

# Energy Technology Perspectives 2015

EVI meeting

May 4, 2015 - Goyang, Korea

## Insights emerging from the 2015 Global EV Outlook (IEA)

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# Transport energy use

ETP  
2015

- Transport is the end-use with the least diversification

1973

										(Mtoe)
SUPPLY AND CONSUMPTION	Coal/peat	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Biofuels and waste <sup>(a)</sup>	Other <sup>(b)</sup>	Total	
Produced									6.13	6 224.36
Imports									8.14	2 190.61
Exports									-8.27	-2 267.15
Stock change									-	-38.82
TPES									6.00	6 109.01
Transfers									-	2.02
Statistics									-0.03	17.32
Electricity									502.41	-721.60
CHP plants									100.94	-65.93
Heat plants									7.11	-3.08
Blast furnaces									-	-84.31
Gas works									-	-6.01
Coke ovens									-	-101.59
Oil refineries									-	-20.93
Petchemicals									-	-0.28
Liquefied gas									-	-0.50
Other									-	-23.28
Energy ind. own use	-35.06	-2.59	-158.81	-106.78	-	-	-0.20	-57.68	-361.10	
Losses	-8.97	-7.07	-0.27	-6.03	-	-	-0.25	-43.14	-65.73	
TFC	640.04	22.15	2 227.36	652.29	-	-	616.56	515.61	4 674.01	
Industry	361.89	16.42	432.21	356.95	-	-	91.52	286.35	1 545.32	
Transport <sup>(d)</sup>	33.00	1 019.05	17.72	-	-	-	0.24	10.60	1 080.60	
Other	239.14	0.00	520.05	259.26	-	-	524.80	218.67	1 761.93	
Non-energy use	6.01	5.73	256.05	18.37	-	-	-	-	286.16	

(a) Biofuels and waste final consumption has been estimated.  
 (b) Other includes geothermal, solar, wind, electricity and heat, etc.  
 (c) Also includes patent fuel and BKB plants.  
 (d) Includes international aviation and international marine bunkers.

2012

										(Mtoe)
SUPPLY AND CONSUMPTION	Coal <sup>(a)</sup>	Crude oil	Oil products	Natural gas	Nuclear	Hydro	Biofuels and waste <sup>(b)</sup>	Other <sup>(c)</sup>	Total	
Produced									142.85	13 461.14
Imports									58.58	5 145.53
Exports									-58.23	-5 181.03
Stock change									-	-54.62
TPES									143.19	13 371.03
Transfers									-	35.85
Statistics									-0.21	-205.67
Electricity									654.43	-2 486.17
CHP plants									335.70	-247.65
Heat plants									194.92	-50.77
Blast furnaces									-	-186.93
Gas works									-	-7.06
Coke ovens									-	-70.47
Oil refineries									-	-73.73
Petchemicals									-	-0.02
Liquefied gas									-	-22.67
Other									-0.64	-77.88
Energy ind. own use	-85.91	-10.37	-190.82	-282.62	-	-	-11.91	-207.82	-789.45	
Losses	-3.35	-8.02	-0.70	-18.62	-	-	-0.17	-178.69	-209.55	
TFC	909.39	20.06	3 632.08	1 365.87	-	-	1 110.56	1 940.89	8 978.86	
Industry	727.74	9.68	299.57	498.64	-	-	186.62	818.52	2 540.77	
Transport <sup>(d)</sup>	3.28	2 327.70	90.37	-	-	-	59.97	25.65	2 506.97	
Other	139.30	0.14	430.05	592.33	-	-	863.97	1 096.71	3 122.51	
Non-energy use	39.07	10.24	574.76	184.53	-	-	-	-	808.60	

Transport in 2012

- 27% of total final energy consumption, mostly (93%) using oil products
- 64% of global oil demand

