Decision Center for a Desert City
Arizona State University

Water Management Awareness

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Tempe

Research Question

➤ **How does the outdoor water consumption across the different commercial properties differ with the temperature change, precipitation change, irrigation controller and landscape style within the year and across the years?**

➤ **How does landscape affect the water usage?**

Background

➤ Many limited natural resources are causing anxiety and concerns.

➤ US EPA reported 9 million gallons of water usage per day due to irrigation.

➤ It was estimated 50% of wasted water is because of irrigation control system.

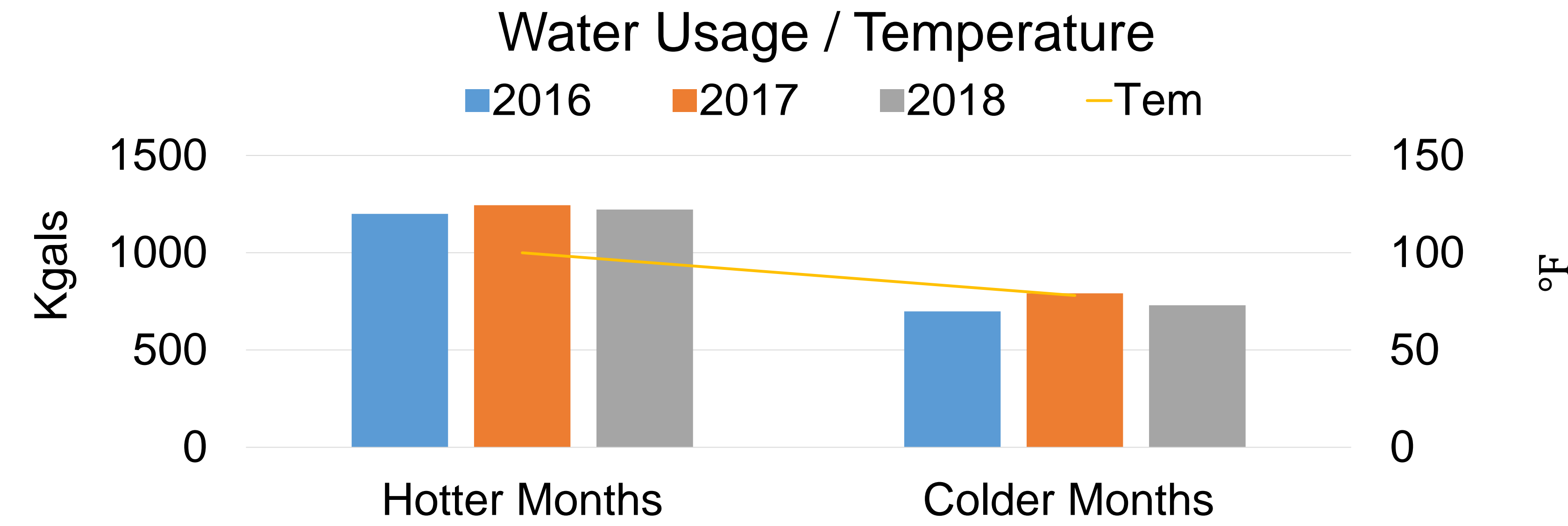➤ Water usage exceeds the water budget.

Research Purpose

➤ Identify the water usage change through the Temperature and precipitation.

➤ Identify the water usage change through the landscape and irrigation controller type.

➤ show and compare the water usage and water budget.

