



Stanford University - Continuing Studies

BUS227 – “Clean Energy & Transportation – Market and Investment Opportunities”

Lecturer: Tony Seba

Tentative Course Overview – Spring 2014

Course Objectives:

- Provide you with frameworks and tools to analyze market opportunities in the disruption of energy and transportation.
- Provide you with the opportunity to develop your ideas using these tools as well as interactions with clean energy and transportation entrepreneurs, senior executives, and investor guest speakers.

Date/time:

- Mondays (March 31st through May 19th) from 7pm to 9:15pm.

Course Grading / Class Project

- Grade: **The final class project will account for 100% of the grade.**
- Class Project: business plan for a product or service in a clean energy or clean transportation market. I will provide a powerpoint template. Please don't disclose any confidential information.
- It's a group project. Groups should consist of 3-4 members.
- Group matching: we will have a class LinkedIn Group where you can network and look for teammates. Also, I'm usually in the classroom around 6:30pm. Feel free to come in early to connect with potential group members.
- Focus on finding a market opportunity and then develop products or services to meet that need (rather than starting with a technology or product.)
- **Team rosters are due** Mon April 28th. If you don't have a group by then, I will assign one.
- **Project due date: Saturday, May 17th.** No late submissions.
- Class project team presentations (in person): Monday May 19th.

Book / Course Materials / Resources

- Book: “[*Solar Trillions – 7 Market and Investment Opportunities in the Emerging Clean-Energy Economy.*](#)” The book is available on Amazon.com, Google Books, Apple store and Amazon Kindle store.
- Book: “*Clean Disruption of Energy & Transportation – How Silicon Valley Will Make Oil, Nuclear, Natural Gas, Coal, Electric Utilities and Conventional Cars Obsolete by 2030*”. This book is in the publishing process.
- I will provide free PDF copies of the assigned chapters of my books.
- Reading material: each class session includes links to news and videos as well as optional reports and reference material for those who want to have a deeper understanding of each topic.
- Slides: I will email the key slides **after** each class.

Video / Audio Consent / Copyright

- This class will be videotaped. By staying in this class you give your **consent to be audio and videotaped, authorize the release of voice and likeness and release and hold harmless** Mr. Tony Seba and Stanford University.
- *Note that the lectures are my copyrighted material – please don't record (audio, video or otherwise) or share any of the lectures.*

Miscellaneous

- Please include ‘BUS227’ in the subject line whenever you email me.

BUS227 – Tentative Course Schedule**Session 1 – March 31 – Introduction / Technology vs Extraction / The Solar Disruption****Lecture themes:**

- The Energy Industry, Global Energy Choices & The Future of Energy
- Course intro/overview
- The Electric Vehicle Disruption

Reading:

- “*Solar Trillions*”, chapters 1 and 2 – Energy Choices and The Future of Energy
- “*Clean Disruption of Energy & Transportation*”, “*Introduction*” & chapter 1 – “*The Solar Disruption*”

Video:

- “Is The Electric Vehicle Disruptive?”, (watch from 18:32 to 32:40), *League of California Cities Public Works Officers Institute* Keynote Address, March 20, 2012, <http://www.youtube.com/watch?v=vgY1Z8RQ9vM>
- *Optional: Nate Lewis, ‘Challenges for Global Energy’*, (81 min) <http://online.itp.ucsb.edu/lecture/lewis/rm/flash.html>

News:

- “Buffett Utility Buys \$2.5 Billion SunPower Solar Projects”, Bloomberg January 2, 2013, <http://www.bloomberg.com/news/2013-01-02/buffett-utility-buys-sunpower-projects-for-2-billion.html>
- “Germany Breaks World Record for Solar Power Generation with 22GW”, May 28, 2012, http://www.pv-tech.org/news/germany_breaks_world_record_for_solar_power_generation_with_22gw

Optional / Reference Reports:

- David MacKay, “*Sustainable Energy Without the Hot Air*”, at <http://www.withouthotair.com/>

Session 2 – April 7 – Finance, Business Model Innovation and the Disruption of Energy**Lecture Themes**

- The Solar Disruption
- Finance & the Disruption of Energy
- Business Model Innovation in Energy
- What is ‘Grid Parity’ and what’s wrong with it?
- Information Economics vs extraction economics.

