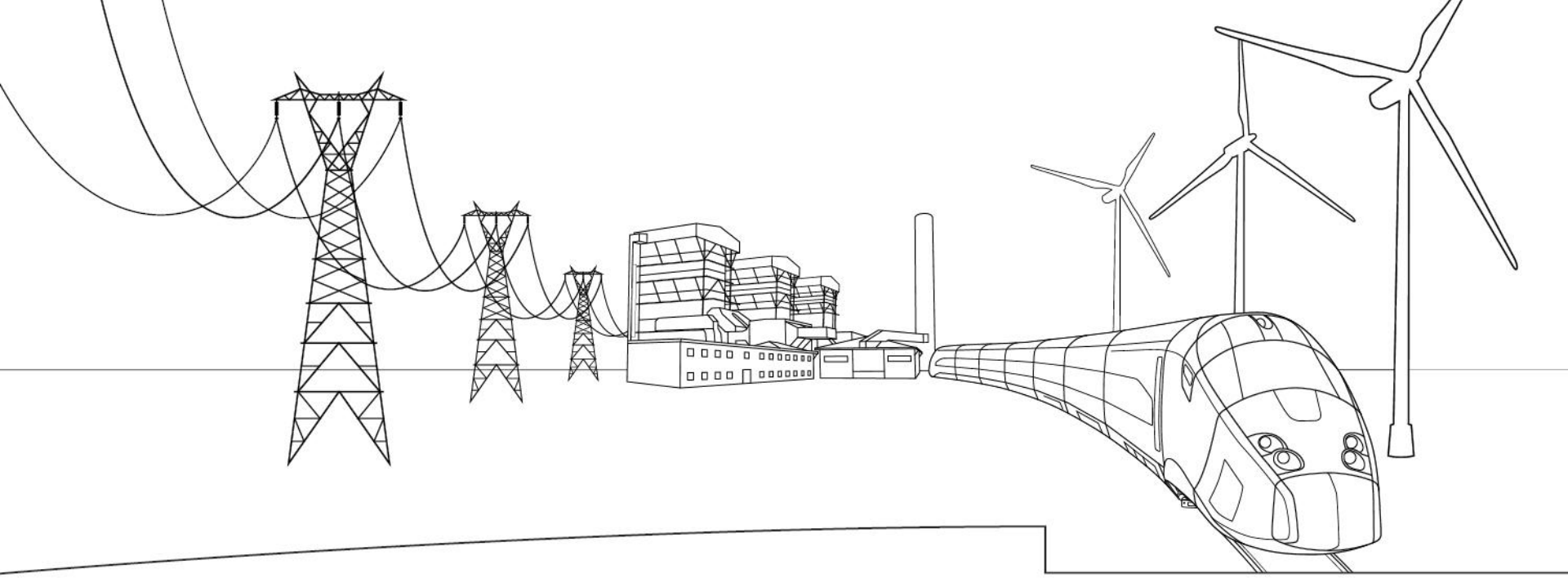


Integrated power solutions

Vladimir Naumov

Brussels

November 6, 2014

iPad App

ALSTOM

Shaping the future

Alstom: a long lasting history

ALS·THOM

A GROUP BORN IN 1928

- Creation of Alsthom through the merger of Thomson-Houston and Société Alsacienne de Constructions Mécaniques (SACM).
- The first factory was based in Belfort, France.

ALSTOM

Three main activities in four sectors

Equipment & services for power generation

Alstom Thermal Power

Equipment & services for rail transport

Alstom Transport

Alstom Renewable Power

Equipment & services for power transmission

Alstom Grid

ALSTOM

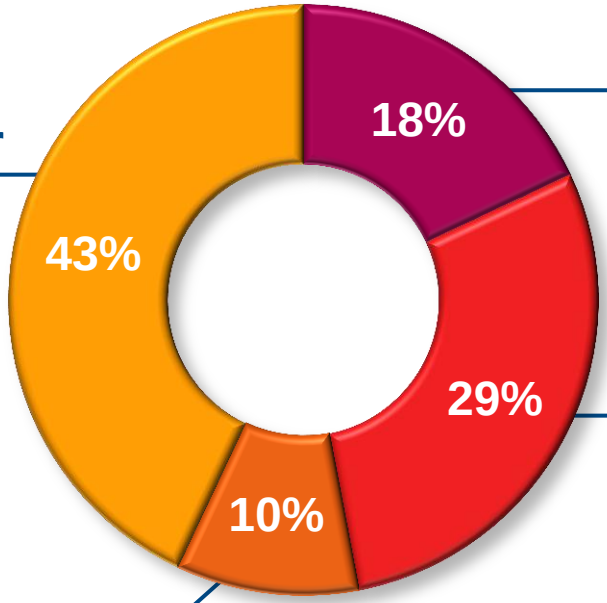
Three main activities in four Sectors
92,600 employees worldwide in around 100 countries

