

Print and cut out the cards on slides 1-4, making one card set per group.
Slides 5-8 provide example connections (solutions) made with the cards.



Dome It Challenge Card Set

Atmosphere Reservoir

Some elements and compounds available in the atmosphere:

nitrogen (N)
oxygen (O₂)
carbon dioxide (CO₂)
water vapor



Sunlight Reservoir

Some scenarios may not have access to natural sunlight.



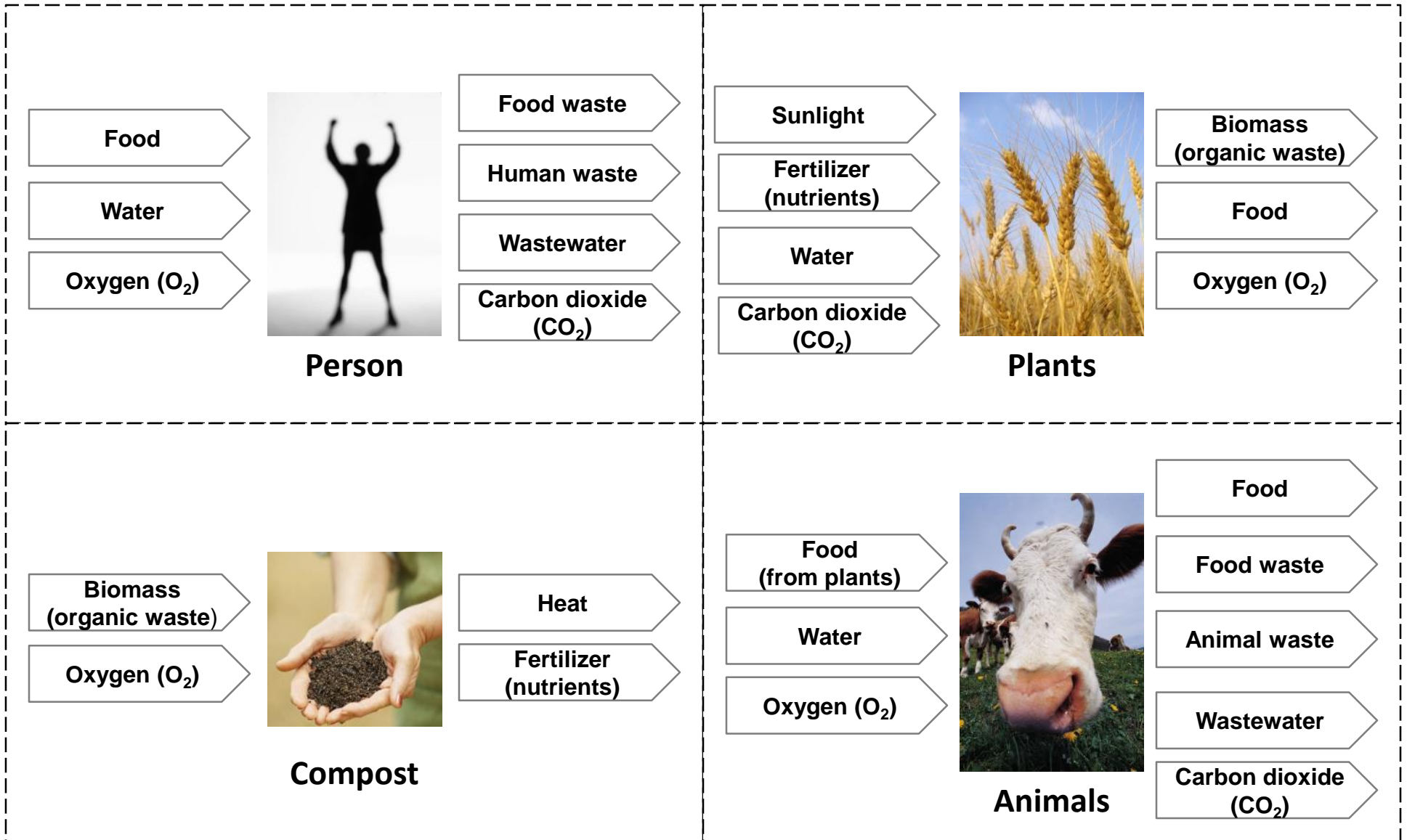
Water Reservoir

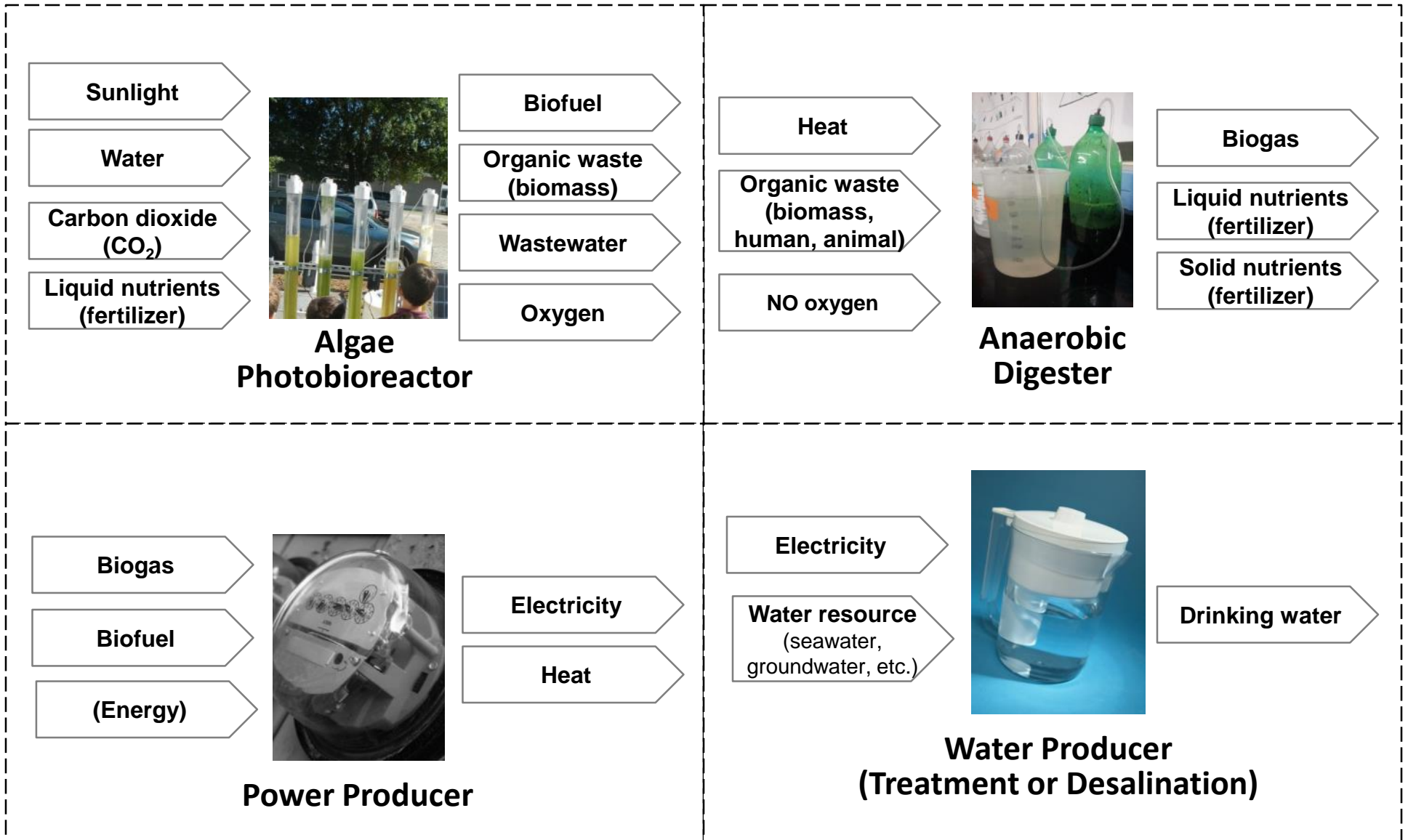
Potential sources of clean water:

