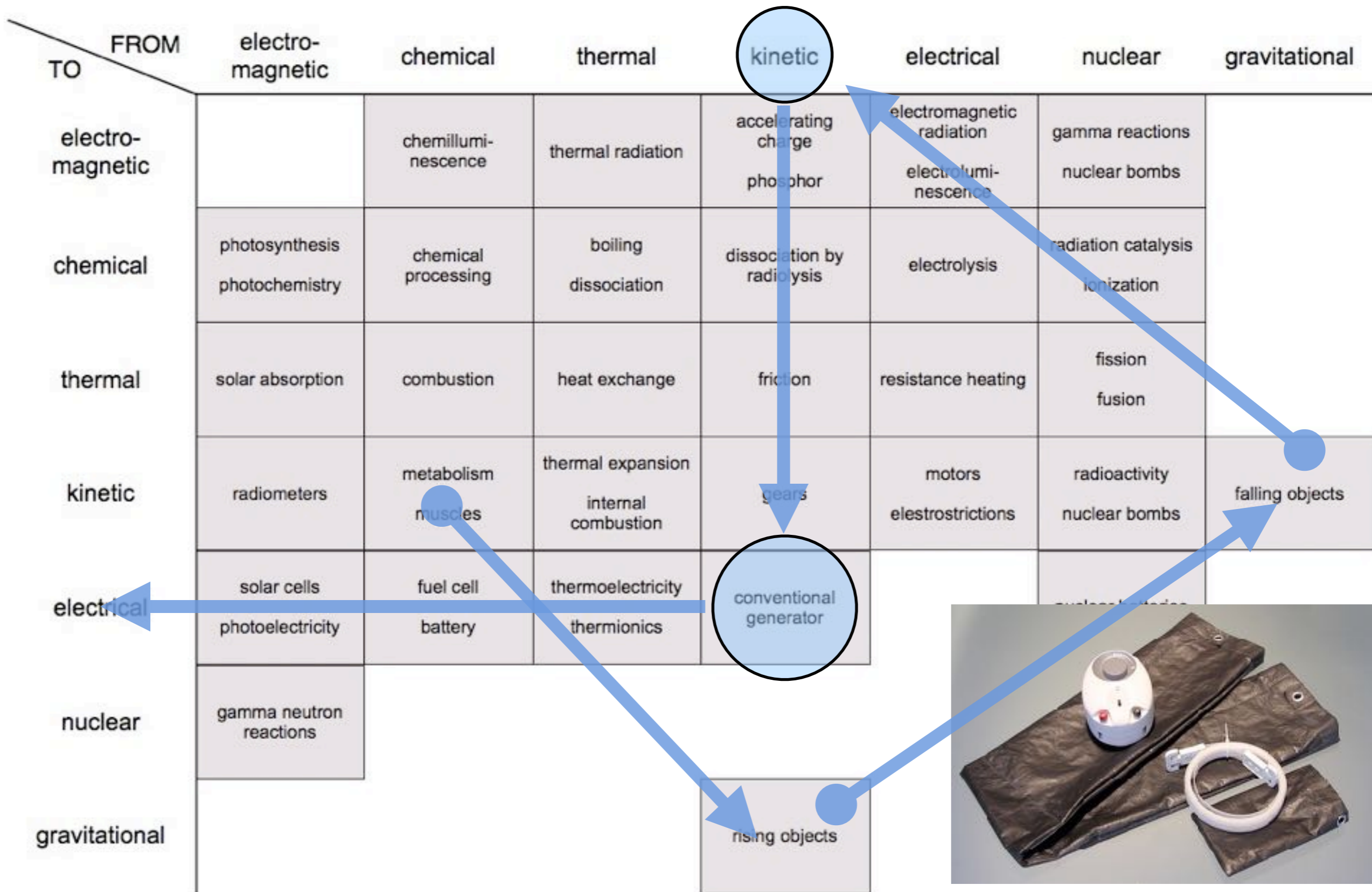


Strategy: Conversion pathways

TO \ FROM	electro-magnetic	chemical	thermal	kinetic	electrical	nuclear	gravitational
electro-magnetic		chemilluminescence	thermal radiation	accelerating charge phosphor	electromagnetic radiation electroluminescence	gamma reactions nuclear bombs	
chemical	photosynthesis photochemistry	chemical processing	boiling dissociation	dissociation by radiolysis	electrolysis	radiation catalysis ionization	
thermal	solar absorption	combustion	heat exchange	friction	resistance heating	fission fusion	
kinetic	radiometers	metabolism muscles	thermal expansion internal combustion	gears	motors electrostrictions	radioactivity nuclear bombs	falling objects
electrical	solar cells photoelectricity	fuel cell battery	thermoelectricity thermionics	conventional generator		nuclear batteries	
nuclear	gamma neutron reactions						
gravitational							rising objects

Source: *Energy: A Beginner's Guide*, Vaclav Smil, 2006.

