IEA PVPS Workshop @ WCPEC-7

‘PV enablers from PVPS perspective : what will drive the PV market in the coming years?’

Towards PV-based e-mobility

‘PVPS Task17: PV and Transport’

Waikoloa, HI, USA, 14 June 2018

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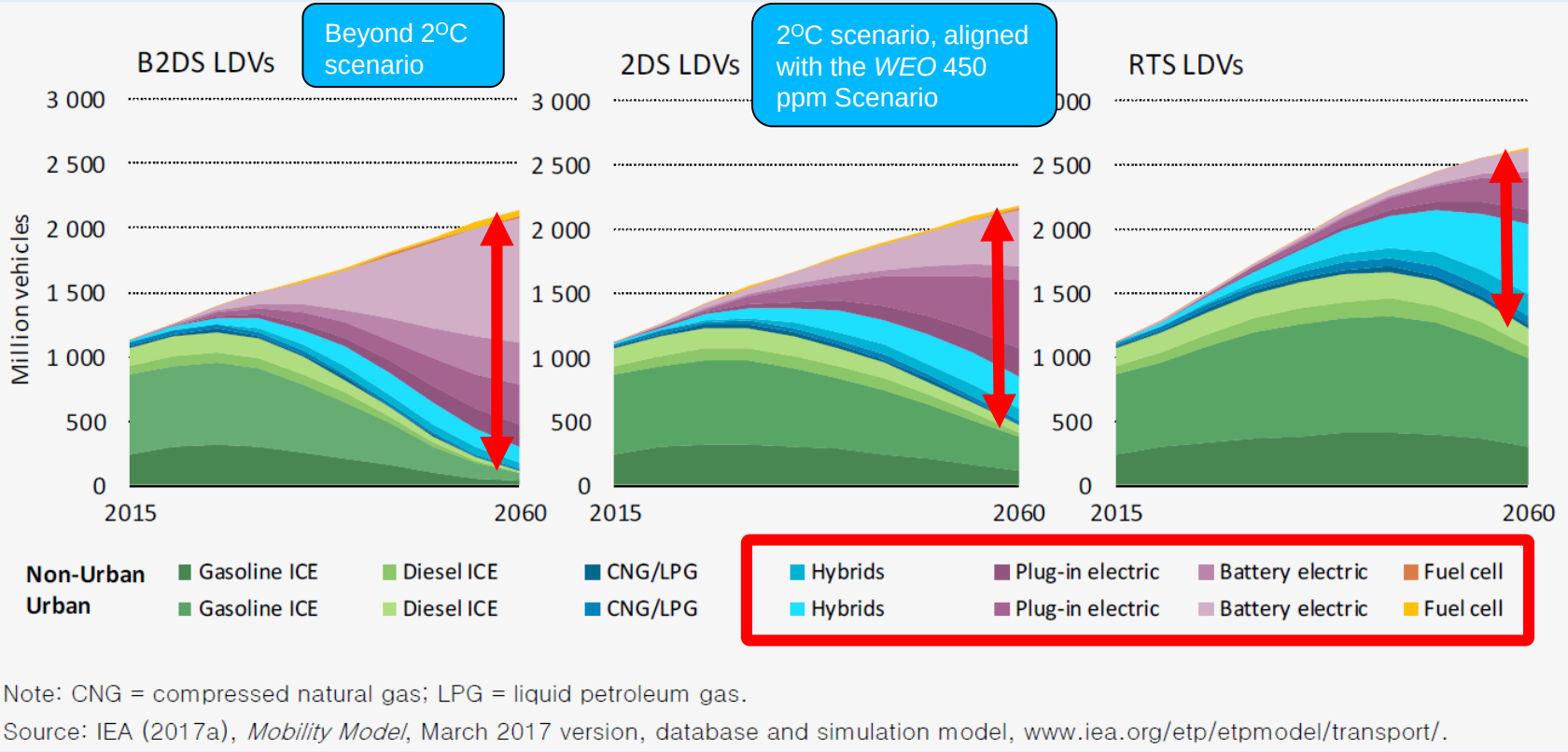
PVPS

Why e-mobility?

