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CLEAN FLOW WB6

From Wastewater Practice to Policy

REGIONAL FINDINGS AND ADVOCACY PAPER ON

Human Capital

REGIONAL FINDINGS AND ADVOCACY PAPER
HUMAN CAPITAL FOR SUSTAINABLE WASTEWATER SERVICES

Topic	Human Capital
Prepared by	Lejla Alagić, Regional Coordinator, CLEAN FLOW WB6
Based on contributions from	Six Communities of Practice (CoPs) and associations of water and wastewater utilities across the Western Balkans Six (WB6): SHUKALB, UPKP, AWRS, SHUKOS, ADKOM, AWM, UTVSI.
Date	11 November 2026
Status	Regional findings and advocacy paper – prepared for CLEAN FLOW WB6 stakeholder dialogue, 17–18 November 2026.

EXECUTIVE SUMMARY

Regional headline finding: Wastewater infrastructure is advancing faster than the systems needed to recruit, prepare, retain and replace the people who operate it. Across the six contributions from WB6, the recurring risk is not simply staff numbers, but whether critical competences are available on every shift and sustained over the life of the asset.

The evidence is uneven and cannot support regional ranking or a single staffing ratio. It is, however, sufficient to justify **three proposed priorities**:

- Make a costed workforce-readiness plan a requirement for every new or upgraded Wastewater Treatment Plant (WWTP), covering staffing, shifts, recruitment, training, mentoring, handover and post-commissioning support.
- Build practical competence and knowledge continuity through role profiles, documented onboarding, supervised practice, mentors, trained backups and succession planning before deciding on wider certification or licensing.
- Address recruitment and retention barriers with verified evidence and action by the institution able to change the relevant constraint, including skills supply, pay and conditions, recruitment procedures, career routes or shared specialist support.

FOUR MESSAGES FOR CLEAN FLOW

“Money can build infrastructure. Skilled people keep it working.”

#1	Every new or upgraded wastewater plant needs a plan for the people who will operate it, and the money to put that plan into practice.
#2	Protect every critical function and task with competent staff and a qualified internal, shared or external backup.
#3	Match recruitment and retention responses to verified local barriers, including pay, working conditions and career prospects.
#4	Use a small comparable WB6 evidence base to guide pilots, financing and policy dialogue.

The participants at the CLEAN FLOW event are invited to discuss the practitioner-endorsed priorities, identify what their institutions can contribute, and agree on practical next steps.

PURPOSE OF THIS PAPER

This paper brings together evidence and practitioner experience from the six Communities of Practice (CoPs) of wastewater operators from the Western Balkans Six (WB6). It identifies common implementation challenges, important domestic-level differences and priority issues requiring

policy, institutional, financing or operational action. It is intended to support regional advocacy and policy dialogue through CLEAN FLOW WB6.

The paper does not seek to harmonise domestic-level systems, rank the WB6 or imply that the same solution is appropriate in each of them. Domestic-level examples illustrate operational reality and are qualified where evidence is partial or not directly comparable.

This paper synthesizes contributions from the six domestic-level Communities of Practice (CoPs) and their partner associations. Its findings and proposed advocacy priorities reflect the evidence and perspectives provided by participating wastewater practitioners and CoP representatives. They are presented as a basis for broader discussion with competent institutions, financing partners and other stakeholders at CLEAN FLOW WB6, where participants will be invited to consider the findings, discuss the proposed priorities and identify possible areas for follow-up.

WHY THIS TOPIC MATTERS

WWTPs deliver environmental, public-health and economic results only when operators, laboratory staff, process technologists, maintenance teams and managers can run complex biological processes, automation and Supervisory Control and Data Acquisition (SCADA), sludge and chemical systems and safety-critical equipment every day. The six contributions describe vacancies in critical staff positions, reliance on a few experienced employees, uneven onboarding and delayed repairs when specialist support must be procured externally.

The consequences include weaker compliance, longer downtime, higher operating costs, safety risks and shorter asset life. Plants and utilities cannot solve the problem alone because recruitment rules, tariff allowances, vocational curricula, occupational standards and investment conditions are determined by several institutions. Workforce readiness is therefore an implementation condition for wastewater investment and European Union (EU) alignment, rather than a separate human capital initiative.

