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New graphic layout of IETU News and IETU website

Starting from this issue IETU News will have a new graphic layout. The new layout corresponds with the new logo, visual identity and the new website of the Institute which was launched in January 2017.

The new website is not only a completely altered graphic design but - first of all - an improved and modernised structure which makes the access to information about IETU, our offer and possibilities of cooperation faster and easier. The new site has been designed using RWD (Responsive Web Design) technology, so it can also be viewed on mobile devices such as smartphones or

tablets. Our intention was to make the new site readable and modern to ensure you quick access to the most important information. We do hope that it will not only be a valuable source of information but also a convenient tool for contacting us.

Since June 2017 IETU has also been adding posts on a mutual profile of the institutes acting under the Ministry of the Environment entitled NATURALNIE NAUKA: <https://www.facebook.com/InstytutMS> and https://twitter.com/Instytut_MS.

You are welcome to visit us!

Ed.

IETU is working on Urban Adaptation Plans to Climate Change for eight Silesian cities



Since January 2017 works have been carried out under the project of the Ministry of the Environment entitled: **Development of plans for adaptation to climate change in cities with more than 100 thousand inhabitants.**

The Ministry entrusted the implementation of this innovative project to a consortium consisting of leading environmental institutions: Institute of Environmental Protection - National Research Institute (consortium leader), Institute of Meteorology and Water Management - National Research Institute, Institute for Ecology of Industrial Areas and the consulting and engineering company - Arcadis.



Workshop No. 1 MPA — Ruda Śląska,
23 May 2017



Workshop No. 2 MPA — Chorzów,
7 September 2017



Workshop No. 2 MPA — Katowice,
18 September 2017

The partners of the project are 44 Polish cities.

The project is co-financed by the European Union from the Cohesion Fund under the Operational Programme Infrastructure and Environment as well as from the state budget, and for the development of 44 urban adaptation plans the implementors have two years.

The cities investigated under this project are inhabited by 30% of the Polish population and generate about 50% of GDP. In each of the cities its vulnerability to climate change will be analysed and for the identified risks proper adaptation measures will be planned. Development of urban adaptation plans is accompanied by information and educational ac-

tivities carried out under the slogan "Let's feel the climate". Their aim is to raise the public awareness of the necessity of adaptation to the effects of climate change.








Before an urban adaptation plan is developed, it is important to assess how the climate affects the city and its people, what consequences we can expect, what actions should be taken to remedy the situation and when, how much it will cost and who will be responsible for implementation of such actions. The size of the protected areas of high nature values, or urban forests and green areas are one of the factors which determine the sensitivity of the city and have an influence on its adaptation policy. It is

important that urban activities and projects carried out in parallel, such as those associated with the revitalisation programme, for example, should also strengthen the aspects of raising the urban resilience to climate change, says Dr. Justyna Gorgoń, coordinator of IETU experts.

Currently, IETU experts are developing Urban Adaptation Plans (MPAs) for eight Silesian cities: Bytom, Chorzów, Dąbrowa Górnicza, Katowice, Mysłowice, Ruda Śląska, Siemianowice Śląskie and Sosnowiec. In June the first series of workshops was completed. Together with representatives of municipalities the organisers discussed the results of the analyses of the cities' vulnerability to climatic factors and went on to assess their adaptation potential.

The experts analysed historical meteorological data from the last 35 years (1981-2015), collected from the synoptic station Katowice - Muchowiec, climate station of the Silesian Planetarium and Świerklaniec, and other sources. *On this basis they identified the most important climate factors for the city, which are high temperatures, heat and cold waves, torrential rains, extreme snowfalls, strong winds and storms. In the Upper Silesian agglomeration, a significant increase in the number of hot and scorching days and the occurrence of prolonged periods without precipitation with a temperature above 25°C can be expected. This will exacerbate the inconvenience of the urban heat island, i.e. maintain high air temperatures in areas with intensive development and high concentration of population. These*

