



avicenne
ENERGY

INFORMATION FOR GROWTH

www.avicenne.com

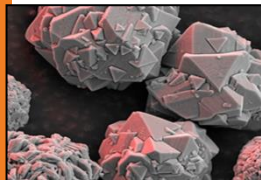
AVICENNE ENERGY

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February 2020

CONTACT

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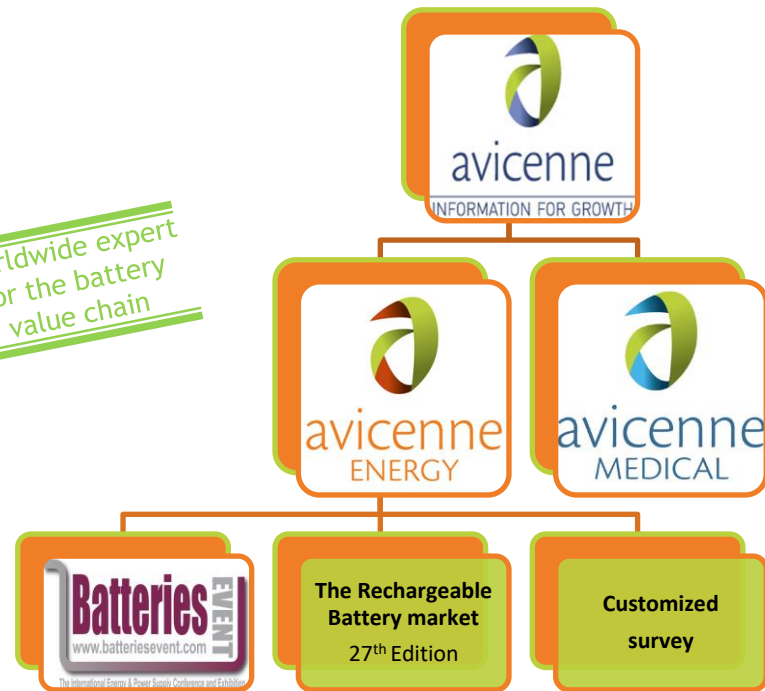


AVICENNE PROFILE

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

- 🕒 Creation: 1992, by Ali MADANI
- 🕒 Headquarter: Paris
- 🕒 Liaison Office: Japan, USA, China
- 🕒 AVICENNE Energy Director: Christophe Pillot
- 🕒 4 consultants
 - 🕒 A Madani
 - 🕒 C Pillot
 - 🕒 JP Salvat
 - 🕒 A Yassari
- 🕒 3 Senior advisors
 - 🕒 M Sanders
 - 🕒 F Renard
 - 🕒 X Zhang
- 🕒 Database: >20 000 contacts in the battery value chain

Worldwide expert for the battery value chain

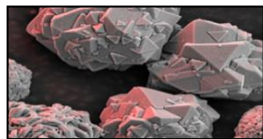


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Creation: 1992, by Ali MADANI



AVICENNE Energy Director
Christophe Pillot



3 Senior Advisors

M Sanders (US Market)



F Renard



X Zhang (Chinese Market)



