

Cleantech to Market - MBA 212A, EWMBA 212A & MBA 217 (3 units)

Tues/Thurs 11:00–12:30, Haas Room C125

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[Cleantech to Market](#) is a capstone program in its seventh year that serves three groups: (1) *graduate students* who develop and apply their business, engineering, scientific, legal, and policy knowledge to identify and optimize market opportunities for leading-edge clean technology, (2) *researchers and entrepreneurs* who benefit from these valuable insights and recommendations, and (3) *industry partners* who value their front row view of the next generation of cleantech solutions and leaders from UC Berkeley who will implement them.

Cross-disciplinary student teams perform a 15-week market assessment of inventions from existing startups, blue chip universities (e.g., UC Berkeley, Stanford, and Princeton), and Department of Energy-related programs, including [Lawrence Berkeley National Laboratory](#), [ARPA-E](#), and [Cyclotron Road](#).

Students meet and work with professionals from across the cleantech industry to prepare market reports and public presentations for each technology, and collaborate as a class to support each other's work.

The course culminates in teams presenting their findings at an all-day symposium for industry professionals and in private meetings with the researchers and entrepreneurs. Throughout, students learn skills that position them to become the next generation of innovative cleantech leaders.

PHASE I: TECHNOLOGY CHARACTERISTICS & INITIAL HYPOTHESES

APPLIED INNOVATION: Problem Framing, Diverging, Team Creativity, Opportunity Recognition

C2M students first identify their technology's performance characteristics. Next, they frame initial hypotheses about the value proposition of those characteristics for potential customer segments. Teams develop at least twelve path-to-market hypotheses through brainstorming, informational interviews, and other market research.

PHASE II: TESTING HYPOTHESES & PRODUCT-MARKET FIT

APPLIED INNOVATION: Valuation of Ideas, Experimentation, Managing Ambiguity, Converging

After three weeks of divergent thinking about the possibilities, C2M students begin to converge on the most promising opportunities. This involves testing their hypotheses through deeper contacts with potential customers, cost modeling, and more closely analyzing the degree of product-market fit. Students focus on both long-term, larger markets and short-term entry markets for a minimum viable product. Students often find their initial hypotheses are more or less viable, and that relevant markets are larger, smaller or more complex than originally imagined.

PHASE III: MARKET SIZING, COMPETITOR ANALYSES & REVENUE MODELING

APPLIED INNOVATION: Revenue Model Innovation, Risk Selection

After four weeks of multiple iterations and converging, C2M students select the most promising two to four paths-to-market and dive deeper into target market assessments, market sizing, and revenue projections. Teams also begin to frame the structure for their market reports and symposium presentation slides using both the Business Model Canvas and the C2M Core

Analysis (below). They also consider what further scientific and/or engineering research might increase the technology's market potential, what are the main obstacles to commercialization, what is the best pathway to market, what are the most important next steps, and what types of funding may be most appropriate for the next stage.

C2M CORE ANALYSIS

- *Technology Characteristics & Value Proposition / Customer Segments*
 - What characteristics define this technology?
 - What are the key cost and performance metrics?
 - What problems or customer pain does it solve?
 - What solutions, benefits or opportunities could it offer?
 - What degree of improvement might it offer?
 - Are there manufacturing or other issues that might impact the transition from lab to commercial scale?
 - Is it more likely to succeed in the market as a new company, product, or feature?
 - How should the intellectual property be protected?

- *Market Selection, Market Sizing*
 - What is the most promising first market, and who might be early adopters?
 - Is the technology likely to create a new market or re-segment an existing market?
 - What is the size and expected growth of the most relevant customer segment(s)?
 - Who are the buyers, decision makers, users, influencers, recommenders, and saboteurs?
 - What strategies will get, keep and grow customers?
 - Which societal, technical, economic, regulatory, and political trends may impact adoption/growth?

