

Report to Ad Hoc Advisory
Committee Meeting: July 12, 2021
Michael Hanemann

- At the June 14 Ad Hoc Advisory Committee meeting I said that, for today's meeting, I would finalize (1) my analysis of water supply reliability and (2) my rate impact analysis.
- As it turned out, I am still working on both of those topics.
- Today, I will indicate I have been doing on each topic and present a partial update of my analysis of each topic.
- I will also briefly start a discussion of some preliminaries regarding potential exit fees -- I will get much more into that analysis for our August meeting.

Updating reliability analysis – steps taken

May 24, 2021 Received memo from SDCWA with comments and suggestions regarding my Draft Reliability Analysis of May 10.

June 22, 2021 MWD staff present a revised IRP analysis to MWD Board Integrated Resources Plan Special Committee.

As of July 8, the spreadsheets used in the revised IRP analysis have not been posted online.

July 1 Downloaded updated 2020 Urban Water management Plans.

Updating rate impact analysis – steps taken

- June 15 Email three questions to SDCWA
- June 16 Receive response from SDCWA
- June 17 Receive email from Tom Kennedy noting a mistake in my draft report; correct mistake (which involved transposing two numbers). Issue corrected report dated 6/18.
- June 22 Submit questions to SDCWA regarding financial analysis in SDCWA Memo dated 9/18/20.
- June 23 Zoom with SDCWA, discussing that financial analysis.
- June 29 Zoom with Tom Kennedy
- July 2 Receive responses from SDCWA including spreadsheet.
- July 7 Submit further questions to SDCWA regarding spreadsheet.

Updating rate impact: outcome to date

The analysis I presented in the Draft Rate Impact Analysis in June covered the same general ground as the analysis presented by SDCWA on pages 54-61 of its Combined Response dated 9/18/20. My analysis differed from theirs in that:

- I performed a single-year analysis of the rate impact of detachment by FPUD and RMWD. In its Combined Response, SDCWA performed both a single-year analysis (their Table 4.7) and a multi-year analysis) their Table 4-10). I did not perform a multi-year analysis.

One small difference in our respective single-year analyses is the following:

- I used not the total amount of water sold by SDCWA in FY 2020 to member agencies (354,007 AF) but rather the total amount of water sold by SDCWA member agencies in FY 2020 *and used* in FY 2020 (346,431 AF) – member agencies put some of the water purchased from SDCWA into storage.

I believe this had no impact on my estimate of the reduction of net revenue that would be occasioned by the detachment of FPUD and RMWD.

However, the following two items did create some difference in our single-year analyses:

- I did not allow for the fact FPUD and RMWD do not pay SDCWA's transportation charge on the portion of their water delivered through their direct connection to the MWD Aqueduct system.
- My analysis lacked data on four components of the revenues received by SDCWA through the membership of FPUD and RMWD, namely property tax revenue, the availability standby charge, and the system and treatment capacity charges.
 - SDCWA provided that information in its response on 6/16.

I am now in a position to adjust for these two items.

Bottom line: with regard to a single year analysis, I am essentially on the same page as SDCWA, except for a question regarding reserves, which will be resolved shortly.

TABLE 11 SDCWA NET IMPACT - MY ANALYSIS VS SDCWA (9-18-20)		
	MY ANALYSIS	SDCWA TABLE 4.7
(A) REVENUE REDUCTION	\$39,120,858	\$40,022,983
(B) EXPENDITURE REDUCTION	\$27,536,844	\$27,249,516
(C) USE OF RESERVES		\$3,627,081
NET IMPACT	\$11,584,014	\$16,400,548

- We considered different years: 2020 (me) vs average of 2017, 2018 & 2019.
- That aside, I believe we agree on (A) and (B).
- I am continuing a discussion with SDCWA staff to better understand (C).

A multi-year analysis of the rate impact

- SDCWA have said – and I agree – that it would be desirable to conduct a multi-year analysis of the impact of detachment, which they did in their Combined Response.
- I am in the process of communicating with them to understand exactly how they did this.
- Issues include:
 - Which years and how many to simulate.
 - What to assume about demand and local supplies for the non-detaching member agencies.
 - These questions overlap with some of the issues that arise in a forward-looking analysis of water supply reliability.

A key factor in a multi-year analysis of rate impacts

- The more heavily SDCWA relies on MWD as a source of supply in a given year, the lower the rate impact relative to what it would be if SDCWA was not so reliant on MWD that year.
 - MWD is the source of the cheapest water for SDCWA.
 - The greater the extent to which SDCWA can reduce its use of MWD supply in the event of a detachment, the less the rate impact.
 - That does NOT make the impact zero. There still is some impact.
 - The extent to which SDCWA uses MWD as a source of supply will vary more transparently in a multi-year analysis.
 - That makes a multi-year analysis more informative.
- Thinking about the rate impact and supply reliability analyses together highlights that these two concerns are in a sense antithetical.

Supply reliability and rate impacts

- In one case, the problem would be that the demand for water facing SDCWA from its member agencies might be so *high* that SDCWA is pressed to find a supply large enough to meet the demand.
- In the other case, the problem would be that the demand for water facing SDCWA from member agencies is *too* low to cover the cost of the supplies to which SDCWA has committed.
- Which is the more difficult problem for SDCWA is actually changing compared to in the past.

A shifting landscape for urban water in Southern California

- Looking back over 35 years of working on the economics of urban water in California, there are two changes which I had not anticipated:
 - Although California's population has continued to grow, per capita urban demand has declined to a striking degree, especially since the 2008 Great Recession, housing market collapse, and drought in California.
 - The development of local supplies in Southern California, which I first noticed on a very small scale in 1993, but which has truly gathered steam in recent years.
- The consequence is that there is not today as large a regional demand for water facing the major regional wholesale agencies in Southern California – MWD and SDCWA – as was anticipated in 2000 or even in 2010.

Forward-looking water supply agencies always develop new supply ahead of demand

- Quabbin Reservoir was built between 1930 and 1939 to serve the Boston metro area. It was not until the 1970s that it was being fully used.
- The State Water Project: MWD first started making payments for the SWP in 1963; it received the first deliveries in 1972, by which time it had paid a total of \$118M without receiving any water; its deliveries mainly scaled up in mid-1980s.
- Central Arizona Project (built by federal government): first federal funding advanced in 1970; construction started in 1973; project declared “substantially complete” in 1993, by which time \$4.4 billion had been spent.

