# STAGES OF REHABILITATION/MODERNIZATION OF THE SECONDARY INFRASTRUCTURE OF IRRIGATION FACILITIES IALOMIȚA CĂLMĂȚUI TERRACE, IALOMIȚA COUNTY. CASE STUDY: SPP 13 IRRIGATION PLOT BELONGING TO O.U.A.I. MURGEANCA

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***Abstract.*** *After 1989, irrigation facilities were increasingly less used, entering a process of physical and moral damage. The paper briefly presents the way applications for accessing the rehabilitation/modernization of the main and secondary infrastructure of irrigation facilities are done. The case study is made for an irrigation plot from the patrimony of irrigation water users (O.U.A.I.) using modern mobile watering equipment and equipping pressure pumping stations with new energy performance aggregates, start/stop safety and higher functioning yields. The Ialomița-Călmățui Terrace irrigation facilities in operation between 197and 1983, of which, in the Țăndărei area, the gross area of 7,275 ha and the net area of 7,158 ha is served by pressure pumping stations SPP 13, SPP 14, SPP 22, SPP 21+21bis, of which: 1,354 ha in plot SPP 13, 1,606 ha in plot SPP 14, 1,686 ha in plot SPP 22 and 2,512 ha in plot SPP 21+21bis. For the case study, the modernization of SPP 13, representative of the current stage, belonging to Murgeanca, the initial state, the technical solution for modernization and the current situation after the modernization investment are presented. By rehabilitation/modernization of the irrigation plot, it has also been streamlined through the economy of labour, energy and water*.

***Keywords:*** *Irrigation, Rehabilitation, Modernization, Pumping Station*.

## INTRODUCTION

The Ialomița-Călmățui irrigation facility is situated in the eastern half of Bărăganului Plain extending on a total global area of 161,441 ha, in the space between the Danube River and Ialomița and Călmățui rivers meadows. The hydro ameliorative works carried out within this perimeter comprise:

- Irrigation facilities on 140,000 ha;
- Desiccation works on 82,350 ha;
- Drainage works on 3,416 ha;
- Improving salting marshes on 2,649 ha;
- Controlling soil erosion on 6,233 ha.

The irrigation system entered into operation between 1979 and 1983 is divided into 4 subsystems: Amara and Țăndărei in Ialomița County and Dudeşti and Spiru Haret in Brăila County, which were merely used after 1990, reaching physical and moral wear.

The main infrastructure of the planning, comprising basic pumping, re-pumping stations and the main canal and pipeline network, is part of the ANIF patrimony, and their rehabilitation is being funded by the National Irrigation Program, partially restarted in operation.

For secondary infrastructure, comprising pressure pumping stations and underground piping networks in the O.U.A.I. patrimonial irrigation platforms had the EAFRD structural funding source by measures 1.2.5 and, then, by measure 4.3 "Investments for the development,

modernization or adaptation of agricultural and forestry infrastructure component – irrigation infrastructure", for rehabilitation/modernization with funding by AFIR with one million euros, non-reimbursable EU funds for O.U.A.I. that have accessed, drawing up their technical expertise, DALI and PT. The case study presented in this paper on the modernization and refurbishment of the pressure station SPP 13 belongs to O.U.A.I. Murgeanca.

The Water Users Organization for Irrigation Murgeanca owns the irrigation infrastructure (pressure pumping stations and underground pipe networks for irrigation) from a net area of 7,158 ha related to SPP 13, SPP 14, SPP 22 and SPP 21 + 21bis that are to be upgraded in the area of Ţăndărei, Ialomiţa County:

- SPP 13 located on the CD2 canal north of the town of Ţăndărei and east of the village of Murgeanca;
- SPP 14 located on the CD2 canal north of the town of Ţăndărei and south of the SPP 13 station;
- SPP 22 located on the CD2A canal east of the village of Murgeanca;
- SPP 21 + 21bis located on the CD3A canal south of Victoria.

Pumping stations SPP 13, SPP 14, SPP 22, and SPP 21 + 21bis are part of the "Irrigation facility Ialomiţa Terrace, Ialomiţa County", with a total irrigation area of 7275 ha, divided into 4 plots.

