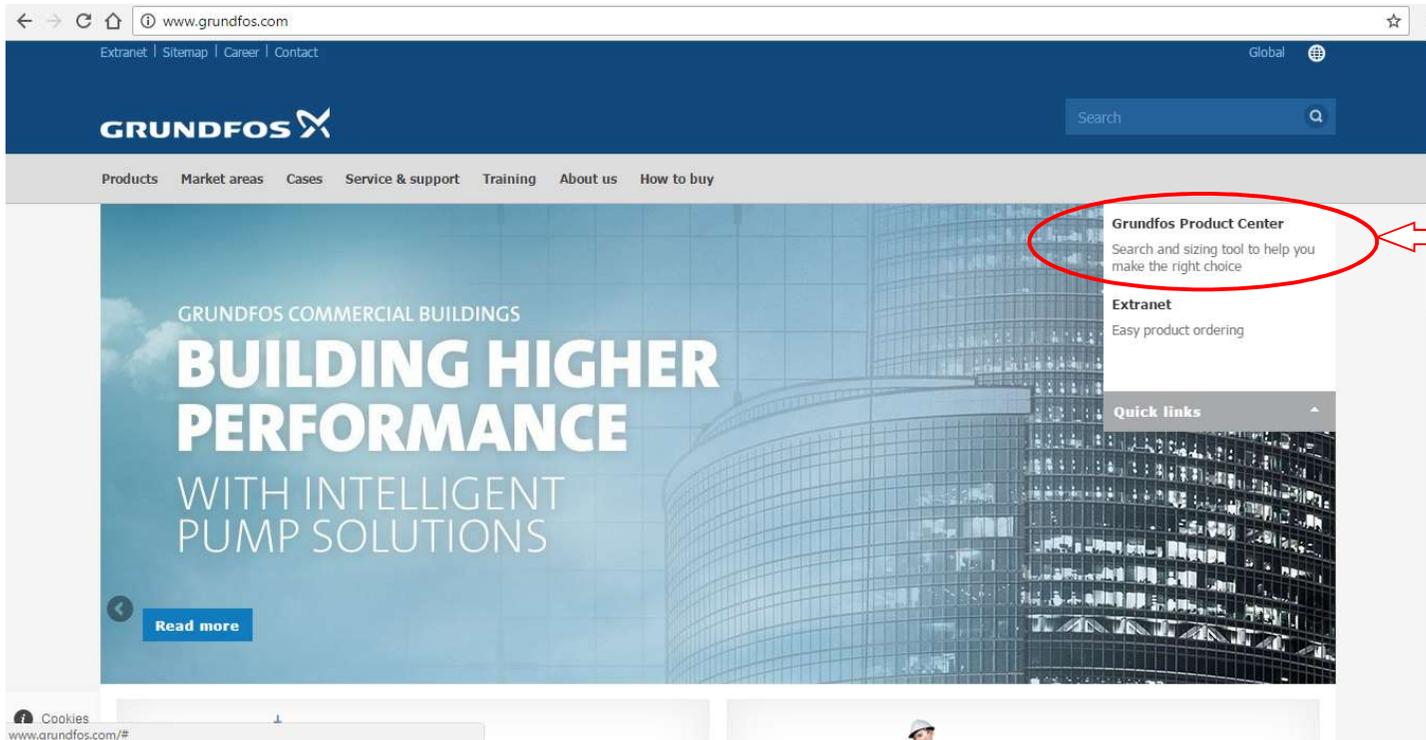


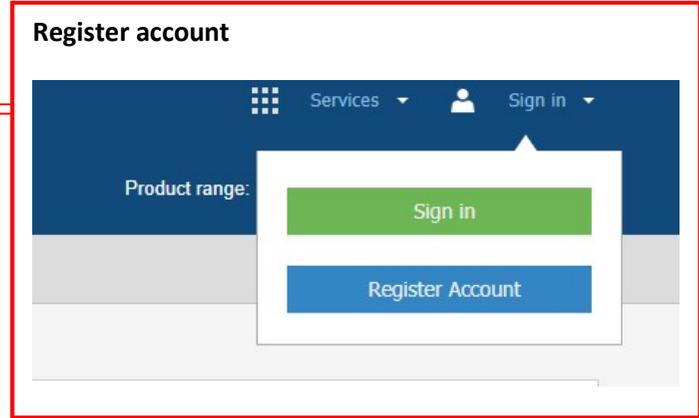
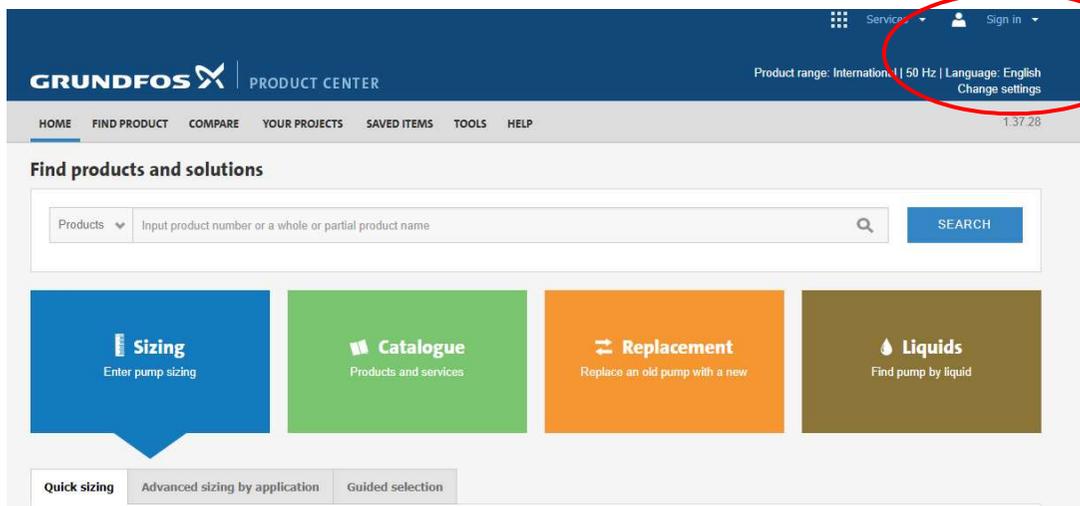
Example of using Grundfos Sizing Software