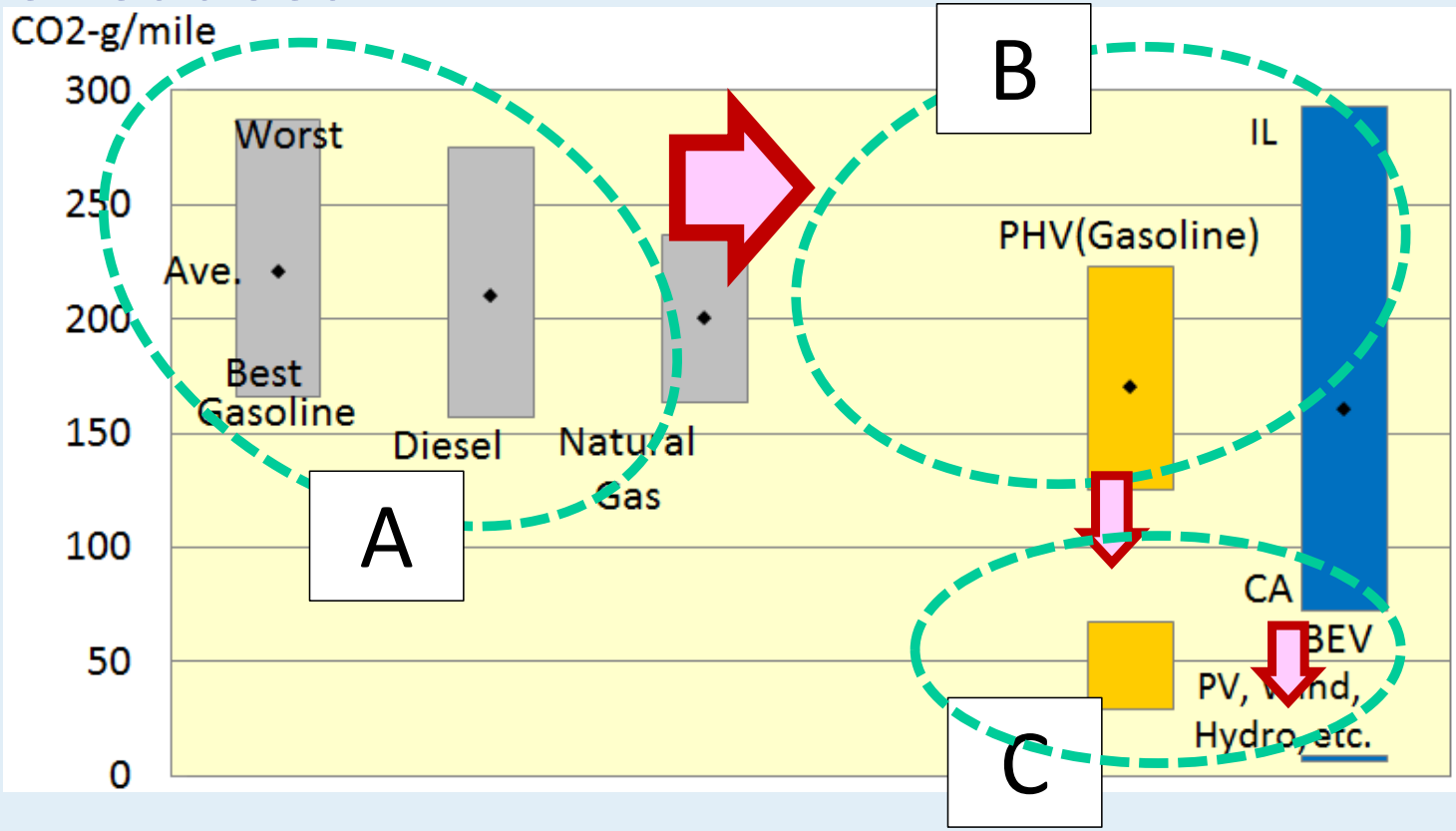
The transport sector is facing the challenge of significant CO_2 reduction



Global technology penetrations in LDV stock by scenario, 2015-60
(Ref.©OECD/IEA 2017, Energy Technology Perspectives 2017, Figure 5.3, p. 223)

Why PV-based e-mobility?