SDCWA was on a similar trajectory

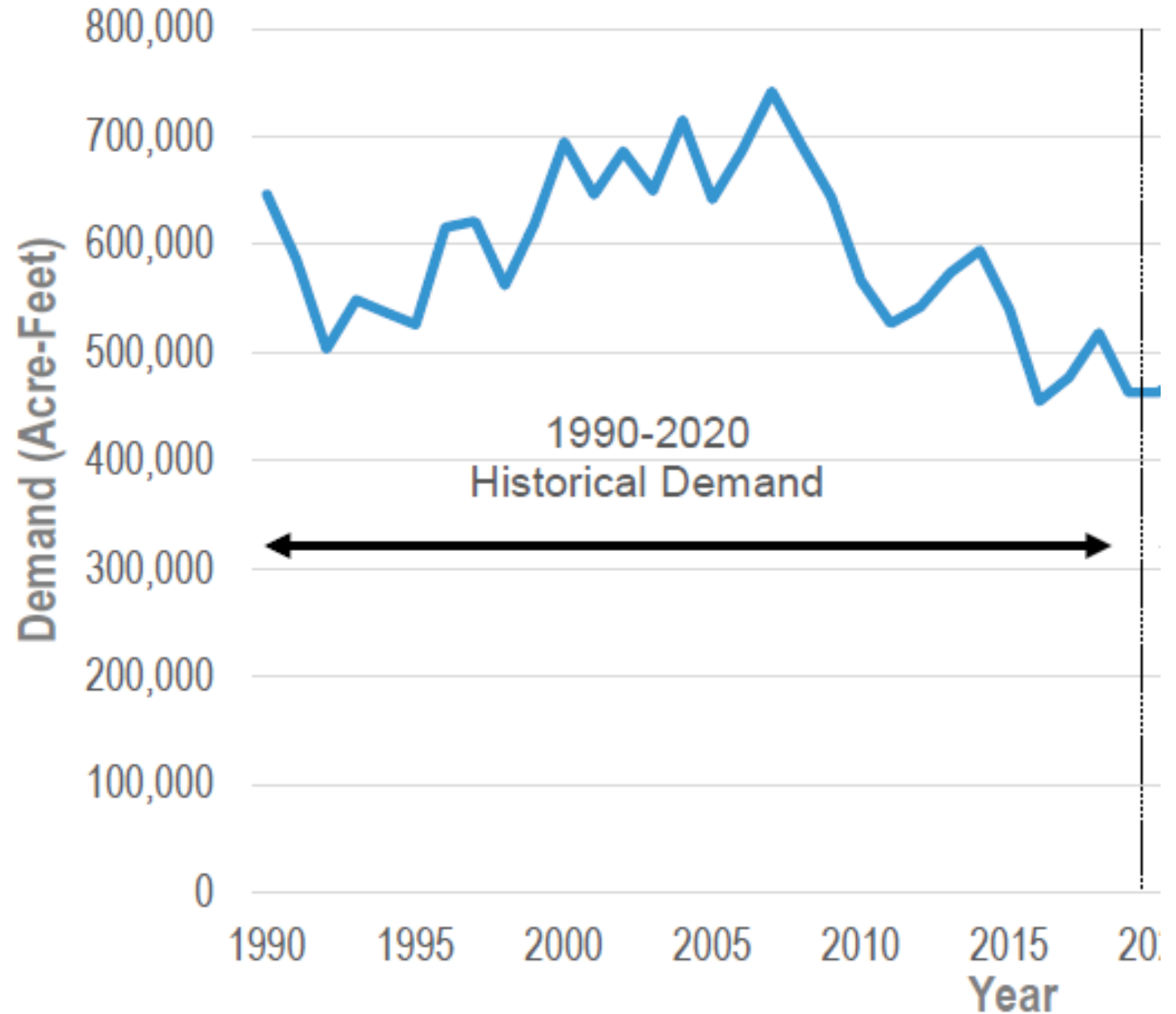
- In 1991, dependent on MWD for 95% of supply. Severely impacted when MWD cut supply available to member agencies.
- In 1995, SDCWA enters into negotiations to purchase Colorado River water from IID, Agreement negotiated in 1998. Agreement amended in December 2002; takes effect with QSA in October 2003. Deliveries ramp up in 2009.
- The Carlsbad Desalination project was first proposed by Poseidon in 1998, and was launched in 2015.

Water supply infrastructure takes a big upfront financial commitment and has a long lead time

- But, if there is then an unexpected downward demand shock while the project is under construction or after it is completed, that can cause a problem because the anticipated revenue isn't forthcoming on the scale expected.
- This is an issue today for both MWD and SDCWA.
 - But it plays out on different timescales for them, as the result of the different timing of their major supply investments.
 - MWD made major investment commitments in 1970s/1980s for SWP, 1990s for Diamond Valley, and coming decade for Delta Fix.
 - SDCWA made major commitments in 2000s for Colorado River, and 2015 for Carlsbad.
 - The longer the time that has elapsed since a major investment/increment in supply, the less severe the impact of an unexpected decline in demand.
 - Because demand will have had more time to grow.
 - Because, with inflation, variable costs assume a large share of the costs to be covered.

Since 2007, there has been a substantial decline in urban water use in SDCWA service area

- Service population grew, gpcd fell more.
- Sales = water use – local supplies.
- Water use fell (shown here).
- Local supplies grew.



