

# Energy Delta Convention 2010

## Business Case, Finance Perspective 2

24th November 2010

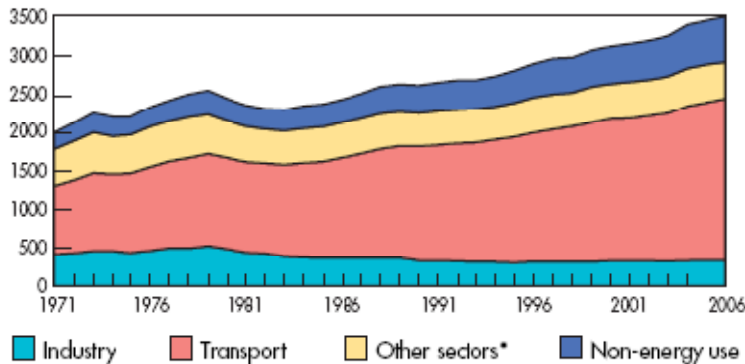
Dirk Jan van Swaay  
Managing Director

# Evolution of Total Final Consumption

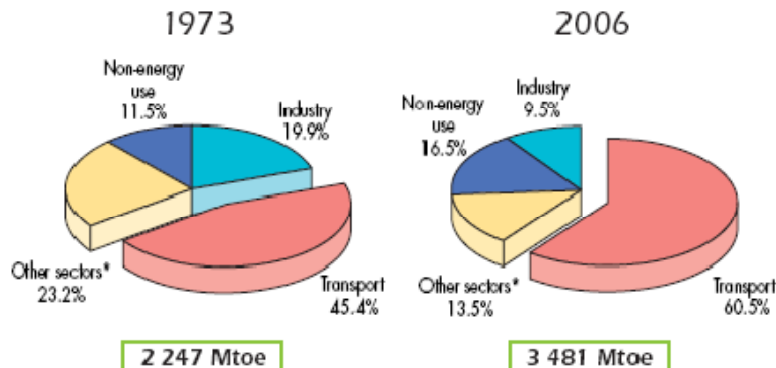
source: IEA Key World Energy Statistics

## Oil

Evolution from 1971 to 2006 of total final consumption by sector (Mtoe)



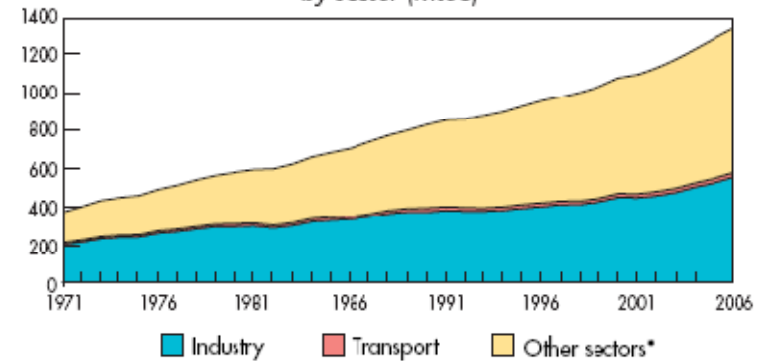
1973 and 2006 shares of world oil consumption



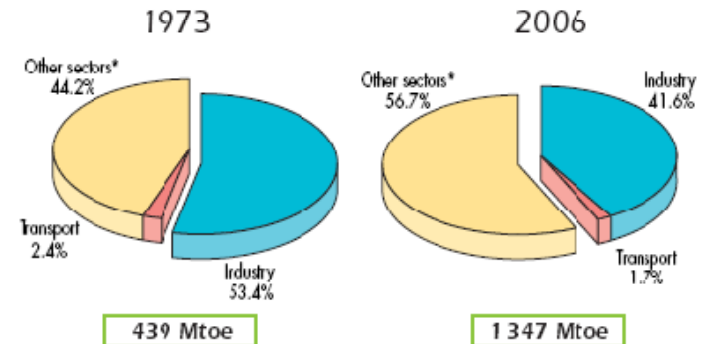
\*Includes agriculture, commercial & public services, residential and non-specified other sectors.

## Electricity

Evolution from 1971 to 2006 of total final consumption by sector (Mtoe)



1973 and 2006 shares of world electricity consumption



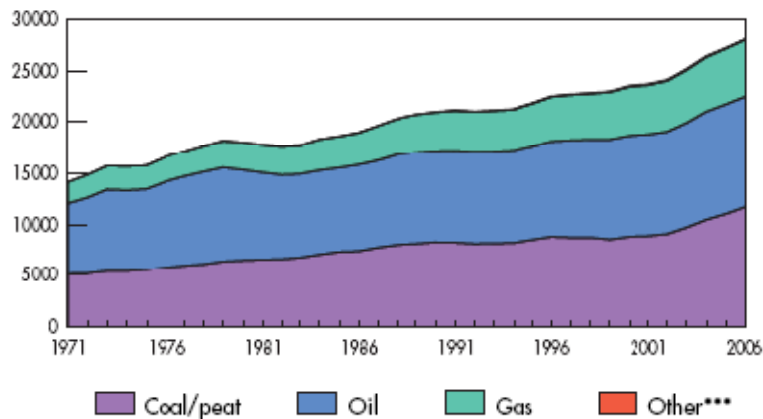
\*Includes agriculture, commercial & public services, residential and non-specified other sectors.

# Evolution of CO<sub>2</sub> emission by Fuel

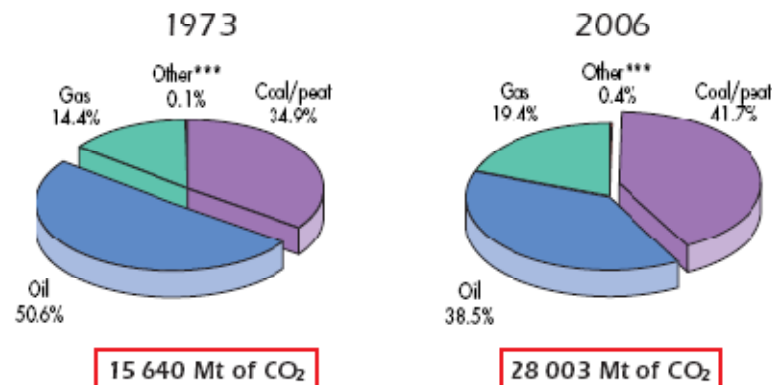
source: IEA Key World Statistics 2008

## CO<sub>2</sub> Emissions by Fuel

Evolution from 1971 to 2006 of world\* CO<sub>2</sub> emissions\*\*  
by fuel (Mt of CO<sub>2</sub>)

