Institute of Power Engineering

Research Institute

One of the largest and leading research institutes in Poland and Central Europe in the field of energy technologies

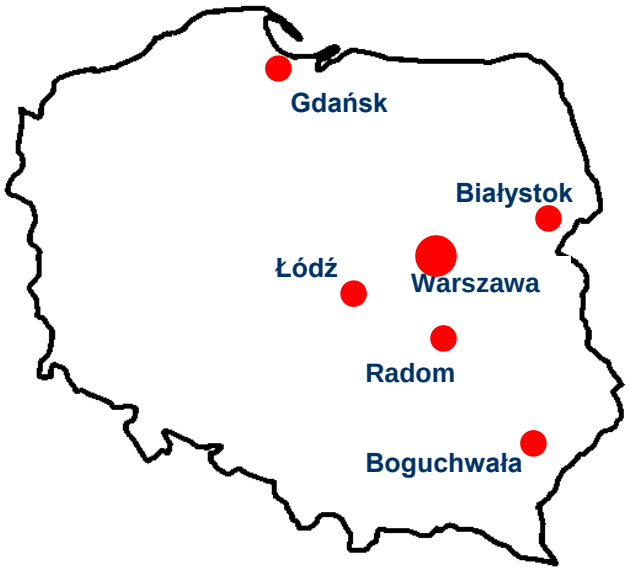
Institute of Power Engineering

Institute of Power Engineering was established in 1953. Currently employs over 400 people, including 37 with a PhD degree or higher.

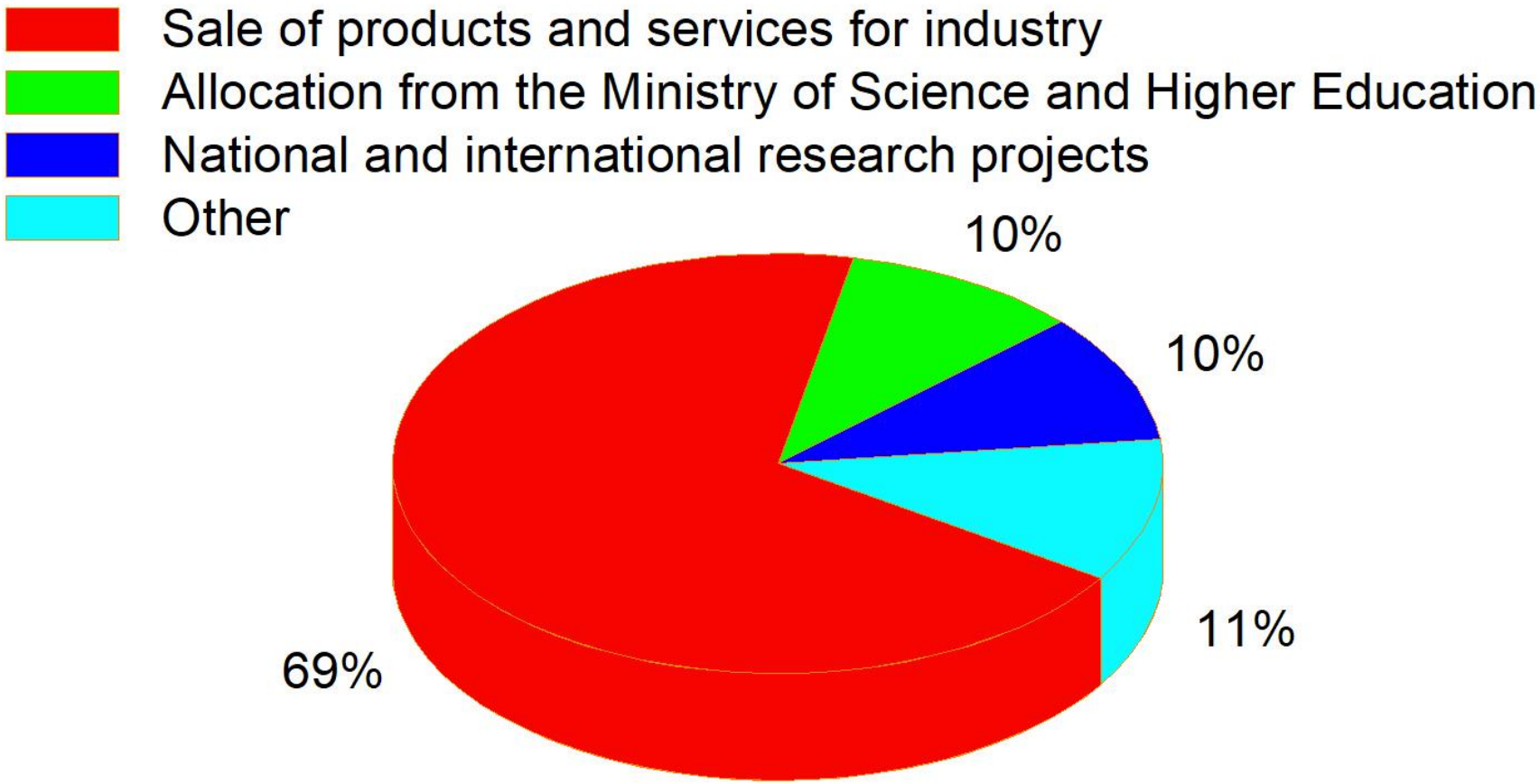
Supervised by the Ministry of Energy.

