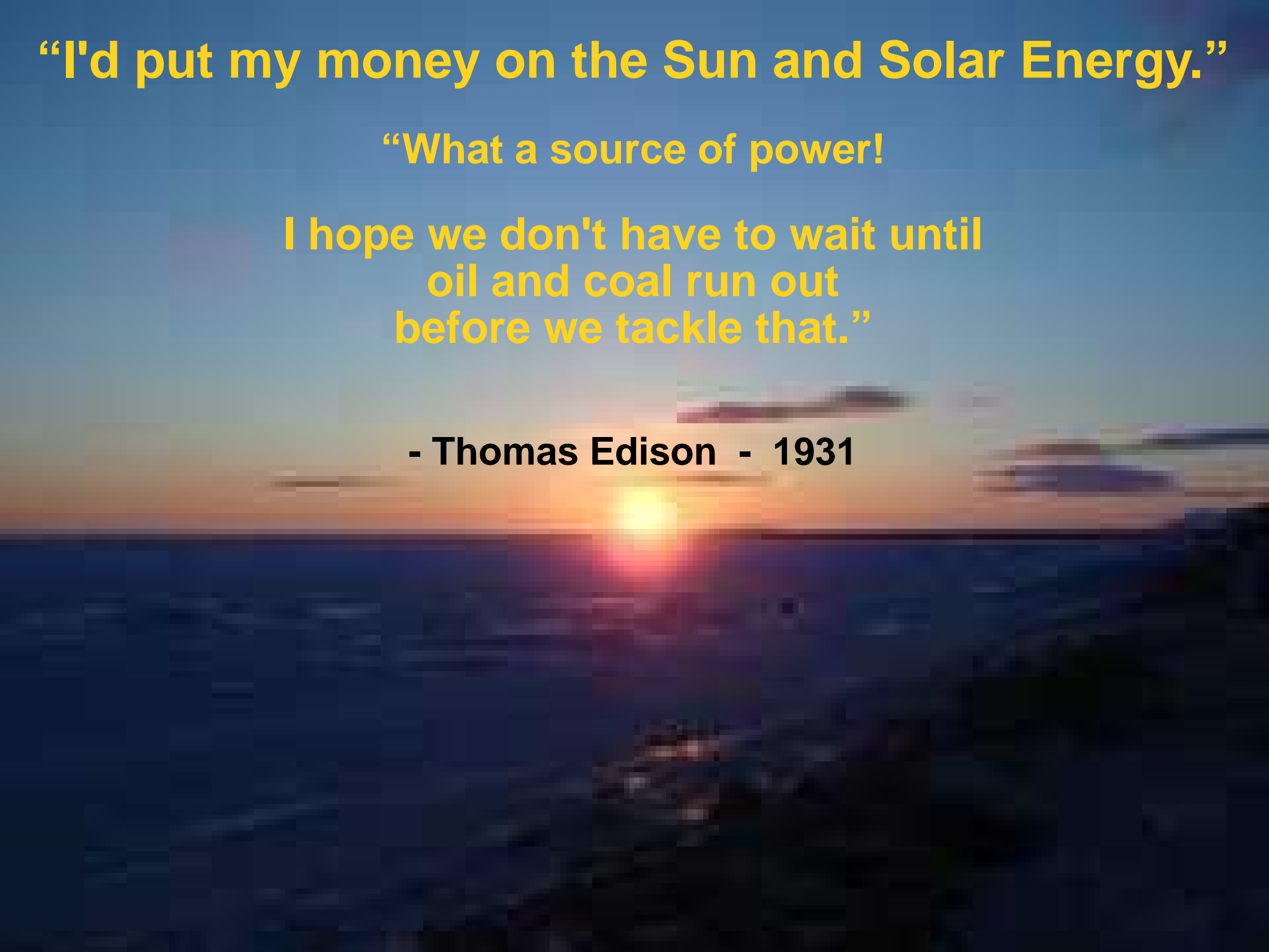


“I'd put my money on the Sun and Solar Energy.”

“What a source of power!

**I hope we don't have to wait until
oil and coal run out
before we tackle that.”**

- Thomas Edison - 1931



City's Sustainability Statement

The Council is committed to fulfilling the community's long-term vision - Vision 2029 - and **being a sustainable city in all respects:**

- Sustainable neighborhoods - ensuring they are safe and attractive;
- Sustainable environment - preserving our environmental assets and enhancing our built environment so that it protects our natural resources; and
- Sustainable services - supporting quality services, facilities and infrastructure.



Practical Application of Renewable Energy

Solar 101

May 23, 2016

Presented by

Larry Owens

Co-Founder - Shoreline Solar Project
Account Executive - Johnson Controls

Maryn Wynne

Co-Founder - Shoreline Solar Project

info@shorelinesolar.org

Purpose of Presentation

Solar is:

- Easy to understand
- Appropriate for Shoreline
- Great Stuff
- Best investment you can make

Become advocate for solar

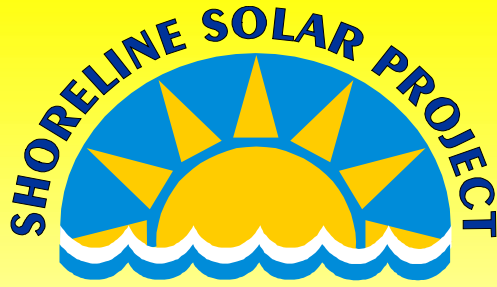
Consider solar energy for your own use

Shoreline Solar Project in community

Benefits of solar

- Save money
- Long lasting
- Good for the environment
- Best investment
- Increased energy independence
- Fuel your vehicle from your rooftop





Practical Application of Renewable Energy

Does Solar really work in Shoreline?

