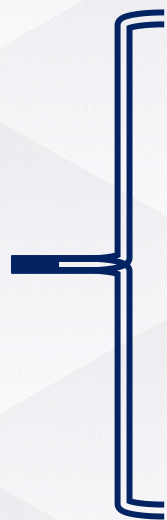


China's Renewable Energy Solution — Methanol Fuel

background

China's Modernization
is Facing Two Major
Problems



Energy security



Air Pollution

• Energy Security



Latest data from the customs general administration show :

In the 1st quarter of 2017 , China's crude oil imported exceeded 100 million tons and reached 0.5 billion tons. The foreign dependence of oil imports will reach as high as 69%, far exceeding the internationally recognized warning line.

The relevant agencies predict that by 2030, China's dependence on foreign energy will exceed 80%.



• Air Pollution



According to China's environmental conditions data:

In 2016, the average number of days exceeded the national standard (ie the air quality index is greater than 100 days) accounted for 21.2% of the 338 cities, 32 cities with more than 30 days of heavy or more pollution days, mainly distributed in Xinjiang, Hebei, Shanxi, Shandong, Henan , Beijing, Shaanxi and other places.

At the same time, there were 2,464 heavy pollutions and 784 serious pollutions in 338 cities. The number of days with PM2.5 as the primary pollutant accounted for 80.3% of the days with severe pollution and above, 20.4% with PM10 as the primary pollutant, and O3 as the chief Pollutants account for 0.9% of the population and seriously affect the health of residents.





Variety of renewable energy

In order to solve the two major problems, the government introduced various policies to promote the development of renewable energy.

However, these renewable energy still faces various problems that cannot be solved!

Instability

Uncontrollability

Nature Affection

Ocean Energy

Wind Energy

Solar Energy

Tidal Energy

Geothermal Energy

• Human ultimate energy

Hydrogen Energy

Hydrogen energy is a green, efficient secondary energy source that is recognized worldwide and is called the "ultimate energy source" of the 21st century.

Fuel cells are the best tool for the efficient and clean use of hydrogen energy, and related technologies have made major breakthroughs in the international area and have begun to enter the stage of commercial operation in various application fields.



• China

Up to now, Beijing, Shanghai, Foshan, Guangdong, Jinan, Shandong, Jiangsu Rugao, Taizhou, Zhejiang, Wuhan, Hubei, Zhangjiakou, Hebei and other places have introduced the relevant hydrogen energy development plan.

There have been existed a few Hydrogen Industrial Parks in China and more are under planning.

The Blue Book on the Development of China's Hydrogen Energy Infrastructure (2016) predicts that by 2030, the output value of China's hydrogen energy industry will reach trillions of yuan.



• Problems in the promotion of hydrogen fuel cells

- ▶ H_2 is a gas with the smallest molecular weight and is very active. There is a safety problem in storage (hydrogen embrittlement).
- ▶ Hydrogen compression is very difficult.
- ▶ Hydrogen storage conditions are harsh.
- ▶ Hydrogen transport costs are high.



• Methanol Energy

American Nobel Laureate, Dr. George Ola - Methanol Economy: Methanol is the Best Secondary Energy Source.



- ▶ It is liquid at room temperature.
- ▶ It is easy to store and transport.
- ▶ Mature methanol production process.
- ▶ Perfect methanol matching chain.



• Methanol Energy - Energy with Chinese Characteristics

1

China's coal resources are abundant. Coal-to-methanol can ensure China's century-long energy security. Future methanol can also be made from biomass, crop stalks, etc.

2

As of 2016, the global methanol production capacity is approximately 129 million tons/year, and China's methanol production capacity has reached 80 million tons/year, accounting for more than 60% of world production.

3

China is increasing the construction of the methanol industry and it is expected that 20 million tons of new production capacity will be added in the future.

4

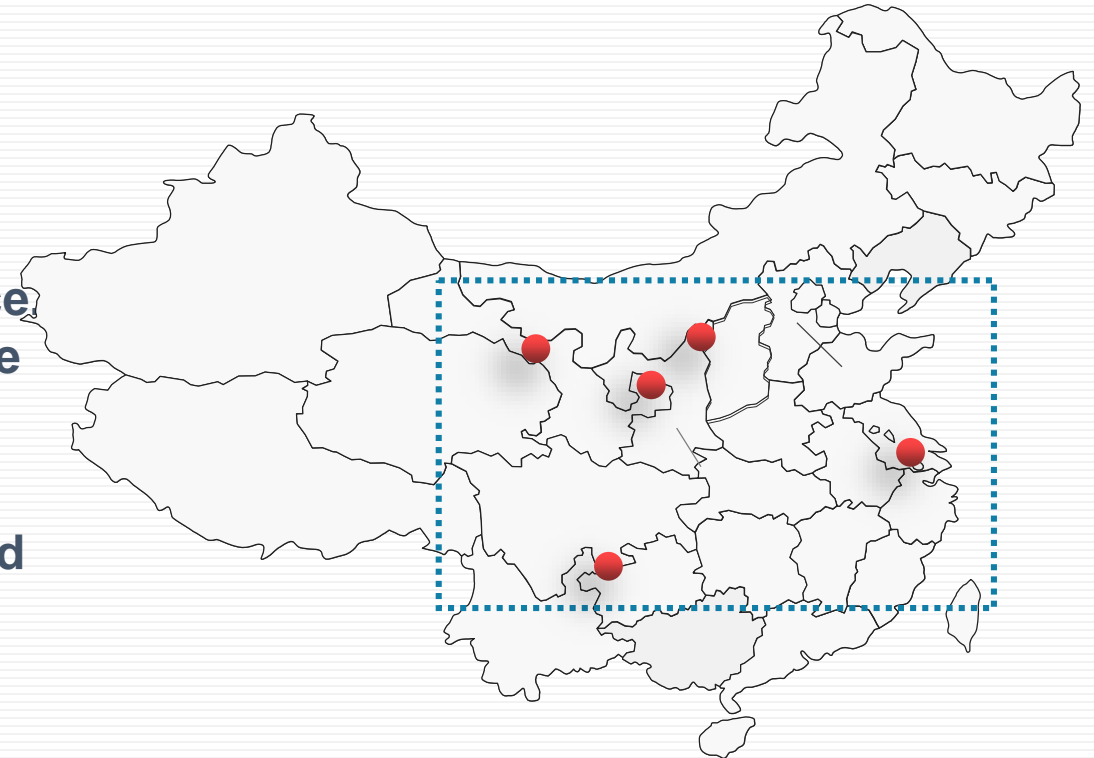
Methanol production technology is mature, and the cost is lower than petrol and diesel.

