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**Energy Northwest Member Forum**  
**Navigating Utility Impacts**  
**from**  
**Solar Resources**

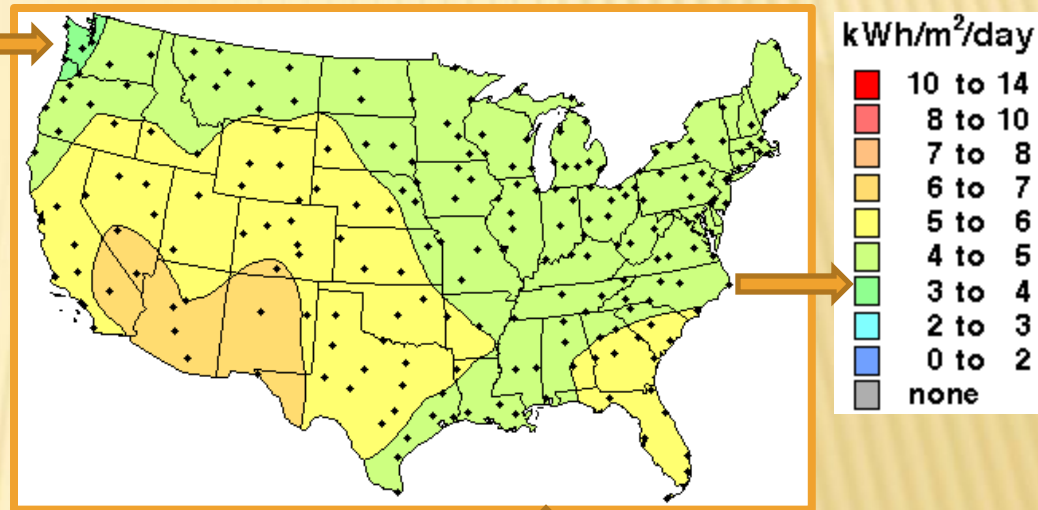
**Rick Dunn, P.E.**  
**Benton PUD**

**Senior Director – Engineering & Power Management**

**October 23, 2014**

# WHY NOW AT BENTON PUD?

- ✓ Washington State
- ✓ **Lowest solar potential** per square meter in the U.S.



Source: NREL Resource Assessment Program

- ✓ Benton PUD
  - ✓ 80% renewable hydro
  - ✓ 91% carbon free
- ✓ Washington State
  - ✓ 70% renewable hydro
  - ✓ 77% carbon free

***On the surface, numbers are not compelling for our state but business and industry trends are telling a different story.***

# LEGISLATORS – ACTING ON ENVIRONMENTAL BELIEFS



Call Today: 206-297-0086 Toll Free: 800-997-0086



HOME	RESIDENTIAL SOLAR	COMMERCIAL SOLAR	ABOUT SOLAR	TESTIMONIALS
ABOUT US				

Most Experienced Solar Installer Serving Seattle And The Puget Sound



## Does Solar Really Work in the Northwest? YES!



Washington State has one of the [best incentive programs](#) in the country. The incentives here make solar more financially attractive than in the majority of the southern states. The Northwest has long summer days with many more months of high solar hours.

## SOLARPASS™



Be a Solar Ambassador for Sunergy Systems! Refer a solar buddy who purchases a system from us and we'll send you a gift card as a way of saying "Thanks"!

- \$150 for Solar Starter System Referrals
- \$150 for Solar Hot Water System Referrals

## Sunergy Systems' SolarClad Program



With our SolarClad Program, the employee-owners of Sunergy Systems keep their ears to your system so you can relax, enjoy your investment and the revenue it produces. Sunergy Systems has the expertise and track record to stand behind the over 750 systems that we've installed in Western Washington. We are so confident in our work, we provide

# ORGANIZATIONS & BUSINESSES RESPOND



## Solar Washington

Advancing Solar Energy in Washington State

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Click here to

Get a Price

Or call us today at: 503-407-6820

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Free Evaluation

### Welcome

Solar Washington is a nonprofit organization composed of solar energy equipment consultants, students, teachers, and solar enthusiasts who are concerned about solar and renewable energy with concern for the economic future of our state.

### NW Solar Summit Dates Announced



The Northwest Solar Summit is the state's largest solar industry event. It brings together solar industry professionals, architects, environmentalists, and solar enthusiasts to expand the solar market in Washington.

