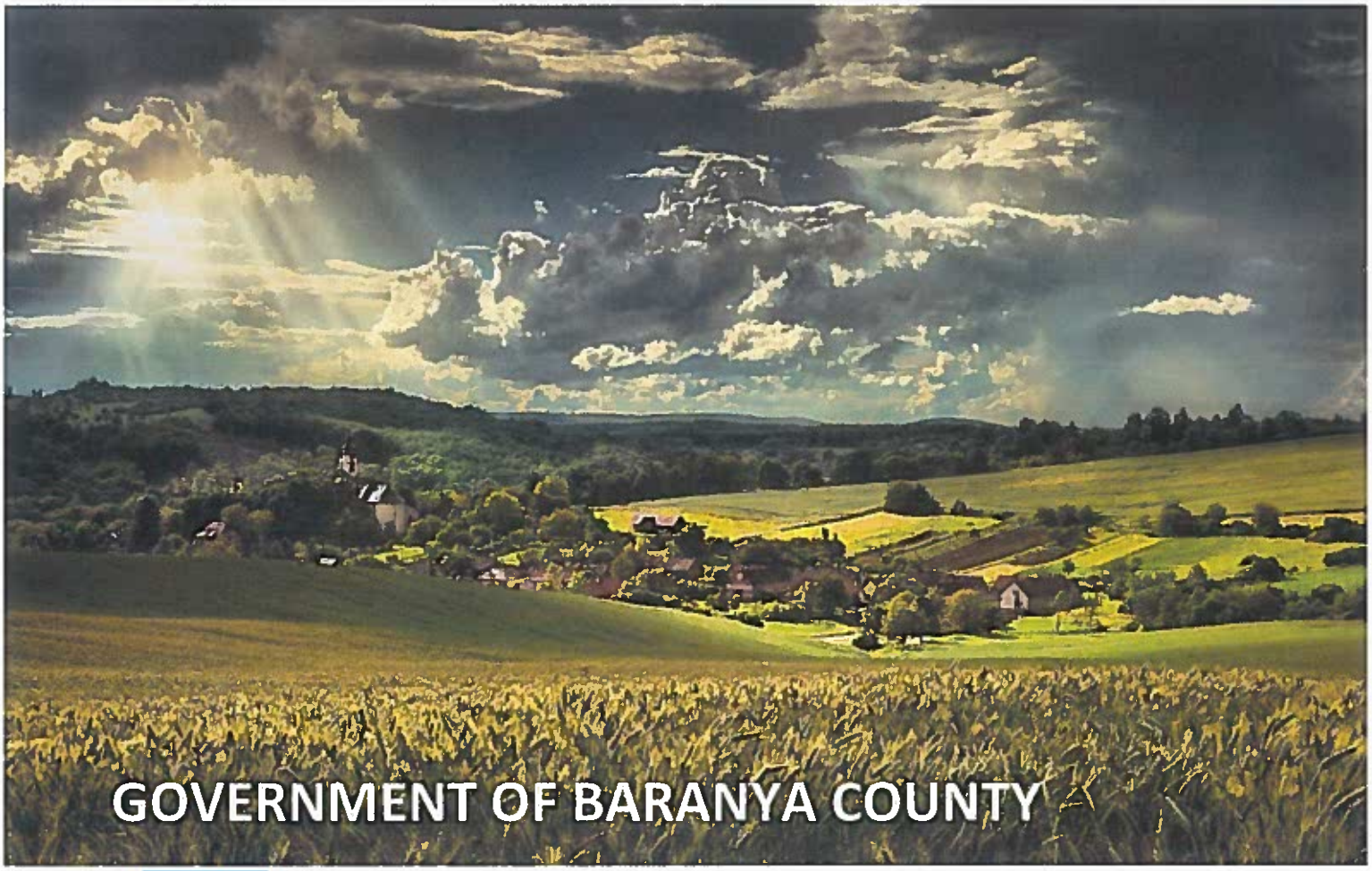
TreAting contamination through NanoremedIAtion



Action Plan

improving the policy instrument addressed by TANIA project

TANIA

The project was started in 2017 with the aim to raise awareness on innovative remediation of contamination for soil and water protection, and to promote long-term, sustainable development by improving policy instruments.

After lot of interregional exchange to compare different experiences on techniques to treat contamination, innovation in environmental protection and governance, and negotiation with stakeholders the partners were able to improve their ERDF policy instruments by elaborating the Action Plans.

Each Action Plan is different in defining measures to support more and better funding for remediation, coordinating governance models and evaluation criteria and inserting integration between innovation and environmental protection in their strategic focus.

This document is the action plan of Hungarian partner and it has been prepared with the aim of developing the awareness of innovative technology of remediation.

