



El papel de la biomasa en la ecoaldea GAIA y su  
utilización en el establecimiento de nuevas eco-casas

Javi Castelló Mollar

La Llotja del Cànem (Castellón), 15 of Juny  
Sede del Peñagolosa (Vistabella), 17 of Juny

# GAIA FOUNDATION

- Projects around the world;  
South America (Argentina, Brazil)  
Africa (Kenya, Ethiopia)  
Europe (Ireland, United Kingdom, Hungary)



<http://www.gaiafoundation.org>

- Hungria

} Galgafarm  
GAIA Ecovillage



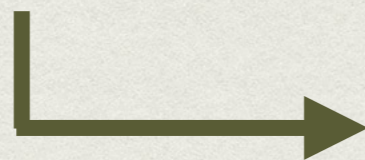
<https://www.gaiaalapitvany.hu>

# GAIA FOUNDATION

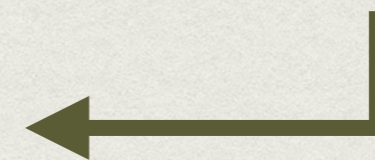
Galgafarm



GAIA Ecovillage



Galgahéviz (Hungria)



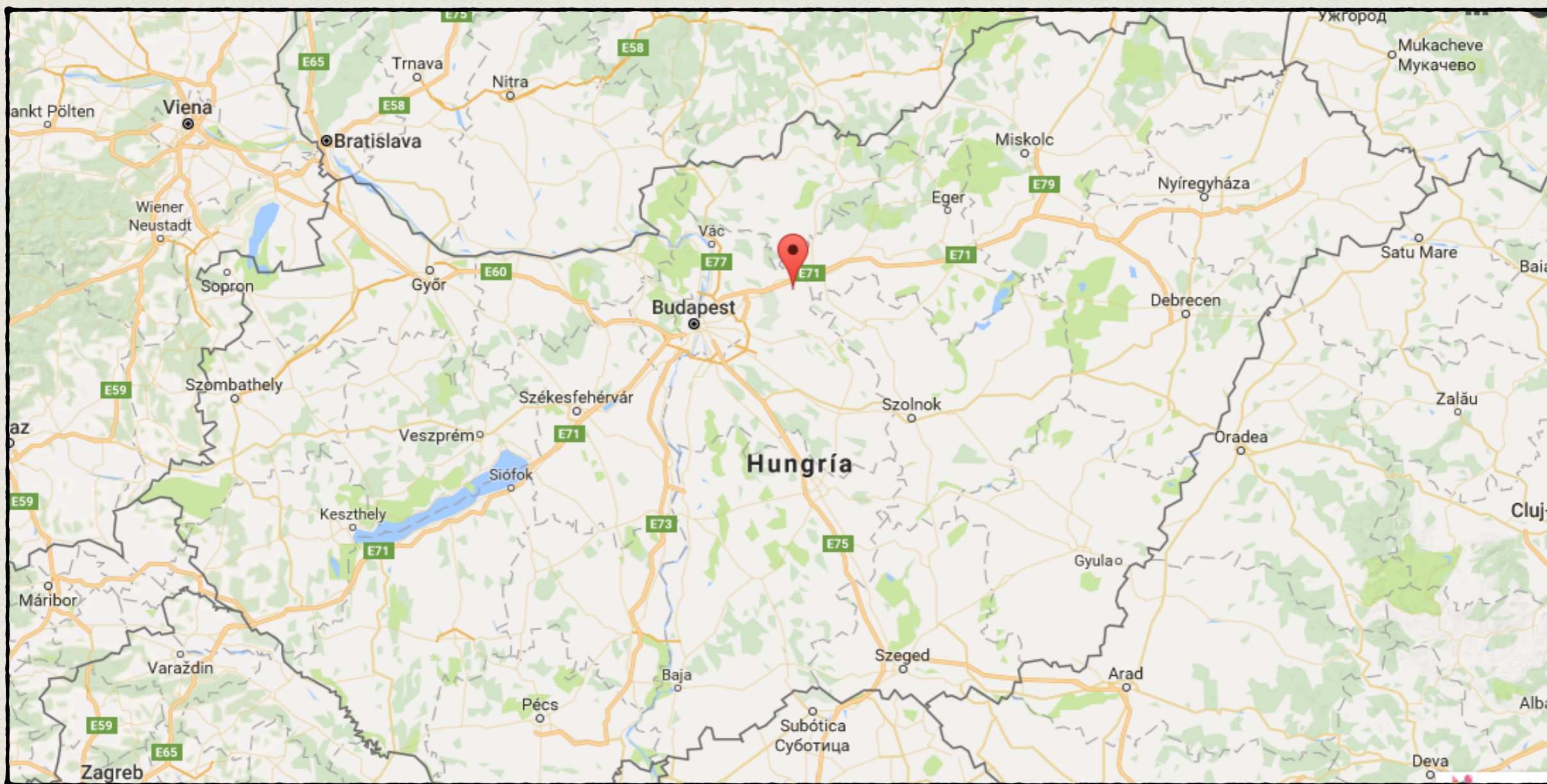
# LOCATION

Galgahéviz (Hungary)



# LOCATION

Galgahéviz (Hungary)



# LOCATION

Galgahéviz (Hungary)



# LOCATION

Galgahévíz (Hungary)



Land

Eco-village

Wooded area

Lake

# Eco-village Galgahéviz (Hungary)





# Eco-village Galgahéviz (Hungary)



# Eco-village Galgahéviz (Hungary)



# Eco-village Galgahéviz (Hungary)



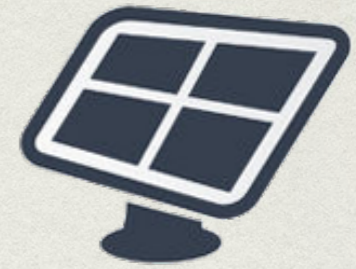
# Eco-village

Galgahéviz (Hungary)



# Eco-village

Galgahéviz (Hungary)



