

1. Name of the solution: TRIAN-S

2. Category of solution: */ Solar / Energy Storage /*

3. Short intro

TRIAN-S is a prototype of a wide purpose offgrid solar electricity production unit with usable room under the solar panels.

General idea is to take in use of the space under ground mounted solar panels, so we can economize resources of land.

Frame (stand) of solar panels makes the room we can use for multipurpose: from storage to accommodation. Roof is made from solar panels, which are producing energy. Energy generation capacity is depending on type and number of panels. It could be 2,5-5 kW and yearly production 2500-5000 kWh.

4. Complexity of building, operating and cost of the solution

Building consists of 3 walls, a floor and solar panels roof. Building is placed on 9 stone blocks and needs no specific foundation. Complexity of the building is medium. Requires basic skills of general building. Special skills for electric installation is required. Construction does not generate waste at the construction site, as the building consists mainly of wood and its parts are intended to be prefabricated at the factory. It can also be built on site, according to the drawings available. Only hand tools are needed for construction.

Operating costs are low (full DIY, low maintenance and operating complexity, low cost <100 EUR), but the building materials cost is over 500 EUR (approx min 5000 EUR, depending also on materials cost, availability, transportation and prefabrication).

5. A representable good quality photo



6. Description of the solution

Trian-s is a relatively low-cost multipurpose offgrid energy production unit with usable room, which can also be placed in a naturally sensitive environment. Its triangular shape allows, in addition to the cheap construction cost, to place the solar panels at the right angle. At the same time, solar panels form the roof of the building. The resulting building (ca 15 m²) can be used for many purposes: warehouse, tool shed, cooling storage, accommodation, sauna, etc.

It is also possible to combine building units in different ways, resulting in a larger building and more options for use.

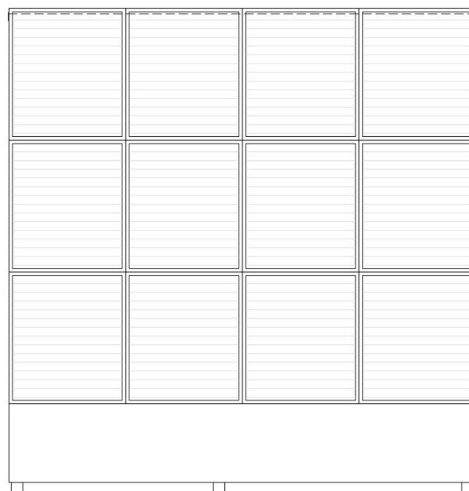
The use of the building reduces the ecological footprint due to environmentally friendly electricity generation and the integration of the materials used.

6.1 More details of the solution and technical description

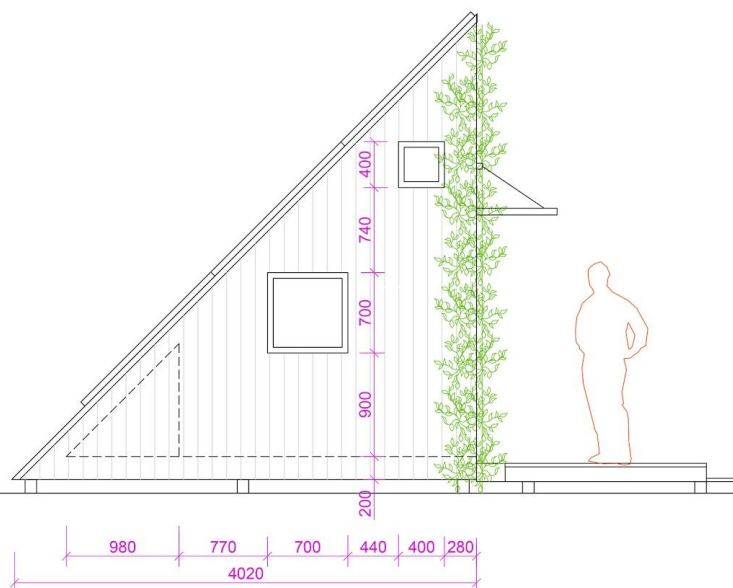
- Dimensions (L x W x H): 4x4x4m
- Number of walls: 3
- Bottom area: 16 m²

- Useful space area: 14 m²
- Electricity generation capacity: 2,5-5 kW
- Annual electricity productivity 2500-5000 kW (as of Estonia)
- Total battery capacity: 400 Ah (24 V)
- Output voltage 24 V (DC), 230 V (AC-main output)
- Number of expansion modules: not limited
- Life expectancy (80% of resources are reusable, except batteries): 25 years