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General Information

Project	**TANIA – TreAting contamination through NanoremedIAtion**
Partner organisation	**Government of Baranya County**
Other partner organisations involved (if relevant)	**n/a**
Country	**Hungary**
NUTS2 region	**Southern Transdanubian Region**
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Policy Context

The Action Plan aims to impact:	
Investment for Growth and Jobs programme	YES
European Territorial Cooperation programme	NO
Other regional development policy instrument	NO

Name of the Policy Instrument(s) addressed:

Environmental and Energy-Efficiency Operational Programme 2014-2020

Further details on the policy context:

Within the framework of the Hungarian National Environmental Remediation Programme in the 1990s measures were initiated to identify the accumulated residual pollution and its extent, to prepare priority lists based on the assessments, aiming the decrease of the risk of pollution at the endangered areas and the facilitation of the reduction or elimination of the pollution at the polluted areas. In view of the large number of polluted areas, diversity of contamination and time- and cost-consuming remediation technologies, estimates foresee that in an optimal case the elimination of contaminations explored so far can be implemented in several decades. Due to the structure of the economy before the change of the regime (the predominance of state enterprises) and the polluter status which was not, or not unequivocally identifiable or legally provable in several cases, the number of remediation actions declared as of state responsibility is considerably high. In addition to enforcing the 'Polluter Pays Principle', the objective is to understand the degree of pollution of the contaminated areas, as well as to use effective and professional technologies in the monitoring, reduction and elimination of pollution – including

control quality tests during and after the intervention (both types of monitoring are absolutely indispensable for remediation, i.e. throughout the elimination of contamination and in the case of follow-up monitoring, monitoring the efficiency of remediation). As an overall result human health and environmental risks will decrease and, in the longer run, there will be an opportunity to re-use environmentally contaminated urban areas instead of greenfield developments.

In Hungary the responsibilities related to contamination of the environment are regulated by the Act on Environmental Protection and the Act on Water Management to ensure good status of groundwater. The implementation process of the remediation is regulated by the Government Decree No. 219/2004 on the protection of groundwater, the status of contamination is determined (investigation) in cooperation of the user of the environment and the authority.

Primarily the 'Polluter Pays' principle prevails, but if the party responsible for the contamination cannot be identified or is not liable, then the Hungarian State becomes liable for the remediation. This is why the sectoral remediation strategy, National Environmental Remediation Program (NERP - a part of the National Environmental Program) was created. The aim of the NERP is to identify the contamination of groundwater and the geological media, to reduce the risk of contamination and to promote the elimination of contamination, remediation. Within the framework of NERP a National Remediation Priority List was compiled. For contaminated areas falling under state responsibility sub-programs were created according to the ministries responsible for the specific areas. The implementation of NERP is supported by EU funds and government resources.

The NERP includes the general and national tasks necessary for the management and coordinated execution of the remediation (such as research, regulatory, registry tasks), as well as the co-ordination of the different subprograms.

At present there are almost 2000 potentially contaminated and certifiable contaminated sites in the NERP register; these areas require some degree of remediation. Due to the large number of contaminated areas, the decades required for remediation and the limited availability of funds, only some of the remediation tasks were performed in the previous programming period of EU funds. The Environmental and Energy Efficiency Operational Program's (EEEOP 2014-2020) 3rd priority axis 3rd measure supports the remediation of contaminated sites within state responsibility in the framework of NERP.

The EEEOP aims to support sustainable growth and contribute to achieving the Europe 2020 targets for smart, sustainable and inclusive growth. It should improve flood protection, provide better waste and wastewater management services and good quality of drinking water to more residents, help protect natural habitats and species, and it should improve energy efficiency and the use of renewable energy sources. The Programme will focus on five main priorities:

- Adaptation to climate change impacts;
- Development of water supply, wastewater disposal and cleaning, wastewater management;

- Waste management and environmental remediation related developments;
- Nature protection and wildlife protection related developments and
- Promoting energy and the use of renewable energy sources.

In the present programming period EEEOP has possible allocation for R&D projects like nanoremediation.

As Objective 3.3.0 of EEEOP is "Remediation of contaminated sites", thus EEEOP was selected as the targeted policy improvement. In view of sustainability, only those remediation interventions will be eligible for support, which the energy efficiency, pollutant emission parameters and overall ecological footprint in lie with and are acceptable according to EU and Hungarian requirements. Instead of larger-scale solutions involving the movement of huge volumes of materials, preference must be given to location specific, innovative, in-situ technologies taking into consideration variant analysis and cost efficiency aspects. Projects must be selected by ensuring that priority is given to the elimination of contamination that represents the largest environmental risk.

The allocations of the EEEOP are already contracted totally, the preparation of detailed feasibility studies with technical alternatives is in progress. Some of the assessments of the contamination are out-of-date, so most of the projects needed new diagnostic detailed fact-finding phase. In case of one of the contacted EEEOP project, the remediation project at Szekszárd the need for pilot experiment including nano/bio technology emerged.

