“Micro- and nanosystems technology for modern industrial applications” MNS DIAG SMART-FRAME conference

The construction of environmentally sound thermoelectric energy converters for the medium-temperature range (400-850 K).

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Project Summary

- **Project area** – alternative energy system creation, namely, construct semiconductor TE module for working temperature range (150-500)^{o}C.
- **World TE market** need to 6.2 billion modules per year. Now TE market fill on 1-2%.
- **Project starting conditions** include:
  - Existing patent protected innovation thermoelectric (TE) material technology;
  - Existing manufacture line for solar concentrators production;
  - Professional business-plan for start TE-materials manufacturing (on the base of bank rate in Ukraine)
- **Project result**: design pilot facility of new alternative energy system "solar collector – thermoelectric generator" and provide PR-company.

Background of problem

- Exist a considerable quantity of free heat which is thrown out in environment
- There are more customers that aspire to energy saving
- TE-market has expansive growth today
- Exist alternative energy materials and devices need optimization for higher of their efficiency

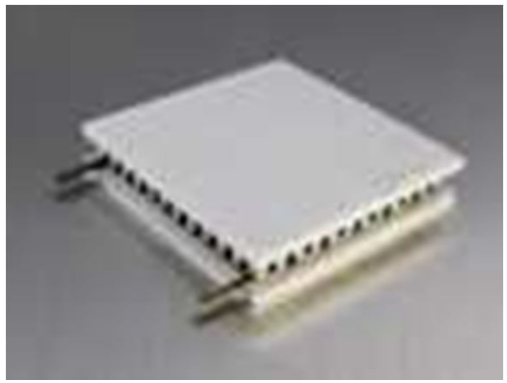
Solution: We propose to connect two different types of alternative energy sources for increase of joint efficiency.

This solution take a possibility for end customers to receive in once device free hot water ("solar collector") and eco-clean electrical energy ("thermoelectric generator")

Technological Advantage

Project team have developed the complete cycle of new technology for TE-materials with predetermined properties, based on deep fundamental theory.

Technologies for TE-materials and solar collectors are protected by more than 50 patents.



Competition: TE-modules

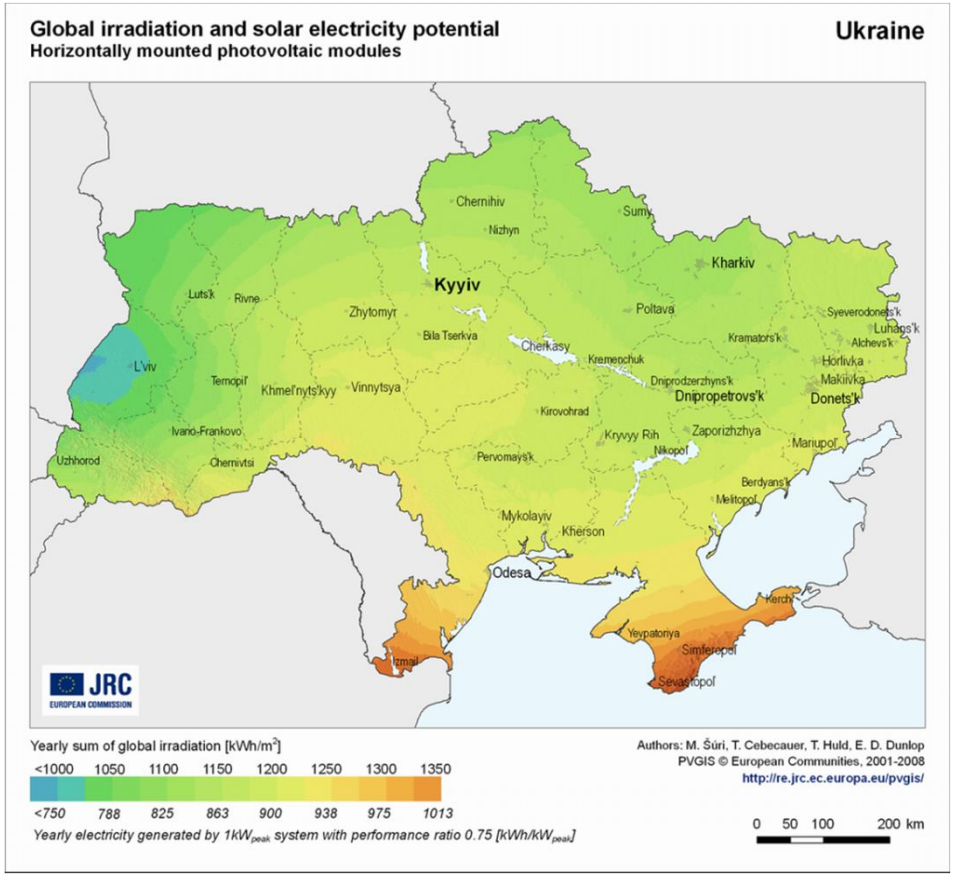
Firm	Q, W	Size	Tmax, °C	Price, USD	Link
Melcor (USA)	33,4	30*30	85	75	http://uk.rs-online.com/web/p/peltier-modules/2382988/
Tellurex (USA)	34,1	30*30	100	25	http://www.tellurex.com/pdf/tellurex-product-catalog.pdf
Velleman (Belgium)	25.7	30*30	100	44	http://www.chipdip.ru/product/peltier1.aspx
Termo-Gen AB (Sweden)	21,1	30*30	200	12	http://www.termo-gen.com/pdf/Pricelist_modules_200605.pdf
Cioterm (Russia)	58.9	30*30	100	43	http://www.chipdip.ru/product/snowball-71.aspx
Altek (Ukraine)	35 2	40*40	100 200	50	http://inst.cv.ua/index.php?option=com_content&view=article&id=1&Itemid=7&lang=en
Own TE-module	**60**	**40*40**	**450**	**30**	

