eco-bot
let's talk energy!

DELIVERABLE 6.8

Eco-Bot Video Version 2

PLEGMA
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www.eco-bot.eu

D6.8: Eco-Bot Video Version 2 Summary

This deliverable documents the creation of the second version of the Eco-Bot project video which describes how Eco-Bot works and provides feedback related to its performance on the pilots, in order to communicate and disseminate the project's outcomes and visibility. The videos are produced by the project consortium and uploaded on the project YouTube channel and leverage the YouTube platform capabilities to share and embed it online.

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LEAD BENEFICIARY	DELIVERABLE AUTHORS
PLEGMA	Stelios Kalogridis (PLEGMA) Nikos Ipiotis (PLEGMA)

QUALITY ASSURANCE	
Reviewer 1: Günter Becker	RISA
Reviewer 2: Dora Karali	ERRA

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DISSEMINATION LEVEL	x PU = Public □ PP = Restricted to other programme participants □ CO = Confidential, only for members of the consortium

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KPI: Key Performance Indicators

NILM: Non-Intrusive Load Monitoring

Executive summary

This deliverable documents the creation of the second version of the Eco-Bot project video which describes how Eco-Bot works and provides feedback related to its performance on the pilots, in order to communicate and disseminate the project's outcomes and visibility. The videos are produced by the project consortium and uploaded on the project's YouTube channel. In this deliverable, we briefly describe the content of the videos and provide their scripts, as well as their links.

1. Eco-Bot YouTube channel

The Eco-Bot project has selected the YouTube platform to host our videos since it is the most popular service globally as well as the easiest and most user friendly to operate. The platform has been described in Chapter 1 of Deliverable D6.7.

The Eco-Bot YouTube channel URL is available at:
https://www.youtube.com/channel/UCdTrJv2eHo7_3tAfpbTPAnA

At the time of writing of this deliverable, the Eco-Bot YouTube channel contains 4 videos with a total of 706 views.
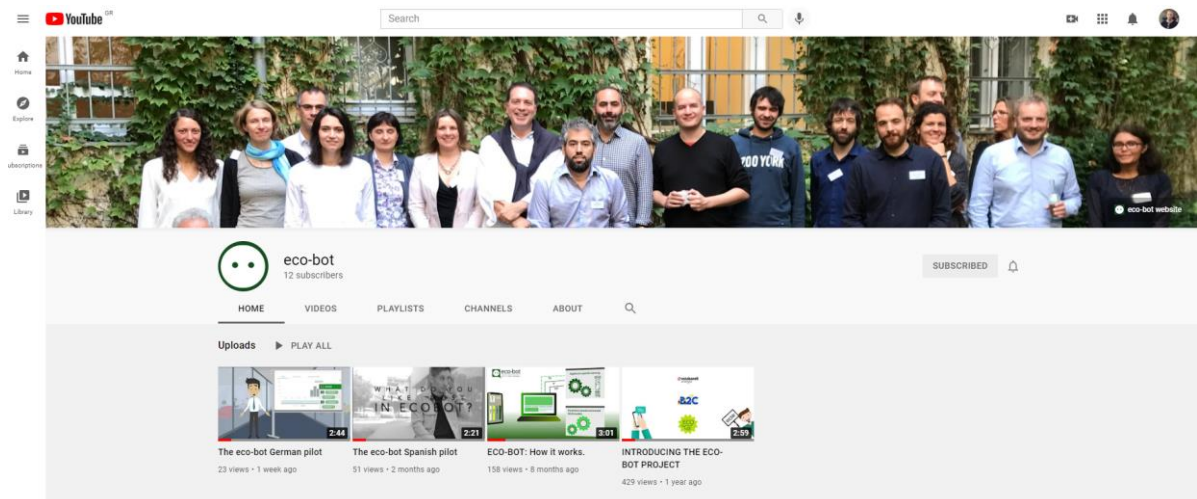
Figure 1: Eco-Bot YouTube channel

The first video's aim was to present in a brief fast-paced and high-level manner the fundamentals of our project and introduce a wide audience to the benefits of the Eco-Bot approach to personalized energy efficiency. The first Eco-Bot video is described in chapter 2 of deliverable D6.7 and is available at https://youtu.be/Yhg8s-K_WnQ.

The second Eco-Bot video that was led by USTRAT is named "ECO-BOT: How it works" and is available at: https://www.youtube.com/watch?v=9ssG6JSZC0w. This project video was also presented at the 5th International Workshop on Non-Intrusive Load Monitoring (http://nilmworkshop.org/). The aim of this video is to present Eco-Bot functionalities and the first set of results from the small scale validation phase.