Step 1: Go to www.Grundfos.com and click on **Grundfos Product Center**

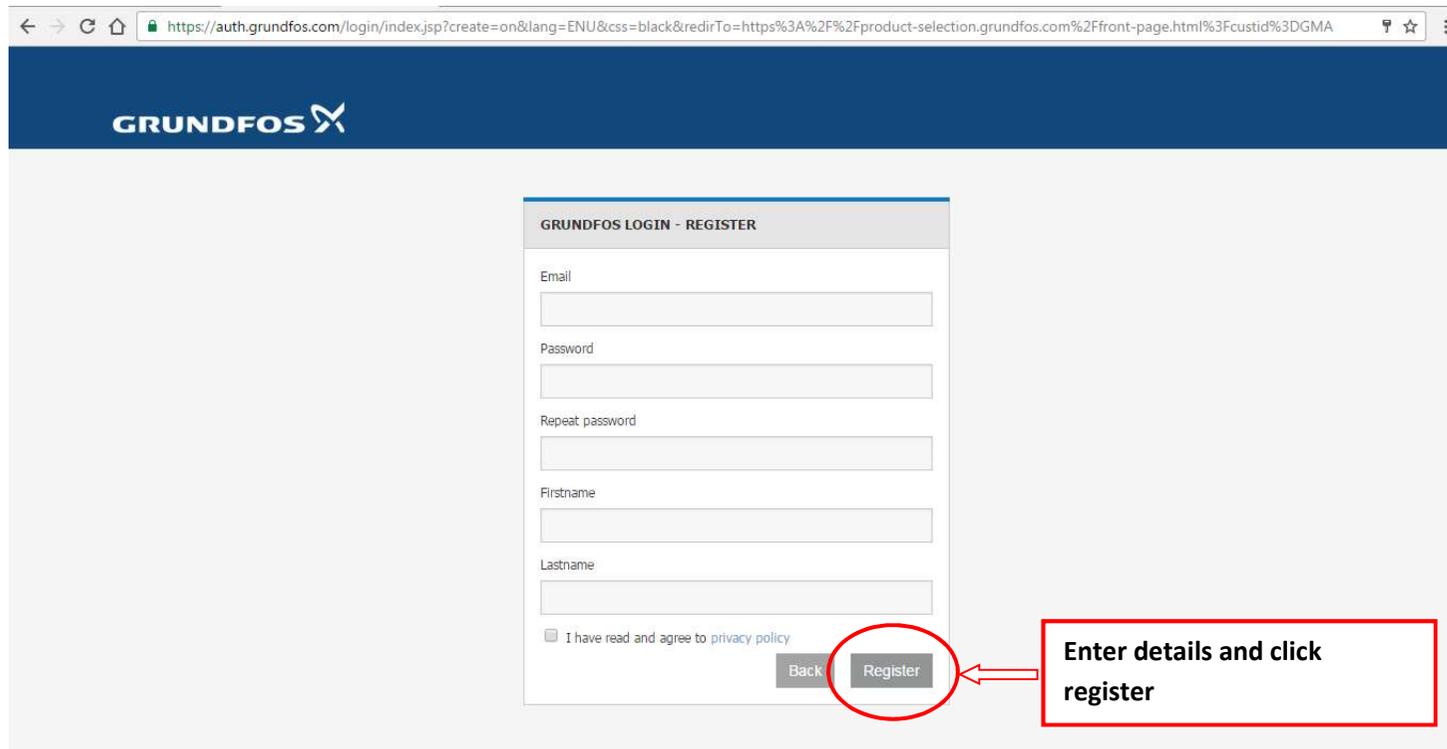


Click on Grundfos Product Center

Step 2: Click on **Sign in >> Register account**

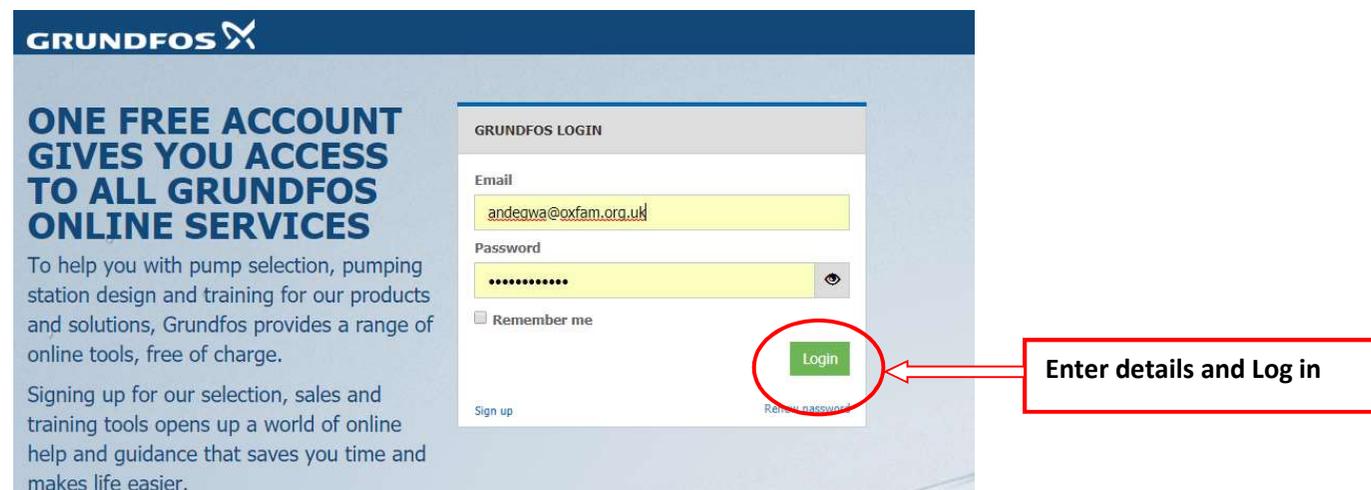


Step 3: Create a user profile by entering your names, e-mail address, password & other details and click **register**



The screenshot shows the Grundfos registration page. The browser address bar displays the URL: <https://auth.grundfos.com/login/index.jsp?create=on&lang=ENU&css=black&redirTo=https%3A%2F%2Fproduct-selection.grundfos.com%2Ffront-page.html%3Fcustid%3DGMA>. The page features the Grundfos logo at the top left. The main content area is titled "GRUNDFOS LOGIN - REGISTER" and contains a registration form with the following fields: Email, Password, Repeat password, Firstname, and Lastname. Below these fields is a checkbox labeled "I have read and agree to privacy policy". At the bottom of the form are two buttons: "Back" and "Register". A red circle highlights the "Register" button, and a red arrow points from a red-bordered box containing the text "Enter details and click register" to the "Register" button.

Step 4: Once the account is created, **log in** using your new credentials (Logging in allows you to customize as well as save your designs/projects).