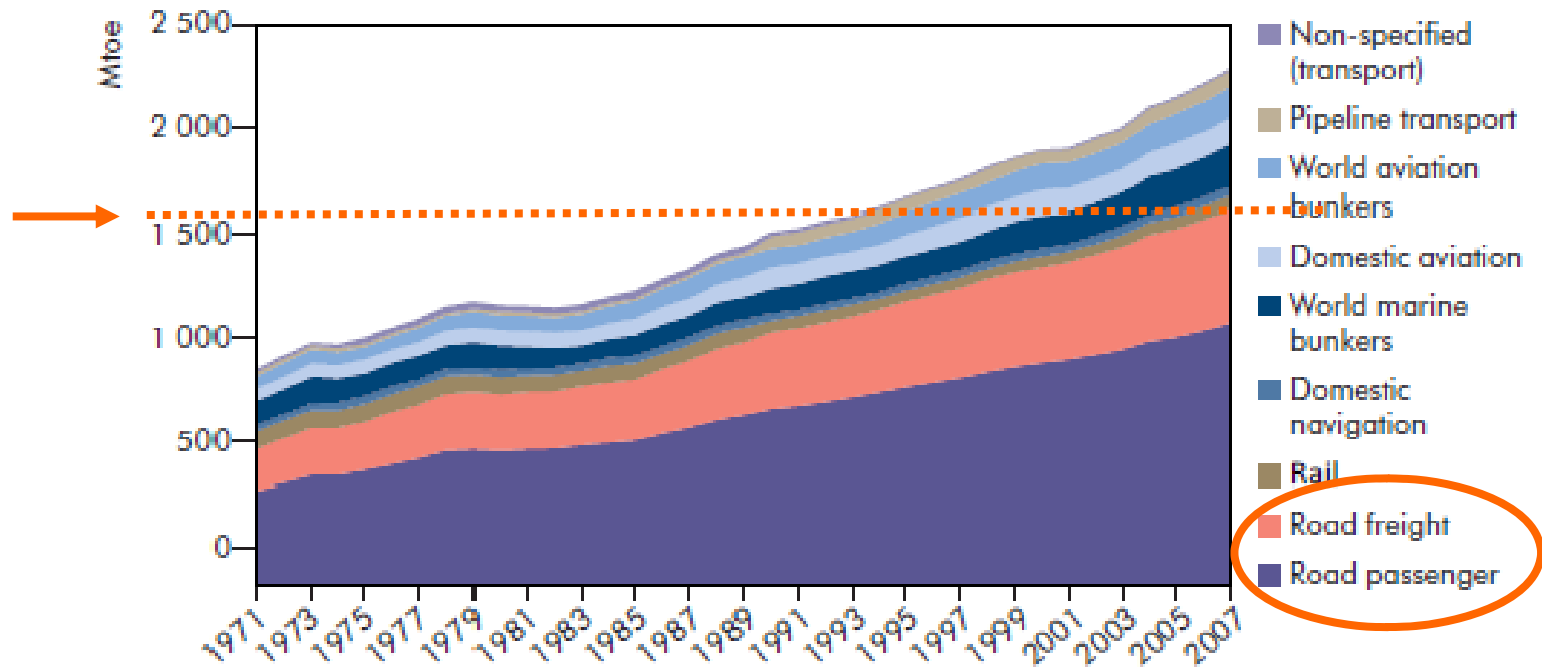


## 1973 and 2006 fuel shares of CO<sub>2</sub> emissions\*\*



# World Transport Final Energy Use by Mode

**Figure 7.1** ► World transport final energy use by mode



Source: IEA (2009b).

# Arguments in *favour* Electric Drivetrain

## Traditional Combustion –vs- Electric Drivetrain

- World Population + GDP Growth → **TENSION** ← fossile fuels
- Negative side-effects of combustion (**GHG\* emission**)
- Geopolitics (remains) supply chain risk + dependency → price volatility
- Conversion fossile fuel to 'wheels' is inefficiënt (well-to-wheel = 20-30%)
- Conversion renewable energy to EV (well-to-wheel) is 60 %
- EV in urban city is favoured politically (noise, emissie)
- **Total Cost of Ownership (TCO\*\*)** can be at par with ICE

\* GHG: Green House Gas Emission

\*\* TCO: Total Cost of Ownership

# Arguments *against* Electric Drivetrain

1. Storage of electricity is expensive, cost of battery  
solution: specialised financial products
2. Storage is clumsy and heavy (weight)  
solution: re-design vehicles, capacity (range) – use to be optimised, slow/fast charging or change
3. Storage is not sustainable  
solution: recycling, alternative use, scrapping
4. Electriciteit from coal- & gas-fired plants does not solve CO<sub>2</sub> emission  
solution: saving via coal- & gas fired plants is at least 22 % and with Renewable Energy 100%.
5. Infrastructure not available  
solution: introduce EV segment-by-segment and succes upon succes
6. TCO\* Electric Drivetrain –vs- ICE  
solution: detailed segmentation, generating positive cashflow per segment

