

Bonneville Power Administration (BPA)

# **BPA's PATH TO THE FUTURE**

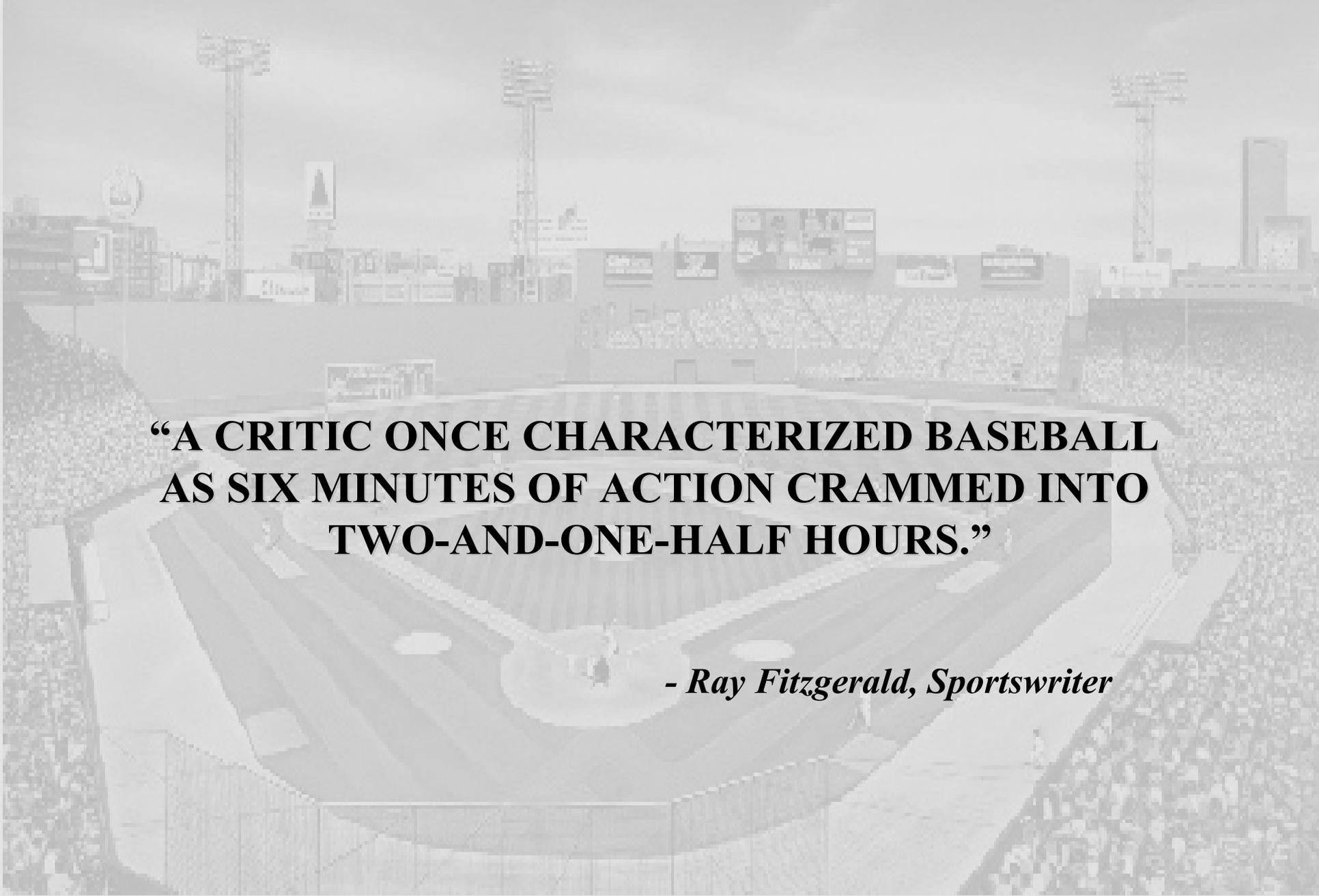
Mike Weedall, Vice President  
Energy Efficiency

Hydrogen Production and Northwest Transportation

June 16, 2003

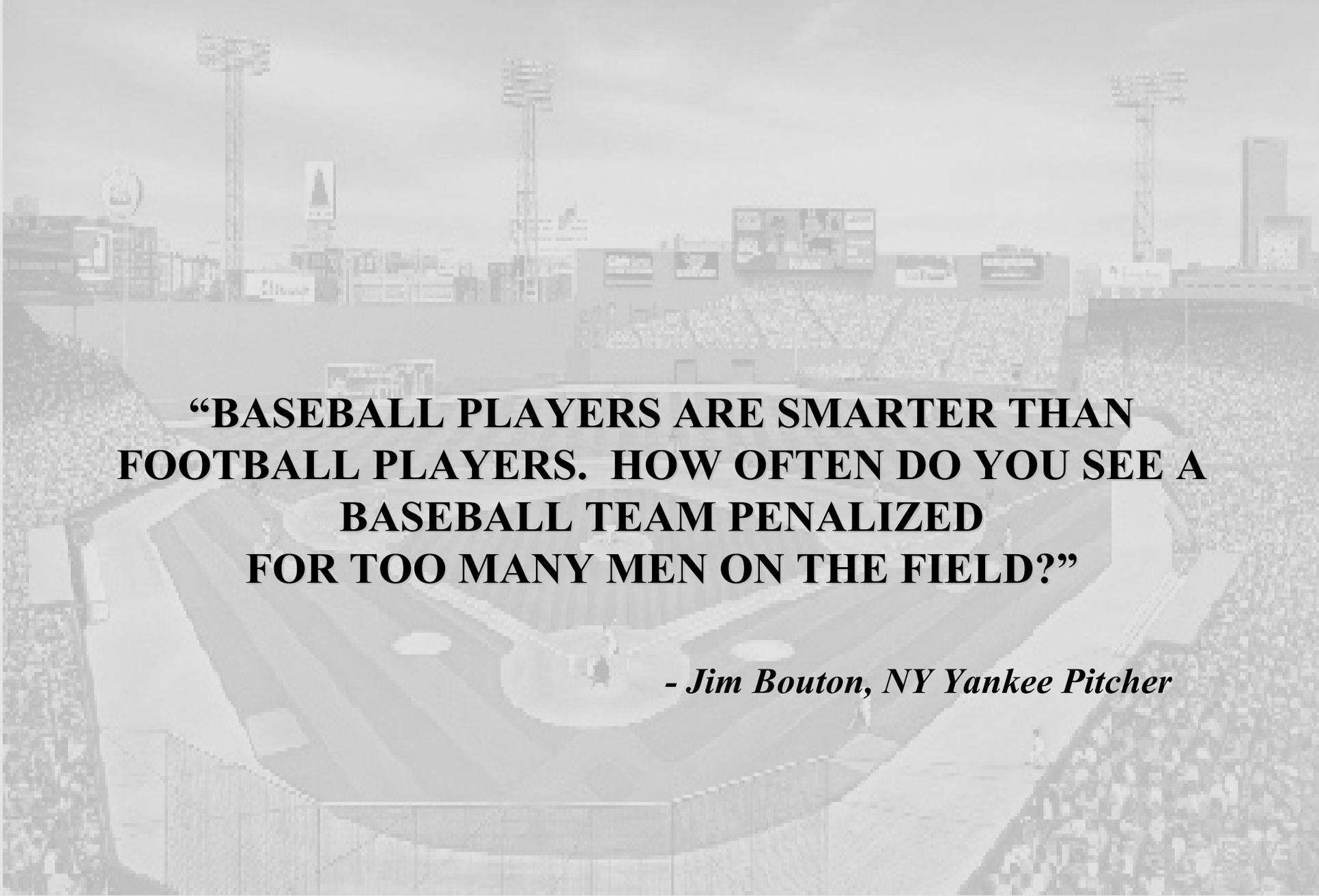
## Presentation Overview

- BPA Background
- Conservation Overview
- Renewable Overview
- Energy Web Strategic Thrust