In 2012, the technical expertise and documentation for the approval of intervention works (DALI) was drawn up for rehabilitation of pressure pumping stations SPP 13, SPP 14, SPP 22, and SPP 21 + 21bis with an area of 7,158 ha, of which: 1,354 ha in SPP 13, 1,606 ha in SPP 14, 1,686 ha in SPP 22 and 2,512 ha in SPP 21 + 21bis for funding by measure 1.2.5 AFIR. Due to long operation (over 30 years), basic pumping machines, auxiliary and electrical installations, pipes, hardware and fittings that make up the pumping technological lines are in an advanced degree of wear and no exploiting safety. This is why they often needed interventions and repairs, some of the deficient components being replaced over time to maintain the functionality of the water pumping system for irrigation.

Electro pumps, manufactured and mounted in 1979, are physically and morally worn out, operating in low yields and with high electricity consumption. Also, worn out metal pipes and fittings lead to increased hydraulic load losses, implicitly increasing electricity consumption with water pumping.

The pumping stations SPP 13, SPP 14, SPP 22, and SPP 21 + 21bis subjected to expertise are pressure pumping stations that aspire water from CD3A, CD2 and CD2A irrigation canals and pour it into the pressure pipe network – main, secondary and antennae over the agricultural area.

Irrigation water is taken from the Danube by the I. M. Gheorghiu floating station and pumped into the terrace canal CA, after which it is re-pumped by the SRPA1 Spiru Haret station, reaching CD3A, CD2 and CD2A derivation canals from which it is aspired by the pressure pumping stations SPP 13, SPP 14, SPP 22, SPP 21 + 21bis.

Pressure pumping stations SPP 13, SPP 14, SPP 22, and SPP 21 + 21bis, proposed for rehabilitation, were put into operation over 30 years ago, and are no superstructure wet tanks. The electric annex is in an overground construction with partial part height regime ground level + floor. Upstairs is the average voltage cell of the electricity operator (Enel) for the protection of the voltage transformer 20/0.4 kV.

SPP 13 – located on CD2 canal, has 6 aggregates mounted on base plates fixed in the tank floor, of which 3 MV253x3 aggregates with 160 kW electric motor at 1500 rpm with 1500 rpm with a 0.4 kV power supply voltage, 1 aggregate MV253x2 with an electric motor of 132 kW at 1500 rpm with a 0.4 kV supply voltage and 2 horizontal aggregates type 8NDS with a

160-kW electric motor at 1500 rpm with a 0.4 kV power supply voltage. It feeds from a PTS type 1600 kVA. It serves a net area of 1,354 ha. The underground pipeline network consists of two CPs from which 10 telescopic antennae leave.

SPP 14 – located on the CD2 canal, has 10 aggregates mounted on base plates fixed in the tank floor, of which 7 MV253x3 aggregates with 160 kW electric motor at 1500 rpm with 1500 rpm with supply voltage on 0.4 kV and 3 Worthington aggregates with 90 kW electric motor at 1500 rpm with 0.4 kV supply voltage. It feeds from a PTS type 1600 kVA. It serves a net area of 1,686 ha. The underground pipeline network consists of two CPs from 12 telescopic antennae leave.

SPP 22 – located on CD2A canal, has 6 aggregates mounted on base plates fixed in the tank floor, of which 1 MV253x2 aggregate with an electric motor of 132 kW at 1500 rpm with a 0.4 kV power supply voltage, 1 MV253x3 aggregate with 160 kW electric motor at 1500 rpm with 0.4 kV feed voltage and 4 VDF400 aggregates with 250 kW electric motor at 1500 rpm with 0.4 kV power supply voltage. It feeds from a PTS type 1600 kVA. It serves a net area of 1,686 ha. The underground pipeline network consists of a CP that continues with two CSs from which 16 telescopic antennae leave.

SPP 21 + 21bis – located on CD3A canal, has 10 aggregates mounted on base plates fixed in the tank floor, of which 1 MV253x2 aggregate with an 132 kW electric motor at 1500 rpm with a 0.4 kV power supply voltage, 2 MV253x2 aggregates with electric motor of 110 kw and 1500 rpm with 0.4 kV power supply voltage, 2 NDS-400-350 aggregates with a 630 Kw electric motor at 1500 rpm with 0.4 kV power supply voltage, 2 8NDS aggregates with 160 kw electric motor at 1500 rpm with a 0.4 kV power supply voltage and 3 MV253x3 aggregates with a 160 kw electric motor at 1500 rpm with 0.4 kV power supply voltage. It feeds from PT PTS type at 1600 KVA. It serves a net area of 2,512 ha. The underground pipeline network consists of two CPs from which 12 telescopic antennae leave. Following the checks performed at SPP 13, SPP 14, SPP 22, and SPP 21+21bis, it is obvious that construction works are in good condition, and have no visible defects (cracks, crashes, trips, etc.), which ask for consolidation works. Degraded paintings are due to the lack of periodic maintenance and repairs. They will restore the perimeter pavement around the buildings, which is partly mashed and with missing pavement tiles, waterproofing electrical annexes and station fences. Interior and exterior lighting installations will be restored. Earthing and lightweight plugs will be restored.

