POLITECNICO DI MILANO

PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 38th cycle

Research Area n. 3 - Environmental and Hydraulic Engineering and Geomatics

PNRR_352 Research Field: DIGITIZATION OF WATER DISTRIBUTION NETWORKS, REDUCTION AND MONITORING OF WATER LEAKAGES FOR THE APPLICATION OF THE PNRR (NATIONAL PLAN FOR RECOVERY AND RESILIENCE) M2C4 - I 4.2

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Develop and apply strategies for optimisation and efficiency of water distribution network. In particular it will deal with the development of the NRW reduction Plan, that includes activities to reduce both real and apparent losses, estimating the impact of each activity on the reduction of losses on time. Some of the activities included in the plan are: - Pressure management: creation of PMZ and DMA and optimisation of pumps operations - Active control of losses - Replacement of customers' water meters: in order to minimise under-registration, development of a massive replacement plan considering the installation of static smart meters - Public fountains: monitoring plan, planning of the installation of water meters on all public fountains in the coming years - Refurbishment of the network and connections: consider selective substitution based on the status of activities and

	the risk of failure, as well as the application of no excavation techniques.
Methods and techniques that will be developed and used to carry out the research	Development of IT and best practice methods promoting rationale use of water resources and enhancing efficiency of water distribution networks (energy saving, water loss reduction, improved level of service etc.) in line with Research Priority 4.a of the PNRR. Including: • Application of IWA methodology to assess the baseline for each component of NRW and Calculation of best practice KPIs benchmark of the water systems; • Benchmark of water systems using best practice KPIs (ILI, burst frequency on mains and on conns, PMI, under registration of meters, etc.) and definition of priorities for intervention; • Identification of the most appropriate mix of leakage reduction activities for each water system and estimation of contribution to achievement of NRW target; • Planning the application of the NRW reduction strategy in selected critical water systems to achieve the target defined by the Water Regulator and insertion in the utility 5 Years Investment plan; • Continuous monitoring and analysis of the results achieved during the implementation of selected NRW reduction strategy and eventually adjust assumptions to improve reliability of the NRW model to better represent specific economic and technical boundary conditions; • Review of the NRW program to account for differences between achieved and expected results and to eventually adjust planning to improve benefits for underperforming activities.
Educational objectives	Learn about best practices and innovative technologies. Gain experience in all aspects related to efficiency of water distribution networks. Prepare highly qualified professionals to efficiently tackle engineering scenarios

	linked to water network management, leakage control and climate changes. Close collaboration between PoliMI and the industrial partner yields a unique opportunity for the PhD to be trained in diverse aspects contributing to shape their future careers, including economic-management and goals oriented to sustainable use of water and energy resources.
Job opportunities	Expert in non revenue water management, asset management and digitalization of water networks.
Composition of the research group	1 Full Professors 1 Associated Professors 2 Assistant Professors 4 PhD Students
Name of the research directors	Stefano Malavasi

Contacts
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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
Company where the candidate will attend the stage (name and brief description)	ISLE Srl, Via Branze 45, 25123 Brescia (BS) - www.isleutilities.com
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Isle Utilities, 61 Downs Wood, Epsom Downs, Surrey, KT18 5UJ (UK) - www.isleutilities.com
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research:

- UKWIR (United Kingdom Water Research Ltd) - the candidate could help deliver some of the UKWIR projects that Isle is likely to win,
- Isle Utilities Ltd (UK),
- Isle Utilities BV (NL),
- Asociación de Investigación Metalúrgica del Noroeste (AIMEN) (ESP) - they are a partner on a few European Commission funded projects,
- Bristol Water (UK) - they take part in the Leakage Benchmarking process managed by Isle,
- University of Sheffield (UK).

Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): approximately 1902,38 euros per PhD candidate per year, on average.

Teaching assistantship (availability of funding in recognition of support to teaching activities by the PhD student): there are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability and desk availability: individual assignment for the entire career.