

*Environmental Comparisons of Steel
and Plastic Automotive Fuel Tanks*

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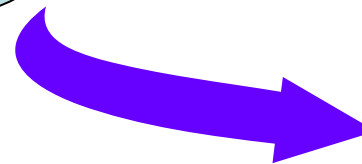
Automobile
Fuel Tanks

••• Competitive issues between steel and plastic

- Engineering performance
 - structural, fatigue, etc.
- Weight
- Design flexibility
- Cost
- Full service supply

AND

Environmental
issues



Today's
focus

Environmental benefits of steel fuel tanks

- Proven recyclability



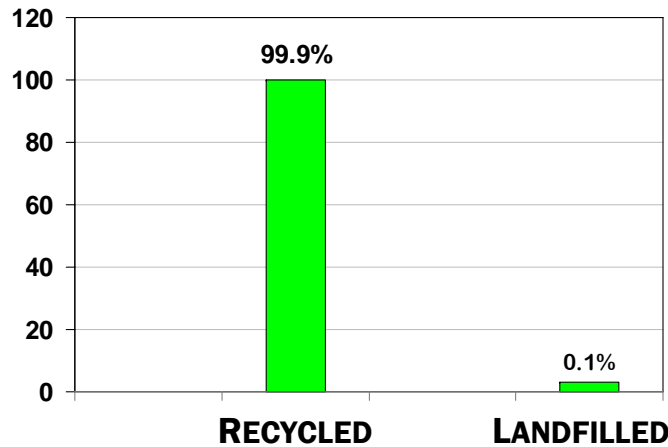
- Low evaporative system emissions



Recycling of
a Typical
Automobile

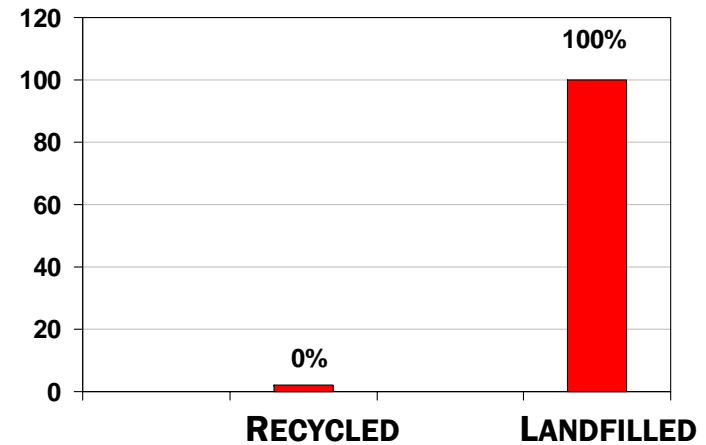
- 1999 study by Steel Recycling Institute
 - Model year 1980 - 1990
 - Average vehicle weight: 3,252 pounds
 - Based on survey of auto dismantlers and shredders and American Metal Market automobile materials data

Steel*
(2324#)



