030年)》
上海	《氢燃料电池汽车产业集聚区规划》	广州市	《广州市黄埔区广州开发区促进氢能产业发展办法》
	《鼓励氢燃料电池汽车产业发展的有关意见（试行）》	济宁市	《济宁市加氢站管理暂行办法》
天津	《天津市氢能产业发展行动方案（2019-2022）年》	嘉兴市	《关于加快嘉兴氢能产业发展的若干意见》
重庆	《关于印发重庆市2019年度新能源汽车推广应用财政补贴政策的通知》	六安市	《六安市人民政府关于大力支持氢燃料电池产业发展的意见》
河北	《河北省推进氢能产业发展实施意见》		《2019年全市工业经济工作要点》
山西	《山西省新能源汽车产业2019年行动计划》	常熟市	《常熟市氢燃料电池汽车产业发展规划》
河南	《河南省加快新能源汽车推广应用若干政策的通知》	苏州市	市政府办公室印发关于《加快氢能产业发展的若干政策措施》的通知
江苏	《关于印发江苏省氢燃料电池汽车产业发展行动规划的通知》	老河口市	《老河口市加氢站管理办法（试行）》
浙江	《浙江省加快培育氢能产业发展的指导意见》	潍坊市	《关于做好全市汽车加氢站规划建设运营管理工作的意见》
张家口市	《张家口市支持氢能产业发展的十条措施》	济南市	《济南新旧动能转换先行区促进产业发展十条政策》
	《氢能张家口建设规划（2019-2035年）》	镇江市	《2018-2020年镇江市新能源汽车推广应用地方财政补贴实施细则》
佛山市	《禅城区新能源公交车推广应用和公交充电设施建设财政补贴资金管理实施细则》	张家港市	《张家港市氢能产业发展三年行动计划（2018-2020年）》
	《促进加氢站建设运营及氢能源车辆运行扶持办法》	深圳市	关于印发《深圳市2018年新能源汽车推广应用财政支持政策》的通知
成都市	《成都市支持氢能暨新能源汽车产业发展及推广应用若干政策》	长治市	长治上党区人民政府关于印发《长治市上党区氢能产业扶持办法（试行）》的通知
	《成都市氢能产业发展规划（2019-2023年）》	江门市	江门市人民政府关于印发《江门市推动新能源汽车产业创新发展实施方案》的通知
宁波市	《宁波市人民政府办公厅关于加快氢能产业发展的若干意见》	株洲市	《株洲市氢能产业发展规划（2019-2025）》

Shanghai Policies for Hydrogen Energy and Fuel Cell Industry

● Shanghai FCV Industry Develop Plan(2017.9)

TARGETS	2017-2020	2021-2025	2026-2030
FCV Relevant Enterprise	100 companies	International Leading Level: 1 automobile manufacturer, 2-3 power system companies, 8-10 critical parts companies.	-
Hydrogen & FC Technology R&D Center	1 institution	World Top Level: 2 R&D and public services institutions	
FCV Inspection Center	1 institution		
Annual Output Value of FCV Industrial Chain	15 billion CNY	100 billion CNY	300 billion CNY
FCV Demonstration Area	2	scale up	Distribute Shanghai's FCV industrial & value chain to nationwide.
FCV	3000 city buses & logistical trucks	20000 passenger vehicles 10000 special vehicles scale up city buses & logistical trucks	
Hydrogen Station	5-10	50	

