THE EFFICIENT FIFTY
THE LEADING PRIVATE COMPANIES IN INDUSTRIAL AND ENERGY TECHNOLOGY

Joseph A. Osha, CFA
josh@jmpsecurities.com
415.835.8998

Hilary Cauley, CFA
hcauley@jmpsecurities.com
415.835.8996

Copyright: Shutterstock/Immersion Imagery
# TABLE OF CONTENTS

How to Invest in Making Things Work Better – This Year’s Efficient Fifty ................................................................. 3  
Advanced Microgrid Solutions .............................................................................................................................................. 9  
Apeel Sciences ........................................................................................................................................................................ 10  
AutoGrid .................................................................................................................................................................................. 11  
Ayla Networks ........................................................................................................................................................................ 12  
Bidgely .................................................................................................................................................................................... 13  
Blue Pillar ............................................................................................................................................................................... 14  
BreezoMeter ........................................................................................................................................................................... 15  
ChargePoint .............................................................................................................................................................................. 16  
Cleest Solutions Inc .............................................................................................................................................................. 17  
ecobee .................................................................................................................................................................................... 18  
Electric Imp ............................................................................................................................................................................. 19  
Element Analytics ................................................................................................................................................................. 20  
Enbala ...................................................................................................................................................................................... 21  
Encycle .................................................................................................................................................................................. 22  
EnergySage ............................................................................................................................................................................... 23  
EnergySavvy ............................................................................................................................................................................. 24  
Eos Energy Storage ............................................................................................................................................................... 25  
Falkonry ................................................................................................................................................................................... 26  
Farmers Business Network .................................................................................................................................................... 27  
FirstFuel Software ................................................................................................................................................................. 28  
Geli ......................................................................................................................................................................................... 29  
GlassPoint Solar ....................................................................................................................................................................... 30  
Greenwave Systems .............................................................................................................................................................. 31  
INRIX ......................................................................................................................................................................................... 32  
K2 Energy .................................................................................................................................................................................. 33  
Kespry ......................................................................................................................................................................................... 34  
NantEnergy ............................................................................................................................................................................... 35  
Optimum Energy ................................................................................................................................................................. 36  
OSIssoft ......................................................................................................................................................................................... 37  
Peloton Technology ................................................................................................................................................................. 38  
Planet ......................................................................................................................................................................................... 39  
PrecisionHawk .......................................................................................................................................................................... 40  
Proterra ................................................................................................................................................................................... 41  
Seeq ......................................................................................................................................................................................... 42  
Sentient Energy ................................................................................................................................................................. 43  
sonnen ..................................................................................................................................................................................... 44  
SparkCognition ................................................................................................................................................................. 45  
Spirae ....................................................................................................................................................................................... 46
Stem .................................................................................................................................................................................................. 47
Tendril .................................................................................................................................................................................................. 48
Thor Trucks .................................................................................................................................................................................................. 49
T-REX .................................................................................................................................................................................................. 50
Trilliant .................................................................................................................................................................................................. 51
Velodyn LiDAR .................................................................................................................................................................................................. 52
View .................................................................................................................................................................................................. 53
Vigilent .................................................................................................................................................................................................. 54
Vivint Smart Home .................................................................................................................................................................................................. 55
ZPower .................................................................................................................................................................................................. 56
ZincFive .................................................................................................................................................................................................. 57
ZOLA Electric .................................................................................................................................................................................................. 58
Analyst Biography .................................................................................................................................................................................................. 59
Some things change, and some things stay the same. A year ago, in the inaugural edition of the Efficient Fifty, we pointed out that the importance of making processes work more efficiently has been around at least since the construction of the pyramids at Giza. It was true then and it is still true now. Enthusiasm around what is often (and inaccurately, in our opinion) called cleantech will ebb and flow, but the basic idea of using resources more sparingly and making things work better will continue to be important. This is the single, big idea that underpins our coverage of companies in industrial and energy technology.

The big idea may be obvious, but the path to the right investments may not be. The need to reduce carbon emissions associated with power generation did not save investors from the brutal series of booms and busts in solar and wind power generation equipment. Tesla notwithstanding, many early-stage EV ventures have not fared well, as investors in Fisker and Smith know all too well. Smart power grids need storage, but lithium-ion cell manufacturing is commoditizing quickly, and the demonstrable need for long-duration storage was not enough to save investors in Aquion, Imergy, or Alevo. The pace of change in the efficiency business is bewildering, and it is made more so by the web of public subsidies and incentives that can change quickly and unpredictably.

With that in mind, it is interesting to look at how our selections for this year’s Efficient Fifty have evolved. A look at Figure 1 makes a couple of points apparent. First, the number of companies in our Industrial Applications sector has grown, and now comprises thirteen of the total fifty. That number would be even higher had we not chosen to move the three drone and imaging companies to our expanded Logistics, Transport, and Mapping sector. We expect the industrial part of our world to continue to be a big piece of our total coverage. In transportation, we have tried to be judicious – we could fill an entire book with just EV and battery startups, but failure rates in the vehicle space have been high. Our selections – Thor and Proterra in commercial vehicles, ChargePoint in charging infrastructure, Peloton Technologies in vehicle platooning, Kespry in drone and precision mapping technology – represent differentiated businesses that are best-of-breed, in our opinion.

Some of the earliest efforts to drive efficiency were focused on managing power transmission and distribution. Here, we will say that our Power and Grid Infrastructure sector seems to have entered a period of consolidation as competitors grapple with the slow pace of change in utilities and tough prices in both power generation equipment and storage. We have consolidated the group as well, as the barriers between storage, grid services, analytics, and pure software companies blur. The result is what we believe are the 16 best-in-class companies highlighted in Figure 1, including T-Rex’s platform for analyzing investments in renewable energy assets, Stem and AMS’ industry-leading storage service offerings, and Sentient Energy’s rapidly growing network of power line sensors.
We have also made an effort to better define the line between working directly with utilities or industrial enterprises, as opposed to helping to engage their customers. The challenges around helping customers understand their options and make the right choices cut across multiple end markets, and we have been careful to create our Customer Tools and Engagement sector around that concept, as opposed to the more common notion of focusing on consumer experience. Vivint Smart Home may have started life as a security company, but it is now much more than that, and we think of Vivint as a systems integrator that offers customers a better answer to the patchwork of DIY hardware-based offerings. Energysage has taken on the complex process of comparing different residential solar hardware and financing products, putting everything together on a single shopping platform. FirstFuel helps utilities drive better engagement with their business customers, while EnergySavvy is more consumer-focused. Our Customer Tools and Engagement sector debuts this year with ten companies.

Finally, we have inaugurated a Food, Agriculture, and Resources sector this year, highlighting a total of two companies. To be clear, we are steering away from trying to analyze the very large crop science and agriculture industry. Rather, we are interested in enterprises that address efficiency concerns within agriculture and food distribution. In Apeel Sciences’ case, this comes as technology that wraps fruits and vegetables with an extra organic layer of protection and reduces the enormous amount of produce lost to spoilage while being transported. Farmers Business Network is an information and pricing platform that allows farmers to make better decisions by aggregating and sharing seed, fertility, and soil information.

The fifty companies profiled in this book have raised a total of $5.76 billion since the beginning of 2010, with that number heavily skewed toward the past few years. Indeed, we note the YTD 2018 outcome of $1.8 billion is up 70% from last year’s total. To be fair, the growth results from a couple of very large transactions, but it is also true that the number of transactions continues to grow as well. Transportation and storage dominate, with Proterra, ChargePoint, AMS, and Stem taking four of the top five slots. View is in a class by itself with $1.7 billion raised to date. The list becomes more eclectic after that with Farmers Business Network, Planet, and sonnen.

This year’s Efficient Fifty has skewed more to larger companies, with nine of the fifty at $100 million or more in annual revenue, and another two at $75 million or more. This compares to a total of six companies in last year’s lineup that were at $75 million or more. The shift to larger companies represents a deliberate effort on our part to identify enterprises that can be successful in an increasingly consolidating environment.

The leading investors show some commonality with last year. Four of the top six firms in this year’s lineup – GE Capital, Energy Impact Partners, EnerTech Capital, and Kleiner Perkins – were in the top six last year. E.ON moves into the top six with some new additions. The most notable shift is additions by DBL Partners with a total of six companies, double last year’s number. This year’s search process turned up a number of interesting enterprises, with DBL funding Apeel Sciences, for example, that were not in last year’s lineup.

On the following pages are profiles of each of our Efficient Fifty companies. We hope you enjoy the second edition of the Efficient Fifty, and we welcome any questions or feedback. Feel free to contact us, or to request copies of the 2018 Efficient Fifty, at josha@jmpsecurities.com.
FIGURE 1. The Efficient Fifty - Top Private Companies in Industrial and Energy Technology

Source: JMP Securities LLC, Company logos
FIGURE 2. Private Funds Raised by The Efficient Fifty ($m)

Source: JMP Securities LLC, Company disclosures

FIGURE 3. Largest Amounts Raised to Date in The Efficient Fifty ($m)

Source: JMP Securities LLC, Company disclosures

CY2018 ends up handily beating the 2017 record.

Transport and storage dominate, although View’s electric glass technology is in a class of its own.
A mix of sizes, although the nine $100M+ companies are more numerous than last year.

Private-sector funding has been skewed toward transportation.

Source: JMP Securities LLC, Company disclosures
There are a total of 12 investors that show up with three or more companies in the Efficient Fifty, and six of those lead the pack.

Source: JMP Securities LLC, Company disclosures
Advanced Microgrid Solutions

Management
Susan Kennedy (Founder, CEO)
Mark Tholke (Chief Development Officer)
Carlo Woods (CFO)
Manal Yamout (SVP of Policy & Markets)
Jesse Bryson (SVP of Market Development)
Seyed Madaeni (SVP of Electricity Markets Trading)

Location
San Francisco, California

Founded
2012

Revenues
[not disclosed]

Employees
80

Funding Rounds
July 2017 - $34M Series B
July 2016 - $200M Project Financing
July 2015 - $18M Series A

Board Members and Advisors
Susan Kennedy
Nancy Pfund
Michael Donnelly
Toby Corey
Kelly Warner

Key Investors
Southern Company
Macquarie Capital
ENGIE
AGL Energy
Energy Impact Partners
GE Ventures
DBL Partners

Company Description
Advanced Microgrid Solutions (AMS) was formed by a team of energy industry veterans with experience in every aspect of the energy industry, from regulation and finance to technology and analytics. AMS is a SaaS company with a software platform that uses deep learning algorithms to optimize and transact complex energy assets in wholesale markets. AMS’s industry-leading Transactive Energy Management software platform provides its partners with innovative economic optimization services to end-use customers, utilities, asset owners, energy developers, and grid operators.

AMS provides services for developers and owners of behind-the-meter distributed energy resources, front-of-the-meter energy assets, and full portfolios of energy resources. The AMS platform enhances financial returns on all energy asset types by co-optimizing amongst all available value streams, including end-use customer energy bill savings, grid and utility services, and wholesale market participation.

