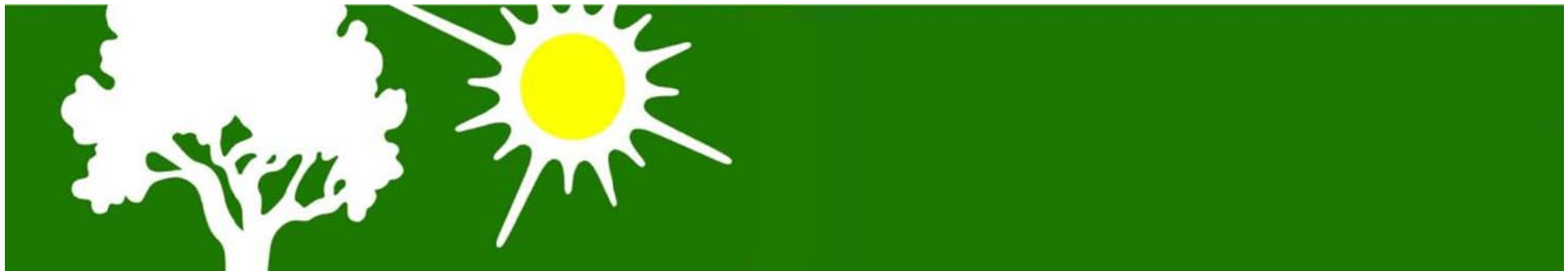


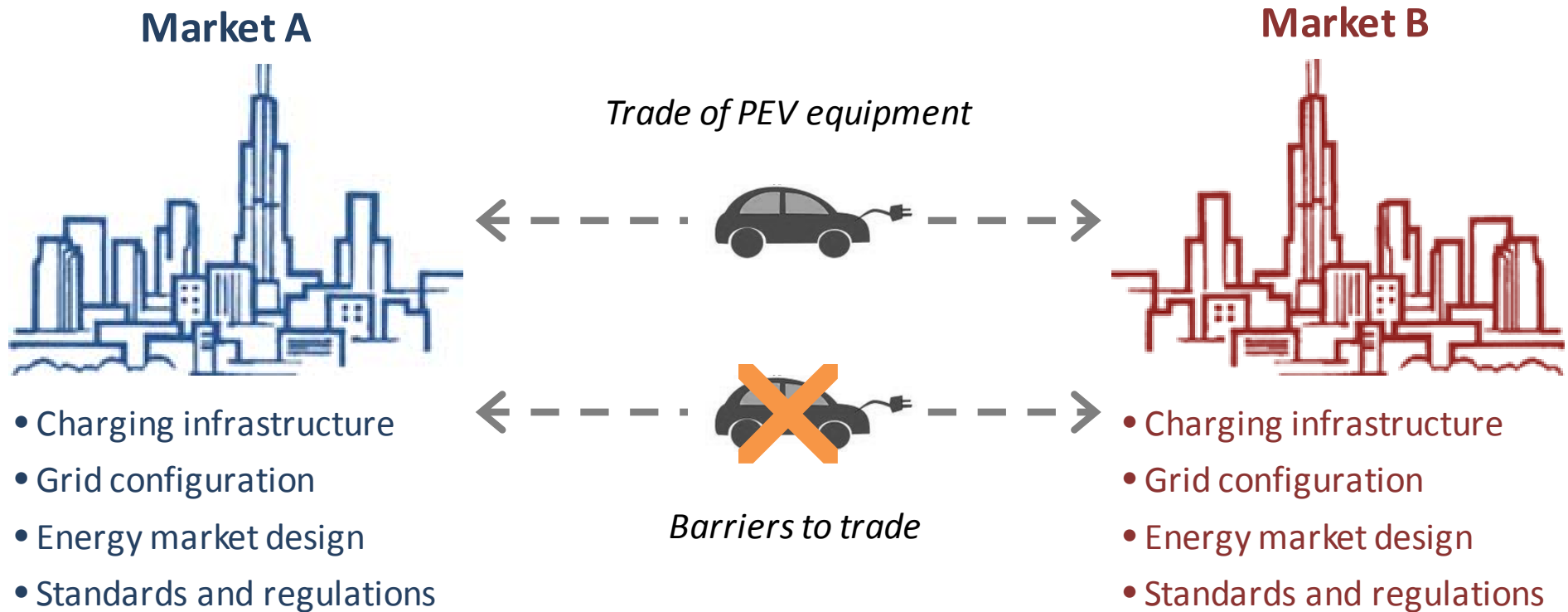
Key Findings:
**Potential Barriers for International Trade of PEVs and
Opportunities for APEC Cooperation and Resolution**