Pathway: kinetic to electrical via generator (induction)



Pathway: metabolism to falling weights to kinetic to electrical via generator (e.g. DeciWatt GravityLight)

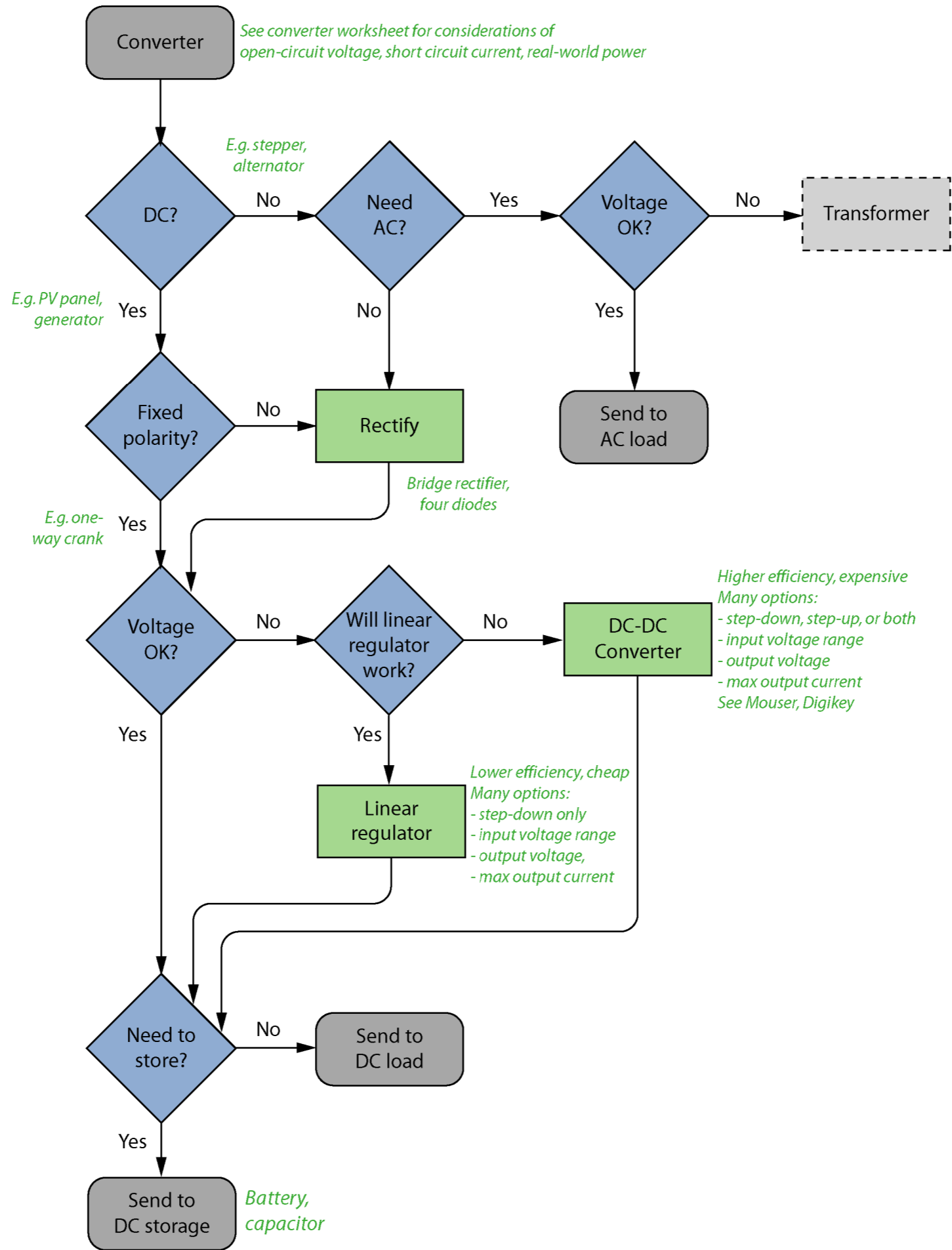
Source: *Energy: A Beginner's Guide*, Vaclav Smil, 2006.

