

# An educational awareness program to reduce energy consumption in public institutions: The case of the French Social Security

T. Marquez, P. Rostan

*Abstract—To achieve ambitious energy efficiency objectives, large public institutions face challenges to embark employees and building users. In this regard the French Social Security deploys actions to raise awareness among a large number of internal stakeholders, in order to increase acceptance, participation and responsibility to bring about behavioural change on energy efficiency. The paper presents the results of the programme Impulsion2021, a large-scale awareness-raising program which targets 5800 employees. The program consisted of several phases: a) identify participants, b) develop learning material, c) plan and execute the communication campaign d) facilitate internal communities, and e) measure and analysis of participatory results. A specific focus on the adaptation of learning programs is presented: one program targeted for general users on daily actions, and another targeted to professionals responsible of building operations and renovation actions. The results show an increased level of participation during the program, as measured by the increased level of interactions on the topic within the internal communication channels, and the exchange of over 50 best practices carried out throughout the institution. The experience shows the opportunities and impact of a common and long-term awareness program and its potential influence on daily behaviour of users. Finally, the program managed to mobilise an unprecedented number of people, which has encouraged the institution to evaluate its continuity.*

**Keywords**—awareness-raising, energy efficiency, capacity building

## I. INTRODUCTION

THE building sector now accounts for 44% of the energy consumed in France and is one of the main drivers of the climate challenge. One third of real estate emissions come from buildings in the tertiary sector,

i.e. 34 Mt CO<sub>2</sub>e, according to the report on the state of the environment. Between 1990 and 2017, greenhouse gasses (GHG) emissions from buildings in the tertiary sector increased by 8%, which can be explained in particular by the significant expansion of the tertiary surface area, by almost 50% over the period [1].

However, since 2009, the sector's energy consumption has been decreasing by an average of about 2% each year, due to energy efficiency improvements and the use of less carbon-based energy.

Recently, the French government set out a new regulation to accelerate the performance improvement energy consumption via the Tertiary Eco Energy decree. The decree sets rather ambitious targets for energy consumption thresholds and energy reduction. The decree concerns all buildings with a surface area of 1000m<sup>2</sup> or more that are used for tertiary purposes. It thus concerns offices, educational buildings, administrations, hotels, shops, etc. The objective of reducing the energy consumption of buildings is set at -40% by 2030, -50% by 2040 and -60% by 2050 [2].

Moreover, the Ministry of Ecological Transitions has since 2005, put in place a nationwide program to support massive renovation: the CEE program (Energy Savings Certificates). This scheme is based on a three-year obligation to achieve energy savings imposed by the public authorities on energy suppliers. The energy suppliers are thus encouraged to actively promote energy efficiency among their energy consumers client-base: households, local authorities or professionals to comply with their obligation.

CEEs are awarded, under certain conditions, by the Ministry of Energy to eligible actors that carry out energy saving operations. These actions can be carried out in all sectors of activity (residential, tertiary, industrial, agricultural, transport, etc.), on the property of eligible parties, and/or with third parties. Standardised operation

---

Manuscript received 31 August, 2021; revised 10 December, 2021; accepted 5 January, 2022; published 19 January, 2022.

This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 licence (CC BY <http://creativecommons.org/licenses/by/4.0/>). Unrestricted use (including commercial), distribution and reproduction is permitted provided that credit is given to the original author(s) of the work, including a URI or hyperlink, this public license and a copyright notice. This article has been subject to single-blind peer review by a

minimum of two reviewers. Digital Object Identifier <https://doi.org/10.55066/proc-iccc.2021.20>

“Impulsion2021 was supported by the Ministry of Ecological Transition and the Agency for Ecological Transition (ADEME) within the national program of Certificates of Energy Economy (CEE).”

T. Marquez is with Green Soluce, 10 Rue Pergolèse, 75116 Paris, France ([tmarquez@greensoluce.com](mailto:tmarquez@greensoluce.com)).

