avicenne
ENERGY

INFORMATION FOR GROWTH

www.avicenne.com

Li-ion batteries & material market trends: Past & Future

Christophe PILLOT

Director, AVICENNE ENERGY

International Congress on Automotive Li Ion Batteries 2012

23 – 25 April 2012

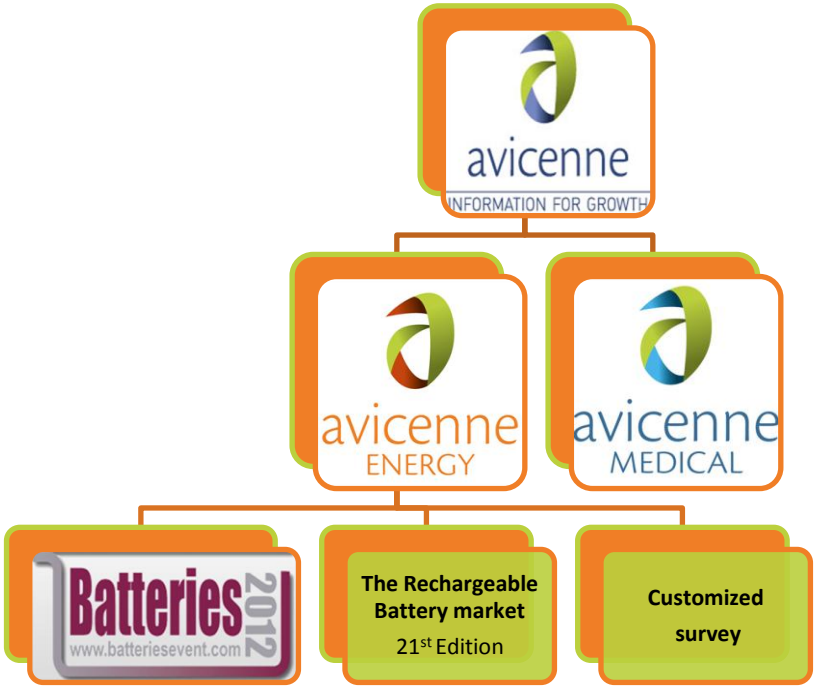
CONTACT

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

AVICENNE PROFILE

Information for Growth - Powering your company's market strategy with in-depth research

- Creation: 1992
- Headquarter: Paris
- Liaison Office: Japan, USA
- AVICENNE Energy Director: Christophe Pillot
- 4 consultants in Paris



The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne ENERGY

INFORMATION FOR GROWTH

www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

METHODOLOGY: EXTENSIVE FIELD RESEARCH TO RETRIEVE & CROSS CHECK INFORMATION

Top management contacts network > 17 000 contacts

Conferences & Exhibitions

Batteries 2011 – www.batteriesevent.com – The International Energy & Power Supply Conference and Exhibition

aabc

2nd Int'l Rechargeable Battery Expo BATTERY JAPAN

THE BATTERY SHOW

CIBF2010 – 9th China International Battery Fair

JAPAN ELECTRONICS SHOW

CeBIT

In Depth analysis Of applications

Cross Check Analysis

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

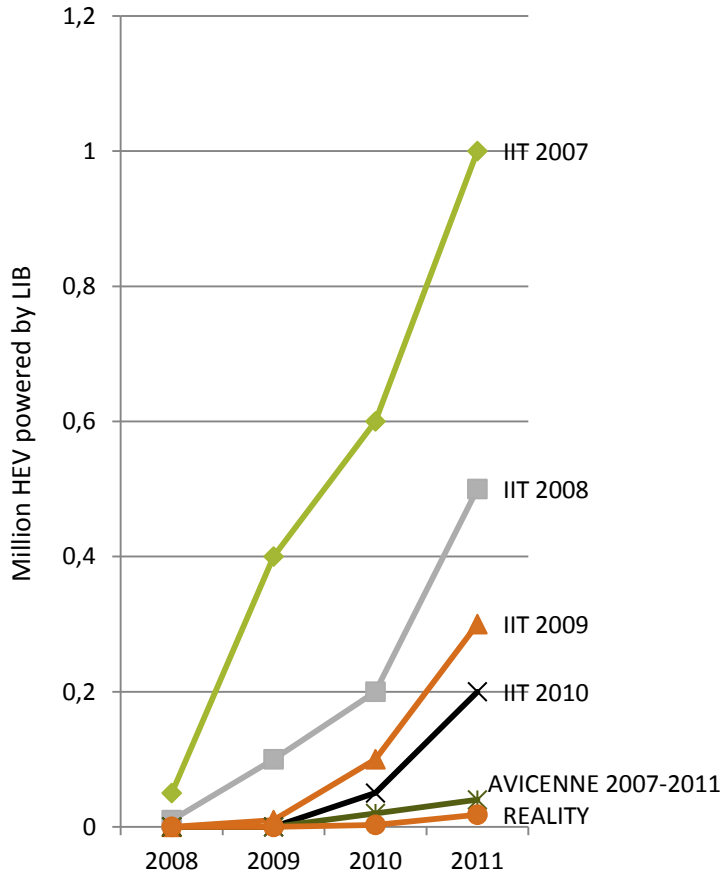
MORE THAN 170 REFERENCES WORLDWIDE

- A123
- Air Liquide
- Air Product
- Alcatel
- Amperex (ATL)
- Aros Securities
- ARC
- Atofina - Arkema
- AT Kearney
- Axeon
- Bain
- Battery R&D Association of Korea
- B&D
- BHP Billiton
- Brand Licencing Parners (BLP)
- Bourns
- Bosch
- BYD
- Cap X
- Catella
- Carbone Lorraine
- Carlyle
- CDN Cobalt
- CEA/LITEN
- Celgard
- Chemetall
- CIAPS
- CIBA
- CNRS
- Cogema
- CRU Group
- CSC Challenge Strategy Change
- DELTA
- DGA
- Dialog Semiconductor
- Dow Chemical
- Dupont
- Duracell
- EDF
- Electro Energy
- Ener 1
- Energizer
- ETC AB
- Facom
- Falcon Bridge
- Fairshild semiconductor
- Fameart
- FIST
- Floridienne de Chimie
- FMC Lithium
- Fortu Power Cell
- France Telecom
- Fulton Innovation
- GAIA
- GIL Import Batteries Ltd.
- GS Melcotec
- HC Starck (Bayer)
- HILTI
- Hitachi Maxell
- Hollingsworth & Vose Cie
- Honeywell
- HPL (High Power Lithium)
- Hutchinson
- IER
- IGL Export.
- International Component
- Inco
- Intersil
- ITRI
- ITS
- Johnson Controls
- JBC
- Kodak
- Kruger
- Lazard
- Leclanché
- Legrand
- LG Chemical
- Lion cells
- Little Fuse
- Lilipucian
- Lynas Corp
- Matsushita
- Microsoft
- MTI Micro Fuel Cells
- Mindbranch
- Moltech
- Molycorp
- Motorola
- NCCP - Russia
- Nitech
- NKKPC – Brett Nelson
- Norilsk Nickel
- Novaled
- NTK Powerdex
- OMG Inc
- Panasonic
- Philips
- Photon
- PK & Wise
- PRAYON
- Prismark
- PSA
- Rayovac
- Recharge
- Renault
- Rhodia
- Saft
- Samsung SDI
- Sanik
- Schroder Venture
- Scotent Entreprise
- Shenzhen High Power Technology
- Schott AG
- SKC
- SVE - Dassault
- Solvay
- Sony
- Stibat
- Storck
- Toda Kogyo
- TOTAL
- Total Wireless Solution
- Toyota
- Tyco
- Umicore
- Uniross
- Varta
- Warburgpincus
- World Industrial Information Center
- WR Grace & Cie
- Zebra
- ZPower

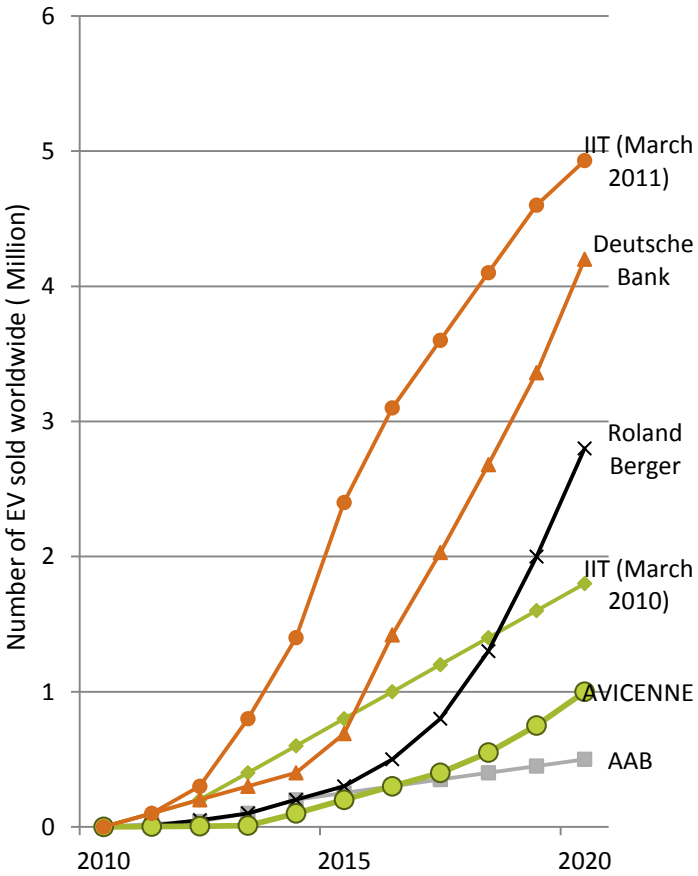
avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

AVICENNE ENERGY: RENOWNED TO HAVE REALISTIC FORECASTS

HEV powered by Lithium ion battery forecasts from 2008 to 2011



EV sold, in million units, worldwide, 2010 - 2020



Source : International Battery Conference, Fort Lauderdale 2007, 2008, 2009, 2010 & 2011

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

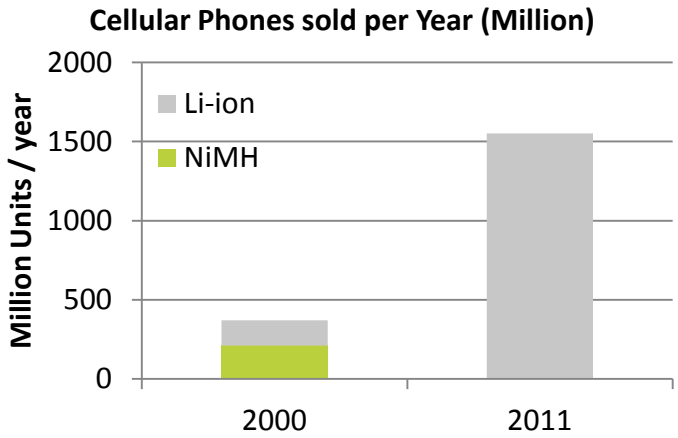
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

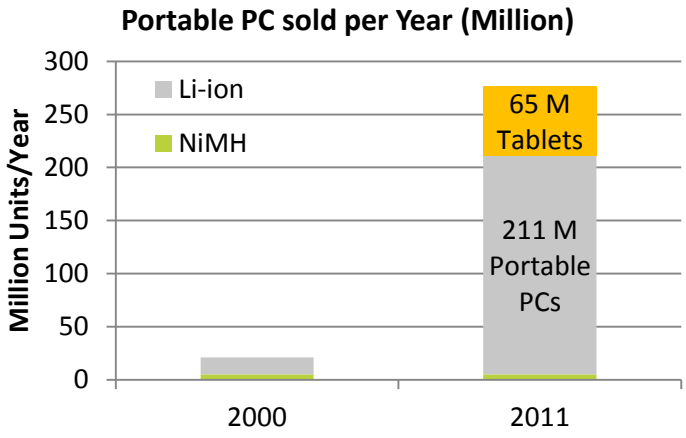
OUTLINE

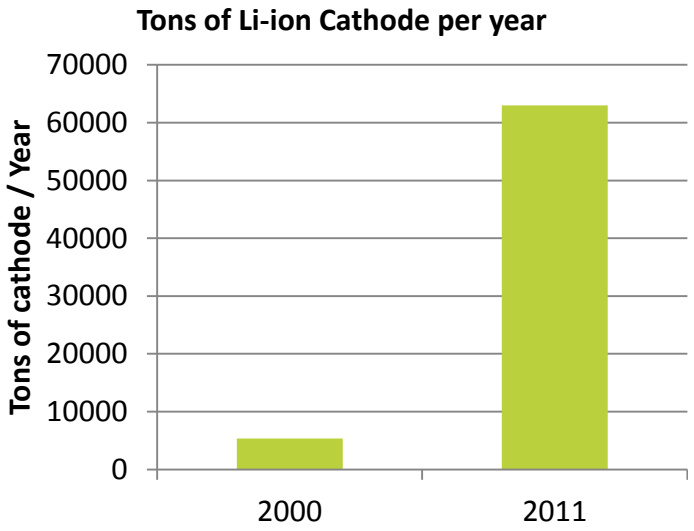
- THE RECHARGEABLE BATTERY MARKET IN 2011
- ELECTRIC VEHICLE SEGMENTATION
- HEV, P-HEV & EV MARKET BY COMPETITOR AND BY AREA
- FORECASTS BY 2025
- IMPACT ON THE BATTERY BUSINESS

