

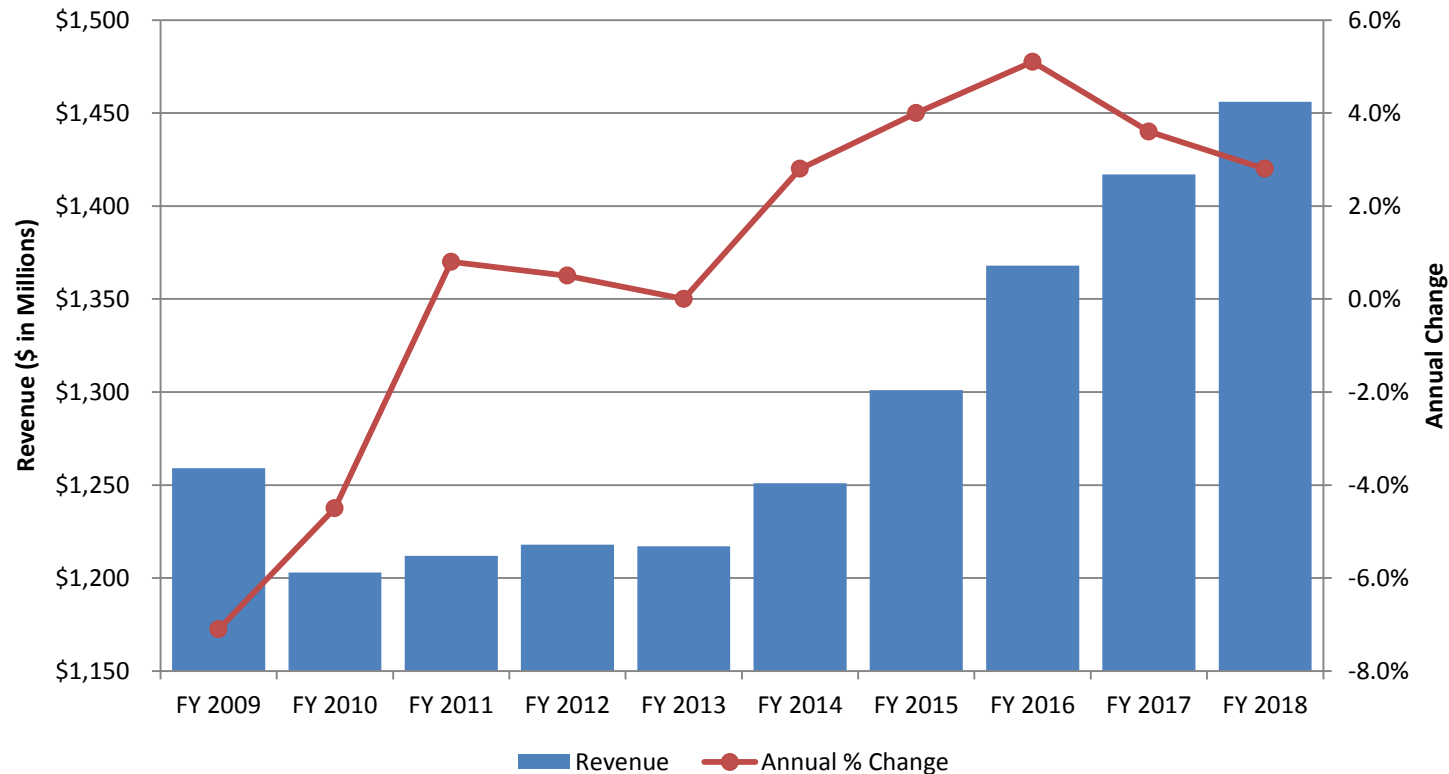
Arizona Department of Transportation

Highway User Revenue Fund (HURF) Forecasting Process

October 11, 2018