Data Analysis and Methods

ORACLE UTILITIES → Excel → IBM SPSS
↕
ArcGIS
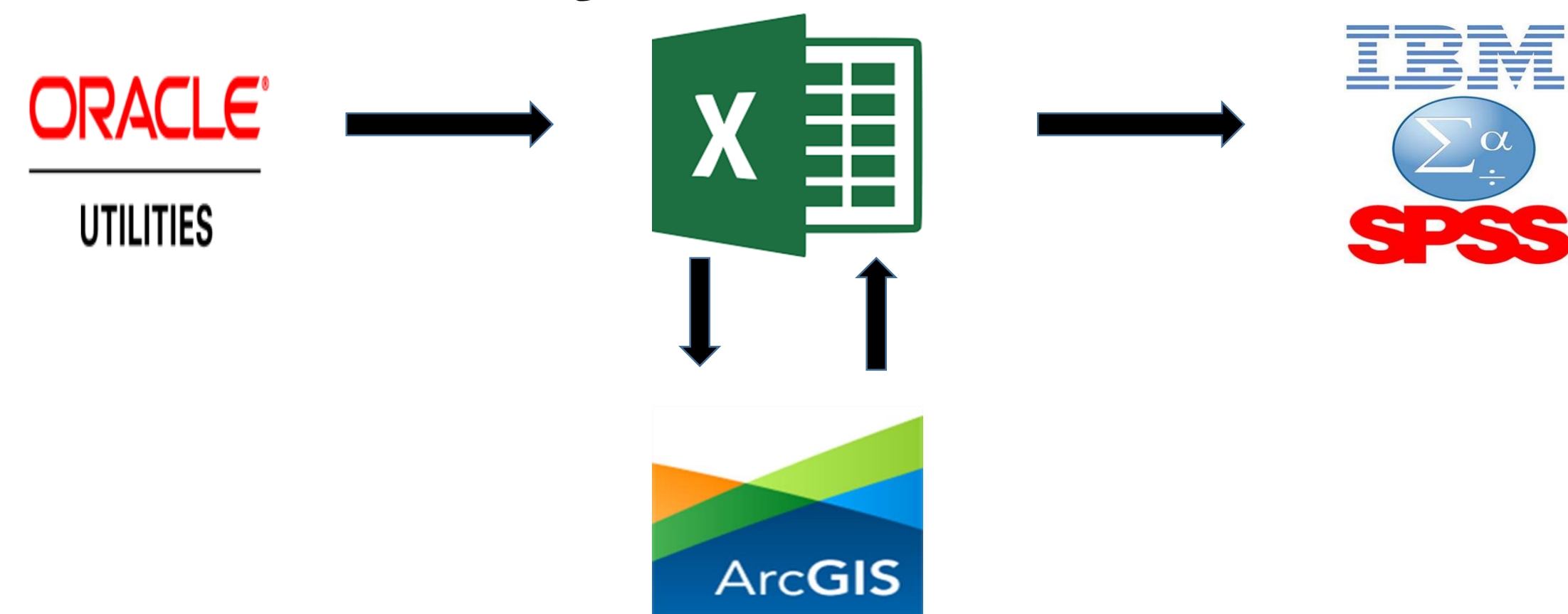
ORACLE – Data Source; Excel – Data Analysis
ArcGIS – Mapping; SPSS – Statistical Analysis

Results

Water Usage / Temperature

Bar chart: 2016, 2017, 2018 — Tem (temperature). Kgals vs °F. Hotter Months and Colder Months.
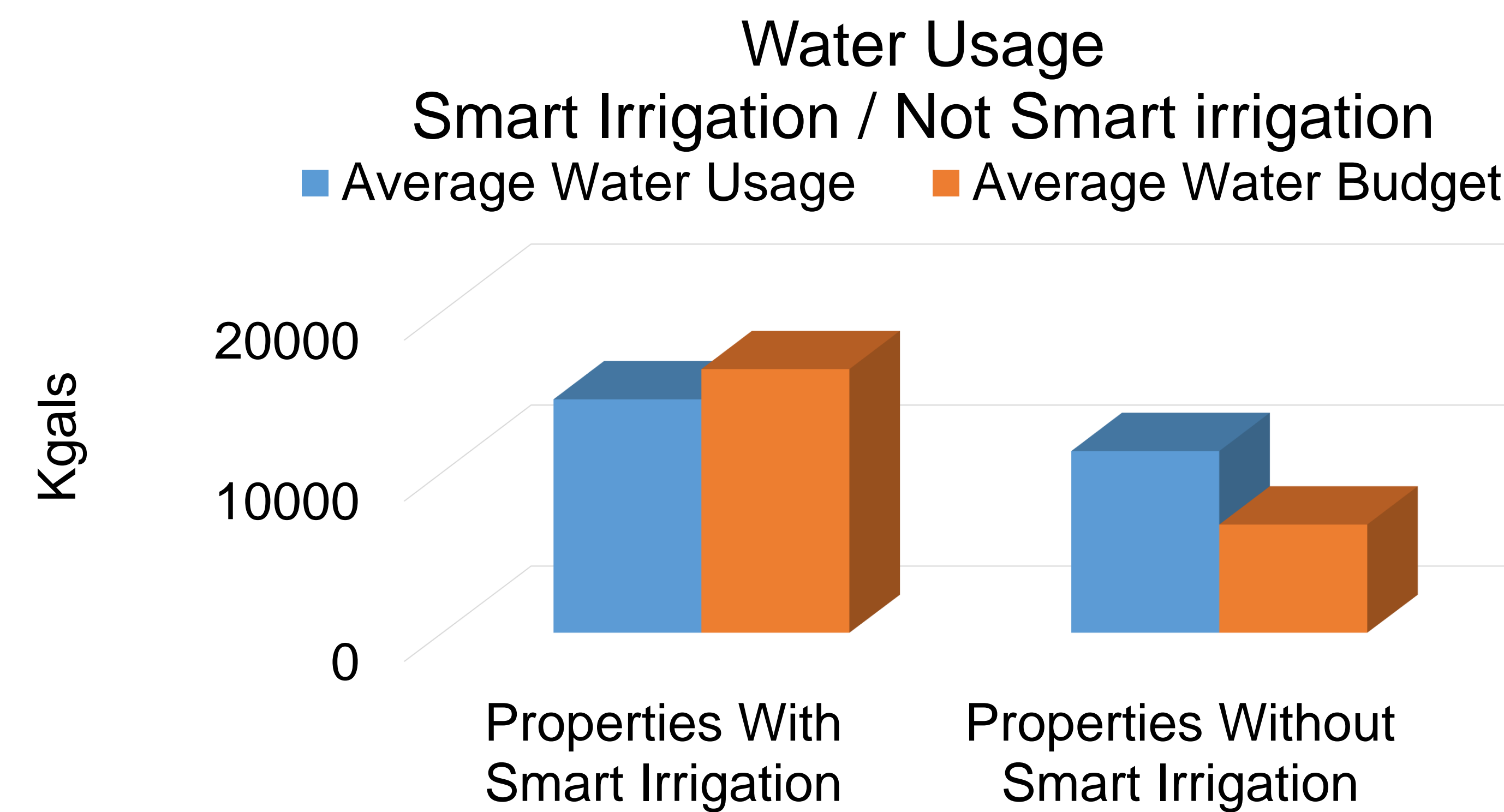
➤ Hotter months: May-Sep. The total average water usage: 3666 Kgals.