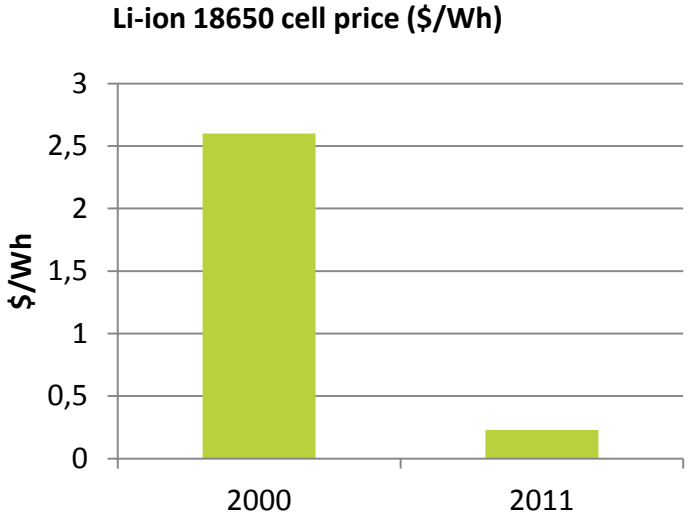
avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

THE BATTERY MARKET IS REALLY DYNAMIC









The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

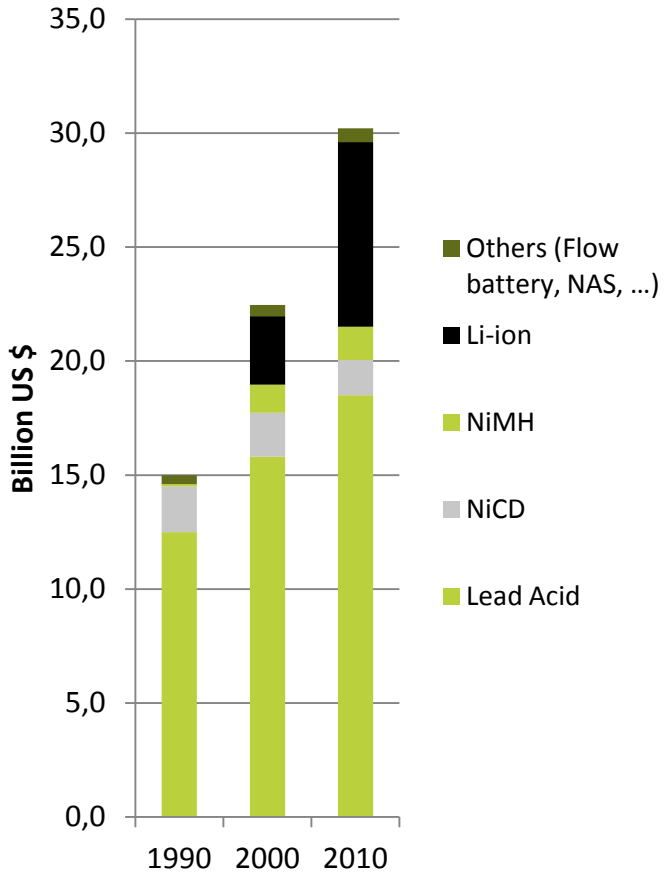
CONTACT

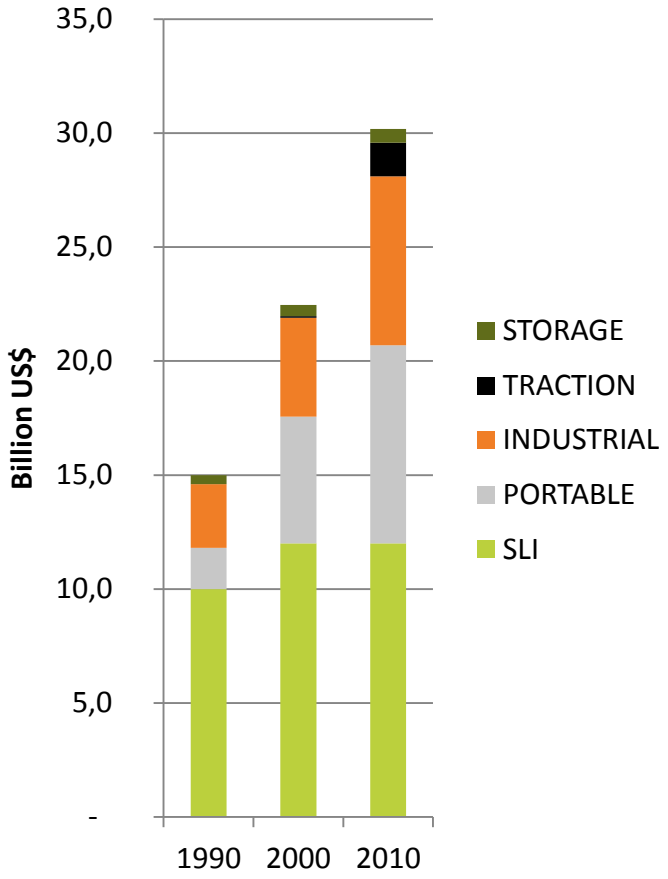
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

THE WORLDWIDE BATTERY MARKET 1990-2010

30 BILLION US$
3-4% AVERAGE GROWTH PER YEAR (1990-2010)





The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

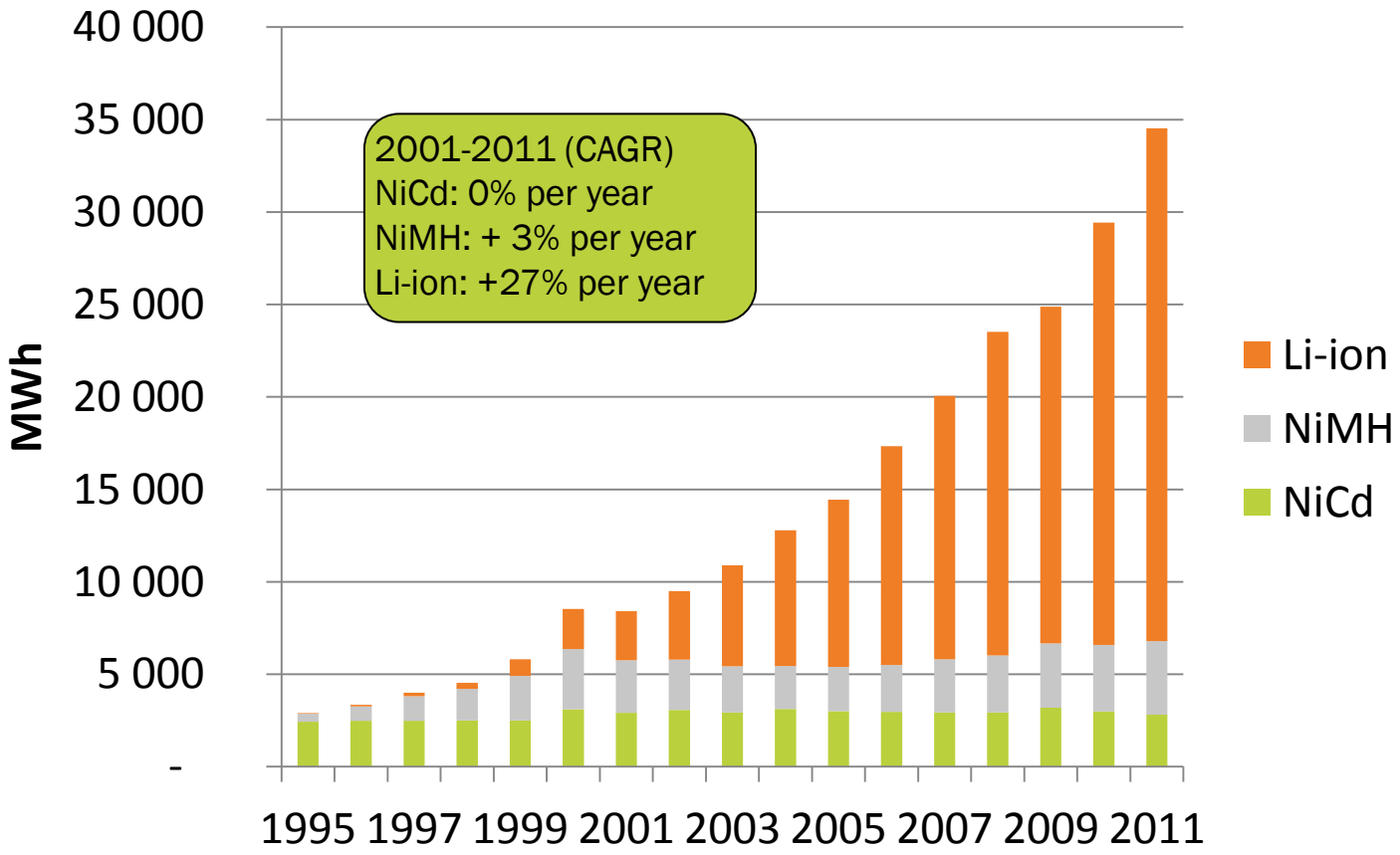
CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

WORLDWIDE BATTERY SALES BY CHEMISTRY, MWH, 1995-2011

The worldwide rechargeable battery market, in volume, MWh, 1995-2011



The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

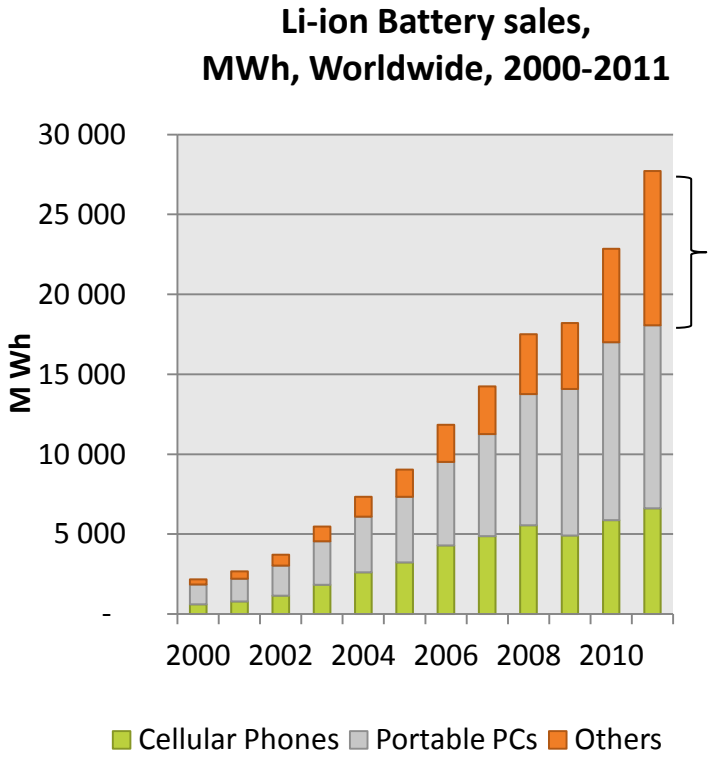
LI-ION IN 2011

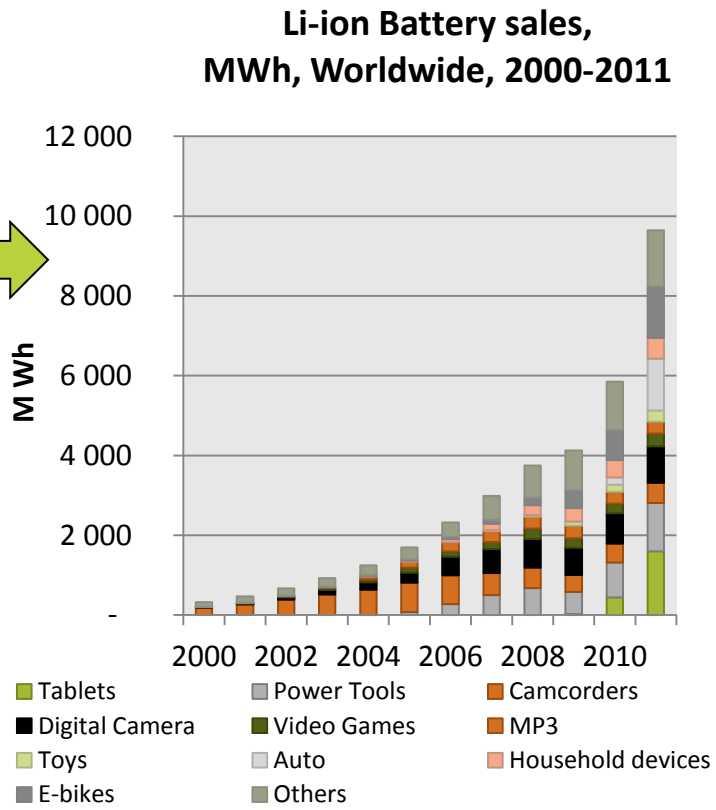
MAIN APPLICATIONS: CELLULAR, NOTEBOOK

4 125 M cells – 28 000 MWh

9 300 M$

CAGR 2006/2011
+21% per year in Volume
+12% per year in value





The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

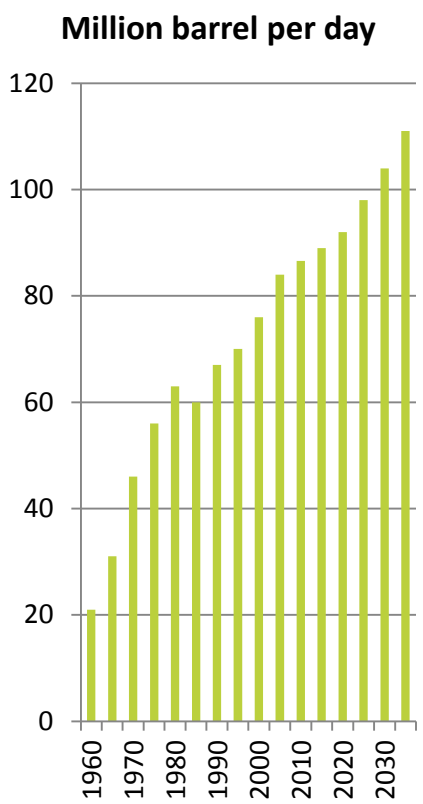
CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