6.2 Technical drawings and drafts

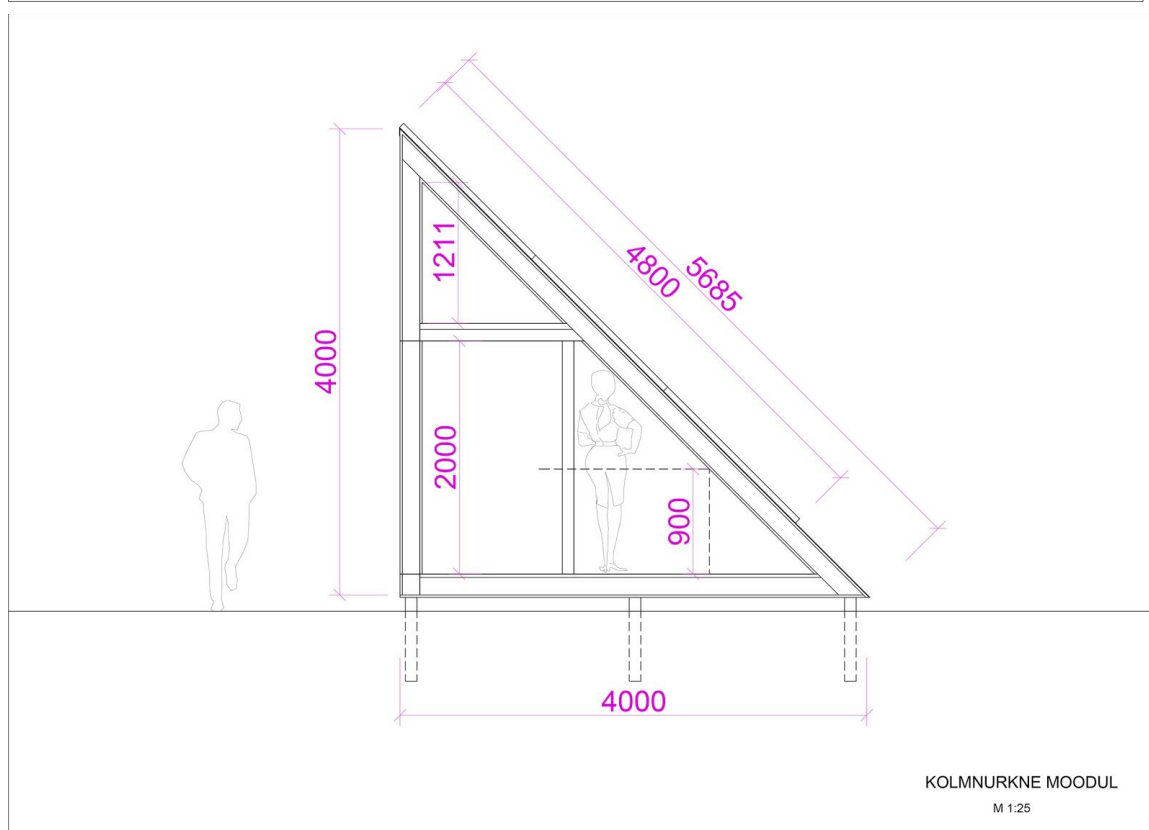
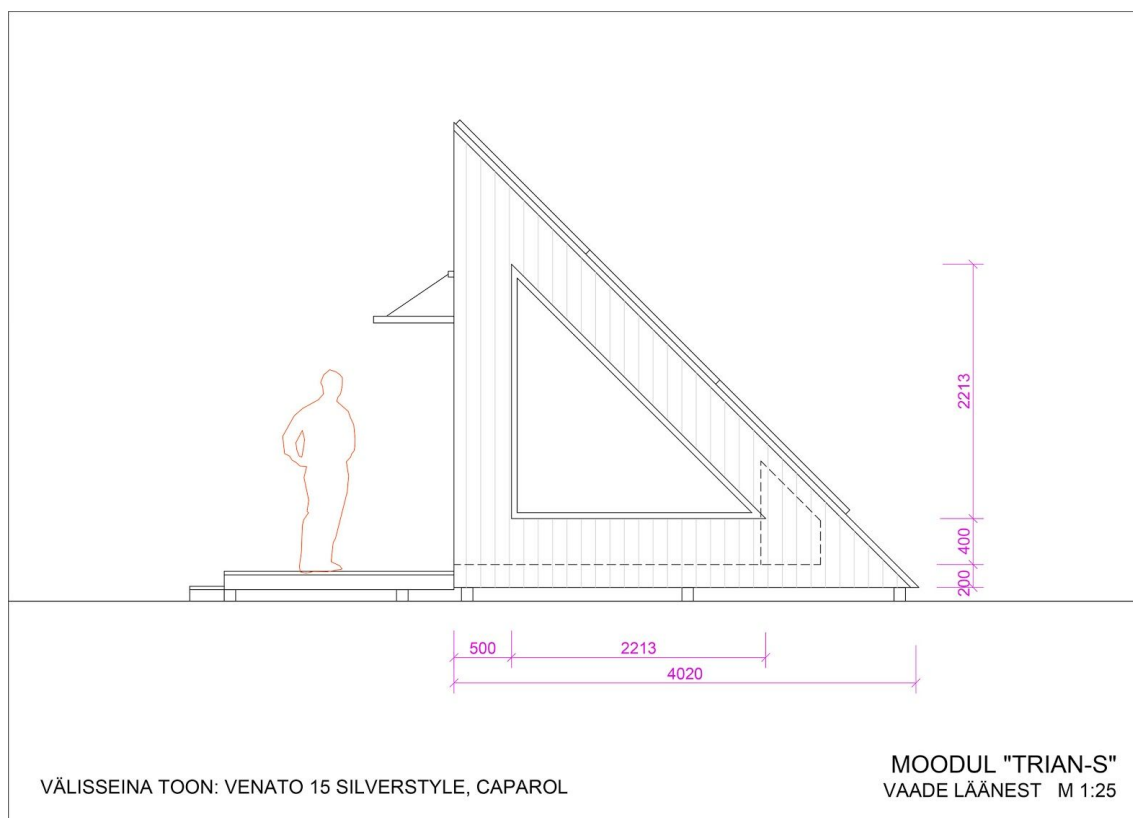


