

Mini-Seminar Hydropower Allocations

History of Hydropower in the West

- U.S. Reclamation Service created in 1902
 - President Teddy Roosevelt
- Renamed U.S. Bureau of Reclamation in 1923
- Began to build irrigation & power projects in the '20s & '30s
- U.S. Army Corps of Engineers began building dams in 1920s
- Tennessee Valley Authority Created: May 1933
- New Deal funding led to Hoover Dam, Grand Coulee Dam, and many others
- Preference Clause (Right of First Refusal) underlies it all in federal law

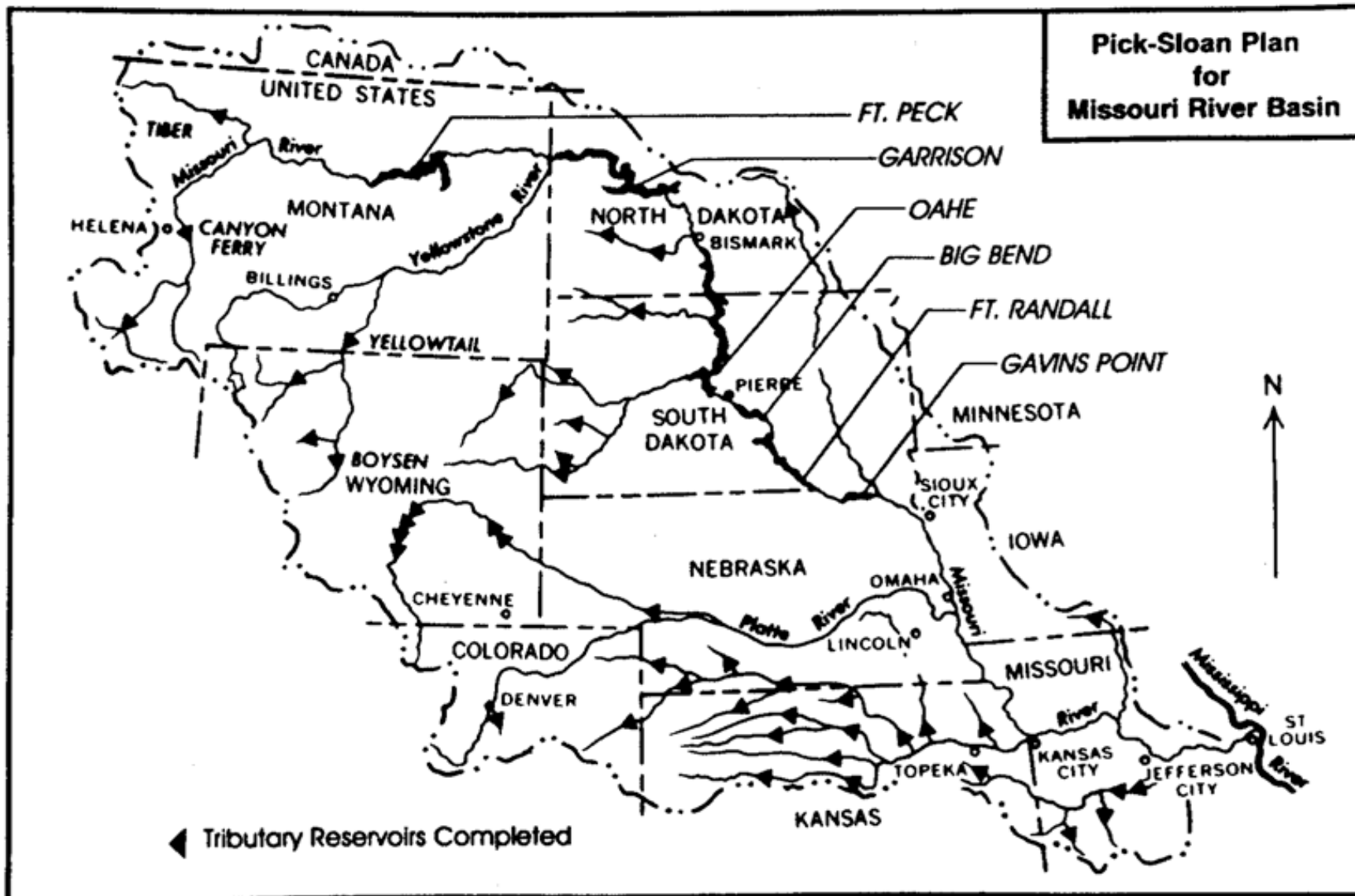
History of Hydropower in the West



First Street, Downtown Mandan, ND, 1943 Flood

- Flooding was especially bad in 1943
- Floodwaters covered 2 million acres along the Missouri
- \$26 million in damage

