



Personal Energy Administration Kiosk application:
an ICT-ecosystem for Energy Savings
through Behavioural Change, Flexible Tariffs and Fun
Contract No 695945

Deliverable D3.3.

Report on the technical performance of the field test

Document control information											
Title	D3.3 Report on the technical performance of the field test										
Editor	GreenPocket										
Contributors	TECNALIA										
Dissemination Level	<input type="checkbox"/> CO Confidential, only for members of the consortium (including the Commission Services) <input type="checkbox"/> RE Restricted to a group specified by the consortium (including the Commission Services) <input type="checkbox"/> PP Restricted to other programme participants (including the Commission Services) <input checked="" type="checkbox"/> PU Public										
Reviewers	<table border="0"> <tr> <td><input type="checkbox"/> Baskent-Elek</td> <td><input checked="" type="checkbox"/> GreenPocket</td> </tr> <tr> <td><input type="checkbox"/> DTU</td> <td><input type="checkbox"/> IJsfontein</td> </tr> <tr> <td><input type="checkbox"/> EI-JKU</td> <td><input type="checkbox"/> RTDS</td> </tr> <tr> <td><input type="checkbox"/> ELDER</td> <td><input checked="" type="checkbox"/> Tecnalia</td> </tr> <tr> <td><input type="checkbox"/> ENAMO</td> <td><input checked="" type="checkbox"/> 220 Energia</td> </tr> </table>	<input type="checkbox"/> Baskent-Elek	<input checked="" type="checkbox"/> GreenPocket	<input type="checkbox"/> DTU	<input type="checkbox"/> IJsfontein	<input type="checkbox"/> EI-JKU	<input type="checkbox"/> RTDS	<input type="checkbox"/> ELDER	<input checked="" type="checkbox"/> Tecnalia	<input type="checkbox"/> ENAMO	<input checked="" type="checkbox"/> 220 Energia
<input type="checkbox"/> Baskent-Elek	<input checked="" type="checkbox"/> GreenPocket										
<input type="checkbox"/> DTU	<input type="checkbox"/> IJsfontein										
<input type="checkbox"/> EI-JKU	<input type="checkbox"/> RTDS										
<input type="checkbox"/> ELDER	<input checked="" type="checkbox"/> Tecnalia										
<input type="checkbox"/> ENAMO	<input checked="" type="checkbox"/> 220 Energia										
Status	<input type="checkbox"/> Draft <input type="checkbox"/> WP Manager accepted <input checked="" type="checkbox"/> Co-ordinator accepted										
Action requested	<input type="checkbox"/> to be revised by Partners involved in the preparation of the deliverable <input type="checkbox"/> to be reviewed by applicable PEAKapp Partners <input type="checkbox"/> for approval of the WP Manager <input type="checkbox"/> for approval of the Project Coordinator										
Requested deadline for Action											

Versions			
Version	Date	Change	Comment/Editor
V0.1	24/10/2018	Initial release	Template provided
V0.2	24/10/2018	First release	First version
V0.3	19/12/2018	Final	

Executive Summary

The app system was developed with the ambition of potentially serving hundreds of thousands of household electricity customers. An important step on this way is the field testing with about 2,500 households in the course of the PEAKapp project. These households are real customers, and while kindly agreeing to participate on a voluntary basis, they expect a faultless and professional service from the app.

In this respect, an evaluation of all the findings took place in order to document the technical performance of the system. This report summarizes the procedures and the findings reported during the field test by customers.

This deliverable D3.3 provides a detailed description of the technical performance of the app.



Table of Contents

Executive Summary..... 3

Table of Contents 4

1 General Information of the Deliverable..... 5

2 Introduction 6

3 Issues in the field test of the GreenPocket App 7

4 Issues in the field test of the 220E App 9

5 Lessons Learned..... 10

1 General Information of the Deliverable

Table 1 - D3.3 General Information

Title	Report on the technical performance of the field test
Description	The field test is finished and its results of the technical performance are reported in a short communication. Therefore, the reported issues during the field test were evaluated. The completion of the field test was on 16. October 2018.
Deadline	M32 – November, 2018
Leader	GreenPocket
Partners Involved	GreenPocket, 220E, ENAMO,
Steps covered	All

2 Introduction

The comprehensive pre-testing phase of PEAKapp was followed by the actual field test phase starting from June 2017. Besides the important objectives to identify how customers can best be engaged with their energy consumption and to what extent behavioural change can be stimulated via an exploitation of smart meter data, the field tests also served to assess the technical performance of the ICT system.

