

## Renewable Energy

Solar  
Wind  
Micro Hydro  
Geothermal  
Biomass/fuels  
Efficiency

### Hydro System Specs

- 200 Feet of HEAD  
Buried Pipeline (800 of 1000 feet)
- 50 - 500+ gpm FLOW  
Run of the River
- 10,000 Watt Output  
Hundreds to Thousands of Watts
- 15 Year Payback  
Cost Avoidance basis
- 30+ Year Service Life  
Civil Works last longer, to 50 years

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## North OP Hydro Power: Green Electricity (& Green Cash)

**A farming couple on the North Olympic Peninsula have tapped their nearby stream for power, enhancing their organic produce.**

Though several factors went into the decision to Go Hydro, not the least of which was rising electricity prices, the main reason was even more obvious—because the water was there, falling and flowing abundantly for over six months of the year.

The Hydro Project began with a site survey last December that identified good potential for hydro electric generation, in the range of 5 to 10 KW.

With preliminary design, final design, construction, and equipment installation complete, there remains the “paperwork” - negotiation with the utility of the price of surplus power and certification by the electrical inspector of system safety and NEC code compliance.

Costing less than \$50,000, and having a payback of 15 years based only on cost avoidance (in not having to purchase utility power), the expected maximum power output with 200 feet Head and 500 gpm FLOW is 10 KW. Nominal output, expected continuously throughout the six

month flow season, is 5 KW.

The new system owners will receive 100% of their electricity from hydro, a renewable energy source, thanks to net metering. By state law, utilities must allow small producers (less than 25KW) on line with credit for production.

The US at large derives just over 10% of its electricity generation from hydro, with 20% from nuclear. Large scale hydro projects in the US are absent from the event horizon, for the environmental impacts and competition for water can not sustainably expand. In developing countries, like China and Brazil, large hydro electric dams are being or have recently been built. The natural trend in the US is for smaller scale and distributed (local) generation to predominate, as has already begun on the North OP.

The design and construction had the goal of following some basic ecological **principles**:

*Minimize impact to terrain, soil integrity, and wildlife;*

*Use natural or recycled materials;*

*Use local labor;*

*Procure from local and regional sources, for parts and equipment;*

*Design for long life operation, without planned replacement;*

*Accommodate varied flows.*



Things are looking up when you can look down the penstock from the headworks...

The local **build team** consisted of: Greenspace Design & Landscape, Bud Smith Excavating, the owner, and their crews.

The regional **suppliers** included:

Do It Best Hardware, Walt Davy Supply, H.D. Fowler, Mobile Logic, Hydroscreen, Canyon Industries, and Thomson & Howe.

Olympic Energy Systems provided system design and consulting.



First Flow at the powerhouse site of the OP's latest hydroelectric system

## News and Announcements

### WHAT

### WHEN

### WHERE

Eco-Building Guild Meetings

1st Thursday 7:30 pm

606 Roosevelt in PT

Jefferson County Fair

August 8-10, 2003

Fairgrounds in PT

Northwest RE Festival

September 18-21, 2003

Walla Walla, WA

## WHO WE ARE—Olympic Energy Systems, Inc.

Olympic Energy Systems, Inc. was founded by an electrical engineer in 2001 as a renewable energy consulting firm specializing in solar photovoltaic design. The company can assist in the application of a variety of alternative and clean energy technologies—solar, wind, micro-hydro, fuels, energy efficiency and energy management.

Company operations are located in Port Townsend, Washington and primarily serve the North Olympic Peninsula. Olympic Energy Systems uses local licensed contractors for installation and is

a partner on local projects with Alternative Technologies Construction, whose website at [www.alt-techconst.com](http://www.alt-techconst.com) features energy efficient systems.

The founder, Jonathan Clemens, relocated from Texas, where he was involved in renewable energy activities. Serving on the board of the Texas Solar Energy Society (TxSES) proved a valuable experience for him. TxSES and the Texas Renewable Energy Industries Association (TREIA) hosts the annual Renewable Energy Roundup and Sustainability Fair in Fredericksburg,

TX, where Jonathan has spoken about the Economics of Renewable Energy.

Olympic Energy Systems enjoyed hosting a booth at the sunny 2002 Jefferson County Fair and the Olympic Energy Expo in Port Angeles. We plan to be at both again in 2003.

For more information, contact:

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*Solar, Wind, and Micro Hydro Power*



Jonathan with Chris Stafford, an architect member of Green Homes USA

The [solarpowerinc.com](http://solarpowerinc.com) domain is for sale.

E-mail  
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## BOOK REVIEW—“Tomorrow’s Energy - Hydrogen...” © 2001

Peter Hoffmann’s “Tomorrow’s Energy - Hydrogen, Fuel Cells, and the Prospects for a Cleaner Planet” is not an encyclopedia, anthology, single story, or sales pitch. The book is a world-around report of hydrogen’s history, current status (including technology level and policies), and future, providing the reader with perspective.

Hydrogen is the most abundant material in the universe—about 3/4 of its mass. Mankind has known of hydrogen, or at least the concept of such an entity, as an object of curiosity, awareness, and study, for 500 years.

The book is virtually a Who’s

Who on the scientists, industrialists, and enthusiasts who have made the lightest element a serious energy source for tomorrow.

