Ted Helvoigt, PhD
President

1500 SW 1st Avenue, Suite 720
Portland, OR 97201
helvoigt@evergreenecon.com
www.evergreenecon.com

Dr. Ted Helvoigt has years of professional experience in economic and statistical analysis and modeling and has applied these methods in a wide range of projects dealing with natural resources, healthcare, energy efficiency, and regional economic and demographic forecasting. Ted is a former member of the faculty of the Lundquist College of Business at the University of Oregon, where he taught applied regression analysis and other statistical methods.

EDUCATION

- Ph.D. in Operations Research, Management Science Oregon State University College of Forestry
- M.S. in Resource Economics, University of Montana
- B.S. in Business Administration, Ashland University

EMPLOYMENT

- Evergreen Economics
  2024 – current (President)
- Evergreen Economics
  2011 – 2023 (Vice President)
- EcoNorthwest
  2002 – 2011 (Consultant)
- American Express
  2000 – 2002 (Economist)

AREAS OF EXPERTISE

Ted has designed and conducted technical analysis and modeling for dozens of impact and process evaluations throughout the US and has vast experience applying a wide range of analytical methods to answer complex research questions. He has been the lead econometrician on numerous energy efficiency evaluations, market analyses, and other projects that required creative application of sophisticated analytical methods. Ted is a recognized expert in the design and implementation of sample designs for large, complex energy efficiency evaluations and other projects, and has applied various sampling methods to projects in the Northwest, California, and elsewhere across the US. He was the principal architect in the development of Evergreen's Advanced Metering Infrastructure Customer Segmentation (AMICS) modeling approach, which has gained widespread acceptance among California utilities and others as an industry best practice approach to modeling customer energy load shapes.

SELECTED INDUSTRY EXPERIENCE

- **Southern California Edison Trust Tracking Study**
  Led the logit regression for the stated choice data analysis component of a trust tracking study for SCE that involved in-depth qualitative customer research to define what trust in their utility means to customers and how that relates to likely engagement with optional utility offering such as energy efficiency programs or future services.
- **Energy Trust of Oregon Sampling and Weighting Training**
  Developed and conducted training program for Energy Trust staff on sample design, sampling methods, and data weighting.
- **Northwest Energy Efficiency Alliance Residential Laundry Field Study**
  Led survey analysis for a field study of residential consumer laundry habits. This residential laundry field study leverages NEEA's current Residential Building Stock Assessment (RBSA) project to collect data on laundry habits in the region served by NEEA.

SELECTED INDUSTRY EXPERIENCE (continued)

- **Washington Wood Supply Study**
  For the Washington Department of Natural Resources, project director for a team led by Evergreen to complete a wood study for the state of Washington, estimating the current and future supply and demand for wood in Washington west of the Cascade crest based on the current forest practices of private forest landowners, state trust lands, and federal lands.

- **Bonneville Power Administration Energy Efficiency Strategic Energy Management (SEM) Persistence Study**
  Led the analysis for a persistence study to estimate the effective useful life and remaining useful life for measures associated with BPA's SEM program.

- **Enstor Gas Economic Impact Analysis of Natural Gas Storage and Pipeline Expansion**
  Project director and manager for economic impact analysis of a proposed expansion of natural gas storage and pipeline facilities in three counties in Mississippi for Enstor Gas.

- **Northwest Energy Efficiency Alliance 2022 Residential Building Stock Assessment**
  Developed sample design and weighting scheme for 2022 RBSA study, the primary goal of which is to develop a current, robust, and representative characterization of the existing residential single-family and multi-family building stock in the Northwest. Also assisted in developing recruitment strategy allowing study to be conducted during COVID delta and omicron surges.

- **Consolidated Edison 2020-2021 Heat Pump M&V Research Study**
  Conducted advanced metering infrastructure (AMI) data analysis as part of a team working to quantify the impacts of heat pump technologies in terms of energy and demand and to identify key drivers of the impacts for ConEd.

- **Energy Efficiency Equipment Expected Useful Life and Remaining Useful Life Study**
  For the Connecticut Energy Efficiency Board, managing Evergreen's component of a study of the expected useful life and remaining useful life of energy efficient equipment used in residential and commercial applications in Connecticut.

- **Market Analysis for Boutique Hotel at Old Sacramento State Historic Park**
  Managed a financial feasibility analysis of constructing a boutique hotel at the Old Sacramento State Historic Park. This analysis included estimation of capital costs, detailed cash flow analysis of hotel operations, likely funding options for hotel development, discussion and recommendations regarding contractual terms for a concessionaire, and assisting DPR staff and other stakeholders in defining appropriate physical characteristics of a hotel.

