ReiterIWS Key Projects

Fundamentally rethinking Seattle's water, energy and solid waste systems



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Electrical Resource Management

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Seattle – Three Crises, Three Opportunities & Three Sustained Success Stories over 25+ Years



Presented at the 5th COF Conference
Sydney February 9, 2015

By Paul Reiter, ReiterIWS

Chapter One

The Showdown Over the City's Supply of Electricity and the Emergence of the DSM Powerplant



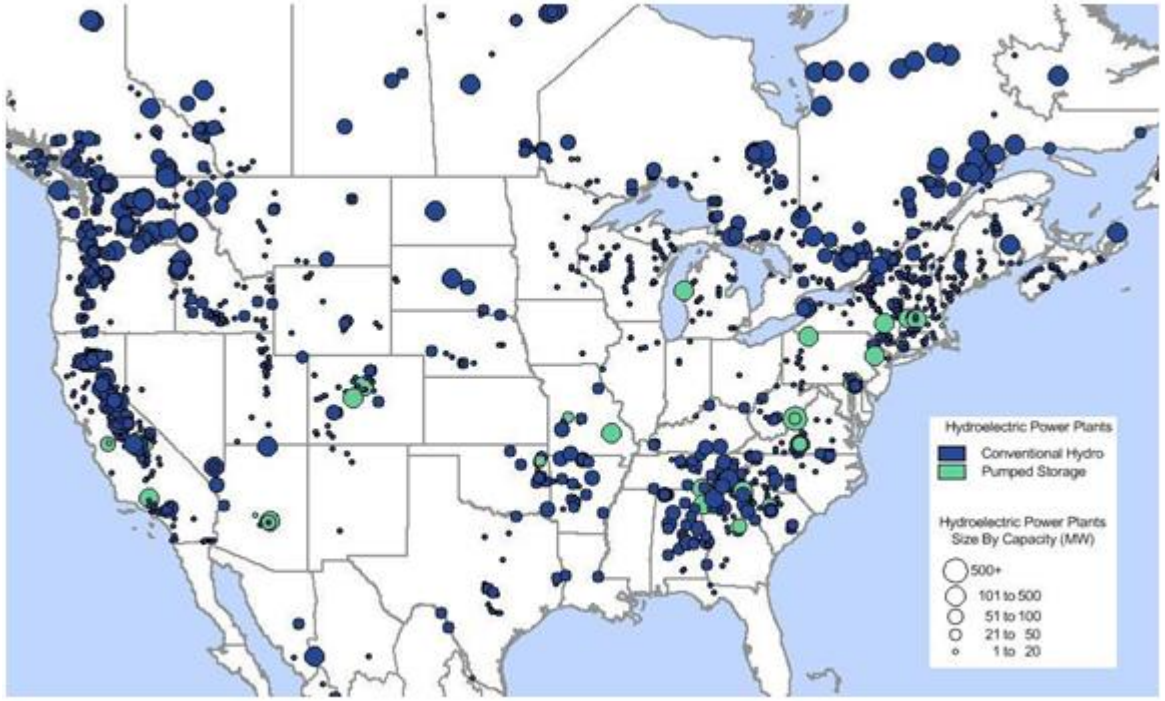






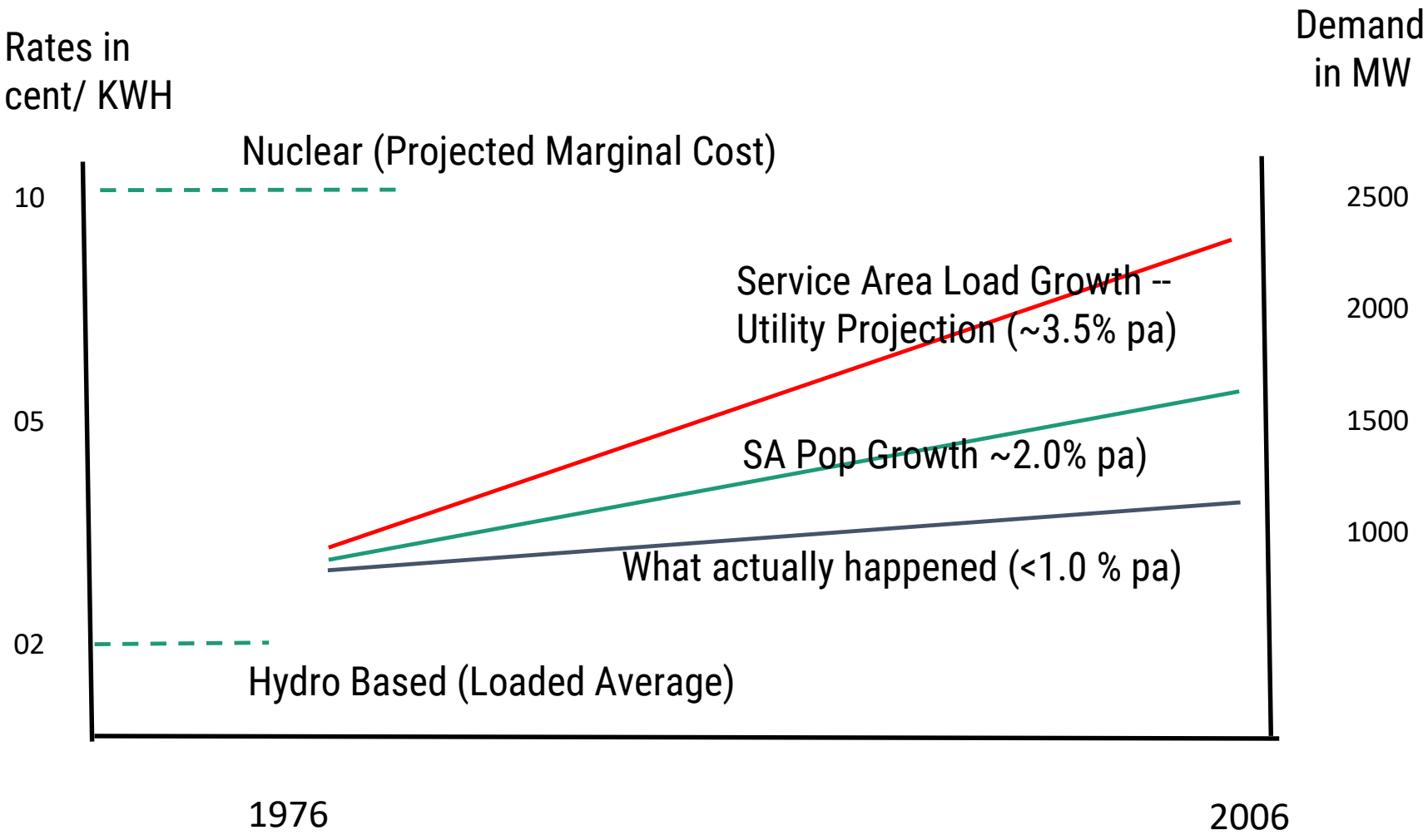


Hydroelectric generators in and around the United States



Source: U.S. Energy Information Administration, derived from Energy Velocity

Seattle's Electrical Supply Dilemma in the Late 1970's



Seattle City Council rejects nuclear power in favor of conservation on July 12, 1976.

On July 12, 1976, the Seattle City Council votes not to participate in two nuclear power plants and passes five resolutions adopting conservation as a long-term energy strategy. Mayor Wes Uhlman (b. 1935) and Seattle City Light Superintendent Gordon Vickery (1920-1996) want Seattle to purchase a 5 percent share of Washington Public Power Supply System's (WPPSS) Plants 4 and 5, but the council believes this to be too expensive. The council chooses to meet load growth with conservation as recommended in a study titled *Energy 1990*.

From Ever-increasing Exploitation to Conservation

In the late 1960s, Seattle City Light planned to meet load grow
hydroelectric dams and with power generated by thermal sourc
publicly-owned utilities in the Northwest, launched constructic
Hanford and Satsop, Washington. The member utilities were ir
power generated in exchange for shares of the cost.