*includes steel tanks

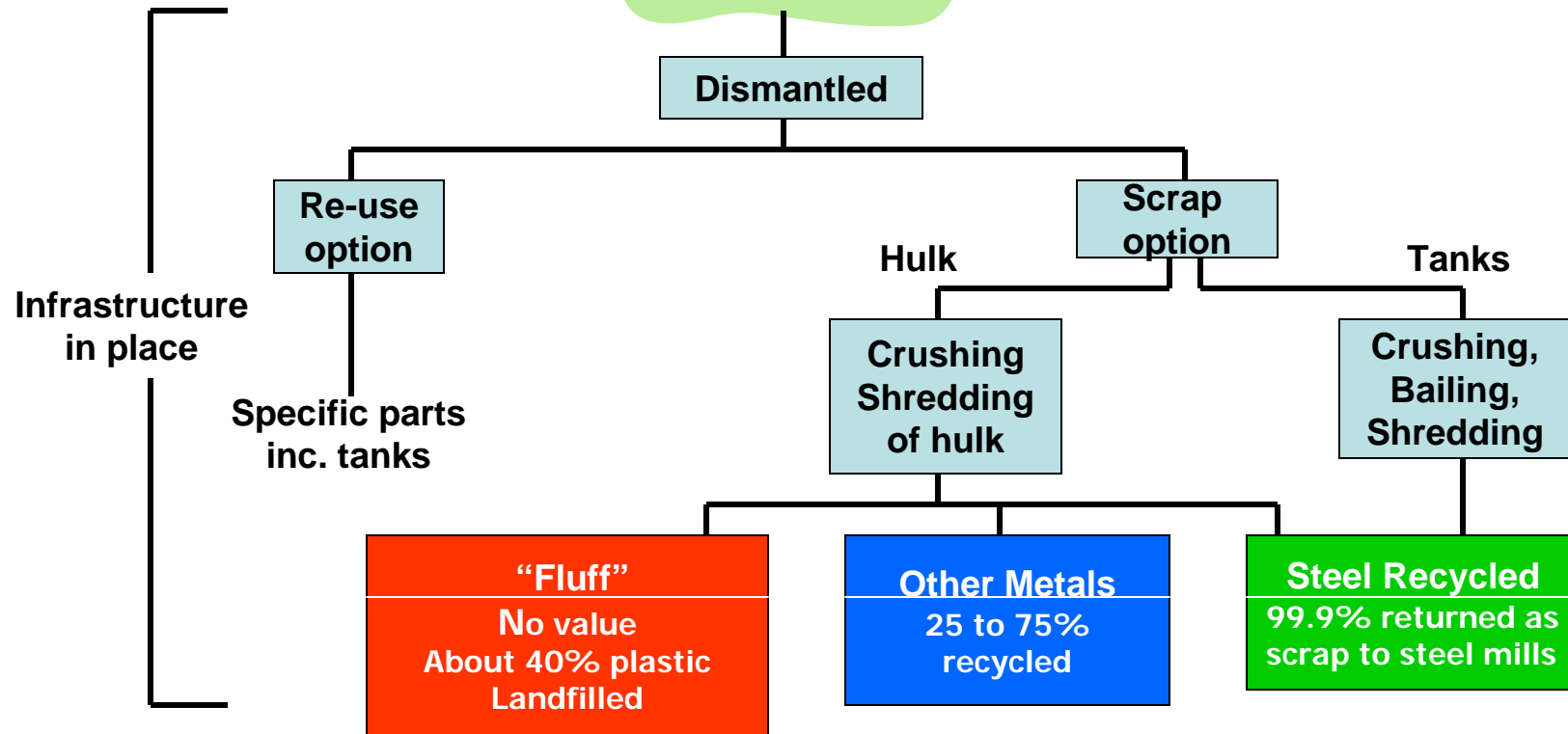
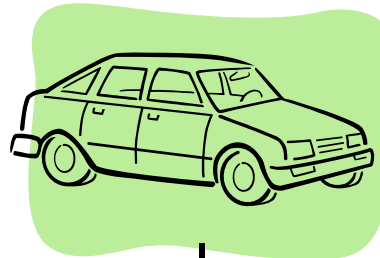
Plastic**
(212#)



