



Electric vehicles as energy storage

FRESHMILE

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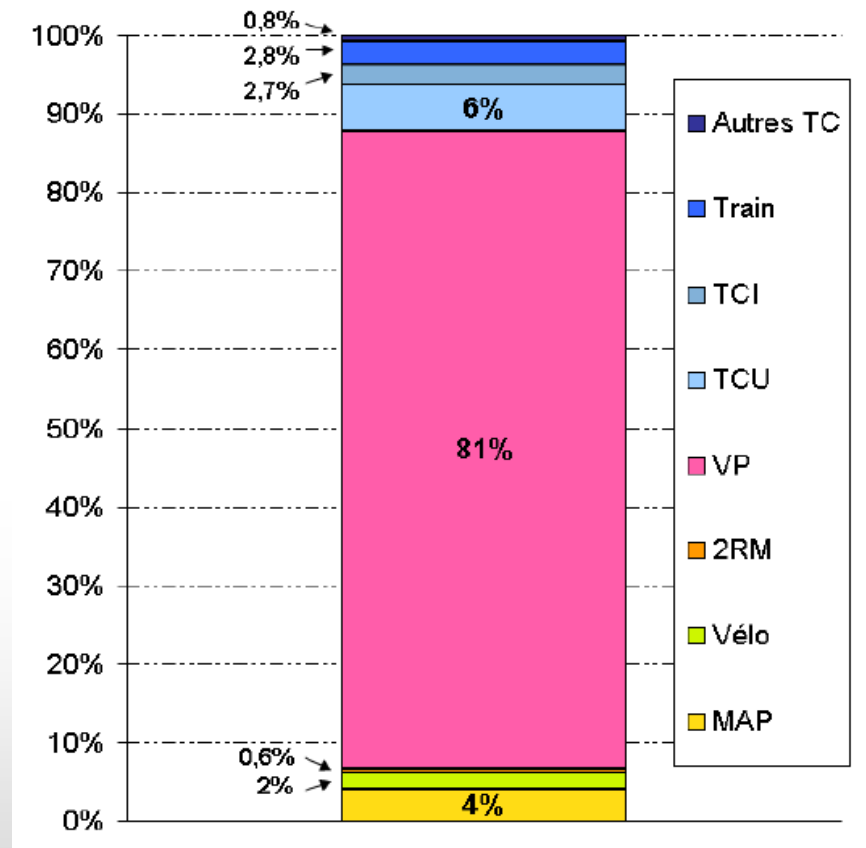
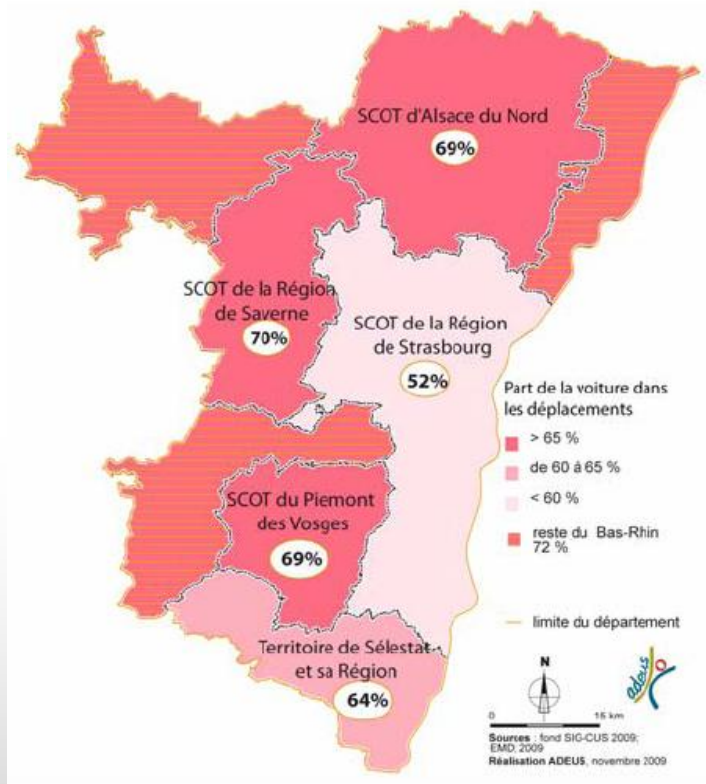