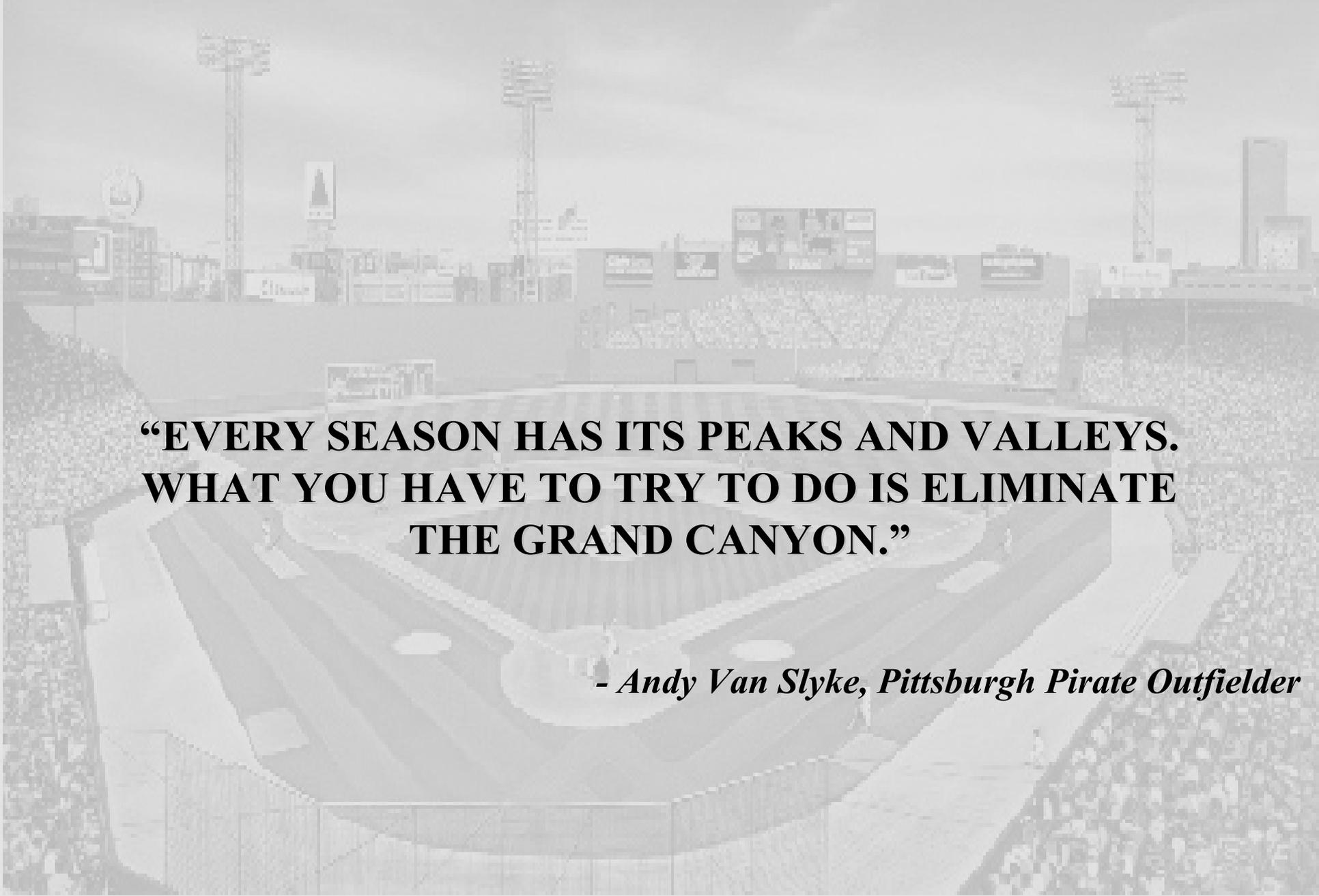
**“A CRITIC ONCE CHARACTERIZED BASEBALL  
AS SIX MINUTES OF ACTION CRAMMED INTO  
TWO-AND-ONE-HALF HOURS.”**

*- Ray Fitzgerald, Sportswriter*



**“BASEBALL PLAYERS ARE SMARTER THAN  
FOOTBALL PLAYERS. HOW OFTEN DO YOU SEE A  
BASEBALL TEAM PENALIZED  
FOR TOO MANY MEN ON THE FIELD?”**

*- Jim Bouton, NY Yankee Pitcher*



**“EVERY SEASON HAS ITS PEAKS AND VALLEYS.  
WHAT YOU HAVE TO TRY TO DO IS ELIMINATE  
THE GRAND CANYON.”**

*- Andy Van Slyke, Pittsburgh Pirate Outfielder*



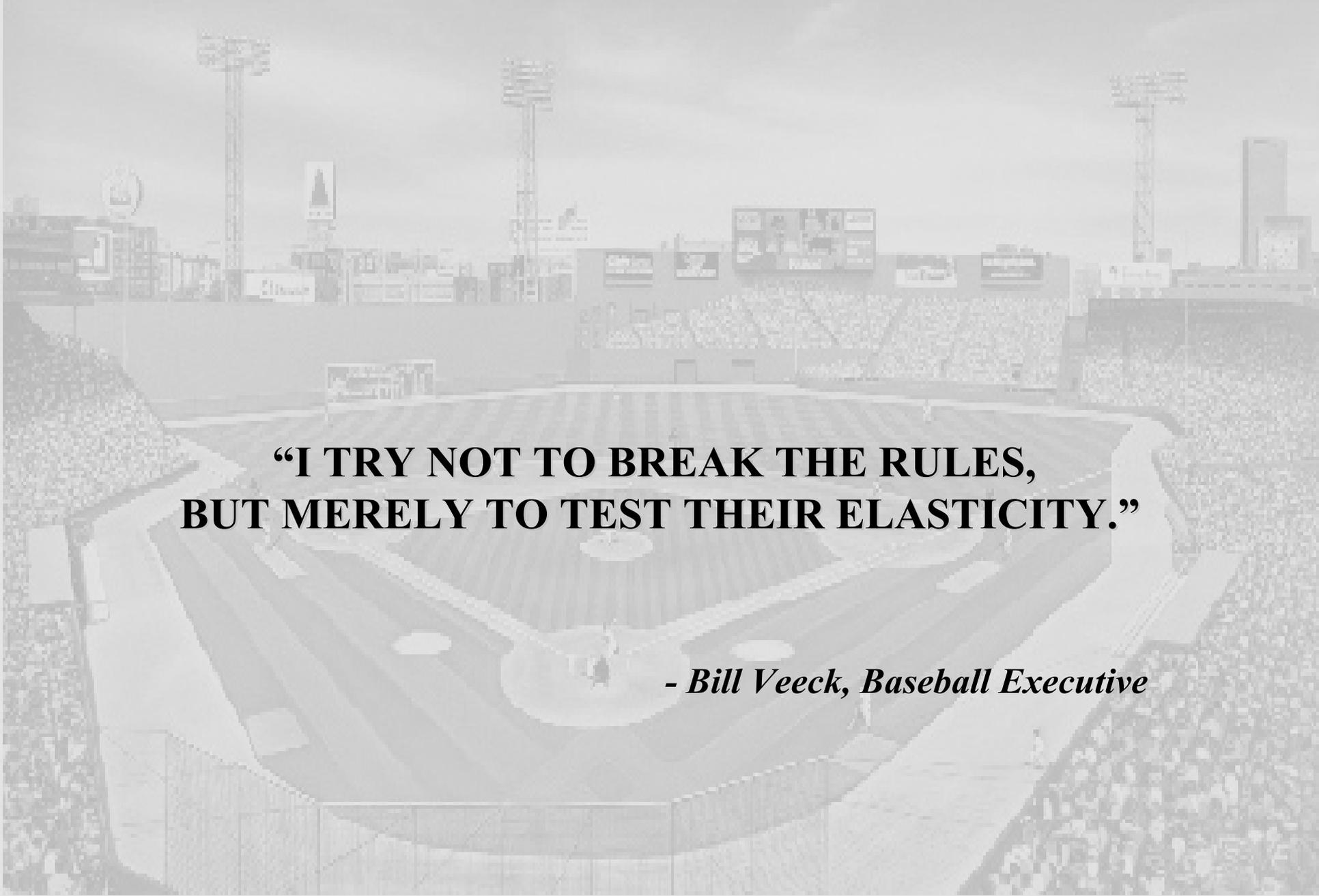
## BPA Profile

- Congress created the Bonneville Power Administration in 1937 to market and transmit the power produced at the Bonneville Dam.
- Today, BPA markets the power from 29 federal dams and 1 non-federal nuclear plant in the Pacific Northwest, and has built one of the largest and most reliable transmission systems in the United States.
- BPA's service area includes: Oregon, Washington, Idaho, western Montana, small parts of Wyoming, Nevada, Utah, California, and eastern Montana.
- BPA sells wholesale power to publicly-owned and investor-owned utilities, as well as to some large industries.



## BPA Profile (continued)

- BPA also sells or exchanges power with utilities in Canada and other parts of the western United States.
- BPA's primary mission is to meet public responsibilities for citizens of the Pacific Northwest.
- BPA is a nonprofit entity and its programs are funded by Pacific Northwest ratepayers.
- About half of all the power used in the Pacific Northwest comes from BPA.
- More than 80 percent of the power BPA sells is hydroelectric. About 60 percent of the region's electricity comes from hydropower.
- BPA's grid provides about three-fourths of the region's transmission capacity.



**“I TRY NOT TO BREAK THE RULES,  
BUT MERELY TO TEST THEIR ELASTICITY.”**

*- Bill Veeck, Baseball Executive*



## BPA's Conservation Accomplishments

1981-2002: Over 800 aMW for \$2 billion which equates to an average cost of about \$2.5 million per 1 aMW.

- Residential: 300 aMW
  - Weatherized over 400,000 existing homes.
  - Over 20,000 new energy efficient site-built homes.
  - Over 60,000 energy efficient manufactured homes.
- Industrial: 200 aMW
  - Improved energy technologies/equipment in over 400 manufacturing firms.
- Commercial: 180 aMW
  - Improved energy technologies/equipment in over 10,000 commercial buildings.
- Multisector: 95 aMW
- Agriculture: 25 aMW



## Public Benefits Program

- Conservation and Renewables Discount (\$160 million/4 years):
  - 0.5 mill discount (times load placed on BPA) off each customer's rates to the extent they'll spend the funds on approved conservation and/or renewable resource initiative.
- Market Transformation (\$40 million/4 years):
  - Supports the NW Energy Efficiency Alliance in using the techniques of manufacturer leverage, regional cooperation, and paying attention to other market actors to transform markets (codes, standards, etc.).
- Low Income Weatherization (\$14 million/4 years):
  - Administered by four PNW states through established infrastructure.