Details of the Actions Envisaged

ACTION 1
Support cooperation among the managing organizations responsible for remediation projects

Policy Need	Typology of Policy Improvement
The remediation sector (both the regulatory and financing bodies) is highly fragmented into several ministries and coordinating bodies. There is a need to reduce the high number of coordinator bodies. The remediation issue should be more concentrated that the alternative methods would be better financed. Remediation projects should comply with several different administrative conditions and legal criteria to be financed by EU or other funds. In order to reduce the several different administrative obstacles from the way of remediation, change in the administrative system can be managed at executive level.	Change in the management of the policy instrument

Overall Topic and Description of the proposed Policy Improvement	
Overall Topic	The remediation process is controlled by environmental legal regulations. The projects under the responsibility of the state are included in the NERP, the implementation of which is the responsibility of the Ministry of Agriculture. Remediation projects that can be selected for support by EU funds (such as EEEOP Objective 3.3.0) are named on the priority list of the NERP. After being selected for support, the EEEOP projects are managed by the Ministry for Innovation and Technology. Our aim is to support the cooperation among the different managing organizations responsible for remediation projects.
Specific Description	In Hungary, regarding the responsibilities related to contamination, the 'Polluter Pays' principle prevails, but if the party responsible for the contamination cannot be identified or is not liable, then the Hungarian State becomes liable for the remediation. The National Environmental Remediation Program (NERP) was created to identify the contamination of groundwater and the geological media belonging to state

	responsibility, to reduce the risk of contamination and to promote the remediation. The Ministry of Agriculture is responsible for the implementation of NERP and thus for the compilation of the priority list of remediation projects. Based on this priority list projects can be selected for support by EU-funds such as Objective 3.3.0 of EEEOP. Ministry for Innovation and Technology is responsible for the implementation of EEEOP as the managing authority. After launching projects supported by EU funds, the professional role is taken over by the environmental authorities (Regional Government Offices) belonging to the Ministry of Interior. The professional organization (Ministry of Agriculture) who started the project is not involved later in the implementation phase of the project. The aim of the proposed policy improvement is to **support the cooperation among the above-mentioned different managing organizations responsible for remediation projects by organizing regular coordination meetings / workshops for them where emerging problems and their possible solutions can be discussed.**

Background	
Regional / National input, including input from TANIA Stakeholder Groups	The main objective of TANIA is the promotion of innovative technology in remediation, so the managing organizations responsible for remediation were contacted primarily: • Ministry of National Development (MA of EEEOP) • Government Office of Baranya County – Environmental Protection Authority (belonging to the Ministry of Interior) • Government Office of Baranya County – Mining Authority • Ministry of Agriculture (responsible for NERP) In last 3 years, structural changes at political level were carried out in the administrative system, so the managing authority of the targeted EEEOP was transferred to Ministry for Innovation and Technology, so by the reallocation of roles tasks related to remediation became more fragmented. We also contacted the Ministry for Innovation and Technology. As the allocations of the Objective 3.3.0 of the EEEOP are already contracted, compilation of feasibility studies and technical intervention plans are in progress, so there are few opportunities within the TANIA project to promote the application of innovative technologies in the projects co-funded by present EEEOP 2014-2020. However, as a result of the multilevel consultations with stakeholders identified, responsible bodies and authorities, policy needs and the opportunities to address

	them were identified. In case of one of the contracted EEEOP project, the remediation project at Szekszárd, the need for pilot experiment/tests including nano/bio technology emerged. At the former shooting-range site at Szekszárd the protected drinking water resource was contaminated by incorrectly stored halogenated solvents (DNAPLs). During the pilot tests different technologies (nanoiron, in situ chemical oxidation and reduction, air sparging technology) were tested and then based on the results, the most effective method will be selected for remediation. In relation with the remediation project at Szekszárd, it became obvious that several organizations are responsible for remediation, relevant tasks belong to different ministries. Due to the fragmentation of organization and tasks, delays in the remediation projects occur occasionally. Accordingly tried and proven but in some cases obsolete technologies (exploitation and transportation of huge amount of material, disposal in waste landfills) are planned and used, and thus the new innovative technologies may stay in the background. In order to promote the application of the innovative technologies the policy improvement aims to support regular cooperation among the different responsible bodies, ministries.
Transfer of TANIA Solutions	<u>TANIA Solution of University of Helsinki</u> Title of the Solution: *Making environmental permission easier to get for new remediation techniques* The testing of novel techniques was suggested as a solution for a TANIA project to gain some knowledge of how these new techniques work in real sites in larger scale. And if these techniques work and show no severe risks the techniques could be taken into use as a common practice and applying environmental permission for them made easier. This would work as an incentive also for consults and contractors to use and test these new techniques. This solution was applied in case of the pilot tests carried out at Szekszárd. The experiences of the solution can be useful with regard to the understanding of the environmental administrative system of another project partner and the cooperation of managing bodies responsible for environmental protection.
Other input from TANIA project	The Finnish Ministry of Environment issued new guidelines on the risk assessment and sustainable risk management of contaminated soils, and their National Risk Management Strategy for Contaminated Land was published. These Finnish documents were provided for the experts of the Ministry of Agriculture responsible for remediation in Hungary and may support them for good thoughts and other aspects. No direct result is expected to this action, but it can help national experts in revising the

	national remediation strategy of Hungary.