**almost no plastic tanks

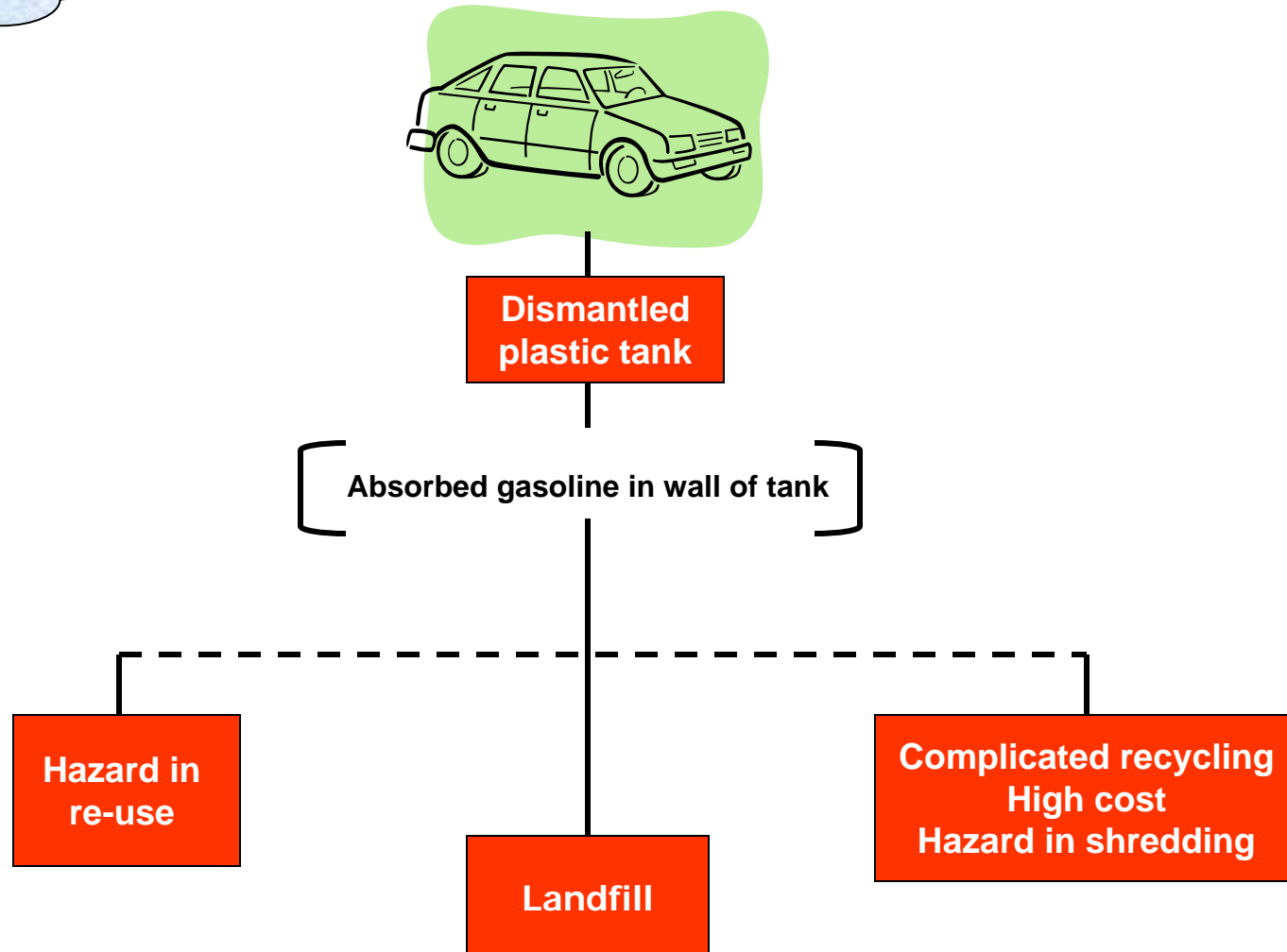
Recycling

TODAY steel fuel tanks are fully recycled ...



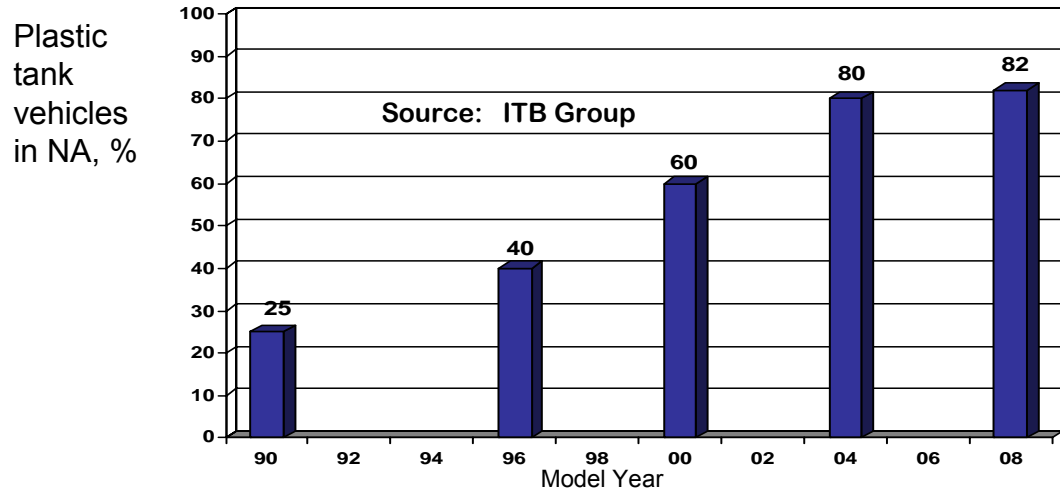
Recycling

TODAY plastic tanks are NOT re-used or recycled ...



Consequence of more plastic tanks...

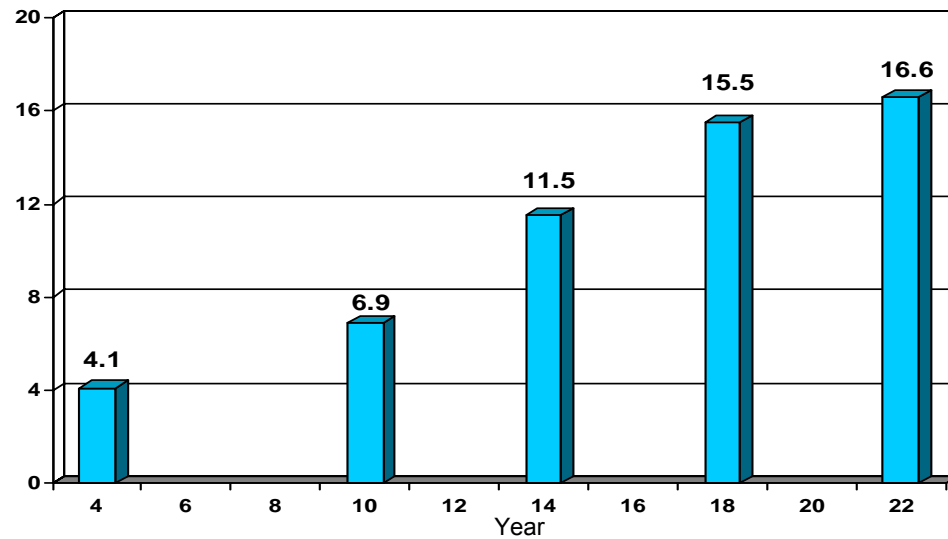
- ▶ **Increased disposal of plastic tanks at end of life of automobiles**
 - landfill
 - incineration
- ▶ **Negative impact on existing automotive recycling infrastructure**
 - dismantlers
 - shredders



As plastic tanks increase – impact on disposal will increase

average vehicle life of 14 yrs.

No. of EOL plastic tanks in NA, millions



**The full impact
of plastic fuel
tanks**

In North America . . .

