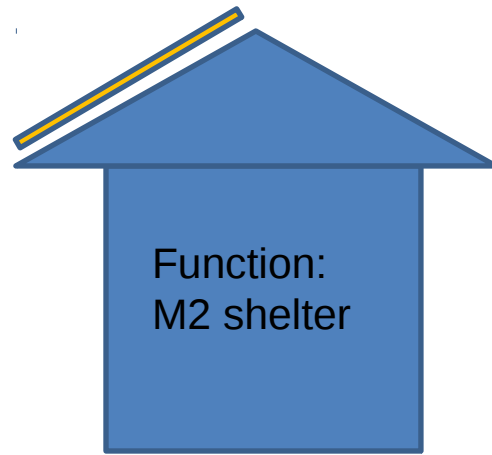


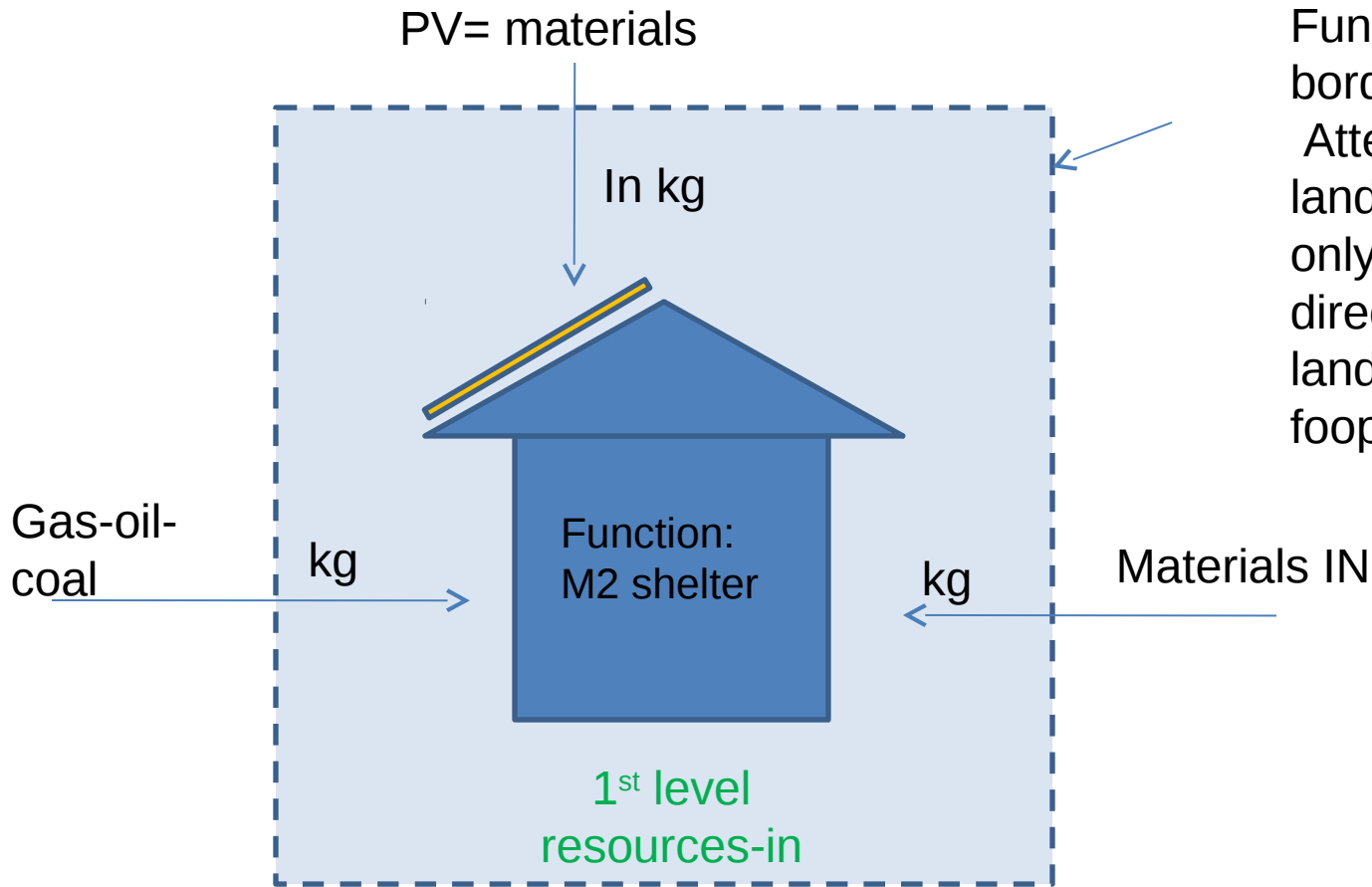
Maxergy in a nutshell:

The simple definition of MAXergy is that it is a way to calculate the re-production of the resources used for a functional unit. All energy and materials is thus compensated to original quality. Which in fact always should involve a source from outside the system, which is solar energy, the only available source outside the system earth. The indicator is the Embodied Land involved in making the source available.

