

GFEI Fuel Economy Workshop, Beijing 4-5 June 2014



International Comparison of Light-Duty Vehicle Fuel Economy

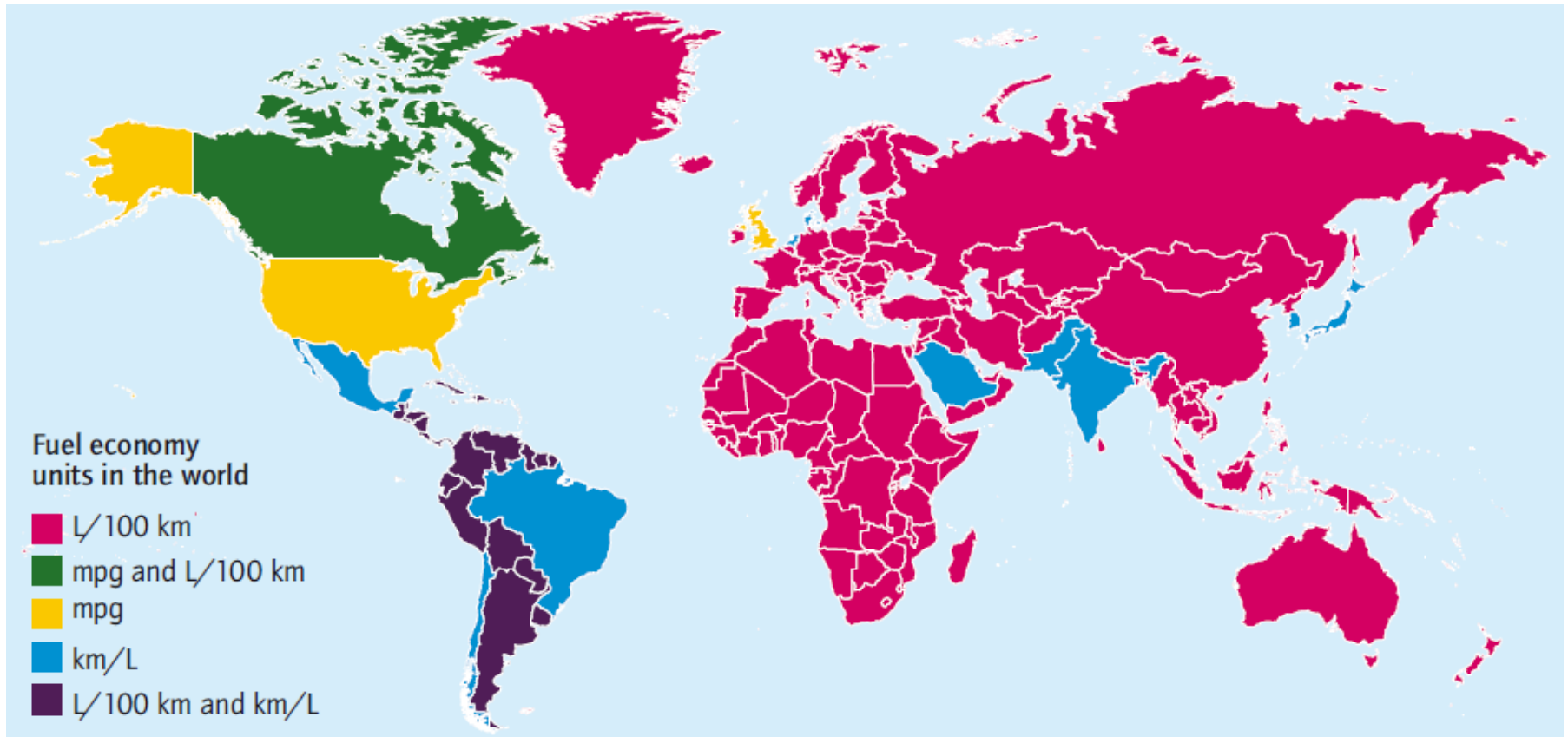
国际轻型车燃油经济性比较

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- Methodology 方法
- Fuel economy trends by country
各国燃油经济性趋势
- Car size/displacement/power trends
汽车尺寸/排量/动力趋势
- Market shift vs. technology evolution
市场转移与技术发展
- Conclusions 结论

