

POWER



SUSTAINABILITY REPORT

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OUR APPROACH

DESIGNING FOR A SUSTAINABLE FUTURE

POWER Engineers understands that every project we undertake has an impact on the earth, its resources and society. We believe it is important to do our very best to help meet the world's present needs without compromising the ability of future generations to do the same.

This vision drives us to operate our business in a sustainable fashion, which includes implementing energy and materials conservation measures, maintaining a healthy workplace and developing relationships with the surrounding community. However, it's how we approach each consulting opportunity that makes the biggest difference for future generations. Through our relationships with our clients, we can promote sustainable design and construction practices. We can educate and lead them to choices that meet their needs and objectives while limiting the environmental impact of their project.

That's what sustainability means to POWER. We live it through our people, our projects and our practices.



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POWER Engineers is 100% employee-owned, and that means we're all involved in creating sustainable solutions. Many employees participate in national programs and present sustainable design practices to international audiences. In some areas, our people are sustainability thought leaders.

OUR CORPORATE SUSTAINABILITY COMMITTEE Now entering its ninth year, POWER's Sustainability Committee continues to promote how we can be better stewards of the planet. This includes creating design philosophies, publishing regular communications to all POWER employees and welcoming suggestions on how we can be even more sustainable. It's a way to ensure we stay responsible and practice what we preach.

CORPORATE MEMBERSHIPS

INSTITUTE OF SUSTAINABLE INFRASTRUCTURE (ISI)
 U.S. GREEN BUILDING COUNCIL (USGBC)
 AMERICAN SOLAR ENERGY
 AMERICAN WIND ENERGY ASSOCIATION (AWEA)
 GEOTHERMAL ENERGY ASSOCIATION (GEA)

ENV SP
 CERTIFICATIONS

7

LEED
 CERTIFICATIONS

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SIAB BOARD
 MEMBERS

1

PEOPLE

TAKING A LEADERSHIP ROLE

POWER Chairman of the Board Jack Hand serves as chair of the American Council of Engineering Companies (ACEC) Energy and Environmental Subcommittee.

In addition to recommending policy positions to the full committee, he has advocated and testified before Congress for legislation and regulatory proposals for responsible energy development.

Federal Business Unit Director Dick Corolewski is a representative on the Sustainable Infrastructure Advisory Board (SIAB) for the Zofnass Program for Sustainable Infrastructure at the Harvard University Graduate School of Design. Corolewski joins other industry leaders responsible for promoting topics of sustainability within today's global infrastructure.

POWER is a charter member of the Institute of Sustainable Infrastructure (ISI) and the chair of its Envision™ Energy Committee—a ground-breaking group that's developing ways to measure exactly how sustainable a design project really is, including how it addresses social, economic and environmental concerns.

When Harvard's Graduate School of Design worked with Envision to write a textbook on the subject of strategic planning for sustainability, they turned to POWER to author the introduction to the chapter on energy.

POWER DELIVERY

Power Delivery Senior Project Manager Peter Catchpole has taken the responsibility to address the often neglected power delivery side of the energy industry. His book, *Structural Engineering of Transmission Lines* contains a section on sustainable development (SD). Catchpole, Project Engineer Buck Fife and Senior Project Manager Steve Walker have worked to develop POWER's sustainability evaluation tool, SustainEval (see PROJECTS).

Fife, a co-author of Catchpole's book, is also involved with introducing SD into the technical literature of IEEE and Cigre, as well as presenting on the topic at design conferences and training events.



POWER GENERATION

Generation Senior Project Manager Chun Chin has served as chair of the ISI Energy & Emissions Technical Subcommittee, which covers the technical aspects of energy, reducing energy consumption and carbon emissions, climate threats, heat island reduction and other related issues on potential infrastructure projects that would be scored and rated. Chin has also written many articles and papers regarding the use of sustainable design in power generation projects, most notably in the area of geothermal and cogeneration plants.

Other Generation employees have also been key contributors to sustainable practices and design, like Senior Project Manager Bill Harvey, who presented "Managing Sustainable Design for Geothermal Plants: the Engineer's Perspective" at the 2011 World Renewable Energy Congress in Linköping, Sweden.