Historical Water Sales

Acre-Feet

700,000

600,000

500,000

400,000

300,000

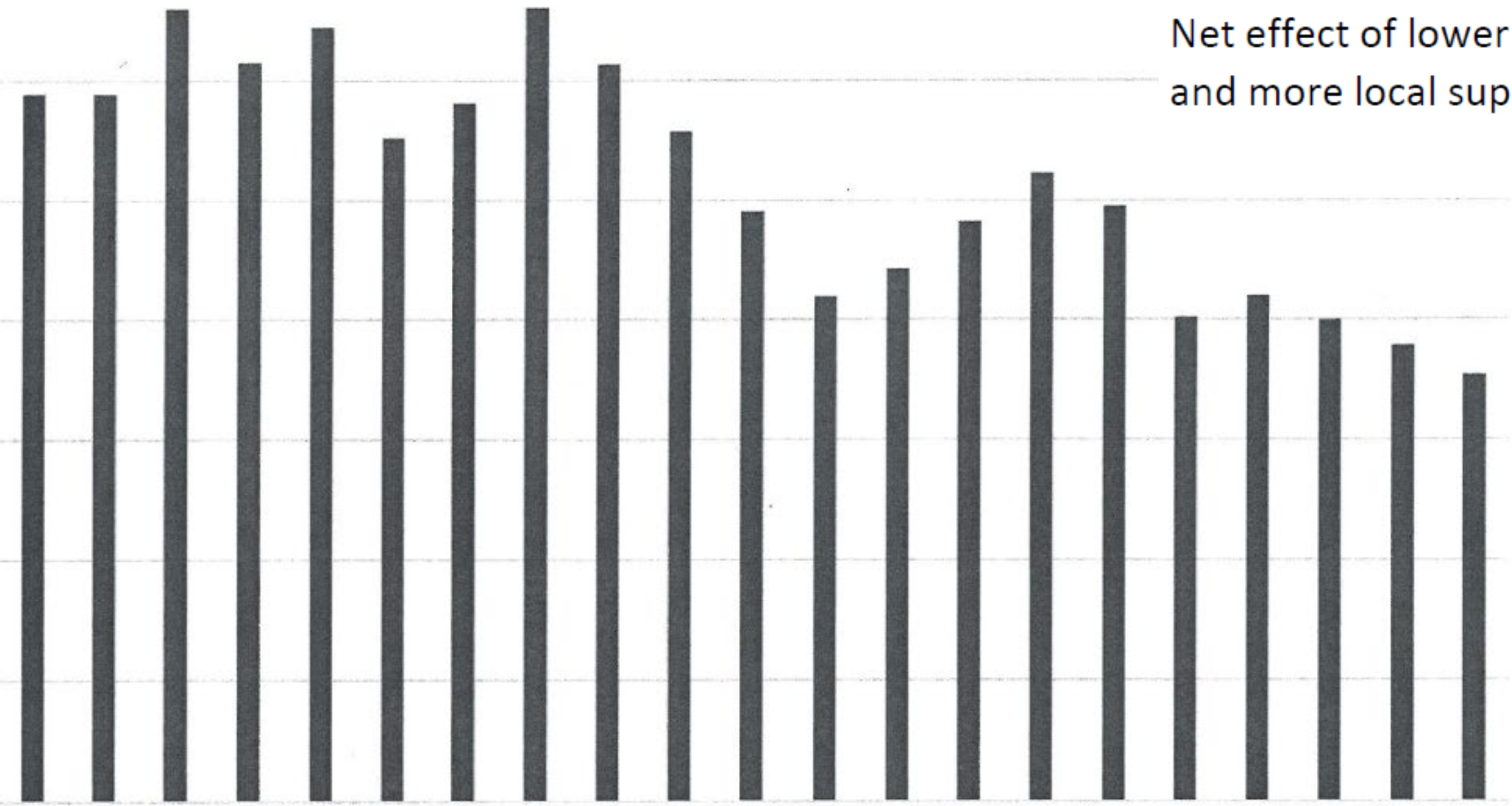
200,000

100,000

0

Net effect of lower use
and more local supply

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020



Between 2007 and 2020, in round terms:

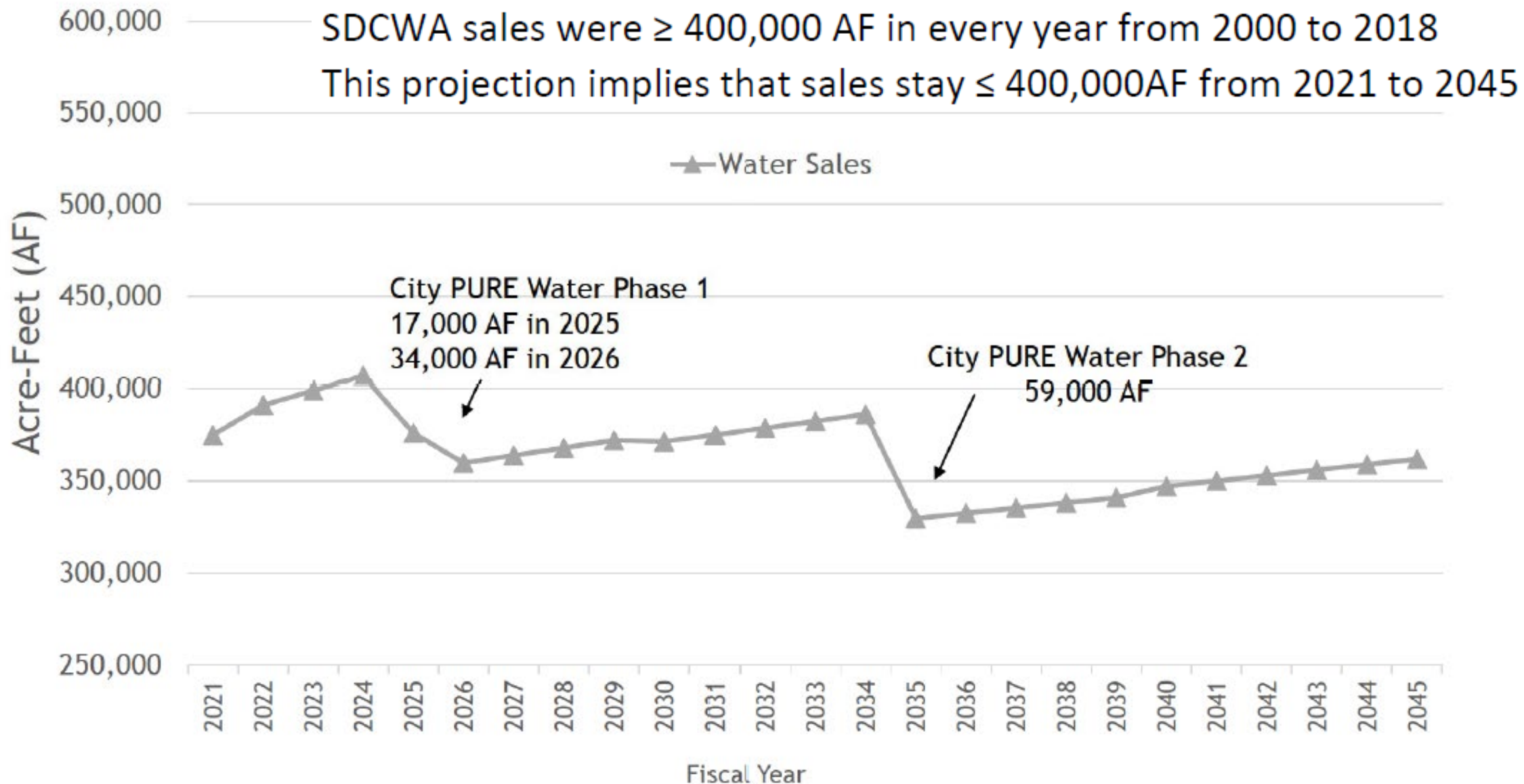
- Total water use fell from ~700,000AF to ~450,000AF, reduction of 36%
- Water delivered by SDCWA fell from ~600,000AF to ~350,000AF, reduction of 42%
 - The difference reflects increased local supply