## Why Solar Power Works in Cloudy Areas of Washington State



There was a time when people thought it to be too cloudy for solar energy.

But times have changed. With financial incentives, Washington is growing solar markets in the state.

### Why Solar Can Work in Western

There are three main reasons that solar energy will work in the West:

1. Long, sunny summer days.
2. A policy called "Net Metering"
3. "Cloudy Power."
4. Excellent Financial Incentives

### Have a Question?

Call 888.765.2489

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FOR HOME

BUSINESS & GOVERNMENT

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COMPANY

STORE

Home » States » Washington State Solar Panel Installer

## Solar Panels in Washington



SolarCity is the nation's leading solar provider for homeowners, businesses and government organizations.

Photo Gallery

Video

News

SolarCity Enters Into Largest Rooftop Solar Aggregation Facility

CBS News: Inside SolarCity: The Rise of a Hot Solar Panel Provider

SolarCity Expands to Delaware & The Eastern Shore

SolarCity to Introduce Solar Financial Products for Individuals, Institutions of All Sizes

SolarCity Launches Give Power Foundation™ to Provide Solar-Powered Lighting to Schools Without Electricity

### Helping Washington Shine

What better way to keep the Evergreen State green, than to use solar power to produce clean electricity from an ever-renewable energy source. And even though we have a reputation for "liquid sunshine", Washingtonians are smart enough to know that we can produce solar electricity even on those cloudy days.

SolarCity is Washington's leading full-service solar provider—taking care of you every step along the way and making your transition to clean, solar power as smooth as possible.

We make it easy and affordable for Washington homeowners and businesses to go solar with design, financing, permits, installation, and ongoing monitoring included. Our team works closely with local building departments and utilities to help Washingtonians take advantage of sunny days and generous solar rebates and tax credits.

### Free Consultation

First Name

Last Name

Address

City / State

Zip

Email

Phone

Monthly Electric Bill .00

Monthly Gas Bill .00

# BUSINESS INFLUENCES “GOOGLE FACTOR”



Home

Solar Energy

Energy Efficiency



## We Make it Simple and Affordable

Best Buy partnered with SolarCity to make it more affordable than ever to go solar. Installation is free and you simply pay for your solar power by the month—just like your utility bill—only lower.

High utility bills? Switch to clean, more affordable energy.

Act Now ▶

And we make it simple. It starts with a free consultation and thorough evaluation of your home's energy needs. SolarCity takes care of your project every step of the way handling rebate administration, permitting, installation and inspection.

Request a free consultation today to see how much you could save!