More specific : *MAXergy is based on a thermodynamic approach : By using resources, exergy is lost (resources get diluted and spread in the system) , and entropy grows (chaos in molecules) Maxergy analyses and calculates how much solar energy is required to restore the exergy to original levels.*

See the sheets, and the document: Update MAXergy spring 2016



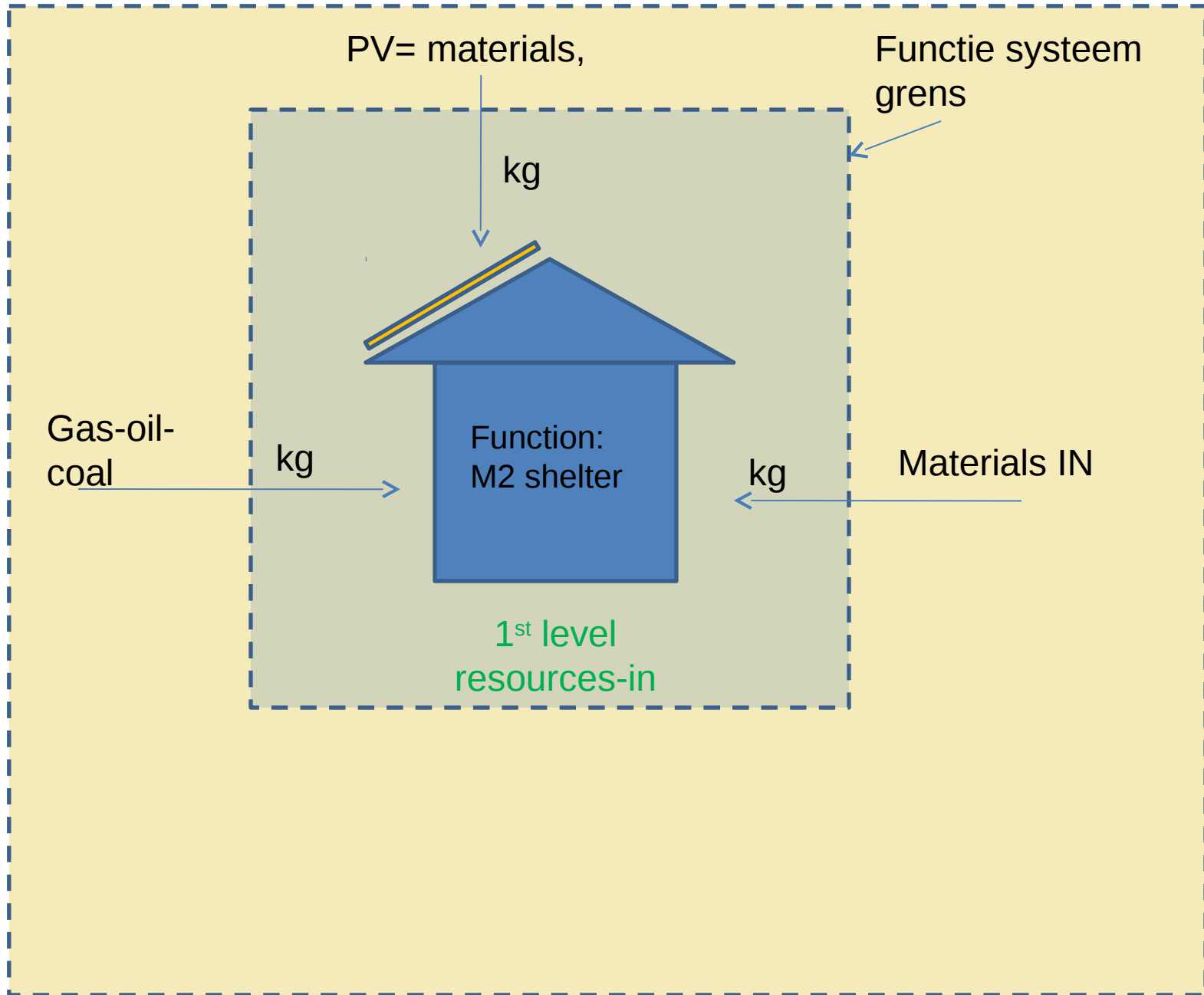


Functional system border.

Attention: its not a landbased system, only the function with direct inputs, not the land as building footprint.

For a 0-energy building: its only PV panels, which count as material input!

If not 0 , and still some input in gas oil coal based energy is required, this counts as (liquid) materials input!