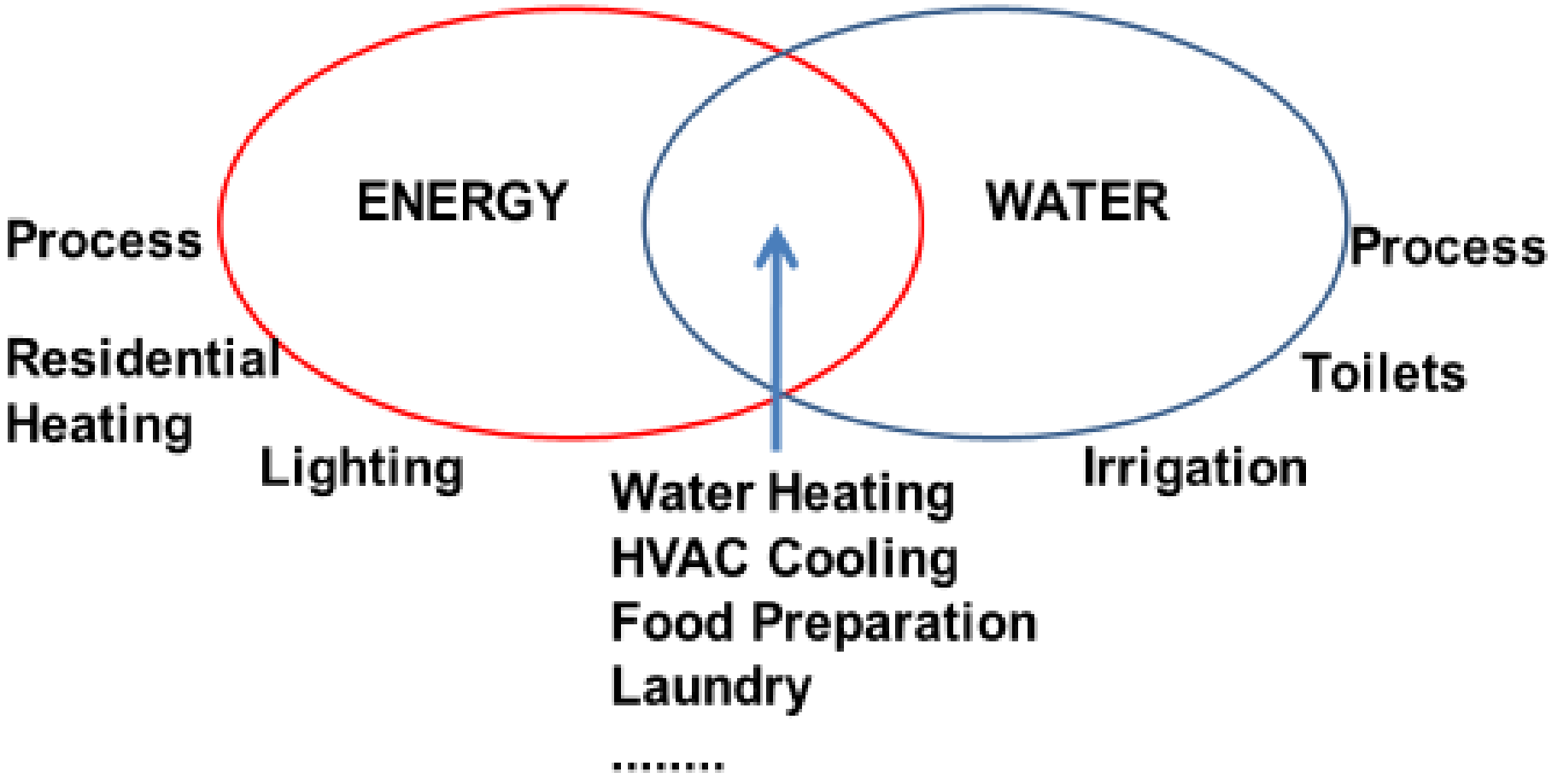


Councilman Jim Miller: *"The heart of the matter can be stated in two sentences. It cost too much. We don't need it". Later WPPSS cancels construction of all the plants because of astronomical cost overruns and project demanded did not materialize. The agency defaulted on 2.25 billion in bonds.*

Steps

- Long term (20 year) commitment to make conservation the exclusive source of supply (late 70's) – City Council action
- Commitment has continued to be renewed through the present
- "Energy 1990" study was the ground breaker (not done by the utility)
- Utility Challenge: make conservation a reliable, cost effective long term source of supply – in effect, a DSM power plant
- Key Tool: Conservation Potential Assessment which laid out a set of measures packaged into programs
- Conservation supply curve and strategy followed
- All accompanied by a complete rethink on rate principle and structures

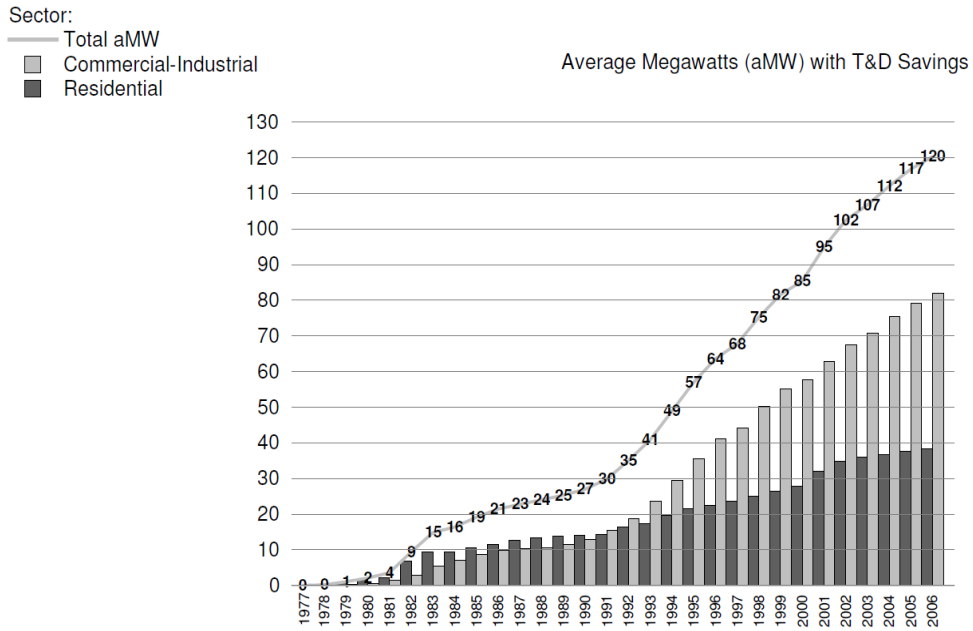
Cross-Walk Between Energy and Water Efficiency Measures

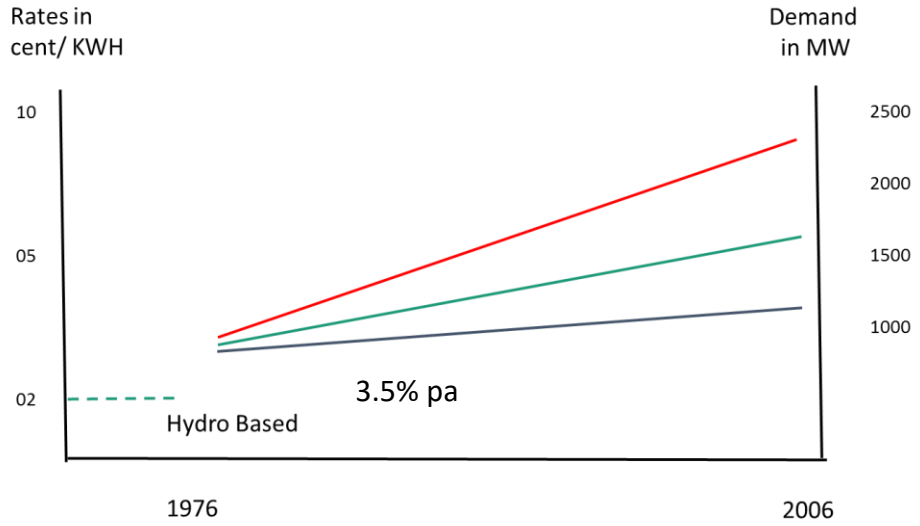


Results

Figure 6

Programmatic Load Reduction in Each Year
From Completed Projects





Actual ~0.8% pa

FACTS OF 2006

- Reduced system load 120 MW/yr (11%)
- Program participants have saved >$600 million through lower bills
- Rate per kWh 22% lower than national avg – 6.2 c/kWH vs 7.98 c/kWh
- CO2 reduction in 2006 is equal 1 in 3 cars in service area not used

