



## POLYSILICON PRODUCTION

### PROJECT

There is provided a project on building a **polysilicon production plant**.

The project is considered high-opportunity due to the following prerequisite:

- World polysilicon market totals **145 thou t (USD 5 bn)**, annual average growth rate since 2009 – **20%**.
- The main consuming industries – **microelectronics** and **solar energetics** with projected annual average growth rate of **7%** and **24%** respectively by 2020.
- Developed mining industry in Belarus, research and raw materials (the volume of identified quartz sand deposits is **175 mn t**) base.
- Skilled labor and experience in implementation of projects in quartz industry.
- Capital expenditures for the launching a polysilicon production plant start from **USD 200 mn**, payback period is **6-7 years**.

### MARKETS

#### Customs Union market:

- By 2020 Russia is planning to commission **152 GW** of solar power stations. Annual average capacity growth is expected to amount to **14%**.
- Russian microelectronics market is growing on average by **21%** a year. It is projected to reach **USD 2,84 bn** by 2015, thus having increased by 3 times since 2009.

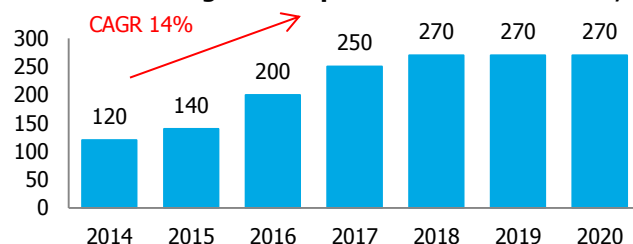
#### Internal market of Belarus:

- Integrated circuit output in Belarus increased by 1,5 times since 2005 and totals **1734 mn** pieces. Annual average growth rate is **6%**.
- There are 22 solar power stations in Belarus of total capacity of **1,89 MW**. National development program of local and renewable energy sources implies installing **172** facilities by 2015. By 2020 aggregate capacities are expected to get raised to **85 MW**.

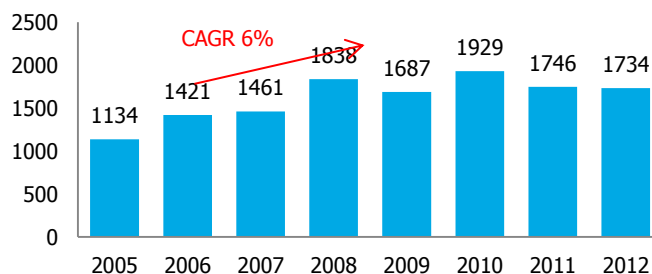
#### European and South-East Asia markets:

- Since 2009 world volume of solar battery installations is actively growing. In 2010 it increased by **172%**, in 2011 – by **40%** (CAGR **22%**). Leading countries: Germany, China, Japan, India, USA.
- The bulk of the electronic components market is accounted for by **APEC** countries (around **55%**), followed far behind by the USA and European markets.

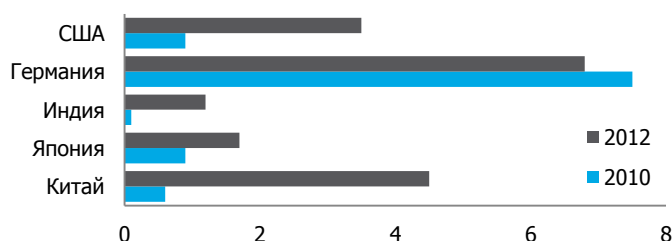
#### Commissioning of solar power stations in Russia, MW



