

[招待講演] 日本の EV/PHEV 開発と充電インフラの現状と将来
－OECD WORKSHOP 出席報告と欧州動向－

寺谷 達夫

名古屋大学大学院工学研究科

[Invited] Status and Future View of EV/PHEV Development and Charging
Infrastructure in Japan
－OECD WORKSHOP Report and Worldwide Trend in Europe－

Tatsuo TERATANI

Graduate School of Engineering, Nagoya University

<招待講演> 電子情報通信学会WPT研究会：2013.6.14 於 東大本郷

日本のEV/PHEV開発と充電インフラの現状と将来

～OECD WORKSHOP出席報告と欧州動向～

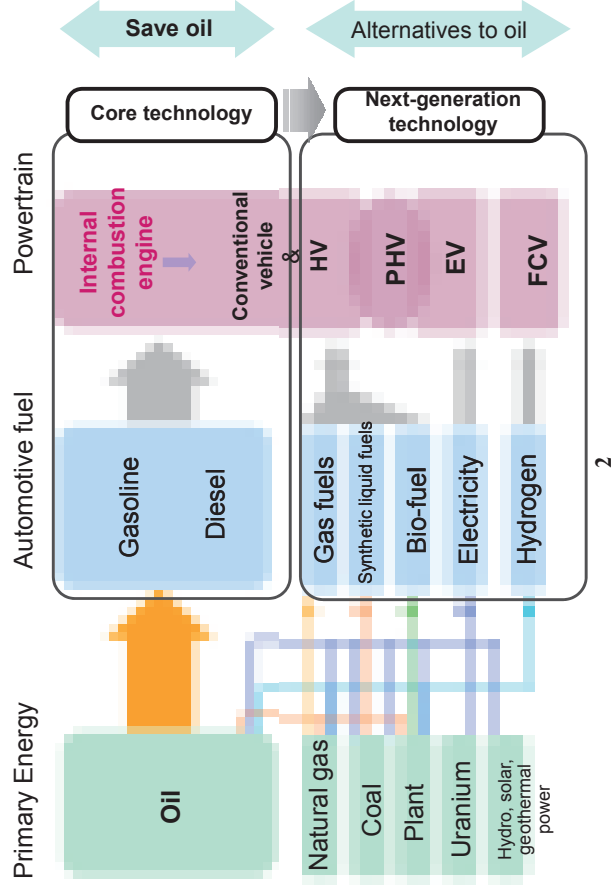


寺谷 達夫

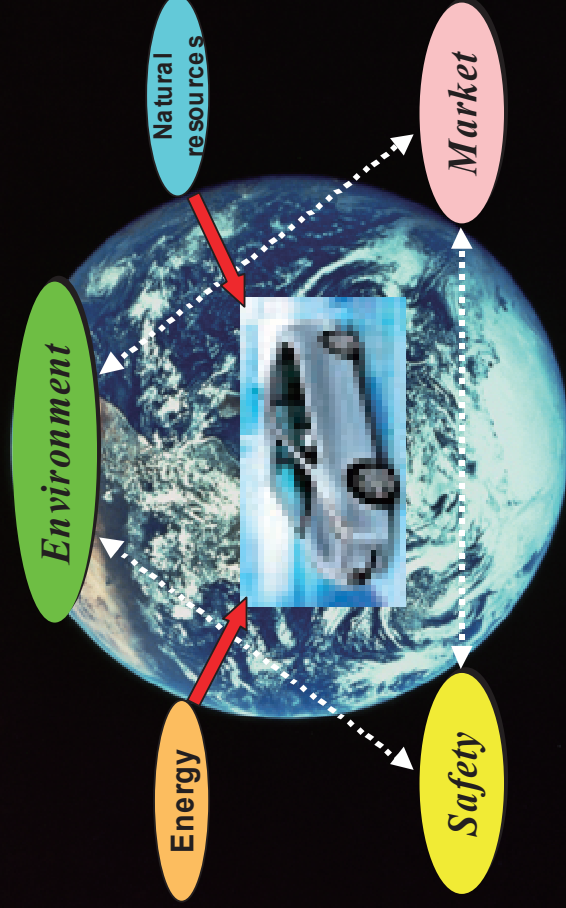
名古屋大学院

(元トヨタ自動車、前日本自動車工業会充電TF主査)