- **Commercial Building Stock Assessment Data Review and Summary Table Development**
  Led statistical analysis efforts for a data review and summary table development of the fourth commercial building stock assessment (CBSA) completed by the Northwest Energy Efficiency Alliance.

- **Energy Trust of Oregon Production Efficiency Impact Evaluation**
  For an evaluation focusing on the industrial and agricultural sectors to develop estimates of program savings by fuel for the 2016 and 2017 program years, led sample design and developed confidence intervals for realization rate estimates. The project included projects within three tracks: streamlined (prescriptive and calculated measures), custom, and SEM (Strategic Energy Management).

- **California Energy Commission Building Codes and Appliance Standards Economic Studies**

Led the economic analyses of proposed performance standards for appliances and equipment used in California residences, businesses, and government facilities. The economic analyses estimated the expected impacts in economic output, employment, labor income, and business investment in California.

- **Pacific Gas and Electric Economic Impact Analysis of the Water Efficiency Standards for Spray Sprinkler Bodies**
  Estimated the economic impacts to California residents and businesses of new performance standards for spray sprinkler bodies proposed by the California Energy Commission. The study included analysis of the economic value of water and energy savings and reductions in greenhouse gas and other emissions. Results of analysis served as basis of economic analysis of Standardized Regulatory Impact Assessment (SRIA) completed by the California Energy Commission.

- **California Energy Commission Economic Impacts Analyses in Support of Standardized Regulatory Impact Assessments**
  Conducted economic impact analysis of the Appliance Efficiency Standards for HVAC fan filters (based on the results of the economic impact analysis, the California Department of Finance determined a SRIA was not required); economic impact analysis of efficiency standards for linear fluorescent lamps exempt from federal regulation; and economic impact analysis of efficiency standards for commercial and industrial fans and blowers (based on the results of the economic impact analysis, the California Department of Finance determined a SRIA was not required).

- **Southern California Edison NMEC Pre-Qualification Pilot Feasibility Study**
  Served as statistical advisor and provided technical expertise on the model testing procedures for a study to conduct analysis of hourly interval baseline energy usage data and determine if a streamlined normalized metered energy consumption (NMEC) approach might be feasible to estimate energy savings for multiple locations across a single business entity in Southern California Edison's proposed pilot program. This included developing pre-screening procedures and adapting the AMI Customer Segmentation (AMICS) package to compare and contrast the relative error of various model and segmentation options by customer (i.e., chain) and individual branch (site).

- **Pacific Gas and Electric Home Energy Use Study for the Codes and Standards Program**
  Developed the sample design and serving as advisor for data analytics and modeling for a field study including on-site surveys and metering of equipment to update saturation estimates and load shapes. The study covers the residential sector, encompassing all electricity and natural gas-using equipment, as well as building shell characteristics and the presence of distributed generation (i.e., solar photovoltaic). This study is utilizing a rigorous sampling scheme of 1,000 homes representative of the customer population.

- **Commonwealth Edison Income Eligible High User Needs Assessment**
  Conducted sampling, modeling, and quantitative analysis for a needs assessment study of income-eligible customers with high usage. The study employed consumption data analysis, a quantitative customer survey, in-depth interviews, and in-home visits to investigate causes of high usage, customer needs, and opportunities for program engagement. Results will aid utility program staff and social service agencies partnering with the program to more effectively address the needs of eligible high users.

- **Statewide Evaluation of New Mexico Investor-Owned Utilities' Electric and Gas Energy Efficiency and Load Management Programs**
  For the New Mexico Public Regulation Commission, leading all statistical analyses in support of a statewide evaluation of electric and gas energy efficiency and load management programs focusing on five New Mexico utilities, including process and impact analysis for programs serving the residential (including multi-family and low-income), commercial, and industrial sectors.

- **Southern California Edison Distributed Energy Resources (DER) Customer Profiling Research**
  Conducted propensity modeling of customers that adopted rooftop, solar, EV charging, and green energy charges for a project for SCE to develop a distributed energy resources (DER) customer-profiling tool and then provide

insights into the characteristics and needs of future adopters. The overarching goal of this research was to inform future program efforts and expand DER adoption.

- **Energy Trust of Oregon Existing Buildings Program Process Evaluation**
  For an evaluation of the 2017-2018 Existing Buildings program, led statistical analysis of participation in the SEM portion of the program, which offers five tracks of participation (Direct Install, Lighting, Standard, Custom, and SEM) for commercial customers in Oregon and Southwest Washington.

