

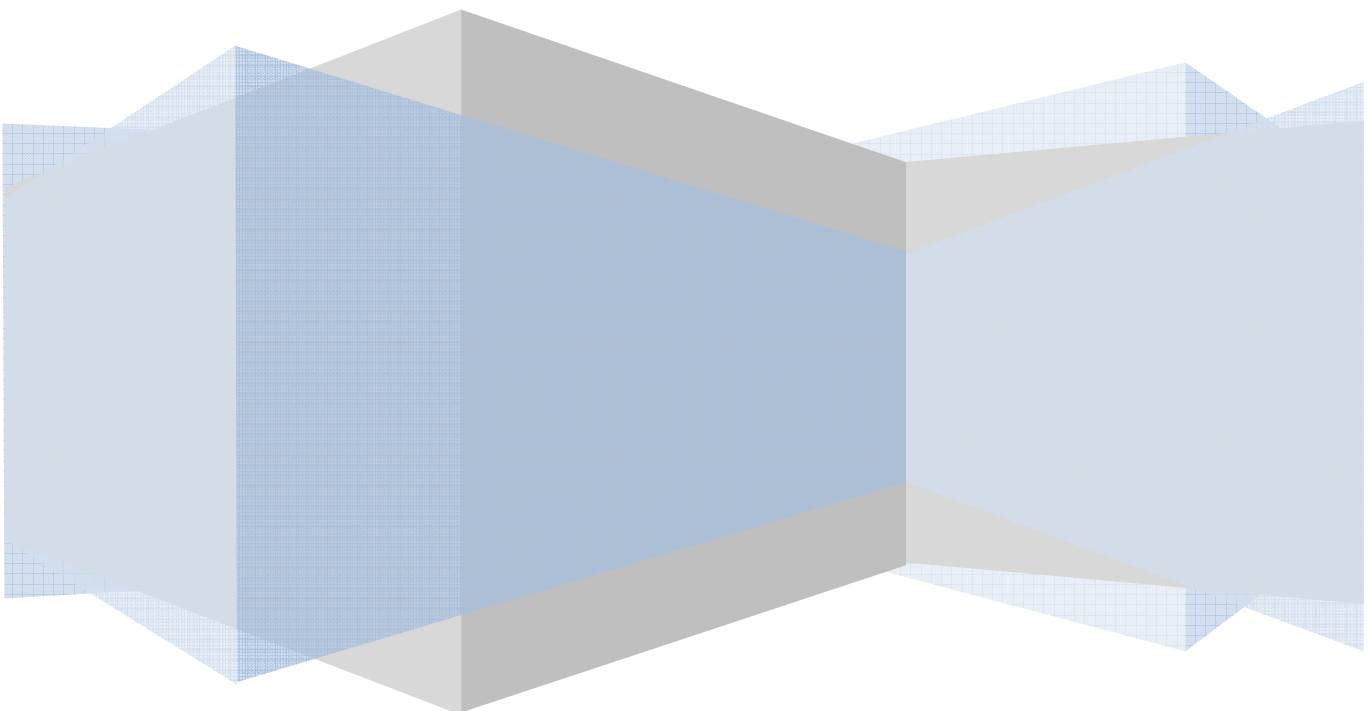
Template of Mid-Term Progress Report

Water Joint Programming Initiative 2018 Joint Call

Closing the water cycle gap - Sustainable management of water resources

This Template should be used by the Project Coordinator for the reporting of the project.

This template does not substitute national regulations

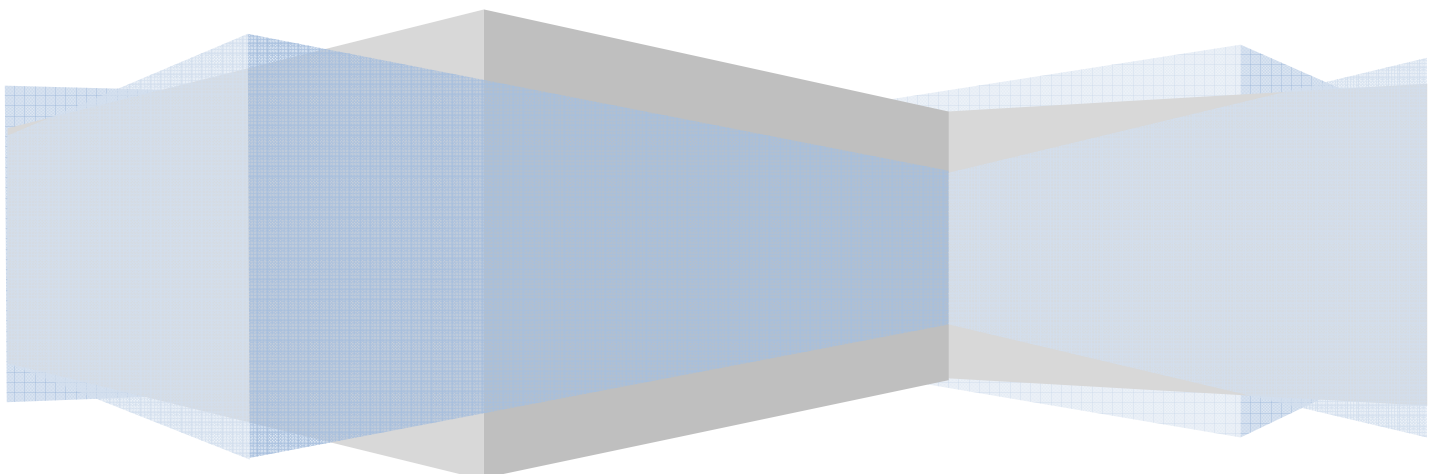


2018 Joint Call Mid-Term Progress Report Closing the water cycle gap - Sustainable management of water resources

Nudges for Economics of Water Tariffs (NEWTS)

This document must be filled in by the project coordinator with the help of its project partners and must be sent to the WaterWorks2017 Follow-up Secretariat by 31/10/2020 (for Consortium NEWTS).

The WaterWorks2017 Follow-Up Secretariat will ensure distribution to the concerned national funding agencies. The project coordinator is responsible for sending a copy of the report to its partners.





Nudges for Economics of Water Tariffs - NEWTS
--

Author of this report (Coordinator): Michel PAUL

Date of submission: 31/10/2020

E-mail: michel.paul@univ-reunion.fr

Project Website: in progress

Project code: WaterWorks2017-NEWTS

Duration of project:

Start date: May 2019

End date: April 2022

Period covered by this report: May 2019 - October 2020

1. Publishable Summary

The project objectives The research program addresses the issue of household water demand management. Prima facie, it aims to provide a socio-economic assessment of green nudging policies, focusing on water consumption controlling and proper understanding of the charging system by the households, taking into account adjustments in the pricing policy that nudges may generate (in view of their effects on water demand functions). From an operational point of view, it consists in developing a micro-simulation model, based on econometric estimates of household water demands, to assess the socio-economic returns of mix policies, combining nudges and pricing instruments, and identify financially sustainable DSM (demand-side management) policies to improve current water utility tariffs.

The program is designed around various methodologies. The effects of nudges on household water consumptions are examined through the realization of controlled experiments, in the lab and in the field. Randomized controlled trials are planned to be performed in Gijon (Spain), Saint Paul (Reunion Island - France) and Sfax (Tunisia). Econometric estimations of residential water demand are carried out to measure basic water needs of the households, price-sensitivities of demand and perceived prices of water. Econometric exercises are implemented before and after the nudging campaigns, in order to infer the effects of BIs (behavioural interventions) on the latter three factors and identify the transmission channels through which nudges modify the water demand functions of the households. This knowledge about the water demand functions, as provided by econometric analysis, combined with databases used for their estimation enables (i) to assess the socio-economic performance of the tariff; (ii) to infer the effects of nudges on this socio-economic performance; (iii) to identify optimal policies, according to well-defined decision criteria for local public decision-makers, in various analytical and regulatory frameworks. This evaluation process is carried out through a scoreboard and the use of appropriate indicators, in accordance with the objectives of EU Water Framework Directive (affordability, incentive effect of pricing, equity, economic welfare and quality of funding). In fine, all of these elements articulate to construct a DST (decision support tool) that can be used to inform decision-making about Water Utility DSM policy.

The main results achieved so far COVID-19 crisis has had a strong impact on the work program, in particular with lab and field experiments that have been postponed. The team relied on data collected in the context of other projects to make as much progress as possible on the various items of the project. At this stage, it has produced methodological results, in each of the three major areas of expertise around which the consortium is organized. The later refer to behavioral economics with results relating to the conduct of nudge policies, econometrics of water demand with the measurement of overconsumption, and evaluation of pricing policy with the development of the micro-simulation model that provides, at this stage of the project, a large part of the information for the aforementioned first 3 fields of analysis..

Potential impact The project aims primarily to inform local water DSM Policy with the integration of economic and social sciences into decision-making processes. It is at first to make use of the information provided by econometric model of household water demand for diagnostic and simulation purposes concerning the socio-economic performance of pricing. It is as well to make progress on the issue of evaluation of water DSM policy, by supplementing common indicators of documented socio-economic impacts by targeted "new measures", commonly used in other areas of economics, and that are thought to be informative for all the stakeholders involved in water management. It is finally to improve tariff instrument with appropriate and well targeted BIs, taking into account the full array of their consequences on the multidimensional performance of DSM policy. It is hoped that by implementing policy that makes use of the findings and tools of this research, positive economic and social benefits should be realized in terms of, for instance, improved management of water use by household, reduced pressure on water resources due to water wastage and enhanced water management practices.

2. Work Performed and the Results achieved during the reporting period

a. Scientific and technological progress

Please describe the work performed and the results obtained during the period concerned, and the conformity of the work progress within the initial schedule. Take into account the following aspects:

- Has progress been made towards progressing the project objectives according to the original description and milestones? If not, please, explain the deviation.

Compared to forecast, significant progress has been made in the area of Evaluation with the following:

(i) construction of the dashboard and selection/construction of indicators measuring the socio-economic performance of the pricing policy in 3 of the 5 targeted fields of analysis (affordability, incentive effect of pricing, equity);

(ii) development of the related micro-simulation model (prototype).

Besides, the project is in line with the scheduled work plan concerning (iii) the contents of behavioral interventions (BIs), (iv) the design of lab experiments and (v) the development of the multi-agent model. At the same time, work on household water demand econometrics, with one model by study-site, experienced several delays linked to (i) problems of access to or production of individual household data needed to make those estimates, and (ii) the COVID-19 crisis. The programming and experimental plans for the implementation of BIs, both in the field and laboratory conditions, were also impacted by the COVID-19 crisis and had to be adapted. A detailed account of the difficulties encountered by each of the partners is given below.

A) Experimental Economics

In terms of experimental economics, the implementation of actions programmed within the project encountered 3 difficulties.

1) **Nudges Design** The first relates to the nature of BIs to be tested as part of the programme.

Reunion Island As explained in the full proposal, implementation of the Nudges methodology requires initial field feedback on the difficulties that households may face in managing their domestic water use. To this end, a Reunion Island Nudge Unit was set up, composed of academics, users' representatives, managers of La Créole water company and a member of Office de l'Eau Réunion [OER - Reunion Island Water Office] which plays the role assigned to water agencies in mainland France. At the end of its (initial) work, the working group recognised the interest of BIs initially envisaged in the project and consisting in replicating (with adaptations) the messages on good understanding of the tariff system deployed by the South African partner (EPRU) on the Cape Town site (preliminary studies carried out by CEMOI [Indian Ocean Economics & Management Centre] on the characterisation of water consumption in Reunion Island established that Reunion Island households largely underestimated the price of water, and that such poor perception caused significant over-consumption, on average 14% of total consumption).

At the same time, and in the light of the same field feedback, the working group considered that BIs concerning users' willingness to pay was a priority. The aim here is to make paying one's bill a meaningful act and create a certain level of acceptance by the population of the very principle of paying for water and sanitation services. Beyond the fact that, as we live in a tropical environment, "water is everywhere," Reunion Island's high poverty rate means that a large part of the population does not pay for most local public services (canteen, transport, etc.) and therefore does not understand why the same does not apply to

water service and, above all, collective sanitation service (whose development in Reunion Island has resulted in a near doubling of the bill). The idea is that households will be better able to implement rational management of their water use, in the same way as they can scrutinize other consumption items, if they understand the need for recovering water service costs and the "water pays for water" transparency principle, which the pricing policy must satisfy. It should be noted that the local water company involved in the project has a high rate of unpaid bills, which is at the origin of a significant deficit, with a legislative framework that prohibits water cuts and flow restrictions.

The working group then requested the expertise of behavioural scientists involved in the project to think about designing a nudge on willingness to pay for water and sanitation. This request was a major challenge, as previous experiments on which it was possible to capitalise were rare. Apart from a few communication campaigns that have been conducted in some developing countries, the only nudge that can be considered to be close to the recommendations of the working group is an Australian experiment, playing on the feeling of national pride, with images of emblematic animals of the country to justify "what your taxes are for" in the environmental field. The (two) working groups then embarked on this path and several proposals were drawn up, but none of them were accepted.

Given time constraints, the decision was made to continue working on the design of this nudge on willingness to pay for water by mobilising resources other than those allocated to this project. In this context, the CEMOI (France - Reunion Island) and EPRU (South Africa) teams requested the PROTEA exchange programme to finance missions by South African researchers, specialists in behavioural economics, to come and work on site with stakeholders on the design of this nudge (whose deployment, if this work is successful, will be financed by specific local resources). It should also be noted that the Consortium recruited via the Spanish partner an expert who had worked precisely on the Australian campaign mentioned above. Unfortunately, she had to give up due to COVID-19 crisis restrictions, as she was unable to obtain her (Spanish) work permit and her skills could not be made use of. In the end, we therefore returned to the initial project, namely the replication (with adaptation) of nudges relating to a good understanding of the tariff system that were implemented by the South African partner in Cape Town. Although this production diversion is regrettable, it does not seem to us to be detrimental. First, stakeholders were fully involved in the Nudge Unit operation. Co-construction with stakeholders is at the heart of the NEWTS project, which also aims to "break down borders." In this context, it would have been unwise not to take into consideration the only demand that stakeholders ultimately expressed. Secondly, this work, while contributing to knowledge transfer, also made it possible for stakeholders to join together in the BIs that will now be deployed. Thirdly, this work also made it possible to define a new project that will allow several members of the Consortium to continue working with local stakeholders, with a strong "regional cooperation" dimension.