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APEC Electric Vehicle Connectivity Workshop
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This is why we are here today



Session Outline

1. Defining trade barriers
2. Trade barriers from PEV connectivity conditions
3. Other trade barriers for PEVs
4. Opportunities for barrier removal
5. Recommended APEC actions

Defining Trade Barriers

- Trade barriers are government-induced restrictions on international trade
 - There are tariff vs. non-tariff barriers
- Technical barriers to trade are:
 - A category of non-tariff barriers
 - Standards and regulations that economies use to regulate markets and protect their consumers and natural resources



nicholsoncartoons.com.au, 5 October 2010

Significance of Trade Barriers

- Through ongoing globalization and free trade agendas, the significance of non-tariff barriers has increased.
- The OECD has estimated that differing standards and regulations in different markets may constitute between **2-10% of overall costs of production:**
 - Multiple testing and certification a.k.a. “costs of compliance”
 - Depends on the product and market
 - PEV market is relatively immature, so exact cost impacts are still unknown

Standards vs. Regulations

- Standards vs. regulations are not the same

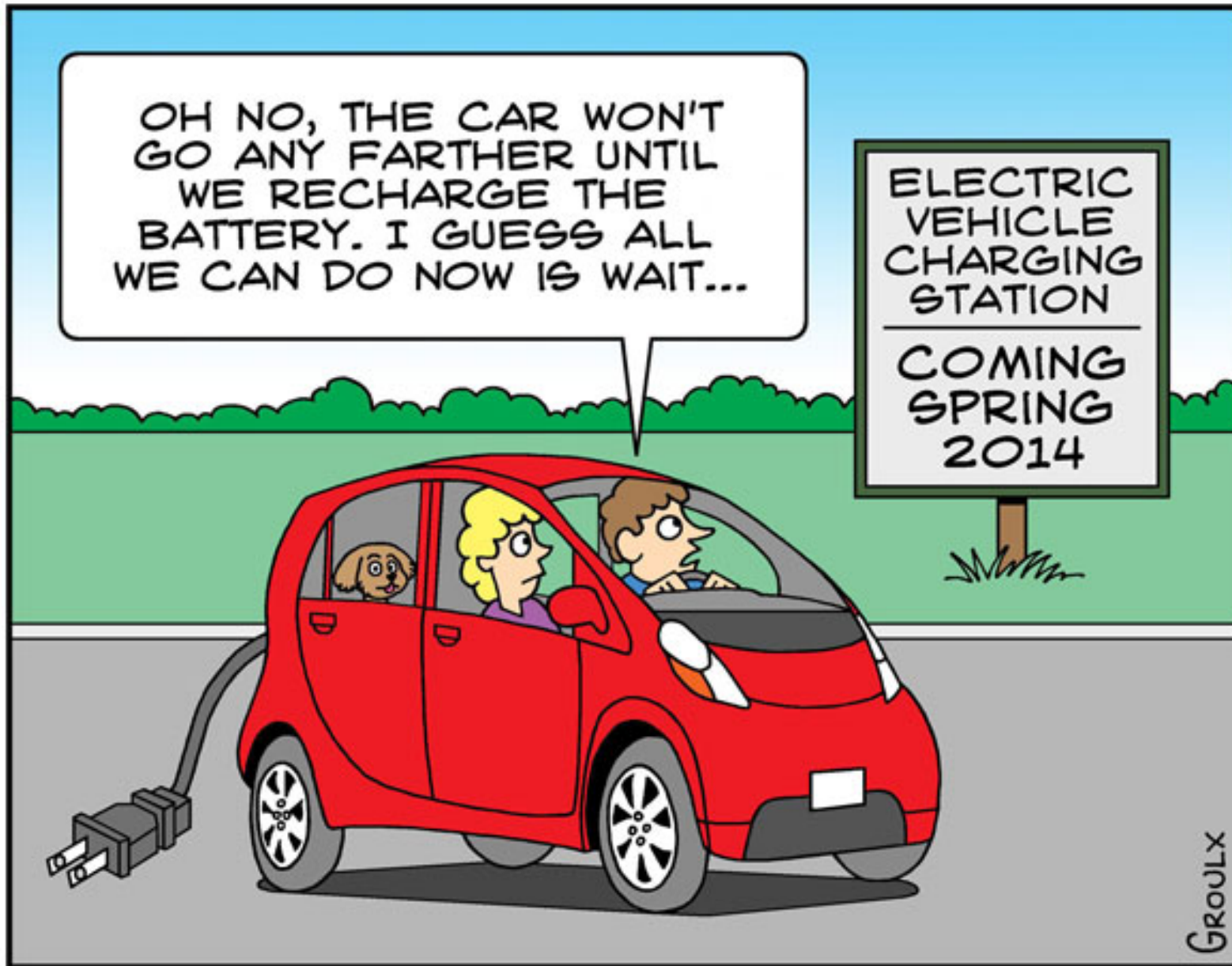
STANDARDS	REGULATIONS
<p>Normally represent industry best practices determined by a broadly consultative and inclusive stakeholder group:</p> <ul style="list-style-type: none">•Not mandatory, considered voluntary•Often a precursor to regulation•Example: SAE J1772	<p>Are legal instruments used by governments to regulate markets including goods and services traded:</p> <ul style="list-style-type: none">•Normally mandatory•Sometimes apply voluntarily e.g. incentives•Often refer to standards•Example: Californian ZEV Regulation