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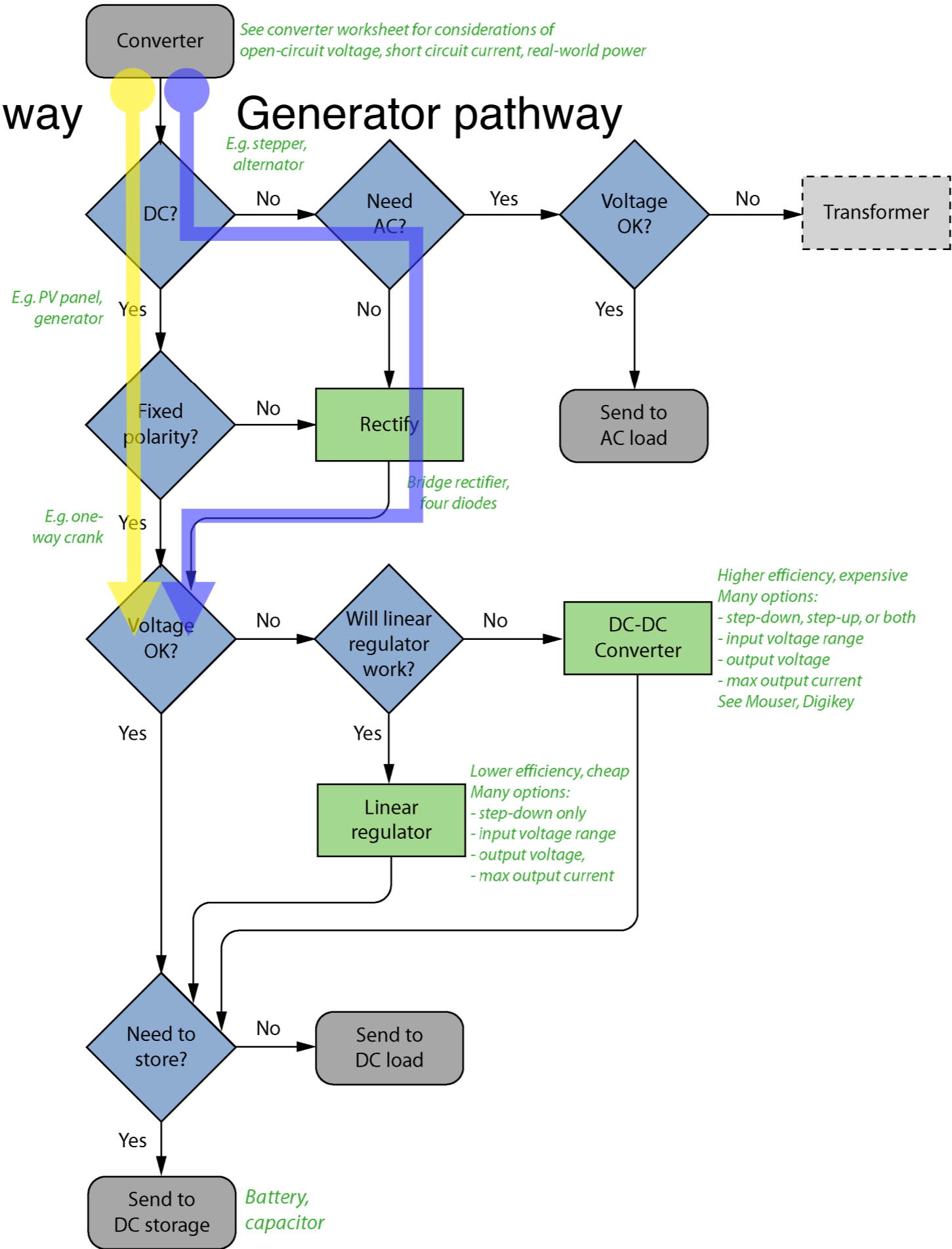
Pathway: electromagnetic to solar via solar cells