Spain - Delays for the selection of a Post-Doc candidate (with special expertise on nudges design) The internal application for a Post-doc position (with special expertise in nudges design) started once the funds were available (November 2019). Delays in the internal procedure at the University of Oviedo lead to publish the call for the position at the beginning of February 2020. A foreign non-EU candidate was selected on 18-02-2020, starting the procedure to apply for labour permit and visa. However, COVID-19 crisis also generated mobility problems that prevent the foreign candidate selected to work in the project to travel to Spain. Actually, during the National Health Alert period Spanish Embassies/consulates did not issue visas. Finally, the candidate decided to resign her position on 30 June 2020. This fact leads to restart the selection process on July 2020. Again, delays in the internal procedure at the University of Oviedo allow hiring a person by mid-October 2020.

Given this failed hiring procedure, nudging experimental design is been developed along 2020. Conducting the nudging field experiment, activity originally scheduled by the end of 2020, has been postponed and it will be conducted by mid 2021. The presence of collective meters and changes in the metering procedures after the COVID-19 crisis have had strong impacts on both the nudging design and implementation.

Tunisia (the information given below corresponds to the one provided as is by the Tunisian partner)

As mentioned in the proposal, it was planned to examine the effects of nudges on household water consumptions through the realization of controlled field experiments for the study site of Sfax (Tunisia). Unfortunately, due to technical and bureaucratic difficulties out of our control, we are still unable to perform any actions related to the implementation of randomized controlled trials. The main difficulties are twofold: (i) our local partner, the SONEDE, was not at all collaborative; we tried several times to meet the responsible who are concerned with the project to explain the method and the steps to follow to realize such controlled experiments but without any response; (ii) we have not found in Tunisia any expert in behavioral economics who could help us in implementing nudges and performing randomized controlled trials (and helping in setting a local nudge unit for the Tunisian part of the project). Besides, we were not able, due to bureaucratic difficulties, to participate to the Grenoble workshop held last year to meet behavioral economics experts who may help us in our application.

2) Lab experiments

Initially, lab experiments were planned in Grenoble (GAEL) and Rennes (CREM) on the two experimental platforms with decontextualized experiments (with students) managed by CREM and field-in-the-lab experiments (with real people) managed by GAEL. The project aims to test the impact of informational nudges in the form of price recalls with different pricing modes and complexities. It was also proposed to test the persistence of these BIs, and the question of the best time and frequency at which they should be deployed.

Regarding planning, lab experiments were to take place from the start of the project (first semester - year 1). These were postponed for the first time (second semester of year 1), at the request of the stakeholders involved in the project who wanted nudges relating to the user willingness to pay for water (and that there remained to be designed) to be included in the research program (and therefore potentially tested under laboratory conditions). Once the contents of the BIs determined, the holding of experimental sessions was impacted by the COVID-19 crisis.

CREM The laboratory experimental designs were built in Rennes from September to December 2019, and the computer scripts were developed from January to March 2020. The experimental sessions were planned from May to June, but lockdown was settled in France from Mid-March, 2020 to Mid-May 2020. Then, a series of experimental sessions supervised by other researchers that use the LABEX EM as well as ours that should have been settled during this period had been cancelled. After the end of lockdown, the Department of Economics was closed for students or anybody else with exception to salaries from the University until the end of August 2020. It was therefore impossible to have experimental sessions as no participants were authorized to be present at the LABEX-EM. Since September, we have participants, but the capacity was settled to 50%, as for other facilities. A particular setting for the LABEX EM was designed for coping with the COVID-19 pandemic. We just start in October to have experimental sessions and other experimenters have priority for their experimental sessions that had been cancelled. We plan to have our experimental sessions in January 2021 (at last a 6 month delay compared to the original planning).

GAEL The experimental platform in Grenoble has been closed since March (date of confinement in France). It reopened at the end of September 2020 and only have half of its capacity. As a result, the laboratory experiment has been rescheduled and will take place in early 2021. This time was devoted to an important work on literature which allowed to deepen the reflection on nudges. The literature on consumers' inattention (Gabaix (2014)¹, (2019)²) and on the biases and erroneous beliefs of water in behavioral economics (Sexton (2015)³, Wichman (2017)⁴) has considerably enriched the theoretical framework of the

¹ A sparsity-based model of bounded rationality. Quarterly Journal of Economics 129 (4), 1661-1710.

² Behavioral Inattention. In: Handbook of Behavioral Economics, edited by D Bernheim, S Della Vigna and D Laibson. Vol. 2. Elsevier, 261-343.

³ Automatic bill payment and salience effects: Evidence from electricity consumption. Review of Economics and Statistics. 97(2), 229-41

experiments. Accordingly, the planned experiment is currently being redesigned and will be the result of a collaboration between Rennes and Grenoble researchers.

Generally speaking, our way of working has been modified, with in-depth work on the theoretical framework and the design of 2 new experiments completed in 2020. The realization of these two experiments (one in Rennes and one in Grenoble) is scheduled for 2021. We plan to use the 2 platforms in parallel in 2021 for the same experiment, to accelerate implementation and give flexibility (after 6 months of closure, the experimental platforms in Grenoble and Rennes returned their activity but the dedicated rooms can now only accommodate 50% of the participants, with many experiments rescheduled).

3) Field experiments

The field experiments were to be implemented from month 6 of the project, over a period of 6 months following the implementation of first lab experiments (ideally, the nudges deployed in the field should be tested initially under lab conditions). The delays related to the implementation of lab experiments led to postpone field experiments until the first half of 2020. This reprogramming was in turn severely impacted by the COVID-19 crisis and the lockdowns which mobilized water companies as a priority to ensure the continuity of the service (in terms of logistics, the messages addressed to households were planned to be sent with the water bills and this mailing is managed by the operators themselves). At the present time, it is expected that two out of the three field experiments start in mars 2021.

These delays are harmful with regard to the production, over the timescale of the project, of some program outputs that relate to the effects of nudges on household water demand functions. At the same time, the implementation of BIs in the midst of the COVID-19 crisis and containment would surely not have been something desirable. This is in particular the case for **Spanish study site** of the project. COVID-19 crisis has indeed generated changes in the metering procedures, since going to read meters was not possible due to the National Health Alert state. Once finishing the alert state, water company is keeping this procedure in the interest of public health. Since intelligent meters are not currently installed, this setback could generate significant impacts to successfully implement the project, especially when analysing the impacts on nudging on residential water consumption.

Other additional difficulties, specific to the **study site in La Reunion Island (France)**, must also be mentioned. The latter concern :

- the change in status of La Créole water company, whereby its competences were transferred to an inter-district utility agency under the Notre Act, with heavy internal reorganisations. It led to the creation of a new water company on January 1, 2020 and gave rise to a strike of all employees of the company, resulting in delayed implementation of the operation;
- municipal elections (first round on 15 March 2020 and second on 28 June 2020, with a 3-months period between the two rounds due to the COVID-19 crisis). At the request of the partner (La Créole water company), which did not wish to make nudging campaigns an electoral issue, all operations on the implementation of the field experiment were postponed to September 2020 (following also a recommendation of the Nudge Unit of the Consortium);
- changes in French regulations on the protection of personal data that necessitated a further readjustment of the experimentation plan with the establishment of a (heavy) procedure to get explicit agreements of water company subscribers concerning the very principle of their participation to the field experiment.

Regarding this last item, it was planned that La Créole water company would inform its subscribers that, as part of a collaboration with the University of Reunion Island, their personal data (mainly consumption history) contained in the company Subscribers' file might be used for scientific purposes and to improve the

⁴ Wichman CJ (2017) Information Provision and Consumer Behavior: A Natural Experiment in Billing Frequency. Journal of Public Economics 152: 13-33.

quality of service. The message also specified to subscribers that they had a 2-months deadline to notify their disagreement to this potential use of their personal data (failing which their consent would be deemed to have been given). **A negative turn of phrase was therefore used in this information.**

We were subsequently informed at a local steering committee meeting that recent changes had been made in personal data protection regulations. In particular:

1. negative turns of phrase were henceforth prohibited (in favour of unambiguous consent);

and, as such:

2. it was essential that partners in the project could demonstrate at all times that the subscriber had consented "by clear positive statement or act" to the use of their personal data.

It was therefore imperative to obtain the explicit and prior consent from each subscriber, be it for access to their personal consumption data, participation in the Household survey (see below) or participation in the experiment. This change in regulations had major consequences on the project's progress if we intended to maintain the quality of data to be collected. In particular, and apart from the fact that we are no longer in the conditions of randomised controlled trial:

- firstly, and given our experience in this domain, we had good reason to believe that if a few hundred households out of the 48,000 in Saint-Paul district expressed their disagreement with the initial experimental plan, it was equally likely that only a few hundred households (in the best of cases) would send us their explicit agreement if we simply added to La Créole's information message a reworded form to that effect;

- secondly and from an operational point of view, as the company was no longer able to provide us with the list of its subscribers' telephone numbers without their explicit prior agreement, the (short) telephone calls that had been programmed using student services (as part of promotional projects; see below) were henceforth to be made from La Créole premises and in strict compliance with health protocols all companies, public and private, were subject to under COVID-19 crisis.

Taking into account this last difficulty and the (legitimate) protection the water company owes to anyone working on its premises, a final adjustment of the experimental plan was done recently, in September 2020, with a procedure which is now completely dematerialized. It provides in particular for (i) a press conference to inform the public of the experimentation; (ii) the addition of a newsletter sent together with invoices (during 4 months) inviting subscribers to connect to a secure website on which they will be asked to give their explicit consent to participate in the survey and field experimentation; and (iii) various measures aimed at boosting the response rate/the participation to the field experiment with e-mail reminders, and the possibility of winning vouchers worth 15, 30 and 50 euros in a lottery. This procedure goes with the construction of a data management plan, currently being finalised with the partner; an application to CNIL [Commission Nationale de l'Informatique et des Libertés - National Information science and Liberties Commission]; and a budget reshuffle approved by the ANR [National Research Agency].

Tunisia (the information given below corresponds to the one provided as is by the Tunisian partner)

One of the main problems we encountered with our local partner is the non-availability of micro data at household level (subscribers). We are informed that the only available data that could be provided are at district level; the other micro data are considered as confidential information and accordingly could not be provided to any person. For this reason we could not conduct a survey on water consumption at household level, making use of the subscribers file of the water company. To address the problem, we attempted to conduct our own survey but the difficult sanitary situation and some bureaucratic difficulties make that we failed to conduct such survey. Lastly, we succeed in getting (informally; see below) some data about water consumption and number of subscribers at district level during the last decade. These data will be used to perform an estimation of the household water demand function in Tunisia.

B) Econometrics of Water Demand As explained in the full proposal, project implementation requires to estimate household water demand functions using observational methods before and after BIs (although ex ante estimates can always be done retrospectively). Implementation of the econometric exercise in turn requires the availability, for each household (of a representative sample), of data on its water consumption (i.e. consumption history from the water utility's subscriber files); the characteristics of the (progressive) pricing that is applied (fixed part, size and unit price of each consumption block); taxation details (VAT, fees for the protection of aquatic environments) completed with regulation variables showing other public initiatives (like restrictions or educational campaigns); socio-demographic variables (household size, family composition, educational level, etc.); and housing characteristics (house size, house age, garden size, swimming-pool, etc.). Ideally, these data should also include climatic variables like temperatures and rainfall, all referring to the billing period. All partners encountered serious difficulties in setting up these databases, one per demonstration site.

France (Reunion Island) The initial strategy was to merge databases from major national surveys with the subscriber file of La Créole water company, the NEWTS project's local partner. The plan paid particular attention to the INSEE [French National Institute for Statistical and Economic Studies] census surveys which provided much of the socio-economic information needed (for estimating the econometric model of household water demand) in 40% of the 48,000 Saint Paul district households. Information on household income was taken from the FILOSOFI systems, themselves fed by Ministry of Finance (tax statements) and Caisse d'Allocations Familiales (Welfare Services) files. The idea was to match those files on the basis of household names and addresses.

Steps were taken in April 2019 with the Committee on Statistical Secrecy and producer organisations for access to these data (census, FILOSOFI system), which are now all grouped together on a secure platform managed by the public interest group CASD (Centre d'Accès Sécurisé aux Données - Secure Data Access Centre). The Committee on Statistical Secrecy issued a favourable decision on 28 June 2019; in this context, 3 researchers from the Reunion team attended the CASD enrolment sessions required for access to those survey data (during personal visits to France, which did not generate any mission costs taken from the project budget).

Subsequently, and following initial preparatory work, it appeared that the survey data available on the CASD platform did not allow for merging those files with consumption data taken from La Créole water company subscriber file (the data management plan initially provided for loading those consumption data onto the CASD platform). Contrary to information that was previously provided by major national statistics producers (allowing Households to be identified), the only information available on the geographical location of households provided by survey data available on the CASD platform is actually that of IRIS (Ilots Regroupés pour l'Information Statistique - Aggregated Blocks for Statistical Information). The use of this information as is (with consumption data aggregation by IRIS) required the application of "ecological regression" methods with a very small number of observations for Saint-Paul district, which has a total of some forty IRISs. As such small number undermined the accuracy of the results that could be expected in terms of demand econometrics and treatment effects, it was necessary to turn to other data production strategies. Two options were available for that purpose.

- The first was to request access to the original files (containing a Household identifier) by filing an application with CNIL. This option was not chosen because of response time length (about 2 years) and the limited chances of this request being successful (according to data producers themselves).
- The second, following the example of the Spanish partner, consisted in carrying out a survey of households in the district of Saint Paul and collect the minimum information required to implement the econometric estimation of the water demand model, then to draw by lot, within this group of respondents, the households where BIs would be deployed.

For that purpose, a questionnaire was drawn up in consultation with local stakeholders involved in the project, and contacts were made with local polling companies to carry out the survey. Given the prohibitive amounts of estimates, from €60,000 to €125,000 (excluding VAT) for a panel of 2,000 households filling in a 20-25 minutes face-to-face questionnaire, we decided (initially; see below) to ask University of Reunion Island students enrolled in M1 and M2 (postgraduate) training courses in Quantitative Economics to carry out this survey as part of promotion projects. It should be recalled that, unlike in Spanish and Tunisian partners, the French budget did not provide for the holding, and therefore the financing, of a household survey for the collection of statistical data for econometric estimation of household water demand functions.

