FCV Development and Practice of SAIC Maxus

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SAIC MAXUS
Focus on Light Commercial Vehicles, MPV, Van, Pickup, SUV and Future Green Technology
• The compound annual growth rate of SAIC Maxus is over 70% since the company is founded in March, 2011.
Childhood Memories of My Hometown...

- Yellow Sea
- Twisted Pipelines
- Spherical Tanks
- Big Torches
• Currently, China is the world’s largest hydrogen producer, in 2016, there were 11.89 million tons of by-product hydrogen were produced.

Sinopec SHPEC Products

- Synthetic Fibers
- Petroleum resin
- Petrochemical Products
- Plastics

By-product Hydrogen

About 40,000 Tons Hydrogen produced by SPC every year
In order to make better usage of the by-product hydrogen, the government has built the Jinshan Hydro-Refueling Station. The opening Ceremony is Jun, 2019.

The Jinshan Hydro-Station has began operation at Jun, 2019:
- Largest Hydro-Fueling station of the world
- First commercialized 70-Mpa station in China.
- Most of the hydrogen source is provided by the SINOPEC by-product Hydrogen.

SAIC Motor also present the SAIC Hydro-Power Tech on the ceremony:
- SAIC-Sunwin: FCV Bus
- SAIC-Maxus: FCV Mini Bus V80
- SAIC-Rowe: FCV Rowe 950
The state council of China has published the "Made in China 2025" strategy, this file was stated that the fuel-economy and New energy vehicle would be the key development area. And this is the only national level strategy toward the automotive.

**New Vehicle Average Fuel Consumption [L/100km]**

- 2020: 5
- 2025: 4
- 2030: 3.2

**NEV Sales Volume Target (M)**

- 2020: 2
- 2025: 7
- 2030: 15

Market share:
- 7%
- 20%
- 40%

Meet the demand
China's FCV Development Roadmap

- The China's FCV market growing very fast under the development plan. But unlike Japan, most of the FCV sold in China is the Commercial Vehicles.

Made in China 2025 plan, in 2016 the Energy Saving and New Energy Vehicle Technology Roadmap was published, which includes a Technology Roadmap for Hydrogen Fuel Cell Vehicles.
SAIC Group started the FCV Investigation since 2001, invested over 1.5 billion RMB in total to the FCV businesses.
In order to meet the future zero emission tasks, SAIC Commercial Vehicle Technology Center is planning a full product portfolio to meet different scenes and demands.
## MAXUS FCV80 Operation Status

<table>
<thead>
<tr>
<th>Operational Vehicles</th>
<th>394</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation Cities</td>
<td>Shanghai, Fu Shun, Fo Shan, Da Lian, Wu Xi, Hai Nan</td>
</tr>
<tr>
<td>Typical Operation Scene</td>
<td>Fu Shun, Liao Ning: Commute Microbus Shanghai: Jinshan Sinopec shuttle bus</td>
</tr>
<tr>
<td>Mileage (KM)</td>
<td>Total Mileage &gt; 1.5 million KM</td>
</tr>
<tr>
<td></td>
<td>Average Mileage &gt; 25,000 KM (Fushun)</td>
</tr>
<tr>
<td>Highlights</td>
<td>FCV80 is operated from south to north in China. The operation temperature covered from -25deg to 45deg.</td>
</tr>
<tr>
<td></td>
<td>Low warranty claims.</td>
</tr>
</tbody>
</table>
The FCV80 development is following by the SAIC CVDP standard, fully validated with component and vehicle level, the total validation mileage is exceeding 600,000 km. Delivered a safe, reliable and fully meet customer requirement product.
Industry status and gap

- Compare to the global top Fuel Cell Vehicles, SAIC & China FCV industry still have long way to go to catch up with the up-to-date FCV technology and cost target.

Key Parameters Of FCV80

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Seats</td>
<td>13</td>
</tr>
<tr>
<td>L<em>W</em>H(mm)</td>
<td>6030<em>1998</em>2660</td>
</tr>
<tr>
<td>WB (mm)</td>
<td>4180</td>
</tr>
<tr>
<td>NEDC Range (km)</td>
<td>260 (H2) + 45 (ELEC)</td>
</tr>
<tr>
<td>Rated Output of Cell Stack (kW)</td>
<td>30</td>
</tr>
<tr>
<td>Pressures (MPa)</td>
<td>35</td>
</tr>
<tr>
<td>Maximum Hydrogen Storage</td>
<td>4.4kg</td>
</tr>
<tr>
<td>Hydrogen container volume (L)</td>
<td>100*2</td>
</tr>
<tr>
<td>Motor Type</td>
<td>Permanent Magnet AC synchronous</td>
</tr>
<tr>
<td>Rated/Maximum motor output (KW)</td>
<td>55 / 100</td>
</tr>
<tr>
<td>Battery Type</td>
<td>LFP</td>
</tr>
<tr>
<td>Battery Capacity (kWh)</td>
<td>14.2</td>
</tr>
</tbody>
</table>
Fuel Cell + Recreational Vehicle = ?

- Currently SAIC-Maxus is the biggest RV Manufacturer in China.
- The Only Emission of Fuel Cell Vehicle is water and electricity, Which are the most important things for a RV.
Road-Blocks of FCV Development In China

1. Government Subsidy Cutoff
   - Currently Subsidy could cover over 60% of the vehicle cost.
   - OEM can only submit the subsidy application after the vehicle operation mileage exceed 20,000 km.
   - 20% off to the current subsidy since 2019. And will be drop more later.
   - The subsidy will be shifted to H2 Refueling facility construction cost and fuel price in the future.

2. High material cost
   - The cell stack is developed by SAIC individually, but a lot of core suppliers is oversea supplier.
   - High investment but low scale of volume at this stage leads to the high material cost.
   - Most of the SAIC Maxus FCV80 core part supplier is the strategic partner.

3. Safety Concern
   - Peoples are sometimes very skeptical to the new technologies. FCV is not excluded.
   - Currently the Hydrogen is still treated as “dangerous chemicals” but fuels in China, which makes the application process for the H2 refueling station construction is very slow.
Looking Forward to the Future...
THANK YOU!