\* Total Cost of Ownership

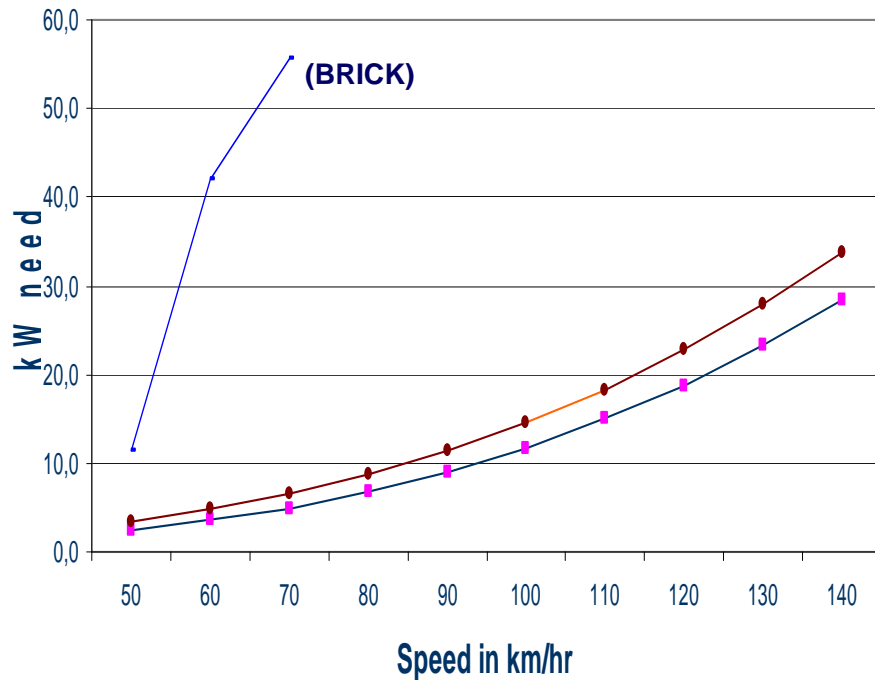


# Well to Wheel EV: efficiency high

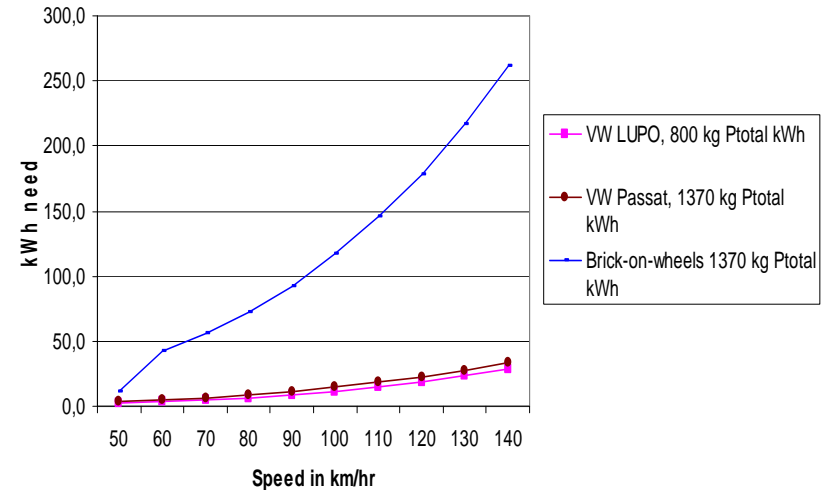
	<u>loss</u>	<u>wind/solar</u>
MTOE	100 %	
Gas-fired utility	57 %	
Coa-fired utility	61 %	
		100 %
NL electricity grid	8 %	8 %
charge-discharge	14-20 %	14-20 %
Electric Drivetrain	15 %	15 %
well to wheel	<b>~ 24 %</b>	<b>~ 60 %</b>
GHG emissie		0 %

