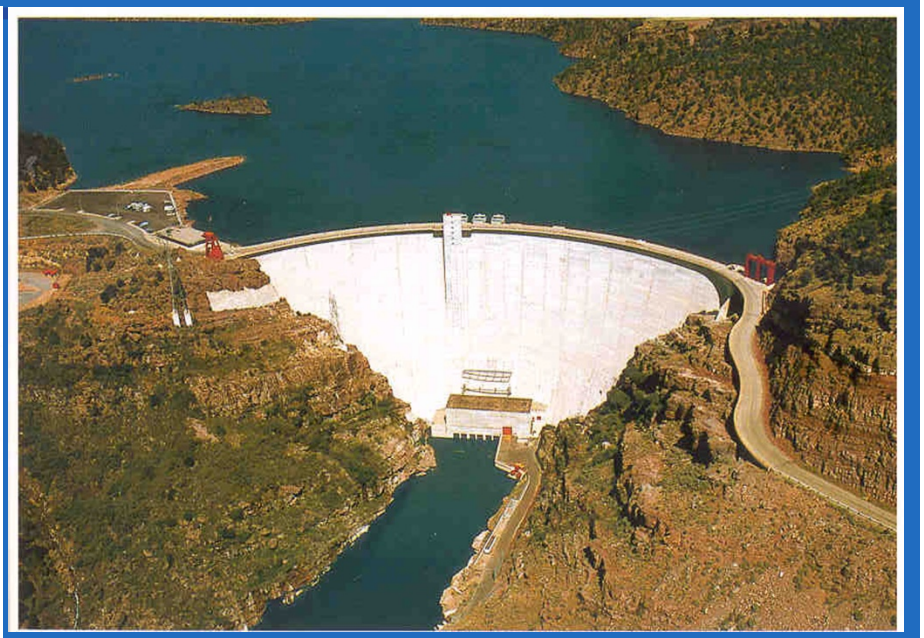
RECLAMATION

Managing Water in the West

Impacts of Lower Lake Levels on Hydropower Production

U.S. Department of the Interior
Bureau of Reclamation

Reclamation Perspective



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Reclamation Overview

- 58 Powerplants
- 194 Units
- 14,876 MW Installed Capacity
- 2nd Largest Hydropower Producer in United States
- 40 Million MWH Annual Average Net Generation
- 3.6 Million Customers
- Approximately 10 Percent of Power in West
- 27 Million Tons of Annual Carbon Dioxide Offset

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Impacts to Hydropower

- **Reduced Lake Levels = Reduced Capacity**
- **Less Storage = Less Energy**

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Reduced Capacity

- Running more units
- Decreased efficiency
- Rough zone operation
- Increased wear and tear
- Increased costs

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Less Energy

- Since 2001
- 13% less average annual energy Reclamation-wide
- 20.5% less average annual energy on the Colorado River System
- Results in more purchase power Reclamation-wide