Source: Company discussions
Apeel Sciences

Management
James Rogers (Founder, CEO)
Bill Strong (VP of Finance)

Location
Goleta, California

Founded
2012

Revenues
[not disclosed]

Employees
100

Funding Rounds
Series A - $5.8M
Series B - $33M
Series C - $70M

Board Members and Advisors
Vijay Pande
Walter Robb
Brian Kaufmann
Yves Sisteron

Key Investors
Andreessen Horowitz
Viking Global Investors
Upfront Ventures

Company Description
Apeel Sciences is a company that is fighting the global food waste crisis by utilizing nature’s tools to prevent waste in the first place — a sustainable approach to the world’s growing food demands. The company’s plant-derived technology helps USDA Organic Certified and conventional fresh food growers, suppliers, and retailers improve produce quality and extend shelf life, which minimizes food waste from the farm to the retail shelf to the kitchen table. Apeel formulations have been proven effective at reducing the rate of spoilage for dozens of USDA Organic Certified and conventional produce categories, and the company works with partners ranging from smallholder farmers and local organic growers to the world’s largest food brands and retailers.

Founded by CEO James Rogers, PhD, Apeel Sciences investors include Andreessen Horowitz, Viking Global Investors, Upfront Ventures, S2G Ventures, Powerplant Ventures, DBL Partners, The Bill & Melinda Gates Foundation, UK Department for International Development, and The Rockefeller Foundation.

Source: Company discussions
AutoGrid

**Management**
Amit Narayan (CEO)
Christopher Sternberg (President & COO)
Quique Schwarz (Chief Data Scientist)
Rajeev Singh (VP of Engineering/Chief Software Architect)

**Location**
Redwood City, California

**Founded**
2011

**Revenues**
$10m - $20m

**Employees**
105

**Funding Rounds**
- Sept. 2018 - $32M
- Oct. 2012 - $9M
- May 2016 - $20M
- May 2012 - $2.8M
- Jan. 2014 - $12.8M

**Key Investors**
- Energy Impact Partners
- Envision Ventures
- E.ON
- ClearSky Power & Technology
- Foundation Capital
- Stanford University
- CLP
- innogy
- Tenaska
- National Grid Ventures
- Orsted
- Total SA

**Board Members and Advisors**
- Dan Ahn
- Michael Donnelly
- James Huff
- Amit Narayanan
- Konrad Augustin
- Steve Vassallo

**Company Description**
AutoGrid’s distributed energy resource (DER) flexibility management software allows utilities, electricity retailers, energy service providers, and owners of large asset portfolios to deliver clean, affordable, and reliable energy. The company’s patented predictive controls technology leverages advanced data science, machine learning, and high-performance computing to predict, control, and optimize all DERs at scale and in real time. AutoGrid has nearly 5,000 megawatts of flexible capacity from distributed generation, storage, and demand response resources under contract. Its solutions help more than 30-35 global energy companies, such as National Grid, Florida Power & Light, Eneco, CPS Energy, and NextEra Energy to balance supply and demand, increase grid reliability, integrate renewables, and deliver value-added services to customers in regulated and deregulated markets worldwide. AutoGrid is one of the larger providers of DER flexibility management software in the industry.

Source: Company discussions

**Flexibility management supports new utility business models**

- **Value Streams**
  - Wholesale Markets
  - Transmission & Distribution
  - Customer-Sided

- **Energy Assets**
  - Solar DG
  - Battery Storage
  - Combined Heat & Power Plants
  - Electric Vehicles
  - Thermostats, Water Heaters
  - HVAC, Lighting

- **Resource Flexibility**

- **Flexibility Management**

- **$\$**
Ayla Networks

Management
Jonathan Cobb (CEO)
David Friedman (Co-Founder, Chairman, CSO)
Phillip Chang (Co-Founder, GM Asia-Pacific)
David Adams (CFO)
Prashanth Shetty (CMO)
Sahir Sait (VP of Products)
Bill Podrasky (Head of BD)
Ashish Agrawal (SVP of Engineering)

Location
Santa Clara, California

Founded
2010

Revenues
 <$50m

Employees
160

Funding Rounds
Series D - $60M
Series C - $39M
Series B - $14.5M
Series A - $5.4M

Board Members and Advisors
[not disclosed]

Key Investors
International Finance Corporation
Linear Venture
Cisco
Voyager Capital
Ants Capital
SAIF Partners
SJV Ventures
Crosslink Capital
Run Liang Tai Fund (RLT)
Sunsea Telecommunications Co. Ltd

Company Description
Ayla Networks is the world's leading platform for product manufacturers, service providers, and enterprise companies to connect any device to any application on any cloud. Ayla's pure-play IoT platform runs across devices, the cloud, and applications to provide secure connectivity, data analytics, and feature-rich user experiences for our customers as well as the end consumer.

Offered as a managed cloud Platform-as-a-Service (PaaS), Ayla's platform currently serves over 120 enterprises. Ayla is an expert in building enterprise-class, cloud-based software for the Internet of Things, enabling some of the largest companies in the world to turn everyday home controls and appliances, commercial, and industrial devices into intelligent systems that are managed by the cloud and accessible anywhere by great mobile and web applications.

Source: Company discussions
**Bidgely**

**Management**  
Abhay Gupta (Co-Founder & CEO)  
Vivek Garud (Co-Founder & CTO)

**Location**  
Mountain View, California

**Founded**  
2011

**Revenues**  
[not disclosed]

**Employees**  
130

**Funding Rounds**
- Jan. 2018 - $27M
- Nov. 2015 - $16.6M
- July 2013 - $5M
- Oct. 2012 - $3M

**Key Investors**
- Khosla Ventures
- innogy New Ventures
- E.ON
- Constellation Technology Ventures
- Georgian Partners

**Board Members and Advisors**
- Vijit Sabnis
- Rahul Bhalodia
- Witold Bik
- Abhay Gupta
- Vivek Garud
- Roland Acra
- Rich Boyle
- Subodh Bapat
- Hervé Touati
- Simon Chong

**Company Description**
Bidgely uses machine learning algorithms to disaggregate home energy data, and is able to generate itemized energy usage by appliance and personalized insights. With an omni-channel communications approach, Bidgely helps customers save energy and enables utilities to achieve their consumer engagement goals. The company has a substantial presence in energy disaggregation technology and has 14 patents filed. Bidgely’s SaaS-based analytics platform currently serves 10M customers and does not require any hardware or sensors in the home, making it easily scalable to residential gas and electric customers targeted throughout North America, Europe, and Asia Pacific. Bidgely serves millions of homes on its platform, and has multi-year contracts with some of the largest utilities in the world.

*Source: Company discussions*
Blue Pillar

**Management**
- Tom Willie (CEO)
- Brad Witter (President & CTO)
- Jeff Pontius (VP of Finance)
- Eric Reichel (VP of Operations)

**Location**
- Frederick, Maryland

**Founded**
- 2006

**Revenues**
- $10m - $25m

**Employees**
- 37

**Funding Rounds**
- Series D - $10.3M
- Series B - $6.9M
- Series C - $13.9M
- Series A / Seed - $6.3M

**Key Investors**
- Allos Ventures
- Arsenal Venture Partners
- EnerTech Capital
- Claremont Creek Ventures
- GXP Investments
- Maryland Venture Fund
- Elevate Ventures
- Elemental Excelerator

**Board Members and Advisors**
- Paul Straub
- John C. McIlwraith
- Bill Kingsley
- Doug Davis
- Dennis Odell

**Company Description**

Blue Pillar is a leading provider of technology to what the company has dubbed the ‘Energy Network of Things’. The company’s Aurora Energy Network of Things IoT platform is the first self-configurable solution to auto-prescribe secure energy control networks to connect behind-the-meter distributed energy resources for real-time control and collection of energy data.

Blue Pillar’s platform allows customers to connect all of their energy assets within a single platform. Aurora collects and organizes facility energy data in real time, while enabling centralized control of behind-the-meter assets. From legacy diesel generators and switches to solar panels, inverters, and batteries, Blue Pillar’s mission is to connect any asset that consumes, generates, switches, stores, or measures energy – regardless of make, model, or vintage.

Aurora has connected more than 250K data streams at over 800 buildings across several industry sectors, including hospitals, cable/telecom, energy service providers, military, and higher education. In 2016, Blue Pillar was recognized as having the largest microgrid portfolio based on megawatts connected with the ability to island off the grid, per Navigant Research.

*Source: Company discussions*
BreezoMeter

**Management**
- Ran Korber (CEO & Co-Founder)
- Emil Fisher (CTO & Co-Founder)
- Ziv Lautman (Co-Founder)
- Ayana Hirt (CFO)

**Location**
- San Francisco, California

**Founded**
- 2014

**Revenues**
- $1m - $5m

**Employees**
- 30

**Funding Rounds**
- Sept. 2018 - $7.8M
- July 2016 - $3.2M
- June 2015 - $1.8M

**Key Investors**
- Entrée Capital
- Idinvest Partners
- Phi Square Holdings
- JumpSpeed Ventures
- Launchpad Digital Health
- Hella Ventures
- Axess Ventures
- Goldacre Ventures

**Board Members and Advisors**
- Aviad Eyal, Entrée Capital
- Martin Rosenbaum, Phi Square
- Ran Korber, BreezoMeter
- Emil Fisher, BreezoMeter
- David Bloom, Goldacre

**Company Description**
BreezoMeter reaches people around the world by providing relevant air quality and pollen data and actionable health recommendations, and is currently available in more than 30 countries, including most of Europe. BreezoMeter increased the global coverage of air quality data, now available in 83 countries, and added data sources to enrich the coverage already offered. BreezoMeter's impact is far reaching. Via its partners and customers, BreezoMeter shows people what is in the air they breathe. While some air pollution at high concentrations is visible to the naked eye, many harmful pollutants we are exposed to daily are invisible. Lastly, a major project this year has been connected to its goal of democratizing air quality data. Via a partnership with search giant Google, BreezoMeter was the source data for its new (currently paused) air quality card, displayed for searches of air quality/pollution in a given location. Air pollution awareness is growing, and BreezoMeter is proud to be at the forefront of this advancement, helping businesses and cities better engage with their customers and citizens, and helping them improve the health of people globally.