## 60 Stores

- Arizona
- California
- Hawaii
- New York
- Oregon

## Video Section



Why SolarCity For Solar Leasing



Affordable Solar Power



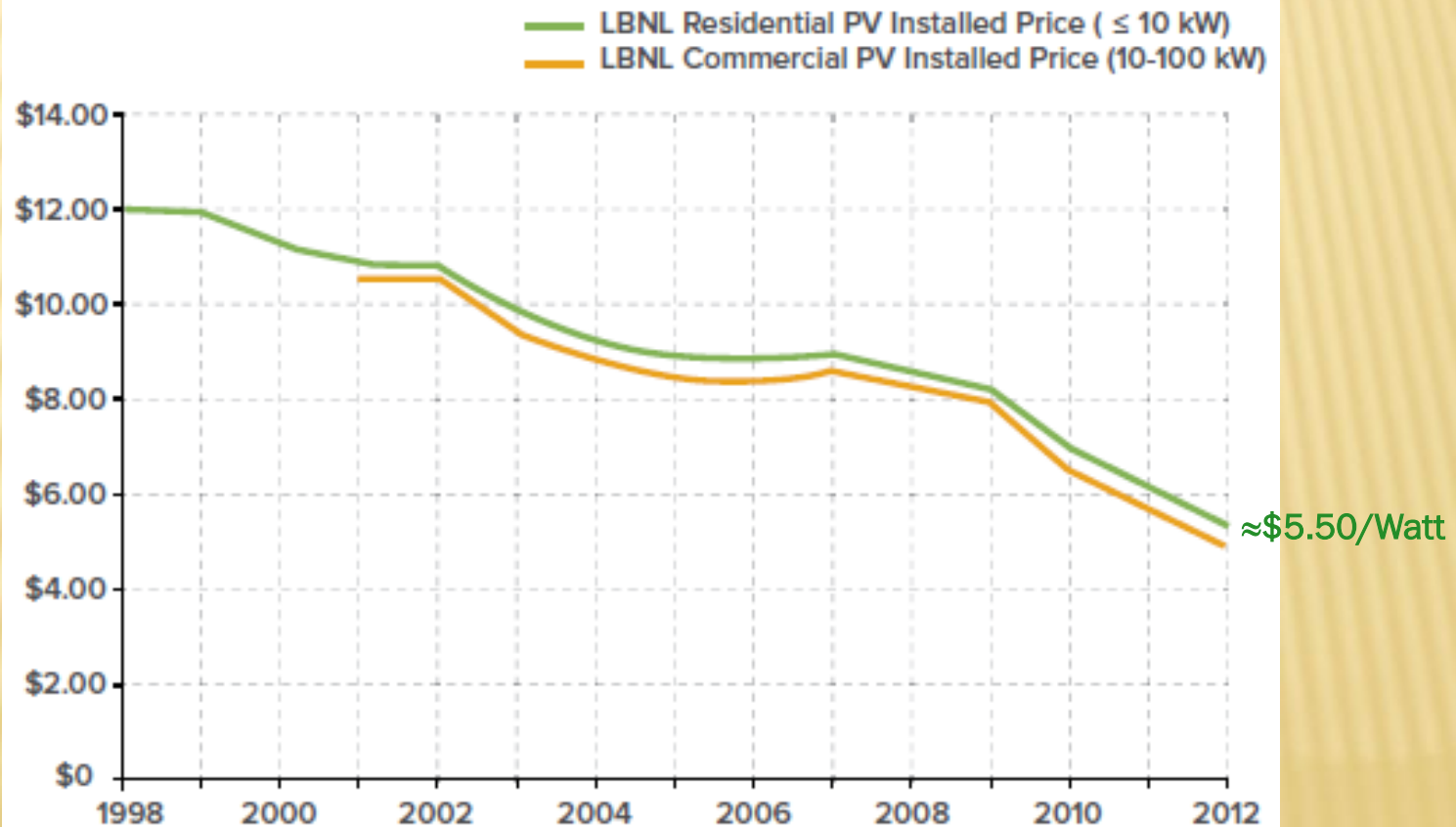
Google & SolarCity Partner

Google invested \$280M in SolarCity

# SOLAR INSTALLATION COST CURVE

FIGURE 9: HISTORICAL PV PRICES<sup>3</sup>

[Y-AXIS 2012\$/W<sub>dc</sub> - INSTALLED]



Source: Rocky Mountain Institute

# LOCAL COMMUNITY INFLUENCES



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For breaking news throughout the day, go to [www.tricityherald.com](http://www.tricityherald.com)

## MID-COLUMBIA

SECTION B | [tricityherald.com](http://tricityherald.com) | Monday, March 24, 2014

CONTACT THE NEWSROOM: 582-1502; [news@tricityherald.com](mailto:news@tricityherald.com); fax 582-1510

### Tri-Tech hopes to lure students with solar panel



Bob Brawdy | [bbrawdy@tricityherald.com](mailto:bbrawdy@tricityherald.com)

Shamus Farrell, left, and Mickey Ritthaler, both of Hire Electric Inc. of The Dalles, Ore., install a new solar panel recently at the Tri-Tech Skills Center in Kennewick.

Teachers, staff want to draw students to sustainable building

TY BEAVER

HERALD STAFF WRITER

**M**ilagro Manzanares says she wanted to be an architect when she first began taking classes at Tri-Tech Skills Center.

The Southridge High School senior enrolled in some construction trade courses and began learning about alternative energy and green building practices. She and several other students are designing solar-powered cookers that could help communities in developing countries.

Now Milagro, 17, wants to work as a construction manager or engineer.

"This has opened several doors for me," she said.

Teachers and staff at Tri-Tech, keen to student interest in sustainable building, are hoping to draw more students like Milagro to their program. And they recently got a new tool — a large solar panel on the school's campus in west Kennewick.

The solar panel, paid for by a grant, provides power to the school, but students haven't had the opportunity to work with it yet. School officials hope it will serve as a lure for students as part of a diverse building and engineering curriculum.

Instructor Tony Milewski began incorporating sustainable building into his classes several years ago, he said. Students loved it and he began bringing in new elements each year.

"Everything about it is teamwork and thinking and making their math

skills come alive," Milewski said.