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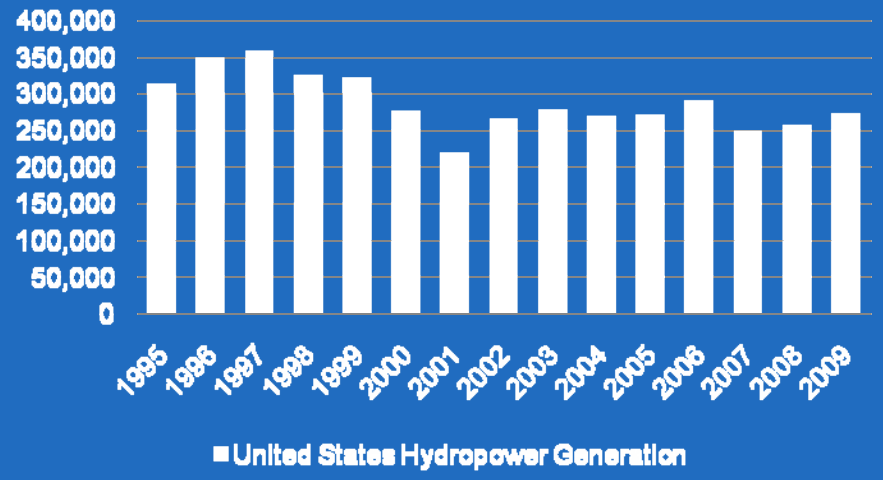
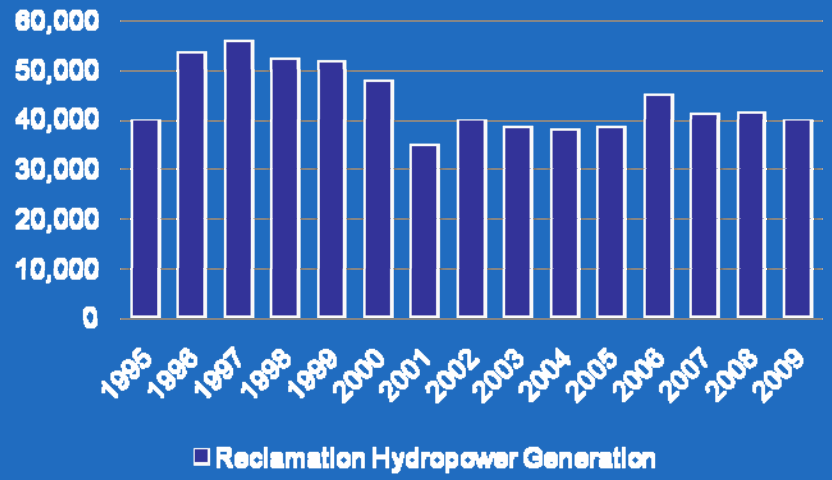
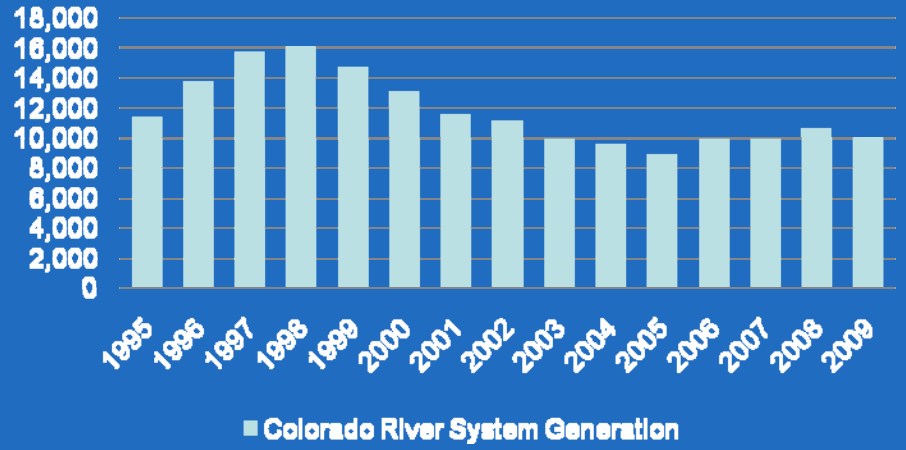
United States Hydropower Generation (GWh)