FACILITIES

As building designers, POWER-Facilities A/E staff regularly attend workshops and seminars to stay current on the latest sustainable building products, from floor to ceiling. On LEED design-build projects, POWER's LEED-accredited professionals like Architect-Designer Steve Scott coach both client contractors and various subcontractors on sustainable construction practices required to maximize LEED scoring.



JACK HAND



DICK COROLEWSKI



PETER CATCHPOLE



BUCK FIFE

IN SOME AREAS, OUR PEOPLE ARE SUSTAINABILITY THOUGHT LEADERS.



A POWER FIRST
SustainEval is the first industry application of the Envision rating system to transmission line projects.

POWER SustainEval

Facility: Overhead Transmission Line
 Purpose: Utility
 Category: Alignment and Spacing
 Parameter: Length

IMPACTED CREDIT NAME: RA1.1. Reduce net embodied energy
CREDIT DESCRIPTION:
 This line component requires the length of the transmission line in miles. The longer the line is, the longer the score drops as recognition of the negative impact on land used for large projects. While an indirect path between endpoints causes a lower score, the avoidance of impacts to various natural world features that may be along the direct path can offset the negatives of the longer route. This is of course, the basic principle of transmission line siting and routing. Such impacts are evaluated by other line parameters.

IMPACTED CREDIT NAME: RA1.1. Reduce net embodied energy
CREDIT DESCRIPTION:
 2-level: Conserve energy by reducing the net embodied energy of project materials over the project life.
 Metric: Percentage reduction in net embodied energy from a life cycle energy assessment.
 Levels of Achievement:
 - Improved: Score = 2: Life cycle energy assessment.
 - Enhanced: Score = 3: 10-40% reductions.
 - Superior: Score = 4: 40-70% reductions.
 - Exemplary: Score = 5: >70% reductions.
 - Restorative: Not Applicable

Actual	Category	Parameter	Units	Baseline Value	Proposed Value	Parameter
20%	Renewable Energy	Renewable Energy	%	20%	20%	2.0
20%	Capacity	Capacity	MW	20%	20%	2.0
1000	Load Capacity	Load Capacity	MW	1000	1000	3.0
Standard	Rating Assessment	Rating Assessment		Standard	Standard	3.0
1.0	Alignment and Spacing	Alignment and Spacing		1.0	1.0	3.0
0.0	Alignment and Spacing	Length	mi	0.0	0.0	0.0
0.0	Alignment and Spacing	Area Habitat	mi	0.0	0.0	0.0
0.0	Alignment and Spacing	Waterbody Buffer	mi	0.0	0.0	0.0
0.0	Alignment and Spacing	Forest	mi	0.0	0.0	0.0
0.0	Alignment and Spacing	Ecology Risk	mi	0.0	0.0	0.0
0.0	Alignment and Spacing	Cultural Resources	mi	0.0	0.0	0.0

PROJECTS

CREATING AWARENESS. PROVIDING OPTIONS.

As POWER Engineers, we have the opportunity to perform consulting and engineering services on many types of projects that have a sustainable end-use, for example, our renewable power generation work.

But to us, sustainability has a much broader application. POWER's definition of sustainability includes how all projects are designed, how they are constructed and even how they are maintained and operated.

As consulting engineers, our challenge is to create awareness of a project's effects on the environment and society, and to provide our clients with options to mitigate those effects.

To accomplish this goal, we need to be able to measure sustainability, to evaluate alternatives and to incorporate industry sustainability standards.

By making sustainability measurable, practical and implementable, we are doing our job to responsibly influence decisions that will ultimately benefit us, our clients and future generations.

MEASUREMENT

POWER SustainEval

POWER has developed a web-based application called SustainEval. It is based on the Envision™ Sustainable Infrastructure Rating System, a scoring tool for infrastructure project developed by the Harvard University Graduate School of Design and ISI.

SustainEval allows a designer, planner or owner to evaluate how a transmission line facility rates for environmental, social and economic impacts and compares that rating to other projects.

