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PROGRESS REPORT 2
Less-Water Bev.Tech
Contract ECO/13/630314

Covering the reporting period from
01/05/2016 to 31/12/2016

Reporting Date:
31/12/2016

Project coordinator: A DUE DI SQUERI DONATO & C. S.p.A.
Project website: www.lesswaterbevtech.com
Deliverable: D1.14 Second Progress Report (PR2)

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1 Progress of work plan in the period

This technical progress report (named progress report - PR), contains all the needed information for EASME to evaluate the state of implementation of the project, the respect of the work plan and how far project's objectives have been achieved. This PR does not include any financials, but only an overview of the hours spent by the staff allocated to the project per each partner and per WP.

1.1 General progress

The project was carried out by partners according to the scheduled timetable, without any substantial problem in terms of deviation to the original Gantt. Almost every scheduled task and deliverable has been timely produced by partners according to the responsibility set in the Annex I of the Grant Agreement. A few deliverables have been released in delay due to some technical and organisational issues to solve before their implementation, mainly depending on the production needs of the final client (CCdP- Consorzio Casalasco del Pomodoro). These delays had no impacts on the correct project implementation and on the achievement of planned results and outcomes.

The lead partner coordinated the overall project management and the cooperation among partners was very good, ensured by different tools, like physical and virtual meetings (e.g. via Skype™, WebEx™), phone call, very frequent e-mail exchange and many different contacts in the project management tool (BaseCamp™). All the deadlines and the action plans were agreed together with the partners, which have been very active in this reporting period as well. After the preparation and submission of the Interim Report, which was accepted by EASME, the second pre-financing payment has been received and accepted by the coordinator, who forwarded the relevant funds to the other two partners without delays.

As for the technical activities, partners strongly worked to have the start-up of the pilot plant in the middle of May 2016, right after its installation concluded in April 2016 (and reported in the last period) and the subsequent tests started in June 2016. The partners organised a site visit in June 2016 in order to assess the functionalities of the Innovative Water Treatment System, during which there were the Company Management, the Technicians responsible for the implementation of the System, the Client testing and using it, the Project Partners/Consultants and the Representative from EASME.

The business exploitation was performed through the deep analyses of both EU and MENA markets, with important investigation of the technology benefit demonstration and measurement, including the technology adaptation.

Some dissemination activities have been carried out, in particular through the project web site www.lesswaterbevttech.com and through the direct participation or organisation of Forums, Workshops and Exhibitions, during which info about the project were diffused through e-mails, flyers, posters, advertisements, articles in specialized trade magazines, Internet portals and specific power point presentations to some potential interested clients as well.

1.2 Progress on all work packages against initial objectives

All the project progresses, in comparison to the planned activities (as in Annex I of the Grant Agreement), are hereafter reported, work package by work package.

In **WP1 (Management)**, two different transnational meetings have been carried out, as scheduled (on September 20th 2016 and November 29th 2016), in order to discuss and review on the project correct implementation, keeping all the key actors updated and fully coordinated. All the partners and external experts took part, as usual. The adopted scheme was the same of the other partners' meetings, so that both administrative and technical issues were discussed in different sessions and in sub-groups in order to define the next steps to perform to reach the project goals (*see deliverables D1.7 Project coordination meeting/sub-meetings #6 and D1.8 Project coordination meeting/sub-meetings #7*).

The web-platform for data sharing and communications among partners, as a Project Management tool (Basecamp™), was updated with all the project materials.

The project coordinator received the funds of the second pre-financing payment (linked to the info provided in the IR) and forwarded the relevant amounts to the other two partners with no delays. The last activity was the preparation of this PR2 (*see D1.14 Second Progress Report (PR2), coordination and timing control*). All the partners gave their contributions to finalise it, under the coordination of the lead partner.

As for **WP2 (Design of a new water treatment and waste recovery system)**, the activities have been coordinated by the WP leader (Unibo) and supported by A Due Spa. CVAR participated with a minor role.

