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Outline
Clear Vision, Mission, Approach
It’s an Ecosystem
People, Communication and Strategy
National Presence
**Vision**
Design the battery for the application, not the application for the battery
Batteries satisfy all required performance metrics simultaneously

**Mission**
Transformative materials, chemistries and architectures for next generation batteries

**Approach**
Build materials and systems “from the bottom up” atom-by-atom and molecule-by-molecule
*Anodes, cathodes, electrolytes, interfaces, architectures*

More Information: https://www.jcesr.org/
The Energy Storage Ecosystem

Market pull selects winning battery technologies
Materials supply chain constrains cost and scale up

The ecosystem develops as a whole
JCESR’s Core Values

Close Personal Relationships within JCESR
Strong communication culture
   * Thrust conference calls bi-weekly
   * Directorate conference calls bi-weekly
   * Executive Committee calls weekly
   * Frequent ad hoc calls among leaders
   * Webinars bi-weekly (20 since Nov 2018) recorded for later reference
   * In-person Directorate meetings quarterly at Argonne to keep costs down
   * All hands meetings annually

Clear strategy expressed in milestones
   * 3 overall Level 1 strategic milestones
   * ~ 20 tactical Level 2 milestones set annually

Annual reviews by sponsor
   * Basic Energy Sciences, Office of Science

Frequent personal visits to Congress
   * Benefit to nation and partner states

Visibility in community
   * Topical workshops, session organization at society meetings
JCESR’s First Five Years…  
Focus exclusively on beyond Li-ion batteries

Innovative tools
- Materials Project
- Electrolyte Genome
- Multi-modal Characterization
- X-ray, Raman, FTIR, LEIS, NMR, STEC
- Techno-Economic Modeling

Frontier Science Advances
- Comprehensive simulation of multivalent cathodes and solid state electrolytes
- Stripping and plating mechanisms of multivalent electrolytes
- Versatile redox polymers (redoxmers) for flow battery design
- Machine learning for redoxmer discovery
- Polymer membranes for size and charge separation
- Li-S lean electrolytes and alternate reaction pathways

Transformative Next Generation Batteries

Redoxmer Flow
- Air-Breathing Aqueous Sulfur
- Multi-modal Characterization
- Polymer membranes
- Li-S lean electrolytes

Fundamental Science Outcomes
- Secretary of Energy Achievement Award
- August 29, 2018

Other topics:
- Secretary of Energy Achievement Award
- Three Startups
- Four Prototypes
- Solid State Electrolytes
- Size-selective polymer membranes
- Multivalent Mg++
- Air-Breathing Aqueous Sulfur
- Li-S
- Form Energy
- Next Generation Batteries
JCESR’s National Presence

- **JCESR Partner States**: 100+ JCESR Affiliates in 25 states, 4 countries
- **14 JCESR Regional Events**
- **18 Partner Institutions, $120M/5 years, Y2 of Five Year Renewal**

**Bay Area event**: EVs, Solar energy

**Southwest event**: Grid installations

**Texas event**: Wind energy

**University of Texas at Arlington**

**First International Li-S event in the U.S.**

- **Scientific and Industry Organizations**:
  - Argonne National Laboratory
  - Dow Corning
  - General Motors
  - GE Global Research
  - Idaho National Laboratory
  - Lawrence Livermore National Laboratory
  - NASA Jet Propulsion Laboratory
  - National Renewable Energy Laboratory
  - Lawrence Berkeley National Laboratory
  - Pacific Northwest National Laboratory
  - National Institute of Standards and Technology
  - Pacific Northwest, Pacific Northwest events: Wind energy
  - Responsible Battery Coalition
  - Johnson Controls
  - ComEd
  - Exelon Corporation
  - Illinois Institute of Technology
  - NAATBatt
  - Navigant
  - 24M Technologies, Inc.
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  - United Technologies
  - Praxair, Inc.
  - Carnegie Mellon University
  - Concurrent Technologies Corporation
  - University of Delaware
  - DuPont Central R&D
  - National Institute of Standards and Technology
  - GE Global Research
  - Argonne National Laboratory
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Thank You!