Figure 1

RESIDENTIAL ENERGY SAVINGS

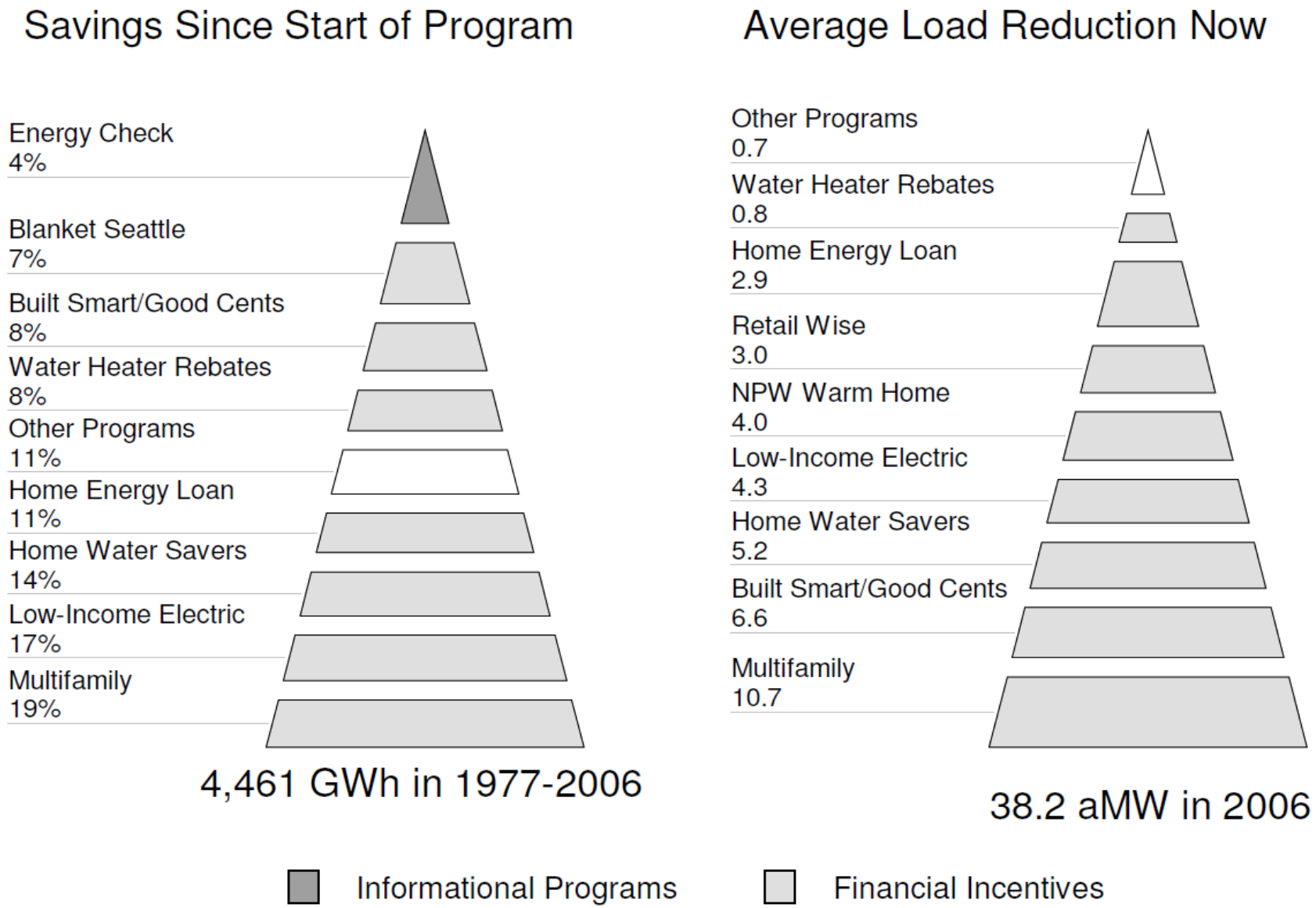
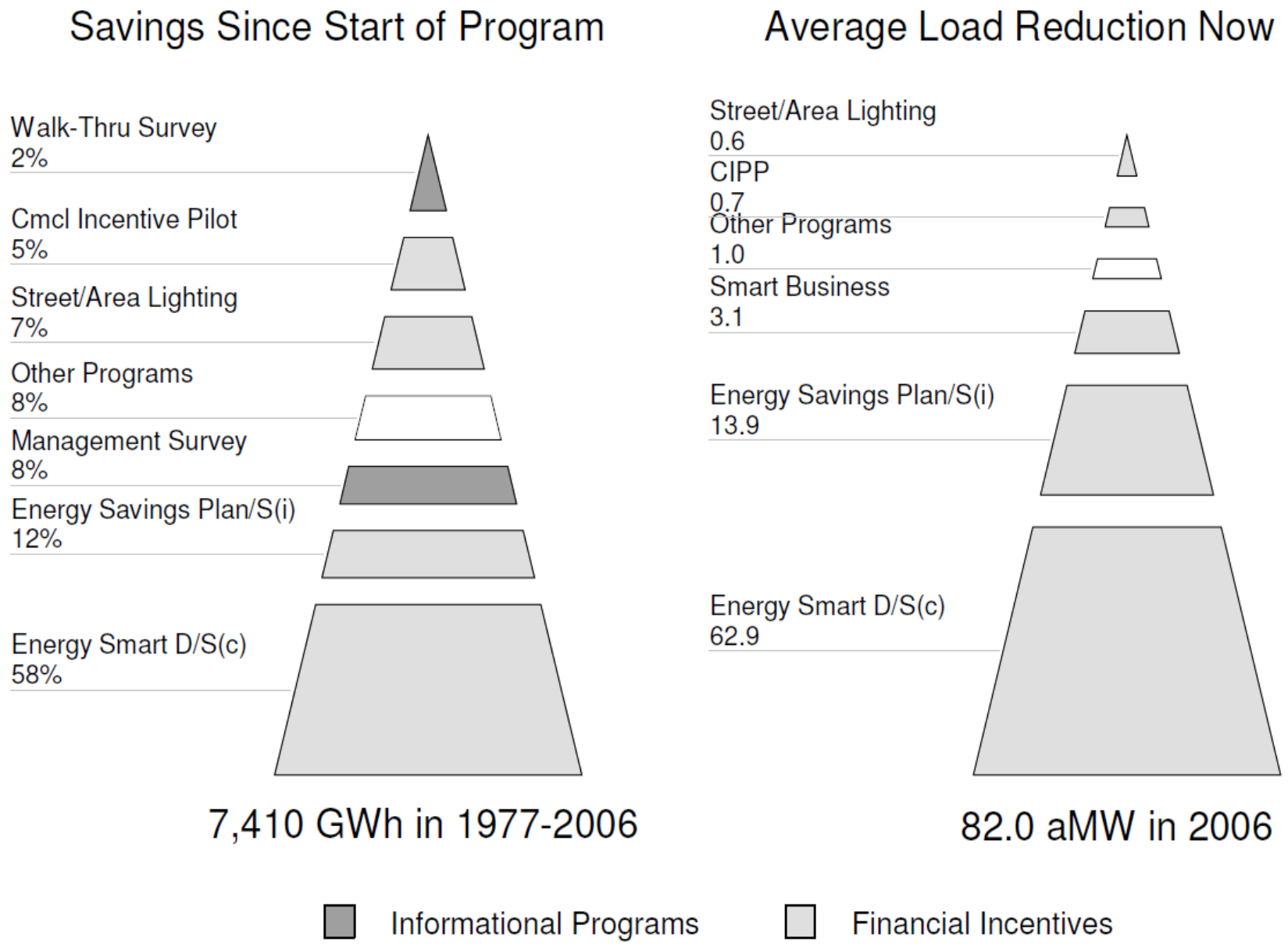


Figure 2

COMMERCIAL–INDUSTRIAL ENERGY SAVINGS



Chapter Two

Turning a Superfund-Grade Waste Disposal Nightmare into a City-Wide Resource Recovery Machine

10 Years On …1986

- The City's 2 landfills are shutting down
  – declared "Superfund Sites" by the USEPA
- The City has three choices:
  1. Sign a 40 year agreement for alternative landfill option
  2. Build an incinerator
  3. Take some big risks and pioneer large scale recycling
- Emboldened by City Light's success, Seattle chooses Option 3 and opts for:
  - For a comprehensive MSW program with aspirations for an overall recycling rate of 60% and extensive community outreach/education
  - Construction of a small landfill in an arid area
- Key members of the City Light team are recruited and a Recycling Potential Assessment framework/model is developed
- Following this planning, the entire solid waste system of the City is entirely revamped (in stages) beginning in 1989

