DOUGHERTY & COMPANY LLC
Equity Research

Industrial

June 5, 2015

Tesla Motors

TSLA - NASDAQ

Rating: Buy
Price Target: $355.00
Reason for Report: Price Target Change

Tesla Energy analysis & deep dive for non-physicists: Raising PT to $355

Investment Conclusion:
Early on in our coverage of Tesla Motors, we posited that this technology company could drive forward human evolution, because harnessing the sun's energy represents humanity's next great leap forward.

In April, after three years of operating Tesla Energy in somewhat stealth mode, Tesla unveiled two energy storage products, and it appears that the company intends to do exactly that. CEO Elon Musk asserted that it is possible to power the entire world's energy needs by harnessing solar energy and storing it. Tesla would provide the "storage," which has been the missing piece of the solar puzzle.

But how to value the opportunity? After speaking with a dozen experts and companies in this space, as well as conducting a nationwide survey of 30 solar panel installers, we believe that Tesla's entry into the grid storage market disrupts it. Tesla's primary advantage is in offering a turn-key solution, at scale and at favorable costs.

Our new sum-of-the-parts price target is $355, which comprises $330 for the automotive business and $25 for the energy storage business.

Key Points:
Goals for this research report:

1. Update our price target to reflect a sum of the parts, with 93% of our price target tied to the auto business and 7% tied to the energy business.
2. Advance the body of research on Tesla Energy, helping investors and ourselves to become more sophisticated thinkers about the space.
3. Assist investors in getting their arms around the storage market as it exists today and grasp how Tesla is changing that market.
4. Illustrate why we believe that Tesla's first mover advantage in energy dwarfs its lead in electric vehicles.

Bottom line up front: Our new sum-of-the-parts price target is $355, which includes $330 for the automotive business and $25 for the energy storage business.

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Changes	Previous	Current
Price Target	$325.00	$355.00
Jun '15 Revenues (MM)	$1,065.0	$1,064.8
Annual '15 Revenues (MM)	$5,620.1	$5,619.4
Annual '16 Revenues (MM)	$8,742.0	$8,741.0

Price	$245.92
52 Week Range	$181.40 - $291.42
Mkt Cap (MM)	$31,085
EV (MM)	$32,160
Shares Out (MM)	126.4
Pub Mkt Float (MM)	96.3
Avg Daily Vol (000)	5,441
Short Interest %	20%
Long-term Growth	25%

EPS	FY 14A	FY 15E	FY 16E
Mar	$0.12	$(0.36)A	$0.61
Jun	$0.11	$(0.63)	$0.77
Sep	$0.02	$0.31	$0.87
Dec	$(0.13)	$0.95	$0.69
FY	$0.14	$0.39	$2.93
P/E	1,756.6x	630.6x	83.9x

Revenues (MM)	FY 14A	FY 15E	FY 16E
Mar	$713.0	$1,103.6A	$1,987.3
Jun	$857.5	$1,064.8	$2,185.3
Sep	$932.3	$1,490.8	$2,284.3
Dec	$1,095.6	$1,960.3	$2,284.3
FY	$3,598.5	$5,619.4	$8,741.0
EV/Sales	8.9x	5.7x	3.7x

Palo Alto-based Tesla Motors Inc. designs and sells electric vehicles and electric vehicle powertrain components. Its core products are the Tesla Roadster and the Model S sedan. Upcoming vehicles include the Model X, a cross-over based on the S platform, and Tesla's Gen 3 vehicle, slated for after 2015. We see four points as differentiators for Tesla. 1) Tesla is the first company to design an all-electric vehicle from the ground up, capturing key driving advantages of all-electric. 2) Tesla's battery IP is five-to-ten years ahead of its competition. 3) Tesla's manufacturing plant in Fremont, Calif. is a game-changer as it allows Tesla to make hundreds of thousands of vehicles per year and was purchased at about 5 cents on the dollar. 4) Tesla is pursuing a differentiated distribution strategy by putting its stores in high-traffic, high-end retail locations.

Analyst certification and disclosures begin on page 16

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Sum-of-the-parts estimates & assumptions:

Assumptions on the vehicle business	
Global market size for $48,000+ price point (units) (millions)	5
Tesla's Model 3 market share	7%
Global market size for $100,000+ price point	1
Tesla's Model S & X market share	15%
Additional capital raises Gigafactory and Model 3 (millions)	2,000
Long-term effective tax rate	22.5%
Conservative discount rate, based on automotive industry WACC of 8%	10%
Shares outstanding today (millions)	143.0
Additional share dilution	10.0
New diluted shares for calculating long term EPS	153.0
Model 3 units sold in 2020 (thousands)	350
Model 3 ASP	$45,000
Model S & X platform units sold in 2020 (thousands)	150
Model S ASP	$95,000

Tesla Motors -- 2020 cash income statement, auto business	
Auto business revenue (millions)	30,000
COGS	22,500
Gross Profit	7,500
Gross margin %	*25.0%*
Operating expenses	3,900
Operating income	3,600
Operating margin	*12.0%*
Interest expense	100
Income before tax	3,500
Net Income	2,713
EPS	17.73
Stock multiple	30
Stock valuation	$531.9
Net present value, discounted back from 2020 at WACC of 10%	**$330.2**

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Assumptions on the energy business	
Consumer residential	
Powerwall installations, globally, in units	80,000
Powerwall installations, in kWh at an average 9.5 kWh per home unit	760,000
Powerwall ASPs per kWh	$350
Commercial / Utility	
Powerpack installations in individual units. (Customers order 1 - 10+ units each.)	75,000
Powerpack installations, in KWh at an average 100 kWh per unit	7,500,000
Powerpack ASPs per kWh	$250
KWh of battery packs produced for vehicles @ Gigafactory	33,000,000
KWh of battery packs for storage	8,260,000
Storage production as a % of total Gigafactory output	20%
Check against Tesla's communication: Tesla has guided to annual Gigafactory production of 35 GWh of cell production and 50 GWh of pack production but is considering expanding capacity 50%. Tesla said it would have capacity for 15 GWh of stationary storage pack production, or 30% of total pack capacity. There's room to raise estimates, given TSLA's capacity projections.	