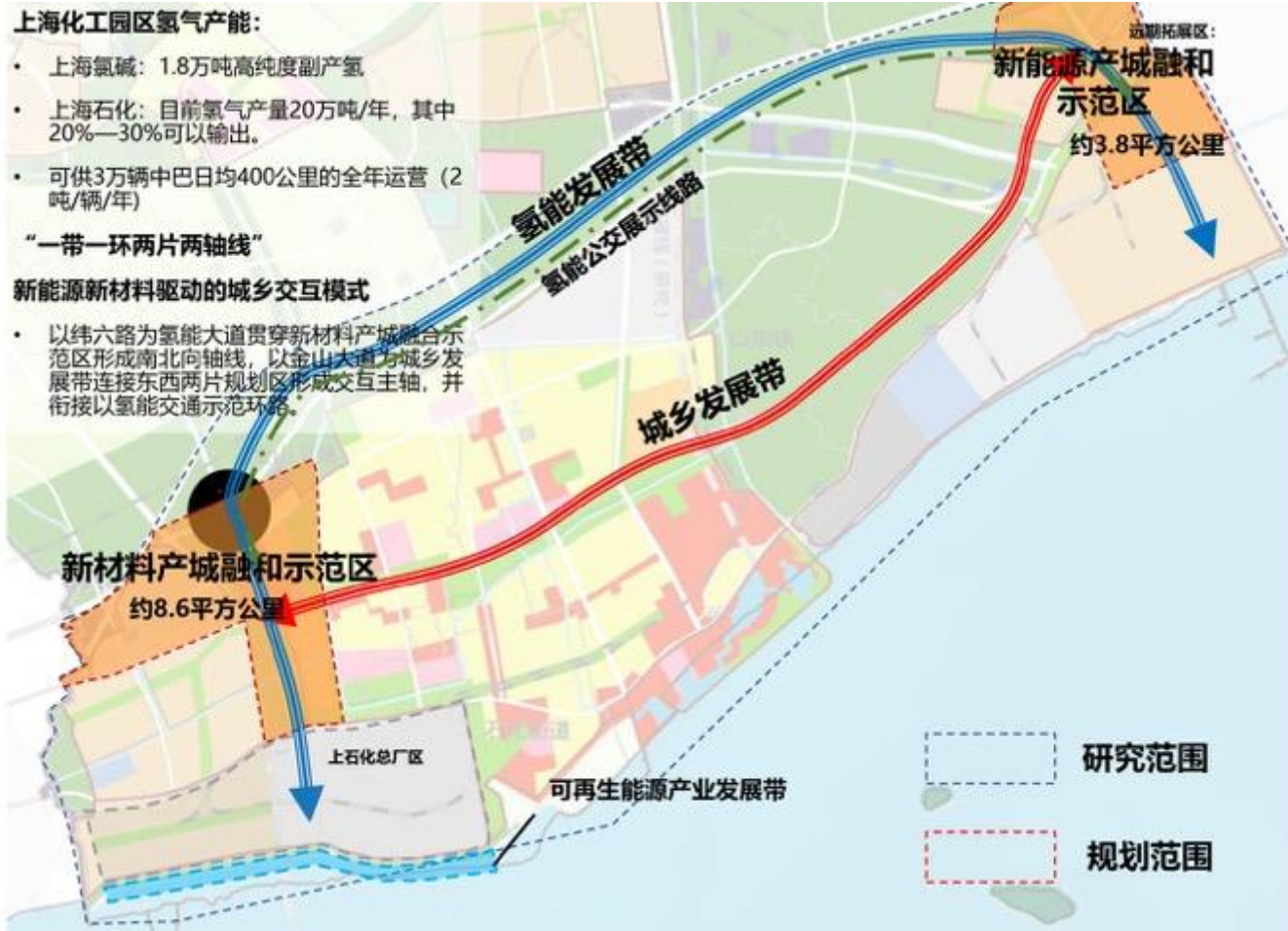
Shanghai Policies for Hydrogen Energy and Fuel Cell Industry

- 2019年6月 《嘉定区鼓励氢燃料电池汽车产业发展扶持的有关意见（试行）》 -JIADING District

Promoting FC industry investment	<ul style="list-style-type: none"> ● 5000万美元的外资项目或5亿元人民币以上的内资项目，按照一企一策优先安排产业用地、专项资助和人才激励政策。 ● 鼓励引进企业总部。最高100万元的一次性奖励。 ● 支持降低企业生产用地和用房成本。最高1000万元
Enterprises cultivation	<ul style="list-style-type: none"> ● 并购国内外知名品牌的，经认定给予并购金额10%，最高1000万的补贴 ● 推动氢燃料电池公交车的示范运营，按照国家和市级标准给予补贴。
Promoting FC R&D	<ul style="list-style-type: none"> ● 获得重大突破并取得国家发明专利，该产品形成开票销售后奖励100万元。支持企业制订行业标准。对主导制订相关行业国际、国家、行业标准的企业和机构，分别给予100万元、50万元和20万元的一次性奖励。
Financial support for FCV Enterprises	<ul style="list-style-type: none"> ● 区产业投资基金、创业引导基金和天使引导基金可优先出资并提高出资比例至30%；可按照约定价格退出。对经认定的实缴资本1亿元以上、已投资区内氢燃料电池相关产业链企业且发生投资额占实缴资本20%以上的股权投资企业予以最高不超过300万元扶持
Subsidy for H2 ST	<ul style="list-style-type: none"> ● 支持加氢站建设。对于加氢压力35MPa/70MPa、加氢能力≥500kg/d@12小时、固定高压储氢罐总储氢量≥200kg、加氢枪数量≥2把，并同时具备氢危化品经营许可证和氢气车用钢瓶气瓶充装许可证的加氢站给予补贴，其中加氢压力≥70MPa（含兼容35MPa）的每站补贴500万元，加氢压力≥35MPa的每站补贴200万元（待市住建委制定补贴标准后，我区补贴标准相应上浮10%-20%）。
Promoting FC association & PR	<ul style="list-style-type: none"> ● 经认定按每次活动费用的30%-50%给予扶持，年度累计不超过100万元；企业参加市级以上的博览会、交易会等商务活动，经认定给予每次10%-30%的参展补贴，年度累计不超过50万元。 ● 支持企业建立产业联盟和行业组织。经社团登记和认定后，可给予30万元的一次性开办补贴；产业联盟、创新联盟或创新服务行业组织运营良好的，三年内经评估后可给予最高50万元奖励。

Shanghai Policies for Hydrogen Energy and Fuel Cell Industry

● JINSHAN District(金山区)



- From petrochemistry Industry to Hydrogen industry

→ Supply Low cost(500 Japanese Yen) H2 by-product 40thousands ton/year H2(=200thousand TOYOTA MIRAI /year)

- From Hydrogen pipeline to H2 society.

