



Integrated Resource Management

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Integrated Approaches



Integrated Permitting



Integrated Planning



Integrated Resource Management



Integrated Permitting

Combining common
regulatory goals for most cost
effective solutions





Integrated Planning

Developing plans and strategies for a common resource to be sustainable and efficient





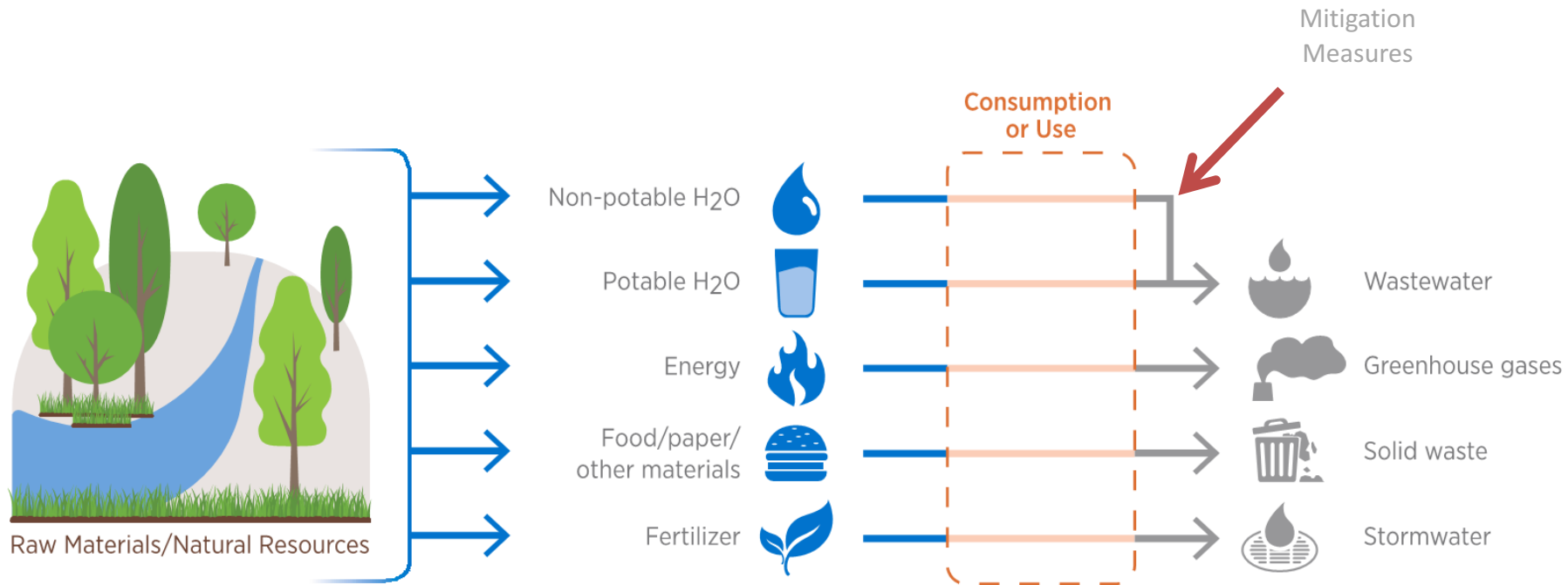
Integrated Resource Management

Viewing wastes as a resource across resource types.

