

Gregg Edmund Hardy, MBA

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EDUCATION

MBA, Operations, MIT Sloan School of Management, 1995

Won full-tuition, Leaders for Manufacturing scholarship
Elected president of Outing Club and championship Soccer Club

BSE, Mechanical & Aerospace Engineering, Princeton University, 1988

Won best senior thesis for analysis of helicopter rotor blade modeling methodologies
Member of Sigma Xi
Elected president of Jazz Ensemble, which consisted of two, 18-member ensembles

PROFESSIONAL EXPERIENCE

Founder, Pacific Crest Labs, Portland, OR, Present Position

Oversee start-up, management and operations of Portland, OR office and laboratory. Facilitate network standby policy pathfinding for Natural Resources Canada. Representing Northwest Energy Efficiency Alliance in California rulemaking for computers and monitors. Helping develop PJM capacity program for set-top boxes.

Principal, Ecos Research LLC, Portland, OR, 2015 - 2016

Managed operations of Portland, OR office and laboratory. Conducted research and policy analysis to improve the energy efficiency and performance of consumer electronics and appliances on behalf of utilities, government agencies, and non-profit organizations.

Led May 27, 2015 Set-top Box Canadian Energy Efficiency Voluntary Agreement (CEEVA) workshop in Ottawa, Canada for Natural Resources Canada. Prepared draft CEEVA document.

Independent Consultant, Portland, OR, 2014

Technical leadership in national discussion with major cable, satellite and telco service providers lead to signed U.S. voluntary agreement for set-top boxes, accepted by DOE as an alternative to regulation. Led dialogue with Canadian pay-TV stakeholders – service providers, global set-top box manufacturers, utilities, trade groups and NGOs – which resulted in a decision to pursue a Canadian voluntary agreement for set-top boxes.

Led June 25, 2014 Set-top Box Canadian Energy Efficiency Voluntary Agreement (CEEVA) workshop in Toronto, Canada for Natural Resources Canada.

Vice President, Ecova, Portland, OR, 2008-2013

Led Ecova team of 40 focused on Research and Policy, Utility Program Services, and Plug Load Solutions. Responsibilities included staffing, strategic planning, financial reporting and operations.

Supported client work for the U.S. Department of Energy, the EPA ENERGY STAR® program, Northwest Energy Efficiency Alliance (NEEA), Northeast Energy Efficiency Partnership (NEEP), National Rural Electric

Cooperative Association (NRECA), Collaborative Labeling and Standards Program (CLASP), Asia Pacific Partnership (APP), Natural Resources Defense Council (NRDC), Natural Resources Canada (NRCan), NYSERDA, Electric Power Research Institute (EPRI), Public Interest Energy Research (PIER) Program, Electric Program Investment Charge (EPIC) Program, TopTen USA, Northwest Power and Conservation Council (NWPCC), UK Department for Environment, Food & Rural Affairs (DEFRA), European Council for an Energy Efficient Economy (ECEEE), Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and many other utilities across the U.S..

Expanded global 80 PLUS® power supply program to include over 4,000 certified power supplies (through end of 2014), including power supply designs for desktops, enterprise servers, and storage/network solutions. 80 PLUS is part of the Plug Load Solutions umbrella program, that rewards manufacturers and retailers for increased market availability and promotions of 80 PLUS and ENERGY STAR desktops, servers, displays, televisions, and set top boxes.

Explored advances in European set-top box power management through extensive engagement in summer of 2010 with EU stakeholders including, British Sky Broadcasting, Pace Plc., DEFRA, European Commission, BIOIS, and the International Energy Agency.

General Manager & Engineering Director, ESI Corporation, Portland OR, 2006-2007

Led \$50M laser drill capital equipment business to include line management of 8-person engineering team and coordination of company-wide, global cross-functional support team. Grew innovative micromachining business from start to a profitable, \$10M business in one year. Outsourced routine design activities and manufacturing to Flextronics and other Asian ODMs. Developed optics supply chain quality controls and field failure feedback mechanisms resulting in significant MTBF improvement. Overhauled Integrated Circuit packaging product line strategy.