*Source: Company discussions*
**ChargePoint**

### Management
Pasquale Romano (CEO & President)
Dave Baxter (Co-Founder, VP of Engineering)
Michael Hughes (CCO, CRO)
Rex Jackson (CFO)
Colleen Jansen (CMO)

### Location
Campbell, California

### Founded
2007

### Revenues
$10m - $25m

### Employees
140

### Funding Rounds
- June 2017 - $43M
- Mar. 2017 - $82M
- May 2016 - $50M
- May 2014 - $22.6M
- Oct. 2013 - $100M
- May 2012 - $47.5M
- Sept. 2010 - $15M
- Feb. 2010 - $14M

### Key Investors
- Voyager Capital
- Envision Ventures
- BMWi Ventures
- Constellation Energy
- Harbor Pacific Capital
- Statoil Energy Ventures
- Braemar Energy Ventures
- Rho Ventures
- Linse Capital
- Daimler
- Siemens
- Toyota Tsusho

### Board Members and Advisors
- Pasquale Romano
- Richard Lowenthal
- Bruce Chizen
- Mark Leschly
- Ralf Christian
- Bill Thayer
- Axel Harries
- Neil S. Suslak
- Michael Linse
- Rick Wagoner

### Company Description
ChargePoint is the largest electric vehicle (EV) charging network in the world, with charging solutions in locations that EV drivers are likely to use at home, work or while traveling. With more than 56,400 total charging spots and more than 924 Express DC fast spots, ChargePoint is the only charging technology company on the market that provides hardware and software solutions across every use case. Leading EV hardware makers and other partners rely on the ChargePoint network to make charging station details available in mobile apps, online and in navigation systems for popular EVs. ChargePoint drivers have completed more than 45 million charging sessions to date.

*Source: Company reports and website*
Clearest Solutions Inc.

Management
Thomas Ligocki (CEO)
Trevor Greene (CFO)
Garnik Bobloyan (CTO, VP of Engineering)
Carol Johnston (VP of Product Marketing)
Julien Marin (VP of Sales North America)
Ricardo Ferreyros (VP International)
David Trotter (Global VP of Sales)

Location
Richmond, Canada

Founded
2002

Revenues
$20m

Employees
125

Funding Rounds
Dec. 2017 - $10M+

Key Investors
Energy Impact Partners

Board Members and Advisors
Thomas Ligocki
Jim Thompson
Michael Donnelly
Bruce Chatterley
Peter Ciceri

Company Description
Clearest is an expert in mobile workforce automation and smart grid operations solutions for utilities. Clearest provides a scalable solution for small- to large-sized utilities as well as for the smart grid environment, including deployment and post-deployment activities on a handheld computer. By supporting multiple operating systems (iOS, Android, and Windows), Clearest helps to create a bring-your-own-device program that allows workers greater flexibility by using their own device. The company currently serves over 220 electric, gas, and water utilities worldwide. This translates to having deployed 30m+ AMI meters serving over 100m consumers through 12,000+ mobile workers and 1,200 dispatchers.

Source: Company reports and discussion
ecobee

Management
Stuart Lombard (CEO)
Scott Cleaver (COO)
David Brennan (CFO)
Jackie Poriadjan-Asch (CMO, CRO)

Location
Toronto, Canada

Founded
2007

Revenues
$100m+

Employees
110

Funding Rounds
May 2018 - $36M
Mar. 2018 - $62M
Aug. 2016 - $35M

Board Members and Advisors
[not disclosed]

Key Investors
Amazon Alexa Fund
Energy Impact Partners
GXP Investments
Thomvest Ventures
Ontario Capital Growth Corp.
Export Development Canada
Caisse de dépôt et placement du Québec

Company Description
ecobee is a home automation company focused on saving consumers money, conserving energy, and seamlessly bringing home automation into consumer’s lives. ecobee makes wi-fi enabled smart thermostats for residential and commercial applications that save customers in the U.S. up to 23% on their heating and cooling costs. The system is able to pair up to 32 sensors within the home and uses a low-power radio frequency (915Hz) to communicate with the ecobee thermostat for up to two years of battery life. The next-generation smart thermostat ecobee4 comes with Amazon Alexa and far-field voice recognition built-in, allowing for hands-free control anywhere in the home.

Source: Company reports and website
Electric Imp

Management
Hugo Fiennes (Co-Founder, CEO)
Peter Hartley (Co-Founder)
Oliver Hutaff (CFO, COO)

Location
Los Altos, California

Founded
2011

Revenues
Bookings >$20m

Employees
50

Funding Rounds
Apr. 2016 - $21M
Aug. 2014 - $15M
May 2012 - $7.9M

Key Investors
Redpoint Ventures
Lowercase Capital
Rampart Capital
PTI Ventures
Hugo Fiennes

Board Members and Advisors
Tomasz Tunguz
Geoff Yang
Jeff Hastings
Giles White
Hugo Fiennes

Company Description
Electric Imp helps more than 100 manufacturers and enterprises operate more effectively and securely with the company’s device-focused cloud technology. Over one million IoT devices have been built on the company’s secure platform (which is provided as a service), with devices deployed in 105 countries. Electric Imp’s solution, which features integrated device OS and hardware, UL-certified security, APIs, and cloud services, is intended to decrease cost and time to market, while increasing security, scalability, and flexibility. The close integration of device and cloud product technology appears to us to be well-differentiated. Electric Imp, founded in 2011, is located in Los Altos, California and Cambridge, England.

Source: Company discussions
Element Analytics

Management
Andy Bane (CEO)
Sameer Kalwani (Founder, VP of Product)
Stephen Walsh (EVP, Sales)
Sean McCormick (VP, Engineering)
Sheena Badani (Head of Marketing)

Location
San Francisco, California

Founded
2015

Funding Rounds
Jan. 2018 - $15M
Aug. 2016 - $4.5M
Nov. 2015 - $2.5M

Revenues
$2m - $10m

Employees
35

Key Investors
Kleiner Perkins Caufield & Byers
Honeywell Ventures
GE Ventures
ABB Technology Ventures
Mitsui & Co.
Aster Capital
Blue Bear Capital

Board Members and Advisors
Andy Bane
David Mount
Veery Maxwell

Company Description
Element Analytics wants to unlock industrial data, enabling modern analytics systems to find insights that transform operational performance, resulting in hundreds of millions of dollars of value for customers. The Element Platform pulls data from thousands of enterprise sources and automates the creation of millions of data relationships to rapidly build, continuously update, and manage asset twins of industrial equipment. With Element, any person or system can access every reliable data point in the enterprise. The company has invested in building that knowledge in its initial base of energy and industrial customers. Founded in 2015, Element is based in the SoMa district of San Francisco.

Source: Company discussions
## Enbala

### Management
- **Bud Vos** (President & CEO)
- **Eric Toler** (CFO, EVP Corporate Development)
- **Malcolm Metcalfe** (Founder & Chief Research Officer)
- **Jeff MacAulay** (COO)
- **Trent Bowers** (CCO)

### Location
- **Vancouver, British Columbia**

### Founded
- 2003

### Revenues
- $5m - $10m

### Employees
- 46

### Funding Rounds
- May 2017 - $17.5M
- Sept. 2015 - $3M
- Mar. 2015 - $11M

### Key Investors
- ABB Technology Ventures
- National Grid
- GE Ventures
- Obvious Ventures
- EnerTech Capital
- Edison Energy Holdings
- Export Development Canada (EDC)
- Chrysalix Venture Capital

### Board Members and Advisors
- **Bud Vos** (CEO)
- **Bob Chiste** (Chair, Independent)
- **Thomas Brady** (Independent)
- **Cheryl Martin** (Independent)
- **Scott Ungerer** (EnerTech Capital)
- **Andrew Beebe** (Obvious Ventures)
- **Daniel Westerman** (National Grid)

### Company Description
Enbala Power Networks is focused on making the world's power grids more reliable, efficient and predictable by harnessing the power of distributed energy. Enbala’s real-time energy-balancing platform is transforming energy system operations using a highly flexible approach for creating controllable and dispatchable energy resources. Enbala’s platform captures and aggregates available customer loads, energy storage and renewable energy sources to form a network of continuously controlled energy resources. The platform dynamically optimizes and dispatches these resources to respond to the real-time needs of the power system – all without impacting customer operations.

*Source: Company discussions*
Encycle

**Management**
Robert Chiste (President & CEO)
Steve Alexander (CFO, COO)
Andrew Stickler (EVP, Engineering)
Chris Hensley (EVP, Sales and Marketing)

**Location**
San Marcos, California

**Founded**
2005

**Revenues**
$5m - $10m

**Employees**
50

**Funding Rounds**
[not disclosed]

**Key Investors**
BDC Venture Capital
EnerTech Capital
Export Development Canada (EDC)
Duke Energy Ventures
Prelude Ventures
NGEN Partners

**Board Members and Advisors**
Robert Chiste
Rich Cilento
Larry Lam
Tim Woodward
Paul Grod
Shay Murphy
Christopher Fallon

**Company Description**
Encycle Corp. is focused on helping commercial and industrial customers achieve improvements in the efficiency of their heating, ventilation, and air conditioning systems with a simple and elegant “set and forget” approach. Encycle’s SaaS-based business model delivers its service through the company’s EASE Program (Energy as a Service by Encycle). The company’s Swarm Logic energy management technology is at the heart of its solution set, leveraging honey bee-inspired biomimicry to build a wireless network among HVAC rooftop units (RTUs) that enables autonomous communication.

Encycle reports that customers using its synchronization technology have reduced HVAC electricity costs by 10-20%, often with payback periods of less than a year. Encycle offices are in Toronto (Canada), San Marcos (California), and Taunton (UK).

*Source: Company discussions*
EnergySage

**Management**
Vikram Aggarwal (Founder and CEO)
Jamie Biggar (CTO, VP Engineering)
John Gingrich (SVP, New Business Development)
Luke Tarbi (VP, Marketing)
Georg Bettenhauser (VP, Sales & Supplier Partnerships)
Tess O’Brien (VP, Strategic Partnerships)

**Location**
Boston, Massachusetts

**Founded**
2012

**Revenues**
$150m [GMV]

**Employees**
32

**Funding Rounds**
Apr. 2018 - $2.7M
May 2016 - $1.4M
Sept. 2014 - $1.5M
July 2013 - $0.4M

**Key Investors**
Clean Energy Venture Group
LaunchPad Venture Group
Massachusetts Clean Energy Center

**Board Members and Advisors**
Gail Greenwald
Robert Gervis
Alison Ernst
Vikram Aggarwal

**Company Description**
EnergySage is focused on providing a straightforward online marketplace for prospective residential solar customers to understand and compare different offerings. The company’s platform allows users to research different offerings and receive quotes from EnergySage’s network of pre-screened installers. Given the numerous considerations surrounding not only the solar power equipment itself, but also the available financing options, there is considerable value in being able to compare different proposals in a uniform way.

On the backhand side, EnergySage collects over one million data points per day regarding the market dynamics of the U.S. solar industry. The data, available on the company’s website, is frequently used by government agencies, non-profits, journalists, universities, and investors and offers insights into the broader U.S. solar market.

CEO and founder Vikram Aggarwal founded EnergySage following a 15-year career at Fidelity Investments, where he specialized in private equity investments. He brings a substantial breadth of experience in financial markets to EnergySage.