The implementation of this Plan B, the broad outlines of which were agreed in consultation with local stakeholders involved in the project in November 2019, was in turn disrupted successively by the COVID-19 crisis and changes in French regulations on the protection of personal data (see above). The latter have an impact on the methods of carrying out the survey, now held in a 100% dematerialised way via an internet platform.

To sum up, the insufficient quality of available data in relation to the project's objectives led the team to adopt a different data production strategy with the implementation of a household survey in Saint Paul. The strategy modalities have now been decided and are in line with the new regulations on the protection of personal data. For this reason, work on econometrics of household water demand with an estimate before BIs has not yet been undertaken to date. However, these same estimates can be made retrospectively once the survey has been carried out (the agreement between the water company and the CEMOI team provides for access to the entire consumption history subject to the subscriber's explicit agreement (see above)).

South Africa The progress on the project in South Africa, related to the econometric estimation of local water demand functions of the Households, is in line with the milestones. In particular, as part of their contractual obligations, the South African NEWTS team was required to write an inception report and is currently working on the first progress report for the Water Research Commission of South Africa. The inception report outlined the approach to the project, the project plan, and highlighted key literature. The first progress report, which is due at the end of November 2020, describes the household water demand function for Cape Town and provides a written record of the data sources used, the work process and outcomes. All project deliverables have been handed in on time to the Water Research Commission of South Africa so far (Project Inception Report was submitted and accepted successfully; Progress Report 1 is due at the end of November 2020 and on schedule).

Spain In addition to difficulties related to the availability of funds at national level, what has delayed the start date of the works by 9 months (see below), the COVID-19 crisis has generated significant delays and difficulties concerning data production (which was planned to be obtained through a survey in the dedicated Spanish work plan). The field survey (through face-to-face interviews) was planned to be conducted in 6 weeks, starting at the second fortnight of March 2020. However, the COVID-19 crises blocked its implementation in the aforementioned target date. A National Health Alert state was declared on 14 March 2020, be extended until 21 June 2020. From the beginning of the COVID-19 crisis, face-to-face surveys are not allowed by the water supplier. Due to uncertainty, the target implementation date was further postponed to September 2020, switching the methodology towards a postal/on-line survey. Moreover, this new methodology requires longer time allocation to be conducted.

However and despite being delayed, the Spanish team is collaborating with other groups in order to get residential water demand function estimates using databases from previous projects. These activities could help to understand and solve some econometric problems that could potentially emerge. This strategy has been developed while the new field data collection is conducted. Simultaneously, an updated literature review on residential water demand has been framed by the Spanish team.

Tunisia Tunisian partner made several contacts with SONEDE (the national water company) to obtain individual household data which remained unanswered. Following the (recent) integration into the Tunisian team of a doctoral student, an engineer in statistics and working on the theme of the impact of climate change (the thesis subject is precisely "Climate change, Water resources, Food security and adaptation costs for developing country: case for Tunisia"), Tunisian team has succeeded in collecting data on residential water consumption, by district and trimester, and related number of subscribers. Subsequently, some progress are actually made to estimate the household water demand function using the collected and updated data for Tunisia. The results of this work are expected to be available in a few months' time

C) Evaluation of DSM Policy Progress have been made on the various items coming into this area with, in particular, the development of the micro-simulation model that aims to measure the socio-economic performance of the tariff policy in the 5 major fields of analysis posed by the European Water Framework Directive (affordability, incentive effect of pricing, equity, economic efficiency and quality of funding (cost recovery in particular)). Given the difficulties encountered by the Econometrics units (in connection with the availability and production of household data, see above), it was decided to embark on the construction of this model based on previous works concerning the estimation of household water demand functions (namely, the one estimated for Reunion Island by Binet, Carlevaro et Paul (2014)⁵). As the work progressed, various difficulties linked to computer design, depth of information and computational time appeared and make the model is still today at the prototype stage. However, the latter provides a large part of the relevant information for the aforementioned first 3 fields of analysis. Future work will be undertaken with regard to the areas of efficiency and quality of funding (given its essential nature, the indicators related to the quality of funding have to be developed in conjunction with the stakeholders involved in the project).

- *Detailed update on methodology & results*

A) Lab and field experiments (on perception of water tariff system)

1) CREM (France) - presentation of the experimental design The work that we want to implement is an experimental economics study about water consumption choices by households and their relationship both with possible pricing schemes for water as well as information impacts. In this experimental setup, we have a situation choice game where participants have to decide which consumption level they want to choose for a given period. We use an induced-value setting where monetary payoffs increase as consumption levels increase, but for which participants are charged depending on the pricing scheme that prevails during the experiment. This individual choice is repeated which enables us to control for learning process. In this experimental project, we aim at studying three possible pricing schemes that are frequently used for water consumption all over the world:

- The Constant Block Rate pricing scheme (CBR, hereafter), where the unit price for water remains constant whatever the level of consumption, and the charged bill is simply the price times the quantity chosen,
- The Super Progressive pricing scheme (SP) where the marginal price increases from one consumption block to the following, the charged bill being the level of consumption chosen times the higher marginal price corresponding to the block to which consumption belongs,
- The Increasing Block Rate (IBR) pricing scheme, where the marginal price increases as in the SP scheme, but the charged bill is a compound amount of each block limit times the corresponding marginal price up to the chosen consumption level.

⁵ Estimation of Residential Water Demand with Imperfect Price Perception. Environmental and Resource Economics, Springer, 2014, 59 (4), pp.561-581.

The experiment is based on a first work (Binet, Denant-Boemont & Hammiche (2020)⁶) that demonstrates that a simple and permanent marginal price recall had a significant impact by helping consumers to correctly determine their optimal level of water consumption, and, as a consequence, was an efficient tool to reduce overconsumption, especially in the case of complex tariff schemes (like, e.g., IBR). In order to go deeper in the investigation of information impacts, we want to implement experimental treatments where:

- A permanent recall could be displayed about the potential water bill when a consumer actually chooses his consumption level and the way the bill is computed,
- Permanent recalls that indicate both the marginal price and the potential bill.

We also want to investigate the persistence in time about the impact of these recalls on consumption choices. We therefore organize experimental treatments where the recall could stop after some repetition or could start at a given period.

At this date (October 2020), we plan to have 300 participants for our experimental sessions. A given experimental session will last about 1h30 and each participant will go through 4 steps: The first one is a cognitive abilities task, the second one is the repeated situation choice game of water consumption and the last one is a post experimental detailed survey about one's personal motivations and about beliefs about other participants' behaviors.

2) GAEL (France) Two scientific papers were carried out by the GAEL team (including one in collaboration with the CREM). Since the lab experiments planned within the NEWTS project could not be carried out (see above), these works make use of data collected under previous projects.

- The first one relates to an initial laboratory experiment from 120 participants allowed testing the degree of consumer inattention to complex tariff schemes. More precisely, we design an induced values laboratory economic experiment where participants choose a consumption level under different tariffs schemes, where either the marginal price per unit remains constant (Constant Block Rate, i.e. CBR), or increases above a certain threshold (Increasing Block Rate, or IBR). To investigate the impact of an informational nudge, some of our participants get a marginal price reminder displayed permanently on the choice screen. We observe that the vast majority of choices are optimal ones, but a significant part of them reveal overconsumption which is consistent with ironing (Liebman and Zeckhauser (2004)⁷). We also show that a nudge in the form of a price recall can reduce over-consumption by reducing consumer inattention. Indeed, overconsumption is reduced thanks to IBR tariff scheme compared to CBR one. Also, in the IBR scheme, price reminder makes participants closer to the optimal. Last, we explain experimental deviations by building upon behavioral inattention to price models. Following Gabaix (2019), *op.cit.*, we observe significant inattention levels of our participants that are affected by our various experimental treatments. These results are developed in Binet, Denant-Boemont and Hammiche (2020), *op. cit.*, currently under review for publication in an international peer-reviewed journal.

- The second paper⁸ deals with the discrepancy between the payment of the water bill and its consumption. Recent work in behavioral economics shows the existence of false beliefs on the price of water (Brent and Ward (2020)⁹) and the importance of the frequency of billing on them (Wichman (2015), *op. cit.*). Given the impossibility of planning a new experiment, an initial study was carried out in advance on the basis of the

⁶ The incidence of tariff schedules and price information on inattentive consumers: a laboratory economic experiment, preliminary version presented to the French Association of Environmental and Resources Economics (FAERE) congress in Rennes, September 2019.

⁷ Schmeduling, mimeo, available at <http://www.econ.yale.edu/~shiller/behmacro/2004-11/schmeduling-zeckhauser.pdf>.

⁸ Binet ME, Garcia-Valinas M ad M Paul (2020) "Price perception under blocks tariff schemes: a comparison of drinking water consumption beliefs and behaviors and recommendations for efficient nudging policies", French Association of Environmental and Resources Economics (FAERE) congress, Grenoble, September 2020

⁹ Brent, D. A., & Ward, M. B. (2019). Price perceptions in water demand, *Journal of Environmental Economics and Management*, 98.

available survey data. As tariff schedules used by public utilities to price goods like electricity, gas or drinking water are often complex, with increasing or decreasing block rates and fixed charges, an important issue discussed in the literature is the choice of the relevant price variable used by households for their consumption choice. Using data from household survey carried out in Reunion Island, and on the basis of two empirical methods, we propose two indicators measuring the knowledge of the price of drinking water by households. We distinguish and compare price knowledge based on beliefs from that based on observed consumption behaviors, which are conditioned by the degree of attention of the consumer. Both methods confirm the hypothesis of price misperception, and argue in favor of price informational nudges. However, they reveal contradictory results. If a large number of households think that the price is much higher than it actually is, they base their consumption choices on an underestimated price, lower than marginal price. Nudges must therefore be deployed during periods of water consumption if a rebound effect on consumption is to be avoided. Finally, using econometric models, we identify the main determinants of price knowledge. We are also currently working on replicating this work on Spanish data (with survey data collected in 2010).

3) OEG (Spain)

- Simultaneously and linked to previous research, a collaboration with the researchers Roberto Martínez-Espiñeira (Memorial University of Newfoundland, Canada) and Marta Suárez-Varela (Universidad Autónoma de Madrid, Spain) is developed. This research is aimed at identifying socio-demographic profiles concerning the level of information that households have on water consumption and prices. This is a key point for the consortium since it allows developing a specific methodology to detect those social groups with the most obvious gaps regarding information. The paper entitled "Price and consumption misperception profiles: The role of information in the residential water sector", in under review in the journal *Environmental and Resource Economics*.

- The last contribution (of this section) is the result of a long-run collaboration with some researchers in the School of Economics and Finance at the Queensland University of Technology (Brisbane, Australia). We conducted a field experiment combining both monetary and non-monetary treatments in Brisbane, gaining some experience for the field experiment to be conducted in Gijón. One major output of this project is the paper "Do monetary and non-monetary incentives influence environmental attitudes and behavior? Evidence from an experimental analysis" (co-authored with Rajapaksa, D., Gifford, R., Torgler, B., Athukorala, A., Managi, S. y Wilson, C.), published in 2019 in the journal *Resources, Conservation and Recycling* (149, 168-176). Findings show that both monetary and non-monetary treatments lead to offered significantly reduce residential water consumption, which is especially so for those households holding pro-environmental attitudes/behaviors.

B) Econometrics of Water Demand

As explained above, planned econometric estimates of water demand functions have not been implemented so far, mainly due to problems of access to and production of data. Nevertheless, South Africa and Spanish teams have performed some works, making use of available data that have to be updated.

EPRU has derived a new household water demand function for Cape Town and provides a written record of the data sources used, the work process, and the outcomes in their Progress Report 1 which will be submitted to the Water Research Commission of South Africa at the end of November 2020. Preliminary findings show that the subsistence level of water usage before the nudging period is similar to previous findings by Martínez-Espiñeira & Nauges (2006)¹⁰.

EPRU has been making use of the already existing data sources (Census data, municipal billing data, and historic nudge data) to do so, but the econometric estimates of the impact of nudges on water demand functions of the households for the site of Cap Town requires data update. The econometric work has been indeed performed by using historic Census data from 2011 (this was approved by the Water Research

¹⁰ Is all domestic water consumption sensitive to price control?, *Applied Economics*, 36:15, 1697-1703.

Commission of South Africa) while nudging campaigns have been carried out in 2016. To inform the water demand function for Cape Town, the South African NEWTS team had originally intended to collect income and property data from households through a survey work that was supposed to be done in June/July 2020. Due to the COVID-19 pandemic and nationwide lockdown, this data collection is planned to take place in the first quarter of 2021. Nevertheless, an uncertainty on the financing of this operation appeared recently (we return to this point later).

Remark The option of making use of the already existing data sources was also considered by CEMOI with regard to the (ex ante) estimation of the water demand function of households living in the Municipality of Saint Paul (Reunion Island). However, access to the CASD platform must be made from a secure room at the University of Reunion Island, using a dedicated box, and the closure of the University, linked to the COVID-19 crisis, did not allow access. The team decided therefore to focus efforts on producing the survey data.

Last, **Spanish partner OEG** makes use of databases collected in 2010-2011, from previous projects, to estimate residential water demand in Spain. The estimates have been connected with households' price perceptions, since usually, these perceptions are deviated from the real price that households pay, due to cognitive costs. These costs have been shown to be an important factor in explaining diminished responses of consumers to price, since most consumers find it complex to understand tariffs. Even if consumers were assumed to perceive the actual marginal price and adjust their behavior accordingly, the lack of information would still jeopardize the effectiveness of pricing policies when managing residential water demands.

C) Evaluation

Three categories of work are cited here, related to micro-simulation models, methodology and pricing policy.

1) Micro-simulation models

a) The NEWTS-Run1 micro-simulation model, still at prototype stage at this level of the project, includes 5 modules: Population, Pricing, Demand (calculation of consumptions), Invoices and Evaluation (dashboard). Its development has led to the elaboration of "new" indicators relating to the measurement of over-consumption and the quality of the targeting of an IBT (Increasing Block Tariff).