Intel Corporation, Hillsboro, Ore./Chandler, AZ, 1995-2006

Product family manager

Championed development of Media Center PC, launched by Gateway, lauded by WSJ's Walt Mossberg and CNET, honored by CES Innovations 2004 award committee. Recruited and managed 12-person Intel team. Selected Asian ODM partner, FIC, and directed joint development and launch of successful media center computer system.

Managed profitable, \$300M, performance motherboard product line, to include line responsibility for engineering team. Received major awards from PC Magazine, PC World and PC Gamer magazines.

Managed midrange server product line to include line responsibility for two engineering teams. Achieved a 25% BOM and 35% conversion cost reduction on a dual-processor server system that set volume and profit records and enabled division to achieve first time profitability.

Director of manufacturing, planning and logistics – Home Products Group

Directed 14 manufacturing and planning reports and 10 members of Global Systems Manufacturing Outsourcing organization to manage the total supply chain for web appliance and set-top box product lines and component kits. Managed on-time production and delivery of 210k appliances to customers in Europe. Developed controls for inventory exposure of > \$130M and idle factory charges of > \$2M.

Desktop Products Liaison, Worldwide Assembly & Test Manufacturing Network

Served as executive liaison to desktop business group relative to capacity planning, cost control, yields, and integrated product development. Reported to general manager of Intel's global assembly and test manufacturing group. Drove early factory engagement and risk assessment for acceleration of 10% CPU shrink. Led team to develop method for integrating physical health indicators into capacity planning cycle.

Corporate initiatives manager

Benchmarked world-class operations and platform management companies including Toyota and Samsung for Corporate Platform Office. Facilitated discussion to align corporation on common Product Life Cycle.

Operations manager

Cut supercomputer development time by months by reducing proto-board throughput time by 50%.

MIT Intern, Vought Aircraft, Grand Prairie, TX, 1994

Benchmarked US vs. Japanese design and manufacturing techniques with ShinMaywa in Japan.

United States Air Force, *Strategic Defense Initiative (Star Wars) R&D*, Albuquerque, NM, 1989-1993

Managed \$200 million budget and acted as satellite commander for space-based laser weapon system demonstration called the Relay Mirror Experiment.

Directed integration & test for high-altitude-balloon laser weapons demonstration. Negotiated groundbreaking environmental test agreement with Sandia National Labs.

General Electric – Astro Space Division, Princeton NJ, 1988-1989

Engineered and implemented breakthrough spacecraft load test process. Lauded by customer.

RELEVANT PRESENTATIONS, REPORTS AND PUBLICATIONS

1. Technical Presentations to IEC PT100-15 regarding TV HDR video test clip development, prepared for Pacific Gas & Electric (PG&E) July 2018 – February 2019.
2. TV Ecosystem Study, Report and Presentation prepared for NRDC in December 2018.
3. Presentations to Small Network Equipment Policy Pathfinding Stakeholder Workgroup prepared for Natural Resources Canada (NRCan) in fall of 2018.
4. TV Research in Support of DOE Rulemaking, presentation and workbooks prepared for NEEA in June 2018.
5. Energy Efficiency Advocates Proposal, December 2017. Presentation delivered to industry, developed with Noah Horowitz (NRDC) and Jennifer Amann (ACEEE).
6. Policy Recommendations for Connected Devices, October 2017. Memo prepared for Natural Resources Canada.
7. Computer Server Memory and Power Supply Power Demand Analysis, October 2017. Memo presented to EPA by NRDC.
8. U.S. Set-top Box Voluntary Agreement Tier 3 Discussion, June 2017. Presentation prepared for NRDC.
9. ENERGY STAR® Connectivity Discussion, April 2017. Prepared for U.S. EPA with Bruce Nordman.