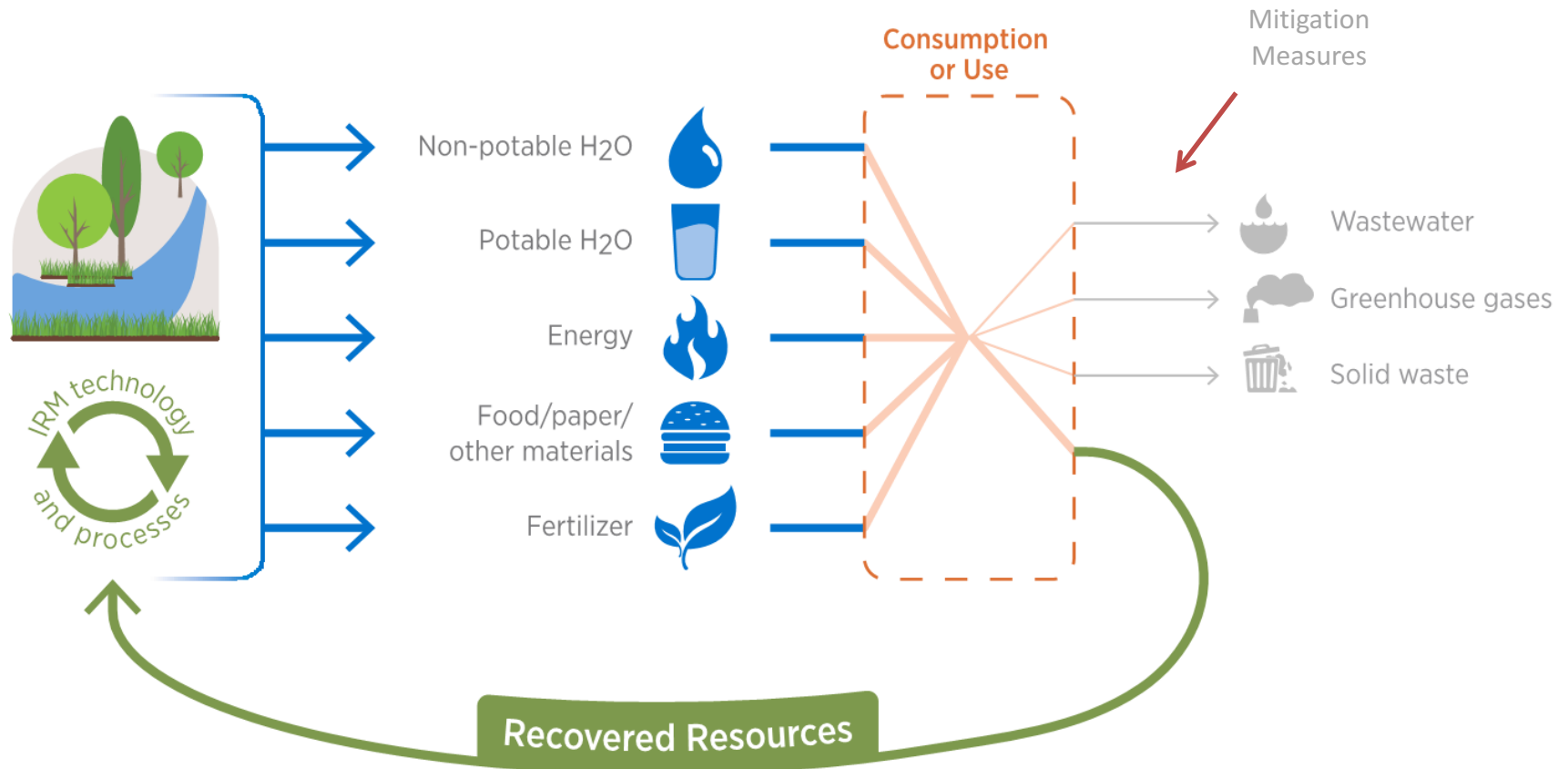


2270 Folsom Street's non-potable water reuse system

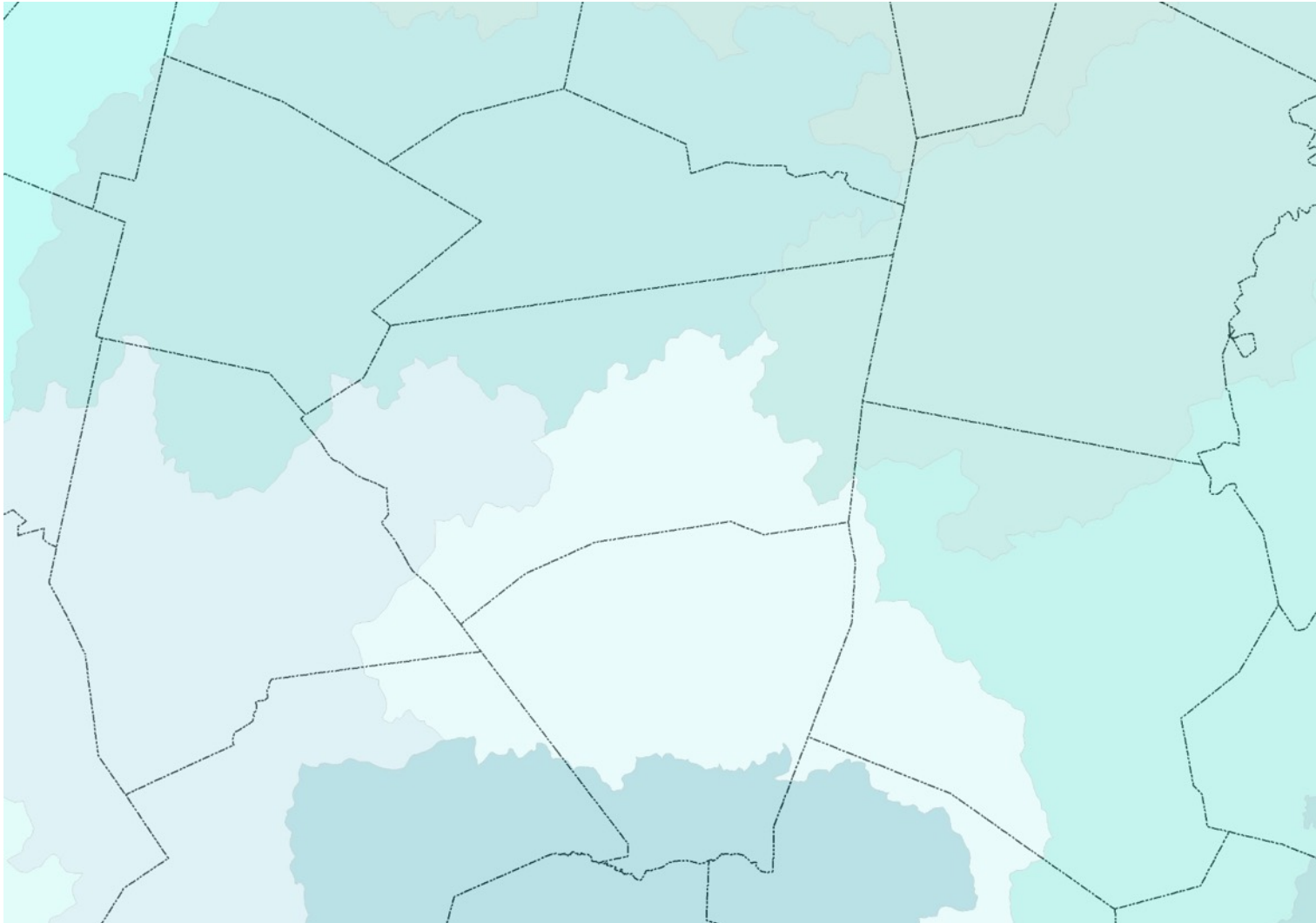
Traditional Resource Management



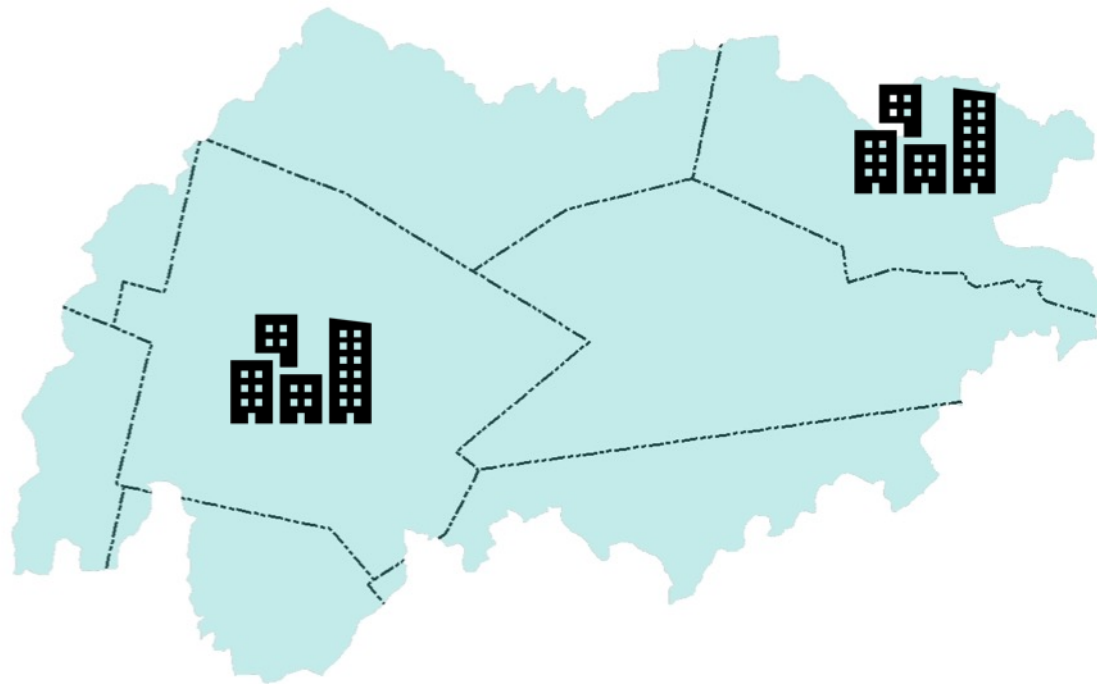