Tesla's 2020 cash income statement, storage business	
Storage business revenue (millions)	2,141
COGS	1,756
Gross Profit	385
Gross margin %	*18.0%*
Operating expenses	118
Operating income	268
Operating margin	*12.5%*
Income before tax	268
Net Income	207
EPS	1.36
Stock multiple	30
Stock valuation on the storage business	$40.7
Net present value, discounted back from 2020 at WACC of 10%	**$25.3**
Sum of the parts TSLA price target	**$355.5**

The rationale behind our estimates:

Our estimates do not have Tesla maxed out on storage capacity in 2020. There are two reasons for this. First, the market is changing rapidly and we have low visibility into how it will shape up, though after talking extensively with industry contacts, we are confident that Tesla will be a market leader.

Second, the market size is essentially every building in the world that consumes electricity, which is giant, but adoption rates will be tied to market forces including global solar installations growth, government regulations (globally), government incentives (globally), US national security investments, flexibility at the utilities, and macro-energy costs.

Given that the market potential is large, and that adoption is currently limited by cost and awareness, and that both of those will change with time, we hesitate to model aggressively on this segment. Costs and ASPs will come down, but adoption will increase accordingly.

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To strike a balance between the elasticity of adoption as prices come down, we have held ASPs steady in 2020 at a lower adoption rate, knowing that prices may fall and volumes might be higher.
We believe our Tesla Energy estimates are prudent and we leave room to raise them. In 2020, we are modeling 80,000 Tesla Powerwall (residential) installations and 75,000 Powerpacks (commercial/grid) sold. We believe this is a reasonable *global estimate*, given that about 645,000 homes and businesses already have solar installations today in the US alone, according to the Solar Energy Industries Association. The number of US residential homes with solar grew from 30,000 in 2006 to 400,000 in 2013 and should be 900,000-to-3.8mm in 2020, according to the US. Dept. of Energy's outlook. At the midpoint, this represents an average of 390,000 new installations per year over the next five years in the US alone. If we assume that the US is 1/3 of the global market (conservative given that the US falls behind Germany, China, Italy and Japan on pure solar capacity today), and we're seeing more than 1mm new solar installations per year in 2020, then Tesla storage systems would be installed on 8% of new residential solar applications, and that's not giving Tesla credit for retrofits of the existing solar install base. On commercial, we note that one factory or utility could install 10 Powerpacks or more, which implies that our actual *customer count* for 2020 is just 7,500. It's likely even less as grid/utility-scale installations will demand even more Powerpacks. That said, we believe it is prudent to model conservatively now and raise estimates later as we watch the market evolve.

Obviously, better-than-expected adoption would reflect favorably on our price target.

Tesla expects demand for battery packs (as measured in kilowatt hours) to be double that of the vehicles, long term. This implies eventual Tesla Energy revenues of more than $16 billion.

We expect initial gross margins in the energy business to be lower than the auto business, but operating margin and EBITDA should be comparable.

We expect Tesla to be a key player in this market. The question is how fast the industry will grow. Just like with electric vehicles, we believe that Tesla's very presence in this industry will speed its growth.

Analysis of the energy business:

Getting our arms around the energy storage business opportunity. We see three primary energy storage market growth drivers:

1. The growth of solar energy adoption.
2. Government regulations that help stabilize energy prices, require grid-back-up, and incentivize the usage of renewable fuels.
3. The desire to adopt more dispersed energy generation and solutions compared to the traditional hub-and-spoke grid, for the purposes of national security (for nations), as well as grid independence (for individuals and businesses), and cost savings (for individuals and businesses).

Tesla is entering three markets: The energy storage market can be divided into three segments: residential, commercial and utility/ grid-scale applications.

For this research note, we define the markets as such:

- < 10 kWh Residential
- 100 kWh+ Commercial
- 1 MWh+ Utility/Grid-scale applications

All three markets are growing. Dougherty Research, IHS and Green Tech Media Research predict the global market will grow threefold in the next year, with Utility/Grid seeing the biggest growth (6x) and residential the smallest (2x).

Tesla's Powerwall and Powerpack products will allow it to play in all three segments.

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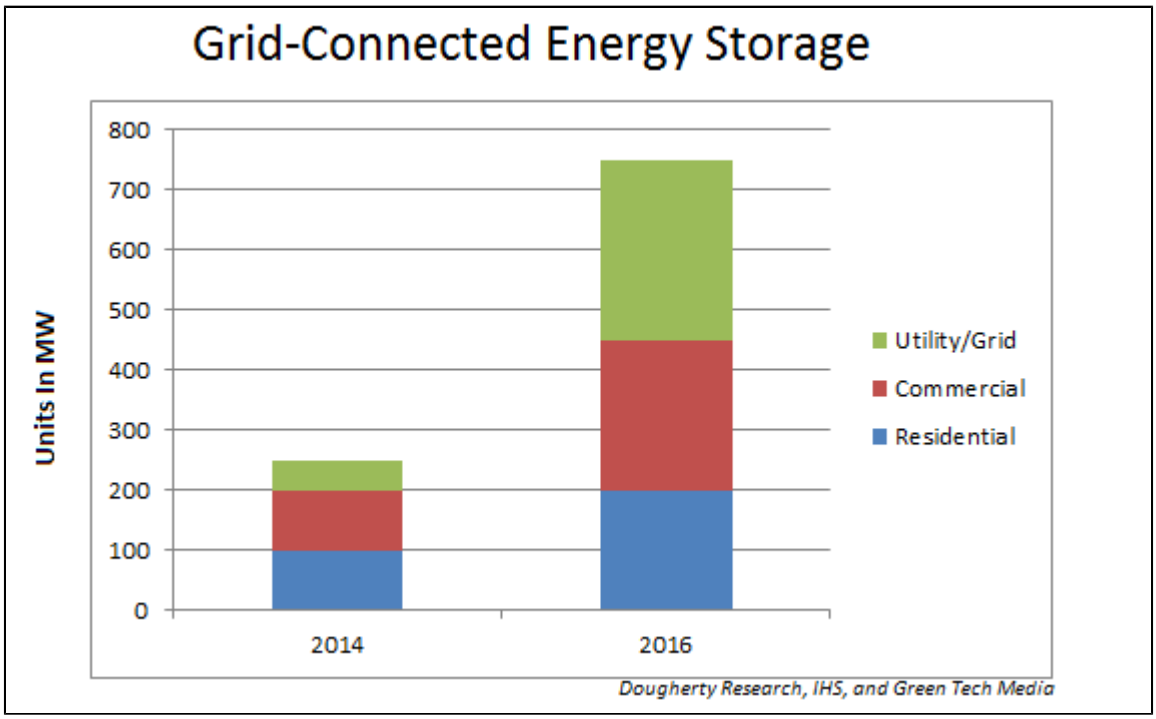

Market #1: < 10 kWh Residential

The residential market will be small in dollars but large in a disruptive sense. Bearish commentary on residential is overblown: Much of the public discussion around Tesla's entry into energy storage has focused on the residential market. For context on our price target, *all of Tesla's Energy business* accounts for $25, or 7% of the value of our price target. The residential installation market accounts for $5, or *just 1% of our price target.*

Tesla management expects the residential piece of Tesla's energy business to be one-fifth to one-tenth of Tesla's total presence in energy storage.

