

Adapting a Green Roof For Tucson, AZ

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Research Goals

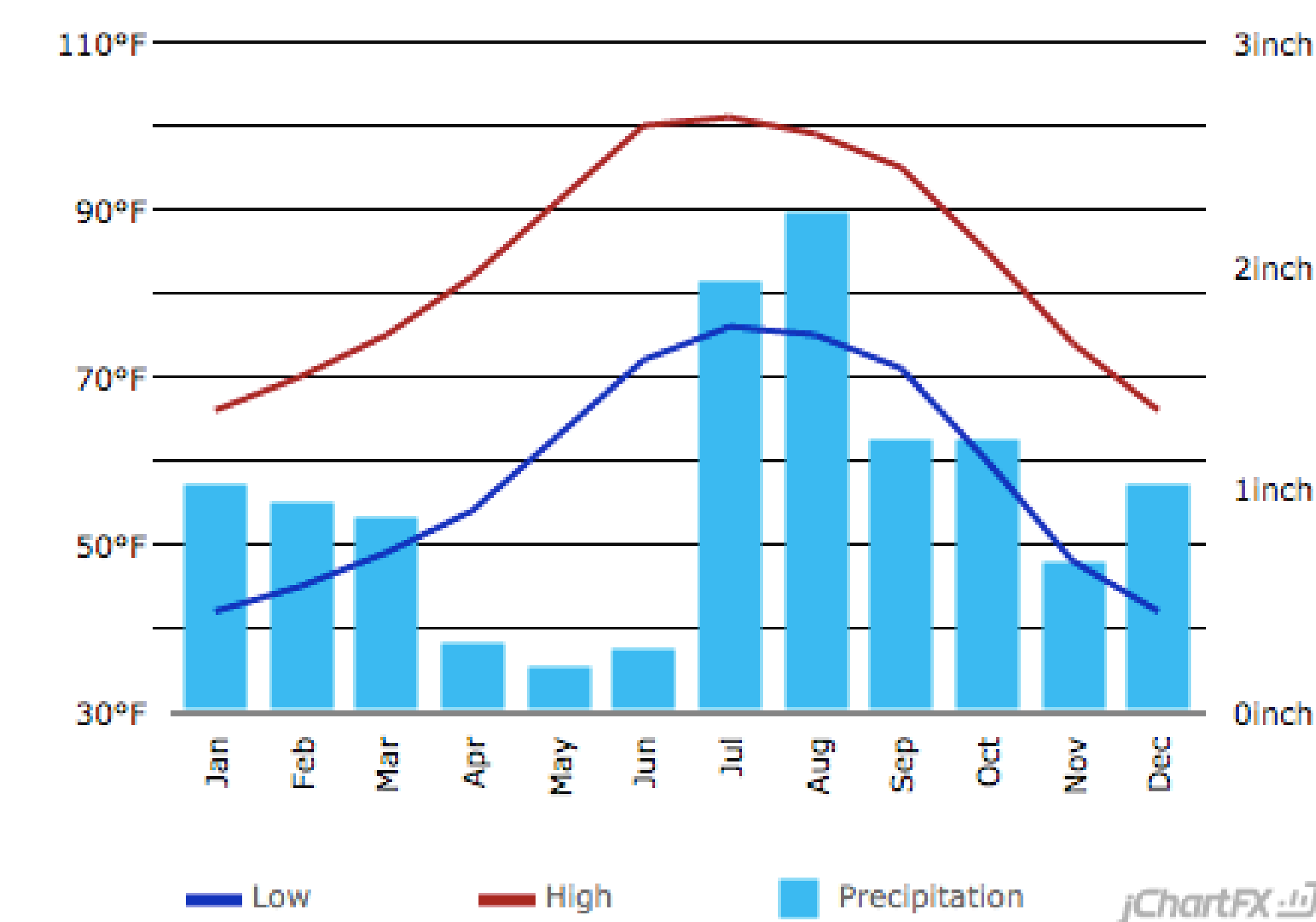
The goal of this study is to fill the gap in our knowledge about the performance of green roofs and their benefits for commercial buildings in Tucson, Arizona's hot and arid urban climates.

Methodology

The methodology of this report includes extensive research on current literature of the benefits, cost, and retrofitting green roofs for hot and arid climates. Followed by creating a cost benefit analysis for an extensive green roof.

Project Site: Tucson, Arizona

Tucson Climate Graph - Arizona Climate Chart



Hot and arid climate with an average annual high of 83°F and a low of 58°F. The average annual precipitation for the region is 11.9 in.



- Extensive Vegetation (sedums, etc.)
- Growing Media
- Filter Fabric
- Moisture Retention / Drainage Panel
- Insulation
- Root Barrier
- Protection Filter
- Waterproofing Membrane
- Roof Deck

COST

Extensive Roof Retrofit Costs (per square foot)	
Initial premium	-\$12.6
NPV of installation & maintenance	-\$18.2
NPV stormwater (savings from reduced infrastructure improvements)	\$14.1
NPV of energy (savings from cooling and heating)	\$6.6
Net Present Value Total (installation, maintenance, storm water, & energy)	\$2.5
Internal rate of return	5%
Payback period	6.4
Return on investment	220%

SAVINGS

Other Financial Impacts (per square foot)	
NPV of GHG savings	\$2.1
NPV of Real Estate (value & rent)	\$120.1
NPV of Community Benefits	\$30.4

LOCATION



The roof area available for gardening is roughly around 10,850 ft² (70%). This research looked into only retrofitting 5,000 ft² (30%) over a period of 50-years.



Utilizing suitable plants is key to building healthy green roofs with low irrigation and maintenance requirements in the arid West. Plants like the Opuntia basilaris for example perform well in five to seven inches of growing medium.

Conclusion

The study was set out to explore the economic feasibility of building extensive green roofs on commercial buildings in Tucson, Arizona based off of the payback of energy savings and public benefits. There is limited research on drought resistant landscaping for green roofs in hot and arid climates. The cost benefit analysis and research support the findings that green roofs offer a great amount of savings and can be adapted for the extreme temperatures in Tucson, Arizona.