## Public Benefits Program (continued)

- Energy Web Related Initiatives (\$4 million/4 years):
  - Demonstration and testing of distributed generation, smart metering, direct application renewables and a variety of other cutting edge technologies that reinforce energy use decisions by the end-use consumer.
- Information/Education/Outreach (\$2.4 million/4 years).



## Conservation Acquisition Program

- Conservation as a part of Augmentation re/ConAug (\$152 million/4 years):
  - Designed to reduce the administrator's obligation to serve customers' loads.
  - Voluntary, pay-for-delivered savings design with a strong verified savings requirement.
  - RFP approach with customized and off-the-shelf components supplemented by limited standard offers, regional turnkey programs and federal initiatives, such as:
    - Commercial lighting LSO.
    - Regional CFL/TFL coupon program.
    - Vending Mi\$er.
    - CFL drop ship Corps/Bureau dams and related facilities.



## Conservation Acquisition Program (continued)

- Federally-funded fish hatcheries.
- Water/wastewater treatment facilities pilot.
- Peak Load Management/Demand Exchange (\$2.4 million/4 years):
  - Voluntary and Pre-Purchase Options; “Share-the-Economic-Advantage” approach; enhanced reliability.



## BPA Federal Energy Efficiency Program

- Since 1995, BPA has provided cost reimbursable project support to federal agencies - Governmental functions only - \$15 million of existing orders to a variety of agencies, including DOE, GSA, DOD, NOAA, Forest Service, State Department, Coast Guard, and the National Park Service. BPA acts as an extension of the other agency's staff, including procurement and project management. A full range of solar, wind, fuel cell, and energy efficiency projects are supported.
- To date, BPA Energy Efficiency has produced cumulative utility bill and other savings (reduced O&M costs, utility line extension deferrals, etc.) for federal agency customers in excess of \$7 million/year; new savings of about \$2 million/year are expected in 2003.



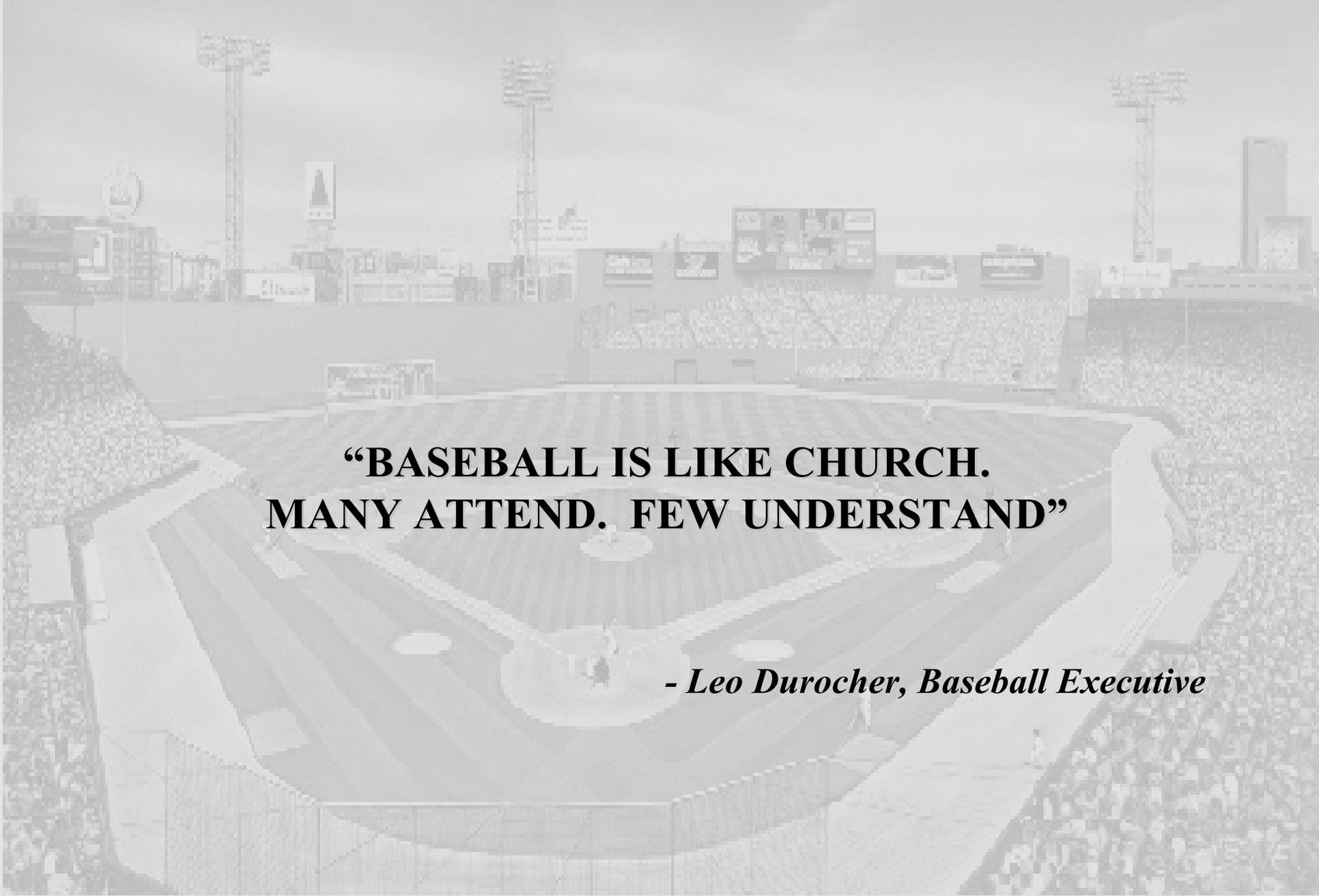
## BPA's Peak Load Management Program (Demand Exchange)

- Program Description:
  - The DEMX, which began in August 2000, manages peak load and mitigates the costs of buying energy on the spot market during times of supply constraint through voluntary load reductions and internet trading of curtailments.
  - The program provides economic benefits to utilities and end-use customers who turn off large power-using equipment and/or run generators during periods of high demand.
  - During the 2001 energy crisis, BPA was the first West Coast utility to pursue the DEMX concept and implement it on a wholesale level. BPA's foresight contributions to Apogee helped design a product with the flexibility to accommodate two-and-one-day ahead trading. It is an outstanding example of what can happen when government and private industry work together to address a national crisis.



## BPA's Peak Load Management Program (Demand Exchange) (continued)

- Achievements:
  - As of August 2001, BPA has received over 20,000 megawatt-hours of curtailment.
  - The program had a one-time achieved maximum contribution level of 838 megawatts; however, long-term load curtailment offers have cut the available megawatts in half.
  - Winner of the 2001 Peak Load Management Alliance “Demand Response Achievement Award.”



**“BASEBALL IS LIKE CHURCH.  
MANY ATTEND. FEW UNDERSTAND”**

*- Leo Durocher, Baseball Executive*



## Renewable Energy Program

- BPA has acquired a variety of renewable energy projects.
- Renewables budget set to cover acquisition costs in excess of competing resources - capped at \$15 million/year.
- $(\text{Cost of Output}) + (\text{Firming/Shaping/Transmission Costs}) + (\text{Other Costs}) - (\text{Long Run Marginal Cost of Power}) - (\text{Green Tag Revenue})$  equals \$15 million/year.