- *254 million vehicles on the road*
- *If 80% of vehicles have plastic tanks
when vehicles are retired . . .*

Plastic tanks placed end-to-end would stretch:

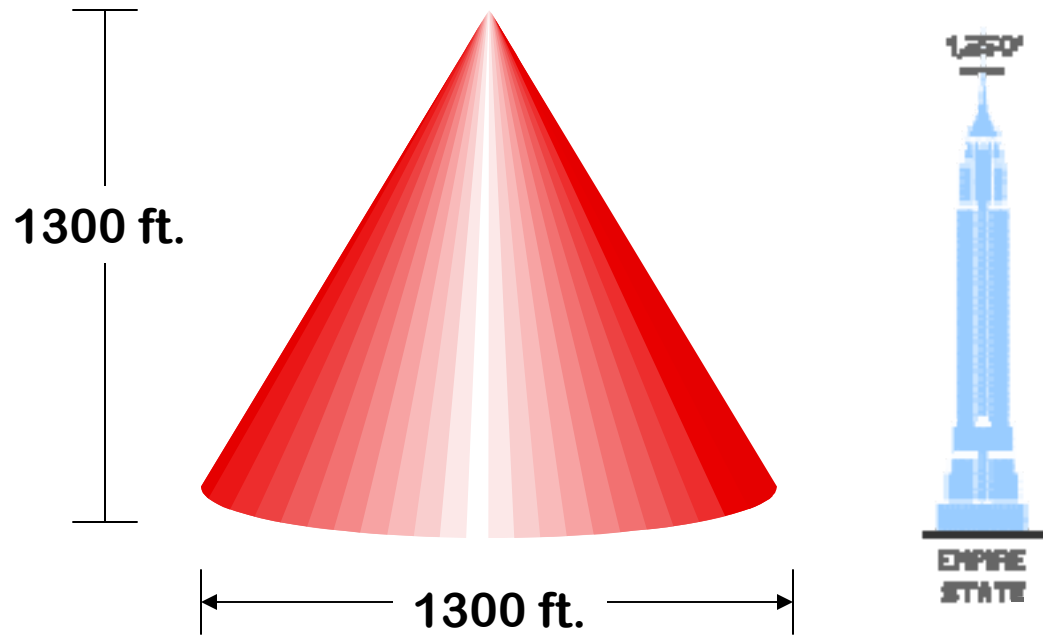
- **125,000 miles**
- **5 times around the world**

. . .



If landfilled

... *a mountain of plastic tanks.*



...

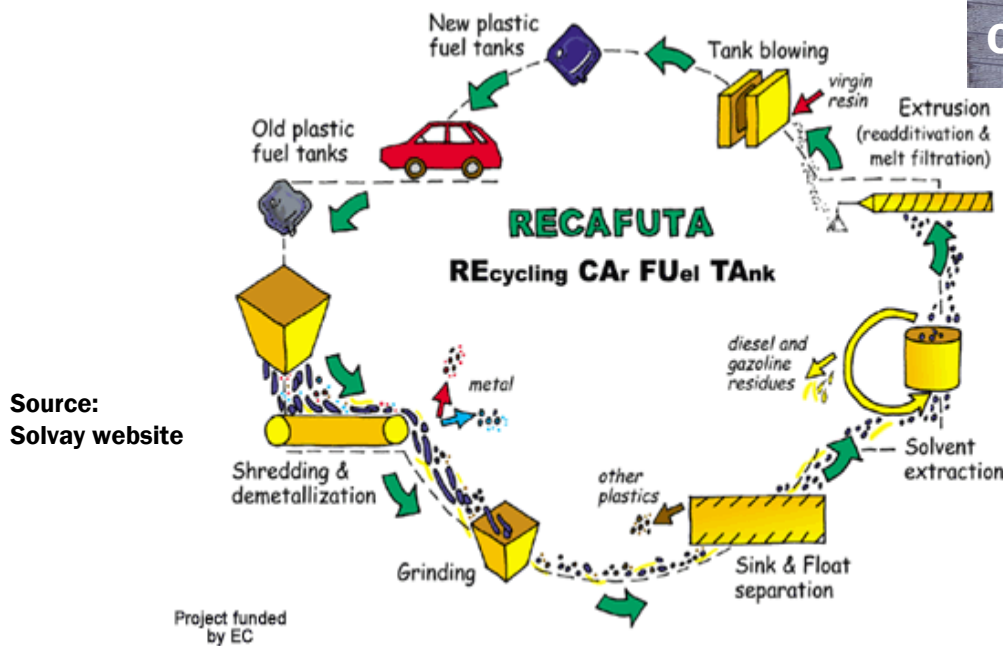
or Incinerate?