- H2 production

→Wind/solar power to H2、Sewage biogas to H2

- H2 store & transportation

→high pressure H2 equipment

→liquid H2 equipment

- FC R&D and producing

→FC for **vehicle , drone, off-road, backup power**

- H2 Application Introducing

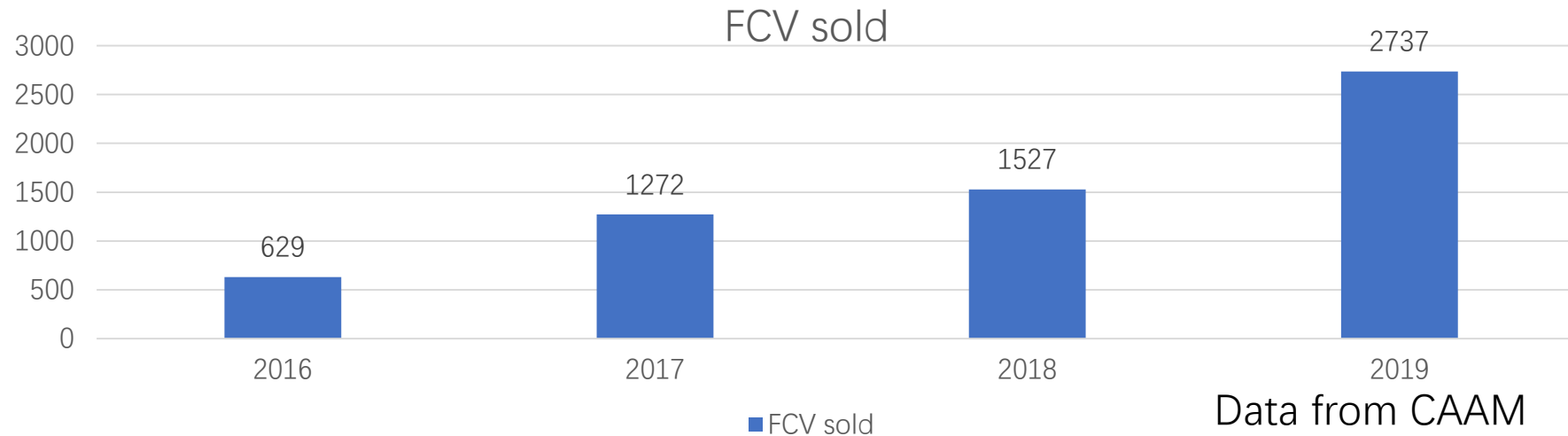
→800 FCV logistics truck

→ Large scale heat & electricity cogeneration FC for commercial application such as hotel

Current Situation of Hydrogen Energy and Fuel Cell Industry in China

Popularization Situation of FCV

- 2016-2019: 6165 FCV sold in China(data from CAAM) , 2019: 2737 FCV sold in China



- Types of FCV

- 41 types of truck

- ✓ 30types are 4.49-16.5ton trucks. 1 type for 42ton truck-tractor.

- ✓ Currently(2019.7-11) the mainstream capacity of FC applied in logistics truck is raising from 30 kW to 40-50 kW.

- 107 types of bus:

- ✓ 93types are 7-12m city buses.

- ✓ Currently(2019.7-11) the main capacity of FC applied in bus is raising to 40-65 kW. The max one is 92kW,

FCV in Shanghai



mini bus (35MPa)



passenger vehicle(70MPa)



MVP (70MPa)



heavy truck (35MPa)