# Eco-village

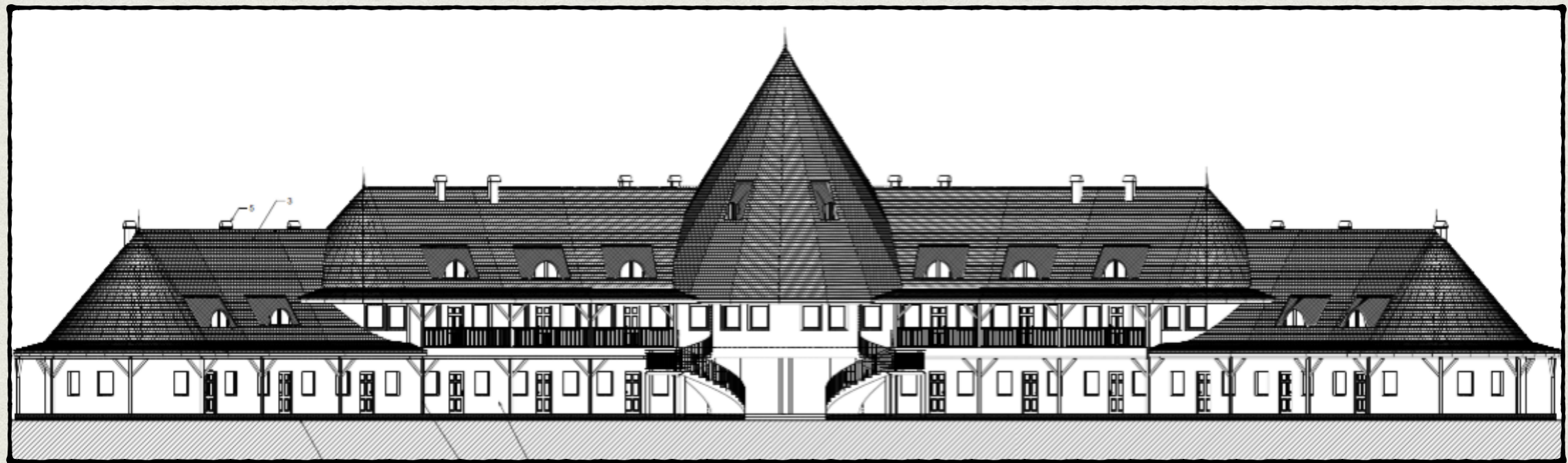
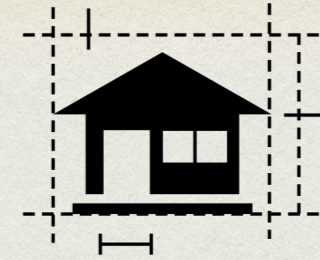
Galgahéviz (Hungary)



# Construction



# Construction

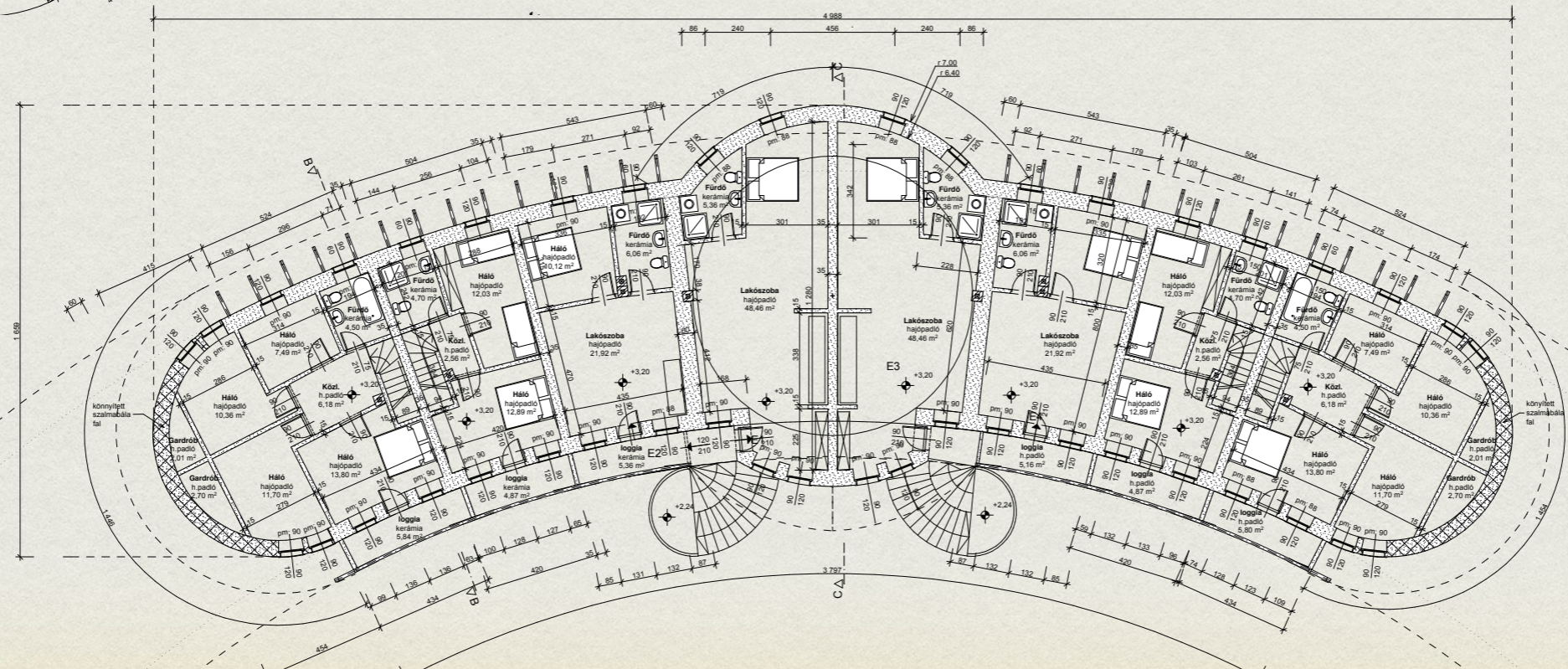
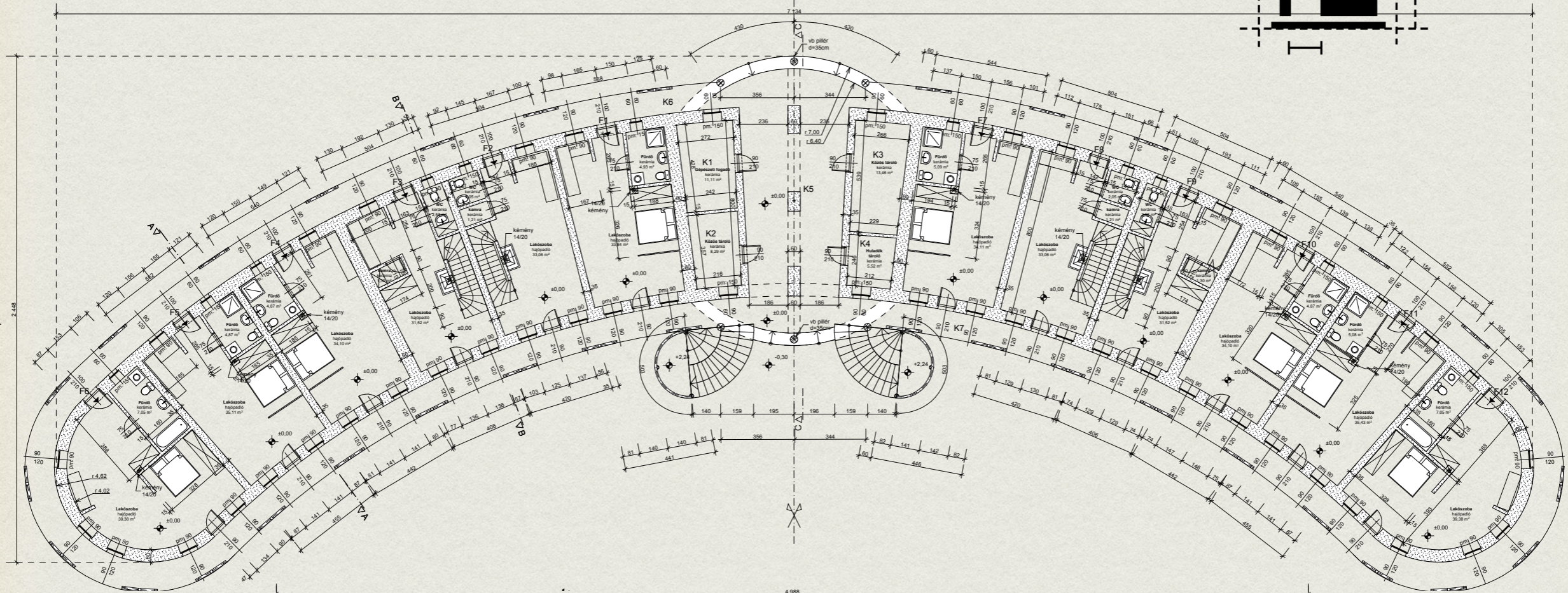
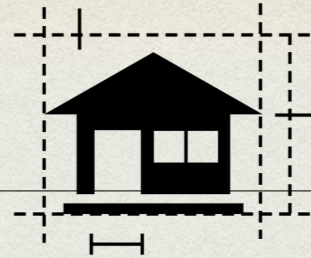


