EMERGING OPPORTUNITIES TO CAPTURE NEW CUSTOMER AND STAKEHOLDER VALUE

Navigating the Energy Transformation

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Global Utilities Segment Leader

Kansas Renewable Energy Conference
October 3, 2019
AGENDA

1. The Energy Transformation
2. What Do Customers Want?
3. New Business Opportunities for Utilities and Energy Firms
4. Key Trends with Solar, Wind, and Energy Storage
5. Closing Remarks and Q&A
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About Navigant
Navigant Consulting, Inc. (NYSE: NCI) is a specialized, global professional services firm that helps clients take control of their future. Navigant’s professionals apply deep industry knowledge, substantive technical expertise, and an enterprising approach to help clients build, manage, and/or protect their business interests. With a focus on markets and clients facing transformational change and significant regulatory or legal pressures, the firm primarily serves clients in the healthcare, energy, and financial services industries. Across a range of advisory, consulting, outsourcing, and technology/analytics services, Navigant’s practitioners bring sharp insight that pinpoints opportunities and delivers powerful results. More information about Navigant can be found at navigant.com

With over 600 consultants, Navigant’s global Energy practice is the largest energy and sustainability consulting team in the industry. We collaborate with utilities and energy companies, government and NGOs, large corporations, product manufacturers, tech vendors, and investors to help them thrive in a rapidly changing energy environment. Our clients include the world’s 60 largest electric, water, and gas utilities; the 20 largest independent power generators; and the 20 largest gas distribution and pipeline companies. Navigant’s seasoned professionals and highly skilled specialists form exceptional teams to help clients transform their businesses, manage complexity and accelerate operational performance, meet compliance requirements, and transform organizations and systems to address upcoming changes as the energy transition accelerates.
THE ENERGY INDUSTRY TRANSFORMATION IS NOT A FUTURE OR EMERGING TREND, IT IS ALREADY WELL UNDER-WAY

Disruption is a prevailing and uncompromising threat to our industry.

Multiple megatrends underpin utility industry transition:

1. Greater customer choice and demand for more (sustainable) energy options
2. Increased policies and regulations to reduce carbon emissions
3. Shifting power-generating sources
4. Search for shareholder value: new ventures and increased M&A
5. Regionalization of energy
6. Merging of mega industries around growth opportunities
7. Replacement of old infrastructure and transition toward an increasingly clean, decentralized and intelligent grid architecture: the Energy Cloud
WE ARE MOVING TOWARDS A CLEANER, MORE DISTRIBUTED, INTELLIGENT, AND MOBILE GRID – TOWARDS THE ENERGY CLOUD

**PAST**: Traditional Power Grid
Centralized, One-Way Power System

**TODAY**: The **Energy Cloud**
Distributed, Cleaner, Two-Way Power Flows

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WITH VALUE SHIFTING VIS-À-VIS GROWTH PLATFORMS, DISRUPTORS WILL COMPETE FOR THE LAST MILE

Disruptors are cash-heavy, with strong R&D engines and a keen focus on customer relationships.

Sources: Navigant, global figures

- Less asset-based, central power generation
- Increased investment in grid modernization and intelligence
- Energy Cloud platforms with energy & non-energy services
NAVIGANT/ PUBLIC UTILITY FORTNIGHTLY’S SURVEY ON “WHAT’S NEXT” SHARPENS THE PACE OF THIS TRANSFORMATION

Transformative Forces
DER and Renewables are the Most Disruptive Forces For Utilities

- We hear about flat and declining demand for energy, but other forces are driving more potent disruption in the traditional utility business model.

- Nearly 60% of survey respondents said rapid increases in distributed energy resources (DER) and renewables are clearly the most disruptive force for utilities.

New Business Models
Utilities Need to Invest in Current Business Models, but Also Offer New Value

- Whether it’s DER and renewables or climate change, disruptive forces drive utilities to explore what’s next for their organizations, including new growth opportunities.