Definition of fuel economy 燃油经济性定义



- GFEI Fuel economy definition: GFEI燃油经济性定义
Energy per distance travelled – Lge/100km
单位行驶距离能耗-lge/100km
CO₂ emission per distance travelled – gCO₂/km
单位行驶距离CO₂排放– gCO₂/km

■ New vehicle registration data from Polk:

新车注册数据来自于Polk

- Vehicle sales data by brand, model, powertrain, fuel, power 机动车销售数据，按品牌、模型、传动系统、燃料、功率分类
- Vehicle segment/class data are missing 缺少机动车分类/分级数据
- Empty weight data partly missing 缺少部分整备质量数据
- CO₂/FE data partly missing 缺少部分CO₂/油耗数据

■ Manual input of missing data based on model/sales sampling 根据模型/销售样品人工补充缺失数据

- Satisfactory market coverage when CO₂/FE data coverage >75% of total sales

CO₂/油耗数据覆盖总体销售量的75%以上为满意市场覆盖率

■ Comparison and convergence with official national CO₂/fuel economy data when available (e.g. from EEA, FPA)

Vehicle size classification 机动车尺寸分类

Typical vehicle	IEA segment	Simplified segmentation
Smart fortwo Fiat 500	A	Small
Opel Corsa Renault Clio	B	
Toyota Corolla VW Golf	C	Medium
Honda Accord Mercedes C Class	D	Large
BMW 7 series Ford Fusion (US model)	E	
Porsche Carrera Bentley Arnage	F	
Wuling Zhiguang Maruti / Suzuki Wagon R	Micro truck	Small
Renault Kangoo Renault Modus	Compact truck	Medium
Toyota Rav4 Suzuki Gran Vitara	Medium Truck	
Audi Q7 Chevrolet Silverado	Large Truck	Large

- GFEI analysis focuses on passenger light duty vehicles, light commercial vehicles are excluded for most of the countries