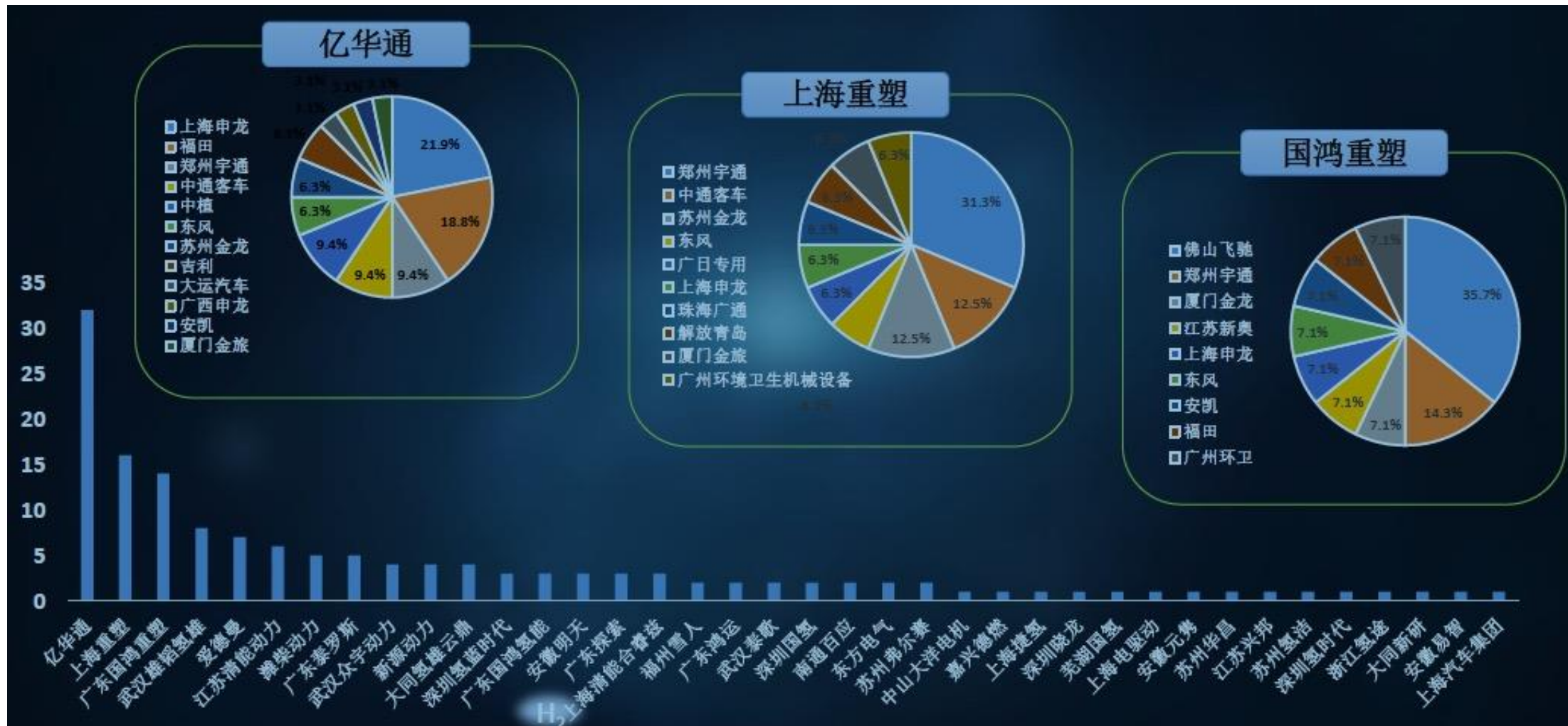


city bus (35MPa)



logistics truck (35MPa)