P. Rostan is with Green Soluce, 10 Rue Pergolèse, 75116 Paris, France ([prostan@greensoluce.com](mailto:prostan@greensoluce.com)).

sheets, defined by decree, are drawn up to facilitate the setting up of energy saving actions.

Since the second period of the CEE scheme, capacity building and innovation programmes have been added as potential activities financed by CEE certificates [3]. The objective is that non-technical actions can also contribute to the control and reduction of energy consumption.

This article presents the results of a large-scale awareness-raising and capacity building CEE programme, called *Impulsion2021*, which targets 5800 employees of the French Social security.

## II. CONTEXT OF PROJECT

With a building stock of 4.5 million m<sup>2</sup> spread over more than 3,700 buildings, most of which have high energy consumption, and 145,000 employees, the Social Security system is a privileged field of experimentation for the implementation of awareness-raising and capacity building actions with a strong potential impact towards its energy transition strategy [4].

In order to meet the objective of energy efficiency targets set by the Social Security in its CSR strategy, it is necessary to raise awareness and participation among the greatest number of internal stakeholders [5]. Thus, the need to promote behavioural change among Social Security employees, and to bring about new management practices among operational staff through an in-depth knowledge of the subject coupled with a playful and educational approach.

Although collective awareness of the environmental impact of buildings is not new, it would seem appropriate for an actor as that of the Social Security to trigger potential energy savings by the mobilisation of its internal stakeholders (e.g. occupants and operators).

The Social Security system aims to deploy the program across the institution, which composed of four complementary and independent branches: Health Insurance (in charge of the health system and accidents at work), Family Allowances (in charge of supporting families throughout their lives: children, solidarity, housing assistance, etc.), Retirement Insurance (in charge of collecting and paying pensions) and Collection (in charge of collecting contributions from companies to finance the other three branches); where each branch manages their teams, buildings and training policy internally.

Thus, the challenge on how to propose training and participatory activities at the institution level with various user profiles.

## III. METHODOLOGY

The French Social Security has been committed to the issues of sustainable development and CSR for several years. As such, the programme *Impulsion2021* supplements the institution's environmental training to take actions at their role and level. To ensure maximum

impact of the programme the following methodology was devised:

- a) Identify the population to take part in the deployment of the programme.
- b) Design a specific training content.
- c) Implement the communication campaign.
- d) Deploy and support of the different communities of the four branches of the institution.

The course training was deployed with the support of the Union of National Social Security Funds (UCANSS), which is the entity responsible for carrying the tasks of common interest within the French Social Security (e.g. professional training, collective bargaining, national examinations and competitions). It also acts as a central purchasing office by pooling certain public procurement contracts.

Throughout the programme, its progress was evaluated according to several key indicators: the participation of the different social security branches, the satisfaction rate of the employees who followed the MOOCs, the number of participations in the participatory workshops and finally the number of exchanges and interactions that took place between branches by the end of the programme.

## IV. IMPLEMENTATION

### A. *Identify the population to participate in the deployment of the programme*

Two audiences were targeted: a) the Institution's employees, and b) the Institution's real estate professionals/experts. These two groups were selected for the following reasons:

On the one hand, the Institution's employees, the occupants of the buildings, as they use the premises on a daily basis (lighting, air conditioning, IT equipment, etc.) and can have a direct impact on reducing energy consumption in the buildings. On the other hand, the Institution's real estate professionals/experts, which include the asset managers, real estate directors, maintenance or project manager. Those who supervise the maintenance and operation, the renovation of the building stock in compliance with the increasingly demanding energy and environmental regulations.

For *Impulsion2021*, within a universe of 140,000 employees, a target 5% of employees was defined for both types of users, where 5300 were general employees, and 500 were real estate professionals.

In terms of planning, the programme started in September 2019, the creation of courses was finished in April 2020, the online courses were available from June 2020 until December 2021, webinars and workshops were carried out between October 2020 and December 2021, and the main Forum took place in March 2021.