During this period, the partners continued the discussion for the scouting of clients, potentially interested for the installation of the pilot and how this is to be adapted to meet particular clients' needs.

The recovery of water included a series of chemical and mechanical treatments that allow water purification and make it suitable, both from the microbiological, chemical and physical points of view to be reintroduced upstream of the production chain or for other purposes.

After the assembly, the start-up and tuning phases of the water treatment system, partners fine tune the design of each function units according to the emerged requirements, if needed.

Concerning **WP 3 (Engineering, integration and assembly of the new water treatment and recovery system)**, the assembly and the installation of the pilot plant totally met the client's stringent requirements in terms of layout, sqm as well as exact place in which placing the prototype in order that the machine test did not create interference with the daily production processes. The start-up phase has been finalised in this reporting period.

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The main points taken into consideration for the carrying out of the subsequent tests were the following:

- a) the logistics complexity at client premises;
- b) the provision of the production waste (concentrates) by client to add to the water in order to enlarge the tests spectrum;
- c) the provision of chemicals (e.g. sodium, sodium hypochlorite, etc.) necessary for the sanitisation stages of the new water treatment plant;
- d) the final evaluation on how reusing the treated waters (as an ingredient in the production line or for any other services and for utilities in the plant) done together by all the partners and the client in order to give the right value to the entire process.

The activities for **WP4 (Start-up, tuning and performance/sustainability analysis)** foreseen the start-up of the pilot plant which has been initiated in the middle of May 2016 in

terms of checking the correct hydraulic operations, testing the software with the needed integrations, tuning the various system parameters like pressure, flow, etc., calibrating all the instruments, optimising the chemicals dosage during the functioning and washing phases and, lastly, igniting the entire machinery.

The tests has started in June 2016 and had some delays due to some internal problems by the client CCdP in terms of water provision and production of waste, in particular due to the fact that the tests were proceeding in parallel with the important season of tomatoes (summer). These led to a delay in the implementation of the tests with the right production waste, namely those industrial effluents which are of outmost importance for marketing the water recovery system to the final customers located in EU and MENA regions.

Anyway, the partners took the occasion to perform some specific tests also with waters containing tomato sauce in order to verify the correct functioning of the entire system. This delay did not have major impacts on the project implementation and on the final results.

The contaminants of industrial drink production waste water were different in nature: organic compounds used for production (fruit juices, sugar, flour thickeners, ascorbic acid, citric acid,...), chemical products for washing and disinfecting production equipment (caustic soda, nitric acid, peroxides, chlorine,...), salts and metals (normally present in water used for production, but in this case concentrated and discarded by the reverse osmosis plants).

Summarising the results of the seven series of industrial performed tests, one can note that the main recognised analytical data fall within the limits (as established by the main producers of beverages industries worldwide) of the water used for the production of beverages. It should be also noted that, in five out of seven tests, the treated waters can be used to power the smoke-tube boilers, thus expanding the possibilities of reuse the treated waste water by Less-Water Bev.Tech project.

Almost all the parameters respected the clients' standards, demonstrating that the first test support the good functionalities of the water treatment system developed under the project. Further actions were carried out, in particular: some implementation on the pilot plant (installation of the self-cleaning filter), chemical/physical assessments, some microbiological tests and some analyses on the water potability, performed together with the client in order to get an official validation.

The first results of those tests were presented on November 2016 during the two workshops organised by the partners in Dubai (UAE) and Bologna (Italy) and during the workshop "Eco-innovation project in the Water Sector" organised by the research team of ARTICA4NR (an European project also funded under the eco-innovation programme) at the international exhibition iWater in Barcelona (Spain).

The water treatment system was tested, therefore running without any possibility to reintroduce the treated waters in the production processes, to give the client the possibility to assess the consistency and repeatability of the results obtained so far. In the meantime, A Due planned the organisation of some training sessions for the CCdP's operators in order to teach how to use correctly the system, especially on the possible warnings the same system may generate.