The screenshot shows the Grundfos login page. The browser address bar displays the URL: <https://auth.grundfos.com/login/index.jsp?create=on&lang=ENU&css=black&redirTo=https%3A%2F%2Fproduct-selection.grundfos.com%2Ffront-page.html%3Fcustid%3DGMA>. The page features the Grundfos logo at the top left. The main content area is titled "GRUNDFOS LOGIN" and contains a login form with the following fields: Email (containing "andegwa@oxfam.org.uk"), Password (with a masked password "....." and an eye icon), and a checkbox labeled "Remember me". Below these fields are two buttons: "Login" and "Sign up". A red circle highlights the "Login" button, and a red arrow points from a red-bordered box containing the text "Enter details and Log in" to the "Login" button.

Step 5: Once logged in, scroll down the page and click on “**advanced sizing by application**”

The screenshot shows the 'Find products and solutions' interface. At the top, there is a search bar with a dropdown menu set to 'Products' and a 'SEARCH' button. Below the search bar are four main navigation tiles: 'Sizing' (blue), 'Catalogue' (green), 'Replacement' (orange), and 'Liquids' (brown). Below these tiles is a 'Quick sizing' section with three tabs: 'Quick sizing', 'Advanced sizing by application' (highlighted with a red circle), and 'Over selection'. A red box with the text 'Click on advanced sizing by application' has an arrow pointing to the 'Advanced sizing by application' tab. Below the tabs, there are two columns of input fields. The left column is titled 'Enter duty point:' and contains two rows: 'Flow (Q)*' with a text input and a dropdown menu set to 'm³/h', and 'Head (H)*' with a text input and a dropdown menu set to 'm'. The right column is titled 'Select what to size by:' and contains three radio button options: 'Size by application', 'Size by pump design', and 'Size by pump family'. At the bottom right of the 'Quick sizing' section is a blue 'START SIZING' button.

Step 6: This leads to the **data input page** below where you customize the data using the outlined steps

Quick sizing **Advanced sizing by application** Guided selection

Application: Heating [Help me select](#)

Application area: Commercial buildings [Help me select](#)

Installation type: Distribution

Installation: Main circulator Mixing loop [Help me select](#)

Flow (Q)*: m³/h [Calculate](#)

Head (H)*: m [Calculate](#)

Evaluation criterion: Preference index

1. Set application as Renewable energy systems

Quick sizing **Advanced sizing by application** Guided selection

Application: Heating [Help me select](#)

Application area: [Help me select](#)

Installation type: [Help me select](#)

Installation: [Help me select](#)

Flow (Q)*: [Calculate](#)

Head (H)*: m [Calculate](#)

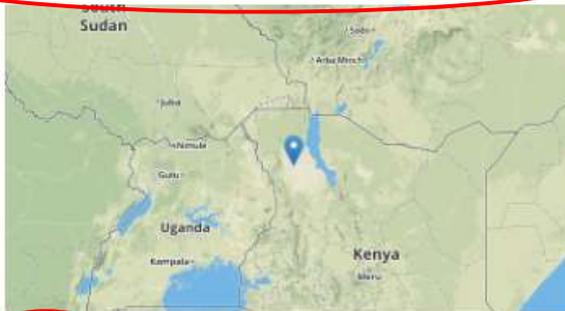
- Heating
- Air-conditioning
- Pressure boosting
- Groundwater supply
- Domestic water supply and rain water
- Wastewater
- Industrial applications
- Dosing & Disinfection
- Renewable energy systems**

Application

Renewable energy systems Help me select

Location

Turkana, Rift Valley Province, Ken Change System Location



Select type of system

Solar Wind Combi Help me select

Installation

Borehole Surface pump

Water volume

100 m³/day Calculate

Static lift above ground*

20 m

Dynamic water level*

40 m

Pipe system friction losses

17.36 m Calculate

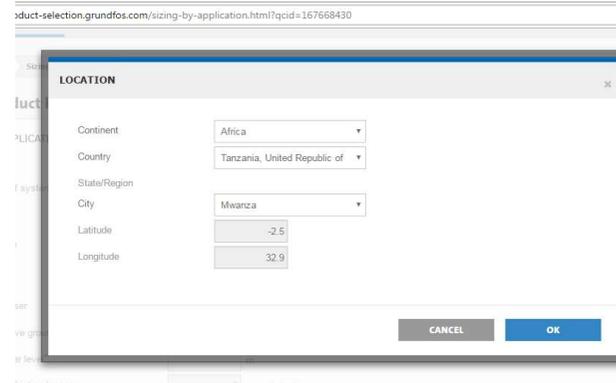
Month for sizing

July Calculate

Solar modules

CF 270 Calculate

2. Select location by clicking on change system location



3. Select type of system and Installation type

4. Enter the design water volume

5. Enter the static lift & the dynamic water level

6. Calculate pipe frictional losses by clicking on calculate. Here you'll calculate friction losses both on the riser & discharge pipe