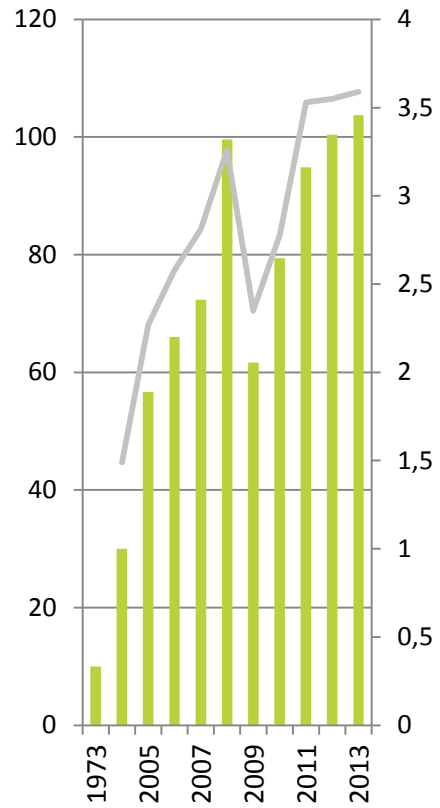
WHY X-EV ?

Petroleum consumption worldwide 1960-2030



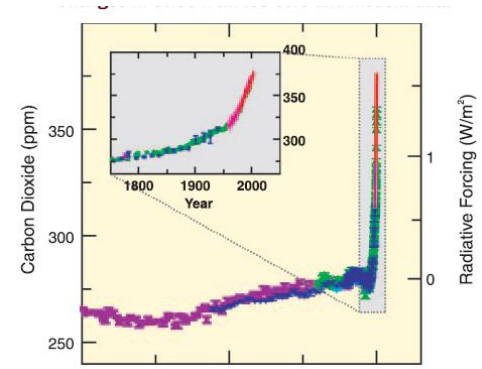
Source: Energy Information Administration, US Government

Price of the WTI barrel of oil, US $



Source: http://www.eia.doe.gov/emeu/steo/pub/contents.html

CO2 density in the atmosphere increase



Source: IPCC, Intergovernmental Panel on Climate Change, Climate Change 2007, Synthesis Report p38

The Rechargeable Battery Market and Main Trends 2011-2020

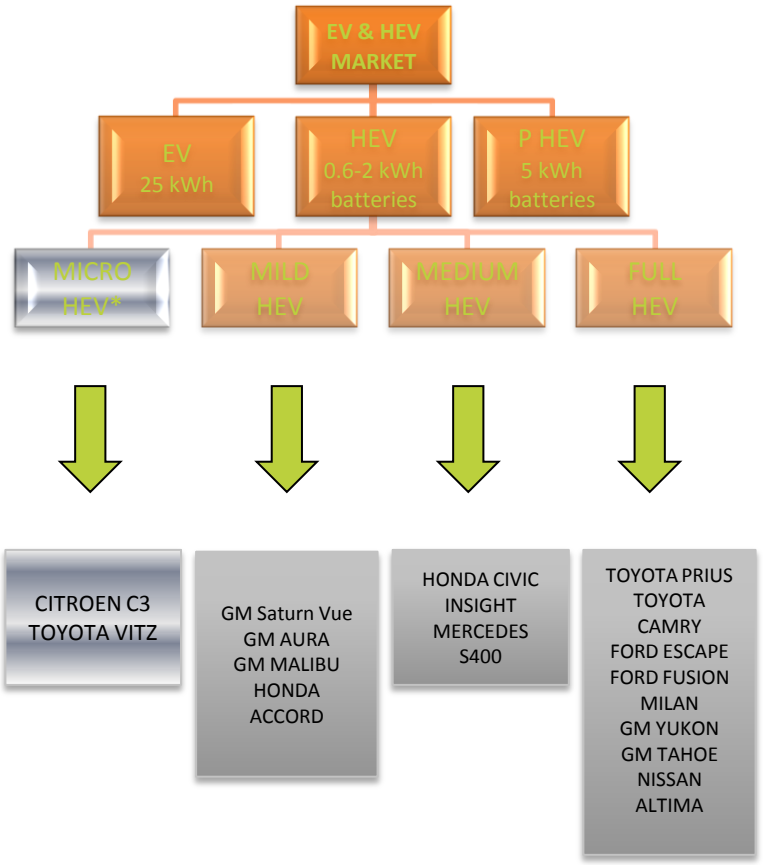
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

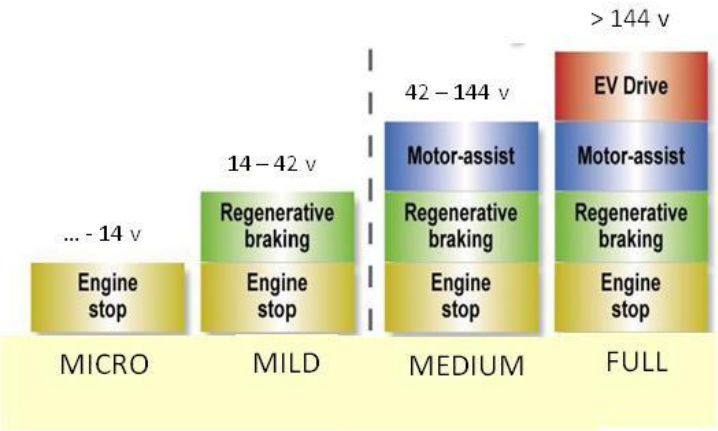
CONTACT

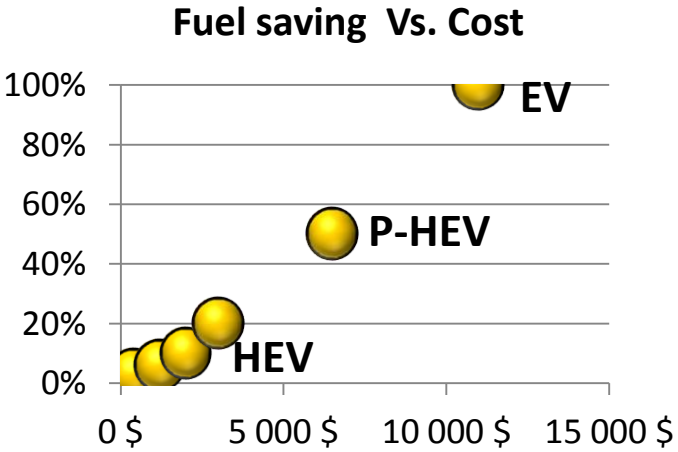
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

HEV, P-HEV & EV DEFINITION & SEGMENTATION







Note: Micro HEV are not in the HEV statistics & HEV forecast

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

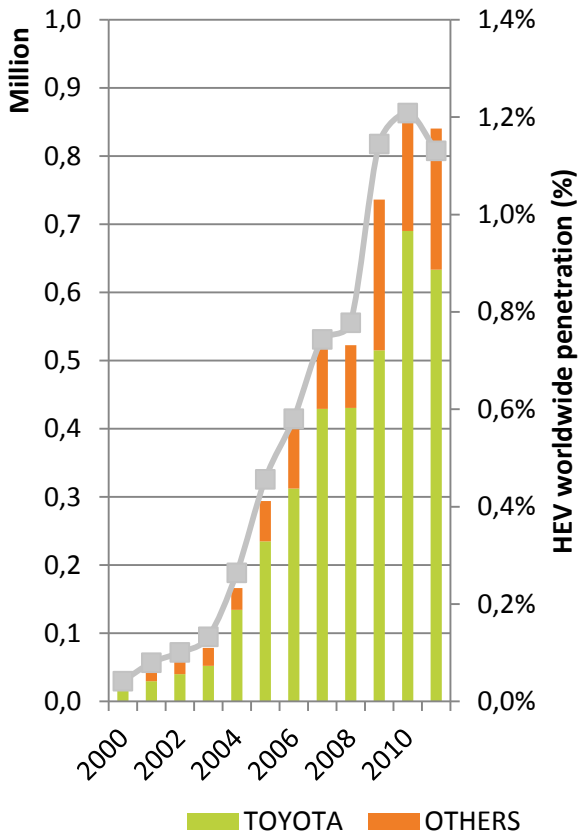
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

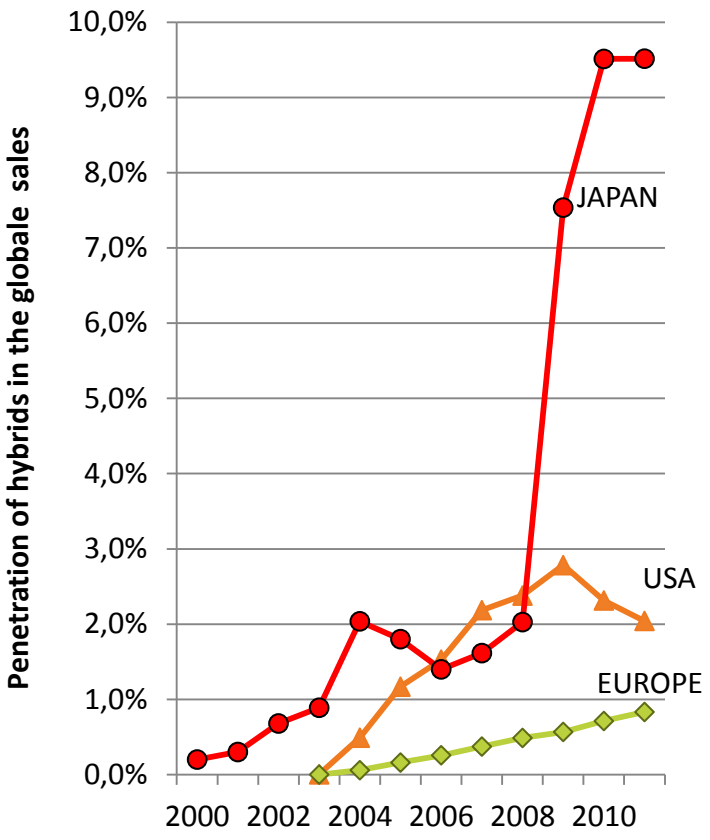
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

HEV WORLDWIDE IN 2011 LESS THAN 0.9M HEV SOLD

HEV sold per year, M units, worldwide, 2000 - 2011



Penetration of hybrids in the global sales, 2000-2011



Source: TOYOTA, HONDA, NISSAN, FORD, GM, HYUNDAI, MERCEDES, GM, BMW, VW, PORSCHE… Compilation AVICENNE ENERGY

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

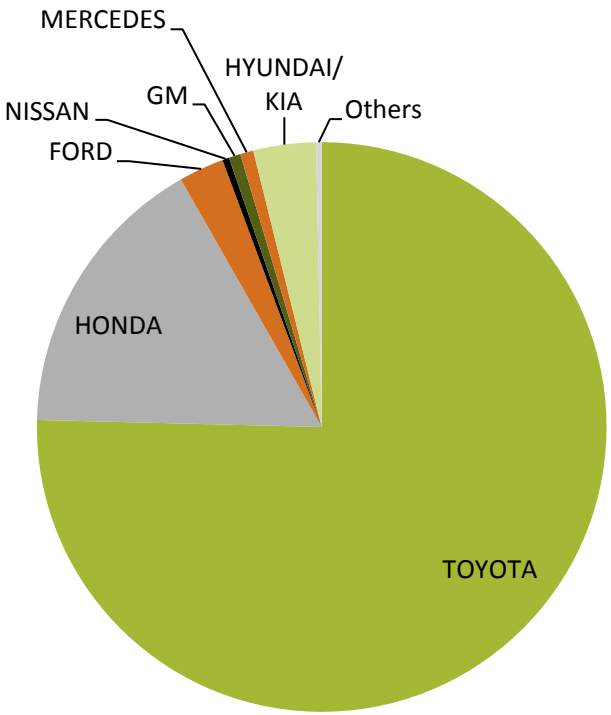
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