*Source: Company discussions*
EnergySavvy

Management
Aaron Goldfeder (CEO and Co-Founder)
Scott Case (COO)
Kalpana Narayanaswamy (VP, Engineering)
Michael Rigney (SVP, Client Solutions, Marketing, and Regulatory Affairs)

Location
Seattle, Washington

Founded
2008

Revenues
[not disclosed]

Employees
72

Funding Rounds
Oct. 2016 - $14.3M
Dec. 2010 - $1.1M
July 2014 - $8.25M
July 2009 - $0.58M
Aug. 2012 - $3.25M

Key Investors
El Dorado Investment
EnerTech Capital
GXP Investments
Inherent Group
Pivotal Investments
Prelude Ventures

Board Members and Advisors
Aaron Goldfeder
Karl Siebrecht
Tim Woodward
Dean Sciorillo
Thomas King
Bradley Zenger
Rebecca Norlander
Dennis Odell

Company Description
EnergySavvy has developed a customer-facing platform that allows utilities to significantly improve engagement with their customers. The company’s cloud-based product offers utility customers data-driven personalization and automated program delivery to help them better understand their energy usage, receive targeted recommendations, and become more efficient. More than 30+ utilities across the U.S. are currently using the EnergySavvy platform. The company, founded in 2008, comes to the industry with a strong background in software and hopes to transform the way that utilities interact with their customers.

Source: Company discussions
Eos Energy Storage

Management
Michael Oster (Co-Founder & CEO)
Steve Hellman (President)
Dr. George Adamson (CTO)
Dave Henry (CFO)
Philippe Bouchard (SVP, Development & Marketing)
Jeff Wiener (SVP, Sales)

Location
Edison, New Jersey

Founded
2007

Revenues
$25m - $50m

Employees
60

Funding Rounds
Oct. 2016 - $52M
May 2015 - $23M
Jan. 2015 - $15M
Dec. 2014 - 2.1M
Nov. 2014 - $2.5M

Board Members and Advisors
Jim Hughes

Key Investors
AltEnergy LLC
NRG Energy
Fisher Brothers
Yorktown Partners

Company Description
Eos Energy Storage is focused on providing safe, reliable, and cost-effective energy storage solutions. The company’s energy storage technology uses zinc hybrid cathode materials and a water-based electrolyte to deliver cost and reliability that Eos believes can compete with lithium-ion based solutions. Products are focused on grid-scale storage, and the company reports that it has been able to hit $160/kWh of storage for its DC battery system. Eos is located in Edison, NJ, and New York, NY, and Board Chair Jim Hughes was previously the Chief Executive Officer at First Solar.

Source: Company discussions
Falkonry

Management
Nikunj Mehta (Founder & CEO)
Dan Kearns (CTO)
Greg Olsen (SVP, Product)
Crick Waters (SVP, Customer Success)
Sanket Amberkar (SVP, Marketing & Partnerships)
Mike McDermott (SVP, Sales)

Location
Sunnyvale, California

Founded
2012

Revenues
(not disclosed)

Employees
33

Funding Rounds
June 2018 - $5.5M
Feb. 2017 - $5.3M

Key Investors
Polaris Ventures
Zetta Venture Partners
Presidio Ventures
Start Smart Labs
Basic Set Ventures
Fortive Corporation

Board Members and Advisors
Nikunj Mehta (Founder & CEO)
Parveen Jain
Mark Gorenberg

Company Description
Falkonry’s technology is enabling process engineers to find early indications of potential downtime, quality problems, and yield declines by recognizing patterns in real-time data. Using Falkonry, industrial leaders are improving their operations by utilizing predictive analytics at commercial scale. The company has invested heavily in its user-ready AI interface for condition discovery and recognition. Falkonry’s interface can use any existing time series data, automatically extract pattern features from the data, and learn to distinguish unique patterns. It then presents its findings as an intuitive timeline to business users and obtains user-defined condition labels.

Source: Company discussions
Farmers Business Network

Management
Amol Deshpande (CEO, Co-Founder)
Charles Baron (VP of Product, Co-Founder)
Kelby Kleinssasser (VP of Operations)
Maria Olide (CFO)
Ed Rowe (VP of Engineering)
Eric Carnell (General Counsel)

Location
San Carlos, California

Founded
2014

Revenues
$100m - $200m

Employees
300+

Funding Rounds
Nov. 2017 - $110M
Mar. 2017 - $40M
Oct. 2016 - $20M

May 2015 - $15M
Apr. 2014 - $4.6M

Key Investors
Kleiner Perkins Caufield & Byers
DBL
Google Ventures
Bow Capital
Acre Venture
T. Rowe Price
Temasek

Board Members and Advisors
Gareth Asten
Andy Wheeler
Nancy Pfund
Randy Komisar

Company Description
Farmers Business Network, Inc. is an independent farmer-to-farmer network. Built by and for farmers, the FBN network connects farmers to share information and enable powerful insights to help make the best decisions for farmers’ land and profits. FBN members receive comprehensive farm benchmarking, real-world seed performance analysis and field-seed matching, data mapping, and pricing analytics based on over 95 million acre events of real-world precision agronomic data. The FBN Direct platform connects farmers to manufacturer-direct, national, and transparent pricing on ag chemicals, fertilizers, seeds, technology and services. The FBN network has grown to thousands of farms, from 38 states, across more than 14 million acres. Farmers Business Network, Inc. has offices in San Carlos, CA, Geneseo, IL, and a National Operations Center in Sioux Falls, SD.

Farmers Business Network, Inc. blends the best of Midwestern agricultural roots and Silicon Valley technology as a completely independent company representing “Farmers First”. The Farmers Business Network, Inc. mission of democratizing farm information has earned the support of world-class technology investors GV, DBL Partners LLP, Kleiner Perkins Caufield Byers LLP, Bow Capital, Acre Venture Partners, T. Rowe Price, and Temasek.

Source: Company discussions

How It Works
Farmers Business Network℠ is an independent network of thousands of America’s most advanced farmers.

Agronomic Intelligence
Access farming’s most advanced analytics driven by the combined intelligence of millions of acres.

Smarter Buying
Cut the bull. Save thousands of dollars with FBN℠ Direct’s manufacturer-direct input prices & radical price transparency.

Profitable Marketing
Set new opportunities to sell your crop and always know when you are in the money.
FirstFuel Software

Management
Swapnil Shah (CEO, Co-Founder)
John MacPhee (CFO, COO)
Scott McClintock (SVP, Sales of North America)
Raman Sud (SVP, Engineering & Cloud Operations)

Location
Lexington, Massachusetts

Founded
2010

Revenues
[not disclosed]

Employees
130

Funding Rounds
Apr. 2015 - $23M
Dec. 2013 - $8.5M
Feb. 2012 - $10M
Sept. 2011 - $2.4M

Key Investors
RockPort Capital
Nth Power
E.ON
Electranova Capital
Next World Capital
Vast Ventures
Battery Ventures

Board Members and Advisors
Tom Crotty (Battery Ventures)
Nancy Floyd (Nth Power)
Phil Giudice (Ambri Inc.)
Tom Rikert (Next World Capital)
Todd Wilson (RockPort Capital Partners)
Jonathan Temple (The Riverside Company)

Company Description
FirstFuel Software uses advanced analytics to help energy providers in North America and Europe improve business customer satisfaction, drive sales and revenue, and reduce service costs. Combining data science, building science, and software, the business customer engagement platform derives intelligence from over four million meters, transforming energy providers into trusted advisers to their business customers. The company’s SaaS solutions deliver accurate, insightful, and cost-effective results at scale. Founded in 2010 and privately held, FirstFuel is headquartered in Lexington, MA.

Source: Company discussions
Geli

Management
Crispell Wagner (CTO and Co-Founder)
Ryan Wartena (President and Co-Founder)
Daniel Loeflin (CEO)
Brad Smith (VP of Operations)
Jim Morgenson (VP of Business Development)
Mukunda Saddi (VP of Engineering)

Location
San Francisco, California

Founded
2010

Revenues
[not disclosed]

Employees
60

Funding Rounds
2017 - $5.5M
2016 - Series A - $9.5M
2015 - Bridge - $1.25M
2014 - Seed - $250k
2013 - Seed - $500k

Board Members and Advisors
Steve McGrath
Jim Lyons
Dan Loeflin
Ryan Wartena
Miguel Granie
John Scull
Ravi Mulugu

Key Investors
Shell Technology Ventures
Siemens
Southern Cross Venture Partners
Momenta Partners
Greenstart
Elemental Excelerator

Company Description
Geli, which stands for Growing Energy Labs, Inc., provides software and business solutions for designing, automating, and managing energy storage and microgrid systems. Geli’s suite of products creates an ecosystem where project developers, OEMs, financiers, and project operators can deploy advanced energy projects using a seamless hardware-agnostic software platform. Co-founders Ryan Wartena and Crispell Wagner bring a deep background in battery technology and software platform development to the company. Geli is headquartered in San Francisco.

Source: Company discussions
GlassPoint Solar

Management
Steven Moss (CEO)
Pete von Behrens (CTO)
David Allsworth (CFO)
Sanjeev Kumar (SVP, North America)
Dave Tickner (Interim COO)
Seti Gabriel (Chief Commercial Officer)

Location
Fremont, California

Founded
2009

Revenues
[not disclosed]

Employees
250

Funding Rounds
Sept. 2014 - $53M
Dec. 2012 - $26M
Dec. 2011 - $1.3M
Mar. 2011 - $1.5M

Key Investors
RockPort Capital
Nth Power
Chrysalix Energy Ventures
Royal Dutch Shell
State General Reserve Fund of Oman

Board Members and Advisors
Rod MacGregor
Hisham Al-Sheedi
Richard MacKellar
David Prend
Robert Linck
Zaki Salim (Non-Executive Chairman)

Company Description
GlassPoint designs, manufacturers, and installs solar steam generators with energy leaders across the globe. The company’s solar thermal technology is focused exclusively on the global oil and gas industry and is designed specifically to overcome challenges of deploying solar on an oilfield. The company’s enclosed trough technology houses thin, curved mirrors inside a greenhouse. The mirrors track the sun throughout the day, focusing heat on pipes containing oilfield water. Concentrated sunlight boils the water to generate steam, which is then injected into the oil reservoir just like steam produced by burning fuel. The result is a much more carbon-efficient approach to enhanced oil recovery.

Source: Company discussions
Greenwave Systems

Management
Martin Manniche (Co-Founder, CEO)
Christos Lagomichos (COO)
Leon Hounshell (CTO)
Peter Wilmar Christensen (Co-Founder, CFO)
Eskild Hansen (Chief Design Officer)

Key Investors
EDBI
The Westly Group
E.ON
Singapore Technologies Telemedia
Craton Equity Partners

Location
Irving, California

Founded
2008

Revenues
$100m+

Employees
325

Funding Rounds
Series C - $45M
Series B - $19M
Series A - $12M

Board Members and Advisors
Martin Manniche
Peter Wilmar Christensen
Stephen Miller
Nikhil Eapen
Paul Ng
Romulo Pontual
Kevin Wall
Steve Westly

Company Description
Greenwave Systems is a global software leader for managed services. The company is dedicated to empowering market-leading brands to profitably deploy their own managed services and products, foster deeper customer relationships and grow their businesses. Mobile carriers, telecommunications operators, semiconductor manufacturers, utilities and all manner of service providers use Greenwave’s award-winning AXON Platform. The platform safely integrates data and communications from a variety of existing and emerging digital protocols to swiftly create vanguard services via managed networks.