Pilot processes for plastic tanks are being developed

Example: RECAFUTA

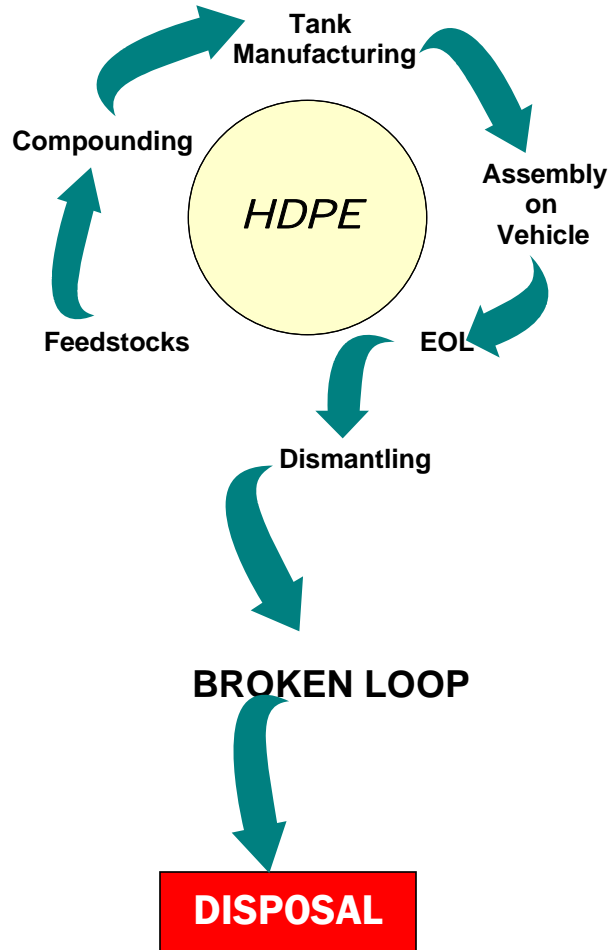
Partnership: Solvay, Inergy, Watco, Renault, Ciba, and University of Lisbon
Co-financed: European Commission



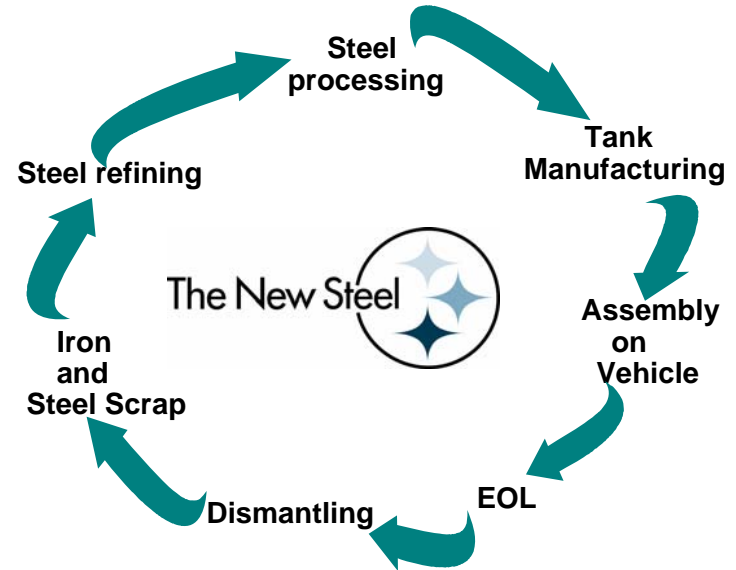
Technically feasible:
BUT ... high cost
... no commercial infrastructure

COMPARISON OF RECYCLING

Plastic Fuel Tanks



Steel Fuel Tanks



BROKEN LOOP

CLOSED LOOP

Deserving of.....



.....recycling emblem



Implication ...

PLASTIC FROM SHREDDED HULKS

Current burden
on recycling industry

+

PLASTIC FUEL TANKS

Increasing burden on
recycling industry in the
future

- Disposal problem
- Jeopardizes current auto recycling process

Solution ...