Integrated Resource Management



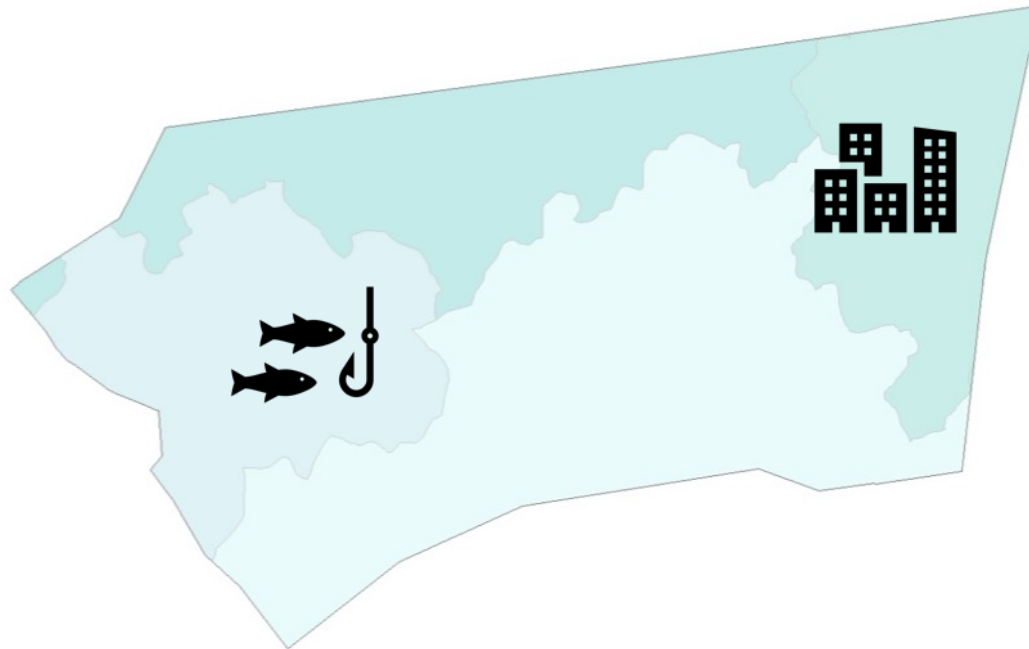
Scales of Implementation



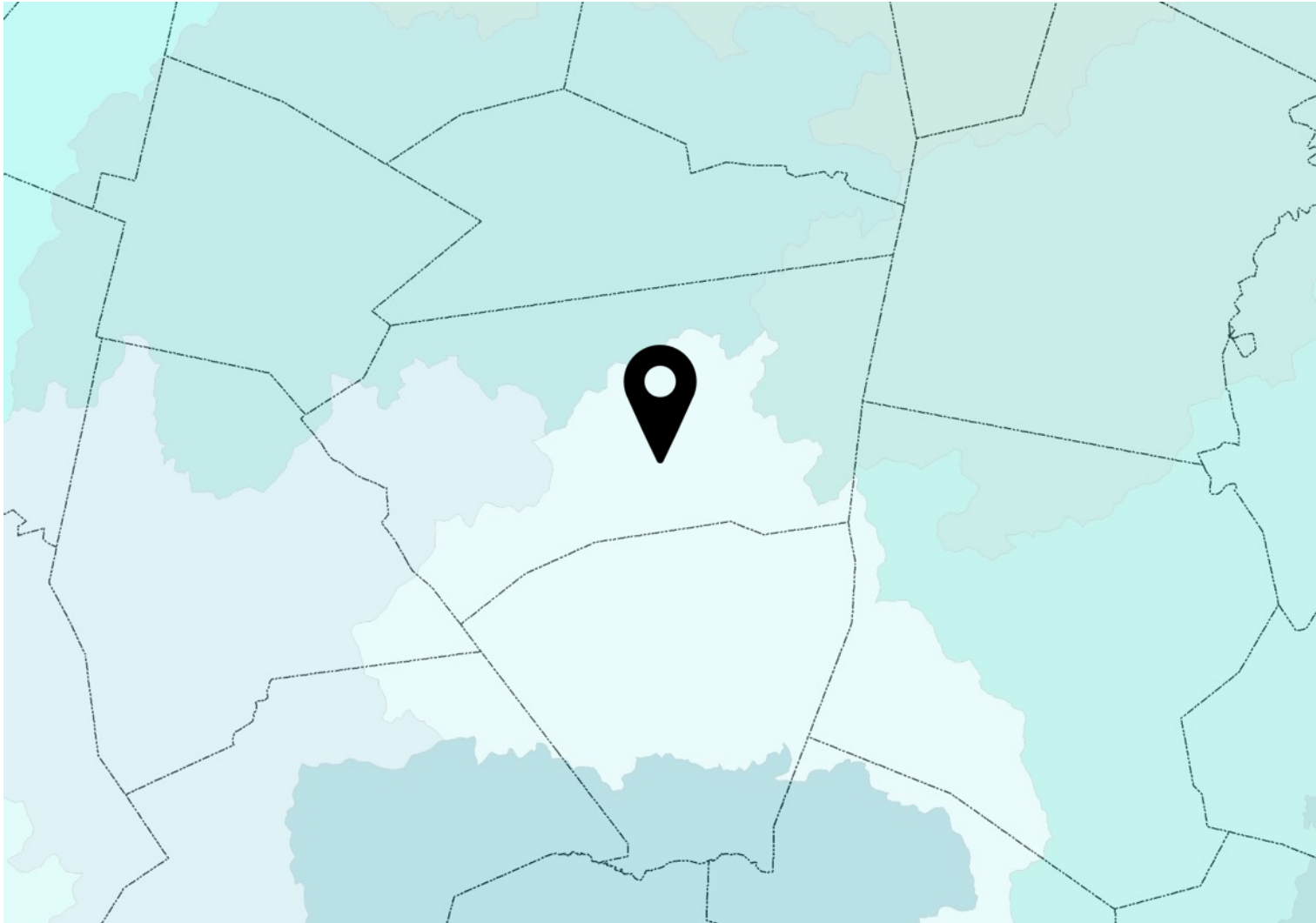
Scales of Implementation



Scales of Implementation

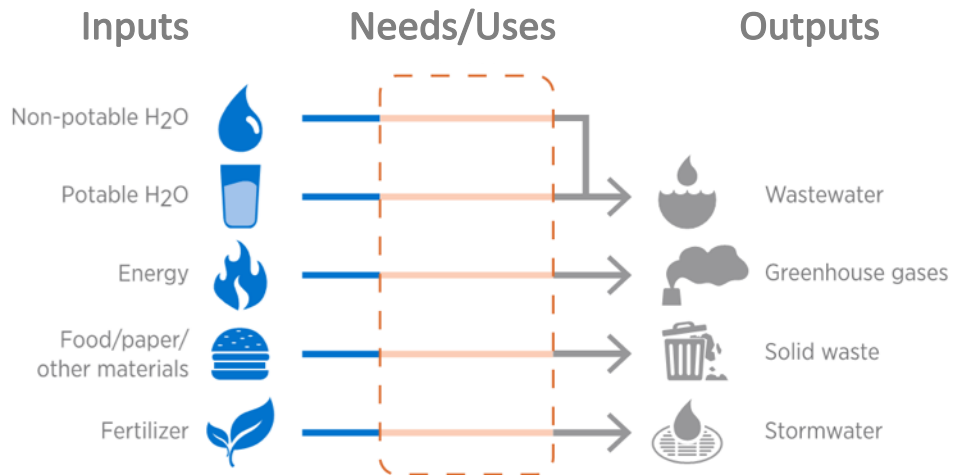


