

Cleantech to Market

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Cleantech to Market (C2M)

■ *Innovative Partnership*

- A partnership between UC Berkeley graduate students and scientists to bring clean energy technologies closer to market

■ *Twofold Mission*

- Help commercialize new low carbon energy technologies
- Develop next generation of energy leaders





C2M – Partners

University of California
Berkeley
Haas School of Business

■ *Berkeley graduate students*

- Business
- Engineering & Sciences
- Law
- Energy Resources Group



■ *Inventions from*

- Lawrence Berkeley National Laboratory
- UC Berkeley Office of Technology Licensing
- Joint BioEnergy Institute
- Center for Information Technology Research in the Interest of Society





C2M – Students

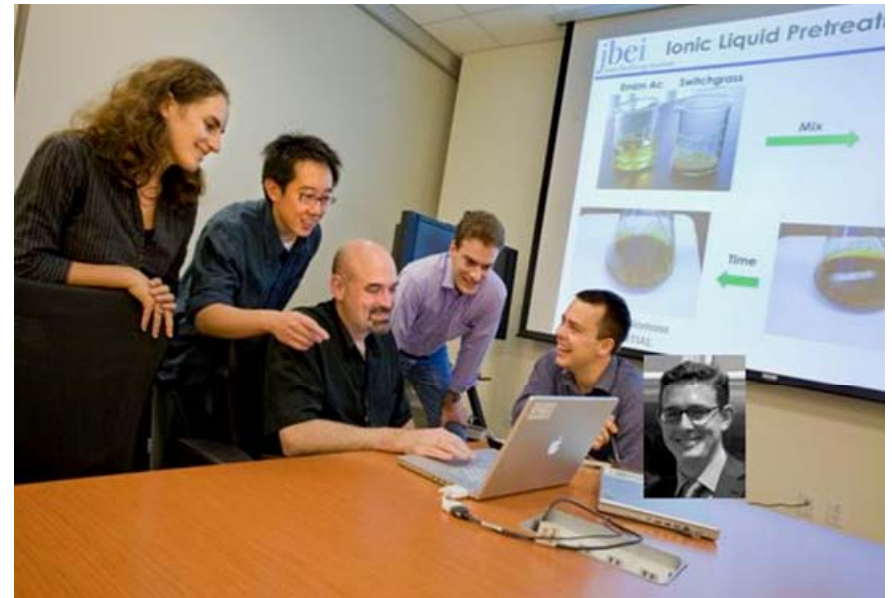
- **2009-10 Applications:** 118 for 42 seats
- **Diverse Backgrounds:**
 - 14 MBAs - technical backgrounds
 - 13 MBAs - business backgrounds
 - 8 PhDs - science and engineering
 - 4 JDs – various backgrounds
 - 3 ERG - extensive energy training