AWARENESS

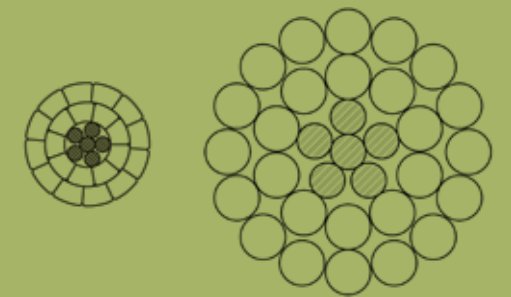
A More Sustainable Shape

The standard form of transmission line conductor uses round aluminum wire strands, which creates 21 percent air in the spaces between the wires (see diagram).

Conductor strands are also available in trapezoidal shapes. Although the purchase cost increases by about five percent, the air content drops to about two percent.

Since losses are nearly inversely proportional to the amount of aluminum in the conductor, a near 20 percent increase in aluminum content can offer a nearly 20 percent reduction in losses. This can come with only a five percent cost increase and no increase in diameter (i.e. no increase in wind load).

Averting losses in the line saves fuel that is used to generate the power.



AVERT LOSSES AND SAVE FUEL

The trapezoidal wire-stranded conductor (left) with very few air voids between strands is a more sustainable choice compared to the round-stranded conductor (right) with 21 percent air.



INFRASTRUCTURE STANDARDS — ENVISION™

Envision is a rating system for sustainable infrastructure (non-building projects). It was developed by the Institute for Sustainable Development (ISI) and the Zofnass Program for Sustainable Infrastructure at the Harvard University Graduate School of Design.

Envision was designed to improve a project's sustainability performance from a technical as well as a social, environmental and economic perspective. It provides an opportunity for owners and designers to be publicly recognized for collaborating with communities and using a life-cycle and restorative approach to infrastructure projects.

EXAMPLE: DENNY SUBSTATION DESIGN

The prime considerations in substation design are safety and reliability. However, there are significant opportunities to incorporate sustainable practices during the planning, designing and construction phases.

Site Selection: Choosing existing, non-greenfield sites that are close to existing infrastructure.

Water Runoff And Management: Controlling runoff from the site and minimize disruption to groundwater recharge.

Construction Materials: Creating construction/demolition waste management and recycling plans.

Optimal Layout And Design: Minimizing the footprint of the site through the use of sustainable strategies.

Public Education: Educating the community about sustainability integration and the role of the utility grid in everyday life.



U.S. NAVY P-239 HANGAR & TRAINING FACILITY METRICS

- » 41 percent reduction in building potable water use
- » 32 percent energy cost savings
- » 99.8 percent diversion of construction waste from landfill

PROJECTS



U.S. NAVY P-251A HANGAR & TRAINING FACILITY METRICS

- » 42 percent reduction in building potable water use
- » 16 percent energy cost savings
- » 99.6 percent diversion of construction waste from landfill
- » Daylighting in 79 percent and views for 90 percent of regularly occupied spaces

THE CHEMICAL BATTALION HQ SUSTAINABLE METRICS

- » 46 percent reduction in building potable water use
- » 34 percent energy reduction from baseline
- » 95 percent diversion of construction waste
- » Daylighting in 79 percent and views for 90 percent of regularly occupied spaces

IMPLEMENTATION

A BOLD Collaboration

POWER is teaming up with BOLD Transmission, a subsidiary of American Electric Power (AEP), to support a 'breakthrough overhead line design' (aka BOLD).

The patented BOLD design arranges phase-conductor bundles into a compact delta configuration that can pack more capacity into the right of way. It provides an opportunity to markedly improve line surge impedance loading, lower series impedance and reduce the effects of magnetic fields.

The design also allows transmission towers to be much shorter, up to a third lower in height than traditional towers, and to be located within existing rights of way. Its modern, sleek design also meets with greater acceptance from the public, which favors more visually pleasing designs with smaller environmental footprints.

POWER's role includes educating users about the new design, helping them implement it and understand its performance.

BUILDING STANDARDS — LEED

POWER Engineers remains a member of the U.S. Green Building Council (USGBC)—the organization that developed the Leadership in Energy and Environmental Design (LEED) certification system.

