



European Commission
**ERASMUS
MUNDUS**



YEAR 2 SPECIALISATIONS:

AGH in KRAKOW / POLAND

eit
Knowledge & Innovation
Community
KIC InnoEnergy





AGH UNIVERSITY OF SCIENCE
AND TECHNOLOGY



FACULTY OF ENERGY AND FUELS

SPECIALIZATION

SUSTAINABLE FUELS ECONOMY



AGH University of Science and Technology

AGH-UST is one of the best, most prestigious and modern Polish universities

- **16 faculties, 54 branches** of studies over **200 specializations**
- **38000 students**, and over **750 of PhD students**
- **2000 researchers**, nearly **600** associate and full professors
- over **100 international research projects** are currently being run
- over **370 agreements** of direct collaboration with partners in Europe, North and South America, and Asia
- over **100 agreements with research and scientific units in Poland**
- member of many international organisations (e.g. ACRU, EUA, IAU, SEFI, AEUA, T.I.M.E)
- and **nearly 250 agreements with industrial plants**



Faculty of Energy and Fuels

The program of “Sustainable Fuels Economy” at **Faculty of Energy and Fuels**

- 2 **branches**: Energy and Chemical Technology, 8 **specializations**
 - 100 **research** workers, including almost 30 **associate and full professors**
 - Cooperation with industry:
 - power** (EDF Polska, RWE Polska, GE-Hitachi, Polish Energy Group, Tauron,...),
 - rafineries** (PKN ORLEN, LOTOS, Trzebinia S.A)
- over 1150 students**