Reading:

- “*Clean Disruption of Energy & Transportation*”, chapter 2 – “*Finance and the Disruption of Energy*”
- “Smarter Finance for Cleaner Energy: Open Up Master Limited Partnerships (MLPs) and Real Estate Investment Trusts (REITs) to Renewable Energy Investment”, Felix Morman and Dan Reicher, Steyer Taylor Center for Energy Policy and Finance & Brookhaven, Nov 2012,

www.brookings.edu/~media/Research/files/Papers/2012/11/13_federalism/13_clean_energy_investment.pdf

- “These Solar REIT pioneers are mining the sun for good income”, Jared Viedmeyer, RenewableEnergyWorld.com, Aug 13, 2013, <http://www.renewableenergyworld.com/rea/news/article/2013/08/these-solar-reit-pioneers-are-mining-the-sun-for-good-income>
- “Solar Financing Explained”, Greentech Media, January 23, 2013, <http://www.greentechmedia.com/articles/read/Guest-Post-Solar-Financing-Explained>

Media:

- “Five Reasons Why California Cities Will Build One Million Solar Roofs and 12 Distributed GW by 2020”, Forbes.com, April 24, 2012, <http://www.forbes.com/sites/tonyseba/2012/04/24/five-reasons-why-california-cities-will-build-one-million-solar-roofs-and-12-distributed-gw-by-2020/>
- “Why Crowdfunding Could Disrupt How Solar Power is Created”, GigaOm, Jan 11, 2013, <http://gigaom.com/2013/01/11/why-crowd-funding-could-disrupt-how-solar-power-is-created/>

Optional / Reference Reports:

- “Major Solar Projects List”, Solar Energy Industries Association, March 6, 2014: <http://www.seia.org/research-resources/major-solar-projects-list>

Session 3 – April 14 – Distributed Energy and the Disruption of Power Utilities

Guest Speaker

Masato Inoue, (former) Chief Product Designer, Nissan Leaf, Nissan

Lecture Themes

- The Disruption of Electric Utilities
- Participatory Energy, Electricity 2.0: The New Architecture of Energy
- Net Zero Energy
- Energy markets and zero marginal costs.

Reading

- “*Clean Disruption of Energy & Transportation*”, chapter 3 – “*Distributed, Participatory Energy and the Disruption of Power Utilities*”
- Edison Electric Institute, “Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business”, January 2013, <http://www.eei.org/ourissues/finance/Documents/disruptivechallenges.pdf>

Media:

- “Exploratorium’s Net Zero Energy Goal for New Waterfront Home 2013”, <http://www.exploratorium.edu/press-office/press-releases/exploratoriums-net-zero-energy-goal-new-waterfront-home-2013>
- “Tokelau Islands Switch to Solar Power” BBC News, Nov 7, 2012, <http://www.bbc.co.uk/news/world-asia-20233754>

Optional / Reference Reports:

- “Solar Trillions”, chapters 4 & 5 - Opportunities II & III – Industrial Scale Solar; Island and Village Scale Solar
- Solar Industrial Process Heat – State of the Art”, European Solar Thermal Industry Federation, <http://www.estif.org/fileadmin/estif/content/policies/downloads/D23-solar-industrial-process-heat.pdf>

Session 4 – April 21 – Distributed Energy and the Disruption of Power Utilities**Lecture Themes**

- Flipping the Architecture of Energy and Transportation
- Net Zero Energy
- Zero Marginal Cost

Reading

- “Clean Disruption of Energy & Transportation”, chapter 3 – “Distributed, Participatory Energy and the Disruption of Power Utilities”
- “Solar Trillions”, chapter 8 - “Energy-In-A-Box”– Energy Storage

News:

- “How to Lose Half Trillion Euros”, The Economist, Oct 12, 2103
<http://www.economist.com/news/briefing/21587782-europes-electricity-providers-face-existential-threat-how-lose-half-trillion-euros>

Optional / Reference Reports:

- “Electricity Energy Storage Technology Options - A White Paper Primer on Applications, Costs, and Benefits” Electric Power Research Institute (EPRI), May 2011,
http://my.epri.com/portal/server.pt?Abstract_id=000000000001020676

Session 5 – April 28 – Autonomous (Self-Driving) Cars and the Disruption of Conventional Cars**Guest Speaker**

Haresh Patel, CEO, Mercatus

Lecture Themes

- Autonomous (self-driving) cars
- The Disruption of the Conventional Car and Petroleum industries

Reading

- “Clean Disruption of Energy & Transportation”, chapter 5 – “The Autonomous (self-driving) Car Disruption” and chapter 7 “The End of Oil”

Media:

- “Self-Driving Cars – The Next Revolution”, KPMG, 2013,
<https://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/self-driving-cars-next-revolution.pdf>

Video:

- “Self-Driving Car Test: Steve Mahan”, Google, March 28, 2012, <http://www.youtube.com/watch?v=cdgQpa1pUUE>

Session 6 – May 5 – Intelligent Energy Management and the Disruption of Energy and Transportation

Guest Speaker

Danny Kennedy, Founder & Exec Vice President Sungevity

Lecture Themes

- Exponential technologies (sensors, robotics, cloud, mobile Internet, computing) and intelligent energy management
- Energy Efficiency, transmission, the smart grid

Reading

- “Solar Trillions”, chapter 4 - Opportunity VII – Internet Times Ten - The Smart Transmission Grid
- “What’s Wrong with the Electric Grid?”, Eric Lerner, at <http://www.aip.org/tip/INPHFA/vol-9/iss-5/p8.html>

Media:

- “NESTS’s Smarter Home”, MIT Technology Review, Feb 15, 2013, <http://www.technologyreview.com/featuredstory/511086/how-nests-control-freaks-reinvented-the-thermostat/>
- “Quirky, GE Unveil Smart Air Conditioner”, PC Magazine, March 13, 2014, <http://www.pcmag.com/article2/0,2817,2455161,00.asp>

Optional / Reference Reports:

- “Terrorism and the Electric Power Delivery System”, The National Academies of Sciences, 2012, http://www.nap.edu/catalog.php?record_id=12050

Session 7 – May 12 – Baseload Solar and the Disruption of Conventional Energy Sources

Lecture Themes

- Baseload Solar / Utility Scale Solar
- Wind Power
- Clean Cars: Why not Hydrogen Fuel Cell Vehicles?

Reading

- “Clean Disruption of Energy & Transportation”, chapter 6 – “The End of Nuclear”
- SolarReserve: Crescent Dunes project <http://www.solarreserve.com/what-we-do/csp-projects/crescent-dunes/>

Media:

- “The World’s First Baseload (24/7) Solar Power Plant”, Forbes.com, June 21, 2011, <http://www.forbes.com/sites/tonyseba/2011/06/21/the-worlds-first-baseload-247-solar-power-plant/>

- “BYD completes 36MWh energy storage solution to accompany wind, solar generation in Hebei Province, China”, <http://www.solarserver.com/solar-magazine/solar-news/current/2012/kw01/byd-completes-36mwh-energy-storage-solution-to-accompany-wind-solar-generation-in-hebei-province-china.html>

Optional Reading

- “*Solar Trillions*”, chapter 8, Opportunity VI - “Energy-In-A-Box”– Energy Storage
- “*Solar Trillions*”, chapters 3 and 10 - Utility Scale Solar
- “*Chemical Valley*”, *The New Yorker*, April 7, 2104, http://www.newyorker.com/reporting/2014/04/07/140407fa_fact_osnos

Session 8 – May 19 – Team Project presentations

Student Business Plan Project Presentations

Special Guest

Angelika Blendstrup, Founding Partner, ZFunction University