Functie systeem grens

PV= materials,

kg

Gas-oil-coal

kg

Function:
M2 shelter

kg

Materials IN

1st level
resources-in

Resources system border , size to be determined in this stage

PV= materials, added to materials

Funcție systeem grens

kg

EEp, EEt
Gas-oil-coal

kg

Function:
M2 shelter

kg

EEp, EEt
Materials IN

EMp,EMt

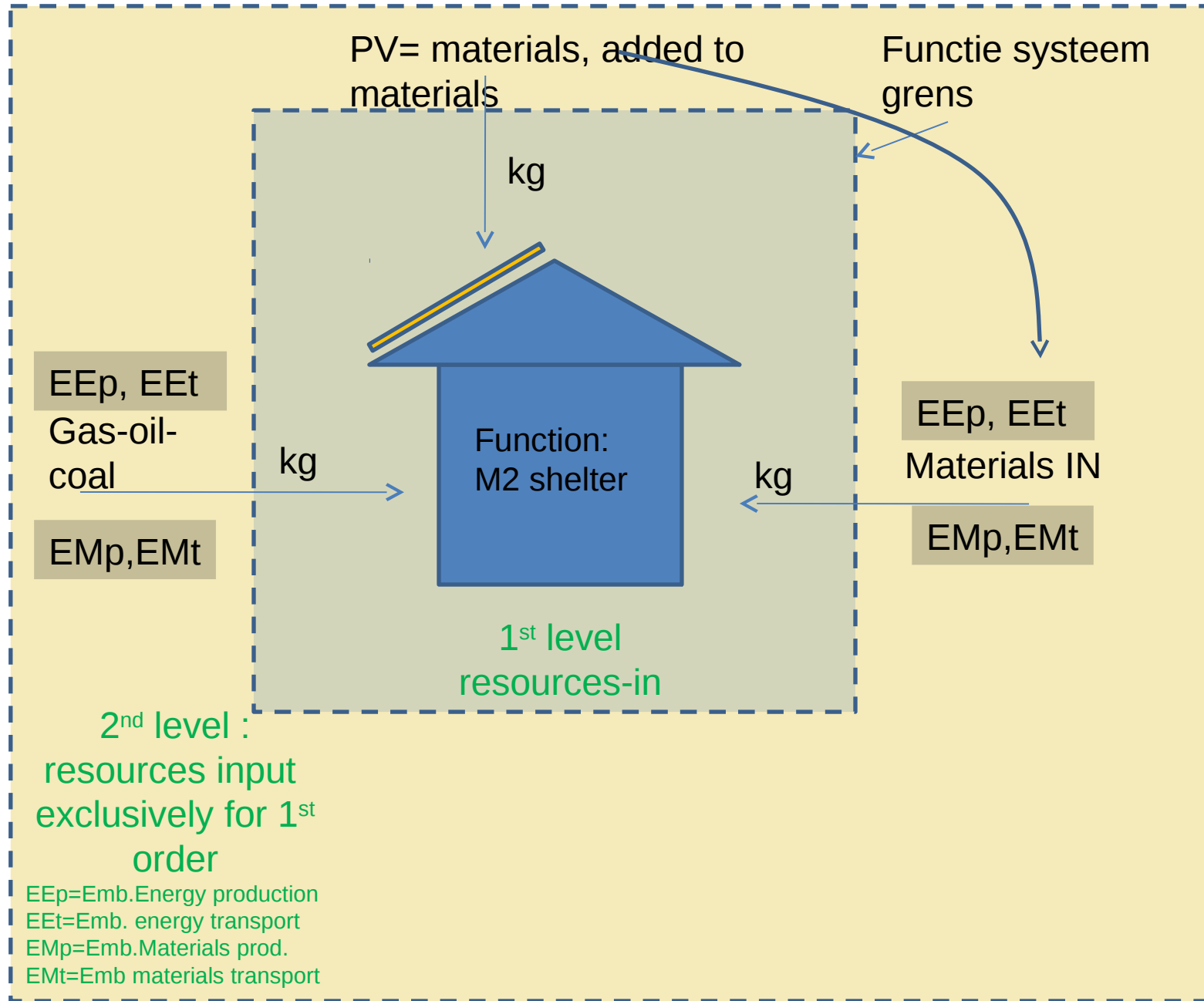
EMp,EMt

1st level
resources-in

2nd level :
resources input
exclusively for 1st
order

EEp=Emb. Energy production
EEt=Emb. energy transport
EMp=Emb. Materials prod.
EMt=Emb materials transport

Resource
system border
with 2nd level
impacts:



PV= materials, added to materials

Funcție systeem grens

kg

EEp, EEt
Gas-oil-coal

kg

Function:
M2 shelter

kg

EEp, EEt
Materials IN

EMp,EMt

EMp,EMt

1st level
resources-in

2nd level :
resources input
exclusively for 1st
order

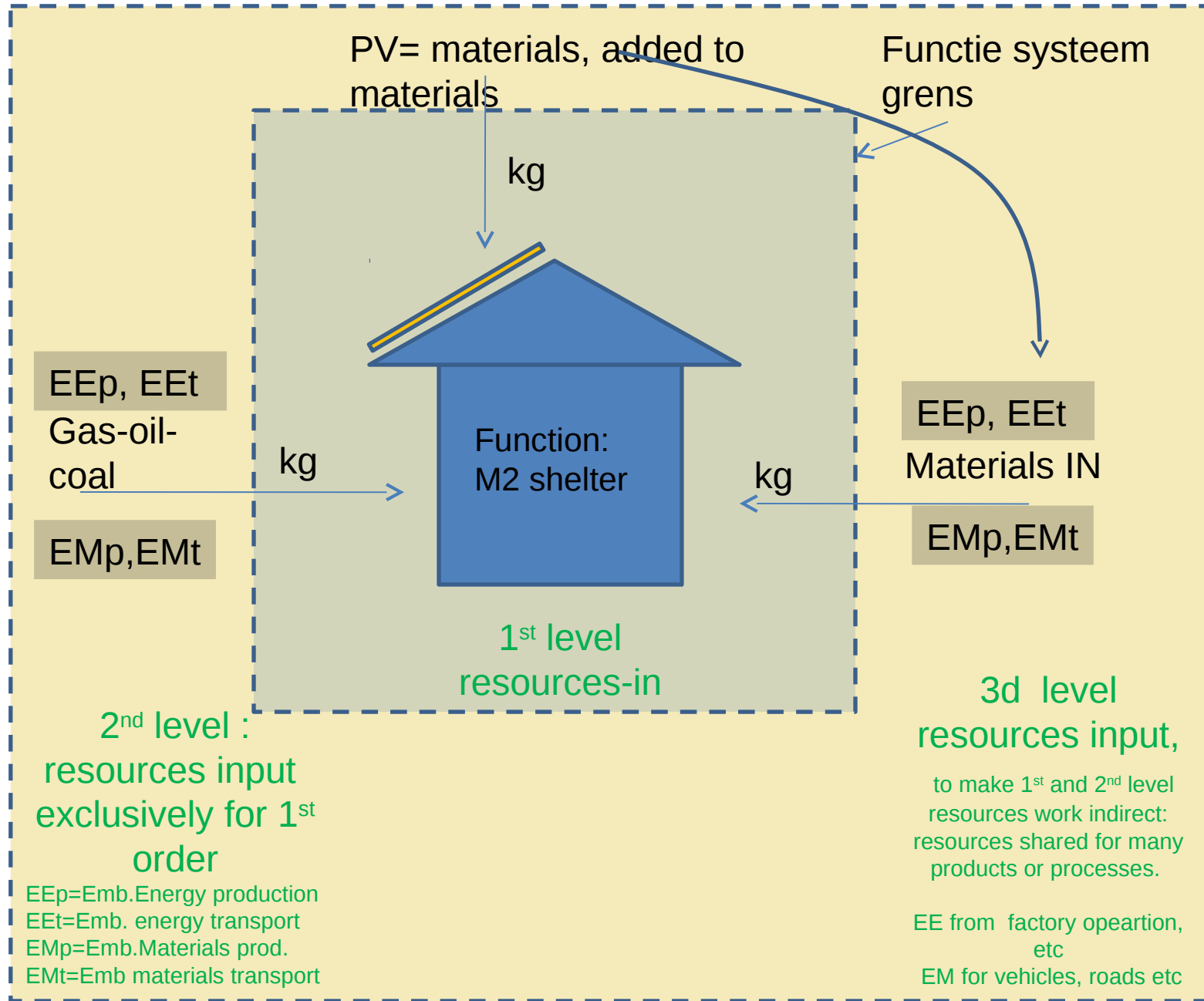
EEp=Emb. Energy production
EEt=Emb. energy transport
EMp=Emb. Materials prod.
EMt=Emb materials transport