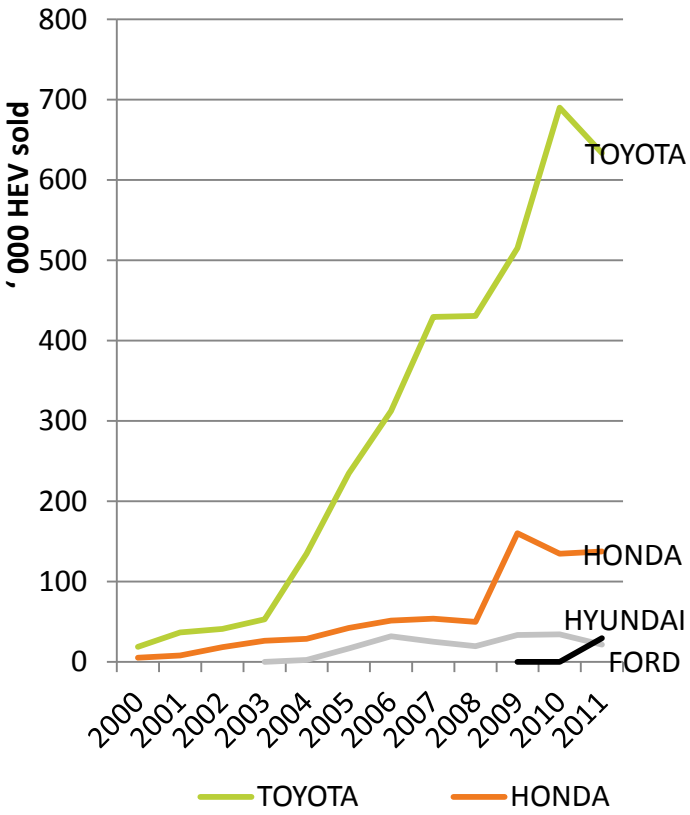
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

HEV WORLDWIDE IN 2011 BY CAR SUPPLIER

Total HEV Vehicles Less than 0.9 M in 2011



HEV sold per year, M units per car manufacturers, 2000-2010

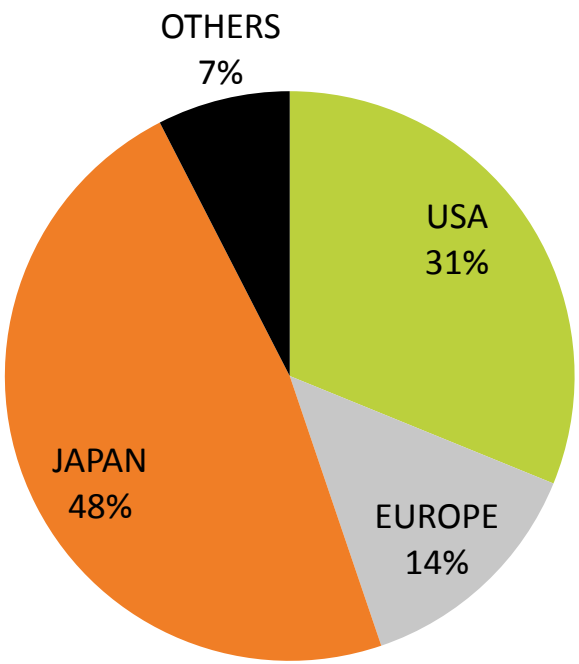


Source: TOYOTA, HONDA, NISSAN, FORD, GM, HYUNDAI, MERCEDES, GM, BMW, VW, PORSCHE… Compilation AVICENNE ENERGY

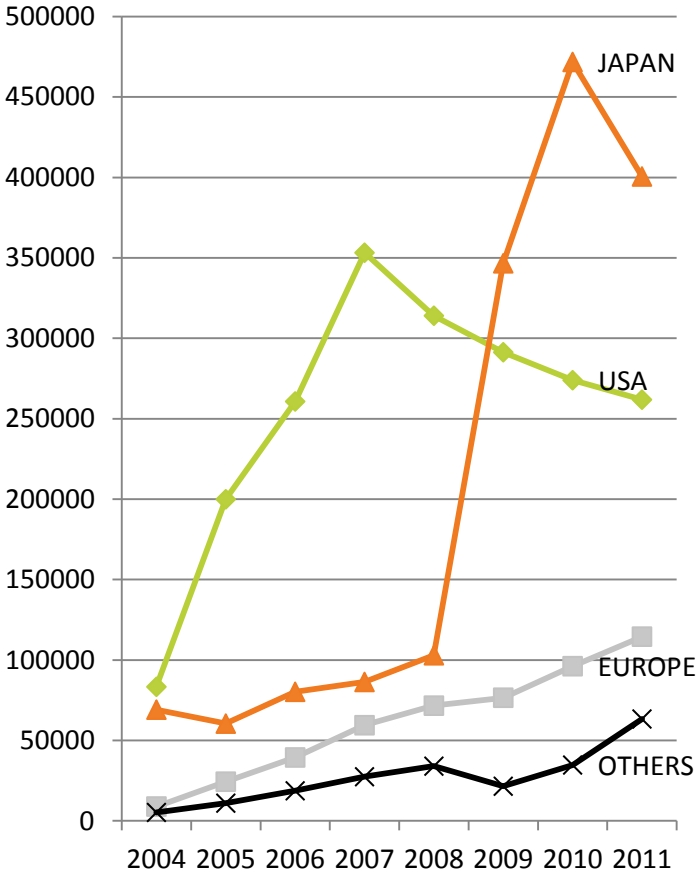
avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

HEV WORLDWIDE IN 2011 BY COUNTRY

Total HEV Vehicles Less than 0.9 M in 2011



HEV sold per year, M units per country, 2004-2011



The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

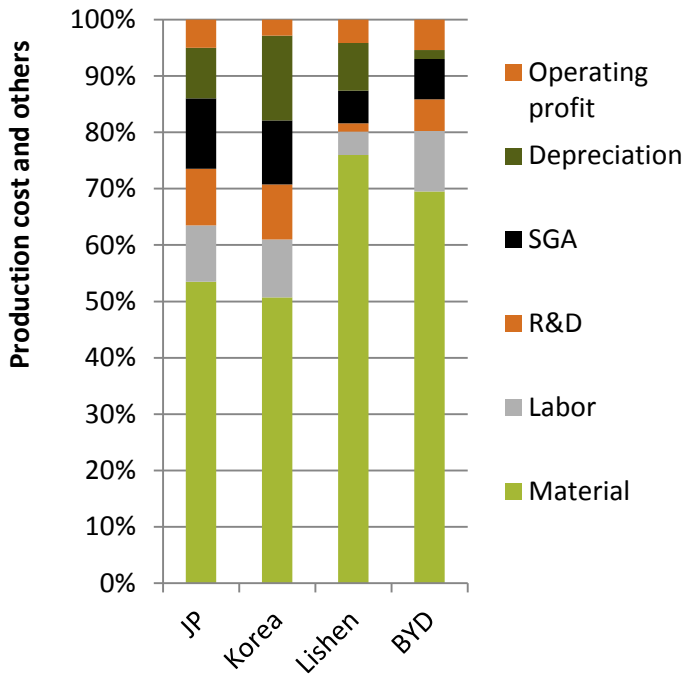
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

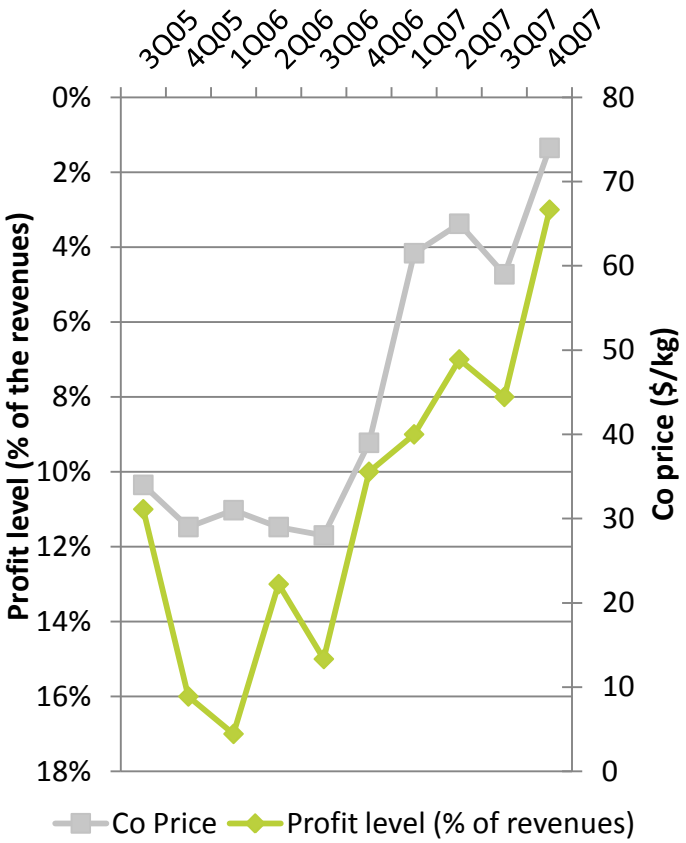
avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

RAW MATERIALS IS DRIVING THE BATTERY BUSINESS

RAW MATERIALS ACCOUNT FOR 50 TO 80% OF LIB BUSINESS
RAW MATERIAL COST IMPACT DRASTICALY ON THE BATTERY MAKERS PROFIT

Production cost for Japanese, Chinese & Korean makers for prismatic cells in 2011





The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

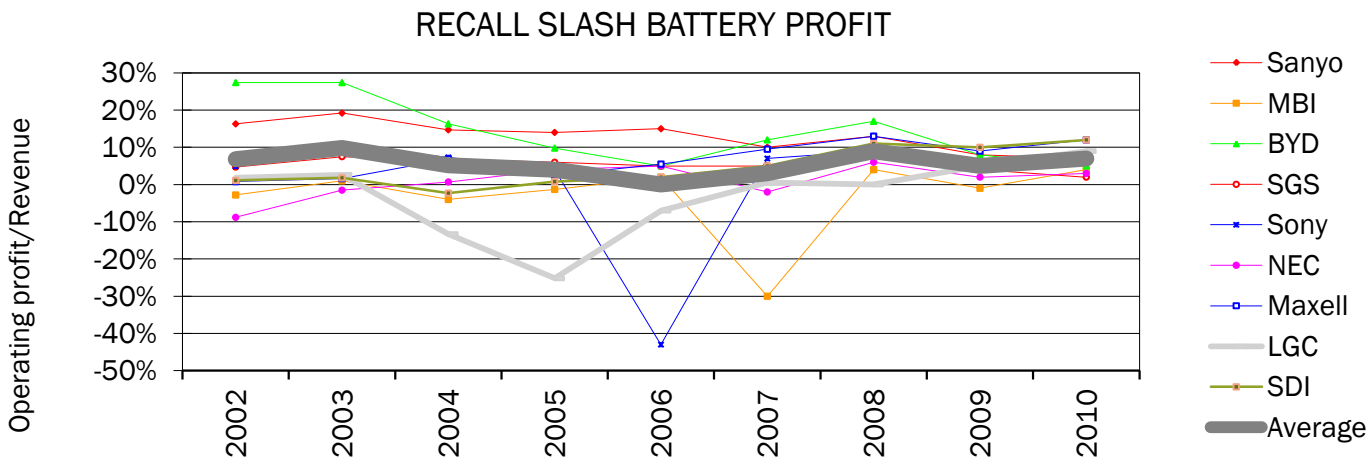
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LIB BUSINESS
RECALL SLASH BATTERY PROFIT

- More & more incidents & accidents
- All the battery makers and the OEM are concerned
- Recall cost impact drastically the battery business and the profitability