Thermal Power

€9.6

Renewable Power

€2



Grid

€5.0

Transport

€7.1

In billion euros

Total order intake 2012/13

€23.7 billion

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Alstom Renewable Power Technologies adapted to all renewable energy sources

WIND OFFSHORE

WIND ONSHORE

HYDRO

TIDAL

WAVE

SOLAR THERMAL

GEOTHERMAL

BIOMASS

FOR NEW PLANTS AND FOR THE INSTALLED BASE

ALSTOM

Presence – Kazakhstan and Central Asia

- **100 Alstom** employees
  - (75 Transport)
  - plus 250 in JVs
- **Representation offices** through the region except Kazakhstan and Tajikistan (~20 on projects)
- **2** industrial sites (Transport):
  - Astana (electrical locos)
  - Almaty(point machines)

Alstom, a world leader in transport infrastructure, power generation and electrical grid.

ALSTOM

- Present in around 100 countries
- Sales 2011/12: €20 billion
- Orders 2011/12: €22 billion
- 92, 600 employees *(at 31 March 2012)*

Presence

- Offices in Astana & Almaty, in Transport, Grid and Power sectors
- Locomotives factory in Astana - JV EKZ (KTZ, TMH, Alstom)
- Point-Machine factory in Almaty (under construction) – JV KazElectroPrivod with Kamkor (KTZ)

Contracts

- KTZ – 295 electric locomotives: 200 double freight KZ8A & 95 passenger KZ4A
- KTZ – Maintenance of 27 locomotives for 25 years,
- KTZ – 10,000 point machines,
- Grid – Several high voltage equipment provided (substations, circuit breakers, disconnectors, transformers …)
- Power – Turbines modernization (Aktau), environmental control systems equipment, spare parts …

Alstom integrated solutions: thermal and renewable power

- Integrated Solar – Gas Combined Cycle power plants (ISCC) based on Concentrated Solar Power
- Concentrated solar power (CSP) technology provides many advantages:
  - Fully dispatchable
  - Allows contribution at pick times
  - Allows integration with thermal power plants
- Optimal solution for Central Asia countries:
  - High solar radiation (especially in the South)
  - Low population/high percentage of unused land
  - Low current gas price/short investment payback period

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CSP Power Station, Ivanpah, California, USA; 3 x 130 MW