In 2018 - Preparation of memoranda specifications and partial check of underground pipes and construction of SPP 13 O.U.A.I. Murgeanca for the Integrated Project objective – FEADR Structural funds – "Project for measure 4.3 Investments for the development, modernization or adaptation of agricultural and forestry infrastructure component – irrigating infrastructure, objective "Modernising and re-technologising the pressure pumping station SPP 13 of O.U.A.I. Murgeanca".

The entire irrigation territory to be modernised falls geomorphologically in the Romanian Plain, the Ialomița-Călmățui Terrace. The relief in the analysed territory is a fluvial accumulation and it is made up of a terrace, it has the appearance of a low plain region, with an absolute altitude of 20-30 m, with NW-SE inclination.

The land is stratified as follows: the first portion of 0.60-0.70 m is vegetal soil followed by a second layer about 6.00 m poorly clayey loessoid sandy dusts.

The frost depth is 0.7 - 0.8 m in accordance with the provisions of the STAS 6054/77.

The climate of the area around Țăndărei is the climate of Ialomița County, a temperate-continental climate characterised by very hot summers and very cold winters through a relatively large, precipitous diurnal amplitude and rainfall in small quantities. The

average annual sunlight duration is between 2,100 and 2,300 h, the annual number of days with a clear sky is 110, the annual number of days with a cloudy sky is 123, and the annual number of days with a with covered sky is 130 days. The average annual air temperature increases from NW (10.4ºC in Armășești) to SE (11.1ºC in Feteşti). The absolute minimum reached up to -32,50ºC in Armășești (January 25, 1942), and the absolute maximum reached up to +44,0ºC in Armășești in Amara (August 1951), which causes a maximum thermal amplitude of 76,50ºC. Atmospheric precipitation varies between 400 and 520 mm/year, the smallest being distributed in the Danube meadow, and the largest in the rest of the county. The winds have NE, N, SW, and S dominant directions, with such dominant winds as Crivăț, Austrum, Bălțărețul and Suhovei. Relative moisture varies between 74 and 76%. Among characteristic climate phenomena are climate frost, white frost and blizzard in the cold period, drought, dew and hail, in the warm period of the year.

In accordance with the provisions of the normative P 100 – 92 “Norms for the antisismic design of the constructions" approved by Order no. 3/N/14.09.1992, the area in which the constructions are located is characterized by the following values of the seismic calculation coefficients: the “C" area, KS = 0.16, corner period Tc = 1.0 sec.

## MATERIALS AND METHODS

### 1. Presentation of the SPP irrigation plot before rehabilitation

The object of technical expertise is: "Check of the current state of basic constructions and hydromechanical installations, electrical installations, pipes, hardware, reinforcements on the suction – discharge circuit, main pipelines and antenna pipes in the underground pipeline network for rehabilitation".

The organization, a public utility legal person without patrimonial purpose, received the infrastructure of land improvements belonging to the private domain of the state consisting of pressure pumping stations and hydrotechnical constructions, together with the facilities and land, underground pipelines as well as other goods on the organisation land.

The documentation for the endorsement of the intervention works (DALI) drawn up in accordance with the provisions of H.G.Nr.28/09.01.2009 analyses the necessity and opportunity to carry out works for the modernization of the irrigation system so that the global energy efficiency is better than the current one, and crop watering conditions are optimal, avoiding waste and water losses.

The technical project (PT) was drawn up according to the framework content provided in accordance with the instructions of July 2, 2008 implementing provisions in the Government Decision no. 28/2008 regarding the approval of the framework content of the technical and economic documentation for public investment, as well as the structure and methodology for drafting the general estimation for investment objectives and intervention works, issued by the Ministry of Development of Public Works and Housing, published in Monitorul Oficial No. 524 of July 11, 2008.

The refurbishment interventions provided by this project for the SPP 13 station plot by upgrading the degree of performance with performance pumps and the modernization of the hydromechanical and electrical equipment in the station, the replacement of the main pipes, the pipes of five antennas owned by the organization, the valves on the main pipes and antennae connections.