Battery Makers	OEM	Battery recall	Date	Cost
Matsushita	Nokia	46 M cells	08/07	170 MUS$
Sanyo	Mitsubishi	1.3 M cells	12/06	35 MUS$
Sony	Dell, Apple, Toshiba, Lenovo,...	10 M Packs 65 M cells	2006	430 MUS$
Sony	HP, Toshiba, Dell	0.44 M	2009	



avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LI-ION VALUE CHAIN

CATHODE SUPPLIERS
63 000 T in 2011
Revenues: 1,8 B$
CAGR 06/11: +13%

ANODE SUPPLIERS
32 000 T
Revenues: 0,6 B$
CAGR 06/11: 11%

ELECTROLYTE SUPPLIERS
21 000 T
Revenues: 0,4 B$
CAGR 06/11: 17%

SEPARATOR SUPPLIERS
440 M m²
Revenues: 0,8 B$
CAGR 06/11: 15%

ANCILLARY
Revenues: 0,6 B$

→ **CELL MANUFACTURERS**
Revenues: 9 B$
Gross margin: <10%

→ **PACK MANUFACTURERS**
Revenues: 11 B$
Gross margin: <10%

→ **OEMs**

-> Cell makers & raw material suppliers relationship
-> Raw material new entrants
-> Entry barriers for raw materials suppliers
-> Raw material impact on battery efficiency
-> Raw material cost and main trends

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

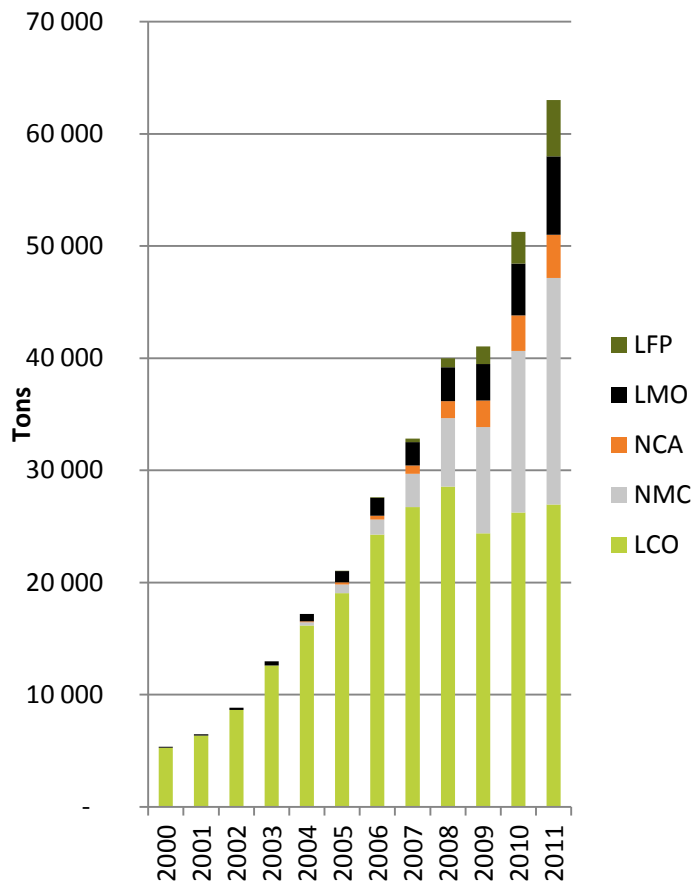
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

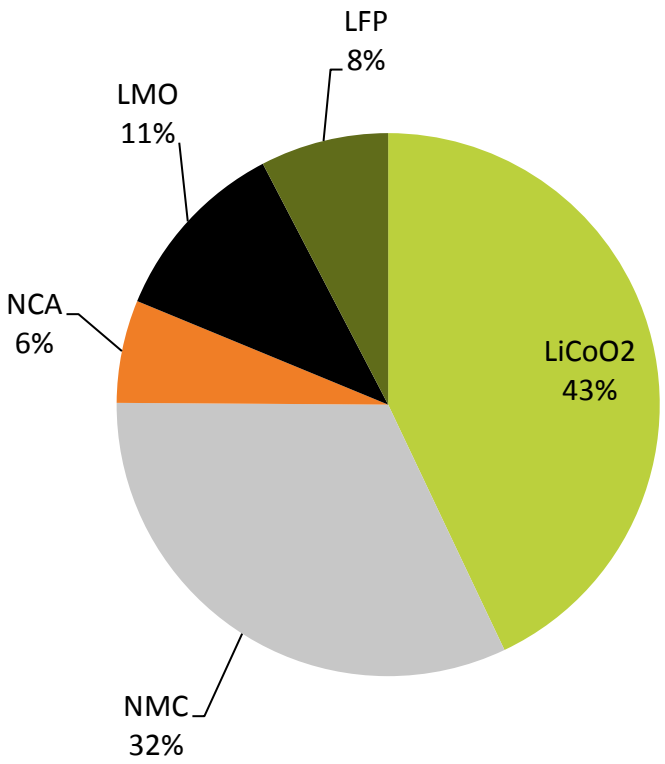
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

CATHODE ACTIVE MATERIALS NEEDS BY CHEMISTRY

Cathode active materials for LIB in Tons, 2000-2011



Cathode active materials for LIB, % of volume, 2011



avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

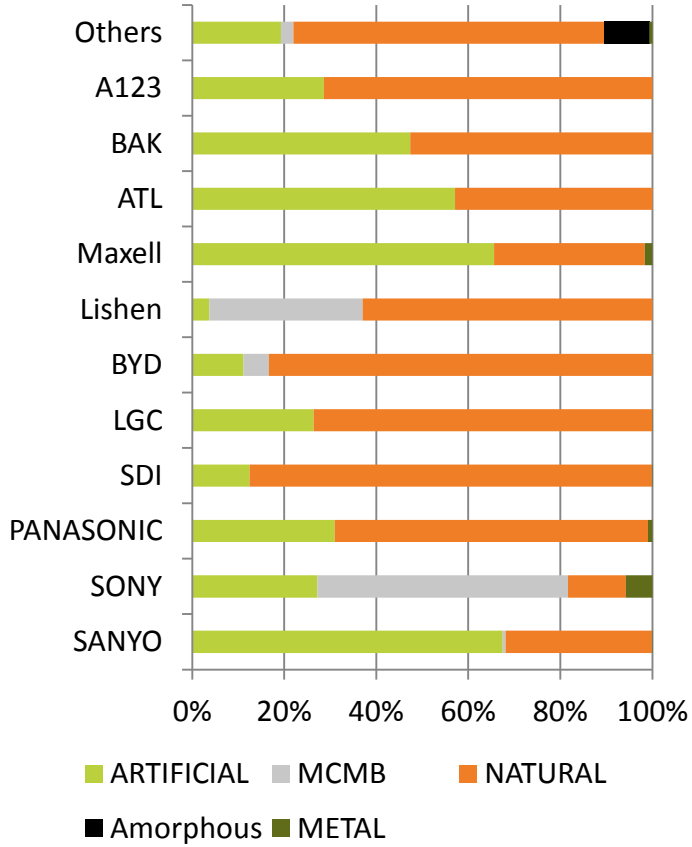
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

ANODE FOR LIB IN 2011

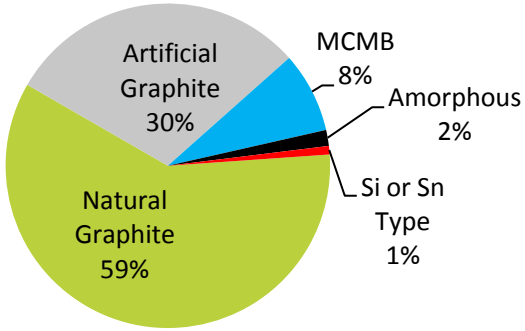
Natural graphite is more & more used



Material	Energy	Life	Power	Safety	Cost
Artificial Graphite	++	+	o	+	o
Natural Graphite *	++	o	o	o	++
Meso Phase Artificial Graphite	o	++	++	++	o
Hard Carbon	o	++	++	++	o
Soft Carbon	o	+	++	++	+

Source: Hitachi Chemical

Carbon for LIB anodes by type (2011)

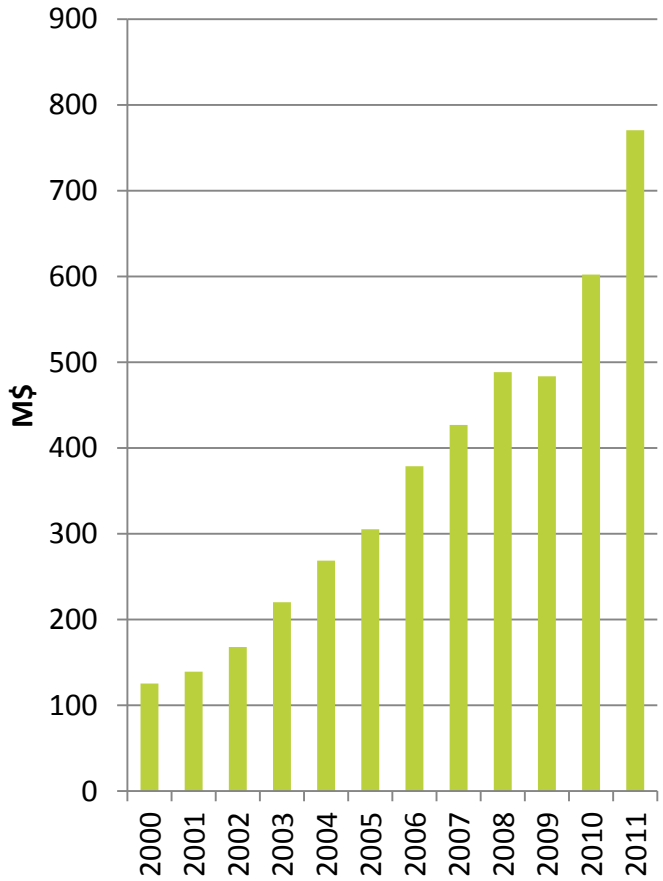


Note:
MCMB: Mesocarbon Microbeads

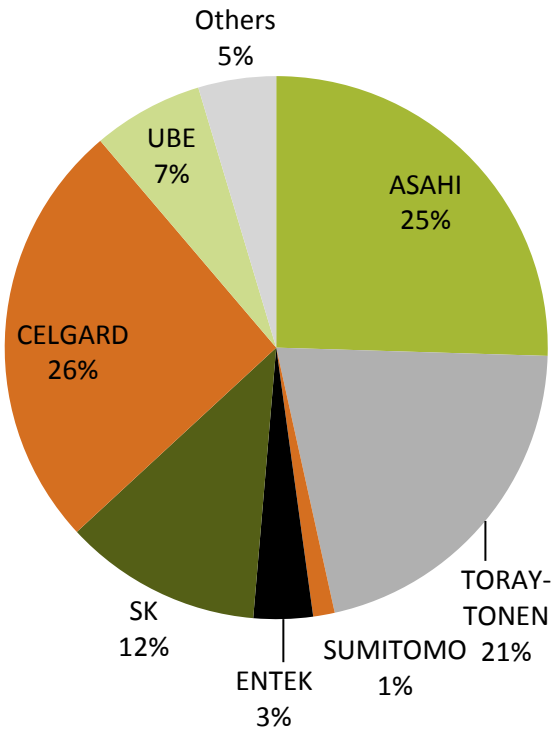
avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

LIB SEPARATOR MARKET 2011

LIB separator market, M$, CAGR 2001/2011: +19%



LIB Separator supplier, market share in 2011



Others: TDK/Nitto Denko, Foshan Jinhui Hi-Tech, Shenzhen Senior Technology Material, Xinxiang Green next Energy, Dupont,…

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

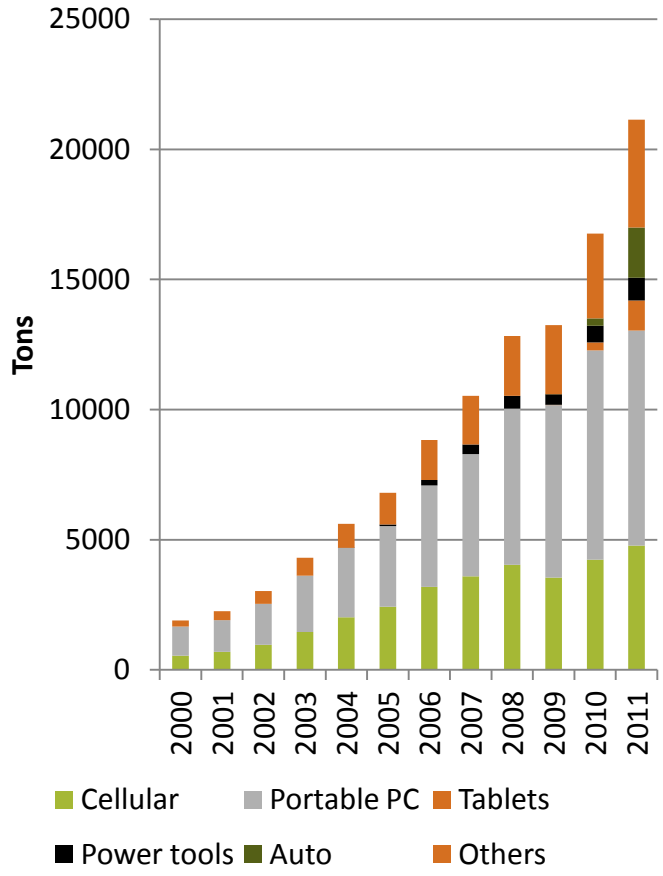
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