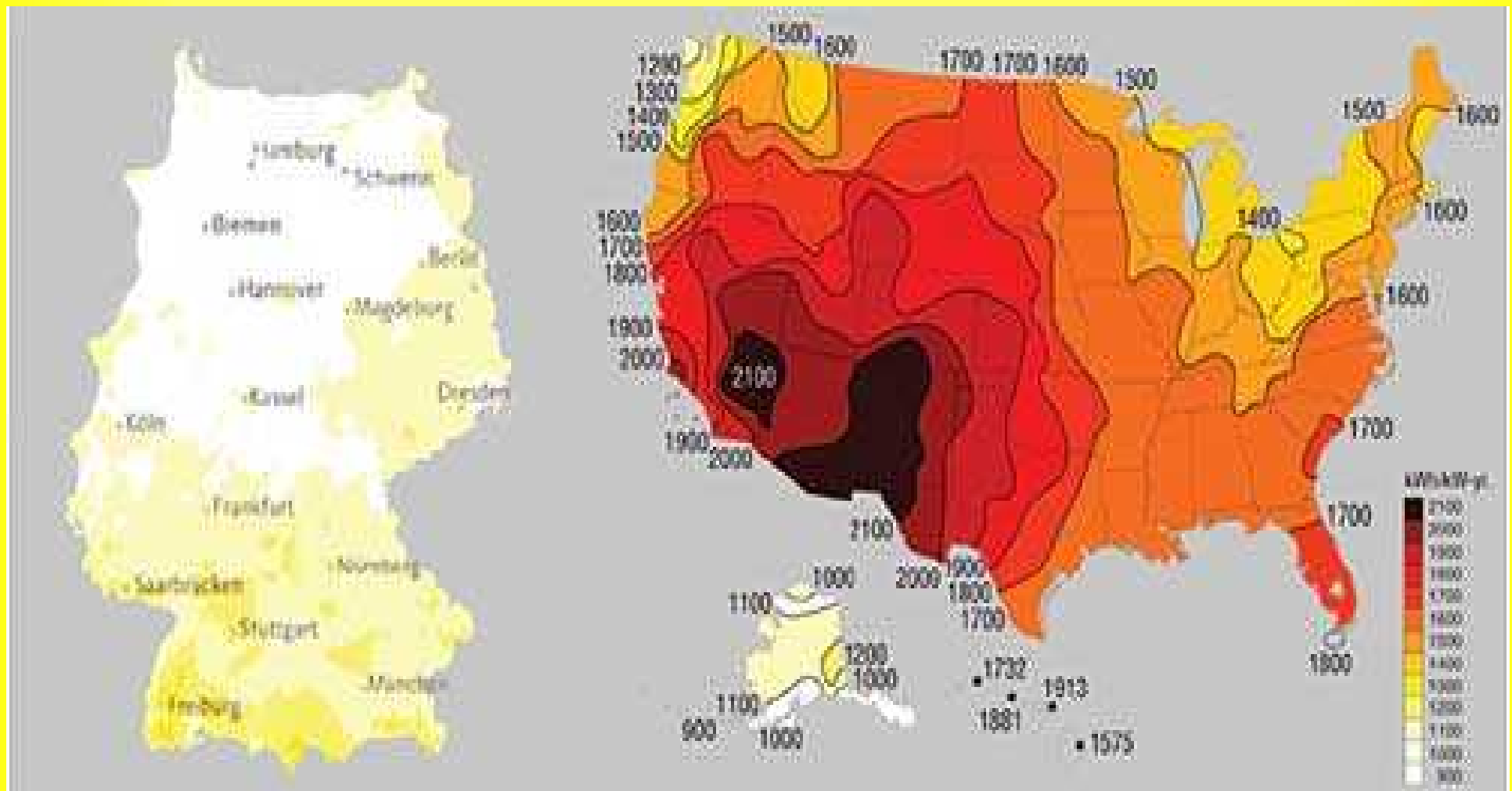
Comparisons

The **Worst** Solar availability in the State of Washington (Forks),

is **Better** than anywhere in Germany.

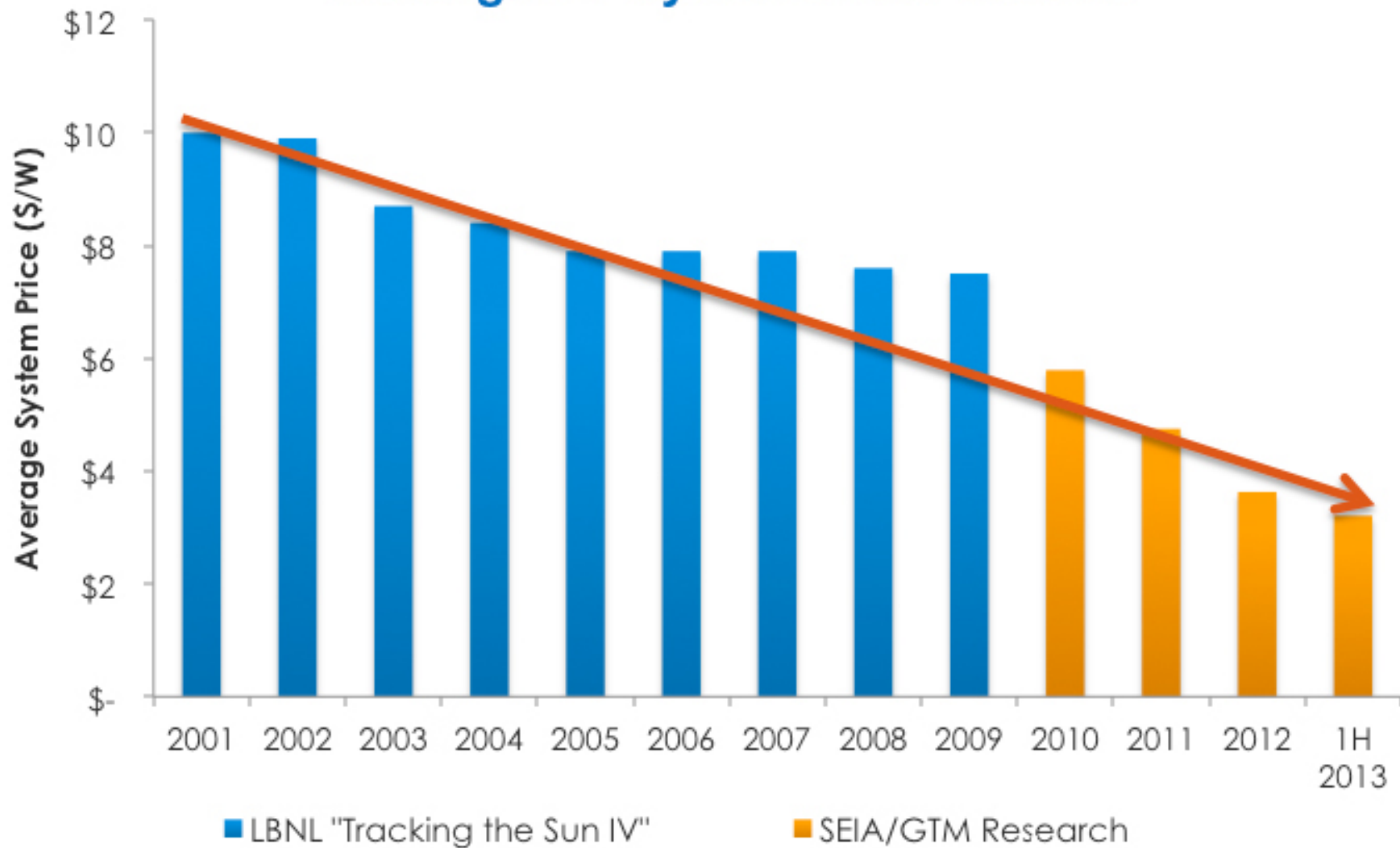
On an annual basis, Seattle gets **70%** of the Solar resource that L.A. gets.

Direct Comparison



Germany is the world leader in PV energy. Germany has over 50% of the world's installed PV capacity. Source: www.invest-in-germany.de