- 69% respondents said that utilities must focus on delivering on their current business models in addition to future business models (i.e., dual-track innovation).
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Walmart’s verified science-based target emissions-reduction plan, ‘Project Gigaton’, aims to reduce emissions in its supply chain by 1 gigaton by 2030

**Target Areas**

- Provide a sustainability toolkit that assists suppliers with reducing emissions
- Make a business case for emissions reductions that affects upstream and downstream markets
- Also reduce direct and indirect GHG emissions by 18% by 2025

**Energy**
- Achieve 100% renewables target, including suppliers

**Waste**
- Reduce waste in supplier operations

**Packaging**
- Focus on recycling and sustainably-sourced packaging

**Agriculture**
- Spread knowledge on agriculture best practices

**Deforestation**
- Increase transparency in sourcing

**Products**
- Factor consumer use of products into the equation
LARGE C&I CUSTOMERS ARE LEADING THE WAY
MCDONALDS HAS ANNOUNCED GLOBAL SUSTAINABILITY TARGETS

- GHG emissions reduction of 36% by 2030
- Will eliminate 150 million metric tons of GHG emissions, equivalent of:
  - 32 million passenger cars off the road (in a year)
  - Planting 3.8 billion trees and growing them for 10 years
- Targeting global carbon footprint: beef production, restaurant energy usage and sourcing, packaging and waste (representing 64% of their global emissions).
- McDonald’s will work across its global supply chain, offices, and restaurants (37,000 locations) to be more innovative and efficient through improvements such as:
  - Renewable energy
  - LED lighting
  - Energy-efficient kitchen equipment
  - Sustainable packaging
  - Restaurant recycling
  - Sustainable agriculture practices
HEALTHCARE AND HIGHER EDUCATION INSTITUTIONS ARE SWITCHING TO LONG-TERM ENERGY-AS-A-SERVICE CONTRACTS WITH NEW ENTRANTS

**The Ohio State University EaaS Partnership:**
- Engie paid OSU $1.1 billion for the right to manage and operate campus energy infrastructure, in exchange for an annual fee of $45M over 50 years
- End-to-end, turnkey solution that can meet OSU's total energy needs on a long-term basis
- Access to low cost of capital through a partnership with investment partner
- Intimate understanding of OSU's energy strategy and long term objectives, as well as energy systems and infrastructure of individual campuses and users

**Harvard Longwood Campus EaaS Partnership:**
- Similar to the OSU deal, with a focus on significant sustainability and efficiency improvements
- Engie and Axium acquired a microgrid and district energy system serving six Harvard-affiliated medical institutions in the Longwood Medical Area in Boston
- Long-term contract through 2051
- The energy system has the capacity to produce 99 MW of electricity, 1,100,000 lbs/hr of steam, and 42,000 tons of chilled water
CITIES AND COMMUNITIES HAVE STARTED THEIR ENERGY TRANSITION AND WANT TO PARTNER WITH UTILITIES, DEVELOPERS, AND TECHNOLOGY FIRMS

- More than 65% of cities use renewable energy; 8 cities (and growing) cover 100% of municipal needs.
- Over the past 12 months, 60% of cities have launched or significantly expanded climate initiatives or policies.
- Nearly 83% of cities are partnering with private businesses for support in deploying advanced transportation, renewable energy, and energy-efficiency solutions.

CUSTOMER INNOVATION IN SUBSCRIPTION-BASED RATES WILL ALSO IMPACT THE MASS MARKET SEGMENT

The “subscription economy” is growing exponentially

For energy, this means creating a platform to offer fixed energy billing along with additional products & services (a la Netflix)

- Multi-year fixed bill, that doesn’t vary with usage, with no true up
- Customized to an individual
- Allows for layering of additional products & services

- Visibility and simplicity for customers
- Additional revenue for energy suppliers

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Source: Zuora

Investor's Business Daily, December 2019

<table>
<thead>
<tr>
<th>Subscription Economy Growth</th>
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<tbody>
<tr>
<td>300</td>
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<tr>
<td>250</td>
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<tr>
<td>200</td>
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<tr>
<td>150</td>
</tr>
<tr>
<td>100</td>
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S&P 500 Sales Index