The challenges raised regarding the residential market, particularly the economics in the US, are real.

However, the focus in the unveiling of Tesla Energy on residential did something critical: It sparked the imagination of everyday consumers on a topic that was rarely discussed with any interest prior.

That public relations push is catching the attention of the true consumers of the energy products: Commercial and grid-level customers.

Key topics of discussion:

- **Net metering:** When bears want to criticize Tesla Energy, this is the first arrow pulled from the quiver.
    - **How net metering works:** The average American household consumes 30 kWh of electricity per day, with an average monthly bill of $110. A typical California or Australian home could have a 3 kilowatt system with photovoltaic (PV) panels that pull in ~12 kWh per day. With net metering, the electric bill would reflect 18 kWh of total consumption -- a net figure.
    - **With net metering, the electric grid *is the storage system*,** which mitigates the need to purchase in-home stationary battery storage. The home generates solar energy and in effect, sells it back to the grid.
    - **The United States is the only major market that uses net metering**. In other countries, such as Germany and Australia, a feed-in tariff system is used. Under a feed-in tariff scheme, a residence purchases electricity drawn from the grid. That residence sells back excess energy to the grid, but at a lower value than the residence pays to buy it. For example, it may cost €0.29/kWh to purchase electricity, but the grid will buy back solar-generated excess energy at just €0.12/kWh. This causes an incentive for consumers to *store their own energy* via a storage system rather than sell it back.
    - **Net metering will be phased out in the US:** Numerous industry experts indicated net metering may not stay the program of choice for the United States long-term. We believe that net metering options for residents are expected to decline in the coming years. Thus, the market for storage solutions in the US should evolve favorably. Solar energy and net metering causes grid instability, which we are already seeing in Hawaii. It's likely to be phased out.
    - **About 70% of energy storage sales globally are in Germany and Japan**. The fastest growing markets are the UK, Australia, and futher down the road, North America. Incentives and regulations drives sales in Germany and Japan. Tesla is already building up a team to target sales in international markets. Investors should note that any discussion about the residential market for Tesla Energy products that *does not include mention of Germany, Japan, Australia or the UK* is an irrelevant, misinformed discussion from the outset.

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- We expect Tesla's residential growth in Australia in the near-term to outpace US growth.

Market #2: 100 kWh+ Commercial

The commercial market is already viable. The math is already favorable for energy storage in the commercial segment in the United States, particularly because of *peak demand charges*. Peak demand charges occur when an energy customer has high bursts of energy usage. The fees are generated based on the highest energy consumption used in a 15-minute period.

Growth drivers:

- **Peak demand charges are costly:** Peak demand charges can comprise 30%-70% of a commercial customer's energy bill. Any electricity customer is susceptible to peak demand charges, but only a high-usage customer will incur charges. No residential customer would qualify. The charge is high because it is subsidizing the use of special power plants called peaker plants. (See Utility/ Grid section below for a deeper explanation.) All 50 states have demand charges. Demand charges are trending up while overall energy prices are sinking. Utilities cannot lower peak demand charges by much because these charges are the cost of having a grid that can support demand at its peak, even though that means that capacity goes unused during off-peak times of the year. In other words, the highest consumers of energy in a particular area bear the brunt of the cost of peak demand and they are highly incentivized to avoid those charges.
- **'Peak demand' is different than 'peak shaving':** Much has been made of 'peak shaving,' the practice of buying some power from the grid at night when rates are lower and running off batteries during peak hours when electricity prices can be higher. This is a practice several industry experts believe could be phased out by utilities if storage scales to a material amount. Still, in the early years, we believe that commercial facilities and factories will find value in battery storage for the purpose of peak shaving.
  - We note that the Tesla Factory in Fremont, Calif., is its own test case for peak shaving. Tesla buys electricity at night, stores it, and uses it during the day to offset peak load costs that are three-to-five times the night-time rate.
- **"Storage is the enabler of solar":** Storage is what will enable solar to continue to grow. Turning that phrase around, continued adoption of solar energy generation depends on storage solutions. This is another reason we remain bullish on the future of storage. A scaled storage solution enables the already growing solar energy industry -- which is a positive symbiotic relationship that should drive continuous growth and adoption of both.
  - Dougherty notes that SpaceX in Hawthorne has < 1 megawatt of solar array on the rooftop, as well as an 800 kilowatt, or 1,600 kilowatt hour, battery storage system.
- Known pilot customers in commercial include Walmart, Cargill, Amazon.com, Target, Jackson Family Wines and EnerNoc.
- **Tesla is winning big already in commercial in California:** Tesla has been dominating new wins for energy storage deployments in California. In California, Tesla is winning 80% market share of non-residential applications (as measured by megawatts). We estimate that in the past few years Tesla has won about 1,000 grid storage projects worth up to $200mm, net of cancellations. This does not include other states, and Tesla is just getting started. Based on state tax data, we calculate that Tesla's project win rate in 2014 in California was worth $120mm, though not all projects are completed.
  - The grid storage industry is already standing up and taking notice. A March 16 report from Greentech Media says, that "*Tesla has, by far, the largest share of interconnected energy storage deployments through (a California incentive program.) In the non-residential segment, of the 4.9 megawatts and 45 projects interconnected under the (California incentive program) regime, 3.9 megawatts and 20 projects were from Tesla; in the residential segment, Tesla has a smaller share, with 45 kilowatts out of a total 207 kilowatts. . . . What is more staggering is the massive pipeline of Tesla's approved projects under (this particular California incentive program) -- which stands at 35 megawatts non-residential and 1.7 megawatts residential (39 megawatts non-residential and 2.1 megawatts residential if we include projects that are still pending reservation).*"
    - Our source on this information is California's data on its Self-Generation Incentive Program, which provides grid storage application tax incentives. For the purposes of simple analysis, we assume that the value of the projects translates to Tesla revenue. We note that these projects can be sold over time and that some revenue may come in over an extended contract period so that the payments mirror the customer's cost savings. Also, the California tax incentive data is the only publicly available source of information that we've discovered so far, and thus does not capture the entire picture and thus, our analysis may underestimate the market opportunity.