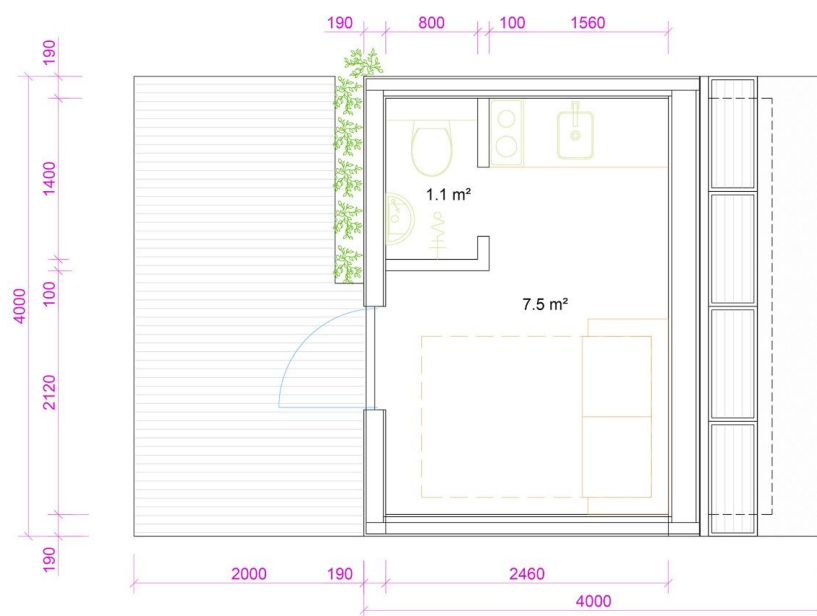
KOLMNURKNE MOODUL
VAADE "B" M 1:25



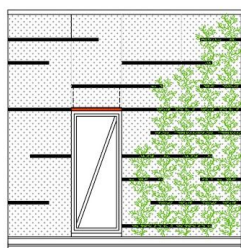
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MOODUL "TRIAN-S"
VAADE IDAST M 1:25