Employment status

87.2%

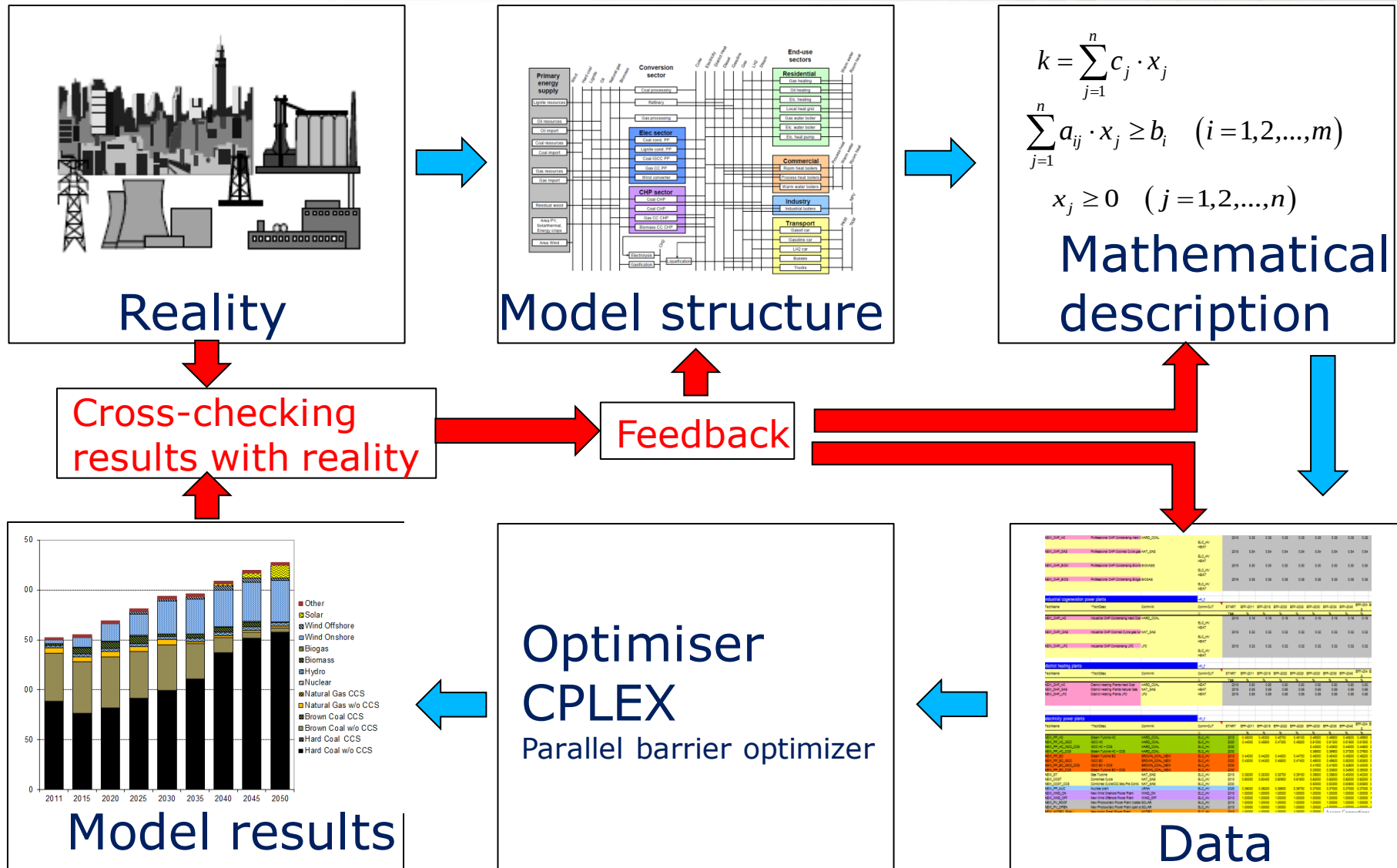
OF UNIVERSITY GRADUATES
FOUND A JOB IN LINE
WITH THEIR EDUCATION

25.6%

OF UNIVERSITY GRADUATES
WERE OFFERED A JOB

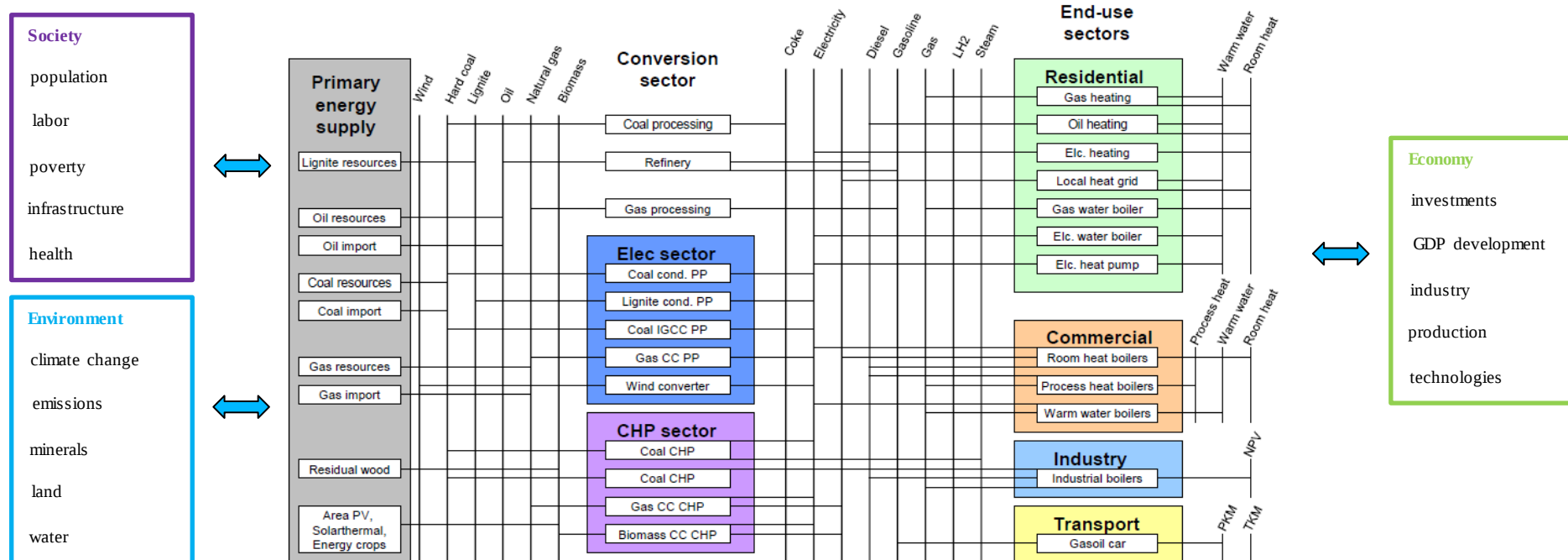


Depicting reality inside an energy system model



SFE and SELECT

...the very foundation of SELECT is to consider the conversion chain, from primary energy source to final energy service delivered to mankind, and those environmental pathways which ensure minimal environmental impact while maintaining sustainable economy...



What if we want to answer questions related to entire energy system?

What is the (cost)optimal way to reach certain targets(e.g. decarbonization)?

How deployment of certain technology can influence the behaviour of the whole system?

How economy, society and environment will be affected?

Energy system analysis

Goal: Decision support (governmental bodies, energy companies) on development of a energy system.

- Decision makers define targets (e.g. CO₂ reduction, RES deployment)



- Analysts with the use of techno-economic models calculate the possible development pathways of the system (environmental factors)