10. A Roadmap for Canadian Energy Efficiency Policy Pathfinding. January 2017. Prepared for Natural Resources Canada (NRCan).
11. [The Secret Costs of Manufacturers Exploiting Loopholes in the Government's TV Energy Test: \\$1.2 Billion for Consumers, Millions of Tons of Pollution](#). September 2016. Prepared for Natural Resources Defense Council (NRDC) with C. Calwell and R. Hohenhausen.
12. [Revising the TV Energy Use Test Procedure: Incorporating HDR and other Needed Changes](#). September 2016. Prepared for Northwest Energy Efficiency Alliance (NEEA) with C. Calwell, R. Hohenhausen, and D. Houghton.
13. Canadian Pay-TV Set-top Box Energy Efficiency Voluntary Agreement (STB CEEVA) Final Draft. March 2016. Prepared for Natural Resources Canada (NRCan).
14. Impacts of UHD TV Technology and Market Trends on Energy Usage. February 2016. Presentation to Northwest Energy Efficiency Alliance (NEEA) with C. Calwell.
15. Set-Top Box Efficiency Module Development. January 2016. Prepared for Natural Resources Canada (NRCan).
16. Estimating Canadian Pay-TV STB Efficiency Gains. December 2015. Presentation delivered to STB CEEVA working group for Natural Resources Canada (NRCan).
17. [The Big Picture: Ultra-High-Definition Televisions Could Add \\$1 Billion to Viewers' Annual Electric Bills](#). November 2015. Prepared for Natural Resources Defense Council (NRDC) with C. Calwell and R. Hohenhausen.
18. Demand Response Policy Recommendations for the Pacific Northwest. June 2015. Prepared with Brian Eberhardt, Justin Steel, Diane Lozovoy, and Ken Dragoon for Portland State University Master's Degree Course Smart Grid Policy and presented in public forum to Pacific Northwest smart grid stakeholders.
19. STB National Energy Modeling: Market Analysis for Set-top Boxes in Support of STB National Strategy. March 2015. Prepared for Natural Resources Canada (NRCan).
20. Workshop presentation to Facilitate STB Canadian Efficiency Voluntary Agreement (CEEVA) Working Group. May 2015. Prepared for Natural Resources Canada (NRCan).
21. STB Canadian Efficiency Voluntary Agreement (CEEVA) Workgroup Kick-off Presentation. April 2014. Prepared for Natural Resources Canada (NRCan).
22. What can I do? Presentation to staff at Brown and Caldwell, environmental consulting firm. March 2014.
23. [Codes and Standards Enhancement \(CASE\) Initiative for PY 2013: Title 20 Standards Development: Analysis of Standards Proposal for Set-top Boxes](#). Prepared for Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and Southern California Gas Company with J. Swofford, S. Foster Porter, A. Pawashe, K. Dayem and D. Driscoll. July 2013.
24. [Codes and Standards Enhancement \(CASE\) Initiative for PY 2013: Title 20 Standards Development: Analysis of Standards Proposal for Small Network Equipment](#). Prepared for Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and Southern California Gas Company with D. Denkenberger, J. Swofford, S. Foster Porter, A. Pawashe, K. Dayem and D. Driscoll. July 2013.
25. The Power of Where and When. Presentation on the topic of wireless cloud energy consumption at the University of California Irvine CalPlug workshop on set-top boxes for Pacific Gas & Electric. May 2013.
26. Set-top Boxes and Small Network Equipment: Response to California Energy Commission: 2013 Pre-Rulemaking Appliance Efficiency: Invitation to Participate. Prepared for Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and Southern California Gas Company. April, 2013.