• Methanol Energy - Energy with Chinese Characteristics

15 years ago, methanol cars were listed as national key science and technology projects and pilot projects were promoted in multiple cities.

In 2014, the Ministry of Industry and Information Technology expanded the methanol car pilot to China's "four provinces and one city" :
Shanxi Province, Shaanxi Province, Shanghai Municipality, Guizhou Province, and Gansu Province.
In the future, we will further expand the scope of the pilot.

The 2017 methanol car pilots have all been accepted by the State Ministry of Industry and Information Technology.



• Methanol Energy Specification

In 2015, the General Office of the Ministry of Industry and Information Technology of China issued Notice on "Code for Construction of Vehicle Methanol Fueling Station" and "Safety Specification for Methanol Fuel Used in Vehicles"



中华人民共和国工业和信息化部
Ministry of Industry and Information Technology of the People's Republic of China

工业和信息化部 新闻动态 信息公开 在线办事 公众参与 专题专栏 工信数据

首页 > 工业和信息化部 > 机构设置 > 节能与综合利用司 > 工作动态 > 正文

工业和信息化部办公厅关于印发《车用甲醇燃料加注站建设规范》和《车用甲醇燃料作业安全规范》的通知

发布时间: 2015-10-27 来源: 节能与综合利用司

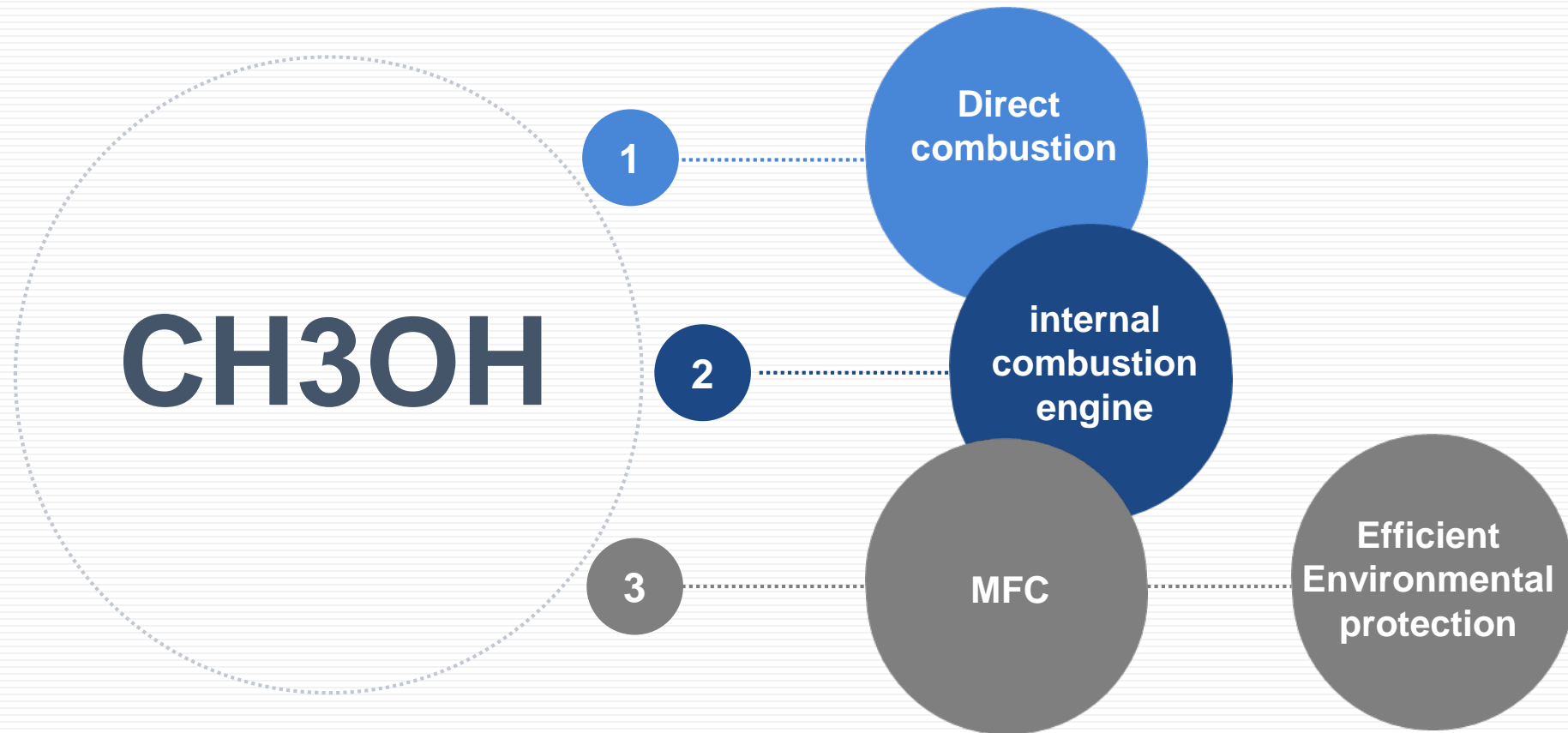
工信厅节〔2015〕129号

山西省、上海市、贵州省、陕西省、甘肃省工业和信息化主管部门:

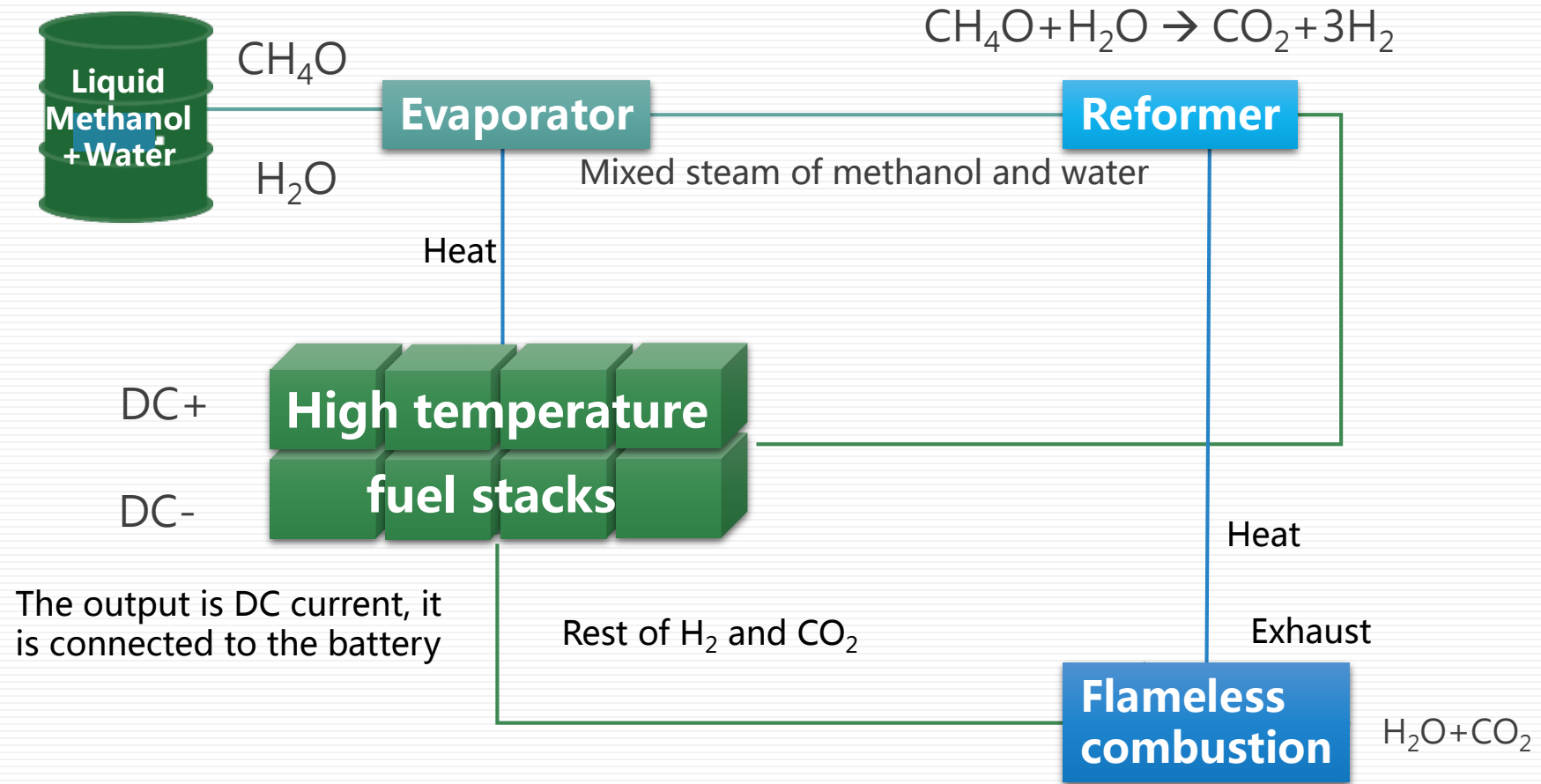
为推动甲醇燃料加注站规范化建设,指导和规范甲醇燃料加注作业安全操作,保证甲醇汽车试点工作顺利进行,我部组织编制了《车用甲醇燃料加注站建设规范》和《车用甲醇燃料作业安全规范》。现印发你们,请遵照执行。

工业和信息化部办公厅
2015年10月13日

• The use of methanol as an energy source



Palcan Technology

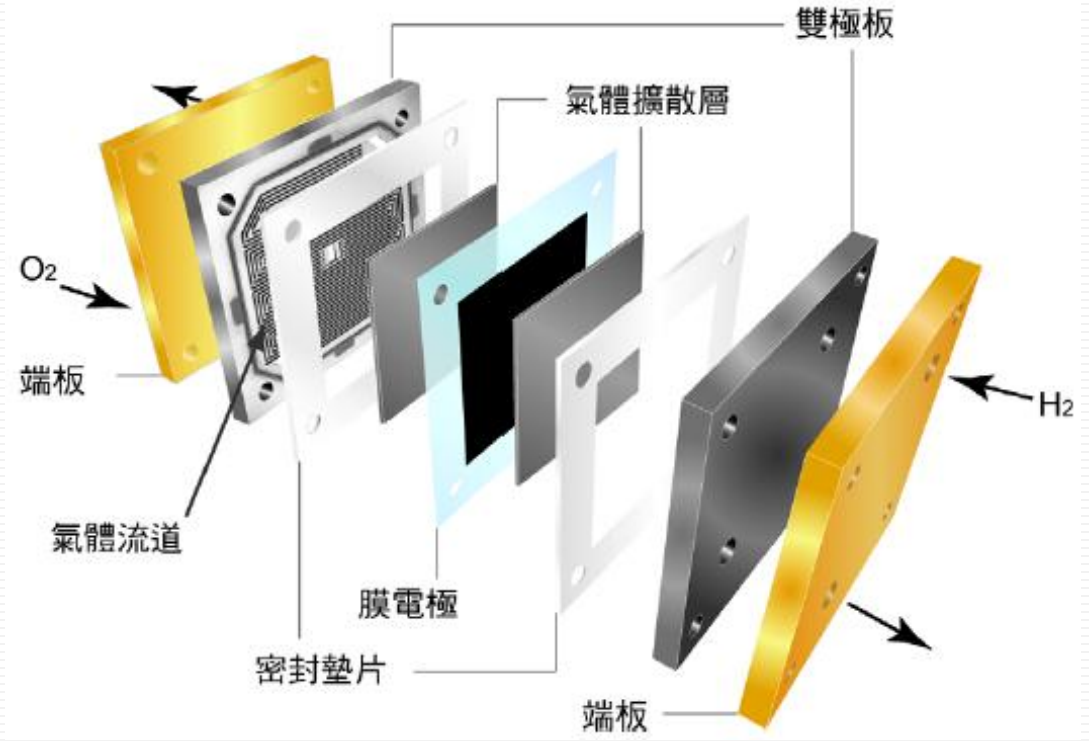


No hydrogen storage, safe and reliable!