2.1 Video content

The figures below show example frames from the video.
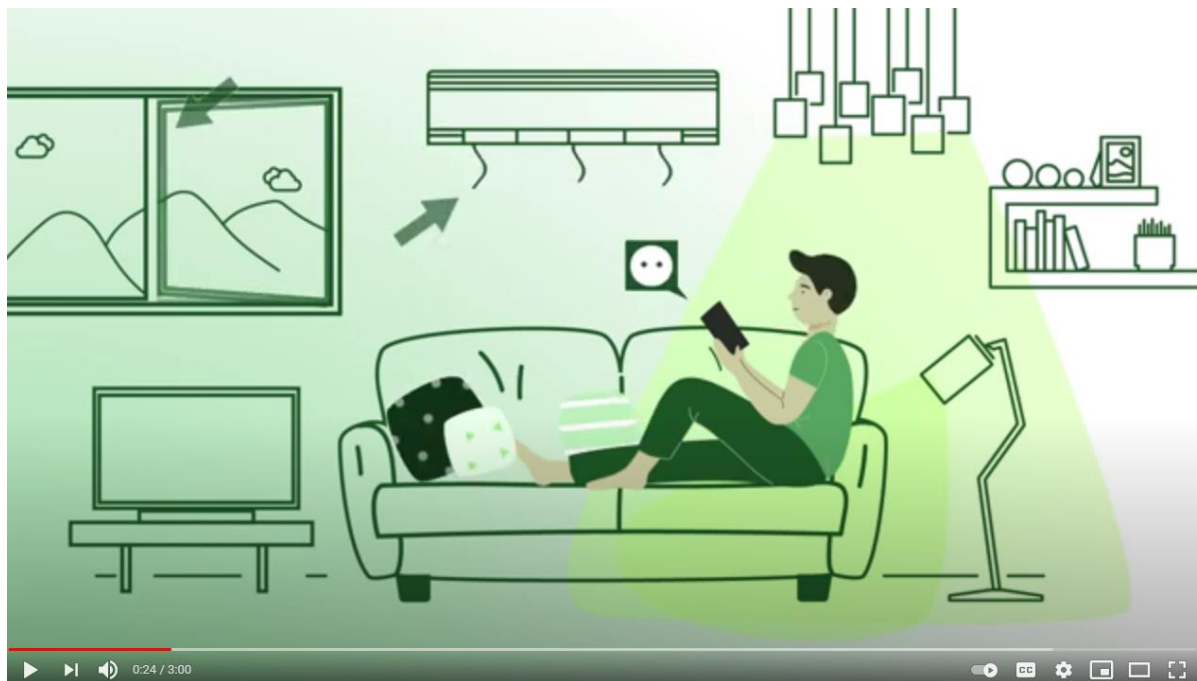
Figure 2: Eco-Bot "How it Works" video screenshot 1