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<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<tr>
<td>Value</td>
<td>150</td>
<td>175</td>
<td>200</td>
<td>225</td>
<td>250</td>
<td>275</td>
<td>300</td>
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Fixed monthly price based on household profile usage (Your average current bill is $115/month)

- Unlimited Savings: $115/month for 36 months
- Unlimited Choice: $125/month for 36 months
- Unlimited Premium + EV: $145/month for 36 months

- 30% Clean Energy with energy portal app: ✓ ✓ ✓
- 100% Clean Energy: × × ✓
- Free Smart Thermostat: ✓ ✓ ✓
- Access to free or discounted energy efficiency upgrades: ✓ ✓ ✓
- Unlimited EV charging at home and in community: × × ✓
- Maximum number of control days: 30 15 7
- Free control day over rides per year: 3 5 7
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Energy utilities have recently increased their level of investment and acquisition activity…

...with a focus on Data Analytics Platforms and Distributed Generation

THERE HAS BEEN SIGNIFICANT INVESTMENT IN ENERGY CLOUD PLATFORMS RECENTLY

<table>
<thead>
<tr>
<th>Total Amount Invested</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019 YTD</th>
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<tbody>
<tr>
<td>$9bn</td>
<td>$41bn</td>
<td>$10bn</td>
<td>$50bn</td>
<td>$26bn</td>
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<thead>
<tr>
<th>No. of Acquisitions</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019 YTD</th>
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<td>77</td>
<td>98</td>
<td>54</td>
<td>87</td>
<td>107</td>
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<thead>
<tr>
<th>No. of Investments</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019 YTD</th>
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<tbody>
<tr>
<td>35</td>
<td>53</td>
<td>76</td>
<td>96</td>
<td>59</td>
<td></td>
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</tbody>
</table>

Source: Navigant analysis, S&P Global Market Intelligence
Number of Investments and Acquisitions
Jan 2015 – Jun 2019, top 25 energy utilities, categorized by utility holding company headquarters region

European utilities have been the most active, relative to their North American and Asian peers.

**Europe-headquartered oil and gas majors** are increasingly active – with Total, Shell, and BP totaling $8bn investment.

**North American utilities** tend to be less active than their European peers.

**Utilities in Rest of the World** are typically lagging behind, although Japan-based TEPCO and Australia-based AGL Energy, and Hong Kong-based CLP Group have made significant investments.

Source: Navigant analysis, S&P Global Market Intelligence; total transaction value excluding undisclosed amounts.
THESE INVESTMENTS GIVE RISE TO TWO PRIMARY STRATEGIC PATHWAYS MOVING FORWARD - STAY IN OR CHANGE THE GAME

1. Energy-as-a-Service (EaaS)
   - Move from asset owner to energy services
   - Integration of several technologies
   - Bundled devices, alternative pricing

2. Platform Orchestration
   - Enable collaboration and transactions
   - New economy trading on platforms
   - Dynamic services and B2B partners
   - New revenue streams and business models
STRATEGIC PATH ONE: STAY IN THE GAME WITH ENERGY-AS-A-SERVICE

- EaaS has the power to change the way customers meet their energy needs
- New businesses emerging with a partner network providing customized, flexible solutions
- The EaaS market for commercial and industrial (C&I) customers is expected to reach **$221.1 billion** by 2026

<table>
<thead>
<tr>
<th>EaaS Application</th>
<th>EaaS Product &amp; Service Components</th>
</tr>
</thead>
</table>
| Supply Services (Production & Procurement) | • Solar  
• CHP  
• Backup Generation  
• Fuel Cell  
• Storage  
• Microgrids  
• Large-Scale Renewable Energy  |
| Demand Services (Consumption)        | • Energy Efficiency (e.g. Lighting, HVAC, other industrial equipment)  
• Building Optimization & Commissioning (project based)  |
| Energy Optimization Services         | • Energy Monitoring & Load Management  
• Demand Response  
• Building Energy Management (BEM)  
• Other “Energy” Software as a Service & Management |
Integrated DER platforms could support more than $3-4 trillion in value within the next two to three decades.