The object of activity of O.U.A.I. Murgeanca is the water delivery for irrigation, administration, exploitation, maintenance and repairs in the irrigation facility of the Ialomița-Călmățui Terrace, serving agricultural land located on the territory of the city of Țăndărei, Ialomița County. The land to be irrigated is located in the Danube River basin, in the perimeter

of Ialomița-Călmățui Terrace. SPP 13 located on the CD2 canal in N Țăndărei is part of the "Irrigation facility Ialomița-Călmățui Terrace, Ialomița County" with a total area for irrigation of 1,354 ha.

The station was put into operation in 1979. Due to the long functioning (over 30 years), basic pumping machines, auxiliary and electrical installations serving them, pipes, metallic garments and fittings that make up the technological lines of the pumps, have an advanced degree of wear and are no longer safe.

Following the checks carried out on the occasion of the technical expertise at the SPP 13 pumping station, the construction works were found to be in good condition, it does not have visible defects (cracks, crashes, trips, inclinations, etc.), which do not impose consolidation works. Two variants were presented by choosing in DALI the technical-economic variant recommended by the technical expertise, according to the guidelines.

On the occasion of check of the technical conditions, the following results were obtained:

- The SPP 13 pumping station requires rehabilitation and re-establishment, in particular, the hydromechanical installations for the two MV 303x2 aggregates;
- The equipment related to the two MV 303x2 aggregates mounted in the station are old (over 30 years), are worn physically and morally and damaged;
- Basic pumps and electric motors related to the two MV 303x2 aggregates are malfunctioning, low yielding and high energy consumption;
- The discharge valves for the two MV 303x2 aggregates operated manually are worn, do not close perfectly, open with difficulty, are blocked, etc.;
- The retaining flaps have an advanced degree of wear because of seniority;
- Electrical installations related to the two MV 303x2 aggregates are old, physically and morally worn and no longer in exploitation;
- The main pipelines, the pipes of the five antennas owned by O.U.A.I. Murgeanca, the valves on the main pipes and the headline connection valves with the main pipelines produce losses, are old, worn out and need replacing.

## 2. Photos with the situation before rehabilitation

Fig. 1 SPP 13 building disabled

Fig. 2 Detail of SPP 13 pumps disabled

- Fig. 3 SPP 13 electric installation disabled

Fig. 4 SP 13 pipeline and van state

## RESULTS AND DISCUSSIONS

### 1. Presentation of Rehabilitation/Modernization Works of the Irrigation Plot SPP 13

**Rehabilitation/Modernization Works of the Irrigation Plot SPP 13**

Thus, the proposed rehabilitation/modernization solution includes the following:

- Dismantling the equipment for the two MV 303x2 aggregates in the station (pumps, engines, valves, flaps, mounting compensators, pipe sections, etc.);
- Procurement of pumping machines (pump and motor) with 60 m CA pumping height and 800 mc/h flows for base pumps;
- Electro pumps will be provided with frequency converters for taking over flow variations and to protect electric motors and their economic functioning;
- The valves and flaps on the discharge pipes will be replaced by new ones;
- Electrical installations will be dismantled and replaced by new installations (the overall panel with a USOL switch, electrical panels for frequency converters);
- The main pipes from premio and azbo antenna pipes of the station will be replaced by other PEHD pressure pipes with diameters identical to the old ones;
- CP and line valves will be replaced by new ones.

These works lead to an estimated value of approximately 1,000,000 euros.

Rehabilitation/modernization works of the SPP 13 irrigation plot comprised in the technical project includes the written part and the drawing part of the works.

The written part includes: General data; General description of the works; Technical memories on specialties; Execution specifications and annexes with the lists of quantities of works containing: Centralizer of expenditure on the objective (Form F1); Centralizer of works by categories, by objects (Form F2); Lists of quantities of works by category of works (Form F3); Lists containing the consumption of materials, workmanship, machinery and transport for each category of works (C6, C7, C8 and C8); Lists of quantities of technological machinery and equipment, including facilities (Form F4); Technical sheets of technological equipment (F5 F5) and General investment program (Form F6).

The following categories of papers were provided for the SPP 13 pumping station:

- Restoring the vertical pumps mounting platform with reinforced concrete casting around metal parts used for pumps ascending and consolidation;
- For the rehabilitation of the suction basin of the SPP 13 station, the filling of the gaps between the tiles was provided on an area of 150 sqm (about 500 ml of filling) and the repair of the metal grills in an area of 10 sqm.