Steel tanks

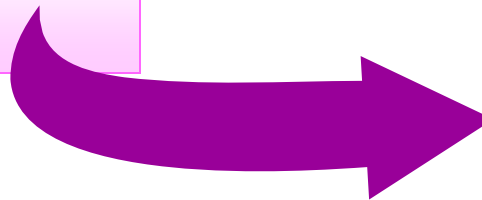
Vehicle Emissions

••• *Lower evaporative emissions required to reduce air pollution.*

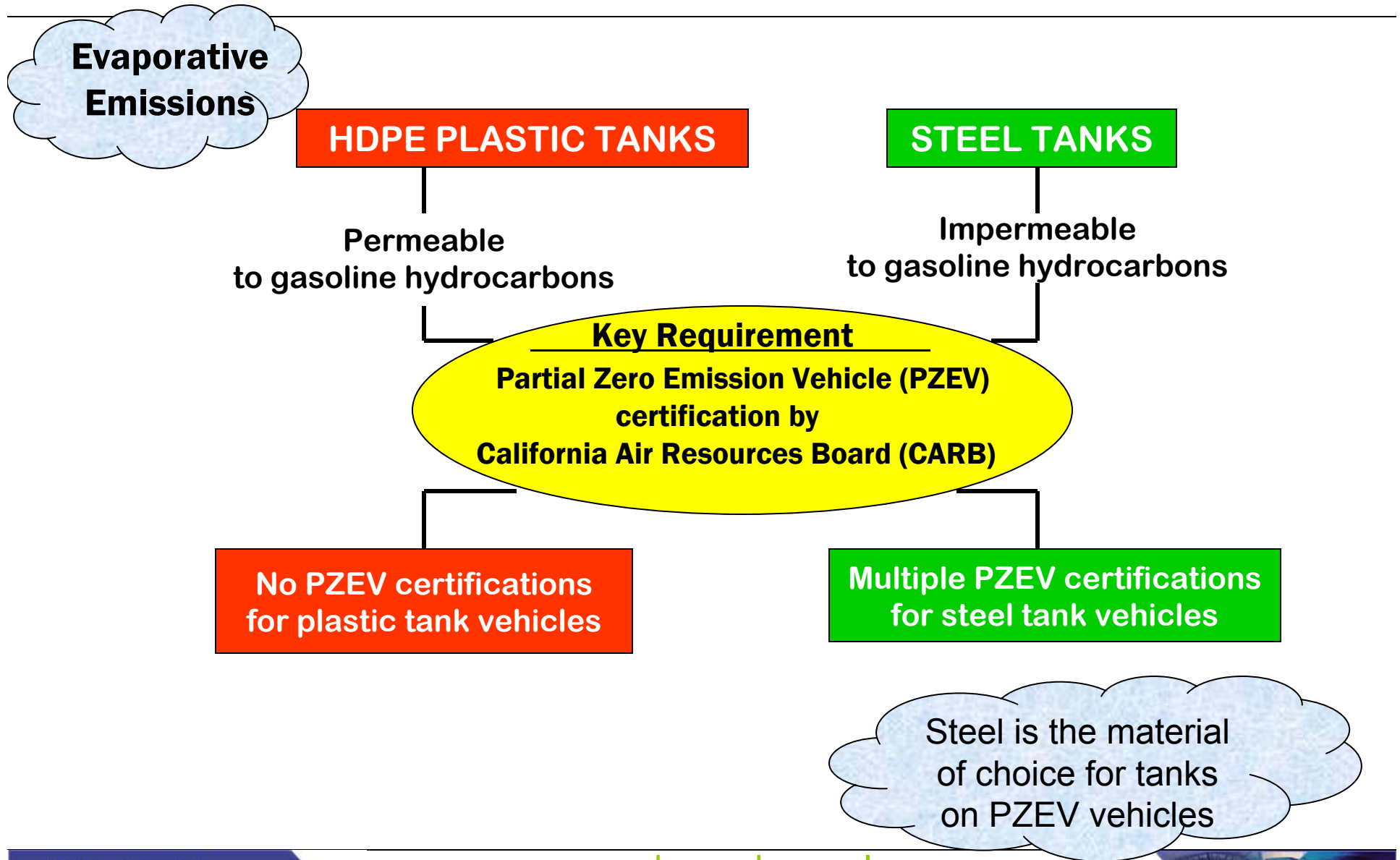
California Air Resources Board (CARB)

••••• stringent requirements for certification of gasoline powered autos

- Low EXHAUST emissions
- Low EVAPORATIVE emissions
- +
- DURABLE
(15 years or 150,000 miles)



All required for certification as a Partial Zero Emission Vehicle (PZEV)

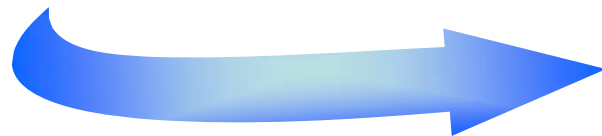


*Steel Fuel Tanks . . .
the choice for PZEV
vehicles*

California Air Resources Board:

— Certified gasoline PZEV models

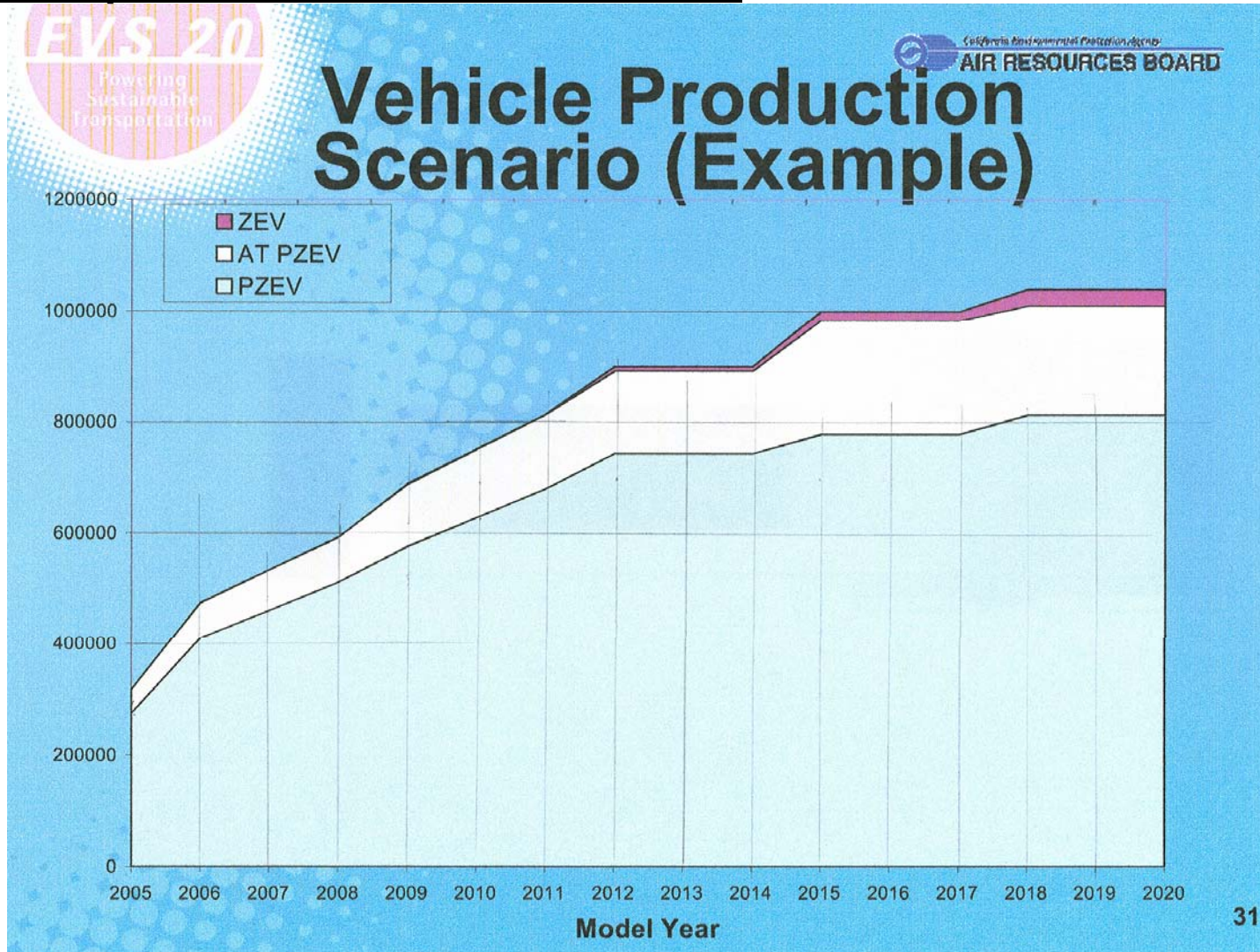
- 14 in 2003
- 23 in 2004
- 29 in 2005



CARB PZEV certified vehicles for 2005				
<u>Company</u>	<u>Model Year</u>	<u>Model Name/Type</u>	<u>Emission Rating</u>	<u>Tank Material</u>
Ford	2005	Escape – Hybrid	ATPZEV	Steel
	2005	Focus – Wagon	PZEV	Steel
		- 2X3	PZEV	Steel
		- 2X4	PZEV	Steel
		- 2X5	PZEV	Steel
DaimlerChrysler	2004	Sebring – Sedan	PZEV	Steel
	2004	Stratus – Sedan	PZEV	Steel
BMW	2005	325CI – Coupe	PZEV	Steel
	2005	325I – Sedan	PZEV	Steel
	2005	325I - Wagon	PZEV	Steel
Honda	2004	Civic – Hybrid	ATPZEV	Steel
	2004	Accord – EX Sedan	PZEV	Steel
	2004	Accord – LX Sedan	PZEV	Steel
Hyundai	2005	Elantra – GLS & GT	PZEV	Steel
Mazda	2004	Mazda 3	PZEV	Steel
Mitsubishi	2004	Galant DE & ES2.4L	PZEV	Steel
Nissan	2004	Altima 2.5, 2.55, 2.55L	PZEV	Steel
	2004	Sentra 1.8, 1.85	PZEV	Steel
Subaru	2004	Legacy 2.5 GT Sedan	PZEV	Steel
	2004	Legacy 2.5 GT Wagon	PZEV	Steel
	2004	Legacy L Sedan	PZEV	Steel
	2004	Legacy L Wagon	PZEV	Steel
	2004	Outback Ltd Sedan	PZEV	Steel
	2004	Outback Ltd Wagon	PZEV	Steel
Toyota	2004	Camry LE, SE or XLE	PZEV	Steel
	2004	Prius - Hybrid	ATPZEV	Steel / plastic bladder
Volkswagen				
Volvo	2004	Jetta – Sedan GL/GLS 2.0	PZEV	Steel
	2004	S60 2.4 Sedan	PZEV	Steel
	2004	V70 2.4 Wagon	PZEV	Steel