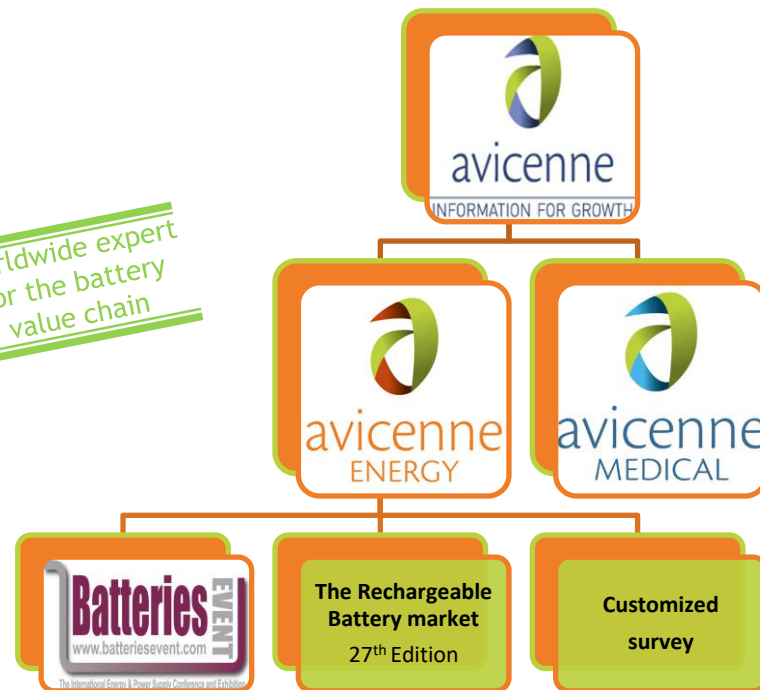
2 Analysts

JP Salvat



A Yassari

Worldwide expert
for the battery
value chain



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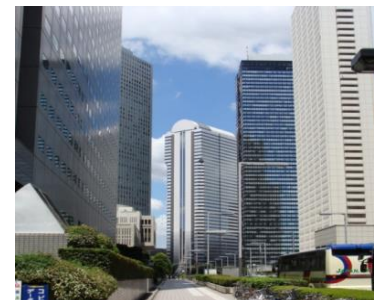
February 2020

CONTACT

Christophe PILLOT
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c.pillot@avicenne.com

OUR BUSINESS STORY

- 1992**
 - AVICENNE Creation
- 1994**
 - AVICENNE advised French Industry Ministry on the European battery business
 - AVICENNE open its office in JAPAN
- 1999**
 - « BATTERIES » congress 1st edition in Paris
- 2003**
 - AVICENNE work on the due diligence process for the sales of SAFT by ALCATEL
- 2008**
 - AVICENNE: expert witness in the NTT-Hydro Quebec conflict
- 2009**
 - AVICENNE presented its market forecasts to industrials in Asia: CIAPS in Beijing – China , Battery Japan in Tokyo
- 2010**
 - Avicenne developed partnership with BATTERY JAPAN
 - 20th Edition of “The rechargeable battery market worldwide 2010-2020
- 2011**
 - AVICENNE Energy division is created
 - 13th Edition of BATTERIES Congress
- 2012**
 - 21st Edition of “The rechargeable battery market worldwide 2011-2025
- 2014**
 - 16th Edition of BATTERIES Congress in NICE, France
 - 1 month mission in China: Qinghai EV Rally, CIBF, 50 companies visited
- 2016**
 - 25th Edition of our Battery Market Survey – May 2016
 - 18th Edition of BATTERIES Congress in NICE, France, Sept 2016
 - European Community Project ALISE: Dissemination & Exploitation Work Package leader
- 2017**
 - 26th Edition of our Battery Market Survey – September 2017
 - 19th Edition of BATTERIES Congress in NICE, France, Oct 2017
- 2020**
 - 28th Edition of our Battery Market Survey – March 2020
 - 22th Edition of BATTERIES Congress in LYON, France, Oct 2020



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OUR METHODOLOGY

Track valuable
Information's



Strategic
Analysis



Presentation of
the results



Q&A with
customers



Customer
Evaluation

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INFORMATION COLLECTION

	Primary Research	Secondary Research
SUPPLY SIDE	<ul style="list-style-type: none"> Executive Interviews (> 20 000 contacts in the battery value chain) Vendor Briefings Product Demos and Tours 	<ul style="list-style-type: none"> Company News & Financials Technology & Product Specs Government Data Economic, Demographic Data
DEMAND SIDE	<ul style="list-style-type: none"> Consumer Surveys Business Leader Surveys 	<ul style="list-style-type: none"> Case Studies Reference Customers

MARKET & STRATEGIC ANALYSIS

Qualitative	Quantitative	Strategic
<ul style="list-style-type: none"> Business Models & Trends Technology Issues Policy & Regulatory Factors Competitive Landscape Profiles of Key Players 	<ul style="list-style-type: none"> Company News & Financials Technology & Product Specs Government Data Economic, Demographic Data 	<ul style="list-style-type: none"> SWOT Analysis Gap Analysis Business Plan Value Proposition Due Diligence Merger & Acquisition

METHODOLOGY: EXTENSIVE FIELD RESEARCH TO RETRIEVE & CROSS CHECK INFORMATION

Top management
contact network
> 19 000 contacts

Conferences &
Exhibitions

BATTERIES
EVENT 2020

aabc

2nd Int'l Rechargeable Battery Expo
BATTERY JAPAN

CIBF

THE BATTERY SHOW

JAPAN ELECTRONICS SHOW

CEVR

CeBIT

32nd ANNUAL INTERNATIONAL BATTERY SEMINAR & EXHIBIT
The Latest Technological Advances in Energy Systems for Consumer, Automotive, Military & Stationary Battery Applications