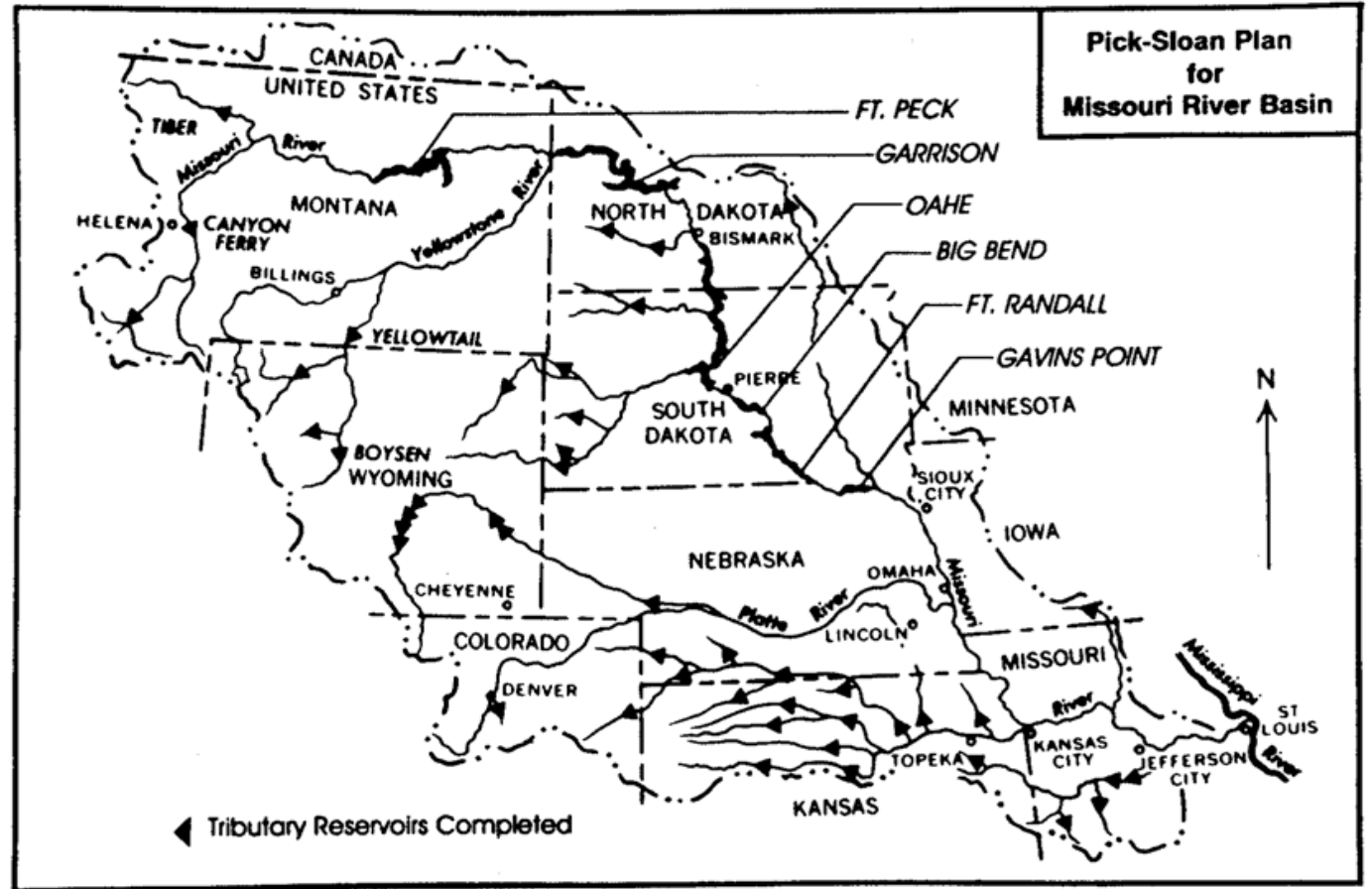
Pick-Sloan Missouri River Basin Program



- 1944 Flood Control Act
- Lewis Pick (Corps) and William Sloan (Bureau)
- Compromise plan included with Flood Control Act
- Authorized Bureau & Corps to build power and irrigation projects in the region