Market #3: 1 MWh+ Utility/Grid-scale applications

Utility/Grid-storage growing the fastest: This is the fastest estimated growth area of the market and it's easy to see why. The same market forces that generate the peak demand charges are what will drive utilities, regions, and cities to build their own storage solutions.

Growth drivers:

- **Peaker plant usage and construction:** The grid needs to be able to provide energy on demand. That means when a peak on the grid arises, more energy needs to be produced quickly or else brownouts or failures will occur. To remedy this, utilities build "peaker plants" to take the load during bursts of demand. A peaker plant may be used a few times a day or a few times a week, depending on

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its location. These plants are expensive to build, and expensive to use and maintain. Because of the nature of needing to generate a lot of power quickly, efficient solutions such as coal, geothermal, and nuclear are not realistic. Most often, peaker plants are natural gas turbines, diesel or jet-fuel driven (think of a jet engine strapped to the ground). These are more costly to use to produce energy, but satisfy the need for a quick ramp on energy production.
    - It costs approximately $500 / kWh for installed capacity for a natural gas-fired peaker plant. Tesla is charging $250 / kWh. We believe that Tesla is seeing a lot of interest from utilities who hope to realize an immediate ROI benefit.

- **Tesla's product has advantages beyond cost.** The Tesla system is also quiet, better at frequency regulation, and can turn on faster than a peaker plant. The Tesla solution also scales better -- peaker plants are not economical below 50 MW.
- **Large amounts of solar energy causes grid instability:** When a small percentage of energy produced comes from solar, the grid can accept those peaks without problem. Experts say that when solar comprises 10% to 15% of total energy production at any given time, it can cause spikes that make the grid unstable. In Hawaii, when this occurred, regulators stepped in to limit the amount of energy put back into the grid at a given time. We expect regulators will limit solar energy well ahead of problems. The best solution to this problem is energy storage.
    - In Hawaii, solar is so popular that the grid is failing. Per a Bloomberg News article from December 2013: "*Solar installers here estimate that hundreds if not thousands of the state's residents are being put in solar limbo by a virtual moratorium on new connections in many parts of the company's service area. The reason, according to the Hawaiian Electric Co.: so many Hawaiians are stampeding to solar that circuits may become oversaturated, causing voltage spikes, damaging appliances, electronics and even the utility's equipment.*"
- **Tesla is already winning large utility clients**: In May, Tesla announced Irish renewable group Gaelectric is going to pilot a 1 MW utility scale grid storage battery system. Southern Co. also announced a pilot with Tesla energy storage. Enel Green Power, based in Italy, also announced a 1.5 MW deal. At launch, Tesla also announced clients of Advanced Microgrid Solutions, OnCor, Southern California Edison and AES.

Analyzing the ecosystem, including alternative chemistries and competition:

We'd initially set out to build a matrix that compares Tesla's Powerwall and Powerpack products against competing offerings, contrasting variables such as battery life, cycles supported, warranty and cost to manufacture. We wrongly assumed that Tesla's products had comparable competition.

Today, energy storage solutions are frankensteinian -- with jury-rigged batteries hooked up to converters and inverters, or commercial applications that are architected by a local installer, who picks and chooses individual components from different suppliers. Tesla's product is turn-key, all in, including the battery, inverter, DC-to-DC converter, thermal management system, and other software.

Key players are familiar: The key players should be familiar to Tesla investors. Panasonic (and thereby Tesla), LG Chem, Samsung SDI, and BYD are all players in the energy storage market now.

Emerging competitors focusing on materials innovation: Many of the emerging competitors -- who we include Aquion, Ambri, Enphase, EnerVault, Imergy, LightSail Energy, EOS Energy Storage, and Oxis Energy – are hoping to innovate in the materials used in batteries. Alternate technologies include liquid metal, compressed air, enhanced lithium-ion and lithium sulphur.

Tesla is commercializing already: Experts and competitors to Tesla agree that the enhanced lithium-ion blends are ready to be commercialized at scale now.

Tesla already has a turn-key solution: One of the signs of infancy in this market is the lack of a turn-key solution to install for energy storage. Installers now say when they quote a system, the installer must piece together a system. Tesla, they say, is one of the first to be truly turn-key. (Please see Batteries 101 Q&A below for more on competition.)

Our take on up-and-coming battery technologies: We believe that Tesla has evaluated every conceivable concept in chemical storage. While competitors have other technologies that may show promising numbers in labs, such as higher cycle lives, the question remains as to whether they can be commercialized properly.

Cell features have trade-offs. Optimizing a cell for one feature will diminish other features. There are at least a dozen critical features of a cell, so it's easy to claim big gains in a couple of areas *without considering all the trade-offs* in an automotive application or a storage application.

When one layers on the complexities of manufacturing, whereby Tesla needs extremely high consistency of millions of cells, a very low rejection rate (scrap cost), at a low production cost, we see huge gating factors that labs don't consider.

There are many claims on a superior chemistry. We believe that Tesla evaluates all chemistries and is still maintaining a market lead.

Does Tesla really have a proprietary advantage in producing battery packs?

Yes. Tesla does.

Logical follow-up questions are, "Why?" and "How?" Those are complicated questions that we ask industry experts all the time. The answers to these questions have formed the building blocks of our research on TSLA since 2010. It is not an exaggeration to say that the world's best battery experts flock to Tesla.