Source: Company discussions
INRIX

Management
Bryan Mistele (Founder & CEO)
Peter Wengert (CRO)
Mark Daymond (CTO)
Jim Beach (CFO)
Rose Fechko (CMO)
Brooks Larsen (General Counsel)

Location
Kirkland, Washington

Founded
2004

Revenues
$75m - $125m

Employees
400

Funding Rounds
2005 - $6.1M
2006 - $10M
2007 - $15M
2011 - $37M
2015 - $36M

Board Members and Advisors
Ajay Agarwal
Brian Ascher
Bryan Mistele
Diane Irvine
John Johnston
Philip Von Hogen
Kendra Vandermeulen
Mike Gerling
Tony Posawatz

Key Investors
August Capital
Bain Capital
Venrock
Kleiner Perkins Caufield & Byers
Porsche SE
Intel Capital

Company Description
INRIX is a provider of connected car services and transportation analytics. The company leverages data from a wide variety of public and private sources in order to enable services, including connected vehicles, parking management, dynamic data for city planning and traffic flow optimization. Of particular interest is the ability the INRIX platform offers to identify and alleviate traffic hotspots, a growing problem in urban environments. More recently, INRIX expanded its offering to include solutions for automakers and transportation agencies to aid in the successful deployment of autonomous vehicles. The company’s customers include automakers, governments, mobile communications network operators, and a variety of other enterprises.

Source: Company discussions
K2 Energy

Management
Sean Campbell (CEO & President)
Dr. James Hodge (CTO)
Jeffery Wu (Co-Founder, Strategic Advisor)
Robert Licha (CFO)
Arsen Khousnoutdinov (CBDO)

Location
Henderson, Nevada

Founded
2006

Revenues
$25m - $50m

Employees
41-50

Funding Rounds
2018 - $1.2M

Key Investors
[not applicable]

Board Members and Advisors
[not disclosed]

Company Description
K2 Energy’s lithium ion battery technology delivers high power and energy density without compromising safety. It experiences no thermal runaway, has low capacity loss and impedance growth, is lightweight and up to a third of the size of conventional lead acid batteries. It can be cycled to 100% depth of discharge allowing cells, batteries and systems to meet, often exceeding energy needs and even avoiding the need for redundant capacity. The battery technology improves power and energy at extreme temperatures and can exceed the performance of other traditional lithium chemistries by up to 2-3x, potentially reducing or eliminating the need for thermal management while reducing total cost of ownership with improved calendar and cycle life.

Source: Company website and reports, i3 Connect
Kespry

Management
George Mathew (Chairman and CEO)
Jeff Palmer (President)
Parker Clark (CTO)

Location
Menlo Park, California

Founded
2013

Revenues
$20m - $25m

Employees
100

Funding Rounds
Nov. 2017 - $33M
June 2016 - $16M
Oct. 2014 - $10M

Board Members and Advisors
Jason Krikorian
John Vrionis
David Mount
Jay Borenstein

Key Investors
DCM Ventures
Lightspeed Venture Partners
G2VP
Shell Technology Ventures
Cisco Investments
ABB Ventures

Company Description
Kespry develops drone hardware, software and cloud-based services that are fully integrated to deliver a seamless, accurate, and highly efficient solution from field to finish. The Kespry solution delivers highly accurate imaging to customers at a fraction of the cost and time required by traditional solutions. Important target markets include mining and resource management, as well as catastrophe response and insurance claim processing. Customers include Farmers Insurance, Hancock Claims Consultants, Catastrophe Response Unit (CRU), Fluor, Lehigh Hanson/Heidelberg, Sully-Miller/Colas USA, and Webcor.

Source: Company discussions
NantEnergy

Management
Steve Scharnhorst (CEO)
Mark Smith (CFO)
Dennis Thoren (VP of Engineering)
Rakn Kumar Krishnan (CTO)
Cody Friesen (Founder)
Katie Avila (VP of Marketing)

Location Scottsdale, Arizona
Founded 2006
Revenues <$2m
Employees 225

Funding Rounds
Nov. 2016 - $20M
Nov. 2013 - $7M
July 2013 - $20.8M
Feb. 2013 - $13M
May 2011 - $16M
May 2009 - $1M

Key Investors
Madrone Capital
Caterpillar
International Finance Corporation
ARPA-E
Satcon Technology
Chevron Energy Solutions
Asia Climate Partners

Board Members and Advisors
Jamie McJunkin
Lee Scott
Ned Hall
Robert Kelly

Company Description
NantEnergy, formerly Fluidic Energy, is dedicated to accelerating the worldwide transformation to clean, reliable energy through its innovative and intelligent energy storage solutions. Enabled by groundbreaking battery technology and smart-grid intelligence, NantEnergy designs, manufactures and markets long-duration energy storage solutions globally. The company produces rechargeable Zinc-air battery technology in high volumes and NantEnergy has more than 120,000 batteries globally with its industry leading whole product approach. NantEnergy continues to build momentum in the long-duration energy storage market, installing systems worldwide that increase reliability and functionality for customers.

Source: Company reports and website
Optimum Energy

Management
Larry Stapleton (President)
Bert Hogue (CFO)
Ben Erpelding (CTO)

Location
Seattle, Washington

Founded
2005

Revenues
$10m - $25m

Employees
55

Funding Rounds
Nov. 2016 - $3M
July 2015 - $10M
June 2013 - $14.2M
Mar. 2013 - $1M

Key Investors
Johnson Controls
Navitas Capital
Columbia Pacific Management
Edison Energy

Board Members and Advisors
Stan Baty
Robert Andrews
Daryl David
Bert Valdman
Terry O'Keefe
Joe Franzi

Company Description
Optimum Energy enables campuses, healthcare facilities, pharmaceutical plants, data centers and other commercial buildings to cut energy costs and meet sustainability goals by optimizing HVAC systems, the largest consumer of energy in buildings. The company’s cloud-based OptiCx™ Platform and its associated modules reduce an HVAC system’s energy usage and resulting costs by up to 50 percent. The technology also reduces water use in chiller plants, tracks and reports on savings, provides detailed insights into building system operations, and efficiently scales across entire building portfolios. Optimum Energy technology has enabled current customers to clock one billion kwh of energy savings which translates to cost savings of more than $100m and carbon reduction of more than 667,000 metric tons.

Source: Company discussions
OSIsoft

Management
Dr. J. Patrick Kennedy (Founder & CEO)
Bob Guilbault (COO)
Jenny Linton (President)
Richard Beeson (CTO)

Location
San Leandro, California

Founded
1980

Revenues
$430m+

Employees
1,300

Funding Rounds
Oct. 2011 - $3.3M
Jan. 2011 - $135M

Board Members and Advisors
Jenny Linton
Dr. J. Patrick Kennedy
Eric Streed
Virginia Smith
Patricia Kennedy

Key Investors
SoftBank Vision Fund
Mitsui & Co.

Company Description
OSIsoft has developed and marketed a broad-based solution for aggregating and managing data from a wide variety of operating environments. The platform, dubbed the PI System, captures and structures data from operational equipment—sensors, power supplies, manufacturing tools, even large structures like ships—and serves it up in a coherent manner that allows customers to boost production, save money, improve safety, or conduct analytics. Importantly, PI provides an interface between the highly fragmented operating environment and the more limited number of large data management environments that customers often want to work with. The platform’s value extends from simple data aggregation to more powerful uses, including predictive failure analytics and operational modeling.

Source: Company discussions
Peloton Technology

Management
Dr. Josh Switkes (Co-Founder, CEO)
Antonio Vitti (CFO)
Dave Lyons (Co-Founder, CIO)
Steve Boyd (Co-Founder, VP-External Affairs)
Chris Gerdes (Co-Founder, Board Member)

Location
Mountain View, California

Founded
2011

Revenues
< $1m

Employees
87

Funding Rounds
Series B - $60M
Series A - $17M

Key Investors
Omnitracs Intel Capital
DENSO Mitsui USA
Volvo Group B37 Ventures
Schlumberger Lockheed Martin
Nokia Growth Partners Birchmere Ventures
BP Ventures UPS Strategic Enterprise Fund

Board Members and Advisors
Dr. Lawrence Burns
Imran Kizilbash
Mark Lydon
Ken Arnold
Chris Gerdes

Company Description
Peloton Technology’s truck platooning technology integrates throttle and braking control, external sensors, advanced safety systems, and vehicle-to-vehicle communication to allow two Peloton-equipped trucks to travel together in a tightly coupled lead-follow formation. The result is significant fuel savings, not just for the following truck at 10% on average, but also for the lead truck at 4% to 5%. The result is also potentially much-improved safety as the integrated technologies allow for closer following distances than human control would permit.

Peloton offers its technology in cooperation with truck manufacturers, and the requisite hardware and software will be installed on new trucks and integrated with the trucks’ existing throttle, braking and other control systems. The company works closely with Bendix, a large supplier of braking systems to class 8 truck manufacturers. Peloton is also working with several North American truck OEMs, including close collaboration with Peterbilt, Kenworth and Volvo Trucks.

Source: Company discussion and website
Planet

Management
Will Marshall (Co-Founder & CEO)
Robbie Schingler (Co-Founder & CSO)
Shawna Wolverton (CPO)
Nate Dickerman (CCO)
Laura Malinasky (Chief Legal and People Officer)

Location
San Francisco, California

Founded
2010

Revenues
$25m - $100m

Employees
400

Funding Rounds
Apr. 2015 - $23M
Jan. 2015 - $95M
Dec. 2013 - $52M
Jul 2013 - $16.6M

Key Investors
Founders Fund
First Round Capital
Innovation Endeavors
AME Cloud Ventures
Industry Ventures
Felicis Ventures
Obvious Ventures
International Finance Corporation (IFC)

Yuri Milner
Data Collective
Draper Fisher Jurvetson
Capricorn Investment Group
O’Reilley AlphaTech Ventures
Lux Capital
Western Technology Investment

Board Members and Advisors
Chris Boshuizen
Chris Kemp
Renata Quintini
Mark Jacobsen
Steve Jurvetson
Zack Bogue

Company Description
Founded in 2010 by a team of ex-NASA scientists, Planet is driven by a mission to image the entire Earth every day, and make Earth’s changes visible, accessible and actionable. Planet started as a small team of physicists, aerospace and mechanical engineers in a garage, using the CubeSat form factor to inform the first designs of the Dove satellite. The company’s satellites are collecting a radical new data set with endless, real-world applications. Planet’s data allow businesses and humanitarian organizations to measure agricultural yields, monitor natural resources, or aid first responders after natural disasters. Planet believes timely, global imagery will empower informed, deliberate and meaningful stewardship of our planet.