The Population Module describes the population of households with regard to certain variables relevant for the calculation of (i) consumption (typically, household size and income), (ii) bills (which requires knowing whether or not the household benefits from the collective sanitation service) and (iii) certain indicators making up the dashboard. At this stage, this information is to be gathered and provided in a data file by the user; the team is also working on the possibility given to the user to simulate these data using parametric distributions (on this item, the problem encountered by the team refers to a "tractable" way for the user to properly manage the dependencies/correlations that may exist between these different variables).

The Pricing Module describes the tariff system that applies for the population of households listed in the Population Module. By default, the tariff scheme considered is an IBT, the description of which is based on French regulations governing the pricing of water and sanitation services. The user is asked to fill in the amount of the fixed part, number and size of consumption blocks, unit prices within each block as well as VAT rate and various environmental charges (the two tariffs, water service and wastewater service, are then consolidated in a specific IBT for households that are billed for sanitation service). The user is also asked to provide information on service costs (amount of fixed charges, unit variable cost of production for, successively, water and sanitation) and environmental cost (if available).

The Demand Module calculates the water consumption of each household in the Population module using an econometric model of household water demand, namely the one estimated for Reunion Island by Binet et al. (2014), *op. cit.*, itself fed by data from the Population and Pricing Modules (this econometric model will subsequently be replaced by the one specifically considered for the study site of Saint Paul (Reunion Island)). With the captive component of the demand function, the Demand Module also provides an upper estimate of water volumes needed to cover basic household needs (again with an estimate per household).

The user is invited to reprocess these estimates, removing from the list of captive component determinants variables that it considers do not meet basic needs (use of a garden, for example), in order to obtain estimates of basic consumption that are (more) consistent with the user's qualification of water uses as basic needs. This information is used in the Invoice Module to break down the amount spent on water (still for each household in the Population Module) into a minimum subsistence type part and a non-basic consumption part. Lastly, the user can also modify the econometric demand model parameter values (response coefficients), including, in particular, the parameter measuring tariff perception by households (which can be adjusted through a dedicated nudges campaign).

The Invoice Module reconstructs the amount of the invoice of each Population Module household by distinguishing different subsidies and contributions to the financing of the service, with reference to a structurally balanced two-part tariff where (i) the fixed part is determined by an average fixed cost (fixed charges divided by the number of households) and (ii) the unit price of water is determined by the average variable production cost. In this way, the amount of subsidies and "taxes" (in effect, gross contributions to the financing of the service) that are paid/taken from basic and non-basic consumption, respectively, is identified for each Population Module household. This information is used in the Evaluation Module to calculate several indicators measuring the targeting quality of the pricing policy considered by the user.

The (fifth and last) **Evaluation Module** includes a scoreboard and about fifty indicators (for level 1 information) allowing the measurement of the socio-economic performance of the pricing policy in the different main fields of analysis (affordability; incentive effect of pricing; equity; efficiency; quality of funding (sustainable cost recovery)) set by the European Water Framework Directive. At this stage of the project, 80% of the relevant information is provided for the first three fields of analysis. Thus:

- **Affordability** is fed by calculating two conventional indicators, CAR [Conventional Affordability Ratio] and PAR [Potential Affordability Ratio], for each Population Module household (the user is asked to give the threshold rate above which it considers that there is an unaffordability issue). On this basis, the model provides basic statistics and synthesises all this information by calculating the Sen Index (commonly used to measure poverty). At information level 2, the model provides information on the distribution of unaffordability within the population, with breakdowns by income deciles or deciles of household living standards. The measure of IBT value considered by the user is assessed with reference to the structurally balanced two-part tariff. It is hoped by the end of the project to complement these indicators with measures of vulnerability (that refer to households/individuals who are close to unaffordability) and water poverty.

- **Incentive effect** of pricing is assessed at this stage with regard to three items (with calculation of different indicators for each of these items). The first is the variations in consumption that emerge with the introduction of the IBT (considered by the user) compared to the structurally balanced two-part tariff. The second is that of allocative inefficiency with (i) identification of over-consumption due to poor perception of the IBT (knowing that the water demand model estimated by Binet et al. (2014), *op. cit.* does not generate poor price perception when tariff is of two-part type); and (ii) calculation of mismanagement costs, linked to such poor price perception, which are borne by the households. The third family of indicators focuses on the quality of targeting by measuring the exclusion and inclusion errors (gross and net), in terms of volume, that are generated by tariff calibration. At this stage of the project, this characterisation is based on a simple confusion matrix where a basic unit that is not subsidised is a false negative and a non-basic unit that is subsidised is a false positive. On the basis of this typology, overall consumption is broken down into four categories (true positives, false positives, true negatives, false negatives) and various indicators are calculated to provide an initial assessment of the IBT (considered by the user) in the field (Sensitivity, Anti-Specificity, Predictive Values, LR+, LR-, DOR, etc.; Kappa Score and Cohen Ratio are also calculated). The idea in the long run is to use this information to construct the equivalent of a ROC curve, by varying price band thresholds, for financially balanced IBTs, which could serve as a basis to select an efficient tariff calibration (with regard to a well-defined decision criterion).

- **Equity** The aim here is to develop indicators of the extent to which the IBT (considered by the user) increases or reduces inequalities in income or standard of living of the households, always compared to a structurally balanced two-part tariff. After measuring the cross-subsidies implemented by IBT, various Lorenz curves are constructed to calculate several (concomitant) Gini index variations. The model then performs factor (source) decomposition of such variations with, at level 2 information, measurement of the impacts of "good" and "bad" subsidies as well as "good" and "bad" "taxes" (in fact, gross contributions to the cross-subsidy system financial closure) on inequalities. The role of consumer tax (VAT) and environmental taxation (charges for aquatic environments protection) are also highlighted. Level 3 information produces Gini index multi-decomposition by sources and population groups (in this case, by household income deciles or household living standard deciles). In the long run, we wish to supplement this equity component with indicators that will make it possible to assess the social component of the IBT, i.e. its capacity to support poor households (still compared to a structurally balanced two-part tariff).

The fields of **Economic Efficiency** and **Quality of Funding** have been little investigated at this stage of the project (it is known, however, that some of the information already available, such as the operating result and some tables allowing for the measurement of "good" and "bad" subsidies/contributions to water service funding, will be included in the Quality of Funding area). The work plan includes close collaboration with stakeholders on this last item (in particular, deep reflection is to be carried out upstream on funding risk identification and measurement).

b) **GRANEM** is expected to consolidate the results of lab and field experiments in a multi-agent model, to study the transition to a low-water economy, with a nudging campaign adapted to local conditions (given in particular the importance of social interactions that impact the formation of pro-environmental behaviors). The main activity to date has been to investigate the literature about micro-simulation to think how modeling supply and demand behaviors of residential water in order to build a spatial micro-simulation framework with heterogeneous agents, as well as the transmission channels through which BIs influence those behaviors. The main assessment is the specific design of each micro-simulation framework and the lack of work about spatial micro-simulation especially related to water concerns (approximately two recent contributions over six referenced articles). Further, a complete work has to be made about the integration of the economic policy tool "nudge" in the micro-simulation model. The work that is remaining to do will depend on the economic mechanisms and channels of transmission highlighted by experiments which are currently conducted.

2) Methodology

a) **Methodology to measure the efficiency in residential water use:** based on frontier non-parametric techniques (Data Envelopment Analysis) adapted to domestic water consumption, the Spanish team is developing a specific methodology to estimate the efficiency of residential water use. This method allows us calculating potential water savings for those households categorized as "inefficient". The model will take into account the level of information that households have, testing the hypothesis that well-informed households register higher levels of efficiency.

b) **Methodology to cluster households in terms of information:** The use of Latent Class Models analysis is used to control for unobservable factors to inform a distribution of consumers in terms of their level of awareness of water prices and consumption into a finite number of groups or "classes". For each of these classes, different regression models can be estimated, which makes it possible to control for heterogeneity in preferences and constraints beyond what the information available through the observable data would. This approach involves two simultaneous steps: estimation of the main regression of interest and estimation of the probability that each respondent household belongs to a specific class. Households are allocated to each class according to how similar their unobservables are.

3) Water Pricing

a) Structural progressivity In parallel to work on micro-simulation model, CEMOI team developed indicators to measure the so-called structural progressivity of IBT. This consisted initially in transposing some basic fiscal indicators used in income tax (like average rates of progression, liability progression and residual progression) to water and sanitation tariffs. Then, and on the basis of those first elements, the team investigated a set of "new" indicators that would give a "constitutive" role to the Difference variable of Nordin (Nordin D). Work is underway to carry out an axiomatic characterisation of these latter measures. Measurement of price structural progressiveness and the related indicators are likely to be integrated into the micro-simulation model and the Incentive Effect area of the dashboard.

b) Evaluation of water pricing and taxation in Spain: urban water prices in Spain are among the lowest in the European Union. Moreover, it is a federal country where sub-central governments (regional and local) are autonomous entities with different responsibilities in the design of water policies. The extremely atomized local panorama and the strong power of sub-central governments have led to a highly complex system with a wide range of water price/tax levels and structures. A critical overview and evaluation of water pricing/taxing framework in Spain has been developed. The presence of special tariffs as a method to deal with affordability problems have been broadly described and discussed.

- *How has the progress of the project promoted multi-disciplinary work ?*

A workshop was held at the beginning of the project (May 2019), which brought together the three units to which the research programme is geared and stakeholders. These meetings offered the opportunity to (i) clearly specify the project's objectives to all participants and (ii) launch work on the design of the nudges that will be tested in the lab and in the field. Also, (iii) in addition to the participation of behavioural science specialists, (iv) a sociologist, member of the IPCC (3rd Volume - 5th Report) and working on the theory of change applied to energy transition, took part in the various seminars over the three days. The contributions and feedback of this qualified personality focused on the mechanisms of social acceptance, ownership and commitment that need to be taken into account in the development of public policies targeting a change in practices. They undeniably enabled the members of the various local nudge units present at this workshop (including stakeholders) to feed their reflections on the design of BIs planned as part of the project. Furthermore, it should be stressed that the key issue of the research programme, namely the impact of nudges on household water demand functions and the performance of the resulting DSM policy, naturally leads behavioural scientists and econometricians (with special expertise in water demand) to share tools, methods and knowledge on this innovative research theme.

The multi-disciplinary work is called upon to develop further within the framework of the project. The work plan provides indeed for the involvement of sociologists from the University of Grenoble (of which GAEL team is a part) to analyze, through focus groups, the perception of the BIs that will have been deployed on the study site of Saint Paul (Reunion Island).

b. Collaboration, coordination and mobility

- *Is the collaboration between partners effective? Is the contribution of each partner clearly identifiable? Does the project still meet the transnational nature?*

Is the collaboration between partners effective? Yes, but there are areas for improvement, including a major one. To be precise,

- As explained in the full proposal, the research consortium hinges on 3 competence blocks with a Nudge Unit, an Econometric Unit and an Evaluation Unit. These working groups are respectively led by GAEL (Ms Binet), OEG (Ms Garcia-Valinas) and LAREQUAD (Mr Jemmali).

- Work relating to the nudges design and lab and field experiments gave rise to several working meetings, particularly at local level, and the organisation of a workshop (May 2019) in which several stakeholders involved in the project took part. The Lab experimental component of the project is a common work from CREM and GAEL. The coordination is effective since one researcher belonging to GAEL (Marie Estelle Binet) is a common developer of the experimental work jointly with two researchers belonging to CREM (Laurent Denant-Boemont and Sabrina Hammiche) aiming at supervising the programming task implemented by Elven Priour, computer engineer of the LABEX-EM in charge of the experimental infrastructure located at the Department of Economics, University of Rennes 1. Despite the pandemic that imply to minimize travelling, CREM and GAEL leaders meet frequently for making progress about the project (one time per month approximately). The project is also the subject of regular discussions between experimental teams and those carrying out field experiments in Spain and Reunion Island.

- Work relating to water demand econometrics, in particular on model specification and estimation methods, was carried out during several meetings (in remote connection) between the various Country partners and Econometric Unit coordinator. The latter when requested also worked out and communicated the necessary computer programmes to produce the various econometric estimates of household water demand functions, one per study site. She also shared a (Spanish) database for pre-testing. Data strategy for econometric work was also the subject of presentations during the 2019 workshop.

- The Evaluation Unit's work was actually not led by the Tunisian partner; the CEMOI, in charge of the development of the micro-simulation model, built and developed the different indicators for the evaluation of the socio-economic performance of water pricing. To date, the indicators have been discussed occasionally between some of the partners and will have to be approved by all the partners with the provision of the micro-simulation model for adaptation to local conditions (in spite of COVID-19 crisis uncertainty, a workshop on the presentation and use of this tool will be scheduled). It is hoped that in the future, Tunisian partner will be able to lead work of the Evaluation group on water poverty indicators to complement those developed for the measurement of affordability (thereby enriching the micro-simulation model and its dashboard).

Does the project still meet the transnational nature?

Yes, it does except (unfortunately) for Tunisia. First, it should be emphasized that EPRU plays its advisory role as much as possible with regard to the operational implementation of nudging campaigns. A further intention was for guidance and knowledge sharing to take place between the universities through workshops, which could not take place in person due to COVID-19. These events were instead hosted online and EPRU attended all of them.

Second, since all study sites make use of progressive pricing for water, it follows common research issue in each country related to the impact of nudges on water demand functions of the Households and the resulting socio-economic performance of local IBTs. The latter contributes to create great cohesion within the research consortium: the concerns are the same and features of and challenges faced by local DSM policies are quickly and clearly identified by the involved researchers when they interact.

Third, it proves that special bilateral relations have been established between some of the project partners. In particular,

- it is expected ongoing strong collaboration between CEMOI and EPRU during the course of this project with CEMOI being the expert in evaluation of pricing policies and EPRU being the expert in BIs. Due to the strong collaboration between CEMOI and EPRU, the two consortium partners applied for external travel grants to allow for international travel (South African regulation of the Water JPI does not allow funding of research stays of EPRU members);

- GAEL and OEG plan to deploy the laboratory-tested nudges in the field with the Spanish case study. It is here to test the robustness of results and, also, to relieve congestion on the experimental platform of GAEL;

- EPRU is expected to econometrically estimate water demand in Cape Town and to assess the impact of nudges on tariff performance and socio-economic indicators. EPRU has been receiving ongoing support from OEG with several meetings held to update on project progress and to share expertise.