Work plan within TANIA Phase 1 – ELABORATION of the Action 1

Activities already undertaken at interregional and regional level in Phase 1

The regional meetings helped to form the content of the action plan and to address some critical issues. Firstly, the identification of stakeholders and several times of brainstorming helped to define how to address the selected policy instrument (EEEOP), and how to support the cooperation among the managing organizations responsible for remediation projects as shown by these milestones:

10/04/2017 Pécs, Project launch and workshop meeting-1

Participants:
- Government of Baranya County;
- Ministry of National Development, MA of EEEOP
- Government Office of Baranya County – Environmental Protection Authority;
- Government Office of Baranya County – Mining Authority
- Cluster of Applied Earth Sciences
- Mecsekérc Ltd. (environmental protection expert)
- BIOKOM Ltd. (regional waste management company)

Topics discussed, results: Stakeholder group was established. Remediation technologies related to on-site inspections were presented, the Ministry of National Development highlighted that preference should be given to site-specific, innovative in-situ technologies also promoted by TANIA solutions. Participants filled in the relevant sections of the Lead Partner document.

03/05/2018 Pécs, Stakeholder meeting-2

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, new MA of EEEOP
- Mecsekérc Ltd.

Topics discussed, results: Discussing and classifying Policy Needs and Potential Improvements. Comprehensive lists of Policy Needs were developed.

18/07/2018 Pécs, Stakeholder meeting-3

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, MA of EEEOP
- Government Office of Baranya County – Environmental Protection Authority;

Topics discussed, results: The technical and policy related solutions proposed by other partners were analysed and relevant TANIA solutions were chosen (NANOIRON, NANOBOND).

21/11/2018 Budapest, Stakeholder meeting-4

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, MA of EEEOP
- Mecsekérc Ltd.

Topics discussed, results: Discussion of the political situation in Hungary with regard to environmental protection (public administration, authorities, professional organizations, research and educational institutions). Overview of the strengths and weaknesses of the remediation policy.

13/03/2019 Budapest, Stakeholder meeting-5

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, MA of EEEOP
- Ministry of Agriculture (responsible for NERP)
- General Directorate of Water Management
- Mecsekérc Ltd.

Topics discussed, results: Introduction of TANIA to new stakeholder members. Participants of the responsible Ministries suggested several ideas referring to the definition of the actions.

15/08/2019 Pécs, Stakeholder meeting-6

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, MA of EEEOP
- Ministry of Agriculture (responsible for NERP)
- Mecsekérc Ltd.

Topics discussed, results: Defining actions for draft Action Plan and analysing the feasibility, explore and discuss the content of the Action Plan document.

29/11/2019 Pécs, Stakeholder meeting-7

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, MA of EEEOP
- Mecsekérc Ltd. (environmental protection expert)

Topics discussed, results: Development of TANIA Action Plan

Work plan within TANIA Phase 2 – IMPLEMENTATION of the Action 1	
Activities planned at interregional and regional level in Phase 2 (January 2020 – December 2021)	
Activity / Description	**Timing (month/year or specific date where possible)**
A review of the success of the ongoing remediation projects co-funded by EEEOP is being carried out on behalf of the Managing Authority of the EEEOP (Ministry for Innovation and	December, 2020

Technology). Conducting consultation with the reviewing company and transferring results and experience of TANIA may contribute to the development of the operational program for the next funding period (2020-2027). Experiences on the progression of the ongoing projects could support the better coordination or reallocation of remediation tasks in the future, and thus could make the cooperation of the different managing organizations more effective.	
Coordination meetings among relevant stakeholders identified will be organized regularly, at least every 6 months in order to reveal the weaknesses of the present system and to identify the possible options to make the cooperation of the different managing organizations more effective. Cooperative consultation will be organized for the managing organizations responsible for remediation projects such as the Ministry for Innovation and Technology, Ministry of Agriculture, Ministry of Interior with the proposed topics below. Proposed topics: • opportunities for the use of "smart" and innovative technologies in in-situ remediation involving different organizations responsible for remediation, presenting the results of in-situ pilot tests • based on TANIA results, examination of options to modify the selection criteria of the call for proposals of next EEEOP (with particular regard to the use of innovative technologies), should a standard selection system be introduced at a later stage instead of the priority procedure applied • reassessment of earlier or ongoing remediation projects with special attention to innovative technologies (update of fact findings and technical intervention plans) and revising the different roles of the several managing organizations involved in the processes • elaboration of proposals to modify the relevant administrative or legal environment (with special regard to Government Decree related to remediation)	at least every 6 months: • by June, 2020 • by Dec, 2020 • by June, 2021 • by Nov, 2021

Stakeholders involved	
Name of Organisation / person (where possible)	**Role in Action Plan**

Ministry of Agriculture / Gábor Hasznos	responsible body for remediation
Ministry for Innovation and Technology / Ferenc Réder, Hajnalka Huszár	managing authority of EEEOP
Ministry of Interior	environmental authority
Government of Baranya County / Yvette Szabados	TANIA project partner responsible for implementing Action 1
Mecsekérc Ltd. / Gábor Földing, András Gerstenkorn	professional environmental expert
General Directorate of Water Management / Irma Zöldi	responsible body for the implementation of remediation projects
University of Pécs / Anita Dolgosné Nagy	regional educational centre
National Research, Development and Innovation Office (NRDIO)	responsible body for research, development and innovation