Palcan MFC system

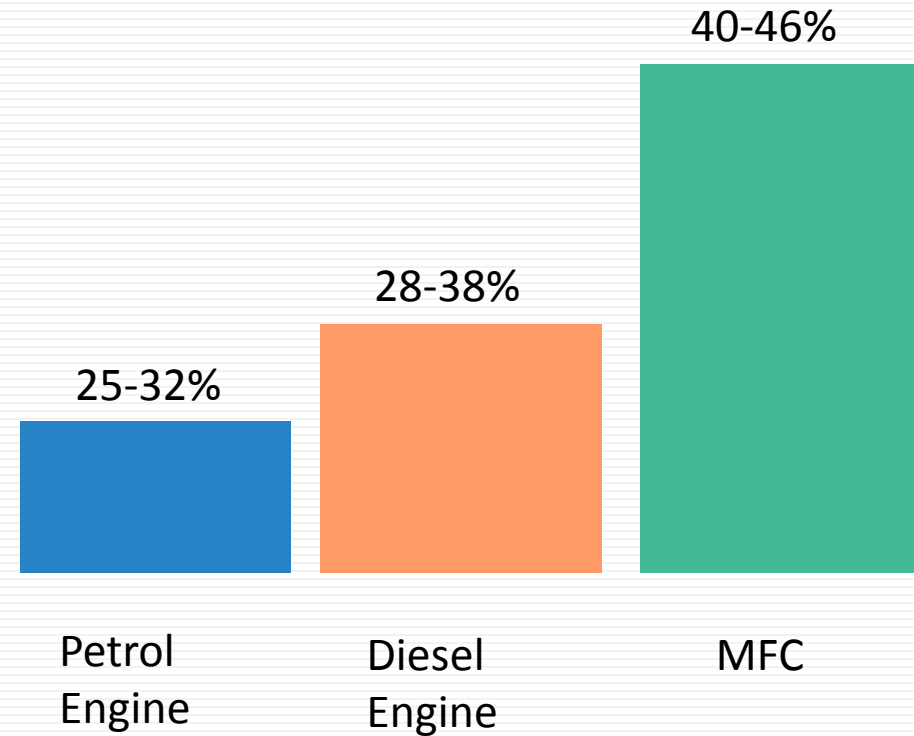


Power : 5KW
Weight : 80KG



• Technical Advantages

► Highest energy conversion efficiency



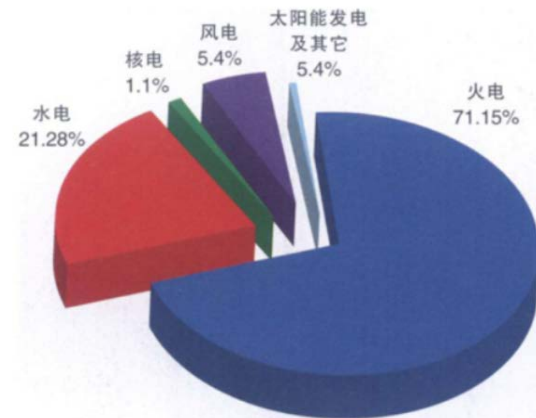
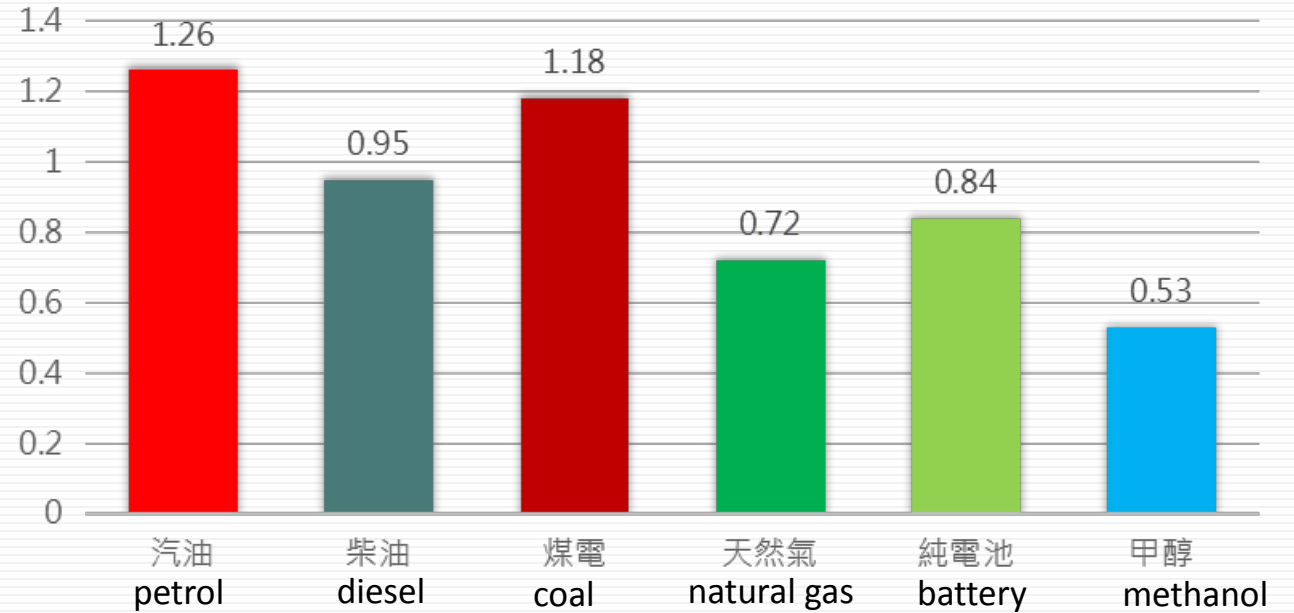


Technical Advantages

► **CO₂ emission is lower than current pure electric emission!**

To make the current level of electricity average emission reach the level of methanol, it needs to reduce the proportion of coal thermal power generation to below 45%!

