



HIGH-PURITY QUARTZ PRODUCTION

PROJECT

There is provided a project on launching **high-purity quartz (HPQ) production**.

This is a high-opportunity project due to the following prerequisites:

- World HPQ market totals about **60 thou t** (app. **USD 500 mn**). The market is characterized of stable growth and annually increases by **3-5%**.
- 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 high-purity quartz production are estimated at **USD 30-70 mn**, payback period is **5-6 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.

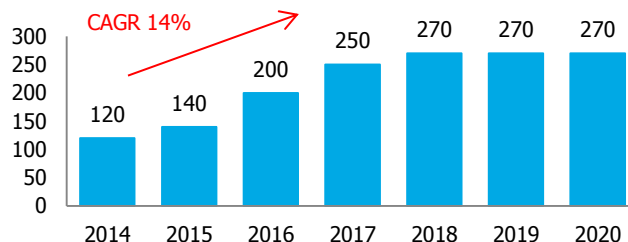
Internal market of Belarus:

- 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**.

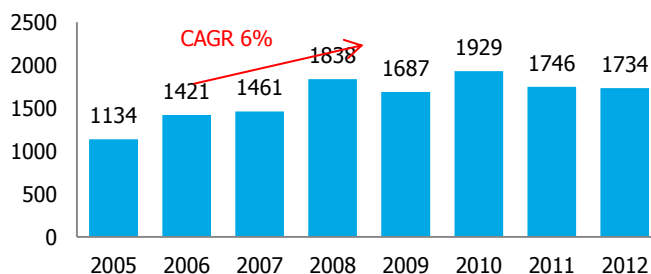
European and South-East Asia markets:

- 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.

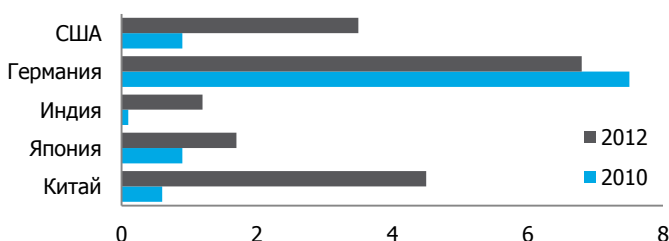
Commissioning of solar power stations in Russia, MW



Integrated circuit output in Belarus, mn pieces



World volume of solar battery installations, GW



MARKET OPPORTUNITIES

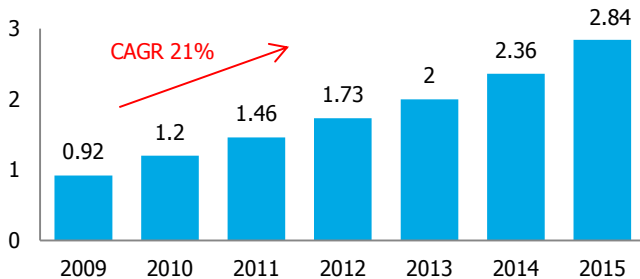
Global opportunities:

- World HPQ market totals about **60 thou t** (app. **USD 500 mn**).
- The market is characterized of stable growth and annually increases by **3-5%**.
- 60%** of global HPQ consumption is accounted for by **microelectronics** and **solar energetics**.
- World electronics industry is stably growing and reached **10,5 mn sq in (USD 338 mn)**. With current growth rates, the market may double by 2017.
- Growth driver of HPQ market is **quartz crucibles market**. In 2013 it was estimated at **USD 434 mn** with annual average growth rate of **12%**. The bulk of the market is accounted for by quartz crucibles for semiconductor industry.
- Market of silicon for semiconductor industry is expected to grow at the level of **7%** a year.
- 35%** of all crucibles for microelectronics is of 300 mm technology process, **40%** - of 200 mm one. Demand for **quality products** will grow by means of gradual replacement of 200 mm technology process by 300mm and 450 mm ones.
- Global capacity of solar power stations exceeds **100GW**. Annual average growth rate of solar battery installations is projected to reach **22%**.
- Solar energetics market growth will trig the increase in share of crucibles for solar energetics up to **34%** in 2015 (compared with **21%** in 2008).
- HPQ market is monopolistic and characterized of constant price growth, quality issues, spot prices (customers' concern).