Concerning **WP5 (Business plan & exploitation)**, after the analyses on the EU market and the relevant industrial sector, focussed on the quantification of the technical strengths and the economic advantages that new water treatment system will produce to the customers, A Due and UniBO discussed and studied how to penetrate in MENA market, by carrying out a complete competitive analysis, with some highlights on opportunities and threats.

Contrary to what takes place on the EU market, the rules and good practices in place in MENA area to monitor and reduce water consumption are not yet widespread, and especially poorly enforced. In addition, the unfavorable cultural, economic and political context causes a

lack of sensitivity to environmental issues and to natural resources savings in many countries. Nevertheless, in view of the increase in demand for beverages and the scarcity of available water (caused by the demographic increase and the growth in consumption in the agricultural and industrial sector), a reversal of the trend is expected. Today, some more structured companies are beginning to comply with the European standards also in MENA region.

Another peculiar aspect identified in this area, that could give efficacy to this prediction, is the existence of numerous private bottlers that produce beverages on license for multinational companies like Suntory - Orangina, American Cola, Pesi Cola, Coca Cola, etc. These international brands are more and more driving local partners to align not only to quality but also to environmental parameters, which refer to European and/or American standards, following with the guidelines of international environmental protocols (e.g. those of Kyoto).

Therefore, at present there are not complete and personalised solutions for the treatment of waste water resulting from the process of beverage preparation. There are some technical adaptations needed because of different water characteristics in markets outside EU which were studied and analysed, with particular reference to market with a high scarcity of water as raw materials, where this new technology could have a significant impact (*see deliverable D5.2 Final Business Plan formal definition - MENA market*).

Coming back to the EU market, the proposed technology for wastewater purification and pure water saving has to be spread and adopted in the whole European Union. Furthermore, the features of raw water available in Europe differs from country to country and from region to region. The concentration of dissolved salts, microbiological organism, minerals, heavy metals and dissolved gases define the characteristics of the fresh and groundwater used as input by the beverage processes. Thus, the proposed wastewater treatment plant has to consider the variety of this operating environment to achieve high flexibility, versatility and a widespread adoption in the whole continent.

The first action implemented to target this goal is a proper design of the entire wastewater treatment plant. Thus, the plant is made of several functional modules, each of these distinguished by a specific purpose. Aim of most of the modules is the partial or complete removal of one or more pollutants from the process water. The modules are connected through proper piping elements which enable to easily reconfigure the wastewater treatment plant. However, the adaptation of the developed wastewater purification and pure water saving technology has to be further improved beyond the current state of the art.

Considering the variety of soft drinks produced in Europe the plant has to be able to treat wastewater affected by several contaminants. The wastewater coming from the production plant for juice and nectars are distinguished by a significant concentration of organic matters and related fibre and puree. To ensure a fully flexibility and adaptation to the highest number and category of EU stakeholders, a corrective action is already planned. A self-cleaning pre-filter is designed and it will be installed in the Italian test-plant in January 2017 to be tested in February 2017 (*see deliverable D5.3 Technology benefit demonstration and measurement. Technology adaptation (EU market)*).

In **WP6 (Dissemination activities)**, the activities have been coordinated by the lead partner, with the active participation of the other two partners with different level of efforts (minor role for CVAR). The website was used to carry out a better dissemination and communication of the new technology (www.lesswaterbevtech.com). Some gadgets and promotional materials have been produced and distributed during main events organised or participated in. UniBo took part and presented the project in the 20th European Forum on Eco-innovation held in Tallinn (Estonia) on October 26-28th, 2016 in the name of the partnership, during which some interested investors have been met. The partners could be interest in those investors who can finance with debt the possible future development/commercialisation of the water

treatment system. There is no interest on equity investors. There was also the occasion to talk with other participants and researchers, running different projects, to share ideas on possible future cooperation, and to have a clear framework about the coordinated panel of action the EU Commission is running to support both the SMEs and the transition toward green standards, management and solutions.

