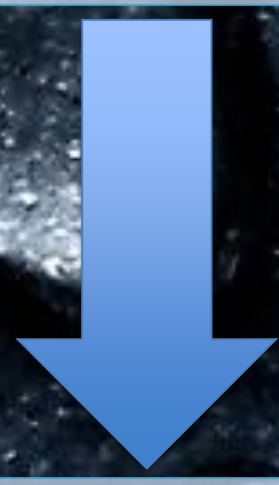


Rainwater Catchment System to Reduce Pollution

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PROBLEM

- Rainwater runoff in Central Massachusetts is a continuous problem that is polluting nearby bodies of water.
- Agriculture is the largest user of water in the United States, so sustainable agriculture can reduce energy use and water use.



EFFECTS OF THE PROBLEM:

- Erodes freshwater sources and imposes health, financial, and environmental costs on communities.
- Chemicals from non-porous pavements and fertilizers from farming can be carried into freshwater sources and pollute drinking water

GOAL:

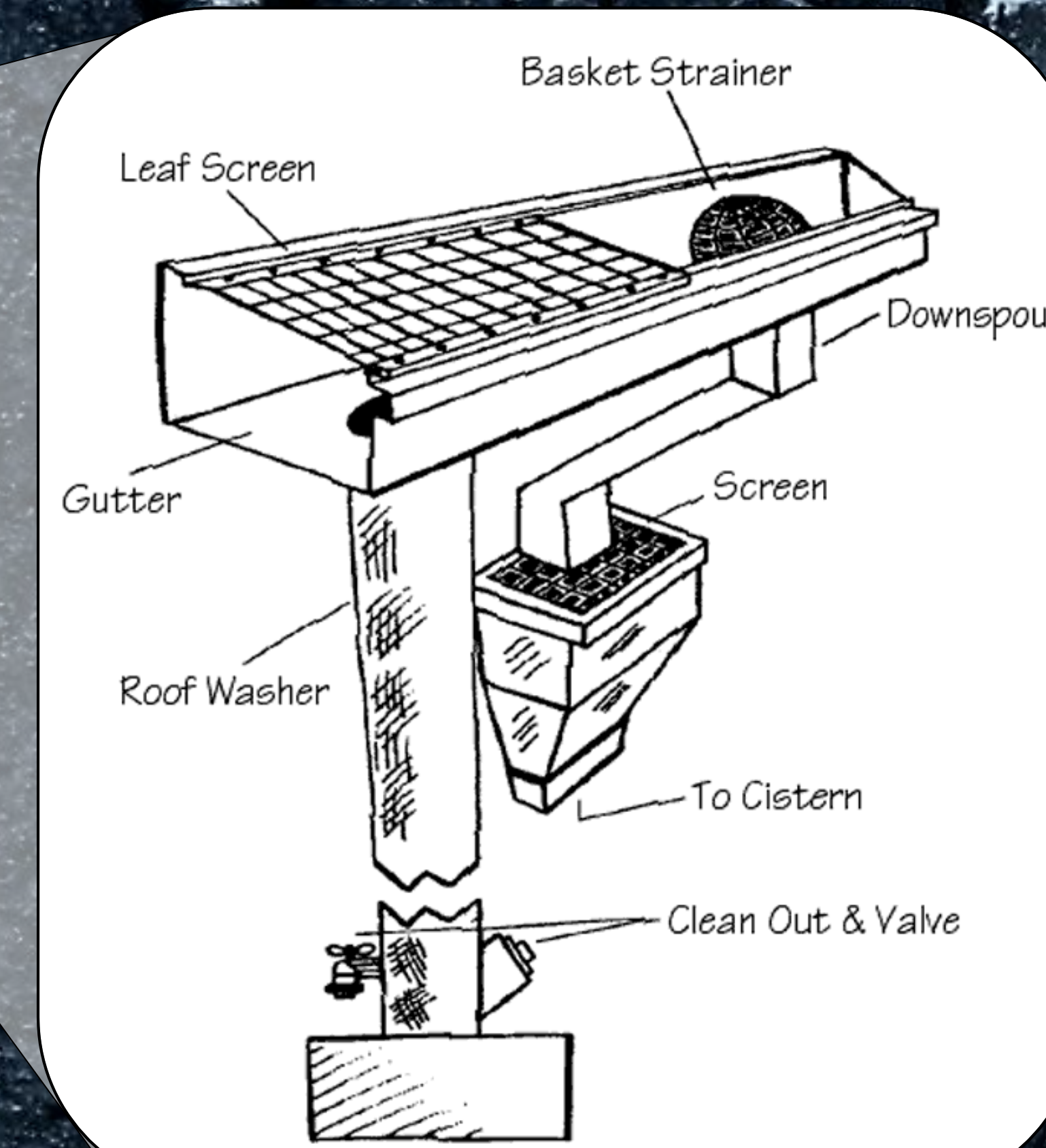
Design a model for a rainwater catchment system that can be used on most greenhouses (solar or non-solar).