In Depth analysis
Of applications



Cross Check
Analysis



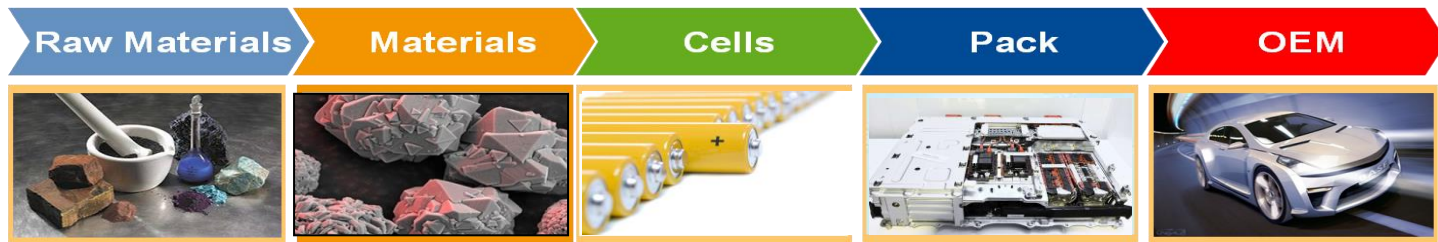
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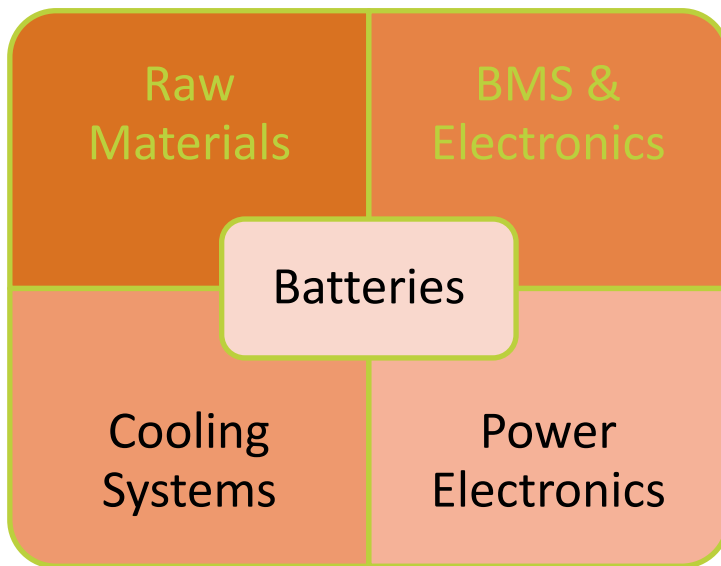
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CUSTOMIZED & MULTICLIENT SURVEY FOR ALL THE VALUE CHAIN