- How will global and capital markets, commodities, and existing infrastructure impact adoption/growth?
- *Value Chain (Components & Dynamics) & Competitors (Existing/Emerging)*
 - Where does this technology fit in the value chain?
 - Who are potential partners, channels and suppliers?
 - What is the nature of the value chain "neighbors"? How much disruption could this technology cause?
 - Who are the existing and emerging competitors? Substitute products & services?
 - Do customers face inertia, barriers to entry/exit, and real or perceived switching costs?
 - How can you position the technology relative to existing and emerging competitors?
- *Minimum Viable Product*
 - What product would have the fewest features that customers need to "pay" for with resources of value (e.g., money, time, attention, data, etc.)?
 - What are the pros/cons of additional features or functionality?
- *Cost Modeling*
 - What are the startup costs (initial/sunk, ongoing fixed & variable, and capital or operating)?
 - What market research can help estimate those costs?
 - Is the business model high-margin/low-volume, low-margin/high-volume, or other?
 - Would a startup need to create manufacturing facilities or could they use facilities that already exist?
 - Could partners help provide resources and/or perform key activities?
 - Would it help to develop a techno-economic analysis of key leverage points?
 - How large are projected customer acquisition costs?

- *Revenue Projections, Sources of Capital*
 - For what value are the customers really willing to pay?
 - Who are the customers (what is the "customer archetype"), and what do they currently pay?
 - What is the revenue model, and what are the best pricing tactics?
 - Is the technology well suited to a startup or should it be licensed to an existing company?
 - If licensing is the best path, what should be the scope of the license (geography, field of use)?
 - How long will it really take to deliver the first product to the first paying customer?
 - Is non-dilutive funding available (e.g., government grants, non-recurring engineering, other)?
 - Would a debt strategy help?
 - If this is a startup, when should they seek funding that gives people equity in the company?
- *Next Steps*
 - What are the strengths, weaknesses, opportunities, threats, and key mitigation strategies?
 - What are the specific and actionable next steps to improve market viability?

PHASE IV: PRESENTATION SLIDES & MARKET REPORTS

APPLIED INNOVATION: Influence Beyond Authority

At the end of the semester, C2M teams present their findings to cleantech professionals at the annual C2M Symposium. Teams have 20 minutes to present, followed by 10 minutes of Q&A. The objective is to increase awareness of and commercial interest in the cleantech research. The presentations must be crisp, clear, compelling, grounded in market research, and present an inspiring vision of the opportunities along with a credible description of key risks and mitigation strategies. Teams also provide a one-hour debrief to their scientists. The goal of that private meeting is to provide a deeply

realistic view of the market along with actionable recommendations on next steps. The discussion should include key takeaways from the market report, a summary of the most promising paths to market, and new performance and/or cost targets that would improve market positioning.

THROUGHOUT: TEAM FORMATION & TEAM PERFORMANCE

APPLIED INNOVATION: Team Creativity, Adaptive Governance, Managing Conflict

Finding paths-to-market for new technologies involves significant ambiguity and innovation. C2M team members come from different disciplines, countries, and cultures. This means they must work hard at learning to function as a high-performing team rather than just a collection of diverse individuals. Students work with select Haas tools to manage that experience, including a team performance model, checklists of team best practices, and a mid-semester team survey instrument.

DELIVERABLES:

Interim: (1) list of technology characteristics & performance metrics; (2) presentation of 12+ path to market hypotheses; (3) presentation of the 2-4 most promising areas needing deeper market research; (4) draft slides, market report summary, and work plan; and (5) dry-run presentations to instructors & industry professionals.

Final:

- Market report (approximately 50 pages plus source notes and appendices)
- Symposium slides & oral presentation (20 minutes for presentation + 10 minutes of audience Q&A)
- Final debrief with researchers/entrepreneurs (1 hour +/- based on need and availability)

GRADING:

65% Team

- Market report – 40%
- Symposium slides – 25%

35% Individual

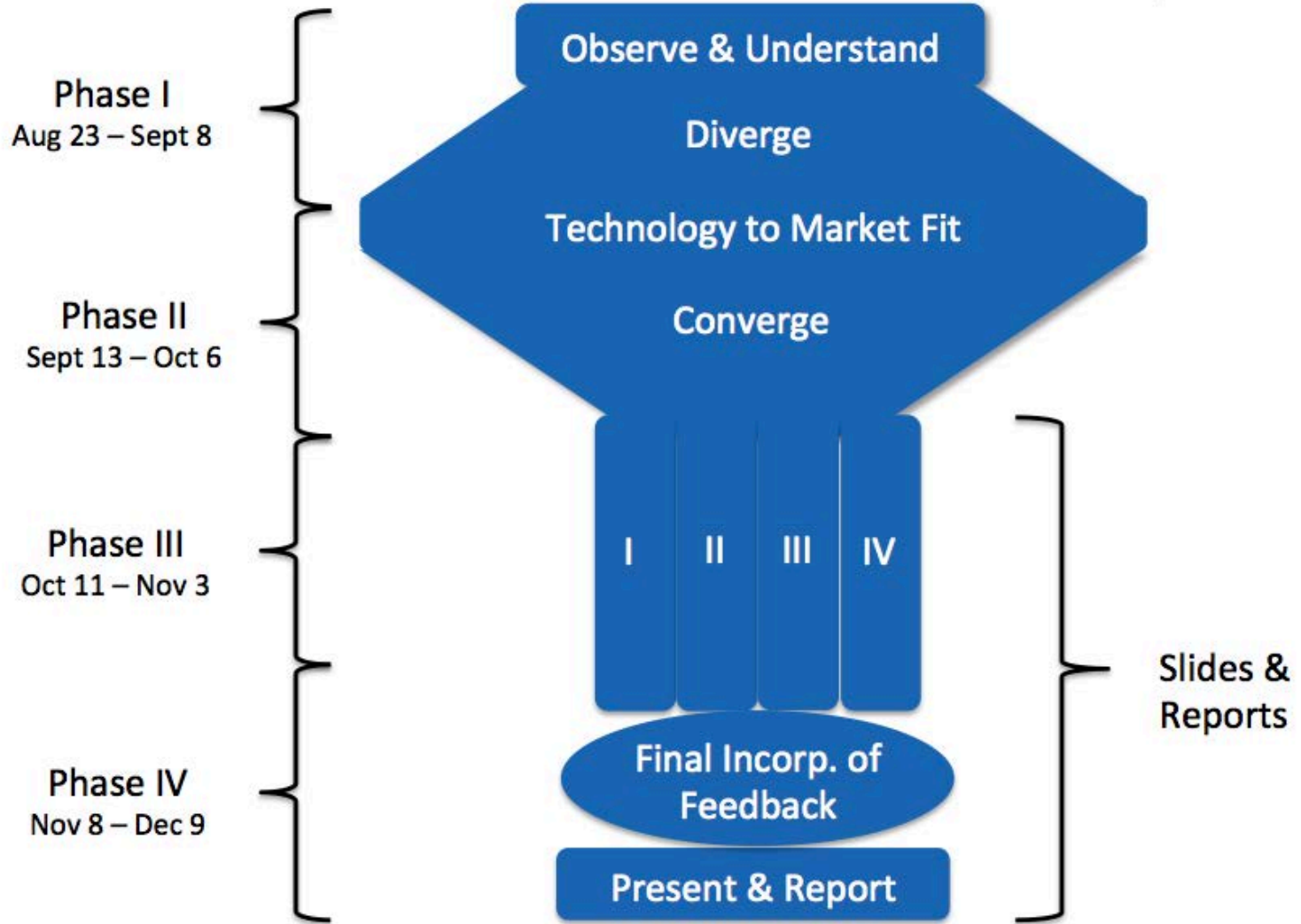
- Peer feedback surveys – 20% (5% mid-semester + 15% end-of-semester)
- Read & comment assignments (3) + instructor observations – 10%
- Symposium oral delivery – 5%

CLASS STRUCTURE: Class is a combination of instruction, guest lectures, and in-class team meetings and coaching. Students should spend 9-10 hours/week (3 in class and 6+ outside class).

COACHING: Throughout the semester, the instructors provide in-class team coaching. They are also available for conference calls, email correspondence, and additional in-person coaching as needed.

READINGS: C2M readings include (1) articles, case studies, and book chapters in study.net; (2) web links to materials embedded in the syllabus; and (3) sample C2M work products from prior years.