Overview

- Electric cars have many drawbacks
 - No need to detail
- And also a single one big advantage:
 - The battery is „free“ of charge for storage applications
- Many technical issues
 - Standards between manufacturers
 - Standards between countries
 - Lack of telecom abilities in the grid (smart grid)
 - ...
- Our goals
 - Not to go into technical issues
 - Go for economic feasibility and business model

A sizable market: Northern Alsace as an example

CARTE N° 4 : Part de marché de la voiture en 2009
- découpage en 6 zones -



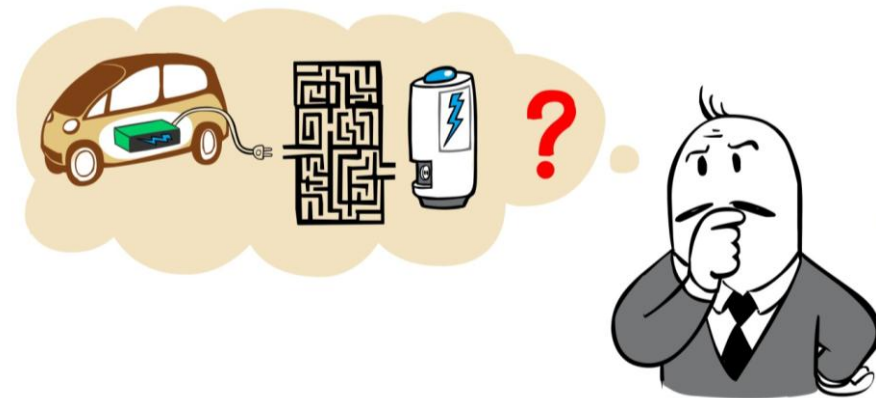
Northern Alsace in figures

- Population
 - 1.1 million inhabitants
 - 450,000 households
 - 37% have at least two cars
 - 170,000 households can switch to Evs
- Electricity
 - 600-700 MW base load
 - > 1,000 MW peak
 - 170,000 Evs charging at same time: 500 MW
- Reasonably
 - 10% EV switch
 - 50 MW storage / load shifting capacity added to the grid

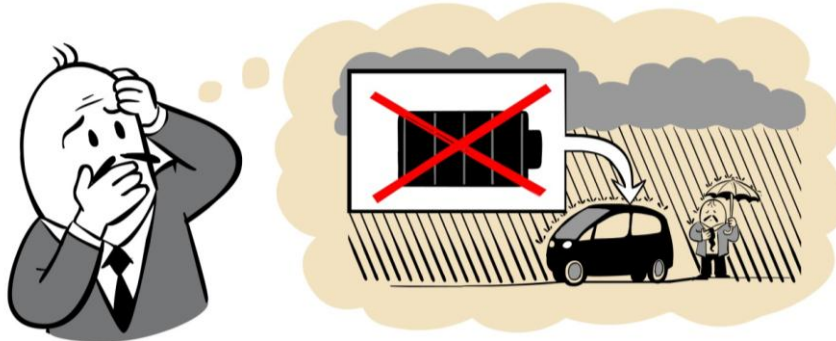
So many hurdles for the end client...



MR GREEN WOULD LIKE TO BUY AN ELECTRIC CAR BUT WHAT A HASSLE!
 WHAT CAR SHOULD HE CHOOSE?
 WHAT DRIVING RANGE WILL IT HAVE?
 AND AT WHAT PRICE, IT'S SO EXPENSIVE!



WHERE WOULD HE CHARGE THE CAR?
 THERE ARE NO CHARGING STATIONS IN TOWN!