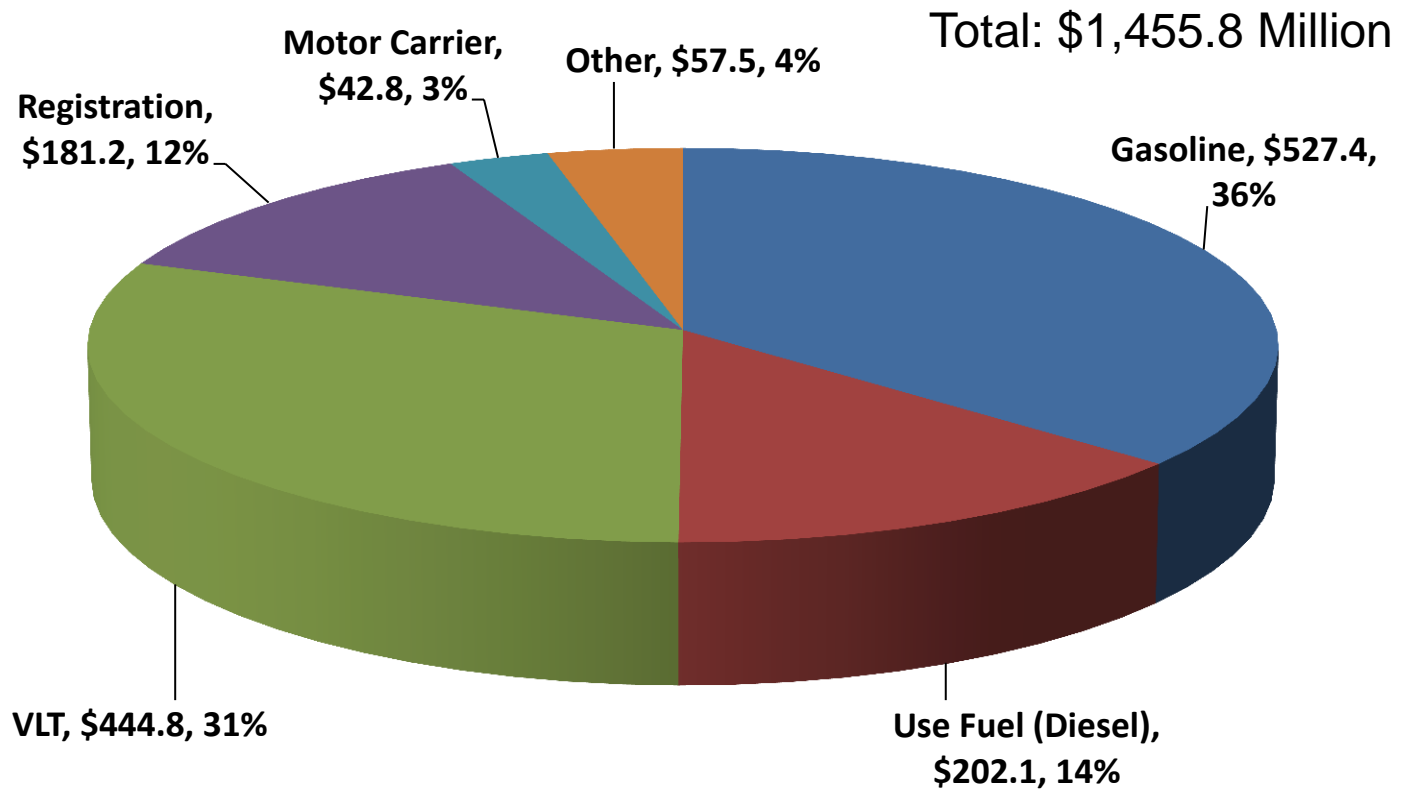
Prepared by: Joshua Worley, ADOT

Highway User Revenue Fund (HURF): FY2018 Revenues