CO₂ emissions per 1kwh
 每输出1kWh能量对应的CO₂排放量
 (单位: kg/kWh)



Hydropower: 21.28%
 Nuclear power: 1.1%
 Wind power: 5.4%
 Solar power and other: 5.4%
Thermal power: 71.15%

• Technical Advantages

US Department of Energy - Comparison of Energy Security

DANGER	PETROL	DIESEL	METHONAL	LPG
Leakage	3	1	2	5
Evaporation	3	1	2	4
Released to the atmosphere	5	6	3	4
Released in a closed room	2	5	4	3
Automatic ignition	6	5	4	3
Spark ignition	2	1	-	3
Flame propagation	2	1	5	3
Flash fire	5	6	1	2
Radiation from the flame	6	7	1	5
Health effects	7	5	6	4
Total	41	34	28	36

► High energy security

Relative risk of several fuels
Divided in seven levels (1=low, 7=high)

• Technical Advantages

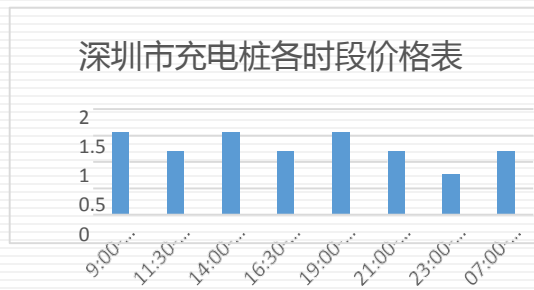
Take Dongfeng T7 for example , the operation costs are lowest!

地区	90号汽油		93号汽油		97号汽油		0号柴油	
	报价	涨幅	报价	涨幅	报价	涨幅	报价	涨幅
北京油价	5.67(京89)	-	6.06(京92)	-	6.45(京95)	-	5.89	-
上海油价	5.62(沪89)	-	6.03(沪92)	-	6.42(沪95)	-	5.83	-
江苏油价	5.66	-	6.04	-	6.43	-	5.83	-

Petrol/Diesel :
2.2yuan/kWh
18 L/100KM
103.4yuan/100KM

MFC :
0.96 元/kWh
47kWh/100KM
45.1yuan/100KM

Methanol price of 2017/8		
100tons	300tons	500tons
¥ 2230	¥ 2060	¥ 1999
Average price :		¥ 2100



Pure electrical :
1.16 yuan/kWh
47kWh/100KM
54.5yuan/100KM

High pressure
hydrogen FC :
52yuan/kg
4kg/100KM
200yuan/100KM



• Applications-Traffic area



► It has been successfully used in the transportation market of logistics vehicles, buses, and cold chain logistics vehicles.

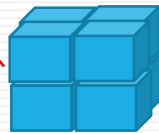
Palcan's advantages in traffic applications

“Extended range - to solve the problem of short mileage”

Take electric bus for example



Lithium battery



540V, 600Ah
324 kWh,
3600 kg

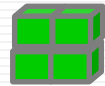
Controller

Electric Machinery

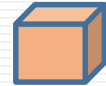
√Save 50% batteries, reduce 1 ton weight of the car
√Electricity increased from 324 kWh to 492 kWh

Palcan's solution

Fuel Cell



+



Methanol Tank

About 800 kg ,
330kwh Reserve

492 kWh, 2600 kg



About 1800kg , 162kwh Reserve

Controller

Electric Machinery



• Palcan's advantages in traffic applications

“Methanol injection time is short - to solve the problem of long charging time of electric vehicles”



Methanol station

Mobile methanol tank

Charging time ▶ 1-3mins



Electric charging pile

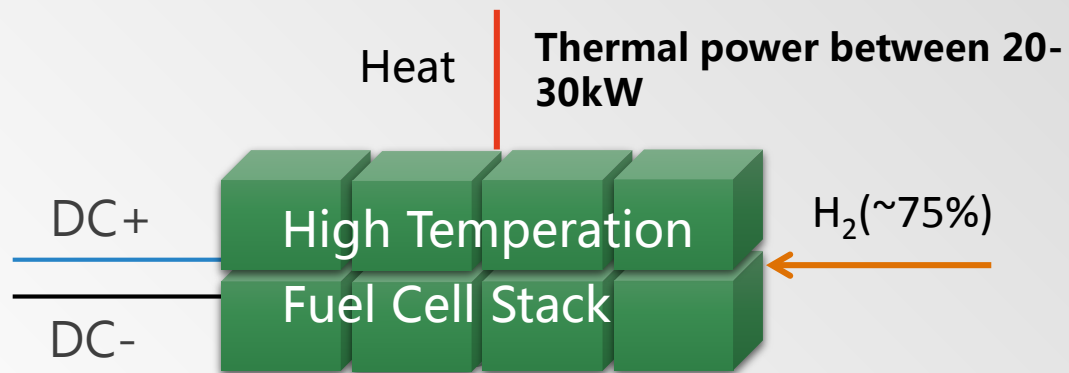
Charging time ▶ 1.5-8hrs

😊The Sinopec has built more than 2000 methanol stations, and more are coming.

😊Movable methanol tanks are available in districts lack of methanol applying.

• Palcan's advantages in traffic applications

“Low-temperature operation - Solving the problem that lithium batteries cannot be charged or discharged at -20°C ”



We use “high-temperature fuel cell stack” , the temperature of the heat exchanger is about 140 degrees, the heat energy can be fully utilized to heat the lithium cell and the car.

• Palcan's advantages in traffic applications

“Compared with hydrogen FC, MFC is more economical and feasible”

MFC Logistics vehicle



- ▶ Various ways to add methanol: methanol station, partial refit of gas station, tank truck, etc.
- ▶ Same volume, twice the energy of high-pressure hydrogen tank.