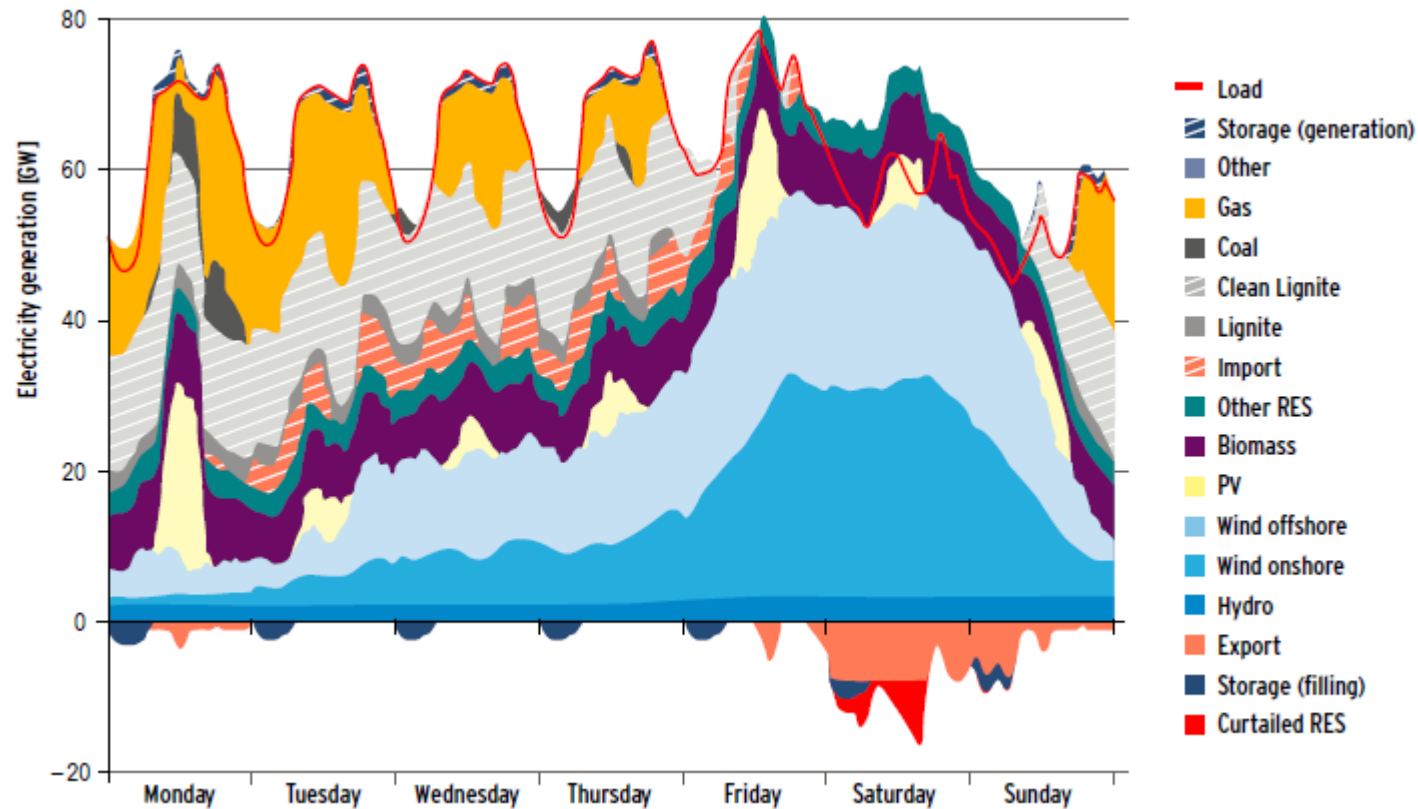


- Analysts identify optimal strategies to reach targets and evaluate their impacts and tradeoffs between diverging objectives and dimensions



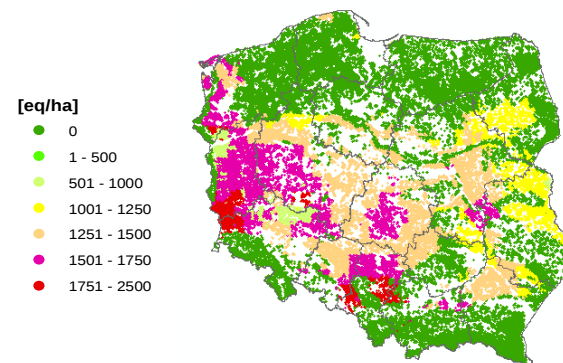