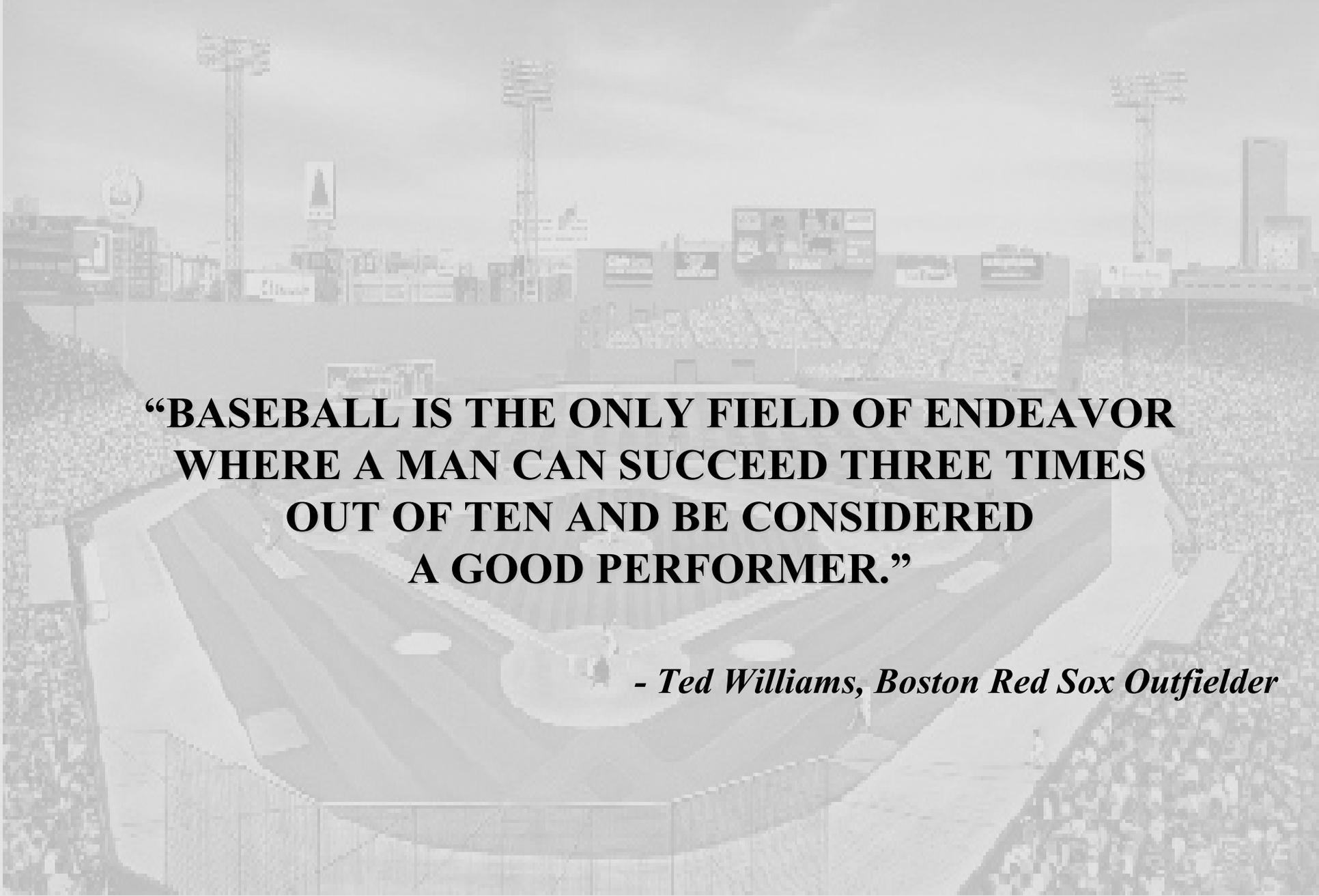
## BPA' s Renewable Portfolio

Year PPA Signed/ on-line Date	Project	BPA Share (MW)	Cumulative Capacity (MW)
1997 / April 22, 1999	Foote Creek I Wind	15.32	15.32
1998 / June 18, 1999	Foote Creek II Wind	1.8	17.12
1999 / Oct. 01, 2000	Foote Creek IV* Wind	16.8	34
2000 / June 15, 2000	Ashland Solar	0.015	34
2000 / 2004	Fourmile Hill Geoth. (CA.)	44.9*	79
2001 / May, 30 2002	White Bluffs Solar* (WA.)	0.0387	78.89
2001 / Dec. 31, 2001	Condon Wind	49.8	128.7
2001 / Dec. 18, 2001	Stateline Wind	90.42	219
2001 / Dec. 31, 2001	Klondike Wind	24	243



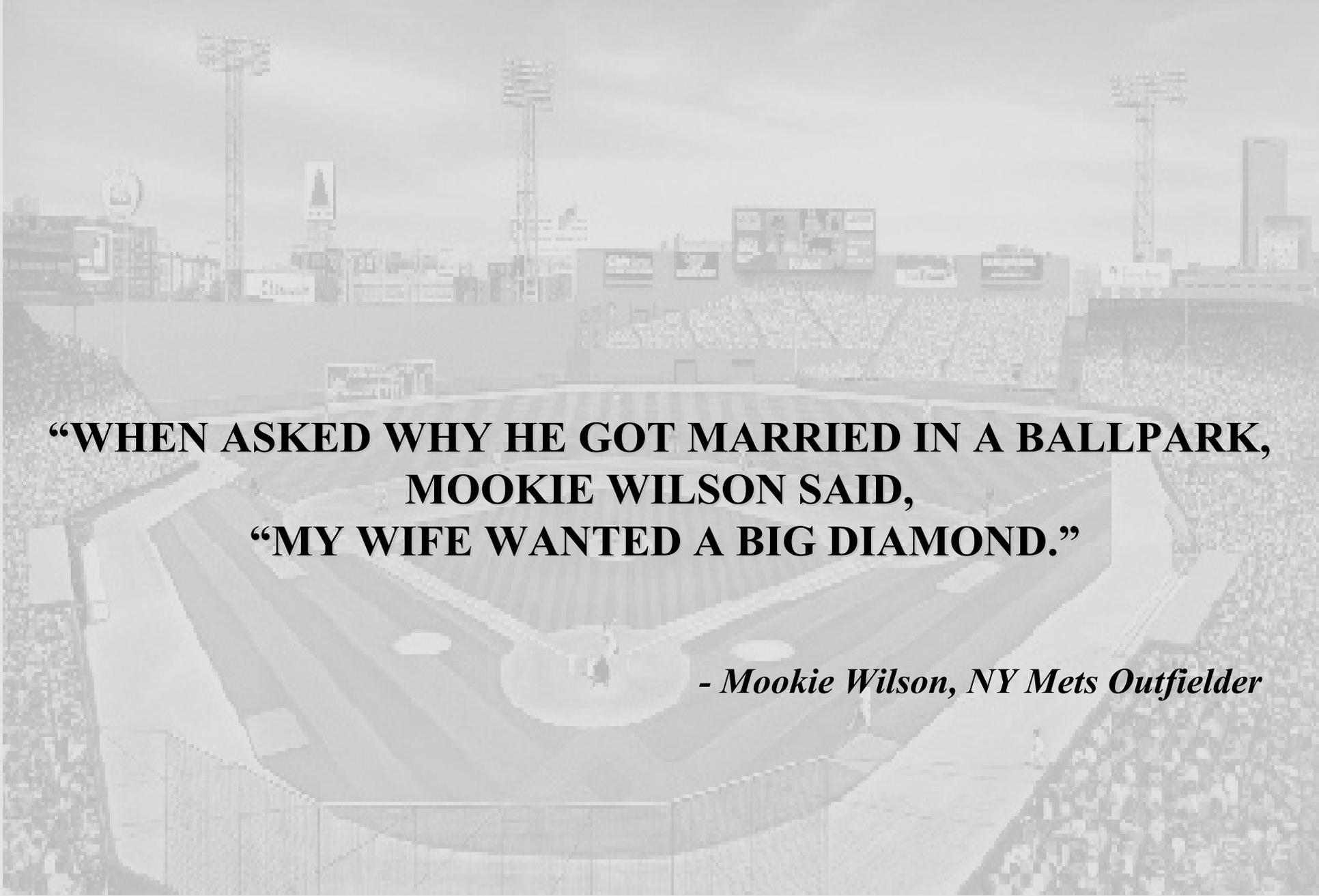
## Where Does the Money Go?

- BPA uses EPP premiums to acquire new renewables and to promote new renewable development:
  - Buying down the cost of wind power. Energy from BPA's wind projects cost between \$8 and \$13 more to deliver than energy from combined cycle combustion turbines. All of BPA's renewables (except FC I) were partially purchased with premiums from past EPP purchases.
  - Buying the output from emerging renewable technologies. BPA purchased the output from the Ashland & White Bluffs solar projects.
  - Renewables Development:
    - BPA funds the NW wind monitoring network.
    - Avian use and mortality study (at wind farms).
    - Eric Hurst study on the impacts on the power system of integrating wind.
    - BPA funds the NW Solar monitoring network.



**“BASEBALL IS THE ONLY FIELD OF ENDEAVOR  
WHERE A MAN CAN SUCCEED THREE TIMES  
OUT OF TEN AND BE CONSIDERED  
A GOOD PERFORMER.”**