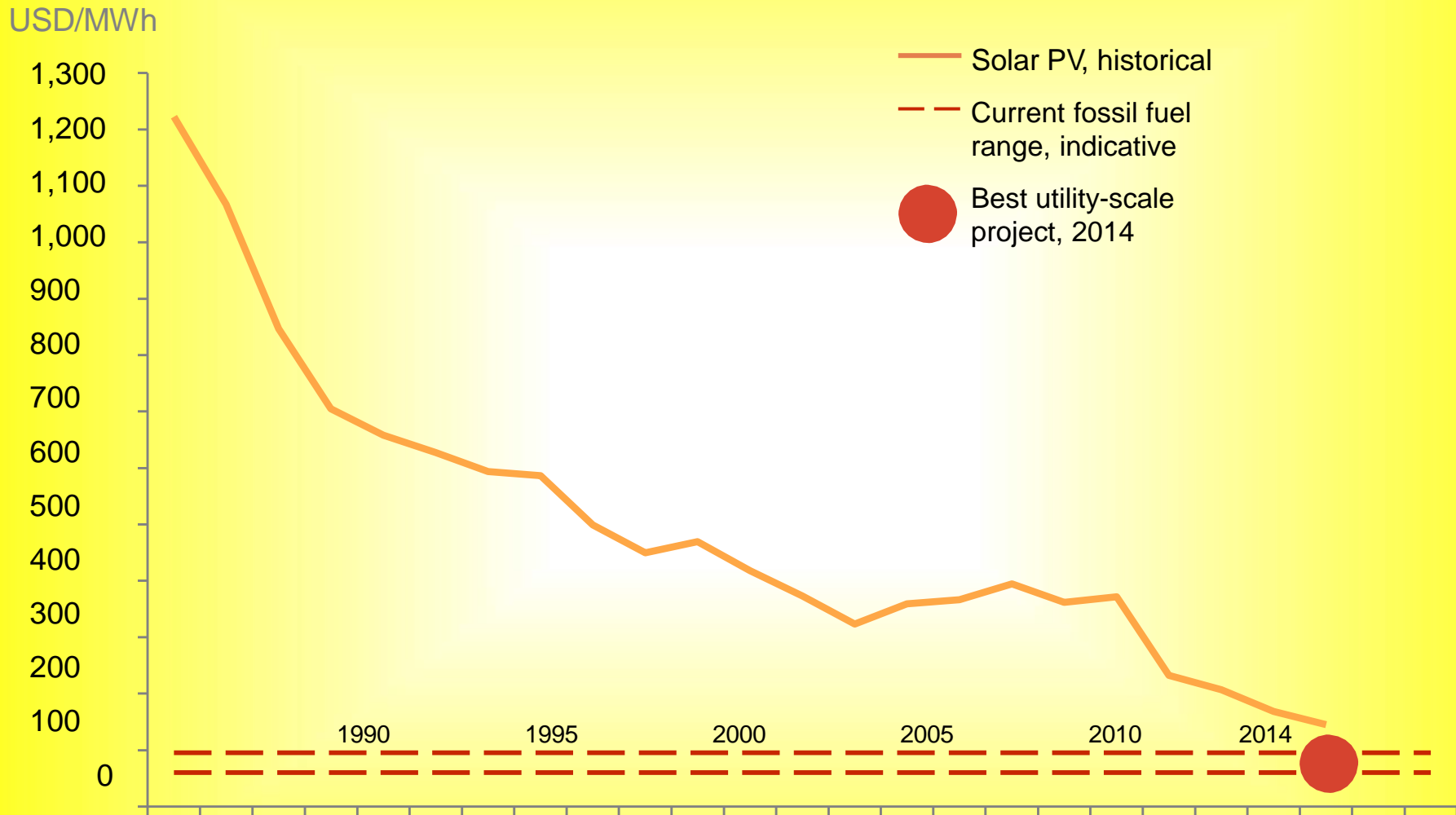
Average PV System Price Decline



© 2013

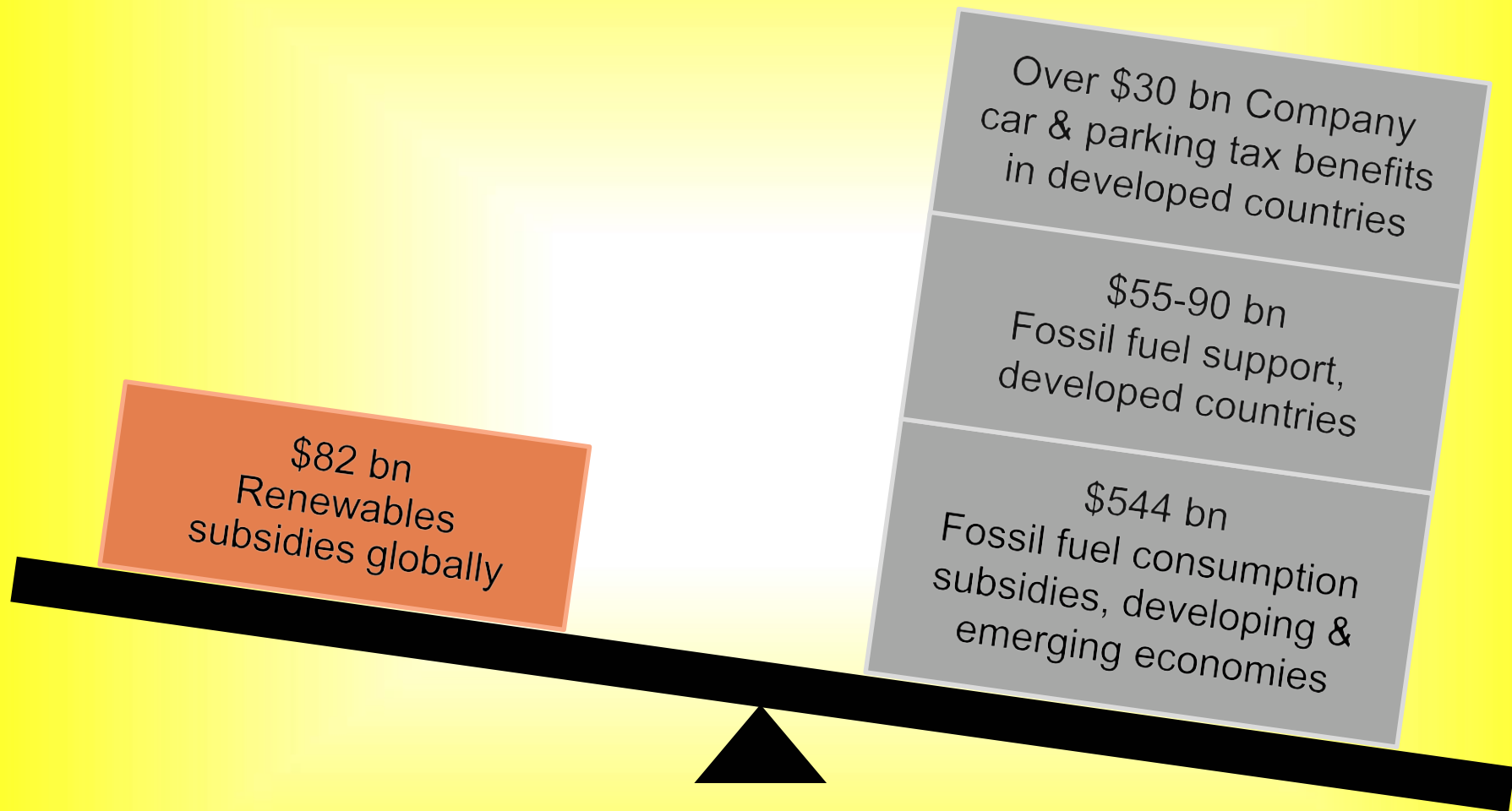


ENERGY: The cost of solar PV is dropping fast; with renewables increasingly cost-competitive