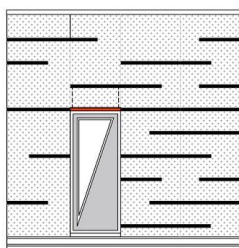




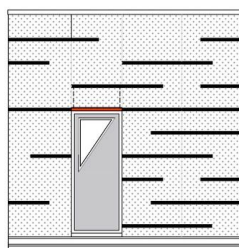
MOODUL "TRIANG"
PLAAN M 1:25



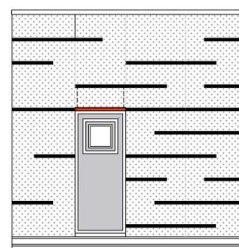
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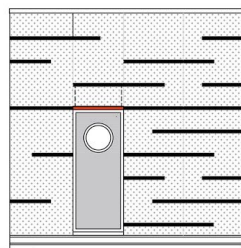
VARIANT 2



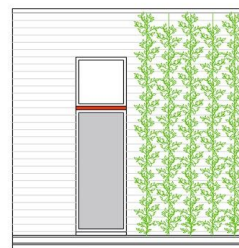
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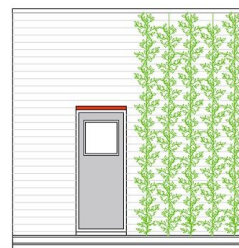
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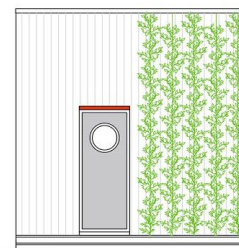
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VARIANT 6