# Speed reduces Range with Electric Drivetrain

kW needed per vehicle - speed

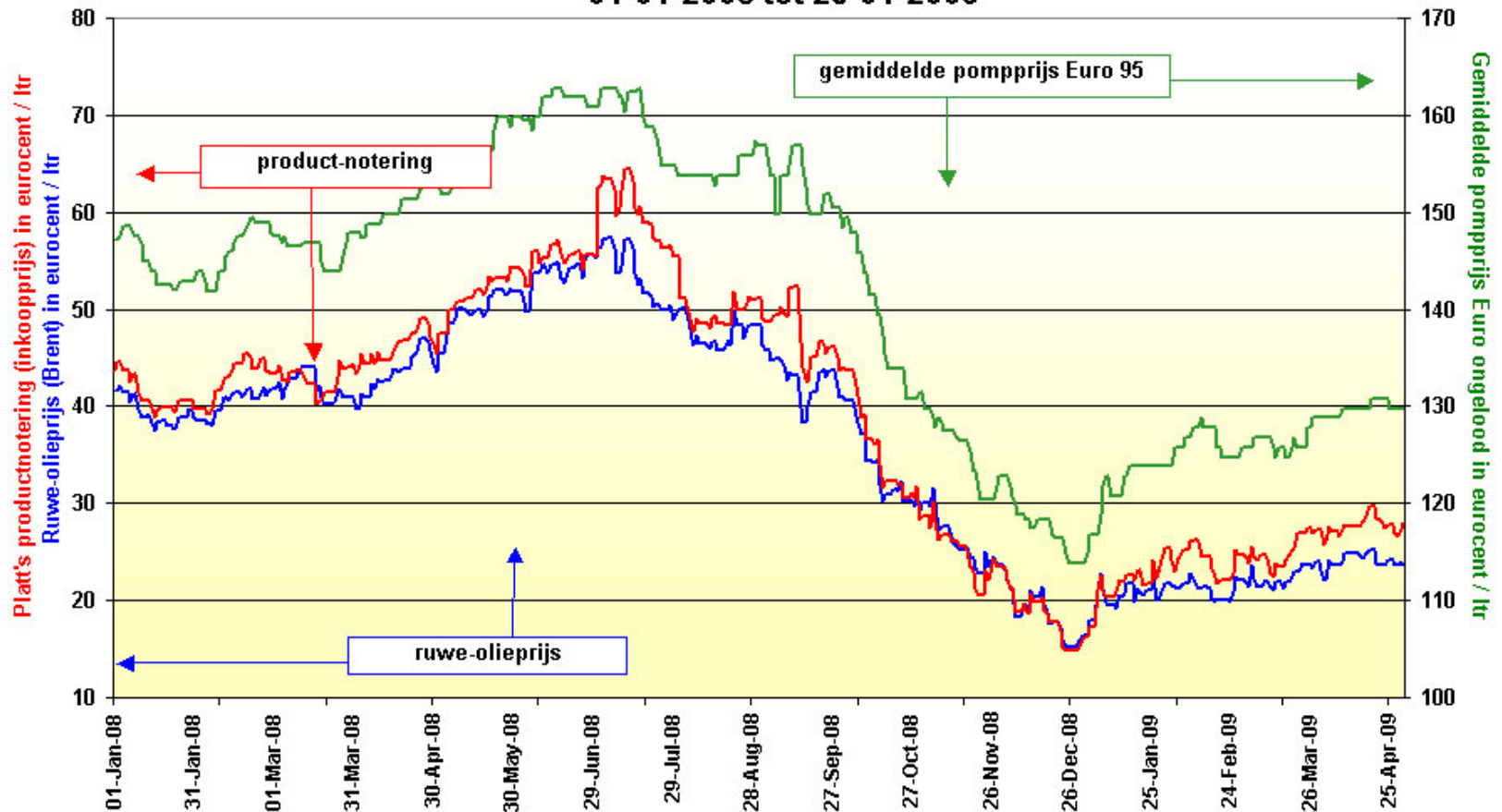


kWh need per vehicle - speed

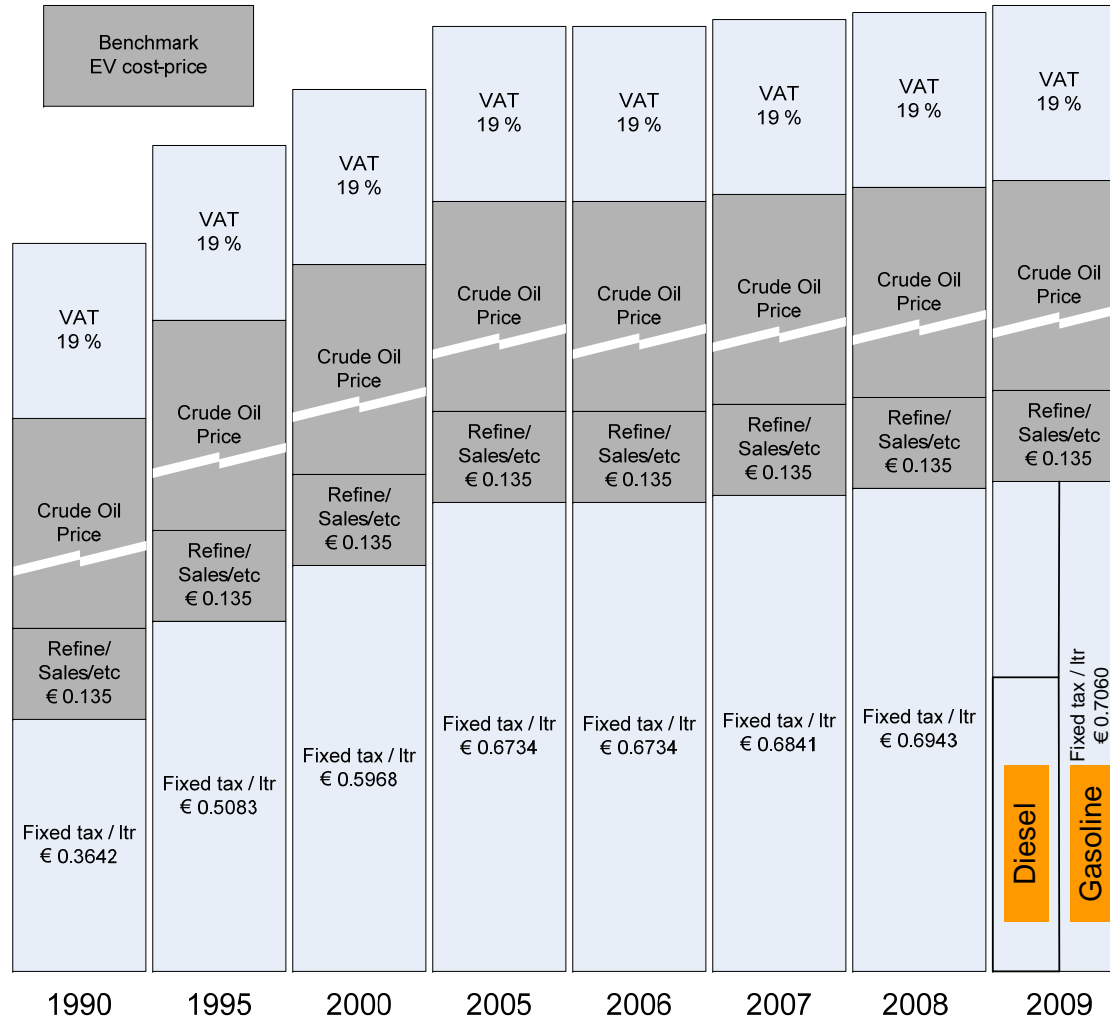


# Fuel price consumer follows price crude-oil

Relatie gemiddelde pompprijs Euro 95, Platt's productnotering en ruwe-olieprijs  
01-01-2008 tot 25-04-2009



# Duty and tax dominant price components RETAIL



# Taxes: Energy related taxes main cost component

source: Ministerie van Financiën

	Gasoline	Diesel
Production costs	€0.416	€0.448
Duty minimum strategic stock	€0.005	€0.005
Duty	€0.70 *0.6545	€0.413 *0.4704
VAT	€0.213	€0.165
Price recommendation (varies)	€1.335	€1.031
tax: absolute	€0.9192	€0.5832
tax: relative	68.84 %	56.55 %

\* Germany

# Taxes: Electricity important source of cash!

average household in NL: 3.500 kWh

*Pricelevels Electrabel (January 2010) 1 year contract, incl VAT*

Cost per kWh	<u>rate</u>	<u>duty</u>	<u>total*</u>
One meter system	€0.0833	€0.1326	€0.2159
Two meter system day	€0.0946	€0.1326	€0.2372
Two meter system night	€0.0690	€0.1326	€0.2016

**Note: duty per kWh**

<b>0</b>	<b>- 10.000 kWh</b>	<b>€0.1291</b>
<b>10.000</b>	<b>- 50.000 kWh</b>	<b>€0.0474</b>
<b>50.000</b>	<b>- 150.000 kWh</b>	<b>€0.0126</b>

**\* + €25 fixed charge  
+ network charges  
- heffingskorting**

# EV reduces tax income due to energy efficiency

## sales (2007 NL)

diesel 8 bln liters  
gasoline 6 bln liters  
LPG 0.3 bln liters

## Retail costs (per year, estimate)

diesel €7 – 11 bln (*incl € 3.3bln duty/tax*)  
gasoline €7 – 9 bln (*incl € 4.9bln duty/tax*)  
LPG € 0.1 bln

## Electricity Equivalent (2007 NL)

11.800.000 mWh (avg. 20 kWh, 59 bln km\*)  
10.620.000 mWh (gem. 18 kWh, 59 bln km\*)  
(-)

\* assumption: 50-50 split

## Electricity cost (per year, estimate)

€2.4 – 2.8 bln (€0.2065 – 0.2356 per kWh)  
€2.2 – 2.5 bln (€0.2065 – 0.2356 per kWh)  
(-)  
Duty €1.5 bln for diesel **included** (€0.1326 kWh)  
Duty €1.3 bln for gasoline **included** (€0.1326 kWh)

# National Accounts: Duty + Energy tax (NL)

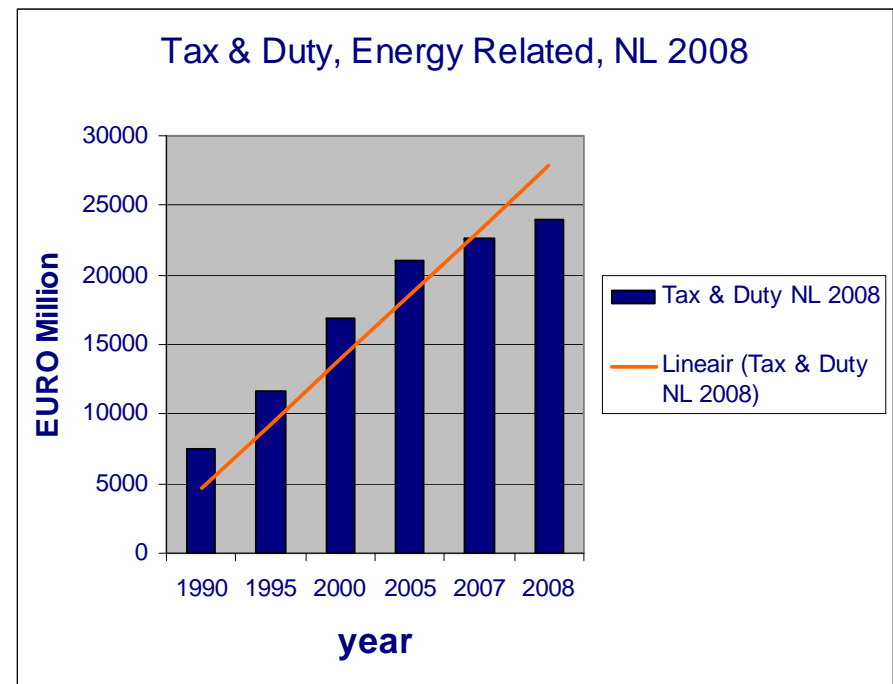
## Opbrengst milieueffingen en -belastingen