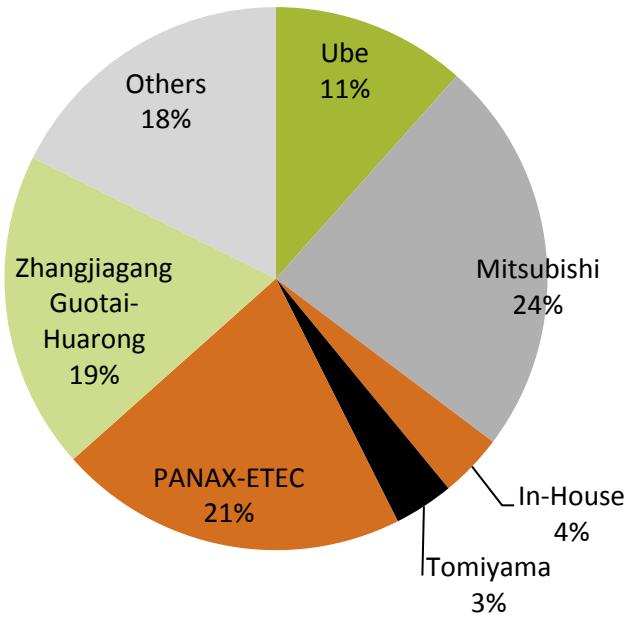
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

ELECTROLYTE SUPPLIERS/CUSTOMERS 21 200 TONS IN 2011

LIB electrolyte market, Tons, CAGR 2001/2011: +19%



LIB electrolyte supplier, market share in 2011



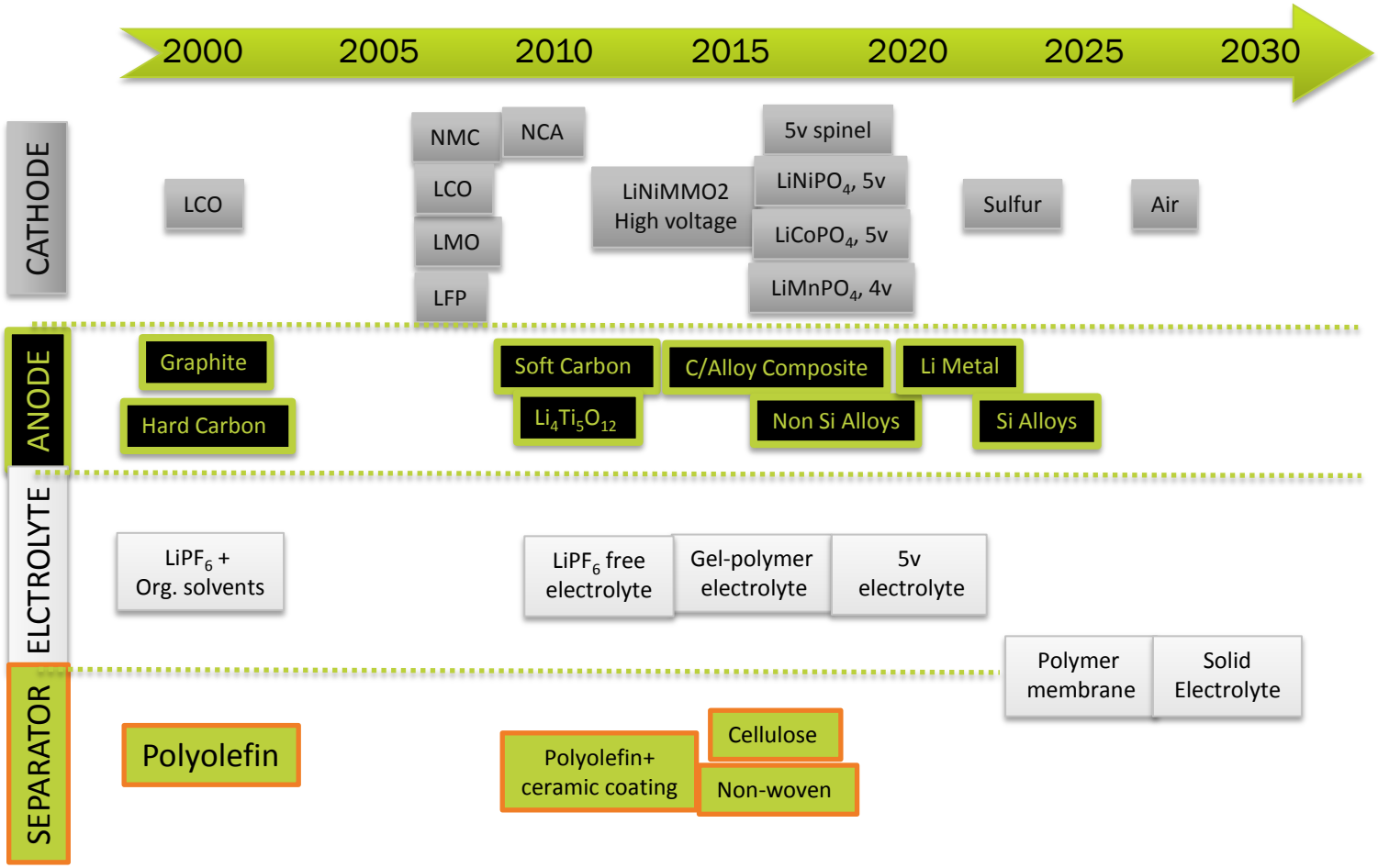
avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LI-ION RAW MATERIALS ROADMAP



Source: Avicenne Compilation, Kai-Christian Möller, Fraunhofer ISC

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

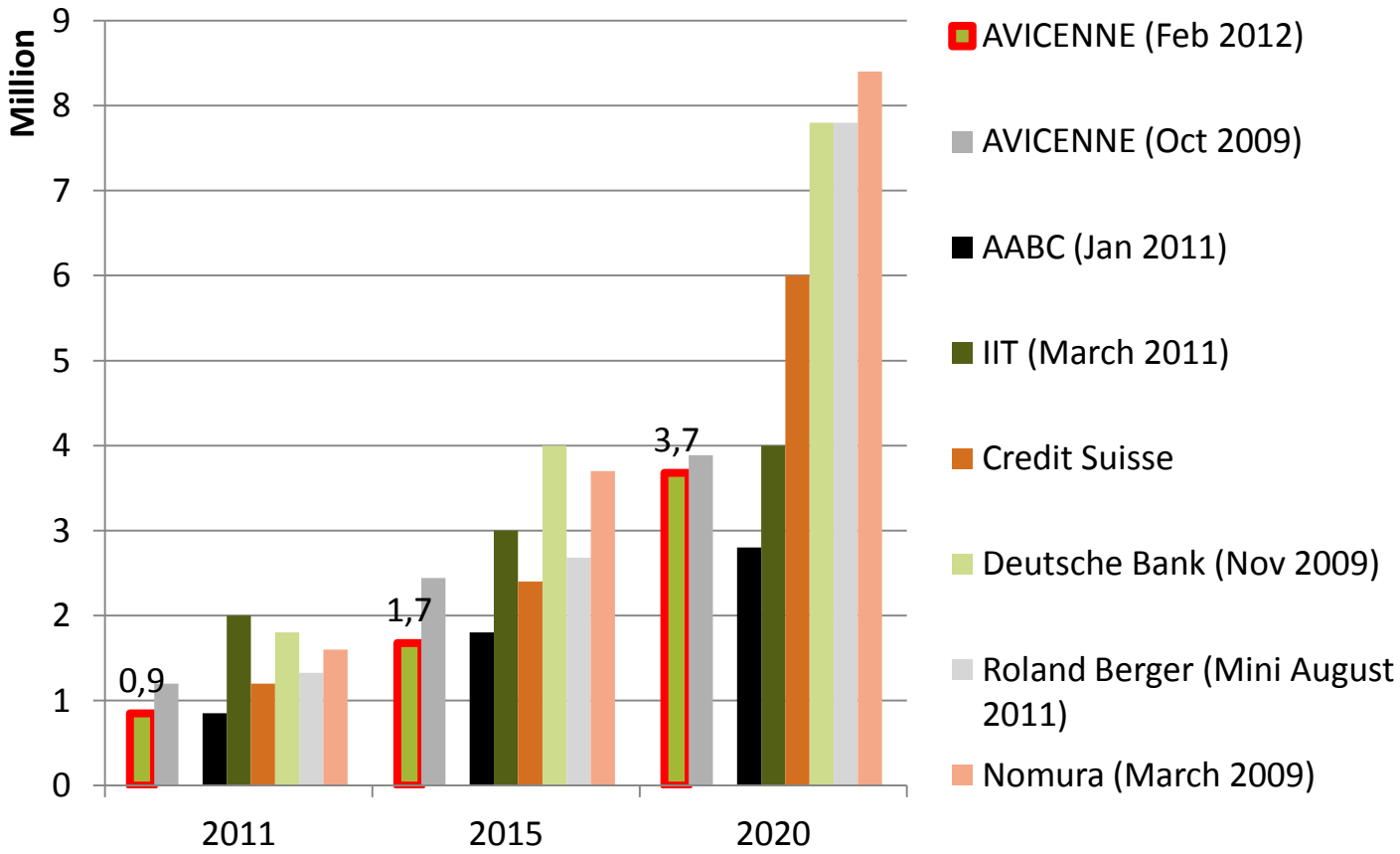
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LONG TERM HEV FORECAST FROM 3 TO 8 M HEV IN 2020

AVICENNE ENERGY FORECASTS ARE REALISTIC COMPARE TO OTHER ANALYSTS



Source: AVICENNE ENERGY Compilation, February 2012

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

WHICH BATTERY TECHNOLOGY FOR HEV?

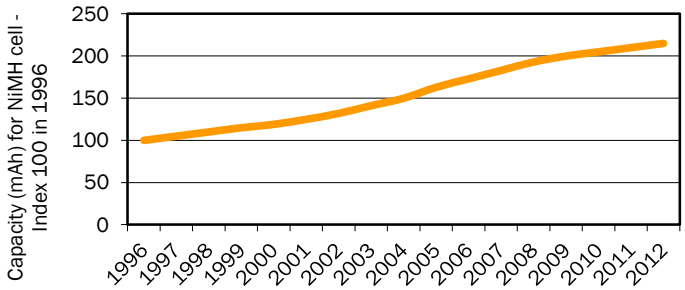
NiMH is improving and powering more than 95% of HEV car sold in 2011

	PRIUS II	PRIUS III
Capacity	6.5 Ah	6.5 Ah
Cells	228 (38 * 6)	168 (28 * 6)
Voltage	273.6 v	201.6 v
Specific power	1000 W/kg	1300 W/kg
Specific energy	46 Wh/kg	46 Wh/kg
Total power/HEV	36 kW	37.8 kW
Total energy/HEV	1778 Wh	1310 Wh

Source: TOYOTA

NiMH Capacity is increasing

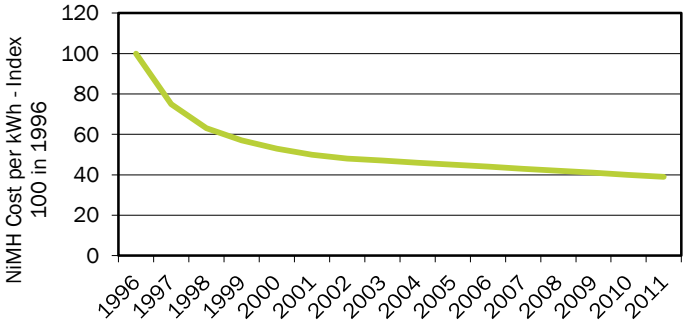
Exemple of AA NiMH
(index 100 in 1996)



Source: Sanyo – AVICENNE ENERGY Compilation

NiMH cost per kWh is decreasing

(index 100 in 1996)



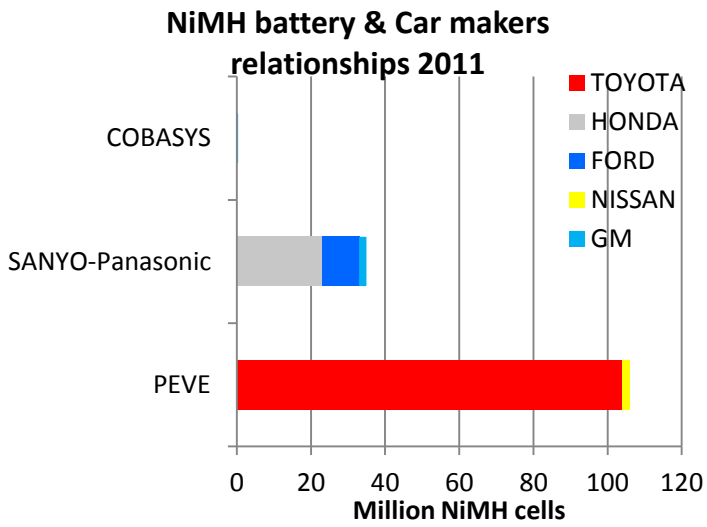
Source: AVICENNE ENERGY

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

NIMH BATTERIES FOR HEV IN 2010/2011

Thanks to TOYOTA, Primearth EV Energy (PEVE), got more than 75% of the HEV battery market and a large know-how