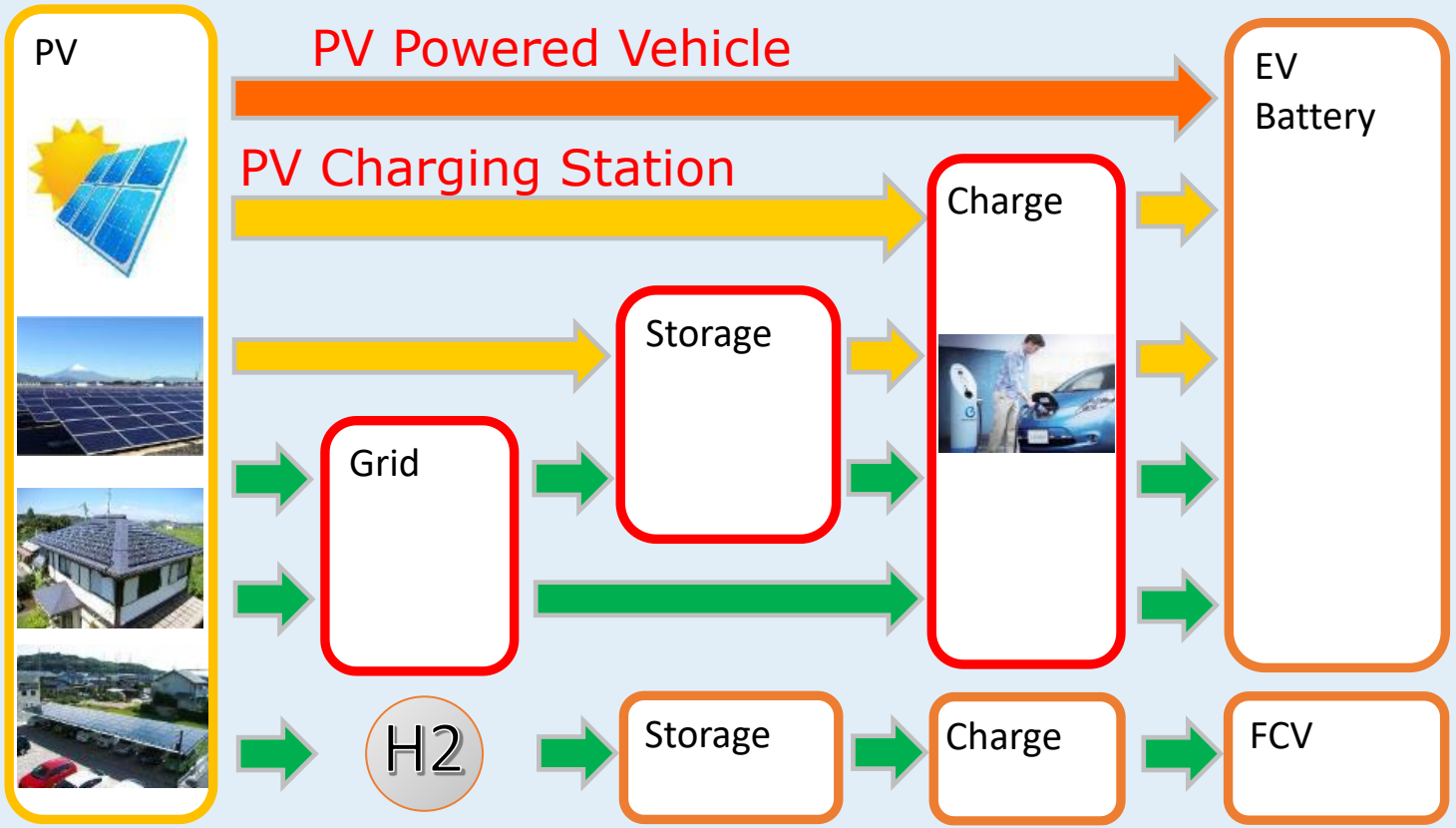
- **Well-to-Wheels GHG gas emissions should be reduced.**



Well-to-Wheels Greenhouse Gas Emissions for 2035, Mid-Size Car(Ref. U.S.DOE: Program Record Offices of Bioenergy Technologies, Fuel Cell Technologies & Vehicle Technologies, 10 May 2013)

Why PV-based e-mobility?