Flow limitation: 16.5 m³/h

Period start:
 Period end:
 Installation:
 Water dispenser:
 Static lift above ground:
 Dynamic water level:
 Pipe system friction losses:
 Month for sizing:
 Solar modules:
 Second choice for:

PIPE SYSTEM FRICTION LOSSES

Riser pipe friction losses: 0.285 m Calculate

Discharge pipe friction losses: 0.713 m Calculate

Other friction losses: 5 m

CANCEL OK

7. Select sizing month based on month with least output (coldest month)

Month for sizing: July Calculate

Solar modules: GF 270 Calculate

Second choice for solar module: None

Maximum ambient temperature: 308 K

Expand all | Collapse all | Show full width

Your requirements (Cable size (pump), Cable length (pump), Cable loss (pump))

Cable size (pump): Any (mm2)

Cable length (pump): m

Cable loss (pump): 2 %

Operational conditions (Minimum ambient temperature, Sun tracking, User-defined day)

Pump design (Pump material, Pump outlet)

System configuration (Water dispenser, Solution, Switch box, Control unit, Level switch ...)

Water dispenser:

Solution: Integrated or external Integrated External (RSI)

Switch box: IO50

Control unit: CU 200 control unit CIU 273 (Remote management) None

Level switch:

Include battery back-up:

Frequency: 50 Hz 60 Hz

Solar inverter RSI:
Standard range 3x380VAC
Low voltage range 3x220VAC

Wirekits for solar modules:

8. Customize the solar module characteristics based on the module to be used in the design. You can also use the provided Grundfos module for design)

SOLAR MODULES

Solar modules: GF 270

Input mode: View Edit

Brand: GRUNDFOS

Pinax: 270 Wp

Vmp: 31.8 V

Imp: 8.78 A

Voc: 38.4 V

Isc: 9.11 A

μ Voc: -0.31 %/K

μ Isc: 0.05000 %/K

Ns: .80

ACELL: 243.4 cm²

Rsh: 300 Ohm

Crystalline:

NOCT: 319 K

ITNOCT: 0.8 kWh/m²

Tref: 298 K

ITref: 1 kWh/m²

9. Enter cable length and allowable losses

10. Select the system configuration
The RSI inverter is selected based on the power range for the country of operation

Step 7: After checking all required data has been input, click on **Start Sizing**. The system will do a background run and return results with several options of all suitable products for your design

ALL SUITABLE PRODUCTS (8)																	
Batch actions:		Table size:															
<input type="checkbox"/>	EXPORT TO	ADD TO PROJECT	<input checked="" type="checkbox"/> Show full width														
		System	Product No	Info	Pump	Product number	Solar Inverter	Product number	Solar modules	Solar array power [kWp]	Water [m ³ /year]	Average water [m ³ /day]	Water [l/Wp/day]	Water in month for sizing [m ³ /day]	January	April	July
<input type="checkbox"/>		X	12A01911 + ...		SP 17-11	99044363	RSI 3x380-440V IP66 11kW 23A	99299012	36 x GF 270	9.72	50600	138.6	14.3	130.9	142.9	134.6	130.9
<input type="checkbox"/>		X	12A01910 + ...		SP 17-10	99044352	RSI 3x380-440V IP66 7.5kW 16A	99299012	36 x GF 270	9.72	46900	128.5	13.2	123.8	131.1	126.2	123.8
<input type="checkbox"/>		X	98699361 + ...		SP 14-23	99044352	RSI 3x380-440V IP66 7.5kW 16A	99299012	36 x GF 270	9.72	46700	128.1	13.2	121.8	131.5	124.8	121.8
<input type="checkbox"/>		X	12A01909 + ...		SP 17-9	99044352	RSI 3x380-440V IP66 7.5kW 16A	99299012	36 x GF 270	9.72	45700	125.1	12.9	120.8	127.7	122.6	120.8
<input type="checkbox"/>		X	98699360 + ...		SP 14-20	99044352	RSI 3x380-440V IP66 7.5kW 16A	99299012	36 x GF 270	9.72	45900	125.9	13	120.4	129.1	122.7	120.4
<input type="checkbox"/>		X	12A01908 + ...		SP 17-8	99044352	RSI 3x380-440V IP66 7.5kW 16A	99299012	36 x GF 270	9.72	41100	112.6	11.6	109.1	114.3	111.1	109.1
<input type="checkbox"/>		X	98699359 + ...		SP 14-17	99044351	RSI 3x380-440V IP66 5.5kW 12A	99299012	36 x GF 270	9.72	41000	112.3	11.6	108.1	114.6	109.7	108.1
<input type="checkbox"/>		X	13A01908 + ...		SP 30-8	99044363	RSI 3x380-440V IP66 11kW 23A	99299012	36 x GF 270	9.72	42200	115.7	11.9	104.3	122.3	109.7	104.3