Solar power has been a big part of the interest in the class. A group of students last year built a scaled-down home that used solar power to provide electricity and hot water. The project took several honors at the 2013 Imagine Tomorrow competition at Washington State University at Pullman.

This year, along with the solar-powered cookers, another group of students is working on a solar-powered shower for the homeless.

"I never thought I'd be working with solar," said Alexa Castellanos, 16, a Pasco High School junior who came to Tri-Tech interested in home building.

Milewski looked for more ways to augment his courses and was encouraged to apply to the Solar 4R Schools program. Developed by the Bonneville

See **STUDENTS** | Page B2

### STUDENTS | Panel pumping 3 kilowatts of power into school

FROM PAGE B1

Environmental Foundation, the program provides science kits and other materials for teachers and students but also grants for solar arrays.

Tri-Tech chipped in \$20,000 and agreed to maintain the solar panel in exchange for the program providing \$75,000 for its installation. The array, installed by Hire Electric Inc. of The Dalles, Ore., went online only recently and is currently pumping about 3 kilowatts of power into the school.

The goal is to have the solar panel become the cornerstone of a standalone renewable energy program at Tri-Tech, said Vice Principal Lisa McKinney. Students have enjoyed observing its movements as it tracks the sun and eventually they'll be able to learn how the array is

programmed and adjusts to weather conditions.

The device is already turning the heads of visitors and prospective students.

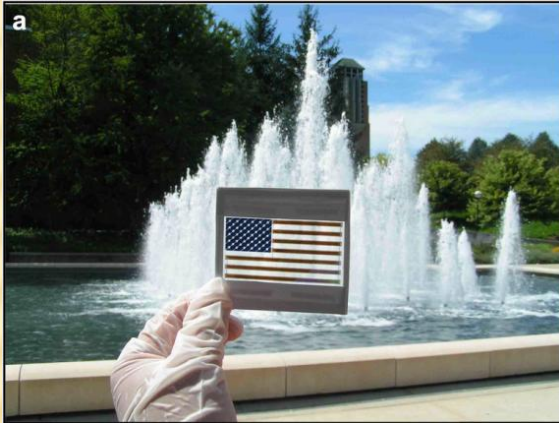
"We just had three days of tours," McKinney said. "Half the kids noticed the thing and the teachers commented on it. It's doing what it's supposed to do."

It could be years or decades before solar power becomes a dominant power source, said Austin Wolley, 17, a Connell High School junior. But he and other students said they're glad to be getting a foothold in the area and that Tri-Tech is working to help the students who come after them.

"We're leading the way to the future," said Jose Anguiano, 17, a Kamiakin High School senior.

▶ Ty Beaver: 509-582-1402; [tbeaver@tricityherald.com](mailto:tbeaver@tricityherald.com); Twitter: @tybeaver;

# NEW TECHNOLOGY RESEARCH & DEVELOPMENT



## UBIQUITOUS SOLAR PANELS?

*Colorful, see-through solar cells invented at the University of Michigan could one day be used to make stained-glass windows, decorations and even shades that turn the sun's energy into electricity.*

## ENERGY STORAGE ADVANCEMENTS

*Harvard University researchers say they've developed a new type of battery that could make it economical to store a couple of days of electricity from wind farms and other sources of power.*

*Battery based on an organic molecule—called a quinone—that's found in plants such as rhubarb and can be cheaply synthesized from crude oil.*

*The molecules could reduce, by two-thirds, the cost of energy storage materials in a type of **battery called a flow battery**, which is particularly well suited to storing large amounts of energy.*