History of Hydropower in the West

- Pick-Sloan Plan:
 - Flood Control
 - Power Supply
 - Water Supply
 - Recreation
 - Fish & Wildlife
 - Water Quality
 - Irrigation
 - Navigation



History of Hydropower in the West

- Ft. Peck – First mainstem Missouri dam
 - Construction began in 1933 – finished in 1940
 - First powerhouse construction starts 1941 – not done until 1951
 - 89% of all runoff passes through Ft. Peck (snowpack)
- Ft. Randall – 1946-1952
- Garrison - 1946-1953
- Oahe – 1948-1958
 - First generator produced power in March 1962
- Gavin's Point – 1952-1957
 - Smallest of the Mainstem dams – Regulating Dam
- Big Bend - 1959-1963
 - Last mainstem project built – run of the river

East River organized in 1949 – built first transmission lines before any power flowed from the dams on the Missouri River (1953 first delivery)

Power Generation by Plant - Today

- Oahe: 786 MW (27.4% of total mainstem generation)
- Garrison: 583 MW (27.2% of total mainstem generation) **73.6%**
- Ft. Randall: 320 MW (19% of total mainstem generation)

- Big Bend: 494 MW (10.2% of total mainstem generation)
- Ft. Peck: 185 MW (8.8% of total mainstem generation) **26.4%**
- Gavin's Point: 132 MW (7.4% of total mainstem generation)

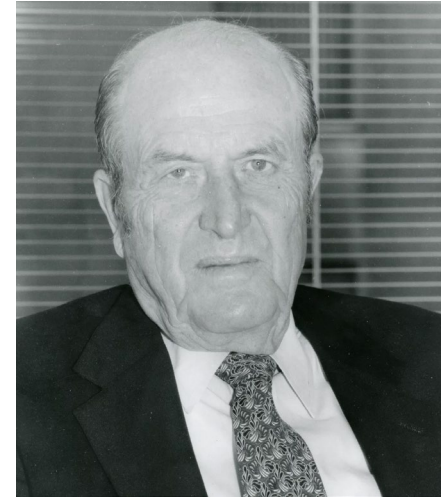
2,500 MW of nameplate capacity

100% Hydropower

- Early on, East River's power supply was 100% hydropower
- Bureau of Reclamation set power allocations immediately based on needs at the time – all requirements
- Federal system's ability to provide capacity and energy
 - Allocations based on load factor – dams were about 62%
 - For every kW of demand, 62% energy (max allocations of D & E set)
 - Some co-ops lower, some higher than dams' load factor
 - Bureau cautious of energy and capacity – so they wouldn't be exposed to having to buy power to fulfill contracts
- Growth on the system far outpaced initial projections
- By 1958 Bureau of Reclamation started sounding the alarm that usage could outpace supply

Mid-West Electric Consumers Assoc.

- Created in 1958
- Hydropower advocacy group
- Principle organizer: Ken Holum
 - Original incorporator of East River
 - Northern Electric director
- Today 250+ publicly and cooperatively-owned utilities
- 9 states, 12 million consumers



“We cannot have a first-rate economy and a second-rate electric power system.”

- Ken Holum

1963 South Dakota Farmers Union Convention



Supplemental Power Supply Needed

- May 5, 1961 – Cooperatives sign Articles of Incorporation for Basin Electric
- Basin builds Leland Olds Station – online in 1966