river
lake
aquifer
groundwater
rainwater

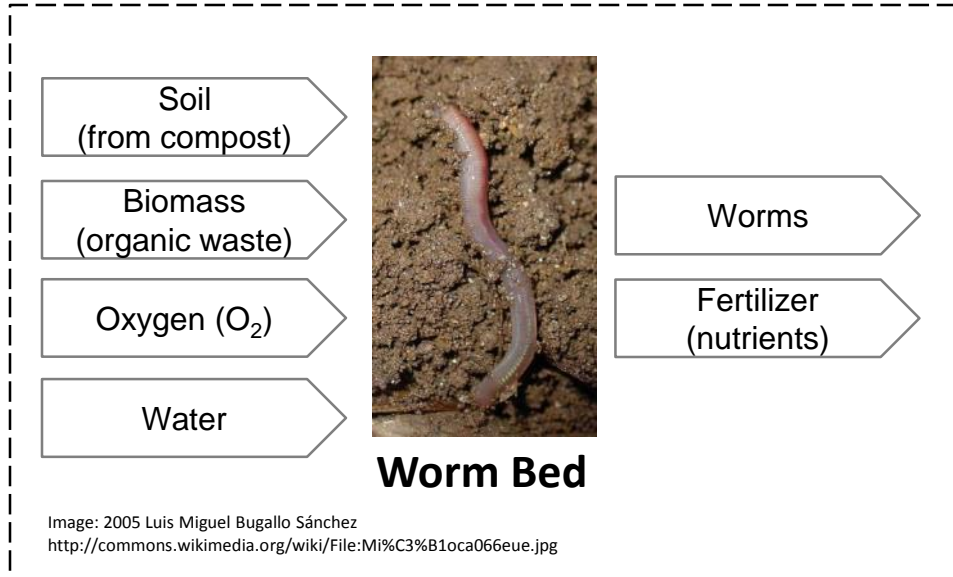


Not all are available for all scenarios.

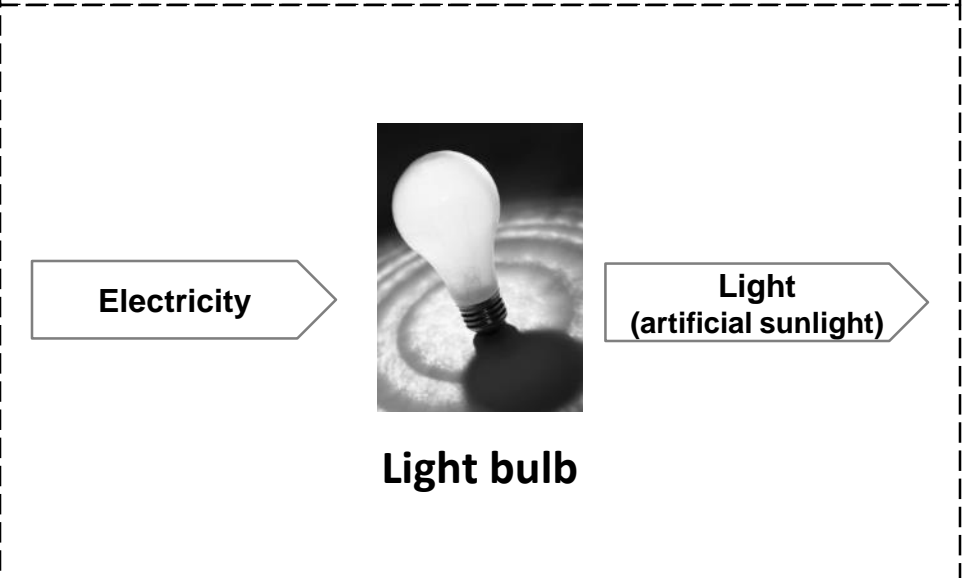
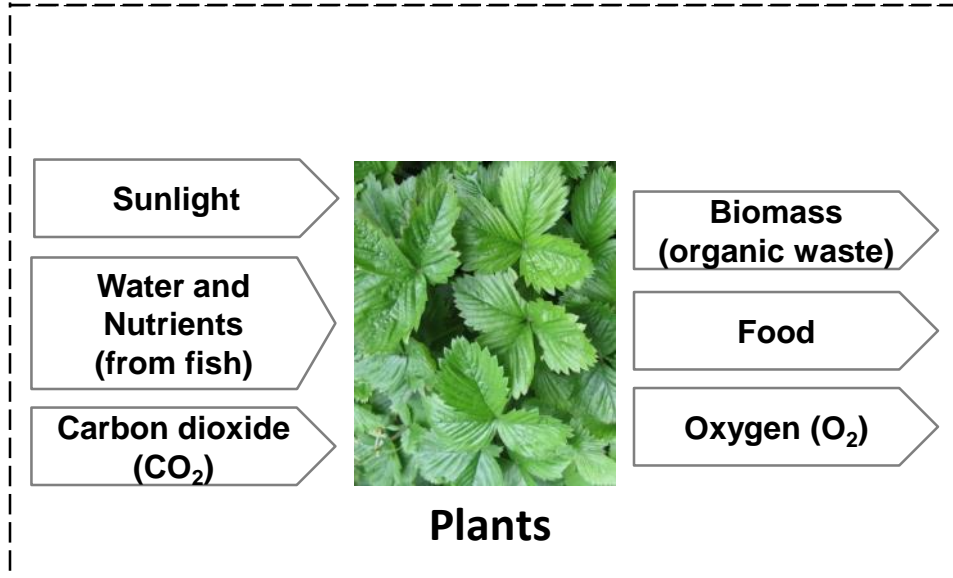
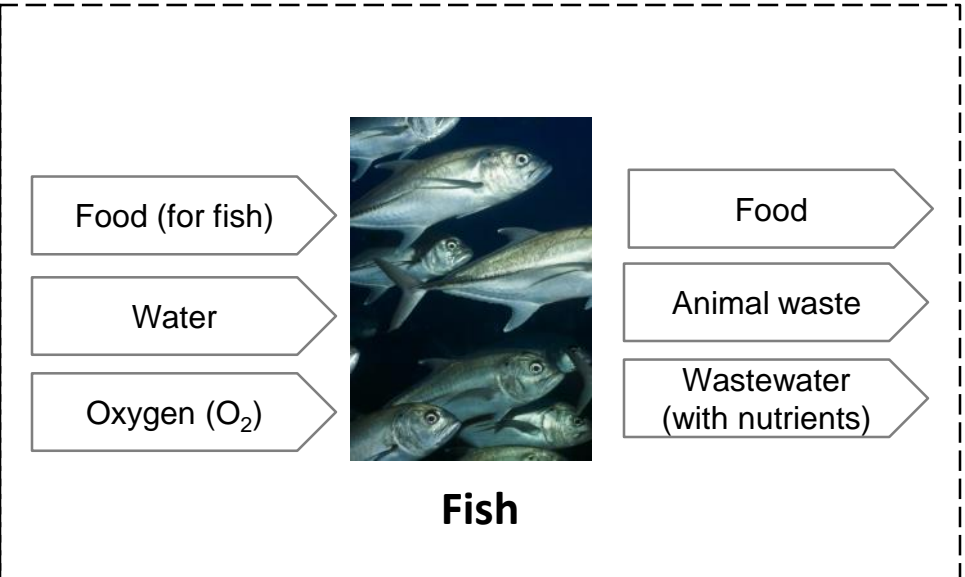