- *Please, indicate clearly those who performed the work (incl. also in-kind partners).*

The project's nature is such that each partner has to carry out a range of work in experimental economics, demand econometrics and the evaluation of demand management policies (knowing that South Africa has already implemented nudging campaigns and French teams CREM and GAEL deal mainly with lab experiment). Therefore - and this shows on the work plan - one partner cannot, strictly speaking, be considered to carry out a specific task on behalf of the other partners. On the other hand, some real collaborations, especially methodological, can give rise to a sharing of outputs. This is the case for the various survey questionnaires relating to the household data production phase, which were exchanged between the various partners in the research consortium. This also applies to the micro-simulation model, developed by CEMOI, which will be made available to all Country partners in the near future for adaptation to local conditions (in particular with regard to the Pricing Module, which is actually affected by national and local regulations governing the pricing of the service). The indicators making up the scoreboard are also likely to be adjusted, particularly with regard to the Quality of Funding field (for this reason, it will be developed in close consultation with local stakeholders involved in water management). NEWTS also facilitates international knowledge sharing through enabling other countries to learn from what was achieved in Cape Town and that relates to nudging campaigns. Last, as emphasized above, EPRU has received strong support from Spanish Partner (OEG) concerning the econometric work related to the estimation of household water demand function in Cap Town. EPRU indicates as well that the NEWTS (online) workshop on tariff schedules, price information and inattention with a common presentation CREM-GAEL was particularly useful.

- *Are the coordination and organisation of the project efficient?*

It is delicate for the main project leader to evaluate his own coordination of the programme. As the term "efficient" refers primarily to maximum effectiveness, the answer is clearly no and, to be honest, I think we are below par in spite of the real efforts made by the team in Reunion Island. There are two problems in my opinion.

The first is the absence of a project engineer specifically dedicated to managing the project. This function was initially intended to be carried out by a resource person from the University of Reunion's Research Service, who is now working on other assignments. Given the reorganisation of services and

missions within the UR, we benefited from support which was considered insufficient at the beginning of the project but is now satisfactory. However, too many of the logistical tasks remain the responsibility of the CC with a large number of teams to be coordinated (7). I, as CC, regret not having been alerted to this management risk during the project's construction and the constitution of its budget; this would (obviously) have been addressed by budgeting the volume of hours necessary for the employment of a resource person.

The second difficulty relates to internal institutional blockages linked to the implementation of "simple" tasks that were designed with the University of Reunion Research Service and approved (de facto) by the University's bodies when the project was presented to the various councils. A case in point is the creation of the project's website, which actually became an obstacle course. Because it was open to all researchers and teachers involved in the research consortium, it turned out to be contrary to the University of Reunion Island's information security policy (the suggestion was made to us to create and manage a site on Google, but of course we opposed it because we did not want to see the project's website polluted by advertising). Goodwill helped us find solutions but this process is particularly time-consuming (and stressful). For all intents and purposes, the same issues related to digital identity management make it impossible today to use the project website for the public consultations we intended to make on certain project outputs. Other difficulties of a similar nature may arise with regard to the policy for managing software purchases, acquisition of computer hardware and allocation of management costs.

After underlining the difficulties, it should also be pointed out that many things are going well. We now receive real support from the Research Service of Reunion Island University. Partnership Service coordinated the drafting of the consortium contract and the Documentation department took care, with great efficiency, of creating an archive dedicated to the project on the HAL [Hyper Articles Online] platform.

- *Please, describe the mobility of the researchers within the Consortium.*

Mobility is currently frozen or, more precisely, postponed from quarter to quarter due to the health crisis, which is detrimental. Research stays that were planned could not take place due to the COVID-19 pandemic and this is also the case for the second workshop that was to be held at CREM, University of Rennes 1. It should also be emphasized that South African and Tunisian teams were previously unable to attend May 2019 Consortium meeting due to lack of or delays in funding (EPRU was however present via video call).

Given the current context, we are trying to make up by holding remote work meetings, as we now have effective tool to do this (for instance, CEMOI team can now rely on the zoom software program provided by the University of Reunion Island). Nevertheless, effective research requires people be able to work together on site over relatively long periods of time with regular stays to advance work and project. This is all the more necessary as all academics of the research consortium are very stretched today. With the COVID-19 crisis management, their teaching missions are seen as a priority by their respective components and it does encroach on the time that is devoted to research.

- *Please indicate coordination with other projects funded in the 2018 Joint Call or national and international projects funded by other instruments*

We had some contact with the EnTruGo project leader, the idea being to allow him to use the micro-simulation model developed as part of the project as a decision support tool. The NEWTS project also aims to improve local public action effectiveness through a shared elaboration of diagnoses and action

plans by stakeholders (co-construction of Demand Side Management policies). Given the nature of case studies considered in the EnTruGo project, which do not relate to pricing policy, it is unlikely that this transfer will take place during the project.

At the same time, several national and international stakeholders have wished to develop projects similar to the NEWTS project capitalizing on the micro-simulation model developed as part of this programme. This has led to the preparation of a response to a call for projects, which unfortunately was not selected, but will be submitted again in the future. Some information about it is given below.

c. Impact and knowledge output

- *Are the main impacts achieved?*

Concerning impact, the Newts project aims mainly (i) to improve the management of local water services involved in the project, by helping the decision-making process related to pricing policy, (ii) a better management of their water uses by households with significant reductions in over-consumptions and water bills, making use of BIs, and (iii) an environmental improvement with a reduction of water wastage and less pressure on the resource. Thereafter, since (i) estimation of local water demand functions and (ii) implementation of nudging campaigns have not yet been completed for three study sites, the overall main impacts are clearly not achieved at this stage of the project.

Nevertheless and concerning more specifically the French and Spanish field study sites, there is a real interest and even some expectation by local stakeholders involved in the project concerning BIs, field experiments and the micro-simulation model. The project is thus in line with its general objective "to break boundaries between services valuation [...] and the use of economics and social science". However, we are aware that its achievement at the end of the project depends on the realisation of these two outputs that are (i) some successful nudging campaigns, and (ii) some robust and valuable econometric models of local water demand functions (in this respect, the quality of forecasts on operators' revenues following pricing policy changes is crucial).

Concerning now the study site of Cap Town (SA) where nudging campaigns have already been implemented, the EPRU team has estimated water demand function of the households living in this area but the available data make the latter relates to a pre-intervention period (see above). Accordingly, the main impacts are due to be achieved further following the completion of various analysis tasks but the team is on track to achieve this according to schedule. In particular, data update makes it possible to estimate the function of household water demand after BIs and, accordingly, to analyse the effects of policy mixes, combining nudges and tariff instruments, on the socio-economic performance of demand side management policies. This is precisely the hearted objective of the project, as its acronym indicates.

- *Are there any unexpected impacts?*

Something that is not impact but was unexpected and seems important enough to me to be mentioned. Generally speaking, it appeared during the various working meetings that when it came to pricing policy assessment, the interest of service managers mainly focused on cost recovery and sustainability of funding. In particular, issues of affordability and equity were not considered primary objectives as they were not basically within the manager's area of competence but rather within that of local public authorities (city council, inter-communal structure). Even though discussions naturally took place, it is clear that a political economy of water pricing is being shaped here, undoubtedly complex and geared to

local issues. From the point of view of the NEWTS project's "break boundaries" objective, this means that dissemination of the micro-simulation model, which should eventually become a decision-making tool, must target very different categories of stakeholders whose motivations are undoubtedly very diverse. Since proper use of the tool requires that the skills of all stakeholders, including therefore local political staff, be increased, a special careful thought has to be given at the local level to the dissemination plan to promote the use of the tool and maximise long-term impact.

- *Where do the results of the project impact? (e.g. industry, end users, policy, etc.)*

As the NEWTS research programme has not yet produced the main results related to (i) estimates of local water demand functions and (ii) implementation of nudging campaigns programmed in the work plan (for the reasons given above), there is not yet, strictly speaking, any impact of the project results. That said, as several stakeholders were involved in research programme implementation from the start, this has an impact on them, including water company operators on partner study sites as well as public stakeholders acting at local level. This is notably the case in Reunion Island where Office de l'Eau Réunion (the local water agency), DEAL Reunion [Regional Environment Directorate] and AGORAH [Regional Urban Planning Agency] are linked to the project through their participation in the local study site steering committee.

Besides, other stakeholders, informed of the NEWTS programme, developed a similar project called ECO-GDE (Econometrics of Water Demand Management (demonstration on domestic sector)). This project, led mainly by the Office International de l'Eau [OIEau - International Office for Water], pooled OIEau with ONEE (Kingdom of Morocco's national water company), SONEDE (Tunisia's national water company), EBML (Beirut and Mount Lebanon Water Establishment), IME (Mediterranean Water Institute) and CEMOI (University of Reunion Island), the latter as CC of the NEWTS project. The ECO-GEDE project capitalised on some of the deliverables of the NEWTS project, with training actions using the micro-simulation model developed as part of the NEWTS research programme, its replication with adaptation to local conditions, and BIs targeted on good understanding of the pricing system and reduction of over-consumption. It was submitted to the SWIM/EuropeAid call for European projects in June 2019. In spite of honourable marks on most items (from 4 to 4.67 out of 5), it was unfortunately not retained due to weak budget points. The group of stakeholders thus formed is considering the possibility of submitting a new application, in principle to the PRIMA program, with an improved dossier/project. We rely also on this partnership to create the links that have not been established today between the team of Tunisian researchers (LAREQUAD) and the Tunisian water company (SONEDE).

Lastly, with the development of the micro-simulation model (prototype), it appeared that much work was to be done on dashboard design, data visualization and information depth (from levels 1, 2 and 3 depending on whether an aggregated figure, a decomposition of this figure by groups or factors, or a decomposition of this figure by groups and factors was provided) to be truly informative. It was also realised that the tool did not correspond to the needs of certain categories of stakeholders, who require more macroscopic information on the various tariff policies that are implemented at territory scale. For that reason, a project is being built as part of the S3 [Smart Specialisation Strategy] of the European Commission. It is here to continue the development of the micro-simulation model with (i) the improvement of computer design weak points and (ii) the development of an additional module allowing institutional bodies such as water agencies to have a mapping of demand management policy performance at their level of competence and action. The aim here is to build a global dashboard, fed by local dashboards, and develop appropriate analysis tools for targeting the various measurement programmes, particularly those emerging in line with SDAGE (Water Development and Management Master Plan). This project named ECO-GEM is currently under construction (it has just passed a first

local selection phase). The consortium is expected to bring together private sector companies (digital services), public sector stakeholders (including the Reunion Island Water Office), organisations specialising in adult training (Andragogy) and several academics currently involved in the NEWTS project. The engagement of the above mentioned stakeholders testifies to the interest and impact that the NEWTS project can have today.

- *Have the partners identified exploitable results?*

As stated, the programme has not yet produced the main results related to (i) estimates of local water demand functions and (ii) implementation of field experiments (nudging campaigns) programmed in the work plan, so that, strictly speaking, we have no identified exploitable results yet. However, all partners agree on the interest and strong potential of the micro-simulation model deliverable. Several stakeholders involved in the project have also shown interest in the digital nudge, providing real-time information on consumption, water price and bill amount, which is now being developed by the Spanish partner OEG.

Originally, nudging design in Spain contemplates to transfer information to households using digital technologies. Actually, that part of the project is aimed at generating a digital nudging system that could be useful for the water company or/and other water operators. The development of a mobile app and website is still being developed. However, some technical difficulties have emerged. First of all, it is necessary to deal with a high percentage of collective meters. Secondly, conventional water meters are generally spread in Gijón, strong efforts would be necessary to switch into smart meters. Finally, the COVID-19 crisis have introduced some changes in the procedures to read meters in the city. Sometimes meters are located inside the house, so the access has been restricted due to public health reasons.

- *Has intellectual property protection been considered?*

Not yet, but it is in progress. Concerning the micro-simulation model, an open source strategy is being pursued with (i) the possibility of free redistribution and, by giving access to the source code, (ii) the possibility for users to adapt the tool to local conditions, particularly with regard to regulations on service pricing, and even develop additional modules to test additional strategies in the domain of DSM Policy (such as aid programmes). The fact that the consortium contract is always partially signed to date, due to administrative difficulties encountered by one of the partners, means that this option has not yet been discussed and decided upon by the project's Executive Committee. At present, the programmes are written in Python and the (free) software Django is used for interfaces.

3. Table of Deliverables

Remark The dates in the table are given for a project start date set at May 2019, with start dates for the availability of funds that revolve around September 2019 for French teams and November 2019 for Spanish partner.