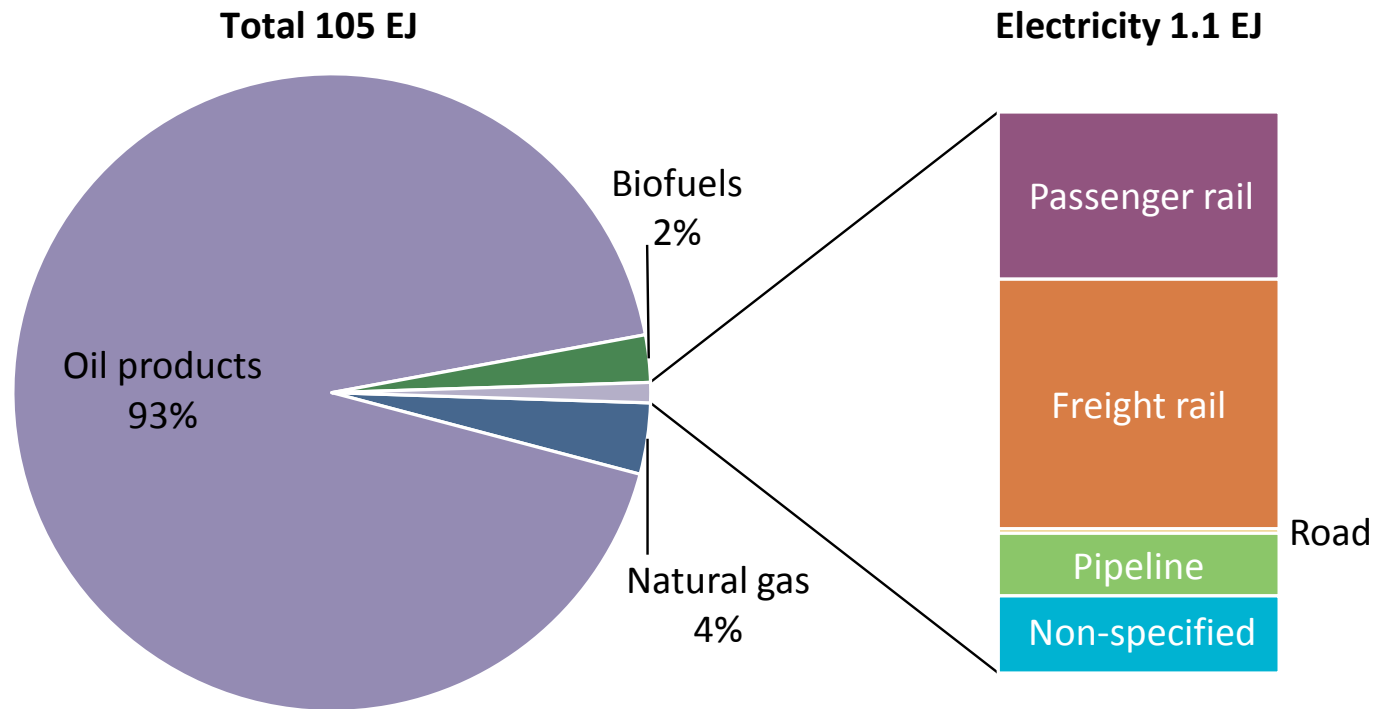
Source: [IEA Key World Energy Statistics 2014](#)



# Transport electricity use

ETP  
2015

- Electricity represents 1% of final transport energy use
- Rail is currently the most relevant mode for electric mobility