	Onderwerpen	Totale opbrengst	Milieubestemmingsheffingen	Groene belastingen	Belastingen m.b.t. voertuigen		Regulerende milieueffingen	Mineralenheffingen
			Totale opbrengst	Totale opbrengst	Totale opbrengst	Totale opbrengst	Totale opbrengst	
Particuliere huishoudens en producenten	Perioden	m/n euro						
Totaal particuliere huishoudens	1990	4 846	1 153	3 693	3 659		34	
	1995	7 154	1 662	5 492	5 327		165	
	2000	10 212	2 095	8 117	6 839		1 278	
	2005	13 362	2 797	10 565	8 108		2 457	
	2007**	14 012	3 113	10 899	8 815		2 084	
	2008*	14 911	3 204	11 707	9 077		2 630	
At/mP Totaal producenten	1990	2 597	466	2 131	1 871		260	17
	1995	4 462	705	3 757	3 047		710	17
	2000	6 667	811	5 856	4 267		1 589	18
	2005	7 630	925	6 705	5 033		1 672	1
	2007**	8 610	1 006	7 604	5 903		1 701	-4
	2008*	8 968	1 039	7 929	5 861		2 068	2
Totaal part. huishoudens en producenten	1990	7 443	1 619	5 824	5 530		294	17
	1995	11 616	2 367	9 249	8 374		875	17
	2000	16 879	2 906	13 973	11 106		2 867	18
	2005	20 992	3 722	17 270	13 141		4 129	1
	2007**	22 622	4 119	18 503	14 718		3 785	-4
	2008*	23 968	4 243	19 725	14 938		4 787	2

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# Growth Rate Energy Tax and Duty

Year	€ million	increase
1990	7.443	-
1995	11.616	4.173
2000	16.879	5.263
2005	20.992	4.113
2007	22.622	1.630
2008	23.968	1.346



# Financing EV: Battery is dominant

## ASSUMPTION

Battery cost: price level today	€ 12,000 (~ 50% cost of vehicle)
7mln vehicles	€ 84 bln
+	
Infrastructure cost	€ 1,000 average per charge point
7 mln charge points	€ 7 bln
Infrastructure + battery	€91 bln
<b>Average</b> energy saving/year	€10 bln minimum (duty + efficiency) €16 bln maximum (duty + efficiency)
<b>Average</b> energy saving/vehicle	€1.000 – 2.000 per year
<b>Average</b> CO <sub>2</sub> reduction compared to ICE*	22 - 35 %

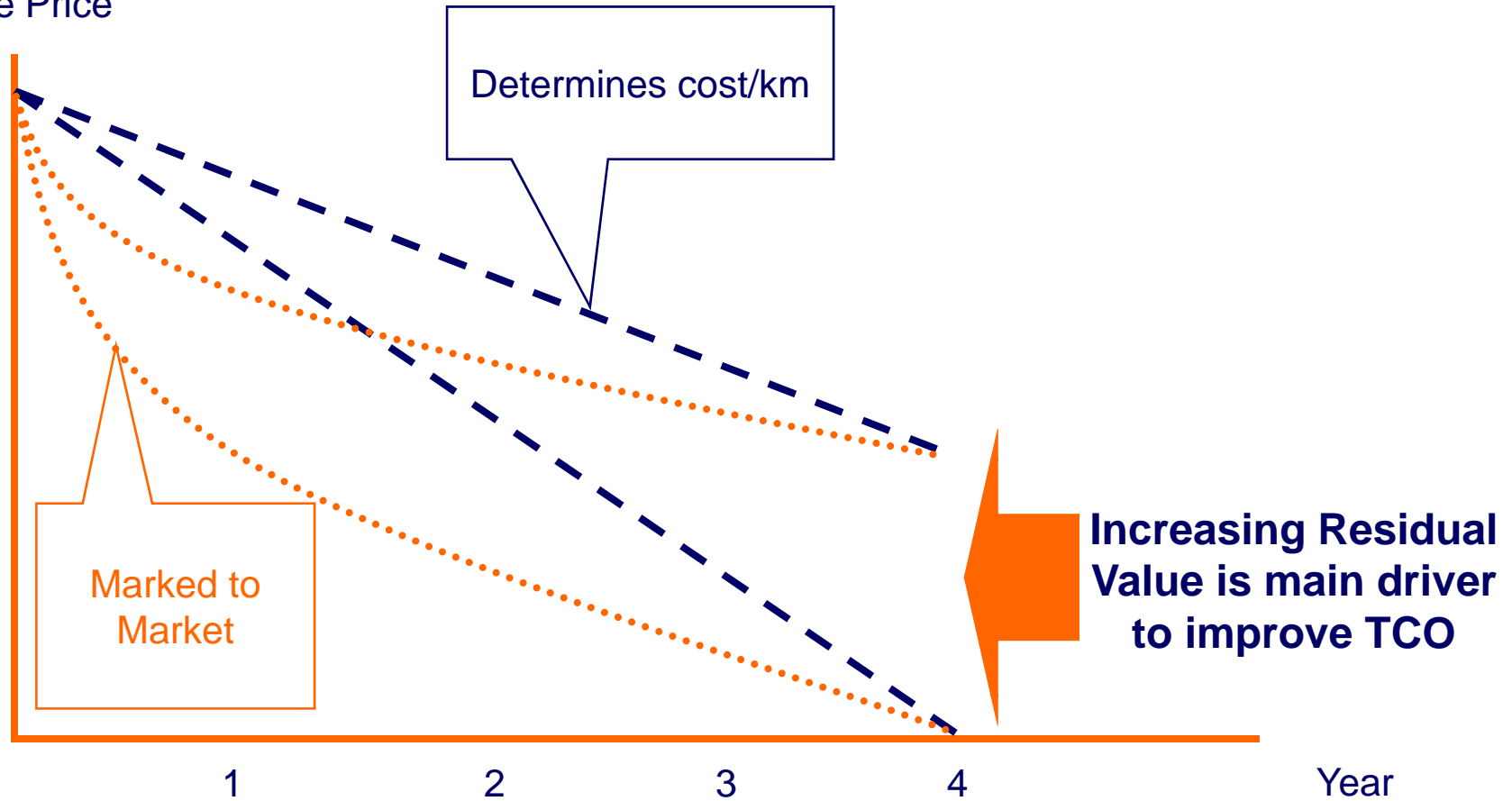
\* source: V&W “Plan van Aanpak”