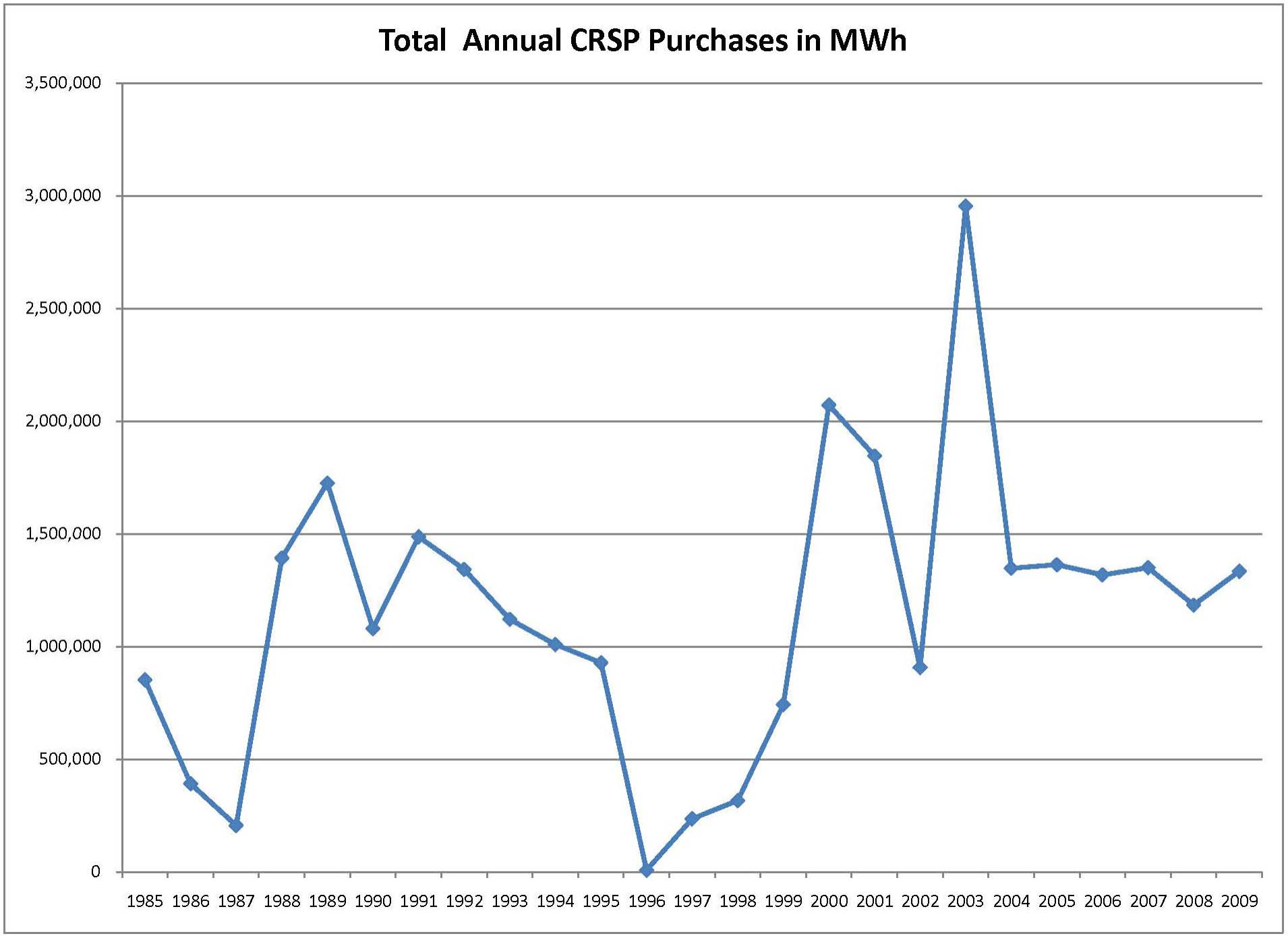
Reclamation Hydropower Generation (GWh)