In addition to that, the partners organised two workshops: the first one during the Gulfood Manufacturing Exhibition in Dubai (UAE) on November 7th 2016, to which more than 30 persons participated, in order to take the occasion to present the technology implemented in the project to some possible and interested clients from the MENA region (<http://www.gulfoodmanufacturing.com>). The project was promoted also on the exhibition website and through a dedicated advertisement and a technical editorial in a specialised magazine (Italian Food & beverage Technology - <http://www.chiriottieditori.it/it/italian-food-beverage-technology.html>) shared during the exhibition.

The second workshop was organised in Bologna (Italy) on November 14th 2016, with the aims to bring together professionals and researchers in order to discuss and validate the results achieved so far in the project, together with extending the knowledge of the Italian water context to emerging academics, practitioners and researchers in the field. More than 30 persons participated and the topic was on both the results of tests and the project technology benefit demonstration. (*see deliverable D6.14 Workshops organization*).

Further to that, the project was presented with slides to the “Eco-innovation project in the Water Sector” during the international exhibition iWater in Barcelona (Spain) on November 16th 2016 (<http://www.iwaterbarcelona.com/>).

A Due participated in the following exhibitions (public events), during which possible clients for the water treatment system were informed about the project and its results:

- ExpoPack, Ciudad de Mexico, May 17-20th, 2016
- Iran Food & Bev Tec, Teheran, 30th May to 2nd June 2016
- GulFood Manufacturing, Dubai, November 7-9th, 2016

In addition, A Due participated in the Job Day event, organised by the State University of Parma on October 7th, 2016 to find out possible talents to be hired in the company. This was the occasion to spread also the results of the innovation generated in the company, like the new water treatment system to a specific target of high level and interest in making “green” practices a goal to focus on in their next job.

Finally, the partners started planning the project presence during the World’s leading trade fair for the beverage and liquid food industry (Drinktec in Munich on September 11-15th 2017 - <http://www.drinktec.com/>), during which with high probability the final event in the form of a Clustering Event will be organised together with other projects funded under the Eco-Innovation Programme.

As for the major subcontractors, A Due Spa was supported also in this reporting period by Mrs. Micaela Guerzoni, a chemical expert that intervened in the design, engineering and tests of the water treatment system, with particular regard to chemical aspects.

A Due Spa continued the collaboration with Mr Maurizio Violi, an experienced engineer in water treatment process, which intervened in the design, engineering and business analyses of the water treatment system.

Part of the implemented chemical analyses have been carried out, as in the previous periods, by the external specialised company SAVI LABORATORI & SERVICE S.r.l., with which there is a running contract service.

In addition, two separate contracts on Specialised Commercial Relationship Consultancy were signed to perform the best dissemination of the new technology and its potential results: the

first one for the MENA market with the company SBA Cote d'Ivoire, the second one for the EU market with Herve Zanini.

In the present reporting period, A Due Spa has purchased some materials and other consumables for system integration and testing.

The table below reports the deliverables listed in Annex I of the Grant Agreement which correspond to the present reporting period, sorted by WP:

Del. N° ¹	Deliverable name ¹	Type ¹	WP N° ¹	Delivery date from Annex I ¹	Delivered (yes/no) and status (draft/final)	Submission with report ²	Forecasted delivery date	Comments on progress
D1.7	Project coordination meeting/sub-meetings #6	Meeting minutes	1	31/08/2016	Yes - final	PR2	20/09/2016	None
D1.8	Project coordination meeting/sub-meetings #7	Meeting minutes	1	31/12/2016	Yes - final	PR2	29/11/2016	None
D1.14	Second Progress Report (PR2), coordination and timing control	Report + Project Information Sheet	1	31/12/2016	Yes - final	PR2	31/12/2016	None
D5.2	Final Business Plan formal definition (MENA market)	Business Plan	5	30/09/2016	Yes - final	PR2	30/11/2016	Issued on delay without impact
D5.3	Technology benefit demonstration and measurement. Technology adaptation. (EU market)	Report	5	31/07/2016	Yes - final	PR2	31/12/2016	Issued on delay without impact
D6.4	Project information updates (pre-defined)	text, ppt	6	31/12/2016	Yes - final	PR2	31/12/2016	None
D6.14	Workshops organization	Workshop	6	31/07/2016	Yes - final	PR2	30/11/2016	Performed on delay without impact
D6.15	Workshops organization	Workshop	6	30/04/2017	Yes - final	PR2	30/11/2016	Performed in advance without impact

All the due deliverables with public dissemination level (PU) were put in the project website for public download. The Eco-Innovation logo and the legal disclaimer are indicated in these published documents.