Looking forward to 2030 or 2035, local supplies will ramp up even more, especially from increased water re-use, thereby significantly lowering SDCWA deliveries to member agencies

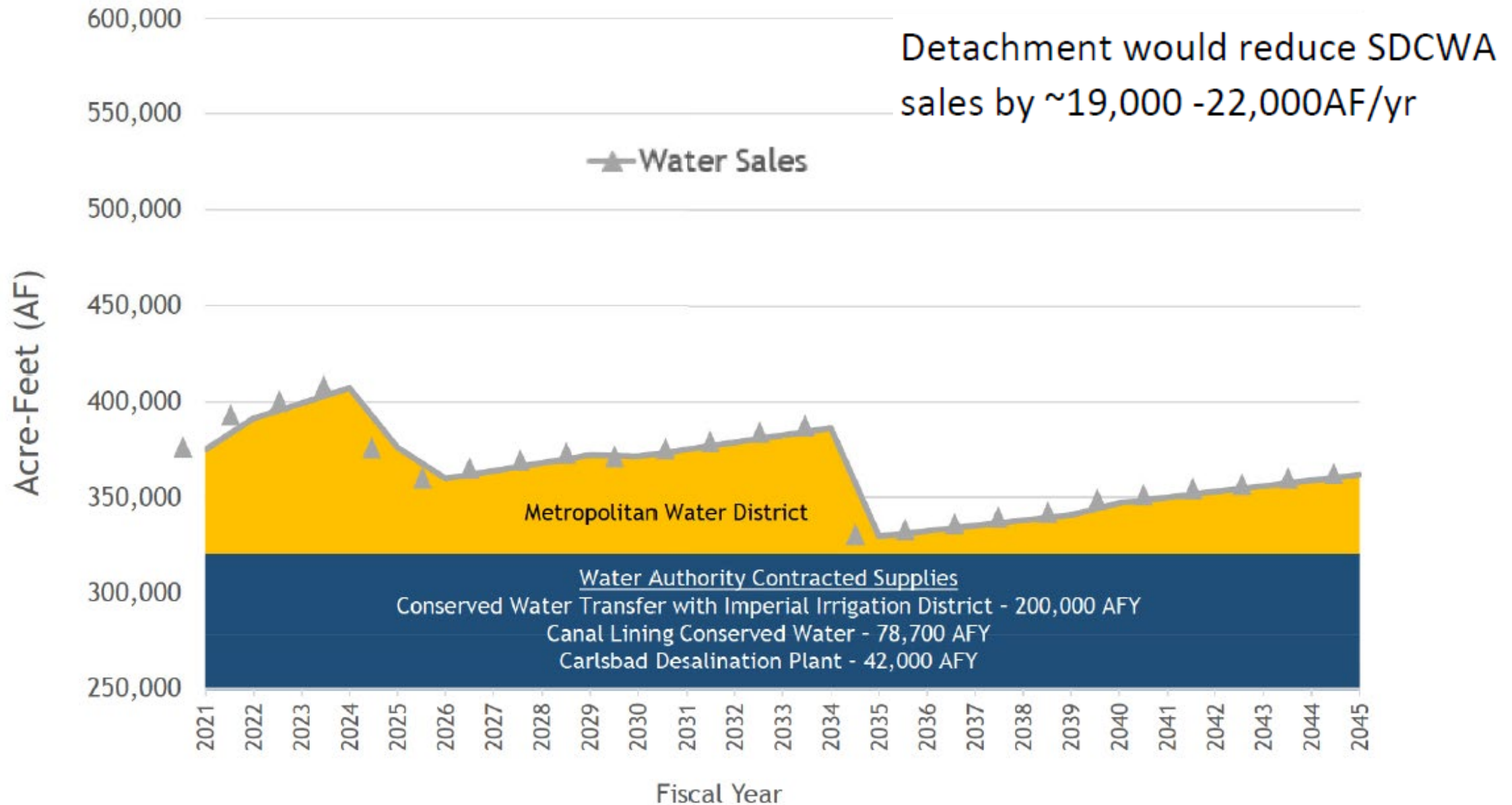
Planned increases in local supplies (from 2020 UWMPs)

- Fallbrook (Conjunctive Use Project) 4,500 AF starting 2022
 - Helix (Recycled Water) 8,882 AF starting 2025
 - Padre Dam MWD (AW Program) 3,500 AF starting 2025
 - San Diego (Pure Water Program) 16,800 AF starting 2025
 - San Diego (Pure Water Program) 33,600 AF in 2030
 - San Diego (Pure Water Program) 92,960 AF in 2035
-
- By 2025, a reduction in member agency demands on SDCWA of 33,682 AF
 - By 2030, a reduction in member agency demands on SDCWA of 50,482 AF
 - By 2035, a reduction in member agency demands on SDCWA of 109,842 AF