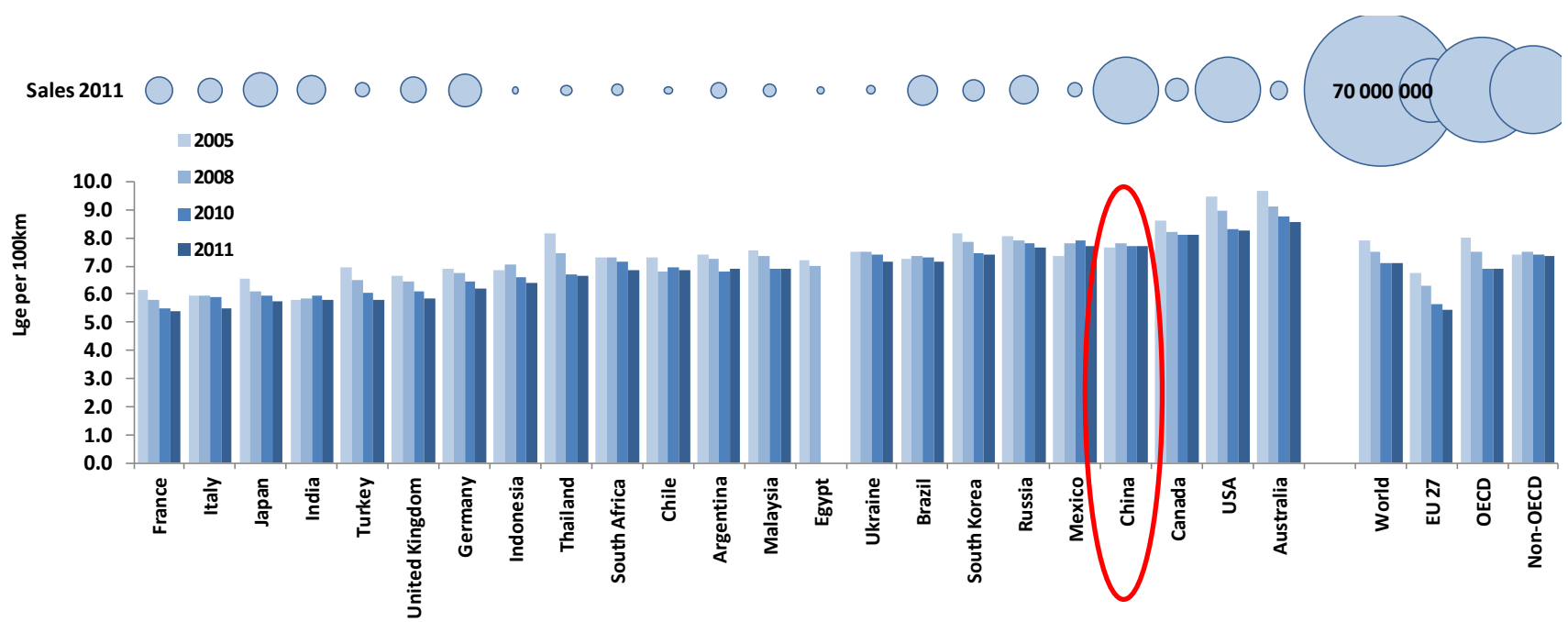
GFEI的分析主要针对轻型乘用车，大部分国家都不包含轻型商用车

- In Australia, Canada and US light commercial vehicles are included within passenger cars as this category comprises the large pick-up segment which are mostly used for passenger transport

由于澳大利亚、加拿大和美国的轻型商用车包含大量承载乘客的皮卡，所以被划分为轻型乘用车

- Currently, the following test cycles to measure new vehicle fuel economy are used 当前，用于测试燃油经济性的工况有以下几种：
 - Europe: New European Driving Cycle (NEDC) – also used in China , Australia 欧洲：NEDC，也用在中国和澳大利亚
 - Japan: JC08 日本：JC08
 - US: FTP 75 – also used in Canada, Korea 美国：FTP 75- 也用于加拿大和韩国
- Within the GFEI analysis the different tested fuel economy values are not harmonized 在GFEI的研究中，不同工况下测试出的燃油经济性值没有经过调整统一。

FE trends & market size 燃油经济性趋势和市场大小



- Significant fuel economy improvement can be observed if policies are in place
如果有政策出台，燃油经济性显著提高
- Size shift vs. technology evolution moderates Non-OECD improvement
尺寸的转变与技术发展相冲，减缓了非OECD国家的燃油经济性提高幅度
- Growth of markets with worse fuel economy affects global fuel economy trend
如果市场扩大而燃油经济性下降，将影响全球燃油经济性趋势

Targets and reality 目标与现实

		2005	2008	2011	2030
OECD average	average fuel economy (Lge/100km)	8.1	7.6	7.0	
	annual improvement rate (% per year)	-2.2%		-2.7%	
		-2.4%			
Non-OECD average	average fuel economy (Lge/100km)	7.5	7.6	7.5	
	annual improvement rate (% per year)	0.4%		-0.6%	
		-0.1%			
Global average	average fuel economy (Lge/100km)	8.0	7.6	7.2	
	annual improvement rate (% per year)	-1.7%		-1.8%	
		-1.8%			
GFEI target	average fuel economy (Lge/100km)	8.0			4.0
	required annual improvement rate (% per year)	2005 base year	-2.7%		
		2012 base year	-3.0%		