# Financing EV: Battery is dominant

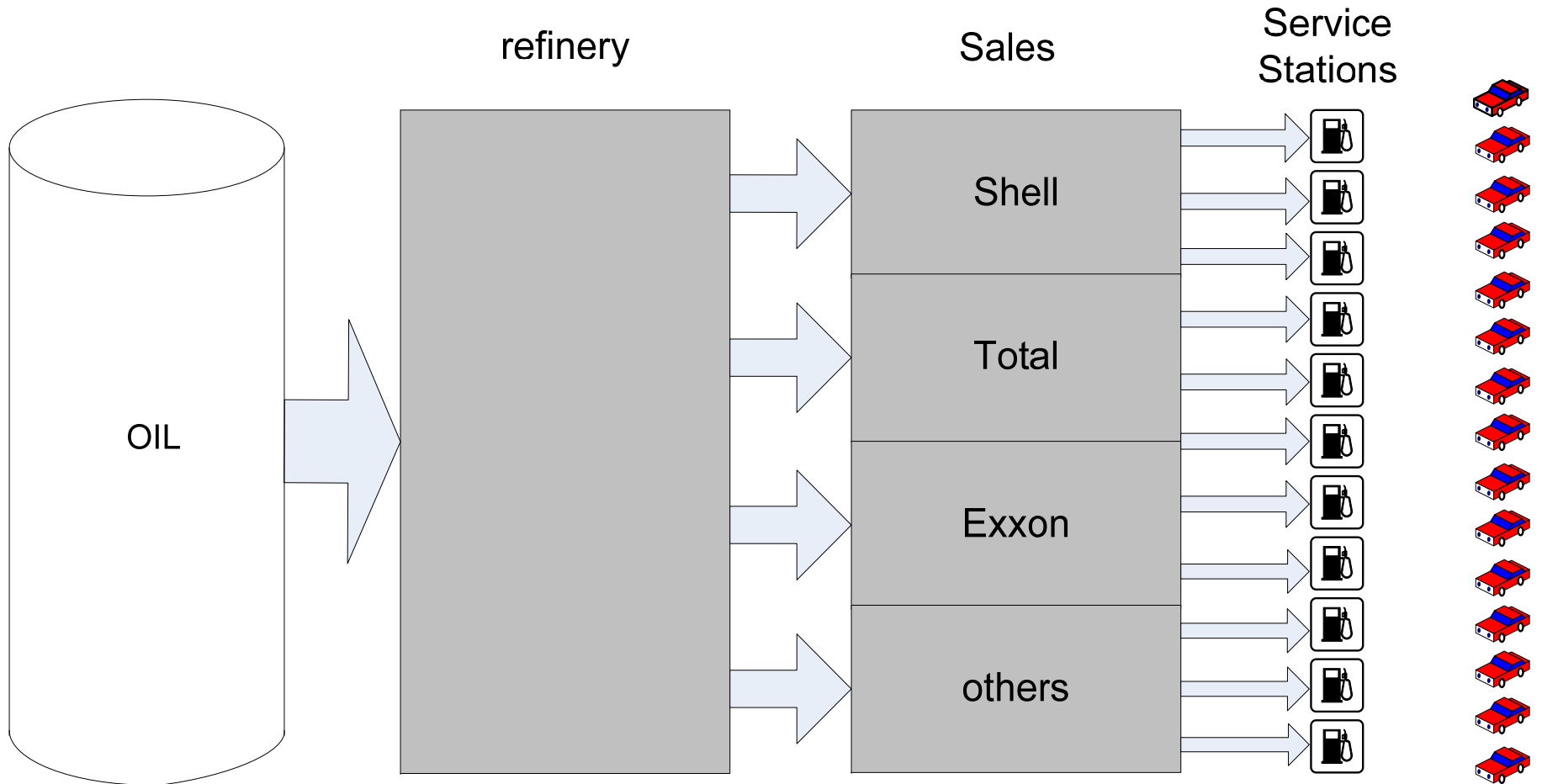
<b>Fixed costs</b>		Upfront cost, EUR Salvage Value after 4 years, % of upfront Annual depreciation, EUR Registration taxes over 4 yrs, EUR, annual Annual maintenance cost, EUR Annual insurance cost, EUR Annual road tax, EUR Total fixed cost 4 years per annum, EUR
<b>Variable cost</b>	<i>Electricity costs</i>	Batter power, cycles per battery # of kms per battery Cost of battery, EUR <b>Battery depreciation cost/km, EUR</b> Electricity cost/km electric, EUR Total cost electric/km, EUR
	<i>Fuel (gas or diesel) cost</i>	Direct fuel cost/km fuel, EUR Total fuel cost/km (incl battery depr.), EUR Average price to the consumer/km
		Variable cost/annum, EUR
		<b>Total cost per annum, EUR</b>