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
WP1 <i>Nudges set-up, lab experiments and analysis</i>	GAEL (France)		

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
D1.1 Setting up of Nudge campaigns	GAEL (France)	30/10/2020	<p>The nudge design report is delayed for three main reasons:</p> <ul style="list-style-type: none"> - some stakeholders involved in the project request to include and design nudges relating to the user willingness to pay for water in the program; - the teams fell behind in the design of the nudges due to the health context; - the second workshop could not take place in Rennes and the session to present the experimental designs in order to cross-reference them was not held. <p>We are going to organize this meeting online and the report will be delivered in early 2021, in the continuity of this meeting.</p>
D1.2 Preliminary version of the multi-agent model	GRANEM (France)	30/04/2021	None at this stage
D1.3 Laboratory experiments	CREM (France)	30/04/2022	<p>We plan initially to have all our sessions in April-May 2020, but due to COVID-19 pandemic and lockdown in France from Mid-March to Mid-May, we were constrained to delay our experimental sessions at the end of the second semester of 2020.</p> <p>We plan to have data before Spring, 2021 and then to start analysis and writing during Spring, 2021 in order to make conferences and workshops from June to October 2021 to present the first results provided by our data analysis.</p>
D1.4 Final version of the multi-agent model	GRANEM (France)	30/04/2022	None at this stage

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
WP2 Econometric Models and their application	OEG (Spain)		
D2.1 Econometric analysis of water demand before nudge campaigns	OEG (Spain)	30/06/2020	<p>This analysis was originally planned to be delivered by mid-project. It is delayed, because of the COVID-19 crisis, since information obtained through the survey is required to conduct the econometric analysis of residential water demand.</p> <p>SA : EPRU is currently using Census data for the demand function estimation.</p> <p>SP and Reunion Island: due to COVID-19 crisis, field surveys have been postponed to the end of 2020-beginning of 2021. In the mean time, old databases have been used to estimate residential water demand.</p> <p>New date of delivery: This deliverable will be finished by mid 2021 (30/06/2021), once data have been collected and properly analysed.</p>
D2.2 Four micro-simulation models report	OEG (Spain)	30/04/2022	<p>None at this stage except for the measurement of BIs impact on the socio-economic performance of the water tariffs. The latter requires indeed to assess how water demand functions of the households change with nudges and, accordingly, some minimal time and hindsight to get some consistent results. The latter may be therefore readjusted (given the planned end date of the project).</p>

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
WP3 <i>Dashboard and Evaluations</i>	LAREQUAD (Tunisia)		
D3.1 Report on evaluation indicators dashboard	LAREQUAD (Tunisia)	30/04/2020	<p>LAREQUAD did not lead the work of the Evaluation Unit on the selection/construction of dashboard indicators to measure the socio-economic performance of the pricing policy. It is all the more unfortunate since several work have been conducted in the field by several researchers of the Consortium. The COVID-19 crisis partly explains this situation.</p> <p>To our knowledge, the report to be produced by LAREQUAD is not currently available. The matter will be discussed at the next meeting of the Project Steering Committee (which is held informally for now, the Consortium Contract having still not been signed by the Tunisian partner).</p>
D3.2 Nudges cost-benefit analysis	EPRU (SA)	30/04/2022	None at this stage

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
D3.3 Social-economic evaluations of the tariff schemes and recommendations	LAREQUAD (Tunisia)	30/04/2022	<p>No delayed but it may be readjusted.</p> <p>- This analysis requires that econometric estimates of water demand functions of the households be performed with, if appropriate, an update of previous works making use of national surveys data. The tool that constitutes the micro-simulation model will then be applied with the updated econometric models and relied data sets used as inputs for diagnostic purpose.</p> <p>- At the same time, it is also here with the recommendation part to assess the gains and losses of dedicated BIs on the socio-economic performance of current water pricing, through their effects on household water demand functions. Accordingly, it cannot be taken for granted that the teams will be in position to provide the latter analysis to the actual end date of the project. The identification of transmission channels through which BIs modify water demand functions of the households needs indeed specific data to be produced with, in addition, a minimum time to measure these effects in the short and medium term.</p> <p>The difficulties encountered by all the partners in producing this necessary data sets, linked in part to the COVID-19 crisis, suggest that the results thereof may be produced and available over a time horizon of 2 to 3 years, what goes beyond the current planned end date of the project</p>

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
WP4 Simulation Models and guidelines	CEMOI (France)		
D4.1 Report on First prototype of the simplified micro simulation model	CEMOI (France)	30/10/2020	<p>The CEMOI team has made good progress on this project output. As explained in the text, the prototype developed to date covers 80% of 3 fields of analysis out of 5 (affordability, incentive nature of pricing, equity). The fields of Efficiency and Quality of Funding still need to be invested.</p> <p>As explained in the text, there are still some technical concerns relating (in particular) to the design of the dashboard, the computation time and the depth of information.</p> <p>The team is currently working on these issues that are expected to be fixed within 3 months. It is desired to set report D4.1 on this significant milestone. The latter will be available on 03/01/2021.</p>
D4.2 Simplified micro simulation model report	CEMOI (France)	30/04/2022	None at this stage
D4.3 Guidelines for Decision Support Tool	CEMOI (France)	30/04/2022	None at this stage
WP5 Nudge case studies	GAEL (France)		

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
D5.1 Mid-term field experiments report	GAEL	28/02/2021	<p>Mid-term field experiments and the related reports are delayed for some of the following reasons :</p> <p>(1) the demand of stakeholders to include BIs relating to the user willingness to pay for water to be included in the research program (and therefore potentially tested at first under laboratory conditions, next in the field);</p> <p>(2) the effects of the COVID-19 crisis and lockdown that blocked some actions related to the implementation of randomized controlled trials, in particular the conduct of the field survey with the survey respondent households forming treatment and control groups for the implementation of nudging campaigns;</p> <p>(3) other unforeseen events like the evolution of French regulation on protection of personal data that requires to get explicit agreements of water company subscribers concerning the very principle of their participation to the field experiment.</p> <p>Nudging field experiment are planned now to be conducted by mid 2021, over a length of time of 4 to 6 months. The mid-term report will follow and will be available in November 2021.</p>
D5.2 Report on Analysis of the 3 field experiments	GAEL	30/04/2022	<p>None at this stage if the report merely contents to analyze the very short-term effects of BIs. Otherwise, an extension of the project duration of at least 9 months seems to be needed.</p>

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
D5.3 Stakeholders and Household consultation report following field experiments	GAEL	30/04/2022	None at this stage
WP6 Dissemination, Communication, training and exploitation	CEMOI (France)		
D6.1 Report on mobility and training activities	CEMOI (France)	30/02/2022	None at this stage.
D6.2 Report on interactions with stakeholders	CEMOI (France)	30/03/2022	None at this stage

Deliverable name	Lead partner (country)	Date of delivery (dd/mm/yyyy)	Changes, difficulties encountered and new solutions adopted
D6.3 Report on dissemination and communication actions	CEMOI (France)	30/04/2022	<p>- A HAL collection was created for the Newts project.</p> <p>The aim of this collection is to enable the researchers involved in the Newts project to register online outputs of the project, by distinguishing between those that are intended for academics and those that are intended for stakeholders. To facilitate the registry process, the platform's interface that hosts the collection is available in French and in English.</p> <p>The HAL collection should have been presented to the team leaders of the Newts project in a consortium meeting of July 2020. However, the agenda was modified with a focus on the preparation of the mid-term report. It will then be presented at the next online consortium meeting that will be organized by the end of the year 2020. Accordingly, the collection will be fully operational shortly.</p> <p>- The same applies for the website of the project which can now be loaded with contents (the latter was delayed given the IT security policy of Reunion Island' University).</p> <p>However, public consultations on certain outputs of the project that we wanted to implement by using this site cannot be carried out. It will be here to compensate by small local meetings, in particular with stakeholders not involved in the project.</p>

4. Budget review

Please include a budget breakdown here, i.e. how the funding has been used so far.

FRANCE

- **CEMOI (Reunion Island)** Management costs excluded, a little over €25,000 have been spent by CEMOI since the start of the project. This amount breaks down into 3 main items: €15,000 for the hiring of a non-permanent job of a design engineer working on the development of the micro-simulation model, €3,600 linked to the acquisition of 2 computers and the purchase of softwares and a little less than €7000 for the financing of missions including the participation of 5 people in the Grenoble workshop in May 2019 (for information, costs of plane tickets between Reunion Island which is in the south of the Indian Ocean and mainland France are quite high).

- **CREM** In 2020, the expenses for CREM partner consisted in computer and electronic devices for researchers (around €6000). There had been the first online seminar NEWTS but no expenses were made for organizing it as researchers organize it themselves. The experimental sessions have not yet started, and therefore, for 2020, up to now, there is no experimental payoffs that are related to the NEWTS project.

- **GAEL** Expenses incurred amount to €2123, including newspaper submission fees (€106), FAERE 2019 conference fees (€80) and costs related to the organization of the launch workshop in Grenoble. No cost related to lab experiments and research stays in Spain and in Reunion Island have been incurred since the latter have been delayed to 2021

- **GRANEM** : no information provided at this stage.

SPAIN - OEG COVID-19 crisis has generated significant delays in the Spanish budget implementation. So far, the only expenditure chargeable to the budget has been the renovation and upgrade of two STATA licenses in 2019 (€2.075,57). Expenditure related to survey is planned to be charged at the end of 2020. Moreover, on-site meetings and conferences were cancelled, so no travelling expenses have been registered in 2020.

SOUTH AFRICA - EPRU EPRU received R148,750 for the Project Inception Report which was successfully handed in to the Water Research Commission of South Africa on the 29 February 2020. The funding was allocated to cover human resource costs for data acquisition, data cleaning and management, and initial data analysis. The funding also covered the write up of the project inception report.

TUNISIA - LAREQUAD Tunisian partner hasn't spent any money from the allocated budget. The equipments included in the budget have not yet not been purchased. It is worth to note that given the pandemic situation, none of the Tunisian researchers travelled to some countries to participate to planned meeting and training sessions.

5. Consortium Meetings

N°	Date	Location	Attending partners	Purpose/ main issues/main decisions?
1	21 to 23 May 2019	Grenoble School of Political Science	<p>All (except Tunisian team) including stakeholders with:</p> <ul style="list-style-type: none"> - La Creole water company (online presentation); - Reunion Island Water Office; - SEMIDE /EMWIS. 	<ul style="list-style-type: none"> - Newts - General presentation - Nudges and water consumption: literature survey - Presentation of study sites - Videoconferencing with EPRU, Cap University, SA, nudge campaign in Cap Town: results and feedbacks. - Presentation of field experimentation projects (objectives and preliminary designs) - Work on the designs and development of field and laboratory experiments (reactions, expertise, advice) - Organization of the consortium: presentation of the 3 units of the project (Nudge unit, Econometric unit, Evaluation unit), WPs and interplays, Deliverables list, Dissemination aspects, and requests from Water JPI - Steering Committee meeting (PI)
2	8 of July 2020	Rennes	<p>All (except Tunisian team) including Stakeholders (Reunion Island Water Office and SEMIDE /EMWIS).</p>	<ul style="list-style-type: none"> - 1st online Workshop of NEWTS - Presentation of Binet et al. (2020) - NEWTS state of progress meeting

Remarks (4)

- A working meeting was scheduled over the period February-March 2020. It was postponed to April 2020 because of lack of common availability between partners. The April 2020 meeting could not be held because of the COVID-19 crisis. At the time, the organization of videoconference required indeed the assistance of computer services of the University of Reunion Island, to take

place in good conditions, and the closure of the premises meant that it had to be suspended. During the period, several online meetings bringing together 2 or 3 partners (not reported in the table) were held to take stock and provide information on the impact of the health crisis on the progress of the project.

- The first online meeting was created as a substitute to the second NEWTS meeting that was planned in July 2020 during 2 days. Some stakeholders were planned to be there (Veolia and Rennes Métropole) during 1 day and another day was planned for academic progress regarding the NEWTS project.

- On the initiative of and under the responsibility of CREM, it decided to perpetuate this NEWTS seminar with regular online meetings (once every two months). In addition to research papers, partner laboratories will take advantage of this meeting point to present a progress report of their work, with a minimum of sufficient time to do so. We will also take advantage of this meeting point to systematically organize Consortium meetings.

- In addition to these Consortium meetings, a large number of local working meetings were held throughout the project, with stakeholders involved in it. These are shown in the following tables (the information is not provided for the Spanish partner who has regular working meetings with the local water company (once a week) and for the Tunisian partner who has not yet succeeded in involving the national water company in the project).

Local Meetings - Overview of meetings with stakeholders

- Study site of Saint Paul (Reunion Island - France) ; CEMOI's participation is systematic :

N°	Date	Location	Attending partners	Purpose/ main issues/main decisions?
1	Friday April 5th, 2019	Faculty of law and economics, University of La Reunion	Reunion Island Water Office, La Créole (water company)	Discussions about the operational aspects of field experiments
2	Monday April 8th, 2019	Faculty of law and economics, University of La Reunion	Reunion Island Water Office	Presentation of the Newts project: description of the Reunion Island part of the project (field experiments, strategy of data collection, budget, stakeholders' days etc.)
3	Friday April 22th, 2019	Faculty of law and economics, University of La Reunion	Reunion Island Water Office	Presentation of the Newts project: description of the whole project (partners, scheduling of the research program, scheduling of the workshops etc.)
4	Friday April 26th, 2019	La Créole, St Paul	Reunion Island Water Office, La Créole	Discussions about the nudging campaigns – Preparation of the Grenoble workshop (May 2019)

5	Friday June 21th, 2019	Faculty of law and economics, University of La Reunion	La Créole	Discussions about the households' survey
6	Friday August 23th, 2019	Reunion Island water office	Reunion Island Water Office, La Créole, DEAL (Regional Environment Directorate)	Steering committee for the Newts project
7	Friday September 20th, 2019	La Créole, St Paul	Reunion Island Water Office, La Créole	Households' survey - Finalization
8	Thursday February 27th, 2020	Faculty of law and economics, University of La Reunion	Reunion Island Water Office	Discussions around the organization of local stakeholders days + Dissemination Plan (including regional conference of water stakeholders)
9	Wednesday October 7th, 2020	Videoconference	Reunion Island Water Office, La Créole	Data recovery protocol - Finalization

- Study site of Cap Town (South Africa) ; EPRU's participation is systematic :

N°	Date	Location	Attending partners	Purpose/ main issues/main decisions?
1	14 February 2019	Cape Town	City of Cape Town departments represented: Water Demand Management; Water Resilience; Finance and Commercial; Integrated Planning, Strategy & Information Management; Meter Management and Revenue	EPRU / City of Cape Town: Research Collaboration - Past and Future: Broad project initiation meeting in which the project was positioned in relation to the previous work, and representatives within the City were identified.
2	12 April 2019	Cape Town	City of Cape Town departments represented: Technology and Innovation Steering Committee; Water Demand Management; Water Resilience; Finance and Commercial; Integrated	EPRU / City of Cape Town Research Lecture Series: Presentation for the City of Cape Town Technology Innovation Steering Committee to present past findings and introduce wide audience to the project and request inputs.

			Planning, Strategy & Information Management; Meter Management and Revenue External Attendees: Green Cape: Water Desk	
3	19 August 2019	Cape Town	City of Cape Town departments represented: Strategic policy unit; Water Demand Management	EPRU / City of Cape Town Strategy: Workshop and meeting hosted by the City to define their research needs around understanding water demand and tariff burdens in Cape Town.
4	22 October 2019	Cape Town	City of Cape Town departments represented: Water Demand Management; Water Resilience Communications	EPRU / City of Cape Town Data Requirements and Strategy (1): Workshop with the City of Cape Town to discuss the data requirements, City research questions, fieldwork logistics and the signoff of MOA and Confidentiality Agreements.
5	28 October 2019	Cape Town	City of Cape Town departments represented: Water Demand Management	EPRU / City of Cape Town Data Requirements (2): Follow up call with City of Cape Town to focus on data requirements
6	17 January 2020	Cape Town	City of Cape Town departments represented: Water Demand Management; Data Analyst / IT	EPRU / City of Cape Town Data Requirements (3): Workshop with a CoCT Data Analyst and operational specialist for water in the City to refine data requirements and strategy.
7	23 March 2020	Cape Town	City of Cape Town departments represented: Strategic policy unit	EPRU / City of Cape Town Research Strategy: Presentation and meeting with the City of Cape Town Strategic Policy Unit to explain and motivate for the research design and gather information on CoCT priorities and considerations.

