

**Table S1**– Set of selected decision criteria.

| No. | Criterion group     | Parameter symbol | Criterion   | Criterion symbol     | Preference | Value range |
|-----|---------------------|------------------|---|----------------------|------------|-------------|
| [-] | [-]                 | [-]              | [-]   | [-]                  | [-]        | [-]         |
| 1   | Technical criterion | $c_T$            | Shape factor ( $A/V$ )  | $c_{T A/V,i}$        | decreasing | (0, 1>      |
| 2   |                     |                  | Total building completion time ( $T_{BLD}$ )                                      | $c_{T T,BC,i}$       | decreasing | (0, 1>      |
| 3   |                     |                  | Difficulties in implementation ( $D_{IMP}$ )                                      | $c_{T D,IMP,i}$      | decreasing | (0, 1>      |
| 4   |                     |                  | Total service life of the building and its technical installations ( $T_{LIFE}$ ) | $c_{T T,LIFE,i}$     | increasing | (0, 1>      |
| 5   |                     |                  | Total service life of renewable energy installation ( $T_{RES}$ )                 | $c_{T T,RES,i}$      | increasing | (0, 1>      |
| 6   | Energy criterion    | $c_{EN}$         | Total primary energy consumption ( $PE_{TOTAL}$ )                                 | $c_{EN PE,TOTAL,i}$  | decreasing | (0, 1>      |
| 7   |                     |                  | Total usable energy consumption ( $UE_{TOTAL}$ )                                  | $c_{EN UE,TOTAL,i}$  | decreasing | (0, 1>      |
| 8   |                     |                  | Total final energy consumption ( $FE_{TOTAL}$ )                                   | $c_{EN FE,TOTAL,i}$  | decreasing | (0, 1>      |
| 9   |                     |                  | Total generated usable renewable energy ( $UE_{RES}$ )                            | $c_{EN UE,RES,i}$    | increasing | (0, 1>      |
| 10  |                     |                  | Total transmitted final renewable energy ( $FE_{RES}$ )                           | $c_{EN FE,RES,i}$    | increasing | (0, 1>      |
| 11  | Exergy criterion    | $c_{EX}$         | Sum of exergy losses of the building and its installations ( $B_L$ )              | $c_{EX B,L,i}$       | decreasing | (0, 1>      |
| 12  |                     |                  | Sum of exergy generated by renewable energy sources ( $B_{GEN,RES}$ )             | $c_{EX B,GEN,OZE,i}$ | increasing | (0, 1>      |
| 13  |                     |                  | Cumulative primary exergy consumption ( $B_{p^*}$ )                               | $c_{EX B,p,i^*}$     | decreasing | (0, 1>      |
| 14  |                     |                  | Utilization of the generated renewable energy ( $UTIL_{RES}$ )                    | $c_{EX UTIL,RES,i}$  | increasing | (0, 1>      |
| 15  |                     |                  | Use of natural heating, cooling and lighting strategies ( $N_{ST}$ )              | $c_{EX N,ST,i}$      | increasing | (0, 1>      |
| 16  | Economic criterion  | $c_{EC}$         | Internal return rate on renewable energy sources ( $IRR_{RES}$ )                  | $c_{EC IRR,RES,i}$   | increasing | (0, 1>      |
| 17  |                     |                  | Total operational cost (TOC)  | $c_{EC TOC,i}$       | decreasing | (0, 1>      |
| 18  |                     |                  | Analysis of the building's life-cycle cost (LCC)                                  | $c_{EC LCC,i}$       | decreasing | (0, 1>      |
| 19  |                     |                  | Total prime cost of the investment ( $TC_{INV}$ )                                 | $c_{EC PC,INV,i}$    | decreasing | (0, 1>      |
| 20  |                     |                  | Dynamic generation cost of renewable energy installation ( $DGC_{RES}$ )          | $c_{EC DGC,RES,i}$   | decreasing | (0, 1>      |

The methodology for designing residential buildings with a positive energy balance – general approach – Table S2

| No. | Criterion group        | Parameter symbol | Criterion   | Criterion symbol      | Preference | Value range |
|-----|------------------------|------------------|---|-----------------------|------------|-------------|
| [-] | [-]                    | [-]              | [-]   | [-]                   | [-]        | [-]         |
| 21  | Social criterion       | $c_S$            | Compliance with the thermal comfort parameters (TC)                                       | $c_{S\ TC,i}$         | increasing | (0, 1>      |
| 22  |                        |                  | Compliance with the air quality parameters (AQ)   | $c_{S\ AQ,i}$         | increasing | (0, 1>      |
| 23  |                        |                  | Compliance with the acoustic comfort parameters (AC)                                      | $c_{S\ AC,i}$         | increasing | (0, 1>      |
| 24  |                        |                  | Compliance with the visual comfort parameters (VC)  | $c_{S\ VC,i}$         | increasing | (0, 1>      |
| 25  |                        |                  | Impact of the building and its installations on the surrounding environment ( $I_{ENV}$ ) | $c_{S\ I_{ENV},i}$    | decreasing | (0, 1>      |
| 26  | Environmental criteria | $c_{ENV}$        | Lice-cycle analysis of the building (LCA)   | $c_{ENV\ LCA, i}$     | decreasing | (0, 1>      |
| 27  |                        |                  | Carbon dioxide emission ( $E_{CO2}$ )   | $c_{ENV\ E_{CO2}, i}$ | decreasing | (0, 1>      |
| 28  |                        |                  | Coherence of renewable energy sources ( $C_{RES}$ )                                       | $c_{ENV\ C_{RES}, i}$ | increasing | (0, 1>      |
| 29  |                        |                  | Energy payback time of renewable energy sources (EPBT)                                    | $c_{ENV\ EPBT, i}$    | decreasing | (0, 1>      |
| 30  |                        |                  | Greenhouse gas emission payback time (GPBT)   | $c_{ENV\ GPBT\ i}$    | decreasing | (0, 1>      |