Risk and Contingency Plans		
Description of Risk	**Level of probability (High, Medium, Low)**	**Description of Contingency Plan**
Unfavourable attitude or low interest of the targeted responsible organizations, insufficiently effective cooperation	low	initiating multilevel consultation with several organizations, well definition of the added value of TANIA
Structural change (change of personnel, especially in the management) of the responsible organizations	medium	follow any current changes, and immediately initiating consultation with the new management (responsible leaders)
Unfavourable modification in the objectives of the operative program (e.g. remediation may get a smaller role)	low	finding new opportunities taking into consideration both EU and national tools to promote the innovative remediation technologies
Modification in the EU funding structure	low	finding new opportunities taking into consideration both EU and national tools to promote the innovative remediation technologies

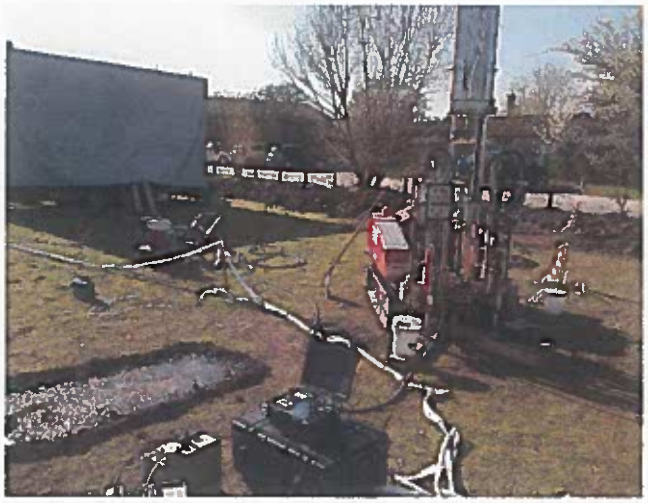
Costs and funding sources

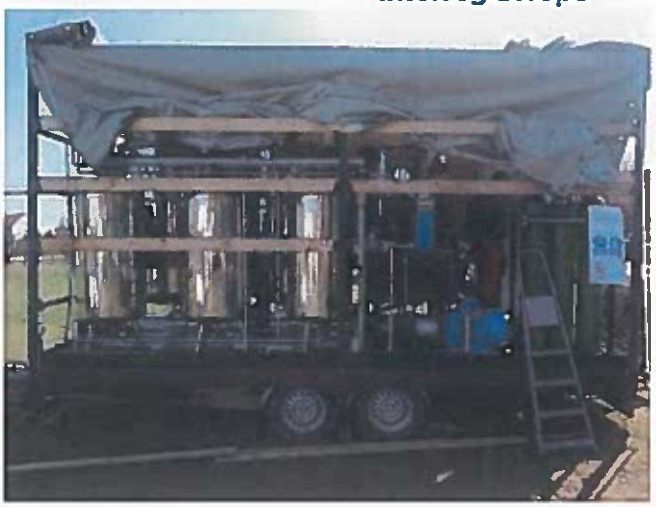
Costs	Funding Sources
Consultation with the EEEOP reviewing company – 2000 EUR	Related costs will be covered by own resources of the project partners.
Cooperative consultation with the managing organizations responsible for remediation – 8000 EUR	Related costs will be covered by own resources of the project partners.

Monitoring		
Self-defined Performance Indicators		
Indicator	**Target**	**Means of Verification**
Output Indicators		
Indicator	**Target**	**Means of Verification**
Number of meetings organized	5	List of participants, Minutes
Number of managing organizations involved	4	List of participants
Territorial Impact		

Thanks to the multistage consultations carried out with the responsible bodies and authorities, preparatory laboratory tests and in-situ pilot tests of innovative remediation technologies (including nanoremediation) were applied in the ongoing remediation project at the so-called shooting-range water resource contamination in Szekszárd (the project is co-funded by EEEOP-3.3.0). Based on the results of the pilot tests carried out, the most appropriate innovative technology will be selected for remediation of the water resource contamination. The results of the pilot tests and lessons learnt can be used for other remediation projects as well.

In order to promote the different innovative technologies, the management of EEEOP need to be developed. The preparation of the operation programs of the next programming period has recently started and the long-term perspective of the AP implementation is that the results of TANIA would be built in the next OP. The application of the most appropriate methods in remediation such as innovative, in-situ technologies could be built in as a criterion in the method of the project selection.





ACTION 2
Increase the technological innovation in remediation projects

Policy Need	Typology of Policy Improvement
In the present programing period of EU-funds all the allocations are contracted, the preparation of technical alternatives and feasibility studies are in progress. For the next programing period of 2021-2027 there is still a good chance to influence the addressed policy instrument (EEEOP) to give preference to in-situ innovative technologies (including nanotechnologies) over more expensive traditional ex-situ or even ex-site solutions. As innovative remediation technologies are currently not applied widely in Hungary thus the awareness of decision makers and experts on the process of remediation and especially on innovative technologies should be raised. As according to the regulation, the compliance of the new technologies applied must be verified, the pilot tests can play an important role in this process.	Soft or modified support measures