For the Green Agenda for the Western Balkans (GAWB), human capital is an enabling condition for water-sector alignment, monitoring and wastewater infrastructure. Regional Cooperation Council (RCC) can provide a route for dialogue and visibility of validated evidence, while implementation remains with the competent domestic-level and local institutions, utilities and financing partners.

EU integration and implementation of the environmental acquis, including the recast Urban Wastewater Treatment (UWWT) Directive (EU 2024/3019), require more than constructing treatment facilities. Competent operators, laboratory personnel, maintenance specialists and managers are essential for reliable treatment, monitoring, reporting, energy performance and the safe handling of sludge. Workforce readiness should therefore be planned, financed and verified alongside each major wastewater investment, before commissioning and throughout operation.

The Revised Action Plan for the Green Agenda for the Western Balkans (2025–2030), particularly its depollution and water-related objectives, provides a relevant policy framework for this work. While the Action Plan does not establish a single WB6 staffing model, the CoPs can add regional value by sharing competence profiles, practical training approaches and evidence on staffing risks. This can help domestic-level institutions and investment partners turn EU-alignment commitments into operational capacity, while respecting different domestic-level employment and qualification systems.

The WB6 Climate Adaptation Strategy recognises the importance of wastewater management for water security, environmental protection and climate resilience. It calls for climate-proofing wastewater collection and treatment infrastructure in line with the UWWT Directive, as well as strengthened capacities and training in sustainable wastewater management. This also requires

operators with the competence to manage rainfall-related hydraulic overloads, drought-related receiving-water risks and other climate-related operational conditions.

WHAT THE DOMESTIC-LEVEL EVIDENCE TELLS US

Full contributions were available from all WB6. Coverage ranges from sector estimates and plant examples to questionnaire samples. Findings are treated as regional only where several contributions support them. For Bosnia and Herzegovina, it combines eight utilities from one entity with two plant questionnaires from other entity.

Common findings

Common finding	WB6 where reported	Key evidence / examples
Specialised competences are difficult to secure and sustain.	All WB6, with different levels of evidence	Repeated needs concern process and laboratory work, mechanical and electrical maintenance, automation/ SCADA, sludge and biogas management, safety and supervision.
Onboarding, knowledge transfer and succession are uneven.	Strongly evidenced in Bosnia and Herzegovina, Montenegro, North Macedonia and Serbia; also raised elsewhere	Retirement exposure, few young entrants, informal mentoring and lack of trained backups create continuity risks. Training attendance does not ensure plant-specific competence.
Workforce readiness is weakly connected to investment, recruitment and financing.	Reported across all six contributions in different forms	Staffing, recurrent costs, supervised practice, usable procedures and post-handover support are not consistently designed and financed with the asset. Recruitment and retention barriers vary.

Important domestic-level differences

Issue	Important domestic-level differences / exceptions
Institutional starting point	Albania has already developed a domestic-level training, testing and certification framework, although implementation is lagging behind. Other WB6 are at different stages; certification, qualification, recognition and licensing are not interchangeable.
Sector stage and operating model	Some WB6 participants need to build teams for an expanding plant fleet, while others must retain and renew existing teams; in some cases, both challenges occur. Plants range from small facilities using shared staff to large standalone operations, so one staffing ratio is inappropriate.
Evidence coverage and confidence	Serbia has the broadest questionnaire sample. Bosnia and Herzegovina now combines ten utilities broadening coverage across two entities while remaining partial. Montenegro has three detailed plants; Albania relies mainly on sector estimates; North Macedonia has updated plant data; pay evidence is not comparable across WB6.

WHAT IS THE IMPLEMENTATION BOTTLENECK?

What practitioners experience	What appears to be causing it	Level where action is needed
Critical staff positions are vacant, shared or insufficiently covered on shifts.	Scarce profiles, non-competitive conditions, slow approvals, weak forecasting or insufficient scale for a full-time specialist.	Utility/owner and domestic-level rules; regional peer expertise can support.