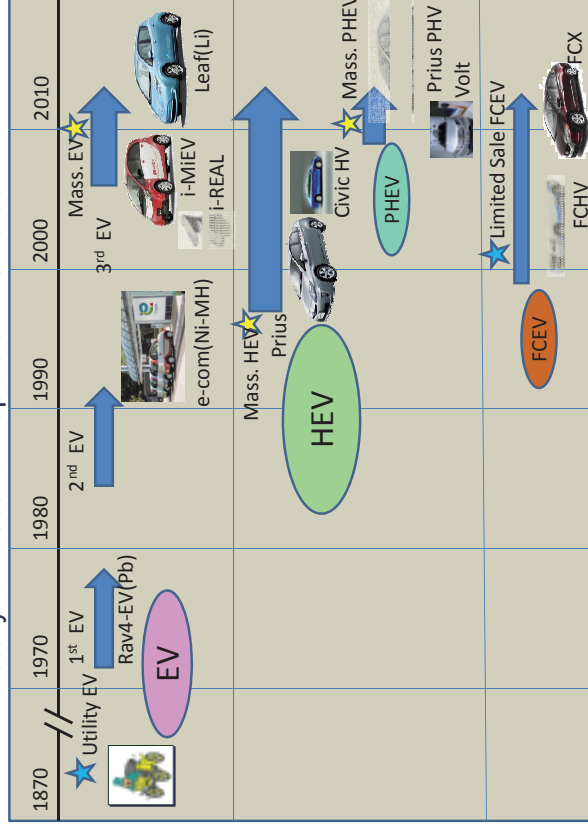
Diversification of Automotive Fuels and Powertrains



Environmental Change around Automobiles

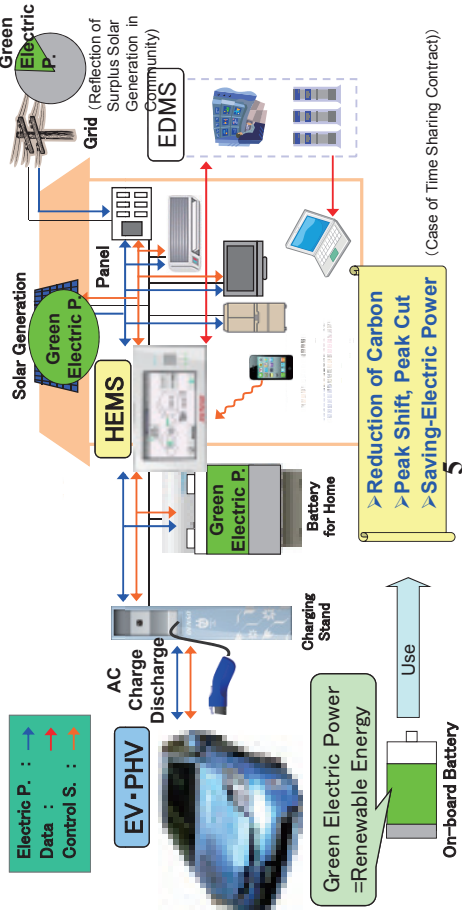


History of Electric Propulsion Vehicles



Energy Management (V2H) : Green Electric Power

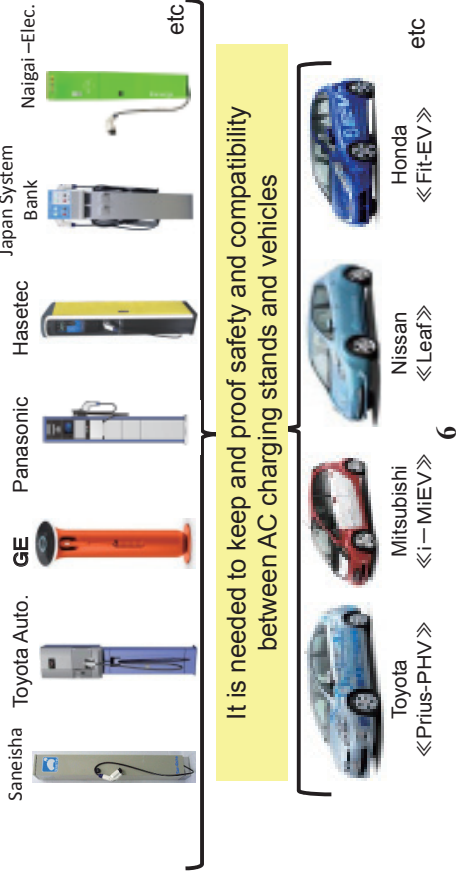
Renewable Energy ; Each Electric P. (On-board Battery, Battery for Home, Grid, Solar Generation) is visible for Green Electric P. and decided timing and volume of V2H.