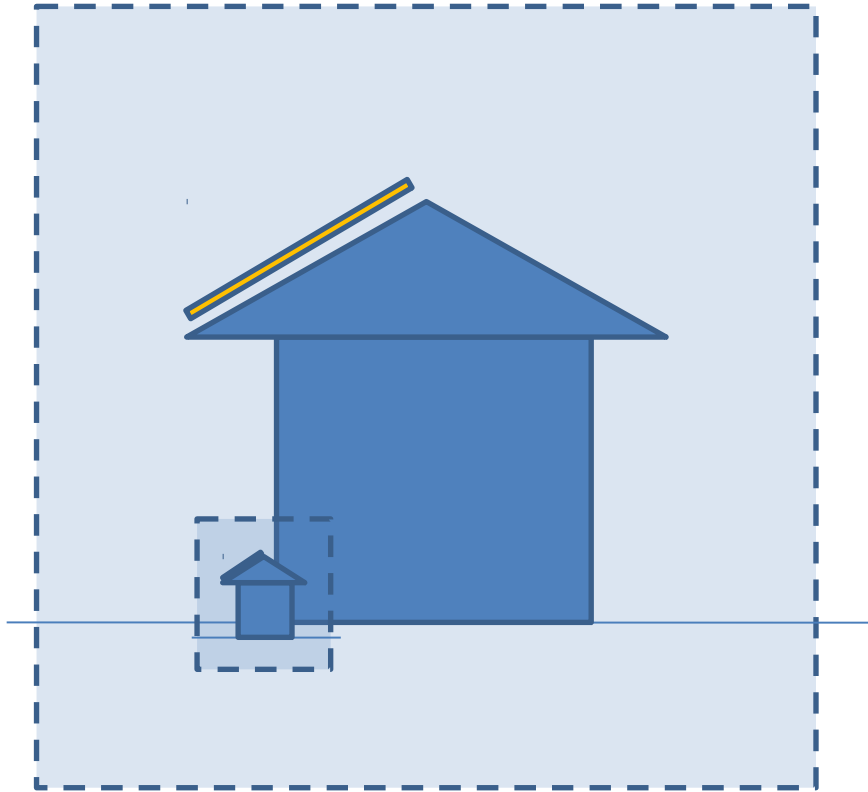
3^d level
resources input,

to make 1st and 2nd level
resources work indirect:
resources shared for many
products or processes.

EE from factory operation,
etc
EM for vehicles, roads etc

Bronnen
systeemgrens
= orde niveau





Zooming out....



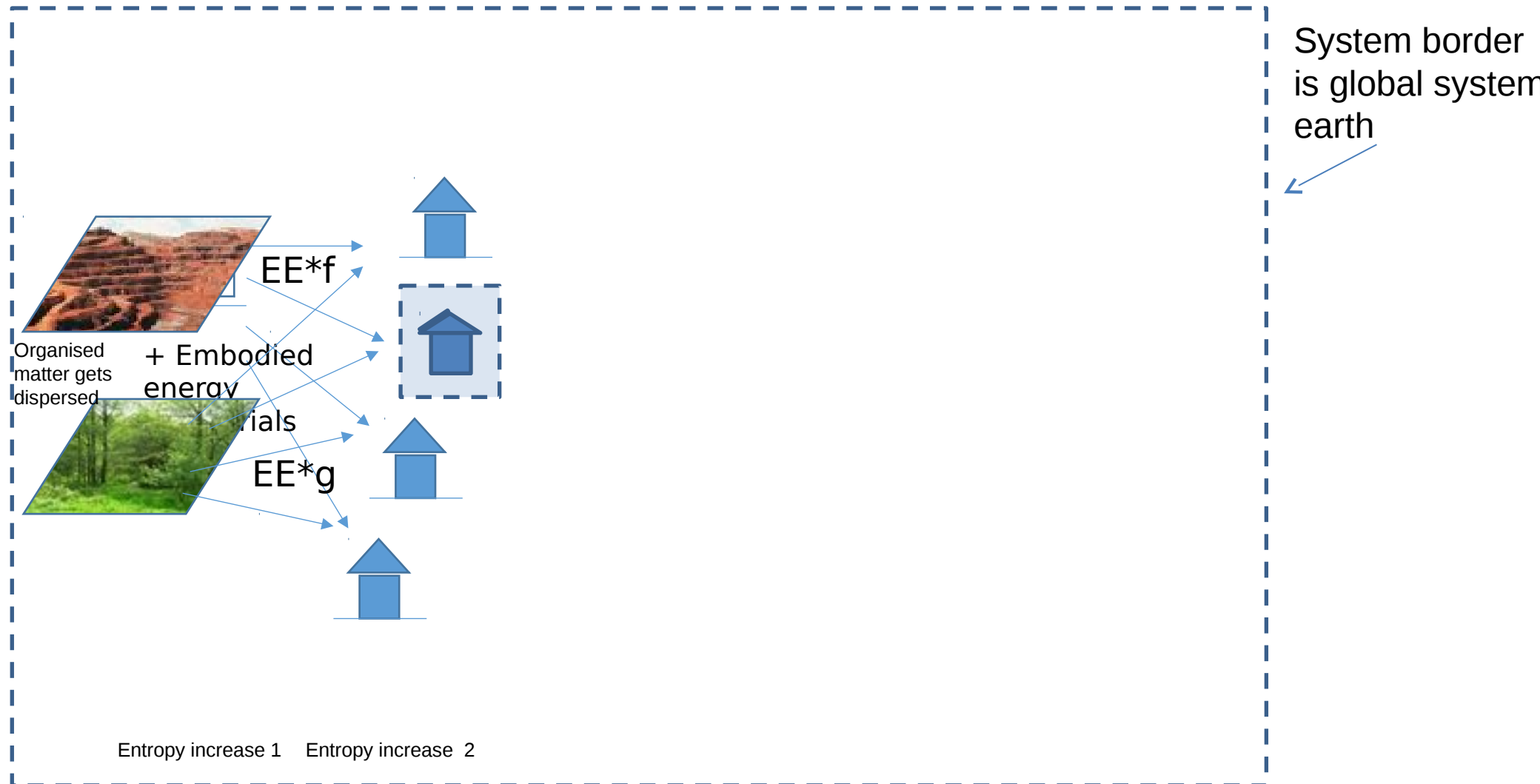
If we zoom out , the functional unit becomes visible as part of a overarching system, that of reosurces, which revels the actual resource system border , next slide:



General framework for MAXergy 2.0 : organised around the flow or resources in the system: exergy loss -> higher entropy -> counterentropy strategy , ie -> circular energy required, from outside system.