Projected Water Sales Forecast



Projected Water Sales Forecast by Source



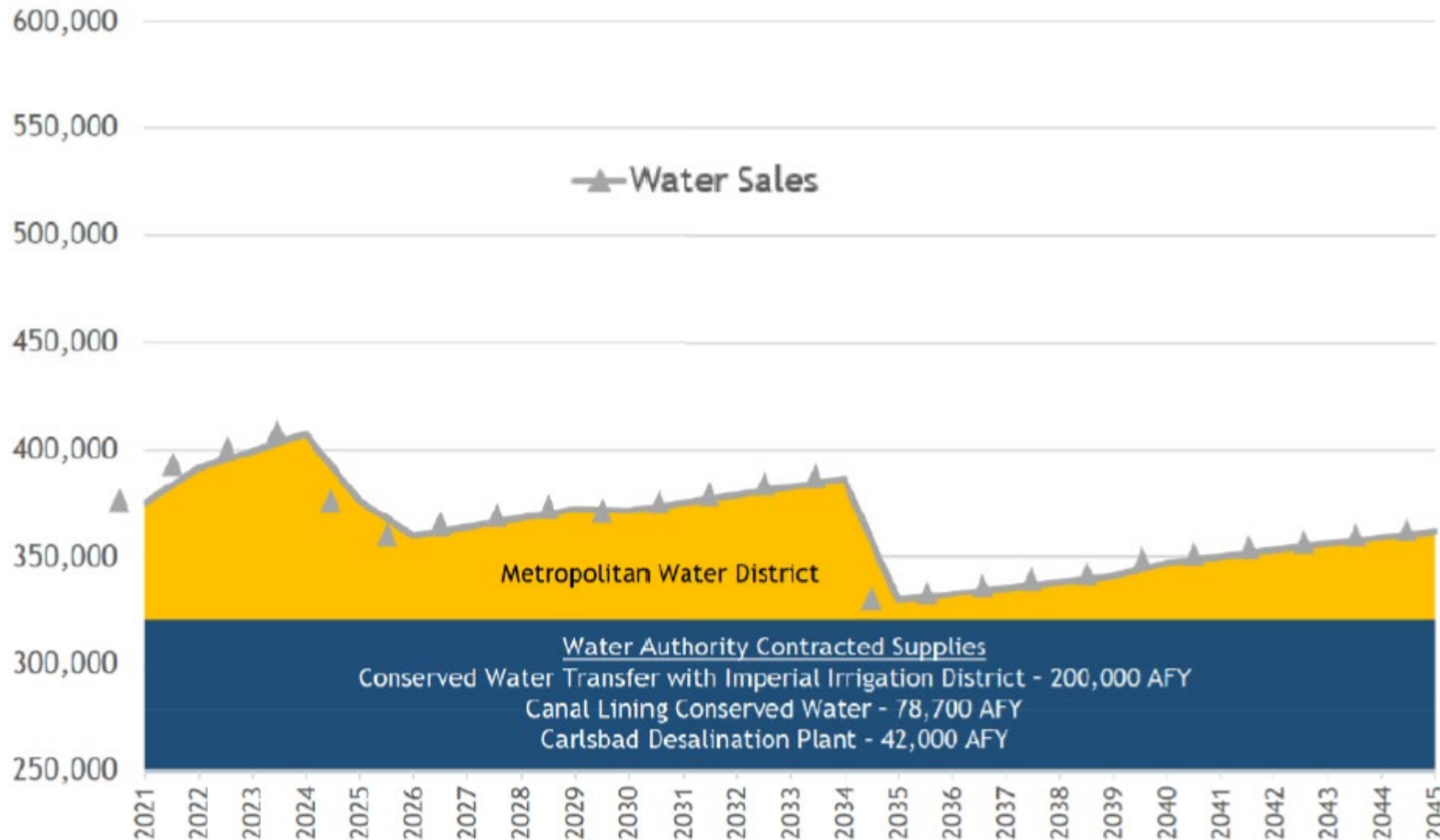
Once SDCWA deliveries < 320,700AF,
all water supply is a fixed cost for SDCWA

The blue water is a
fixed cost, the yellow a
variable cost.

At today's prices, the
blue water costs
\$1,028/AF (Colorado
River, 87%) and
\$2,752/AF (Desal, 13%).

The yellow water costs
\$777/AF.

The blue water is more
reliable than the yellow
water.



Water breakdown SDCWA FY 2020

SDCWA Service Area (in thousand acre-feet)

- Total water use 470 (includes addition to storage)
- Local supplies 116
- Supplied by SDCWA **354**
 - Colorado River 230 Cost = \$ 993/AF, a fixed cost*
 - Carlsbad Desal 40 Cost = \$2,550/AF, a fixed cost*
 - MWD 84 Cost = \$ 755/AF, a variable cost

* With fixed cost items, if fewer AF are supplied, the unit cost per AF delivered rises.

How the presence of a fixed cost affects the unit price of water when the quantity delivered is lower

- For the Delta component of payments by MWD for the State Water Project, MWD was committed to paying \$155,983,533 in CY 2020.
 - This was calculated by applying a Delta supply rate of \$81.60/AF to MWD's Table A entitlement of 1,911,500 AF.
 - The figure of \$81.60 was calculated as the equivalent of an annual mortgage payment as the discounted present value of all past and present Delta supply expenses divided by the lifetime total of all annual Table A amounts of water.
 - MWD had been expected to receive 1,146,900 AF of SWP water in CY 2020.
 - That would have made the effective unit rate for MWD to cover the Delta component of its SWP water \$136/AF.
 - MWD actually received 399,708 AF of SWP water in CY 2020.
 - That made the effective unit rate for MWD to cover the Delta component of its SWP water \$390/AF.
 - This is because, regardless of the quantity of SWP water it received, MWD was committed to paying \$155,983,533 in CY 2020.

- Other components of what MWD pays for SWP water include a Transportation Charge Component and a Water System Revenue Bond Surcharge.
- The Water System Revenue Bond Surcharge is a fixed cost for MWD – it does not vary with the amount of SWP actually delivered to MWD in the particular year – just like the Delta Water Charge does not vary with the amount actually delivered that year.
- Part of the Transportation Charge is also a fixed cost.
- Part of the Transportation Cost (the Variable OMP&R component and the Off-Aqueduct component) are variable costs – they do vary with amount of SWP actually delivered to MWD in that particular year.
- Overall, of the total amount to be paid by MWD in CY 2020 for SWP water, 26% was a variable cost and 74% a fixed cost.

MWD's Colorado River water

- MWD's other source of water, besides the State Water Project, is the Colorado River.
 - There is also water market purchases from the Central Valley.
- MWD obtains water from the Colorado River in two ways:
 - A. It has a water right to divert water from the Colorado River.
 - B. It has exchange arrangements with other entities that have a water right to divert water from the river and, through arrangements, it also has some water in storage.
- For (A) there is no payment for the water; there is the cost of constructing, operating and maintaining the Colorado River Aqueduct. This is mostly a fixed cost – it does not vary depending on the particular amount of water diverted by MWD in a given year.
- There is a power cost to pump water along the Aqueduct – this is a variable cost.
- There are also costs associated with (B) that are variable costs, but these are not broken out.

TABLE 12 MWD PLANNED EXPENDITURES FY 2021			
			Cost
ITEM	\$ Thousands	Percent	Type
State Water Project			
Variable Transportation & OAC*	\$166,984	9.2%	Variable
All other SWP costs	\$473,784	26.0%	Fixed
Colorado River Power Costs	\$52,237	2.9%	Variable
Supply Programs	\$68,683	3.8%	Fixed
Demand Management	\$48,532	2.7%	Fixed
Capital Financing	\$408,690	22.5%	Fixed
Recycled Water Program Planning Costs	\$15,000	0.8%	Fixed
Other Operating costs	\$14,878	0.8%	Fixed
Increase/(Decrease) in Required Reserves	\$42,400	2.3%	Fixed
Operating Departments*	\$529,254	29.1%	Fixed
TOTAL	\$1,820,442	100.0%	
* Estimate			

Only about 12% of MWD's cost of operation is a variable cost.