Source: Company reports and website
# PrecisionHawk

**Management**  
Michael Chasen (CEO)  
Ernest Earon (Co-Founder, CTO)  
Lara Oerter (COO)  

**Location**  
Raleigh, NC  
**Founded**  
2010  
**Revenues**  
$5m - $10m  
**Employees**  
165  
**Funding Rounds**  
Jan. 2018 - $75M  
Apr. 2016 - $18M  
**Board Members and Advisors**  
[not disclosed]

**Key Investors**  
Third Point Ventures  
Millennium Technology Value Partners  
Comcast Ventures  
DuPont  
Intel Capital  
NTT Docomo  
Yamaha Motor

## Company Description

PrecisionHawk is a leading provider of drone technology for the enterprise. PrecisionHawk’s client list includes Fortune 500 companies and market leaders in 150 countries, spanning a range of industries, including agriculture, energy, insurance, government and construction. To date, PrecisionHawk has raised more than $100 million from leading venture capital firms including Third Point Ventures and Millennium Technology Value Partners, with strategic investments from enterprise customers and partners including Comcast Ventures, DuPont, Intel Capital, NTT Docomo, and Yamaha Motor. The company, founded in 2010, is privately held and headquartered in Raleigh, NC.

*Source: Company reports and website*
Proterra

Management
Ryan Popple (President & Chief Executive Officer)
Amy Ard (Chief Financial Officer)
Josh Ensign (Chief Operating Officer)
Matt Horton (Chief Commercial Officer)
JoAnn Covington (Chief Legal Officer)
Gary Horvat (Chief Technology Officer)

Key Investors
Kleiner Perkins Caufield & Byers
G2VP
Daimler
General Motors Ventures
Generation Investment Management
Constellation Ventures
Edison International
BMW i Ventures
Tao Capital
88 Green Ventures
Mitsui
Obvious Ventures

Company Description
Proterra designs and manufactures zero-emission, heavy-duty vehicles, enabling bus fleet operators to significantly reduce operating costs while delivering clean, quiet transportation to local communities across the U.S. The company has sold vehicles to 90 different municipal, university, airport, and federal and commercial transit agencies in 40 U.S. states and Canadian provinces. Proterra’s configurable Catalyst platform is capable of serving the full daily mileage needs of nearly every U.S. transit route on a single charge. With unmatched durability and energy efficiency based on rigorous U.S. certification testing, Proterra’s products are designed, engineered, and manufactured in America, with offices in Silicon Valley, South Carolina, and Los Angeles.

Source: Company discussions and website
Seeq

Management
Steve Sliwa (Co-Founder, CEO)
Brian Parsonnet (Co-Founder, CTO)
Michael Risse (CMO)
Tammy Martin (CFO)
Mark Derbecker (VP, Engineering)
Jon Peterson (VP, Product & Customers)

Location
Seattle, Washington

Founded
2013

Revenues
$5m - $10m

Employees
50 - 75

Funding Rounds
Series A - $11M
Series B - $23M

Key Investors
Second Avenue Partners
Altira Group
Next47
Chevron Technology Ventures

Board Members
Pete Higgins
Cameron Myhrvold
J.P. Bauman
Steve Sliwa
Brian Parsonnet

Company Description
Seeq provides insight to process manufacturing companies in a variety of industries. The company follows agile software development techniques which rely on frequent customer touches, demonstrations, and reviews. As a result, Seeq customers have a shorter time to useful features with a faster response cycle to customer input and requests. Seeq is supported by a broad set of process automation vendor partnerships including OSIsoft, Honeywell, and Siemens, and by system integrators for sale licensing and services around the globe. In support of the industry’s transition to cloud-based platforms, Seeq recently expanded its offerings to include solutions delivered via software as a SaaS offering on Microsoft Azure to address customer interest in cloud-based analytic solutions.

Source: Company discussions and website
Sentient Energy

Management
Michael Bauer (Founder, President & COO)
James Keener (CEO)
Venkat Bahl (CRO)
Konda Anki Reddyapalli (CTO)
Mark Sloan (EVP Engineering)

Key Investors
Foundation Capital
Clear Sky Power and Technology Fund
GE Ventures
KCK Group

Company Description
Sentient Energy helps to make power delivery safe, reliable, and solar-ready. The company provides the Grid Analytics System, which allows customers to cover their power distribution networks with easily deployable intelligent sensors for the entire distribution grid, overhead feeders, laterals, and underground, and is supported by powerful analytics. The result is a much-improved ability to identify and analyze potential faults, failures, and other distribution grid events. Sentient Energy partners with leading utility network providers including Silver Spring Networks, Landis + Gyr, Cisco, and AT&T to deploy its RF mesh-based line sensor network. Founder and president Michael Bauer brings a background in both power distribution and broadband communications technology to Sentient.

Source: Company discussions

Location
Burlingame, California

Founded
2009

Revenues
$25m - $50m

Employees
80

Funding Rounds
Apr. 2013 - $15M
Apr. 2015 - $7.5M

Board Members and Advisors
Steve Vassallo
sonnen

Management
Christoph Ostermann (Co-Founder, CEO)
Oliver Koch (COO)
Hermann Schweizer (CTO)
Torsten Stiefenhofer (Co-Founder, CINO)
Steffen Schneider (CFO)
Jean-Baptiste Cornefert (MD, sonnen eServices)

Location
Wildpoldsried, Germany

Founded
2010

Revenues
$25m - $50m

Employees
400-500

Funding Rounds
May 2018 - $71M
Oct 2016 - $65M

Key Investors
Envision Energy
GE Ventures
Inven Capital
Munich Venture Partners
Tomas Putter
SET Ventures
eCAPITAL Entrepreneurial Partners
Shell Ventures

Board Members and Advisors
[not disclosed]

Company Description
sonnen was founded with the belief that clean, affordable, and reliable energy for all is one of the greatest challenges of our time. The company has installed sonnenBatterie systems worldwide with intelligent energy management solutions that provide greater energy control for residential and commercial customers. sonnen’s products enable customers to increase solar self-consumption, reduce peak energy usage and access reliable backup power during outages – contributing to a cleaner and more reliable energy future.

Source: Company discussions
SparkCognition

Management
Amir Husain (Founder, CEO)
Dr. Bruce Porter (CSO)
Suzanne Shifflet (CFO)
Usman Shuja (CCO)
Sridhar Sudarsan (CTO)
Vijay Doradla (CBO)

Location
Austin, Texas

Founded
2013

Revenues
>$30m

Employees
260

Funding Rounds
Series A - $16M
Series B - $56.5M

Key Investors
Alameda Ventures
Verizon Ventures
Boeing HorizonX Ventures
Pankaj Patel
CME Ventures LLC
JC2 Ventures
Invenergy Future Fund
MSD Capital LP
The Entrepreneurs’ Fund
Brevan Howard Investments Holding Ltd.

Board Members and Advisors
Steve Nordlund (Chairman)
Amir Husain
John R. Allen
Pankaj Patel

Company Description
SparkCognition builds artificial intelligence systems to advance the most important interests of society across the globe. SparkCognition builds human-level intelligence applied at machine scale. This allows customers to analyze complex data, empower decision making, and transform human and industrial productivity. With SparkCognition’s leading-edge artificial intelligence platforms, clients can adapt to a rapidly changing digital landscape and accelerate their business strategies.

Source: Company discussions
Spirae

Management
Sunil Cherian (CEO)
Julie Zinn (COO)
Oliver Pacific (CTO)

Location
Fort Collins, Colorado

Founded
2002

Key Investors
NRG Energy
Avista

Employees
70

Revenues
$10m - $15m

Funding Rounds
[not disclosed]

Board Members and Advisors
Sunil Cherian
Dennis Arfmann
Kevin Berkemeyer
Ed Schlecht

Company Description
Spirae’s Wave control platform provides a dynamically scalable architecture for integrating and managing high levels of renewable and distributed energy resources (DER) at the edge of the grid. Spirae’s Wave distributed energy resource management system (DERMS) includes peak shaving, energy shifting, virtual power plant, facility management, and real-time microgrid features, such as import-export, transition to island, spinning reserve management, and resynchronization. Wave insight and intelligent algorithms allow customers to monetize multiple DER value streams from end-use optimization to energy market participation.

Source: Company discussions

Spirae Wave is a technology platform that harnesses the power of distributed energy resources to create new value for utilities, service providers, and energy consumers.
Stem

Management
John Carrington (CEO)
Larsh Johnson (CTO)
Bill Bush (CFO)
Mark Triplett (COO)
Alan Russo (SVP, Global Sales & Marketing)
Patti Lusk (VP, Human Resources)

Location
Millbrae, California

Founded
2009

Revenues
[not disclosed]

Employees
160

Funding Rounds
Series A: $10.2M (2012)
Series B: $15M (2013)
Series C: $68M (2015 and 2016)
Series D: $200M (2018)

Key Investors
Angeleno Group
Iberdrola
GE Ventures
Mithril Capital Management
Total Energy Ventures
BNP Paribas
Temasek
Starwood Energy Group Global
Ontario Teachers Pension Plan

Greener Capital
Constellation Energy
Mitsui & Co.
RWE AG
Activate Capital
Magnesium Capital

Board Members and Advisors
Zeb Rice
David Buzby
Go Mizoguchi
Paul Leggett
Jorge Acevedo
Catherine Wainwright
Anup Jacob
Olivia Steedman

Company Description
Stem markets services focused on how energy is distributed and consumed, utilizing digitally connected energy storage technology. The company’s analytics platform optimizes the value of customers’ energy assets and facilitates participation in energy markets, yielding economic and societal benefits while decarbonizing the grid. The company provides energy storage services with no upfront cost and without disruption to existing services for commercial and industrial customers. Stem’s customer-sited energy storage network also provides utilities and grid operators with a fast-acting virtual power plant when it is needed most.

Source: Company reports and website
Tendril

Management
Adrian Tuck (CEO)
Chris Black (COO)
Jaylene Kunze (CFO)
Jake Meier (CTO)

Location
Boulder, CO

Founded
2004

Revenues
[not disclosed]

Employees
100-150

Funding Rounds
[not disclosed]

Key Investors
Engie
Good Energies
next47
SunPower
VantagePoint Capital Partners

Board Members and Advisors
[not disclosed]

Company Description
Tendril’s data analytics on more than 123 million homes creates new business opportunities for any product or service provider connected to the home. Today, this includes electric and gas utilities, energy retailers and real estate professionals. Built over more than a decade, the Tendril Platform delivers real-time, ever-evolving data about the home and how people use energy in it. These rich insights help customers improve customer acquisitions, increase engagement and orchestrate home energy experiences.