The Austrian field test started right away and took 15 months, during which 1.060 customers of ENAMO used the PEAKapp in Austria. Another 500 customers were recruited during the same period to serve as a control group for further comparison. While the pre-testing identified a number of issues, which all were resolved before rolling-out the app to the larger community of Austrian field test users, it was important to learn which issues would show up in a real-life validation.

The field tests in Estonia, Latvia and Sweden started later than in Austria due to some delays in programming. In Estonia field testing effectively started in October 2017, Latvian field testing started in April 2018 and field testing in Sweden started in May 2018. However, in these countries the app was offered to all clients of 220E which required a more intense preparation phase to ensure a faultless operation in case of a high number of users. Some of the recruited users also granted access to their data for research purpose, namely 824 users in Estonia, 62 in Latvia and 5 in Sweden.

During the field test the customers had a possibility to report issues according to the 3-step procedure explained in Del 3.1 “Guidelines for communication and troubleshooting”.

In these report we analysed the issues reported by the customers. Most of these issues have been fixed, if not this report explains why.

3 Issues in the field test of the GreenPocket App

Before the app was provided to the real household test users, a comprehensive pre-test with friendly users was carried out (see Del 2.3 for details). By resolving the issues identified in the pre-test, a highly stable version of the app could be provided to the real users, which is demonstrated by the low number of reported issues.

As defined in Del 3.1 the issues were reported by the customers to the ENAMO call centre in a first step, and then distributed to Energieinstitut Linz if the problem could not be resolved. Energieinstitut Linz has resolved most issues, in particular those which were related to forgotten passwords, misunderstandings about the information as displayed in the app, or general inquiries about the app's functionalities.

Some issues had more complex origins and could only be addressed by the developers of the software solution, i.e. GreenPocket. The main issues were related to the consumption data interface, group membership changes and notifications. In total 24 issues were identified during the 15 months field test.

Table 2 shows the status of the issues. The issues have been clustered in 4 categories. "Cannot Reproduce" describes failure reports from clients that the project partners could not see in the system, but were reported by the client only. For these cases a user-failure or significant misunderstanding may be present. For example, for the issue "PEAKAPP-149", after several interactions with the client the team found out that the problems of the client were actually related to a different app and not to PEAKapp.

Category "Fixed" describes issues, which stem from a malfunction of the app, e.g. when clients did not update their operating system for a long period. PEAKapp was developed to be backward compatible to a reasonable number of older versions of the operating system, but some clients had even older smart phones that were never updated. Such issues could be fixed and PEAKapp showed a normal performance afterwards.

The category "Done" does not report a malfunction of the app, but relates to support requests from users whose claim could only be resolved by partner, namely GreenPocket. Such requests were mostly of an administrative nature, such as the representation of the Smart Time tariff in the app was not correct immediately after a tariff change one time (PEAKapp-117). Or that the consumption data of a user was not displayed for a couple of days, which happened after the connection to a smart meter was lost for some time (PEAKapp-148). All these issues could be resolved and provided important insights for a potential large-scale application of the app. Most importantly, it was agreed that only a very high degree of automation, e.g. automated updating of tariff changes, will result in a 100% up-to-date data bank of the PEAKapp system. Such automated updating requires a continuous bidirectional communication between the customer Relation Management System of the provider, i.e. the electricity company providing the app to its clients, and the app's backend system. However, while such a continuous communication can be established via a tailored interface, parts of the communication during the project runtime had to be done manually, considering limited resources.

For one issue, the category "Won't fix" was established. This issue PEAKapp-103 was related to substantial loss of consumption data, i.e. the consumption data could not be retrieved from the smart meter. However, several attempts to re-contact the smart meter of the respective client failed, and were finally stopped as the PEAKapp team saw no chances to reactivate the smart meter.