Six locations in Poland:

- Central Unit, Warsaw:
  - Thermal Division
  - Electric Division
  - Mechanical Division
- "CEREL" Ceramics Branch, Boguchwała
- Gdańsk Branch, Gdańsk
- "ITC" Thermal Engineering Branch, Łódź
- Heating and Sanitary Technology Branch, Radom
- Prototype Production Branch, Białystok



Structure of income (2017)



Results (2017)

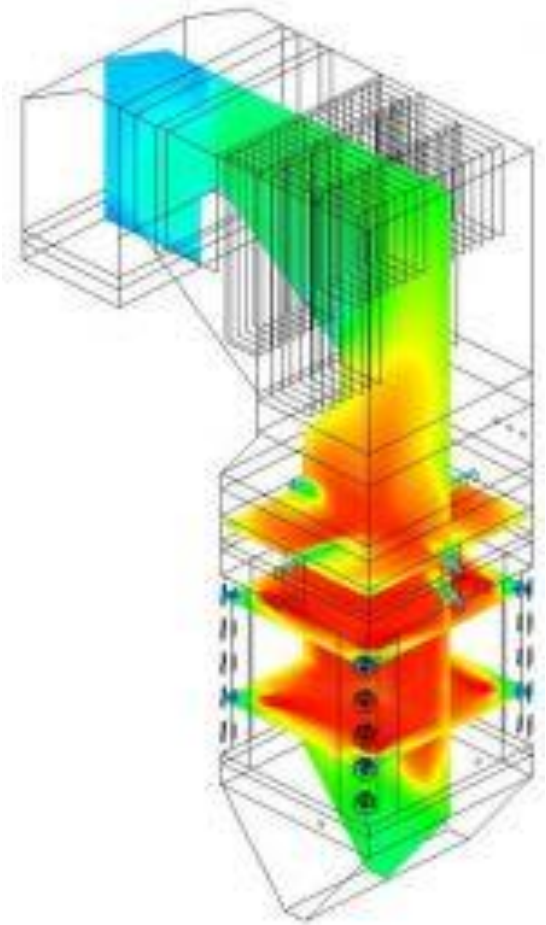
- Over 400 research works and studies for industry;
- 52 research works financed by the Ministry of Science and Higher Education (allocation);
- Participation in 16 international research projects (Horizon 2020 – 8, Framework Programme 7 – 3, EU Coal and Steel Research Fund – 1, ERA-NET – 2, Norwegian Fund – 1, Fullbright Commission – 1);
- Participation in 10 national research projects financed by the National Centre of Research and Development (6) and National Centre of Science (4);
- Membership of the Executive Committee of European Energy Research Alliance (EERA – second consecutive tenure);
- Over 100 publications;
- Over 80 papers in conference proceedings;
- 13 patents.