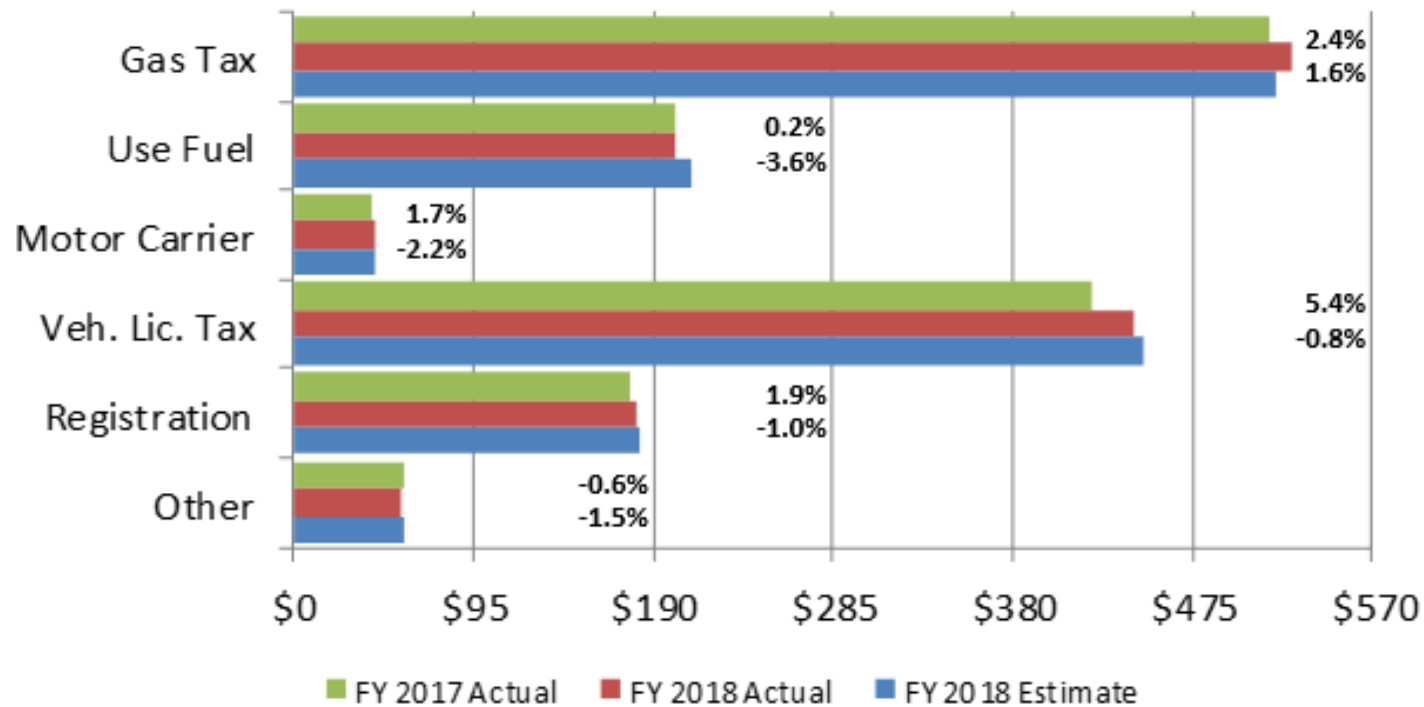
	FY 2017 Actual	FY 2018 Actual	Change	FY 2018 Estimate	Change
Total	\$ 1,416,523	\$ 1,455,779	2.8%	\$ 1,462,500	-0.5%