Hydrogen FC Logistics vehicle



- ▶ Hard to find hydrogen station
- ▶ Construction costs and transportation costs are higher
- ▶ Two times higher cost than gasoline
- ▶ Safety hazard

• Present Market

“China's first 30KW Methanol Reformed FCV (Co-op with Dofeng)”



Present Market

“China's first 30KW Methanol Reformed FCV (Co-op with Dofeng)”





报告编号: QM17EA1770031

检 验 报 告

燃料电池电动汽车 安全要求

产品名称: 甲醇重整制氢燃料电池厢式运输车/甲醇重整制氢燃料电池载货汽车底盘

产品型号: EQ5080XXYTFCEV2/EQ1080TTFCEVJ2

受检单位: 东风汽车公司

检验类别: 强制性检验


国家机动车产品质量监督检验中心(上海)






国家机动车产品质量监督检验中心(上海) 报告编号: QM17EA1170031

检 验 报 告

共 7 页 第 1 页

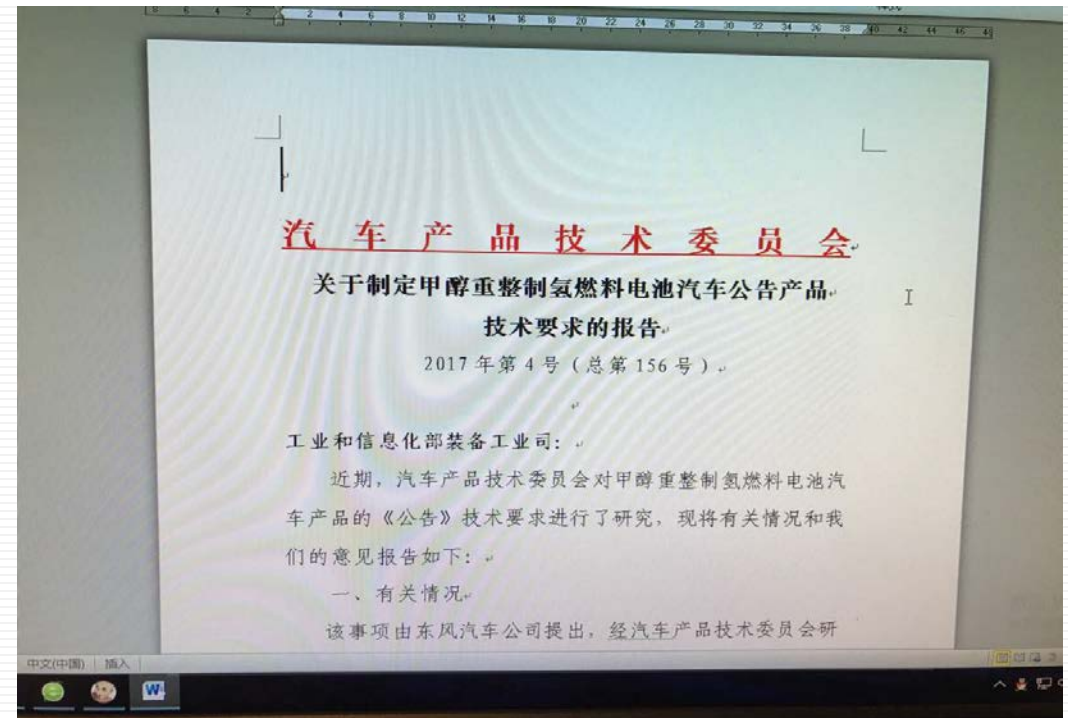
样品名称	甲醇重整制氢燃料电池厢式运输车/甲醇重整制氢燃料电池载货汽车底盘	商 标	东风
型号规格	EQ5080XXYTFCEV2/EQ1080TTFCEVJ2	检验类别	强制性检验
受检单位	东风汽车公司	生产单位	东风汽车公司
送 样 者	范秀云	送样日期	2017年8月20日
样品数量	一辆	生产日期	2017.04
检验依据	GB/T 24549-2009《燃料电池电动汽车 安全要求》	检验项目	燃料电池电动汽车 安全要求
检 验 结 论	经检验, 该样品的性能符合 GB/T 24549-2009《燃料电池电动汽车 安全要求》的要求。 		
备 注	其他说明: 1.样品情况见附录1; 2.试验照片见附录2;		

批准:  审核:  主检: 

• Present Market

“China's first 30KW Methanol Reformed FCV (Co-op with Dofeng)”

Palcan's development of the 1st methanol reformed hydrogen FCV in China, came with significant assistance from multiple government departments to work out the technical requirements and a standard for methanol reformed hydrogen FCV, which Palcan has been certified for.



Present Market

“China's first 30KW Methanol Reformed FC Truck (Co-op with Dofeng)”

中华人民共和国工业和信息化部
Ministry of Industry and Information Technology of the People's Republic of China

企业申报车型公示详情

产品商标：	东风牌	产品型号：	EQ5080XXYTFCV2	产品名称：	甲醇重整制氢燃料电池厢式运输车
企业名称：	东风汽车公司	注册地址：	湖北省武汉市武汉经济技术开发区东风大道特1号		
目录序号：	3	生产地址：	湖北省十堰市		

[查看原图](#)



右部照片

[查看原图](#)



后部照片

[查看原图](#)



防护装置照片

外形尺寸(mm)：	长：6310 宽：2200 高：2820		
货箱栏板内尺寸(mm)：	长：3150 宽：2150 高：1920		
排放依据标准：		燃料种类：	
最高车速(km/h)：	80	总质量(kg)：	7600
载质量利用系数：	0.58	额定载质量(kg)：	2605
转向型式：		整备质量(kg)：	4800
轴数：		准拖挂车总质量(kg)：	
轴距(mm)：		轮胎规格：	
钢板弹簧片数(前/后)：		半挂车鞍座最大允许承载质量(kg)：	
轮胎数：		驾驶室准乘人数(人)：	3
额定载客(含驾驶员)(座位数)：			
轮距(前/后)mm：	前轮距: 后轮距:	接近角/离去角(度)：	
反光标识生产企业：	浙江道明光学股份有限公司	反光标识型号：	VCDM-4
反光标识商标：	道明	防抱死制动系统：	有
车辆识别代号(VIN)：		前悬/后悬(mm)：	1180/1530

► Has been issued by the Ministry of Industry and Information Technology "new energy automotive product announcement" (2017/12/29)

► Has entered the "new energy vehicle promotion recommended list" (3rd batch of 2018)