*- Ted Williams, Boston Red Sox Outfielder*



**“WHEN ASKED WHY HE GOT MARRIED IN A BALLPARK,  
MOOKIE WILSON SAID,  
“MY WIFE WANTED A BIG DIAMOND.”**

*- Mookie Wilson, NY Mets Outfielder*

**Bonneville**



Power Administration

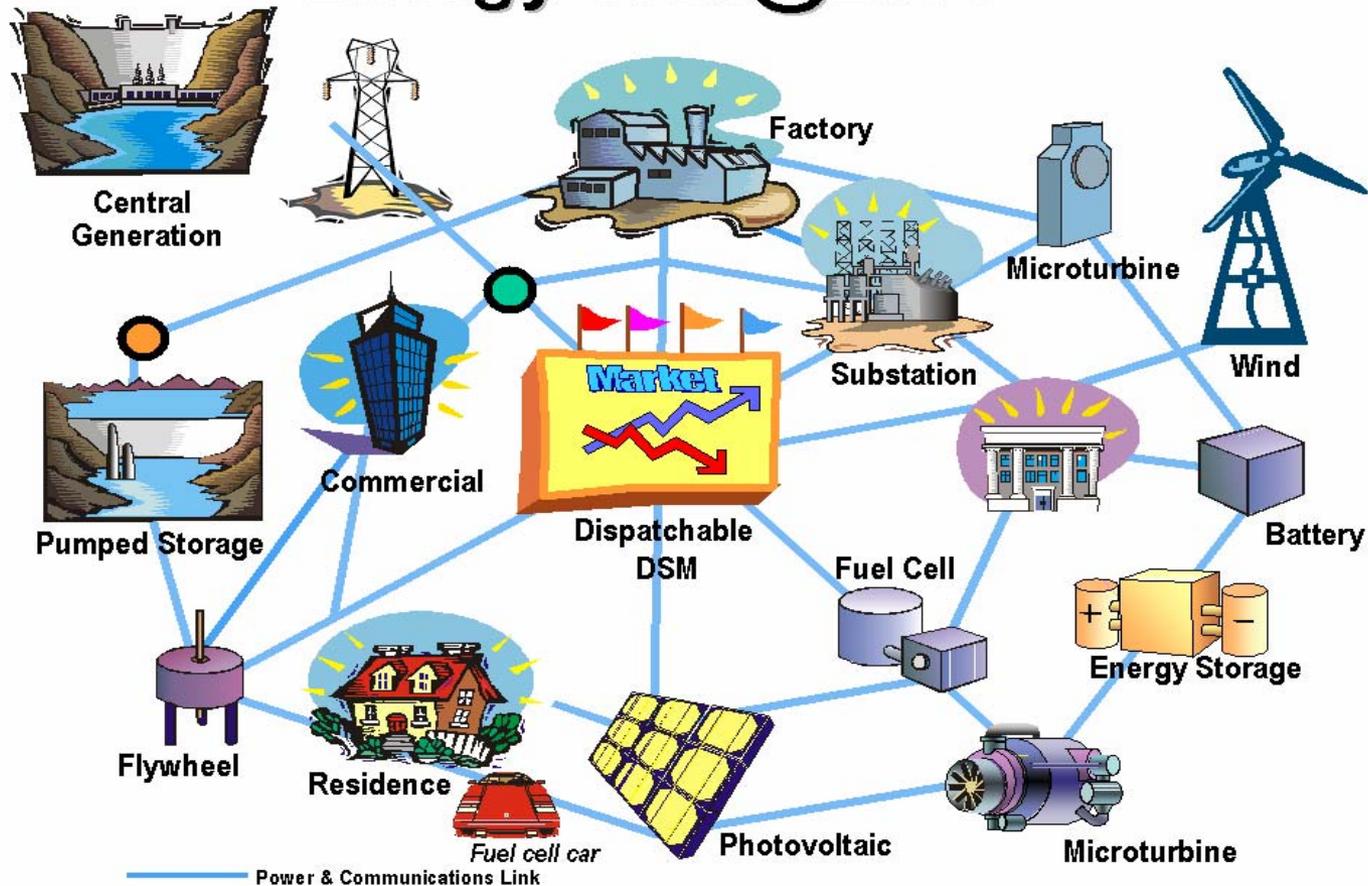
**Energy Web Vision  
and Implementation Strategy  
for 2002 and Beyond**



## Energy Web Definition

- Integrate utility electrical system, telecommunications system, and energy market.
- Optimize loads on the electrical network.
- Reduce costs to customers and utilities.
- Facilitate integration of renewable resources.
- Increase electrical system reliability.
- Reduce environmental impacts of load growth.

## Energy Web@2010

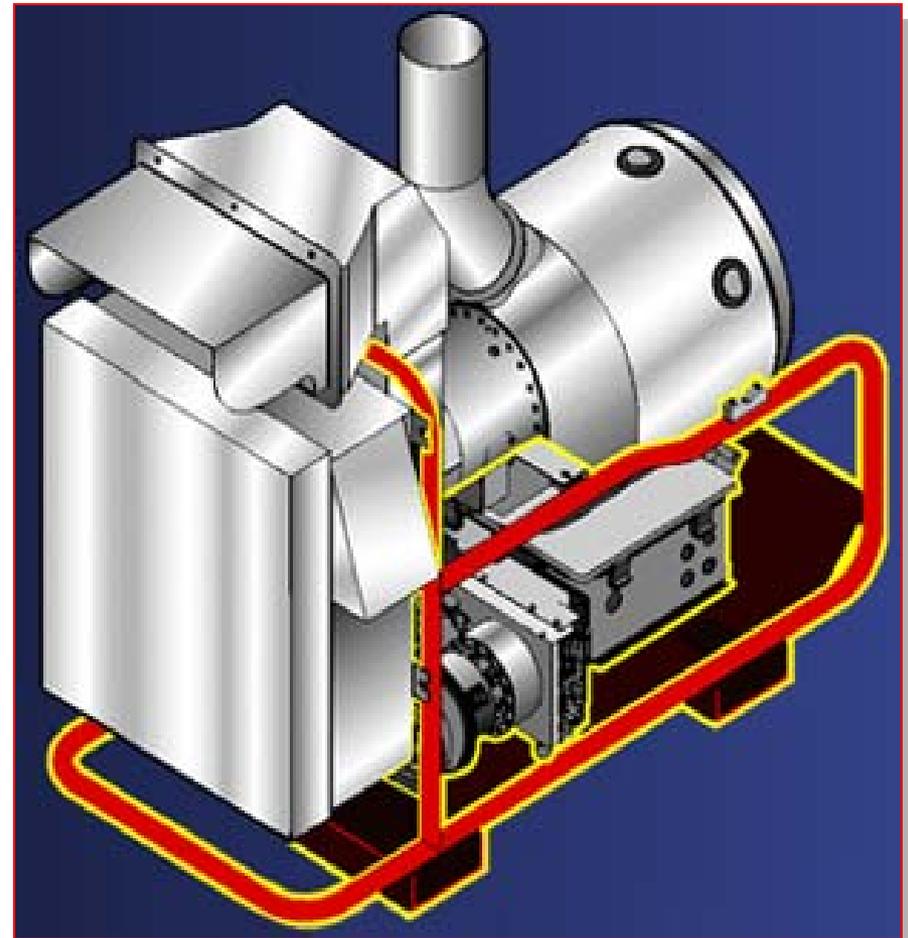


## Fuel Cell-BPA Customer Site





## Capstone Microturbine



## Geothermal Energy Plant

West Ford Flat Facility, California





## Solar Voltaic

in

## Remote Areas





## Central Station Wind Facility



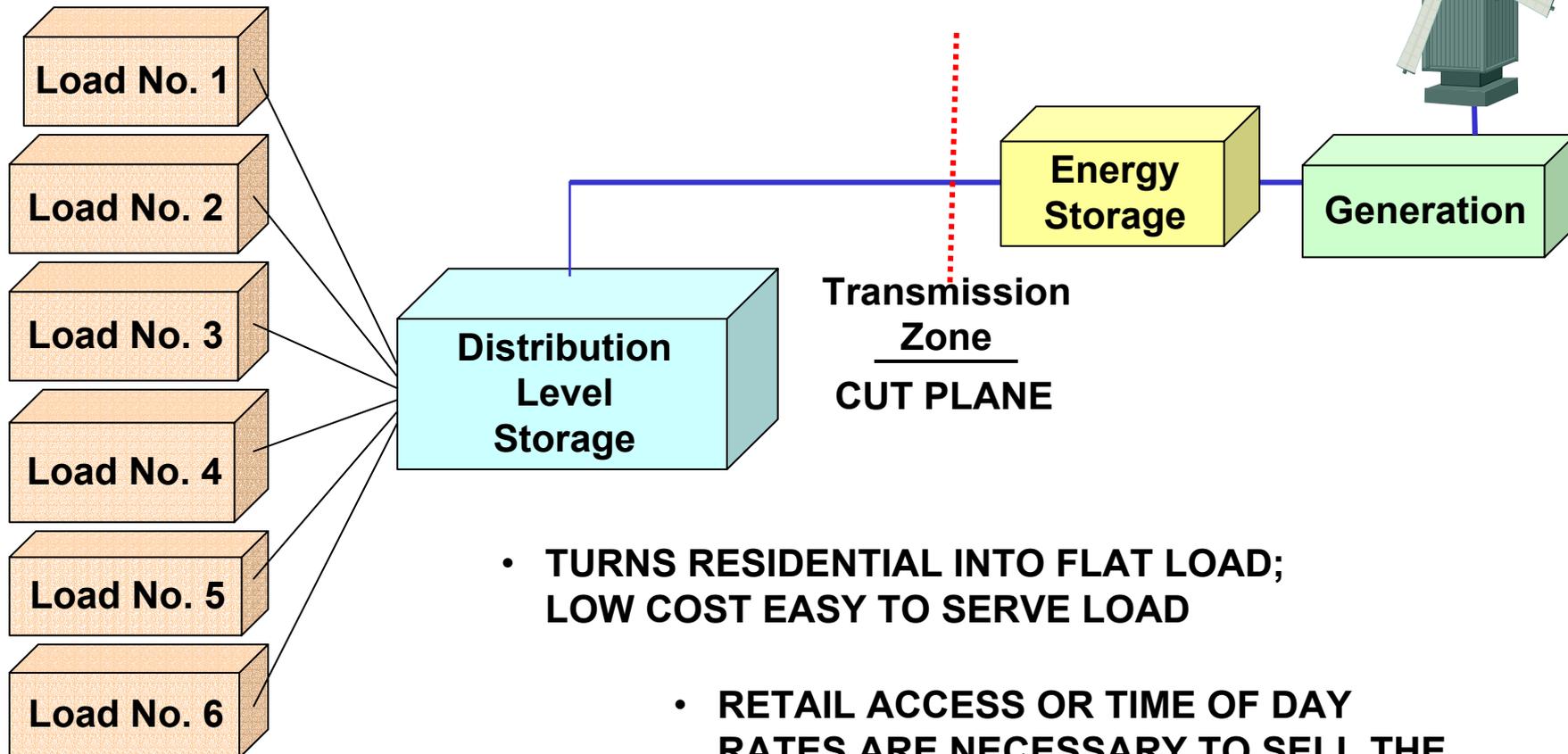
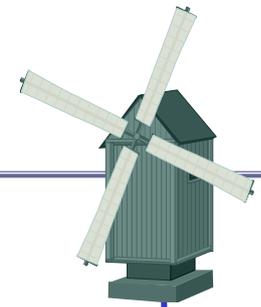
Wyoming Wind Project