Scales of Implementation



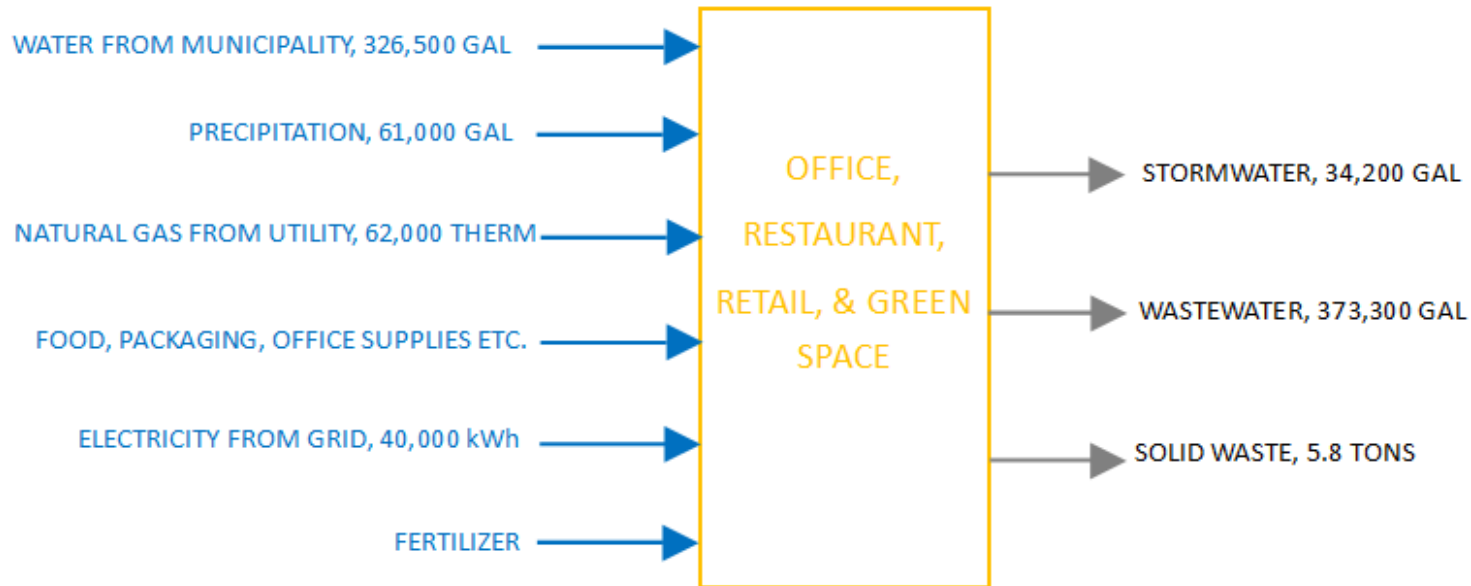
IRM Case Studies

- Scope
 - Characterize IRM drivers and goals
 - Identify and select IRM opportunities
- Approach
 - Resource stream analysis