Source : Photo from BASF



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MORE THAN 270 REFERENCES

3M	COMPASS LEXECON	GRAPHIT KROPFMÜHL	MPEG	SEPCELL
A123	CONOCO PHILIPS	GS MELCOTEC	MTI MICRO FUEL CELLS	SFPZ
AHLSTROM	CRU GROUP	HALDOR	MUNSTER UNIVERSITY	SGL CARBON
AIR LIQUIDE	CSC CHALLENGE STRATEGY CHANGE	HALDOR TOPSOE	NANOCYL	SHARK NINJA
AIR PRODUCT	DARTON COMMODITIES	HC STARCK	NCCP – RUSSIA	SHARP
ALABC	DCN	HERAEUS QUARZGLAS	NEC	SHENZHEN HIGH POWER TECHNOLOGY
ALBEMARLE	DELTA	HIGH POWER LITHIUM	NECSA	SILATRONIX
ALCATEL	DERA BGR	HILTI	NILAR AB	SKC
AMAZON	DGA	HITACHI	NISSAN	SOLVAY
ANDREWS KURTH	DIALOG SEMICONDUCTOR	HITACHI MAXELL	NITECH	SONY
APPLE	DOW CHEMICAL	HOLLINGSWORTH & VOSE CIE	NKKPC	SQM
APPLIED MATERIALS	DOW CORNING	HONEYWELL	NORILSK NICKEL	STIBAT
ARC	DRAXLMAIER	HOPSCOTCH	NOVALED	STORA ENSO
ARKEMA	DSM	HUTCHINSON	NTK POWERDEX	STRATEGY ANALYSIS
ARMOR	DUPONT	ICC NEXERGY	OLIVER WYMAN	STORCK
AROS SECURITIES	DURACELL	IER	OMG INC	SUNLIGHT
ASHLAND	DYSON	IGL EXPORT.	ORANGE	SVE – DASSAULT
AT KEARNEY	ECM GREENTECH	INCO	OROCBRE	SWM
ATL AMPEREX	EDF	INNOVIA FILMS	OSKR	TECHNO CORE CO.
AUSTRIAN INSTITUTE OF TECHNOLOGY	ELECTRO ENERGY	INTEK	PANASONIC	TERRAROSSA CAPITAL
AXEON	ELKEM	INTEL	PENOX GROUP	THALES
BABCOCK & WILCOX MEGTEC	ENEL	INTERNATIONAL COMPONENT CORP.	PHILIPS	THREE HILLS CAPITAL PARTNERS
BAIN	ENER 1	INTERNATIONAL RECTIFIER	PHOTON	TIGER GLOBAL
BASF	ENERGIZER	INTERSIL	PK & WISE	TIMCAL
BAŞKENT ELEKTRİK DAĞITIM ANONİM ŞİRKETİ	ENEVATE	ISRAEL CONSULTING	PLEXTRONICS	TODA AMERICA
BATTERY ASSOCIATION OF KOREA	ENTEGRIS	ITRI	POSCO	TODA KOGYO
BAYER	EOLITE	ITS	POWER GENIX	TOSHIBA
BHP BILLITON	EPCOS OHG	JBC	POWER UP	TOTAL
BLACK & DECKER	ERAMET	JETRO	PRAXAIR	TOTAL WIRELESS SOLUTION
BLUE ENERGY	ESI	JOHNSON CONTROLS	PRAYON	TOYO
BOOZ	ETC AB	JOHNSON MATTHEY	PRISMARK	TOYOTA
BOSCH	EUCOBAT	KIMBERLY CLARK	PSA	TREOFAN
BOSE	EURASIAN RESOURCES GROUP	KISTI GII	RAPHIT KROPFMUHL	TYCO
BOSTON CONSULTING GROUP	EUROPEAN COMMUNITY	KNOWLEDGE FOUNDATION	RAYOVAC	UMICORE
BOURNS	EXXONMOBIL	KODAK	RECHARGE	UNIROSS
BRAND LICENCING PARTNERS (BLP)	FACOM	KOSMO MAROC	RENAULT	URALELEMENT
BRGM	FAIRSHILD SEMICONDUCTOR	KRUGER	RHODIA	US NAVY
BRUCKNER	FALCON BRIDGE	LAZARD	RIO TINTO	VARTA
BUHLER	FAMEART	LECLANCHÉ	ROCKWOOD LITHIUM	VOLTA ENERGY TECHNOLOGIES
BYD	FERRARI	LEGRAND	ROGERS CORPORATION	VOLTRACK
CABOT	FISH & RICHARDSON	LEK	ROLAND BERGER	WACKER CHEMIE AG
CALL2RECYCLE	FIST	LG CHEMICAL	ROSKILL INFORMATION SERVICES	WARBURGPINCUS
CAP X	FLORIDIENNE DE CHIMIE	LILIPUCIAN	RSR CORP	WILDCAT
CARBONE LORRAINE	FMC	LION CELLS	RUSNANO	WINSTON & STRAWN
CARLYLE	FORTU POWER CELL	LITTLE FUSE	SABIC	WORLD INDUSTRIAL INFORMATION CENTER
CATELLA	FRANCE TELECOM	LUMINUS	SAES GETTERS	WR GRACE & CIE
CATERPILLAR INC.	FRAUNHOFER IPA	LYNAS CORP	SAFT	XGSCIENCES
CDN COBALT	FRAUNHOFER ISI	MAGNA	SAGENTIA	YASLAMEN
CEA/LITEN	FREUDENBERG VLIESTOFFE SE & CO	MATSUSHITA	SAINT GOBAIN	ZEBRA
CELGARD	FRIWO	MCKINSEY	SAKTI	ZPOWER
CHEMETALL	FULTON INNOVATION	MICROSOFT	SAMSUNG SDI	...
CHEMISHE FABRIK BUDENHEIM	FURUKAWA BATTERY	MINDBRANCH	SANDVIK	
CIAPS CHINA	GAIA	MOLTECH	SANIK	
CIBA	GII - TOKYO ELECTRON LIMITED	MOLYCORP	SCHOTT	
COBAT	GIL IMPORT BATTERIES LTD.	MOMENTIVE	SCHRODER VENTURE	
COGEMA	GM	MOSAID TECHNOLOGIES	SCOTENT ENTREPRISE	
	GOODPOINT FELLOWS	MOTOROLA	SEB	