- **There are various ways to supply PV electricity to EV.**



Why PV-based e-mobility?

- **A potential of PV market in the transport will be large.**

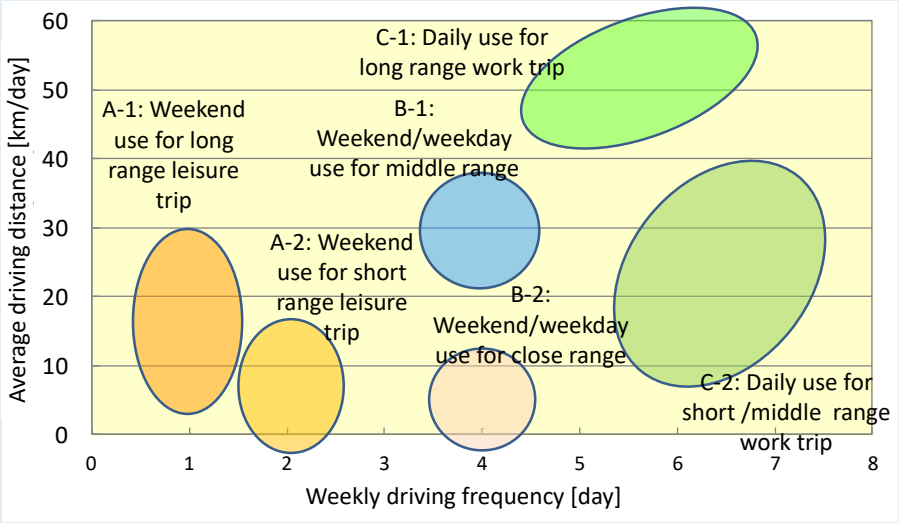
(http://toyota.jp/priusphv/performance/charge/?padid=ag341_from_priusphv_top_performance03#)

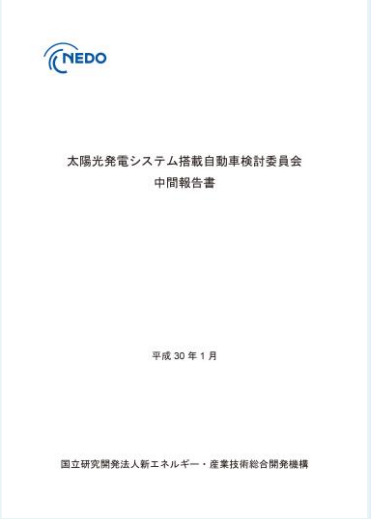
(https://www.sonomotors.com/sion/#page-content)

(http://pps-net.org/column/19534)

A preliminary study on PV-powered vehicles

Expected values of PV-powered vehicles (1kW-PV)