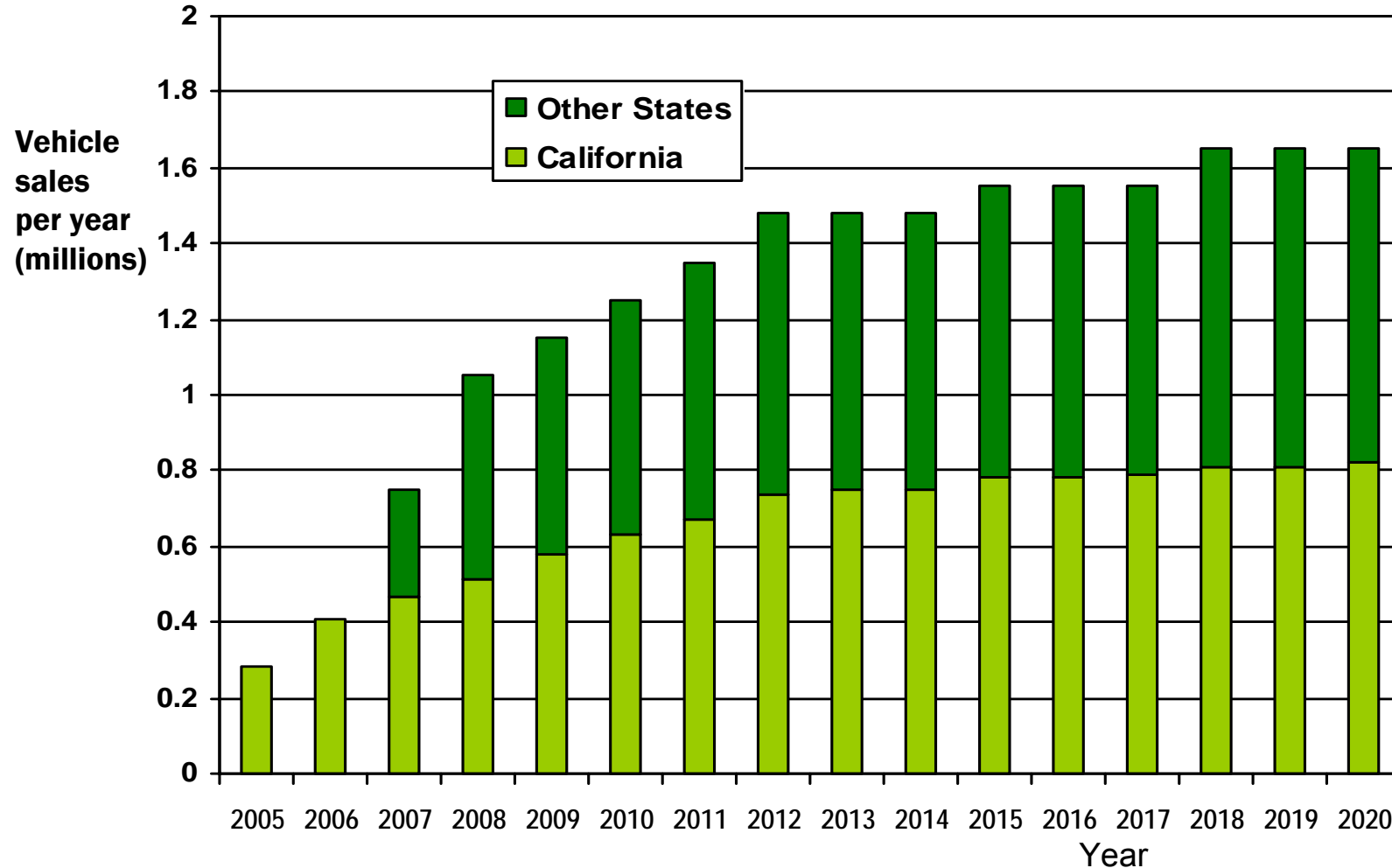
PZEV – most important for California vehicle sales

Vehicle sales per year



Other states to follow California requirements

••• will increase PZEV vehicles



**Overview
Comparison**

	Plastic Tanks	Steel Tanks
Recycling Process	<ul style="list-style-type: none"> • Pilot process demonstrated in Europe. • Economically unfeasible to recycle. • No infrastructure in place . 	<ul style="list-style-type: none"> • Existing auto recycling infrastructure. • Effectiveness of infrastructure jeopardized by growth of plastics .
Recycling Cost	<ul style="list-style-type: none"> • Cost for disposal <ul style="list-style-type: none"> — Landfill — Incineration 	<ul style="list-style-type: none"> • Recycling is profitable and sustaining.
CARB Evaporative Emissions Standards	<ul style="list-style-type: none"> • No certified PZEV vehicles having plastic tanks. 	<ul style="list-style-type: none"> • Multiple certified PZEV vehicles having steel tanks • Broader application of CARB standards in the future?

**Green steel . . .
. . . clean cars**

Summary

- **Steel fuel tanks for automobiles have environmental advantages**
 - proven recycling using an existing, for profit infrastructure
 - able to provide low evaporative emissions
- **Continued growth of plastic fuel tanks will**
 - jeopardize the existing automotive recycling process
 - require substantial landfill or incineration
 - incur end-of-life costs
- **SASFT and AISI will continue to communicate the environmental benefits of steel fuel tanks**

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