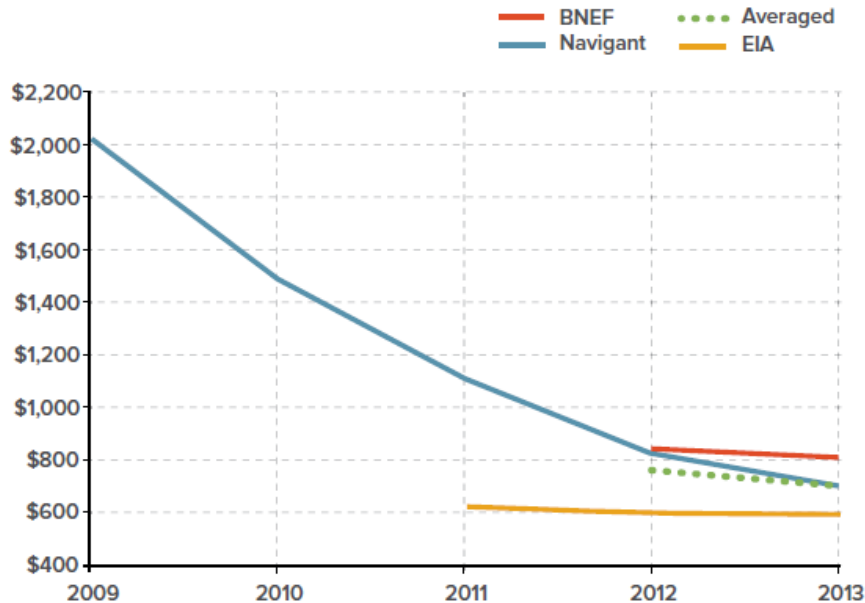




# SOLAR + ENERGY STORAGE

FIGURE 11: HISTORIC BATTERY PRICES

[Y-AXIS 2012\$/kWh]



Source: Rocky Mountain Institute

## ➤ California AB 2514

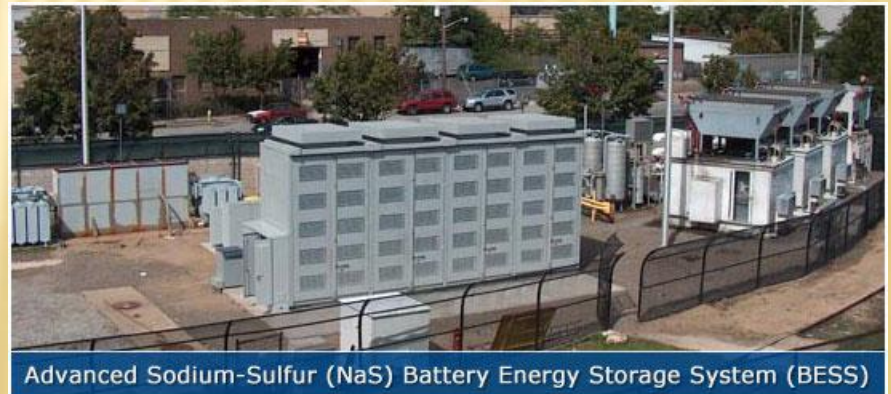
- 1,325 MW energy storage by 2020
- First solicitation by December 1, 2014
- Absolute installation by 2024

## ➤ Electric Vehicle Market

- Lithium-Ion Technology
- Tesla & Solar City

## ➤ FERC Orders 755 & 784

- Increased pay for “fast” grid frequency regulation (generation & load balance)
- Requires tariffs to include accuracy in addition to capacity



Advanced Sodium-Sulfur (NaS) Battery Energy Storage System (BESS)

# WHY NOW AT BENTON PUD?

- ❑ **Worldwide and national trends toward small-scale more dispersed generation resources** make it apparent we need to begin considering adjustments to our current practices and policies
  
- ❑ **Sustainability** and minimizing your **carbon footprint**
  - ✓ Common objectives for many individuals, particularly the **next generation** of energy consumers
  - ✓ **Solar energy** emerging as the renewable resource with the **strongest sustainability label**
  
- ❑ **Washington state** renewable energy system cost-recovery **incentive payments** are some of the highest in the nation
  - ✓ Platform for customers to develop **energy independence** and/or exercise **environmental beliefs**
  - ✓ Governor Inslee's **executive order 14-04** appears to support continued incentives

# WHY NOW AT BENTON PUD?


- ❑ **Facts** surrounding technologies and costs of "clean energy" **difficult to compile and understand**
  - ✓ Benton PUD is well positioned to connect our customers with the technical and financial resources they may need
  
- ❑ Benton PUD believes it is prudent to begin now to develop the **relationships, processes and capabilities** to efficiently and cost effectively integrate customer generation
  
- ❑ Need to **increase our credibility and influence** in shaping state and national energy policies
  - ✓ Requires **actions** we can point to
  - ✓ Move from the "**no side**" of the renewable energy argument where possible
  - ✓ Maintain hallmarks of public utility business model; **community ownership** and **local control**