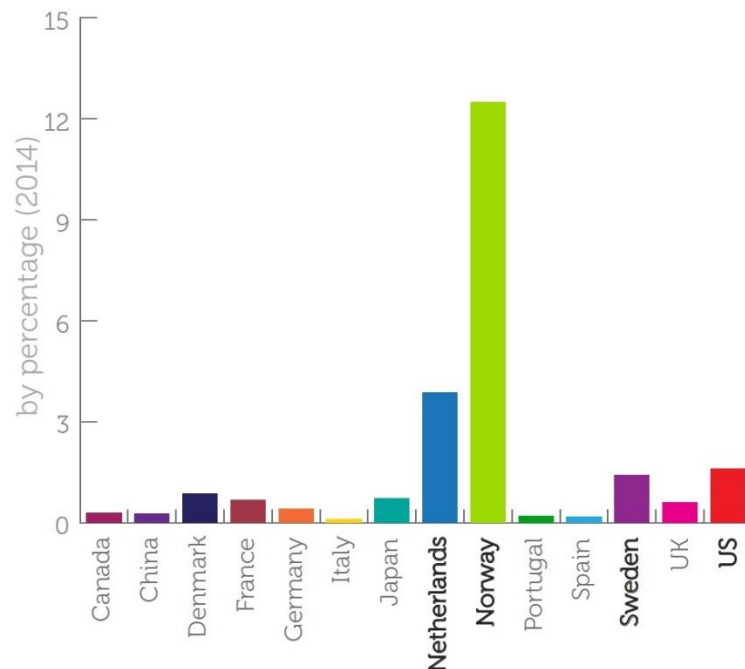
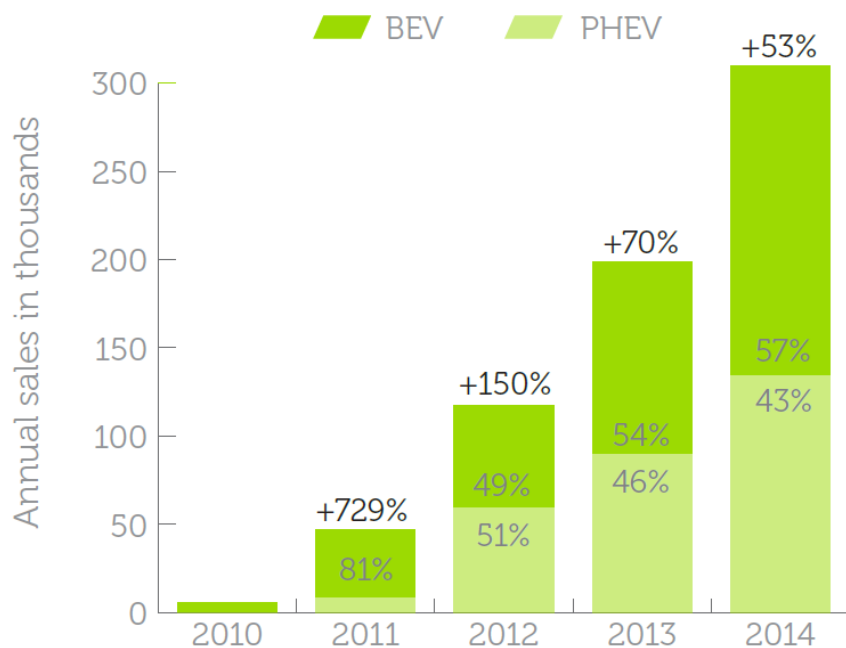


# Transport electrification trends

## Recent developments for passenger cars

Global EV  
Outlook  
2015

- Global passenger car (BEV and PHEV) sales reached 300k in 2014, growing 53% compared to 2013



- Market developments uneven: sales shares of EV cars above 1% in the Netherlands, Norway, Sweden and the US
- EV car stock: 0.65 millions (0.1% of total)



Electric  
Vehicles  
Initiative



International  
Energy Agency

Secure • Sustainable • Together

# Transport electrification trends

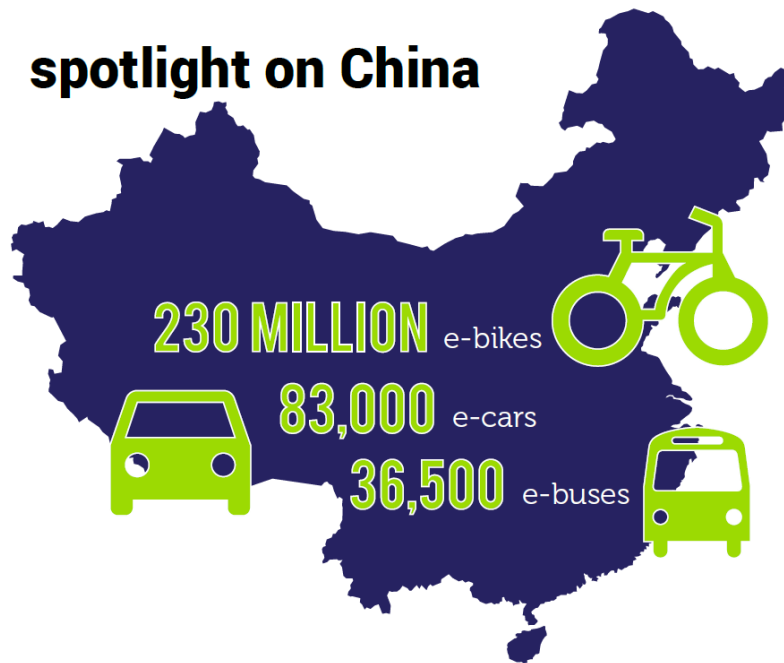
## The quiet rise of electric two wheelers in China