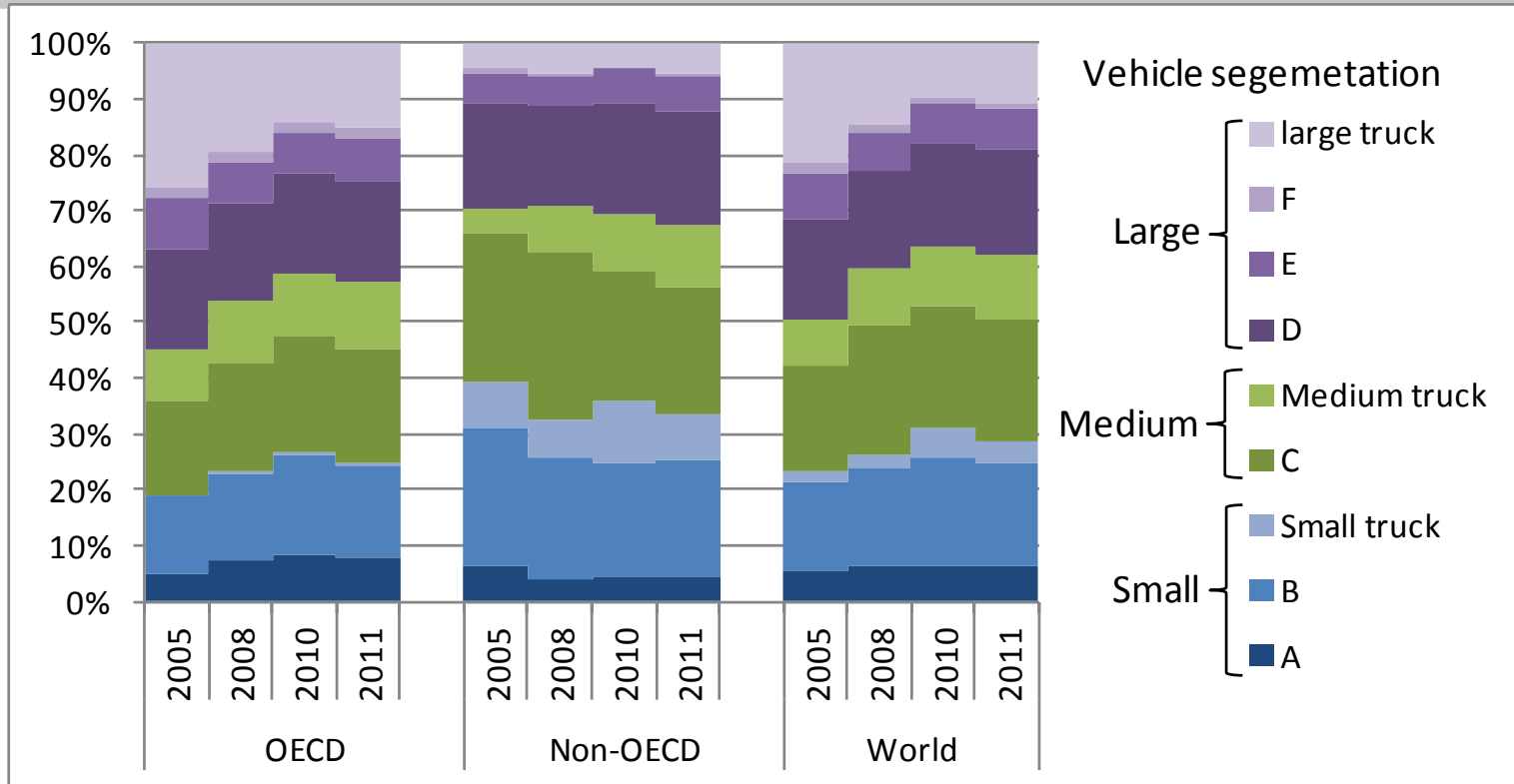
OECD: rates close to target
 OECD: 现实与目标接近