**BASIN ELECTRIC
POWER COOPERATIVE**

A Touchstone Energy® Cooperative 



East River
ELECTRIC
A Touchstone Energy® Cooperative 

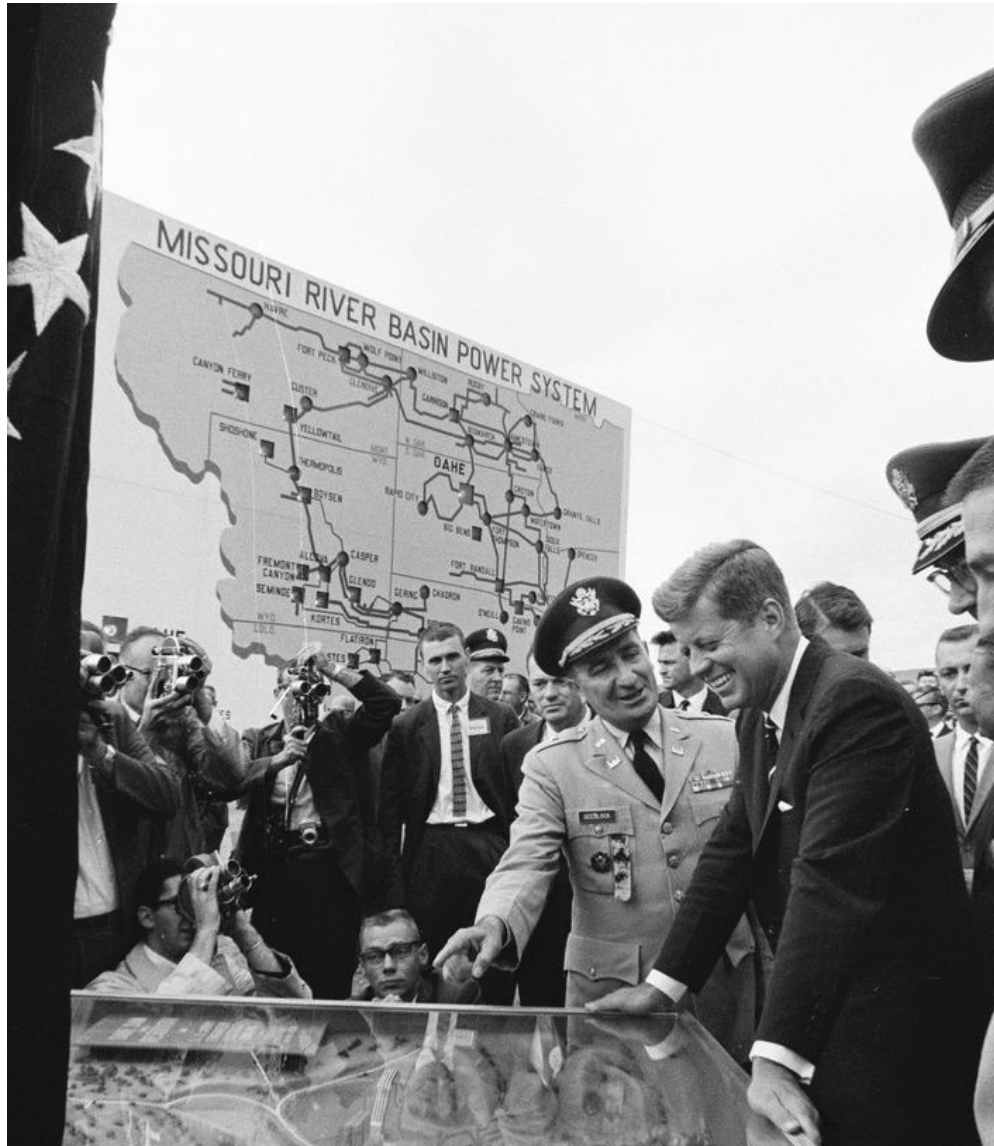
Supplemental Power Supply Needed

- May 5, 1961 – Cooperatives sign Articles of Incorporation for Basin Electric
- Basin builds Leland Olds Station – online in 1966
- Co-ops in Upper Great Plains accepted fixed hydropower allocations (Munis mostly stayed 100% hydro - little growth)
- Ken Holum: Pool federal transmission to get supplemental power out
 - Basin builds 12 miles of transmission from Leland Olds to Bureau of Reclamation substation and access to the region
 - Provided \$1 million/year to help pay off hydropower projects