Source: Company discussions
Thor Trucks

Management
Dakota Semler (Co-Founder, CEO)
Giordano Sordoni (Co-Founder, COO)
Pri Balekai (CPO)
Alex Coates (SVP, Finance)
Saleh Mirheidari (VP, Software)

Location
North Hollywood, CA

Founded
2016

Revenues
<$1m

Employees
38

Funding Rounds
[self-funded to date]

Key Investors
[self-funded to date]

Board Members and Advisors
[not disclosed]

Company Description
Thor recently entered the commercial electric vehicle market, with operating prototypes in both the class 8 segment and class 6 delivery truck markets. More recently, Thor announced a partnership with Wiggins Lift Company to supply Thor’s lithium ion battery technology for eBull, the first zero-emission forklift manufactured in the United States. The wide availability of key components has allowed Thor to assemble a drivetrain consisting entirely of third-party parts. This has allowed Thor to act as a systems integrator rather than a manufacturer, although the company does retain substantial proprietary capabilities in the battery pack. While servicing and support can be complex, Thor is well positioned given its team’s substantial background in truck fleet operations. When combined with fuel and maintenance savings, the TCO analysis works well for electric class 8 trucks being used for short-haul traffic, where Thor will compete directly with Tesla’s 300-mile offering.

Source: Company discussions
T-REX

Management
Benjamin Cohen (Chairman & CEO)
Arad Shaiber (CTO)
Scott Miller (CBDO)
Dina Utberg (Director, Operations)

Location
New York, New York

Founded
2012

Revenues
<$5m

Employees
27

Funding Rounds
Nov. 2016 - $10M
Jan. 2014 - $4M

Key Investors
Ecosystem Integrity Fund
Safeguard Sciences
Innogy Venture Capital
Partnership Fund for New York City

Board Members and Advisors
Donna Milrod
Andy Brown
John Olert
Santiago Suarez

Company Description
T-REX is a leading provider of managed data services and enterprise software for renewable energy and other complex asset classes. Built to empower efficient finance, the company’s SaaS-based solutions suite helps unlock liquidity by lowering capital costs and mitigating risk associated with issuing and investing in complex assets. T-REX’s clientbase includes a global set of investors, bankers, and financial professionals.

T-REX’s solutions are able to effectively bridge the gap between asset originators and end investors, automating workflow and enhancing transparency, collaboration, compliance, and security across the entire investment cycle. T-REX creates significant investment opportunities for the hundreds of billions of dollars of capital across various complex, non-commoditized asset classes and has been used to facilitate almost $5 billion in issuance since 2016.

Source: Company discussions
Trilliant

Management
Andy White (CEO)
David Woodworth (CFO)
Christopher Bull (Global Delivery Executive)

Location
Cary, North Carolina

Founded
1985

Revenues
>$100m

Employees
250

Funding Rounds
Series B - $106M
Series A - $40M

Key Investors
ABB Technology Ventures
Zouk Capital
GE Ventures
Hercules Capital
VantagePoint Capital Partners
MissionPoint Capital Partners
Investor Growth Capital
UMC Capital

Board Members and Advisors
[not disclosed]

Company Description
Trilliant empowers the energy industry with the only purpose-built communications platform that enables utilities and cities to securely and reliably deploy any application on one powerful network. Trilliant specializes in connecting mission critical assets and has a platform that lays the foundation for smart cities, smart grid, smart metering and IIoT applications. With deployments in developed and emerging markets, Trilliant is the global leader in technology, know-how, and experience in the market.

Source: Company website, I3 Connect
Velodyne LiDAR

Management
David Hall (Founder & CEO)
Bob Brown (CFO)
Marta Thoma Hall (President, CBDO)
Mike Jellen (President, CCO)
Anand Gopalan (CTO)
Rick Tewell (COO)

Location
San Jose, California

Founded
1983

Revenues
$182m

Employees
500

Funding Rounds
Aug. 2016 - $150M

Key Investors
Ford Motor Company
Baidu

Board Members and Advisors
[not disclosed]

Company Description
Velodyne is a technology company known worldwide for its real-time 3D LiDAR computing and software platforms. The company evolved after founder David Hall invented the HDL-64 Solid-State Hybrid LiDAR sensor in 2005. Since then, Velodyne LiDAR, Inc. emerged as the unmatched market leader of real-time 3D vision systems used in a variety of commercial applications including autonomous vehicles, vehicle safety systems, mobile mapping, aerial mapping, and security. Its products range from the high-performance, surround view Ultra-Puck™ VLP-32, classic HDL-32/64 and cost-effective VLP-16, the new VLS-128, to the upcoming, hidden Velarray™. Velodyne’s rich suite of perception software and algorithms are the key enablers of its perception systems.

Source: Company discussions and website
View

Management
Dr. Rao Mulpuri (CEO)
Rahul Bammi (CBO)
Dr. Robert Rozbicki (CTO)
Bob Grier (SVP, Operations)
Mark Mendenhall (CCO)

Location
Milpitas, California

Founded
2006

Revenues
$25m-$100m

Employees
300

Funding Rounds
2018 - $1.100M
2017 - $200M
2017 - $100M
2015 - $150M
2013 - $100M
2012 - $55M
2011 - $40M
2010 - $30M

Key Investors
SoftBank Vision Fund
Blackrock
TIAA Investments
NZ Super Fund
Bain Capital
Madrone Capital Partners

Board Members and Advisors
Dr. Rao Mulpuri
Nigel Gormly
Chip Hambo
Harold Hughes
Tom Leppert
Tom Patterson

Company Description
View manufactures View Dynamic Glass, a new generation of dynamic glass windows that let in natural light and views while enhancing mental and physical well-being by significantly reducing headaches, eyestrain, and drowsiness. In addition, View’s windows reduce glare and heat, improving the energy efficiency of buildings by up to 20 percent. View’s windows are digital, connected, and can be controlled from anywhere, including your smart phone – no blinds or shades required.

Source: Company discussions
Vigilent

Management
Dave Hudson (CEO)
Clifford Federspiel (President, CTO)
Dave Lynch (CFO)

Location
Oakland, California

Founded
2008

Revenues
$10m-$25m

Employees
60

Funding Rounds
Mar 2013 - $6.7M

Key Investors
Accel Partners
Telus Ventures
NTT

Board Members and Advisors
[not disclosed]

Company Description
Vigilent uses artificial intelligence to deliver dynamic cooling management in mission-critical environments. Vigilent reduces operating costs, unlocks stranded capacity, and increases reliability across hundreds of data center and telecom facilities worldwide. Today, Vigilent counts among its customers some of the world’s largest telecommunications, data center colocation, enterprise, government, and Internet organizations, including Avnet, Digital Realty, Hutchison, NTT, State of California, Spark, TELUS and Verizon. The company has achieved global reach via direct sales, strategic OEM, and distribution partnerships, and has hundreds of deployments worldwide.

Source: Company website
Vivint Smart Home

Management
Todd Pedersen (Founder, CEO)
Alex Dunn (President)
Mark Davies (CFO)
Scott Hardy (COO)
Todd Santiago (CRO)
Matt Eyring (Chief Strategy and Innovation Officer)

Location
Provo, Utah

Founded
1999

Revenues
>$1B

Employees
12,000

Funding Rounds
2012 – Acquired by Blackstone for $2.1B

Board Members and Advisors
Todd Pedersen
Joe Tibbetts
Alex Dunn
Peter Wallace
David D'Alessandro
Paul Galant
Bruce McEvoy
Jay Pauley

Key Investors
Blackstone Group
Peter Thiel

Company Description
Vivint Smart Home is a leader in smart home technology. Vivint delivers an integrated smart home system with in-home consultation, professional installation and support delivered by its Smart Home Pros, as well as 24/7 customer care and monitoring. Dedicated to redefining the home experience with intelligent products and services that range from safety and security to home automation devices, Vivint currently serves more than 1.4 million customers across North America. The end result is a smart home solution that saves time and money, and ultimately simplifies everyday life.

Source: Company discussions
ZPower

Management
Ross E. Dueber, Ph.D. (President & CEO)
Dennis J. Dugan (CFO)
Herbert Y. Weigel II (COO)
Anson W. Martin (CCO)
Nitin Ameja (CIO)
Barry A. Freeman, Ph.D. (VP, Business Development)
Damon Mikoy (VP, Quality & Regulatory Affairs)

Key Investors
No recent equity funding

Location
Camarillo, California

Founded
1996

Revenues
$50m

Employees
400

Funding Rounds
No recent equity funding

Board Members and Advisors
Arthur N. Budge, Jr.
Charlie McBride
Steve Shane
Roberta Jean Smith
Norman G. Einspruch (advisor)
Gene Meieran (advisor)

Company Description
ZPower develops rechargeable, silver-zinc batteries for microbattery applications. ZPower batteries offer high energy density and operate safely and effectively. ZPower’s first commercial application is the rechargeable system for hearing aids, and most of the major hearing aid manufacturers, including Sonova, William Demant, Starkey, GN Hearing, and Medtronic, offer select products with ZPower batteries. In 2018, ZPower expanded into the consumer electronics market with the launch of noise-masking sleepbuds by Bose. As devices get smaller, more sophisticated and hungrier for energy, ZPower is positioned to meet the demands of developers and innovators across the spectrum of business, manufacturing and engineering.

Source: Company discussions
ZincFive

Management
Tim Hysell (Co-Founder, CEO)
Dan Sisson (Co-Founder, VP Research/Innovation)
Jim Cruckshank (CFO)
Tod Higinbotham (President - Systems Division)
Larry Eggleston (President - Solutions Division)

Location
Portland, Oregon

Founded
2016

Revenues
[not disclosed]

Employees
110

Funding Rounds
Oct. 2018 - $21M
Aug. 2016 - $3M

Board Members and Advisors
Bob Powell – Brightmark Energy
Marc Van Den Berg – DBL Partners
Tim Hysell – ZincFive
Jeff Bornstein – Whipstick Ventures (advisor)
Ron Hynes – Whipstick Ventures (advisor)

Key Investors
DBL Partners

Company Description
ZincFive is the world leader in innovation and delivery of nickel-zinc battery-based energy storage and delivery solutions for mission critical applications in data centers, intelligent transportation, motive power, and other industries. With 95 patents awarded, ZincFive leverages nickel-zinc chemistry within its solutions to provide high power density and performance simultaneously with superior safety and environmental advantages. Over 150 departments of transportation have adopted ZincFive uninterruptible power supply solutions which have achieved over 15 million battery operational hours in the field. Their long operating life, compact size and wide operating temperature range make nickel-zinc batteries ideal for a broad range of indoor and outdoor mission critical applications. ZincFive has operations in the U.S. and China and is establishing nickel-zinc as only the fifth rechargeable battery to scale commercially on a global basis.