Optional Aquaponics Card



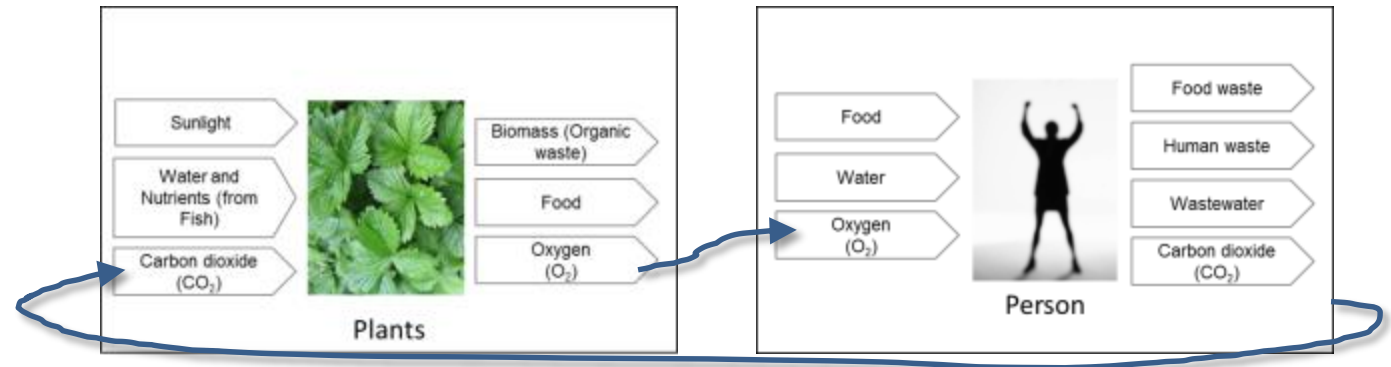
Optional Aquaponics Card



Optional Aquaponics Card

Example Respiration Cycle (Blue)