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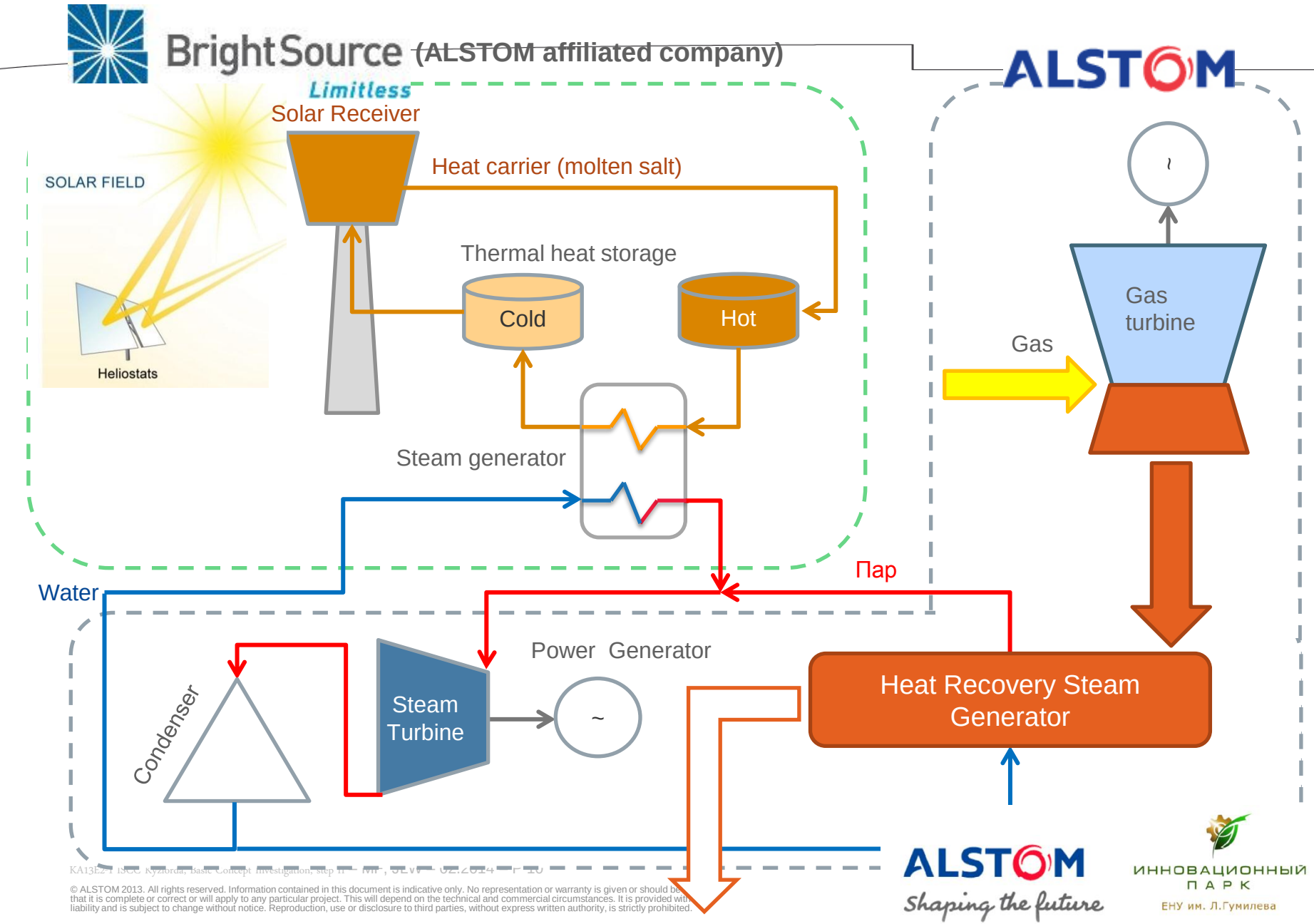
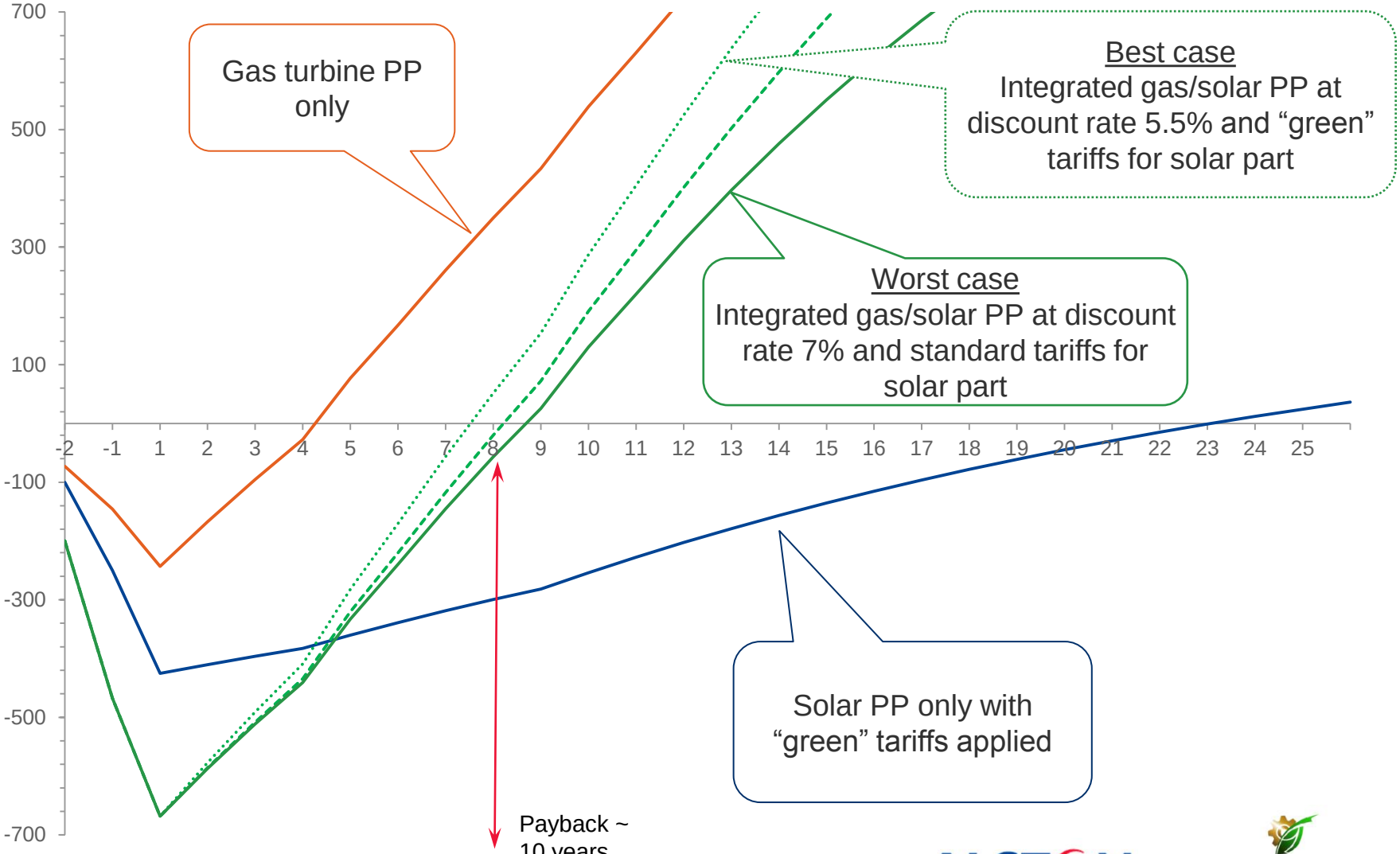
Integrated solar/gas powered power plant



