

MAIN STRUCTURE FRAME

Outer shell/ facade – concrete wall glass+ aluminium rails to mount solar panels
Inner shell - Cross timber beams and coloumns – a natural ventilation shaft of 40 mm in between the two walls, cool the solar cells and make a nice inner climate, vind towers are wellknown In the middle east.
Acoustic panels put on 2 of the 4 concrete walls with vertical bamboo lines.
3 layers of float glass like Pilkington selfcleaning active glass supported by stainless steel
Ramps - Bamboo ramp and Bamboo railing 7,5% rising degree. Led light below and integrated in the hand rail.

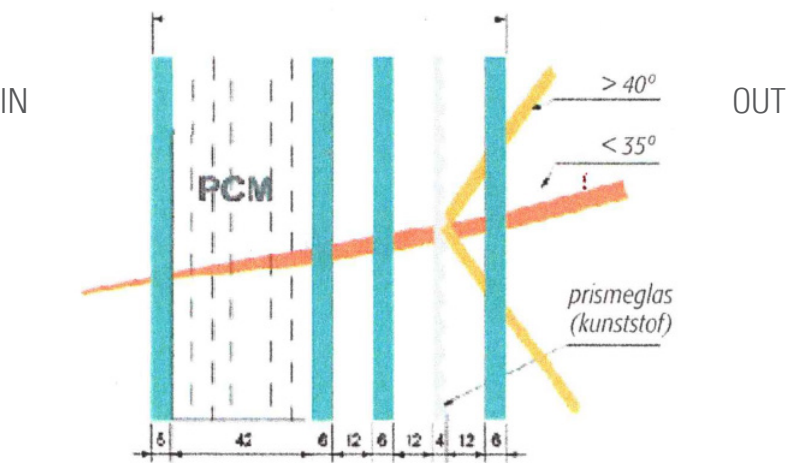


FOTO 1. PARAFFIN GLASSWALL

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Paraffin glasswall – 4 vertical sections of 34 m2 (1 meter width x 34 meter height) 136 m2

The solar wall construction is developed with a special latent-heating storage with paraffin, as PCM (Phase Change material). More thermal possibilities are integrated.
Transparent insulation, absorber for heating storage and protection against overheating.
Construction through the solar wall.
The sunwall makes storage of heat. The construction is called powerglass. The next layer consist of sun covering prism glass. It reflects the sun radiation, as soon as the sun gets higher than 40 Degrees over the horizon.

The built-up from the outside:
6 mm. cover layer of security glass with low energy cover.
29 mm room filled with Argon
5 mm. prisme – glass – plexiglass
6 mm glass without any cover.
12 mm Argon
6 mm. glass with low energy layer
42 mm with paraffin in artificial casette
6 mm. glass on the inside- Can be with silkprint made color.
4 thin vertical walls of 1 meter x 34 meters of paraffin glas can absorbe sun heat, give internal green diffuse light and in the cold evening, give the sun energy back to the internal oasis for human comfort and the plants.

ENERGY STRUCTURE & CAPACITY
580 Photo Voltaic panels: 476 SUNERG PV X Color panels x 270 wp
Total: 128,52 kWp on 4 façade parts ad 104 roof transparent PV panels x 200 wp – installed effect 20,80 kWp. All together: 149,32 kWp.
PV Generator surface: 944 m2. Annual production164.790 kWh.
Co2 emission reduction / savings 989.833 Kg/ annually
In the bottom of the wall below the PV panels are small ventilation openings that allow the wind to cool the PV panels with openings openings up along the round ramp and in the top to remove heat on the backside of PV panels and increase the production effect and change the air to improve the interior climate.
It is the principel of the Russian Leningrad window, Winter Palace – based on a chimney effect without any aiding ventilators that use electricity

8 x 15 KW + 1 x 20 KW Fronius inverters chance DC current to AC current, with 5 datamanagers so the energy production can be followed on mobilphones and computers and for maintanice purpose.
A sun radiation meter on the roof+ a sensor box inside makes it possibel to measure the annual sun radiation and compare it to metrological institute information

5 KW/ 300 KW Vanadium flow Battery in the basement, to store electric energy during the daytime, so it can be used at night in the tower for LED and the city and parked electrical vehicles nearby.An alternative could be at salt water battery, to be considered in a further process.