Global EV  
Outlook  
2015

- 36 million e-bikes are manufactured each year in China
- Total Chinese stock of mopeds and power-assisted bicycles exceeded 230 millions 2014

Global EV Outlook 2015

### spotlight on China



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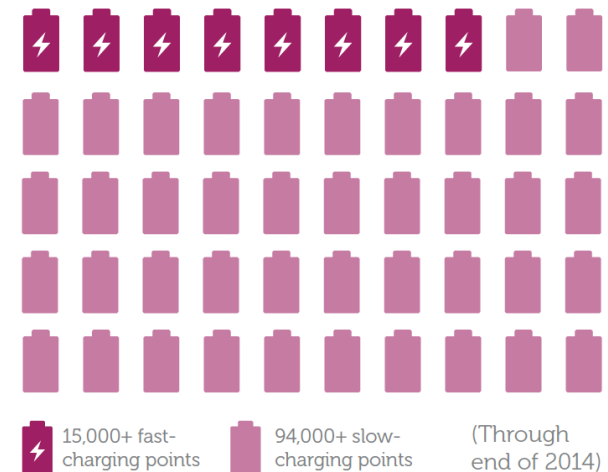
# Transport electrification trends

## Other relevant indicators

Global EV  
Outlook  
2015

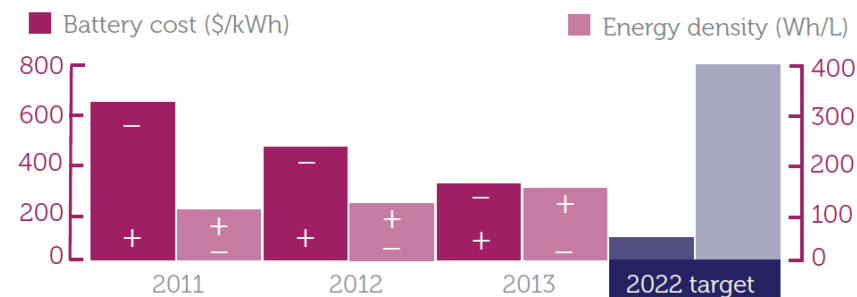
### Electric Vehicle Supply Equipment (EVSE)

- EVSE stock more than doubled for slow charging points between the end of 2012 and 2014, and increased eightfold for fast charging points



### Battery progress

- PHEV battery costs ranging between 300 and 350 USD/kWh
- Energy density close to 150 Wh/L