17,34 m

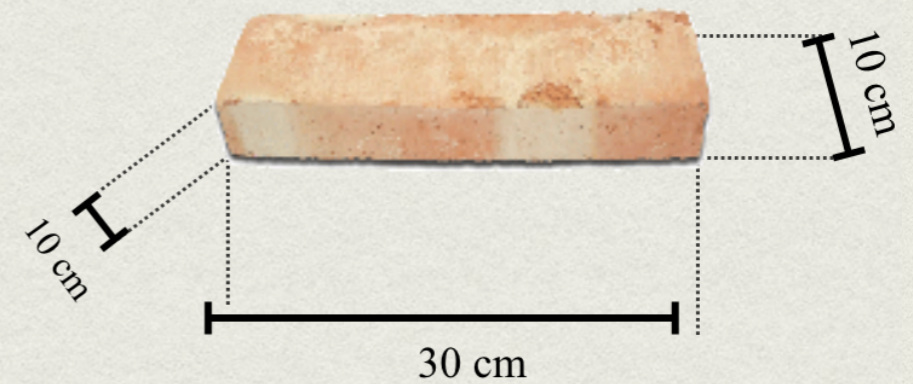
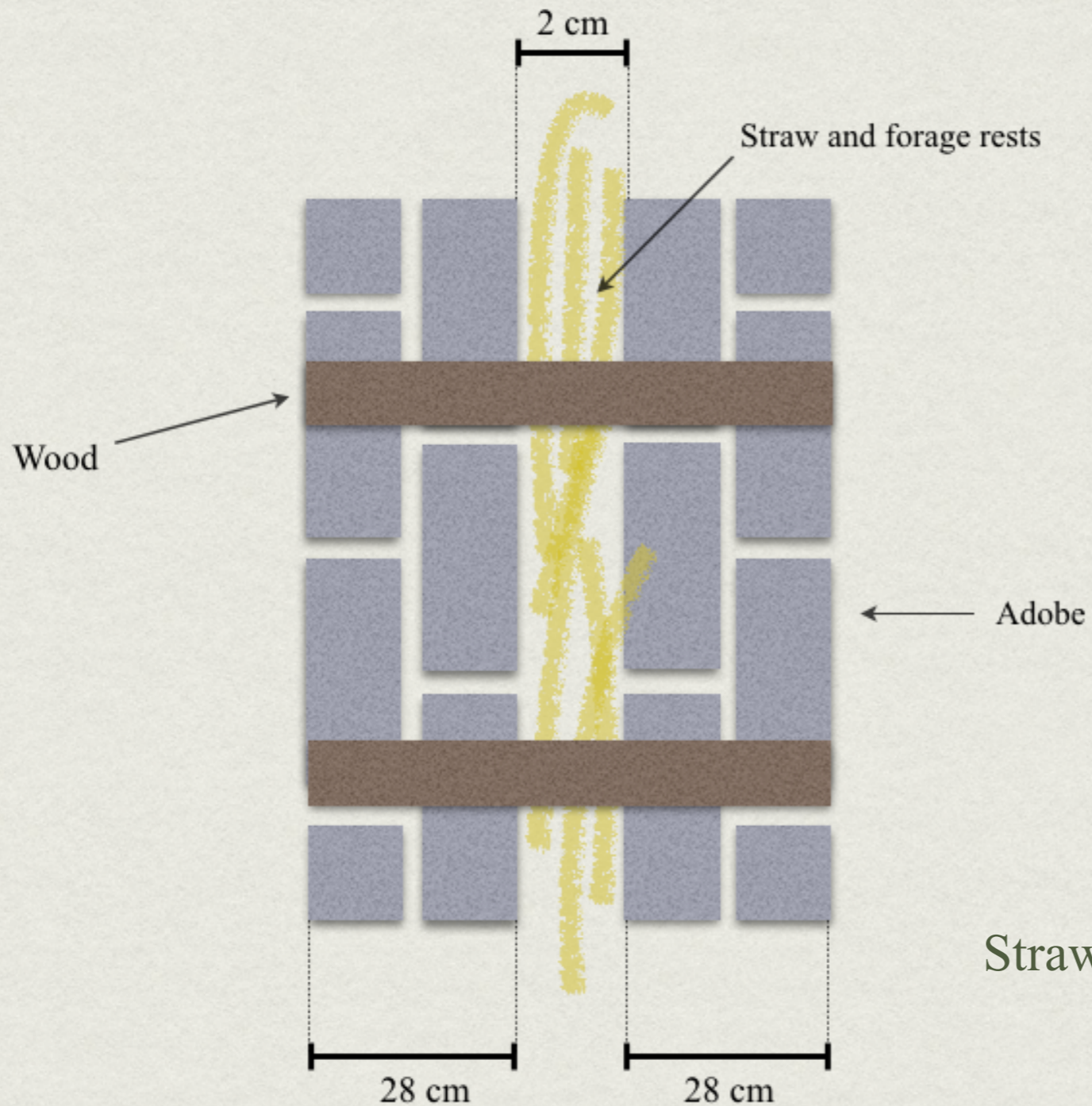
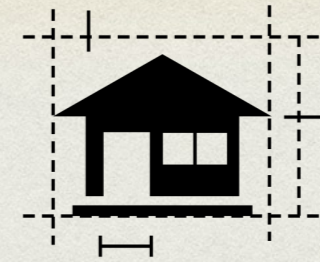
71,4 m