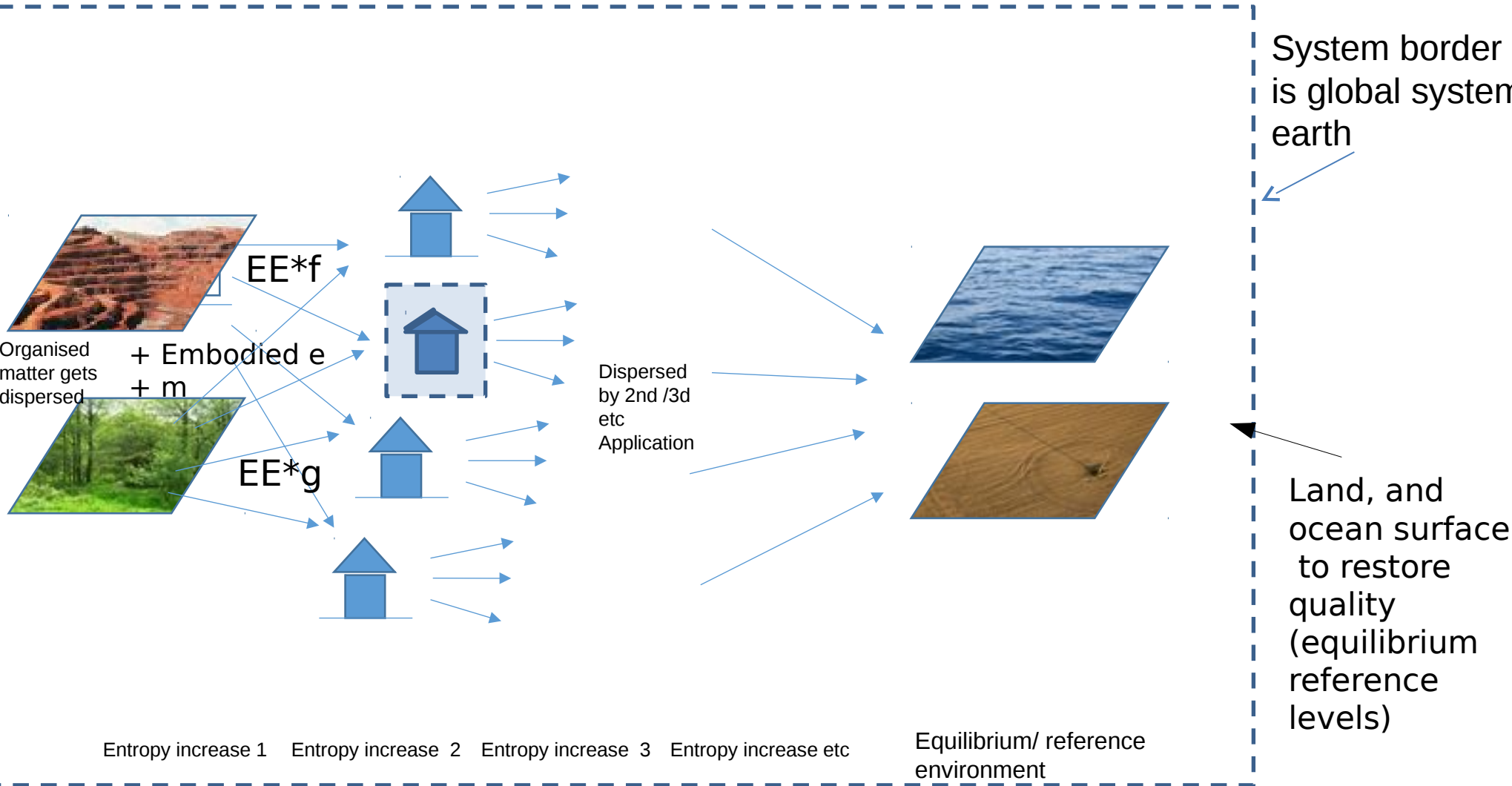
The resources, ores or forests, are yielded, and the 1st entropy step is resources getting dispersed over many objects that are distributed over many functional units : the dilution has already started . Think for instance about nail and screws.

There is two systems/border settings :
Function system evaluated and
resource supply system.