Land Development Case Study

Traditional Design



Cost Assessment

Capital: \$356 Million

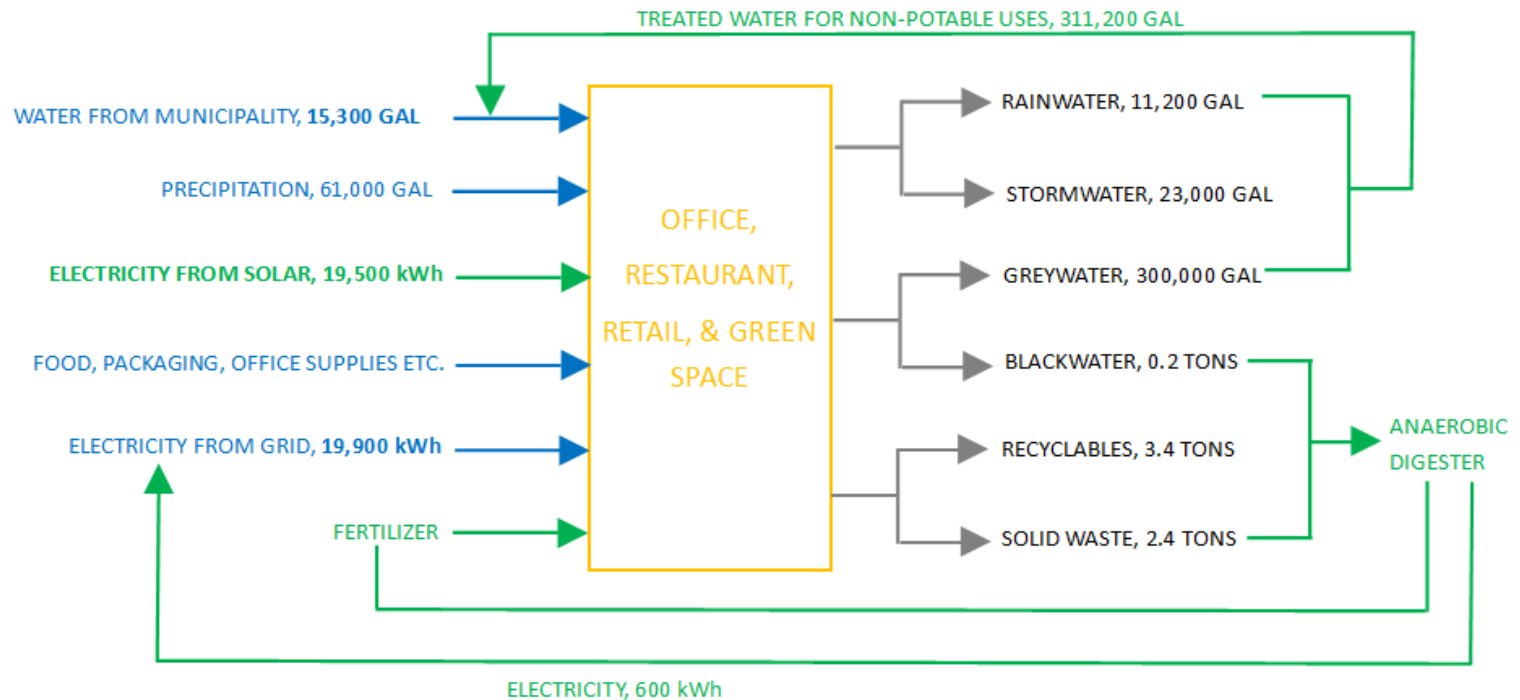
Annual Operating: \$1.9 Million

Land Development IRM Opportunities

IRM Category	Opportunities
Generation	<ul style="list-style-type: none">• Solar panels
Recovery	<ul style="list-style-type: none">• Waste to energy facility• Anaerobic digestion• Low Impact Development
Treatment	<ul style="list-style-type: none">• Constructed wetlands• Membrane bioreactor
Separation	<ul style="list-style-type: none">• Source separation of wastewater• Packaging or composting toilets
Conservation	<ul style="list-style-type: none">• Low-flush toilets• Composting• Passive lighting

