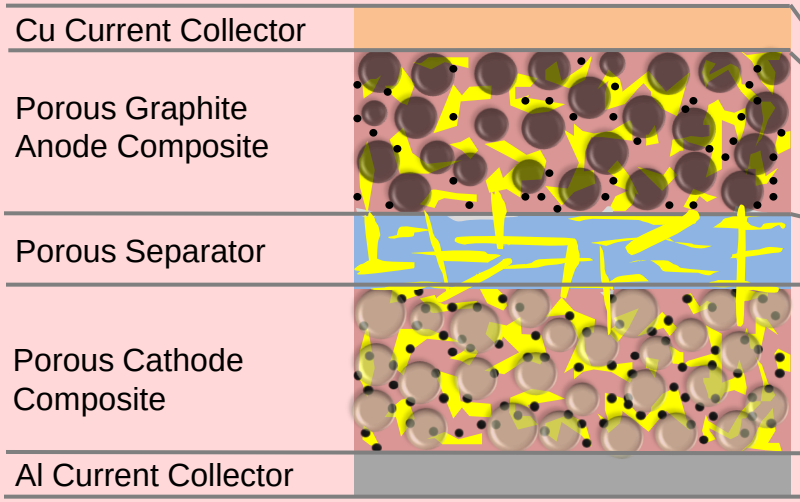
ESS Annual Review 2011

Mohit Singh, VP R&D and Engineering

Funded in part by the Energy Storage Systems Program from the Department of Energy through the *National Energy Technology Laboratory*

Seeo's solid polymer battery

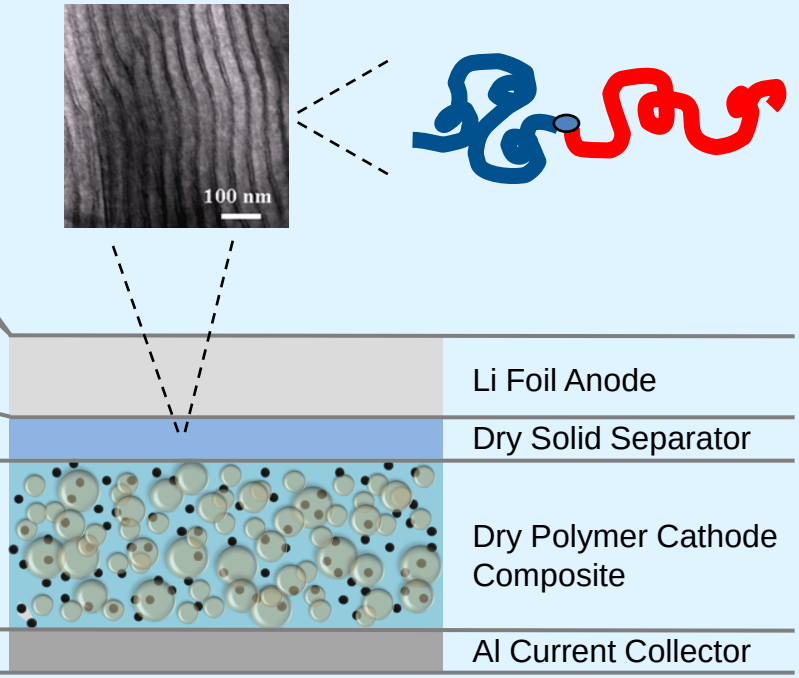
Conventional Li Ion Battery



Liquid electrolyte inherently reactive

Capacity fade and thermal runaway

Seeo's Battery



Non-reactive and non-flammable

Solid state for min. capacity fade

Program objectives & milestones

Develop, test and evaluate a 25 kWh battery pack based on Seeo's nanostructured polymer electrolyte

#	Milestone	Date	Complete?
Phase II: Scale Up and Performance Optimization			
1	High capacity cell packaged - no performance losses	6/30/2011	✓
2	Polymer temperature and voltage assessment complete	9/30/2011	✓
3	Produce a total of 1000 cells with optimized power and energy	12/31/2011	
4	Polymer scale up (10kg +) analysis complete	12/31/2011	
Phase III: Pack Design/Demonstration & Economic/Environmental Analysis			
5	Finalize pack design	6/30/2012	
6	Complete prototype test plan	10/31/2012	
7	Prototype pack assembly complete	1/15/2013	
8	Complete prototype pack performance testing and validation	9/30/2013	
9	Presentation of Final Economic & Environmental Findings	12/31/2013	

Move to Hayward, CA

Technical progress to date

	Key Achievements	Next steps
Polymer optimization	• Polymer electrolyte properties specified	• Polymer optimization work completed
Materials scale-up	• Designed method for large-scale polymer synthesis	• Evaluate cost implications for production-scale deployment
Cell scale-up	• Equipment for large area cell production installed	• Design and evaluate production processes
Module & pack design	• Module and BMS design iteration complete	• Module validation testing and pack-level design