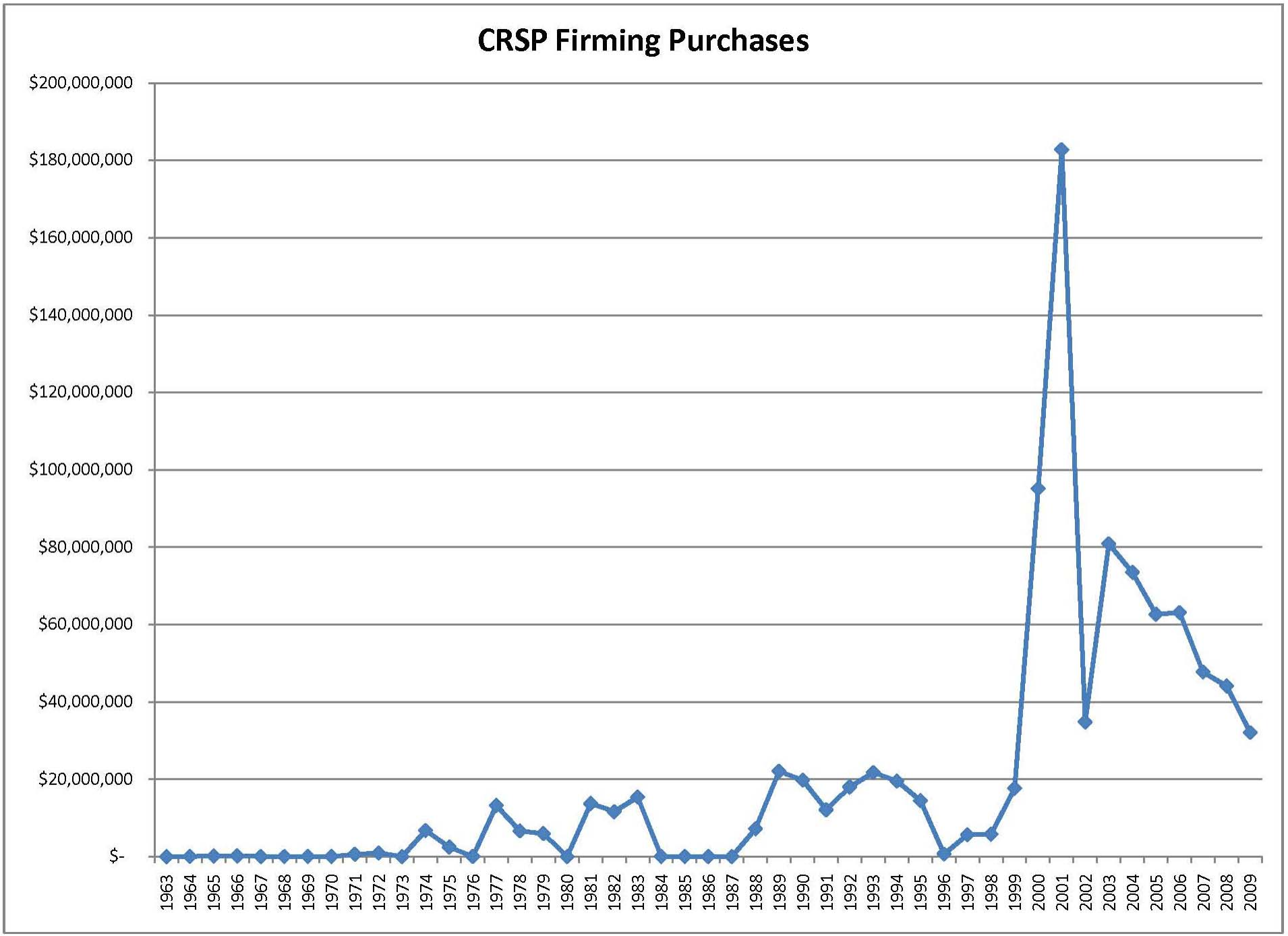


Colorado River System Generation (GWh)



RECLAMATION


Total Annual CRSP Purchases in MWh
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009


CRSP Firming Purchases
$200,000,000
$180,000,000
$160,000,000
$140,000,000
$120,000,000
$100,000,000
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$60,000,000
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Impacts

- Long-term replacements
- Increased annual O&M
- Approximately 36 million customers
- Increased rates
- Increased use of carbon based fuels