At most 15% if Supply Programs is all variable cost.

TABLE 13 SDCWA EXPENDITURES FY20 ADOPTED BUDGET			
			Cost
ITEM	\$ Thousands	Percent	Type
Water Supply			
Colorado River Water			
MWD Wheeling Cost	\$119,184	15.1%	Variable
All other Colorado River water costs	\$124,414	15.8%	Fixed
Water Purchased from MWD	\$82,967	10.5%	Variable
Carlsbad Desal Plant	\$97,934	12.4%	Fixed
All Other Water Supply Expenses	\$61,639	7.8%	Fixed
Operating Departments*	\$54,252	6.9%	Fixed
Debt Service*	\$148,716	18.9%	Fixed
CIP Expenditures*	\$81,111	10.3%	Fixed
Equipment Replacements*	\$3,012	0.4%	Fixed
Grant Expenditures*	\$13,162	1.7%	Fixed
Other Expenditures*	\$1,944	0.2%	Fixed
TOTAL	\$788,335	100.0%	

Contrast with SDCWA

About 25% of SDCWA's cost of operation is a variable cost.

Maybe more than 25% if there are some variables costs for power and pumping.

Volatility in sales and the impact on net revenue

- Harmful impacts on net revenue from volatility sales can be avoided if the variable/fixed structure of costs matches that of revenues.
- If there is a significant imbalance between the structure of costs and that of revenues, with revenue *more* variable than costs, a reduction in sales will place pressure on the agency's net revenue.

Revenues

About 76% of MWD’s revenue is variable – it varies in proportion to the volume of water sales.

TABLE 14 MWD REVENUES FY2020 ACTUAL			
			Revenue
ITEM	\$ millions	Percent	Type
Water Related Revenue			
Water Sales	\$1,188.0	75.7%	Variable
Other Revenue			
Property Tax	\$146.9	9.4%	Fixed
Readiness to Serve Charge	\$134.5	8.6%	Fixed
Capacity Charges	\$30.5	1.9%	Fixed
Power Sales	\$15.9	1.0%	Fixed
Investment Income	\$28.9	1.8%	Fixed
Other Revenue	\$24.5	1.6%	Fixed
TOTAL REVENUE & OTHER INCOME	\$1,569.2	100.0%	

TABLE 15 SDCWA REVENUES FY2020 ACTUAL			
			Revenue
ITEM	\$ Thousands	Percent	Type
Water Related Revenue			
Water Sales	\$420,165	63.3%	Variable
Infrastructure Access Charge	\$36,942	5.6%	Fixed
Customer Service Charge	\$25,600	3.9%	Fixed
Storage Charge	\$65,000	9.8%	Fixed
Supply Reliability Charge	\$37,430	5.6%	Fixed
SUBTOTAL	\$585,137	88.1%	
Other Revenue			
Property Tax	\$15,526	2.3%	Fixed
Standby Availability Charge	\$11,164	1.7%	Fixed
Capacity Charges	\$17,983	2.7%	Fixed
CIP	\$2,726	0.4%	Fixed
Hydroelectric Revenue	\$3,192	0.5%	Fixed
Investment Income	\$6,789	1.0%	Fixed
Other Revenue	\$21,542	3.2%	Fixed
SUBTOTAL	\$78,921	11.9%	
TOTAL REVENUE & OTHER INCOME	\$664,058	100.0%	

Contrast with SDCWA

Only 63% of SDCWA's revenue varies with water sales.

TABLE 16 FINANCIAL EXPOSURE TO VARIATION IN WATER SALES		
	SDCWA	MWD
Percent of costs that are fixed	74%	88%
Percent of revenues that are fixed	37%	24%

- The more closely the percentage of revenues that is fixed matches the percentage of costs that is fixed, the less vulnerable is the agency's net revenue stream.
- SDCWA is less vulnerable financially to a downward volatility in sales.
- SDCWA deliberately set out to raise the fixed component of its charges.
- MWD management has made it clear that MWD needs to raise the fixed component of its charges.
 - This improves revenue stability for the water provider agency.
 - But it creates *more cost instability* for the water provider's customers.

Implications for FPUD and RMWD

- If I understand them correctly, the currently anticipated arrangement between EMWD and FPUD & RMWD leaves able to acquire MWD at what is a 100% variable cost.
 - Property owners served by FPUD and RMWD will pay a Readiness to Serve Charge and Capacity Charges to MWD – but they are doing this already; it is no change.
 - They will also pay some property to MWD and EMWD, instead of to MWD and SDCWA, but I understand that is essentially no change.
 - Whereas FPUD and RMWD currently pay both fixed and variable charges for water supplied by SDCWA, they would pay just a variable charge for water supplied by MWD via EMWD:
 - MWD's Full Service Tier One Treated rate of \$1,104/AF plus
 - A charge of \$11/AF by EMWD for a full cost of \$1,115/AF – with no fixed cost at all.