Preliminary NPV calculations (Kazakhstan, Kyzylorda TPP 210MW)



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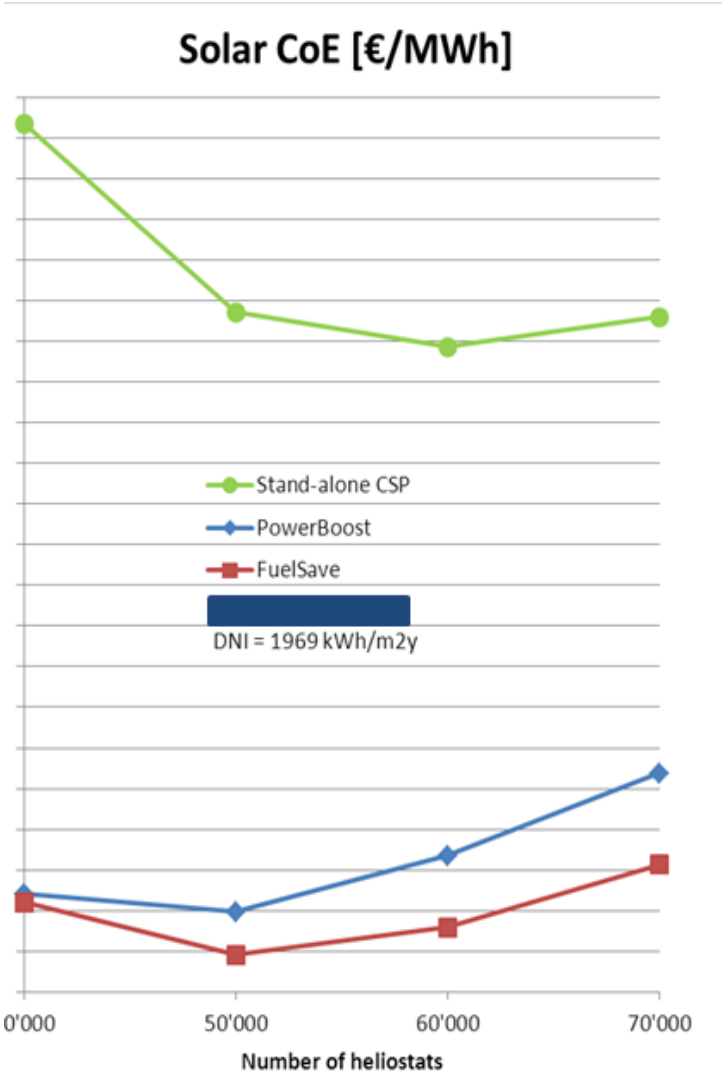
ИННОВАЦИОННЫЙ ПАРК
ЕНУ им. Л.Гумилева