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The easy answer is continuous problem solving for more than decade, combined with the ability to hire the world's top talent in this space, the leadership of Elon Musk and JB Straubel, and a culture of iterative discovery. That's the easy answer.
We've pulled some of the Tesla patents over the years and can see that Tesla has been experimenting with battery cells in unique ways. But the broad answer isn't really in the patents but rather in how Tesla has figured out how to work effectively with thousands of battery cells at a time. Tesla has solved thousands of engineering problems through its proprietary thermal management software, its hardware, and the machines that Tesla designed to produce battery packs at scale.
Tesla has solved around the chemical engineering problems of the cells themselves as well as the mechanical, electrical and software engineering problems of converting those cells into modules and packs, and producing them at scale.
In the five years that we've covered Tesla, we believe the company has consolidated its lead.
Tesla is the largest buyer of li-ion cells in the world today and thus gets the best pricing on volume. Tesla has worked with Panasonic to optimize the cell chemistry for cost and maximize performance features. Tesla has reduced the higher cost elements from what is traditionally used in li-ion batteries.
When manufacturing at scale, there is more to consider than simply lab performance. The ability to create a consistent product, generating low scrap and scale with price efficiency is imperative. As Tesla has proven through automotive, this full context must be explored when considering competing technologies.
Tesla also benefits from having the world's largest database of battery performance, which is derived from its vehicle fleet.All Tesla products scale for both energy and power. The power (measured in kilowatts) of a battery pack is a function of the cells and the number of cells in a pack. Tesla's costs to produce energy storage (measured in kilowatt hours) is about half of the industry average. Cost per kilowatt hour is determined by the cells, packaging, software, thermal management and warranty, along with labor, overhead, and depreciation and amortization.These advantages are leading Tesla to disrupt the automotive business and now the company is disrupting the energy storage business as well. The question is, what will Tesla disrupt next?

Nationwide survey of 30 solar installers. Key findings:

- All surveyed install large commercial solar systems.
- None had done an energy storage install akin to what Tesla pitched in its April 30 unveiling of Tesla Energy.
- All do net metering. Some do net metering with generator backup.
- All 30 had received inquiries from commercial clients interested to learn more after Tesla's announcement.
- Some installers said they had done a few big energy storage projects, but those projects were impractical and expensive and make-shift, not turn-key. One said it had filled an entire garage with batteries.
- Solar installers are telling customers, regarding storage, "Don’t buy now. Just wait. This Tesla battery looks promising, but honestly, nothing else has been worth the cost at this point.”
- Some customers are offering deposits for the Tesla system. But installers had no guarantees as to when they would be able to deliver a Tesla storage solution.
- Quote: “The phone is ringing because of Tesla. We have a couple of clients who are always the early adopters. They’re interested.”

Tesla Energy's offerings: At a glance:

- Tesla introduced two new products on April 30.
  - 1) **Tesla Powerwall** is intended for the residential market. It is wall-mountable and comes in a 10 kWh weekly cycle and a 7 kWh daily cycle model.
    - The ASPs are $3,500 for the 10 kWh backup applications battery and $3,000 for the 7 kWh daily cycle applications battery.
    - The 10 KWh backup product is optimized for energy. The 7 KWh version is optimized for daily cycling and should see initial strong sales in Germany and Australia because of the feed-in tariff price structures in those countries.
    - It can be installed indoors or outdoors.
    - Deliveries begin this summer.
  - 2) **Tesla Powerpack** is a 100 kWh solution that can be layered together to provide gigawatt hours of energy.
    - 10,000 Powerpacks could power Boulder, Colo.
    - 160mm Powerpacks could power the United States.
    - 900mm Powerpacks would transition the world off of fossil fuel and onto solar energy.
    - If all power, including transit, were to come from solar energy, 2bn Powerpacks would be needed for 200,000 GWh of energy.
- We see Tesla's competitive advantage as coming from an entirely in-house design, with a manufactured turn-key solution that benefits from the simplicity of Tesla's electric vehicle battery pack design.

Background: Batteries 101:

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What's the difference between power and energy?

Energy measures potential to complete a task. *Power* measures how fast the task can be done.

Think of it in terms of an elevator. A battery may have enough energy to take the elevator up 10 floors. If it is high-powered, it can do the task in a few seconds. If it is low powered, it may take a minute. The energy defines how much work can be done. The power defines how much energy is integrated over time.

With electric vehicles, energy defines the range the car can drive. Power defines the rate of acceleration. The base constraint on an electric vehicle is the cost of range, and therefore cost per kWh is the most useful metric, as kWh is a measure of energy, or the ability to do work. Kilowatts (KW) measure power output, which equates to acceleration.

Tesla Energy products have different uses and applications within the product group and generally are not comparable to an electric vehicle application.

What are amps, watts, volts and ohms?

Amps are the measurement for the amount of electricity used. Volts are the measurement of the force of the electricity. Watts is the measurement for how much work electricity does per second. Ohms is a measurement of resistance. Resistance may be in the form of something like a fuse or a motor that is driven by the electricity.

What do Americans spend on electricity?

The average American spends $110.20 per month on electricity. The lowest bills are in New Mexico, which average $79.56 a month. The highest are in Hawaii at $190.36 per month.

What's the average electricity consumption per household?

It varies widely from state to state, but the average is 909 kWh per month, or 30 kWh per day. Hawaii has the lowest consumption at 515 kWh per month, or 17 kWh per day. Louisiana is the largest per capita consumer at 1,273 kWh per month, or 42 kWh per day.

What does a battery do?

A battery does not store electricity, it stores energy. A battery can be used to convert that energy into electricity.

What are the main components and costs of a battery cell?

Every cell has a cathode, anode and electrolyte.

The anode is the positive terminal of the battery. The cathode is the negative terminal. The electrolyte facilitates the flow of ions from the one to the other while electrons move through a circuit outside the battery. That movement is what causes an electrical current.

When recharged, electricity from the wall will reverse the process.

Tesla has said it expects its cost per kilowatt hour to come down to $100 by the end of the decade. The rest of the industry is at $500 / kWh or higher today. We believe Tesla is at $250 / kWh today.

Tesla's cost structure is highly secret, but Dougherty estimates that a cell's costs per watt hour, in general, breaks down this way:

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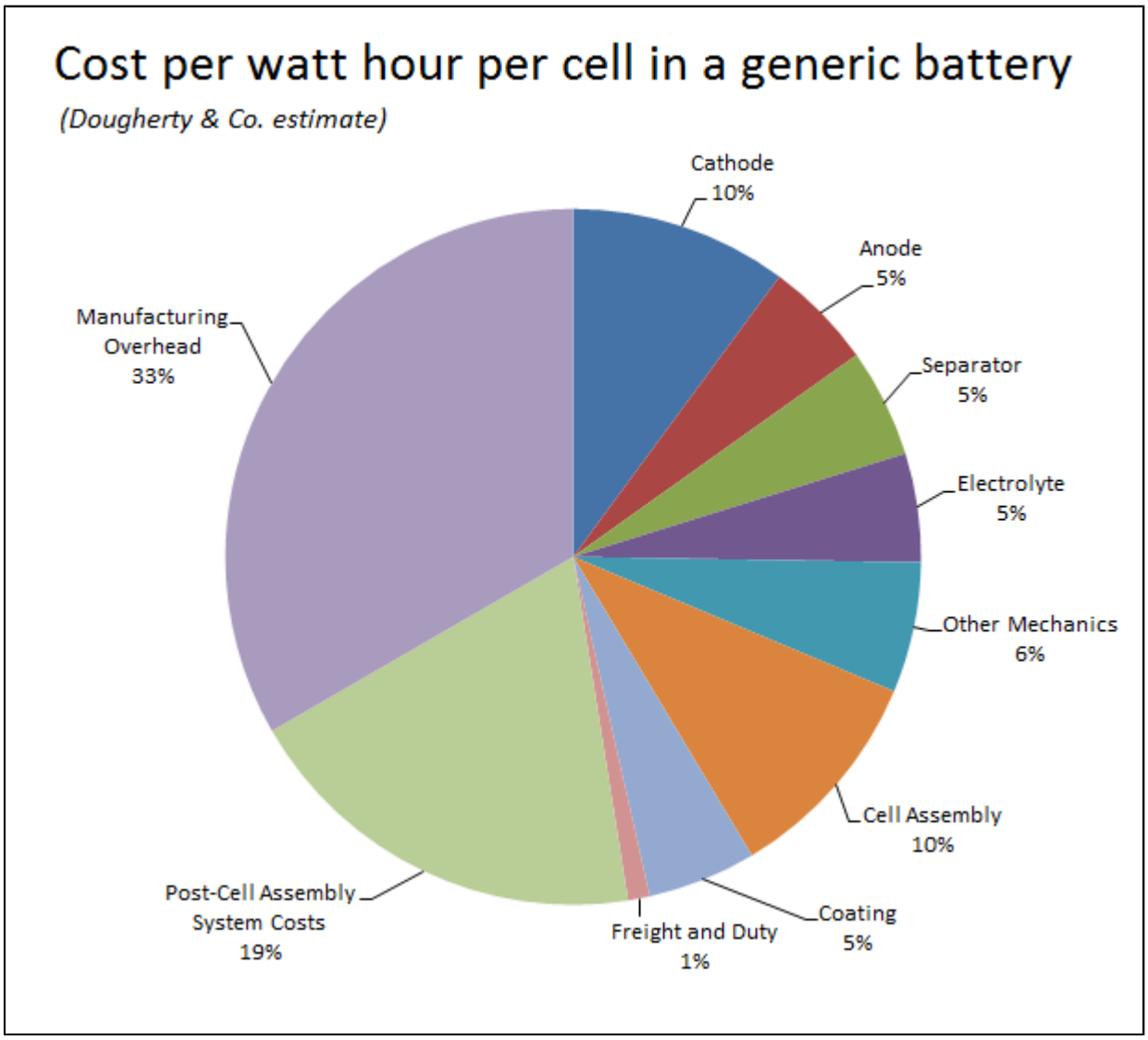

How much energy do common household appliances demand?

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How many Powerwalls does someone need to keep a house powered?

The 10 kWh capacity Powerwall offers 2 kW of continuous power and 3.3 kW of peak power. If a household has solar as well, a 6 kW system produces 23 kWh of additional *daily* production even when accounting for lost production on cloudy days. So even on a cloudy day with little energy coming in from the sun, solar plus Powerwall should be able to handle 3.3 kW peak load for every hour throughout the day. That means a household can run the basics with solar plus a Powerwall.

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During a grid outage, in particular, a household would only need to run the basics. The system would max out, obviously, if a family started running a few air conditioning units, several vacuum cleaners and blow dryers all at the same time. At that point, a second Powerwall would cover the extra load.

Two Powerwalls plus solar would generate 40 kWh to 50 kWh daily, which would be enough to handle an entire family's daily energy consumption and could handle higher peaks.

Powerwall scales for both power and energy.

How does solar energy growth compare with other renewable sources?

Solar will be the fastest growing source of energy over the next year, according to a report released last week by the U.S. Energy Information Administration. It is growing at 30% YOY, or four times as fast as the average of renewables.

What is the nature of SolarCity's partnership with Tesla Motors?

Tesla is supplying the battery backup system for SolarCity's residential Battery Backup program. The Tesla battery is fully integrated into Solar City's system, including giving the customer live information about how much energy is stored in the Powerwall at any given moment, via the MySolarCity app.

How much energy is consumed daily in the US?

The US consumed 98.5 quadrillion BTUs in 2014, of which 82% was produced by fossil fuels, 8% was nuclear generated, and 10% came from renewables, according to the U.S. Energy Information Administration, a federal agency.

We translate that to 80,000 GWh of energy consumed *daily* in the United States.

For context, Elon Musk tweeted on March 31 that SolarCity hit a new daily energy record of 5 GWh. This represents 0.006% of the US's daily energy consumption and is growing rapidly.

Why would anyone buy an Energy Storage System?

It depends on what application is sought.

Residential purchasers will make the purchase to be able to utilize their more affordable solar energy when the sun isn't shining, saving them money versus buying from the grid. In some markets, residents will charge their batteries from the grid when it is being sold at a cheaper rate. This is called peak shaving. The biggest initial markets will be Germany, Australia and Japan. In the short-term, incentives and regulations in those three countries are fueling rapid growth.

As net metering is scaled back in the United States, the US will eventually become a stronger market as well.

Commercial purchasers will want to reduce peak demand charges, which are high-cost fees levied based on having a high-demand of energy that taxes the grid. These charges can comprise 30% to 70% of a bill. The commercial market is global and includes the US.

Utility purchasers will be looking to flatten the demand curve and not waste energy produced. For spikes in demand, a utility must run expensive peaker plants. Energy storage systems allow utilities to run more efficiently by managing outlying surges. The market should be global for this product.

Where is solar most effective?

The darker the area on this map from the U.S. Department of Energy, the better the solar energy will be.