The access paths to the pumping stations are provided and easily practicable. Electricity is secured by the 20KV LEA along the Enel CD2 Canal.

New pumping aggregates and their features are as follows:

**Vertical electro pump:** Q = 800mc/h, pump flow 800 mc/h, pumping height 60 mCA, 300 mm discharge diameter, yield greater than 80%, oil bearings with anti-reverse protective mechanism, coupling between pump and elastic motor, engine type action: asynchronous 3-phase rotor in scc., 400 V power voltage supply, 50 Hz power supply frequency, motor power drive 200 kW, 1500 rpm turation, stator connection insulation class: F, Engine protection degree: IP55.

**Hydro mechanic equipment:**

- Oval drawer faucet DN300 PN10 for pump discharge: nominal diameter DN = 300 mm, nominal pressure PN = 10 bar, body material, cap, drawer, wheel: cast iron, rod material: steel, sealing material: bronze;

- Battant flap DN300 PN10 for pump discharge: nominal diameter DN = 300 mm, nominal pressure PN = 10 bar, body material, cap, flap, rod material: cast iron, steel, sealing material: bronze;
- Ultrasonic flowmeter DN = 300 mm for pump discharge: connect ultrasonic clamp-on sensor non-invasive on DN200-DN4000 pipes, climate sensor protection IP67, LCD signal converter length cable 10 m, converter functions: instant debit measurement and totalization, fluid speed, sound speed, diagnostics, bidirectional measurement, outputs: current, pulse, HART, feeding: 220 Vca, climate protection converter: IP65, precision: 1%, approval for tax transactions;
- Oval drawer faucet DN450 PN10 CP: nominal diameter DN = 450 mm, nominal pressure PN = 10 bar, body material, cap, drawer, wheel: cast iron, rod material: steel, sealing material: bronze
- Oval drawer faucet DN300 PN10 line: nominal diameter DN = 300 mm, nominal pressure PN = 10 bar, body material, cap, drawer, wheel: cast iron, steel, sealing material: bronze:
- Oval drawer faucet DN250 PN10 line: nominal diameter DN = 250 mm, nominal pressure PN = 10 bar, body material, cap, drawer, wheel: cast iron, rod material: steel, sealing material: bronze;

**Electric devices:**

- General panel 1000A: three-phase copper bars, USOL 1000A general switch, current traff, voltmetric key before and after the general switch, kilo-ampermeter in general, fan, degree protection IP55;
- Engine drive frequency converter with P = 200 kw: power range 200 kW input entry: 3 x 400 V/50 Hz, operating modes: v/F, v/F with feedback, sensorless vector, sensorless vector with feedback, output frequency 0-400 Hz in V/f mode, frequency of switching 0-120 Hz in sensorless vector mode, auto-tuning motor parameters, RS485 communication interface;
- PLC type automation panel: 24 Vcc power supply, 24 Vcc power display, UPS 24 Vcc, running soft licenses, network pressure measurement and maintaining a minimum value of 4 bar and a maximum value of 6 bar by starting or automatically stopping electro pumps using 20-50 Hz frequency converters, with a choice of one in one, engine protection, overload, low voltage, missing phase, counting the number of hours of operation of pumping aggregates depending on flows, counting flows, possibility of operating in two modes: automatically and locally.

**Electrical and automation installations** are as follows: electrical and automation installations for the actuation of three-phase electric motors from pumping aggregates, electrical installation for the actuator of the priming electromosphere, inside and outside lighting installations of the pressure stations, 230V/50Hz sockets, remote data transmission installations and atmospheric discharge protection. The electrical characteristics of the pressure stations are as follows: electric circuits from electric motors of pumping aggregates: 2 x Pn = 200 kW, Un = 2 x 400 Vca/50 Hz, In = 2 x 370 A, control electric circuit: Pn = 0.25 kW, Un = 230 Vca/50 Hz, In = 1.2 A/Pn = 0.25 kW, Un = 24 Vcc, In = 10 A, inner lighting circuit: Pn = 0.25 kW, Un = 230 Vca/50 Hz, outer lighting circuit: Pn = 0.5 kW, Un = 230 Vca/50 Hz, socket circuit: Pn = 2 kW, Un = 230 Vca/50 Hz, atmospheric discharge protective system: 100 m protection radius = 1 Ohm.

The general works that will be executed are to replace the electrical force and control plant with panels with automation equipment with frequency converters. A frequency converter

has as main function to maintain the pipe pressure between two reference values by changing the electric motors.