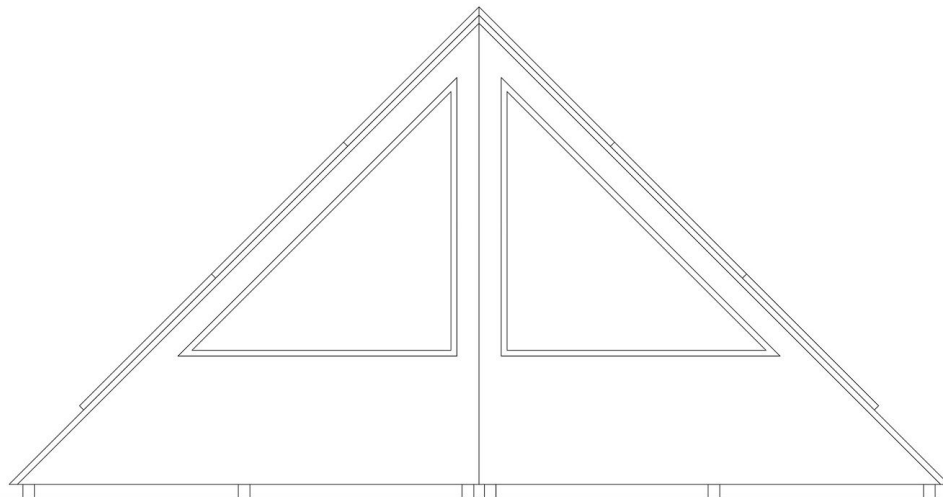


VARIANT 7

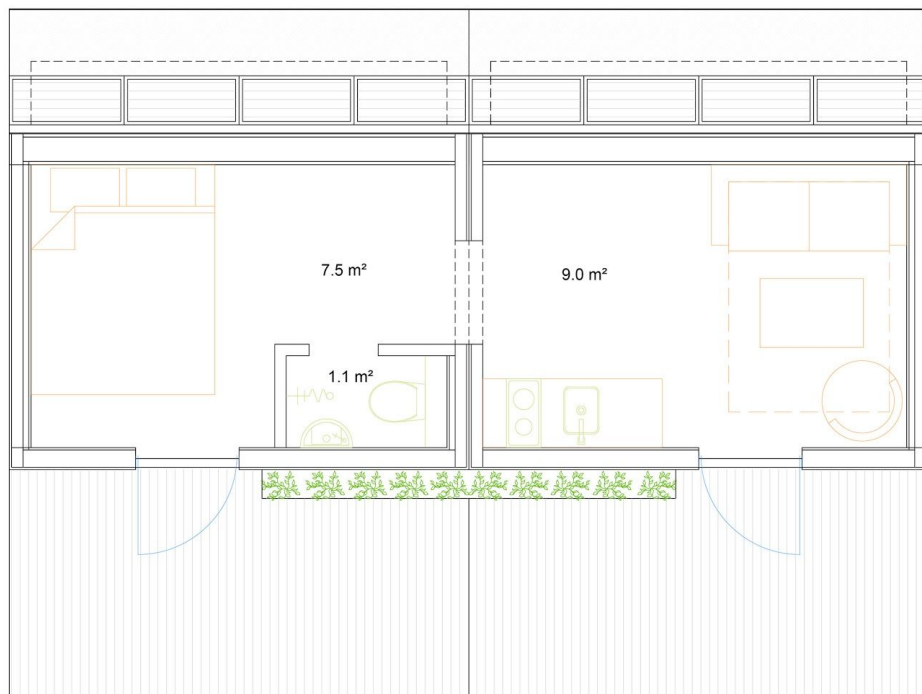


VARIANT 8

MOODUL "TRIANG"
VAATED UKSE SEINALE M 1:50



KOLMNURKNE MOODUL
2 MOODULIT KOOS M 1:25



MOODUL "TRIANG"
KAKS MOODULIT KOOS
PLAAN M 1:25

6.3 Materials, skills and tools required

- 9 stone blocks
- wooden beams 50x150x5000 mm, 12 pcs
- wooden boards 22x10x4000 mm, 8 pcs
- lining boards for external walls, 30 m²
- screws, edge stains
- OSB construction plate 22mm, 16 m² (upper layer of the floor; double if also lower layer is required to carry the optional insulation)
- zinc sheet for the roof
- windows according to the needs and a door
- solar panels 250-400 W, 8-12 pcs.
- offgrid inverter 5 kW
- batteries 200 Ah, 4 pcs.
- wires, fuses

6.4 Other preconditions and/or requirements

Normal carpentry skills are required for construction.

Skill in installing solar panels and electrical installations is required.

6.5 Results, learnings and errors to avoid

In order for a building to be durable and efficient, construction must be carried out in accordance with the drawings.

To avoid danger to life and health, a trained and licensed electrician is required to make electrical connections.

6.6 Cost Analysis and Life Cycle Analysis (to the extent to which it is possible)

Trian-S is designed to last at least 25 years, when it does not require maintenance, except for routine building inspections and minor repairs.

25 years of electricity generation (at current prices of 40 EUR per MWh) would be up to 5000 euros, which could be saved (in addition to the grid costs) by using locally the electricity of the Trian-S unit.

Because the energy is produced and at the same time maintenance costs are close to zero, Trian-S saves resources and recovers construction costs, excluding the costs normally associated with electricity, which in some places can amount to tens of thousands euros.

7. Step by step guidelines for building the solution

7.1. soil preparation (leveling area of 5x5 m)

7.2. installation of 9 foundation blocks

7.3 laying plastic underlay and installing 3 beams on the blocks



7.4. forming five triangles from the beams. If not done, prepare 8 mortises for the roof support planks into the longer beams of 3 triangles.



7.5 placing and fixing the triangles on the floor beams at equal intervals, so that the distance between the outer triangles is 4 m

7.6 installing 8 planks (into the pre-prepared mortises in the middle triangle beams) crossing the top of the triangles for the roof support

7.7 installation of sheet metal on the roof



7.8. finishing the walls outside with a lining boards



7.9. covering the floor with osb plate



7.10. windows and door installation according to the needs



7.11. installation of solar panels



7.12. making the necessary electrical connections and inserting batteries

7.13. construction of a gray water system (optional)

7.14. insulation of the floor, walls and the roof (optional)

7.15. rainwater collection system (optional)



7.16. building a living wall (optional)

7.17. terrace construction (optional)



7.18. finishing internals and externals (optional)

8. Video of the solution building workshop or process (optional)

not available

9. Local Prototype(s) (to be filled by local representative if the info is not available for the expert)

Soonlepa, Hiiumaa island, Estonia

9.1. Geographical territory and its location if publicly accessible

Soonlepa village, Hiiumaa island, Estonia. Accessible only for registered persons during organized workshops.

9.2 Context of the prototype:

Low carbon emission accommodation/housing in semi-natural environment

9.3. Who are the people, community, institution and/or organisation operating the prototype?

- NGO Soonlepa Arenduskeskus
- AS Landholder

9.4. Photos from the location: PHOTOS added in separate files

9.5. Optionally: VIDEO

10. Experts involved (in developing the prototype or building the same solution somewhere else)

Tõnis Kasemägi - inventor and engineer

11. Contact information for more information about the solution in the country of presence:

www.soonlepa.com

12. References (links to external public materials on the internet for relevant additional information)

www.soonlepa.com

additional video on the similar subject:

https://www.youtube.com/watch?v=TnN_GJUHROE

13. Author of the content (name and contact information for further questions by project team)

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