Use of Standards vs. Regulations

1. Both are employed by Governments to achieve legitimate policy objectives, such as the protection of human health and safety or the environment
 - a) may also be used by Governments to discriminate against imports in order to protect domestic industries
2. Standards may legitimately be employed by industry to protect consumer interests or promote competitive advantage
3. Governments may use standards and regulations to protect the early market development of strategically desirable technologies (such as PEVs)

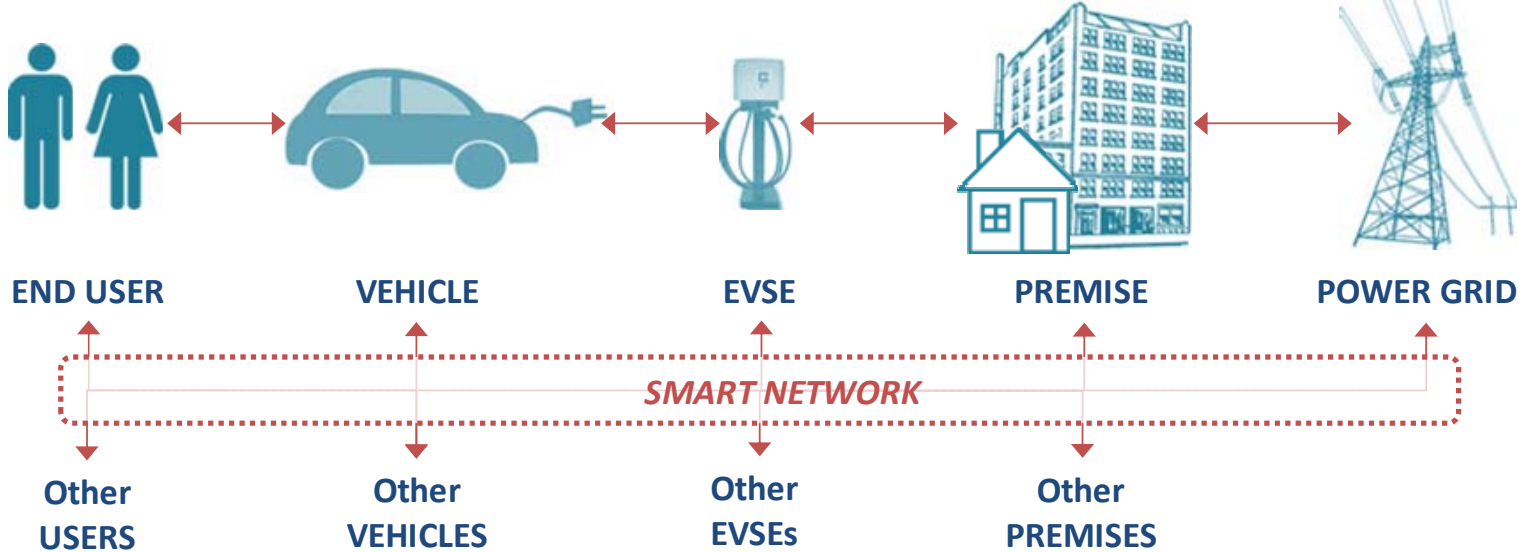
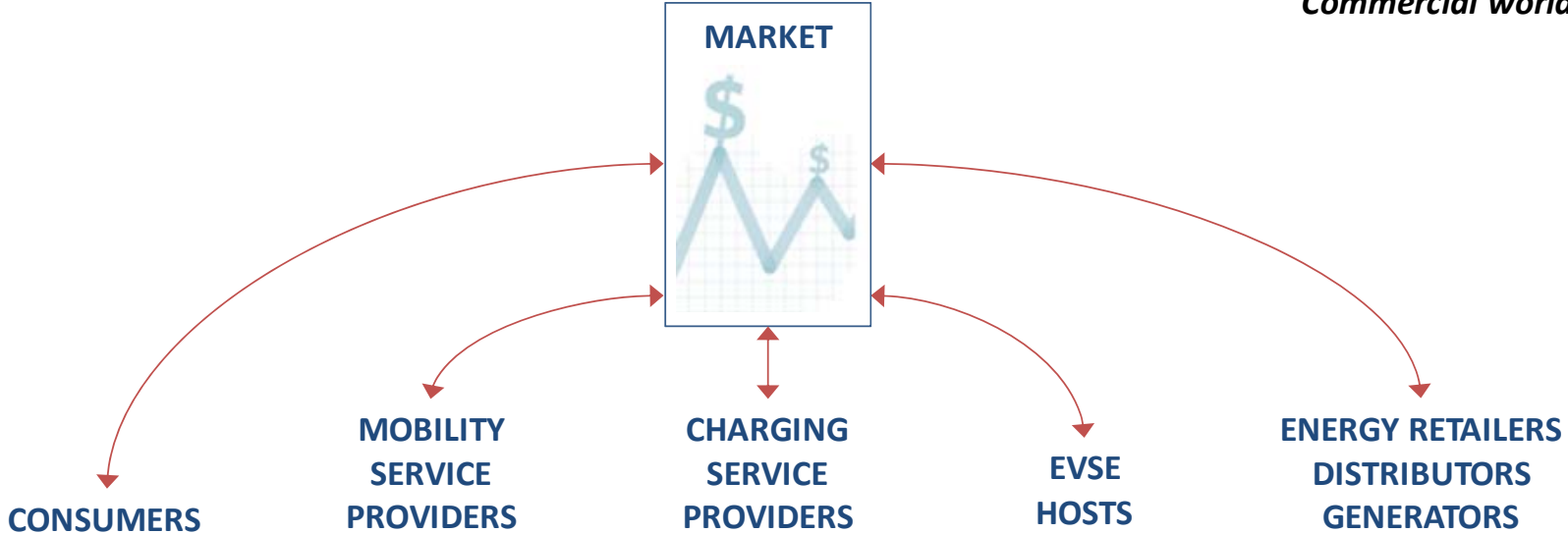
Defining PEV Connectivity Technical Barriers to Trade