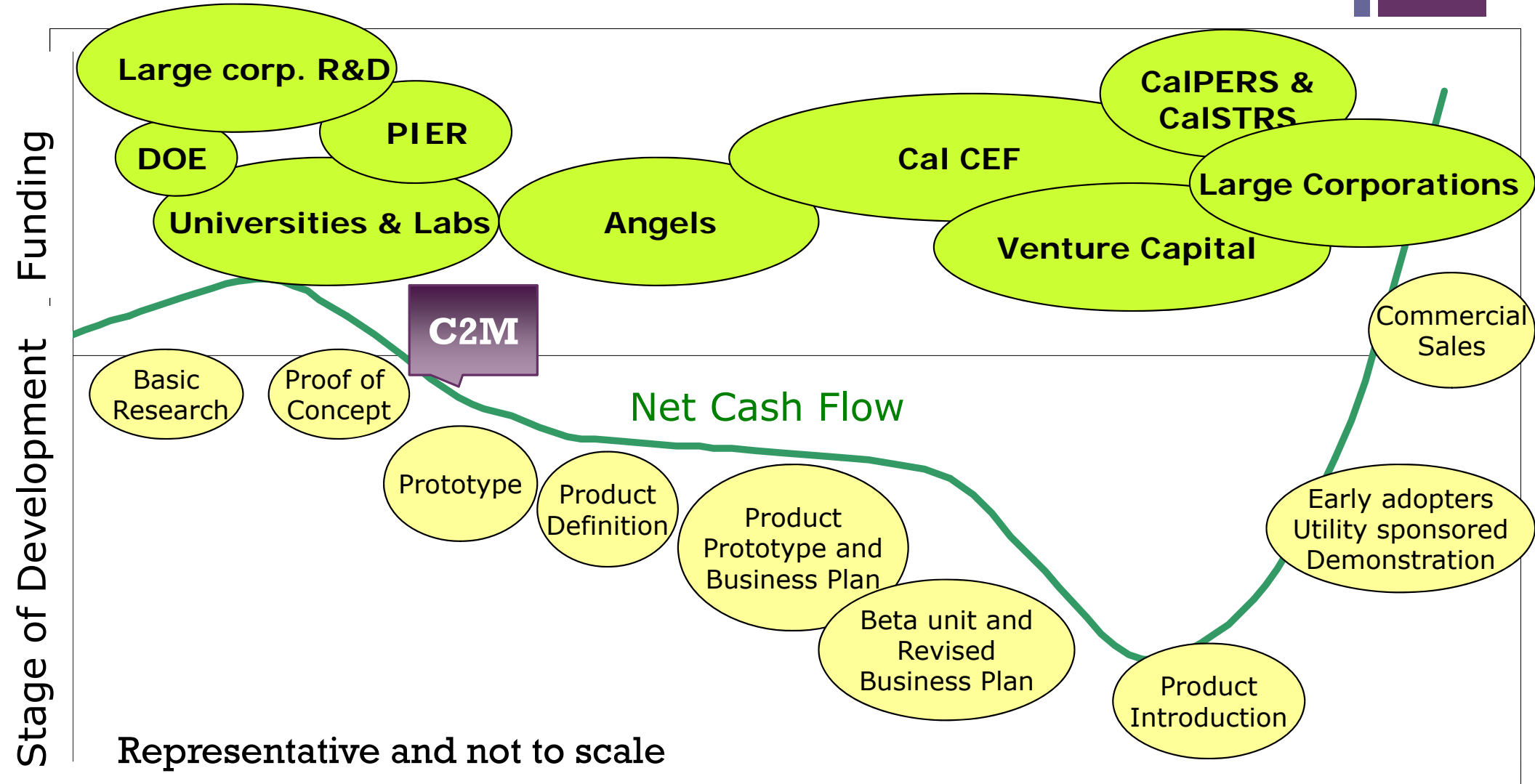
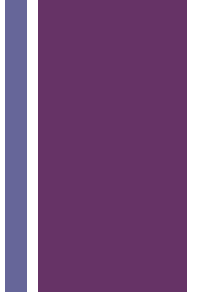
C2M – What

- ***Technology and market analysis***
(2010: 10 reports, approx 300 pages)
 - Distinguishing advantages
 - Target markets and customers
 - Revenue potential
 - Cost sensitivities
 - Intellectual property issues
 - Possible venture or industry partners
 - Key trends and companies
 - Government policies
 - Other relevant information





C2M – Stage of the Process



Representative and not to scale

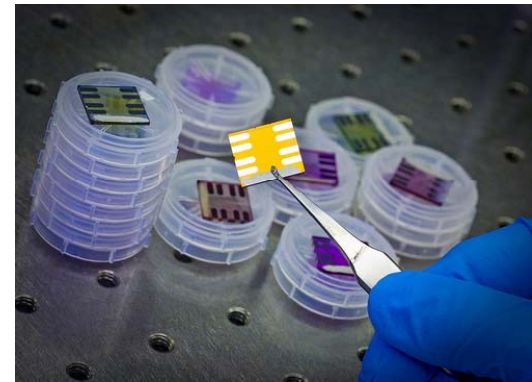
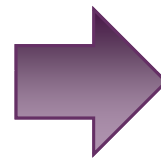
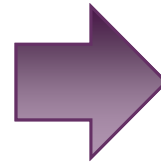
Based on a graphic produced by Ben Finkelor, CleanStart

+ C2M - Part of Haas “BILD” Program

- ***C2M - part of the new “Berkeley Innovative Leader Development” program at Haas***
 - ***Broaden/Reframe*** – Understanding of the commercialization process
 - ***Generate Ideas*** – Help advance the technologies through market research
 - ***Optimize Team Performance*** – Peer feedback and professional coaching
 - ***Motivate People to Take Action*** - Feedback to industry & scientists



+ C2M – Next Generation Energy





C2M – Smart Grid

- ***MEMS Sensors:*** The “smart” grid will require sensors that are small, durable, inexpensive, simple to install and easy to maintain. Researchers have developed current and voltage sensors for a variety of smart grid uses.
- ***“Smart Dust” Platform:*** The Pico Cube is a wireless platform that integrates energy scavenging, printed circuitry, and ultra-low power radios. These provide a valuable tool for remote sensing and asset management. Prototypes are being brought to the micro-scale.





