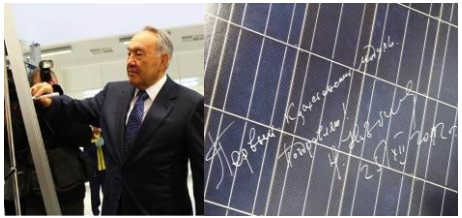
ASTANA SOLAR LLP

Manufacture
of photovoltaic panels in the Republic of Kazakhstan

July 2017

BACKGROUND



Astana Solar LLP is a subsidiary of NAC Kazatomprom JSC implementing the project "Production of photovoltaic modules with the use of Kazakhstani silicon "KazPV".

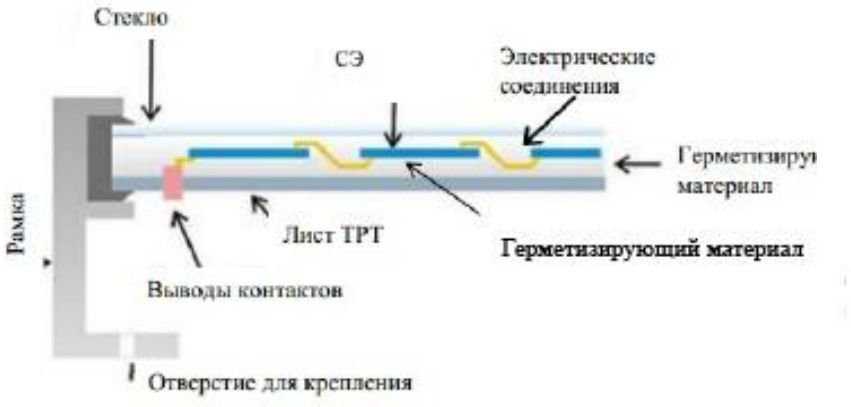
On December 25, 2012, during the visit of the Head of State to the plant, start-up and commissioning works were launched, the first Kazakhstani photovoltaic module was produced.

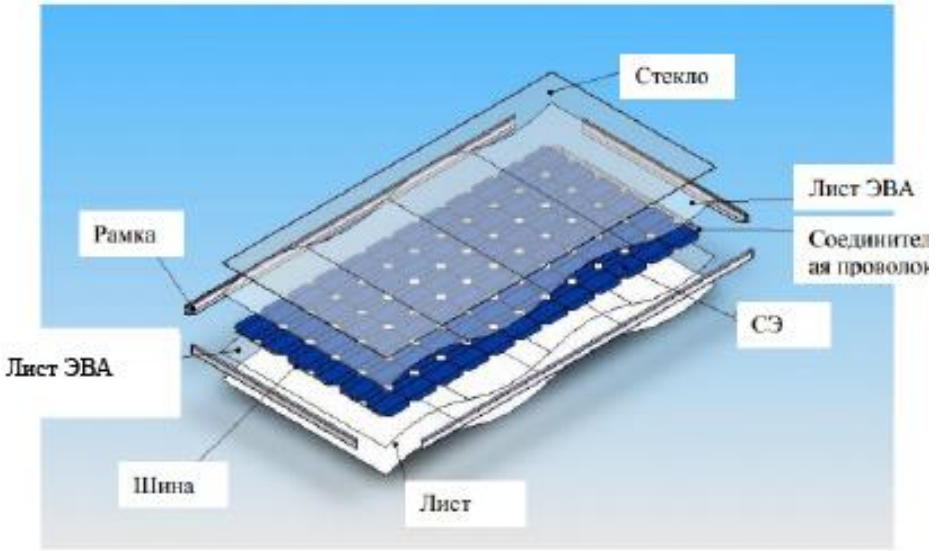
Astana Solar is a member of Astana - Zhana Kala special economic zone.
Project capacity - 50 MW per year.
Expansibility - up to 100 MW per year.

The plant of photovoltaic panels has modern automated European equipment meeting the highest standards of safety and environmental standards.

