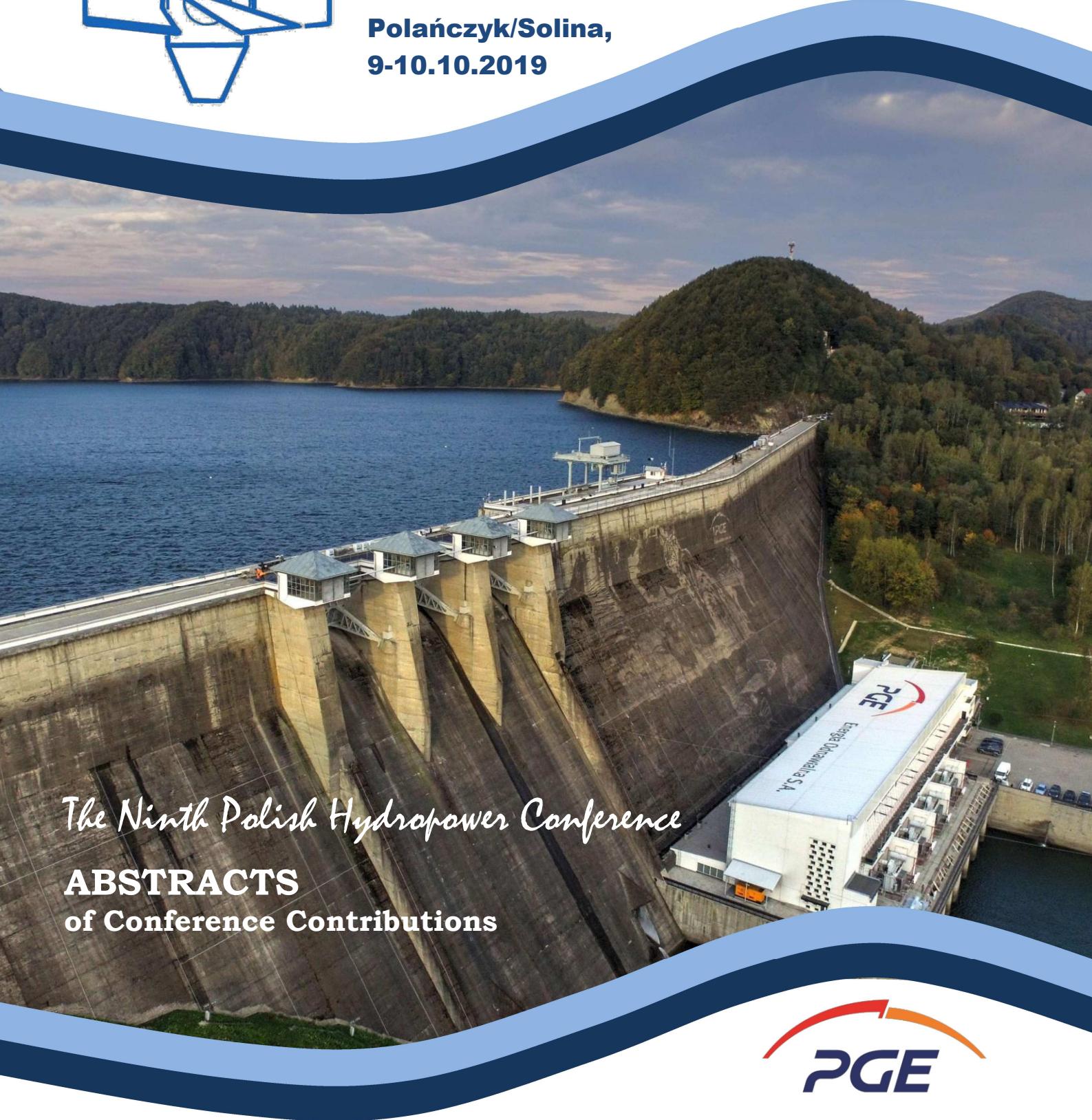




IX Polska Konferencja Hydroenergetyczna
STRESZCZENIA
wystąpień konferencyjnych
Polańczyk/Solina,
9-10.10.2019



The Ninth Polish Hydropower Conference

ABSTRACTS
of Conference Contributions



Energia Odnawialna S.A.