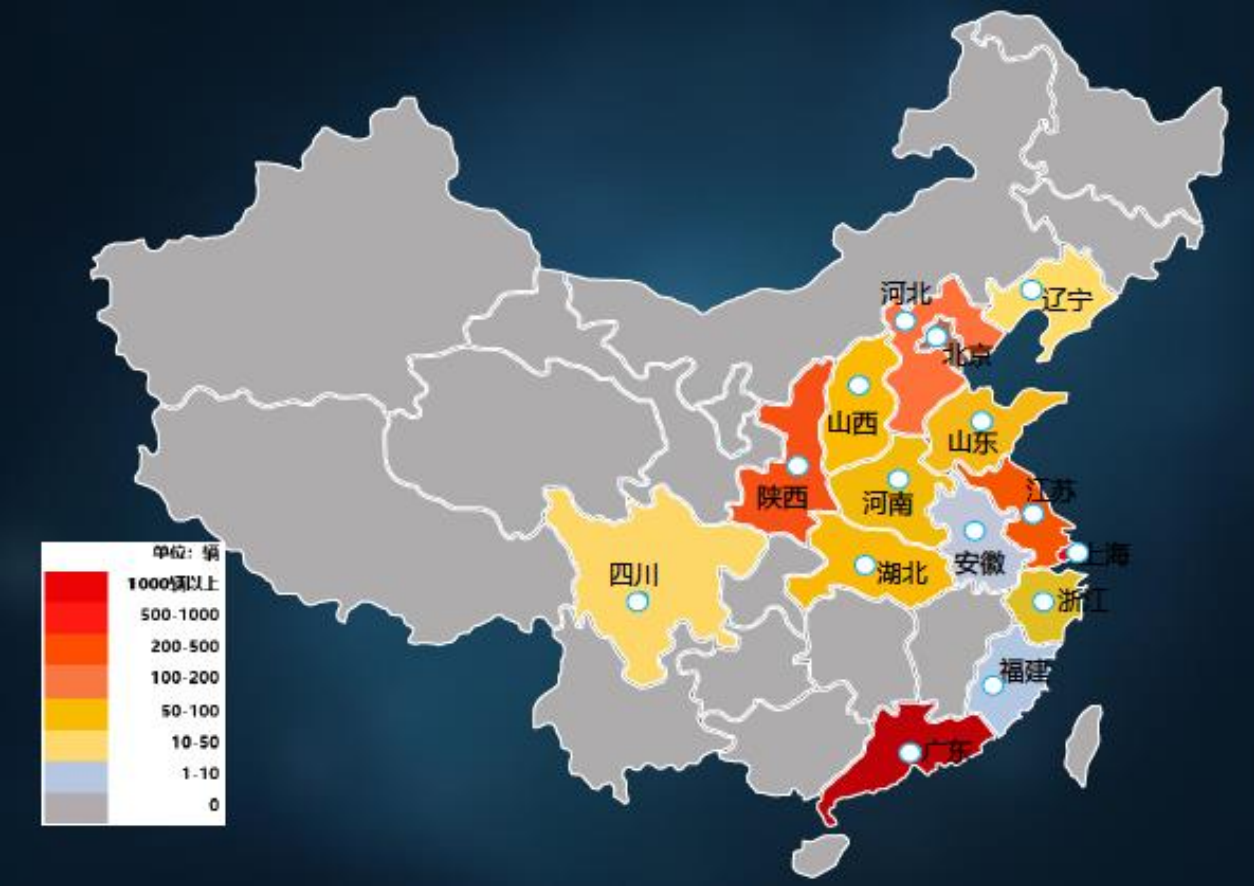
The main FC System Makers in China



Data from Shanghai Partnership of FCV

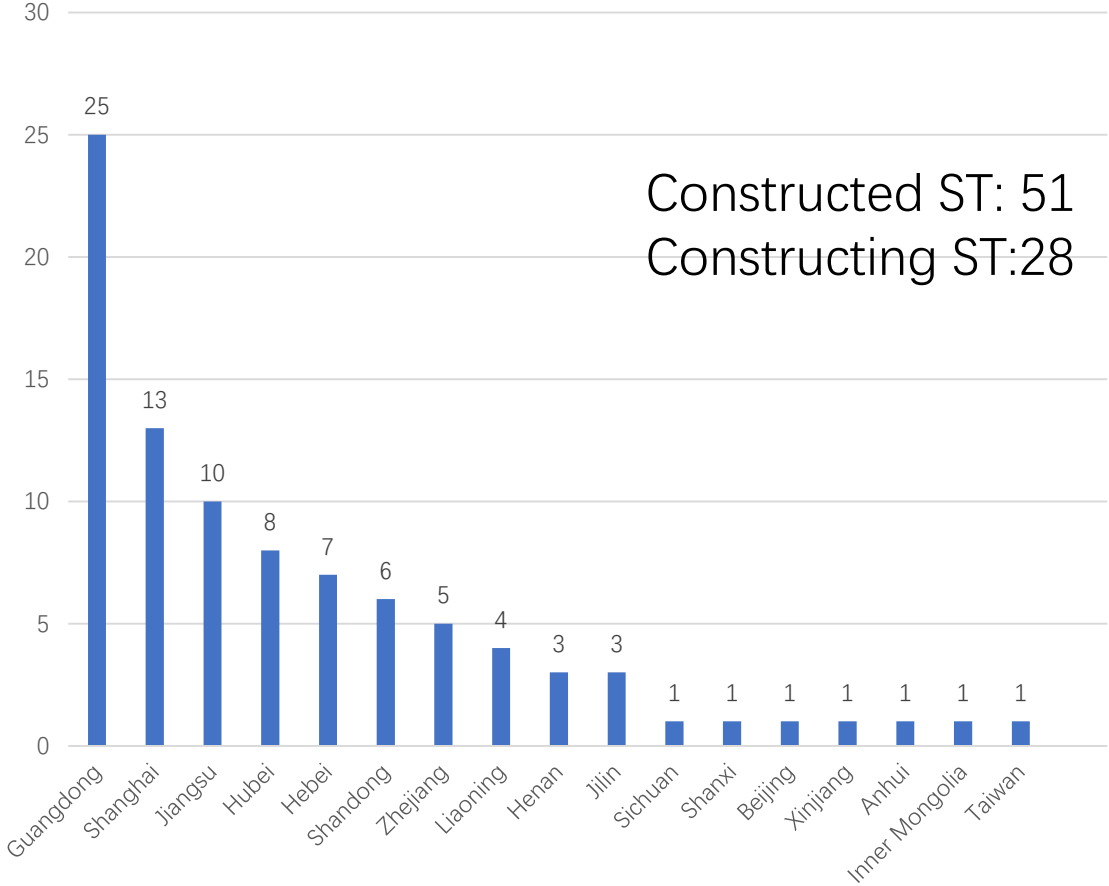
- Three biggest FC makers (Yihuatong, Refire, Guohong) installed their FC products into truck and bus which from numerous automobile manufacturer.