Overall Topic and Description of the proposed Policy Improvement	
Overall Topic	Objective 3.3 of the EEEOP focuses on remediation of contaminated sites. The remediation is regulated by Government Decree 219/2004 which prescribes the most appropriate technology to be applied, and the compliance of the new technologies applied must be verified. Innovative technologies such as nanoremediation are not so widespread in Hungary thus the policy improvement aims to promote the application of innovative remediation technologies by a broad introduction to the decision-making bodies.
Specific Description	Priority axis 3 of the Environmental and Energy-Efficiency Operational Programme (EEEOP) focuses on waste management and remediation, while its Objective 3 relates to interventions entitled "Remediation of contaminated sites". In Hungary, the remediation process is currently regulated by Government Decree 219/2004. The legislation prescribes

	the selection of the most appropriate technology for the given remediation. The application of innovative technologies such as nanoremediation is not specified by the regulation however the compliance of the new technologies applied must be verified. As innovative technologies such as nanoremediation are currently not applied so widely in Hungary thus the proposed policy improvement aims to promote the application of nanoremediation and other innovative technologies by a broad introduction to the decision-making bodies and professional organizations and also universities thus making them more well-known, accepted and applied in Hungary. As a result of the TANIA project, laboratory tests and in-situ pilot tests with different innovative technologies including nanoremediation can be inserted in remediation projects and then the most effective method can be chosen for the remediation. Based on the consultations with the different responsible bodies about TANIA, preparatory laboratory tests and in-situ pilot tests were applied in the ongoing remediation project at the so-called shooting-range water resource contamination in Szekszárd (the project is co-funded by EEEOP-3.3.0). The tests were carried out between July and November 2019, the evaluation is in progress, based on the results the most appropriate technology will be applied for remediation of the contaminated site in Szekszárd. The innovative technologies applied in pilot tests will provide input for further policy improvement as good practice for new projects in the next financing period of the EEEOP thus making the projects more innovative and effective. In the long-term perspective, the aim of the policy improvement is that the results of TANIA would be built in the next OP such as a criterion for the method of the project selection.

Background	
Regional / National input, including input from TANIA Stakeholder Groups	In Hungary, the remediation process is currently regulated by Government Decree 219/2004. The legislation prescribes that the selection should be done with the most appropriate technology for the given remediation. The application of innovative technologies such as nanoremediation is not specified by the regulation however the compliance of the new technologies applied must be verified. Regarding sustainability, in order to be eligible for EU support, the energy efficiency, pollutant emission parameters and overall ecological footprint of the remediation projects should be acceptable according to EU and Hungarian requirements. Instead of larger-scale solutions involving the movement of high volumes of materials, preference is given to location specific, innovative, in-situ technologies taking into consideration variant analysis and cost efficiency aspects.

	As the allocations of the Objective 3.3.0 ("Remediation of contaminated sites") of the EEEOP are already contracted, compilation of feasibility studies and technical intervention plans are in progress, so there are few opportunities within TANIA to promote the application of innovative technologies in the projects co-funded by present EEEOP 2014-2020. However, as a result of the multilevel consultation with stakeholders identified, responsible bodies and authorities (see below), the following options have been identified to address the policy needs No. 3 and No. 4: • pilot tests including innovative technologies (as nanotechnology) to be carried out in ongoing remediation projects; • support the change of the management of OP in order to promote innovative technologies in remediation; • integrate the results of TANIA into the OP of the next programming period (e.g. call for new projects, criteria in the selection of projects to be funded).
Transfer of TANIA Solutions	<u>TANIA Solution of University of Helsinki</u> Title of the Solution: *Making environmental permission easier to get for new remediation techniques* The testing of novel techniques was suggested as a solution for a TANIA project to gain some knowledge of how these new techniques work in real sites in larger scale. And if these techniques work and show no severe risks the techniques could be taken into use as a common practice and applying environmental permission for them made easier. This would work as an incentive also for consults and contractors to use and test these new techniques. The idea of this solution (testing innovative technologies for remediation) emerged on stakeholder meetings (e.g. 18/11/2018) during Phase 1 and there was a good opportunity to carry out pilot tests in case of the updating fact finding phase of the ongoing remediation project in Szekszárd. Pilot tests were carried out from July till November, 2019. <u>TANIA Solution of University of Helsinki</u> Title of the Solution: *Nanoremediation of TCE contaminated groundwater area* The Finnish partner has experience in treating contaminated areas, with remediation that combines technologies. This includes techniques based on DC current invented by University of Helsinki and zero valent nanoiron remediation technique. NANOIRON was the good practice presented in TANIA, taken forward with the recently funded NANORAUTA project. In the ongoing remediation project in Szekszárd zero valent nanoiron was one of the techniques applied during pilot tests. Stronger cooperation with the Finnish partner would be advantageous as the results of the Finnish solution could also be used in remediation of TCE contaminated sites in Hungary such as the ongoing project in Szekszárd, and the results of our pilot tests may also be useful for the Finnish partner.