Step 8: Double click on any of the options to view more details. To print or save the selection, click on **PRINT/PDF**

SP 17-10 - 12A01910 + ..

System: This is a system which contains other products.

- SP 17-10
- GF 270
- Wire kit array in control box (MC4)
- Wire kit array in array (MC4)
- RSI 3x380-440V / P65 7.5kW 15A
- Sine-wave filter
- OTDOP16, Circuit Breaker, 16Amp
- OVR PV 40-1000 P, Surge Protection

ADD TO SHOPPING CART EXPORT TO ADD TO PROJECT **PRINT / PDF**

Performance curve

Product photo

Dimensional Drawing

Block curve

Wiring Diagram

Score parts

3D

Curve settings

Curve types

- Power curves P1
- Power curves P2
- NPSH
- Eta
- Tolerances
- Show control curve
- Both 50 Hz and 60 Hz

Show advanced options

Specifications Quotation Text Videos (9) Documents (31) CAD drawings System parts **Sizing result** Accessories

Sizing result

Pump:	SP 17-10, 1 x 12A01910	Total water production per year:	46500 m³/Year
Solar module:	GF 270, 36 x 99299012	Avg. water production per day:	128.5 m³/day
Number of solar modules in series:	18, in parallel 2	Avg. water production per Watt per day:	13.2 Wp/day
Pipe size (inner diameter):	53 mm	Water produced in month for sizing:	120.8 m³/day
Friction losses in pipes:	16.5 m		
Total head:	76.5 m		
Cable length (pump):	70 m		
Cable size (pump):	2.5 mm²		
Cable loss (pump):	2.6 %		

Controller is not included and must be appended to meet the required input.

Step 9: Select preferences to view and click on **generate PDF**. At minimum ensure 'sizing result' is selected

The screenshot shows a software interface for generating a PDF report. On the left, there is a sidebar with a tree view containing items like 'SP 17-10', 'GF 270', 'Wire kit array to control box (MC4)', 'Wire kit array to array (MC4)', 'RSI 3x380-440V IP66', 'Sine-wave filter', 'OTDCP16, Circuit Breaker, 16Amp', and 'OVR PV 40-1000 P, Surge Protection'. Below the tree view are icons for 'Performance curve', 'Product photo', and 'Dimensional Drawing'. The main area is titled 'Select columns to include' and contains a list of checkboxes for various report sections: 'Sizing result' (checked), 'Map', 'Summary', 'Order Data', 'Do not show prices', 'Load profile and calculators', 'Installation illustration' (with sub-items 'Zeta values', 'Life Cycle Cost report - graphics', 'Life Cycle Cost report - table', 'Replacement report'), 'Accessories' (with sub-items 'GF 270', 'Wire kit array to control box (MC4)', 'Wire kit array to array (MC4)', 'RSI 3x380-440V IP66 7.5kW 16A', 'Sine-wave filter', 'OTDCP16, Circuit Breaker, 16Amp', 'OVR PV 40-1000 P, Surge Protection'), 'Pos', 'Description', 'Annotation', 'Classification Data', 'Part no.', 'Qty.', and 'Unit'. A 'PRINT / PDF' button is visible on the right. At the bottom center, there is a green 'GENERATE PDF' button. Two red annotations are present: one pointing to the 'Sizing result' checkbox with the text 'Must be selected!', and another pointing to the 'GENERATE PDF' button with the text 'Click on GENERATE PDF'.