Chapter 1 opens with a statement by Buckminster Fuller (a noted architect, engineer, and anthropologist), who insists on a comprehensive strategy for our energy needs, one that utilizes our energy income from the sun as opposed to our energy savings account of fossil fuels.

Page 6 tells you that hydrogen is perhaps the ideal Chemical Fuel, Energy Carrier, and Storage Medium. Hydrogen has no greenhouse gas emissions (such as CO2) when burned.

Hydrogen is currently produced for making fertilizer, dyes, drugs, plastics, gasoline from coal, methanol (fuel), rocket fuel, and treating oils and fats.

Hydrogen can be produced from a number of methods, including steam reforming of natural gas or electrolysis of water (or even using algae). Over two hundred years ago two Brits, Nicholson and Carlisle, discovered electrolysis of water into hydrogen and oxygen. William Grove invented the Fuel Cell (1839). Let the book teach you more.

Chapter 12 (the last one), entitled “The Next 100 Years” addresses six scenarios...with the first 20 largely affecting the next 80 years. Interesting....



See a solar-powered electrolyzer at the Olympic Energy Systems booth at this year’s Jefferson County Fair on August 8, 9, and 10

Check out the great workshops at Solar Energy International’s website:  
[www.sei.org](http://www.sei.org)

The San Juan Series occurs in Spring and Fall annually.

## The Hydro Project—Specifications

### HEADWORKS

Galvanized Steel Culverts, 30” \*  
Forebay sealed with Pond Liner  
Debris Gate (wood)\*  
Stainless Steel Intake Box  
Coanda Effect (Wedge-Wire Screen) Filter at Intake  
HEAD = 200 feet (Gross)  
FLOW = 50 to 500+ gpm

### PENSTOCK

Length = 970 feet (10 turns)  
Buried, 2 feet nominal  
C-900 Water Main Pipe, 6” (PVC)  
Elevated portions (60’ and 80’)  
Concrete Thrust Blocks/Anchors  
Ductile Iron angle turns, MJ joint  
Shut Off Valves at top/bottom  
Vent Tube, 4” PVC, near top SOV

### POWERHOUSE

Concrete Slab, 10’x12’ (Steel Structure)  
Front End Loader bucket Tailrace Well \*  
Galvanized Steel Culvert, 18”, Tailrace \*  
Needle Nozzle Jet Control  
Canyon Industries 9513-1 Pelton Turbine  
Thomson & Howe Controls & Switchgear  
Auto Shut Down and Auto Restart  
Westinghouse Induction Generator

See next page for snapshots of the construction...

\* Recycled or Reclaimed



Intake Box at Headworks  
(soon after installation)

### Hydro Electric Project Construction March—July 2003



Dominick Smith at Headworks during construction  
(April 25, 2003)



SOV Installation at Headworks  
(by Geno from Port Townsend)



Mid Stream Flow during Site Survey  
(December 26, 2002)



Penstock Installation  
(C-900 PVC Pipe, buried 2')



Lower penstock near powerhouse  
(Crew with Bud Smith)



Concrete pour at Powerhouse  
(over 2 yards poured)



Elevated portion of penstock with jute cover  
(for UV protection)



Thrust Block, 45 degrees, near the Powerhouse (100 feet away)



Elevated portion of penstock looking up (May 2003)



Installation of the Canyon Industries pelton wheel turbine  
with auto shutdown/restart (July 11, 2003)



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### The solution on the horizon

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JOIN THE  
AMERICAN SOLAR ENERGY SOCIETY  
[WWW.ASES.ORG](http://WWW.ASES.ORG)

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## Eco Building Guild—Islands & Straits Chapter (Green Homes USA)

Green Homes USA is a volunteer group based in Jefferson County, focusing on uniting local talent for the design of sustainable building projects, while balancing ecological integrity and economic viability.

The group's mission is to promote, educate, and raise awareness in the development of sustainable and affordable housing in the region. They follow basic principles—energy and resource efficiency, quality indoor environments, minimized waste, optimized existing infrastructure,

local building materials, new water uses, natural land use optimization, and active wet lands development.

President—Bruce Glenn

Vice President—Jonathan Clemens

Secretary—Andy Cochrane

The group has dozens of local professionals, interested parties, and activists as members.



Port Townsend, WA -  
Home to Green Homes USA

Green Homes USA is seeking your membership, at no charge. Call (360) 385-0474

Northwest Eco Building Guild  
[www.ecobuilding.org](http://www.ecobuilding.org)

## North Olympic Peninsula News

The first photovoltaic electric grid-intertie system in Sequim successfully entered service in May 2003. A 1000 Watt bank of PV panels on a utility shed, and 2000 Watts of PV panels on a pole-mounted sun-tracking rack, have “pushed” over 20 KWh/Day onto the Clallam County PUD electric grid.

The summer's surplus power is credited toward use in off-summer periods. The owners, clients of Olympic Energy Systems, are planning to build an energy-efficient, environmentally benign home on the site. The “Spin Your Meter Backwards” package was developed by Power Trip Energy Company (Port Townsend) and installed by Puget Sound Solar (Seattle).

The system uses Sharp PV panels, a Wattsun tracker, and a Sunny Boy grid-tie inverter.