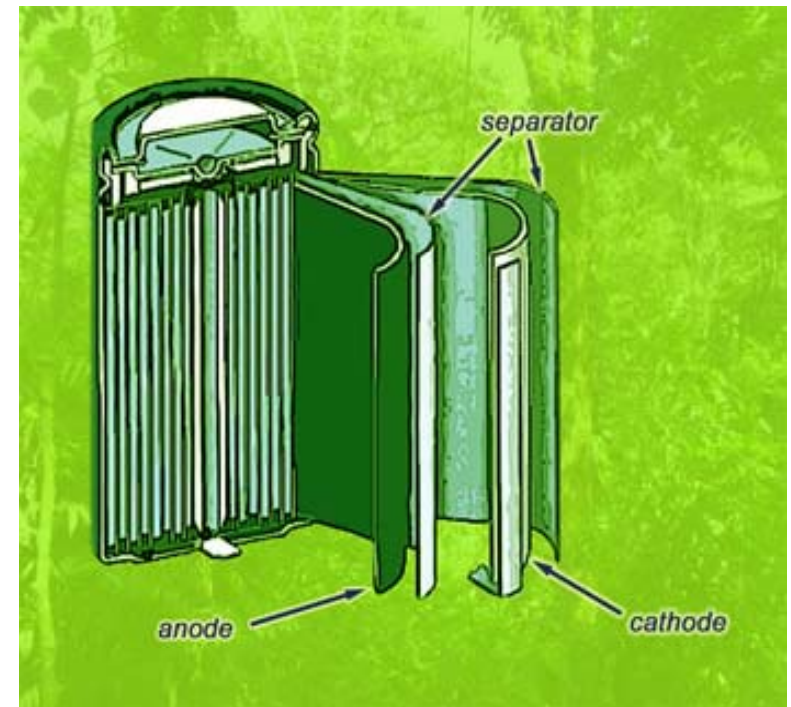
C2M – Energy Management

- **Home Energy Management:** Researchers are developing a home energy management system that would allow homeowners to pre-program their consumption and efficiency across a range of appliances and devices.
- **“OpenADR”:** Standard communication protocols would enable wide participation in demand response programs. Researchers have developed an open architecture demand response protocol (OpenADR) that will allow multiple players to automate electric load management.



+ C2M - Batteries

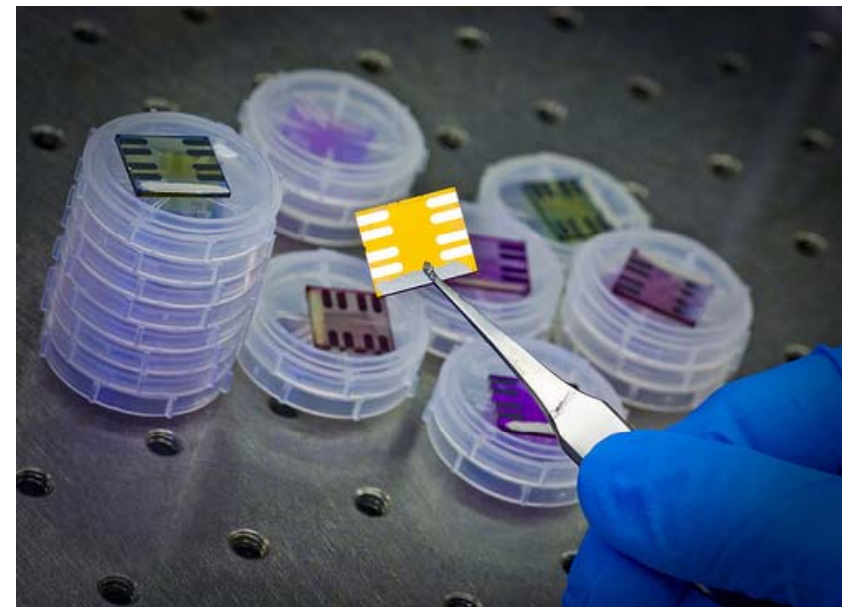
- ***Silicon & Polymer Binder Anode:***
Improving lithium-ion batteries may require new components. Researchers have found polymers that may improve the operational time of current technology when using silicon instead of graphite in the battery anode.
- ***Printable Battery:*** For smart grid and other applications, it is helpful for devices to store their own power. Researchers have developed techniques for “printing” batteries on the surface of small electronic devices. These printable batteries have the potential to scale to larger devices.





C2M – Solar

- ***Iron Pyrite & Copper Sulfide Solar Cells:*** To scale solar to the TW level, we can look beyond silicon. Two alternatives are iron pyrite and copper sulfide, which are abundant, easily mined, nontoxic, and have good absorption. Spin casting may further reduce manufacturing costs.
- **Improved Silicon Solar Cells:** A common belief is that silicon solar cells have a cost floor. Researchers have found ways to better engineer the materials, thereby paving the way toward a lower-cost silicon solar cell.





C2M – Biofuels

- ***Enzyme to Breakdown Cellulose:***
A key to biofuels is finding the right enzymes to break cellulose down into sugars. Researchers have developed one that has the potential to reduce production steps, costs, and time.
- ***Improving Algae Production:*** In nature, algae optimize individual rather than group survival. Researchers have developed algae that can significantly increase batch production efficiencies.