	PEVE	SANYO-Panasonic	COBASYS (SB Limotive)
TOYOTA	■		
LEXUS	■		
HONDA		■	
FORD		■	
NISSAN	■		
GM		■	■
BMW			■
DAIMLER			■
CHRYSLER	■		
VW		■	
BMW		■	



Sanyo's battery used by Ford

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

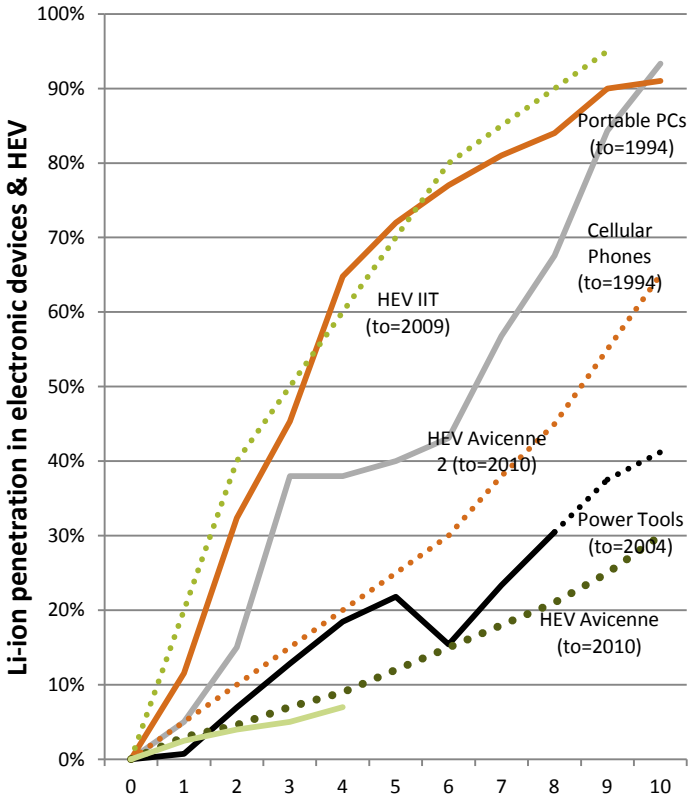
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

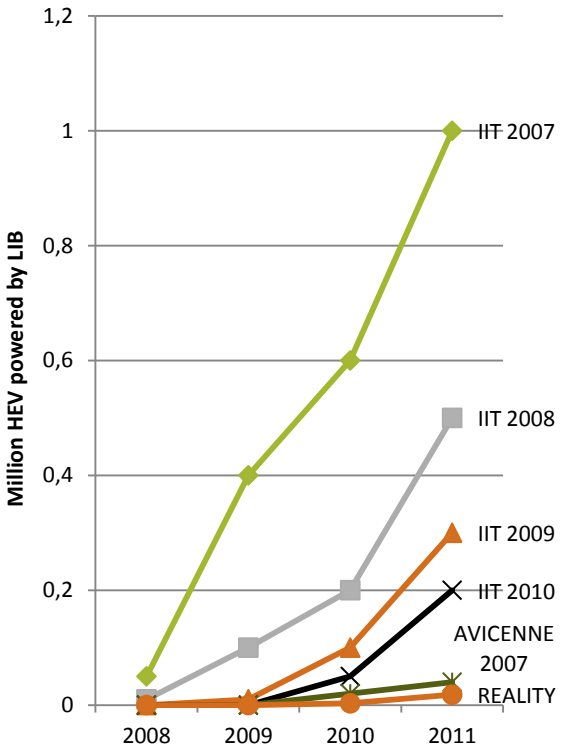
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LI-ION PENETRATION IN VARIOUS DEVICES: AVICENNE & OTHER ANALYSTS FORECAST

Li-ion penetration in electronic devices & HEV



HEV powered by LIB forecasts from 2008 to 2011



Source : International Battery Conference, Fort Lauderdale 2007, 2008, 2009, 2010 & 2011

(1)AVICENNE HEV Forecasts, march 09, Relevant scenario

(2)AVICENNE HEV Forecasts, march 09, Li-ion Optimistic scenario

(3)IIT, TAKESHITA, March 08, THE 25th INTERNATIONAL BATTERY SEMINAR & EXHIBIT, Slide 8 & March 2009, 26th Battery Seminar,

(4)AAB, Menahem ANDERMAN, Ph.D, Tampa, Florida, May 2009

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LI-ION BATTERY DEVELOPMENTS FOR HEV, P-HEV & EV

Li-ion is THE solution for the future

- BUT, SAFETY, LIFE TIME & COST issues
- Lot of technical solutions (NMC, NCA, LFP, LCO...)
- Lot of EXPENSIVE Developments (cell mfg, cooling systems, pack assembly…)
  - So,
- Lot of JV, partnerships etc...

LIB >NiMH but SAFETY & COST ISSUES

	PRIUS III NiMH	PRIUS x - Li-ion
Volts	201.6	201.6
Cells	168 (28*6)	56
Capacity	6.5 Ah	3.8 Ah
Energy	1310 Wh	766 Wh
Weight	38 kg	25 kg
T°C Range	+	+
Cyclability	+	++
Safety		
Cost		

JOINT VENTURE & STRONG PARTNERSHIP

	TOYOTA	NISSAN	HONDA	MITSUBISHI	DAIMLER	BYD AUTO	BOSCH	SAIC
PANASONIC	PEVE							
NEC		AESC						
GSY			JV (HEV)	LEJ (EV)				
SDI							SB LiMotive	
BYD					JV in China	HEV, EV		
Evonik					Li-Tec, Deutsche Accu			
A123								JV

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

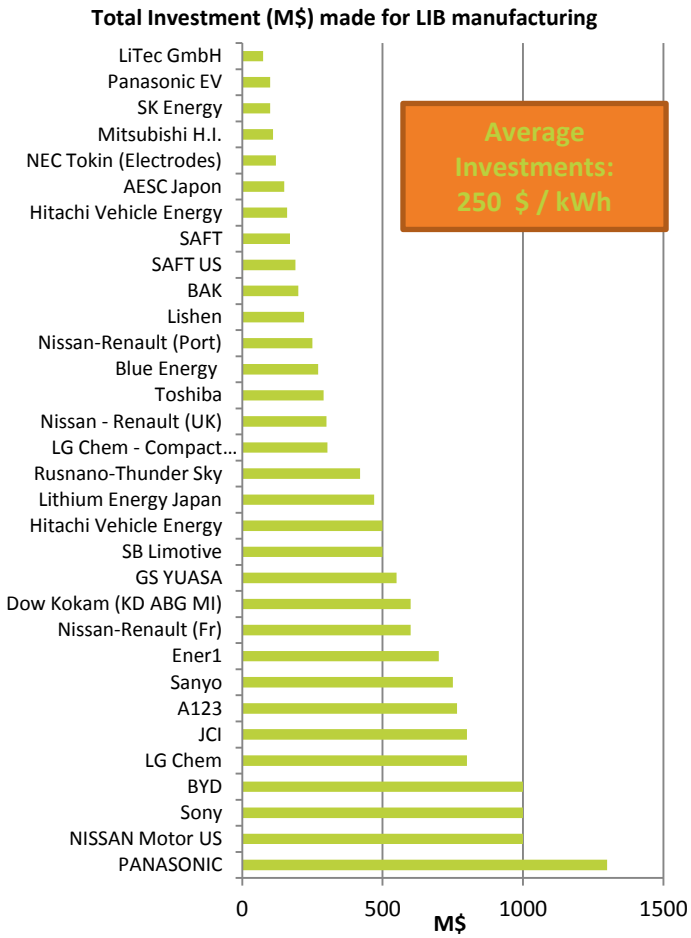
CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LIB MANUFACTURING INVESTMENTS 2009-2015

10-12 B$ WORLDWIDE

>50 GWh in 2015



A123 Michigan Plant - Photo courtesy of A123 Systems

Liotech Plant, Novosibirsk – 1,5 GWh production capacity

avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

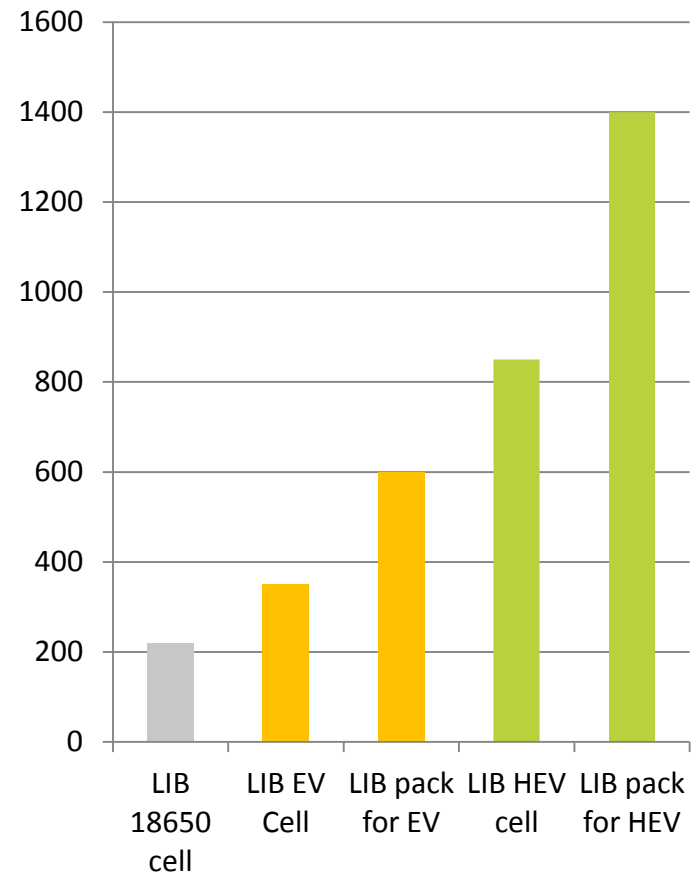
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

LIB BATTERY COST

Costs analysis

- Raw material cost (Co, Mn, Ni, Al, Cu, …)
- Anode, cathode, Electrolyte , separator, binders, Cu & Al foil, etc… cost structure :
  - CAPEX,
  - labor cost,
  - R&D
  - Marketing, Adm, Overhead, margin)
- Raw material needs / mAh
- Electrode process Yield
- Assembly Process Yield
- Cell manufacturing cost
- Module manufacturing cost
- Pack assembly cost
- …

Battery price in 2011 $/kWh



avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

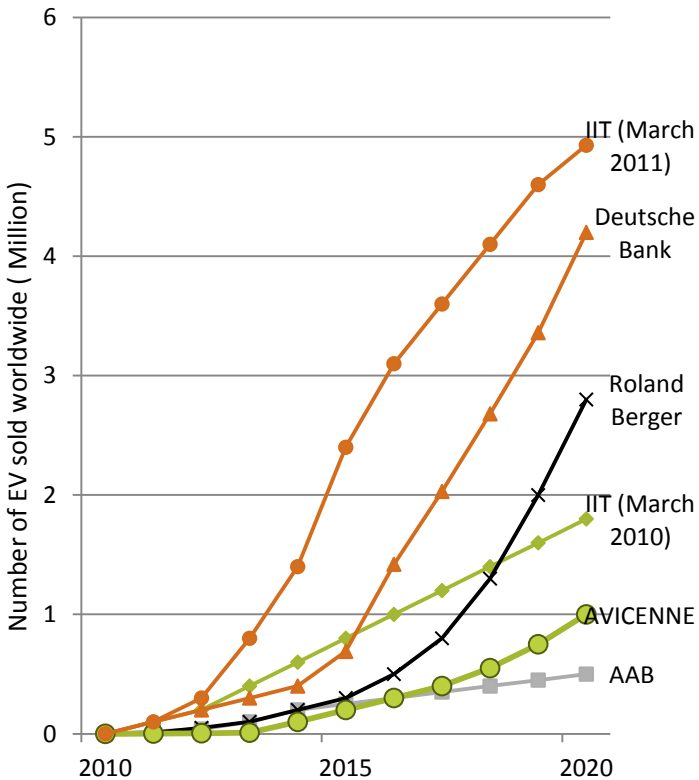
The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