VISUAL SUMMARY OF C2M INNOVATION PROCESS



Assignments Summary:

Date	Details	
Mon Aug 22, 2016	<u>TEAM LEADS COLLECT AND EMAIL INTRO SLIDES from their teams to Bill & Brian by 4 pm Monday, Aug 22.</u>	due by 4pm
Tue Aug 23, 2016	<u>PHASE I: TECHNOLOGY CHARACTERISTICS & INITIAL HYPOTHESES.</u>	8am
Tue Aug 23, 2016	<u>COURSE OVERVIEW & FACULTY/STUDENT INTROS: Read C2M syllabus (intro through Phase I), team formation docs, and Haas core course lessons for Phase I.</u>	due by 11am
Thu Aug 25, 2016	<u>READ/WATCH & COMMENT ON C2M MARKET REPORTS & SYMPOSIUM VIDEOS: Read/watch C2M Core Analysis, two grading worksheets, and one C2M market report plus its associated symposium video.</u>	due by 11am
Tue Aug 30, 2016	<u>C2M ALUMNI PANEL: Bring your best Qs for alums who excelled in C2M; begin researching 40+ written sources & conducting 40+ informational interviews.</u>	due by 11am
Thu Sep 1, 2016	<u>READ/WATCH/SCAN & COMMENT on Hypothesis-Driven Entrepreneurship article and BMC Strategy & Canvas chapters; scan Berkeley Energy Network, Top 50 Market Research Websites, and Steve Blank Slides/Videos website.</u>	due by 11am
Sat Sep 3, 2016	<u>TEAM LEADS EMAIL TEAM COLLABORATIVE PLANS to B3 by midnight.</u>	due by 11:59pm
Tue Sep 6, 2016	<u>BILL PRESENTATION & TEAM WORK IN CLASS: Read short articles on why tech companies fail, customer adoption, and minimum viable products.</u>	due by 11am
Wed Sep 7, 2016	<u>TEAM LEADS EMAIL technology characteristics & performance metrics (including pending Qs for scientists) to B3 by midnight.</u>	due by 11:59pm
Thu Sep 8, 2016	<u>TEAM LEAD PRESENTATIONS & TEAM WORK IN CLASS: Team leads present a summary</u>	due by 11am

Date	Details	
	<u>of their work plans & project management tools, and teams work on path to market hypotheses with B3 coaching.</u>	
Tue Sep 13, 2016	<u>PHASE II: TESTING HYPOTHESES & PRODUCT-MARKET FIT.</u>	8am
	<u>CASE STUDY: Read Aquion case & related materials to prepare for a class discussion.</u>	due by 11am
Thu Sep 15, 2016	<u>TEAM PRESENTATIONS: Teams present their leading hypotheses to class and receive feedback.</u>	due by 11am
Tue Sep 20, 2016	<u>TEAM WORK IN CLASS on path to market hypotheses with B3 coaching.</u>	11am
Thu Sep 22, 2016	<u>CASE STUDY: Read Alphabet case & related materials to prepare for a class discussion.</u>	due by 11am
Tue Sep 27, 2016	<u>READ & COMMENT on cleantech funding readings to prepare for a FUNDING INNOVATION PANEL.</u>	due by 11am
Wed Sep 28, 2016	<u>COMPLETE MID-SEMESTER PEER SURVEY (5% of grade).</u>	due by 11:59pm
Thu Sep 29, 2016	<u>TEAM WORK IN CLASS on path to market hypotheses (B3 available, coaching optional).</u>	11am
Tue Oct 4, 2016	<u>TEAM SURVEY COACHING: Read team survey report and go to special coaching session from 11:00-1:00 (Great Hall at the Bancroft Hotel, 2680 Bancroft Way, Berkeley, CA 94704), lunch will be served).</u>	due by 11am
Thu Oct 6, 2016	<u>TEAM PRESENTATIONS: Teams present their 2-4 most promising deep dive topics and receive feedback.</u>	due by 11am
Tue Oct 11, 2016	<u>PHASE III: MARKET SIZING, COMPETITOR ANALYSES & REVENUE MODELING.</u>	8am