► Has entered the "Exemption Vehicle Purchase Tax New Energy Vehicle Model Catalog" (17th batch of 2018)

• Present Market

“China's first 30KW Methanol Reformed FCV (Co-op with Dofeng)”



2016.05 Chinese Premier Keqiang Li
Visits our car in Dongfeng

2016.05.24 Chairman of Dongfeng
Yanfeng Zhu pays close attention to
MFC car

• Present Market

“1MWh、 30KW Silent mobile power Station(Co-op with Zhongqing)”



Vehicle model	Iveco NJ6495DC
Size	5400*2000*2700
The main components	1. Iveco vehicle 2. Fuel cell module 3. Methanol tank 4. Lithium battery box 5. Controller 6. Inverter 7. Other mounting accessories
Working environment	Outdoor, onboard, stationary power generation
Working temperature	-25°C ~ +50°C
Relative humidity	10% ~ 90%
Altitude	≤4000M
Atmospheric pressure	62KPa ~ 101KPa。 (Approximate altitude 0m ~ 5000m)
Vertical tilt	≤25 degree
Total system weight	≤3.0 tons
Total vehicle weight	≤5.5 tons

• Present Market-Mobile power

“Mobile Charging Car”



Vehicle parameters	
Total size(mm)	4205*1685*2400
Total weight(kg)	2475
Maintenance weight(kg)	2150
Maximum speed(km/h)	80
Methanol barrel capacity(L)	150L
Mileage(km)	500
Battery parameters	
Fuel cell power(kW)	10kW
Fuel cell rated voltage(V)	358
Fuel cell power generation(kWh)	150 (can be expanded)
Lithium battery capacity(kWh)	27kWh

• Present Market-Backup Power

“Communication base station backup power”

Asia Pacific Style



Domestic style



Project	Parameter
Output Power	2.5~10KW
Output voltage	-48DCV
Operating temperature	-20~50°C
Stack Type	HT-PEMFC
Cooling method	Air cooling
Certified product	CTTL certificate
Fuel Type	Aqueous methanol solution
Water tank capacity	100L*2
Dimensions	900*900*2200mm
Weight	425~500kg
Communication Method	RS485/SNMP
Monitoring method	Wireless remote monitoring

• Other Markets



- ▶ Including not limited to commercial vehicles, passenger vehicles, ships, drones and other transportation areas;
- ▶ It can also be widely used in base station backup power, distributed, off-grid generation and new energy community construction.
- ▶ Government departments, financial institutions, big data centers, etc.
- ▶ When the cost is right, it can replace the traditional diesel engine and gasoline engine.

• Government Supports

Supporting target	Depot (State subsidies)	Consumer (Local subsidies)
Supporting vehicles	Pure Electrical Car	
	Plug-in hybrid Car	
	Fuel Cell Car	
Subsidy standard	Subsidy standards for Li-Ion battery car are scheduled for reduction annually except fuel cell cars in 2017-2020..	

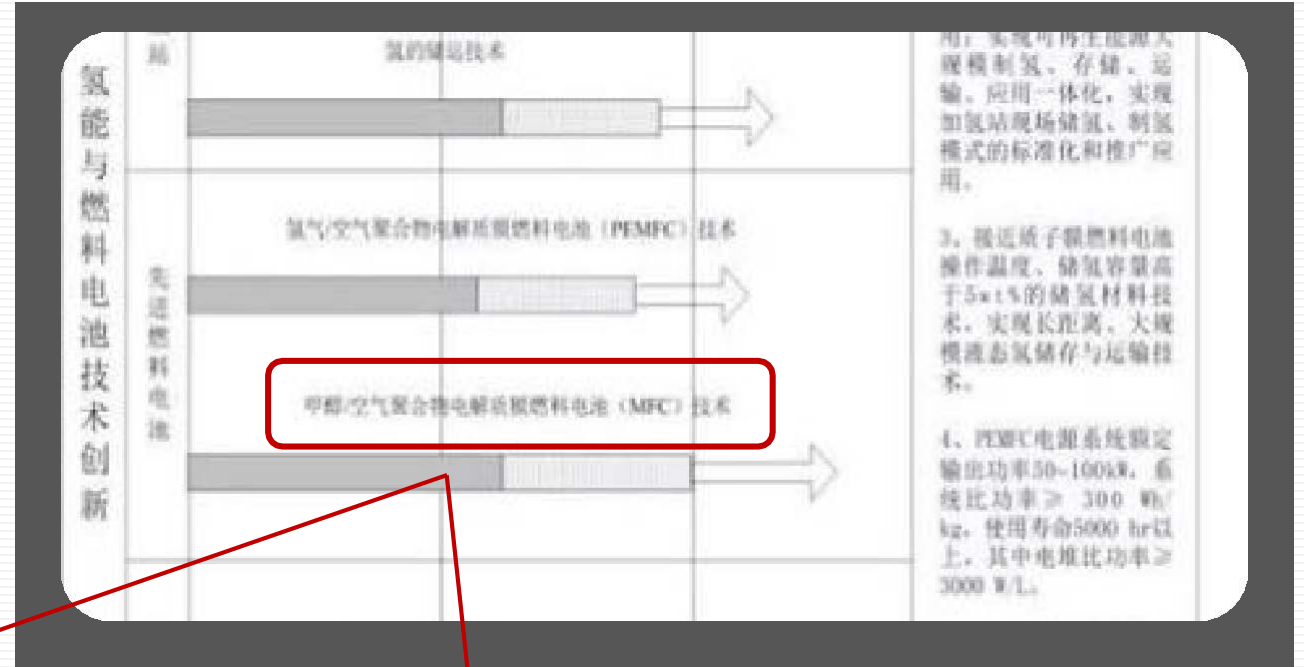
Vehicle Type	Subsidy standard(RMB)
Fuel cell passenger car	200 thousand yuan/vehicle
Fuel cell light buses, trucks	300 thousand yuan/vehicle
Fuel Cell Large and Medium Buses, Medium and Heavy Trucks	500 thousand yuan/vehicle

Government Supports



混合动力

MFC Technology is defined as the technology that should be strongly supported in 2016-2030.