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What are we Doing

More Efficient Turbines

- Flaming Gorge
- Glen Canyon
- Hoover
- Grand Coulee

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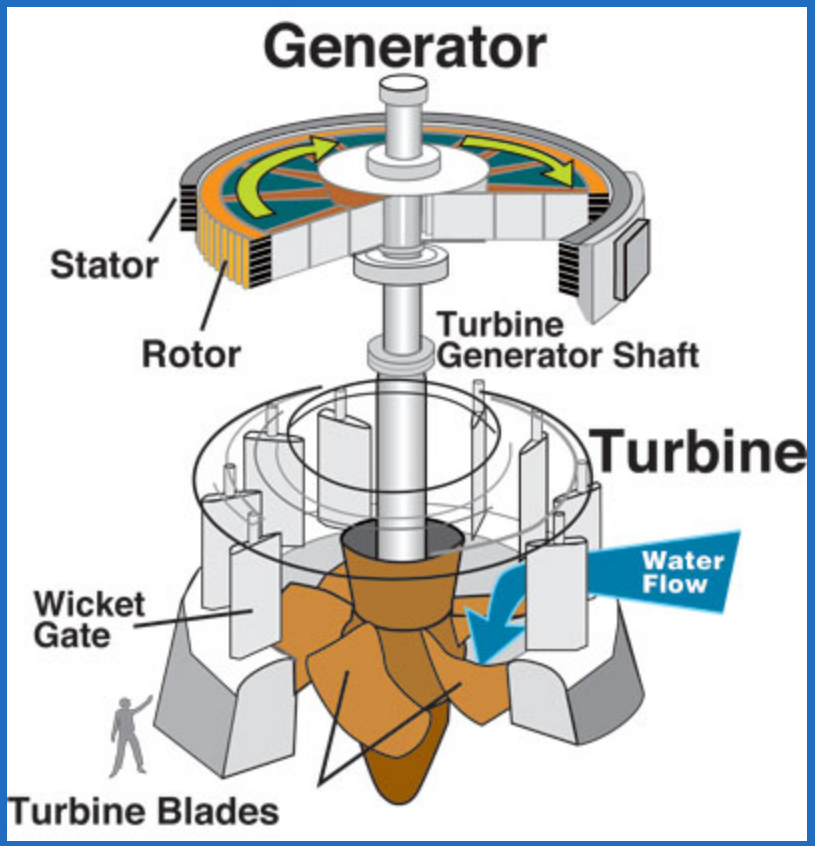
What are we Doing

More Efficient Water Control

- **Hoover**
- **Glen Canyon**
- **Flaming Gorge**



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What are we Doing

- New hydropower
- Nation-wide potential
  - 250,000 Megawatts new small hydro
  - 63,000 Megawatts retrofits
  - 34,000 Megawatts pumped storage
  - 16,000 Megawatts efficiency improvements

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Other Hydropower Development at Reclamation Facilities

- 71 private power plants have been added to Reclamation dams and canals through specific legislation, Lease Of Power Privilege, or FERC Licenses
  - Potential for more

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Secretary Salazar's New Energy Frontier

- Increase the potential for production and transmission of renewable resources on Department of the Interior managed areas, while protecting and enhancing the Nation's water, wildlife, and other natural resources

- At least 10,000 megawatts by 2012

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Memorandum of Understanding DOI/DOE/DOA

- To help meet the Nation's needs for reliable, affordable, and environmentally sustainable hydropower by aligning ongoing and future renewable energy development efforts between DOE, DOI and U.S. Army

- Signed March 24, 2010

RECLAMATION

Memorandum of Understanding

- Federal Facility Energy Resource Assessment
- Integrated Basin Scale Opportunity Assessments
- Green Hydropower Certification
- Work with environmental community
- Federal Inland Hydropower Working Group
- Technology Development and Deployment
- Renewable Energy Integration and Energy Storage
- Regulatory Process

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Hydropower Resource Assessment

- New Hydropower at non-powered dams and other structures
  - Reclamation is conducting a study to quantify the potential at 530 identified sites
  - Completion scheduled October 2010
- Uprate and Efficiency Gains at Existing Facilities
  - Will quantify the potential at Reclamation's 58 hydropower plants
  - Completion scheduled October 2010
- Hydropower Plant Optimization
  - Optimization System implemented at Grand Coulee
    - 45 MW average increase in generation, $17 million annual benefits
  - Beginning to look into opportunities at all Reclamation hydropower plants
    - 1-2% efficiency gains expected, 16.2 MW increase

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Thank You!