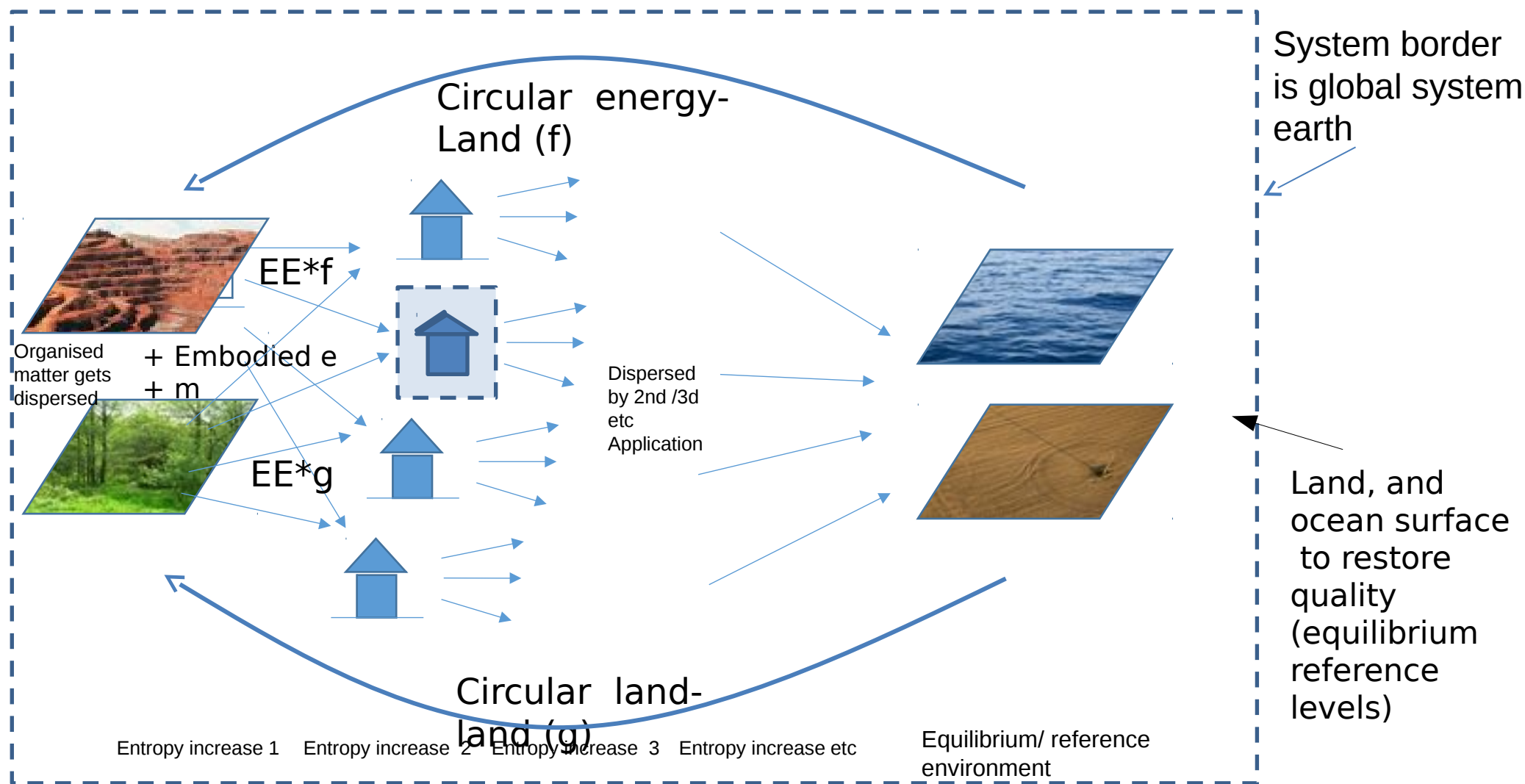
General framework for MAXergy 2.0 : organised around the flow or resources in the system: exergy loss -> higher entropy -> counterentropy strategy , ie -> circular energy required, from outside system.

And from the functional unit the dilution / entropy grows again over time . Sometimes as eroding materials during lifetime, or direct to waste heap, or via recycling spread in pieces with losses in processing , to end up ultimately in soil and ocean to start all over again in the bio- geological cycle.



General framework for MAXergy 2.0 : organised around the flow or resources in the system: exergy loss -> higher entropy -> counterentropy strategy , ie -> circular energy required, from outside system.