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Thu Oct 13, 2016	CLEANTECH POLICY PANEL	due by 11am
Thu Oct 13, 2016	TEAM WORK IN CLASS on deep dive analyses (B3 available, coaching optional).	11am
Tue Oct 18, 2016	FOUNDERS PANEL: Scan company websites to prepare for a panel discussion on what it takes to start new companies and product lines.	due by 11am
Thu Oct 20, 2016	EFFECTIVE MARKET REPORTS: Read another C2M market report and revisit the C2M core analysis and market report grading criteria to prepare for a class discussion.	due by 11am
Tue Oct 25, 2016	EFFECTIVE SLIDES: Study two sets of C2M Symposium slides/videos to prepare for a class discussion.	due by 11am
Tue Oct 25, 2016	TEAM LEADS EMAIL FILES to B3 if meeting on 10/27.	11am
Thu Oct 27, 2016	TEAM MEETINGS WITH Bill & Brian: Half of the teams will meet to check on progress, teams not meeting are free to work in any location.	11am
Tue Nov 1, 2016	TEAM LEADS EMAIL FILES to B3 if meeting on 11/3.	due by 11am
Tue Nov 1, 2016	TEAM WORK IN CLASS on deep dive analyses (B3 available, coaching optional).	11am
Wed Nov 2, 2016	SYMPOSIUM INVITATIONS: Please send Karen Notsund (knotsund@berkeley.edu) the names, affiliations, and emails of people you want to invite to the C2M Symposium. INVITE YOUR SCIENTISTS to the C2M Symposium!	11:59pm
Thu Nov 3, 2016	TEAM MEETINGS WITH Bill & Bev: Half of the teams will meet to check on progress, teams not meeting are free to work in any location.	11am to 12:30pm

Date	Details	
Tue Nov 8, 2016	<u>PHASE IV: PRESENTATION SLIDES & MARKET REPORTS.</u>	8am
	<u>DRY RUN PRESENTATIONS to class & tech transfer staff.</u>	due by 11am
Thu Nov 10, 2016	<u>DRY RUN PRESENTATIONS to class & tech transfer staff.</u>	due by 11am
Tue Nov 15, 2016	<u>DRY RUN PRESENTATIONS to industry experts.</u>	due by 11am
Thu Nov 17, 2016	<u>TEAM WORK IN CLASS (B3 available, coaching optional).</u>	11am
Tue Nov 22, 2016	<u>TEAM WORK IN CLASS (B3 available, coaching optional).</u>	11am
Thu Nov 24, 2016	<u>THANKSGIVING HOLIDAY</u>	8am
Tue Nov 29, 2016	<u>FINAL C2M SYMPOSIUM PREP: Meet at the Banatao Auditorium (310 Sutardja Dai Hall) to test slides on their projector and for Q/A on the market report & scientist debrief.</u>	due by 11am
Wed Nov 30, 2016	<u>KEY DEADLINE 11:59 pm: Team leads email final slides for C2M Symposium to Bill, Brian & Karen (knotsund@berkeley.edu) by 11:59 pm (NO EXCEPTIONS!).</u>	due by 11:59pm
Fri Dec 2, 2016	<u>C2M SYMPOSIUM: PRESENT your slides, EVALUATE three other teams, and STAY for networking.</u>	due by 9am
Mon Dec 5, 2016	<u>DEBRIEF SCIENTISTS this week and find out if they require any redactions to your market report.</u>	due by 8am
Tue Dec 6, 2016	<u>FINAL C2M CLASS to discuss market reports, debrief with scientists, and final peer evaluations (plus fill out course survey).</u>	due by 11am

Date	Details	
Fri Dec 9, 2016	<u>COMPLETE FINAL PEER SURVEY (15% of grade) - REQUIRED to receive class credit.</u>	due by 11:59pm
	<u>TLS EMAIL FINAL WORK PRODUCTS to B3 & Casey - complete market report, complete source notes, redacted market report (if any redactions are required).</u>	due by 11:59pm
Fri Dec 16, 2016	<u>C2M GRADING PROCESS</u>	12am