Towarzystwo Elektrowni Wodnych



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Spis treści

Przedmowa	1
Program konferencji	5
Streszczenia wystąpień konferencyjnych	
Sesja I: Stan, trendy i perspektywy rozwojowe energetyki wodnej w kraju i regionie	
1.1. J. Steller, E.Malicka: <i>Polska i Europa Wschodnia w Światowym Raporcie Rozwoju MEW</i> ..	11
1.3. M. Lewicki, J. Landau, W. Krajnik: <i>Perspektywy rozwoju energetyki wodnej Ukrainy w kontekście strategii rozwoju systemów energetycznych Ukrainy i Unii Europejskiej (EN)</i>	21
1.4. E. Kasiulis, L. Šilinis: <i>Usuwanie zapór w Krajach Bałtyckich: mission (im)possible? (EN)</i>	22
1.5. E. Malicka: <i>Jakie zmiany przyniósł małym elektrowniom wodnym rok 2019, a jakie przyniesie przyszły ..</i>	24
1.6. B.K. Puchowski: <i>20+ : co z elektrowniami wodnymi po zakończeniu okresu wsparcia? Studium przypadku – część pierwsza</i>	26
Sesja II: Mała energetyka wodna i odzysk energii w przemysłowych i komunalnych instalacjach hydraulicznych	
2.2. J. Steller, J.Tomalik: <i>Odzysk energii w hydraulicznych instalacjach przemysłowych i komunalnych</i>	27
2.3. A. Radzevičius, P. Punys, R.M. López Fernández, V.I. Serna González , J. Steller, J. Jagielska: <i>Internetowy atlas mikroinstalacji hydroenergetycznych w miejskich sieciach wodnych (EN)</i> .	29
Sesja III: Ochrona środowiska i gospodarowanie obiektami hydrotechnicznymi	
3.1 L. Jurevičius, L. Šilinis, P. Punys: <i>Optymalna eksploatacja dużego zbiornika hydroenergetycznego na przykładzie EW Kowno (EN)</i>	31
3.4 B.K. Puchowski: <i>Przepławki dla ryb. Inny punkt widzenia - w poszukiwaniu kompromisu</i>	34
3.5 Ł. Kalina: <i>Aktywna przepławka dla ryb – case study w warunkach polskich</i>	35
3.6 M. Puzdrowska, T.Heese: <i>Problem projektowania efektywnych przepławek dla ryb w świetle najnowszych badań turbulencji przepływu strumienia wody</i>	36
Sesja V: Bezpieczeństwo urządzeń i infrastruktury hydrotechnicznej	
5.1 L. Opyrchał, A.Bąk: <i>Funkcja niezawodności i średni czas życia zapór</i>	39
5.2 L. Kwapisz, A. Adamkowski, M. Lewandowski: <i>Stan naprężeń w stalowych rurociągach hydroenergetycznych – wybrane zagadnienia ..</i>	41
5.3 M. Lewandowski, A.Adamkowski, S.Lewandowski: <i>Skutki i rozpoznane przyczyny niekontrolowanego zjawiska uderzenia hydraulicznego w układach przepływowych elektrowni wodnych</i>	44

Web-based Atlas of Micro-hydro Inventory in Urban Water Networks

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The use of hydropower associated with impoundment of natural rivers is a well-established and matured technology, the hydropower resources are well assessed and this kind of power generation is widespread worldwide. It is the conventional or pure hydropower that exploits the potential energy of stream flows and is considered as a renewable energy source. In a similar way can be assessed the potential energy present in flow of urban water networks, be it water supply, sewage collection and treatment or excess pressure from industrial installations. In contrast to the former, there might be raised the question of the renewable energy status.

Urban water management is clearly known to be very energy intensive. Therefore, the harnessing of the potential energy residing in gravity fed networks or excessive pressure installations (e. g., pressure reducing valves -PRV or break pressure tanks - BPT) is of great importance. One of the first aims is to evaluate the resources of this "sleeping" potential. This assessment does not require any sophisticated method, in the past they were considered in a number of studies [1-4]. Commonly it is known, that conventional hydroturbine technologies are not always competitive on the market and to offset this drawback low cost generators - pump as turbine (PaT) are suggested [5-7].

This paper presents the partial results of the ongoing EU LIFE NEXUS project performed by the consortium consisting of Spain, Poland and Lithuania [8]. The project aims to explore the potential for micro-hydropower energy recovery along urban water cycle in selected European cities. The one outcome of this action has been the creation of a Geo-database and geographical representation with new potential energy recovery locations and existing hydropower installations operating in selected European countries [9]. The information contained in this database is georeferenced, mapped in layers according to their location and is accessible through a web platform (Fig.1).

This mapping would be important because it is publicly available enabling any party to see where the sites

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with potential lie and therefore make it easier for them to identify and launch a project development.



Fig.1. Visualisation of micro-hydro potential locations in urban water networks

- **Lithuania**

Due to the country's topographic conditions – a purely lowland country, only sewage (wastewater) networks with free gravitational flow can be attractive for the harvesting water energy. Drinking water distribution systems are artificially pressurised and cannot be used for energy recovery. The urban water networks of the two largest country's cities - the capital Vilnius and Kaunas were studied in depth along with a dozen smaller towns. So far, some 17 potential sites with their main characteristics were identified upstream or downstream waste water treatment plants (WWTP). All of the power capacities are below 100 kW (2 of them below 10 kW). No existing hydropower plants operating in water and waste water infrastructure identified so far in the country.

- **Poland**

20 potential sites were identified; most of them could be located in the sewage networks and WWTPs with free gravitational flows. Most of the power capacities are below 100 kW (4 of them bellow 5 kW). However, there are 2 potential sites very promising with 201 and 525 kW located in WWTPs (upstream or downstream) and a storage reservoir respectively. Regarding the existing facilities, 4 hydraulic energy recovery installations are currently under operation in the urban water network in Poland.

• Spain.

4 potential sites have been identified in Spain and all of them are located at the entrance of the water distribution networks. Three of sites are PRV devices, while the other is a BPT. Approximate power capacities are in the interval 36 – 74 kW.

A number of 9 hydraulic energy recovery installations are operating in the country, including the LIFE NEXUS demonstration site in Leon, involving a PaT machine. 8 of the facilities are micro-hydropower installations (power capacity in the range of 11-84 kW), with 7 PaT machines and 1 cross flow turbine. Regarding the location in the urban water cycle, most of them are at the entrance to the drinking water distribution network, entrance pipeline to the drinking water treatment plant (DWTP) and in the outlet pipeline of the DWTP. Finally, there is the energy recovery device (Pelton turbine) in a desalination plant with a power capacity of 514 kW.

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