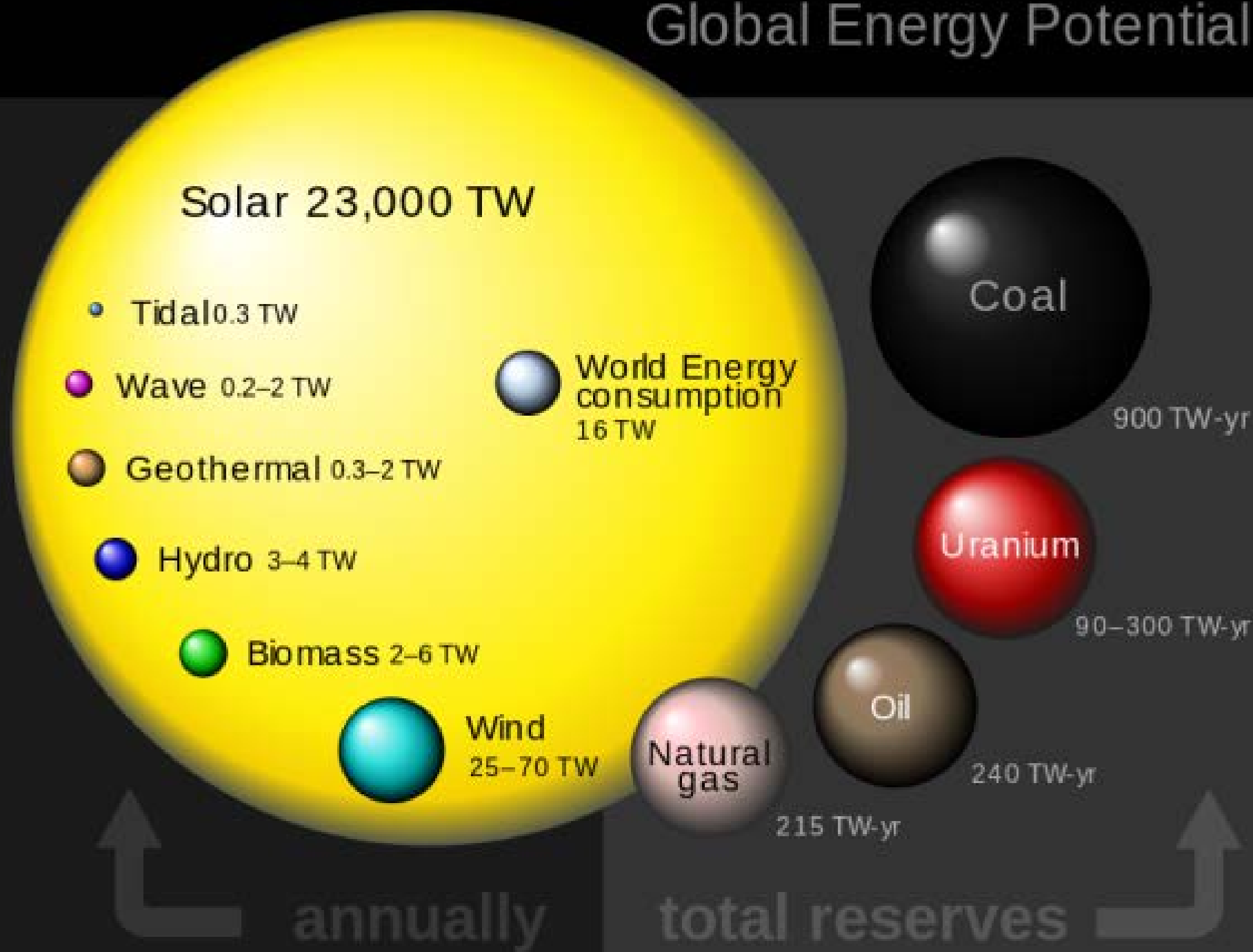
Sources: Citi Research 2012; IEA World Energy Outlook 2013; G. F Nemet, "Beyond the learning curve", Energy Policy 34, 3218-3232 (2006)

ENERGY: There are significant subsidies to the high-carbon economy



Sources: OECD (2013), Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels; IEA (2013), World Energy Outlook; IEA (2013), OECD (2014, forthcoming)

Global Energy Potential



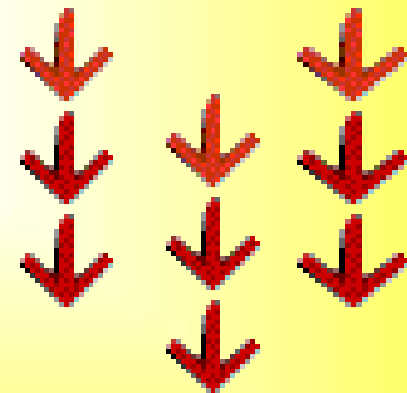


What is solar power?

The path of solar energy from the Sun to your roof

The Sun produces energy as a result of **nuclear fusion reactions**. Solar energy comes to the earth as photons.

It takes about 8 minutes and 20 seconds for the sun's energy to reach the earth.