- **Energy Trust of Oregon Impact Evaluation of the 2015-2016 New Buildings Program**
  Led Evergreen's portion of an evaluation, for which Evergreen was a subcontractor, to develop reliable estimates of gas and electricity savings by participants of the New Buildings program for the 2015 and 2016 program years and to report any important observations about New Buildings projects and make recommendations for specific changes that will help Energy Trust improve the accuracy and effectiveness of future program savings estimates.

- **Community Renewable Energy Association (CREA) Oregon Wind and Solar Economic Impact Analysis**
  Led the analysis to estimate the potential economic benefits of building and operating a portion of PacifiCorp's proposed new renewable energy resources in eastern Oregon. Presented results to CREA at their annual meeting in 2018.

- **Bonneville Power Administration Energy Efficiency Impact Evaluation Services**
  Directing the analysis of a multi-year impact evaluation of BPA energy efficiency programs. Currently, Evergreen is conducting an impact evaluation of residential and commercial HVAC measures, including air source heat pumps, ductless heat pumps, and duct sealing. This project includes coordinating analysis of data across dozens of BPA's customer utilities.

- **Sacramento Municipal Utility District (SMUD) Indoor Temperature Analytics**
  For SMUD, developed models to predict the likelihood a home would be a good candidate for SMUD's retrofit Home Performance Programs based on Advanced Metering Infrastructure (AMI) data and indoor and outdoor temperature data for the home. SMUD is interested in cost efficient analytical approaches as an alternative to existing, but expensive and time consuming, engineering models.

- **Elliott State Forest Analysis of Alternatives**
  Lead investigator for the State of Oregon's study of alternative uses and ownerships of the Elliott State Forest. In this study, we estimated the volume and value of timber and non-timber resources available from the forest and described a range of feasible business models the state considered in transitioning the forest from its current use.

- **State of Alaska Department of Health and Social Services Medicaid Forecasts**
  Since 2006, has served as the lead forecaster of enrollment, utilization, and spending on Medicaid services for the State of Alaska, Department of Health and Social Services.

- **Northwest Energy Efficiency Alliance Rooftop HVAC Market Characterization Study**
  Project manager for an assessment of the current commercial HVAC market in the Northwest and the potential for high efficiency condensing gas HVAC systems.

- **Southern California Edison Advanced Metering Infrastructure (AMI) Billing Regression Study Phase 1**
  Conducted analysis for a research study to determine the potential benefits of using hourly AMI consumption data in a billing regression model to estimate HVAC program impacts. This project resulted in the creation of the AMI Customer Segmentation (AMICS) model that utilizes a version of the random coefficients model and AMI data to estimate very accurate load shapes (within 1 percent of actual use) and develop estimates of energy savings.

- **Pacific Gas and Electric AMI Billing Regression Study Phase 2**

Continued research from Phase 1 that utilized the AMICS model to develop estimates of program impacts based on AMI billing data. Phase 2 expanded the use of the AMICS model to the commercial HVAC sector as well as expanded the use in the residential sector to estimate impacts from a Home Energy Reports program.

- **Pacific Gas and Electric Multifamily Customer AMI Data Analysis**
  Assisted with a project to develop energy consumption load shapes for multi-family customers based on AMI billing data. These load shapes were used in a larger project that explored how demographic and cultural factors affected energy use in the multi-family sector.

- **Alaska Medicaid Cost of Chronic Disease**
  Lead investigator in an analysis of Alaska's Behavioral Risk Factor Surveillance System (BRFSS) survey and Medicaid claims data to estimate the costs of eight chronic diseases to the Alaska Medicaid program.

- **Consumers Energy Commercial and Industrial Programs Impact Evaluation**
  Led statistical analysis for an impact evaluation of the commercial and industrial energy efficiency programs for Consumers Energy. Core responsibilities included sampling design and statistical modeling and analysis.

- **Impact and Process Evaluation of the Ameren Missouri Low Income Weatherization Assistance Program (LIWAP)**
  Conducted regression analysis and led the impact evaluation component of a low-income energy efficiency program evaluation, which included a fixed effects billing regression model to estimate realized energy savings.

- **Public Utilities Commission of Ohio Independent Evaluation**
  Served as a project manager of a comprehensive evaluation of the state of Ohio’s residential, commercial, and industrial energy efficiency programs. As the Independent Evaluator reporting to the Public Utilities Commission of Ohio (PUCO), Evergreen worked with representatives of the four investor-owned utilities and their respective energy efficiency evaluators to coordinate and oversee the evaluation of energy efficiency programs and savings claims submitted annually by Ohio's investor-owned utilities.