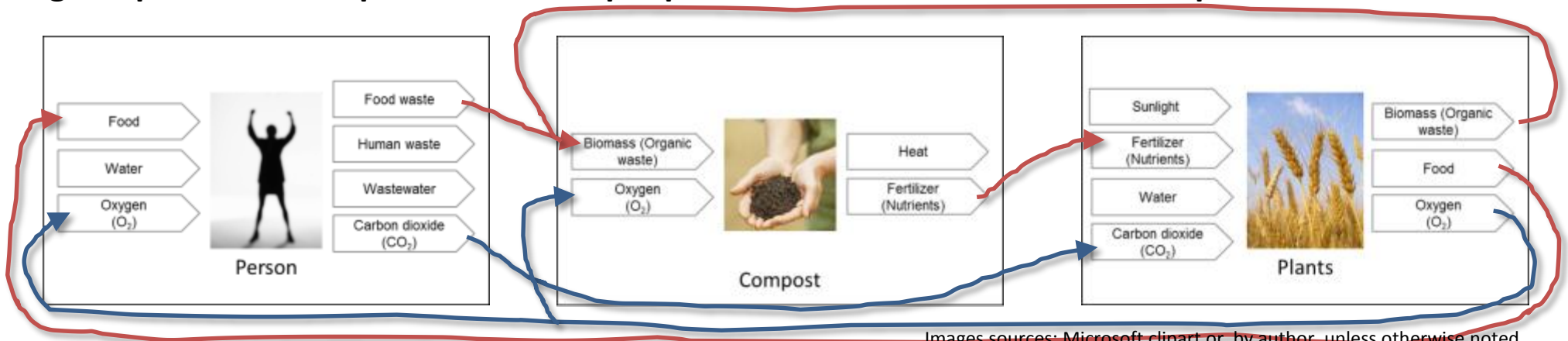
People intake oxygen and exhale carbon dioxide. Plants intake carbon dioxide and emit oxygen.



Example Respiration Cycle (Blue) and Food Cycle (Red)

People intake oxygen and exhale carbon dioxide. Plants intake carbon dioxide and emit oxygen. Compost uses oxygen.