Two Main Categories

Solar Electric



Electricity production

Solar Thermal



Water heating and cooking

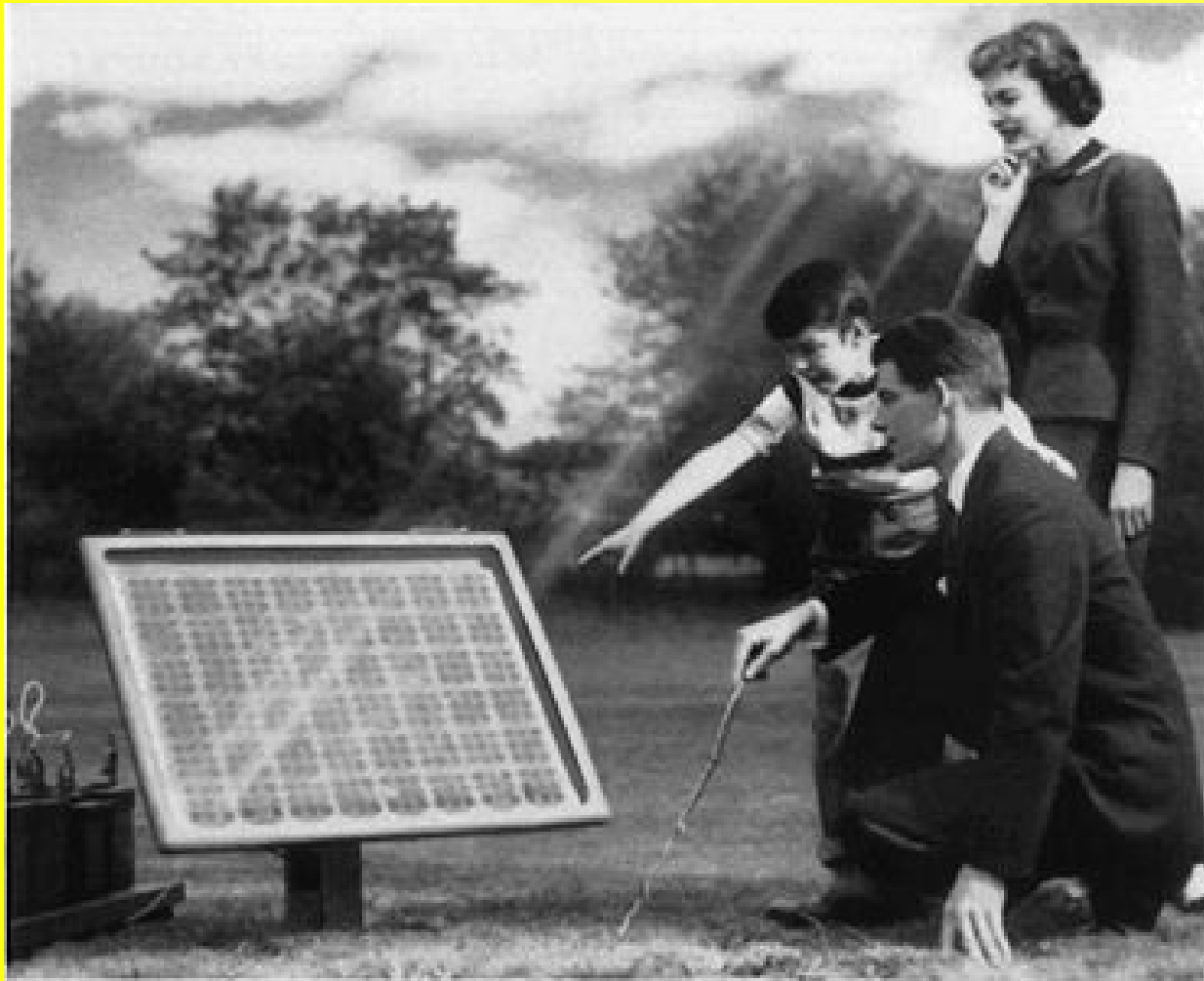
Solar Electric Systems

Better known as

Photo Voltaic

Or

PV Systems



Something New Under the Sun. It's the Bell Solar Battery, made of thin discs of specially treated silicon, an ingredient of common sand. It converts the sun's rays directly into usable amounts of electricity. Simple and trouble-free. (The storage batteries beside the solar battery store up its electricity for night use.)

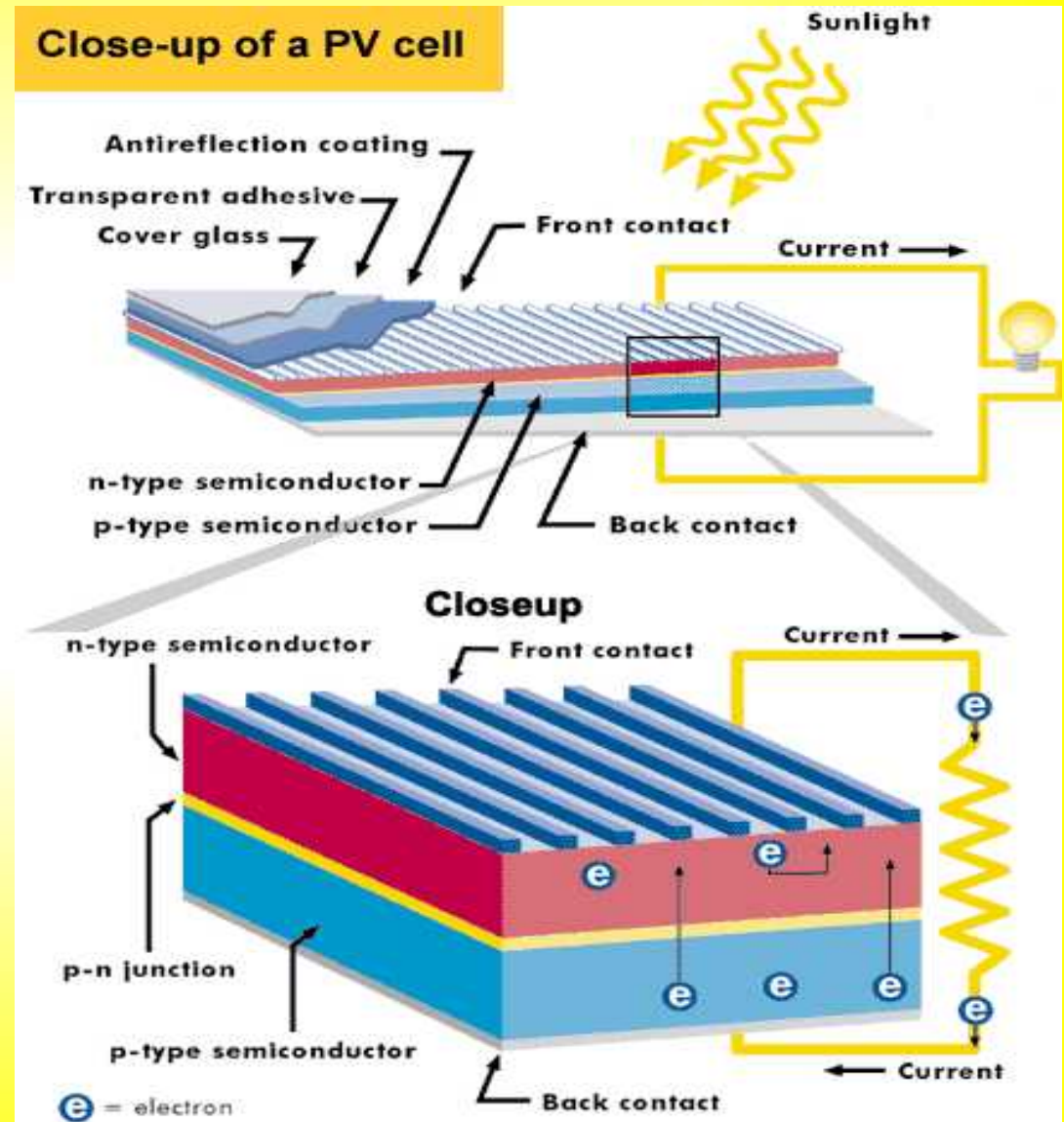
Bell System Solar Battery Converts Sun's Rays into Electricity!

Bell Telephone Laboratories invention has great possibilities for telephone service and for all mankind