6. Stakeholder/Industry Engagement

- Please indicate how stakeholders/industry were involved in the project during the reporting period:

Stakeholders were involved in the project at different levels; some like Reunion Island Water Office and La Créole water company took part in the first workshop held in Grenoble in May 2019, when the work of the Consortium's Nudge Unit was launched, and in the first NEWTS research seminar organised by CREM team in June 2020, with the presentation of a lab experiment testing the effects of a marginal price recall on water consumption. SEMIDE / EMWIS also participated.

Reunion Island's study site The local Water Agency (Office de l'Eau de La Réunion) and La Créole water company took part in the numerous meetings held locally for the elaboration of the questionnaire, modalities of carrying out the Household survey, preparation of the Data Management Plan and design of BIs. The same stakeholders plus DEAL, AGORAH and a users' representative are members of the local NEWTS project steering committee.

SA study site EPRU has shared information about the project and received input about the strategic direction of the project from the City of Cape Town. The NEWTS project includes capacity building and knowledge sharing with City officials and also with other stakeholders linked to the institution. EPRU has met with various City of Cape Town departments to share their research findings and to seek input on the project's methodology and approach.

Spanish study site In the case of Spanish team, it is noteworthy the collaboration and feedback from the water company in Gijón (EMASA). A weekly reporting meeting is usually organized with the head of different departments to catch up with the project breakthroughs. Moreover, the analysis of water pricing and taxation in Spain was discussed in a Webinar organized by the Institute of Fiscal Studies (IEF), institution attached to the Spanish Ministry of Finance.

- *Has the project succeeded to engage with stakeholders/industry? If Yes, how? If No – why?*

Yes (except for Tunisia) regarding stakeholders, who perceive the interest of the tools and methodologies developed by the programme. As mentioned above, a project replicating the NEWTS project, with adaptations, has been set up between OIEau, IME and national and regional water companies of 3 Mediterranean countries. In addition, and more specifically concerning Reunion Island, several dissemination actions have been planned with the Reunion Island Water Office, in particular a presentation of the project for the 2020 stakeholders' regional conference (which unfortunately could not be held due to the COVID-19 crisis). It should also be recalled that the Director of La Créole, a users' representative, the Reunion Island Water Office and public authorities' representatives (the Head of DEAL's Water & Biodiversity Department and the Co-Director of AGORAH) sit on the project's local steering committee. Lastly, the ECO-GEM project (currently being set up, preselected for submission as part of S3), whose main objective is to continue the development of the micro-simulation model, brings together at this stage local and national stakeholders as well as private sector companies.

- *If applicable, please, describe the provision of data by stakeholders/involvement of industry and dialogue between the project and stakeholders/industry.*

Reunion Island study site The local water company La Créole provides consumption history data from its subscriber file. It is also heavily involved both in the implementation of the project (operational aspects) and on a financial level (taking care of the mailing to its 48,000 subscribers). It is also fully involved in defining the procedures that have been put in place to carry out the survey (data production) and the accompanying data management plan.

The local water agency (Reunion Island Water Office) provided information on the costs of water production and distribution as well as tariff information for all of the island's districts. Depending on project progress, this information could be used to estimate a water demand model for Reunion Island's 24 districts and establish a global diagnosis by using the micro-simulation model (this use of the model may require the development of additional and specific modules for the agency). A (provisional) plan for disseminating project results to local stakeholders was also drawn up in partnership with Reunion Island Water Office. The latter needs to be updated and adapted in view of the COVID-19 crisis effects.

As far as the industry is concerned, relations with private (water sector) stakeholders are not yet developed (although private water company Veolia was to participate in the second workshop in Rennes that could not be held due to the COVID-19 crisis; (see above)). However, like all other local stakeholders, the water companies operating on Reunion Island as public service providers will be informed of project results through the implementation of the dissemination plan set up with the Reunion Island Water Office.

South Africa EPRU has an ongoing non-disclosure and confidentiality agreement with the City of Cape Town. This includes permissions to access and analyse the City's monthly municipal billing data. Original approval to analyse the municipal billing data was given when a large-scale behavioural nudging study was rolled out across the city in 2015/2016.

Spain In the Spanish case, a protection data and confidentiality agreement has been signed with the City of Gijón. This agreement has allowed to access data on individual households' consumption, bills and other water service features. Those data will be key for developing both water demand estimation and nudging analysis.

Tunisia Data on water consumptions have been provided indirectly by SONEDE (see above). No dialogue for the moment between the Tunisian partner and the national company.

- *Has the cooperation between the Consortium and industry/stakeholder partners influenced the project outcome(s) to date? If Yes, How? If No, why?*

Yes and in several aspects. As explained, stakeholder partners have guided the work of the Nudge Unit in the design of BIs for field deployment. In particular,

- Reunion Island stakeholders put two specific requests to behavioural science experts: (i) design a nudge on the users' willingness to pay for water and sanitation, and (ii) design of a nudge to reduce the rate of unpaid bills. For the second request, they were presented with the results of taxation experiments made in the United Kingdom, but those were not accepted by the stakeholders who considered them to be disparaging and non-transposable to the local context (where a strong social protest movement had taken place on claims such as the high cost of living and ecological taxation). Finally, and as said above, Reunion partners worked to find data production solutions compatible with changes in personal data protection regulations, which resulted in an adaptation of the experimental plan.

- Concerning Spanish study site (the city of Gijon), from the beginning, the local water company EMASA have had special interest in developing the digital nudging. The technology finally adopted would be in line with the water company preferences. EMASA is currently assessing several options. Moreover and as mentioned previously, the explicit prohibition of carrying out a face-to-face survey (due to public health reasons) has finally lead to change the methodology to conduct the survey, choosing a combination of mail and on-line techniques. This option, despite being more complex and slower, allow us to get very useful information about households' preferences on communication channels (traditional versus digital channels).

- *Outline the progress made towards achieving the project expected impacts.*

We are clearly on the way to the NEWTS project objective to "break down borders" and increase stakeholders' skills on the socio-economic dimension of water demand management policies. Actual

results and targeted pricing policy revisions/improvements are now rather a medium-term objective. As for over-consumption reductions targeted through nudges, they should materialise with the implementation of field experiments (the question of their sustainability will probably have to be tackled subsequently).

Concerning EPRU (South Africa), it should be noted that all project deliverables have been handed in on time to the Water Research Commission of South Africa so far (Project Inception Report was submitted and accepted successfully; Progress Report 1 is due at the end of November 2020 and on schedule). EPRU has been making use of the already existing data sources (Census data, municipal billing data, and historic nudge data).

- *Were there unexpected impacts to date?*

No unexpected impacts (of the project) at this stage of the project.

7. List of Publications produced by the Project - Open Access

International	Peer-reviewed journals	<ol style="list-style-type: none"> 1. Rajapaksa, D., Gifford, R., Torgler, B., García-Valiñas, M.A., Athukorala, A., Managi, S. y Wilson, C. (2019), "Do monetary and non-monetary incentives influence environmental attitudes and behavior? Evidence from an experimental analysis", <i>Resources, Conservation and Recycling</i>, 149, 168-176. 2. Arbués, F. and García-Valiñas, M.A. (2020) "Water tariffs in Spain", <i>Oxford Research Encyclopedia on Global Public Health</i>, DOI: 10.1093/acrefore/9780190632366.013.246 3. Binet M.E, Denant-Boemont L. and S. Hammiche (2020), "The incidence of tariff schedules and price information on inattentive consumers: a laboratory economic experiment", under review. 4. Arbués, F. and García-Valiñas, M.A., "Wastewater tariffs in Spain", under review in the <i>Oxford Research Encyclopedia on Global Public Health</i>. 5. García-Valiñas, M.A., Martínez-Espiñeira, R., Suárez-Varela, M. "Price and consumption misperception profiles: The role of information in the residential water sector", under review in <i>Environmental and Resource Economics</i>.
---------------	------------------------	---

	Books or chapters in books	1. García-Valiñas, M.A. (2019) "Water governance in Spain: The role of federalism and public-private partnerships", in Porcher, S. and Saussier, S. (Eds.), Facing the Challenges of Water Governance, Springer.
	Communications (presentations, posters)	<p>1. French - South African Science and Innovation Days, 2-3 December 2019, Pretoria, poster session : the Newts research program.</p> <p>2. "¿Disponen los hogares de información para la toma de decisiones? El caso de los servicios municipales de agua", (García-Valiñas, M.A., Martínez-Espiñeira, R., Suárez-Varela, M.), Oct. 2020, AIFIL Seminar series (on-line).</p> <p>3. "Do Households Have Enough Information for Adequate Decision-Making in the Water Sector? A Case Study in Spain" (García-Valiñas, M.A., Martínez-Espiñeira, R., Suárez-Varela, M.), Jun. 2020, SWELL Seminar Series (on-line).</p> <p>4. "Los precios del agua en España a nivel residencial: Visión panorámica y aplicaciones" (García-Valiñas, M.A., Roibás D.), Nov. 2019, Universidad de los Andes (Bogotá, Colombia).</p> <p>5. "¿Conocen los hogares los parámetros básicos para la toma de decisiones? Una aplicación en el sector del agua" (García-Valiñas, M.A., Martínez-Espiñeira, R., Suárez-Varela, M.), Nov. 2019, Universidad Tadeo Lozano, Bogotá (Colombia).</p>
National (separate lists for each nationality)	Peer-reviewed journals	
	Books or chapters in books	
	Communications (presentations, posters)	<p>France</p> <p>1. Binet M.E, Denant-Boemont L. and S. Hammiche (2020), "The incidence of tariff schedules and price information on inattentive consumers: a laboratory economic experiment", to the French Association of Environmental and Resources Economics (FAERE) congress in Rennes, September 2019.</p> <p>2. Binet ME, Garcia-Valinas M ad M Paul (2020) "Price perception under blocks tariff schemes: a comparison of drinking water consumption beliefs and behaviors and recommendations for efficient nudging policies", French Association of Environmental and Resources Economics (FAERE) congress in Grenoble (on line), September 2020.</p> <p>3. Paul M, "Decompositions of the Gini Index with Application to IBTs in the Water Sector", CEMOI Seminar, February 2020, Faculty of Law and Economics.</p> <p>Spain</p> <p>4. García-Valiñas, M.A. and Arbués, F., "La fiscalidad del agua", Oct. 2020, El agua en España: Economía y Gobernanza, Oct. 2020.</p>

Dissemination initiatives	Popular articles	1. García-Valiñas, M.A. and Arbués, F. (2020) "La fiscalidad del agua", Presupuesto y Gasto Público, forthcoming
	Popular conferences	<p>1. European Researchers Night, November 2019, Saint Denis de La Réunion.</p> <p>The European Researchers' Night is an event supported by the European Union (as part of the Communities 7th Framework Programme for Research). The Newts project was presented in the two sessions Speed Searching and Stories' Office.</p> <p>2. The NEWTS project and a synthesis of the results obtained in experimental economics will be presented in beginning of 2021 (http://www.sciencespo-grenoble.fr/recherche/les-webinaires-de-sciences-po-grenoble/) in the series of webinars of Sciences Po Grenoble, aimed at the academic public as well as the general public (broadcast on You Tube).</p>
	Others	<p>1. "Newts : un coup de pouce pour mieux consommer", webmagazine de la recherche issue 1, June 2020 (https://webmag-recherche.univ-reunion.fr/webmag-recherche-01#des-nouvelles-de-nos-labos-2--36623)</p> <p>The Newt's project was promoted in the very first issue of the research web magazine of the university of La reunion Island, with a short article describing broadly the project.</p> <p>2. GAEL organized the annual conference of the FAERE (French Association of Environmental and Resource Economists) on September 10-11, 2020 in Grenoble: 80 selected papers were presented in 23 online sessions with special sessions on water.</p> <p>Ahttps://faere.fr/fr/actualites/conferences-ateliers/conference-faere-2020/</p>

8. Knowledge output transfer

Short Title	Rajapaksa, D., Gifford, R., Torgler, B., Garcia-Valiñas, M.A., Athukorala, A., Managi, S. y Wilson, C. (2019), "Do monetary and non-monetary incentives influence environmental attitudes and behavior? Evidence from an experimental analysis", Resources, Conservation and Recycling, 149, 168-176.
Knowledge Output Description	Main results from a field experiment combining both monetary and non-monetary treatments in Brisbane. It allows gaining some experience for the field experiment to be conducted in Gijón. Findings show that both monetary and non-monetary treatments lead to offered significantly reduce residential water consumption, which is especially so for those households holding pro-environmental attitudes/behaviors.
Knowledge Type	* scientific publication
Link to Knowledge Output	https://doi.org/10.1016/j.resconrec.2019.05.034
Sectors & Subsectors	<ul style="list-style-type: none"> • Drinking Water • Adaptation to Global Change • Others <ul style="list-style-type: none"> ○ Other General ○ Modelling & Prediction ○ Socio-Economics ○ Stakeholder Involvement
End User	<ul style="list-style-type: none"> ○ Education & Training ○ Environmental Managers & Monitoring ○ Policy Makers / Decision Makers ○ Scientific Community ○ Civil Society ○ Other
IPR	n/a
Policy-Relevance	Methodology and results are useful to assess the impact of different water demand side policies. Based on our findings, investment in non-monetary instruments - i.e. knowledge and moral suasion - can lead to sustainable water resource management outcomes.
Status	This is a significant contribution since literature in this field is still scarce.