Competition: solar collectors

Firm	Volume of tank, liters	Price, USD	Link
ALTEK (Ukraine)	95-130	416	http://aenergy.com.ua/prajs-list/208-prajs-list-soln-kollektora.html
China	105-150	416	http://aenergy.com.ua/images/stories/price/pdf/soln_koll.pdf
Hewalex (Poland)	-	432-486	http://www.tellurex.com/pdf/tellurex-product-catalog.pdf
Buderus (Germany)	-	1593	http://aenergy.com.ua/images/stories/price/pdf/soln_koll_euro.pdf
Partner's Solar collector	**300-400**	**280**	

Customers

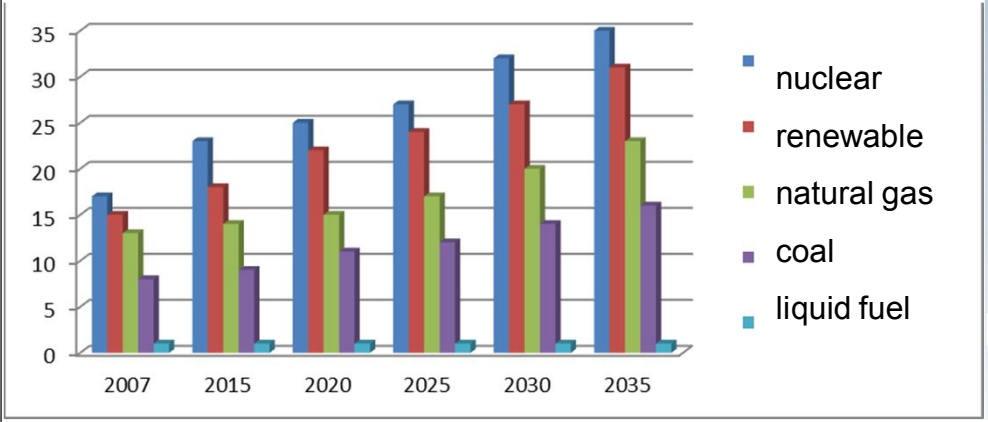
- individual consumers;
- municipal buildings;
- hotels;
- universities;
- etc.