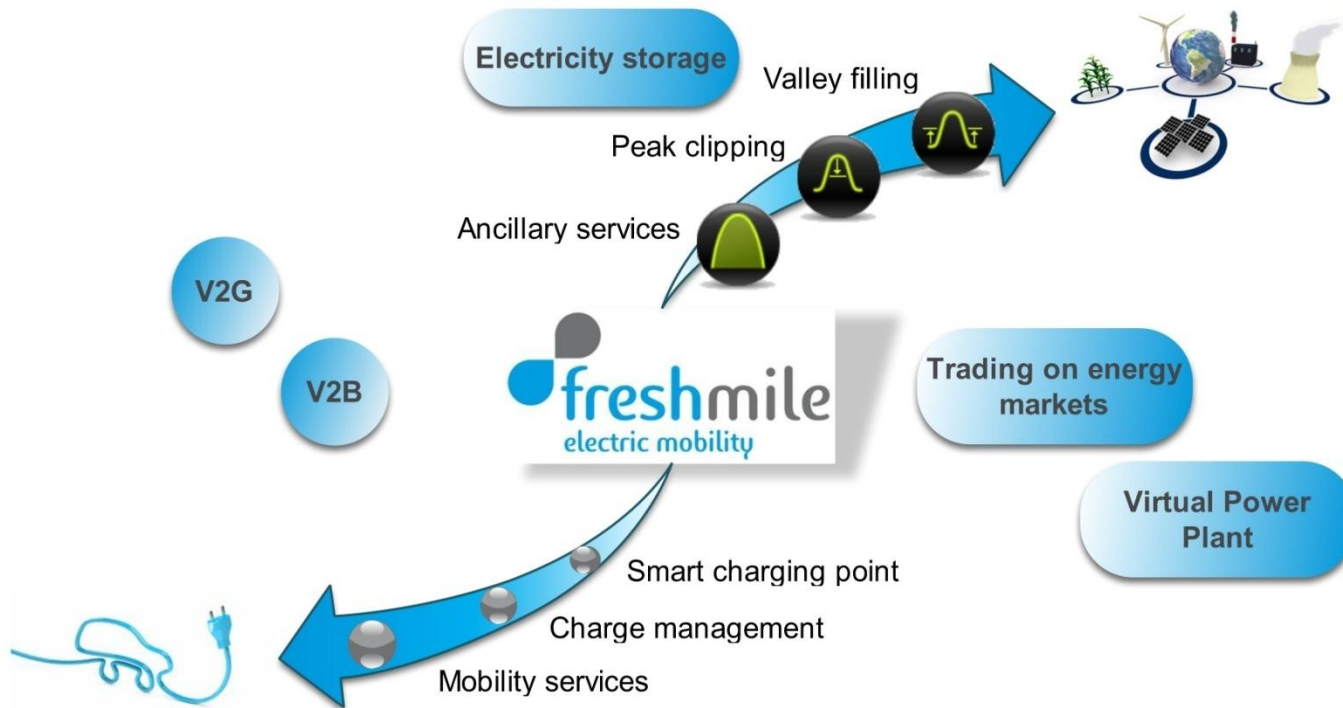


WHEN WOULD HE NEED TO CHARGE THE CAR? FOR HOW LONG?
 HOW COULD HE BE SURE NOT TO RUN OUT OF POWER?



FIRST, WE WILL GIVE MR GREEN A FREE SMARTPHONE APPLICATION.
 THE APP WILL HELP MR GREEN DETERMINE HIS PERSONAL NEEDS FOR ELECTRIC MOBILITY.