Distribution of FCV in China



Data from Shanghai Partnership of FCV

Distribution of Hydrogen Station in China




Data from Shanghai Partnership of FCV

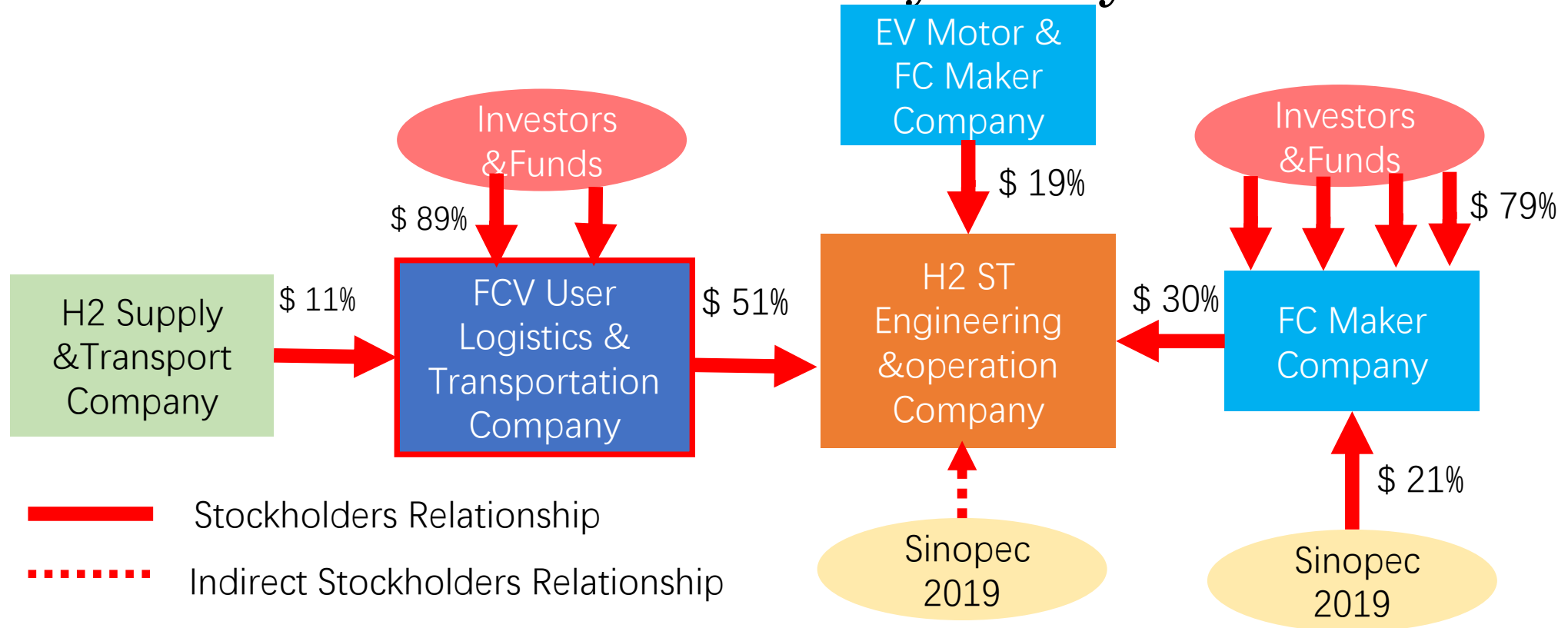
Business Ecosystem of Hydrogen Energy and Fuel Cell Industry in Shanghai

Subsidy Policy Implementation for Demonstrating FC Logistical Trucks

- Within the Subsidies from China national government and Shanghai local government, the FCV truck final cost for logistical company(end-user) become close to or cheaper than traditional diesel truck.
→ The end-users have no worry about initial cost of FCV.
- FCV end-user(logistical company) has the priority to get free cost ECO No. Plate
→The FCV logistical company can start his business faster.