- A potential PEV connectivity technical barrier to trade exists where there are regional market differences in standards or regulations governing PEV connectivity conditions
 - Look for “costs of compliance” or “market lockout”
- There are also other PEV barriers to trade in areas unrelated to connectivity conditions.



blogs.autonet.ca, 21 December 2010

Commercial world



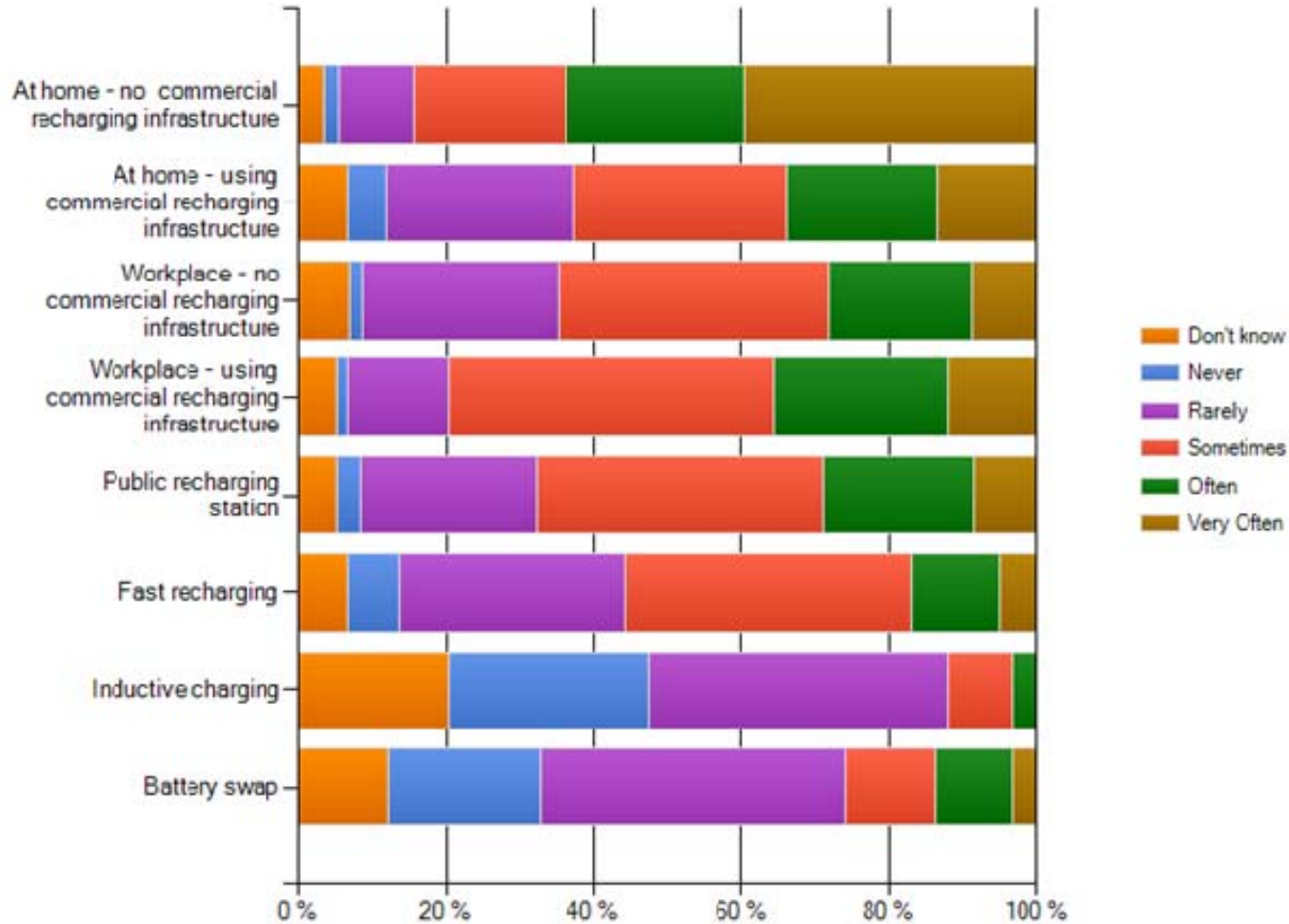
Physical world

Trade Barriers from PEV Connectivity Conditions

1. Recharging interfaces
 - Conductive Recharging
 - Inductive Recharging
 - Battery exchange
2. Network interfaces
 - Grid plugs/sockets, voltages, currents, frequencies and phases
 - EVSE network interfaces
 - Smart grid network interfaces
3. Electrical safety
 - Appliance standards
 - Installation standards
4. Energy market arrangements

Recharging Interfaces

Prevalence of PEV Recharging Infrastructure by Type (Unweighted Draft)



Recharging Interfaces - Conductive

Barrier	Example: IEC 62196
Competing connector standards	Mode 3: Yazaki vs. Mennekes vs. Scame Mode 4: CHAdeMO vs. China vs. Combo
Standards not regulations	No APEC Economies have harmonized with IEC 62196
Adapting to standard residential or industrial electrical outlets	Modes 1-2: There are 8 different types of residential electrical outlet in APEC
Other conductive Recharging scenarios	Mode 4 maximum is 600V / 400A DC, which equates to only 3km/minute reRecharging in an electric bus.

Recharging Interfaces - Inductive

Barriers:

1. Lack of industry standards

