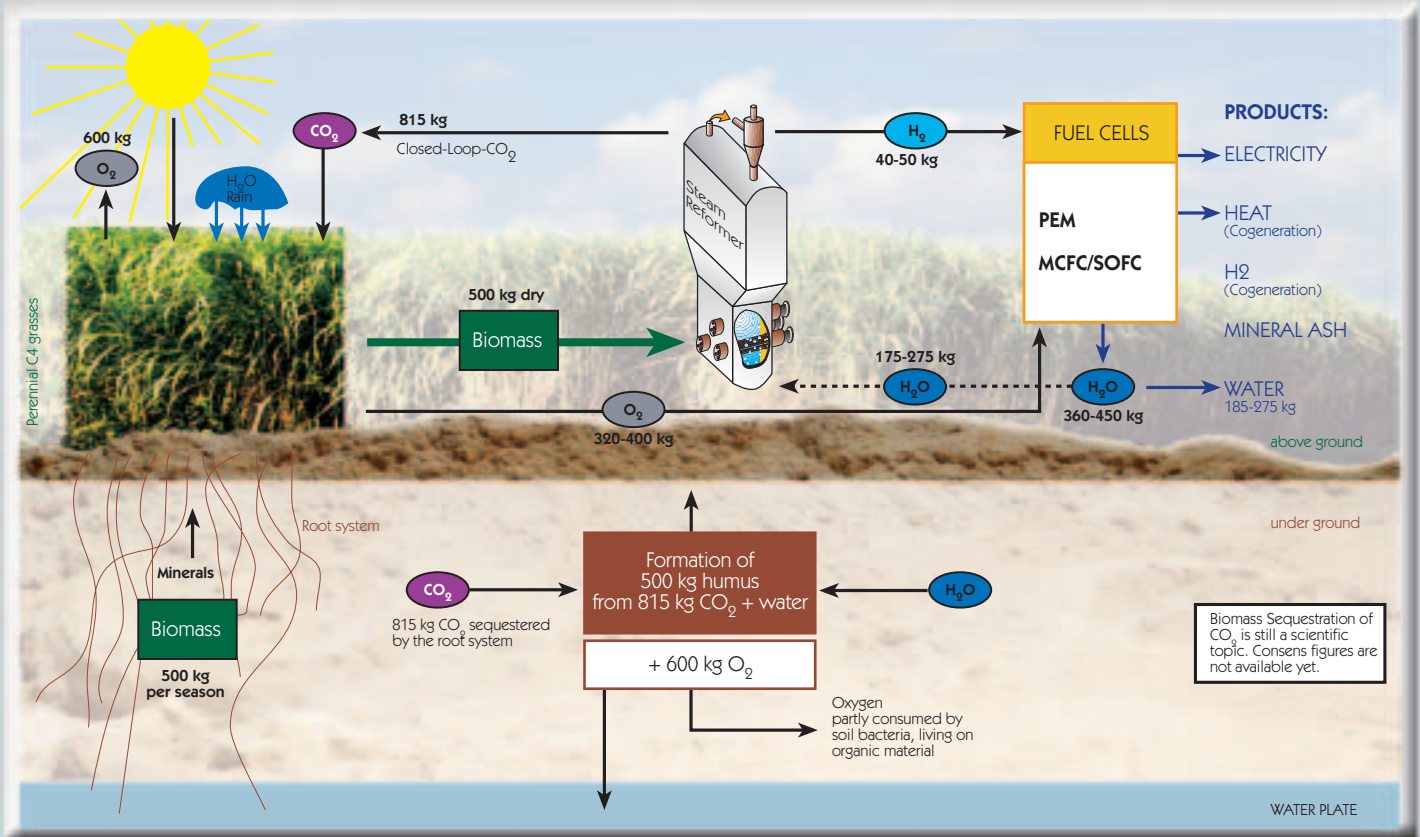




# The ELECTRO-FARMING™ Concept

Decentralized Co-Generation of Electricity,  
Hydrogen and Heat from Biomass

## Metabolism (per hour) of an ELECTRO-FARM with 1MWe power



## SEVEN CLOSED LOOPS with ELECTRO-FARMING™

This is the only cycle with balanced  $O_2$  and  $H_2O$  loops:  
Hydrogen is generated by splitting water in  
the steam reformer

(Fossil  $H_2$  is converted to  $H_2O$ , which is not re-used by splitting it to  $H_2$ )

### I. Closed - Loop - Biomass

Small EF-plant operating on an area with dedicated biomass;  
short transport distances, no intermediaries, no fuel inflation,  
use of biomass wastes depending from crop yields.

### Closed - Loop - Fertilizer

Mineral fertilizer from ash  
(if no heavy metal contamination in soil, if contaminated → soil  
clean-up and disposal of ash)

### II. Closed - Loop - $CO_2$

Using the shoots of the plants for energy conversion

### $CO_2$ Sequestration

Carbon deposition in soil, increase in humus content, working  
against erosion caused by intensive farming

### III. Closed - Loop - $H_2O$

Water (steam) splitting through steamreforming to generate  
 $H_2$ , hydrogen oxidized in fuel cell to  $H_2O$

### Water Generation:

Plant cellulosis is a carbohydrate. Energy conversion is generat-  
ing appr. 0,5 t of  $H_2O$  per 1,0 t of biomass.

### IV. Closed - Loop - $O_2$

Photosynthesis is yielding  $O_2$  (shoots and roots) Same amount  
of  $O_2$  as used in steam reformer (pulse combustors) plus fuel cell.

### V. Closed - Loop - $H_2$

Hydrogen is used at the point of generation and not piped or  
transported (stationary and mobile fuel cell technologies). No  
"hydrogen infrastructure" needed.

### VI. Closed - Loop - Electricity

Power can be used locally and does not need a high voltage  
grid system for further distribution.

### VII. Generation of Heat

Local heat source