Low-emission combustion

Institute of Power Engineering has been involved in low-emission combustion problems since 1980s, initially in development of low-NO_x burners for coal-fired power generating units. Since then, many burner types for coal and biomass have been designed that are currently operated at over 50 power plants and CHP plants.

22 MW_{th} burners for biomass combustion

Low-emission combustion



Current fields of activity in this area include:

- Investigations of heat-flow processes occurring in power boilers,
- optimization of combustion processes in terms of reducing emissions of nitrogen oxides and eliminate corrosion and slugging,
- diagnosis and design of combustion chambers of boilers,
- new designs of low-emission dust burners for coal and biomass combustion,
- preparation and transport systems of pulverized coal and biomass,
- fuel quality testing (including coal, biomass and municipal waste),
- thermal conversion of biomass and waste - co-firing, combustion, pyrolysis, gasification,
- clean coal technology - development of oxygen combustion technology that allows for the CO_2 capture.

Fuel cells technology

Due to increasing importance and fast development of fuel cells technology, in 2017 the High-Temperature Electrochemical Processes Department was established, on the basis of a group of specialists employed at the Thermal Division. Its fields of interest include:

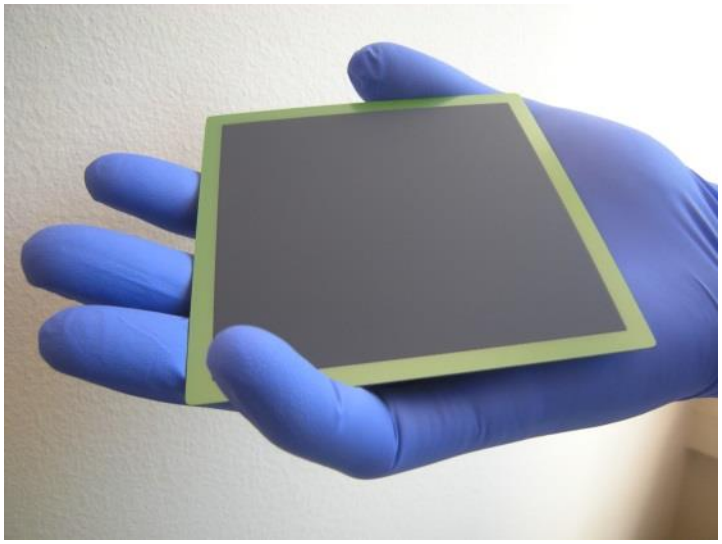
- solid-state fuel cells,
- high-temperature electrolysis,
- solutions in the field of power-to-gas/power-to-liquid,
- CO_2 sequestration and management systems,
- power generation from solid, liquid and gaseous fuels in electrochemical processes,
- ceramic membranes for the separation of oxygen, storage of electricity, heat and other forms,
- numerical calculations and computer simulations of electrochemical and chemical processes as well as power installations,
- design and construction of energy systems,
- technical consulting in the field of new energy techniques.

Fuel cells technology

An SOFC (Solid Oxide Fuel Cell) stack yielding over 50 watts from a single cell has been developed.

In 2017 a demonstration SOEC (Solid Oxide Electrolysis Cell) installation was completed.

Unique technologies for fuel cell elements manufacturing have been developed at the CEREL Ceramics Branch.