Short Title	<p>(1) Arbués, F. and García-Valiñas, M.A. (2020) "Water tariffs in Spain", Oxford Research Encyclopedia on Global Public Health</p> <p>(2) Arbués, F. and García-Valiñas, M.A., "Wastewater tariffs in Spain", submitted to Oxford Research Encyclopedia on Global Public Health, under review</p> <p>(3) García-Valiñas, M.A. and Arbués, F. (2020) "La fiscalidad del agua", Presupuesto y Gasto Público, forthcoming</p>
Knowledge Output Description	<p>These three publications provide a critical assessment of Spanish water pricing/taxation system. Findings show that the heterogeneous water tariff/taxation system found in most Spanish cities runs counter to equity principles and can send the wrong signal to users about water scarcity, thereby hindering compliance with the resource sustainability objective.</p>
Knowledge Type	<p>* scientific publication (1;2) * review (3)</p>
Link to Knowledge Output	<p>(1) DOI:10.1093/acrefore/9780190632366.013.246.</p>
Sectors & Subsectors	<ul style="list-style-type: none"> • Drinking Water • Adaptation to Global Change • Others <ul style="list-style-type: none"> ○ Other General ○ Finances ○ Socio-Economics ○ Stakeholder Involvement
End User	<ul style="list-style-type: none"> ○ Education & Training ○ Environmental Managers & Monitoring ○ Policy Makers / Decision Makers ○ Scientific Community ○ Civil Society ○ Other
IPR	<p>n/a</p>
Policy-Relevance	<p>Results are useful to guide WFD application, since some problems and shortcoming of Spanish water pricing/taxation system are detected. Water prices for different users in Spain have not got to achieve the goals established at the WFD, especially when looking at cost recovery and environmental issues</p>
Status	<p>Results are in line with other publications</p>

Short Title	Binet M.E, Denant-Boemont L. and S. Hammiche (2020), “The incidence of tariff schedules and price information on inattentive consumers: a laboratory economic experiment”
Knowledge Output Description	<p>Two main and original results obtained:</p> <ul style="list-style-type: none"> - some participants overconsume (selected quantity above the optimal level), which can be explained by inattention to water pricing. - Nudge in the form of a visual price recall helps to increase consumer attention and reduce over-consumption. <p>These results are original because errors in consumption choices are linked to a behavioral bias, inattention, and the lack of attention</p>
Knowledge Type	<ul style="list-style-type: none"> * exploitable scientific result * scientific publication * data * other
Link to Knowledge Output	
Sectors & Subsectors	<ul style="list-style-type: none"> • Water Scarcity and Droughts • Drinking Water
End User	<ul style="list-style-type: none"> o Environmental Managers & Monitoring o Policy Makers / Decision Makers o Scientific Community o Civil Society
IPR	n/a
Policy-Relevance	Our results contribute to improve the design of nudges and to understand the cognitive biases to be corrected.
Status	<p>The link between nudges and the literature on inattention is original.</p> <p>The new experiment that will take place in Rennes will test the robustness of our results by including more treatments. These results will have to be validated with real households in the laboratory or in the field (in Spain).</p>

Short Title	García-Valiñas, M.A. (2019) "Water governance in Spain: The role of federalism and public-private partnerships", in Porcher, S. and Saussier, S. (Eds.), Facing the Challenges of Water Governance, Springer.
Knowledge Output Description	This research provides a broad picture of water sector governance in Spain, a country dealing with serious water stress and quality problems. Moreover, a decentralized structure of regional and local governments supports the design and development of water policies. In this context, governance emerges as a key issue to improve water resources allocation. Several key policies and institutional features have been described, with a special attention to economic instruments and the role of Public- Private Partnerships (PPPs).
Knowledge Type	* book chapter
Link to Knowledge Output	
Sectors & Subsectors	<ul style="list-style-type: none"> ● Drinking Water ● Adaptation to Global Change ● Others <ul style="list-style-type: none"> ○ Other General ○ Finances ○ Socio-Economics ○ Stakeholder Involvement
End User	<ul style="list-style-type: none"> ○ Education & Training ○ Environmental Managers & Monitoring ○ Policy Makers / Decision Makers ○ Scientific Community ○ Civil Society ○ Other
IPR	n/a
Policy-Relevance	Water governance issues are also important when it comes to design water policies.
Status	Results are in line with other publications

Short Title	Project Inception Report (EPRU)
Knowledge Output Description	Project Inception Report: A short report which outlines the approach to the project and breaks the South African project plan down in greater detail. Key literature is described as well.
Knowledge Type	Report
Link to Knowledge Output	The report is available but only upon request.
Sectors & Subsectors	
End User	
IPR	n/a
Policy-Relevance	This research is relevant to water policy because it will be used to make recommendations on blending tariffs and nudges effectively.
Status	This knowledge output is finalised and was successfully submitted to the Water Research Commission of South Africa for approval.

Short Title	BINET M.E. , GARCIA-VALINAS M and Michel PAUL (2020), “price perception under blocks tariff schemes: a comparison of drinking water consumption beliefs and behaviors and recommendations for efficient nudging policies”, preliminary version presented to the French Association of Environmental and Resources Economics (FAERE) congress in Grenoble (on line), September 2020.
Knowledge Output Descriptio	This article is original because it highlights the importance of the moment when the nudge is deployed. We show that the nudge must be concomitant to consumption. Otherwise, if it appears on the water bill for example, it can then promote a rebound effect.
Knowledge Type	* exploitable scientific result * scientific publication
Link to Knowledge Output	
Sectors & Subsectors	<ul style="list-style-type: none"> • Water Scarcity and Droughts • Drinking Water
End User	<ul style="list-style-type: none"> o Policy Makers / Decision Makers o Scientific Community o Civil Society
IPR	n/a
Policy-Relevance	Our results contribute to improve the design of nudges and to know how and in at frequency nudges must be implemented
Status	This article is original because it highlights the importance of the moment when the nudge is deployed. We show that the nudge must be concomitant to consumption. Otherwise, if it appears on the water bill for example, it can then promote a rebound effect.

Short Title	García-Valiñas, M.A., Martínez-Espiñeira, R., Suárez-Varela, M. "Price and consumption misperception profiles: The role of information in the residential water sector", submitted to Environmental and Resource Economics
Knowledge Output Description	Consumer misperceptions about key economic variables, such as price or consumption often hinders the effectiveness of natural resources management policies, with lack of information usually found at the roots of observed misperceptions. We study the gap between actual data and consumers' self-perceived levels of residential water bills and consumption, aiming to identify which informational policies may be more effective to bridge this gap.
Knowledge Type	* scientific publication
Link to Knowledge Output	Under review
Sectors & Subsectors	<ul style="list-style-type: none"> ● Drinking Water ● Adaptation to Global Change ● Others <ul style="list-style-type: none"> ○ Other General ○ Finances ○ Socio-Economics ○ Stakeholder Involvement
End User	<ul style="list-style-type: none"> ○ Education & Training ○ Environmental Managers & Monitoring ○ Policy Makers / Decision Makers ○ Scientific Community ○ Civil Society ○ Other
IPR	n/a
Policy-Relevance	Our results have relevant policy implications, since they suggest that better informational policies could substantially improve consumer's response to and effectiveness of pricing policies, while allowing us to suggest effective interventions to increase it. First, we find that consulting the bill before attempting to provide an estimate of consumption and bill is, unsurprisingly, one of the best predictors of reduced perception biases. This suggests that misperceptions are largely caused simply by lack of attention to the bills. Therefore, behavioral economics policies aiming at promoting the careful reading of one's bill (e.g. sending key facts about individual consumption, tariffs, and bill by e-mail, SMS, or smart meter; or showing a banner when opening the website) could prove very useful to increase consumer's knowledge of consumption and prices. Second, we find

	<p>that another important factor in explaining misperceptions is the perceived lack of detail in the issued bill. Better detailing the bills so that consumers find them more explanatory could, therefore, significantly improve people's awareness of the relevant economic variables in demand- side policies while reducing the cognitive problems to understand them.</p>
<p>Status</p>	<p>Our findings and original methodological proposal could, therefore, be useful for policymakers to identify which informational policies may be more effective to bridge the gap between perceived and actual economic magnitudes and to identify target groups when designing informational water policies.</p>

9. Open Data

10. Problems Encountered during Project Implementation

- Please indicate if any problems were encountered during the Project Implementation.

These points (for most of them) have already been listed, with some degree of precision, in the text and it will be here to remind them.

A) COVID-19 crisis: the stakeholders involved in the project are much less available, methods of household surveys had to be revised with online procedures that are now completely paperless (the time period required to carry out the survey is however longer and responses to the questionnaire are no longer face to face, what can affect the quality of the data), workshops and research stays are frozen, what affects knowledge sharing and the quality of the support that can be provided by certain key resource persons to other researchers involved in the project, lab experiments could not be held, are postponed and face to congestion effects, dissemination actions to stakeholders (not involved in the project) that had been scheduled are suspended and it is not certain that they can be held in the near future, the working meetings of the Consortium Steering Committee could not be held, due to the lack of efficient means of communication at the time (however and as underlined in the text, this problem no longer arises, the University of Reunion having provided CEMOI with a tool that allows it to be autonomous in the organization of these meetings).

In addition and concerning still the impact of the health crisis:

- **Study site of Cap Town (SA)** The additional funding that could be found by the South African team to finance the collection of data necessary to achieve an essential output of the project, namely the impacts of the nudging campaigns carried out in Cap Town in 2016 on the water demand functions of the Households and the related performance of water pricing policy, is called into question.

Fieldwork within Cape Town was due to take place in June 2020 that would provide data relating to household water use. The fieldwork was to be conducted in collaboration with the City of Cape Town and while the questionnaire can be completed online rather than face-to-face, the City indicated that they are unable to prioritise anything other than managing their COVID-19 response. Without it being prioritised by the City, it would not have been possible to obtain the necessary approvals and operational input to carry out the work as originally intended.

- **Study site of Gijon (Spain)** Sanitary measures mean that it is no longer possible today to measure the impact of nudges on household water consumption.

For the Spanish study site of the project. COVID-19 crisis has indeed generated changes in the metering procedures, since going to read meters was not possible due to the National Health Alert state. Once finishing the alert state, water company is keeping this procedure in the interest of public health. Since intelligent meters are not currently installed, this setback could generate significant impacts to successfully implement the project, especially when analysing the impacts on nudging on residential water consumption

B) DATA: the French public data which are now made available to researchers are no longer sufficiently precise to allow the achievement of one of the major objectives of the project, namely the identification of the effects of nudges on household water demand functions (and the socio-economic performance of the resulting pricing policy).

This impossibility is regretted; the reasons are understood, but we also think that solutions are possible if national data producers agree to carry out the necessary file merging and anonymisation operation procedures. It leads teams to mobilize resources to produce data and the latter are particularly expensive. This point does not however concern the replication of the micro-simulation model (econometric estimation of household water demand functions, descriptive data input into the Population module). Public data available today are to varying degrees sufficient, but it remains to ensure that open data policies in which national data producers are committed make them effectively available to the stakeholders.

C) The evolution of regulation related to personal data protection has real impacts on the collaborations we want to implement between researchers and stakeholders, operators in particular. The latter are no longer in a position to make data from subscribed files available to researchers without prior consent of the household users. The procedures to be implemented to cope with the regulations are currently laid down. They are particularly cumbersome and involve very strongly operators who do not always have the necessary time and human resources to do so.

- Did any of the partners find difficulties related to the grant agreement, the availability of funds at national level or other similar issues not specifically related to the technical part of the project?

Yes with regard to Spain and Tunisia who brought up the following difficulties:

Spain: The Spanish call to get funded was published on 11 April 2019, and the official resolution with the projects finally granted was published on 31 October 2019, while the funds not available at the University of Oviedo until 19-11-2019. The official starting date included in the application was 1 June 2019, so there was a 5 months delay to start the implementation of project activities.

Tunisia During the first period, we have encountered and still face a lot of administrative problems with the ministry and the concerned university. For instance, we are waiting since months a signature in the consortium agreement from the president of the University El Manar. Besides, we are still waiting the acquisition of the requested equipments we included in the first budget for two years (with part of the problem stemming now from the COVID-19 crisis). When talking with the responsible of cooperation in the University, we were surprised that she has any information concerning the project. Accordingly, the budget of the first year is still not yet spent. It is noteworthy that despite these aforementioned difficulties, we attempted to work at home with our own resources.

11. Suggestions for improvement regarding project implementation ?

We should be able to meet more frequently the Steering Committee of the project, more generally all the teams involved in the research program. This requires a schedule of regular meetings set well in advance that we will (probably) fix on the frequency of the NEWTS seminar led by the CREM. As underlined in the text, the CEMOI team now has a powerful communication tool and, above all, which grants it autonomy for the organization of these meetings.

In the same vein, even though working meetings are organized bilaterally, it is important for the Nudges (Behavioral Economics), Econometrics and Evaluation units to meet more regularly around specific seminars. Following the initiative of GAEL with the organization of an online workshop scheduled for January 2021, the team leaders of the Econometrics and Evaluation units will be asked to engage in this process with the organization of a specific workshop every 6 months. The same request will also be addressed to the person in charge of the Dissemination WP.

The animation task incumbent on the CC remains burdened by too many tasks related to the administration and logistics of the project. It would be helpful that a project engineer, from Research Service of the University of La Reunion or the Europe unit set up with the regional agency NEXA, be assigned to the management of the project (whose potential is recognized) for one working day per week. However, there is little chance that this request will succeed.

The development of the micro-simulation model calls for additional funding to improve dashboard design and data visualization (to be truly informative and friendly-user). This point also applies to the conduct of the household survey on the Cap Town study site. As emphasized in the text, the two teams mobilized to find these additional financial resources.

The situation of the Tunisian partner is worrying on two levels. The first is the animation of the WP Evaluation. This point will be discussed at the next meeting of the Project Steering Committee. The second relates to the difficulty encountered by the Tunisian partner in involving the national water company in the Tunisian part of the project. In the matter, LAREQUAD plans to organize a half-day seminar to present both (i) their results concerning the estimates of Tunisian water demand functions (on which they are now working, using the collected data) and (ii) the micro-simulation model developed by French partner CEMOI. This event is thought to be a good opportunity to discuss with local partners about the difficulties encountered and provide participants with all relevant information about the project and its main objectives.

Last, given the difficulties in achieving some of the project tasks, due (notably but not only) to the COVID-19 crisis, it seems to us necessary to obtain an extension of the duration of the project of 9 months. In particular, it is clear that some work (like survey collection) can only be done at a later stage, when the COVID-19 lockdown restrictions are eased.