Figure 3: Eco-Bot "How it Works" video screenshot 2
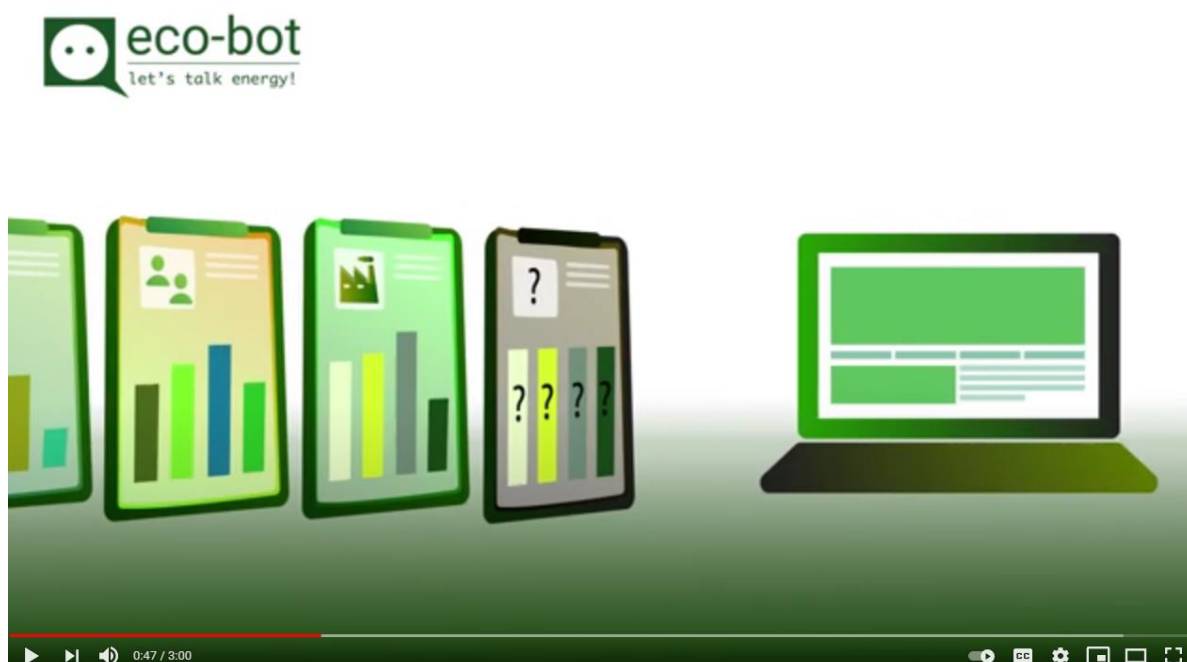
Figure 4: Eco-Bot "How it Works" video screenshot 3
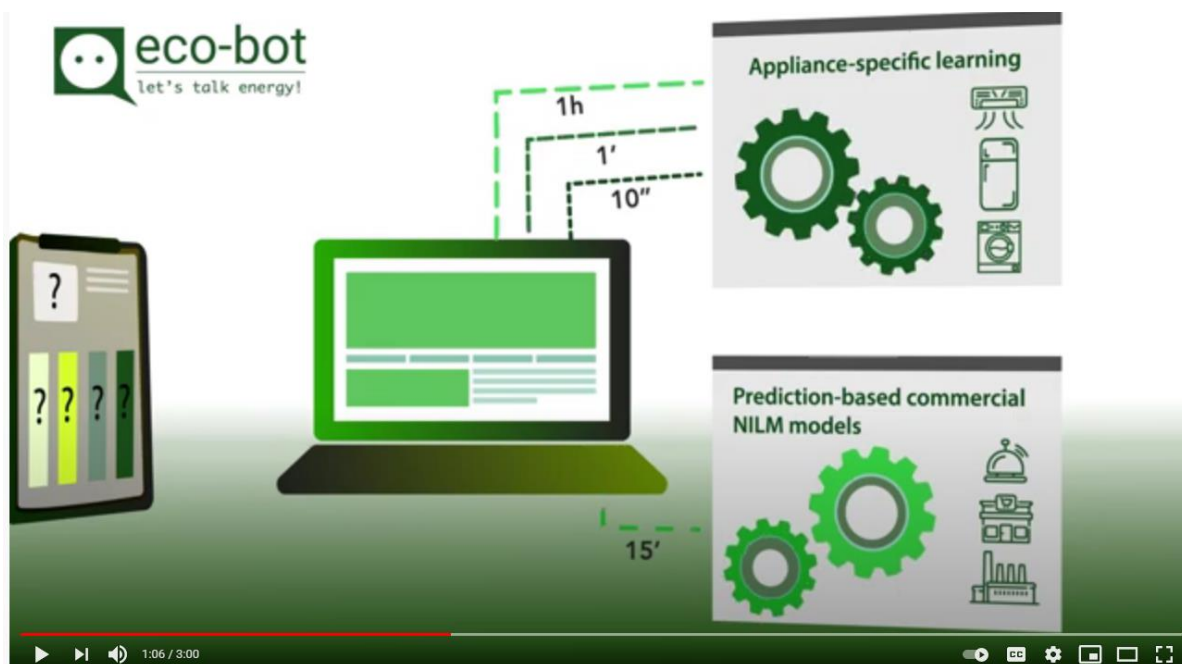
Figure 5: Eco-Bot "How it Works" video screenshot 4