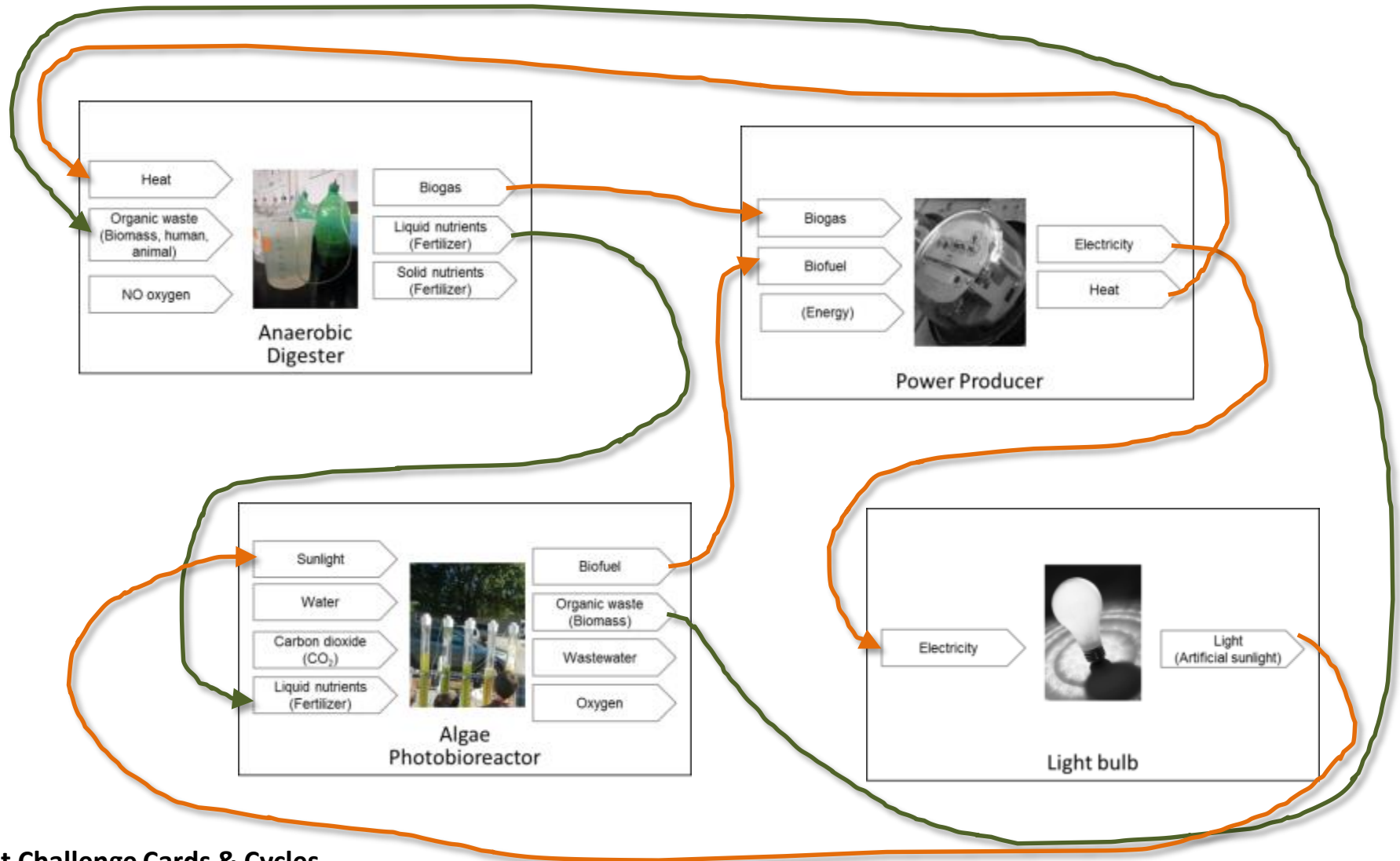
People eat food and produce food waste. Food waste can be composted into fertilizer used to grow plants. Plants provide food to people and biomass waste can be composted.



Example Energy Cycle (Orange) and Nutrient Cycle (Green)

Anaerobic digester and algae photobioreactor (PBR) produce biogas and biofuel that can be turned into electricity. Electricity powers light bulbs for light to grow algae.

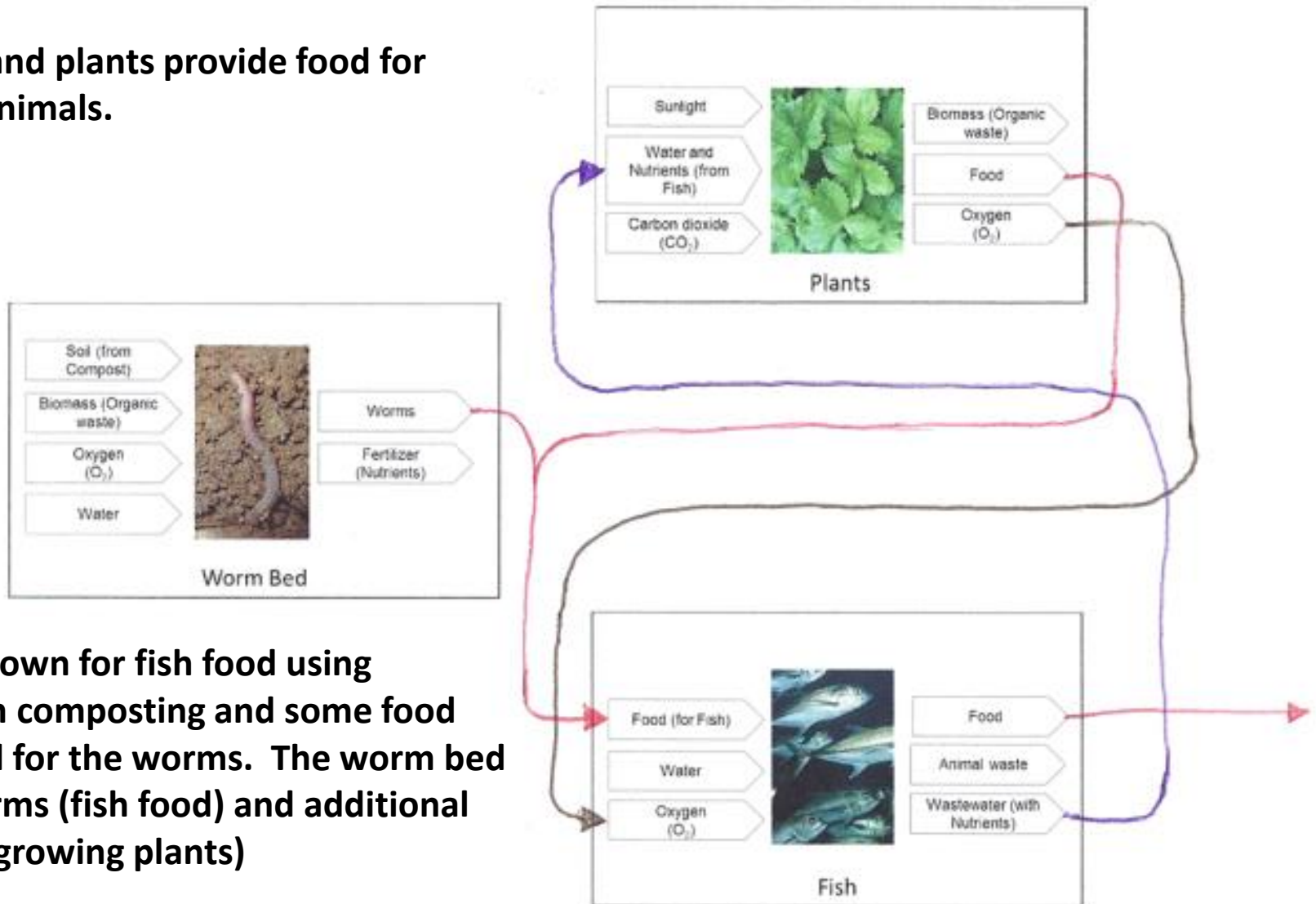
Organic waste from the algae photobioreactor can be used in the anaerobic digester. Liquid nutrients from the anaerobic digester feed the algae in the PBR.