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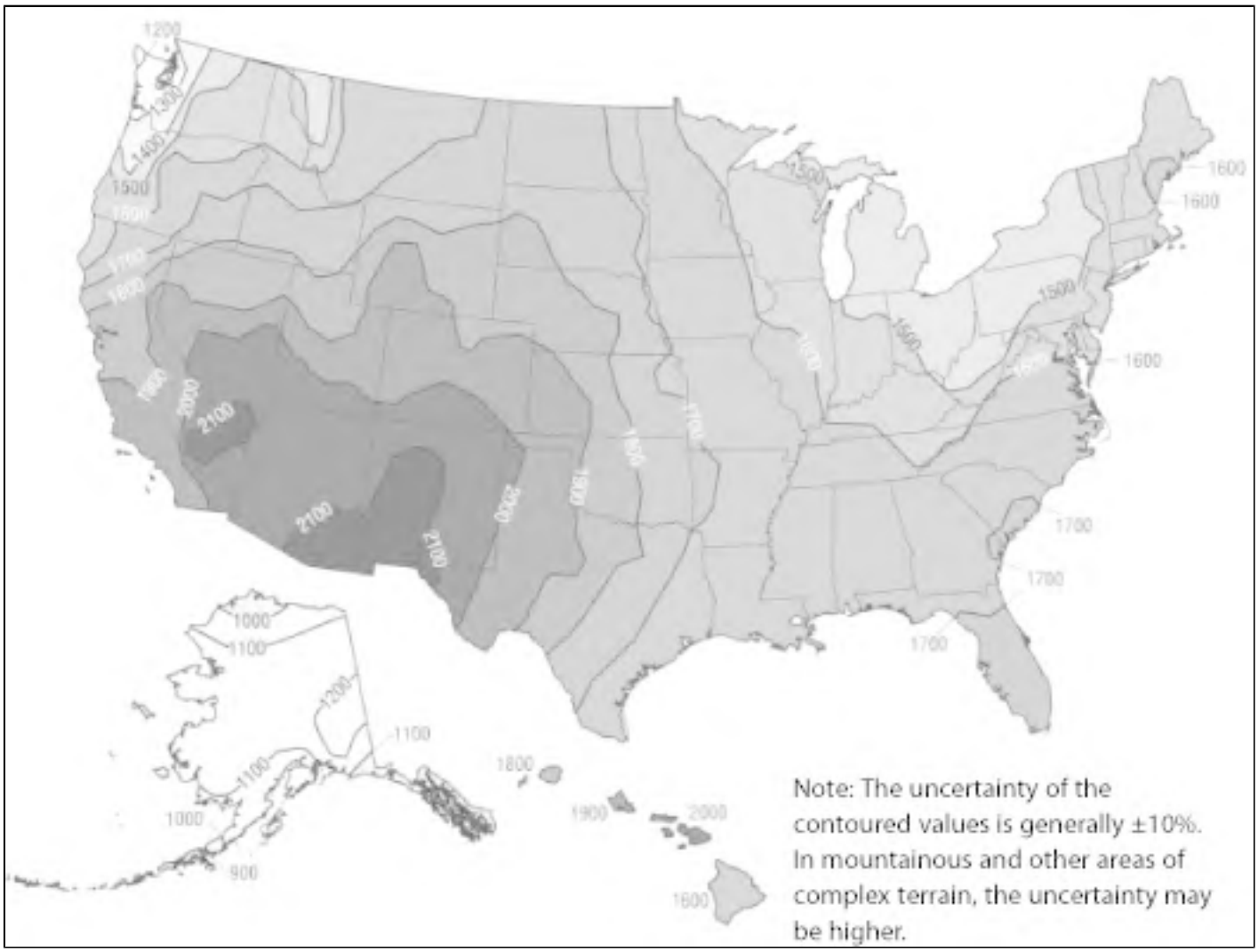

What are the competing products to Tesla Powerwall and Powerpack?

Most battery producers — notably Samsung SDI, LG Chem and BYD — all produce batteries for energy storage systems. However, there are not major comparable products to Tesla, which is a true turn-key solution. This includes the converter, battery and inverter required in a solar execution.

LG Chem, partnering with Eguana, is promising a turn-key AC residential storage application this summer.Enphase says it will sell a 1.2 kWh AC system in the second half of 2015, intended to be stacked as modules. Pricing has not been announced. Daimler subsidiary Deutsche Accumotive said last week that it would begin selling a 2.5 kWh residential and a 5.9 kWh industrial solution in September. Daimler did not announce pricing.

There is a growing base of emerging technologies, some private ventures and some spun off from universities, that use alternative chemistries for their batteries. These systems will need to prove themselves able to be commercialized before being considered true competitors.

While Tesla has a head start in the electrical vehicle market, but Tesla's first-mover status in energy dwarfs their lead in electric vehicles.

What makes the Tesla solution turn-key, compared with competitors?

The DC battery, DC-DC converter, battery management software, thermal management system, AC/DC inverter.

Despite a month of trying, we could not find a similar that solution exists in its entirety in that format that is sold today.

(We note that our published estimates on TSLA unit sales use ASPs that exclude the cost of the inverter and installation, as that revenue is likely to go to distributors and other vendors.)

What else can Tesla do with its technology?

Tesla Water? We believe that there are implications for water desalinization , but that goes beyond the scope of this research report.

USS Tesla? We believe that there are clear national security and US defense implications. Ray Mabus, secretary of the Navy, spoke at this week's Energy Storage Association Conference and said there is a strong need from energy storage in the armed forces: "How do we take alternative energy and run it 24 hours a day? How do we construct a microgrid on base? How do we store energy?" The Navy,

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he said, is already building hybrid ships ("The Prius of the seas.") The limiting factor for many defense technologies is energy storage. This presents a unique opportunity for technology leaders in the energy storage realm, which now includes Tesla.

Acronym list:

Some common acronyms used in the industry:

- ESS: Energy Storage System
- EES: Electrical Energy Storage
- BESS: Battery Energy Storage System
- BTU: British Thermal Unit
- PV: Photovoltaics (using solar panels to harness energy)
- CPV: Concentrated Photovoltaics (A system using lenses and curved mirrors to focus sunlight onto small, highly efficient solar cells)
- MJ: Multi-Junction cells (Used in CPV)
- HCPV: High Concentrating Photovoltaics

What's the basic setup of a battery system and solar panels?

The sun's energy is captured by solar panel as direct current (DC) energy. That DC energy can be stored in a battery or converted into alternating current (AC), which both the home and the grid use.