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Power Resources Manager

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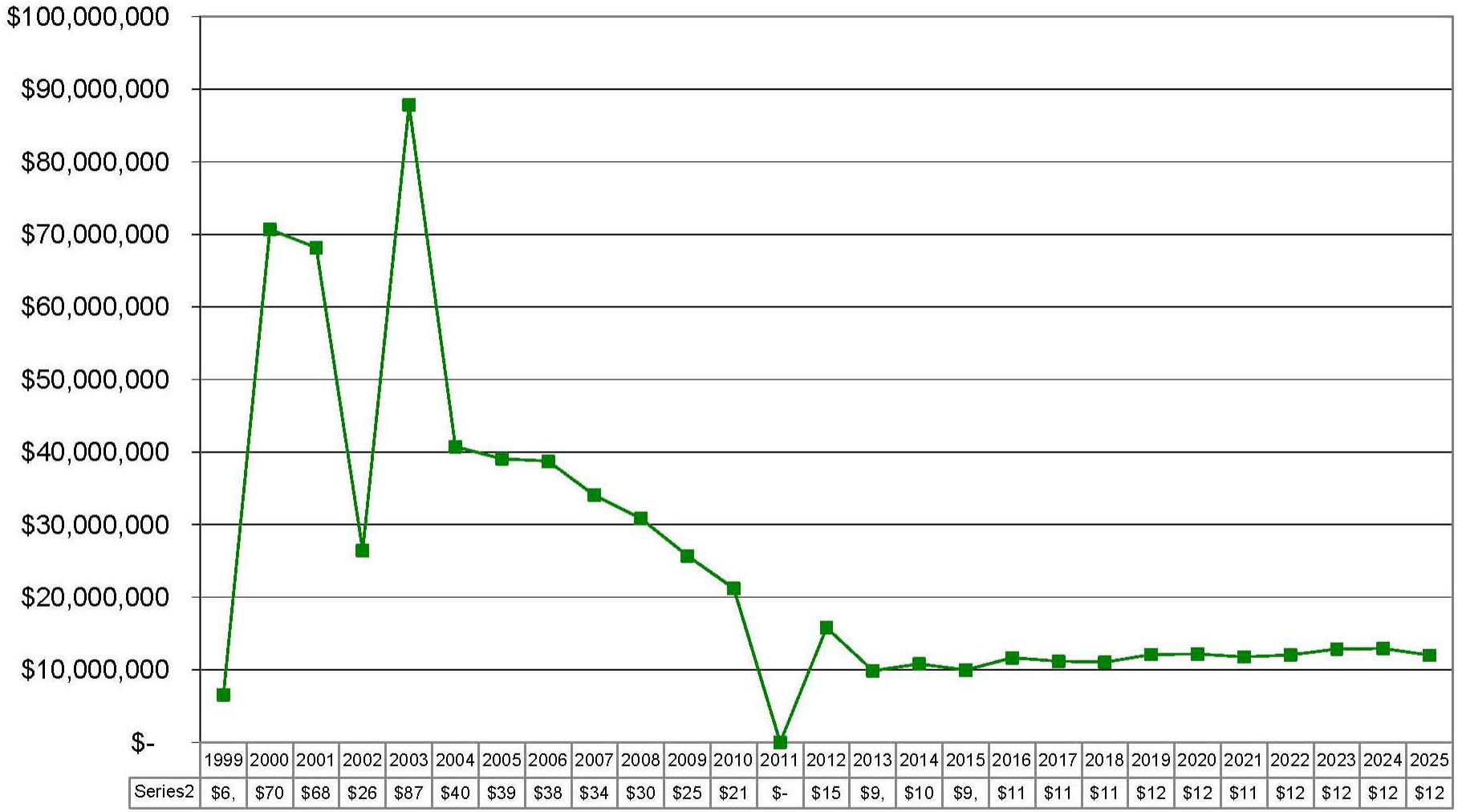
SLIP Historical and Estimated Firming Purchases



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Series2	$6,	$70	$68	$26	$87	$40	$39	$38	$34	$30	$25	$21	$-	$15	$9,	$10	$9,	$11	$11	$11	$12	$12	$11	$12	$12	$12	$12

Dollars