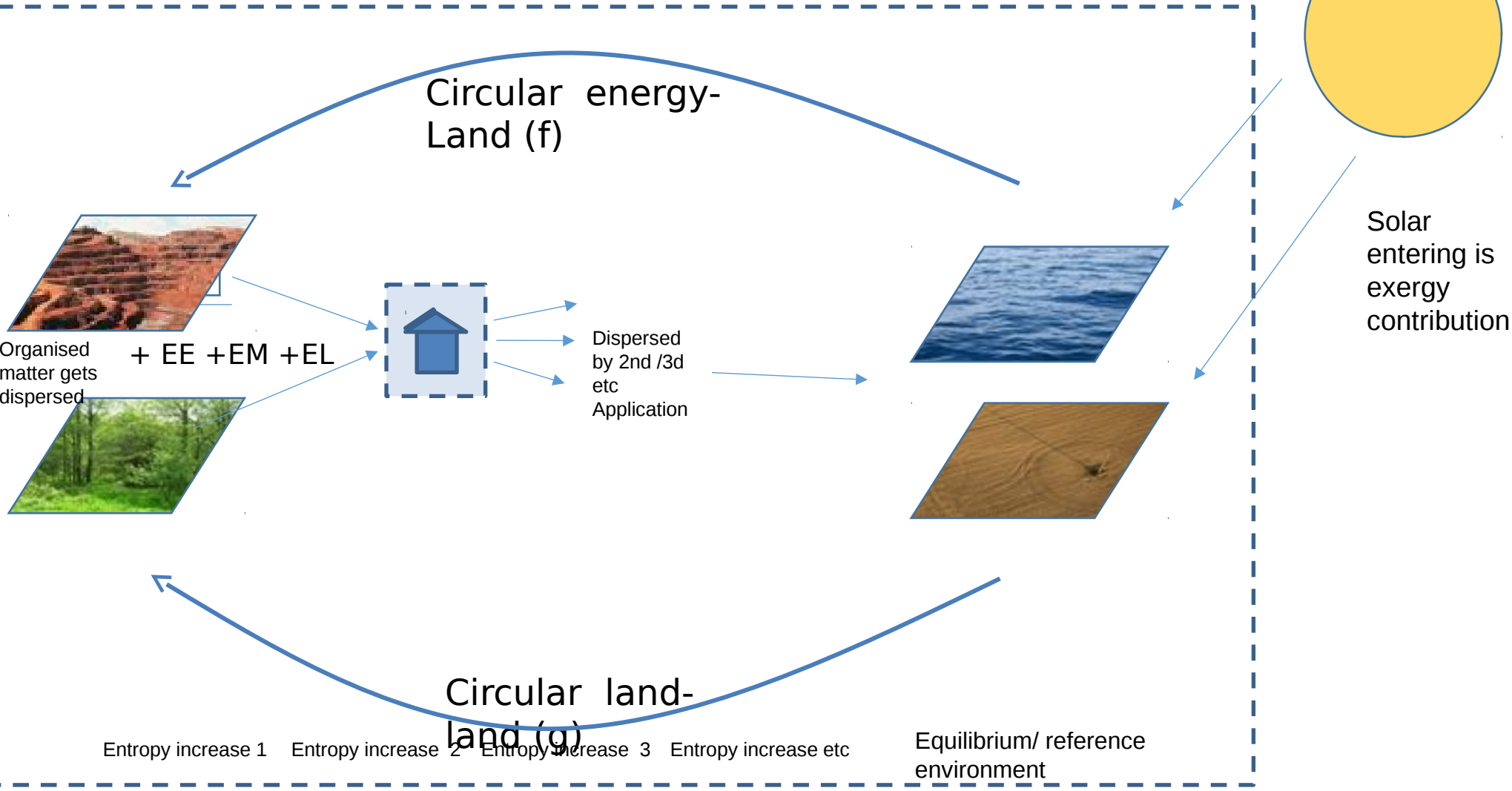
1 Both regrowable as renewable resources need to be renewed to restore exergy levels.



General framework for MAXergy 2.0 : organised around the flow or resources in the system: exergy loss -> higher entropy -> counterentropy strategy , ie -> circular energy required, from outside system.

1 We recalculate for the original situation for 1 functional unit, to be able to pinpoint this to the functional demand

2 This is done by means of solar energy, the exergy source as reference
 3 in current version with PV panels , as converting system to Embodied Land



In Formulas:

ELtot = **ELci** + **ELei** 1st and 2nd level (ci=circular impacts ; ei=embodied impacts)

ELci = **RLdir** + **RLind** (Circular energy in terms of energy needed for regeneration resources, direct and indirect (1^e level))

RLdir = **ML** { * g } The regenerative land-direct for the regrowable material input (mat land)

RLind = **ME** * f regenerative land – indirect for non regrowable resources mat input (mat energy)

and

ELei = **EE** * f + { **EM** (*g) } + **FL**

EE = **EEp** + **EEt** (+ **EErec** = eigenlijk ook processing maar dan anders)

EEp = Production Energy

EEt = Transportation Energy

EM = methodological factor, in theory materials could have been lost during processing. Currently not used, we calculate in endproduct harvest per hectare

FL = Function Land : operational occupied Land, a building for instance)

In full detail:

ELtot = { **ML** * g + **ME** * f } + { (**EEp** + **EEt**) * f + **EM** * g + **FL** }