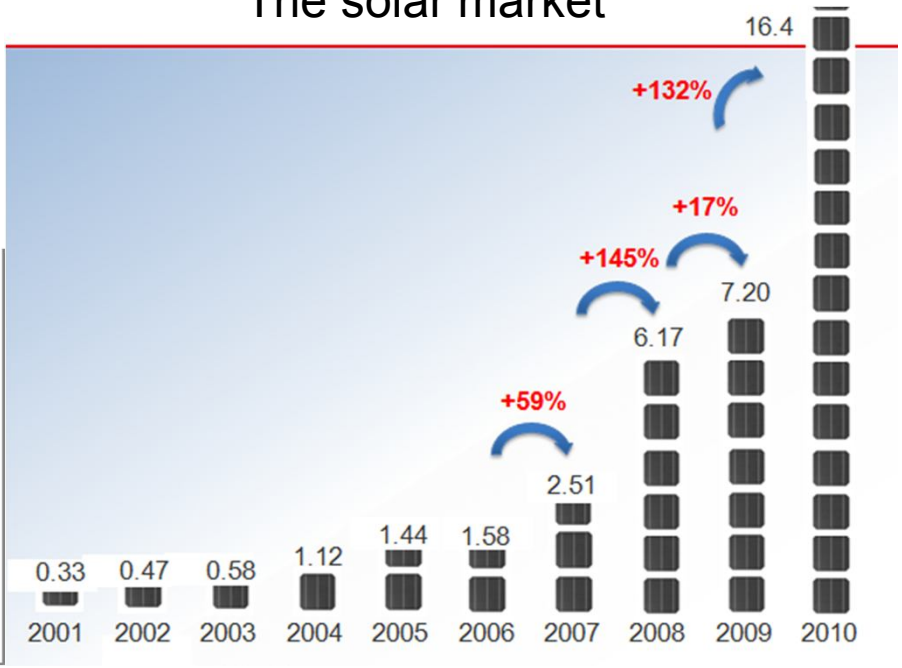
Local project target:
creation the profitability pilot facility for Ivano-Frankivsk geographic region.

Market Opportunity (for Ukraine)

Electrical energy production in trillion kW h



The solar market



Source: http://www.sharp.ua/ua

Global project target:
Move from regional to national market.

Business Model & Financial Projections

We will used exist market of solar collectors production (market of our partner: 250 units per year in 2011).

Together with the "Finance and Credit" consulting group and Datasystems Inc. (Moscow, Russia) we developed a professional business plan (UNIDO) to create its own large-scale production of TE material

The total project cost – 470.000 USD, of which 426.000 USD for the purchase of fixed assets. The economic efficiency of the project was calculated for lending rate of 25% per annum. The applied discount rate - 20%. Planning horizon - 60 months. Discounted Pay-Back Period (PBP) - 2.55 year.

The Team

- Main team experience – technology of thermoelectric materials
- Applicant – University. That can involve to project realization all necessary department from University.
- Stable corporate with solar concentrators manufacturing firm.
- Exist governmental support.
- Young scientists consist 60% in our team

Market expansion in future

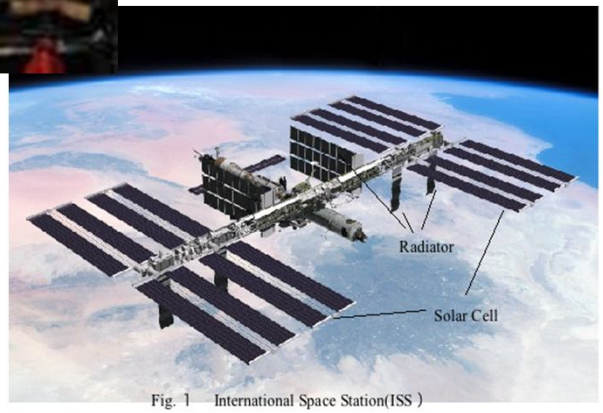


Fig. 1 International Space Station(ISS)

Very global project target: expansion to market the TE-modules for applied in other systems with free heat which is thrown out in environment

Thanks for attention

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