## Regenesys Plant Design - Little Barford, U.K.





## Virtual Green Extension Cord (Building Around the RTO)



- TURNS RESIDENTIAL INTO FLAT LOAD;  
LOW COST EASY TO SERVE LOAD
- RETAIL ACCESS OR TIME OF DAY  
RATES ARE NECESSARY TO SELL THE  
EXTENSION CORD TO END USERS

Prepared by: Allan E. Ingram, Mechanical Engineer, Bonneville Power Administration

<http://www.demx.com>

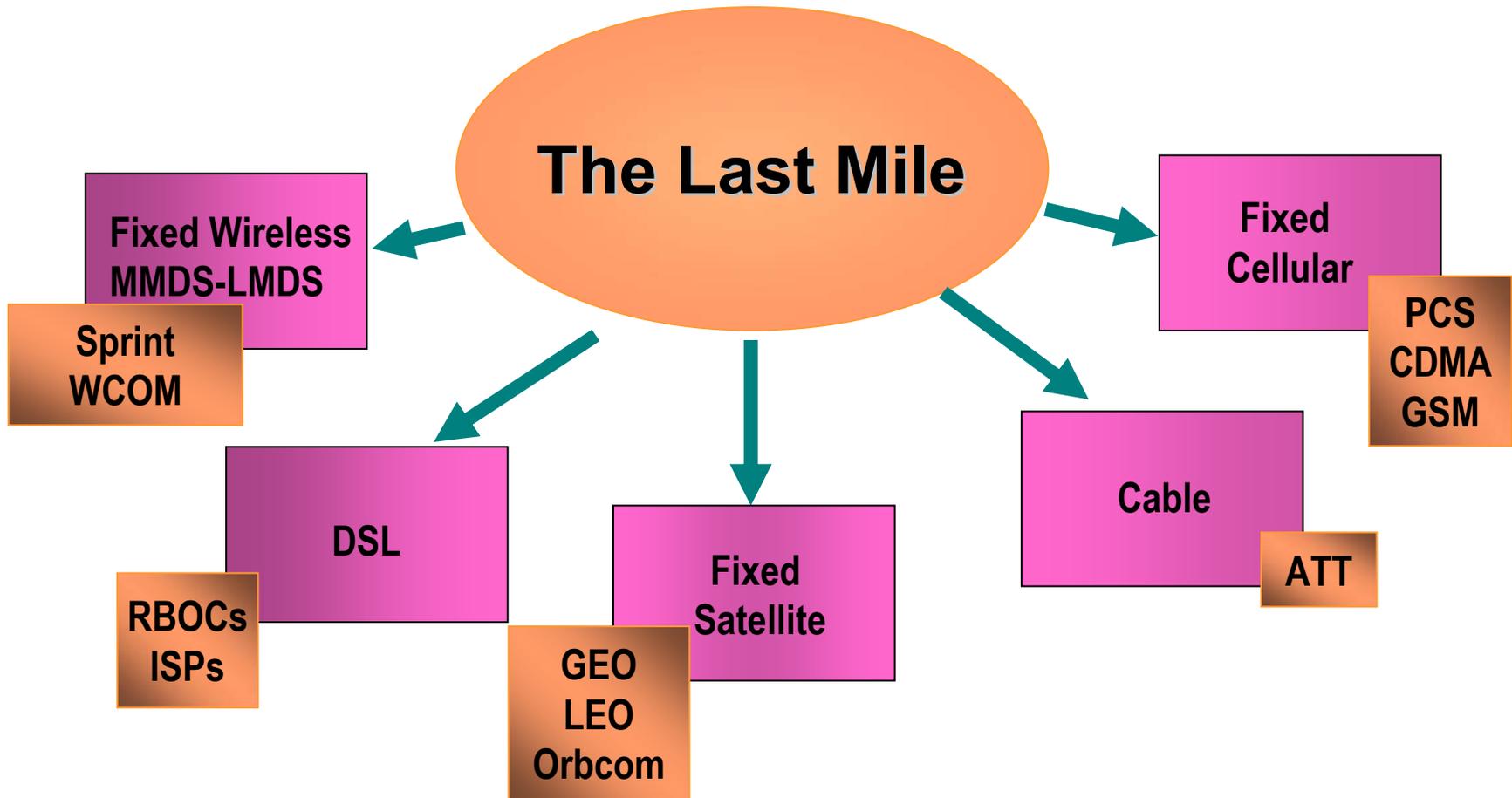


## Objective:

**Balance power purchase price risk with options to meet demand**

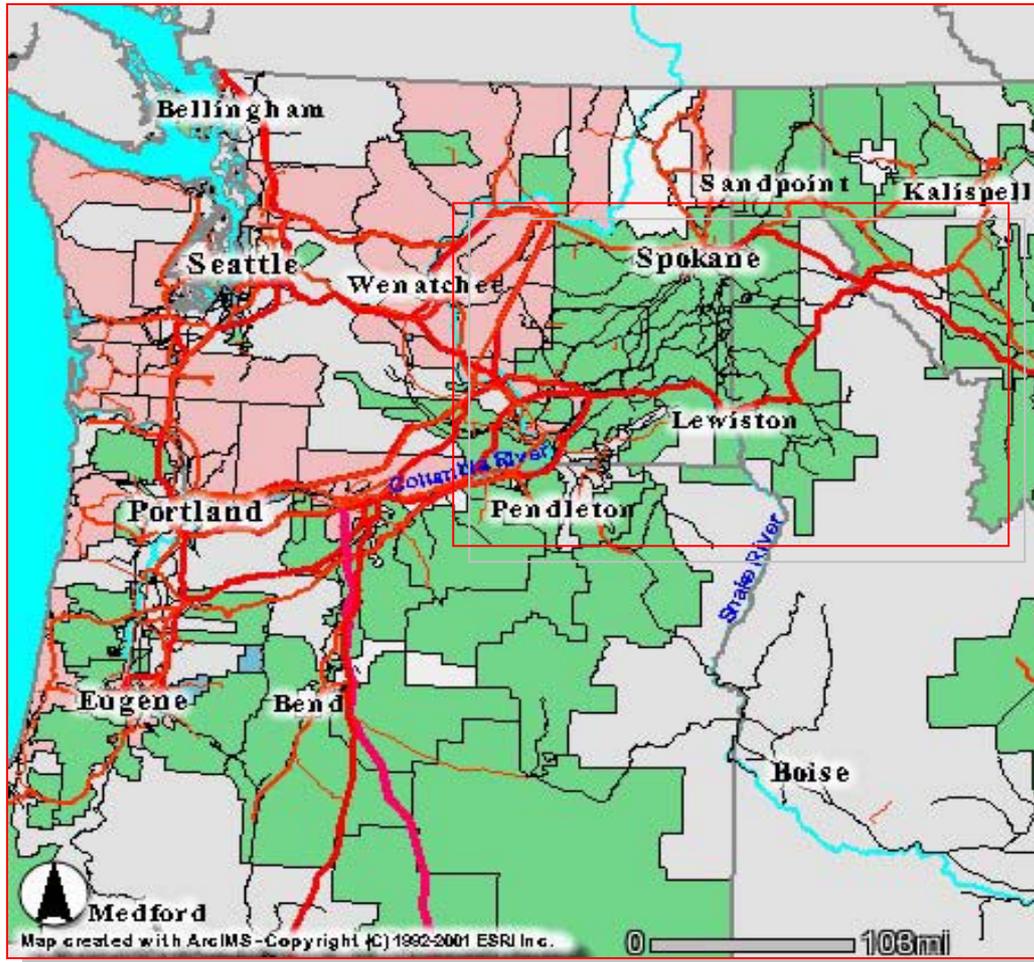
**The**  
**DEMAND EXCHANGE**  
*The Power of Customer Choice™*

## Communications in the Energy Web





## Energy Web and GIS



- Graphic view of real-time distributed energy operations.
- User selectable data layers.