Training does not always translate into safe performance of critical tasks.	Short courses, limited supervised practice, weak onboarding and emphasis on attendance rather than demonstrated competence.	Utilities and training providers, including sector associations; domestic-level competence arrangements; regional tools.
Knowledge is lost when experienced employees retire or leave.	Informal mentoring, poorly documented plant knowledge, insufficiently customised and updated standard operating procedures (SOPs), few young entrants and no competent backup.	Utility/owner, supported by domestic-level education and employment policies.
New assets reach commissioning without a durable operating team.	Staffing and recurrent costs are addressed late; handover is not linked to demonstrated capability or follow-up support.	Project owner, utility, ministries, EU/ International Financial Institutions (IFIs), donors and contractors.
Insufficient recognition of WWTP operators as valuable contributors to public health, the community, the economy and the environment.	Practitioners report limited public visibility of WWTP operations and staff. Public communication often focuses on construction and openings, while operational performance, costs and constraints receive less attention. Much of the infrastructure is also underground or remote, which further reduces its visibility.	Utilities/owners, ministries, media and the general public.

Utilities can act on onboarding, mentoring, procedures, trained backups and succession. Staffing structures, recruitment, education, tariffs, occupational standards and any certification or licensing require domestic-level or local decisions. Regional cooperation adds value through shared tools, peer expertise, comparable indicators and investment dialogue, rather than through a uniform staffing model. The sector should also promote the public value of wastewater work and recognise WWTP operators as essential contributors to community health, environmental protection, the economy and trust in public institutions. Utilities and ministries both have a role in this effort.

EVIDENCE FROM THE FIELD

The strongest available evidence shows that the same regional challenge appears through different operational realities. The examples below are not directly comparable, but together they demonstrate shortages, weak continuity arrangements and the need to connect workforce readiness to investment and plant performance.

Key evidence

Indicator / evidence	WB6 / source	What it tells us
Wastewater staff are estimated at 15-20% of utility staff; about half are over 50 and only 5-10% have advanced or specialised wastewater training.	SHUKALB sector estimates, 2026	Ageing and thin specialist capacity are reported despite an existing certification framework; figures remain indicative.
Across ten utilities from two entities, 111 staff are reported; two are under 25, 55 are aged 46 or over, and seven entities expect 15 retirements within five years.	UPKP questionnaires (eight utilities) and AWRS questionnaires from two plants, 2026	Evidence from both entities shows ageing, critical-role gaps and uneven knowledge transfer. One surveyed plant links recruitment difficulty to low pay and conditions.

Four operating plants report about 48 full-time staff; four planned plants indicate a substantially larger future requirement.	SHUKOS contribution, 2026	Workforce capacity must grow with the investment pipeline; project-level forecasts and early recruitment are needed.
Three surveyed WWTPs in Montenegro report 67 staff in total (29, 17 and 21, respectively), with no employees under 25. Training participation is reported, but none of the three plants has a formal onboarding programme. One of the plants reports that 11 of its 21 employees are aged 46 or over and that three retirements are expected.	AWM Montenegro plant examples, 2026	Training exposure does not replace structured onboarding, succession planning and task-based competence checks.
One large WWTP in North Macedonia reports 22 WWTP staff; 21 of the 22 are aged 45 or over and only two are women.	ADKOM plant evidence, 2026	The age profile supports succession planning but does not establish imminent retirement; expected departures and backup coverage should be confirmed.
Questionnaires cover 29 of 44 operating plants; 24 of 27 substantive answers report a qualified-staff constraint or partial/no dedicated staffing; 19 of 21 report unfavourable hiring conditions.	UTVSI analysis of questionnaires, 2026	The broadest sample shows widespread capability and retention constraints, while role definitions and denominators still need harmonisation.