# Construction



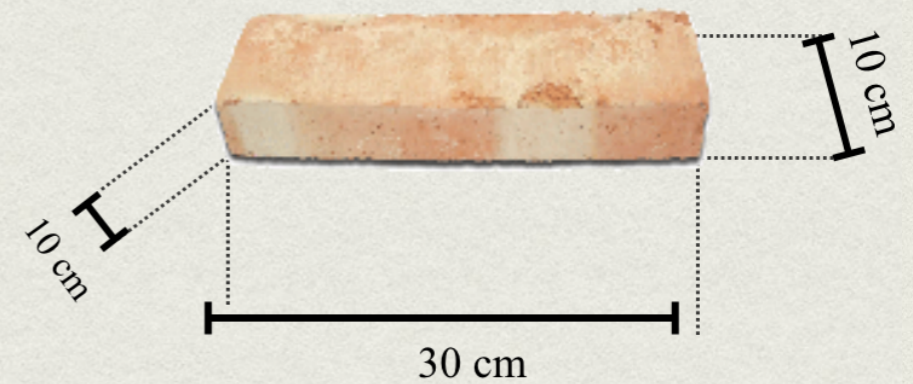
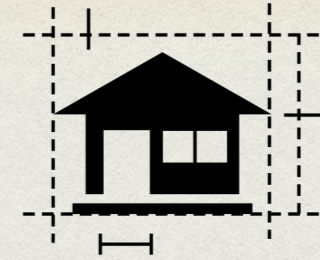
# Construction



$$\text{Adobe} \mapsto R = 0,246 \text{ (W/m}^2 \text{ }^\circ\text{C)}^{-1}$$

$$\text{Straw and forage rests} \mapsto R = 0,25 \text{ (W/m}^2 \text{ }^\circ\text{C)}^{-1}$$

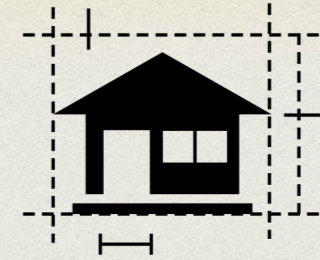
# Construction



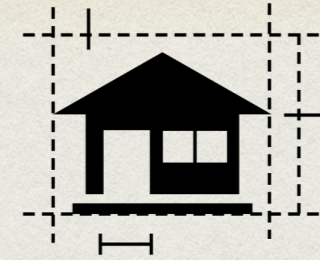
Adobe  $\mapsto R = 0,246 \text{ (W/m}^2 \text{ }^\circ\text{C)}^{-1}$

Straw and forage rests  $\mapsto R = 0,25 \text{ (W/m}^2 \text{ }^\circ\text{C)}^{-1}$

# Construction



# Construction



# Construction



# Conditions



- Temperature;  
Exterior

Land temperature	5 °C
Max. Outside temperature	<b>33,5 °C</b>
Relative humidity	30,34 %
Minimum outdoor temperature (°C)	<b>-7 °C</b>

## Interior

Temperature variation 21°C a 26°C

Humidity variation 40°C a 50°C

# Alternatives

- Conventional sources;



Gasoil



Electric grid



Natural gas

- Renewable sources;