The electrical installation consists of general power panel, frequency converter distribution panels, automation panel and general power panel (which has the function of feeding all electric consumers in the station and to provide protection from general electrical short circuit, short circuit protection for each electric circuit, and overload protection of electro pumps.

The acting and control of the pumps is done with frequency converters. The frequency converter is an electrical device that performs a variable frequency three-phase electric motor (so it controls rotation speed) and performs short-circuit protection, overload, phase inversion, and missing phase. The frequency converter also performs the power engine start and stop function. In the case of electro pumps, this function leads to the elimination of shocks in hydraulic installations (ram blow), reducing electro pump wear and couplings between the electric motor and the actual pump, as well as electricity consumption.

For the **underground pipeline network** of the SPP 13 plot were provided the following categories of works:

- Achieving a network of **two main pipelines (CP)** for irrigation to the ten water distribution antennas in the SPP 13 plot;
- **Antennae pipes** (A1, A2, A3, A4 and A5) of the type PEHD PE100 PN10 SDR17 De = 280 mm/Dn = 250 mm, De = 225 mm/Dn = 200 mm and De = 180 mm/Dn = 150 mm will be placed at the depth of 1.1 m in ditches with a width of 0.6 m positioned perpendicular to the CD2 canal.

The SPP 13 plot rehabilitation/modernization work complies with the provisions of the Emergency Ordinance 195/2005 on Environmental Protection and Order 860/2002 “Environmental impact assessment procedure and environmental agreement" ensures safety and efficiency in all life cycle phases throughout the investment. Here are some photos with the situation before rehabilitation, during the rehabilitation and after rehabilitation.

**2. Photos with the situation during the execution of rehabilitation**

Fig. 5 Overall view of electro pump assembly at SPP 13

Fig. 6 Detail view - pump transport for position mounting at SPP 13

## 3. Photos with the situation after rehabilitation

Fig. 7 Side view of new SPP13 electric pumps and pumping station superstructure

Fig. 8 Overview of SPP13 pumping station and electrical transformation station

Fig. 9 Overview of the SPP13 pumping station after rehabilitation

**Abbreviations:**

AFRI – Agency for the Financing of Rural Investments
MARD – Ministry of Agriculture and Rural Development
NALI – National Agency for Land Improvements
PPS – Pressure pumping stations

IWUO – Irrigation Water Users Organization
NRDP – National Rural Development Program
UE – European Union
DAIW – Documentation approving investment works
PT – Technical project

## CONCLUSIONS

Rehabilitation/modernisation of the main irrigation infrastructure in the ANIF patrimonial comprising the basic pumping stations (SPB), repumping (SRP), main irrigation canals or transportation of irrigation water, SPB and SRP's main discharges, with the role of providing water for the irrigation of O.U.A.I./FO.U.A.I. is in the ANIF's attribution and is done by funding from the National Irrigation Program, currently being implemented.

Rehabilitation/modernization of the secondary irrigation infrastructure in the patrimonial O.U.A.I./F.O.U.A.I. comprising pressure pumping stations and the underground pipeline network is made upon request based on documentation (specification, technical expertise, DALI and PT) from EU - ERDF program; so far, they have financed about 350 O.U.A.I., following a new funding session long awaited by farmers.

The stages of the rehabilitation/modernisation of the secondary infrastructure of irrigation is, briefly, as follows: drawing up specification, auction organization for preparation: technical expertise, documentation for the approval of intervention works and the technical project (PT+DE, DTAC, DTOE, DTAD), based on studies such as: topo (Stereo70), geotechnical, hydrological and/or hydrogeological (as appropriate), obtaining opinions on the basis of technical documentation specific to the procedures of each institution (ANIF, ABA, APM, etc), obtaining the construction authorization. After completion, follows the organization of the auction for the execution of the works. In some situations, at the request of the O.U.A.I., the phase of technical project preparation and the execution can be taken together at auction. The drawing up of the documentation is made according to the framework content provided for in the Government Decision no. 28/2008 regarding the approval of the framework content of the technical and economic documentation for public investment, as well as the structure and methodology for drafting the general estimation for investment objectives and intervention works, issued by the Ministry of Development of Public Works and Housing, published in Monitorul Oficial No.524 of July 11, 2008.

Given the effects on agriculture, the global warming and the emergence of aridization in some areas of our country, it is important and necessary to rehabilitate/modernise irrigation facilities and new investments in EU/governmental or even private funds, to reduce the effects of drought, thus ensuring stable and increased productions independently of climate developments.

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