Introduction

- Experienced and projected increase of extreme climate and weather events globally has required us to rethink our water, energy food system. This drastic shift in climate is affecting crop production and causing damage. This climate issue requires triggering adaptive solutions such as Agrivoltaics (AV) [1–3].

Methods

- Based on the energy balance equation (eqn. 1) and Penman-Monteith concept (eqn. 2).

\[ R - ET - G - H = 0 \]  \hspace{1cm} (1)

\[ ET = \frac{\Delta (R_n - G) + \rho_a c_p (e_s - e_a)}{\Delta + \gamma (1 + \frac{r_s}{r_a})} \]  \hspace{1cm} (2)

Where \( es - ea \) = air vapour pressure, and \( r_s/r_a \) = ratio of (bulk) surface and aerodynamic resistances, \( r_a = \) mean air density, \( cp = \) air specific heat, \( \gamma = \) slope of saturated vapour pressure and temperature, and \( \psi = \) psychrometric constant.

- Predicts changes in heat in layer 1 and 2 assessed in area component 1 and 2 (see fig. 3).

- Estimate evapotranspiration within an AVM.

Results and Discussion

The AVM model considers the heat flux and water balance when a solar panel is present on the farm and further quantifies the potential cooling effect, which represents the heat change and water retention through between ET, G, and H. This model currently being validated using experimental AV data in Germany and Europe.