- Initial progress with SAE J2954 Wireless Recharging Taskforce and Alliance for Wireless Power

2. Uncertain use cases

- SAE J2954 does not include “dynamic” Recharging

3. Lack of recognition

- 90% of survey respondents said “*rarely/never/don't know*”

Recharging Interfaces – Battery Exchange

Barriers:

1. Lack of industry standards

- Early progress via China and European EASYBAT consortium, IEC/TC 69 recently indicated it would build on China's work








2. Lack of recognition

- Renault is currently the only manufacturer of a battery-swap capable car
- 90% of survey respondents said *"rarely/never/don't know"*

Network Interfaces: Grid Configuration

Barriers:

- There are 8 different residential plugs/sockets in APEC, plus multiple voltages and frequencies
- Unique equipment for each configuration
- Costs of compliance

Model	Application	Level	Power	Connector	Mounting Options	Region	
CT2025	Commercial	Dual Level 2	208/240 VAC 30 A	SAE J1772™	Bollard with cable management	North America	
CT2021	Commercial	Dual Level 2	208/240 VAC 30 A	SAE J1772™	Bollard	North America	
CT2000	Commercial	Level 2	208/240 VAC 30 A	SAE J1772™	Wall Pole Bollard	North America Australia	
CT2100	Commercial (dual output)	Level 1	120 VAC 16 A	Nema 5-20 outlet	Wall Pole Bollard	North America	
		Level 2	208/240 VAC 30 A	SAE J1772™			
CT500	Fleet and Residential	Level 2	208/240 VAC 30 A	SAE J1772™	Wall	North America Australia	
CT1500	Commercial	Level 1	230 VAC 16 A	Shuko BS AUZ	Wall Pole Bollard	Europe	
CT2500	Commercial	IEC 61851-1 Mode 3	230 VAC 32 A	IEC 62196-2 e-mobility Type-2	Bollard	Europe	