Polymer optimization and scale-up

Polymer development

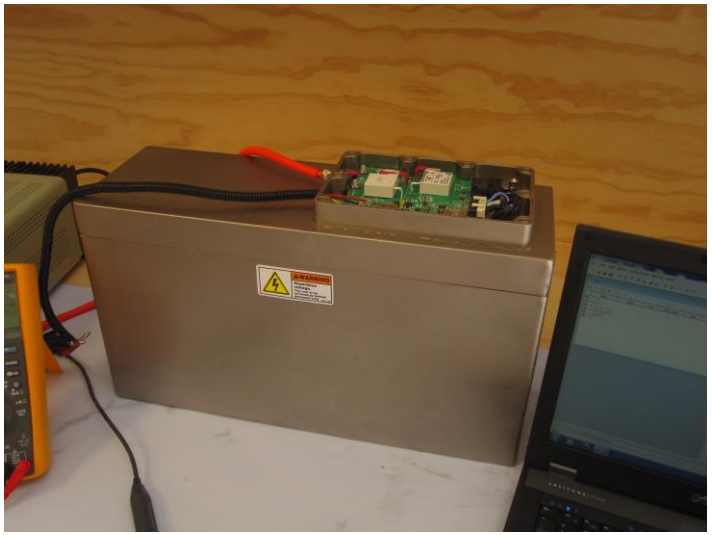
Polymer collection & centrifuge

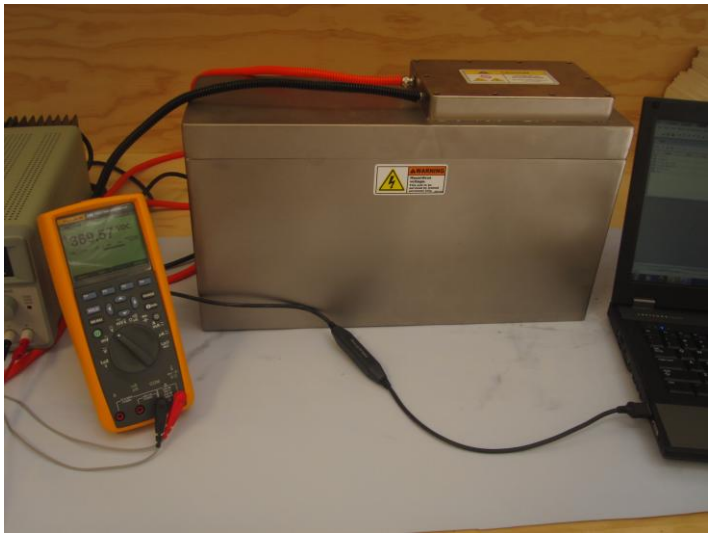
Polymer vacuum drying

Final polymer bagged

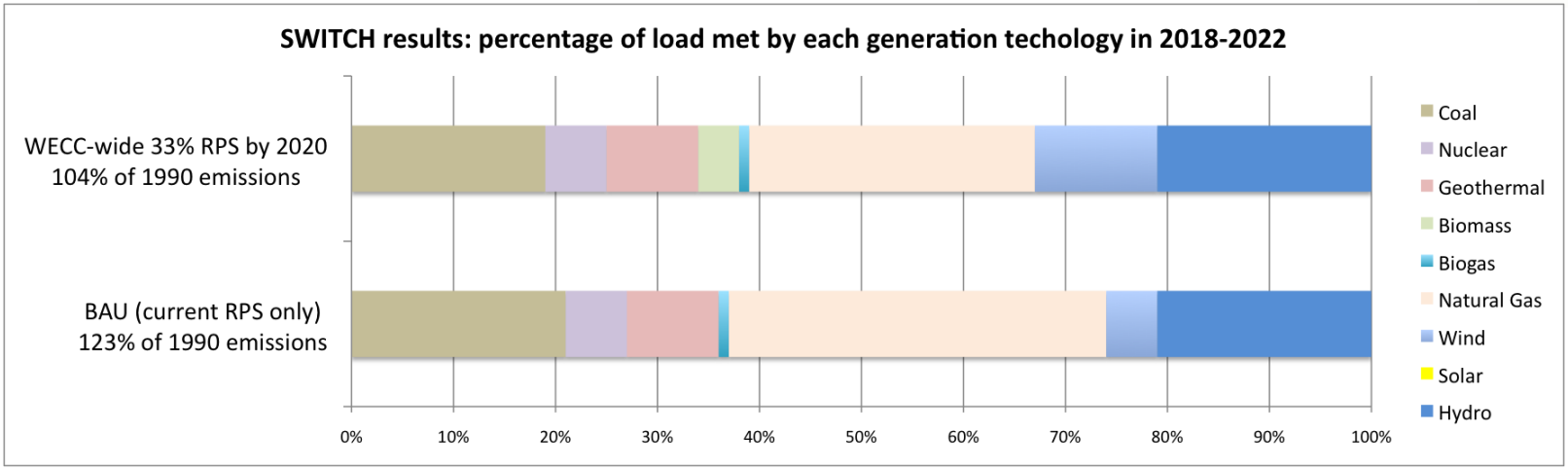
Cell scale-up

Module & pack design





UC Berkeley storage modeling



- SWITCH is a model of the Western Electricity Coordinating Council (WECC) power grid, currently under development at the Renewable and Appropriate Energy Laboratory (RAEL) at UC Berkeley
- With commercially available storage technology, preliminary results show ***no new storage deployment*** under existing RPS policies or a scenario where the entire WECC meets 33% RPS by 2020
- Distributed, cheaper, longer lasting energy storage can significantly reduce the cost of meeting high RPS targets and EV charging loads

Q&A