By 2020, more than 6,000 GWh of electricity is expected to be consumed by plug-in EVs annually in the US, giving rise to Transportation2Grid.

Building2Grid will see more than $50B of anticipated investments in behind-the-meter integrated energy assets for residential/commercial customers within the next five years.

More than $1 trillion in projected cumulative global revenue is at stake over the next decade across Internet of Energy platforms.

Transactive energy platforms are expected to see billions of dollars in software-related investments, technology integration, and fees by 2030.

More than $250 billion in cumulative investments focused on smart cities energy projects alone are anticipated through 2030.

Investments in neural grid infrastructure and emerging technologies through 2030 are expected to exceed $700B.
ENERGY CLOUD PLATFORMS - READINESS FOR SIGNIFICANT DISRUPTION

Most mature of the platforms; Significant DERs being deployed

- Rise of EVs; many models on the way; V2G interaction still early days
- Buildings utilizing technologies, but not widespread interaction with the grid
- Many technologies available, but still largely isolated efforts
- Still early days for technology

Just emerging

- INTEGRATED DER
- TRANSPORTATION2GRID
- BUILDING2GRID
- INTERNET OF ENERGY
- TRANSACTIVE ENERGY
- SMART CITIES
- NEURAL GRID

These platforms are not yet widespread, fully interconnected systems

- Pockets of connectivity and automation, not yet widespread

These platforms have maturing technologies and increasing use, but still awaiting more two-way interactions with the grid

- Rise of EVs; many models on the way; V2G interaction still early days
- Buildings utilizing technologies, but not widespread interaction with the grid
- Many technologies available, but still largely isolated efforts
- Still early days for technology

These platforms are not yet widespread, fully interconnected systems

- Pockets of connectivity and automation, not yet widespread
Capture grid-related value streams on top of load growth and car and fleet management services.

**Value Streams**

- **Owner**
  - Mobility
  - Energy Cost

- **Automaker**
  - Battery Life
  - Vehicle Sales

- **Third Party**
  - Charging Services
  - Grid Services

- **Utility**
  - T&D upgrade cost avoidance
  - Low cost grid services
  - Load growth

**Example Vehicle-to-grid system**

- Enable EV owners to operate as individual energy hubs by using, storing, and returning excess energy to the grid.
- EV owners are paid up to €1500/year for parking their vehicle in designated spots for utility access to the battery.
- First trials in Denmark, followed by Germany and the UK.
- Enel acquired eMotorWorks to pursue V2G market in N.A.

- Real-time energy balancing
- Peak-shaving load shift
- Distribution peak capacity support
- TOU energy management
- Power quality
- Backup power
- Supply firming
- Frequency regulation
- Car and fleet management services

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**Captured Grid-Related Value Streams**

- Capture grid-related value streams on top of load growth and car and fleet management services.

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### STRATEGIC PATHWAYS OPPORTUNITIES AND COMPETITION

**VARIETY OF PLAYERS EXTENDING THEIR BUSINESS INTO THE ENERGY CLOUD**

<table>
<thead>
<tr>
<th>Technology Companies</th>
<th>Global Energy Companies</th>
<th>Oil &amp; Gas Companies</th>
<th>Retailer “Supermarket“</th>
<th>Car Manufacturers</th>
<th>DER and DER aggregators</th>
<th>Niche players &amp; innovators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity selling</td>
<td>DER and optimization</td>
<td>Community energy</td>
<td>Home services</td>
<td>E-Mobility</td>
<td>Lifestyle &amp; Care</td>
<td>EC Platforms</td>
</tr>
</tbody>
</table>

**Aggressive and innovative players pose a potential threat to traditional utilities – but could also offer opportunities to partner.**

Source: Navigant
What about gas? 100% electrification might not be viable everywhere

Navigant assessed the role and value of gas used in existing natural gas infrastructure in a net zero emissions European energy system.