Not Exhaustive

SPEAKER, CHAIRMAN OR WORKSHOP MODERATOR

Tens of INTERNATIONAL CONFERENCES per year

- ∅ Extended Battery Life Working Group on battery technology development for mobile devices Meeting
Taiwan, Feb 2015, Tokyo Japan , Dec 2014 & Oct Feb 2016– 1h30 Presentation
"The battery market for mobile 2014-2025"
- ∅ BATTERIES 2019, FRANCE – (1999-2019)
Owner, chairman & speaker + 2h Tutorial
"The battery market 2013-2025"
- ∅ ILMB 2016, Chicago
"The Li-ion battery market 2015-2025"
- ∅ INTERNATIONAL Li-ion BATTERY SUMMIT – Dec 2015, 2016, 2019 Shenzhen, China
"The Li-ion battery raw materials market 2012-2020"
- ∅ AABC Europe, AABC US (2012 to 2019)
"The Lithium ion battery market and main trends"
- ∅ THE INTERNATIONAL BATTERY SEMINAR - FLORIDA
Fort Lauderdale, Florida , March 2013, 2014, 2015 , 2016, 2017, 2018, 2019 – 2h tutorial
"HEV, PHEV & EV market 2015-2025; Battery is the key" (From 2004 to 2019)
- ∅ EVER 2009, 2011, MONACO
"Challenges for EV market in Europe"
- ∅ EVS 2011, 2013, 2015
"Battery market for automotive industry"
- ∅ CIAPS (China Industrial Association of Power sources), BEIJING, Dec 2009, 2012, 2014, 2016
"Advanced battery market & raw materials worldwide"
- ∅ Advanced Battery for Vehicles, IQPC, Frankfurt, 2009, 2010, 2012
Chairman & speaker,
"The battery business 2009-2020"
- ∅ EET-2008 European Ele-Drive, MOTOR SHOW GENEVA,
International Advanced Mobility Forum – Geneva Motor Show
(Professor Gaston Maggetto Award: C. Pillot as the best rated paper & presentation by EET-2008 Scientific Reviewing Committee)
"The HEV & EV market trends & main challenges"
- ∅ And many more...