Aquaponics Example

Water is circulated between the plants and fish pond. The fish waste in the water provides nutrients for the plants. The plants (and associated microorganisms) treat the water that returns to the fish.

Both the fish and plants provide food for humans and animals.



Worms are grown for fish food using compost from composting and some food waste as food for the worms. The worm bed produces worms (fish food) and additional fertilizer (for growing plants)


Biorecycling Example

Sunlight
Some scenarios may not have access to natural sunlight.




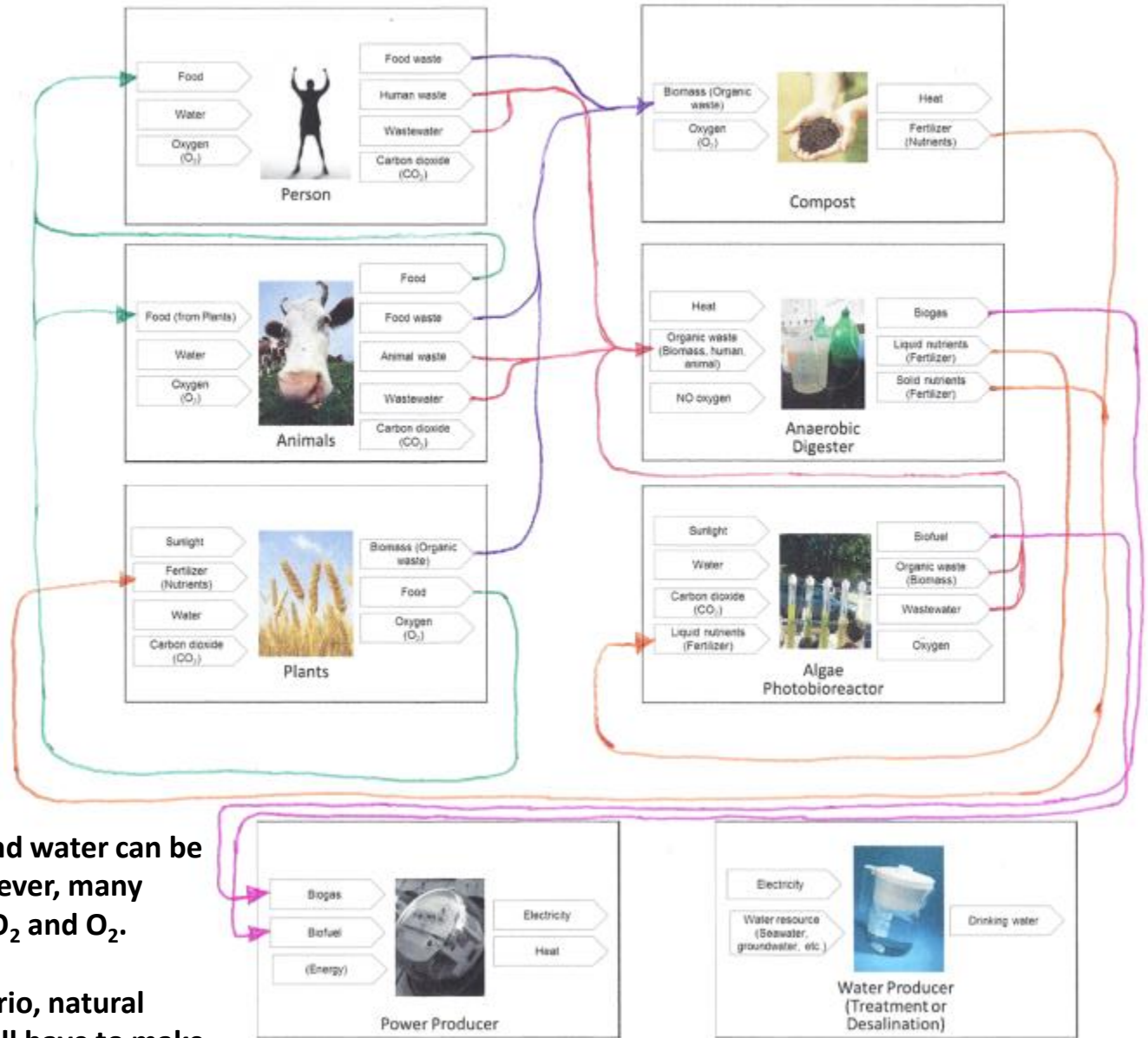
Atmosphere Reservoir
Some elements and compounds available in the atmosphere.

Nitrogen (N)
Oxygen (O₂)
Carbon dioxide (CO₂)
Water vapor



Water Reservoir
Potential sources of clean water. Not all are available for all scenarios.

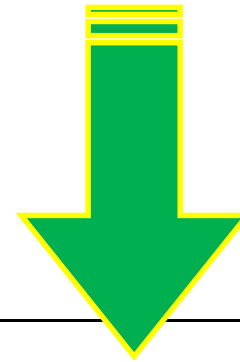
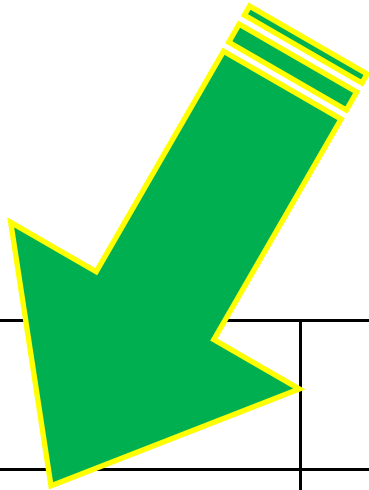
River
Lake
Aquifer
Groundwater
Rainwater

Sunlight, atmosphere components and water can be pulled from the reservoir cards. However, many opportunities exist for recycling of CO₂ and O₂.

***If using the "underground" scenario, natural sunlight is not available. Students will have to make energy to power artificial light to mimic sunlight.

Scenarios & Limitations



	Description	Limitations	Example Background
Under the dome	Your community has been trapped under a large clear dome.	No space for waste. Limited resources.	The town has been sealed off until it can reduce its waste.
Space exploration	Your group is about to embark on a decade-long journey to a distant planet.	Fixed air supply. Limited space.	Mission to Mars or deep space exploration.
Underground dilemma	Your group has been pushed underground.	No natural sunlight.	Underground science lab or bunker.
Recolonize earth	Each has become a wasteland, but is not showing signs of new vegetation. Your group is in charge of recolonizing the planet.	Polluted air. Lots of waste to manage.	After years away from the planet, a group has returned to create a new community.
Life at sea	Your group is adrift on the open ocean.	Sea water undrinkable. Limited space.	Living on a cruise ship or life as a pirate