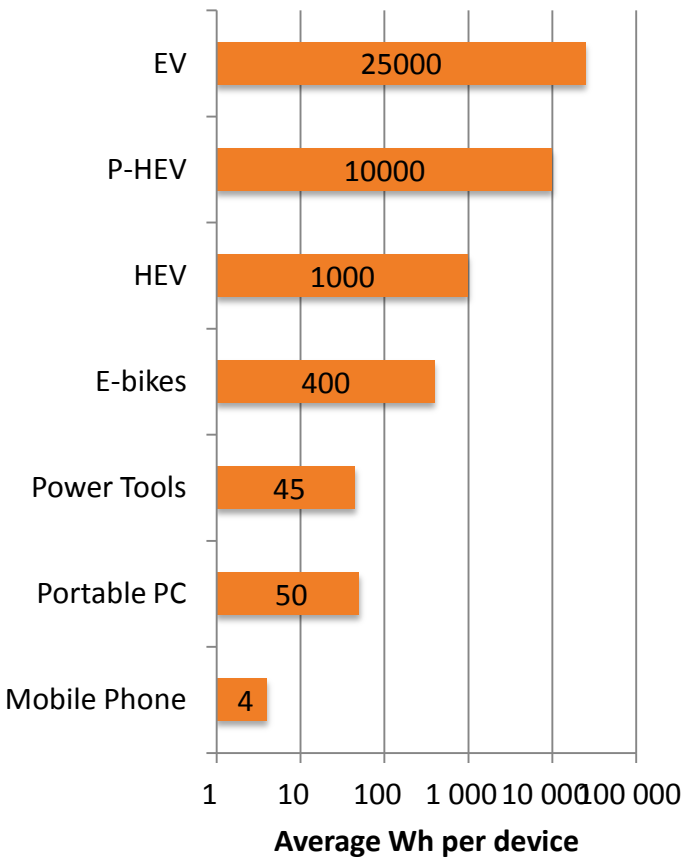
EV FORECASTS 2011-2020

EV sold, in million units, worldwide, 2010 - 2020



IIT, March 2011 Fort Lauderdale
IIT, March 2010 Fort Lauderdale
Deutsche Bank , Electric Cars: Plugged In 2 – Nov 2009
Roland BERGER, Oct 2011, Batteries 2011 Cannes
AAB, AABC Europe, Mainz, June 2011

EV impact on the LIB & raw material market is HUGE



avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

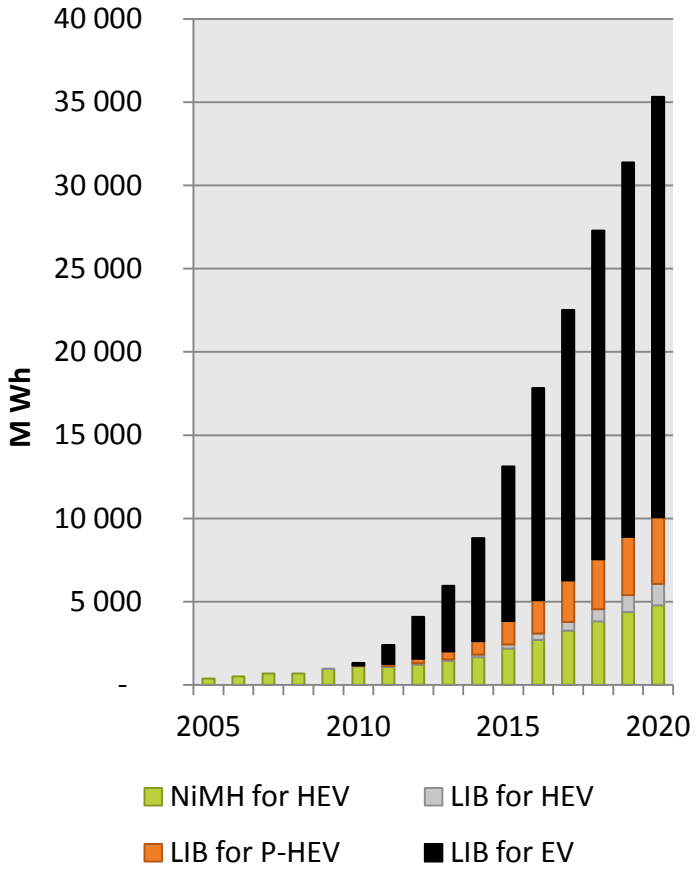
International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

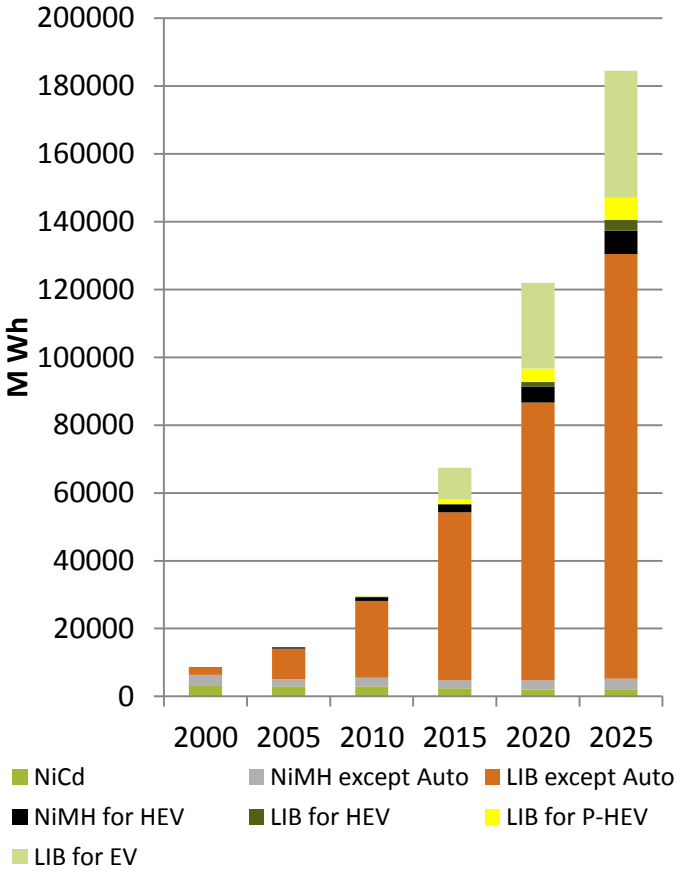
Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

TOTAL BATTERY DEMAND 2011-2020

EV, HEV & P-HEV Battery needs (M Wh) 2005 – 2020



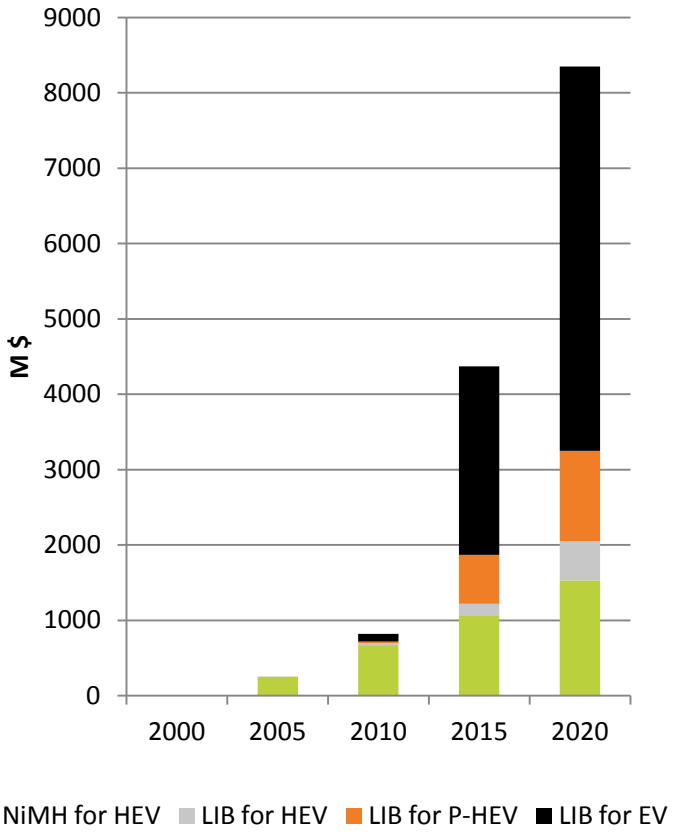
Total battery demand (MWh) 2000 – 2025



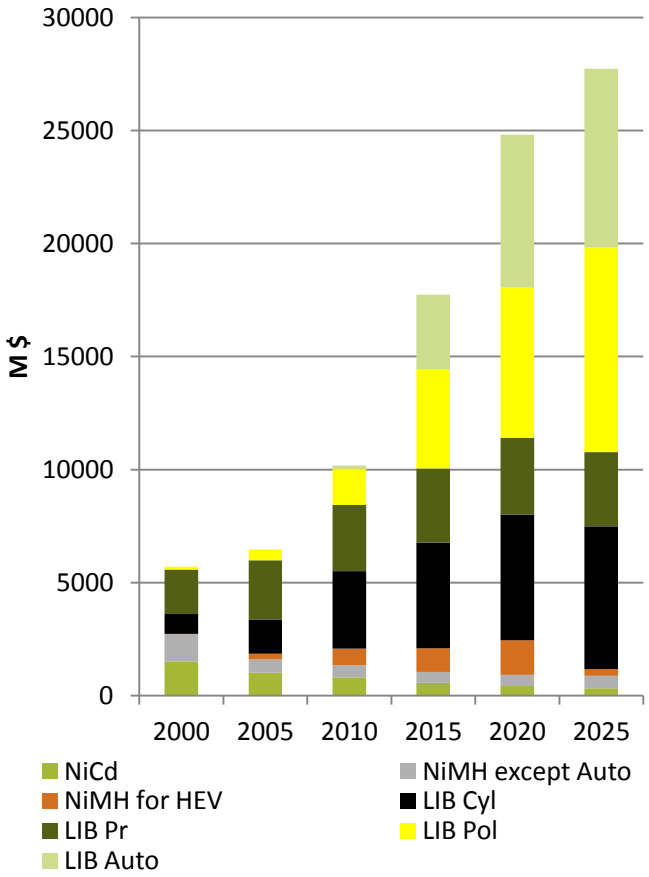
avicenne ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

RECHARGEABLE BATTERY MARKET 2000 – 2025 (CELLS LEVEL)

Rechargeable battery market, M$ for x-EV 2000-2025



Rechargeable battery market, M$, 2000-2025



The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

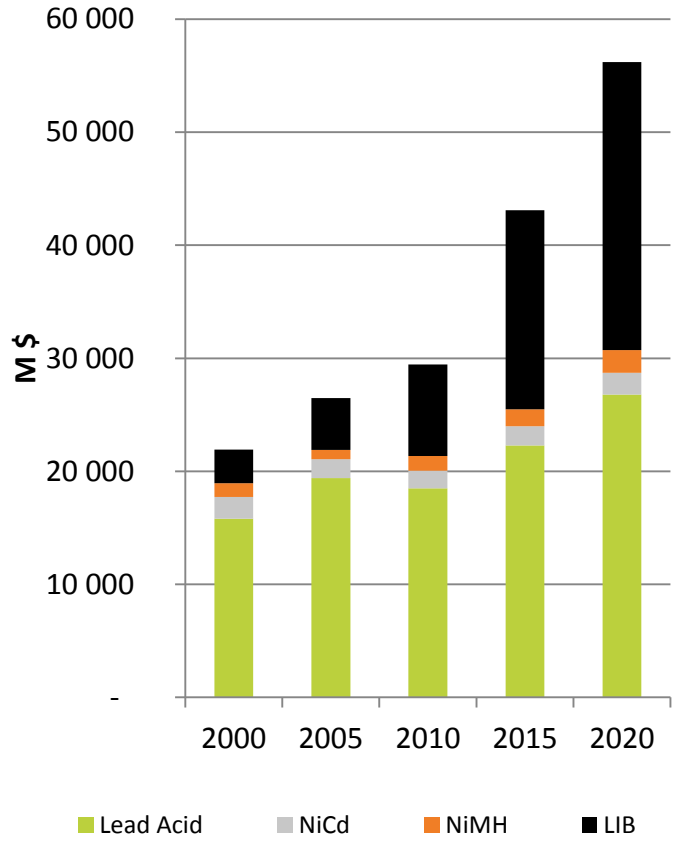
TAKEAWAYS

Battery Market 2010-2020

CAGR = +7%

- Li-ion battery is driven today by Portable PCs & electronic devices
- For automotive, the battery technology is today the NiMH
- LIB begin really to compete in 2012
- P-HEV & EV will be powered by Li-ion: 5 B$ market in 2015 & 9 B$ in 2020
- 1 M EV represent roughly 25 000 MWh, or 60 000 tones of cathode materials!
- EV expectations attract now large Chemical companies
- New materials are needed to meet Automotive standards
- In 2020, Energy storage will represent less than 5% of the total battery market

RECHARGEABLE BATTERY MARKET M US$, Worldwide, 2000-2020 - PACK LEVEL



Note: Excluding Energy Storage batteries

avicenne
ENERGY
INFORMATION FOR GROWTH
www.avicenne.com

The Rechargeable Battery Market and Main Trends 2011-2020

International Congress on Automotive Li Ion Batteries 2012
23 – 25 April 2012

CONTACT

Christophe PILLOT
+ 33 1 47 78 46 00
c.pillot@avicenne.com

THANK YOU

Christophe PILLOT
AVICENNE ENERGY
c.pillot@avicenne.com
Phone: +33 1 47 78 46 00
Mobile: + 33 6 88 82 79 49

avicenne
ENERGY