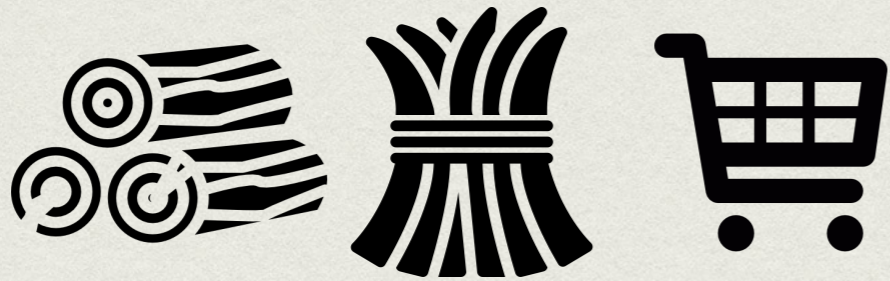
Solar and wind



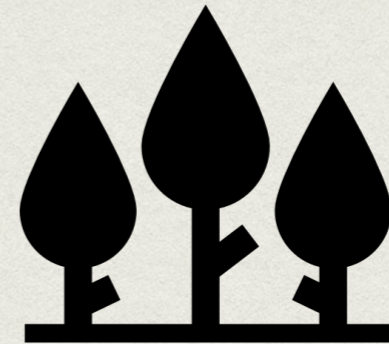
Biomass



# Biomass



- Remains of wood
- Maintenance
- To buy



- Energy crops



Land

Eco-village

Wooded area

Lake

# Biomass

*Populus sp*



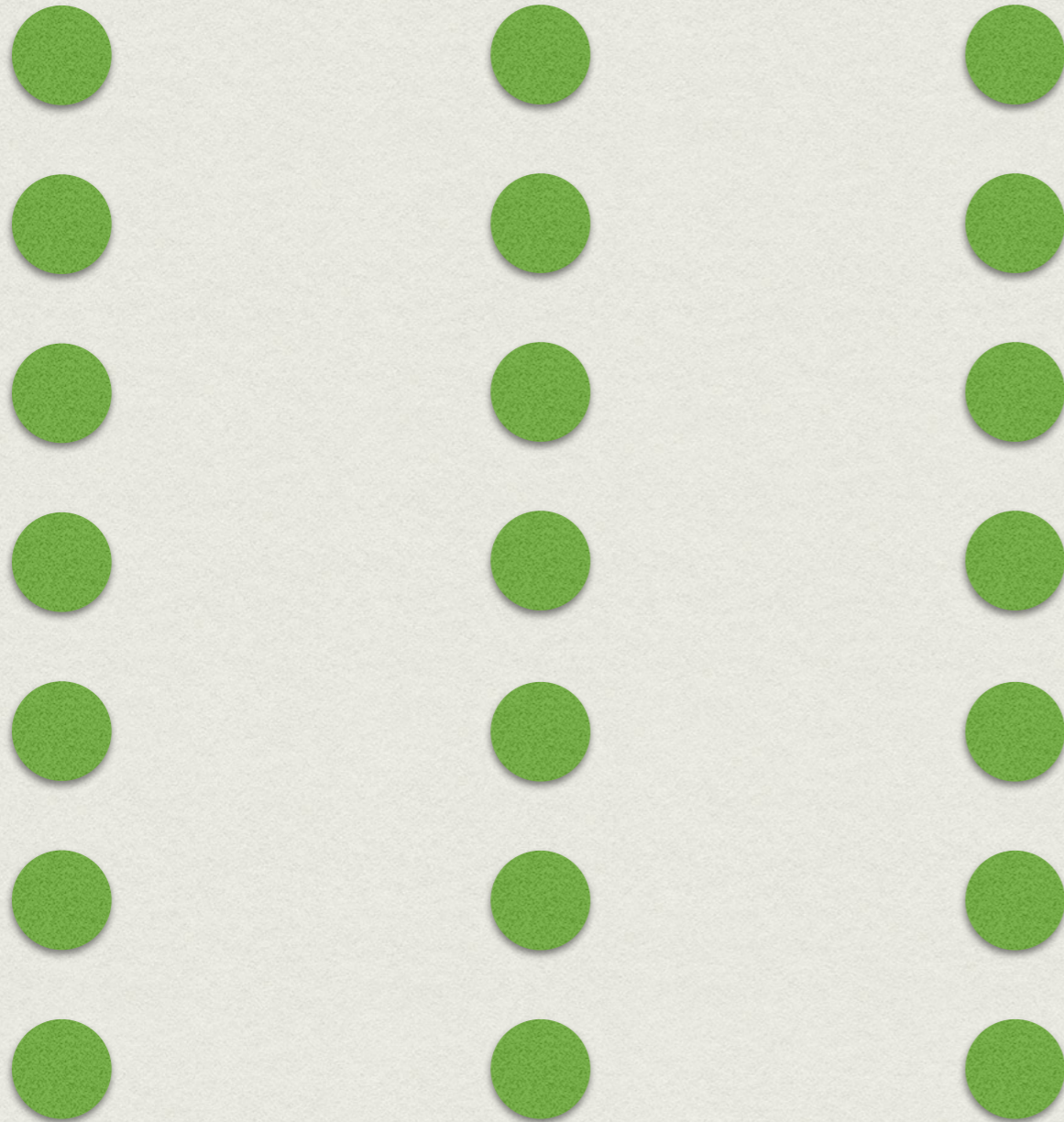
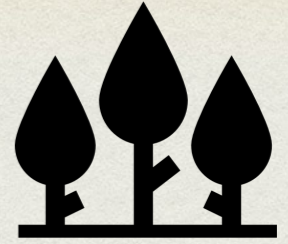
# Biomass

*Salix sp*



# Biomass

Energy crops



Species = *Populus sp* y *Salix sp*

Density = 5,500 trees/ha

1 ha = 83 th = 37,3 ts (3years)