# Battery Depreciation Cost/km, EUR

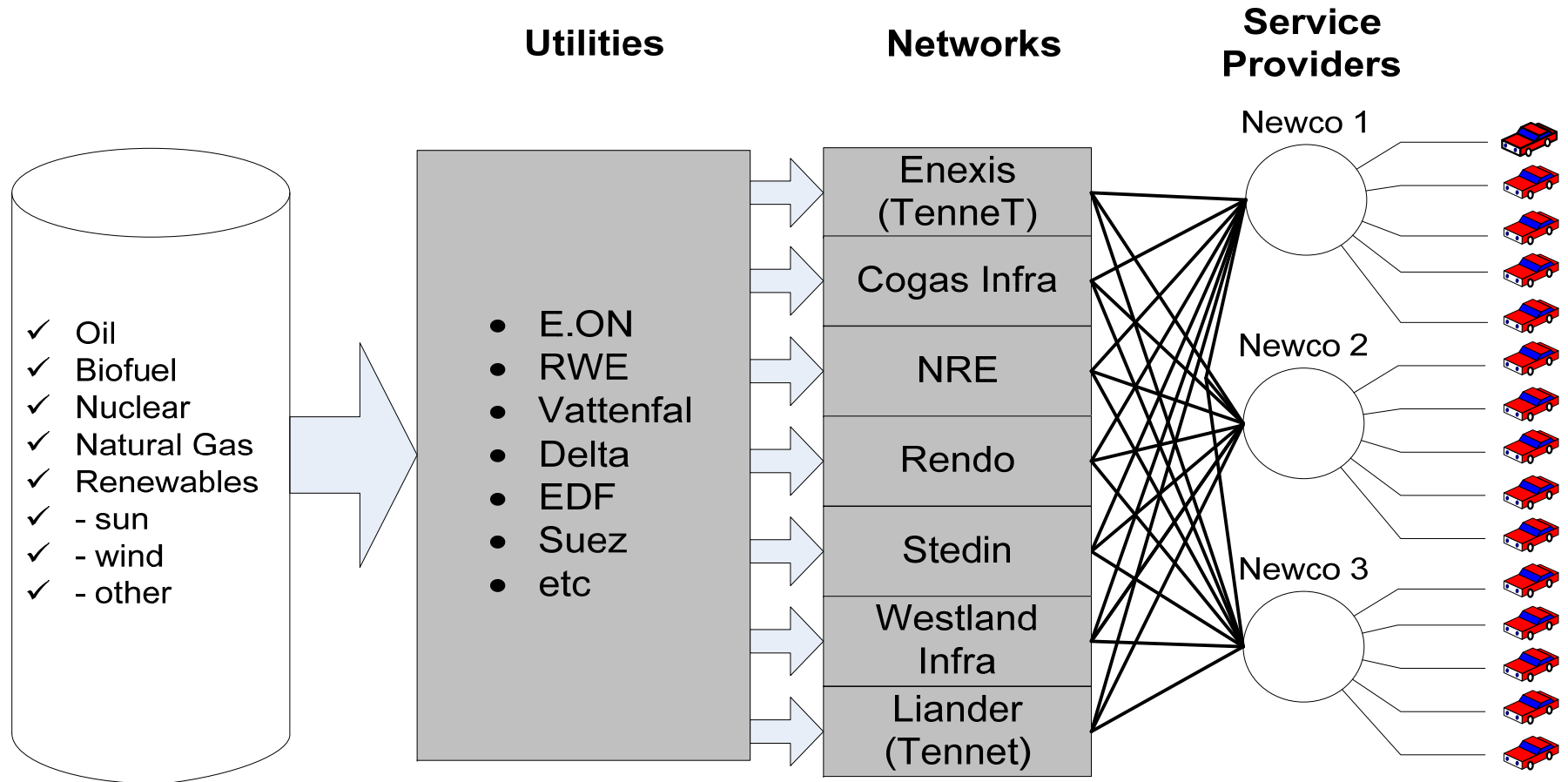
Purchase Price



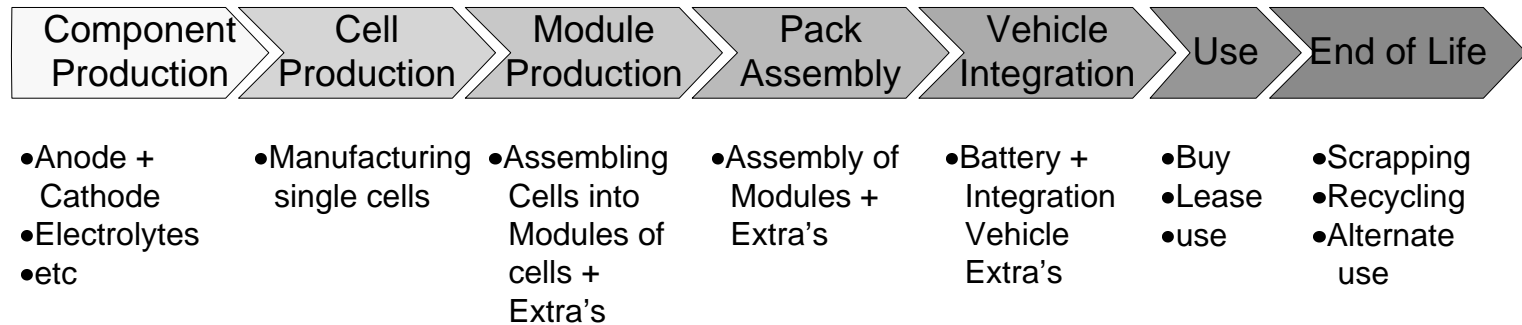
# Changes in Supply Chain



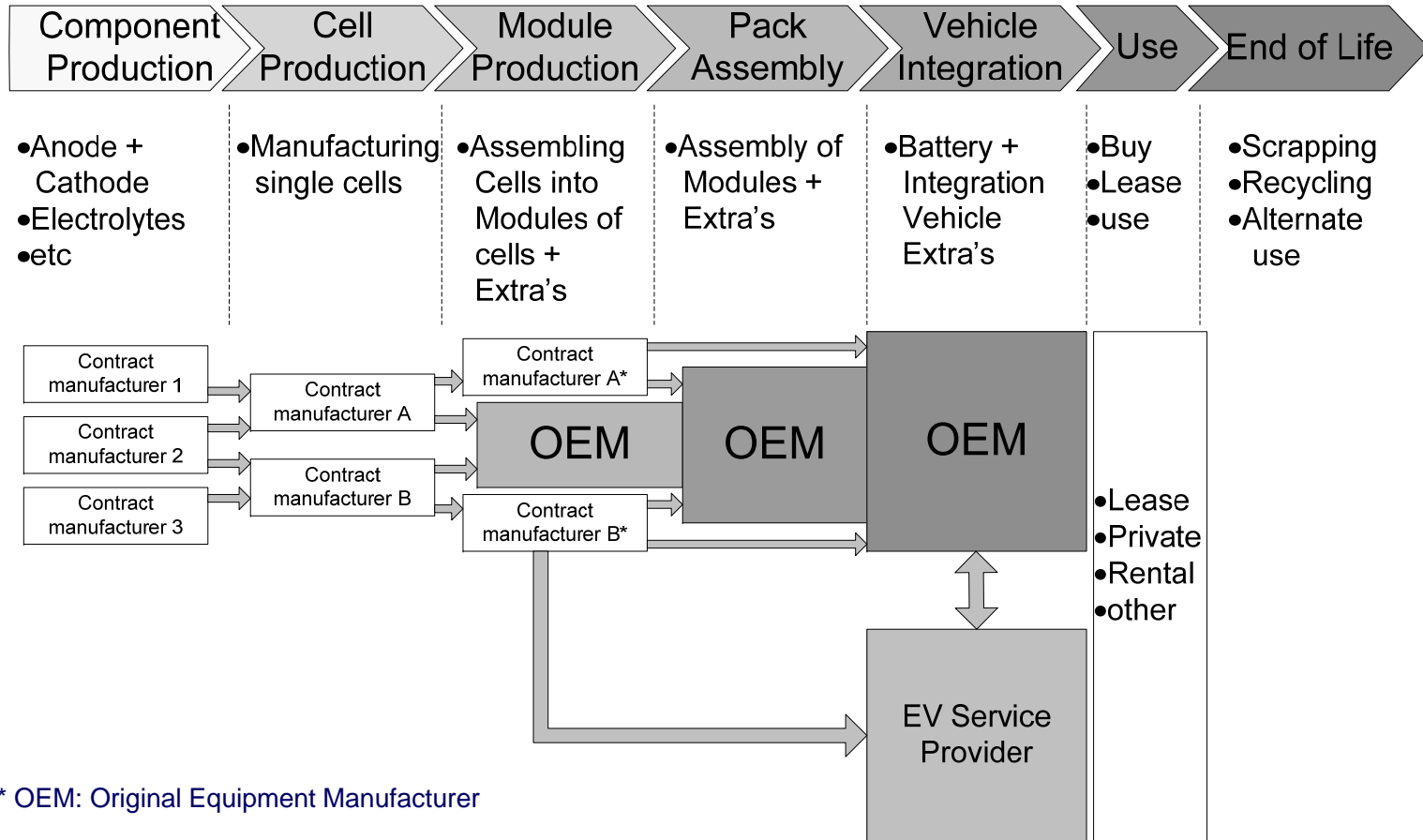
# Changes in Supply Chain



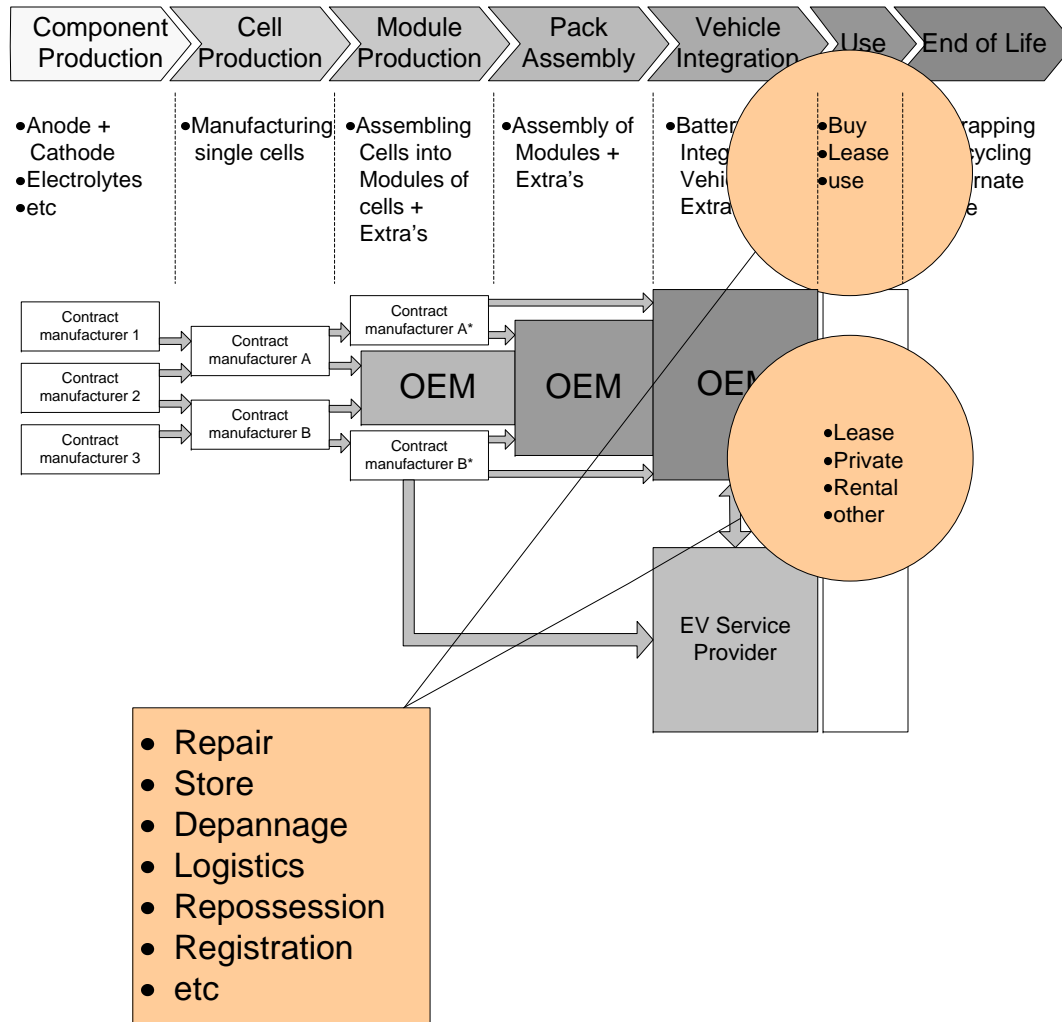
# New Supply Chain Needed



# New Supply Chain, Strategic Positioning



# New Business Opportunities Supply Chain



# Financial Risks

- Subsidies will quickly disappear and not return
- Price Competition
- Lowest cost + best value added, dominate “end game”
- TCO calculation: battery + duty/tax + “bijtelling” determine consumer behaviour  
    **“green is fine and accepted at benchmark TCO (ICE)”**
- Challenge: EV at **lower** (TCO) compared to ICE, with same tax/duty pressure
- Change to EV for entire fleet (ad hoc) unacceptable risk
- Risks of financing material (new technology, long term infrastructure effects)

## Conclusion:

1. Risk mitigation is mandatory
2. Financial decision making to be prudent
3. EV must generate financial profits, taxes and environmental gains

# Product Market Combination, *goals*

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## Product

Strategy aimed for maximising profits in value chain

Profitability to dominate decision making, no hobbyism

Sustainable positive cashflow and profits to determin strategy

## Market Segmentation

Start with 'easy' segment (minimum investment-requirement, 1 charge point)

Built succes, upon succes of previous segment (adding pearls)

Every segment to be profitable, no cross-segment subsidy

## Plan van Aanpak V&W + EZ

200.000 EV in 2020 en 1mln EV in 2025

# Conclusion

- EV is sustainable; substantial contributor GHG emission **reduction**
- EV drivetrain superior to ICE (performance, energy, cost), battery or fuel cell
- Energy costs EV substantially below ICE, duty > 50 %