### B. *Design the training content*

The programme includes two main training courses targeted at each population: a) an "Introduction to Energy

Transition” for the general employee population, and b) on “Optimising your Building” for the real estate professionals.

The training content were presented as massive open online courses (MOOCs) with divers means of engagement (videos, polls, dynamic presentations, chat forum, webinars, etc) including a gamification aspect to increase participation [6] [7]. A Learning Management System (LMS) platform was used for the e-learning and forum, and other collaborative tools (Klaxoon, and WebinarJam/MSTeams) for online workshops and exchange sessions. Both MOOCs included introductory videos tailored-made specifically for the programme, and complementary videos from other governmental agencies promoting energy efficiency in the public sector (ADEME, Ministry of Ecological Transition, etc.). All the other modules were conceived with an interactive, fun and engaging content. The content was created by the programme's co-sponsors and reviewed and validated by a Technical Committee (conformed by the UCANSS and representatives of each branch). The committee ensured the relevance and consistency of the content, and provided input to adapt to each internal community (technical stakeholders, CSR experts, training managers, etc.).

#### C. Creation of the course: Introduction to Energy Transition

A training and awareness-raising course entitled Introduction to the energy transition (MOOC 1) was created to address the 5300 Social Security employees with the main objective to present action that employees can carry out in their organisations. MOOC 1 was divided into

TABLE I  
LEARNING OBJECTIVES OF MOOC 1

Week	Learning objective
1	Defining the challenges of climate change and energy transition ( <i>common for both MOOCs</i> )
2	Distinguish the energy transition issues in the building sector that can be implemented for Social Security
3	Acting on a daily basis to implement this energy transition by being aware of possible individual initiatives and initiatives already carried out within the Institution
4	Accelerate the process of reducing energy consumption around you

The activities (videos, quiz, forum, presentations) were design to address the learning objectives of each week.

four weeks with four key learning objectives (table I).

This course also integrated links to different initiatives carried out by the different branches to increase cross-communication (a challenge within such a large institution). The activities within each module focused on individual eco-actions, which enabled participants to identify concrete measures they could do in the office or at home in order to reduce the energy consumption in buildings.

#### D. Creation of the course: Optimising your Building

A training course entitled Optimizing your Building (MOOC 2) aimed at 500 site managers was created to clarify the opportunities and challenges of property management to accelerate the energy transition of the Social Security's property assets. MOOC 2 was divided into four weeks with four objectives (table II):

MOOC 2 provided real estate professionals/experts with regulatory information on the energy transition for buildings, possible levers for action (e.g. optimisation of technical systems, monitoring solutions, efficient renovation approach, etc.) and successful case studies that showcase various solutions to improve building performance.

For each MOOC 1 and 2), participants took between 2,5 and 3 hours to complete each course. A key challenge in the conception of the courses was the multiplicity of employee profiles targeted. The ambition of the programme was to produce a coherent, fun and impactful content material that could reach a large population and be widely disseminated within the institution. In this context, Green Soluce and UCANSS, in charge of the conception, paid particular attention to the script and language of the content in order to make easy to follow, and at the same time provide in-depth examples for the most seasoned participants [8].

In this regard, the beginning of each MOOCs starts with a common general presentation on the challenges of climate change, the energy transition and its specific application to social security. Subsequently, each course

TABLE II  
LEARNING OBJECTIVES OF MOOC 2

Week	Learning objective
1	Defining the challenges of climate change and energy transition ( <i>common for both MOOCs</i> )
2	Understand the regulatory context related to the challenges of the energy transition and the ambitions of the Social Security
3	Know the tools to reduce the energy consumption of a tertiary building
4	Recognise the internal relays to drive the energy transition in the Social Security building stock

The activities (videos, quiz, forum, presentations) were design to address the learning objectives of each week.

follows its specific structure (tables I and II), where MOOC 1 (aimed at general employees) focused on individual eco-actions and the means for collective involvement in an energy-saving approach, and MOOC 2 presented the regulatory challenges and framework on the energy transition for the built environment, and a list with concrete operation actions to implement. At the end of each MOOC an evaluation was carried out to assess perceived satisfaction, motivation to do the course and knowledge [9] [10].