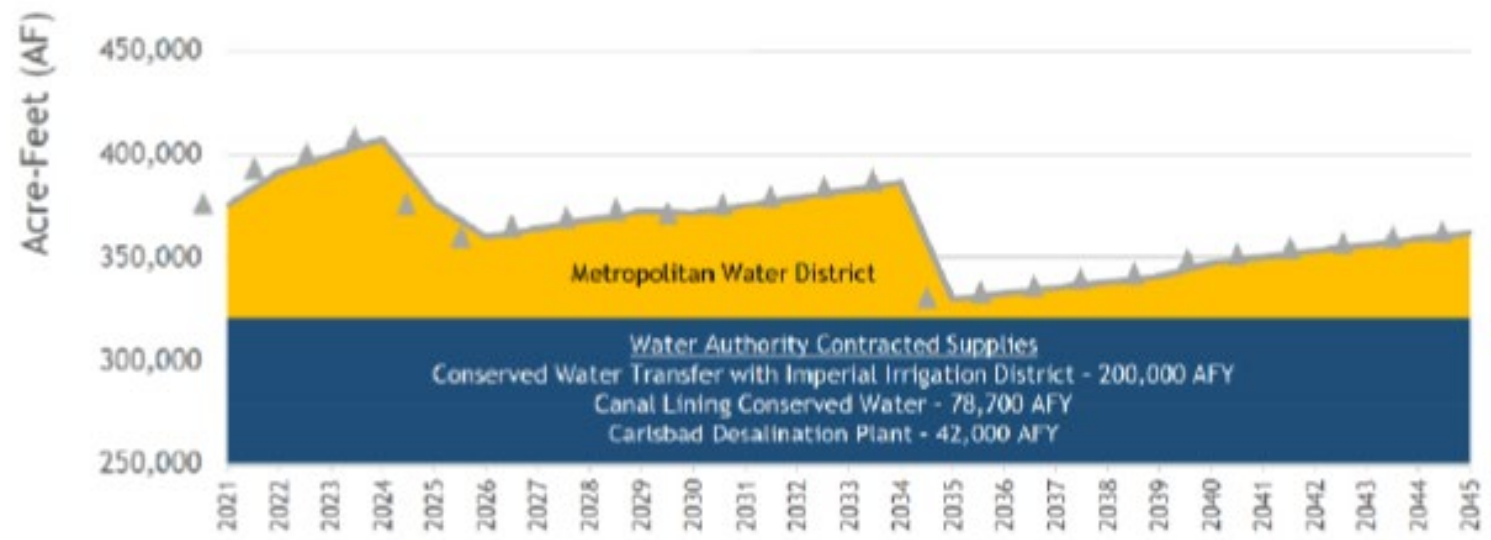
This leaves some issues for FPUD & RMWD to consider

1. If MWD does introduce one or more fixed charges, in the manner of SDCWA, how would that affect them?
 - They would not be member agencies of MWD: EMWD is the member of agency. The fixed charge(s) would be levied by MWD on EMWD. How would EMWD decide to share the fixed charge with FPUD & RMUD?
2. How does this affect their supply reliability?
 - Under the current arrangement, as I understand it, RMWD would be 100% reliant on the supply from MWD, as passed on by EMWD, through 2030. In 2030, it would also have access to approximately 2,000 AFY of local groundwater; at that point it would be 87% reliant on MWD, via EMWD.
 - RMWD would be roughly as dependent on MWD as SDCWA was in 1991.
 - Starting in 2022, FPUD will have access to 4,200 AF from the Santa Margarita CU Project, 100 AF from groundwater, 800 AF from the Lake Skinner Diversion and 830 AF from recycled water. It would thus be 43% dependent on MWD via EMWD in 2025, and 48% dependent in 2035.

I have developed a brief memo with some questions for EMWD, FPUD, and RMWD

- There seems to be some disagreement between SDCWA and the other parties on the precise details of the relationship between EMWD and FPUD & RMWD.
- I myself am uncertain about these issues, including whether the relation between EMWDF and FPUD & RMWD would be identical to its relationship with, say, Hemet, Perris and San Jacinto with regard to:
 - the wholesale pricing of EMWD water,
 - the sharing of EMWD's own local supply, and
 - cutbacks by EMWD as a wholesaler in the event that MWD reduces its allocation of water to EMWD.
- Another question: if MWD introduces some fixed charge(s) for its member agencies in order to reduce the volatility of its revenue stream, how might EMWD modify its wholesale rate schedule and, in so doing, would it treat FPUD & RMWD identically to how it would treat Hemet, Perris or San Jacinto, or would there be some difference?

Supply Reliability



- A major implication of the growth in local supply from SDCWA member agencies and the decline in SDCWA sales to its member agencies is greater water supply reliability for SDCWA member agencies.
 - According to this projection, through 2045, SDCWA deliveries from MWD will remain well below 100,000AFY, often much less.
 - SDCWA will be less reliant on MWD, and on water from the Delta, than EMWD.
 - SDCWA's supply of water from the Colorado River has a higher priority, and is therefore more reliable, than the supply available to MWD and its member agencies, including EMWD.
 - If MWD takes on a fixed cost commitment through the Delta Fix, that will be less of a financial burden for SDCWA than for other MWD member agencies.

MWD will face similar challenges as SDCWA

- Between the SWP and the Colorado River, MWD clearly has a less reliable supply from its core water sources than SDCWA, but its supply cost is cheaper than that of SDCWA.
 - With fixed costs a larger share of total cost than fixed revenue as a share of total revenue, reduced sales due to supply shortage generates a net revenue gap which a wholesaler can handle only by raising unit prices to its customers.
- MWD faces the same challenge of reduced sales due to increased local supply from member agencies as SDCWA does.
 - With fixed costs a larger share of total cost than fixed revenue as a share of total revenue, reduced sales due to development of local supply by member agencies generates a net revenue gap which a wholesaler can handle only by raising unit prices to its customers.
- The Delta Fix will probably increase the fixed cost burden more for MWD than for MWD member agencies.

Financial impact

I will now begin to address this issue.