Voice from the Plants

“We have critical vacancies in electrical and mechanical maintenance, laboratory analysis and technical support. With another technician due to retire shortly, replacing these skills is essential to maintain reliable operation, control costs and meet operating standards.” (WWTP Operator from North Macedonia)

“Training provided through individual projects is valuable, but it is not enough for long-term sector development. We need a continuous domestic-level approach, because new plants will continue to be built and will require qualified personnel from the very first day of operation.” (WWTP Operator from Kosovo*)

“Pay is not fully aligned with the level of responsibility, required professional knowledge and difficult working conditions, including daily exposure to wastewater, chemicals and other hazardous materials. Limited opportunities for professional advancement add to the challenge.” (WWTP Operator from Montenegro)

“Electrical and mechanical engineers, electricians and automation specialists show little interest in WWTP work. One of the main reasons is very low pay for the work performed and the working conditions.” (WWTP Operator from entity-level in Bosnia and Herzegovina)

Plant example, Serbia: one surveyed plant reported 22 engaged employees against 34 established posts. Smaller plants also described reliance on shared staff and insufficient night-shift coverage, showing why total headcount must be read together with functions and shifts.

Plant examples, Montenegro: two plants reported that many staff had attended professional training, yet neither plant had a formal internal programme for new operators. The operational gap is therefore not only access to courses, but a repeatable onboarding and competence process.

* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence

Plant example, North Macedonia: 21 of 22 WWTP employees are aged 45 or over. This age profile supports early succession planning but does not itself indicate imminent retirement. The priority is to confirm expected departures and whether critical tasks have trained backups.
Evidence gaps:

- Samples, reference years, plant status, job categories and treatment of shared or outsourced staff are not yet comparable across the WB6.
- Evidence on vacancies, retirement, turnover, salaries and time to fill positions remains incomplete. North Macedonia provides the clearest pay comparison; Montenegro adds pay evidence from two plants; one surveyed plant adds one entity example from Bosnia and Herzegovina; and the other contributions remain mainly qualitative.
- The relationship between workforce inputs and operational results, such as compliance, downtime, safety incidents, energy use or repeat failures is rarely measured systematically.
- Several figures and plant role breakdowns require domestic-level validation before they are used for targets, financing decisions or public comparison.

PRIORITY ADVOCACY FINDINGS AND RECOMMENDATIONS

PRIORITY 1 - Make workforce readiness an investment condition

What we see: New and rehabilitated plants do not consistently have a costed workforce-readiness plan identifying staffing, shifts, recruitment, role-specific learning, handover and recurring operating needs, together with responsible institutions and financing sources.

Why it matters: Assets cannot sustain compliance or value for money if staffing, operating budgets and practical capability are addressed late or incompletely.

What should change: Build workforce readiness into every investment. Investment preparation and implementation should finance workforce planning, practical training, knowledge transfer, commissioning and defined post-handover support. The workforce-readiness plan should also identify who will finance recurring staffing, refresher learning and specialist support after project closure, including the responsible utility, owner, regulator or other domestic-level institution and the applicable tariff, budget or other funding source. Procurement, commissioning and handover should require supervised practice on installed technology, usable procedures, demonstrated competence in critical tasks and defined backup arrangements.

Who needs to act: Utilities and owners for recurring staffing and learning budgets; ministries, regulators and tariff-setting authorities for sustainable domestic-level financing; and the EU, IFIs, bilateral partners, project implementing agencies, contractors and technology providers for investment-stage preparation, training and handover.

Level of action: Both project and domestic-level requirements, reinforced through regional investment dialogue.

PRIORITY 2 - Build practical competence and knowledge continuity

What we see: Onboarding, mentoring, plant procedures, trained backups and succession are uneven. Training attendance alone does not demonstrate competence, and domestic-level systems start from different points.

Why it matters: Absence, retirement or turnover can cause errors, delayed response and loss of knowledge. A premature uniform licensing model could duplicate existing systems or exclude experienced workers.

What should change: Build competence before introducing credentials. Structured onboarding, mentoring, practical assessment and trained backups should precede wider certification or licensing. Critical staff positions and tasks should be defined, prior learning recognised and performance assessed. Albania's experience should inform pilots elsewhere.
Who needs to act: Utilities, associations and practitioners; ministries responsible for water, environment, education and qualifications; regulators, education providers, professional bodies and development partners.
Level of action: At both levels, domestic-level decisions supported by adaptable regional profiles, tools and peer expertise.