### E. *Implementation of the communication campaign around the project*

The Social Security is a complex organisation, with four main independent branches that oversee 300 local offices. Thus, the importance to establish a project governance to coordinate, communicate and reach all stakeholders. For the implementation plan a Steering Committee was formed with representatives from each branch (composed of ten members representing the UCANSS, the Real Estate Division of each branch, and Green Soluce). The committee was in charge of validating the main orientations of the programme, the monitoring, and the progress of the awareness-raising and participatory actions. To carry out the plan, a Technical Committee was in charge of deploying each action of the programme (communication, start/finish of training, logistics, and measuring key performance indicators). These Steering and Technical Committees made it possible to streamline communication of the project among social security organisations, and in particular to register the employees.

Securing participants was a key concern as it required a significant support and commitment from managers. To address this, the directors of each national social security branch took part in several communication videos that supported everyone to participate [11] [12]. The videos presented: a) a call to participate by the national branches, and b) the institution's strategy towards energy transition. This initial call helped secured over 2000 participants as of June 2021.

### F. *Deployment & support of the different communities*

The main challenge of the project laid in its transversal ambition to provide a digital training, awareness raising, and participatory activities known to all the offices within the Institution and large demographics (e.g. age, education level, role) [13].

To support this deployment over the different communities, the programme provided a centralised an e-learning platform complementary to the tools already in place in the institution. Under this approach the platform would be a one-stop space to exchange on activities within Impulsion2021 and its activities. This made it possible to deploy the courses, solicit feedback from participants, exchange document and good practices, and communicate on upcoming events (webinars and workshops). Moreover, the centralisation of this information made it an ideal repository for outputs, which are to be open-source the general public at the end of the programme [14].

Throughout the programme the existing networks of CSR managers and sustainable development ambassadors within each Social Security organisation, took advantage of the platform to further share articles and actions carried out by their networks. It also allowed for a different form of outreach to raise awareness on other environmental issues and relay exemplary actions already in place in the organisations.

This possibility of exchange between participants was reinforced by the distribution of a weekly Impulsion2021 newsletter to share additional content (articles, quizzes, internal news, events, etc.). This channel was 100% collaborative and allowed participants to propose content to be shared in the newsletter so that everyone can take ownership of the programme and the topics covered.

During the deployment of the courses, three other main types of events were organised to ensure that concrete actions were taken by participants after completion of the courses, specifically for the group of real estate professionals.

#### 1) *Webinars on shared experiences*

After completing the courses, participants were invited to take part in webinars to share concrete feedback on the potential implementation of the proposed actions in the short and mid-term to identify, and develop solutions adapted to the Social Security's real estate assets.

#### 2) *Workshops on Innovative Solutions*

Participants were invited to small groups workshops of about 20 people. In these workshops, they were presented with around 20 innovative solutions in the field of energy performance and exchanged on their feasibility for the social security's buildings. These workshops allowed participants to discover new solutions to integrate into the renovation planning of their assets.

#### 3) *National Forum for the Social Security and the Public Sector*

In March 2021, an Energy Transition Forum was organised to exchange ideas and experiences with other French institutions in the public sector [15]. The 3-day forum which counted with 4 roundtables, 5 workshops, 50 technical solution pitch sessions, 960 participants, 240 Business-2-Business meetings enable participants to identify and exchange on innovative solutions in the field of energy transition. The conclusion of the forum opened channels which have led to calls for tenders for the implementation of some of the solutions identified.

## V. RESULTS

The objective of Impulsion2021 is to contribute to the reduction of the energy consumption of the building stock of the French Social Security via participatory awareness-raising and training activities of employees, either by actions carried out by the building users, or the implementation of innovative solutions that arise from collaborative exchanges among the branches. As this was a first within the Social Security system, it is however complex to compare the results of the Impulsion2021 programme with other similar actions carried out within the Social Security system or in other French public organisations.