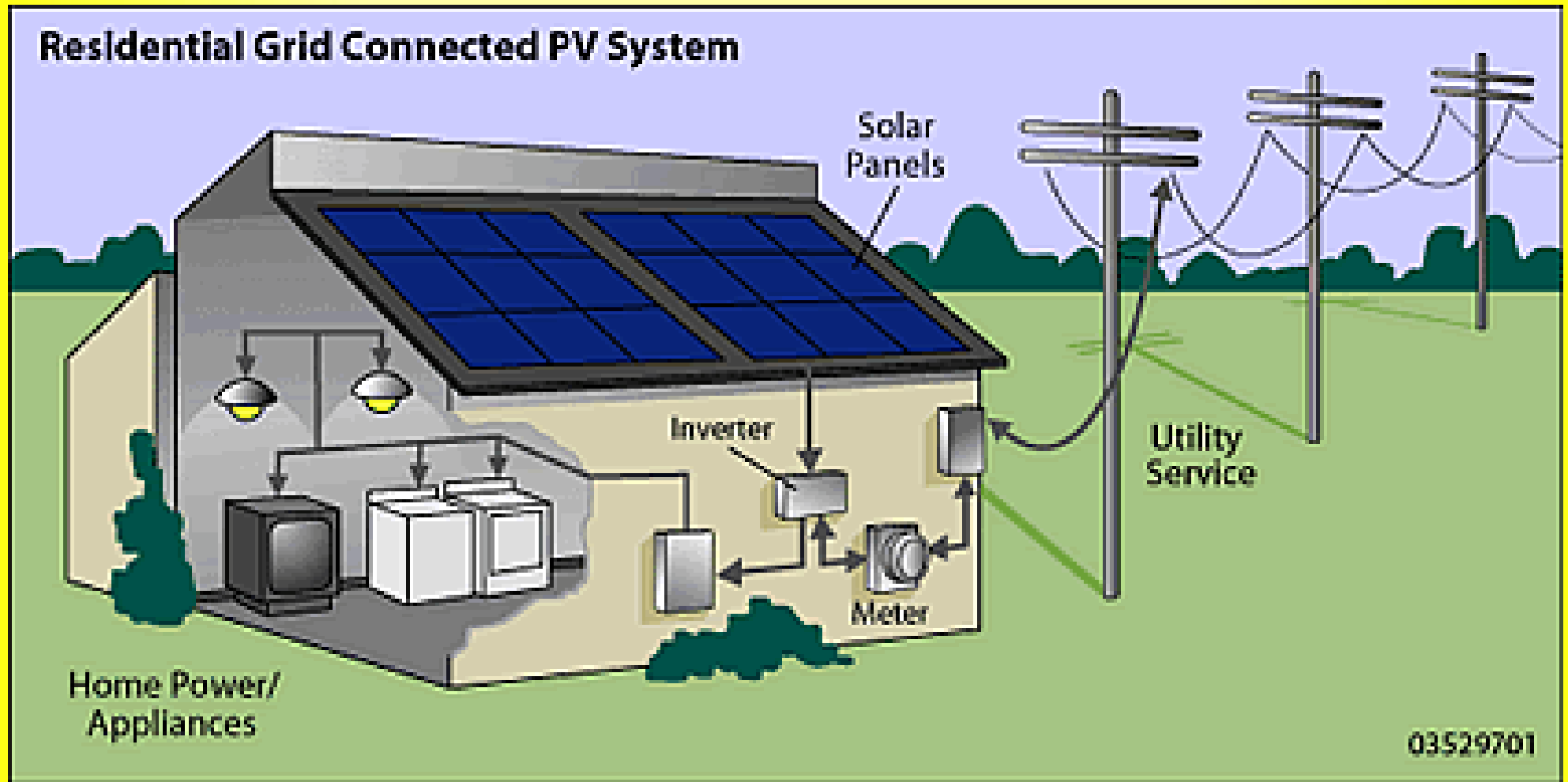
In 1954 Bell Telephone Systems announced the invention of the Bell Solar Battery, “a forward step in putting the energy of the sun into practical use”.

How Solar Electric Works

- Concept discovered in 1800's
- Present design perfected 1950's
- Layer of + semiconductors
- Layer of - semiconductors
- Electrical conduction grid each side
- Sunlight excites semiconductor
- DC current flows from + to --

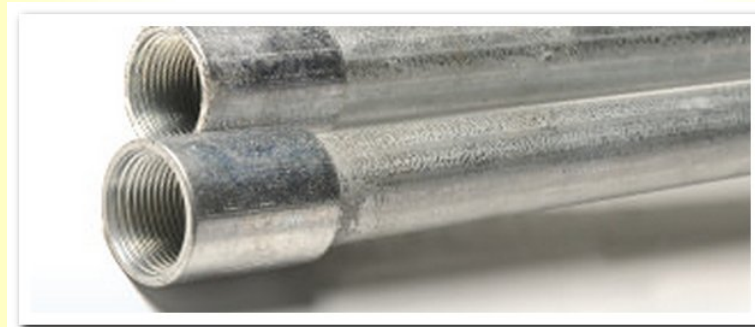


Residential Grid Tie System



Solar Ready

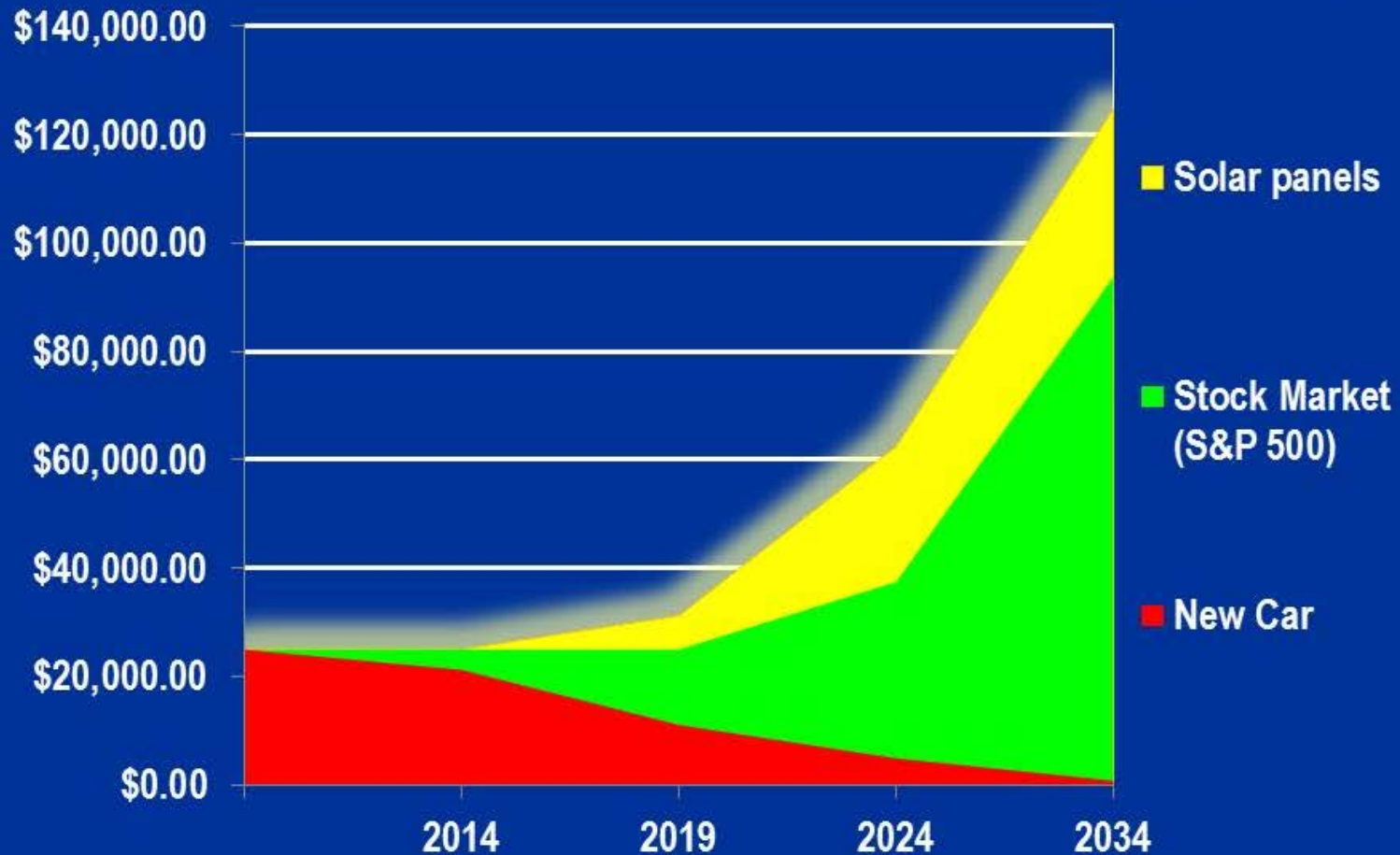
As simple and easy as providing a chase or raceway for your electrical conduit and permanent roof safety anchors.