EQUIPMENT MANUFACTURERS

PARTS OF PHOTOVOLTAIC MODULE





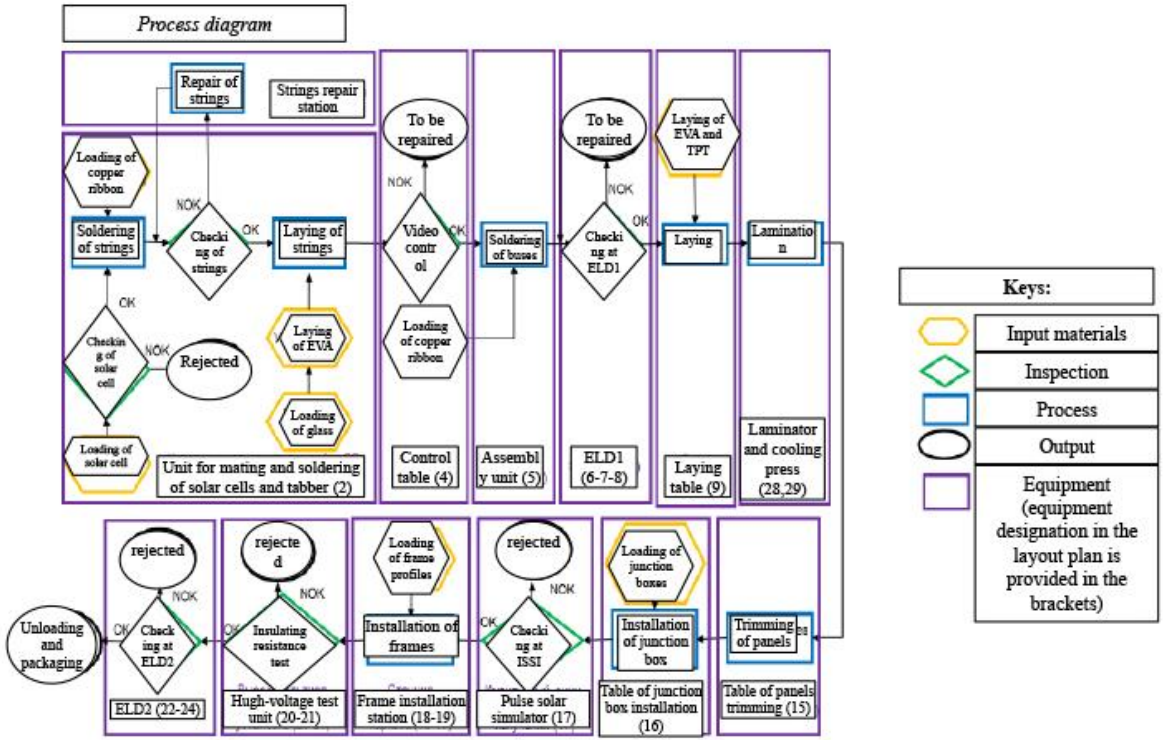
LIST OF MAIN PRODUCTION PROCESSES IN THE ASSEMBLY OF MODULES

ASTANASOLAR

The production process of a module includes operations that ensure efficient and quality manufacture, including:

- effective interconnection of photovoltaic cells into strings
- high-precision soldering of connecting elements
- electroluminescence control before and after lamination
- lamination using an effective temperature monitoring system of vacuum equipment
- high-precision measurement of current-voltage characteristics
- use of automated silicone application systems and installation of profiles (frames)
- insulation resistance test
- packaging of photovoltaic modules

DIAGRAM OF PRODUCTION PROCESS



TECHNICAL SPECIFICATIONS OF PRODUCTS

ASTANASOLAR

Photovoltaic module type KZ PV M60

Module characteristics

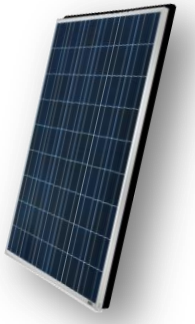
Rated voltage - 24 V

Installed capacity - 250-255-260-265 -270 W

Cell type - polycrystalline 6'' (156x156 mm),

Configuration of the module - 6 columns x 10 rows

Dimensions – 1,649x992x40 mm, **weight** - 19.5 kg



Photovoltaic module type KZ PV M72

Module characteristics

Rated voltage - 24 V

Installed capacity - 295-300-305-310 -315 W

Cell type - polycrystalline 6'' (156x156 mm),

Configuration of the module - 6 columns x 12 rows

Dimensions – 1,967x992x40 mm, **weight** - 28 kg

- **Manufacturer's workshop warranty - 10 years.**
- **25 years of Performance Warranty**
- **Positive Power Tolerance 0 ~ + 5 %**

PRODUCT QUALITY

Photovoltaic modules meet the requirements of international standards in the field of photovoltaics:
IEC 61215 Compliance with configuration requirements and standard sample approval
IEC 61730 (1,2) Compliance with the safety requirements of the photovoltaic module

Available photovoltaic modules are certified by Certisolis company (France) for compliance with IEC 61215, IEC 61730 (1,2)

Certificate of origin of the goods of ST-KZ form received

Integrated quality, environment and occupational health and safety management system has been introduced and certified according to the standards:
ISO 9001:2008 Quality Management System. Requirements
ISO 14001:2004 Environmental Management System
OHSAS 18001:2007 Occupational Health and Safety Management System

CALIBRATION OF REFERENCE MODULES

Standard photovoltaic modules of Astana Solar KZ PV 2XX M60 and KZ PV 2XX M72 are annually calibrated at TÜV Rheinland (Germany).

TÜV Rheinland is the leading international company for the provision of independent audit services. It operates in 32 areas of commercial activity, including inspection of equipment, goods and services, technical supervision of projects, etc.

The company was founded in 1872 and today has 500 representative offices in 60 countries of the world.

TÜVRheinland®
Precisely Right.