In this regard, results at this stage of the programme don't necessarily show a direct short-term impact on the energy consumption, but present the indirect impact on

the employee engagement and participation needed to push the agenda for energy transition at the institution.

The following insights were observed after more than 2,000 employees completed the learning programme and workshops:

#### G. High training satisfaction

The post-course satisfaction evaluations showed that 95% of the respondents indicated they were satisfied or very satisfied with the content and delivery format. These results and commentaries were further shared within the institution to increase engagement. Based on this initial feedback, the programme Impulsion2021 was awarded the 2021 Digital Learning Trophy in the category of Content Strategy, award presented by the jury conformed of Féafur, Schneider Electric, Capgemini, Stellantis, Crédit Agricole, SAFRAN, COTY and Medtronic [16].

#### H. Increased inter-branch knowledge sharing

The Social Security is an institution that groups together autonomous branches that independently manage their training policy, their CSR policy and their property policy. As such, inter-branch communication is a challenge.

The breakdown of participation by branch was: 26% Health Insurance, 13% Family Allowances, 22% Retirement Insurance, 29% Collection and 10% for others regimes. The common platform for exchanges (feedback on needs, sharing of experience, etc.), training courses, events, and ongoing facilitation served to bring together the participants throughout the organisation.

Impulsion2021 made it possible to bring to levels of exchange and knowledge sharing within the Institution on a strategic topic for the Social Security.

Participation in the various events was also an important indicator of the programme's success. As of June 2021, more than 2000 people have completed the learning programme. There were 2 webinars with 350 participants, 10 digital workshops with 200 participants and one flagship Energy Transition Forum with over 1000 participants in total (50% were from the institution). These participants then shared their experience in their own organisations.

After these events, the level of internal participation on the topic of energy efficiency increased as there were more shared initiatives, more requests to register on the courses, and website visits (+50 per month).

More importantly, the programme allowed to identify more than 50 good practices which were implemented throughout the institution and shared between the branches. Course participants were invited to share initiatives implemented through a weekly newsletter (events, awareness-raising actions, concrete energy saving actions in their buildings, etc.).

The experience showed opportunities and potential impact of a central and long-term awareness-raising programme, and its influence on the daily participation of users, particularly in a very large Institution whose

operations are usually very siloed between the various departments and professions.

#### I. Construction of events as means for stakeholder buy-in and participation

Three types of events were conducted and co-created with the UCANSS which resulted in increased attendance and commitment from the Institution:

a) Webinars: two webinars were organised, each targeted more than 150 real estate professionals. The first webinar dealt with the challenges of energy reduction at a building level. The webinar counted with the participation of the Retirement Branch which presented its internal energy tools co-developed with the Scientific and Technical Centre for Building. The second webinar dealt with the challenges of Operations & Maintenance of Social Security buildings, with the participation of the Family



Fig. 1. French news article from Les Echos communicating about the Impulsion2021 programme.

and Allowances Branch who presented their methods and contract-type with external energy service providers. These two webinars received a satisfaction rate of more than 90%.

b) Innovative Solutions Workshops: 10 workshops were organised with a participation of 20 people in each session. The participants were also real estate professionals. During these 10 workshops, about 70 innovative solutions were presented and discussed. Several participants capitalised on the exchanges and followed up with concrete actions, like carrying out public tenders for such type of solutions.

c) Energy Transition Forum: The forum was perceived as the second catalyst (after the launch of the online courses). Not only by the number of participants over three days, but also due to participation of the Minister Delegate to the Minister for Ecological Transition, the French Real Estate Direction and Purchasing Direction, the Bank of Territories, the Centre of Studies and Expertise of Risk, Environment, Mobility and Urbanism (CEREMA), among other public institutions present. These interventions allowed to share relevant points of view on the challenges of the energy transition of public buildings.