PRIORITY 3 - Target recruitment and retention barriers with verified evidence

What we see: A vacancy may reflect lack of local skills, unattractive pay or conditions, slow recruitment, unclear career progression, plant location or the inability of a small utility to employ every specialist. Repeated recruitment failures and staff turnover show that critical vacancies are also linked to whether utilities can offer locally competitive pay, acceptable working conditions and credible career prospects.
Why it matters: Generic prescriptions may miss the responsible actor and fail to solve the vacancy. Inconsistent data also weakens workforce forecasting and the case for policy or financing change. When recruitment campaigns repeatedly attract no suitable candidates, or trained staff leave for better conditions, workloads increase and reliable maintenance becomes harder to sustain.
What should change: Diagnose each critical-role barrier and apply the matching response, such as education and placements, earlier recruitment, review of pay and progression within applicable rules, safer conditions, procedural reform, shared specialists or remote support, supported by a verified minimum dataset. Pay and working conditions should be assessed against relevant domestic-level and local labour-market evidence; the available data do not support a regional salary comparison.
Who needs to act: Utilities and owners; ministries, regulators and public-employment bodies; education providers; associations; RCC, EU/IFIs and development partners within their mandates.
Level of action: Both, mainly domestic-level and local solutions, with regional value from common definitions, peer learning and investment dialogue.

REGIONAL ADDED VALUE

Regional cooperation can add practical value through:

- A small indicator dictionary covering workforce/full-time equivalent (FTE), critical-role and shift coverage, vacancies, expected exits, onboarding, competent backups and selected operational outcomes.
- Adaptable role and task profiles, onboarding checklists, mentoring arrangements and competence-observation tools.
- A regional pool of practitioners, mentors and specialist trainers for scarce competences, combined with peer visits/practical exchanges and twinning programmes for operators.
- Coordinated advocacy for workforce-readiness and post-handover support in investment preparation, procurement, financing and results frameworks.
- A route for validated evidence and pilot learning to reach responsible institutions, RCC, the EU, IFIs and bilateral partners.
- Awareness raising on wastewater careers and their contribution to public health, environmental compliance, economy (in particular tourism) and the Green Agenda.

What should remain domestic-level: staffing and pay, recruitment rules, utility governance, tariff treatment, education arrangements and any certification or licensing. RCC may convene dialogue and connect evidence to relevant GAWB processes, but this paper does not assign it an implementation mandate.

KEY ADVOCACY MESSAGES FOR VALIDATION AND FOLLOW-UP

"Money can build infrastructure. Skilled people keep it working."

#1	Every new or upgraded wastewater plant needs a plan for the people who will operate it, and the money to put that plan into practice.
#2	Protect every critical function and task with competent staff and a qualified internal, shared or external backup.
#3	Match recruitment and retention responses to verified local barriers, including pay, working conditions and career prospects.
#4	Use a small comparable WB6 evidence base to guide pilots, financing and policy dialogue.

PROPOSED FOLLOW-UP THROUGH CLEAN FLOW

At CLEAN FLOW, participants are invited to review and validate the practitioner-endorsed priorities and agree on a focused follow-up package:

- Confirm whether the three priorities adequately reflect the main workforce risks and institutional responsibilities represented at the event;
- Identify at least one current or planned investment/project in which a costed workforce-readiness plan will be tested;
- Select one or more willing plants to test a structured onboarding and backup-coverage package;
- Identify candidate plants/projects and proposed lead institutions;
- Agree on the workforce problem, baseline indicators and expected result to be tested; and
- Agree on a realistic deadline for preparing short pilot concept notes and initiating financing discussions, **with 31 January 2027** suggested as an indicative target, subject to confirmation by the participating institutions.

Questions that still need policy dialogue:

- Which workforce barrier most threatens investments, and what can each represented institution change within 12 months?
- How should validated evidence and pilot learning reach ministries, regulators, owners, RCC/GAWB processes and financing partners?

Possible follow-up:

Domestic-level: CoPs and associations confirm candidate plants/projects, participating utilities and lead institutions.
Pilot leads: Prepare short concepts identifying the problem, activities, responsibilities, baseline, expected results, indicative costs and potential financing sources.
Regional level: Compile pilot concepts, facilitate peer expertise and connect the investment-readiness proposal with RCC, EU/IFI and bilateral-partner dialogue.