A few facts

-  In 2015, according to Eurobarometer, 86% of Poles considered climate change a serious problem and almost **56% thought it was very serious.**
-  **A little over one third of Poles (37%) believe that measures aimed at reducing adverse effects of climate change should be taken by ourselves,** because a lot depends on our individual behaviour.
-  In the years 2010-2011, **losses resulting from extreme climatic events,** especially local floods and inundations, amounted to **56 billion PLN.**
-  The lack of adaptation measures in cities can lead to very costly consequences, jeopardising the safety and well-being of the population. **If no adaptation measures are taken in 2021-2030, the estimated losses may amount to 120 billion PLN.**
-  **Over 300 thousand people live in areas of immediate flood risk.**
-  **The population of Polish cities is getting old, the number of people over 65 is going up, which means the increase in the number of people particularly sensitive to extreme climatic conditions and air pollution.** The changing meteorological conditions adversely affect the air quality and increase nuisance caused by exceeding the permissible air pollution standards.
-  **Mortality rate caused by cardiovascular diseases** connected with the occurrence of heat waves **goes up by 18%.**

climatic factors pose additional nuisance such as local flooding and inundation, floods in cities, urban heat islands and smog, explains Dr. Janina Fudała from IETU.

According to the sensitivity assessment prepared by IETU experts for the eight cities mentioned above, **the most sensitive sectors are: water management, public health, transport, areas of high density development, spatial planning and energy.**

The next element in the development of MPAs is **the assessment of adaptation potential, i.e. the ability of the city to adapt to climate change**, which includes both dealing with the negative effects of these changes and taking advantage of the opportunities that these changes cause or may cause in the future.

In the assessment of the city's potential the following eight elements are taken into account: financial capacity, municipal services, warning and information mechanisms on environmental hazards, health care infrastructure, nature conservation and protection of blue-green infrastructure, social capital, i.e. public awareness and involvement of local groups, cooperation with local governments and innovativeness. Experience in cooperation with the neighbouring municipalities, as well as strengthening the role of innovation in adaptation potential may constitute a metropolitan distinction of the MPAs in the case of cities already functioning in the Upper Silesian Metropolitan Union and being the material of the newly established metropolis, explains Dr. Justyna Gorgoń.

Urban adaptation plans for the next eight cities in the Silesian province, i.e. Bielsko-Biała, Czeladź, Częstochowa, Gliwice, Jaworzno, Rybnik, Tychy and Zabrze are being developed in cooperation with experts from consulting and engineering company ARCADIS.

With the slogan **"Let's Feel the Climate"** the Ministry of the Environment encourages the public to take part in the process of adaptation to climate change. This will be supported by information and educational materials available on the project website: www.44mpa.pl. Information on the project can also be found in social media: www.facebook.com/44mpaPL and <https://twitter.com/44mpaPL>.

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DemoCLOCK project – lowering the costs of CO₂ emission reduction



Pilot installation in Güssing (Austria)

Production of energy from fossil fuels is currently one of the most significant sources of CO₂. Economic forecasts show that the importance of electricity will increase, but coal and other fossil fuels will still remain the main raw materials for energy production. For this rea-

son, research on the use of CO₂ capture technology in the new and existing power plants is gaining more and more importance.

In May 2017 the project **DemoCLOCK (Demonstration of a Cost Effec-**

tive Medium Size Chemical Looping Combustion through Packed Beds Using Solid Hydrocarbons as Fuel for Power Production with CO₂ Capture) implemented under EU FP7 - COOPERATION (ENERGY) was completed.

The aim of the DemoCLOCK project was to demonstrate a cost-effective, modified Chemical Looping Combustion (CLC) technology for CO₂ emission reduction. The final stage of the project included conducting tests on the specially constructed pilot installation in Güssing (Austria). The carried out tests showed the importance of the cycle switching concept to achieve combustion without the contact of the air and fuel in one reactor. The results of these tests confirmed the need to continue research on a medium scale reactor and technical and economic evaluations, the results of which will provide the basis for further develop-



Pilot installation in Güssing (Austria)

ment of the solid fuel gasification and combustion in the chemical loop using packed beds for commercial purposes.

The key effects of applying the IGCC + CLC technology are as follows:

- avoiding emissions to the atmosphere of about 2 million Mg CO₂ per year (power plants of about 300 MW),
- flue gases emitted to the atmosphere (leaving the gas turbine) do not contain SO₂ and NO_x (the result of the CLC process),

- the only pollutant that is emitted from the CLC system into the air is carbon monoxide, the concentration of which in the vicinity of the installation is at the level of 1µg / m³, i.e. 10 times lower than in the case of traditional installation; furthermore, modelling of the pollutant dispersion shows that the range of impact is 50 % lower in the case of CLC,
- water consumption in the case of gasification of solid fuels and combustion in the chemical loop using a

packed bed is higher due to the additional reactor cooling system, whereas the designed cooling water return system will cause a threefold reduction of the process water discharge to the receiver,

- the amount of the generated waste is comparable to the traditional technology, and the main waste streams are generated in the process of synthesis gas production and purification (ashes, slags, sulphur compounds). If waste handling standards are maintained, they will not pose any threat to the environment,
- the lack of data concerning propagation of noise to the environment during the operation of the demonstration plant unables performing a noise nuisance assessment of the new technology.