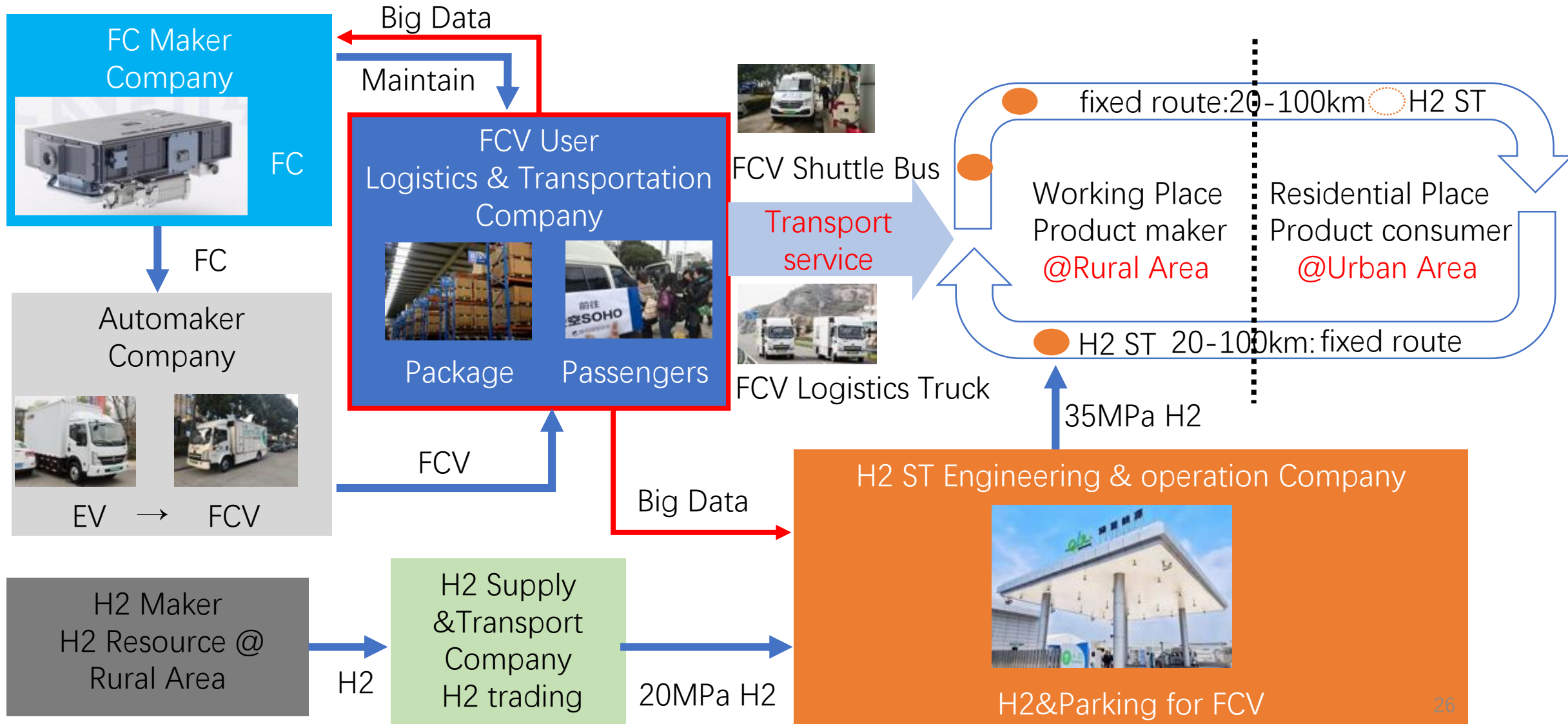
Year	FCV Logistical Trucks(Total Mass: ton)	FC Capacity (kw)	H2 Storage (kg/35m ³)	Mileage (km)	Market Price (million CNY/FCV)	Subsidy (million CNY/FCV)	Final cost for end-user company (thousands CNY/FCV)	Other promotion policy in Shanghai
2017 	7.5 (loading capacity:3.2ton)	30	10	350	1.06	National:0.5 Shanghai:0.5	60	The priority to get free cost ECO No. Plate
2019 	8.7 (loading capacity:3.5ton)	45	9	380	0.87	National:0.4 Shanghai:0.4	70	

Stockholders Relationship in Hydrogen Energy and Fuel Cell Industry Ecosystem



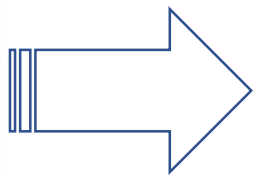
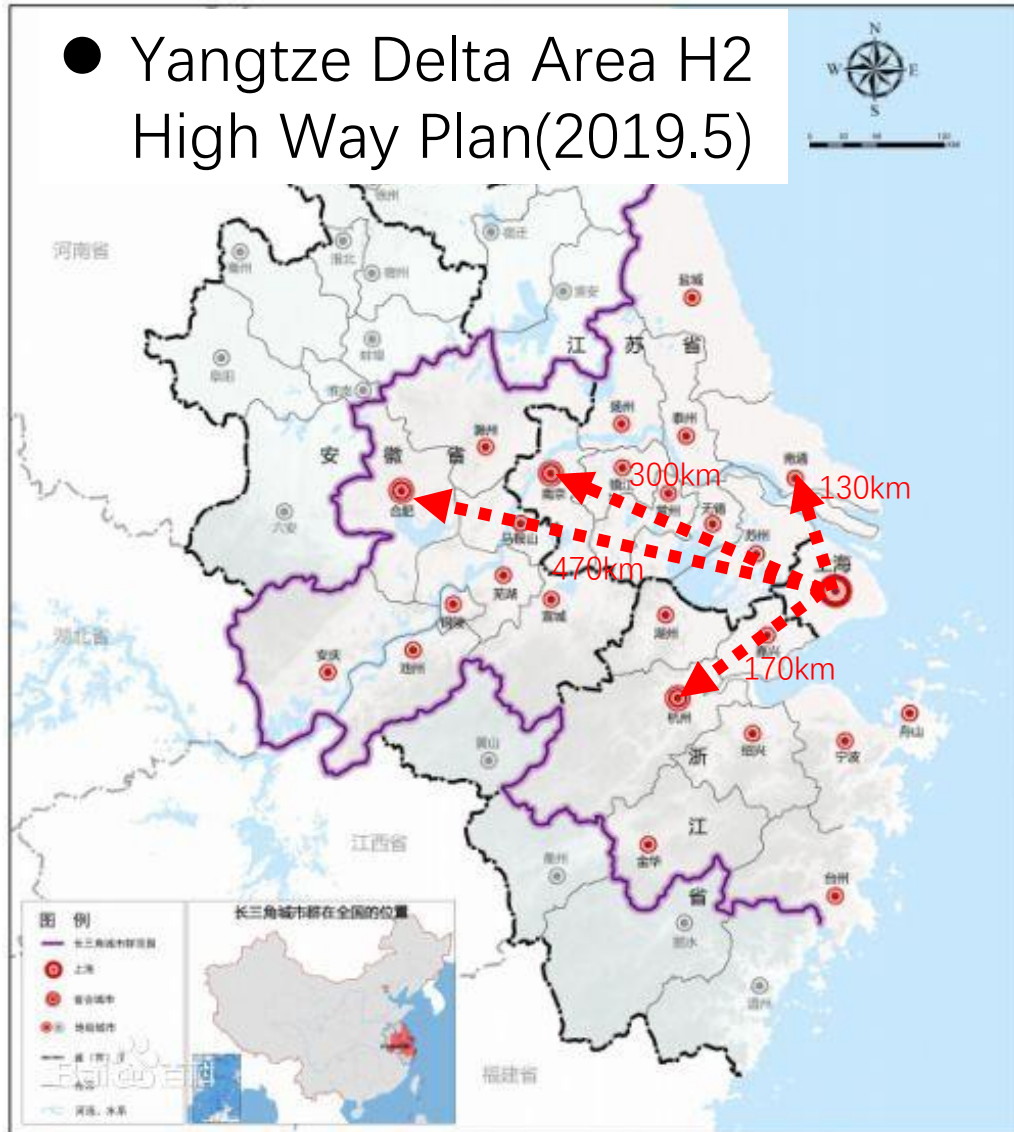
- The companies in the HE&FC business ecosystem have very close connection by capital relationship. FCV Logistics Company is the key player for promoting FCV&FC industries.
- The close connection can great the systematic cost down of H2 energy and FC.