Steps

- The City initially works with residential franchise hauler to retool.
- Recycling is now “free”. Disposal becomes “expensive”
- All residential customers get bins and small disposal cans – yard waste is segregated and composted by law
- The City builds a small long-haul landfill in Eastern Washington and pioneers new approaches to transportation
- The City takes over the formerly-private commercial haulers, introducing a franchise system akin to residential (=lower cost + new recycling opps)
- Over time (20 years), bit-by-bit, disposal of recyclables are banned
- Food waste is added as a source separated stream and composted

Results

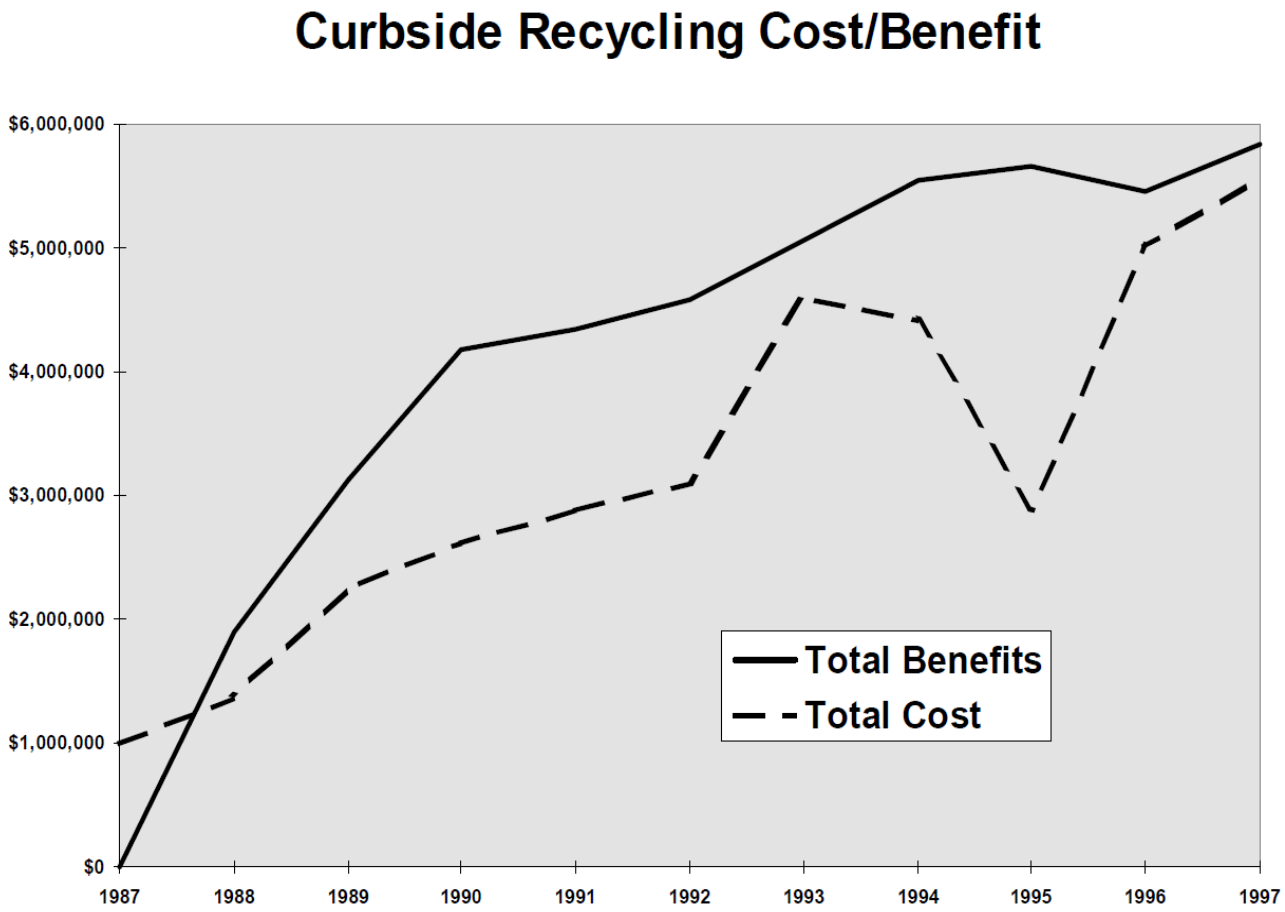
Table 1 Recycling Rates All MSW Sectors 2000-2013

	Residential					
Year	Single Family	Multi Family	Res Total	Self Haul	Commercial	Overall
2000	58.0%	17.8%	47.8%	17.2%	41.6%	40.0%
2001	57.0%	22.0%	48.5%	17.8%	39.6%	39.3%
2002	57.5%	21.5%	48.3%	18.1%	40.7%	39.7%
2003	57.5%	22.2%	48.4%	18.1%	37.3%	38.2%
2004	58.9%	22.2%	49.4%	18.8%	42.5%	41.2%
2005	61.4%	25.2%	52.1%	19.2%	46.6%	44.2%
2006	64.0%	26.3%	54.3%	18.8%	51.7%	47.6%
2007	64.8%	27.6%	55.1%	19.2%	52.5%	48.2%
2008	65.4%	28.3%	55.9%	18.4%	54.7%	50.0%
2009	68.7%	27.0%	58.4%	16.7%	54.9%	51.1%
2010	70.3%	29.6%	60.3%	13.5%	58.9%	53.7%
2011	70.5%	28.7%	60.2%	13.1%	61.4%	55.4%
2012	71.1%	32.2%	61.0%	12.5%	61.4%	55.7%
2013	70.8%	34.3%	60.9%	12.2%	62.9%	56.2%
2015 Goal	75.4%	42.5%	66.9%	32.9%	63.4%	60.0%

Beginning at a recycling rate in 1989 of 28% for some sectors, by 2010 the system achieved the City's 60% goal for residential and probably will achieve a system wide 60% average in the next couple of years.

Results

Figure 2



The curbside recycling program has been cost-effective relative to disposal or incineration within a year from its inception approximately 25 years ago. Courtesy of Jenny Bagby