- Total savings of €217B in optimized gas scenario compared to minimal gas scenario.
- A net zero emissions EU energy system by 2050 is possible. The future energy system can become fully renewable, with a valuable role for biomethane and green hydrogen alongside renewable electricity.
- Blue hydrogen can be critical to achieve fast decarbonization and kickstart the hydrogen market in coming decades.
- Gas infrastructure needed to scale up renewable gas to 272 bcm by 2050, enabling a decarbonized and renewables-based energy system at lowest costs.

<table>
<thead>
<tr>
<th>Vision</th>
<th>Achieving a net zero emissions EU energy system by 2050 based predominantly on renewables</th>
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<tbody>
<tr>
<td>Scenarios</td>
<td>Minimal gas scenario</td>
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<tr>
<td>Future energy categories</td>
<td>Variable renewable electricity</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand sectors</td>
<td>BUILDINGS</td>
</tr>
</tbody>
</table>
Business model evolution is key for utilities to continue to create customer and shareholder value – but balancing today’s business with tomorrow’s opportunities is critical.

**“Defense”**

- Requires reliability
  - Operational efficiency improvement
  - Customer service enhancement
  - Increase profits
  - Free up capital for reinvestment

**“Offense”**

- Requires agility
  - New product and service development
  - New business models
  - New revenue streams

Organizational Transformation

**Track 1 – Optimize the Current Business Model**

**Time**

**Track 2: Develop the Next Business Model(s)**
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While the U.S. tariffs on solar imports caused price increases through 2019, we expect module prices in the U.S. market to continue to decline as additional tariff-exempt capacity becomes available.

<table>
<thead>
<tr>
<th>Year</th>
<th>Tariff</th>
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<tbody>
<tr>
<td>2018</td>
<td>30%</td>
</tr>
<tr>
<td>2019</td>
<td>25%</td>
</tr>
<tr>
<td>2020</td>
<td>20%</td>
</tr>
<tr>
<td>2021</td>
<td>15%</td>
</tr>
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</table>

Original Ruling Exceptions:
- First 2.5 GW imported each year
- Imports from GSP beneficiary countries
- Other individual exceptions

New Exemptions (2019):
- Bifacial modules

Industry Reactions to Tariffs
- Tariff-exempt panel supply has been limited through 2019 and does not match market demand. This has led to increased module prices in the U.S., as developers rush to procure panels ahead of the ITC sunset in 2022.
- Despite some manufacturers building manufacturing plants in the U.S., we have not seen a boom in solar PV manufacturing. Jinko’s new plant in Jacksonville, FL originally projected 800 jobs is now expecting 200 jobs at full production expected in 2020.
- Many companies filed individual exceptions to the tariffs, though few were granted.

Navigant Projections
- Module prices in the US are not expected to increase significantly from current levels due to the tariff impact, and are likely to continue trending downward.
- With new exemptions for bifacial modules and additional tariff exempt capacity coming online, we expect prices to come more in line with global prices.
- As module prices globally decline due to key factors such as supply softness in China, technology advancements, and increased high-efficiency capacity, module prices are expected to continue declining.
- Market slowdown and component price impacts are likely more impacted by the ITC sunset than the 201 trade case.

However, tariff increases are not meaningful enough to negate price declines in total system costs.

The impacts of the tariffs have a disproportional impact on smaller projects. However, these were outweighed by other declines across the value chain.