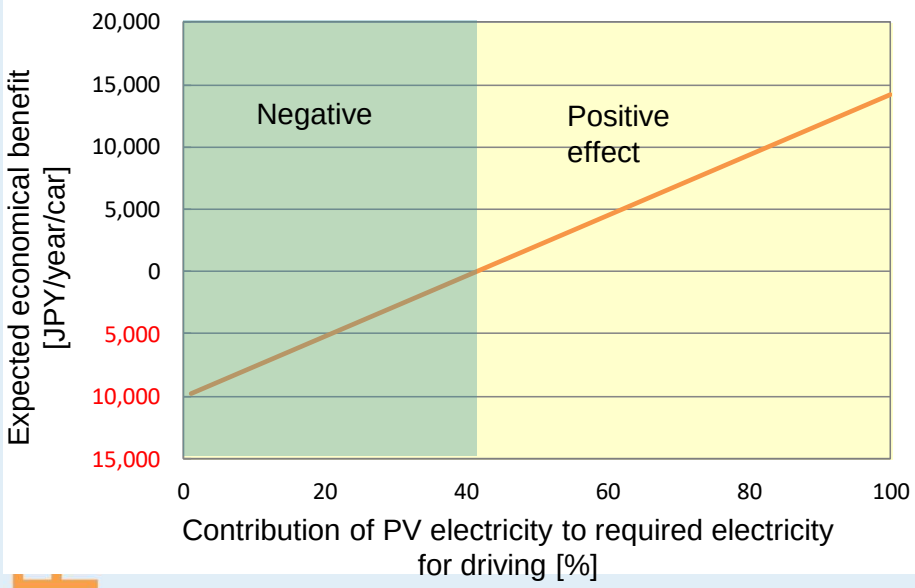


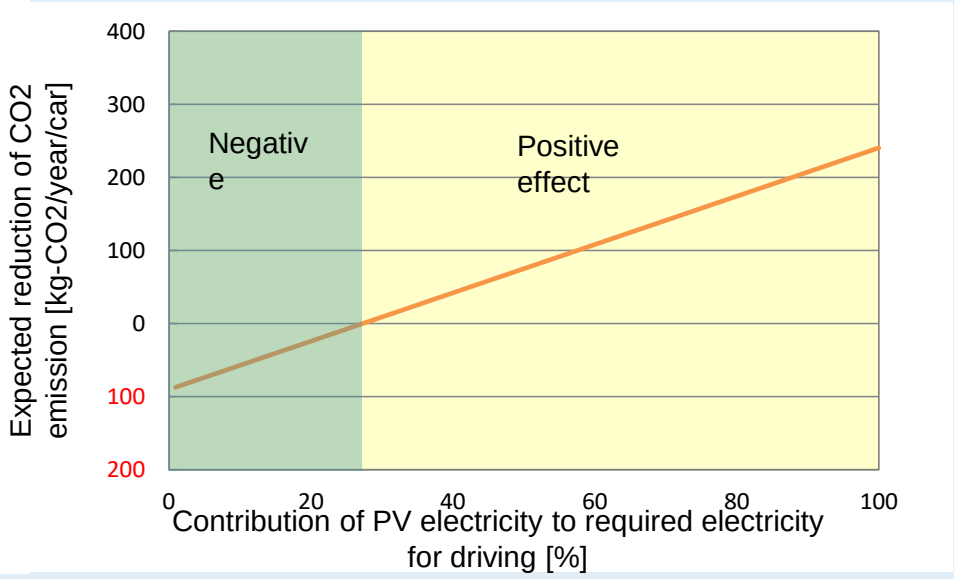
Driving pattern	Range [km/d]	Frequency [days/week]	Effective use of PV electricity	Expected values of PV-Powered vehicle		
				CO_2 reduction [kg-CO_2/y]	Saving charging cost [JPY/y]	Charging opportunity
A-1 Weekend use for long range leisure trip	150	2 (Weekend)	100 %	-240	-14,200	decrease
A-2 Weekend use for short range leisure trip	50		44 %	-54	-650	unnecessary
B-1 Weekend/weekday use for middle range	50	4 (Mon., Wed., Fri. and Sun.)	88 %	-200	-11,300	unnecessary
B-2 Weekend/weekday use for close range	5		9 %	23	7,820	unnecessary
C-1 Daily use for ling range work trip	50	5 (From Mon. to Fri.)	100 %	-240	-14,200	decrease
C-2 Daily use for short/middle range work trip	15		33 %	18	2,010	unnecessary

(Ref. NEDO, Interim Report of Committee on PV-Powered Vehicles, January 2018)

A preliminary study on PV-powered vehicles

- **Environmental benefit compared to use of non-PV electricity, e.g. contribution to reduction of CO_2 emission, will depend on effective use of PV electricity generated on-board , as well as economical benefit.**