Land Development Case Study

Integrated Resource Management



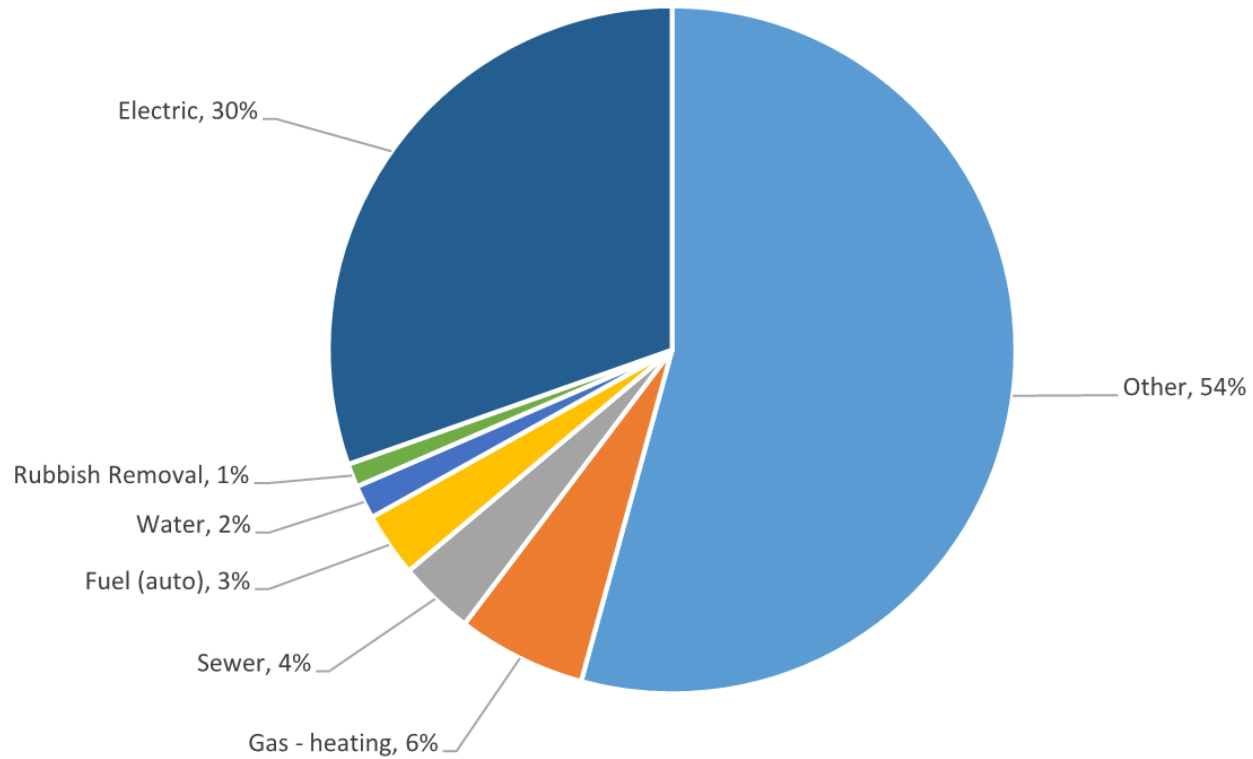
Cost Assessment

Capital: \$371 Million

Annual Operating: \$0.5 Million

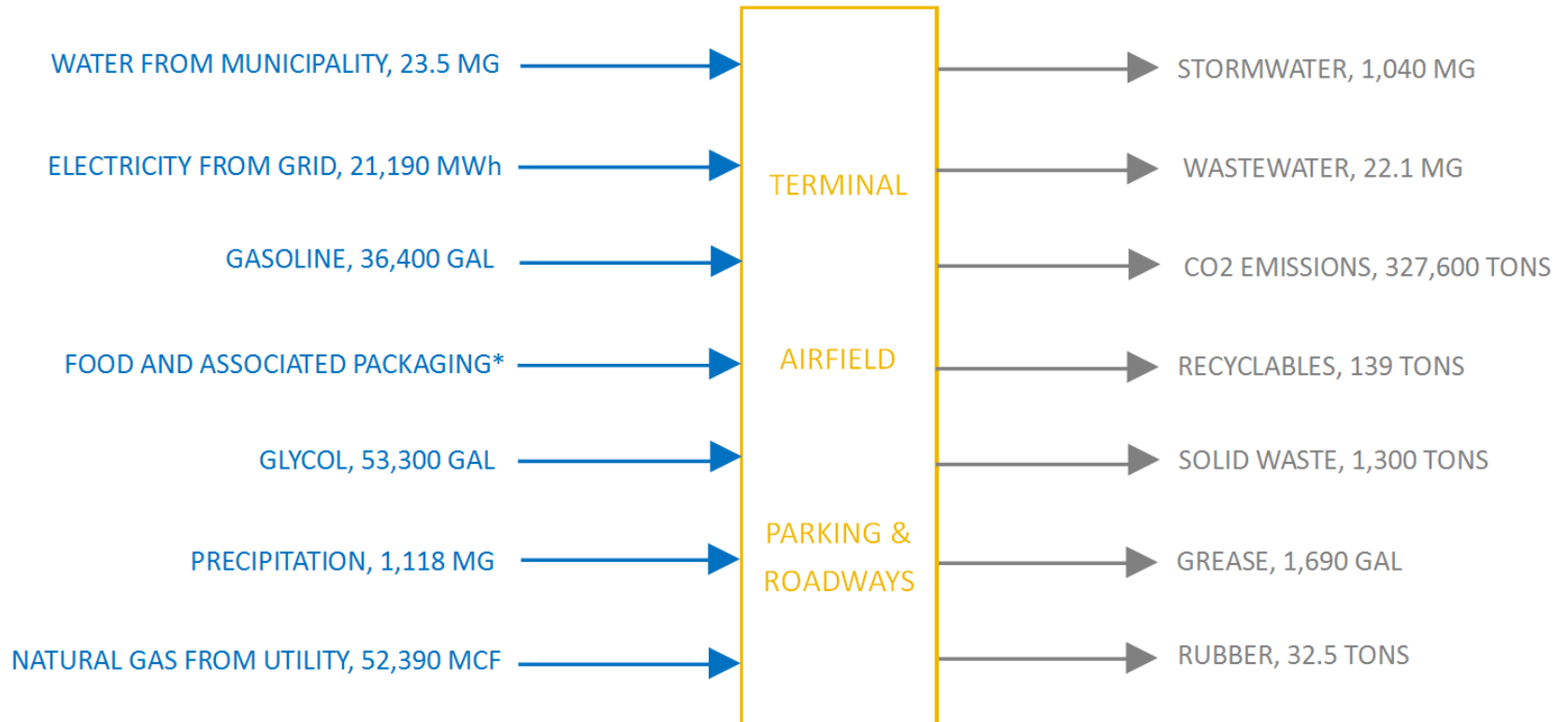
Airport Case Study

Operating Expenses:
Supplies, Materials, and Services



Airport Case Study

Current Operations

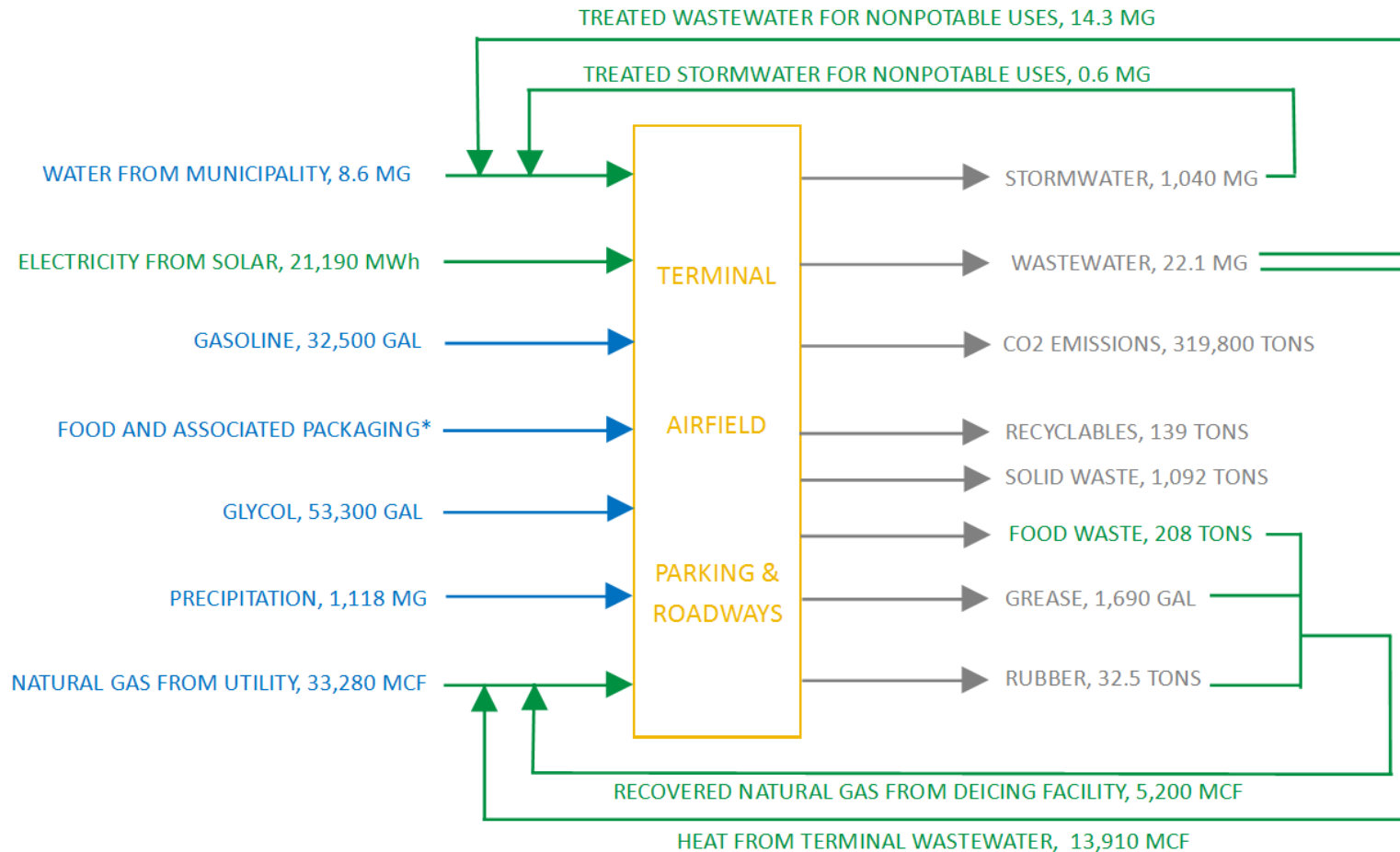


Airport IRM Opportunities

IRM Category	Opportunities