Lastly, a high visibility media partnership (i.e. Les Echos/Le Parisien group and Acteurs Publics) allowed a larger outreach at national level, leveraging on the programme's website (Fig. 1). Thus, confirming the success in mobilising a public institution to raise awareness and increase its commitment to reduce energy consumption of its buildings.

The programme Impulsion2021 officially ends in December 2021, and final results and figures of the balance of the programme will be available early 2022.

## VI. LIMITATIONS AND FURTHER WORK

The results of the Impulsion2021's awareness-raising and participatory are promising and need to be continued within the Institution. It is in the medium-term that the institution will be able to measure the impact of the actions implemented. Moreover, this experience can be used as a baseline for future type of mass participatory awareness activities.

Finally, to be able to reach the totality of employees at the Social Security the programme will need reinforcing actions (as shows in section C).

## ACKNOWLEDGEMENT

The authors would like to thank the team from the UCANSS, P. Badard, D. Conti, M. Nghe and F. Monnot for their work and leadership in the deployment of the program within the Social Security institution.

## REFERENCES

- [1] Ministère de la Transition écologique, Chiffres clés du climat France Europe et Monde, Edition 2021 [link](#) (accessed Nov 2021)
- [2] Ministère de la Transition Ecologique, Le Dispositif Eco-énergie tertiaire, Juin 2021 [link](#) (accessed Nov 2021)
- [3] Ministère de la Transition écologique, Guide des programmes CEE, 2020, [link](#) (accessed Nov 2021)
- [4] Les Echos, Une méthode douce pour accélérer la transition des bâtiments de la Sécurité sociale, Jennifer Matas, 2019 [link](#)
- [5] UCANSS – Sécurité sociale, Responsables au quotidien, le référentiel de la démarche RSO de la Sécurité sociale, 2020, [link](#)
- [6] Rincón-Flores, E. G., Mena Marcos, J. J., Ramírez-Montoya, M. S., Ramírez Velarde, R. (2020). The use of gamification in xMOOCs about energy: Effects and predictive models for participants' learning. *Australasian Journal of Educational Technology*, 36(2), 43-59.
- [7] Carrera J and Darinka Ramírez-Hernández D (2018). Innovative Education in MOOC for Sustainability: Learnings and Motivations. *Sustainability* 2018, 10, 2990
- [8] Carrillo-Rosas, A. & Ramírez-Montoya, M. S. (2016). MOOC as a viable option to energy sustainability and technological training. *Proceedings of the 9th annual International Conference of Education, Research and Innovation*. Seville, Spain: ICERI.
- [9] Valdivia Vázquez, J. A., Ramírez-Montoya, M. S., & Valenzuela González, J. R. (2018). Motivation and Knowledge: Pre-Assessment and Post-Assessment of MOOC Participants From an Energy and Sustainability Project. *The International Review of Research in Open and Distributed Learning*, 19(4).
- [10] Romero-Rodríguez, Luis M., María S. Ramírez-Montoya, and Ignacio Aguaded. 2020. "Determining Factors in MOOCs Completion Rates: Application Test in Energy Sustainability Courses" *Sustainability* 12, no. 7: 2893.
- [11] Video Impulsion2021 – Call to action by Social Security Directors. (March 2020). (YouTube video [link](#))
- [12] Video Impulsion2021 – Social Security Directors on the MOOCs. (March 2020). (YouTube Video [link](#)).
- [13] Canchola González, J. A., & Glasserman-Morales, L. D. (2020). Factors that influence learner engagement and completion rate in an xMOOC on energy and sustainability. *Knowledge Management & E-Learning*, 12(2), 129–146.
- [14] Green Soluce, IMPULSION2021 (2020). Available at <https://impulsion2021.org>
- [15] Green Soluce, FORUM IMPULSION2021 (2021). Available at <https://forumimpulsion2021.fr/>
- [16] Les Trophées du Digital Learning by Féfaur, Les Lauréats des Trophées du Digital Learning 2021 (2021). [Link](#)