Keep the safety and rest for AC charging



- AC charging stands are increasing with mass-production PHEV·EV in Japan. (METI Target: 2 millions AC chargers until 2020)
- For expand of PHEV·EV, its important to guarantee safety and compatibility between charging stand· cable and PHEV·EV.



Standardization for AC Normal Charge

1. Charging Connector

Type1 AC connector, developed by Japan and standardized.

SAE J1772 (adoption) IEC ; from Japan (Type1)	IEC ; from Germany (Type2) (mennekes type)	IEC ; from Italy (Type3)
<ul style="list-style-type: none"> • AC special • Pin-sleeve type 	<ul style="list-style-type: none"> • AC single phase, 3 phase • DC charge possible • Pin-sleeve type 	<ul style="list-style-type: none"> • AC single phase, 3 phase • Pin-sleeve type

2. Control pilot function*1

*1 The function to start the charge after checking the right connection between vehicle and charger

Each OEM has to correspond to charging-cable and charger with control pilot function.

- > Since 2011/11, AC charging method has been unified and reflect the charging infrastructure guideline published in Japan.
- > Since 2012/4, JARI has started to certificate AC normal charger.

AC Normal Charging of Prius-PHV

Civic Center



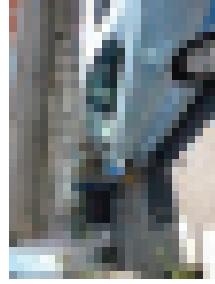
Home



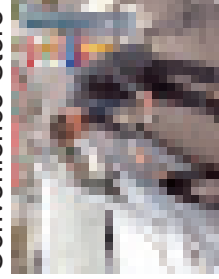
Home



Super



Convenience Store



In France



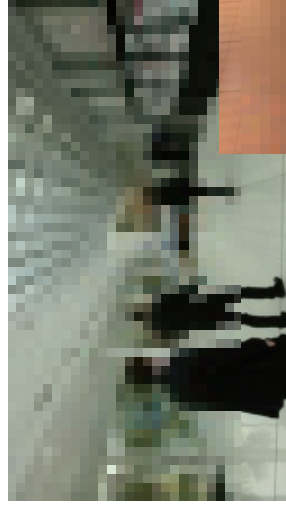
In China



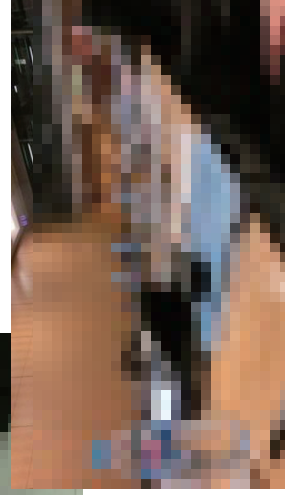
Standardization for DC conductive charge

	Configuration A	Configuration B	Configuration C Type 1 Combo.	Configuration C Type 2 Combo.
Proposal C.	Japan (CHAdeMO)	China	USA	Germany
N. Voltage	600 V	750 V	600 V	850 V
N. Current	150 A	250 A	200 A	200 A
Pin	9	9	7	Inlet: 9 Connector: 5
Charging Signal	CAN	CAN	PLC (Power Line or CPLT Line) (Common Spec. according with ISO 15118)	
Charging Protocol	special	special	CPLT (Common Spec.)	
Compatibility	CHAdeMO	China (GB/T)	SAE J1772	—
Shape				
Memo.	—	— 9	For Low Power, AC Coupler (Type 1) used	For Low Power, AC Coupler (Type 2) used

OECD WORKSHOP (Paris; Nov.30, 2012)



OECD本部 (Paris)



OECD会議室 (世界13ヶ国、32名出席)

Rent-a-car in Okinawa

(Photo by Teratani 2011.9.9)



Nissan Leaf



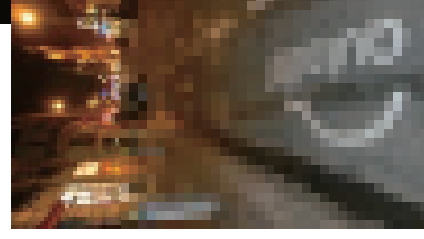
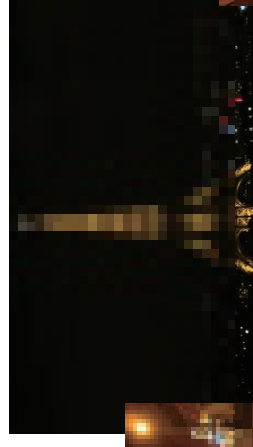
Quick Charging ; 25min.