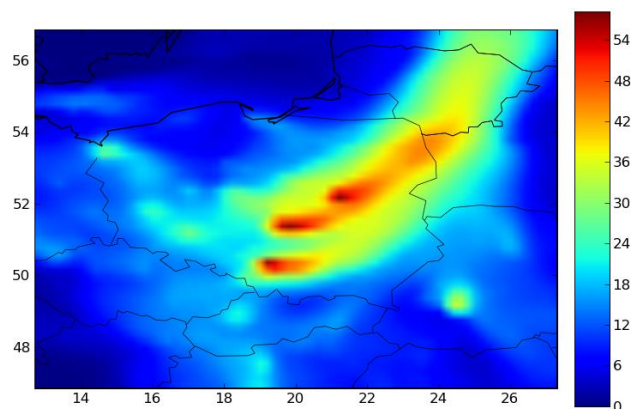
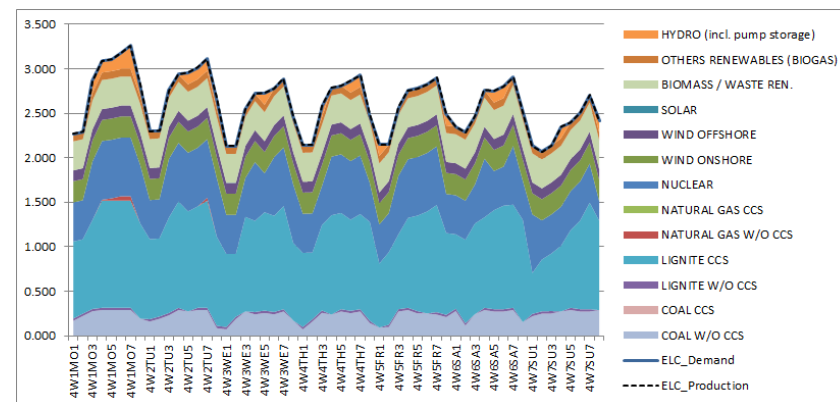
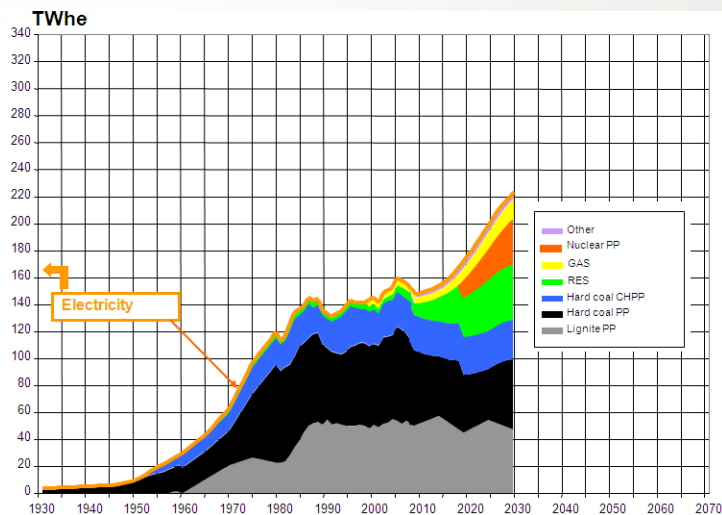
- Decision makers can adopt a strategy or ask for more analysis or define alternative targets