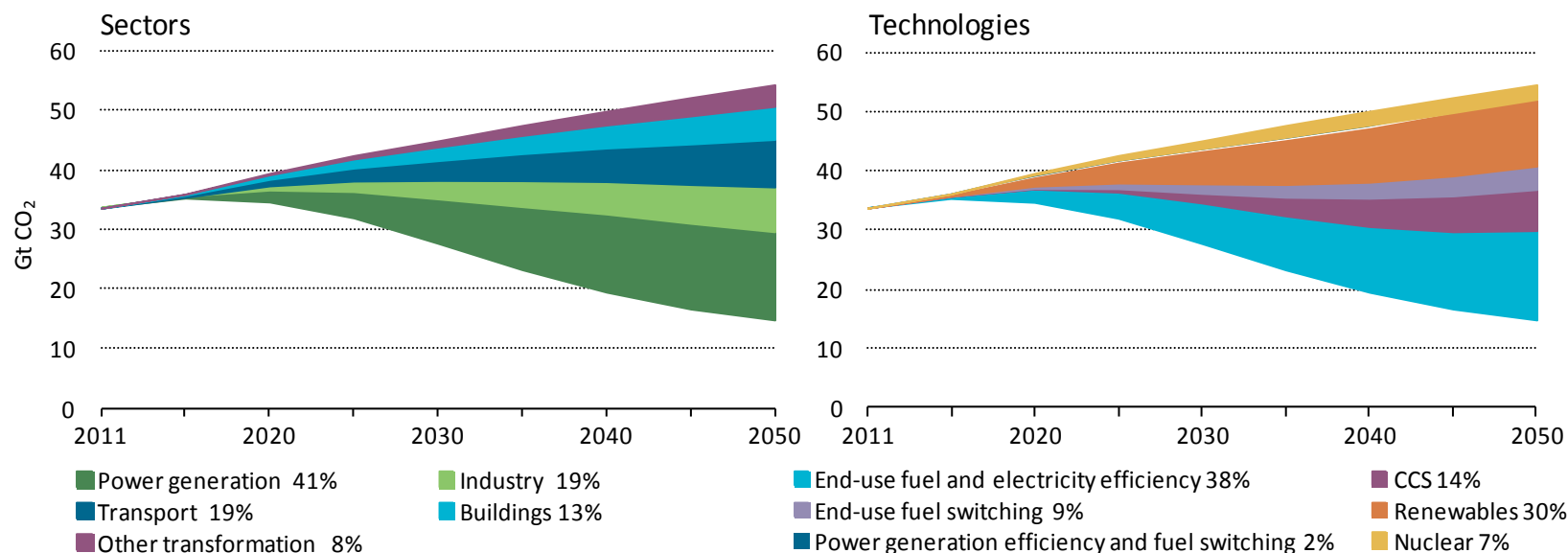


# Future prospects?

IEA scenarios: ETP series of publications

ETP  
2015

- Analysis of systemic efforts allowing the progressive decarbonisation of the energy system
- Three main scenarios: 6DS, 4DS and 2DS



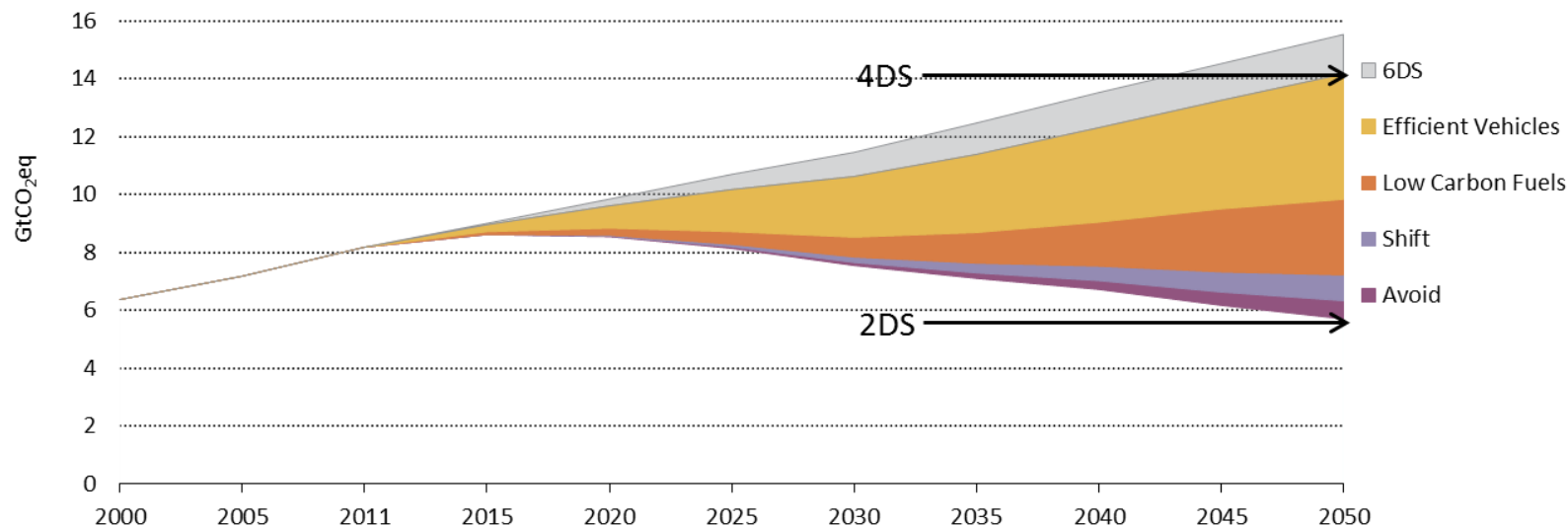
- Transport is part of the solution
- Transport decarbonisation cannot take place in isolation