➤ The average temperature: 100.33 °F.

➤ Colder months: Oct - Apr. The total average water usage: 2219 Kgals.

➤ The average temperature: 77.76 °F .

Precipitation and Water Usage

➤ The statistic shows a significant difference in water usage as the precipitation goes high and low (p=0.0). It is different within and not across. The precipitation does not predict the water usage by itself.

Water Usage Smart Irrigation / Not Smart irrigation

Bar chart: Average Water Usage, Average Water Budget. Properties With Smart Irrigation and Properties Without Smart Irrigation.

➤ The average water usage and budget of the properties with smart irrigation control system are about the same. The water usage of each property is within or very close to the water budget.

➤ The average water usage and budget of the properties without smart irrigation control system are significantly different (p=0.005).

➤ Some properties stayed within their budget even without using smart irrigation.

➤ It is possible to stay within the water budget range with better, persistence and constant water management.

Landscape / Water demand

Line chart: Turf Area, Desert Area. Kgals vs Square Footage.
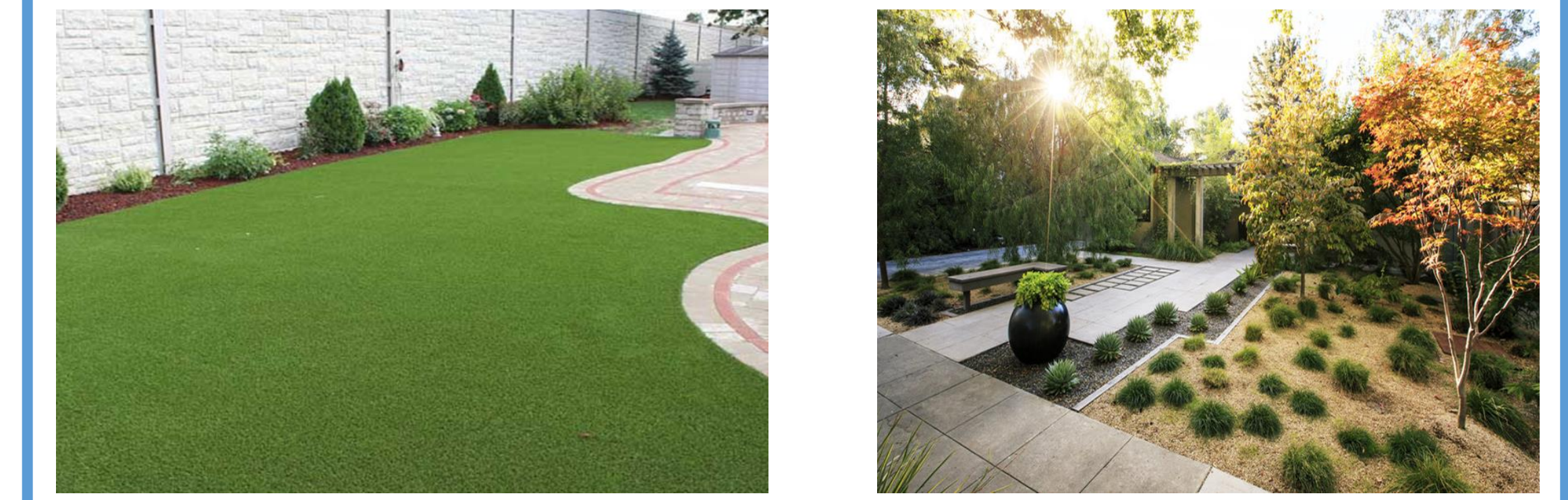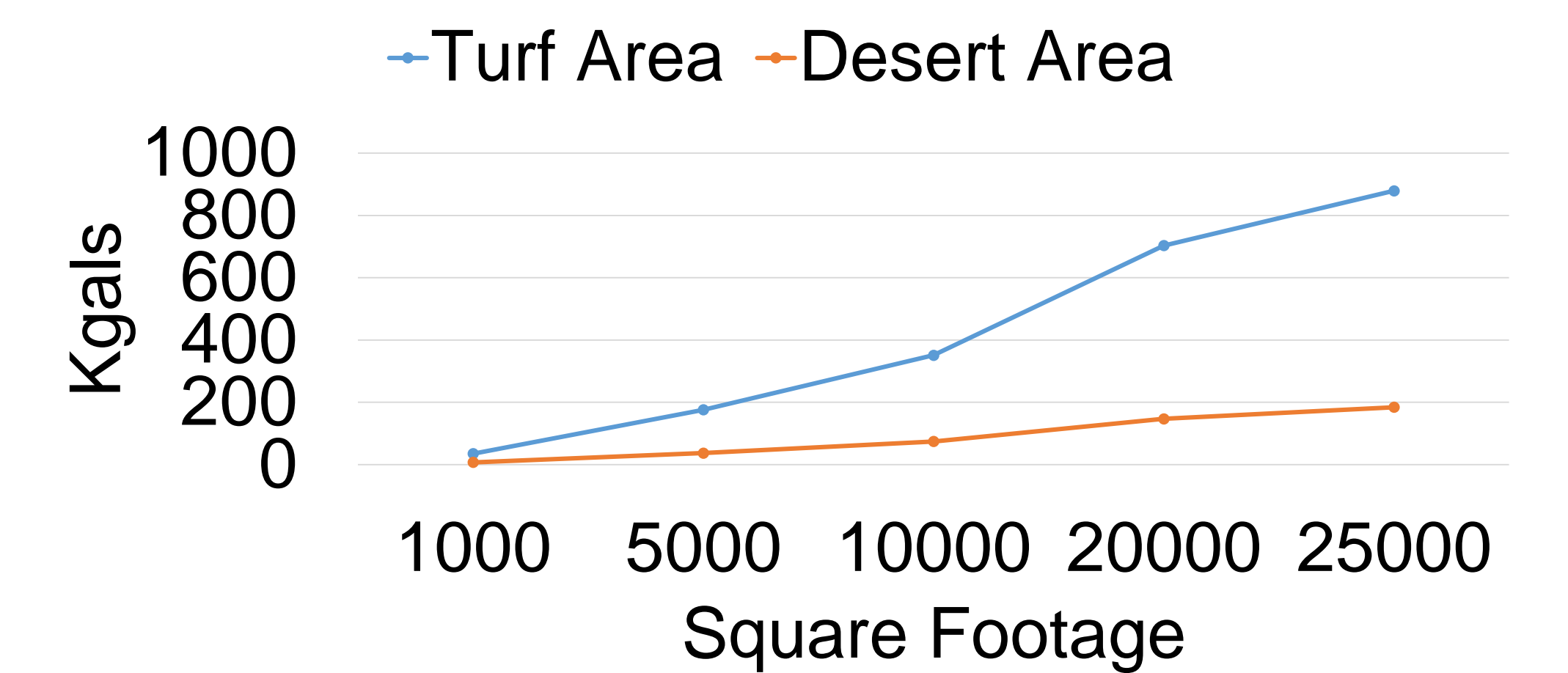
Findings

➤There is a significant water usage change within and not across the years(p=0.0).

➤A unit increase in temperature translates to a 19.159 Kgals increase in water use.

➤Smart irrigation controller use translates to a reduction of water use by 701.502 Kgals.

➤ 1k sq. ft. turf requires 35 kgals and 1k sq. ft. desert requires 7 kgals. The higher the turf square footage, the higher the water demand.

➤ In addition to smart controller, better water management lead to a reduction in water usage.

RECOMMENDATION: It would be beneficial for either water department or water users in Tempe if the smart irrigation controllers are used more and improve management of the system in more efficient way .