FCV Application Business Model for Rural-Urban Transportation



Trans Province & Community Application in the Further

● Yangtze Delta Area H2 High Way Plan(2019.5)



Mid-Term(2-3year)



Heavy truck



Highway bus

↓ New apply

Short-Term(1-2year)

Now applying



Shuttle Bus



Logistics Truck

↓ More apply

Mid long-Term (3-5year)



TAXI Car



City Bus(Now)



offroad Drone

↓ New apply

Yangtze Delta Area

Jiangsu Province

Zhejiang Province

Anhui Province

130-300km

170km

470km

SH Rural Area

20-100km

SH Urban Area

100m-20km

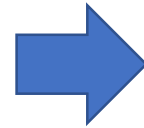
SH Community

Other application for Hydrogen Energy and Fuel Cell

- About 100 million China Market on mobile communication(70m), forklift(20m), drone (10m)



3kW backup power FC system for mobile communication tower (power efficiency: 0.87Nm³/kWh, FC working temperature: -5-65°C)



3kW FC system for off-road machine such as forklift



Other application for Hydrogen Energy and Fuel Cell

- About 100 million China Market on mobile communication(70m), forklift(20m), drone (10m)

Weight of drone : 16kg

Loading capacity: 2kg

Mileage(time): >2 hours

Working temperature: -5-40%

Cruising speed: 8m/s



Performance Test at Qinghai Tibet Plateau
Over 4000m above sea level

Suggestion for China-Japan Hydrogen Energy and Fuel Cell Cooperation

Latitude	Advantage in China	Advantage in Japan
National/Local Government Polices -communications & joint research	<ul style="list-style-type: none"> • SB and regulation policy for promoting FCV • Commercialization for hydrogen and FC industry • Enterprises cultivation 	<ul style="list-style-type: none"> • National level roadmap for hydrogen society • Diversity hydrogen energy application(H2 thermal power station, forklift, ENE-Farm) • Safety standard for FCV and ST • Carbon tax for promoting H2
Industry -experience sharing & products trading	<ul style="list-style-type: none"> • Business ecosystem of hydrogen energy and FCV • EV industry • Diversity of FC/FCV application 	<ul style="list-style-type: none"> • Raw material for hydrogen energy and FC industry • Liquid H2 for transportation & store • Test infrastructure for hydrogen energy and FC industry
Enterprise -joint R&D, business/ technology cooperation by JV, M&A	<ul style="list-style-type: none"> • Cost down and commercialize • Assemble knowhow • IoT and big data for hydrogen energy developing and FC R&D 	<ul style="list-style-type: none"> • Technology R&D • Processing equipment • Specialist resource

THANK YOU



Wechat QR code



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董事长

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产业人才培养 / 産業人材育成・海外考察 / 海外調査



中日市场开发、技术能力提升的双向服务
日中市場開拓、技術能力向上のコンサル
提升中国技术能力 / 中国技術能力改善
提升日本产品产业化水平 / 日本製品産業化拡大
中日两国市场开发 / 日中両国市場の開拓

中日氢能及燃料电池产业合作项目落地
日中水素・燃料電池産業協力の事業化
固体高分子燃料电池 / PEFC
固体氧化燃料电池 / SOFC、甲醇直接燃料电池 / DMFC
低碳・可再生能源制氢
低炭素・再生可能エネルギーによる水素製造
氢能儲+運+加 / 水素の貯蔵+輸送+供給