National Laboratory of the Rockies

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Identifying and Quantifying Multiple Benefits in Industrial Energy Projects: *A Collection of Case Studies*

It is important to look beyond energy cost savings and consider the additional benefits that technology and system upgrades can provide. These benefits, referred to as multiple benefits, capture broader impacts such as increased production capacity, improved equipment reliability, reduced maintenance needs, and enhanced worker safety. Accounting for these value streams helps organizations capture the full operational and financial return of energy-related projects and avoid undervaluing high-impact opportunities. Ultimately, this enables stronger business cases and more informed investment decisions.

This document provides a curated collection of industrial energy productivity case studies from across the United States that demonstrates how multiple benefits were identified and quantified in real project investments. The document is divided into two sections:

1.) Recent Industrial Energy Projects with Multiple Benefits, and

2.) Foundational Energy Productivity Case Studies.

The first section highlights recent case studies, pilot projects, and industry examples that showcase multiple benefits (co-benefits, non-energy benefits) and broader operational impacts resulting from energy productivity initiatives. The second section presents early industrial energy-efficiency projects that demonstrate operational and financial benefits beyond direct energy savings. While many of these projects predate the formal terminology of "multiple benefits," they clearly illustrate the broader value of energy productivity improvements. These resources, developed by external organizations, demonstrate how looking beyond energy cost savings can reveal additional value streams, often recovering savings that would have been missed otherwise.

1. Recent Industrial Energy Projects with Multiple Benefits

Case 1. Soupergirl – Innovative Production Upgrade Boosts Output and Efficiency

Summary: Maryland Manufacturing Extension Partnership (MEP) worked with Soupergirl to implement process and equipment improvements – replaced air blast chillers with water bath chiller - that enhanced production flow, lowered utility expenses, and increased the facility's capacity for growth.

Multiple Benefits: Improved production throughput, reduced operating costs, strengthened energy productivity, and operational scalability.

Reference Link: https://mdmep.org/from-bottleneck-to-breakthrough-how-soupergirl-scaled-up-with-sustainable-innovation/

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Case 2. Eastman Chemical – Optimization Improves Energy Productivity and Operational Performance

Summary: Through the ENERGY STAR certified plant program, Eastman Chemical implemented process efficiency and energy and inventory management initiatives that improved energy intensity, operational efficiency, and long-term resource management performance.

Multiple Benefits: Improved production throughput, reduced operating costs, increased yield, reduced raw material and steam usage, operational scalability, water conservation, and external recognition from the American Chemistry Council.

Reference Link: https://www.energystar.gov/buildings/tools-and-resources/profiles-energy-efficiency-production-strategy-saves-money-energy

Case 3. Pratt & Whitney – Industrial Assessment Improves Facility Energy Productivity

Summary: An Industrial Training and Assessment Center (ITAC) assessment identified multiple opportunities to improve facility energy productivity and operational performance at its thermal barrier coating manufacturing facility of Pratt & Whitney. Recommendations included compressor system improvements, waste heat recovery, lighting optimization, equipment setback controls, and onsite power generation strategies to help relieve facility electricity demand constraints that were limiting future production expansion.

Multiple Benefits: Increased facility capacity for future production growth, improved equipment utilization, reduced operating and utility costs, reduced peak demand, and improved workplace conditions.

Reference Link: https://itac.university/assessment/SU0526

Case 4. General Motors (GM Marion & Orion) – Boiler Upgrades Save Money & Energy

Summary: General Motors upgraded aging coal-fired boiler systems to gas fired and implemented steam system improvements at its Marion and Orion facilities to improve operational efficiency, reduce utility costs, and support more reliable plant operations.

Multiple Benefits: Lowered operating cost (overall fuel, manpower), boosted productivity, improved system reliability, reduced maintenance and labor requirements, eliminated ash disposal from coal-fired boiler.