- Total duty/tax burden to remain at 2010 levels (subsidies not realistic)
- Battery costs + taxes dominant for TCO (purchase + use + residual value)
- TCO can be best influenced (owner) by battery-use optimisation (capacity - range)
- TCO determines EV purchase behaviour rational consumers
- Battery repair and flexibility (vehicle-battery) enhances second hand value
- Risk mitigation via market segmentation
- EV financing decisions relevant for TCO and financial risks
- EV should be good for consumers, profits, employment and environment

# ING and EV

- EV is an excellent alternative for the ICE
- EV reduces TCO for consumer and GHG emission
- TCO is conditional upon current tax regime for fossile fuels and electricity
- ING supports EV in The Netherlands
  - Commercial Banking
  - ING Lease
- ING Lease provides leasing products for all EV vehicles
- For example:
  - Full service operational lease of the vehicle.
  - Supply of charge-points for employers and driver/user
  - Detailed management information on vehicle use



ING Car Lease has signed the covenant Cleaner Car Contracts in which ING Car Lease and other leasing companies expressed their ambition to reduce the average emission of leased vehicles not to exceed 120 gram CO<sub>2</sub> per kilometer.

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Thank you for your attention

# Appendices

# Exhibit 1

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Rules of Thumb: engine and Weight

150 kW (200bhp) electromotor weighs ~ 50 kg

# Exhibit 2

Rules of Thumb:                      weight battery

$$\text{"x" kWh} = 10 * \text{"x" kg}$$

$$\text{example: } 24 \text{ kWh} = 240 \text{ kg}$$

# Exhibit 3

Rules of Thumb:

kWh –vs- range

1 kWh ~ 10 km range (8.5 km)

24 kWh battery ~ 240 km (188 km)

'safe' range 24 kWh: 150 km (50 %)

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