- **2013 California Investor-Owned Utilities and the California Public Utilities Commission Low Income Needs Assessment**
  For the California IOUs and the CPUC, developed econometric models to determine which factors and characteristics explain why some low-income customers participate in utility-sponsored support programs for low-income customers, while others do not. Evergreen staff studied the low-income population’s needs, including characterization of their demographics and energy-using equipment characteristics and assessment of their energy burden and energy needs. The study included a phone survey with 1,000 low-income residents, in-home visits to 100 non-participating customers, and regression modeling of the population and California Alternate Rates for Energy (CARE) and Energy Savings Assistance (ESA) participant populations to determine drivers of participation in both of the state’s low-income energy assistance programs.

- **Impact Evaluation for Idaho Power Low-income Customers**
  For Idaho Power Company, developed statistical billing regression models to estimate energy savings and realization rates for two low-income energy efficiency programs.

- **Economic Review of Hydroelectric Power Acquisition**
  For the Montana Public Service Commission (MPSC), reviewed the economic analysis conducted by NorthWestern Energy (NWE) in support of its application to acquire 11 hydroelectric facilities representing 633 MWs of generation from PPL Montana, LLC.

- **Analysis of Highly Energy Efficient Homes**
  For the Northwest Energy Efficiency Alliance (NEEA), developed current and future baseline adoption forecasts for a new type of highly energy-efficient single-family home.

- **Strategic Energy Management in Hospitals**
  For NEEA, conducted a market study of strategic energy management (SEM) practices in the Northwest hospitals and healthcare sector.

- **US Department of Energy Better Buildings Neighborhood Program Energy and Economic Impact Evaluation**
  As a subcontractor for a multi-year evaluation, assisted with an impact evaluation of the ARRA-funded Better Buildings efficiency programs covering over 40 grantees nationwide.

- **Large Industrial Sector Custom Impact Evaluation**
  For the Northwest Energy Efficiency Alliance, conducted impact analysis of the energy efficiency actions taken by NEEA at 19 large food product and pulp & paper manufacturing facilities in the Northwest. Results of the analyses were used by NEEA to assess the impact of its programs targeting large Northwest manufacturers.

- **Northwest Energy Efficiency Alliance Commercial Sector Impact Evaluation**
  Conducted impact analysis of the energy savings associated with the BetterBricks project for the commercial office sector (including for the Hospitals and Offices sectors) in Portland, Oregon.

- **Research and Analysis of Energy Usage for NV Energy Low-Income Customers**
  For NV Energy in Nevada, conducted analysis of the differences in household composition, housing characteristics, energy use, energy burden, and payment default rates for low-income and other residential customers. In addition, developed statistical models to predict the likelihood that a residential customer is low-income and the likelihood that the customer would participate in an energy assistance program based on monthly energy use, physical location, and other characteristics already collected and maintained by the utility.

- **Cover Oregon Enrollment Forecast Review**
  Led a third-party review of Oregon's state health insurance exchange enrollment forecasts.

- **California Utilities Low-Income Energy Efficiency Program Evaluation**
  Conducted statistical analysis for the annual process and impact evaluation of weatherization and energy efficiency programs for low-income residents. Alternative analyses were conducted on all program participants, a subset of participants that received phone verification and a subset of participants that received on-site verification.

- **Impact Evaluation and Discrete Choice Modeling for Small Commercial Energy Conservation Programs**
  Lead analyst in the development of a nested logic regression model to estimate gross and net energy savings associated with a lighting program for small commercial customers in California. It is our understanding that this project represents the first time that nested logic methods were applied in the evaluation of an energy efficiency program.

- **Alaska Wage Differential Study**
  Lead statistician for the Alaska Wage Differential Study. Project included statewide surveys of purchasing behavior of households and prices for goods and services from retail and other establishments. The results of the study were used to adjust wages of state employees working in communities across Alaska.

- **Puget Sound Regional Forecast**
  Developed long-term economic and demographic forecasts for the Puget Sound region. These forecasts are used by area governments for long-term planning purposes.

- **Pacific Gas and Electric Retail and Hospitality Process Evaluation**
  Lead analyst for research on the retail and hospitality sectors in PG&E's service territory. For this project, we developed an on-line conjoint survey for program participants. The analysis of the information gathered from this survey was to be used to statistically estimate the relative importance that participants place on each attribute of the program.