	TANIA Solution of ACQUE INDUSTRIALI Srl. – ASEV – University of Siena Title of the Solution: *NANOBOND* The project NANOBOND "Nanotechnologies and Advanced Materials for the remediation of environmental matrices associated to dewatering", aims to develop an innovative system for treating contaminated sludge and dredged sediments by coupling the use of nanostructured eco-friendly materials with the classical geotextile dewatering tubes. This solution may enable to reduce contaminated sludge and sediments in terms of volumes and costs of transport but also to convert the resulting solid and liquid wastes to a renewable clean resource to be use for instance in riverbanks settlements and any other applications. Results of NANOBOND could be used as a good practice in Hungary as well and not only for its environmental purposes and technical methodologies, but also looking over the whole of the regional policies that favoured its conception, funding and development.
Other input from TANIA project	The Finnish Ministry of Environment issued new guidelines on the risk assessment and sustainable risk management of contaminated soils, and their National Risk Management Strategy for Contaminated Land was published. The Finnish National Remediation Strategy was provided for the experts of the Ministry of Agriculture responsible for remediation in Hungary. This strategy will support our Ministry for good thoughts and other aspects. No direct result is expected to this action, but it can help national experts in revising the national remediation strategy of Hungary. Adopting this Finnish approach may trigger other positive developments (e.g. partners widely involved in projects, or the publicity of environmental data). These are soft measures that are not expected to be implemented immediately, but are fundamental to sustainable development in the future in Hungary. Contaminated sites are recorded in the environmental register of groundwater and geological media (KARINFO). The development of the system is continuous and the current TANIA project strongly supports the following objectives: • updating and validating data, • GIS development of data queries, • development of the web query.

Work plan within TANIA Phase 1 – ELABORATION of the Action 2

Activities already undertaken at interregional and regional level in Phase 1

The regional meetings helped to form the content of the action plan and to address some critical issues. Firstly, the identification of stakeholders and several times of brainstorming helped to define how to address the selected policy instrument (EEEOP), and how to promote the

application of innovative technologies (including nanoremediation) as shown by these milestones:

10/04/2017 Pécs, Project launch and workshop meeting-1

Participants:
- Government of Baranya County;
- Ministry of National Development, MA of EEEOP
- Government Office of Baranya County – Environmental Protection Authority;
- Government Office of Baranya County – Mining Authority
- Cluster of Applied Earth Sciences
- Mecsekérc Ltd. (environmental protection expert)
- BIOKOM Ltd. (regional waste management company)

Topics discussed, results: Stakeholder group was established. Remediation technologies related to on-site inspections were presented, the Ministry of National Development highlighted that preference should be given to site-specific, innovative in-situ technologies also promoted by TANIA solutions. Participants filled in the relevant sections of the Lead Partner document.

03/05/2018 Pécs, Stakeholder meeting-2

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, new MA of EEEOP
- Mecsekérc Ltd.

Topics discussed, results: Discussing and classifying Policy Needs and Potential Improvements. Comprehensive lists of Policy Needs were developed.

18/07/2018 Pécs, Stakeholder meeting-3

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, MA of EEEOP
- Government Office of Baranya County – Environmental Protection Authority;

Topics discussed, results: The technical and policy related solutions proposed by other partners were analysed and relevant solutions were chosen (NANOIRON, NANOBOND).

21/11/2018 Budapest, Stakeholder meeting-4

Participants:
- Government of Baranya County;
- Ministry for Innovation and Technology, MA of EEEOP
- Mecsekérc Ltd.

Topics discussed, results: Discussion of the political situation in Hungary with regard to environmental protection (public administration, authorities, professional organizations, research and educational institutions). Overview of the strengths and weaknesses of the remediation policy. Opportunity emerged to carry out pilot tests of innovative technologies in case of an ongoing remediation project.

13/03/2019 Budapest, Stakeholder meeting-5

Participants:	• Government of Baranya County; • Ministry for Innovation and Technology, MA of EEEOP • Ministry of Agriculture (responsible for NERP) • General Directorate of Water Management • Mecsekérc Ltd.
Topics discussed, results:	Introduction of TANIA to new stakeholder members. Participants of the responsible Ministries suggested several ideas referring to the definition of the actions.

15/08/2019 Pécs, Stakeholder meeting-6

Participants:	• Government of Baranya County; • Ministry for Innovation and Technology, MA of EEEOP • Ministry of Agriculture (responsible for NERP) • Mecsekérc Ltd.
Topics discussed, results:	Defining actions for draft Action Plan and analysing the feasibility, explore and discuss the content of the Action Plan document.

29/11/2019 Pécs, Stakeholder meeting-7

Participants:	• Government of Baranya County; • Ministry for Innovation and Technology, MA of EEEOP • Mecsekérc Ltd. (environmental protection expert)
Topics discussed, results:	Development of TANIA Action Plan

Work plan within TANIA Phase 2 – IMPLEMENTATION of the Action 2	
Activities planned at interregional and regional level in Phase 2 (January 2020 – December 2021)	
Activity / Description	**Timing (month/year or specific date where possible)**
Multistage consultation with universities on the advantages and application of innovative technologies (e.g. preparation of presentations on nanoremediaton)	May, 2020 - Dec, 2021
Consultation with Bay Zoltán Research Institute on the cooperation related to the possible application of the innovative technologies especially nanoremediation	May, 2020 - Dec, 2021
Compilation of a brochure to promote the application of the innovative technologies (e.g. nanoremediation) to provide input for further policy improvement as good practice for new projects in the next financing period of the EEEOP	August, 2020
Attendance at professional conferences, presentation of the innovative technologies and the results of the pilot project as	

applicable good practice for new projects • Conference on Groundwaters, • Conference on Remediation and Brownfield Investments • National Environmental Conference • ÖKO-Industria – Environmental Industrial Exhibition	March, 2020 May, 2020 September, 2020 October, 2020
Offering thesis topics on the application of innovative technologies in remediation to the University of Pécs	September, 2020 – September, 2021
Publication of TANIA project and presentation of the results achieved on the website developed by the Ministry of Agriculture or on the websites of other concerned parties	from September, 2020
Invitation of TANIA partners for the presentation of the pilot project	November, 2020