1.3 Identified deviations, problems and corrective actions taken in the period

No problems arose in terms of project implementation, since all the activities were performed

¹ This information must be identical with your List of Deliverables in Annex I of your Grant Agreement.

² Please indicate the report with which you have submitted the deliverable (PR1, IR, PR2, ...).

as planned in the approved project. However, the system test had some delays due to the some internal requirements by the client CCdP in terms of water provision and production of waste, in particular due to the fact that the tests were proceeding in parallel with their important business season of tomatoes (summer time). These led to a delay in the finalisation of these tests with the right production waste, namely those industrial effluents which were of outmost importance for marketing the water recovery system to the final customers located in EU and MENA regions. Anyway, the partners took the occasion to perform some specific tests with waters containing tomato sauce as well in order to verify the correct functioning of the entire system. This delay did not have a major impact in the overall project implementation, except for the postponement in issuing both D5.2 and D5.3, produced in December 2016, when the tests results have been analysed and the quantitative indicators correctly interpreted.

In addition, as for the technical implementation on the pilot plant, there was the necessity to plan the installation of some self-cleaning filters to solve the unexpected slight problem of the pre-filters clogging in case of pollutants like pear and tomato juices. The partners also agreed to verify if active carbons can remove also other oxidants such as ozone and hydrogen peroxide and the existence of an alternative system for the PPA and the other oxidants removal, further than the identification of alternative mechanical filtration systems (or other different systems).

1.4 Progress regarding performance indicators

Presently, the performance indicators cannot be assessed as they concern a situation that will be achieved at the end of the project. No amendments are to be done.

2 Progress regarding market uptake and exploitation

A full market assessment was completed and a list of potential customers finalised. This list was divided into subcategories and market segments in order of priority and organise the market exploitation activities, starting from the top prioritised customers going downward, in order to implement the relevant actions in an effective and rational way.

The customer list identified customers, the relevant key actors and decision makers to contact with the information package on the new water treatment system, in order to create an interest and plan one or more visits.

The fine-tuning of market scenario analysis was done according to a deepening and completion of the competitive analysis, through the five forces of Porter, identifying competitors, new entrants, suppliers, buyers, substitute products.

The Strategic Actions were updated as well as marketing strategy to be implemented to spread the new water treatment technology.

The competitive advantage for the water treatment system, and its sustainability in the medium term, depends on the following Strategic Pillars:

- Technology: for water saving, environmental impact and cost reduction
- First mover advantage: to gain market share setting a market leadership for the technology
- Setting a new standard for the performance of the water treatment in the beverage processes: to leave the old technologies behind
- Developing distinctive capabilities: to develop a Learning Curve advantage
- Human resources: to stimulate a distinctive and specialised know-how
- Economies of Scope: to exploit important synergies
- Technology collaboration: to evaluate if becoming a supplier for the competitors

As for marketing and promotion, A Due Spa had a massive and structured marketing

campaign using many different instruments, with the goal to increase the loyalty of the existing clients and to increase the clients' portfolio. The main points of the marketing campaign are multiple customer visits. Taking into account that the products of A Due are distinguished by high complexity and by high customisation degree, multiple direct visits to the Customer by a sale force member is considered to be the most appropriate tool in terms of sales promotion. For this purpose A Due set up a series of training courses for all the sales force in order to get them ready for promoting the new water treatment system with the maximum efficiency.

3 Work plan for the next period

3.1 Planned activities in the next period

In the next reporting period (January-September 2017), partners will finalise all the project activities, with attention on the monitoring and measurement of the performance indicators.