Source: Company discussions
ZOLA Electric

Management
Xavier Helgesen (Co-Founder, CEO)
Bill Lenihan (Co-CEO)
Joshua Pierce (Co-Founder, CTO)
Thor Muller (CIO)
Guido Frantzen (CFO)

Location
San Francisco, California

Founded
2012

Revenues
$50m+

Employees
500 - 1,000

Funding Rounds
2017 - $55M
2015 - $25M

Key Investors
DBL Partners
Tesla
Vulcan Capital
Helios Investment Partners
GE Ventures

Board Members and Advisors
Lyndon Rive (Chairman)
Nancy Pfund
Tope Lawani
Samer Salty
Steve Hall
Xavier Helgesen
Joshua Pierce

Company Description
ZOLA Electric (formerly Off Grid Electric) is the leading renewable energy brand in Africa, and helps customers to light their homes, power small businesses, and to stay connected and expand opportunities for work and study. By providing solar technology that is affordable, accessible and reliable, ZOLA Electric’s offerings allow the average home or business to leapfrog the grid. ZOLA Electric designs renewable energy solutions based on the latest in solar, battery and power electronics technology. Adaptable to energy need and income, the company offers its services on a pay-as-you-go basis via mobile money. Currently, ZOLA serves over one million people and has 200K systems installed across four African countries.

Source: Company discussions and website
Joseph A. Osha
Managing Director and Senior Research Analyst
josha@jmpsecurities.com
415.835.8998

Joseph Osha joined JMP in May 2016 and serves as the Managing Director and Senior Research Analyst providing research coverage for the Industrial & Energy Technology sectors.

Prior to joining JMP Securities, Mr. Osha served as chief financial officer of two alternative energy start-ups, Greenfire Energy and Gravity Renewables. Mr. Osha previously spent 18 years at Bank of America Merrill Lynch, where he was a senior semiconductor analyst for a decade, winning recognition in rankings produced by Institutional Investor, The Wall Street Journal, and Bloomberg. More recently, he served as the firm's Deputy Head of Americas Equity Research, Head of Alternative Energy Research, and Head of Asia ex-Japan Equity Research.

Mr. Osha started at Bank of America Merrill Lynch as a senior electronics analyst based in Tokyo after beginning his equity research career as an analyst at Baring Securities Japan. He holds an MBA and an MA in East Asian Studies from the University of Michigan and a BS from the University of Richmond. He is a Chartered Financial Analyst.
## COVERED COMPANIES MENTIONED

<table>
<thead>
<tr>
<th>Company</th>
<th>Ticker</th>
<th>Rating</th>
<th>Price Target</th>
<th>Analyst</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tesla, Inc.</td>
<td>TSLA</td>
<td>MO</td>
<td>$412</td>
<td>Joseph Osha</td>
</tr>
</tbody>
</table>
INDUSTRIAL & ENERGY TECHNOLOGY

JMP FACTS AND DISCLOSURES

Analyst Certification:
The research analyst(s) who prepared this report does/do hereby certify that the views presented in this report are in accordance with my/our personal views on the securities and issuers discussed in this report. As mandated by SEC Regulation AC no part of my/our compensation was, is or will be directly or indirectly related to the specific views or recommendations expressed herein. This certification is made under the obligations set forth in SEC Regulation AC. Any other person or entity may not use it for any other purpose. This certification is made based on my/our analysis on the date of this report’s publication. I/We assume no obligation to update this certification to reflect any facts, circumstances or events that may subsequently come to my/our attention. Signed Joseph Osha and Hilary Cauley

JMP Securities Disclosures:
JMP Securities expects to receive OR intends to seek compensation for investment banking services from Tesla, Inc. in the next 3 months

JMP Securities Investment Opinion Definitions:
Market Outperform (MO): JMP Securities expects the stock price to outperform relevant market indices over the next 12 months.
Market Perform (MP): JMP Securities expects the stock price to perform in line with relevant market indices over the next 12 months.
Market Underperform (MU): JMP Securities expects the stock price to underperform relevant market indices over the next 12 months.

JMP Securities Research Ratings and Investment Banking Services: (as of November 12, 2018)

<table>
<thead>
<tr>
<th>JMP Rating</th>
<th>Regulatory Equivalent</th>
<th># Co's Under Coverage</th>
<th>% of Total</th>
<th>Regulatory Equivalent</th>
<th># Co's Under Coverage</th>
<th>% of Total</th>
<th># Co's Receiving IB Services in Past 12 Months</th>
<th>% of Co's With This rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARKET OUTPERFORM</td>
<td>BUY</td>
<td>262</td>
<td>59.68%</td>
<td>BUY</td>
<td>262</td>
<td>59.68%</td>
<td>77</td>
<td>29.39%</td>
</tr>
<tr>
<td>MARKET PERFORM</td>
<td>HOLD</td>
<td>155</td>
<td>35.31%</td>
<td>HOLD</td>
<td>155</td>
<td>35.31%</td>
<td>21</td>
<td>13.55%</td>
</tr>
<tr>
<td>MARKET UNDERPERFORM</td>
<td>SELL</td>
<td>3</td>
<td>0.68%</td>
<td>SELL</td>
<td>3</td>
<td>0.68%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>COVERAGE IN TRANSITION</td>
<td></td>
<td>16</td>
<td>3.64%</td>
<td></td>
<td>16</td>
<td>3.64%</td>
<td>1</td>
<td>6.25%</td>
</tr>
<tr>
<td>RATING SUSPENDED</td>
<td></td>
<td>0</td>
<td>0.00%</td>
<td></td>
<td>0</td>
<td>0.00%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>TOTAL:</td>
<td></td>
<td>439</td>
<td>100%</td>
<td></td>
<td>439</td>
<td>100%</td>
<td>99</td>
<td>22.25%</td>
</tr>
</tbody>
</table>

Stock Price Chart of Rating and Target Price Changes:
Note: First annotation denotes initiation of coverage or 3 years, whichever is shorter. If no target price is listed, then the target price is N/A. In accordance with NASD Rule 2241, the chart(s) below reflect(s) price range and any changes to the rating or price target as of the end of the most recent calendar quarter. The action reflected in this note is not annotated in the stock price chart. Source: JMP Securities.
JMP Disclaimer:
JMP Securities LLC (the “Firm”) compensates research analysts, like other Firm employees, based on the Firm’s profitability, which includes revenues from the Firm’s institutional sales, trading, and investment banking departments as well as on the quality of the services and activities performed that are intended to benefit the Firm’s institutional clients. These data have been prepared by JMP Securities LLC for informational purposes only and are based on information available to the public from sources that we believe to be reliable, but we do not guarantee their accuracy or completeness. Any opinions and projections expressed herein reflect our judgment at this date and are subject to change without notice. These data are neither intended nor should be considered as an offer to sell or a solicitation or a basis for any contract for the purchase of any security or other financial product. JMP Securities LLC, its affiliates, JMP Group LLC, Harvest Capital Strategies LLC, and their respective partners, directors, officers, and associates may have a long or short position in, may act as a market maker for, or may purchase or sell a position in the securities mentioned herein. JMP Securities LLC or its affiliates may be performing, have performed, or seek to perform investment banking, advisory, or other services and may have acted as manager or co-manager for a public offering of securities for any company mentioned herein. The reader should assume that JMP Securities LLC will solicit business from the company covered in this report. Members of our Sales and Trading Department provide oral and/or written market opinions and trading strategies to our clients that reflect their personal opinions about stocks that are the subject of the firm’s research reports. Our research analysts discuss trading strategies with clients that sometimes reflect short-term expectations for the price of the securities that are the subject of research reports. These trading strategies are distinct from the analysts’ fundamental rating for the stock, which is based upon the analysts’ view compared to other stocks under coverage for the relevant time period. © Copyright 2018. All rights reserved by JMP Securities LLC. JMP Securities LLC is a member of FINRA, NASDAQ, and SIPC.
## RESEARCH PROFESSIONALS

### FINANCIAL SERVICES

**Alternative Asset Managers**
- Devin Ryan (212) 906-3578
  - Brian McKenna (212) 906-3546

**Commercial & Specialty Finance**
- Christopher York (415) 835-8965
  - Thomas Wenk (415) 835-8962

**Consumer Finance**
- David M. Scharf (415) 835-8942
  - Jeff Zhang, CFA (415) 835-8948

**Financial Processing & Outsourcing**
- David M. Scharf (415) 835-8942
  - Jeff Zhang, CFA (415) 835-8948

**Insurance**
- Matthew J. Carletti (312) 768-1784
  - Karol Chmiel (312) 768-1786

**Investment Banks & Brokers**
- Devin Ryan (212) 906-3578
  - Brian McKenna (212) 906-3545

**Mortgage Finance**
- Steven C. Delaney (212) 906-3517
  - Chris Muller (212) 906-3559
  - Trevor Cranston, CFA (415) 869-4431
  - Mikhail Goberman (212) 906-3543

### HEALTHCARE

**Biopharma**
- Donald Ellis, PharmD (212) 906-3507
  - Nazibur Rahman (212) 906-3519

**Biotechnology**
- Lilasa A. Bayko (312) 768-1785
  - Jonathan Wolleben (312) 768-1788
  - Jason N. Butler, PhD (212) 906-3505
  - Roy Buchanan (212) 906-3509
  - Konstantinos Aprilakis, MD (212) 906-3503
  - Simon J. Gruber, PhD (212) 906-3536
  - Jonathan Helander, PhD (212) 906-3540

**Healthcare Services & Facilities**
- Peter L. Martin, CFA (415) 835-8904
  - Jonathan Freed (415) 835-8908

### Medical Devices & Supplies
- David Turkaly (212) 906-3563
  - Daniel W. Stauder (212) 906-3535

### REAL ESTATE

**Housing & Land Development**
- Peter L. Martin, CFA (415) 835-8904
  - Aaron Hecht (415) 835-3963
  - Doug Hansen (415) 835-8934

**Property Services**
- Mitch Germain (212) 906-3546
  - Corey DeVito (212) 906-3525

**Residential Services**
- Aaron Hecht (415) 835-3963

**REITs: Healthcare & Specialty**
- Peter L. Martin, CFA (415) 835-8904
  - Jonathan Freed (415) 835-8908

**REITs: Diversified, Industrial, Office, & Retail**
- Mitch Germain (212) 906-3546
  - Corey DeVito (212) 906-3525

**REITs: Residential**
- Aaron Hecht (415) 835-3963

### TECHNOLOGY

**Energy Technology & Services**
- Joseph Osha (415) 835-8998
  - Hilary Cauley (415) 835-8996

**Industrial Technology**
- Erik Suppiger (415) 835-3918
  - Michael Berg (415) 835-3914

**Cybersecurity, Data Management & Comm Infrastructure**
- Ronald V. Josey III (212) 906-3528
  - Mike McGovern (415) 835-8916
  - David Yueh (415) 835-3957

**Internet & Digital Media**
- Patrick Walravens (415) 835-8943
  - Mathew Spencer (415) 835-8930
  - Joe Goodwin (415) 869-4477
  - Peter Lowry (415) 869-4419

### ADDITIONAL CONTACTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas R. Wright</td>
<td>Director of Equities</td>
<td>(212) 906-3599</td>
</tr>
<tr>
<td>Charles Sweeney</td>
<td>Director of Sales &amp; Trading</td>
<td>(212) 906-3573</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>