(Ref. NEDO, Interim Report of Committee on PV-Powered Vehicles, January 2018)

IEA PVPS Task17: PV and Transport

- **Objectives**
  - Clarify expected/possible benefits and requirements for PV-powered vehicles
  - Identify barriers and solutions to satisfy the requirements
  - Propose directions for deployment of PV equipped charging stations
  - Estimate the potential contribution of PV in transport
  - To realize above in the market, contribute to accelerating communication and activities going ahead within stakeholders such as PV industry and transport industry

Planned works

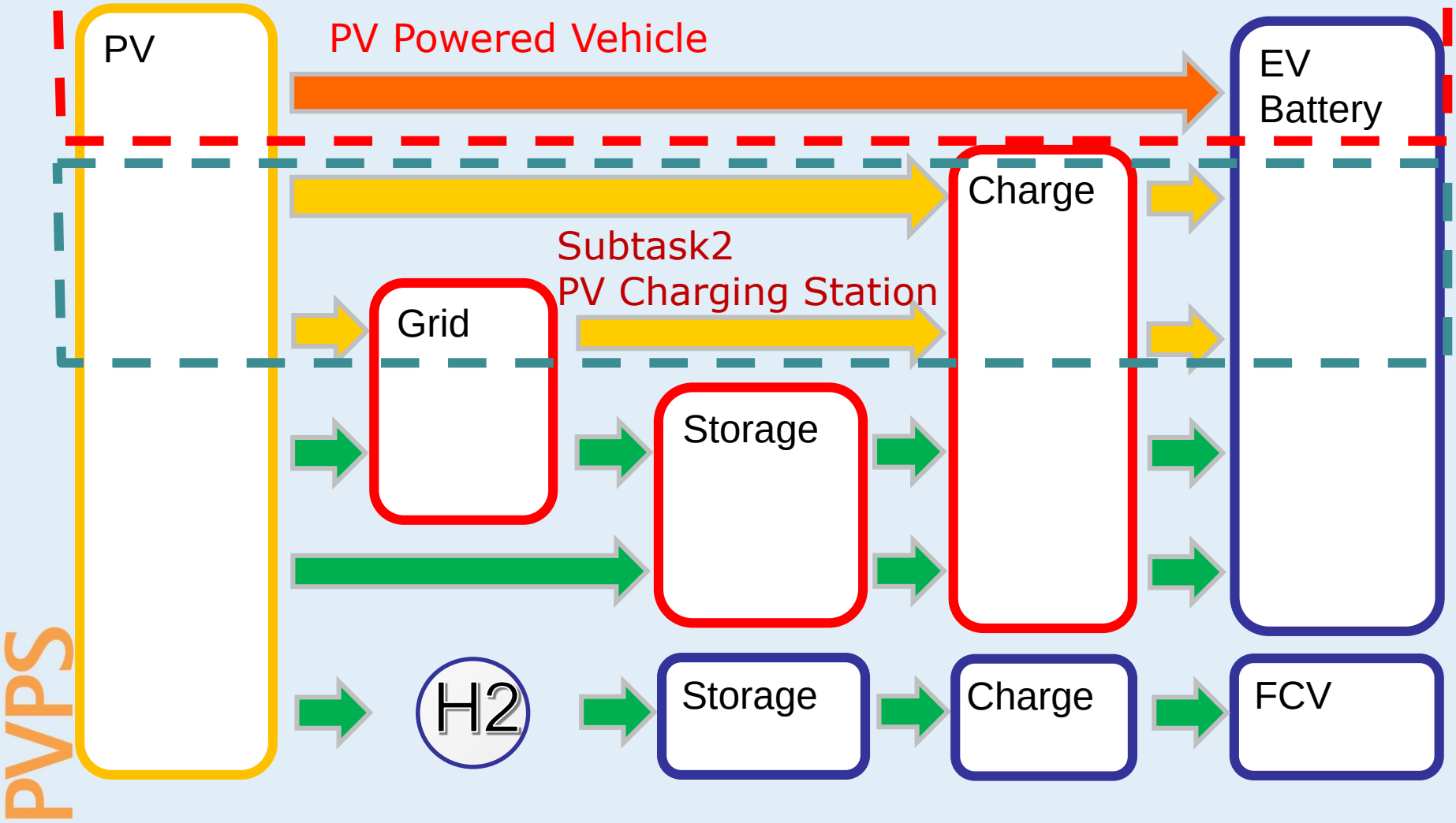
＜Subtask 1＞
Benefits and requirements for PV-powered vehicles