Financing

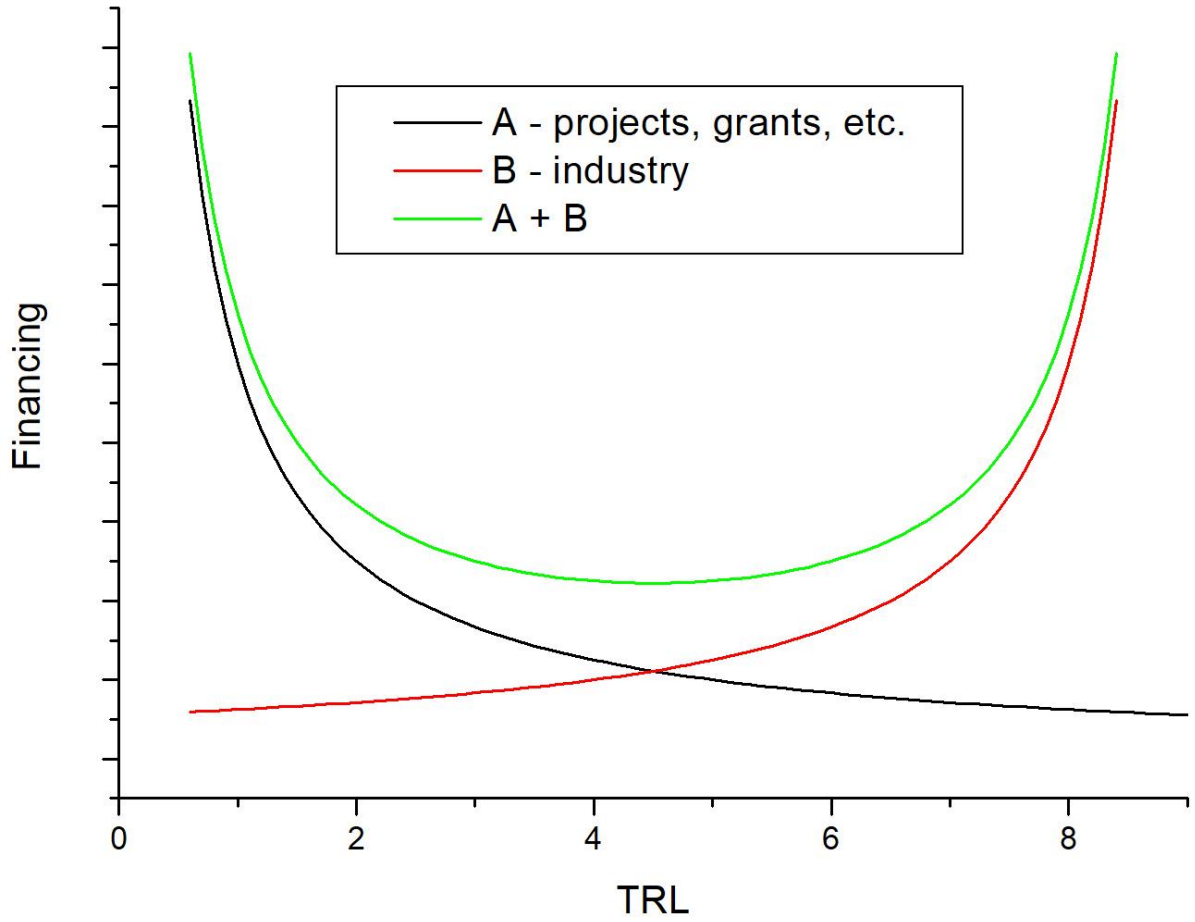
If you have no idea what something is about, then it is about the money.

(a Polish proverb)

Financing


TRL 9
System ready for full scale deployment
TRL 8
System incorporated in commercial design
TRL 7
Integrated pilot system demonstrated
TRL 6
Prototype system verified
TRL 5
Laboratory testing of integrated system
TRL 4
Laboratory testing of prototype component or process
TRL 3
Critical function: proof of concept established
TRL 2
Technology concept and/or application formulated
TRL 1
Basic principles observed and reported

Financing



Thank you for your attention

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