


<p>COUNTRY: <b>MOROCCO</b></p> 	<p><b>SOLAR POWERED IRRIGATION SYSTEMS – COUNTRY CASE STUDY BOUGHLEB</b></p>
	<p><b>Geographical Location:</b></p> <ul style="list-style-type: none"> <li>▪ Casablanca</li> <li>▪ Latitude: 31°40'57" N</li> <li>▪ Longitude: 8°12'1" W</li> <li>▪ Altitude: 57 m</li> </ul>
	<p><b>Specific Site Conditions:</b></p> <ul style="list-style-type: none"> <li>▪ Climatic condition: semi-arid</li> <li>▪ Irrigation water is provided by three deep-wells and pumped with conventional electric pumps into an open reservoir</li> <li>▪ There is also a possibility to fill the reservoir by gravity from a nearby dam (only in winter, extra charges)</li> <li>▪ Farm is connected to a stable public grid; PV system mainly serves to reduce the electricity bill</li> <li>▪ Comparably shallow water level but some wells fall dry after 6 hours of pumping – risk of depletion</li> </ul>
	<p><b>Salient Features of Solar-powered Irrigation System:</b></p> <ul style="list-style-type: none"> <li>▪ 2 x 21,1 kW<sub>p</sub> PV generator; fixed installation</li> <li>▪ Two submersible pumps are installed in an open reservoir which pump the irrigation water directly into the drip irrigation system</li> <li>▪ Daily mean water output: 1600 m<sup>3</sup>/day</li> <li>▪ Pumping Head: 23 m</li> <li>▪ Drip irrigation system in place, irrigation by two parallel 1/2" drip tube lines with built-in emitters (turbulent flow, 0.4 gph discharge)</li> <li>▪ System includes large capacity filter installation and fertigation unit (4 nutrient solution injection tanks)</li> </ul>
	<p><b>System Costs / Financing:</b></p> <ul style="list-style-type: none"> <li>▪ PV system: 51,300 EUR</li> <li>▪ Irrigation system: approx. 86,000 EUR</li> <li>▪ Farm pond: approx. 200,000 EUR</li> <li>▪ System privately financed without any subsidies</li> </ul>
	<p><b>Farming System / Cropping Patterns:</b></p> <ul style="list-style-type: none"> <li>▪ Horticultural farming</li> <li>▪ Main product: Orange with additional lemon and pomegranate</li> <li>▪ Farm size 56 ha, 37 ha under irrigation</li> <li>▪ Continuous irrigation required, irrigation management based on sectors of 1 – 1.4 ha</li> <li>▪ High intensity crop input management</li> <li>▪ Crop rotation: perennial tree crops, rotation 15 – 20 years</li> <li>▪ Oranges are sold via auction and harvested by external workers who are hired by customers</li> </ul>
<p><b>Experiences / Lessons Learnt:</b></p> <ul style="list-style-type: none"> <li>▪ 37 ha can be irrigated within one day based on specific sector management</li> <li>▪ SPIS is economically competitive with grid-electricity</li> <li>▪ Technical reliability is proven</li> <li>▪ Not more than six workers required to manage the farm</li> <li>▪ Economic motivation for PV pumping is reduction of energy cost</li> </ul>	
<p><b>Promoting and Planning Bodies:</b></p> <ul style="list-style-type: none"> <li>▪ Private investor development project</li> <li>▪ System integrator: AE Photonics, Morocco</li> </ul>	