＜Subtask 2＞
PV-powered applications for electric systems and infrastructures

＜Subtask 3＞
Potential contribution of PV in transport

＜Subtask 4＞
Dissemination

Scope of Subtask1 & 2



Subtask 1:
Benefits and requirements for PV-powered vehicles (1)

●Context

- In order to mitigate environmental impacts, promoting electrified vehicles is suggested.
- How to directly use PV electricity for vehicles, and how to integrate PV components on board will be important.

●Scope

- Subtask 1 will clarify expected/possible benefits and requirements for utilizing PV on board.

<Target PV-powered vehicles>

- Passenger cars
- Others: Small vehicles, freight trucks, buses, trains, ships, etc.

Subtask 1:
Benefits and requirements for PV-powered vehicles (2)

●Objectives

- To recognize current status and future potential
- To identify requirements, barriers and solutions
- To clarify expected contributions to energy and environment
- To clarify expected benefits for users, industry and society
- To compare to indirect PV use
- To discuss potential of other PV-powered vehicles

●Activities

1.1: Overview and recognition of current status of PV-powered vehicles
1.2: Requirements, barriers and solutions for PV and vehicles
1.3: Possible contributions and benefits
1.4: Other possible PV-powered vehicles

Subtask 2: PV-powered applications for electric systems and infrastructures (1)

- Context

For promoting electrification of vehicles, not only charging electricity by itself on board, but also charging renewable electricity at the environmental friendly infrastructure, e.g. PV-powered charging stations, will be feasible.

- Scope

In order to utilize the PV in the transport effectively and widely, active combination between PV and electric systems including infrastructure with vehicles will be an effective approach.
Subtask 2 will discuss electric systems using PV-powered vehicles and infrastructures.

Subtask 2: PV-powered applications for electric systems and infrastructures (2)

●Objectives

- To identify requirements, barriers and solutions for PV-powered infrastructure such as charging station.
- To clarify contributions and benefits by PV-powered infrastructure, and to compare them to using PV electricity not produced at the site.

●Activities

2.1: Overview and recognition of current status of PV-powered for EV charging infrastructure

2.2: Requirements, barriers and solutions for PV-powered infrastructure for EV charging

Subtask 3:
Potential contribution of PV in Transport

- Context

  A potential of PV market in the transport will be driving force for the further development of PV.
  New social models expected by innovational ‘PV and Transport’

- Scope

  In parallel with Subtask 1 and Subtask 2, Subtask 3 will develop a path for deployment of PV-powered vehicles and applications.

- Objectives

- R&D scenario of PV-powered vehicles and applications
- Deployment scenario of PV-powered vehicles and applications
- Contribution to saving fossil-energy and reducing CO2 emissions
- Social and business models

Subtask 4: Dissemination

- Context

  Knowledge is disseminated to the general public and end users in a timely manner.

- Scope

  Information dissemination procedures effectively release key findings to stakeholders such as PV industry, transport industry, battery industry, and energy service provider.

- Objectives

  < Expected deliverables >
  - Technical reports based on proposed activities
  - Task brochure
  - Webinars and conference presentations
  - Workshop with stakeholders

Participating/potential countries (tentative)

- Japan (Operating Agent)
- The Netherlands
- Germany
- France (tbc)
- Belgium (tbc)
- Spain (tbc)
- Australia
- Morocco
- Korea
- China (tbc)

Please join us!

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