Highway User Revenue Fund (HURF): FY2018 Sources



Revenue in millions

Highway User Revenue Fund (HURF): FY2018 Revenue Category Performance



Revenue in millions

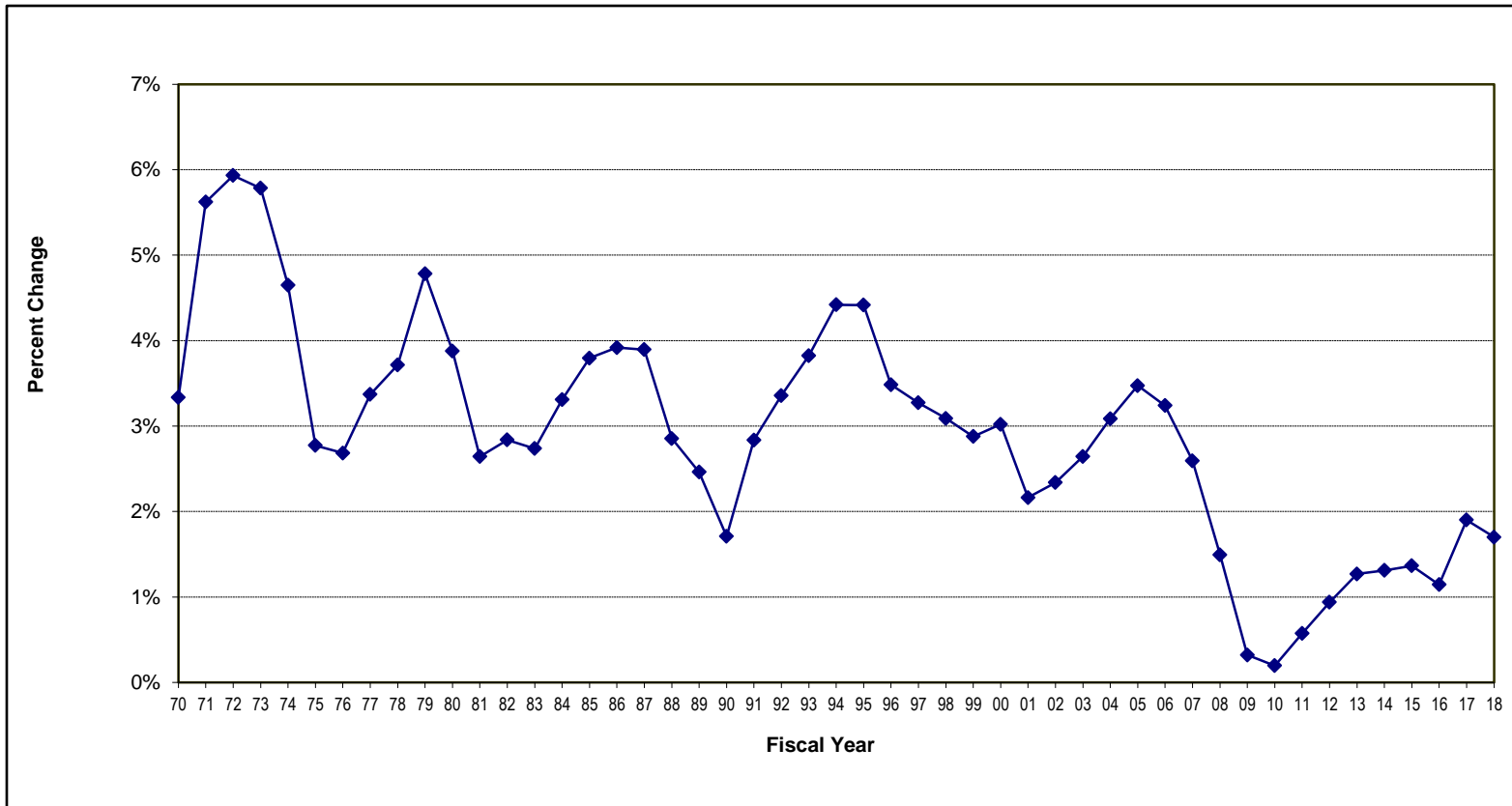
ADOT Forecasting Process for Each Revenue Category:

- 1. Determine factors that influence the category**
- 2. Gather historical data for each factor**
- 3. Use historical data to estimate a regression model**
- 4. Forecast each factor**
- 5. Use the forecasted factors to forecast revenue**

1. Determine Factors That Influence the Category: Highway User Revenue Fund (HURF)

- Population growth
- Personal income growth
- Non-farm employment growth
- Fuel economy (not forecasted by RAP panel)
- Gas price growth
- Diesel price growth

2. Gather Historical Data for Each Factor: Example: Arizona Population Growth



3. Use Historical Data to Estimate a Regression Model: Example: Gasoline Consumption

$$\begin{aligned} \ln(\text{Gasoline Gallons}_t) &= \beta_0 + \beta_1 \ln(\text{Population}_t) \\ &+ \beta_2 \ln(\text{RealPerCapitalIncome}_t) \\ &+ \beta_3 \ln(\text{FuelEconomy}_t) \\ &+ \beta_4 \ln(\text{RealGasolinePrice}_t) + \rho_1 \text{AR}(1) + \varepsilon_t \end{aligned}$$

Where:

AR(1) is a first-order autoregressive term

4. Forecast Each Factor:

2018 Risk Analysis Process (RAP) Panel

- Held in August 2018
- Ten economic and finance experts
- Estimated factors through 2038
- Panel discussed each factor together
- Each member of the panel submitted own estimates

4. Forecast Each Factor: Panelist Input Form for Each Input

Year	Median	Lower 10% Limit*	Upper 10% Limit*
2019			
2020			
2021			
2022			
2023			
2028			
2033			
2038			

* Indicates the upper and lower limits of an 80% confidence interval.