Every 2 years → 75,2 th = **33,8 ts**

70 cm

# Biomass

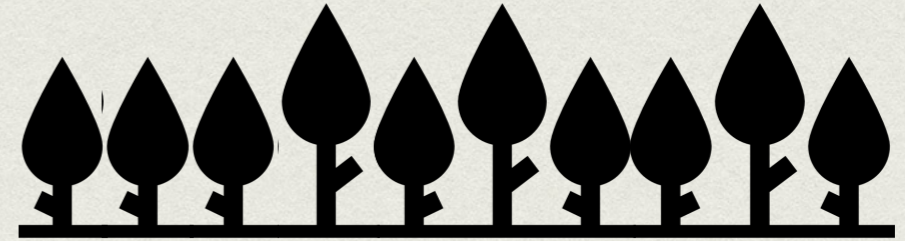
Energy crops



53,85 kW



- Materials
- Thickness



16,7 ts/ha



- PCI = 4,12 kWh/Kg

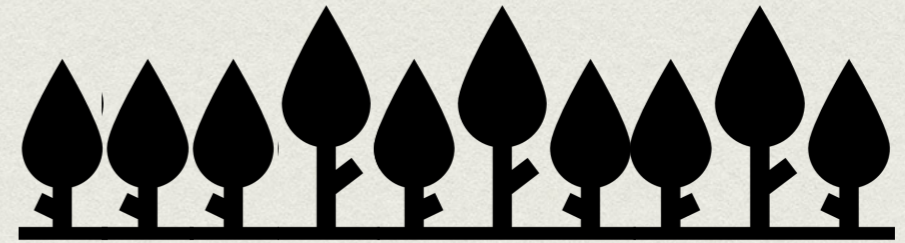
 Diesel automotive PCI = 11,84 kWh/Kg

# Biomass

Energy crops



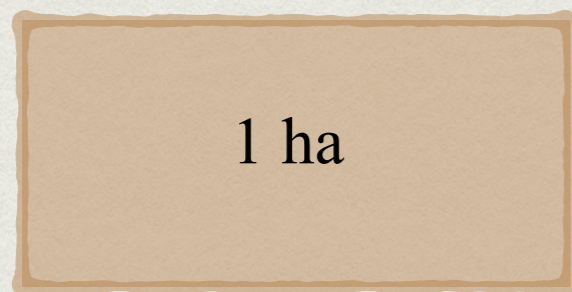
53,85 kW



16,7 ts/ha

$$Q_{\text{comb}} = (63932,75 \text{ kWh}) / (4,12 \text{ kWh/Kg})$$

$$Q_{\text{comb}} = 15,1 \text{ ts}$$



1 ha



x 11

1 year

# Biomass

Energy crops



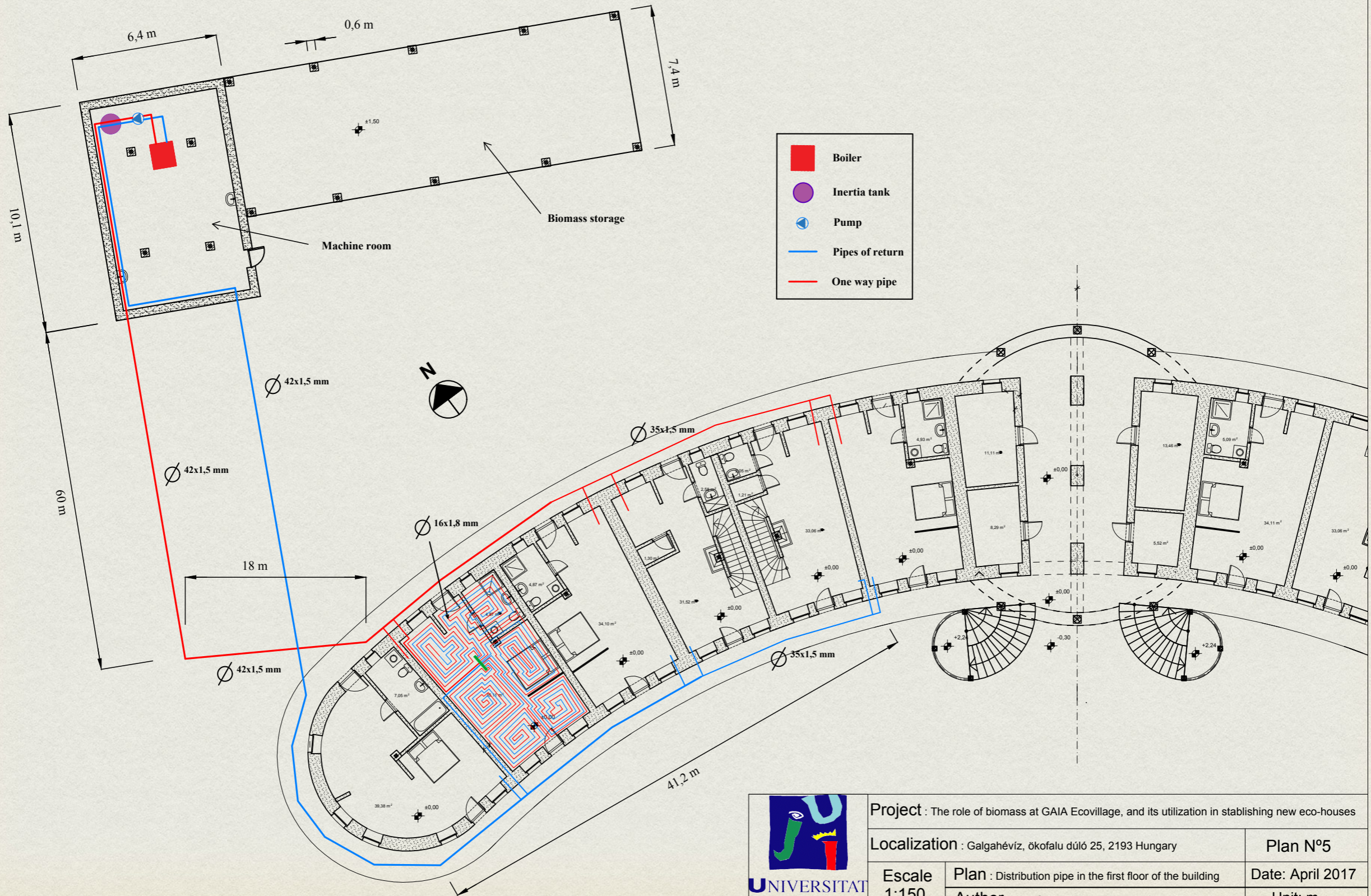
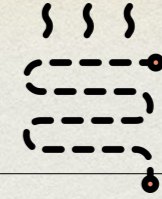