RESEARCH STEPS:

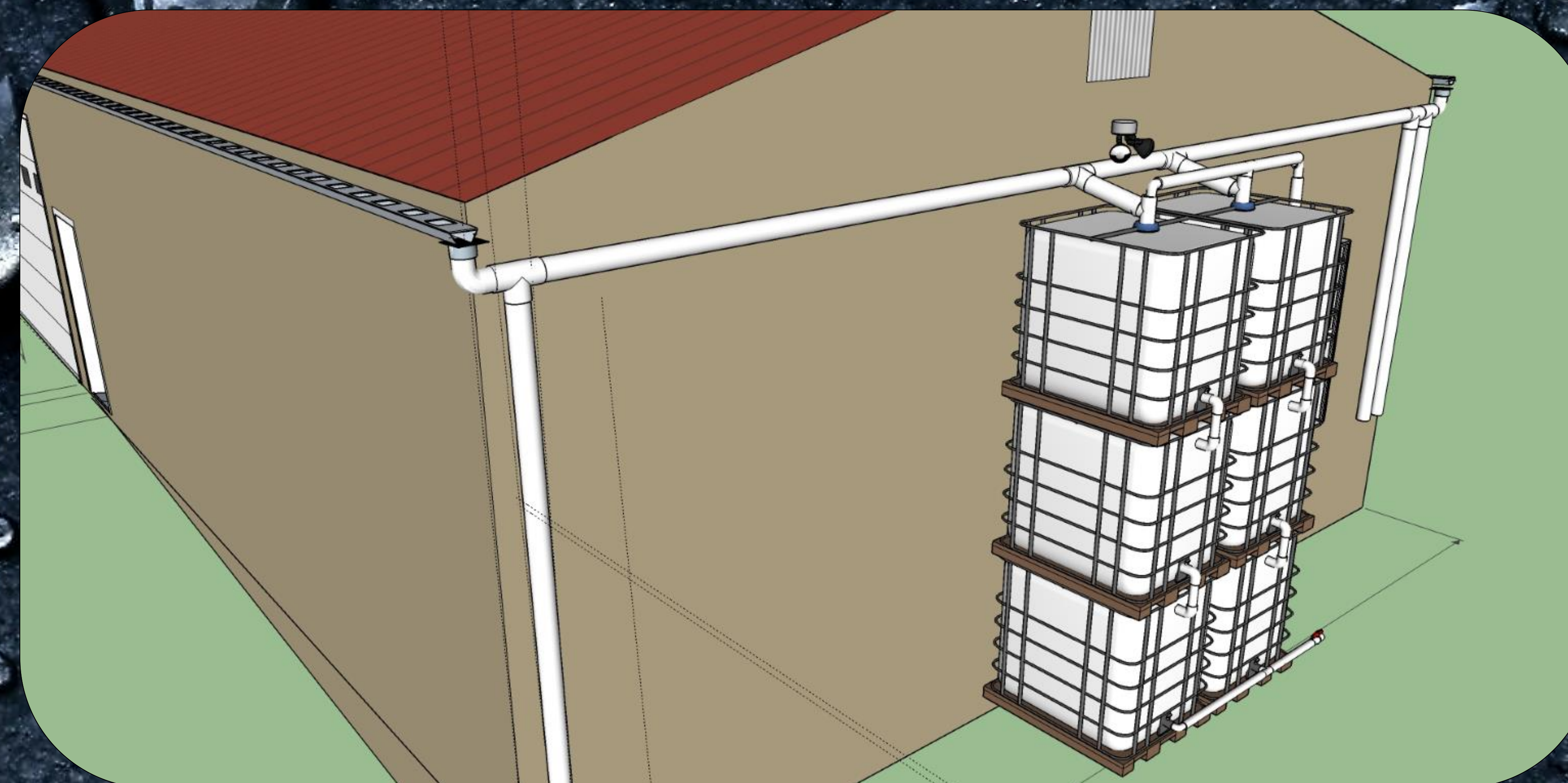
- Choose catchment design from several models
- Research and address limitations of our design
- Develop and implement a plan for measuring the efficacy of the catchment system



Containment Structure



Gutter System



Example of a Catchment System on a Greenhouse

SOLUTION:

- Design a model for a rainwater catchment system that can collect about 20 cubic meters of rainfall per day.
- The system can reduce runoff in large scale use and supply water for agricultural use -> reduces energy use, thereby reduce water use

ADDRESSING DESIGN CHALLENGES:

Usage During Freezing Temperatures

Use larger and rounder tanks to prevent heat loss

Bury pipes below the freeze line and make use of heat tapes for insulation

Result is approx. 1 in of water per 14 in of snowfall

Negative Effects of Roof Material on Water Quality

Recommend biodegradable materials for roof

Advise against using most protective paints (latex, etc.) because of pollutants

No first flush filter, because pollutants can return to water system

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