LEED provides third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

Recent Facilities Division LEED Design-Build Projects:

- » **Silver Rating** U.S. Navy P-251A P-8A Hangar & Training Facility—Oak Harbor, WA
- » **Silver Rating** U.S. Navy P-251B Hangar 6 Expansion and Modernization—Oak Harbor, WA
- » **Silver Rating** U.S. Navy P-239 Hangar and Training Facility—Oak Harbor, WA
- » **Silver Rating** Refueling Vehicle Maintenance Facility, Fairchild Air Force Base, Spokane, WA
- » **Silver Rating** Chemical Battalion HQ, Joint Base Lewis-McChord, WA
- » **Gold Rating** SOAR Dining Facility, Joint Base Lewis-McChord, WA

All power employees are empowered to find sustainable solutions in their work place. Here's how we **reduce, reuse, recycle** and **educate** at work.



PRACTICE

To **reduce** our reliance on fossil fuels, we've installed a 10 KW **renewable energy** solar PV system to help power our Hailey, Idaho corporate campus. Another solar PV system was installed by our Cincinnati, Ohio office. We're also road-testing an **all-electric vehicle** to replace our commuter cars used between our Hailey and Boise, Idaho offices.

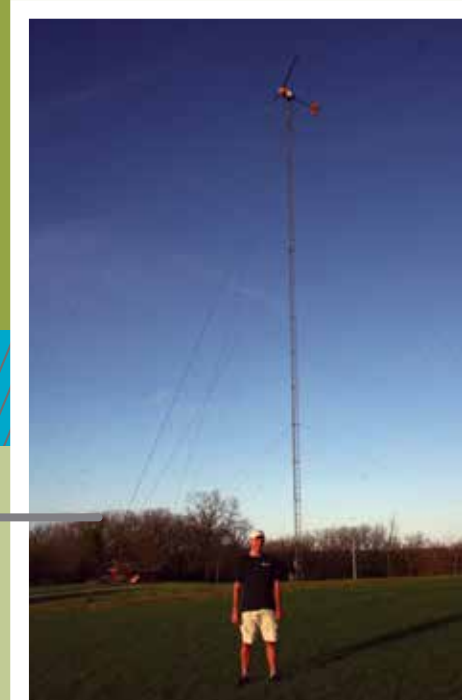
To **reduce** our energy consumption, we've replaced our desktop computers with energy-efficient laptops companywide, which yields an average energy savings of 40 to 60 percent. We've installed energy-efficient LED and CFL lighting across 100 percent of our Hailey Campus. The leftover fluorescent bulbs were **reused** at our Boise office. We also label our light switches with reminders to turn them off when not in use.

To **reduce** paper (our work "product"), our copiers are set to print double-sided (aka duplex printing) as the default setting. We encourage each other to print emails only when necessary with our Go Green! email signature. We also provide each employee with a **reusable** ceramic coffee cup that reduces our consumption of paper cups.

We **recycle** paper, plastic, cans and glass. We also recycle hazardous waste, like electronics, batteries and used fluorescent bulbs. We buy office supplies that are made from **recycled** plastics, like B2P pens. And our paper products contain 40 percent advanced environmental standards or features.

Finally, we're **educating** our employees with Sustainable Guidelines and regular sustainability stories in our internal newsletter, *Surges*. And we provide employees the opportunity to provide their ideas to reduce, reuse and recycle on our Portal intranet.

TAKING THEIR WORK HOME Our employees are passionate about sustainability. Many have taken their enthusiasm home with them. Here are just a few examples:



Kevin B. installed a 10 KW residential wind turbine on his Wisconsin property that allows him to power his home and sell the excess electricity back to his local utility.

Scott C. uses the natural spring water on his family's Idaho mountain resort to drive a microhydro turbine generator that helps power the property along with solar PV.



Justin D. installed an industrial-grade Programmable Logic Controller (PLC) to smart-control his Hailey, Idaho home's HVAC, solar PV system, hot water, exhaust fans and water supply.



Kelly S. lives-off-the-grid in a remote area of Hawaii's Big Island and uses solar PV to power his property, catches rainwater and grows a good portion of his family's food.

VISION

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