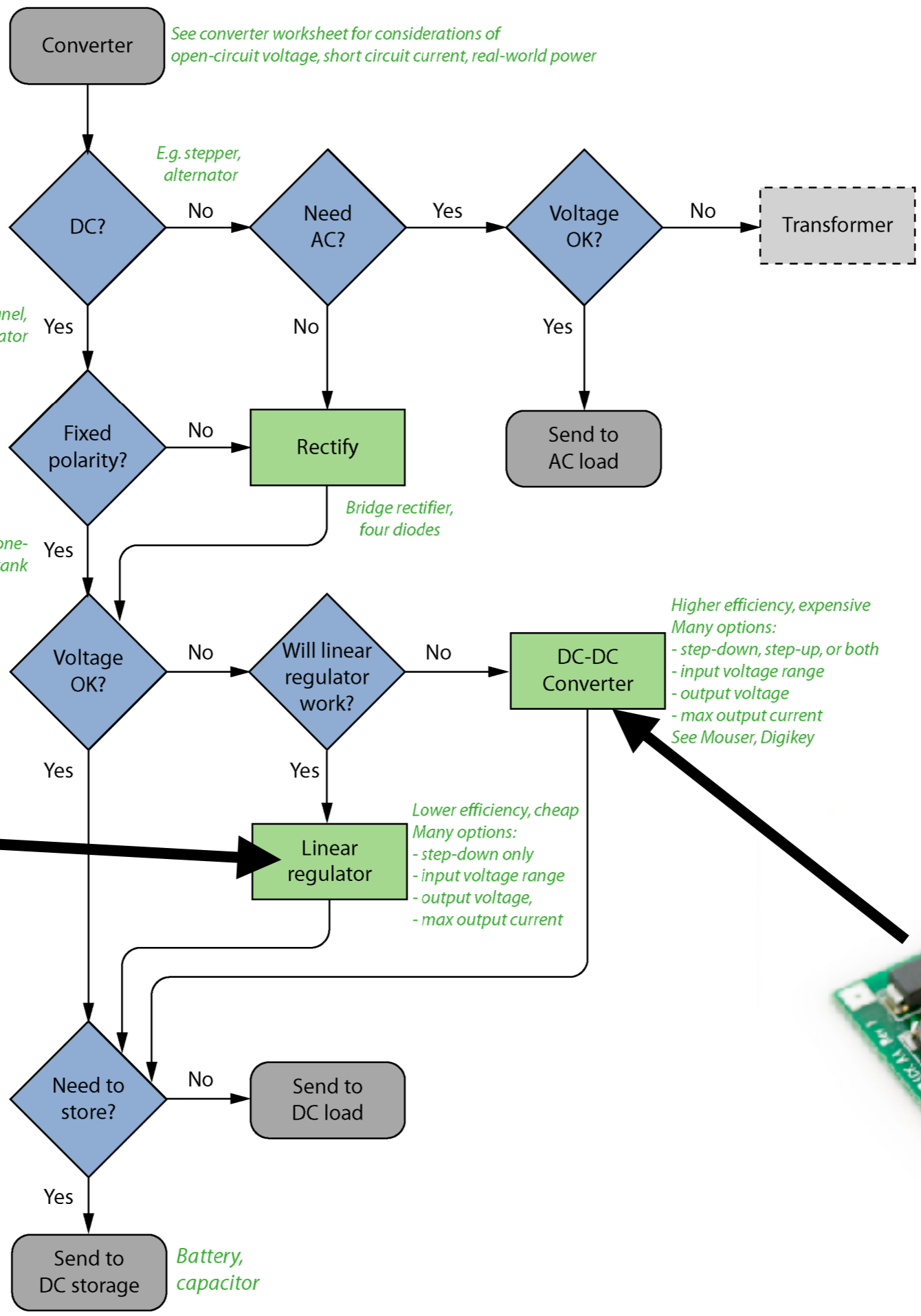
Strategy: Conditioning your converter



Solar pathway

Generator pathway

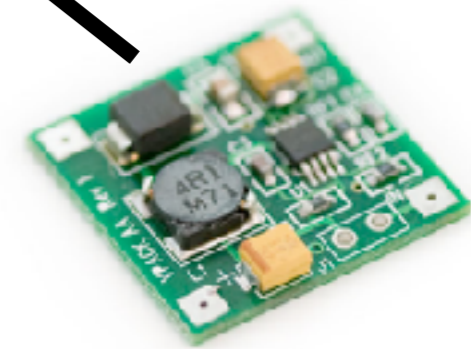




Linear regulator
e.g. LM7805



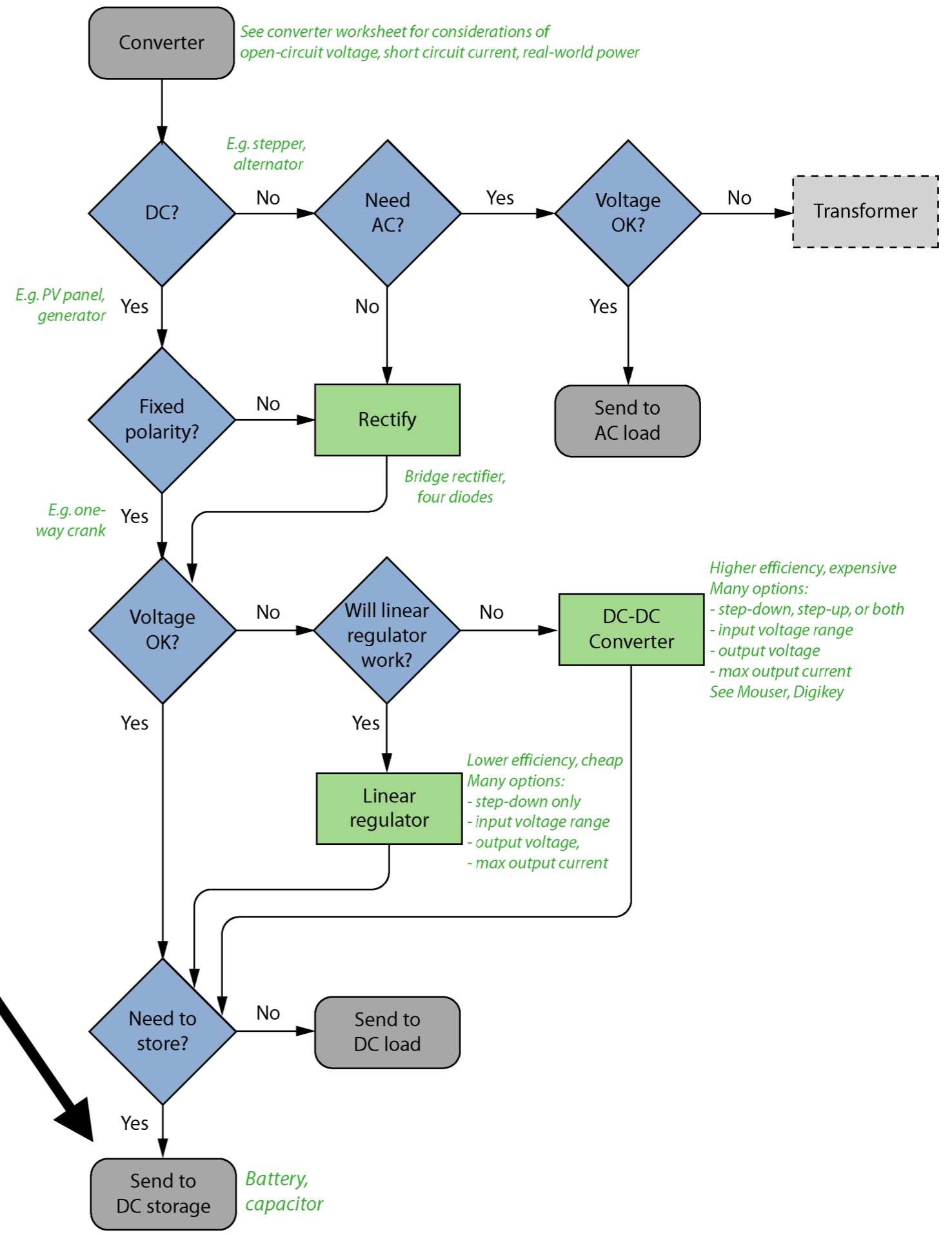
DC-DC converter
e.g. many from Sparkfun. Mouser,
etc.



Smoothing



Storage



Smoothing



.5 * (100 microfarads) * ((5 volts)^2) = 0.00125 joules
[More about calculator.](#)



.5 * (3300 microfarads) * ((5 volts)^2) = 0.04125 joules
[More about calculator.](#)



.5 * (1 farad) * ((5 volts)^2) = 12.5 joules
[More about calculator.](#)



.5 * (60 farad) * ((5 volts)^2) = 750 joules
[More about calculator.](#)

Storage

Energy in a capacitor is:

$$1/2 C * V^2$$

* Would need 2
2.5V caps in series
to get 5V.

Lots of joules



AC pathway - unlikely in this class