Step 10: Save PDF in a desired location on your computer/drive and open to view sizing details



Phone: +254 721878433
 Email: Andegwa@oxfam.org.uk
 Date: 06/09/2018

12A01910 SP 17-10

Sizing results - summary

Water production, Peak flow and Price

Total water production per year: 46900 m³
 Avg. water production per day: 128.5 m³/day
 Average water production per watt per day: 13.2 l/Wp/day

Solar module configuration:

Number of solar modules in series: 18, in parallel: 2
 Solar array rated power: 9.72 kW
 Solar array rated volts: 568.8 V
 Sun tracking: No (fixed)
 Tilt angle: 3 deg.

Typical performance at 800 W/m² radiation 800 W/m²

Flow: 16.2 m³/h
 Total cable loss: 2.6 %

Cables and pipes:

Pump cable length: 70 m
 Pump cable size: 2.5 mm²
 Total cable loss: 2.6 %

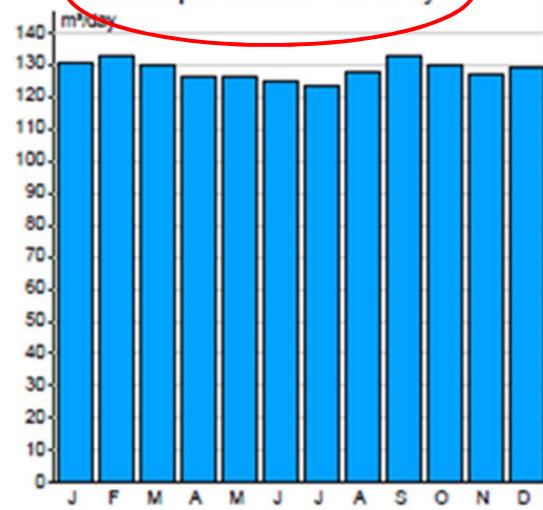
Pipe Length: 150 m
 Pipe diameter: 53 mm
 Friction loss: 16.5 m

System performance - monthly average

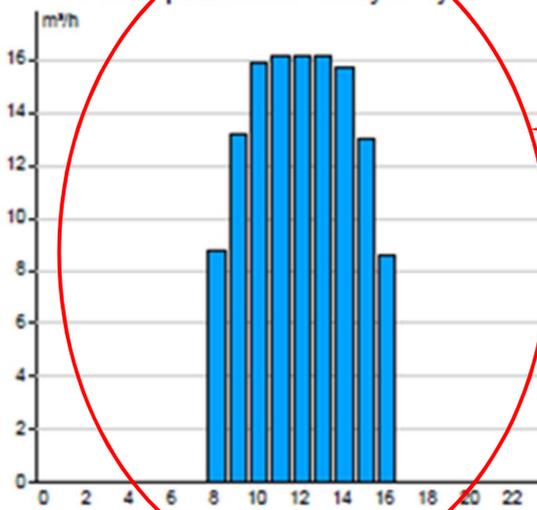
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Water production [m ³ /day]	131.1	133.2	130	126.2	126.4	125	123.8	127.9	133	129.8	126.9	129.2
Energy production [kWh/day]	55.0	56.1	54.5	52.6	52.8	52.1	51.5	53.5	56.1	54.3	52.8	54.0
Radiation horizontal [kWh/m ² day]	7.3	7.8	7.3	6.7	6.8	6.6	6.5	7.0	7.8	7.2	6.7	7.0
Radiation tilt [kWh/m ² day]	7.4	7.8	7.3	6.6	6.6	6.4	6.3	6.8	7.7	7.2	6.7	7.1
Avg. Temp. [K]	23.	24.	25.	25.	25.	24.	23.	23.	23.	24.	24.	23.

Solar data location: Latitude: 3 DD, Longitude: 35 DD

Water production - monthly



Water production - daily: July



Solar PV details.

36 modules will be installed, 2 strings in parallel, each having 18 modules connected in series

123.8m³/day pumped during July, which is the month with least output for our location. As it is higher than the Daily Required Output (100m³/day), it means the solar system alone will provide all the water needed all the year round.

Amount of water pumped daily by month

Amount of water pumped per hour in in the worst month of July. Pump will start running at 0730hrs and stop at 16:30hrs. Output will peak at 16.2m³/hr at noon.