Results: e.g. electricity generation by different technologies



Electricity generation for a sample week

From energy mix to environmental impact assessment



Average **SO₂** concentration 15-16 Jan. 2005[ug/m³]

Environment – Exceedances of critical loads of acidity

Basic idea of SFE

Fuels & Technologies

Physics and chemistry of energy processes , prospects for technology development – learning rates, energy resources availability and price forecasts

**Sustainable
Fuels Economy**

Economy

Energy markets structures, price determination, IRP & least cost planning, energy intensity, energy security, etc.

**Environment &
society**

Emissions & control, modelling of atmospheric transport of pollutants, external costs, energy affordability, policy instruments

The Graduate is able to solve the problems related to the development of energy systems (different scale) with the use of system methods

Subjects

WINTER semester

- Energy and environment
- Prospects of the fuels and energy economy
- Introduction to systems modelling
- Biotechnology
- Energy policy
- Fuel Chemistry
- Modelling of fuels and energy systems
- Catalytic fuels technologies
- Technologies modelling
- Polish Language (basic level)

SUMMER semester

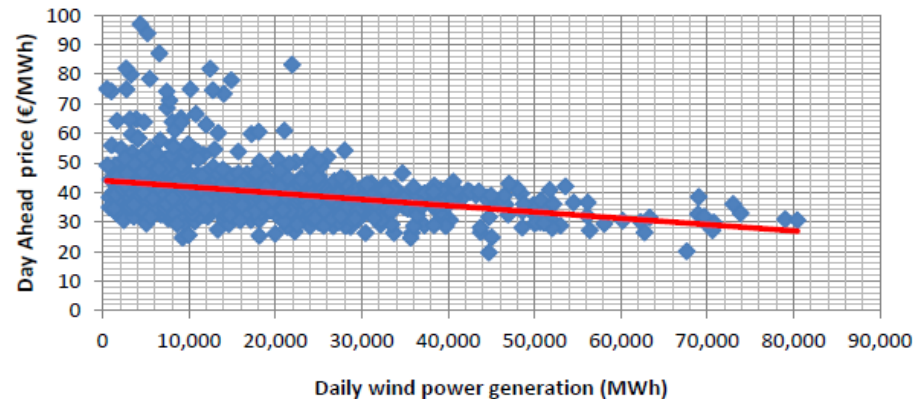
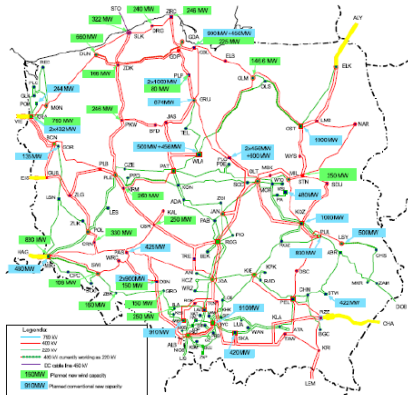
- MSc (internship, seminar)
- Master thesis
- Environomical Pathways for Sustainable Energy Conversion (IPoY)