27. [Small Network Equipment Energy Consumption in U.S. Homes: Using Less Energy to Connect Electronic Devices](#). Edited by Noah Horwitz with Natural Resources Defense Council (NRDC). Prepared with J. Swofford, P. Walters, D. Driscoll, K. Dayem. 2013.
28. Set-top Box Game Plan Kick-off. Presentation to NRDC, ASAP, CA IOUs, NEEA, CEC and other leaders of the efficiency community for Pacific Gas & Electric at The Energy Foundation in San Francisco. March 2013.
29. Cutting Energy and Costs to Connect to the Internet: Improving the Efficiency of Home Network Equipment. Three-page summary report edited by Noah Horwitz with Natural Resources Defense Council (NRDC). Prepared with J. Swofford, P. Walters, D. Driscoll, K. Dayem. 2013.
30. Energy Efficiency: A Clean, Abundant, Low-cost Source of Energy. Presentation to graduate students at the Yale School of Forestry & Environmental Studies. April 2013.
31. Energy Efficiency: A Clean, Abundant, Low-cost Source of Energy. Presentation to undergraduate students at the Massachusetts Institute of Technology. April 2013.
32. DTA Compliance Report. Prepared for Natural Resources Canada (NRCan) with C. Donnelly, and C. Mercier. March 2013.
33. Set-top Box Challenges & Opportunities. Presentation to Technology Review meeting at Southern California Edison. February 2013.
34. Strategic Basis for Achieving Zero Net Energy Facilities That Are Cost-Effective and Interoperable with Smart Distribution System Operations. Prepared by Ecova for San Diego Gas and Electric with D. Houghton, E. Lighthiser, J. Swofford, J. Ketter, D. Denkenberger, and C. Mercier. 2012.
35. Cable Boxes Running Up Electric Bills Nationwide. Interview on KATU news and print article. July 2012.
36. Set-top Box Update. Policy recommendation presentation to the Pacific Coast Collaborative for Pacific Gas & Electric. June 2012.
37. EPB Fiber Optics Excels in ENERGY STAR® Set-top Box Partnership. Case study prepared for EPA with A. Phillips. 2012.
38. General Comments Regarding DOE Set-top Box Test Procedure Notice of Proposed Rulemaking (NOPR). Prepared for Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and Southern California Gas Company. March 2012.
39. Set-top Box Market and Metrics. Presented at University of California Irvine CalPlug workshop on set-top boxes. February 2012.
40. [Better Viewing, Real Savings, and Less Pollution: Improving the Efficiency of Television Set-Top Boxes](#). Edited by N. Horowitz, Natural Resources Defense Council. Prepared with J. Swofford, and T. Dillavou. Cited by over 100 periodicals and news shows. 2011.
41. Small Networking Equipment: Making the Connection to Energy Efficiency. Prepared by Ecova for the Australian Department of Climate Change and Energy Efficiency, in support of the IEA 4E Standby Power Annex. Prepared with M. Krick. 2011.
42. [Cutting Edge Feasibility](#). Prepared by Ecova for the Australian Department of Climate Change and Energy Efficiency, in support of the IEA 4E Standby Power Annex. Prepared with M. Krick, J. Swofford and C. Calwell. 2011.
43. Market, Technical and Policy Assessment: Set-Top Boxes. Prepared for Lawrence Berkeley National Laboratory with J. Swofford, and M. Krick. 2011.
44. Market, Technical and Policy Assessment: Small Networking Equipment. Prepared for Lawrence Berkeley National Laboratory with M. Krick, and J. Swofford. 2011.
45. Market, Technical, and Policy Assessment: Personal Computers and Game Consoles. Prepared for Lawrence Berkeley National Laboratory with E. Lighthiser, W. Westwater, and N. Beck. 2011.