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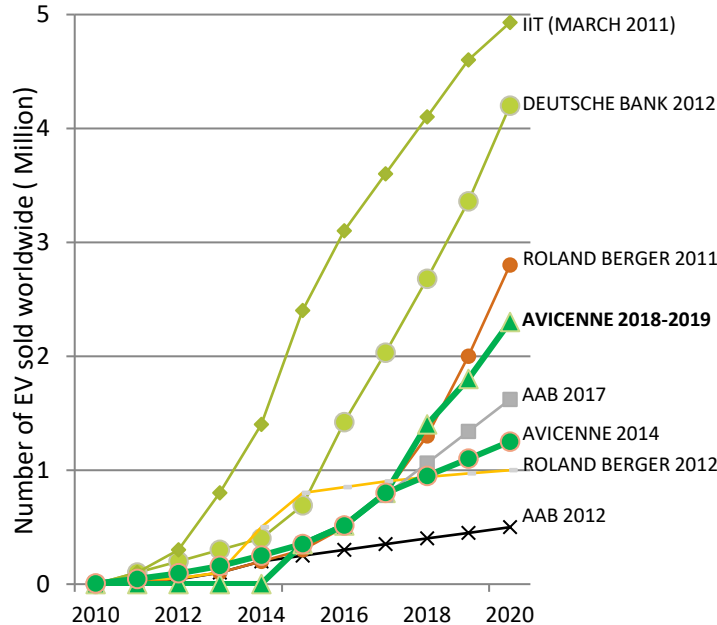
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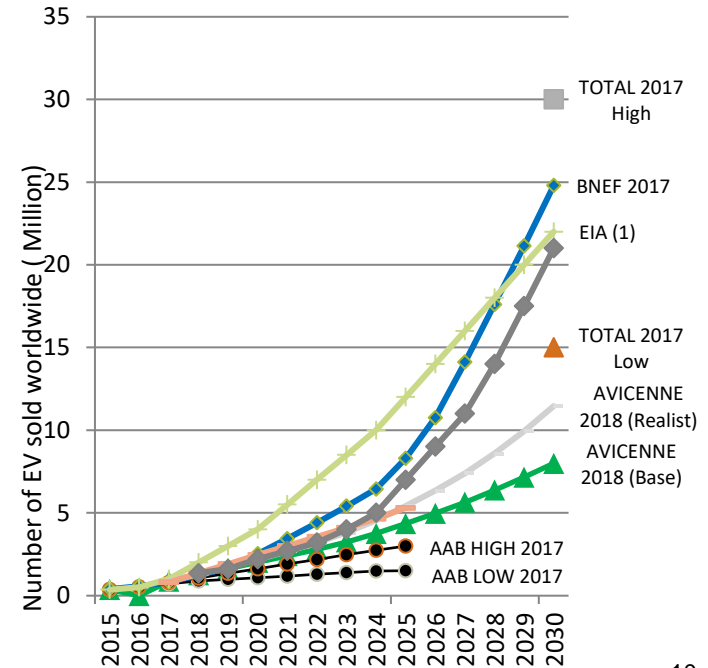
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AVICENNE ENERGY: RENOWNED TO HAVE REALISTIC FORECASTS

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



EV sold, in million units, worldwide, 2015 - 2030



Source : International Battery Conference, Fort Lauderdale 2010-2019

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BATTERIES 2020



www.batteriesevent.com

- 🕒 3 days congress in France (Lyon)
- 🕒 October 7th – 9th, 2020
- 🕒 22nd Edition (first edition in 1999)
- 🕒 500 attendees
- 🕒 40 Booths
Battery makers, raw materials suppliers, IC & BMS suppliers, tests, machining, coating,
- 🕒 80 international experts:
Researchers, industrial process, marketing, financials,

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SUMMARY

- 🕒 A small team dedicated on the battery industry for more than 25 years
- 🕒 Working with large group worldwide: General Motors, Ferrari, Duracell, Energizer, BASF, Dupont, Panasonic, Samsung, LG, Sony, Bosch, Siemens, Toyota, Renault, Eramet, SQM, ...
- 🕒 Synthetic presentation to management & CEO of major groups

*We will help and support
your growth*



THANK YOU



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Mobile: + 33 (0)6 88 82 79 49



AVICENNE Team – Project steering – Project Director

Christophe PILLOT, Partner – AVICENNE ENERGY Director, Battery and xEV expert



Christophe has built up considerable expertise in the area of battery market. He joined AVICENNE 20 years ago and spent 3 years in Japan making analysis on the Electronic, Mobile & Japanese battery market. Christophe gained large experience in marketing, strategy analysis, technology and financial studies for the battery and power management fields. He developed the Battery market analysis for AVICENNE which counts more than 200 customers worldwide. Christophe published several annual surveys like “The rechargeable battery market and trends 2025”. He is also the founder & chairman of Batteries congress in France since 1999. He is now Director at AVICENNE ENERGY.

He has recently lead or participated in missions such as:

- 🔗 Lithium ion battery suppliers' profile
- 🔗 PSA-SAFT project expert analysis
- 🔗 High Si Loading Lithium Ion Battery roadmap
- 🔗 Additive for Lithium ion Electrolyte
- 🔗 Anode market for Li-ion battery market & roadmap
- 🔗 Lithium carbonate & hydroxide market
- 🔗 xEV and E-bus battery market in China
- 🔗 Lithium ion battery Cathode and Anode market and value chain analysis
- 🔗 Lithium ion battery market beyond electronic devices & automotive: industrial batteries (UPS, Telecom, Back-up, Energy Storage systems...)
- 🔗 Analysis of the flow battery suppliers worldwide: large group & start-up analysis
- 🔗 Industrial battery market worldwide 2015-2025
- 🔗 TESLA, BOLLORE analysis: battery choice, battery pack, cost curve, partnership, business model
- 🔗 Lithium iron phosphate cathode market details and forecast – China Focus
- 🔗 Detail profile of anode, cathode, electrolyte and separator makers
- 🔗 Gel and solid electrolyte market and forecasts
- 🔗 Automotive battery market related opportunities
- 🔗 Opportunities in Lithium ion batteries for an US Speciality Chemical company
- 🔗 SWOT analysis of 20 separator makers
- 🔗 Li-ion pack makers market and business plan
- 🔗 Expert Witness in the NTT DoCoMo Vs. Hydro-Quebec IP dispute negotiations
- 🔗 Expert Witness in the UMICORE Vs. BASF IP dispute negotiations
- 🔗 Battery pack analysis – Opportunities to integrate power electronics & chargers in the pack

Christophe is Speaker, chairman or workshop moderator at +20 international conferences worldwide each year (BATTERIES France, IBS Florida, AABC US and Europe, CIBF China, LBIS Shenzhen, BATTERY JAPAN, INTERTEK KOREA,

Globally, he has been involved in more than 300 projects for +200 customers in the Battery Value Chain.

Before joining AVICENNE, Christophe PILLOT held key position in FRANCE TELECOM innovation division.

Degree in Chemistry & MBA in Innovation Management from Paris IX Dauphine.

His mother tongue is French, and he speaks fluent English

AVICENNE Team – Project steering

Ali MADANI, Director- Battery, power electronics,
automotive expert



Ali MADANI is founder and Director of AVICENNE.

He will bring a strategic vision to the project. He will discuss the project with the team and ask strategic questions during the project to bring an “out of the box” vision and perspective.

He has recently led missions such as:

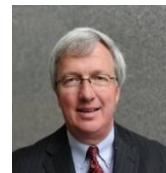
- 🔗 Due diligence for a key battery player
- 🔗 Lithium carbonate & hydroxide market, 2015-2018
- 🔗 Development of AVICENNE Automotive market studies
- 🔗 Lithium ion battery market beyond electronic devices & automotive: industrial batteries (UPS, Telecom, Back-up, Energy Storage systems...),
- 🔗 Participation to the recent AVICENNE study: The rechargeable battery market
- 🔗 Li-ion pack makers market and business plan
- 🔗 Battery pack analysis – Opportunities to integrate power electronics & chargers in the pack
- 🔗 Battery market analysis for Automotive applications
- 🔗 ...

Before creating AVICENNE, Ali MADANI held key position at DL See Consultants in Paris.

Degree from École Normale Supérieure de Cachan, MBA in Innovation Management from Paris IX Dauphine University. 20 years Experience in conducting, strategic and financial studies, technology watch projects for large corporations and small companies.

He is fluent in French and English.

AVICENNE Team – Senior Advisor Michael Sanders, Battery and Automotive expert



Mike is our US expert in Batteries and Materials. He is working at Sanders Group Enterprises, AVICENNE US Agent. He is responsible for proprietary projects supporting customers growth efforts, completing the interviews, writing the reports and mainly solicited for his knowledge on the US market.

He has recently participated in missions such as:

- 🔗 Battery Show Market Presentation
- 🔗 Strategy Workshop for potential entrance into Lithium Ion Battery materials
- 🔗 Market connections and validation of opportunities in Lithium ion batteries for a US Speciality Chemical company
- 🔗 LIB Cathode, anode analysis
- 🔗 High Si Loading Lithium Ion Battery roadmap
- 🔗 Anode market for Li-ion battery market & roadmap
- 🔗 Business development for new clients based on his network

Before forming the Sanders Group and becoming an agent for Avicenne, he had a long career with DuPont in multiple roles. Mike has significant energy storage materials value chain understanding with an emphasis on lithium ion batteries and systems with 10 years of market knowledge and relationships. Successful program leadership experience with significant business growth in ventures and existing businesses with a proven track record leading mergers and acquisition team to enter the lithium ion battery materials market. Most recent role with DuPont was the Global Marketing Director – Energy Storage Venture where he developed significant understanding and insights for the energy storage materials market, device manufacturing and systems while leading global marketing and customer interface efforts to establish programs to enter the \$20B energy storage materials market. Executed strategic and market planning for opportunity evaluation, research, and choices for entry into rapidly growing new market.