Master thesis

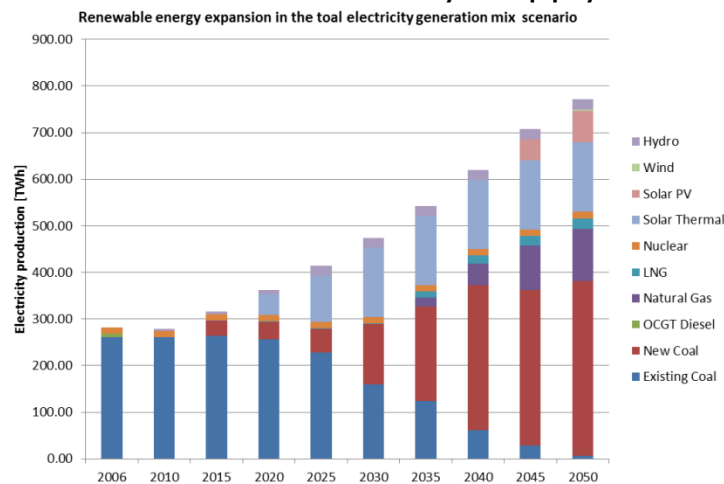
TOPICS: proposed by potential supervisors, coming from industry needs, agreed between a student and a supervisor, examples:

- related to SSM and DSM: primary energy supply, transmission of energy carriers, energy storage, end-use efficiency,
- applied energy systems analysis,
- prospects for deployment of RES, nuclear, IGCC and carbon capture and storage,
- environmental impacts assessment of energy use (particularly power plants based on fossil fuels),
- project of the energy installation,
- setting up laboratory workstation.

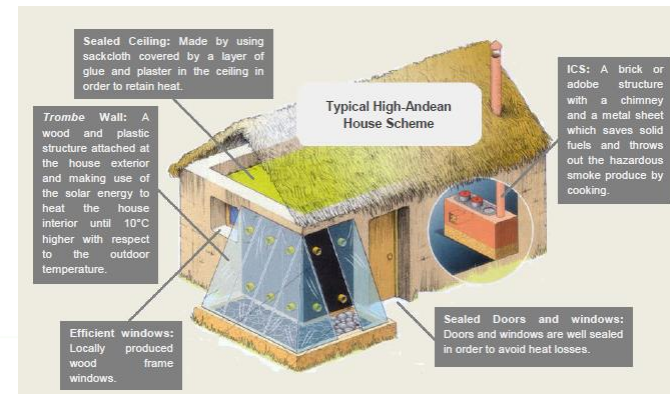
Renato PRATES : Impact of the evolution of renewable energy sources in Germany on the Polish electricity price



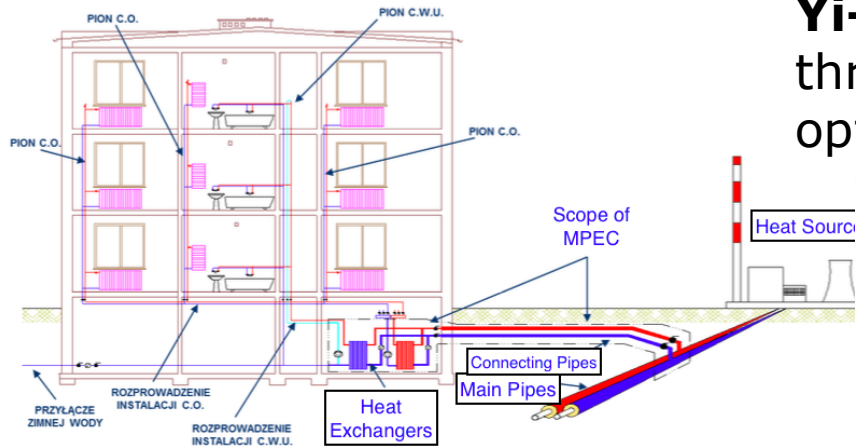
Patrick NSAKANYA : TIMES Energy Modelling of South African Electricity Supply Sector