Supplemental Power Supply Needed



History of Hydropower in the West



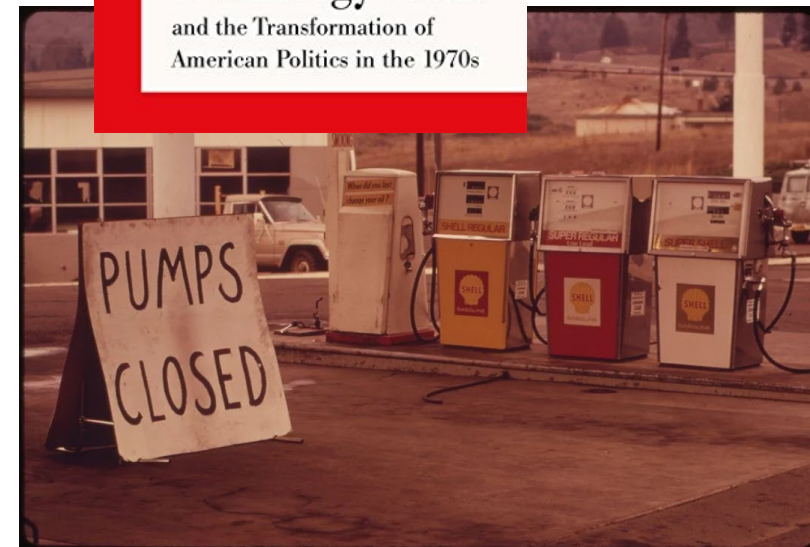
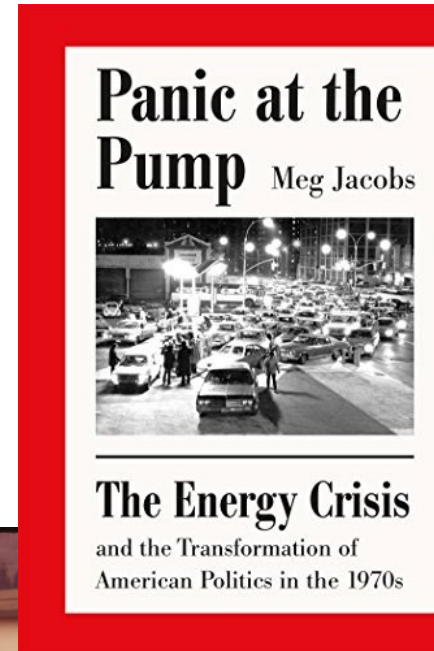
JFK Visits Oahe Dam
August 17, 1962



1970s Energy Crisis Leads to Change

Energy crisis consumes the country

- Early 1970s: Bureau says everyone's allocation will be fixed by 1978
- Must have supplemental power in place by then



Municipals Secure Supplemental Power

- Missouri Basin Municipal Power Agency (later becomes MRES) formed in early 1960s
 - SD munis join in 1974
- Heartland created in late 60s
 - Organized by East River
 - Financing mechanism
 - Tax-exempt bonds for capital
 - REA remained – Heartland left without a mission
 - Heartland assumes supplemental role for ER wheeling customers who needed power



Creation of Dept. of Energy & WAPA

- Western Area Power Administration was created and assumed power marketing responsibilities, ownership, operation and maintenance of the federal transmission system from Bureau of Reclamation



August 4, 1977 – President Jimmy Carter Signs Department of Energy Organization Act

U.S. Army Corps of Engineers



- Responsible for operation and maintenance of the dams themselves
- Guided by the Master Manual
 - Navigation Service Level
 - Winter Releases
 - Flood Evacuation Rates



Original Fixed Allocation Calculation

- Demand allocation: Highest 30-minute non-coincident peak
- In place for 12 months (or when system set a new peak)
- Typical peaks in Dec/Jan/Feb
- Load factor for East River at the time was about 45%

Original Allocation Calculation

January

300 MW peak
150 MW max allocation
50% allocation for 12 months

February

250 MW peak
125 MW allocation (50% of previous peak)

March

200 MW peak
100 MW allocation

January

450 MW peak
150 MW max allocation
33% allocation for 12 months

February

300 MW peak
100 MW allocation (33% of previous peak)

March

250 MW peak
83 MW allocation

Original Fixed Allocation Calculation

- Max energy allocation – monthly
- Percentage of energy (62% of max demand allocation)
- Example: 95,000 MWh max allocation in a month
 - But allocation was set at percentage of peak – if it was set at 50% then energy allocation was 47,500 MWh
- Basin power at the time: 6 cents/kWh
- WAPA power at the time: 2 cents/kWh
 - The lower our allocation, the more Basin power we purchased
 - Variable per month based on allocation calculation

East River Risks Identified

1. Low Load Factor
2. Financial vulnerability created by 30-minute billing
3. Lack of financial flexibility with REA contracts

