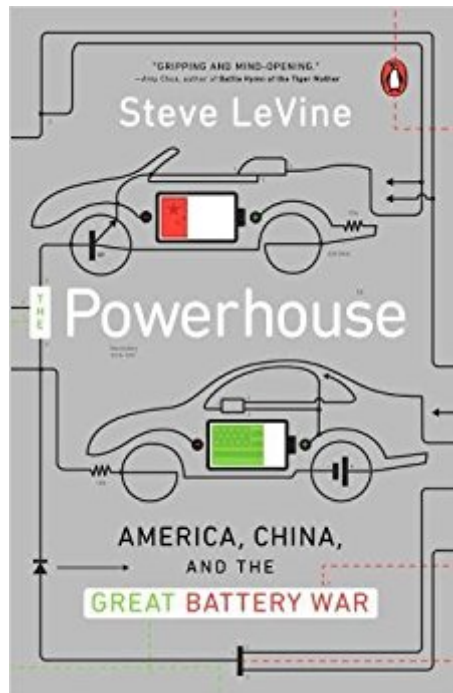




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# The Powerhouse: America, China, And The Great Battery War



## Synopsis

A Soul of a New Machine – A gripping account of invention, commerce, and duplicity in the age of technology – A worldwide race is on to perfect the next engine of economic growth, the advanced lithium-ion battery. It will power the electric car, relieve global warming, and catapult the winner into a new era of economic and political mastery. Can the United States win? – Steve Levine was granted unprecedented access to a secure federal laboratory outside Chicago, where a group of geniuses is trying to solve this next monumental task of physics and engineering. But these scientists – almost all foreign born – are not alone. With so much at stake, researchers in Japan, South Korea, and China are in the same pursuit. The drama intensifies when a Silicon Valley start-up licenses the federal laboratory’s signature invention with the aim of a blockbuster sale to the world’s biggest carmakers. The Powerhouse – is a real-time, two-year account of big invention, big commercialization, and big deception. It exposes the layers of aspiration and disappointment, competition and ambition behind this great turning point in the history of technology.

## Book Information

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## Customer Reviews

“Mr. Levine provides a fascinating insight into the challenges of scientific advancement, especially the difficulty of translating victories in the lab to the demands of the mass market.... Mr. Levine has written something like a thriller.... An important story with world-wide implications.” –Wall Street Journal – “A propulsive

techno-saga. *Nature* "Captivating.... A rollicking good tale." *Joe Nocera, New York Times* "With the pace... of a thriller, [LeVine]... reveals how the very human foibles of scientists and entrepreneurs, as well as fundamental physics and chemistry, stand in the way of such efforts, which, if successful, could result in a new global industry and attendant jobs." *Scientific American* "LeVine [has] a penchant for dissecting the science side of the energy industry." *Andrew C. Revkin, New York Times* "Dot Earth Blog" "Powerhouse" shows readers how a scientific insight can work its way slowly into the marketplace, to the point where it becomes ubiquitous. The book is also packed with the kind of strange, unexpected history that makes good science writing so memorable. *San Francisco Chronicle* "LeVine, who spent two years inside Argonne's battery-research unit, captures the sense of growing urgency and competitive drive among [a] sheltered and sometimes bickering group of tinkerers.... LeVine also provides the authoritative take on the rise and fall—and perhaps the coming resurrection—of Envia, which has licensed Argonne's battery technology in pursuit of its big but not-fully-baked ambitions." *Washington Post* "Journalist LeVine (*The Oil and the Glory*) offers an inside look at the race among industrialized nations to develop a world-changing battery technology. The story's intensity is bolstered by the high stakes." But LeVine wisely stays focused on the competition as it unfolds, luring readers into the drama with clear explanations of the American players involved in both the public and private sectors. *Publishers Weekly* "LeVine is a masterful story teller and *Powerhouse* is a thrilling read about an innovator's quest to transform our planet and our lives. His goal, a revolutionary battery, has the potential to change everything." *Peter H. Diamandis, chairman of the X-Prize Foundation and author of Abundance: The Future is Better Than You Think* "Steve LeVine has written a fast-paced, engaging account of one of this young century's great quests: the search for a technology that will unleash a dramatic transformation of the world with blockbuster new industries and culture-changing products. It's an amazing story, gripping in its surprising narrative and crowded with fascinating characters." *Marcus Brauchli, former Executive Editor, The Washington Post, and former Managing Editor, The Wall Street Journal* "Gripping and mind-opening. Filled with astonishing research, *The Powerhouse* reads like a thriller. It's fabulous." *Amy Chua, Yale Law professor and author of Battle Hymn of the Tiger Mother and The Triple Package* From the Hardcover edition.