SDCWA Combined Response 9-18-2020

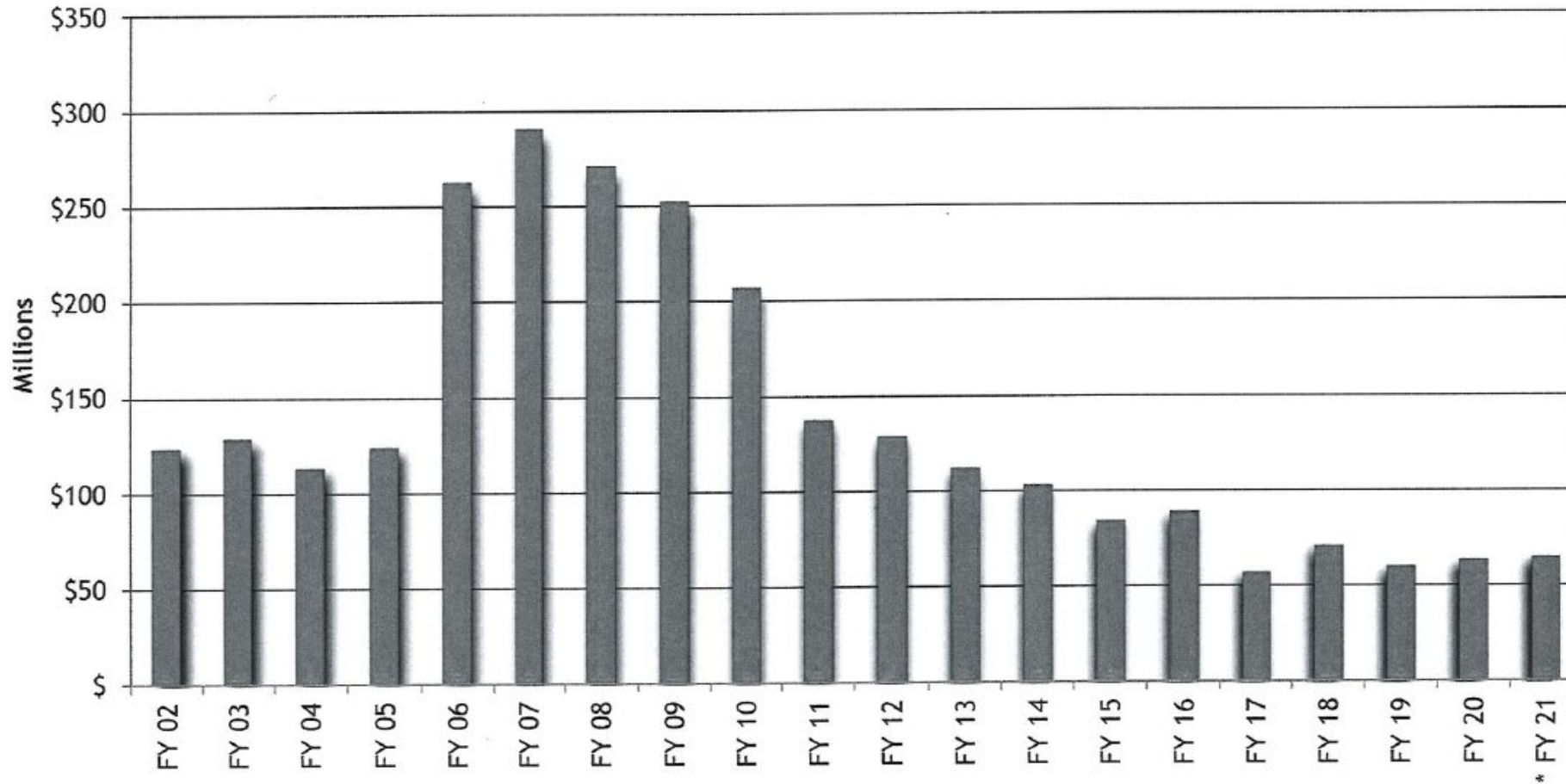
The Water Authority has about \$21.1 billion in bonded and other indebtedness and certain water supply contracts (collectively, “Indebtedness,” or overall existing obligations). Of the \$21.1 billion total, about \$19.1 billion is for long-term “take or pay” water supply contracts, and the remainder is for various forms of debt, such as bonds, CalPERS obligations, etc.

Desc.	Total Balance (PV)
Long-Term Obligations	(\$1,883,425,890)
Short-Term Obligations (Commercial Paper)	(\$345,000,000)
Contractual Supply Obligations	(\$19,096,349,589)
Other Liabilities (long-term)	(\$70,811,734)
Assets & Reserves	\$263,763,888
Total Net Liabilities	-\$21,131,823,325

Commitment for take-or-pay supply contracts

Desc.	CY 2021 Cost	Remaining Term (as of 1/1/2021) (yrs)	Escalation Factor	Net Present Value (3% Discount)
IID	\$135,000,000	27	2.5%	\$3,401,733,753
MWD Exchange - IID	\$106,800,000	27	4.6%	\$3,642,717,018
Canal	\$1,233,099	93	3.0%	\$114,678,207
MWD Exchange - Canal	\$41,491,800	93	4.6%	\$9,029,224,611
Desal	\$111,846,000	26	3.0%	\$2,907,996,000
Total	\$396,370,899			\$19,096,349,589

CIP Historical Spending



* FY21 Forecast

Major investment projects since 2000

Emergency & Carryover Storage Project \$1.5 B

Includes

- 2002 – 2005 Olivenhain Dam/Reservoir, Pipeline & Pump Station
- 2007 – 2012 Lake Hodges Pipeline & Pump Station
- 2010 – 2011 San Vicente Pipeline & Pump Station
- 2014 San Vicente Dam Raise

Also

- 2008 Twin Oaks Treatment Plant

An exit fee or, better, a termination fee.

- The issue of an exit fee arose in Australia in the 2000s in circumstances that were not exactly the same, but have some resemblance to those here.
 - I described this in an article on water marketing in Australia published in January 2020 in the *Oxford Review of Economic Policy*.
- When water marketing opened up in Australia around 2000, some members served by large irrigation districts (IDs) wanted to sell their water to users outside the district.
- With state government support, the IDs imposed caps on the amount that could be transferred outside the district and, for larger IDs, exit fees.
- In 2009, the Australian Competition and Consumer Commission (ACCC), a federal regulatory agency, intervened and placed a limit on these fees.

An important issue during this period was efforts by irrigation districts to block trades outside their district. When inter-district trading had become possible around 1994, some district boards acted to prohibit or constrain the trading of water outside the district. The Victorian government, for example, imposed a 2 per cent limit on entitlements that could be traded out of an irrigation district in any one season.

In 2004, the NWI allowed an interim threshold limit of 4 per cent to be imposed on the volume of permanent trades outside an irrigation area, but with the proviso that this would be reviewed in 2009. Around this time, most major irrigation districts introduced *exit fees* on out-of-district water transfers. Also, some restrictions were being imposed on the ownership of entitlements by non-water users. In 2004 the Victorian govern-

emergence of ‘water barons’ following the unbundling of water licences. Finally, the ACCC intervened in 2009. It adopted rules prohibiting irrigation districts from unreasonably delaying or preventing water transfers. Instead of exit fees, it proposed that districts be allowed to impose a *termination* fee on irrigators wishing to end some or all of their right to water. The maximum termination fee was capped at 10 times the annual fixed charge for water service.

To be continued

- The underlying story is a tale of two vulnerabilities for both the wholesale water agency and for its member agencies (customers):
 1. Financial reliability
 2. Physical supply reliability
- The key challenge is that these work against one another.
 - A supply that is hydrologically more reliable is more expensive.
- The second key challenge is the distinctive economic nature of water supply infrastructure.
 - It is far more capital intensive and takes far more lead time than any other utility infrastructure such as that for electricity.
- Water supply agencies tend to have a governance structure that is backward looking.
 - Given the nature of water infrastructure, governance needs to be more forward-looking, giving more weight to those who will use, and pay for, the new infrastructure in the future, rather than those who used and paid for the old infrastructure.