### Percentage by Component of Total Installed Cost, U.S. National Average: 2019 Base Case

<table>
<thead>
<tr>
<th>System Component ($/W-DC)</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules (all segments)</td>
<td>$0.32</td>
<td>$0.29</td>
</tr>
<tr>
<td>Residential</td>
<td>$2.63</td>
<td>$2.49</td>
</tr>
<tr>
<td>Commercial</td>
<td>$1.74</td>
<td>$1.65</td>
</tr>
<tr>
<td>Utility – Small</td>
<td>$1.28</td>
<td>$1.19</td>
</tr>
<tr>
<td>Utility – Large</td>
<td>$1.01</td>
<td>$0.94</td>
</tr>
</tbody>
</table>

Source: Navigant analysis
OVER THE NEXT 10 YEARS, COST REDUCTIONS WILL CONTINUE, ALTHOUGH AT A SLOWER PACE THAN MOST RECENTLY

Overall system installed cost is forecasted to drop nearly $0.40/W-AC from 2019 to 2028, with the largest drop resulting from modules which, in 2019, include the tariff adder.

Small Utility-Scale Installed Cost, Base Case, US National Average: 2018 and 2027

Source: Navigant analysis

$0.39/W-AC
Based on an analysis of PTC deadlines and construction patterns, Navigant projects that 9-11 GW/year of wind projects will be installed in 2019-2021.
WIND

TIMING OF PROJECT COMPLETION

More than 60 GW of turbines have been safe harbored to qualify for the PTC. ~95% had identified sites by the end of 2018; ~86% will be installed by the end of 2021.

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Sources: AWEA, Navigant

Figures include full repowering projects which qualify for the PTC according to the 80/20 rule.
The U.S. wind market will range from 6 to 11 GW/year over the next decade, for a total of 74 GW.

- Texas, Midwest, Plains, and Mountain regions will dominate near term
- Balanced across nearly all regions in the later years
- Offshore wind will grow to 25-30% of the U.S. wind market starting in 2023.
Wind capacity will provide 30% of U.S. generation additions, resulting in 12% of total capacity by 2028.

- Wind capacity market share was 20% of MW additions in 2018 and 28% over the past decade.
- Wind capacity market share will increase considerably over the next 3 years and then decrease to the 20% range.
UTILITY-SCALE ENERGY STORAGE SYSTEM COSTS WILL BENEFIT FROM MARKET SCALE IN THE NEAR-TERM

For a utility-scale 10 MW/10 MWh system in 2019, Navigant estimates the average price is approximately $7.9 million.

The largest component of this price comes from systems integration, which primarily consists of designing, testing, and ensuring safety of the installation.

The most rapid component price decline is expected to be battery packs, primarily due to improved technology and economies of scale from manufacturing growth.

Price forecast methodology
- **Primary research**: retrieved from surveys with advanced battery stakeholders.
- **Secondary research**: gathered through data points from subsidy programs (such as the California Self-Generation Incentive Program), the Navigant Research Energy Storage Tracker and Advanced Battery Tracker databases, equity analyst reports, and ESS industry press releases.
ENERGY STORAGE
INSTALLED COSTS WILL DECLINE FURTHER - AT LOWER RATES OF CHANGE

- Battery Pack, Balance of Plan, and Systems Integration tied to MWhs
- Declining battery pack and systems integration costs driving down system costs in systems > 1 hour

Total Installed Cost by Component, 100 MW/400 MWh, Low Savings Scenario: 2016-2026

- Battery cells, module, pack including BMS and racks
- Auxiliary power, HVAC, fire suppression
- Includes residual hardware for the system and the integration services

*Battery cells, module, pack including BMS and racks
**Auxiliary power, HVAC, fire suppression
***Includes residual hardware for the system and the integration services

****Goes to EPC player—site preparation, electrical engineering, pouring concrete pad
*****Includes interconnection management, margin, land acquisition, permitting
******Rough estimate
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Summary Key Trends

• The Energy industry transformation is not a future or emerging trend, it is already well under-way.

• Future value creation in the energy industry will primarily occur across seven key platforms, as the primary drivers for growth.

• New and disruptive energy stakeholders will become formidable competitors with incumbent utilities, in providing energy and related services.

“Innovation sounds sexy, sounds fun. But let me tell you something: It is a bruising, bloody battle to be innovative, because you don’t win every innovation”. Tom Fanning, CEO, Southern Company.