Steve LeVine is the Washington correspondent for Quartz, where he writes about the geopolitics of energy and technology. He is a Future Tense fellow at the New America Foundation and teaches energy security at Georgetown University's School of Foreign Service, where he is an adjunct professor. He is the author of *The Oil and the Glory* and *Putin's Labyrinth*.

Spoiler alert! This book would have been better if it were about half as long. I only made it through about 70% before I gave up. Instead I looked up Mr. LeVine's article on Quartz about the collapse of Envia. That article was a good read, but here he tried to wrap the Envia story up with the details of battery research at Argonne and make it into a fairly long book. It loses focus as it delves into needless detail on the interactions of a couple dozen major and minor players. I started to lose track of all the postdocs and bit players who pop in and out of the story. About 20% of the book is just about the process of writing a grant proposal, which is drudgery to do and not much fun to read about. This should be a good story. There is deception and institutional disfunction, politics and backstabbing. However, the author is too coy while building up to the big reveal about Envia. For the part of the book that I read, everything Envia claimed is presented with complete credulity. Ultimately, the suspense is lost. I think a lot of people who read a book about car batteries will already know the Envia story, and the way it is presented here gives no additional insight into what happened there. As for Argonne - I think we are supposed to be rooting for them, but what comes through between the lines makes the institution seem like its own worst enemy. Mr LeVine's presentation of the material is dry and fact oriented. Maybe that's inevitable, given the subject matter: a large government laboratory. It was about as exciting as reading a book about the inner workings of the post office. Finally, there is the science aspect. I'm a physicist, but I don't know anything about battery science in particular. To me, the scientific explanations read like an author who doesn't understand the science trying to paraphrase people who do. He gets all the important details in accurately, but there was not a lot of scientific insight. This disappointed me, as I originally hoped this would be a light science book about battery technology. But again, the book was more about politics than science.

Interesting story of the history of lithium ion batteries, but not so much from a scientific standpoint, rather from a business perspective. Nice history. I felt the history provided was incomplete. Levine only spends a page or so on Elon Musk, CEO of Tesla Motors, and builder of the huge lithium battery factory in Reno, NV. A frustrating omission. Also, he did not mention at all the lithium ion

battery fires in the Boeing 787's. A huge omission, in my view. This book was copy written in Feb, 2015, so there should have been more. Also, I would have appreciated more technical detail, a bit more of the physical chemistry, or whatever, so as to understand what to me is a black box. (I had the kindle version) - I was frustrated by lack of some sort of pictorial representation of the cathode lattice microstructure the Levine spent to much time writing about. I did come to appreciate that lithium ion "battery" resembles a capacitor: they move ions from anode to cathode, without any chemical change - unlike a lead acid battery that involves actual chemical reactions. No wonder lithium ion batteries are so good at brief, large amperage discharges (like starting a car engine), but less good at deep storage capacity (like actually powering a car over about 40 miles). I also feel Levine did a good job describing why government subsidies are important for development of battery technology, and of reasons why development has gone so slowly to date. I do very much agree with the main premise of the book: battery technology is and will be very important for the future of our technical civilization. In that regard, the book is worth reading.

It is a good book, well written and thoroughly researched. It describes in great detail the efforts from 2008 to 2014 to find a viable energy storage solution for electric vehicles, mainly centered around US DOE Argonne National Lab. It focuses almost solely on the efforts within Argonne and Envia; and leaves out discussing countless other efforts around the world. The value of the book is in depicting the numerous forces at play within the large US government labs, the maze of subsidies and hype that supports them, and the complex licensing arrangements and public-private partnerships that became so popular during the financial crisis. It is particularly interesting for entrepreneurs sitting outside those heavily subsidized and centrally orchestrated efforts. The end of the book leaves you feeling unconvinced of the government sponsored leadership pursuing emerging technologies. It almost confirms that those efforts are better left to the markets and entrepreneurs; government intervention seems to pile up risk averse behaviours, consolidate bureaucracies and create unreliable business outcomes. The books also describes sources of compensation for employees of labs that seem excessive in light that those scientists should be regarded more as public servants than bona-fide entrepreneurs, no matter how much their efforts are incentivized through royalty sharing agreements. A good well written book.

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