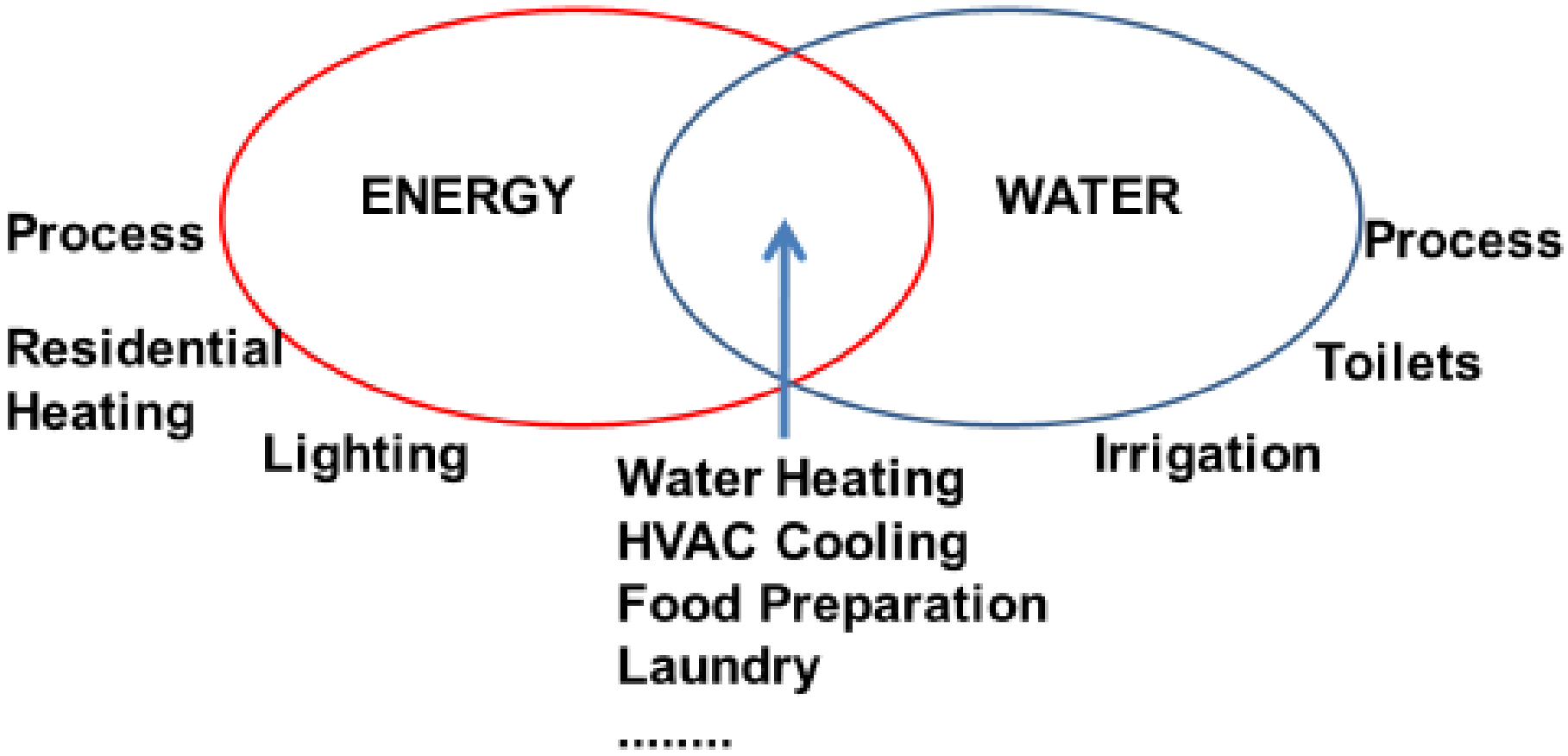
Chapter Three

Creating the Capacity to Provide 50 Year Security for Water Supply for Fish and People Without Building New Facilities

14 Years On …1990 And Now It's Water

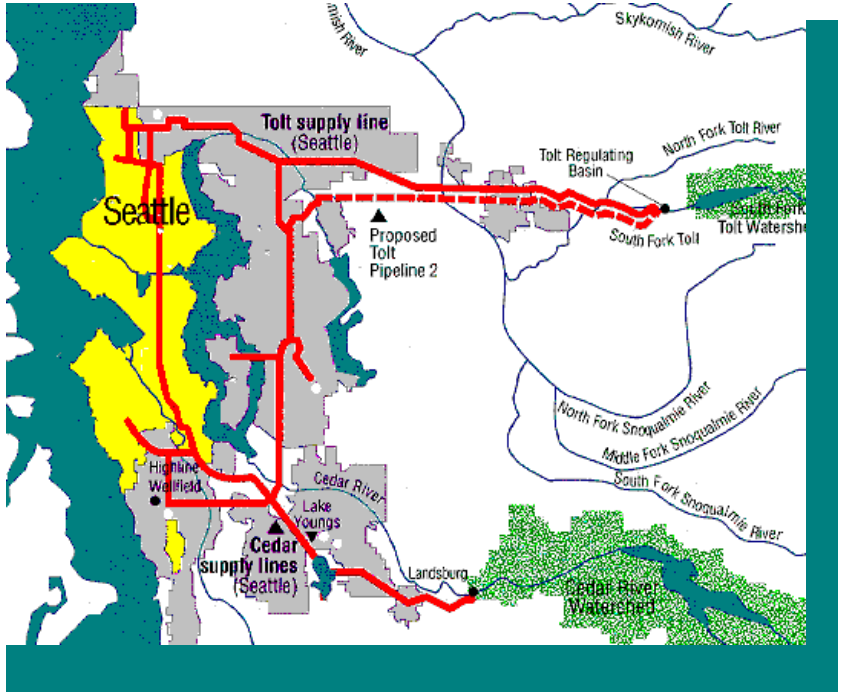
- Lots of growth in the suburbs which Seattle serves
- Very big fights between in-city and suburban perceived needs
- No practical ways to add new storage
  – huge citizen opposition
- In addition, practically no ground water
- The City had three choices:
  1. Take all the experience from City Light's very successful conservation programs and apply the concepts and techniques to water supply
  2. Team up with neighboring jurisdiction who had excess supply but had seismic reliability challenges
  3. Continue to hope that some miracle would produce a new conventional source
- Building on the City Light's success, Seattle chooses Option 1 and opts for:
  - For a comprehensive and aggressive conservation program called "1%"
- Key members of the City Light team and recycling team are reconstituted at Seattle Water and a Water Conservation Potential Assessment framework & model is published in 1997
- Following this planning, and with a lag in acceptance in the suburbs, a very effective program begins to be enacted