# Biomass

Energy crops



# Radiating floor



- Boiler
- Inertia tank
- Pump
- Pipes of return
- One way pipe



Project : The role of biomass at GAIA Ecovillage, and its utilization in establishing new eco-houses

Localization : Galgahévíz, ökofalu dúl 25, 2193 Hungary

Plan N°5

Escale  
1:150

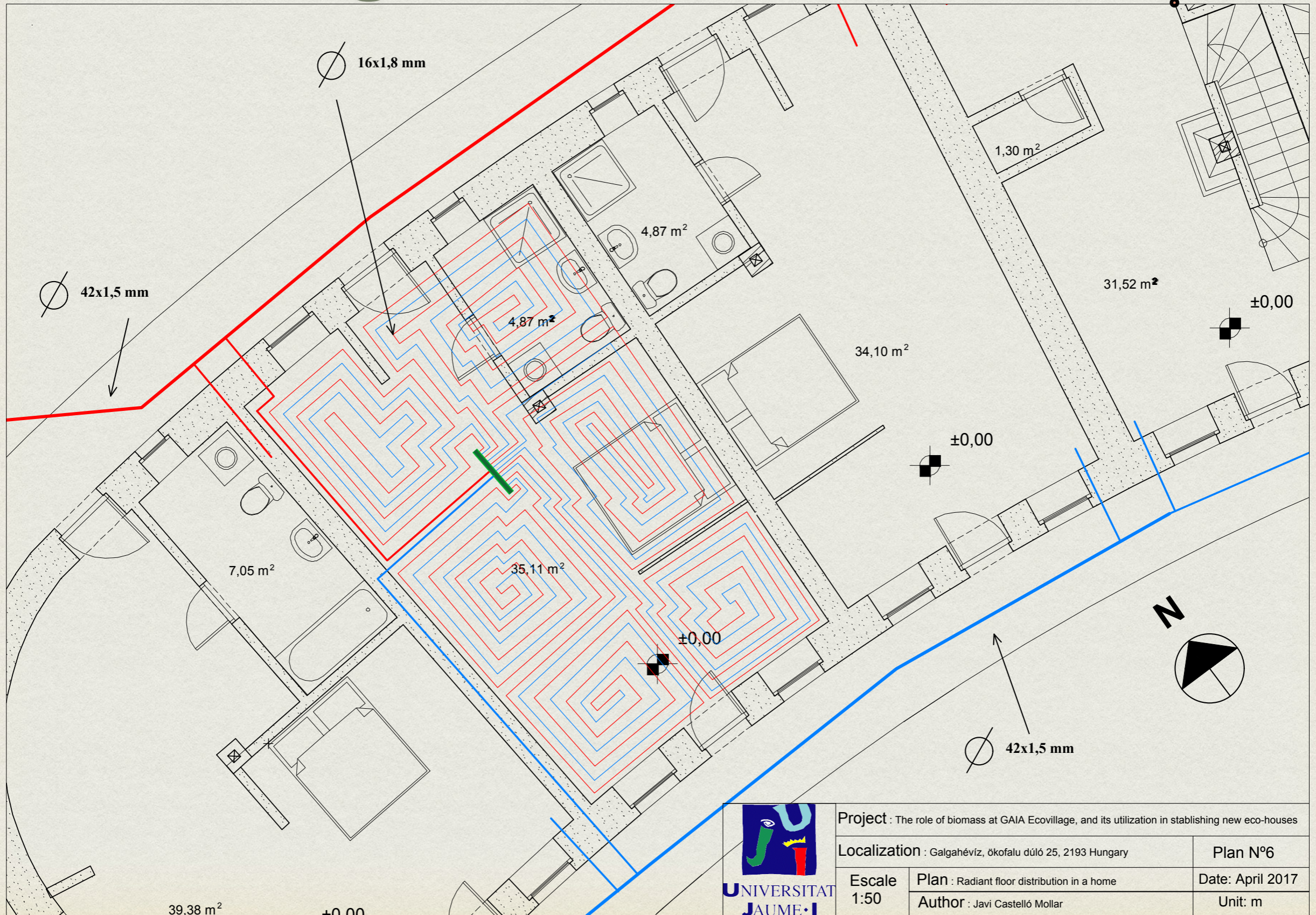
Plan : Distribution pipe in the first floor of the building

