# Defining Bioenergy Sustainability


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U.S. DEPARTMENT OF ENERGY

OAK RIDGE NATIONAL LABORATORY

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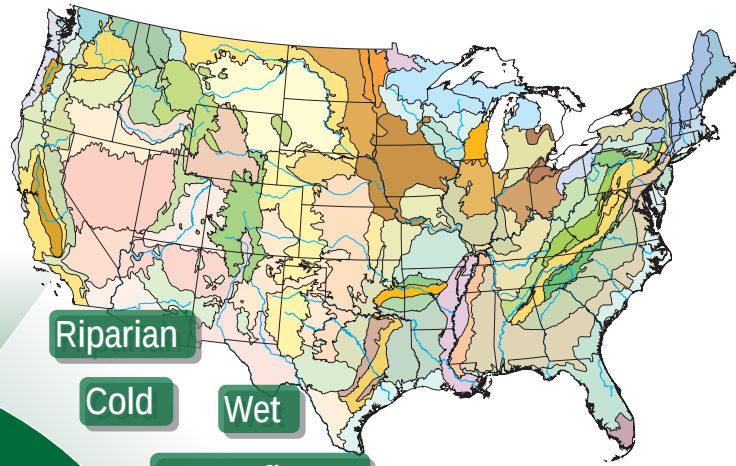
# The challenge of feedstock sustainability