Cross-Walk Between Energy and Water Efficiency Measures

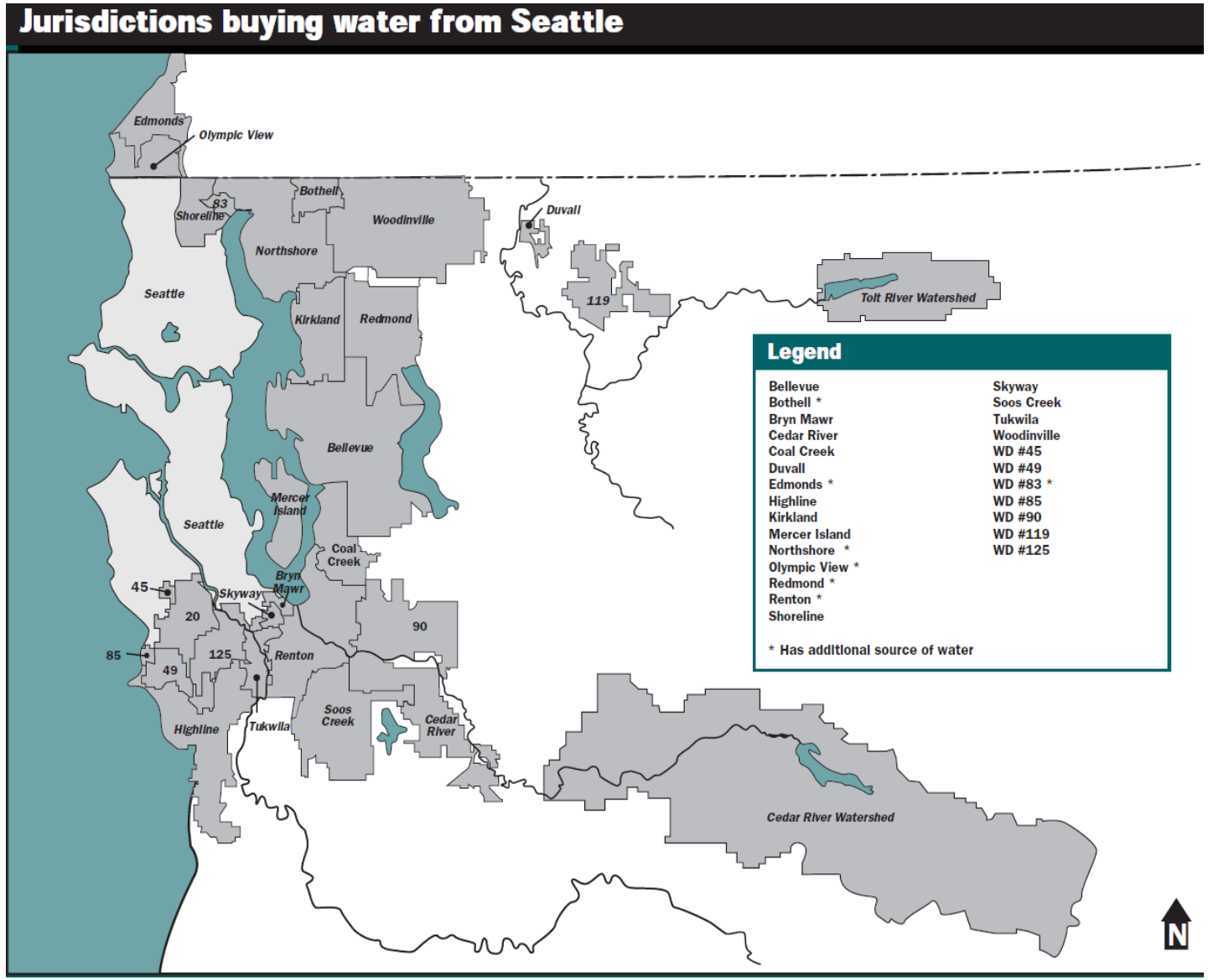


Watersheds

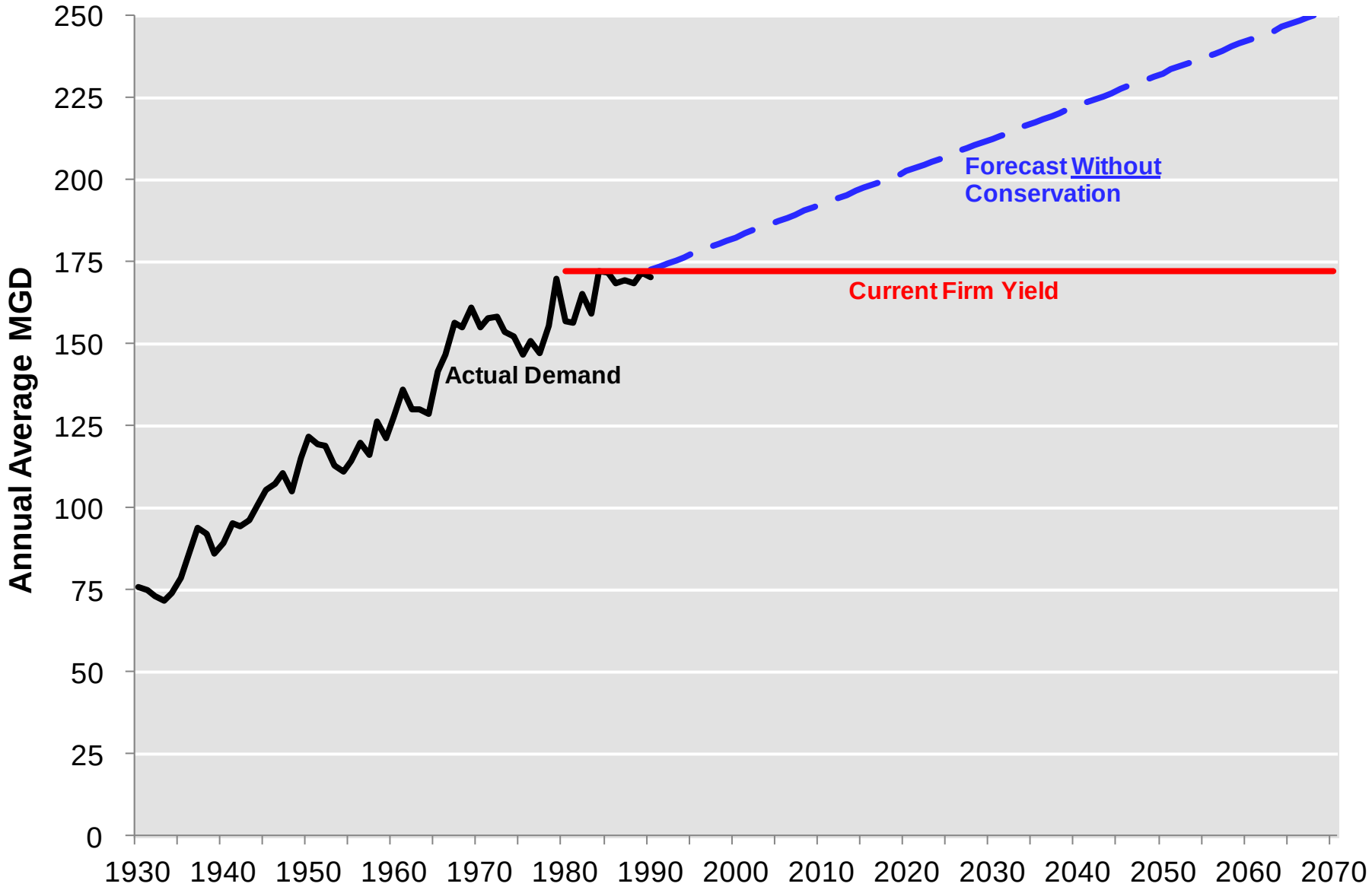
- Water primarily from Cedar and Tolt Rivers in Cascade Mountains