Date: April 2017

Author : Javi Castelló Mollar

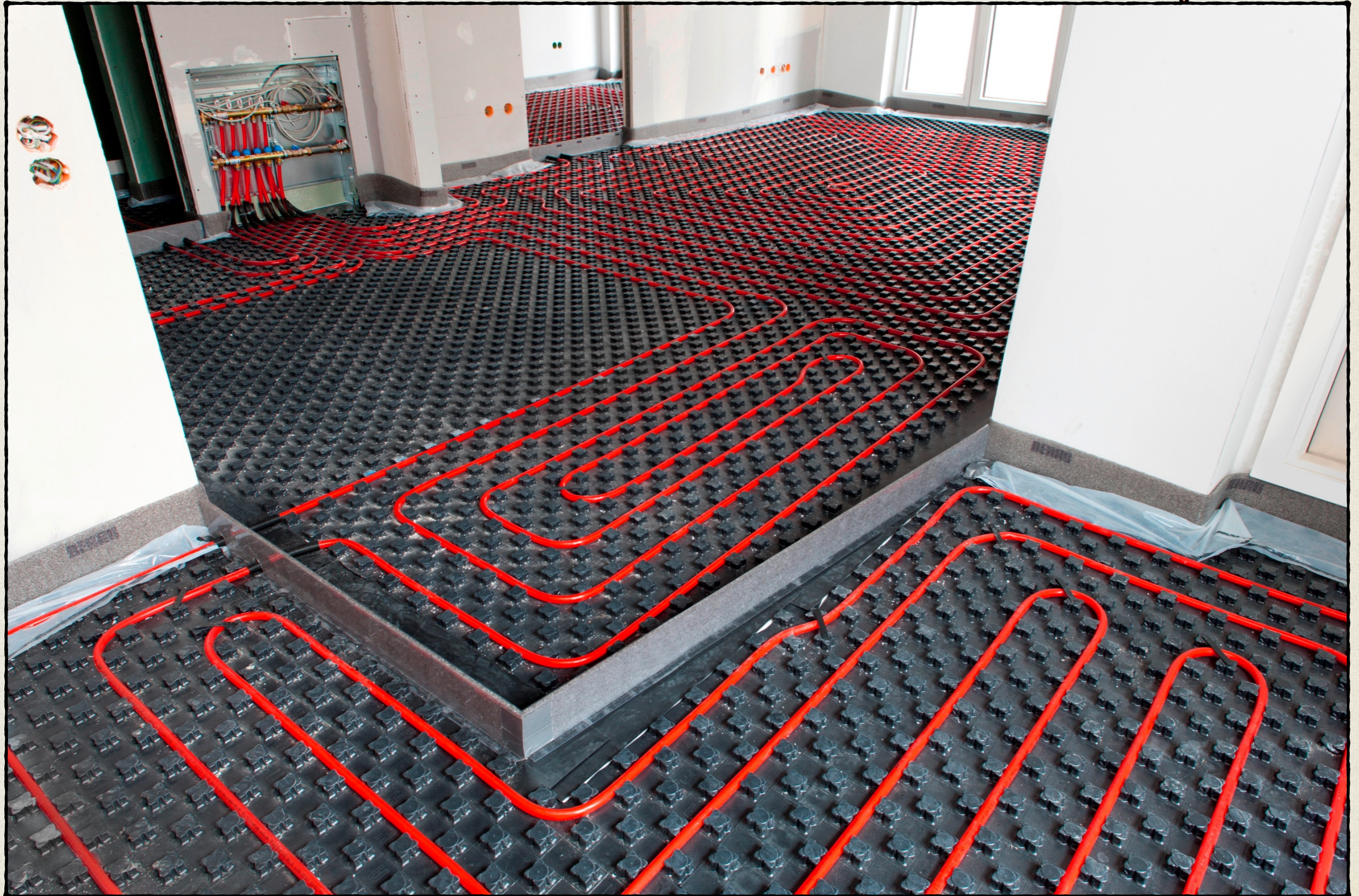
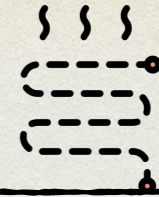
Unit: m

# Radiating floor



Project : The role of biomass at GAIA Ecovillage, and its utilization in stablishing new eco-houses		
Localization : Galgahévíz, ökofalu dűlő 25, 2193 Hungary		Plan N°6
Escale 1:50	Plan : Radiant floor distribution in a home	Date: April 2017
Author : Javi Castelló Mollar		Unit: m

# Radiating floor



# Boiler biomass



**Boiler K2104 of Tatano**

- Power 50 kW

- Coarse wood

- Characteristics

  - Connectivity

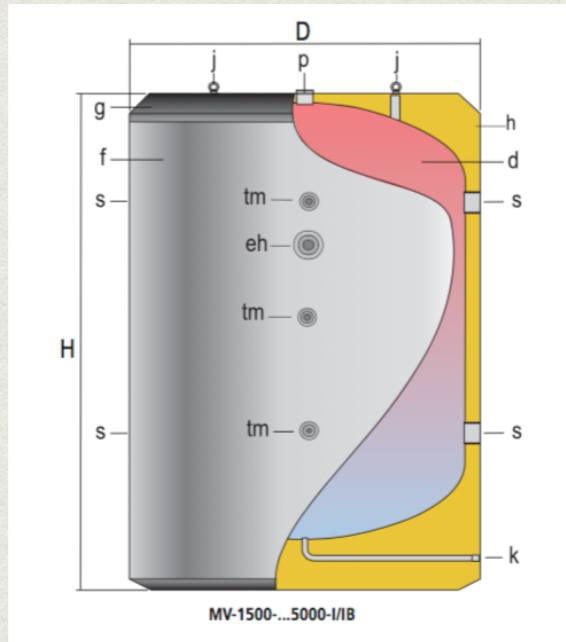
  - Easy removal of ashes

  - Minimal heat loss

  - Large combustion chamber

  - Horizontal heat exchanger

# Installation elements



Tank of inertia **1500 liters**



**120 m** Tube PP 42x1,5 mm  
**83 m** Tube PP 35x1,5 mm



**x2** Pump Wilo-Stratos PICO from Wilo 6mca



**721.76 m per property** Tube PE 16 X1,8 mm

# Costs



- Initial investment

Description	Total price (€)
Direct costs	34.445,27
Indirect costs	22.366,79
<b>Total</b>	<b>56.812,06</b>
<b>Total (+27% )</b>	<b>72.151,32</b>

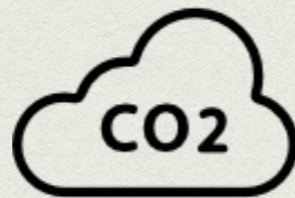


X 1

= 6600 €

# Benefits

- Environmental



- Reduction of CO, HC and NOX emissions.
- Decrease in sulfur emissions.
- CO<sub>2</sub> neutral cycle, with no contribution to the greenhouse effect
- Reduction of the risks of forest fires and insect pests.

- Rural development



- Independence of fluctuations in fuel prices
- Socioeconomic improvement
- Possibility of using land with energy crops
- Setting the population

- Multiplier project



- Ecotourism in the village
- Excursions and outdoor activities
- Expansion of the philosophy of the village
- To make known the different renewable energies

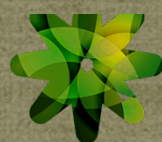




El papel de la biomasa en la ecoaldea GAIA y su  
utilización en el establecimiento de nuevas eco-casas

Javi Castelló Mollar

La Llotja del Cànem (Castellón), 15 of Juny  
Sede del Peñagolosa (Vistabella), 17 of Juny



**IN2RURAL**  
Innovative Practices in Renewable Energies  
to Improve Rural Employability



Co-funded by the  
Erasmus+ Programme  
of the European Union



**UNIVERSITAT  
JAUME I**