Palcan's technology is far ahead of China's current enterprise level and has reached the target value of 2020 in advance.

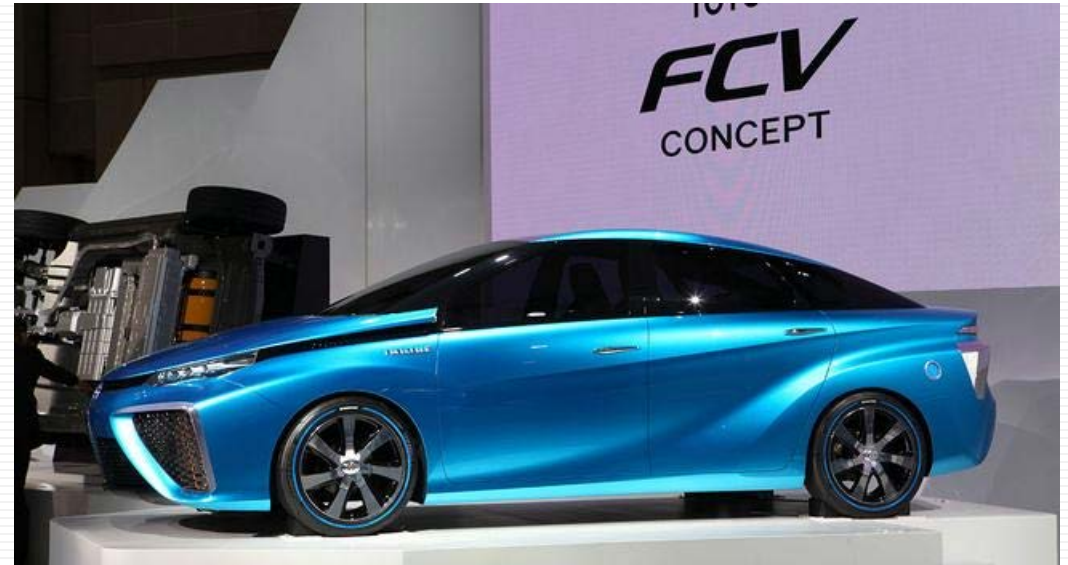
• Our Development Plan I

“High Power Fuel Cell System Module R&D (2018)”

▶ 20kW fuel cell system module R&D

.....

▶ Market target: the passenger car market and high-power generation



• Our Development Plan II

“Build a 50,000 sets of fuel cell module production base (2018)”

- ▶ Industrial Base: Cixi, Zhejiang province
- ▶ Total investment of 100 million
- ▶ Achieve 50,000 sets of fuel cell module production capacity.

.....

- ▶ Market target : Electric logistics vehicle, mobile charging vehicle, communication backup power supply, civil-military integration.



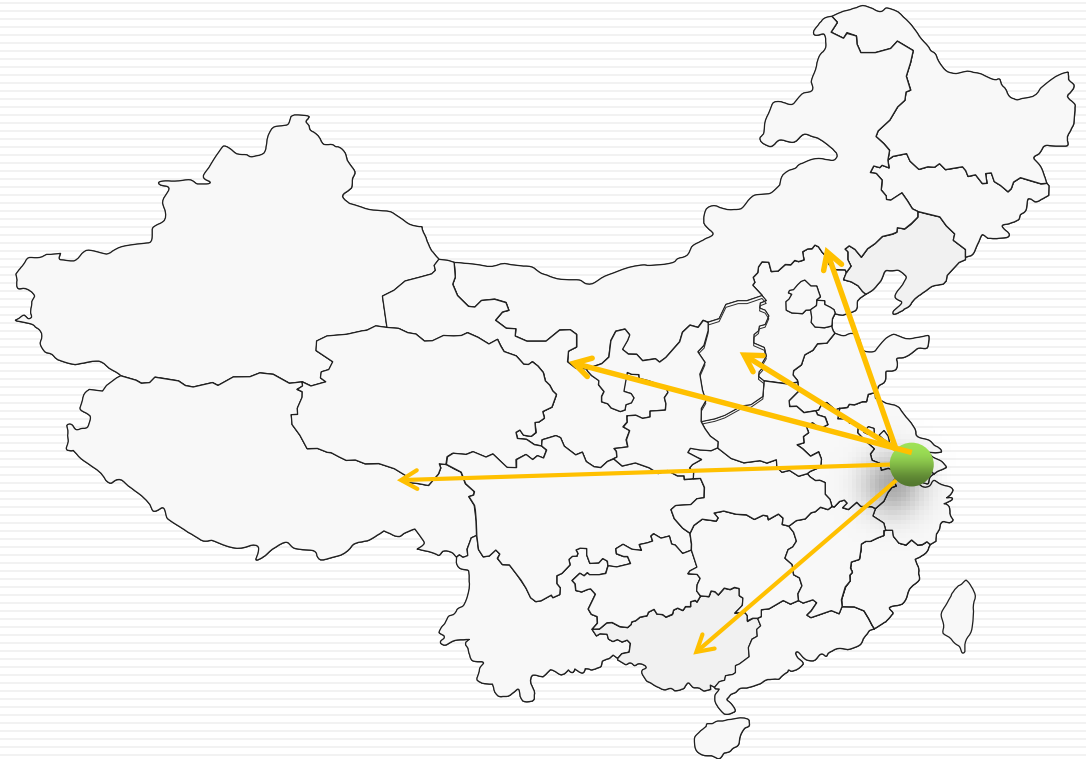
• Our Development Plan III

“Build 200,000 sets of fuel cell module production bases (2020) ”

▶ In 2019, start to prepare for replicate the construction of fuel cell module production bases in five different regions (Guangdong, Northeast, Northwest, Central and Southwest) across the country.

▶ Estimated total output value reaches 25 billion yuan

▶ Market target: to alternative gasoline engine / internal combustion engine



A decorative graphic consisting of a large white circle with a smaller white circle inside it, both with a slight shadow effect.

- **Our Target**

“Leader in Global Methanol Application”



The background features a central white area with a subtle gradient, framed by dynamic, flowing shapes in various shades of teal and light blue. These shapes create a sense of movement and depth, resembling stylized waves or abstract architectural elements.

THANK YOU !