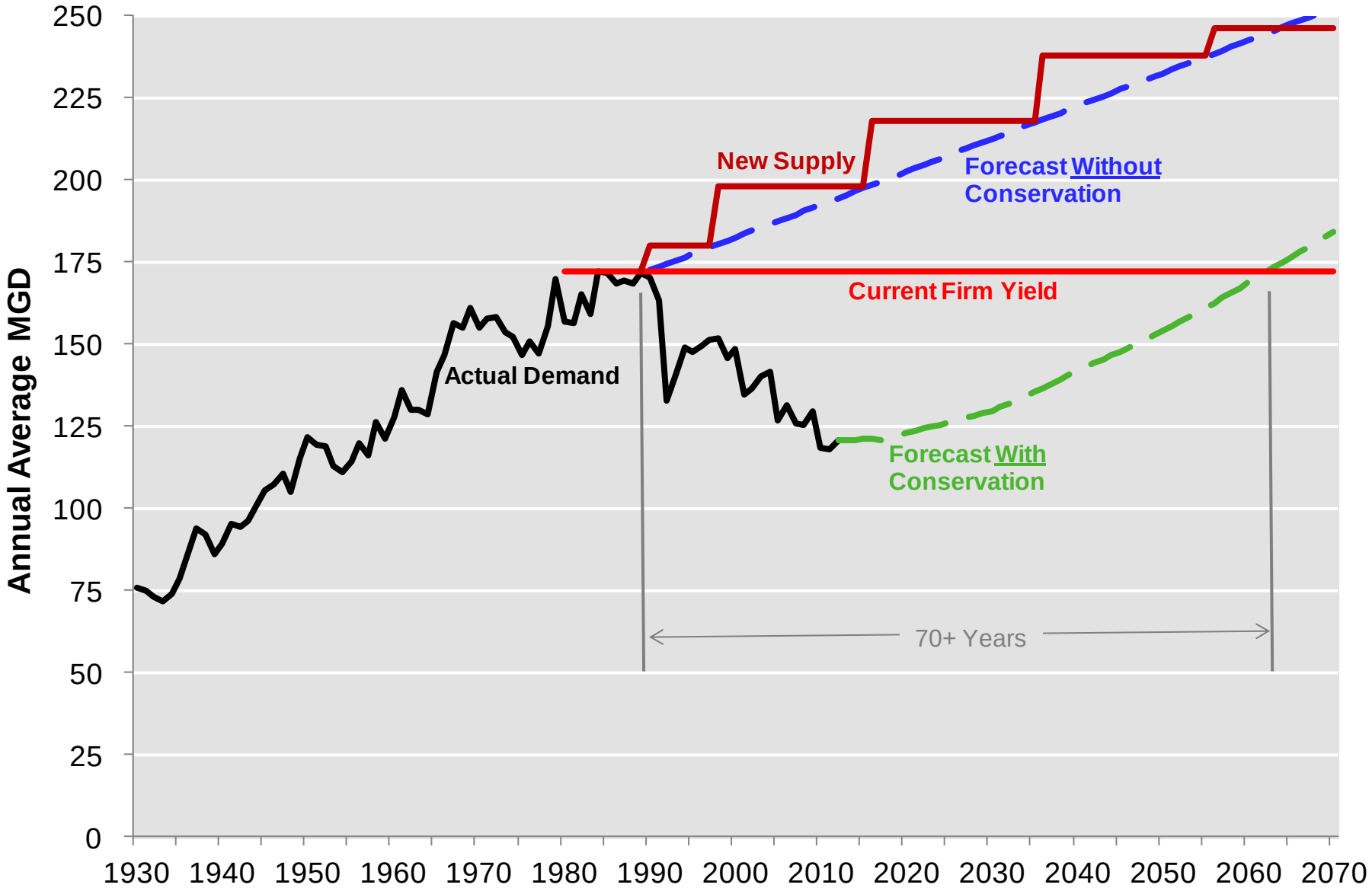
Jurisdictions buying water from Seattle



Conservation Vs. New Supply

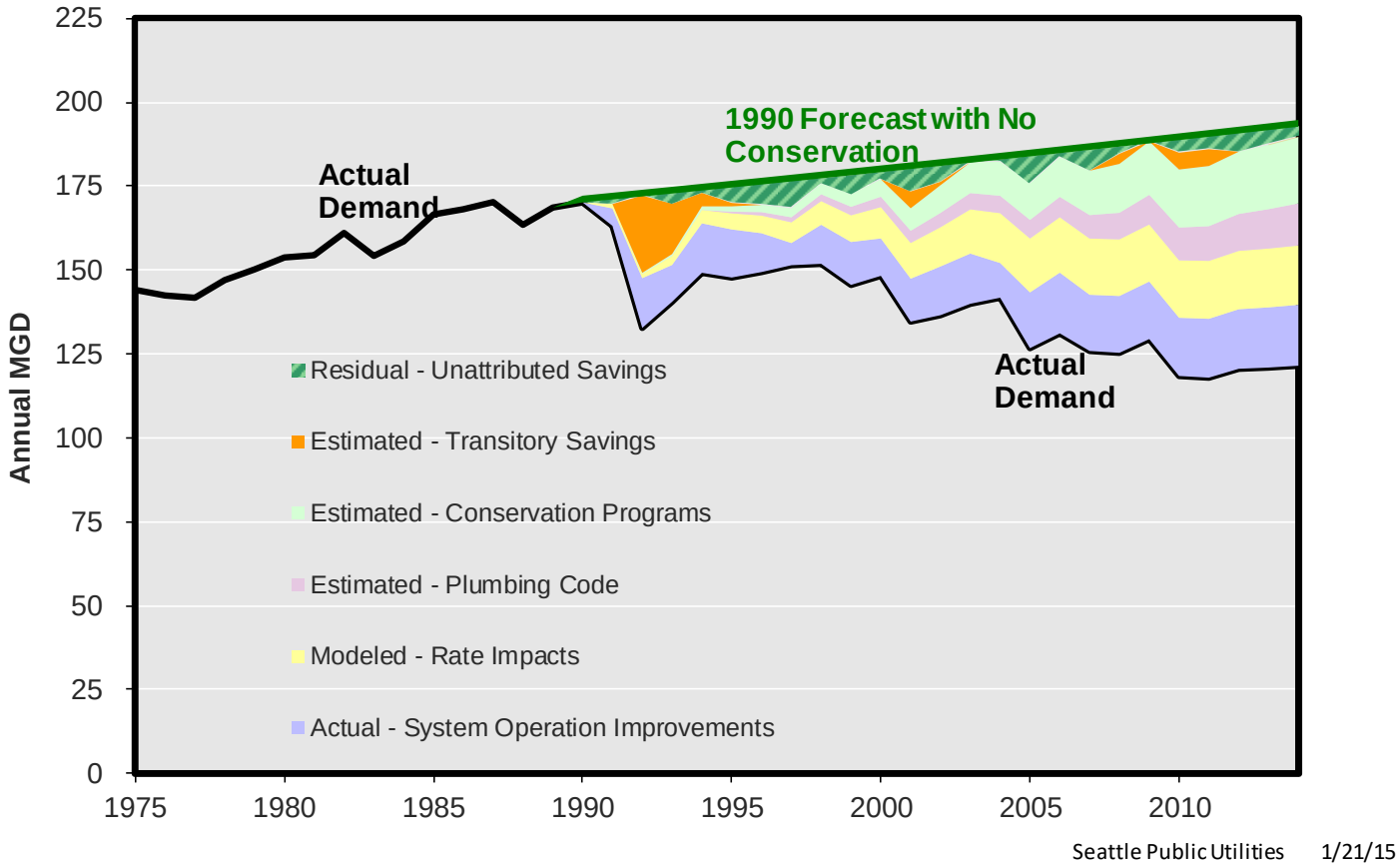


Conservation Vs. New Supply



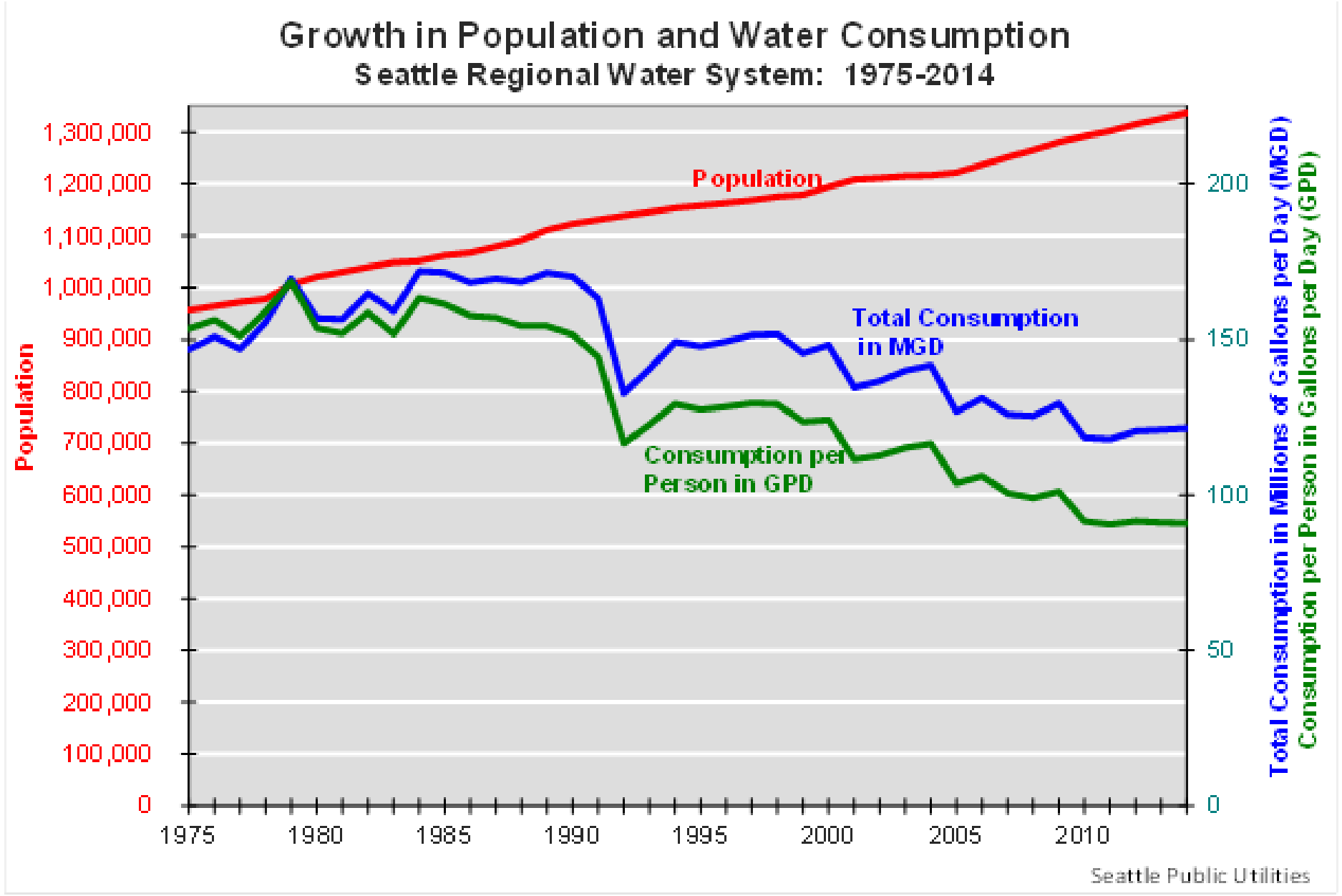
Impact of Conservation on Historical Water Demand

