

# Training on technical design and economic analysis of Solar Water Schemes

14 - 16 September 2022 – The Hague

For WASH technicians

## Day 1

Session	Duration	Objective
Introduction of participants Brief presentation of the Global Solar&Water Initiative Explanation about the structure of the course	8.30 – 9.00h	
<b>Session 1:</b> Calculation of the water demand based on number of consumers Investigation of the water source	9.00 – 10.30h	Know how much water is needed. Tools to check the availability and quality of the water needed.
<b>Coffee break</b>	<b>10.30 – 11.00h</b>	
<b>Session 2:</b> Hydraulic principles: pump characteristics and friction losses in pipelines, efficiency of pumps and calculation required pump power	11.00 - 12.30h	Know how to design or check the hydraulic system.
<b>Lunch break</b>	<b>12.30 - 13.30h</b>	
<b>Session 3:</b> Materials for the hydraulic system	13.30 - 15.00h	Know what materials and accessories to use for the hydraulic system
<b>Coffee break</b>	<b>15.00 - 15.30h</b>	
<b>Session 4:</b> Calculating the required flow rate and pump power in a specific situation (case study) Layout of network based on the conditions of the case	15.30h – 17.00h	To be able to design or check the complete hydraulic system:

## Day 2

Session	Duration	Objective
Recap of day 1 – Self test	8.30 – 9.00h	
<b>Session 5:</b> Security and theft prevention Applicability of a Solar Powered Water System design Installation of panels: direction, angle radiation etc. and calculation of cable thickness	9.00 – 10.30h	Having a method to decide what solution is the best: Solar, diesel/petrol or grid energy. Knowing how to install panels and what cables to use
<b>Coffee break</b>	<b>10.30 – 11.00h</b>	
<b>Session 6:</b> System design: Components in the system (Pump, inverter, cabling etc)	11.00 - 12.30h	Hands-on designing a solar water scheme.
<b>Lunch break</b>	<b>12.30 - 13.30h</b>	
<b>Session 7:</b> System design: Design of the layout of an SPWS in some practical cases. Explanation of the design software of Lorentz and Grundfoss		Hands-on designing a solar water scheme.
<b>Coffee break</b>	<b>15.00 - 15.30h</b>	
<b>Session 8:</b> System design: Continue practicing with the design software. Using the software for practical cases Storage of water: Calculation of the required storage capacity	15.30 – 17.00h	Hands-on designing a solar water scheme. Knowing the required volume of the water storage

### Day 3

Session	Duration	Objective
Recap of day 1 – Self test	8.30 – 9.00h	
<b>Session 9:</b> Resume use of Webcaps and Compass and design of SWPS	9.00 – 10.30h	Hands-on designing a solar water scheme.
<b>Coffee break</b>	<b>10.30 – 11.00h</b>	
<b>Session 10:</b> Different type of hybrid systems Operation and maintenance	11.00 - 12.30h	What are the possibilities of combining solar with diesel/petrol generator Knowing how to operate and maintain a SWPS
<b>Lunch break</b>	<b>12.30 - 13.30h</b>	
<b>Session 11:</b> Economics and cost comparison of solar diesel and grid energy (investment cost, O&M cost, payback time etc)	13.30 - 15.00h	Knowing the cost of a SPWS in certain situation
<b>Coffee break</b>	<b>15.00 - 15.30h</b>	
<b>Session 12:</b> Summary advantages and disadvantages of SPWS Open session, feedback from participants with experience in solar pumping.	15.30 – 17.00h	Solve pending queries, recap of sessions and way forward.