Solutions

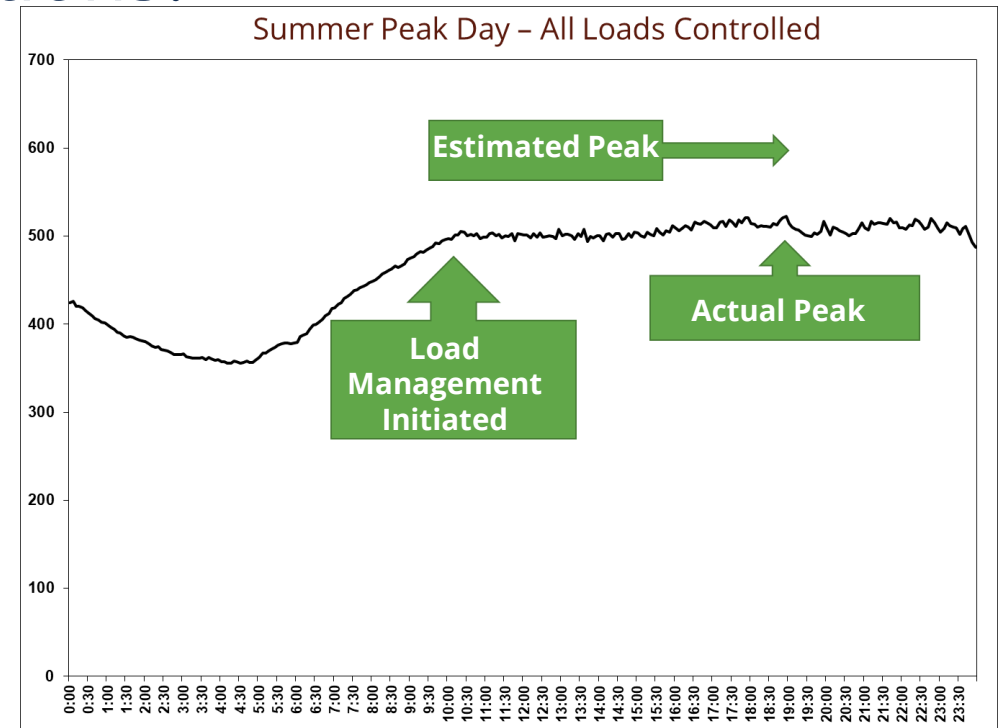
- Load Management System to maximize federal power
 - Lower the peak, the higher the allocation would be
- Worked through Mid-West to create options to fix allocations of demand on a monthly basis to create more certainty
- Convinced REA to allow for deferred revenue (1989) to give more financial flexibility – ER was first in the country

New Allocation Comes in Late 80s

- Through Mid-West, WAPA agrees to fixed monthly allocations
- Most Basin members fixed allocations
- When Oahe, FEM and Renville-Sibley joined East River over the 70s & 80s they each had outlying WAPA contracts
 - Low load factors had an impact – billing was a nightmare
- East River worked to pool allocations for all members (1988/89) to maximize federal power allocations
 - Because they were originally based on load factor of each system it was an advantage to all systems to pool fixed allocations

New Allocation Comes in Late 80s

- East River moves from non-coincident to coincident demand billing – all members billed on coincident monthly peak
- Necessary for Load Management
- How did they calculate fixed allocations?
 - Analyzed years worth of 24/7 data on peaks, kWh, etc.
 - Negotiated a fair lump sum
 - Win/win for WAPA & ER
 - Price certainty for ER
 - Less risk for WAPA to buy power to fulfill contracts



How Allocations Work Today

- East River receives lump sum demand and energy allocation, 1,381,000 kW and 709,800 MWh, respectively
- Makes up about 16.5% of our total power supply
- If East River did not have this WAPA allocation, power costs would increase about \$29,243,000, or ~6.0 mills/kWh

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Demand (MW)	137	127	137	116	85	85	119	114	99	102	120	140	1,381
Energy (MWh)	71,600	67,500	66,000	61,000	43,800	43,800	56,000	60,900	49,700	50,600	60,600	78,300	709,800

WAPA Contracts

- Original contracts extended 20 years – easily renewed
- Concept: allow BOR to re-allocate power every 20 years
- In 2008, Mid-West and WAPA agreed that longer contracts would protect the PMAs from political attacks
- Federal law allows 40-year contracts – but always did 20
 - WAPA compromised at 30-year contracts
- Reached agreement in 2010 to extend 2020 contracts to 2050
- Split contracts: Marketing & Operations
- Entering into SPP was a risk – no other PMA went into RTO
- Moving WAPA into SPP – carveout to market power outside the SPP general market

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