# COMMUNITY OWNERSHIP & LOCAL CONTROL

Community Solar  
Projects are gaining  
momentum around  
the country



# COMMUNITY SOLAR - INCENTIVE PAYMENTS

Customer-generated power applicable rates	Base rate (0.30) multiplied by applicable factor, equals incentive payment rate
Solar modules manufactured in Washington <b>Factor: 2.4</b> (two and four-tenths)	\$0.72
Stirling converter manufactured in Washington <b>Factor: 2.4</b> (two and four-tenths)	\$0.72
Solar inverter manufactured in Washington <b>Factor: 1.2</b> (one and two-tenths)	\$0.36
Both solar modules and inverters manufactured in Washington <b>Factor: (2.4 + 1.2) = 3.6</b> (three and six tenths)	
Other solar equipment <b>Factor: 1.0</b> (one)	\$0.30

# COMMUNITY SOLAR - WASHINGTON STATE

	Standard	Utility Owned	Company
Max Project Size	75 kW	75 kW	75 kW
Ownership	<ul style="list-style-type: none"> <li>•Local individuals</li> <li>•Households</li> <li>•Nonprofit organization</li> <li>•Non-utility business</li> </ul>	<ul style="list-style-type: none"> <li>• Voluntarily funded by utility ratepayers</li> </ul>	<ul style="list-style-type: none"> <li>•LLC</li> <li>•Cooperative</li> <li>•Mutual Corp</li> <li>•NOT a “utility”</li> </ul>
Property	Local government entity not in the light & power business	Own by Utility or lease from LGE	Local government entity not in the light & power business
Incentive Limits	\$5,000 individuals	\$5,000 individuals	\$5,000 individuals
Tax Incentive Limits 0.5% Taxable Power Sales	Balance of Funds up to \$575k	25% of \$575k \$143,750	5% of \$575k \$28,750
Practical Limit up to Max Incentive Allowed by Law		94 kW to 341 kW CapX: \$470k to \$1.7M	19 kW to 68 kW
Environmental Attributes	Belong to participants	Belong to Utility	Belong to participants

# COMMUNITY SOLAR - BALANCED INTERESTS

## □ Better economics

- ✓ Economies of scale vs. rooftop systems
- ✓ Improved performance vs. rooftop systems
- ✓ Warranties and performance guarantees
- ✓ Improved financing options and opportunity to balance interests of developers, customers and utility
- ✓ Reduced barriers to entry for lower income customers


## □ Customer role & benefits

- ✓ Only 27% of residential rooftop area suitable for solar (NREL)
- ✓ Customers provide investment dollars on a voluntary basis
- ✓ Scalable investment customized to customer wants and needs
- ✓ Maintenance & operation not homeowners responsibility
- ✓ Investment not tied to current residence; reduced risk and complexity
- ✓ Reduced barriers to entry for non-technical customers; minimizes possible surprises