## Terry Oliver, *BPA Energy Efficiency*

**Click here to view movie**



**Steve Hickok, *BPA Chief Operating Officer***

**Click here to view movie**



*Angus Duncan, Executive Director,  
Bonneville Environmental Foundation*

**Click here to view movie**



**Jack Robertson, *Former BPA Deputy Administrator***

**Click here to view movie**



## Ken Keating, *BPA Energy Efficiency*

**Click here to view movie**





## What is the Energy Web?

- A concept to integrate a diversified mix of resources:
  - Located near the consumer.
  - Environmentally sound.
  - Aggregated by third party or local utility.
  - Bundled utilities or energy services (i.e., electricity, gas, Internet, broadband).



## Energy Web Vision

- Assess how emerging technologies/strategies can benefit our customers.
- Prioritize opportunities.
- Promote research, demonstrations, and projects to reduce barriers to Energy Web implementation.



## **BPA is the Natural Leader for Energy Web Activities**

**Customers/End-Users are not positioned to undertake the investment and planning required of the Energy Web vision BPA should . . .**

- Spread the Energy Web vision across the region.
- Seek customer/organization buy in.
- Prioritize strategies and technologies.
- Seek financial partners.
- Expand from regional to national and international participation.
- Periodically review and revise Energy Web.



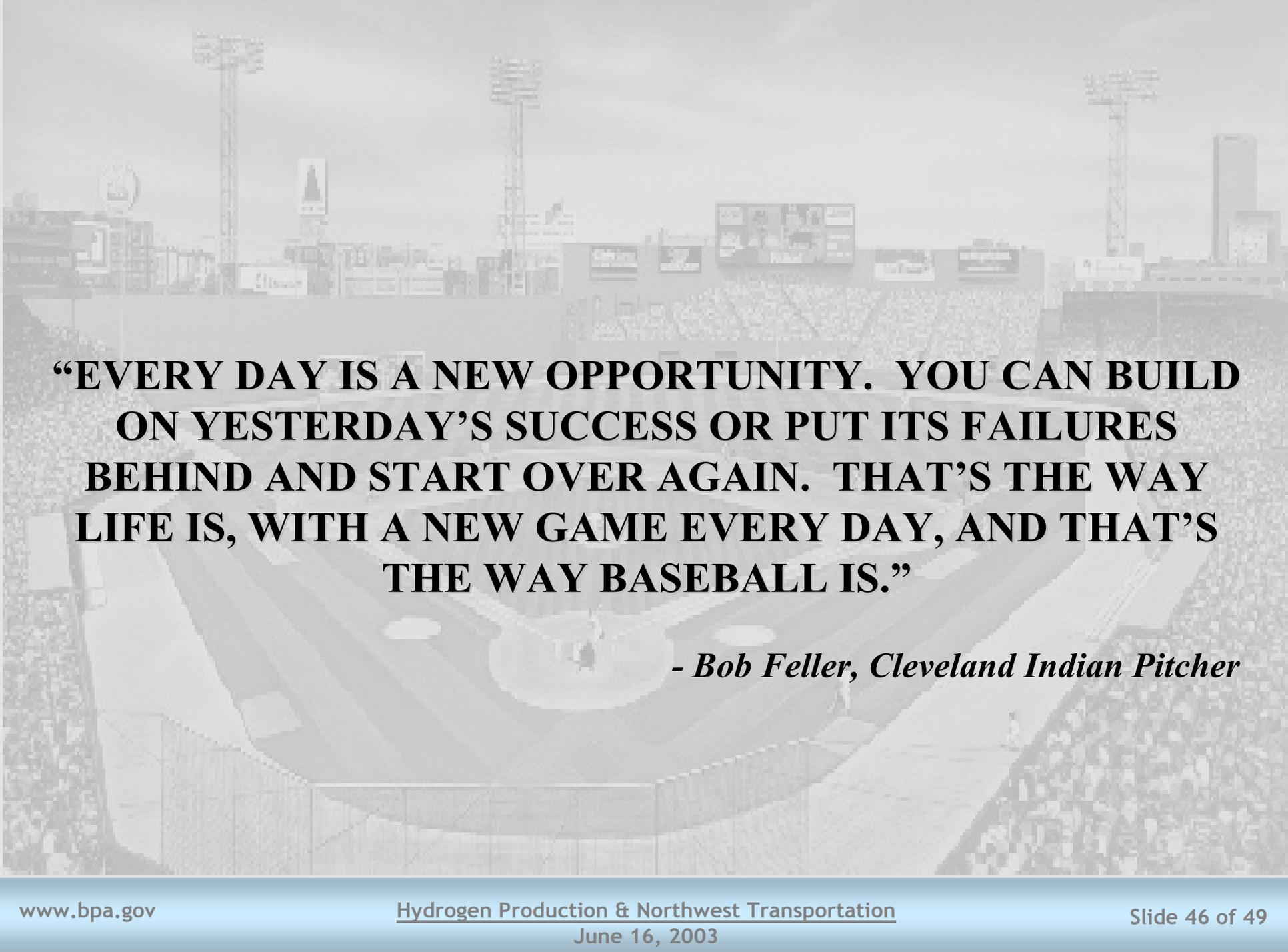
## Energy Web Today

- First field connection of resources will be completed in 2003.
- Some 60 resources in the Northwest are partnering with BPA in this initial roll-out.
- BPA initiative for Non-Construction Alternatives to Transmission will offer opportunities for testing and implementing the Energy Web.
- BPA also providing Energy Web to national initiative of Consortium For Electric Infrastructure In A Digital Society (CEIDS).
- Fuel cells and hydrogen fuel should be an integral part to Energy Web.



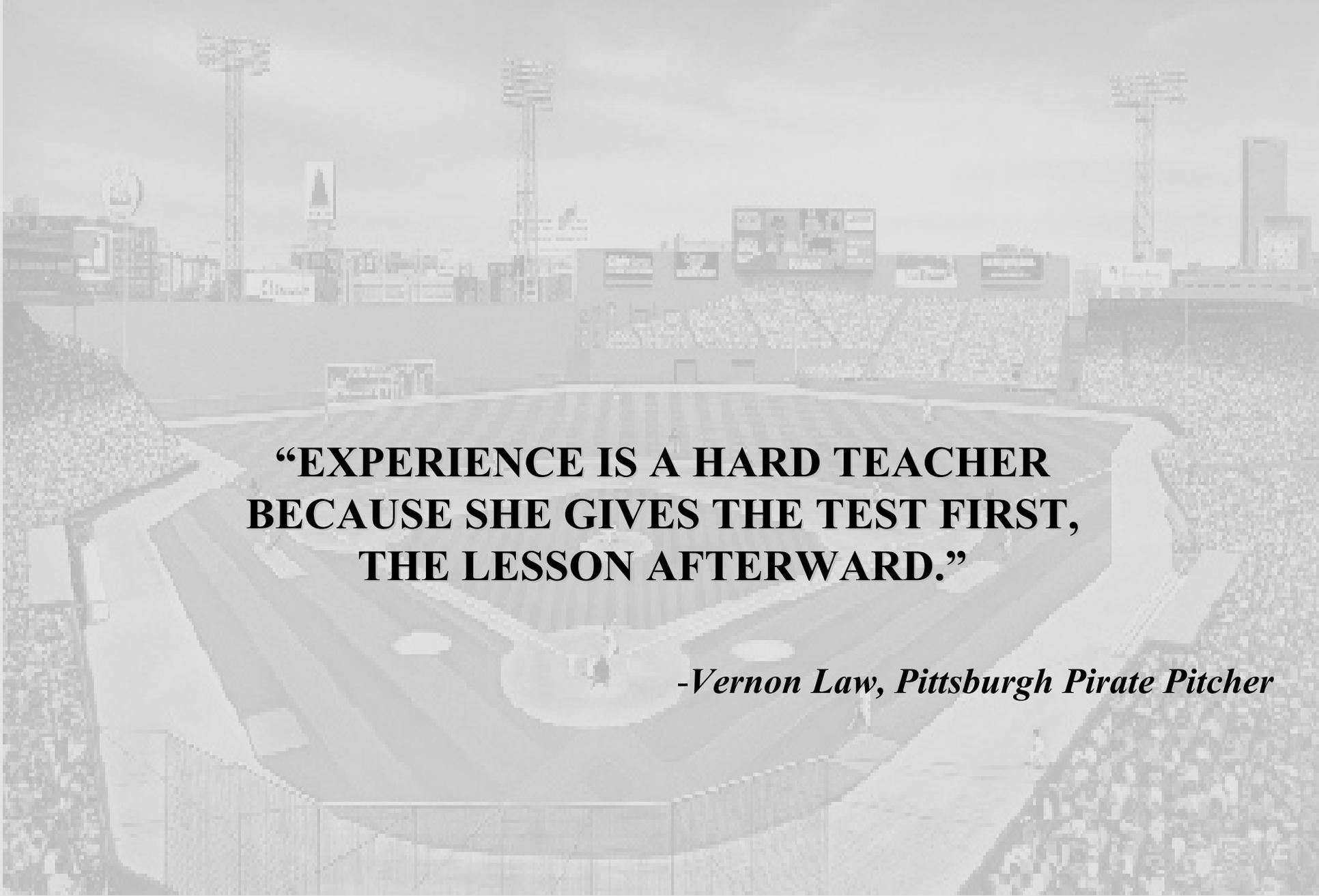
## In Summary

- BPA has a role in exploring emerging technologies in our role as Steward of the Northwest Hydro System.
- Hydrogen and fuel cells will play a critical role as the electric infrastructure evolves in the Northwest.
- BPA can support Transportation applications with hydrogen through our work in the evolving electric infrastructure movement and by partnering on regional hydrogen initiatives.