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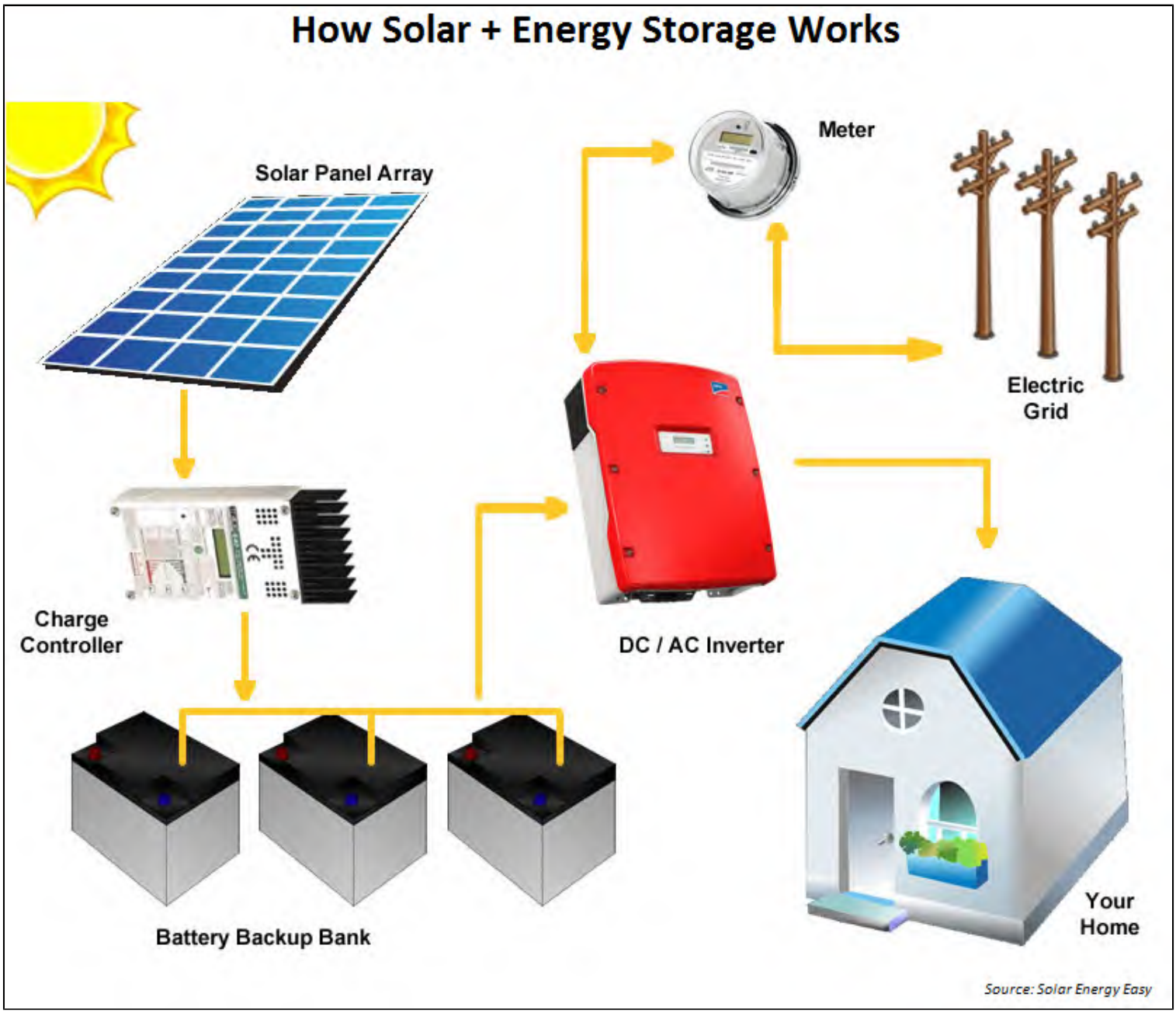

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IMPORTANT DISCLOSURES

RISKS (TSLA)
Battery cell scaling – Tesla will need to solve the battery cell supply problem before it can produce mass market electric vehicles. If Tesla were to produce 500,000 vehicles a year, it would need lithium-ion cell capacity on par with all production in the world today. Cell supply is the biggest constraint on Tesla's growth. Tesla is addressing this through building a Gigafactory through a JV with Panasonic, which adds another element of risk.

Model 3 production and progress – Our price target assumes volume sales of Tesla's third generation vehicle. While advances in battery pack technology make this third generation vehicle a potential reality, it is still a vehicle that largely exists in the minds of engineers.

Model S Progress – We believe that not achieving the anticipated roadmap for the Model S platform presents risk to the stock. Supplier issues could be a source of delay. Tesla's Roadster, for example, relies on 150 suppliers for 2,000 parts. Supplier delays have stalled Roadster and Model S progress.

Failure of the Electric Vehicle Concept – Despite the hype, electric vehicles have not proven their success as a concept. Range anxiety is a real obstacle faced by consumers. Advertised ranges are generally overstated. Like internal combustion engines, ranges vary by usage pattern, including speed, acceleration and cabin climate control, and the temperature and climate of the operating environment. This issue is much bigger for electric vehicles than for internal combustion engines, given the existing limits to their ranges. Also, we note that ethanol failed for a variety of reasons, but a key reason was poor consumer adoption at the pump – vehicle range drops as much as 20% when fueled by E85.

See company filings with the SEC for a list of additional investment risks.

Company Description (TSLA)
Palo Alto-based Tesla Motors Inc. designs and sells electric vehicles and electric vehicle powertrain components. Its core products are the Tesla Roadster and the Model S sedan. Upcoming vehicles include the Model X, a cross-over based on the S platform, and Tesla's Gen 3 vehicle, slated for after 2015. We see four points as differentiators for Tesla. 1) Tesla is the first company to design an all-electric vehicle from the ground up, capturing key driving advantages of all-electric. 2) Tesla's battery IP is five-to-ten years ahead of its competition. 3) Tesla's manufacturing plant in Fremont, Calif. is a game-changer as it allows Tesla to make hundreds of thousands of vehicles per year and was purchased at about 5 cents on the dollar. 4) Tesla is pursuing a differentiated distribution strategy by putting its stores in high-traffic, high-end retail locations.

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I, Andrea James, certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers.

Dougherty & Company LLC makes a market in this security: TSLA .

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Sell: ***Expected to materially underperform the broader market and/or its sector over the next six to twelve months.***

RATINGS DISPERSION AND BANKING RELATIONSHIPS AS OF (June 5, 2015)

Rating	%	IB %
Buy	80.0	5.0
Neutral	17.6	0.0
Sell	2.4	0.0

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