Results / Cost of electricity

- ISCC achieves lower solar cost of electricity than stand-alone CSP
  1) The steam plant is in shared use with the gas turbine
     - No power block to be paid by solar, only adaptation and integration costs
     - The steam plant is fully utilized, thereby shifting optimum to smaller solar field sizes
  2) No loss of solar production from ST start-up time and procedures
  3) Possibility to operate with **gas turbine shut down** (solar only)



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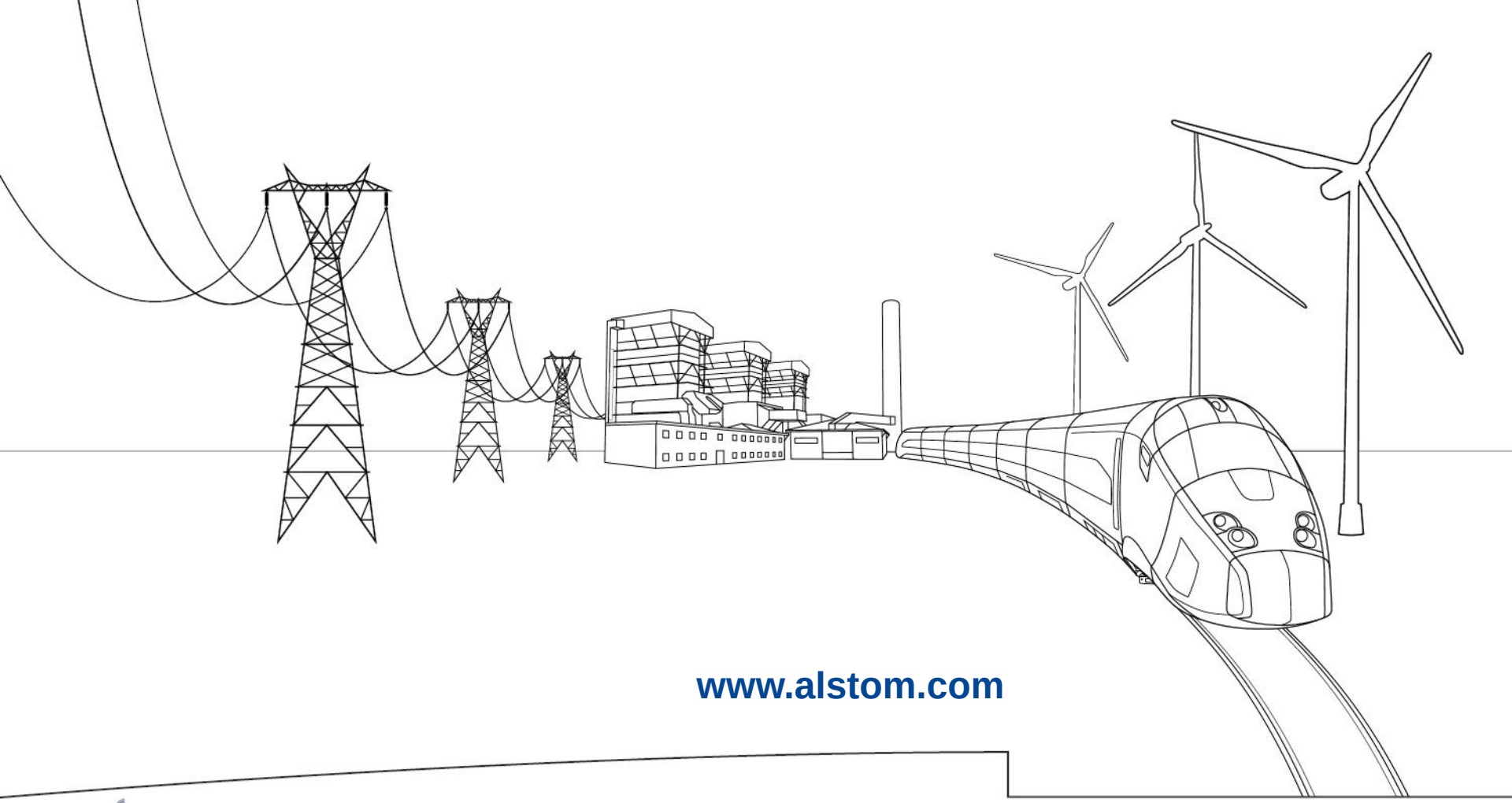

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