#### Integrated circuit output in Belarus, mn pieces



#### World volume of solar battery installations, GW



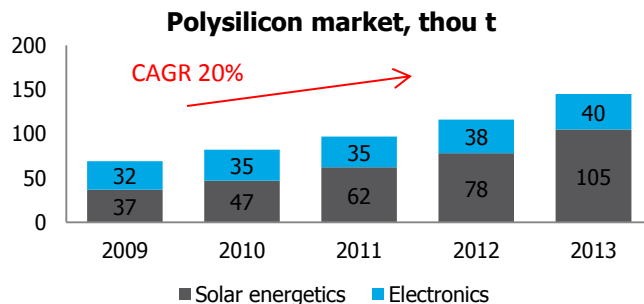
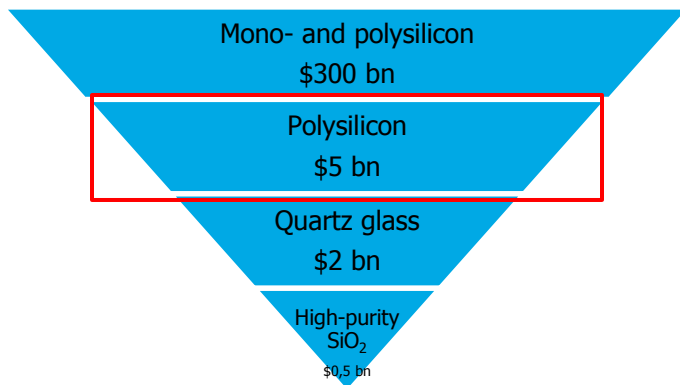
## MARKET OPPORTUNITIES

### Global opportunities:

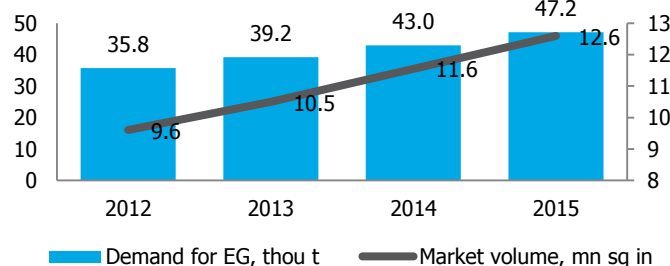
- World polysilicon market totals **145 thou t (USD 5 bn)**, annual average growth rate over 2009-2013 – **20%**.
- The main consuming industries are **microelectronics** and **solar energetics** (**35%** and **25%** respectively).
- Global electronics industry is stably growing, having reached **10,5 mn sq in (USD 338 bn)**. With existing growth rates the market may double by 2017 compared to the current value.
- By 2015 demand of global electronics industry for polysilicon (EG) is estimated to increase to **47,2 thou t** per year.
- Capacity of world solar plants totals more than **100 GW**. Estimated annual average growth rate of solar battery installations is **22%**.
- Demand of global solar energetics for polysilicon (SoG) is projected at the level of **100 thou t** by 2015.

### Local opportunities:

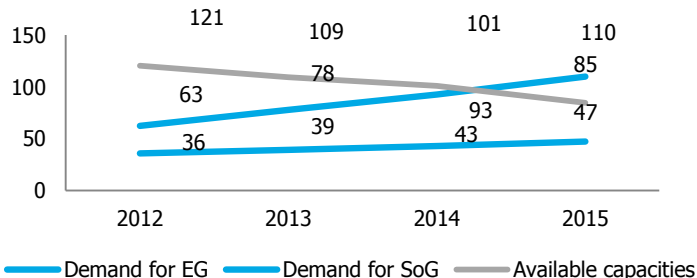
- Share of imported silicon on the Russian market is about **30%**. Silicon produced in Russia is of lower quality and can't be used in electronics industry.
- Russia: Alternative energy development program implying increase of its share in the country's energy balance up to **4,5%** by 2020.
- Europe: **The program 2020** (increase in share of renewable sources by 2020 up to 20%).
- Germany: **"Green tariff"** and "Replacement of nuclear energy by solar by 2020" **programs**.
- India: The program **20 solar GW** by 2020.
- Italy, Japan, China: **State programs** on alternative energy.
- USA: **USD 150 bn** is allocated for 10 years to support alternative energy.
- Kuwait: By 2020 **10%** of energy is to be produced from renewable energy sources.



### Projected demand of electronics industry for polysilicon



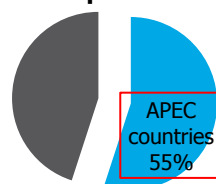
### Demand of solar energetics for polysilicon, thou t



### Commissioning of solar plants in Belarus, MW



### Structure of world market for electronic components



## INVESTMENT OPPORTUNITIES

- Capital expenditures for the project implementation start from **USD 200 mn.**
- Payback period of the project is **6-7 years.**
- IRR varies within **13-15 %.**

## POTENTIAL INVESTORS

- **Strategic investors** – companies with appropriate technologies and experience in polysilicon production.
- **Forward integration** – world major players on microelectronics and solar energetics markets