Network Interfaces: EVSE Network Regulation

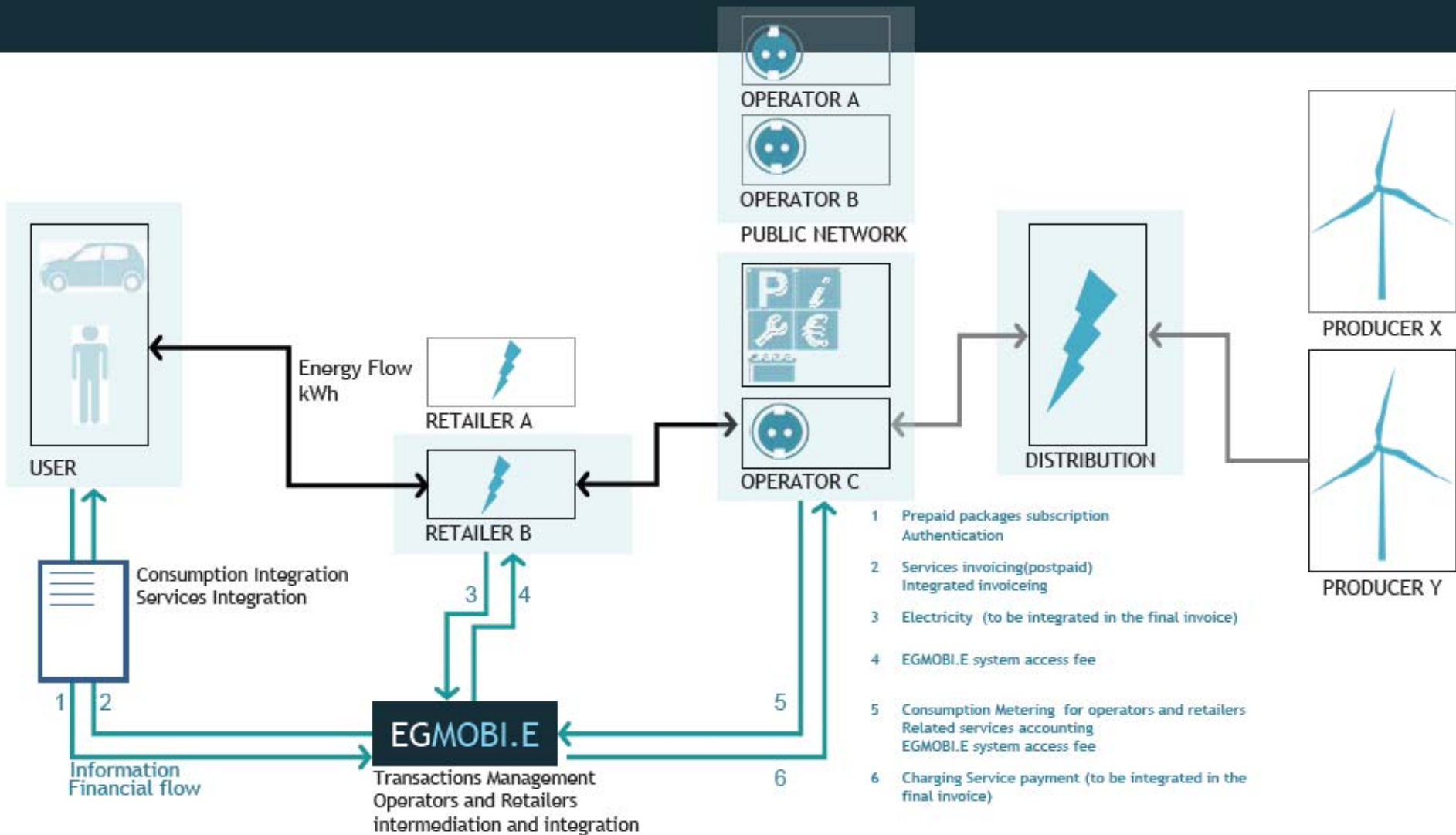
- Concerned with accessibility, interoperability, roaming or legacy infrastructure

Potential barriers:

1. Differences in proprietary systems operated by Recharging service providers
2. Emerging e-mobility market regulations
 - At present, no APEC Economy has established e-mobility market rules
 - Examples to watch include California's NRG settlement or Portugal's MOBI.E system