Address: Germany,
Cologne, Am Grauen Stein.
Website: www.tuv.com
Tel: +4922 1806-2477

Calibration measurements of reference module KZ PV 230 M60. Test report No 21226353. 002

Calibration measurements of reference module KZ PV 270 M72. Test report No 21226353. 001

MONITORING AND INSPECTION CONTROL

Министерство энергетики Республики Казахстан

Мониторинг выработки электроэнергии всеми СЭС

From September 1 to December 1, 2015 , Samruk-Energo JSC (Samruk-Green Energy LLP) tested Astana Solar photovoltaic modules with a total capacity of 3.68 kW, at a 2 W solar power station in Kapshagai city

Modules were tested and monitored with the participation of inverters manufacturer SMA GmbH, Germany

The result showed that the specific output of Astana Solar modules exceeded the one of European modules by 5.2%

From December 2012, Astana Solar LLP constantly monitors the 250 kW solar power station installed on the roof of the plant

As of July 1, 2017, the station has produced 1,370,463.80 kWh

In 2017, the station produced 171,180.1 kWh

On average, the station produces 1,144 kWh per day

	Год	Наименование объекта	Суммарная установленная мощность (МВт)	Выработка за 1 квартал 2016 года (млн. кВтч)	Выработка за 2 квартал 2016 года (млн. кВтч)	Выработка за 3 квартал 2016 года (млн. кВтч)	Выработка за 1 полугодие 2015 года (млн. кВтч)	Выработка за 1 полугодие 2016 года (млн. кВтч)
1	2014 г.	ТОО "СКЗ-U"	0,79	0,10	0,17	0,185	0,25	0,27
2		Кызолардинская обл		0,29	0,43	0,049	0,077932	0,72
3		Акмолинская обл		0,10	0,02	0,012	0,01497	0,11
4		Кызылординская обл		0,36	0,97	0,11	0,1536	1,33
5	2015 г.	Южно-Казахстанская область	1,80	0,11	0,15		0	0,25
6		г. Алматы		0,10	0,12	0,14	0	0,22
7		Южно-Казахстанская область		3,43	4,93	4,8	0	8,36
8		Южно-Казахстанская область		2,18	5,15	5	0	7,33
9		Южно-Казахстанская область		0,22	0,97	0,23	0	1,19
10		Южно-казахстанская область		0,00	2,24	3,25	0	2,24
11	2016 г.	Кызылординская обл	0,02	0,23	0,48	0,48	0	0,71
		Итого:	**2,5916**	**6,885**	**15,14**	**13,776**	**0,50**	**22,03**

DISLOCATION OF SOLAR POWER STATIONS USING ASTANA SOLAR PHOTOVOLTAIC MODULES

IMPLEMENTED PROJECTS OF SOLAR STATIONS IN 2017 USING ASTANA SOLAR PHOTOVOLTAIC MODULES

ASTANASOLAR

20 MW solar power station,
South-Kazakhstan region

12 MW solar power station,
South-Kazakhstan region

2 MW solar power stations, Mangystau region

2 MW solar power stations, Kyzylorda region

HIGH POWER SOLAR POWER STATIONS

ASTANASOLAR

1 MW solar power station for power supply of a group of industrial facilities, South-Kazakhstan region

200 kW solar power station for the facilities of the International Specialized Exhibition ASTANA EXPO-2017

418 kW solar power station, to provide electricity to a rotational camp, Kyzylorda region

301.5 kW solar power station, to provide electricity to the transport and logistics hub, Kyzylorda region

SOLAR POWER STATION, ASTRAKHAN REGION, RUSSIAN FEDERATION

Installed capacity: 250 kW
Purpose: provision of electricity to the municipal facilities of Narimanov city

SOLAR POER AGRO-INDUSTRIAL COMPLEX

ASTANASOLAR

Grain terminal, 2 kW, North-Kazakhstan region

Hydrotechnical facilities for water supply of cattle stations, 10 kW station, Zhambyl region

5 kW solar power station, storage facility, Astana

Rice processing workshop, 30 kW station, Kyzylorda region

SOLAR POWER IN THE INFRASTRCTURE OF RESIDENTIAL AREAS

ASTANASOLAR

10 kW solar power station, a recreation center in Shymkent city, South-Kazakhstan region

5 kW solar power station, private residence, Akmola region

Street lighting system for sports facilities, 2.4 kW station, Astana

5 kW Solar power station, residential complex "Green quarter", Astana

SOLAR POWER STATIONS AT SOCIOCULTURAL FACILITIES

ASTANASOLAR

8 kW solar power station, emergency medical station, Astana

1.5 kW mobile, charging solar unit

0.9 kW station

1 kW solar power station, Bukhar-Zhyrau mausoleum, Karagandy region

MOBILE POWER STATIONS

ASTANASOLAR

0.8 kW mobile solar unit of hunters, fishermen, beekeepers

1.5 kW mobile, charging solar unit

0.9 kW station

Sheepherder cabin, 1 kW station

ASTANASOLAR

We provide the following services:

- Manufacture and sale of photovoltaic modules
- Turnkey production of solar power stations of various capacity
- Design, engineering and installation of equipment
- Development of new products based on solar systems
- Consulting, maintenance and warranty services

Contact details:

Tel.:
+7 7172 55-14- 00
+7 701 532- 08-30
+ 7 777 474-94-58

Email:
info@astanasolar.kz
sales@astanasolar.kz
zhbegaidarov@astanasolar.kz
a.kikbayev@astanasolar.kz