Non-OECD: little improvement
 非OECD: 小幅提高

Global: Right trend at slow pace
 全球: 方向正确, 缓慢前行

2050: Improve global FE by 50%
 2050: 全球燃油经济性提高50%

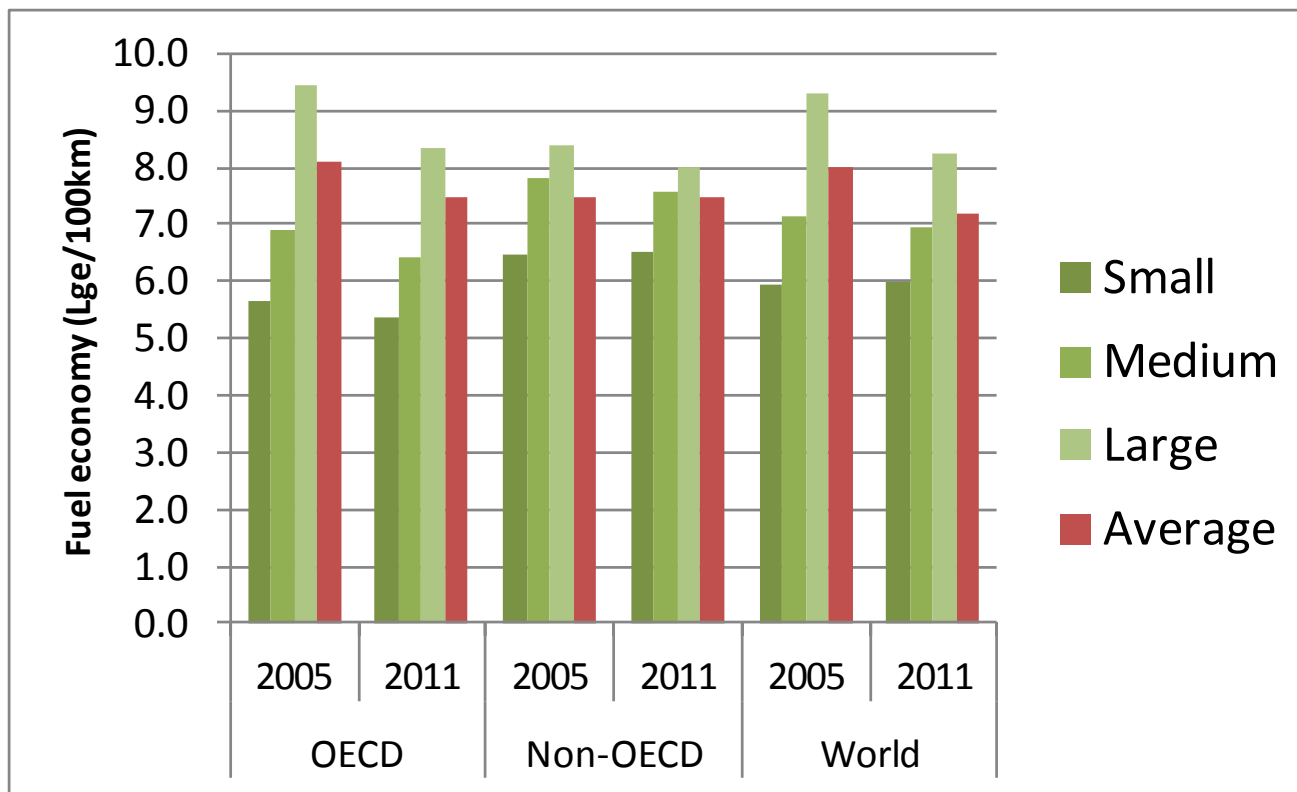
Vehicle size evolution 机动车尺寸变迁



- OECD shows a trend towards smaller cars
OECD车辆尺寸有减小趋势
- In Non-OECD regions SUVs/trucks/vans are getting more popular
在非OECD地区，SUV/卡车/厢式客车越来越受欢迎
- Globally, vehicle segmentation seems to converge
在全球，车辆分类方式逐步集中