ELECTRIC MOBILITY PROGRAM

THE MANAGING ENTITY: INTEGRATION BETWEEN MULTIPLE STAKEHOLDERS



Network Interfaces: PEV-Smart Grid integration

“Unlike other smart grid elements that are already in large-scale deployment, the benefits tied to PEV deployment are more speculative and untested.” (APEC# 211-RE-01.2)

Context:

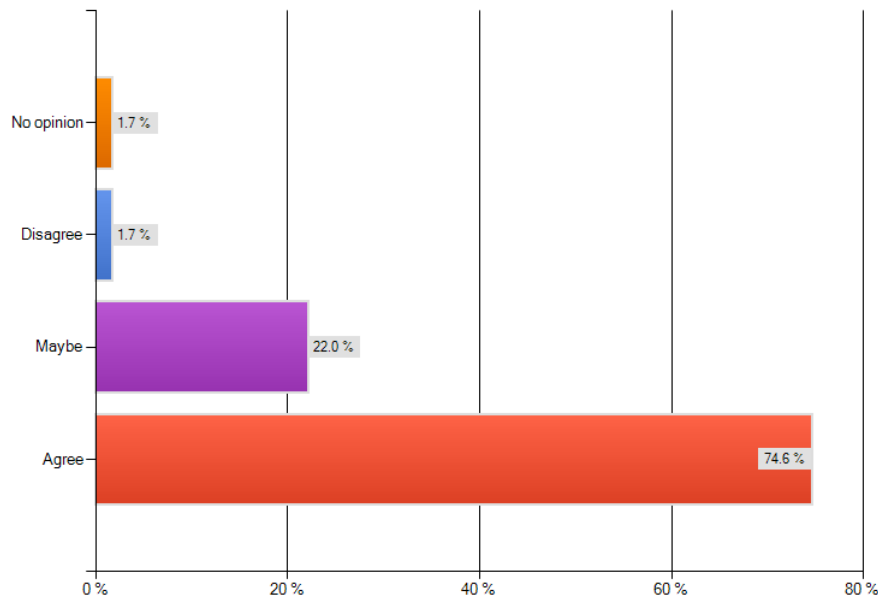
1. Ongoing uncertainty around smart grid feature set, architecture and interface definitions, and costs vs. benefits for PEV integration.
2. PEV-smart grid integration is still predominantly under trial and standards are still under development.
3. APEC regional smart grid preferences are still emerging with unclear regulatory treatment.

Barriers:

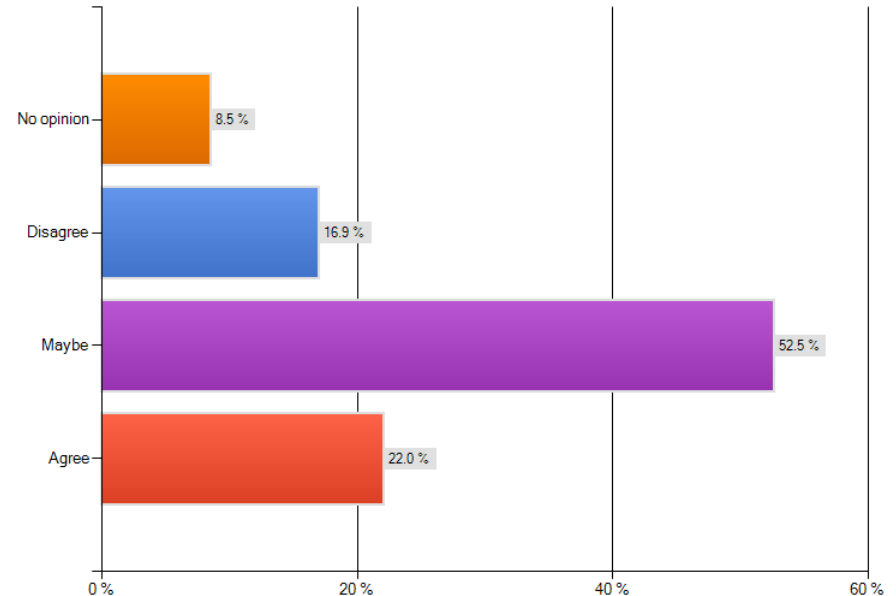
- Hard to say anything definitive about PEV-smart grid barriers to trade

Network Interfaces: PEV-Smart Grid integration

Do you think that plug-in electric vehicle recharging infrastructure should be smart also?
(Draft Unweighted)



Do you believe plug-in EV users in your economy will pay extra for their charging services in return for greater connectivity (faster or smarter charging)? (Draft Unweighted)



75% of survey respondents think PEV infrastructure should be smart.

Only 22% think that PEV users will be willing to pay extra for that!