Table 2 – Issues during the field test

Key	Failure description	Component	Solution
PEAKAPP-88	Emails on 220E environment are not be sent	Email	Fixed by 220E
PEAKAPP-96	Contract of ended meter is not closeable	Tariffs	Fixed
PEAKAPP-112	Spelling mistake in the saving tips	Saving tips	Fixed
PEAKAPP-139	Consumption data queried after 1 pm	Consumption data interface	Done
PEAKAPP-145	Discount savings are not displayed	Discounts	Cannot Reproduce
PEAKAPP-133	Discount of January are not granted to all users	Discounts	Fixed
PEAKAPP-92	Evaluate the login behaviour of a customer	Login	Fixed
PEAKAPP-103	Gap in the consumption data	Analysis	Won't Fix (delivered consumption data were 0)
PEAKAPP-105	CSV files are moved to failed folder	Consumption data interface	Done
PEAKAPP-110	Change the group membership of 3 users	Groups	Done
PEAKAPP-117	Change costs components of tariff SMART-Time Privat	Tariffs	Done
PEAKAPP-119	Impersonating does not work	Administration Area	Fixed
PEAKAPP-122	Change the group membership of 1 user	Groups	Done
PEAKAPP-124	Change the group membership of 1 user	Groups	Done
PEAKAPP-129	Notifications are not sent	Notifications	Fixed
PEAKAPP-134	500-error after opening the analysis page	Analysis	Fixed
PEAKAPP-135	Change the group membership of 2 users	Groups	Fixed
PEAKAPP-137	Exchange of a SSL certificate	System	Fixed
PEAKAPP-144	Ensure the dispatch of notifications	Notifications	Done
PEAKAPP-148	Missing consumption data of a user	Consumption data interface	Done
PEAKAPP-149	User is locked	Login	Cannot Reproduce
PEAKAPP-151	Discount notification is not displayed	Notifications	Fixed
PEAKAPP-155	Disc is full	System storage	Done
PEAKAPP-161	Update Java	System	Fixed

4 Issues in the field test of the 220E App

During the field test, we encountered three types of issues.

Firstly, on a few occasions of the mobile Android devices, the standard solution did not work. Usually, it was a combination of the old Android version and on old mobile hardware which caused this issue. The workaround was to access the self-service via a web browser. Functionality was the same.

Secondly, there were complaints that the data was not always up-to-date. The app users were expecting the meter data to be available early the next day. However, our CRM did not receive the data in the first place. There could be many reasons, the DSO responsible for the data had not uploaded data to the data hub, data hub or data exchange did not forward the data, or our system failed to receive it. We improved several times our systems but could not do anything but to draw attention to the data availability issue if the mistake was not on our side. The more general issue is that data becomes available only the next day not close to real time.

Thirdly, there were some feature requests, like multi-site support, bank payments from the app, running monthly invoice information disappeared after the end of the month, integration of gas data into the app.

We integrated the multi-site support feature to the app. Bank payments were not commercially feasible option for us. The rest of the features we implemented during the field test or are still under the development.

Some non-customers asked if they could use the app during the field test. Unfortunately, at that time Estonian TSO had not added the required new data access options to the data hub. The GDPR implementation had made them very cautious, and the solutions were not ready for commercial use. We are still working on that and hope to make 220Energia PeakApp solution available to everybody during 2019.

5 Lessons Learned

The testing phase was very useful and effective and resulted in the provision of a stable and secure PEAKapp solution for the field test with only a few issues. Thus, the technical performance of the app can be described as mature and stable. Nearly all found issues were fixed with the objective to further enhance the system quality, stability and security.

However, some lessons learned may be useful for improved efficiency of replication attempts beyond the project's runtime.

- **Missing data:** All field tests experienced missing or delayed consumption data from time to time. The origin of the missing data was manifold: no data transfer from smart meters to the metering company (e.g. the grid operator), no transfer from the metering operator to the retailing company, or issues at the side of the retailer who could not receive the data even when sent correctly.