IETU's task was to develop an environmental impact and waste management assessment for the new technology, along with safety assessment and life cycle analysis of materials and installation.

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10th Scientific Conference: AIR PROTECTION IN THEORY AND PRACTICE

Zakopane, 18-21 October 2017

For more information visit the website: www.ipis.pan.pl

Thematic scope of the conference: air protection and climate changes, emission of PM and gaseous pollutants, spreading of pollutants and their changes in the air, air pollution reduction methods, alternative energy sources and clean technologies, current issues connected with environmental management and air pollution.

The conference will also be attended by representatives of IETU, who will deliver the following presentations:

- Application of satellite imagery analysis for assessment of substrate temperature variability in urbanised areas - Janina Fudala, Àdàm Nàduvvari, Joachim Bronder
- Air pollution forecasting system for the Śląskie Voivodeship based on the ALPUFF model - Jacek Długosz, Janina Fudala, Piotr Cofałka, Ewa Strzelecka-Jastrząb
- Minamata convention on mercury. Reporting obligations of the parties of the Convention and the existing domestic data sources - Ewa Strzelecka-Jastrząb

Organisers: Institute of Environmental Engineering of the Polish Academy of Sciences in Zabrze, in cooperation with the International Thematic Scientific Network for Problems of Air Pollution and Climate Change - AIRCLIM-NET



AIRCLIM-NET

Antibiotics are a diverse group of compounds for which there are no specific regulations regarding their occurrence in the natural environment. As biologically active substances they pose a serious threat to living organisms and their accumulation in the environment leads to irreversible changes in ecosystems and the spread of bacterial multi-resistance phenomenon.

Effluents from municipal wastewater treatment plants are considered to be the major anthropogenic source of antibiotics and drug-resistant bacteria released to the environment (in literature referred to as the "hot spot"). Biological wastewater treatment processes are an ideal environment for the development and spread of resistance because bacteria that are present in large quantities are continuously exposed to high concentrations of antibiotics.

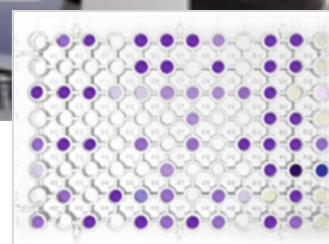
Due to the increasing risk connected with the occurrence of multidrug-resistant bacterial strains, which impede or even prevent effective treatment, antibiotic resistance has been identified



Bioreactor in which biodegradation on a semi-technical scale was carried out and process parameters were monitored



BIOLOG® system for identification of bacterial multiple resistance and MIC (Minimum Inhibitory Concentration) determination for several tens of antibiotics from different chemical groups



as a serious problem, not only medical but also environmental. In recent years, the presence of antibiotics and antibiotic resistant bacteria has been found in almost all environments and they have been classified as environmental „pollutants“.

Under the implemented **OPTITREAT project (Optimisation of small wastewater treatment facilities)** IETU conducted studies on the occurrence of antibiotics and antibiotic resistance of bacteria. The IETU Environmental Microbiology Department isolated bacteria strains in effluents from domestic wastewater treatment plants and tested their resistance to antibiotics. Apart from conventional research, a new PM11-PM14 phenotype microarray technology and the BIOLOG® Omnilog software were used. Microarrays enable to determine the susceptibility of bacterial strains to several dozen of antibiotics in 4 concentrations, including antibiotics coming from different chemical groups.

Another research task was the search for microorganisms showing antibiotic biodegradability properties. For this pur-

pose bioreactors enabling full control of the process on a semi-technical basis were used. A bacterial-fungal inoculum capable of decomposing antibiotics from the fluoroquinolone group, i.e. ofloxacin and norfloxacin, were developed.

The obtained research results were presented at the 9th Conference on Interdisciplinary Problems in Environmental Protection and Engineering – Eko-Dok 2017 and at the 16th International Multidisciplinary Scientific GeoConference SGEM 2016. They were also published in [Acta Biochimica Polonica vol. 62 no. 4](#), [PlosOne vol. 11 no. 1](#) and [Folia Microbiologica vol. 62 \(2017\)](#).

For more information you can visit the website: optitreat.ivl.se

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