EDUCATION

Bachelor - Chemistry, University of Delaware, Newark, Delaware

AFFILIATIONS

Society of Automobile Engineers, Electrochemical Society

AVICENNE Team – Senior Advisor Fabrice Renard, Battery and Advanced materials expert



With more than 25 years of experience in business consultancy and management of chemical and advanced materials business in Belgium, Morocco and China, Fabrice gained strong experience on strategy, M&A, manufacturing, marketing, finance and innovation on high growth new technology business. He joined AVICENNE in 2020.

He is responsible for proprietary projects supporting customers growth efforts, completing the interviews, writing the reports and mainly solicited for his knowledge on economical and industrialization of existing and future materials alongside the battery value chain.

Prior AVICENNE, Fabrice was Chief Innovation Officer of the Prayon group. Over 10 years, he was in charge of the global R&D and Innovation strategy based on sustainable major trends and declined on nutrition, water, precision farming, rare elements recovery and energy. He led various up and downstream complex high-level international negotiations and partnerships including business or technology acquisitions. One of his core focus was the development of cathode materials. In this field, he earned a strong expertise on the battery value chain and served as COO of Belife, a joint venture with Umicore and as a Director of Prayon Pulead Technology, a Chinese-based LFP manufacturer.

Additionally, Fabrice holds different positions in Belgium and Morocco for Eklo, a consulting firm for emerging new business as managing director, for IDCampus, a creative lab as CEO and for Prayon as financial controller, marketing and business development manager, process and plant manager.

He holds a Master in Chemical Engineering, a Postgraduate Diploma in Business Administration, an Executive Degree in Tax Law and an Executive Master in Management.

His mother tongue is French and he is fluent in English.

AVICENNE Team – Senior Advisor

Xiaoyu Zhang, Battery expert



Xiaoyu is our Chinese expert in Batteries. He is working at REAL LI, AVICENNE Chinese Partner. He is responsible for completing the interviews, writing the reports and mainly solicited for his knowledge on the Chinese market.

He has recently participated in missions such as:

- 🔗 Lithium carbonate & hydroxide market,
- 🔗 Lithium ion battery market beyond electronic devices & automotive: industrial batteries (UPS, Telecom, Back-up, Energy Storage systems...),
- 🔗 Opportunities in Lithium ion batteries for a US Speciality Chemical company
- 🔗 The Chinese raw materials market for Rechargeable batteries
- 🔗 xEV market & developments in China
- 🔗 LIB Cathode, anode, electrolyte & separator cost analysis
- 🔗 The rechargeable battery market
- 🔗 Partner research in China for European Companies involved in the Battery Industry

Before joining REAL LI, he held technical position in SAINT GOBAIN R&D Quality Division. PhD in Electrochemistry in Beijing University. PhD in Material Science Université Pierre et Marie Curie, Paris, France. His mother tongue is Chinese, and he speaks fluent English and French.

AVICENNE Team – Consultant Jean Philippe SALVAT, Battery expert



Jean Philippe is our expert in the field of electrochemistry. He is responsible for completing the interviews, writing the reports and mainly solicited for his technical input. He joined AVICENNE 20 years ago.

He has recently participated in missions such as:

- 🔗 Lithium carbonate & hydroxide market
- 🔗 xEV and E-bus battery market in China
- 🔗 Lithium ion battery Cathode market and value chain analysis
- 🔗 The rechargeable battery market
- 🔗 Lithium ion battery market beyond electronic devices & automotive: industrial batteries (UPS, Telecom, Back-up, Energy Storage systems...),
- 🔗 Opportunities in Lithium ion batteries for a US Speciality Chemical company
- 🔗 LIB Cathode, anode, electrolyte & separator cost analysis
- 🔗 SWOT analysis of 20 separator makers
- 🔗 Li-ion pack security needs: PPTC
- 🔗 Li-ion pack makers market and business plan
- 🔗 Battery pack analysis – Opportunities to integrate power electronics & chargers in the pack

Before joining AVICENNE, Jean Philippe held Analyst position in DL See Consultant (3 Years) and Research Center Pont à Mousson SAINT GOBAIN (2 Years)

Degree in Material Science.

His mother tongue is French, and he speaks fluent English.