- 80% Charge; 130km
- IC card; Rent fee 20 €
- In Conv. Store; 5 €/1

High-way SA; Free fee

パリ市内のEV充電スタンド(セーヌ川沿い)

(Photo by Teratani 2012.11.29)



EVのレンタル (Autolib')

€9~
12

“Autolib”のBusiness Model (France)

会社名 ; Bollore Group (ネットセールス ; 8億€2012)

電池 ; Liメタルポリマー (LMP)

車両 ; Bluecar (CeComp ; イタリアベンチャー)

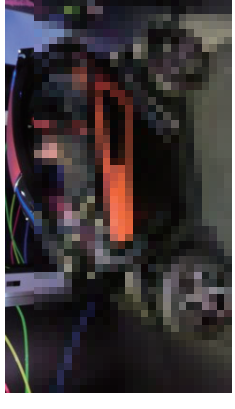
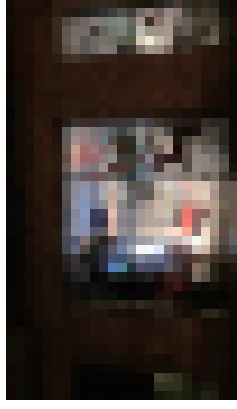
カバー ; フランス47都市、本部パリ、1740車両、500
充電ステーション、47000€補助/1ステーション、
4~6スペース設置、弁済は自治体とシェア
数年で回収できる。

使用法 ; €9/日、携帯TELで予約、電子決済

出典 ; 「OECD WORKSHOP 2012資料」

13

シャンゼリゼ通りのOEMウインドウ



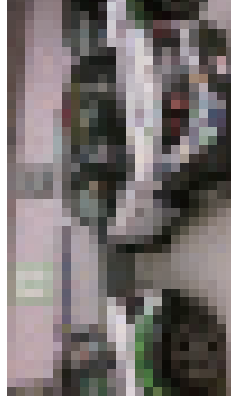
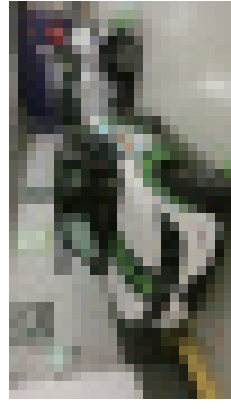
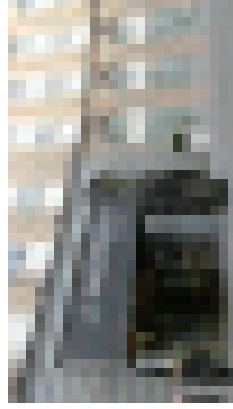
TOYOTA

RENAULT

14

(Photo by Teratani 2012.11.29)

ブラスセル市内のホテル地下駐車場



EVのカーシェアリング

15

(Photo by Teratani 2012.11.28)

まとめ

1. 電動車両の標準化の狙い
→ ・コンポーネント類の標準化 ; 国際調達と車両低コスト化
・充電インフラの標準化 ; 「安全・安心」と「互換性の担保」
2. 3. 11以降、V2Hのニーズと開発の進展
→ ・「クルマと家」(V2H)の開発進む、スマートグリッドも議論
3. 充電コネクタの標準化ほぼ目途、ワイヤレス給電のR&D進む
→ ・AC普通充電器認証開始(2012年~) ; 第三者認証(JARI)
(METI Target: 2 millions AC chargers until 2020)
・DC急速充電器の設置済(2012年、1300台 ; 日本)
(METI Target: 5000 DC chargers until 2020)
4. 都市構造とユーザー行動範囲から充電インフラ構築が必要
→ ・充電インフラの普及は、Liイオン電池容量アップと等価
・EVレンタルやEVカーシェアリング ; 新ビジネスモデル

16