4. Forecast Each Factor:

Average Panelist Inputs for Arizona Population Growth

Year	Median	Lower 10%	Upper 10%
2019	1.69%	1.43%	1.95%
2020	1.63%	1.38%	1.92%
2021	1.58%	1.33%	1.86%
2022	1.54%	1.26%	1.82%
2023	1.53%	1.21%	1.80%
2028	1.37%	1.04%	1.77%
2033	1.32%	0.92%	1.77%
2038	1.19%	0.72%	1.79%

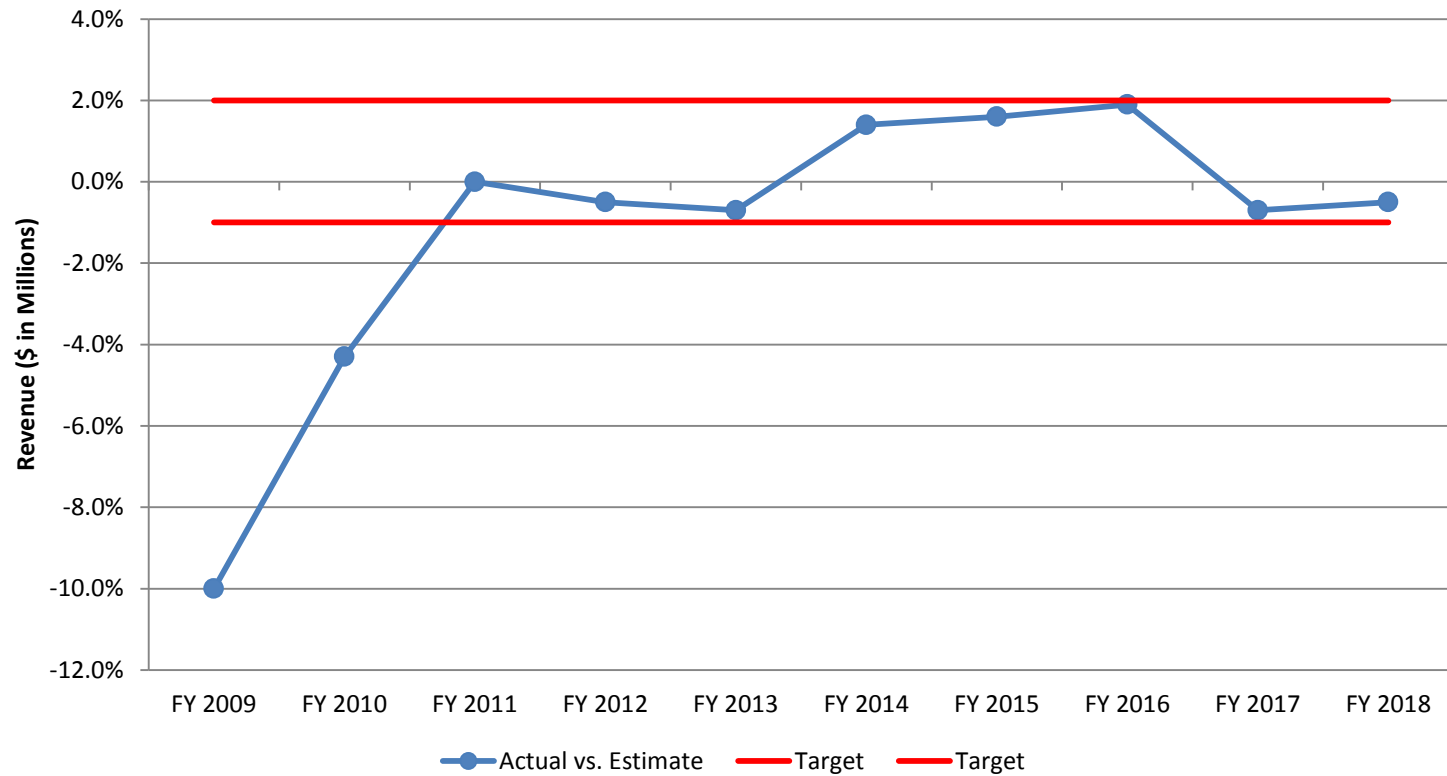
5. Use the Forecasted Factors to Forecast Revenue: Highway User Revenue Fund (HURF)