None of the app versions had foreseen a representation of, or information about, missing data. Thus, displaying just no figures and related data-dependent content, where customers expected to see information related to their energy consumption behaviour. Considering missing data can hardly be avoided from time to time when a high number of metering points is represented in a system, it is recommended for future deployments to think about a solution how such disappointing user experience from missing data can be avoided.

However, there can hardly be a one-serves-it-all solution for handling missing data in the app system, but solutions need to follow the specific situation at the app providing energy company. For example, showing estimated or interpolated values may raise confusion, when these temporal values are substituted by the real values later. Additionally, consumption figures are immediately transferred into monetary units, so that the legal consequences of displaying temporal estimated values have to be assessed based on respective national laws. Thus, while a standardized solution may not be appropriate for all clients, some variants for handling missing data should be developed.

- **Log-in:** A relevant number of field test participants had problems with the log-in, as they could not remember their password after a while. The requirements for setting a password were aligned with the security guidelines of the participating energy companies, and in particular in the Austrian field test these requirements turned out as an obstacle for some. The need to include numbers and special characters, plus upper and lower case letters, has led to passwords that were very different from the ones used by the households in other apps.

As a consequence of the complicated password criteria, some households did not only forget their password several times, which could be retrieved through a "forgotten password" link, but have tried wrong passwords so many times, that they were locked by the system. Such lock-out could only be resolved by contacting the PEAKapp support team, and while these issues could be handled efficiently by the team, some households have given up and quit using the app following this disappointing experience.

In this respect, we clearly recommend to re-assess the security guidelines on the side of the energy companies, to make sure clients can use memorable passwords. Additionally, modern smart phones allow using peoples' finger print or face scan to substitute classic written passwords. Enriching the app by making use of these technologies may be supportive for clients and avoid disappointing user experiences.

- **Time-of-data-delivery:** The consumption values of households are metered between 00:00 and 24:00 o'clock and stored in the smart meter every day, and then transferred to the data hub of the metering company, e.g. the grid operator. However, different technologies are used for transferring the data from the smart meter to the metering company. While technologies allow almost immediate transfer of the data, a widely used technology is Power Line Communication (PLC). PLC, as used in the Austrian field test for example, does not enable fast communication, but allows data drop in over a period of several hours. So, while the communication process is started right after 24:00 o'clock, data transfer is not necessarily completed even at 6 am on the following day.

Several of the functionalities of PEAKapp required data at a very early time of the day to unleash their full motivational potential. For example: the game PEAKpoker was designed to inform households about the accuracy of their preceding day's bet early in the morning of the following day, so that clients could check their status and play a new round e.g. on their way to work.

While the speed of PLC cannot be increased per se, the induced delays are even altered when the app provider is different from the metering company, as it was the case in the PEAKapp field tests (where retailing companies offered the app). The data is then transferred from the metering company to the app providing company according to contracts made between the two parties. These contracts may be long lasting agreements, usually made before the introduction of the app and therefore not considering the urgency of the data transfer.

In this respect, it is clearly recommended to investigate the delay before the data will actually be available to the households, and assess solutions if the delay may be hindering for a positive user experience.

- **Administrator warnings:** All information about the status of the system is accessed by a dedicated person on the side of the app provider (e.g. the retailing companies). In the administrator system, one can check whether complete data is available for each of the connected meters, whether all push messages have been sent as foreseen, or whether the functionalities of the app are operating as expected.

Thus while all information is available to the administrator, she or he is required to actively look into the system to become aware of any unwanted situation, e.g. that a push message was not sent at the planned time. Since the app system was running smoothly for most of the time during the field tests, the administrator may stop looking into the administrator system every day after a while. This can lead to delays in identifying issues.

In this respect, we recommend to develop a tool for the administrator system that detects exceptions automatically and warns the administrator by email or other means of communication. Such issues could be an unusual high number of missing data that may point to a problem with the connection between metering operator and app provider, or stuck push messages that may be due to problems with the connection to the customer data bank. Receiving automatically generated warning can foster the resolution of these issues before customers have a negative user experience.