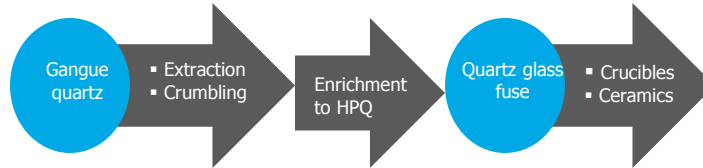
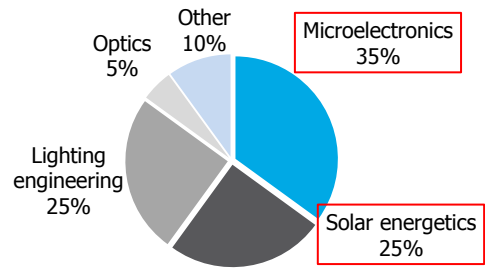
Local opportunities:

- Share of imported silicon on the Russian market is estimated at about **30%**. Necessity of importing high-purity quartz is conditioned by lower quality of silicon produced in Russia and inability of applying it in electronics industry.

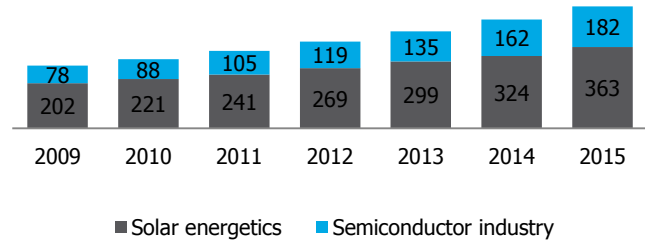
Russian microelectronics market, USD mn



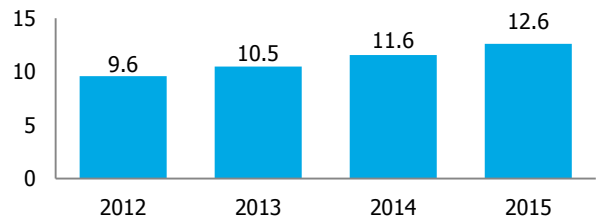
Global HPQ consumption structure



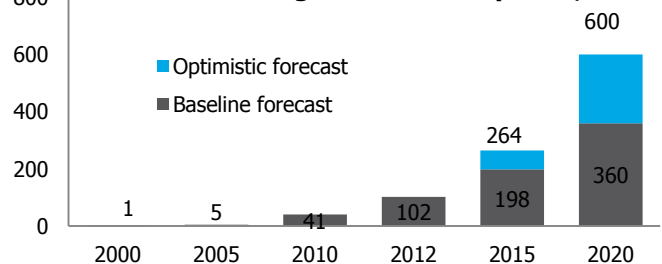
Quartz crucibles market, mn USD



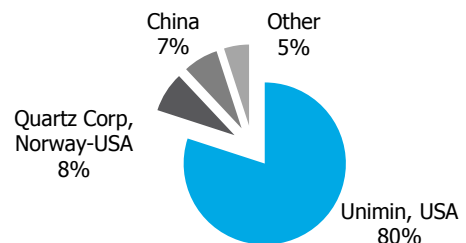
Global electronics industry, mn sq in



World solar energetics installed power, GW



High-purity quartz market



INVESTMENT OPPORTUNITIES

- Capex for the project implementation might total **USD 30-70 mn.**
- Payback period is about **5-6 years.**
- IRR varies within **5-18%.**

POTENTIAL INVESTORS

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