Investment Case for Solar

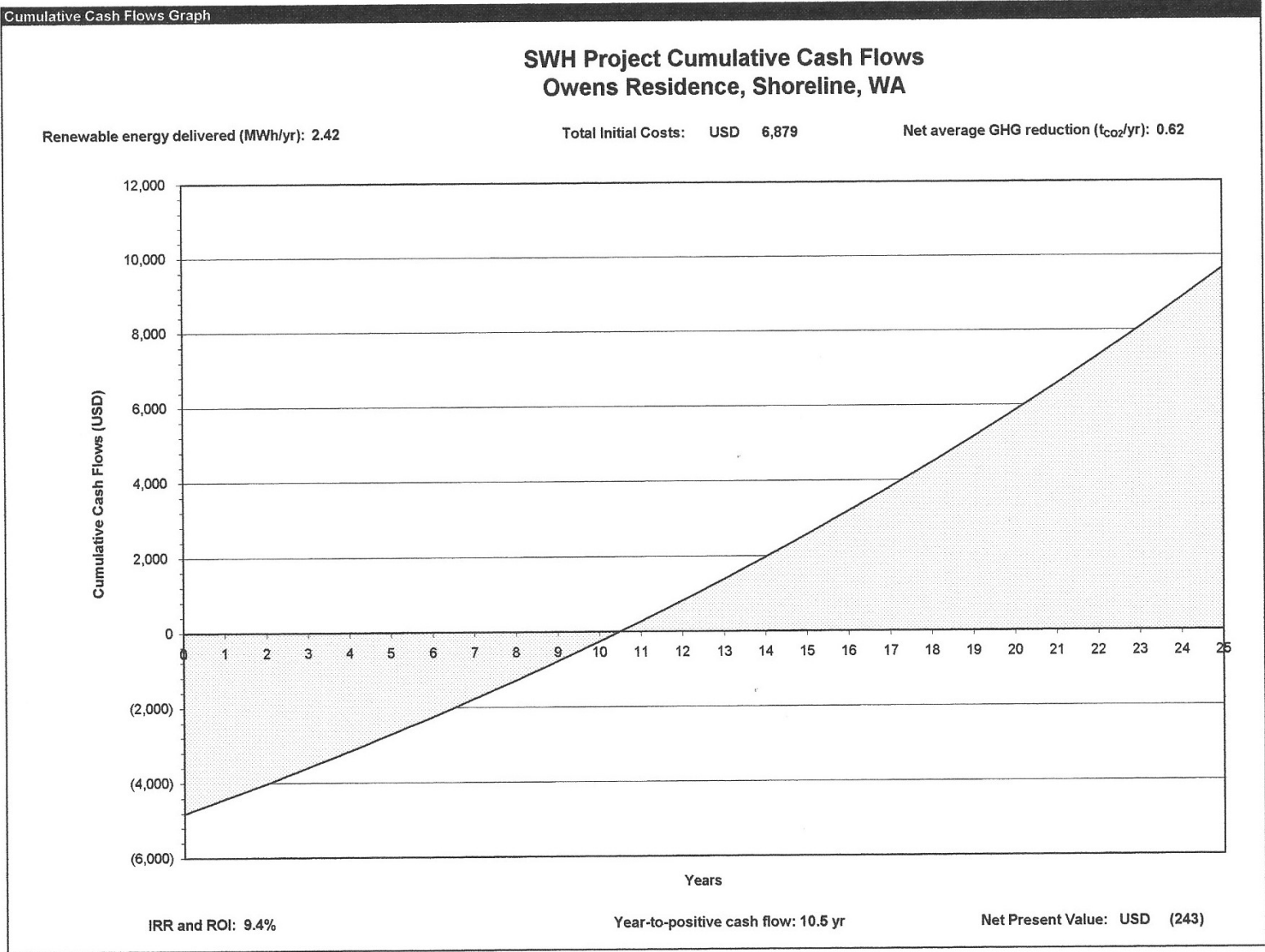
SOLAR ROI SHINES

AVERAGE RETURN ON \$25,000 INVESTMENT OVER 20 YEARS



Residential Solar Hot Water Payback

RETScreen® Financial Summary - Solar Water Heating Project



Shoreline Solar Project spearheaded 1st public solar PV in Shoreline



Meridian Park School

2nd public solar PV in Shoreline



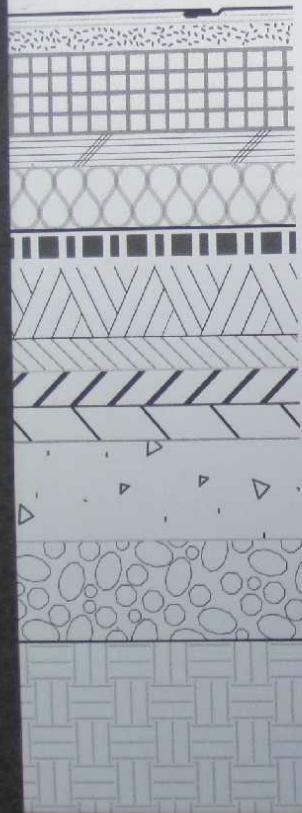
Parkwood Elementary School



Shoreline City Hall



Shoreline City Hall (Looking West)



SOLAR SYSTEMS:

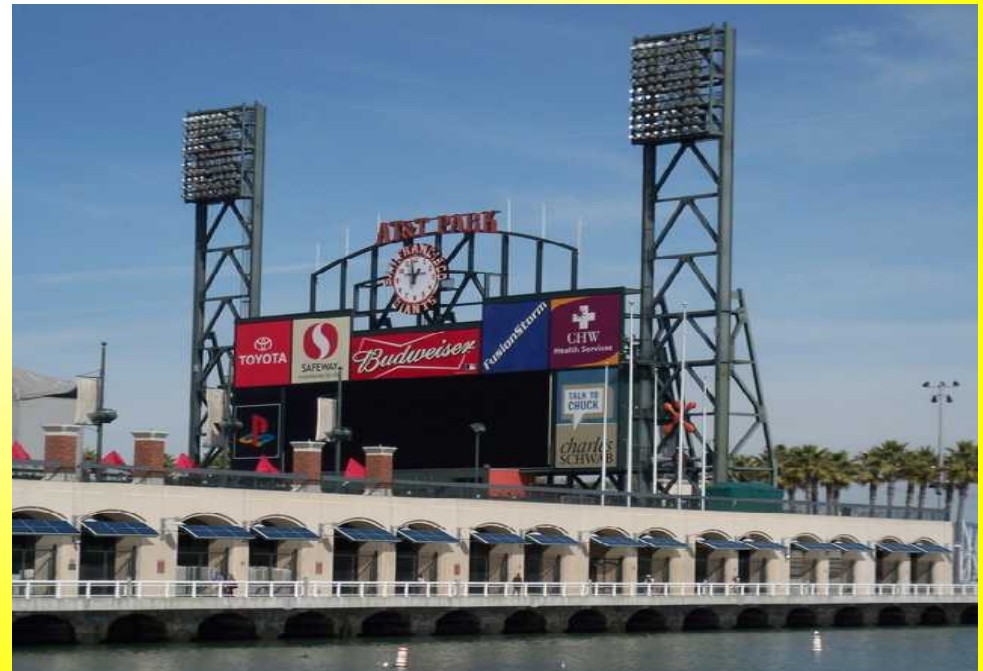
Photovoltaics

Photovoltaic panels collect energy from the sun and convert it to electricity. This helps reduce the amount of energy the city has to purchase. The electricity produced from solar energy is renewable and does not result in carbon dioxide emissions. This helps reduce the effects of climate change.