ANNEX 1. SOURCES AND CoP CONTRIBUTIONS

Associations:

Albania: Water Supply and Sewerage Association of Albania (SHUKALB).
Bosnia and Herzegovina: Association of Employers of Utility Companies in the Federation of Bosnia and Herzegovina (UPKP), and the Association of Waterworks of Republika Srpska (AWRS).
Kosovo*: Water Supply and Wastewater Works Association of Kosovo* (SHUKOS).
North Macedonia: Association of Communal Service Providers in the North Macedonia (ADKOM).
Montenegro: Association of Waterworks of Montenegro (AWM).
Serbia: Association for Water Technology and Sanitary Engineering (UTVSI).

Sources: 2026 domestic-level CoP contributions from: SHUKALB (Albania), UPKP with eight utilities and two utilities from AWRS (Bosnia and Herzegovina), SHUKOS (Kosovo*), the Association of Waterworks (Montenegro), ADKOM (North Macedonia) and UTVSI (Serbia, including 29 WWTP questionnaires); and the Revised Green Agenda Action Plan for the Western Balkans 2025-2030. Evidence limitations: samples, denominators and reporting years differ; domestic-level validation remains necessary before figures are used for targets, financing decisions or ranking.

Main contributors:

Albania: Fjoralba Çaushi, Manager of WWTP Durrës, Hegla Medja, Manager of WWTP Velipoja, Olta Alla, Training Manager of SHUKALB.
Bosnia and Herzegovina: Lejla Alagić, Manager of WWTP Živinice.
Kosovo*: Dukagjin Nishiqi, Manager of WWTP Peja, Zoge Spahiu, Manager of SHUKOS, Nadire Vitija, Manager for Training and Professional Development in SHUKOS, Erdonita Humolli, Project Manager in SHUKOS.
North Macedonia: Dragan Tuševski, Manager of WWTP Kumanovo.
Montenegro: Duška Čučka, Manager of WWTP Budva.
Serbia: Jasmina Jevremović, Manager of the Sewerage System, WWTP Vršac.

ANNEX 2A. REPORTED CONSTRAINTS AND EVIDENCE GAPS BY WB6

Yes = explicitly reported in the domestic-level contribution; Partly = reported only for part of the sector or qualitatively; "–" = not reported in the available material. "Partly" does not mean that the issue is absent.

Common finding	Bosnia and Herze-govina	Kosovo*	North Macedonia	Montenegro	Serbia	Albania
1. Specialised skill shortages	Yes	Yes	Yes	Yes	Yes	Yes
2. Ad hoc, project-based training	Yes	Yes	Yes	Yes	Partly	Yes
3. Gaps in competence recognition and certification arrangements	Yes	Yes	Yes	Yes	Partly	Partly
4. Retirement and knowledge loss	Yes	Partly	Yes	Yes	Partly	Yes
5. Uncompetitive pay and conditions	Partly	Partly	Yes	Partly	Partly	Partly
6. Workforce planning lags investment	Yes	Yes	Yes	Yes	Yes	Yes
7. Fragmented responsibility	Yes	Yes	Yes	Yes	Partly	Yes
8. Transparent and merit-based recruitment concerns	Yes	Yes	Partly	Partly	Yes	Partly
9. Incomplete, non-comparable HR data	Yes	Yes	Yes	Yes	Yes	Yes

ANNEX 2B. PROPOSED APPROACHES APPEARING IN DOMESTIC-LEVEL CONTRIBUTIONS

"Included" means that the approach is proposed or supported in the domestic-level contribution; "Partly" means that it appears only for part of the sector or as a preliminary proposal. These entries describe possible responses, not reported workforce constraints.

Proposed approach	Bosnia and Herze-govina	Kosovo*	North Macedonia	Montenegro	Serbia	Albania
1. Phased route to recognition/ certification	Included	Included	Included	Partly	Partly	Partly
2. Peer learning / twinning	Included	Included	Included	Included	Included	Partly

Interpretation notes: Albania has already developed a test-based certification framework but reports uneven implementation and weak career links. Montenegro proposes licensing in the longer term. Serbia emphasises minimum profiles and competences before any formal scheme. These differences support a phased, domestic-level adapted approach.