ABU Dhabi	UAE		12.05.2019
Masdar - Green Energy Tower	Conceptual estimate		
Architectonic Landmark Competition			
Sustainable Development			
Installed PV effekt	pcs.		USD Max.
Facade PV	478	128,52	
270 wp			
Roof PV transparent	104	20,8	
200 wp			
Total PV effekt kWp		149,32	
Battery Vanadium	5KW/300 KW	300	
	149.320	20	2986400
Facade	USD		
Surface tower m2	incl. PV	Total USD	
852	800	681600	
852	400	340800	
Total 1904 m2		1022400	
Roof Plan - Steel PV			
235	1000	235000	
Floorplan, fountain			
235	500	117500	
Basement concrete			
270	500	135000	
Battery storage	300	1000	300000
LED Light	235	150	35250
Limestone outside	160	200	32000
Waterponds	50	200	10000
Bridge of wood	14	300	4200
Bamboo staircase	600	600	360000
Delivery, Enterprise		2251350	USD
A/E Drawings 10 %		225135	USD
QS.Calculations 2 %		45027	USD
Total incl. projekt.		2476485	USD
12,5 % Unpredicted		309560,6	USD
Total incl. 10 % Unpredicted		2786046	USD
Difference compared to max.		200354,4	USD



Ventilation gap inside to allow natural cool air to enter at the bottom and allow warm air to exit the space. Chimney effect.

Ventilation gap between back wall and solar cells

Green Solar cells, Photo Voltaic

34m

3m

3m

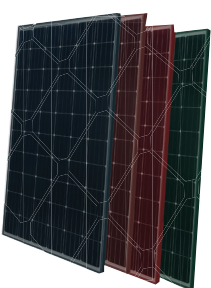


FOTO 3
Green PV solar cells

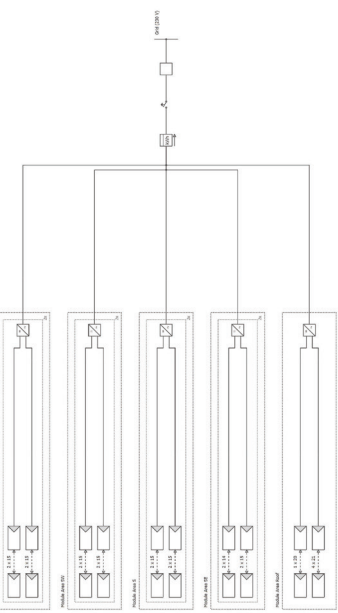


FOTO 4.
5 solar cell group (4 on the facades and on roof) & inverter

FOTO 2. VANADIUM REDUX FLOW BATTERY
How Does a Vanadium battery work?

- A vanadium redox flow battery (VRFB) has two separate tanks, one containing a positive electrolyte and one negative electrolyte. Both electrolytes consist of the element vanadium dissolved in sulphuric acid, with the vanadium occurring in different oxidation states (valences).
- The battery has a number of battery cells as well. Each of these cells is divided into two chambers separated by a membrane, through which the ions can pass. In each chamber there is a positive or a negative electrode. The two electrolytes are pumped through the cells on their side of the membranes.
- The current from the solar panels is fed down into the cells' electrodes, where it moves electrons from the positive to the negative electrolyte, charging the battery as the liquid flows back into the tank. During discharge, this process is then reversed.

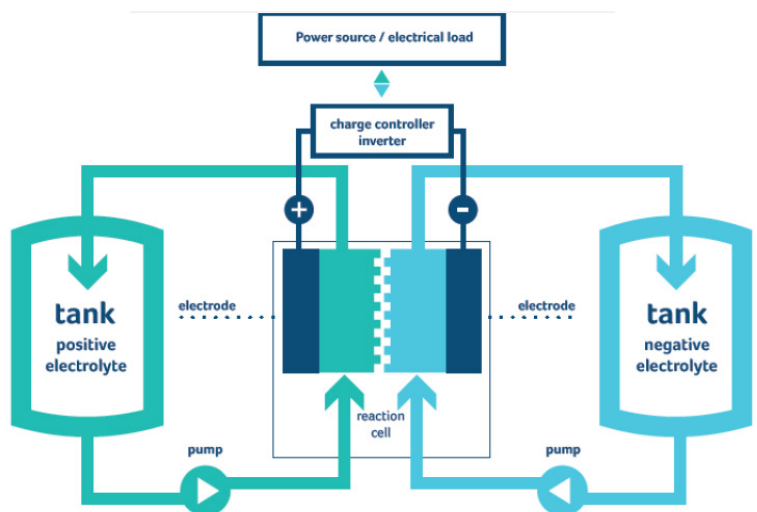


FOTO 2. DIAGRAM FOR VANADIUM REDUX FLOW BATTERY