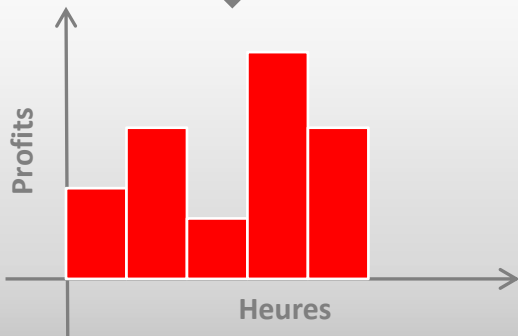
A stage / backstage situation



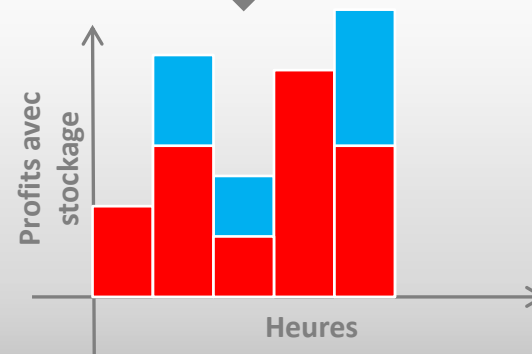
Storage valuation: V1G / V2G



Trading desk



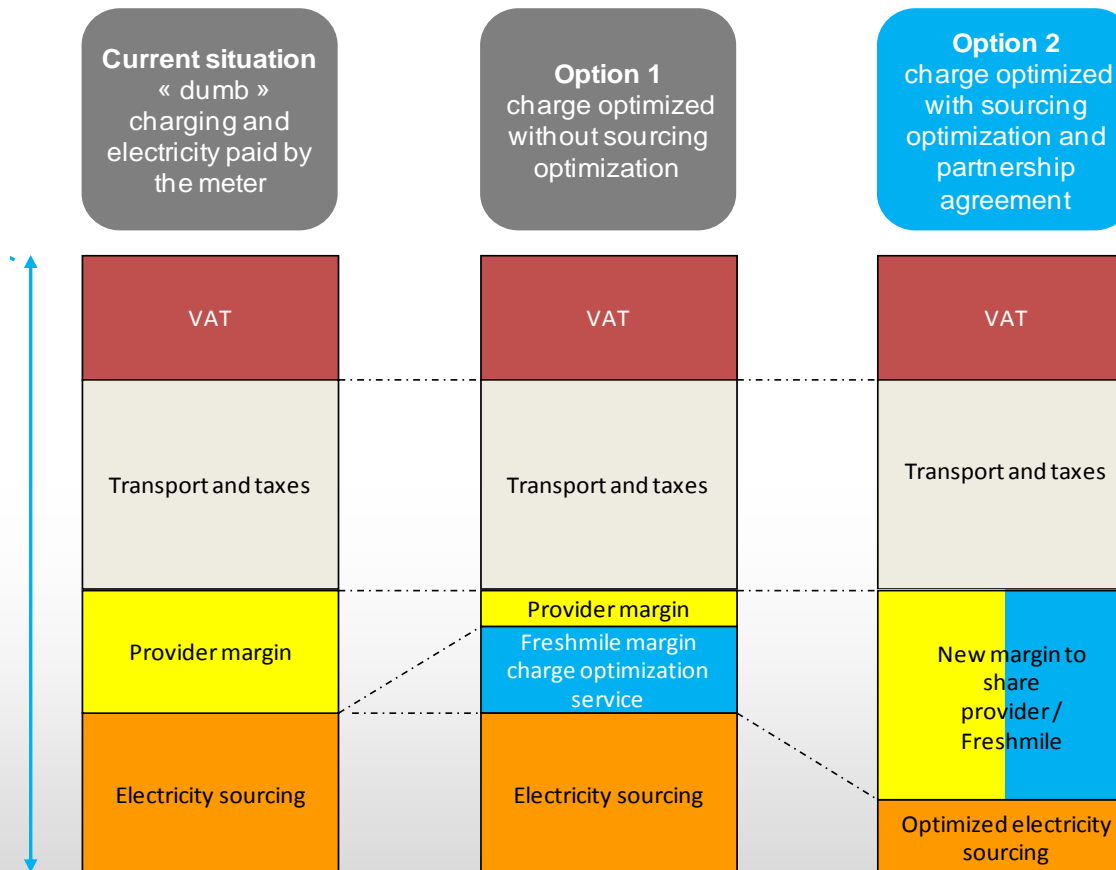
Trading desk



Dumb charging vs. smart charging with freshmile.py

Length	2 years								
Dates	13 September 2010 to 12 September 2012								
Market data set	Epex day-ahead prices								
Average consumption	15 kWh / 100 km								
Users	Freshmile standardized mobility profiles (Pascal, Lauriane, Magali, Irina)								
Results	Long Jing optimizer								
				Supply cost on markets			Savings achieved on supply		
	Weekly distance	Total distance	Electricity	Dumb	V1G	V2G	V1G	V2G	
User	km	km	kWh	€	€	€	€	€	
Pascal	500	52 143	7 821	475,57	248,91	101,14	226,66	374,43	
Lauriane	410	42 757	6 414	373,41	191,86	15,54	181,55	357,87	
Magali	251	26 176	3 926	243,64	125,91	- 107,47	117,73	351,11	
Irina	107	11 159	1 674	102,46	47,82	- 257,85	54,64	360,31	
Average	317	33 059	4 959	298,77	153,63	- 62,16	145,15	360,93	
Monthly average		1 377	207	12,45	6,40	- 2,59	6,05	15,04	

Product for end clients



Conclusion

- Load shifting is already very valuable
- Demand side management is crucial...
- ... but don't expect customers to bother for it!
- Right model: aggregator, playing the demand side management role between utilities and end customers