Fuel economy by segment

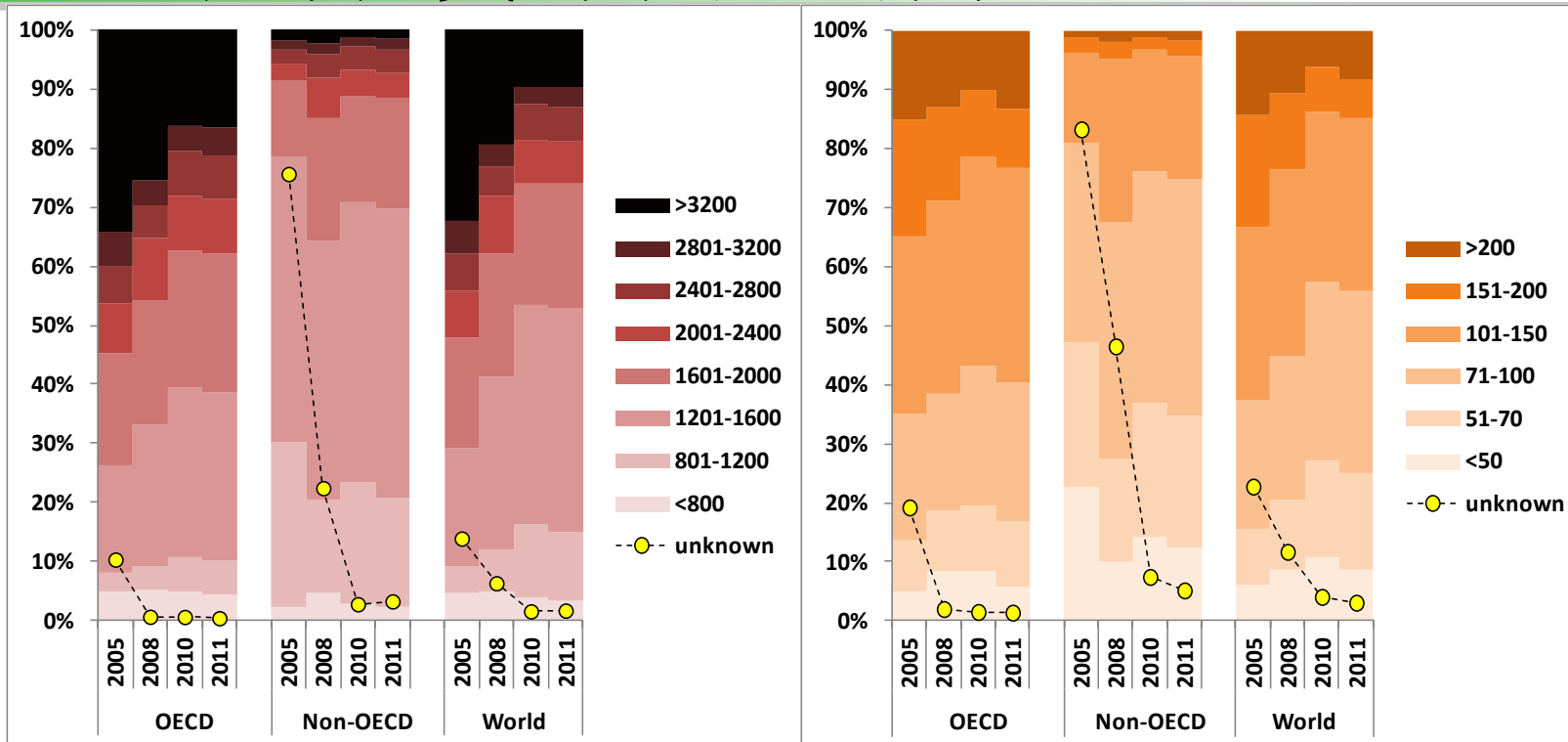
分类别的燃油经济性



- Large vehicles showed significant fuel economy improvement in all regions
所有地区的大型车的燃油经济性都有显著的提高
- Small vehicles improved fuel economy only marginally
小型车燃油经济性的提高微乎其微

Market by displacement/power

按排量/功率分类的市场占有率



- Cars with medium sized engines, both with respect to displacement and power, saw increasing market shares in OECD and Non-OECD regions 在OECD和非OECD地区，具有中型发动机（排量和功率）汽车的市场占有量均有所增长
- Non-OECD cars have significantly smaller and less powerful engines 非OECD国家有很多小排量、低功率汽车

Note: global results for 2005 and 2008 are heavily affected by lack of data in Non-OECD

注：由于非OECD国家缺少数据，严重影响了2005和2008年的全球评估结果

OECD market dynamics OECD市场动态

Big Markets shrinking Big Markets growing	Average emissions (gCO ₂ /km)		Emission reduction rate	Sales evolution
	2010	2011	2010 - 2011	2010 - 2011
France	130.5	127.7	-2.1%	-2.1%
Italy	132.7	129.5	-2.4%	-11.6%
EU 27	140.3	135.7	-3.3%	-9.6%
Japan	140.5	134.4	-4.3%	-16.4%
Turkey	145.2	139.3	-4.1%	16.4%
UK	144.2	138.1	-4.2%	-4.4%
Germany	151.2	145.6	-3.7%	8.8%
Chile	163.7	160.8	-1.8%	22.4%
South Korea	171.3	171.5	0.1%	0.6%
Mexico	186.2	180.8	-2.9%	17.4%
Canada	190.5	189.6	-0.4%	1.4%
USA	194.7	192.8	-0.9%	9.9%
Australia	207.9	204.2	-1.8%	-2.6%

OECD	165.1	164.3	-0.5%	-1.8%
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- Big markets with good fuel economy shrunk significantly 2010-2011

2010至2011年，高燃油经济性的主要机动车市场严重缩水

- Big markets with worse fuel economy grew significantly 2010-2011

2010至2011年，低燃油经济性的主要机动车市场飞速增长

- Although fuel economy improvement in most single markets was remarkable, the fuel economy improvement of the aggregated OECD market slowed down due to the internal market shift