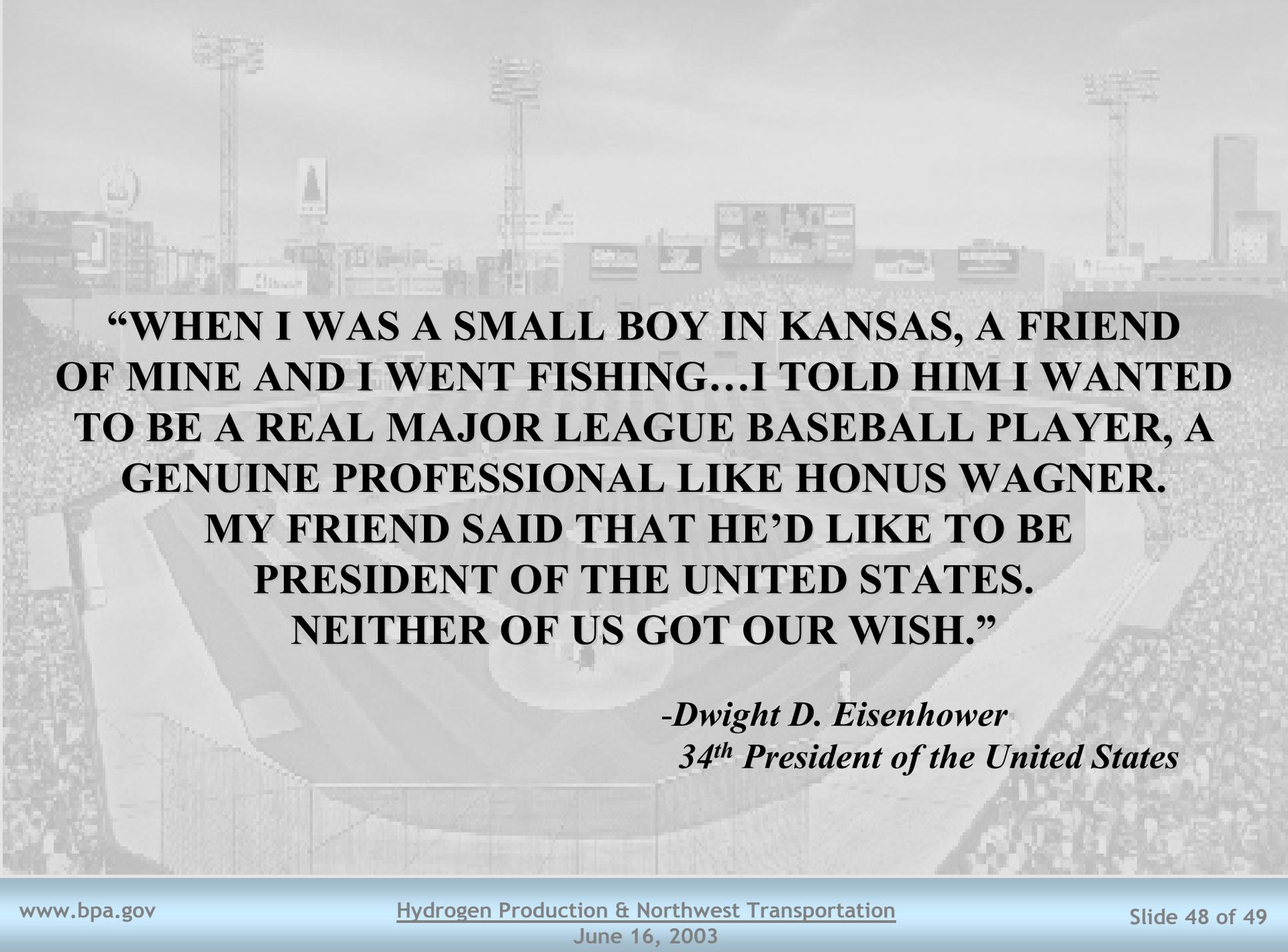
**“EVERY DAY IS A NEW OPPORTUNITY. YOU CAN BUILD ON YESTERDAY’S SUCCESS OR PUT ITS FAILURES BEHIND AND START OVER AGAIN. THAT’S THE WAY LIFE IS, WITH A NEW GAME EVERY DAY, AND THAT’S THE WAY BASEBALL IS.”**

*- Bob Feller, Cleveland Indian Pitcher*



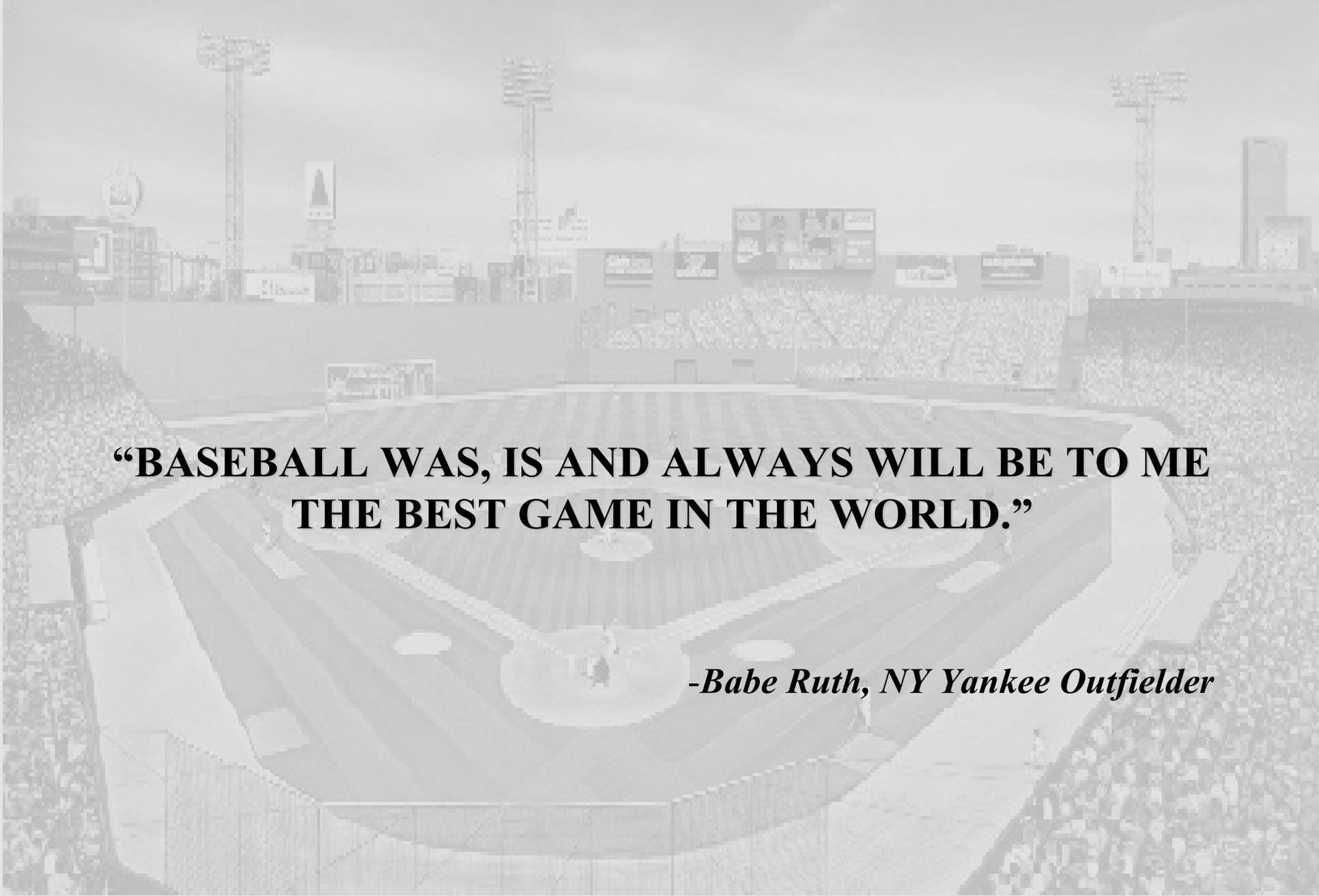
**“EXPERIENCE IS A HARD TEACHER  
BECAUSE SHE GIVES THE TEST FIRST,  
THE LESSON AFTERWARD.”**

*-Vernon Law, Pittsburgh Pirate Pitcher*



**“WHEN I WAS A SMALL BOY IN KANSAS, A FRIEND OF MINE AND I WENT FISHING...I TOLD HIM I WANTED TO BE A REAL MAJOR LEAGUE BASEBALL PLAYER, A GENUINE PROFESSIONAL LIKE HONUS WAGNER. MY FRIEND SAID THAT HE’D LIKE TO BE PRESIDENT OF THE UNITED STATES. NEITHER OF US GOT OUR WISH.”**

*-Dwight D. Eisenhower  
34<sup>th</sup> President of the United States*



**“BASEBALL WAS, IS AND ALWAYS WILL BE TO ME  
THE BEST GAME IN THE WORLD.”**

*-Babe Ruth, NY Yankee Outfielder*