- **Pacific Gas and Electric and Southern California Edison Home Energy Efficiency Survey Evaluations**
  Lead statistician for the 2008 HEES evaluation. Developed two-stage model to estimate energy savings and the proportion of savings attribution to the HEES program.

- **Northwest Energy Efficiency Alliance Commercial and Industrial Facilities Database Development**
  Developed a database of manufacturing, nursery, and winery facilities in the Northwest and, for each facility, developed estimates of annual energy usage for 2011.

SELECTED PUBLICATIONS AND PRESENTATIONS

- Chapman, Liandra, Kayla Banta, Ted Helvoigt, and Sarah Monohon (Evergreen Economics); Lauren Gage (Apex Analytics); Santiago Martin Rodriguez-Anderson (SBW); Hanna Lee (Bonneville Power Administration. 2024. "SEM - Break Down Barriers and the Savings Persist." Paper presented at the American Council for an Energy-Efficient Economy (ACEEE) Summer Study on Energy Efficiency in Buildings, Pacific Grove, California.
- Monohon, Sarah, Dallen Coulter, Ted Helvoigt, and Ross Donaldson. 2020. "Calculated Risk: Chain Businesses with Pay-for-Performance." Paper presented at the virtual ACEEE Summer Study on Energy Efficiency in Buildings
- Monohon, Sarah and Ted Helvoigt. 2019. "Predictions with Restrictions: C&I Metered Energy Consumption." Paper presented at the International Energy Program Evaluation Conference, Denver, Colorado
- Helvoigt, Ted, Sarah Monohon, and Ross Donaldson. 2019. "Identifying Future Adopters of Solar, EV, and Green Power." Paper presented at the International Energy Program Evaluation Conference, Denver, Colorado
- Grover, Stephen, John Cornwell, Sarah Monohon, and Ted Helvoigt. 2017. "Take It From the Top! An Innovative Approach to Residential and Commercial Program Savings Estimation Using AMI Data." 2017. Paper presented at the International Energy Program Evaluation Conference, Baltimore, Maryland.
- Webb-Cabrera, Amy, Dr. Ted Helvoigt, Stephanie Q. Baker, and Ingo Bensch. 2017. "Gauging Consumer Appetite for Super Efficient (Heat Pump) Dryers." Paper presented at the International Energy Program Evaluation Conference, Baltimore, Maryland.
- Helvoigt, Ted, Stephen Grover, John Cornwell, and Sarah Monohon. 2016. "A Smart Approach to Analyzing Smart Meter Data." Paper presented at the ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, California.
- Grover, Steve, Ted Helvoigt, Sarah Monohon, and John Cornwell. 2015. "Random Walk to Savings: A New Modeling Approach Using a Random Coefficients Model and AMI Data." Paper presented at the 2015 International Energy Policy & Programme Evaluation Conference, Amsterdam, the Netherlands.
- Boroski, John, Ted Helvoigt, Anu Teja, and Christopher Frye. 2015. "Watch Your Next Step – Continuing Change in the Northwest New Homes Market." Paper presented at the International Energy Program Evaluation Conference, Long Beach, California.
- Plantinga, Andrew, Ted Helvoigt, and Kirsten Walker. 2013. "Critical Habitat for Threatened and Endangered Species: How Should the Economic Costs Be Evaluated?" Submitted to *Journal of Environmental Management*.
- Helvoigt, Ted and Darius Adams. 2009. "A Stochastic Frontier Analysis of Technical Progress, Efficiency Change, and Productivity Growth in the Pacific Northwest Sawmill Industry." *Journal of Forest Policy and Economics.*
- Helvoigt, Ted and Darius Adams. 2008. "Data Envelopment Analysis of Technical Efficiency and Productivity Growth in the U.S. Pacific Northwest Sawmill Industry." *Canadian Journal of Forest Research.*
- Montgomery, Claire and Ted Helvoigt. 2006. "Changes in Attitudes about Importance of and Willingness to Pay for Salmon Recovery in Oregon." *Journal of Environmental Management*.

- Helvoigt, Ted and Shawna Grosskopf. 2005. "Productivity Growth, Technical Efficiency, and Returns to Scale in the Washington State Sawmill Industry." *International Journal of Information Technology and Decision Making.*
- Helvoigt, Ted, Darius Adams, and Art Ayre. 2003. "Employment Transitions in Oregon's Wood Products Sector During the 1990s." *Journal of Forestry.*