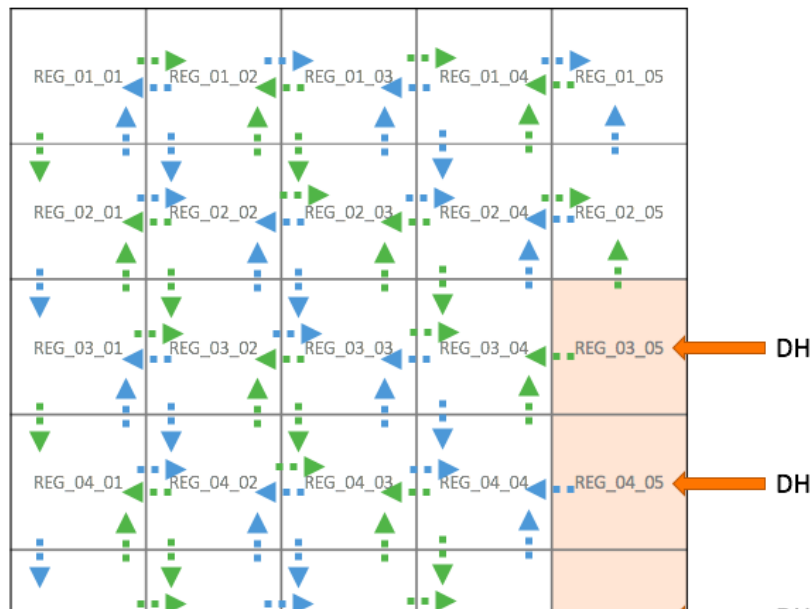
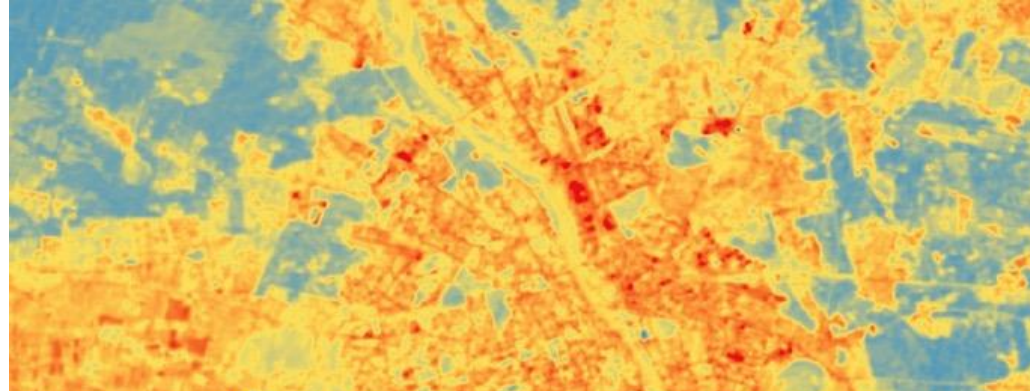
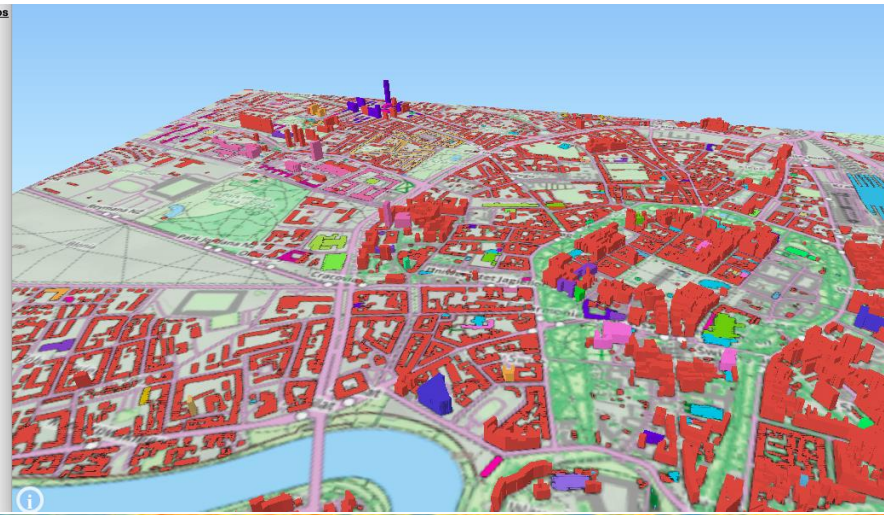
Mariana JIMENEZ: Potential Impacts of the Implementation of Warm Comfort Improvement Measures in the Rural Region of Huancavelica, Peru: A Case Study



