

# The Largyalo-Energieconcept

## Energy source

### **Photovoltaics**

Specialy manufactured solar cells are used with a cell efficiency of 22 %.  
Small 7 and 9 cell modules decrease the loss of efficiency through partial shadowing. The modules are treadfast.

### **On the roofs**

About 15 sqm. Peak 3KW. Efficiency on a sunny day >10KWh

### **Mobile units**

About 12 sqm. Peak 2,5KW. Efficiency on a sunny day >10KWh

### **Around the masts**

About 14 sqm. Peak 2 KW. Efficiency on a sunny day >10KWh

### **MPPTs**

Solar chargers with an efficiency of 98% increase the output at up to 30%.

### **Windgenerators**

Up to 4 windgenerators each delivering 600 W at 12 m/s.

### **Hydrogenerators**

When sailing, the two electric propulsion motors work as generators. Efficiency at 4 kn: about 300 W, at 6 kn: 500W at 10 kn: 800 W. Resistance and output can be varied.

### **Solarthermy**

Heating of service water through a solar collector. The heated medium is led through a heat exchanger in the warm water boiler.

### **Zeolithe Desorption**

Concave mirror tubes ( Sydney tubes) for heating ( drying) of the zeolithe in the cooling box.

### **Cooking**

Parabolic mirror with solar tracking for preparation of cooked food.

### **Hot air convection oven**

Concave mirror tube for heating of air (>200°) that is led to the oven through a tubing system.

### **Emergency power supply fuelled by vegetable oil**

Assures the function of all important installations and the propulsion, in case of an emergency, or a disturbance in the electrical system.

## Storage and Management

### **48 V Lithium Akkus**

supply directly the electrical propulsion units and the 230V board net through alternators.  
Charged through PV , wind generators and the electrical motors.  
Capacity: 100 Ah = 48 KWh

### **24 V Lithium Akkus**

Supply the onboard electrics like pumps, lights, instruments, etc.  
This storage also supplies the 12V net  
Charged through the 48V net  
Capacity: 200 Ah = 4,8 KWh

### **Low loss energy distribution**

Cable diametres are generously dimensioned  
Cables are kept at a distance of heat sources  
Avoiding unnecessary voltage loss  
Use of highly efficient components

### **Energy management**

The three main energy sources – sun, wind and water – are, under normal conditions, sufficient for the coverage of the entire energy needs, even at full occupancy.  
At certain times, the energy production is significantly higher than the momentary need. The overflow is stored in batteries.  
In case those are already fully charged, this overflow has to be used immediately to avoid its loss. For example for desalination or the zeolithe desorption.

The energy management directs the consumption depending on the disposable energy to avoid power loss as well as power need (?)  
Simply put, it means to adapt as well as possible the consumers' on periods to the momentary energy production and the battery charging currents and conditions.

### **Monitoring**

Supervision of consumers and energy

## Consumers

### **Electric Propulsion**

2 Underwater electric motors, that can be swiveled out of the water to reduce resistance during sailing.  
Power consumption: 10 KW each ( 12 for a short time).Static thrust with the currently used propellers, 3400N each.

### **Propeller**

Automatic pitch adaptation through flexible blades, increase efficiency to 10-15 %

### **Desalination**

30% lower consumption through energy recovery. Water lubricated, industrial quality, variable rotational speed. Consumption of about 4-5 Wh/l.

### **Induction cooking stove**

Heat is generated directly in the pot, therefore no loss through heat conduction. Reduces consumption to 30 %. Very quick temperature change is possible, comparable to gas stove.

### **Insulated cooking pots**

Using the induction technology the content of the pot can be heated and the insulation avoids heat loss. Reduces consumption to up to 90% for certain dishes ( rice, beans)

### **Hot air convection oven**

Heat is very quickly available, therefore little pre-heating times.  
Reduces consumption to 5-20%. In combination with the sydney tube for heating of air, up to 99% reduced consumption.

### **Warm water production**

Water heating through solar collectors. Only when not sufficient, electrical heating is added. Reduction to up to 99%

### **Room and Deck lighting, navigation lights**

LED lights. Reduction: 60-90 %

### **Cooling**

Zeolithe/Water Adsorption Technology. Only when cooling power decreases, conventional cooling will be added. Reduction: 60 – 100%

### **Water economizers**

Pedal valves at all wash basins and kitchen sink. Water runs only when it is used. Reduction: 50-80%

### **Washing machine**

Docked on onboard water heating system, which reduces the heating power. Reduction : over 60%

### **Dinghi propulsion**

Electric, 2 KW , corresponds to 6 HP combustion engine. Lithium akku with 150 Ah at 24V= 3,6 KWh