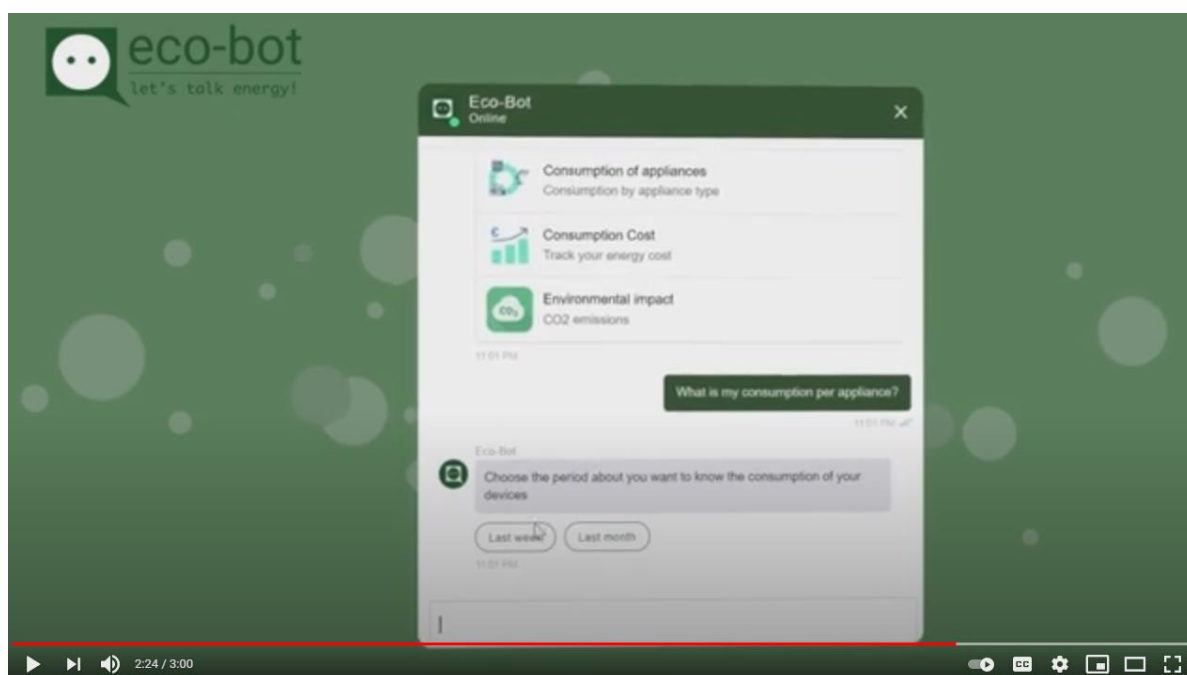
Figure 6: Eco-Bot "How it Works" video screenshot 5
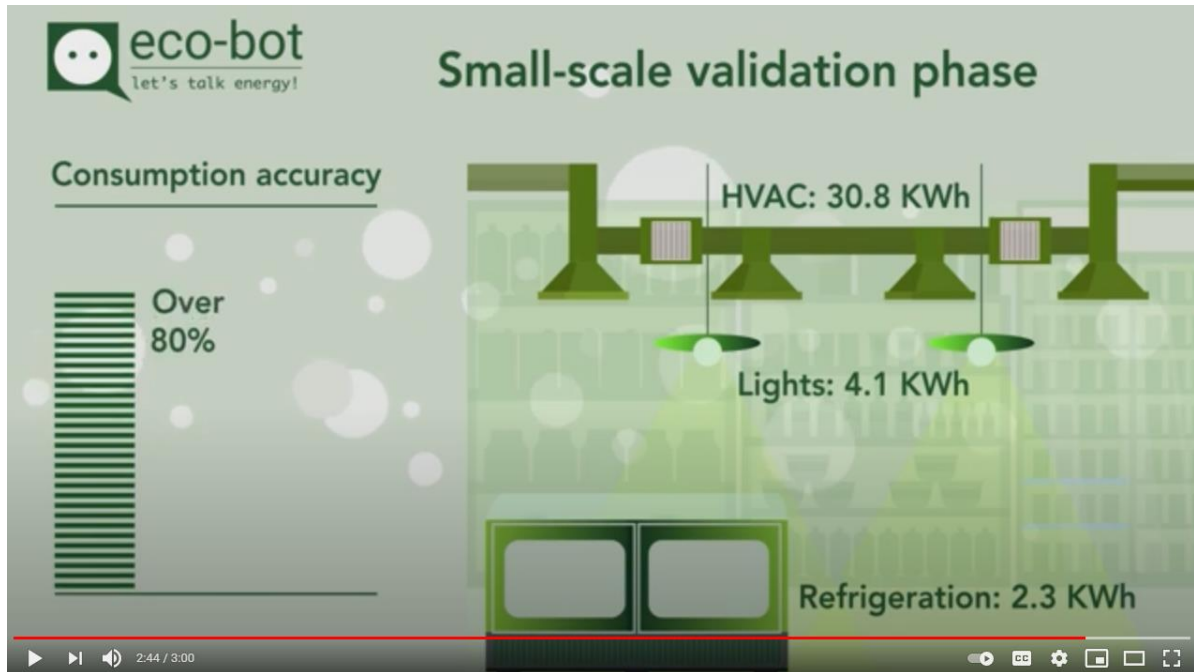
Figure 7: Eco-Bot "How it Works" video screenshot 6