Yi-kuang Chen: Local heat system planning through a GIS-based techno-economic optimization model



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- ☒ ?
- ☒ 36-36A
- ☒ alpine_hut
- ☒ apartment_block
- ☒ apartments
- ☒ apteka
- ☒ arts_centre
- ☒ bank
- ☒ banqueting_hall
- ☒ barn
- ☒ basilica
- ☒ bell_tower
- ☒ bell_tower
- ☒ bridge
- ☒ bunker
- ☒ cabin
- ☒ car_shop
- ☒ car_wash
- ☒ castle
- ☒ cathedral
- ☒ cerkiew
- ☒ chapel
- ☒ chimney
- ☒ church
- ☒ civic
- ☒ cloister
- ☒ collapsed
- ☒ commercial
- ☒ construction



Accommodation

- There are 17 Students' Dormitories offering accommodation for nearly 8,000 people.
- The STANDARD accommodation offered comprises 1-, 2- or 3-bed rooms. There is one bathroom shared by four rooms (2 double rooms + 2 triple rooms) and a kitchen on each floor. Each room has a telephone and a free Internet access.
- The Campus is guarded 24 hours a day.
- **Price: 100€/month**
- The Campus is located at the university grounds, close to the city center.



Other students activities

On the grounds of the Campus there are: students' clubs, football pitches, billiards club, tennis courts, supermarket, fitness club, post office, bank and kindergarten.

In addition, there is lots of students organizations at AGH-UST, e.g.

- „Krab” Academic Diving Club
- „Bystrze” Academic Canoe Touring Club
- „KYC” AGH UST Krakow Yacht Club
- AGH Academic Ski Club
- AGH Academic Sport Union
- “Sokół” Gymnastics Society, AGH UST Group
- Men’s Volleyball Section of AGH UST Academic Sports Union
- AGH UST Student Dance Club, etc.



Kraków leading scientific, cultural and artistic centres of Poland

Old city has rich architecture, mostly Renaissance with some examples of Baroque and Gothic.

Kraków hosts many annual artistic events, including some of international significance, such as the festival of Short Feature Films, Biennial of Graphics, and the Jewish Culture Festival.

Kraków is a „students city”:

The population of Kraków is 760 thousands

from which students are 210 thousands

Students have own Holiday called „Juvenalia” - the biggest students’ party.



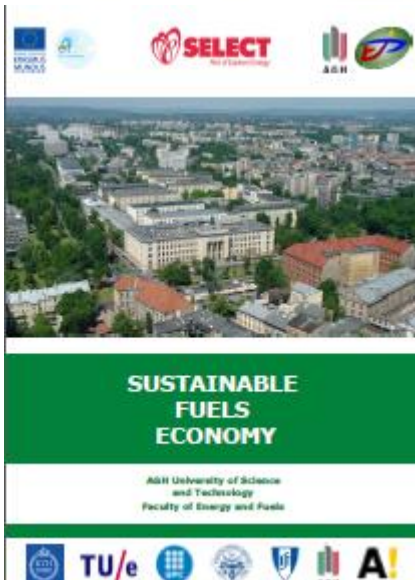
DEAN's SKI CUP



Autor: Zbigniew Sulima



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<http://www.youtube.com/watch?v=wTmJ5F9Ek7c&feature=youtu.be>

Syllabuses:

http://syllabuskrk.agh.edu.pl/2013-2014/en/magnesite/study_plans/stacjonarne-technologie-chemiczna-sustainable-fuels-economy