Reference Link: https://www.energystar.gov/buildings/tools-and-resources/profiles-energy-efficiency-boiler-upgrades-save-money-energy-gm

Case 5. Chivas Brothers – Heat Recovery System Improves Distillation Efficiency

Summary: Chivas Brothers implemented mechanical vapor recompression (MVR) technology to recover and reuse process heat from distillation operations, improving thermal efficiency, reducing overall energy demand, and boosting overall distillation system performance. Pilot testing also helped optimize system configuration and operational integration before broader deployment across additional facilities.

Multiple Benefits: Improved process efficiency, reduced operating costs, enhanced heat recovery, improved thermal system performance, and increased operational productivity.

Reference Link: https://www.renewablethermal.org/piller-chivas-case-study/

Case 6. Dura Automotive Systems – Industrial Assessment Drives Energy, Waste, and Productivity Improvements

Summary: A University of Florida Industrial Training and Assessment Center (ITAC) assessment identified opportunities for Dura Automotive Systems to improve plant efficiency, reduce waste, and strengthen operational performance at its Jacksonville manufacturing facility. Implemented recommendations included compressed air leak repair, improved waste handling and recycling programs, lighting upgrades, and process flow improvements that reduced unnecessary material handling and operating costs.

Multiple Benefits: Reduced compressed air losses, improved material handling efficiency, reduced solid waste disposal costs, increased recycling and material recovery, and improved overall plant profitability and competitiveness.

Reference Link: https://itac.university/assessment/UF0239

2. Foundational Energy Productivity Case Studies

Case 1. **2006 Rohm and Haas** – Furnace Replacement Project Reduces Operating Costs and Improves Production at a Chemical Plant

Summary: This chemicals producer process heating energy efficiency project reduced operating costs and improved material/chemical reclamation process which improved throughput.

Reference Link: https://docs.nrel.gov/docs/fy06osti/39276.pdf

Case 2. **2001 Fetzer Vinyards** – Heat Exchange System Improvement Cuts Utility Costs and Improves Production at a Winery

Summary: This company implemented a project to improve its heating process. The project enabled the winery to reduce its annual natural gas consumption and water consumption, leading to lower utility costs. The project also increased productivity, reduced material waste and reduced labor costs.

Reference Link: https://www.osti.gov/servlets/purl/1216015

Case 3. **2003 American Water Heaters** – Compressed Air System Optimization Project Reduces Utility Costs and Improves Production at Water Heater Plant

Summary: An example of compressed air system inefficiency that adversely impacted production equipment and caused excessive maintenance requirements, all of which were resolved through energy efficiency measures and reducing operating costs.

Reference Link: https://docs.nrel.gov/docs/fy04osti/33648.pdf

Case 4. **2002 John H. Harland Corporation** – Compressed Air Project Improves Efficiency and Production at Harland Publishing Facility

Summary: This publishing company's printing machine re-configuration reduced compressed air demand, lowered utility expenses, and avoided the need for new compressor purchases. Multiple Benefits include increased product quality, decreased production cycle time, and reduced maintenance.

Reference Link: https://docs.nrel.gov/docs/fy02osti/31713.pdf

Case 5. **2001 Mead- Johnson Nutritionals** – Compressed Air System Renovation Project Improves Production at a Food Processing Facility
Summary: An example of air compressor optimization project which resulted in reduced operating costs and improved productivity. Also, this project avoided unnecessary new compressor purchase.
Reference Link: https://docs.nrel.gov/docs/fy01osti/30231.pdf

Case 6. **2001 Solutia, Inc.** – Compressed Air System Optimization Reduces Operation Costs and Improves Production at a Synthetic Textile Plant
Summary: This synthetic textile plant improvement project on a compressed air improved the efficiency of the plant's compressed air system, leading to substantial cost reductions, better product quality, and lower maintenance costs.
Reference Link: https://docs.nrel.gov/docs/fy01osti/30230.pdf

Case 7. **2005 CEMEX** – Cement Manufacturer Reduced $168,000 Utility Costs and $30,000 Maintenance Costs Annually with a Motor Retrofit Project
Summary: This cement manufacturer reduced operating and maintenance costs while improving productivity with their motors retrofit project.
Reference Link: https://docs.nrel.gov/docs/fy06osti/38223.pdf

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Additional questions? Contact: multiple.benefits@nlr.gov

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