2.2 Video script

The following text is the final script we used in the second Eco-Bot video:

Eco-Bot is a virtual energy-saving assistant, developed within an H2020 project, that exploits:

- non-intrusive load monitoring (NILM),
- multi-factorial behaviour modelling, and
- natural language processing

to motivate behaviour change towards more energy efficient practices, by providing user-centric information about energy consumption at appliance level and personalised energy saving advice.

Eco-Bot is currently being demonstrated in three European pilots, each representing a different business model, for validation across real and diverse conditions.

The pilot sites include:

- Estabanell Energia, the power utility of Catalonia for residential customers (B2C);
- SEnerCon, an energy software provider with residential customers (B2B2C); and
- DEXMA, a Building Energy Management System provider, for commercial buildings such as supermarkets, restaurants and hotels (B2B).

In order to meet the varied reliability, sampling and scalability constraints of the user groups and use cases where no submetering data is available for training, the following NILM algorithms form the basis of the NILM module:

- novel supervised, transfer learning based appliance-specific NILM models for each of three Eco-Bot residential pilots resolutions (10 sec, 1 min, 1 hour)
- prediction-based commercial NILM models (15 min sampling resolution)

The NILM module receives as input anonymised smart meter readings and a one-off appliance survey, filled in by the customers once they register and optionally updated when they add or remove an appliance.

Let's see some NILM-related Eco-Bot features and usage scenarios for consumers:

- The user can request the consumption of all their appliances or of a specific appliance for different periods. The user can also compare the consumptions of different periods.
- The chatbot can help the user investigate the reasons for a high electricity bill by providing a number of options. For instance, the user can select to check the consumption of their appliances for last month. Then the user could explore if it's worth investing in a new appliance, triggered by the high consumption of one or more of their appliances.
- Eco-Bot sends alerts when the consumption of the previous day exceeds a certain threshold. The user could check the consumption of their appliances for that day. Then, the user could request the high and low consumption days of the last month and check the appliances' consumption of the day with the highest consumption.

Facility managers have a different menu that is tailored to their needs. They can request the appliances consumption of the last week or of the last month for any of the buildings they manage.

The project involved a small-scale validation phase through online time diaries and feedback, engaging users from all 3 pilots and assessed with 2 metrics:

- Consumption accuracy, which measures accuracy in estimated energy consumption, where submetering was available. In our pilot, only commercial buildings had submetering.
- Over 80% accuracy in estimated energy consumption was achieved in supermarkets for refrigeration, HVAC & Lights. Further improvements can be made on HVAC, with models retrained based on additional data acquisition.
- Classification/detection accuracy, which measures if an appliance run is detected at the correct time. It was a subjective measurement for residential pilots where submetering was not available and is based on the participant's ability to recall all instances of all appliances that were run. An average of 78% classification accuracy was obtained. To improve the accuracy, we continue to train the NILM by "learning" the signature of the specific appliances that were missed.

Eco-Bot has been designed and developed under the project "Personalised ICT-tools for the Active Engagement of Consumers towards Sustainable Energy".

The project consortium consists of nine industrial and academic partners from 5 European countries.

For more information on the Eco-Bot project, please visit www.eco-bot.eu.

3. Eco-Bot Video 3

The third Eco-Bot video was the one led by EYPESA and included interviews with end-users. This video is named "The Eco-Bot Spanish pilot" and is available at: https://www.youtube.com/watch?v=TjZn-p2bDYc.

The main aim of the video is to briefly describe the Spanish pilot and then present feedback from actual Eco-Bot end-users.