Fiscal Year	Mean	10%	20%	30%	40%	50%	60%	70%	80%	90%
2018	\$1,475.3	\$1,699.6	\$1,614.1	\$1,554.2	\$1,505.8	\$1,462.5	\$1,420.4	\$1,376.0	\$1,328.1	\$1,268.1
2019	1,541.6	1,875.3	1,743.7	1,652.8	1,581.4	1,517.4	1,456.1	1,391.7	1,324.3	1,239.2
2020	1,603.7	2,005.2	1,844.8	1,734.7	1,648.2	1,572.2	1,498.2	1,421.9	1,342.9	1,243.4
2021	1,663.7	2,116.7	1,932.8	1,808.4	1,711.2	1,625.9	1,543.9	1,458.3	1,369.5	1,259.9
2022	1,723.9	2,219.9	2,016.2	1,880.7	1,773.9	1,681.1	1,590.4	1,499.5	1,403.0	1,286.3
2023	1,784.9	2,318.6	2,097.7	1,952.0	1,836.5	1,736.7	1,639.9	1,543.3	1,440.0	1,317.4
2024	1,847.0	2,413.1	2,178.9	2,022.5	1,900.4	1,793.5	1,692.2	1,590.1	1,481.0	1,351.6
2025	1,910.6	2,510.0	2,259.8	2,093.7	1,965.6	1,853.4	1,747.2	1,638.7	1,524.4	1,386.6
2026	1,975.8	2,606.9	2,342.8	2,168.4	2,032.4	1,914.9	1,802.6	1,688.3	1,569.0	1,427.6
2027	2,042.5	2,702.9	2,426.5	2,240.8	2,100.5	1,977.7	1,860.3	1,741.1	1,617.7	1,466.7
Total	\$17,569.1	\$22,468.2	\$20,457.2	\$19,108.2	\$18,055.8	\$17,135.2	\$16,251.2	\$15,348.8	\$14,400.0	\$13,246.9

5. Use the Forecasted Factors to Forecast Revenue: Highway User Revenue Fund (HURF) Categories

Fiscal Year Percentile	2017 Actual	2018 N/A	2019 50%	2020 50%	2021 50%	2022 50%	2023 50%	2024 50%	2025 50%	2026 50%	2027 50%
Gasoline Tax	\$515.1	\$519.2	\$530.5	\$541.9	\$549.9	\$558.2	\$566.4	\$575.0	\$583.6	\$592.8	\$601.8
Use Fuel Tax	201.7	209.6	219.0	228.3	236.9	245.2	253.1	260.7	269.1	276.8	285.2
Motor Carrier Fee	42.1	43.8	44.7	45.9	47.3	48.9	50.4	52.0	53.6	55.2	56.9
Vehicle License Tax	421.9	448.5	476.6	505.2	534.9	565.6	597.4	629.9	664.4	700.3	737.2
Registration	177.9	183.0	185.9	188.2	192.5	197.0	201.5	206.2	211.1	216.3	221.3
Other	57.8	58.4	60.7	62.7	64.4	66.2	67.9	69.7	71.6	73.5	75.3
Total	\$1,416.5	\$1,462.5	\$1,517.4	\$1,572.2	\$1,625.9	\$1,681.1	\$1,736.7	\$1,793.5	\$1,853.4	\$1,914.9	\$1,977.7