Commercial Solar Photovoltaic Systems



Solar Communities - Japan



Solar Communities - Germany



Solar Thermal Systems

Collecting solar energy for heating

Flat Plate Systems

Evacuated Tube Systems

Solar Hot Water Systems

- Evacuated Tubes most popular in Seattle area
- Vacuum keeps heat in
- Hotter Water produced
- Produce 50-70% of load
- Better Efficiency in winter



Solar Thermal on City Hall



Hot Water at City Hall



Flatplate Collectors



Solar Thermal in Shoreline since 1982





Practical Application of Renewable Energy

**Shoreline Solar Project
recommends the following steps:**

NW SolarFest Proclamation

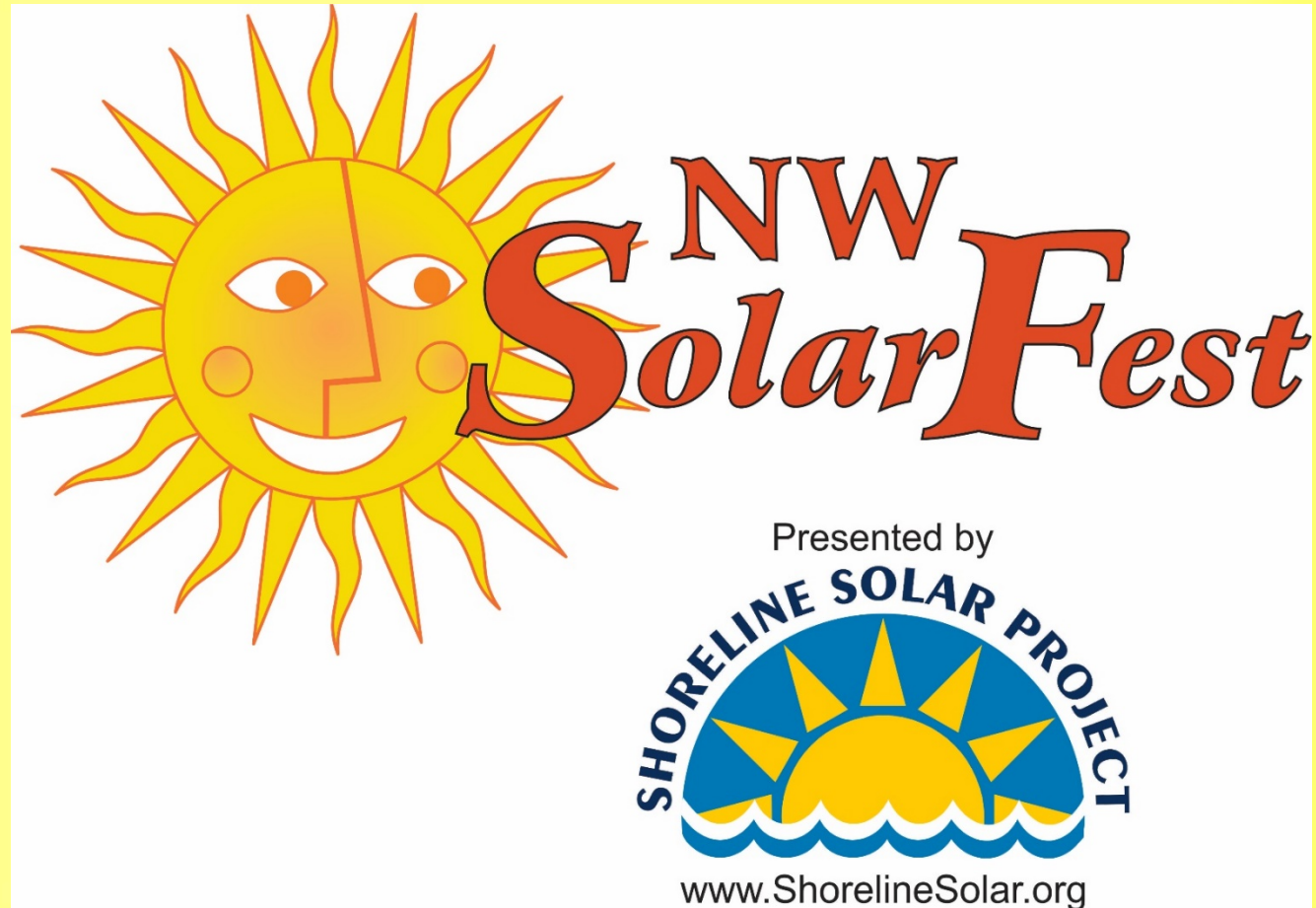
PROCLAMATION

- WHEREAS, The City of Shoreline adopted a Sustainability Strategy that recognizes the value and practical application of alternative energy sources, and
- WHEREAS, on October 2, 2004, Meridian Park School was the first public building in the City of Shoreline to install a Photovoltaic (PV) system on its roof, and
- WHEREAS, Shoreline City Hall incorporates solar solutions including solar electric, solar water heating and solar trash and recycling containers, and
- WHEREAS, the community group Shoreline Solar Project, a 501 (C) (3) nonprofit, promotes renewable energy and sustainability practices, and
- WHEREAS, NW SolarFest offers our community and the region, tools, materials and resources to incorporate sustainable practices in daily living, and
- WHEREAS, the City of Shoreline has supported NW SolarFest for over a decade, and
- NOW, THEREFORE, I, Christopher Roberts, Mayor of the City of Shoreline, on behalf of the Shoreline City Council, do hereby proclaim July 23, 2016 as

NW SOLARFEST DAY

In the City of Shoreline.

Attend NW SolarFest



Shoreline Community College
July 23, 2016



Participate in custom
tour & workshop of
Shoreline City Hall
offered by
Shoreline Solar Project
and City staff

Participate in the Solarize Shoreline Program

- Attend a Solarize Shoreline Workshop
- Get a free site assessment of your own home

solarize shoreline



POWER YOUR HOME WITH SOLAR!

Join your neighbors to save time and money on a solar system for your home or small business.

- Free educational workshops
- Free site assessments
- Group discount for Shoreline residents

GET STARTED AT solarizenw.org

ATTEND A **FREE** SOLAR WORKSHOP TO LEARN MORE



Limited-time offer — come to a workshop for a free site assesment!
Pre-register at solarizenw.org.

Thursday, June 23	7-8:30am	Shoreline City Hall
Saturday, July 23	10:30am to noon	Shoreline Community College 1500 Building, Room #1508
Workshop #3	August	TBA

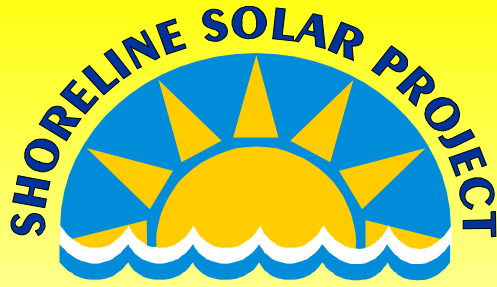
Brought to you by the City of Shoreline and the non-profit Northwest SEED. Powered by community volunteers.



REGISTER AT solarizenw.org | 206.328.2441

Be a solar advocate





Practical Application of Renewable Energy

Does solar work in Shoreline?

YES !



Practical Application of Renewable Energy

Shoreline Solar Project

www.shorelinesolar.org

www.facebook.com/ShorelineSolarProject

NW SolarFest

www.nwsolarfest.org,

www.facebook.com/NWSolarFest