3.1 Video content

The figures below show example frames from the video.
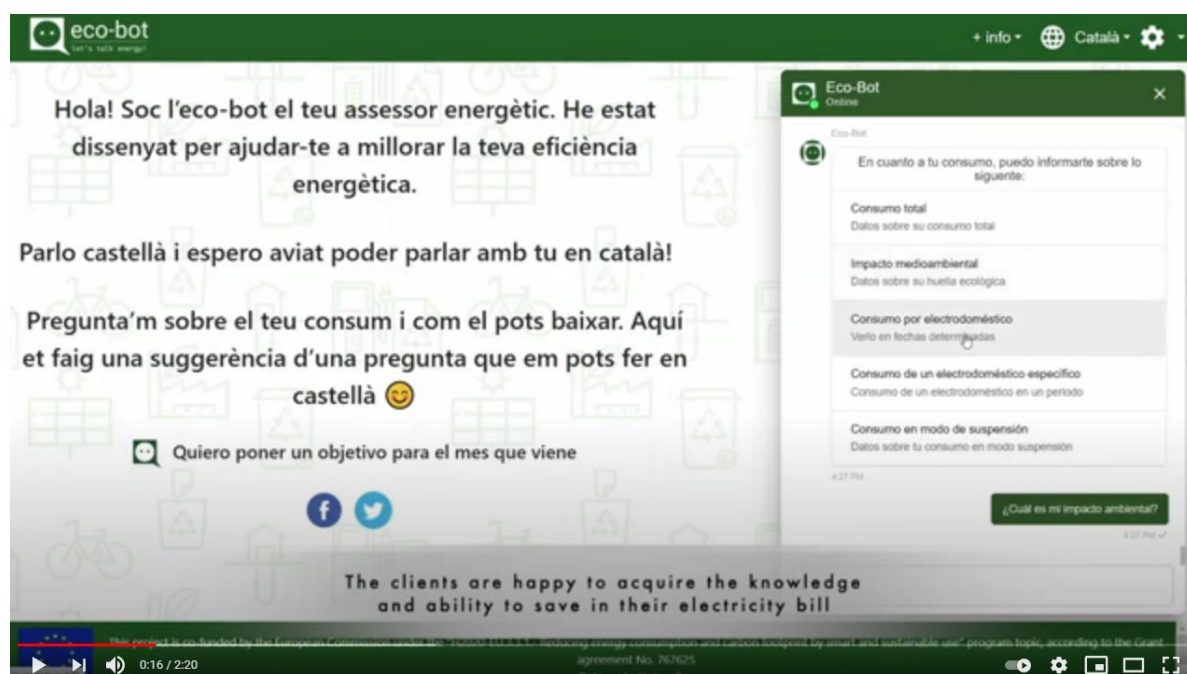
Figure 8: The Eco-Bot Spanish pilot video screenshot 1

Figure 9: The Eco-Bot Spanish pilot video screenshot 2

Figure 10: The Eco-Bot Spanish pilot video screenshot 3

Figure 11: The Eco-Bot Spanish pilot video screenshot 4

3.2 Video script

The following text is the final script we used in the third Eco-Bot video:

Eco-bot is an energy efficiency tool that engages the residential consumers and empowers them with information on their consumption habits.

The clients are happy to acquire the knowledge and ability to save in their electricity bill.

Let's listen to what they have to say…

What do you like most in ecobot? (1st written question)

- ISMAEL – Dedicated saver:
    - The functionality I like and use most is checking my consumption in different periods per appliance.
    - At the end this is what gives me the most valuable information and allows me to save money in my bill.
- DAVID – Tech geek:
    - The recommendations regarding buying a new appliance or when you want to know your consumption. That's one of the functionalities I use most.

Was it easy to understand how it works? (2nd question)

- It is possible to use ecobot in a quick and efficient manner as it's a friendly intuitive energy advisor.
- NURIA – Ecological idealist:
  - All the family can use it, from adults to kids
  - We are really used to its appearance. We use whatsapp or telegram everyday for chatting, and Eco-Bot is simply a chat. It is really easy.

Did you learn something with Eco-Bot? (3rd written question)

- Yes, with Eco-Bot you always learn something. It shows you your environmental impact in different units such as the methane produced by cows and so you actually know what is your environmental footprint.

What would you improve in Eco-Bot? (4th question)

- That it could speak in Catalan
- Maybe the push notifications. That the alerts of high consumption could be sent directly to your mobile phone

How would you define Eco-Bot in one sentence? (last question)

- Energy efficiency at home
- I would say it is a contemporary tool and from the XXI century.
- For me it's clear: the energy advisor we all need!

The fourth Eco-Bot video was the one led by SEC and presented the Eco-Bot German pilot case. The video is named "The Eco-Bot German pilot" and is available at: https://www.youtube.com/watch?v=_sA3HD7H4Ps and with English subtitles at: https://www.youtube.com/watch?v=su_ehwDocLM.

The main aim of the video is to briefly describe the German pilot and then present feedback from actual Eco-Bot end-users.

4.1 Video content

The figures below show example frames from the video.