Stakeholders involved	
Name of Organisation / person (where possible)	**Role in Action Plan**
Ministry of Agriculture / Gábor Hasznos	responsible body for remediation
Ministry for Innovation and Technology / Réder Ferenc, Huszár Hajnalka	managing authority of EEEOP
Ministry of Interior	environmental authority
Government of Baranya County / Yvette Szabados	TANIA project partner responsible for implementing Action 2
Mecsekérc Ltd. / Gábor Földing, András Gerstenkorn	professional environmental expert
General Directorate of Water Management / Irma Zöldi	responsible body for the implementation of remediation projects
University of Pécs / Anita Dolgosné Nagy	regional educational centre
National Research, Development and Innovation Office (NRDIO)	responsible body for research, development and innovation

Risk and Contingency Plans		
Description of Risk	**Level of probability**	**Description of Contingency**

	(High, Medium, Low)	Plan
Unfavourable attitude of the university or the research institutes, or insufficiently effective cooperation with the university or the research institutes	low	initiating cooperation with several faculties and institutes, multilevel consultation
The conference / exhibition will not be held	low	registration for more conferences, forums, events
Delay in the development of the official website of the Ministry of Agriculture	medium	appropriate flexible timing can reduce risk

Costs and funding sources	
Costs	**Funding Sources**
Multistage consultation with universities – 2000 EUR	Related costs will be covered by own resources of the project partners.
Consultation with Bay Zoltán Research Institute – 2000 EUR	Related costs will be covered by own resources of the project partners.
Compilation of a brochure on innovative technologies – 4000 EUR	MECSEKÉRC Ltd.
Attendance at professional conferences, exhibitions – 4000 EUR	Related costs will be covered by own resources of the project partners.
Offering thesis topics to the University of Pécs – Free	MECSEKÉRC Ltd.
Publication of TANIA project and the results achieved on the website developed by the Ministry of Agriculture or other concerned parties – 2000 EUR	Related costs will be covered by own resources of the project partners.
Invitation of partners for the presentation of the pilot project- 3000 EUR	Related costs will be covered by own resources of the project partners and by EEEOP

Monitoring		
Self-defined Performance Indicators		
Indicator	**Target**	**Means of Verification**
Total area of potentially contaminated areas being treated (Target value for whole EEEOP to be reached by 2023 is 50 hectares)	3 hectares	This indicator and target value is included in the remediation project at Szekszárd, but due to the n+3 rule of the EEEOP the target will be achieved until 2023 according to the given Subsidy contract.

Output Indicators		
Indicator	**Target**	**Means of Verification**
Number of meetings organized	5	List of participants, Minutes
Number of attendances at conferences /exhibitions	3	Photos, poster, program of the conference
Number of promotional documents compiled	1	brochures
Number of thesis topics offered to universities	2	Thesis topic plans
Number of publications of TANIA on official websites	2	website address

Territorial Impact

Thanks to the multistage consultations carried out with the responsible bodies and authorities, preparatory laboratory tests and in-situ pilot tests of four different innovative remediation technologies (including nanoremediation) were applied in the ongoing remediation project at the so-called shooting-range water resource contamination in Szekszárd (the project is co-funded by EEEOP-3.3.0). Based on the results of the pilot tests carried out, the most appropriate innovative technology – achieving the highest levels of contamination reduction – will be selected for remediation of the water resource contamination. The results of the pilot tests and lessons learnt can be used for other remediation projects as well.

In order to promote the different innovative technologies, the management of EEEOP need to be developed. The preparation of the operation programs of the next programming period has recently started and the long-term perspective of the AP implementation is that the results of TANIA would be built in the next OP. The application of the most appropriate methods in remediation such as innovative, in-situ technologies could be used as a criterion for the method of the project selection.

Date: 11/02/2020

Name of the organisation(s) :
Government of Baranya County, Hungary

Signatures of the relevant organisation(s):

Baranya Megyei Önkormányzat * Pécs *

Dr. László Őri
President of Baranya County

LETTER OF ENDORSEMENT

Project acronym	TANIA
Name of the signing organisation	Managing Authority for Environemntal Programmes, Deputy State-Secretariat of Environmental and Energy Efficiency Operational Programme, Ministry of Innovation and Technology
Name of the policy instrument addressed	Environmental and Energy Efficiency Operational Programme 2014-2020
Name of the partner of TANIA project	Government of Baranya County

We hereby confirm that we were informed about in the above-mentioned project and were involved in the Action Plan that will be implemented in the frame of the TANIA project.

We accept that actions that planned in the project related to the policy instrument addressed by TANIA project.

Name of signatory	Szalóki Flórián
Date	Deputy State Secretary 2020.02.26
Signature and institution stamp	