Electrical Safety – Appliance Standards

- Electrical safety: Underwriters Laboratory, etc
- EMC compliance: C-Tick, FCC conformance, etc

Barriers:

1. These product standards clearly vary throughout the APEC region
2. Costs of compliance
3. Classification issue:
Is a PEV a vehicle or an appliance, or both?

Electrical Safety – Installation Standards

- Wiring rules or national electric codes
- Permitting procedures during commissioning

Barriers:

1. Can create “market lockout” barriers

2. Example: US National Electric Code

- It is illegal to conduct Mode 1 or 2 Recharging from a 208-240V outlet. PEVs sold in the US must either charge from a 110-120V outlet or from a dedicated EVSE “hard-wired” to a 208-240V circuit.
- This is not a problem in Australia/New Zealand, for example.

Energy Market Arrangements

- Regulations that govern the sale of electricity

Barriers:

1. Can create “market lockout” barriers

2. Examples:

- EVSE ownership in California
- Submetering for EVSEs
- Off-peak Recharging in Queensland, Australia

Other Barriers - Vehicle Homologation

- Regulations governing the vehicles sold in a market

Barriers:

1. These clearly vary throughout the APEC region, with the associated costs of compliance or market lockouts for PEVs
2. Examples:
 - Electric car supply into Australia/New Zealand
 - Neighbourhood electric vehicles in Australia
 - Electric assist bicycles in Australia

Other Barriers - Local Market Factors

- Various other things that discourage the trade of PEVs with a market

Barriers:

1. PEV-related policies vary widely throughout the APEC region
2. Some PEV markets are far more attractive than others
3. Examples:
 - PEV incentives or lack thereof
 - Taxation of fuel vs. electricity
 - Intellectual property regulation

Summary of PEV Barriers to Trade

Conductive Recharging – lack of harmonization
Inductive Recharging and battery exchange – lack of recognition
Inductive and battery exchange – lack of standardization
Grid configuration – lack of harmonization
EVSE network regulations – lack thereof
PEV-smart grid integration – lack of architecture/interface definitions
PEV-smart grid integration – incomplete standards
PEV-smart grid integration – unknown treatment across APEC
Electrical safety – classification of PEV (vehicle vs. appliance)
Electrical safety – lack of harmonization of appliance standards
Electrical safety - market lockouts from installation standards
Energy market arrangements – market lockouts for certain PEV/EVSEs
Vehicle homologation – lack of harmonization
Local PEV market factors
Incomplete info re APEC PEV connectivity conditions

Opportunities to Remove Barriers

Prioritization framework*:

1. Barriers of major vs. minor significance
2. Barriers that are easy vs. hard to remove

* Note we have tried to adopt APEC's perspective

	Easy Barriers	Hard Barriers
Major Barriers	<i>“Low-hanging fruit”</i>	<i>“Worth the effort”</i>
Minor Barriers	<i>“Low priority”</i>	<i>“Not worth it”</i>

	Easy Barriers	Hard Barriers
Major Barriers	<p>Incomplete info re APEC PEV connectivity conditions</p> <p>Inductive Recharging and battery exchange - recognition</p> <p>Smart Grid-PEV integration – architecture and interfaces</p> <p>Electrical safety – classification of PEV</p>	<p>Conductive Recharging harmonization</p> <p>Grid configuration harmonization</p> <p>Smart Grid-PEV integration – unknown treatment across APEC</p> <p>Electrical safety harmonization</p> <p>Vehicle homologation</p> <p>Local PEV market factors</p>
Minor Barriers	<p>Inductive and battery exchange - standardisation</p> <p>Smart Grid-PEV integration – incomplete standards</p>	<p>EVSE network regulations</p> <p>Electrical safety market lockouts</p> <p>Energy market arrangements PEV lockouts</p>

Recommended APEC Actions: Major PEV Barriers, Easy to Overcome

Incomplete info re APEC PEV connectivity conditions

- Establish an APEC PEV Knowledge Network (APKN)

Inductive Recharging and battery exchange – recognition

- Promote awareness via APKN.

Electrical safety: classification of PEVs

- Promote awareness via APKN.

Smart grid-PEV integration: architecture and interfaces definition

- APKN to interface with APEC Smart Grid Initiative (ASGI)

Recommended APEC Actions: Major PEV Barriers, Hard to Overcome

Conductive Recharging harmonization

- Establish an APEC Electric Vehicle ReRecharging Infrastructure Taskforce, with the upcoming IEC 62196 ballot in mind.

Smart grid-PEV integration: uncertain treatment across APEC

- Track this via APKN and ASGI

Grid configuration harmonisation, electrical safety harmonisation, vehicle homologation

- All too hard

Local PEV market factors: promote pro-EV policies

- Promote awareness via APKN