Components of Conservation Savings Since 1990



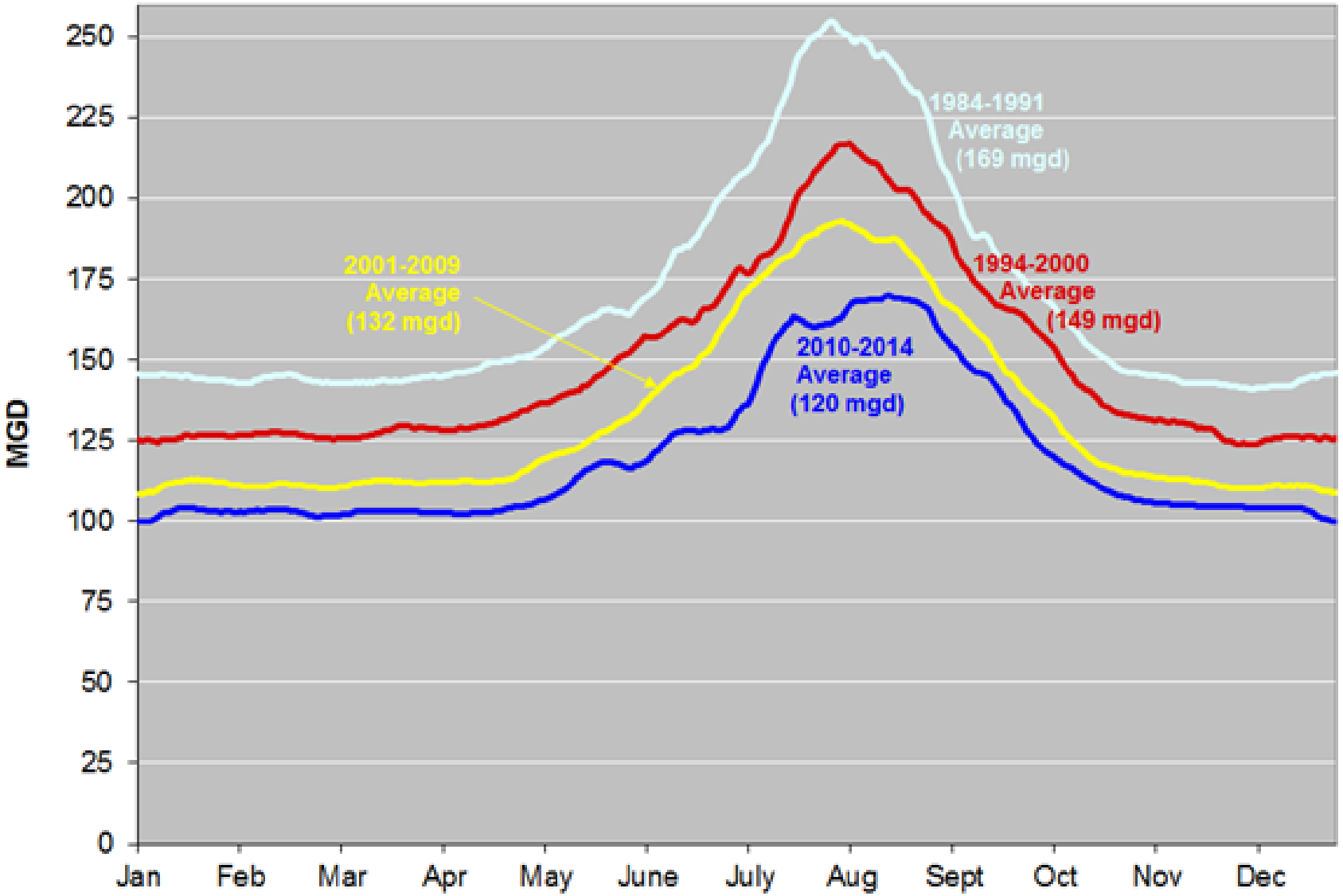
Seattle Public Utilities 1/21/15

Note: Unattributed conservation savings are those that have occurred but are beyond what has been specifically estimated for conservation programs, the plumbing code, and the impact of higher rates on water demand. Transitory savings refers to temporary declines in demand due to short duration events such as drought curtailments or economic downturns.


Growth in Population and Water Consumption
Seattle Regional Water System: 1975-2014
Population
1,300,000
1,200,000
1,100,000
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Population
Total Consumption in MGD
Consumption per Person in GPD
200
150
100
50
0
Total Consumption in Millions of Gallons per Day (MGD)
Consumption per Person in Gallons per Day (GPD)
1975
1980
1985
1990
1995
2000
2005
2010
Seattle Public Utilities

DAILY WATER CONSUMPTION OVER TIME: 1984-2014

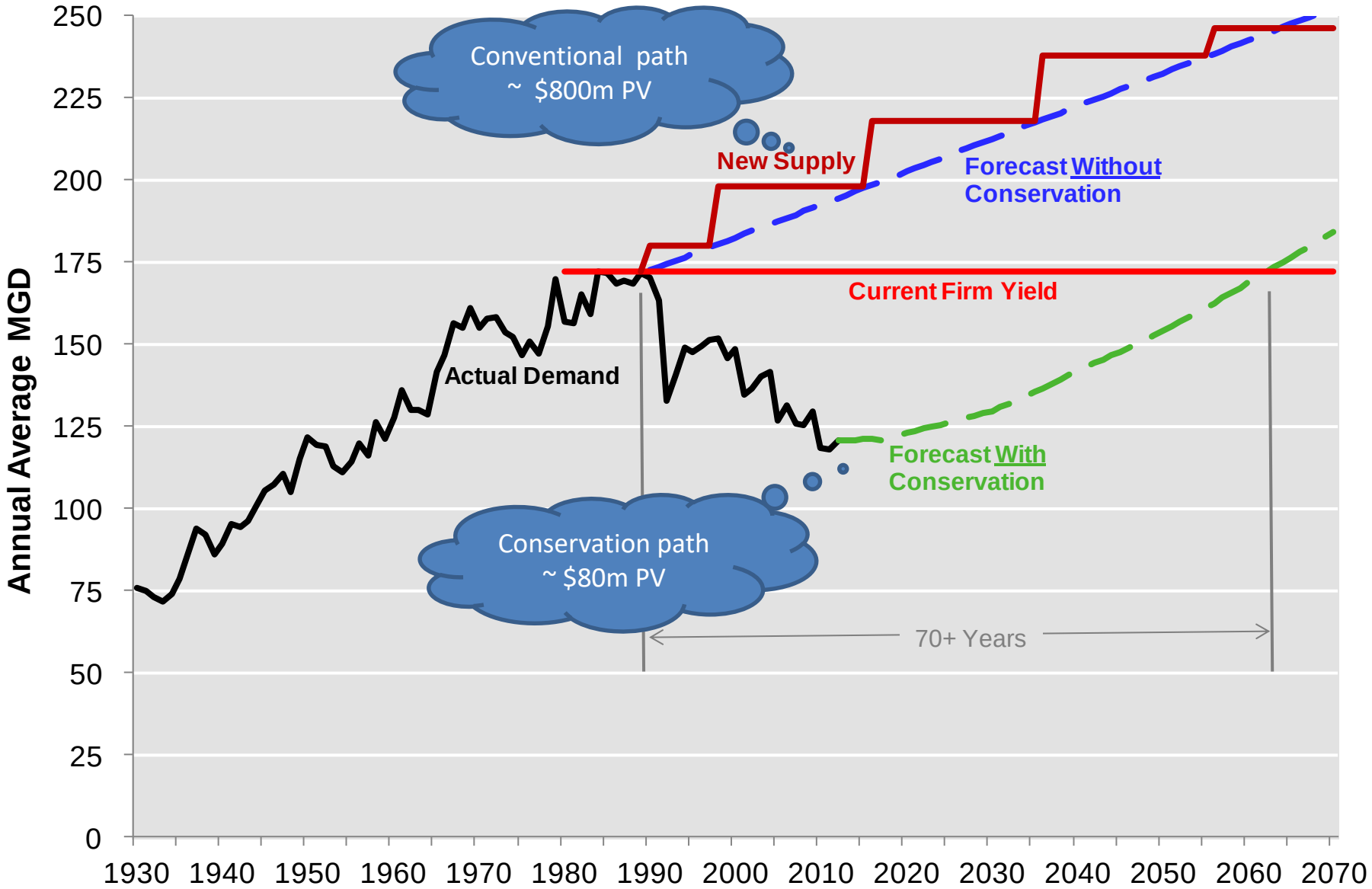
14 Day Moving Averages in Million Gallons per Day (MGD)



Water for Fish, Water for People



Conservation Vs. New Supply



Chapter Four

Why Don’t More Cities Do These Things?

FIVE Reasons

Probably Unique to Seattle

1. Three compelling problems – solutions to each built with cumulative and shared experience/people
2. Generational shift in leadership in each case leading to new ways of thinking and managing

Not unique -- Could be Decided by Many Jurisdictions

3. Quality of the leaders at the utility level and the political level
4. Integration across environmental infrastructure providers with common governance
5. More strategic links if not closer integration between environment infrastructure provider and planners/developers

Creation Seattle Public Utilities





Seattle Public Utilities

- Created 1997
- Consolidated 5 utilities into 2
- Water, sewer, drainage and garbage/recycling services
- Water provided directly and through purveyors to 1.3 million people







Thanks

A huge thanks to a lot of great friends and colleagues who were integral to this great story and who helped in putting this presentation together

You know who you are!

Extra-special thanks to Diana Gale, Margaret Pageler, Jerry Allen, Ray Hoffman, Steve Moddemeyer, Tim Croll, Bruce Flory, Jenny Bagby

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THANK YOU