46. [Energy Savings Opportunities and Market Descriptions for Four Residential Consumer Electronics Products](#). Prepared for Northwest Energy Efficiency Alliance with M. Frank, J. Peters, J. Van Clock from Research Into Action (RIA), and M. Krick. 2011.
47. Set-top Box Utility Program Outreach Update. Presented at ENERGY STAR Products Partner Meeting for EPA. 2011.
48. Set-top Box Market Characterization and Policy Opportunity Memo. Prepared for EPA. 2011
49. [Pay-TV Set-top Boxes: Information for Policymakers, Utilities and Energy Efficiency Advocates](#). Prepared for New Jersey Clean Energy Program (NJCEP). October 2011.
50. Consumer Electronics: Energy Efficient Set Top Box Initiative. Presentation to New Jersey Board of Public Utilities, Office of Clean Energy (OCE) and Office of Cable Television (OCT) for New Jersey Clean Energy Program (NJCEP). June 2011.
51. Breaking out of the Pack: New Efforts to Identify Low-Carbon Products. Presentation at ACEEE Market Transformation Symposium. April 2011.
52. Plug Load Technology Test Center Coordination Meeting. Presentation at Southern California Edison Plug Load Summit meeting. December 2010.
53. Will efficiency save the day? Presentation to the Unitarian Universalist Congregation of Whidbey Island. October 2010.
54. Research Development and Demonstration Roadmap: Summary Report. Prepared by Ecova for San Diego Gas and Electric with R. Lauman, M. Bailey, and C. Mercier. 2010.
55. Set-top Box: How to Partner with ENERGY STAR to Promote Efficient Set-top Boxes. Led ENERGY STAR Products Partner Meeting panel discussion including presentation in work funded by EPA. November 2010.
56. Set-top Box Timer Study: Final Report. Presentation to Energy Trust of Oregon (ETO). Prepared with C. Mercier. August 2010.
57. Set-top Boxes: Proposed Regulation. Presentation given to Canadian Pay-TV stakeholders for Natural Resources Canada (NRCan). I presented, led the webinar, and responded to stakeholder questions. 2010.
58. Pay-Television In-Home Equipment: National Energy Consumption, Savings Potential, and Policy Barriers and Opportunities. Prepared with A. Phillips, D. Driscoll, P. Walters and J. Swofford. Published by ACEEE, Summer Study for Commercial Buildings. 2010.
59. Technology Assessment Report: Set Top Boxes. Prepared for Natural Resources Canada (NRCan) with J. Swofford. 2010.
60. Market Analysis Report: Set Top Boxes. Prepared for Natural Resources Canada (NRCan) with J. Swofford. 2010.
61. C380-11: Test Procedure for the Measurement of Energy Consumption of Set-top Boxes. Contributed sections of this Canadian Standards Association (CSA) document as a workgroup member representing Natural Resources Canada (NRCan). 2010.
62. Set-top Box Program Design. Presentation to the Consortium for Energy Efficiency on behalf of EPA. January 2010.
63. Overview of US ENERGY STAR Programs and California Standards Related to Consumer Electronics. Keynote, international guest speaker at E3 conference in Sydney, Australia. 2009.
64. Ecos Plug Load Solutions Overview. Presentation to the Vermont Energy Investment Corporation (VEIC) resulting in consumer electronics incentive program win. Prepared with J. Boehlke, R. Rasmussen, and B. Denig. 2009.
65. Smart Plug Strip Field Test: Final Report. Presentation to Energy Trust of Oregon (ETO). Prepared with C. Mercier. July 2009.
66. Set-top box Technology Overview. Presentation and co-leadership of set-top box workshop attended by Canadian Pay-TV service providers, global set-top box manufacturers, trade associations, utilities,

NGOs, provincial and federal government representatives. Prepared with G. McGuire, Marbek Consulting. 2009.

67. Set-top Box Feasibility Report. Prepared for British Columbia Hydro, Natural Resources Canada and other Canadian efficiency stakeholders, with G. McGuire, Marbek Consulting. 2009.

68. External Power Supply Market Analysis. Prepared for Natural Resources Canada with C. Mercier in support of EPS rulemaking. 2009.

69. Market Characterization, Product Review, and Data Analysis for Televisions. Prepared for TopTenUSA with C. Calwell. 2009.

70. Market Characterization, Product Review, and Data Analysis for Desktop Computers. Prepared for TopTenUSA with N. Beck. 2009.

71. Market Characterization, Product Review, and Data Analysis for Laptop Computers. Prepared for TopTenUSA with N. Beck. 2009.

PATENTS

20090236323 [Method and apparatus for laser drilling holes with tailored laser pulses](#)

20080296273 [Method of and apparatus for laser drilling holes with improved taper](#)

7968820 [Method of producing a panel having an area with light transmissivity](#)

6717798 [Docking digital picture displays](#)