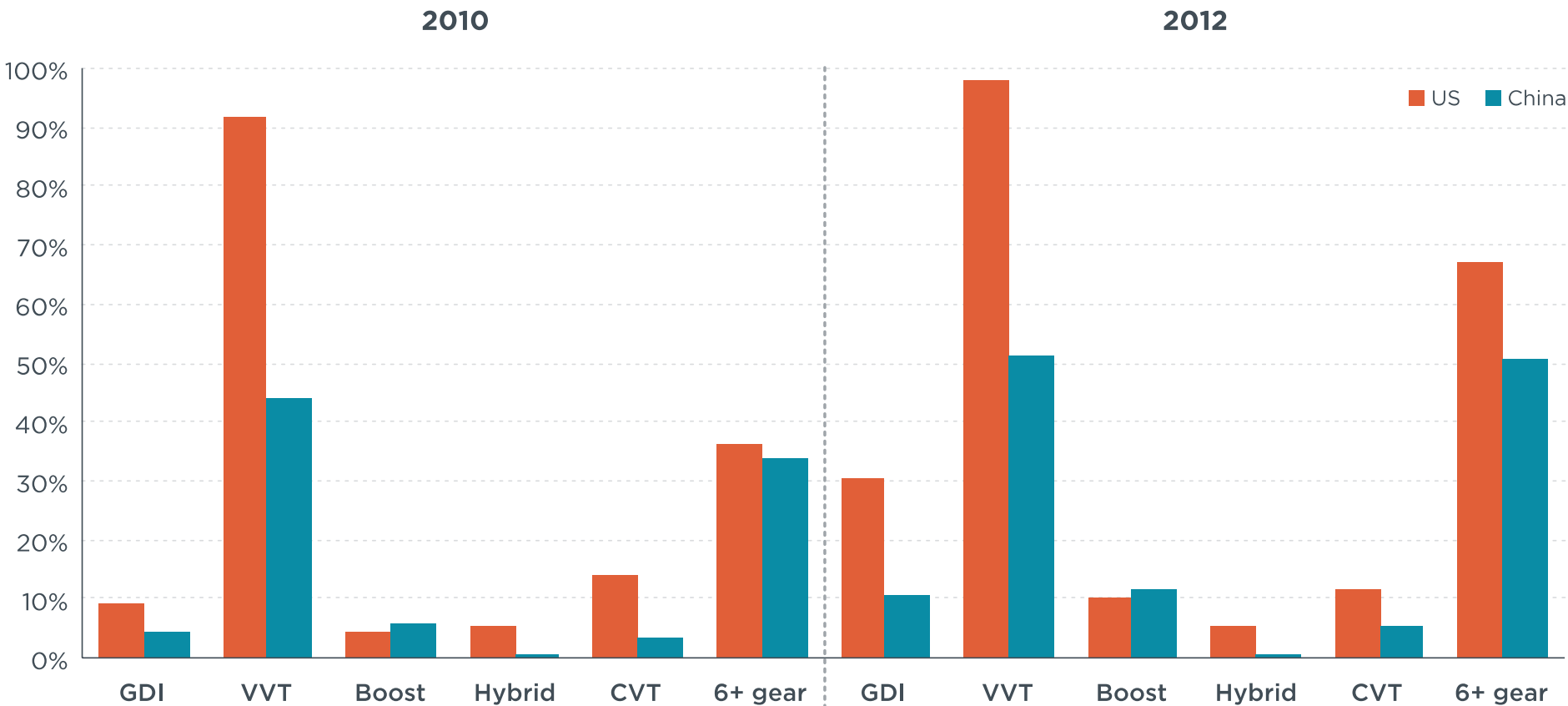
虽然大部分市场的燃油经济性有显著提高，OECD市场整体燃油经济性的提高由于内部市场结构的变化有所减缓

A complementary perspective from ICCT analysis...

ICCT的分析从另一个角度进行了补充...

Comparison of key LDV efficiency technology market trend 2010-2012 in the US and China

美国与中国2010至2012年市场主要轻型车燃油经济性技术趋势比较



- Fuel economy improvement rate has accelerated in OECD markets and is almost matching the GFEI target rate 燃油经济性提升速率在OECD市场加速，几乎与GFEI目标速率齐平
 - Fuel economy policy implementation (and GFEI actions) are fruitful 燃油经济性政策的实施(以及GFEI行动)硕果累累
- Non-OECD markets do not show much progress mainly due to the growing importance of larger classes 非OECD市场没有明显进步的原因在于大型车市场占有率的增长
 - Fuel economy policies (and more GFEI actions) are needed, especially to limit vehicle size shift 需要燃油经济性政策(以及更多的GFEI行动)，尤其是限制机动车车队大型化的转变
- As Non-OECD markets become more and more important, global fuel economy development increasingly depends on successful policy implementation in these regions 鉴于非OECD市场变得越来越重要，全球燃油经济性的发展越来越依赖于在这些地区成功的政策实施
- Fuel economy policies pay back both at the consumer level and at the macro – economic level 燃油经济性政策对消费者和宏观经济水平都会有所回报