ANNEX 3. EVIDENCE PROFILES FROM WESTERN BALKANS SIX

	Evidence base and selected findings	Distinctive points and limitations
Albania	Sector estimates indicate that wastewater staff are 15-20% of utility staff; about half are over 50; 5-10% have advanced or specialised training. Gaps are strongest in laboratory and electromechanical functions. HR plans, recurring training budgets and succession arrangements are uneven.	Existing certification framework, trainers and training centre provide a different starting point. Estimates lack plant-level denominators; uptake and career links need validation.
Bosnia and Herzegovina	Eight utilities from one entity and two plants from other entity report 111 staff, two under 25, 55 aged 46 or over and 15 expected retirements. One surveyed plant reports critical vacancies and no internal induction; another surveyed plant reports informal induction and low pay as a recruitment barrier.	Coverage spans both entities but remains partial. Findings consistently indicate ageing, low youth entry, critical vacancies and uneven onboarding; pay definitions remain non-comparable.
Kosovo*	Four operating plants report about 48 full-time staff and repeated needs in mechanical, electrical, SCADA, laboratory and process skills. Four planned plants imply substantial additional demand.	Expansion makes early recruitment, handover and workforce forecasting central. Pay and turnover evidence are absent.
Montenegro	Three surveyed WWTPs in Montenegro report 67 staff in total (29, 17 and 21, respectively). One plant reports also five employees from other utility services working on site, 11 staff aged 46 or over, three planned retirements. Average net pay is EUR 856 in one and EUR 905.95 in another WWTP plant. None of the three plants has employees under 25 or a formal onboarding programme. An eight-plant annex records 135 staff by education and experience.	The three plants confirm ageing, limited youth entry and weakly formalised onboarding. One plant links qualified-staff shortages with limited advancement, pay not aligned with responsibility and difficult working conditions. Different staffing definitions limit direct comparison.
North Macedonia	Twenty-eight plants are registered and 21 operational. One large plant reports 22 WWTP staff; 21 are aged 45 or over and two are women. Reported WWTP pay is MKD 26,000–32,000 (approximately EUR 425–520), compared with MKD 45,000–60,000 (approximately EUR 730–980) for similar private-sector profiles.	Tariff treatment, staffing approvals and missing occupational profiles are central. The age profile indicates a need for succession planning, but expected departure dates and backup coverage have not yet been confirmed.
Serbia	Twenty-nine questionnaires and ten manager interviews form the broadest evidence base. Twenty-four of 27 substantive responses report a qualified-staff constraint or partial/no dedicated staffing; 19 of 21 cite unfavourable hiring conditions.	The sample is not a census; shared staff and different denominators limit extrapolation.

ANNEX 4. MINIMUM WB6 INDICATOR DICTIONARY

Indicator	Common definition required	Possible use
Operating workforce	Headcount and FTE by plant/function; identify shared and outsourced staff; include reference date, plant status, capacity, technology and operating hours.	Comparable baseline and workforce planning.
Critical-role coverage	Filled posts, vacancies, shift coverage and competent primary/backup for agreed critical tasks.	Identify operational exposure, not only total headcount.
Age and continuity risk	Age bands, expected exits within 3-5 years, mentor/backup coverage and documented critical procedures.	Target succession and knowledge transfer.
Recruitment and retention	Time to fill, hard-to-fill roles, turnover and a locally valid comparator for pay and conditions.	Match action to the actual barrier.
Learning and competence	Documented onboarding, supervised practice, observed competence, refresher learning and recognition of prior experience.	Measure capability rather than attendance.
Operational link	A small locally selected set such as compliance, downtime, safety incidents, repeat failures or response time.	Test whether workforce interventions improve performance.

ANNEX 5. TERMINOLOGY USED IN THIS PAPER

Competence: demonstrated ability to perform a task safely and to the required standard.

Qualification: formal recognition awarded through an authorised education or qualification system.

Certification: documented confirmation that defined requirements or competencies have been assessed; its legal effect depends on the domestic-level system.

Licensing: legal authorisation to perform a regulated occupation or activity, normally subject to conditions and renewal.

Recognition of prior learning: assessment and formal recognition of competences acquired through work and non-formal learning.