# Future prospects?

## Three pillars of transport decarbonisation

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2015

### ■ Avoid-Shift-Improve strategy



- Multiple benefits: energy diversification, CO<sub>2</sub> emission reduction, improved health and environmental conditions (strategy compatible with reduction of pollutant emissions)

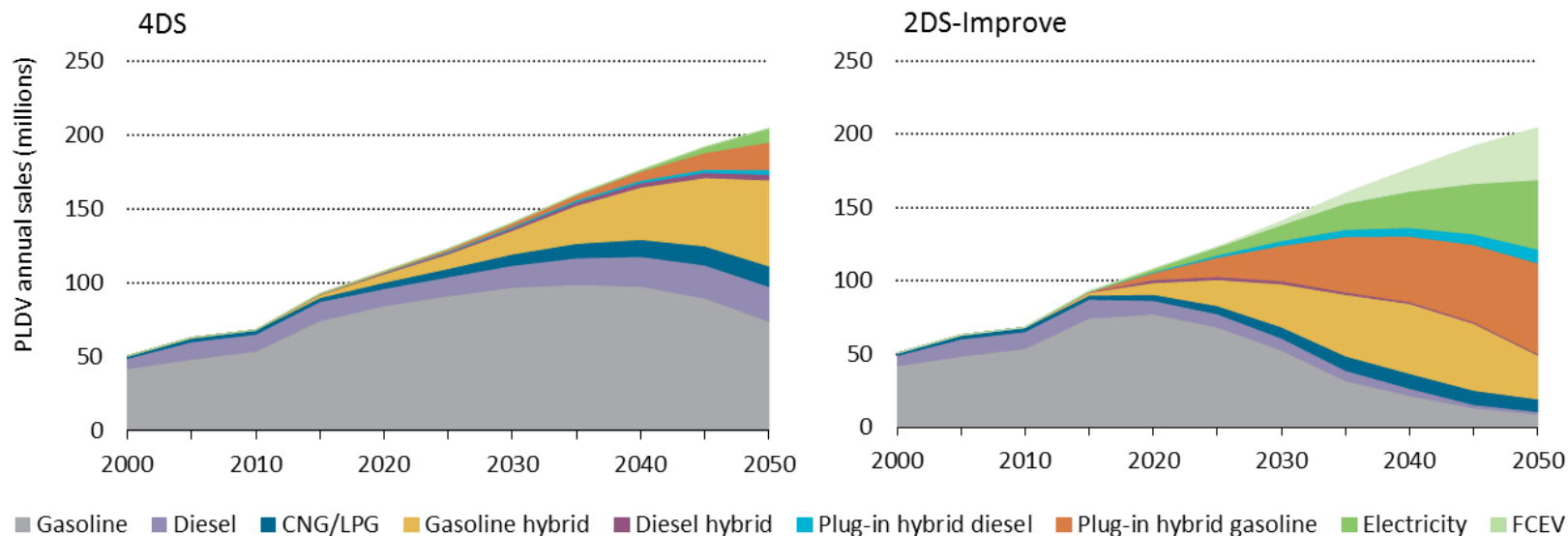


# Transport electrification

## Different prospects for personal EVs

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2015

- 4DS scenario (current policies and limited changes in technology uptake): limited role for PHEVs and BEVs

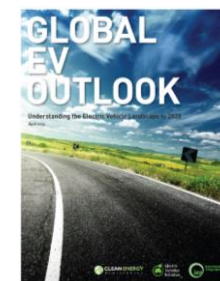
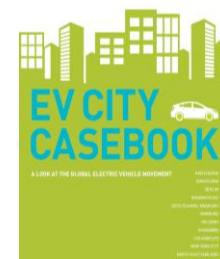


- 2DS scenario
  - 20M BEV and PHEV by 2020 (consistent with EVI target)
  - BEV, PHEV and FCVs: 3/4 of new vehicles sold in 2050