The partners will meet twice for discussing on the project implementation at technical and administrative points of views (WP1). This will give the chance to discuss on how to proceed, in particular on WP 5 Business plan & exploitation.

As for the technical activities, the partners will mainly work to finalise WP4 tasks, in particular there will be an assessment on how reusing the recovered waters: a first possibility could be to connect the water treatment system with the storage tanks of softened waters that feed the client's boilers (January 2017). Then, in February 2017, after the installation of the above mentioned self-cleaning filters, the tests will be repeated by both A Due and UniBo, especially with those polluting inputs that gave the highest grade of difficulty, namely pear and tomato, including also the orange cells as a further input to test. UniBo will also investigate the causes of water haziness after the introduction of polluting inputs like sugar syrup, not removed by the Ultra Filtration action. Subsequently, in March 2017, the water treatment system will be self-operating and all the parameters will be recorded for a deeper analysis by UniBo. In the meantime, Cvar will implement a module for an automatic on-line upload of all the data (readable via remote systems) and explore the possibility to implement a panel indicating a synthesis of the main results achieved by the water treatment system. Cvar will also prepare a comprehensive operator manual to accompany the software, taking into account all the modifications that have been done in accordance with the various needs and requests. The WP will end with the performance & energy analysis, environmental and economic indicator assessment as well as with a complete Plant Life Cycle Assessment.

The partners will then come back to work on WP2 to understand if there will be changes to be done in the original designs of the new water treatment and waste recovery system, also including the feasibility of the beverage solid waste energy recovery via biomass plant.

The WP5 activities will continue with technology benefit demonstration, measurement and technology adaptation for the MENA market as well, and with all the relevant tasks to be performed in order to have a sound exploitation of the business idea, like the First-mover & new technology standard exploitation, Capabilities & Human Resources, Economies of Scope & Technology Collaboration, Clients exploitation (Group 1: Big CSD Bottling Companies in EU and MENA - Technology partnerships), Distribution, Promotion & Replication, Cost-Benefit Analysis. No patents will be registered or extended by the partners.

As for the activities in WP6 in the next period, partners will issue the expected scientific papers in order to disseminate the proposed purification technology and to collect feedback from the scientific community. In addition, the presence to sectorial events will continue through the participation to conferences and public events with the aims to meet professionals and researchers and discuss about the achieved project results. A Layman's report will be issued and the Clustering Event organised, most probably during the World's leading trade fair for the beverage and liquid food industry (Drinktec in Munich on September 11-15th,

2017 - <http://www.drinktec.com/>), together with the other project funded by the Eco-Innovation Programme in order to have a cross-fertilisation about the achieved outcomes.

3.2 Planned meetings, activities related to market uptake and dissemination activities

As for the next project meetings (until the end of the project), partners intend to meet at least twice (March 2017 and September 2017, as scheduled. The main topics to discuss will be both in technical and administrative spheres.

Concerning the activities to foster the market uptake, the partners will continue carrying out the actions to promote and disseminate the project results.

Partners plan to take part in the following exhibitions:

- Drinktec, Munich, September 11-15th, 2017

The partners intend to present two scientific papers, as scheduled, to the following events:

- 4th International Conference on Sustainable Design and Manufacturing April 26-27-28th, 2017, Bologna (Italy), <http://sdm-17.kesinternational.org/index.php>
- XXII edition of the Summer School “Francesco Turco”, September 13-15th, 2017, Palermo (Italy), <http://www.summerschool-aidi.it/>. The Summer School promotes interaction and cooperation among researchers coming from different universities with sessions to share projects, results and research papers.
- Probable participation to the 24th edition of the International Conference on Production Research (ICPR2017), July 30th, August 3rd, Poznan (Poland), <http://www.24icpr2017.put.poznan.pl/>.

4 Other issues

No other issues to report.

5 Annexes

This PR consists in 2 originals and 1 electronic format, and contains as annex:

- the updated version of the publishable project information sheet;
- a copy of the deliverables produced during the reporting period, excluding those already sent with the previous report.

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