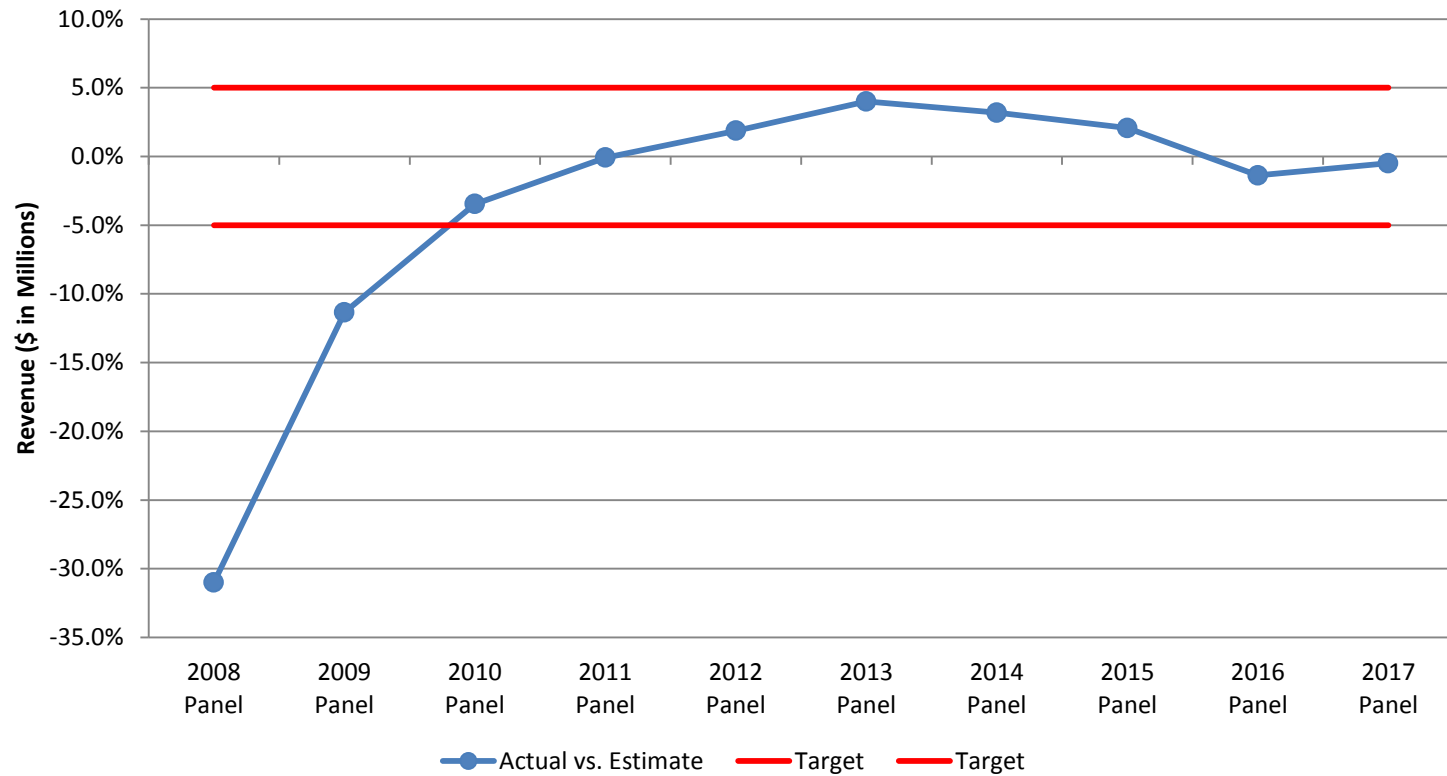
HURF Forecast Short-term Accuracy: Fiscal Year Actuals vs. the Most Recent Forecast



“FY 2015 actual revenues were 1.6 percent above the FY 2015 forecast created in 2014.”

HURF Forecast Long-term Accuracy :

FY 2018 Actuals vs. the Last 10 Long-term Forecasts



“FY 2018 actual revenues were 3.2 percent above the FY 2018 forecast created in 2014.”

ADOT Publishes Our HURF and RARF Forecast Results

<https://azdot.gov/about/FinancialManagementServices/transportation-funding/highway-user-revenue-fund>

<https://azdot.gov/about/FinancialManagementServices/transportation-funding/regional-area-road-fund>

Published reports include:

- Revenue forecasts for each category
- Historical data for each factor
- Panelist forecasts for each factor

Questions?

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