Generation	<ul style="list-style-type: none">• Solar panels
Recovery	<ul style="list-style-type: none">• Waste to energy facility• Existing deicing treatment facility• Wastewater heat pumps
Treatment	<ul style="list-style-type: none">• Rainwater harvesting and stormwater reuse• Onsite wastewater treatment
Separation	<ul style="list-style-type: none">• Source separation of wastewater
Conservation	<ul style="list-style-type: none">• Low-flush toilets• Electric fleet vehicles• Composting

Airport Case Study

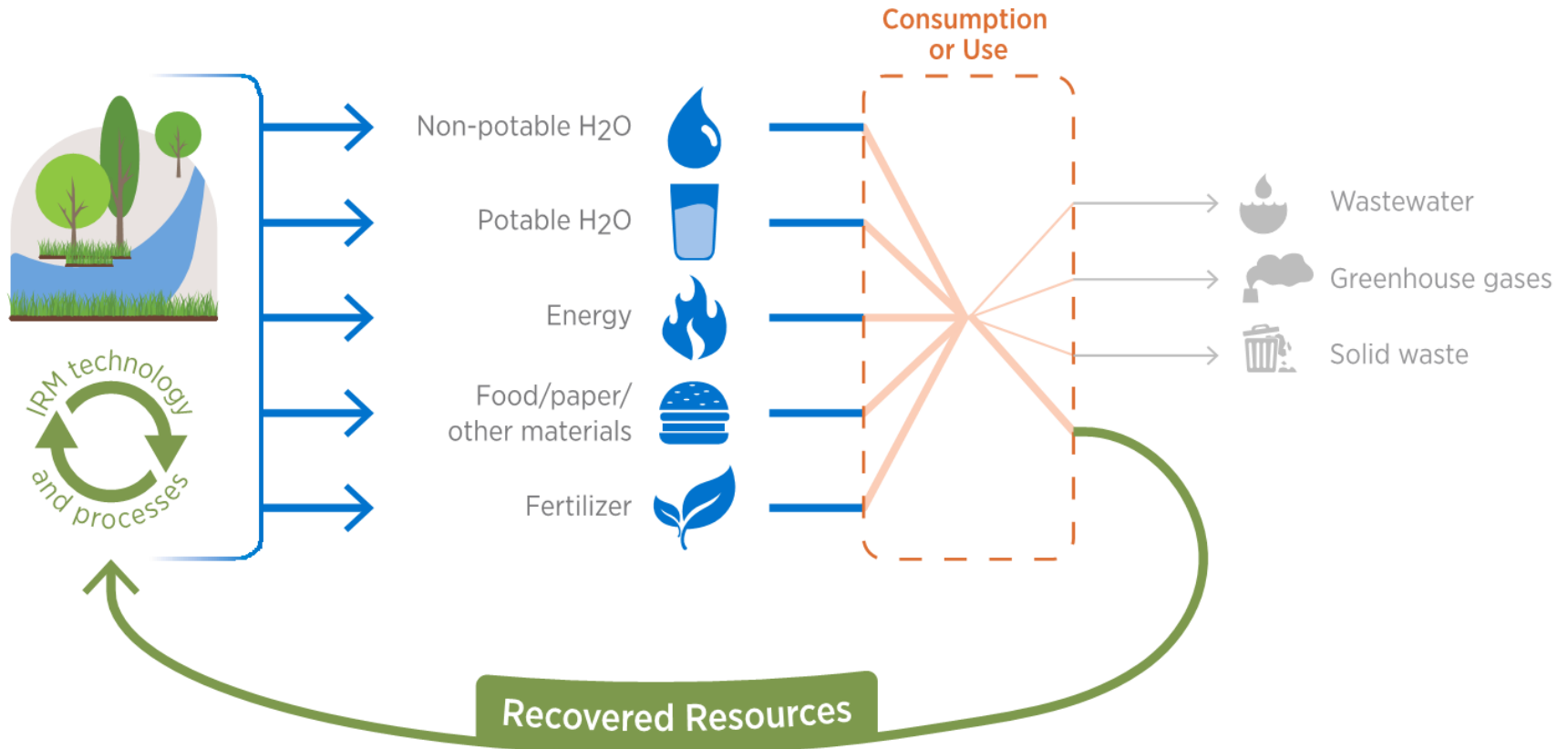
Operations with IRM



Airport Case Study Conclusions

	Current Operations	Operations with IRM
Capital Cost	--	\$35 Million
Annual Operating Expenses (analyzed in this study)	\$3.0 Million	\$0.6 Million
Annual Savings	--	\$2.4 Million
Payback Period	--	14.5 years
Cost Per Enplanement (after payback period)	\$16.72	\$15.70

Final Thoughts



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