## □ Utility role and benefits

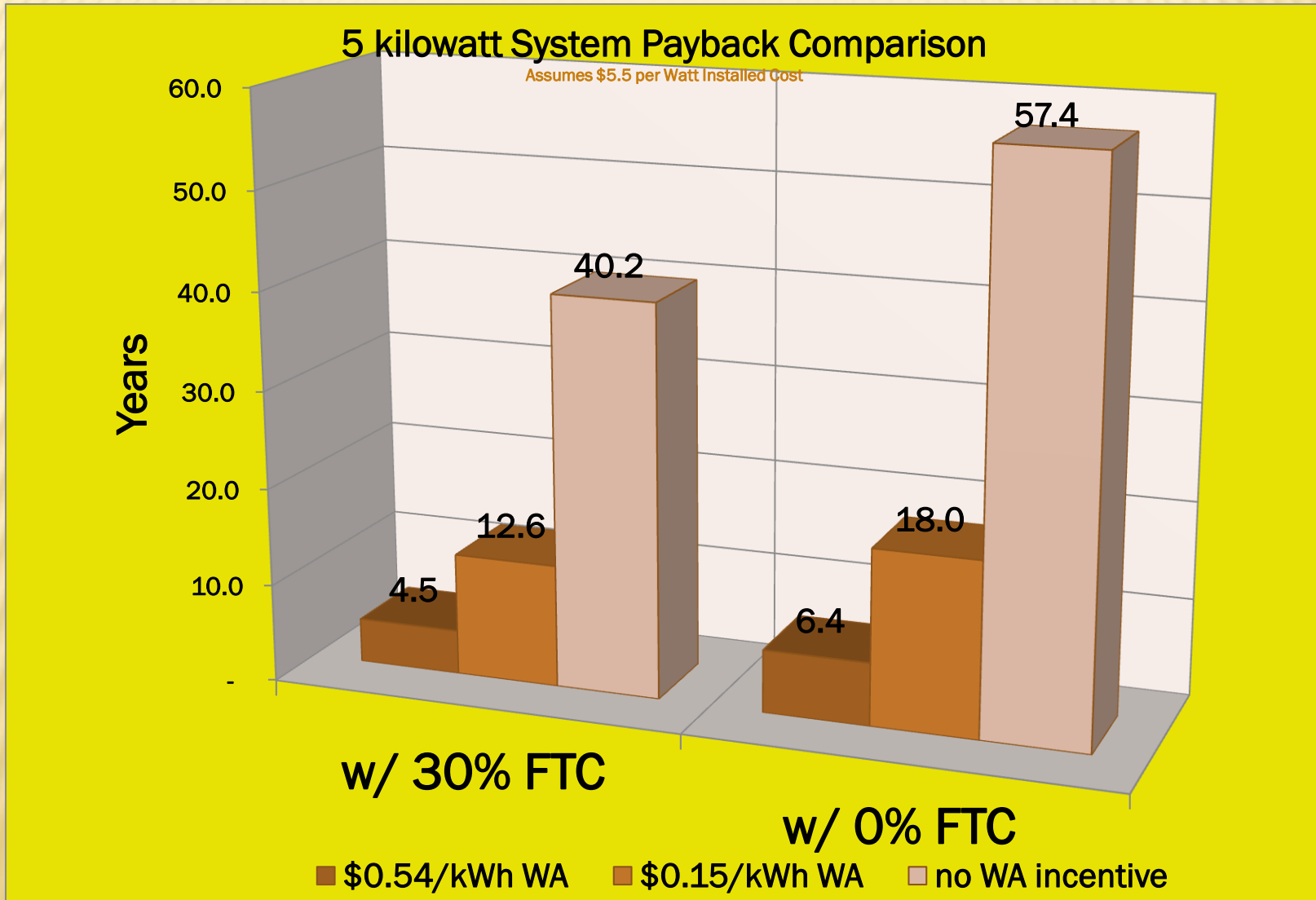
- ✓ Simplified platform for customers who want to exercise their environmental beliefs
- ✓ Responsive to renewable energy & DG trends while minimizing impacts on non-participants
- ✓ Increases utility credibility and experience in developing long term power supply solutions
- ✓ Utility buys the power and may be able to own the RECs
- ✓ Strategic siting; possibly to the benefit of T&D system operations

# INDIVIDUAL CUSTOMER SOLAR - INCENTIVE PAYMENTS

Customer-generated power applicable rates	Base rate (0.15) multiplied by applicable factor, equals incentive payment rate
Solar modules manufactured in Washington <b>Factor: 2.4</b> (two and four-tenths)	\$0.36
Stirling converter manufactured in Washington <b>Factor: 2.4</b> (two and four-tenths)	\$0.36
Solar or wind generating equipment with an inverter manufactured in Washington <b>Factor: 1.2</b> (one and two-tenths)	\$0.18
Both solar modules and inverter manufactured in Washington <b>Factor: (2.4 + 1.2) = 3.6</b> (three and six-tenths)	
Anaerobic digester or other solar equipment or wind generator equipped with blades manufactured in Washington <b>Factor: 1.0</b> (one)	\$0.15
Wind generator equipped with both blades and inverter manufactured in Washington <b>Factor: (1.0 + 1.2) = 2.2</b> (two and two-tenths)	\$0.33
All other electricity produced by wind <b>Factor: 0.8</b> (eight-tenths)	\$0.12



# INDIVIDUAL CUSTOMER SOLAR - ECONOMICS



# NEXT STEPS – SOLAR PROGRAM DEVELOPMENT

- Get **people and organizational structure** in place; who will do what?
- Review how other utilities have done it; better understanding of **best practices**
  - ✓ Benton PUD is a Solar Electric Power Association (**SEPA**) member
  - ✓ SEPA's mission is to support utility integration of solar to the benefit of the utility, its customers and the public good
- Develop written **business plan** for the program
  - ✓ **Staff development** and training requirements
  - ✓ Outreach to **solar installers** and other **potential partners**
  - ✓ **Customer outreach**; near term and long term
  - ✓ Improve existing **net metering** application and contracting **process**
- ✓ Strong focus on **community solar**
- Stay engaged in **legislative process**