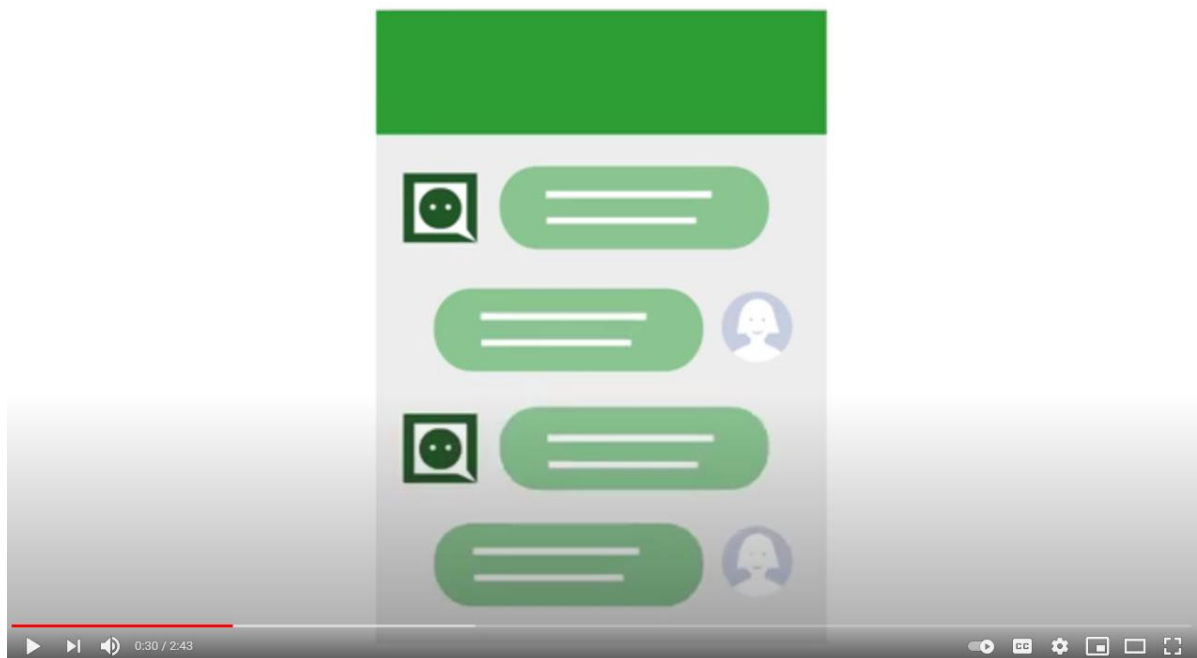**Figure 12: The Eco-Bot German pilot video screenshot 1**

Figure 13: The Eco-Bot German pilot video screenshot 2

Figure 14: The Eco-Bot German pilot video screenshot 3

Figure 15: The Eco-Bot German pilot video screenshot 4

Figure 16: The Eco-Bot German pilot video screenshot 5

4.2 Video script

The following text is the final script we used in the third Eco-Bot video:

What is important for you as an energy supplier or as an operator of an energy management platform when a customer visits your portal?

"Of course the information on the portal, but also its user-friendliness. How you want to communicate to your customers is of central importance.

By email?

By hotline?

In person at the customer centre?

With our chatbot Eco-Bot you can communicate directly with your customers.

With Eco-Bot as part of your portal, you improve communication with your customers. In addition, you offer interesting information on consumption, environmental impact and the purchase of new equipment.

Eco-Bot is not just an ordinary chatbot but an innovative add-on service by combining chatbot technology, behaviour modelling and artificial intelligence in data analysis.

Hello!

With Eco-Bot, we have added a new communication channel with our customers to our energy monitoring platform Energiesparkonto.

Eco-Bot has made our platform more attractive for our customers. Until now, energy consumption, energy costs and CO2 emissions were presented as diagrams and tables.

Now the client can ask for all the information for any period of time through the chat window.

Furthermore, Eco-Bot offers additional functions through the intelligent evaluation of energy data, linked to personalised energy-saving tips.

How? We'll show that with a customer example.

Customer:

Oh God, another back payment! Did I really consume that much more? I'll have to get a better grip on that in future, though.

Ah, there's something new in the energy savings account, a chatbot that helps me save energy!

Let's see what I've used in the last year.

Which appliance consumes the most?

Maybe I should buy a new fridge, is it worth the investment?

Then next month I'll see if it has changed anything about consumption yet.

Oh, another new energy-saving tip from Eco-Bot on how I can save energy even without a big investment.

For the next month I am setting myself an energy saving target, let's see if I can achieve this with Eco-Bot's tips.

and this is what our customers say about Eco-Bot!

Feedback customer no. 1:

With Eco-Bot, I can quickly assess whether an energy-saving measure has paid off.

Feedback customer no. 2:

Eco-Bot's energy saving tips are easy to implement without costing me anything.

Feedback customer no. 3:

The operation is simple, the graphic elements of the menu are user-friendly and self-explanatory.

Feedback customer no. 4:

It's fun to use Eco-Bot to get a quick overview of my consumption and costs and test its understanding of energy saving tips.

A video from UEKAT is currently in preparation and will be released in late September 2021. The video will be presented at the 5th edition of the Silesian Science Festival (https://www.slaskifestiwalnauki.pl/o-festiwalu), which will be held on October 9-15, 2021.

5.1 Video content

The video will show what influences people's decisions and what motivates them to save energy. The material will demonstrate how the behavioural model, developed by UEKAT, works and will also provide some personalised recommendations for different types of energy consumers.

5.2 Video script

The video is prepared based on the following script:

1.

