The Methanol Project

Virgilio Cerutti
FCA – Head of Business Development Central Coordination

Fuel Choices Summit 2016
Tel Aviv – November 3, 2016
EU alternative fuels development, turning Italy into the best country in alternative fuels utilization

... THANKS TO THE FCA CNG TECHNOLOGY, DEVELOPED AT CRF (CENTRO RICERCHE FIAT)
Revolution of the Brazilian transportation energy matrix

...THANKS TO THE PIONEER DEVELOPMENT OF THE SFS® SOFTWARE FLEXFUEL SENSOR, DEVELOPED BY MAGNETI MARELLI (AN FCA COMPANY)
In January 2015, FCA, CNHi and Magneti Marelli signed an MoU with Israel Fuel Choices Initiative for the development and testing in Israel of alternative fuels based on natural gas.
MoU with DOR Chemicals

In 2015 FCA/CRF signed MOU with one of the top Israeli fuel producer company (DOR CHEMICALS) to develop methanol blends in terms of production, blending, infrastructure and automotive technologies
1. Reduce the share of crude oil in *Israel's transportation by 30% by 2020* and by 60% by 2025 while supporting green growth
2. Turn Israel into a center of knowledge and industry of fuel alternative technologies
3. Raise world’s awareness of alternative fuel choices and Israeli activity in the field and build a global partnership network from around the world

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Leveraging on the existing FCA’s experiences and know-how on Natural Gas and on alcohol fueled flex-fuel vehicles as well as on DOR’s expertise on fuels and methanol, to develop a new advanced (E6) alternative fuel:

- Methanol for transportation complying with the highest emission standard
Joint activities to develop M15 application

2015/2016
Joint development & endurance tests performed in Israel

2015/2016
Joint development, measurements & tear down activities performed in Italy at CRF laboratories
Israel M15 Standard

In May 2016, M15 Israeli fuel specifications have been issued by the Ministry of Transport, based on IFCI, FCA and DOR recommendations

- Methanol produced from Natural Gas
- Israel is the first Country in the world – compliant with EU Euro6 and US regulations – that issued a national M15 standard for the methanol as alternative fuel
- Fiat 500 is the first vehicle at worldwide level to comply with the Euro6 M15 standard
- The Fiat 500 M15, running with a blend of 85% gasoline and 15% methanol, is a bi-fuel vehicle that can run on both M15 and gasoline, as well as any mixture of the two fuels.
Fiat 500 EU Euro6 M15 – Engine Performance

![Graph showing engine performance with Gasoline and M15](image)

- Torque (Nm)
- Engine Speed (rpm)
- Gasoline & M15
  Same performance

- Engine Performance Chart

FCA
FIAT CHRYSLER AUTOMOBILES
Fiat 500 EU Euro6 M15 – CO2 emissions

CO2 equivalent - Reduction

Gasoline

M15

0%

-1%

-2%

-3%
Fiat 500 EU Euro6 M15 – Noxious emissions

Adoption of low carbon and/or oxygenated fuel as methanol mitigates the emissions of CO, Hydrocarbons and particle matter

<table>
<thead>
<tr>
<th></th>
<th>CO (mg/Km)</th>
<th>THC (mg/Km)</th>
<th>NOx (mg/Km)</th>
<th>PN (#/Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>1000</td>
<td>100</td>
<td>60</td>
<td>6.00E+12</td>
</tr>
<tr>
<td>M15</td>
<td>FRESH</td>
<td>AGED 80.000</td>
<td></td>
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</tbody>
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EURO 6 Limits

CO: 1000 mg/Km, THC: 100 mg/Km, NOx: 60 mg/Km, PN: 6.00E+12 #/Km
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Expected next steps

- 2017 - the year of M15, with the entry into force of the Arrangements Law, the following actions are expected:
  - Reduced excise duty for M15
  - Grants for the first gas stations adapting themselves to market the new fuel
  - Purchase tax adjustments on vehicles approved for Methanol fuel in accordance with the vehicle’s emissions
  - Accelerated depreciation for investment of facilities producing Methanol gasoline blends
  - Dor will be leading the supply chains and infrastructures
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An effective case of cooperation among different key stakeholders

- **Stakeholders**
  - Public
  - Transportation
  - Energy

- **Topics**
  - Regulation
  - Taxation, Benefit & Incentives
  - Technology and vehicles
  - Fuels & Infrastructure

- **Israel National Goal**

![Graph showing years 2014 to 2030 with Methanol highlighted]
The Methanol Project
A cross country /organization team with a common vision
The Methanol Economy: …a first significant and concrete milestone to develop a new sustainable fuel for transportation

2006
George A. Olah (Chemistry Nobel Prize) and G.K. Surya Prakash, theorized the Methanol Economy

2013
Israel awards the 2013 Eric and Sheila Samson Prime Minister’s Prize to George A. Olah, and G.K. Surya Prakash in recognition of their proposal to use methanol to replace fossil fuels and petroleum-based feedstocks.

2015
- MoU FCA/IVECO/MM with IFCI
- MoU FCA/CRF with DOR Chemicals
- Joint Development
- Endurance tests
- Measurement tests

2016 – Fuel Choices Summit
The Team presents the Fiat 500M15: the first vehicle at worldwide level to comply with the Euro6 M15 standard

2017 over – the development of methanol in transportation