# Electric Vehicles Initiative



- Forum for global cooperation on development and deployment of EVs, established under CEM
  - Target: deployment of 20M EVs (BEV, PHEV and FCVs) by 2020
  - 17 countries: Canada, China, Denmark, France, Germany, India, Italy, Japan, Korea, Netherlands, Norway, Portugal, South Africa, Spain, Sweden, United Kingdom, United States
- Four primary objectives:
  - Common data collection/analysis efforts (Global EV Outlooks)
  - Greater RD&D collaboration (co-operation with IA-HEV)
  - City forum (EV City Casebook, BIG ideas casebook)
  - Dialogue between public authorities and private sector
- Outputs
  - Reports, targeted analysis (policy, regulatory, and technical topics), meetings, workshops, roundtables



Global EV O

## key takeaways

The Global EV Outlook represents the collective effort of the EV Initiative's 16 member governments. Below is infrastructure deployment has continued growing as energy density has climbed, vehicle electrification by two-wheelers deployed, and total EV spending by EV

global EV stock  
(through end of 2014)

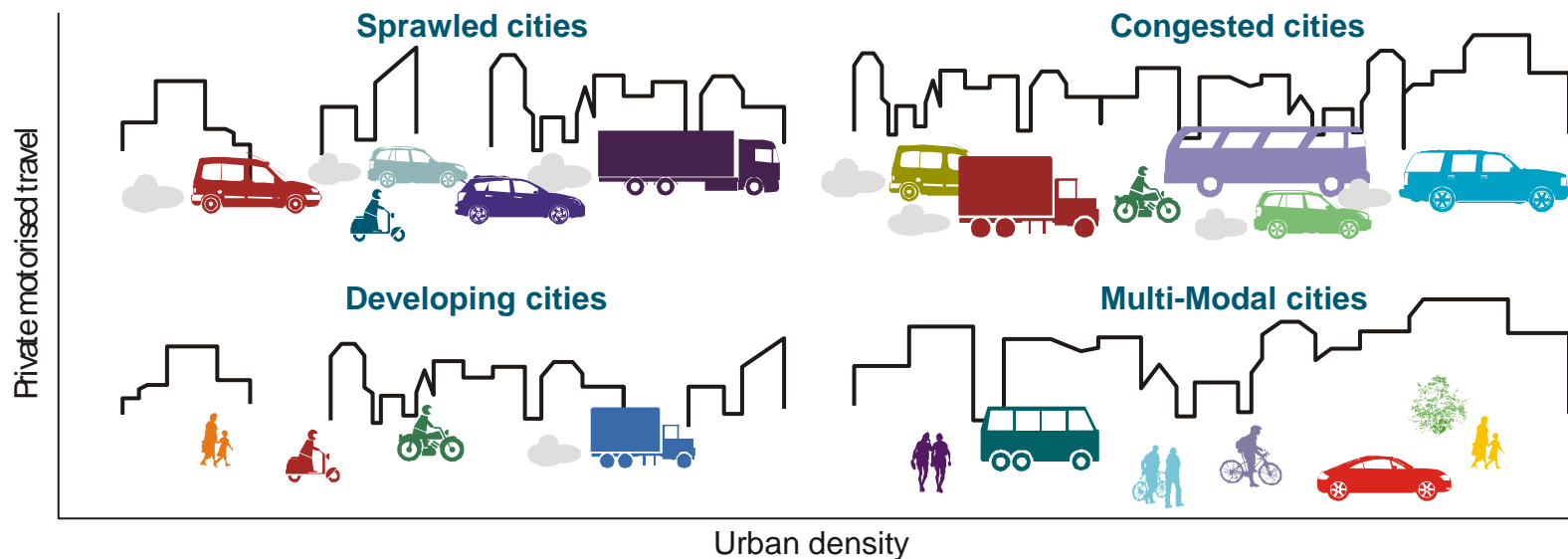
represents 0.08% of total passenger cars

665,000+

# ETP 2016: urban energy focus

ETP  
2015

- Focus on avoid-shift-improve potential through city framework as world continues to urbanize
- Improved assessment of technology deployment potential in urban/non-urban contexts (including EVs)



Source: *Tale of Renewed Cities* (2013)