Eco-Bot is a tool developed within an H2020 project, aiming at behaviour change towards more energy efficient practice.

The whole project aims to provide a personalised virtual energy assistant that will deliver information about energy consumption on an appliance level and user-tailored advice on energy efficiency measures.

So, basically, Eco-Bot is here to help you with your bills and energy consumption!

2.

Eco-Bot aims at empowering people to behave in a more sustainable way and allows them to be more energy-efficient.

- Changing energy behaviour is crucial, as it is an important factor influencing the overall energy consumption and energy efficiency.

- Small changes have a great impact - if everyone contributes just a little bit, together we can achieve great things! Small changes when multiplied by many people sum up to an immense result.

- Changing your behaviour and establishing a new routine may not be the easiest thing, but we are here to help you with that!

- It is easier to try new things when an idea is provided to you from a trusted source, like your energy management application.

3.

Individual consumers' attitudes toward energy consumption are influenced by many different factors: external and internal, financial, social, and economical. From the perspective of Eco-Bot project goals of changing the energy consumers behaviour, their personality traits, the adopted system of values, motives, and emotions play a crucial role.

Therefore, it is extremely important to know the needs of consumers, the level of electricity demand, and the changes in consumer attitudes. Hence, it is a useful skill to be able to predict the behaviour of energy consumers and their assessment. To achieve this, we have developed a segmentation of Eco-Bot clients, taking into consideration factors such as: the impact of social groups, lifestyle and following fashion, habits, experience, and past behaviour.

Different people react to various incentives - and the Eco-Bot project takes that under consideration!

4.

An important element of the Eco-Bot application is a model responsible for classification of the customers due to their behaviour related to energy saving and environmental protection. This model was developed by one of the Eco-Bot project partners - the team from UEKAT.

The University research team designed such a classification model. It uses multivariate statistical methods called data mining. This model is a core of the Eco-Bot application.

The model uses machine learning. Sounds complicated? How does it really work? It is very simple!

We ask you some questions at the beginning, and that enables us to assign you to one of the five segments. What for? To provide you with a corresponding, individually profiled set of recommendations on how to save energy.

So basically, by allowing Eco-Bot to get to know you, you have a better chance to obtain valuable recommendations on how to improve your energy performance! Eco-Bot provides you personalized recommendations appropriate to your needs.

Information obtained from existing users allows the creation of a training set for the model - so that the model can learn the appropriate classification of a new user to the appropriate segment. Segmentation was created taking into consideration specific behavioural attitudes developed on the basis of users characteristics.

5.

For the proper functioning of the model in the application, energy consumer engagement strategies have been prepared, taking into account their attributes characterizing affiliation to the developed segmentation. In addition, recommendations for each of the segmentation sectors were tailored to the user, so as to properly induce consumers to save energy and to promote pro-ecological behaviour.

Assigning the user to a particular segment is equivalent to choosing a corresponding, individually profiled set of recommendations useful for improving the energy efficiency of a given household.

Recommendations are plentiful and concern various aspects and household appliances. Like for example:

- Always boil only as much water as you consume. Remember not to forget to use boiling water immediately. Easy effort and great savings!

- Try switching off the electric oven for a few minutes before the planned end of cooking. It will use the temperature kept inside without using electricity and reduce your environmental impact.

- For your savings you do not need the specialist knowledge to check whether the fridge seal adheres properly and ensures tightness.

- Focus on ironing and do not walk away from the iron, especially if you do not have a device with a touch sensor. You will iron your clothes faster and will save money.

- Natural light is better for your eyes, try to adjust your schedule so that you can use it more during the day!

- Be a manager in your own home - manage hot water economically.

- Sleeping in a cooler room is healthier, set a lower temperature for the night.

- When you work or learn from home, you use more power – try to balance it with scheduling other activities (like cleaning or laundry) during off-peak hours.

As you can see, Eco-Bot promises a simple and easy way into being a more energy efficient person and thus lowering your energy footprint!

We can all change our future and the future of our children by caring for the environment and reducing energy consumption!

For more information on the Eco-Bot project, please visit www.eco-bot.eu

6. Conclusion

The second version of the Eco-Bot videos has been produced and uploaded to the project channel in accordance to Task 6.3 and Task 6.4, presenting how Eco-Bot works and provides feedback related to its performance on the project pilots, in order to communicate and disseminate the project's outcomes and visibility. The videos are produced by the project consortium and uploaded on the project YouTube channel. In this deliverable, we briefly described the content of the videos and provide their scripts, as well as their links.

The total video views on Eco-Bot's YouTube channel exceeded our initial expectations and the set KPI, reaching 706 views.