Poplar

Corn

Crop residues

Grass

Manure

Cover crop

Skidder tires

Fertilizers

No till

Single cut

Feedstock type

Feedstock manage-ment

Feedstock location

Address all six dimensions

Original conditions

Feedstock extent

Environmental attributes

Riparian

Cold

Wet

Near refinery

Adjacent forest

CRP

Ag field

Native forest

Pasture

Erosion

Runoff

Soil carbon

Wildlife

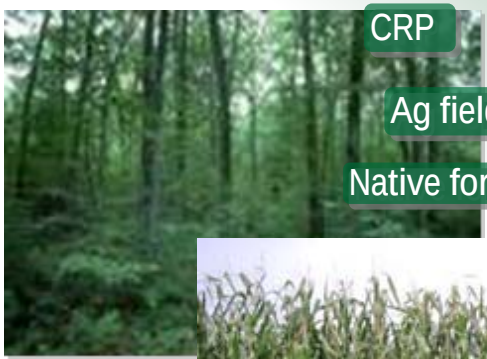
Water quality

20% of watershed

Patchy

5% of watershed

Blocky



# Need to consider the "end to end" costs and benefits of bioenergy use

Feedstock harvest

Feedstock transport

Feedstock conversion

Fermentation production

Ethanol & Chemicals

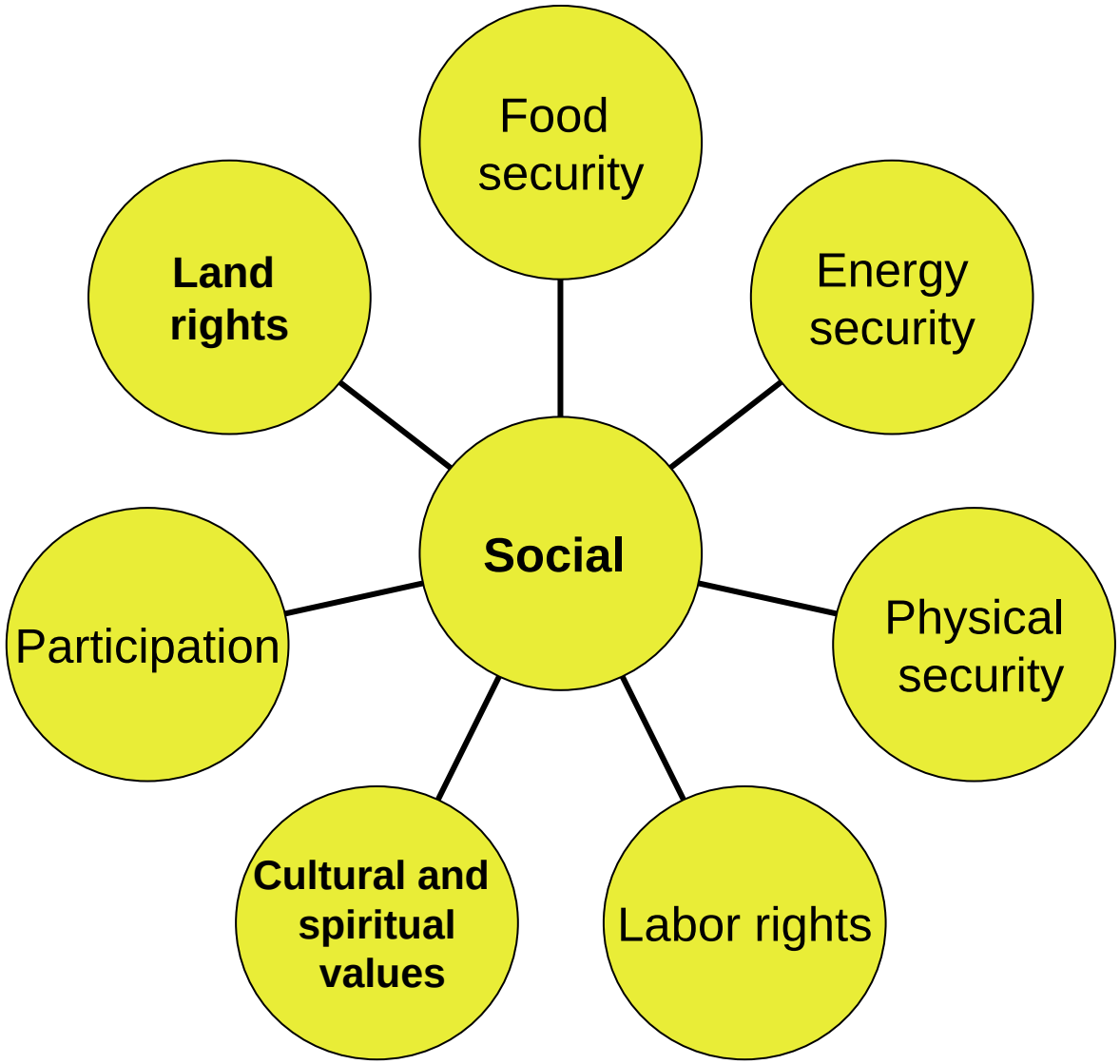
Separation

Sustainability gap

Downstream markets

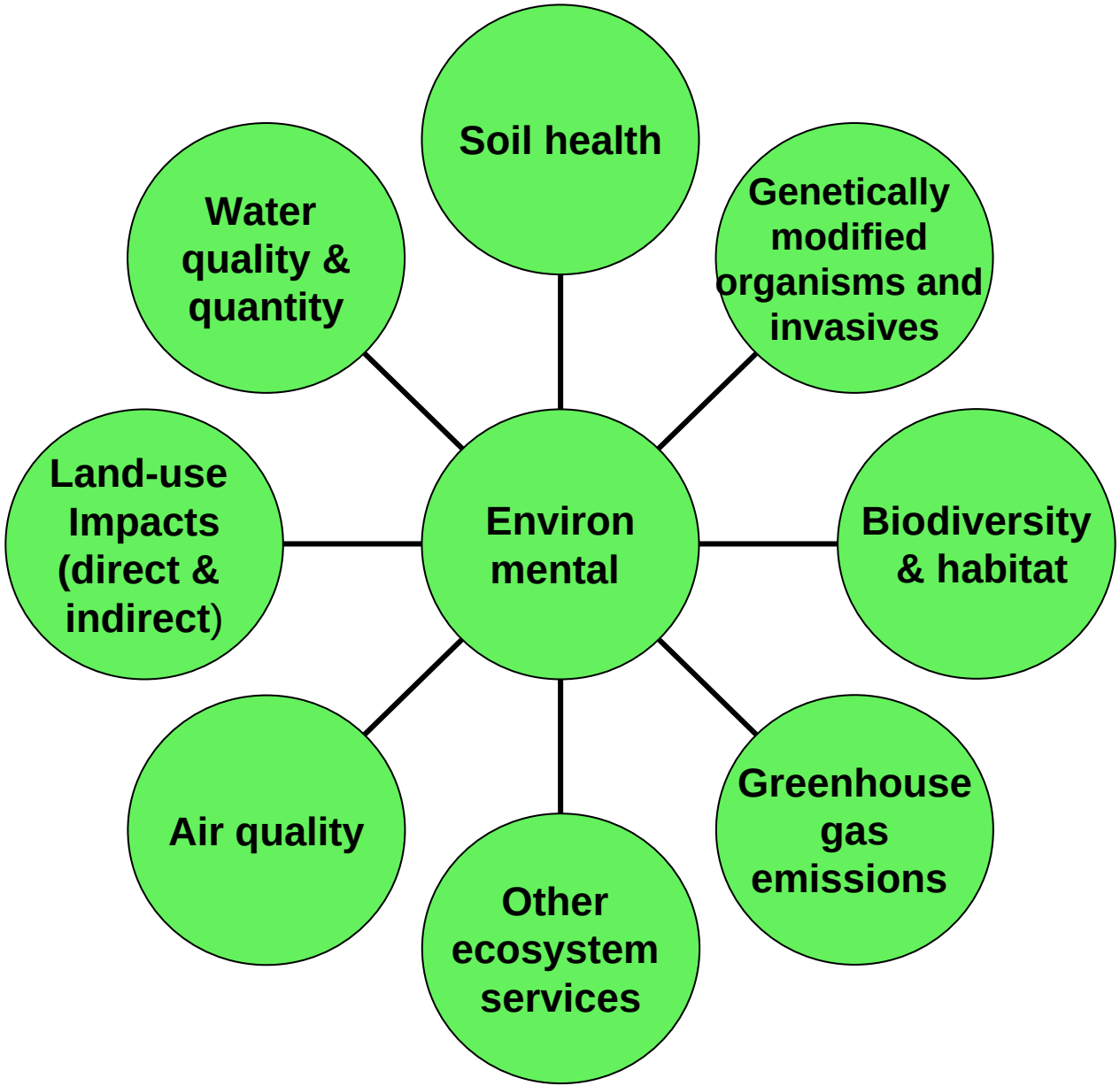
+

# Social components of sustainability

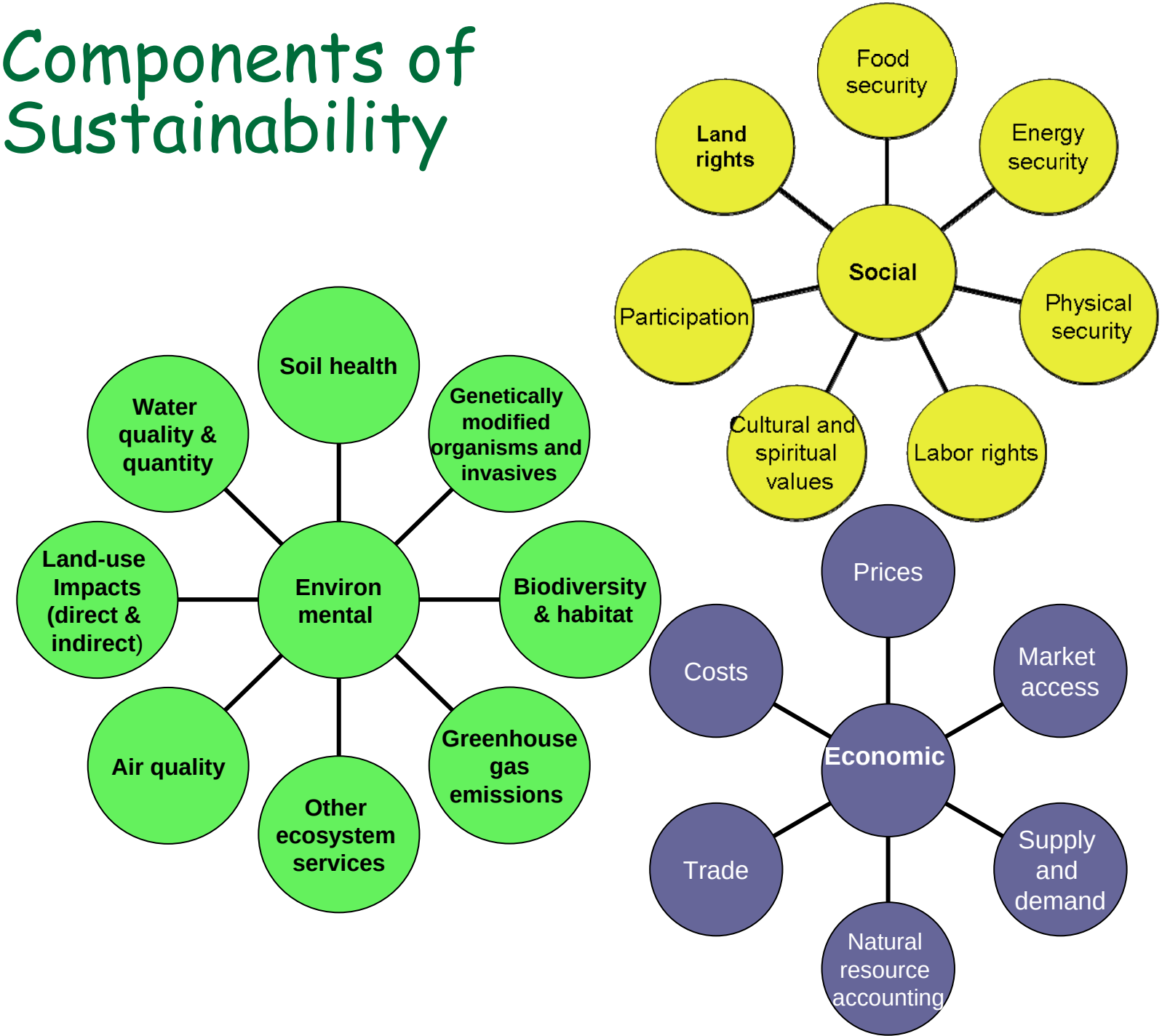


# Economic components of sustainability

# Environmental components of sustainability



# Components of Sustainability



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# The challenge is finding bioenergy options that facilitate smooth interactions of the components of bioenergy sustainability