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PowerShift

Monitoring & Evaluation Report

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"The curious thing is that the more you play, the more Columbia looks like Colombia."

(statement from the ex-post questionnaire)

Table of Content

This report was produced by LEAF Inspiring Change as part of the project "*Supporting multi-stakeholders dialogue on national determined contribution (NDC) trajectories in Colombia using strategic games*". The project is a partnership between the French Development Agency (AFD), LEAF Inspiring Change, the Bern University of Applied Sciences (BFH), the Swiss Federal Institute of Technology (ETH) Zürich and the University of Lausanne (UniL).

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1 Introduction

The project "*Supporting multi-stakeholders dialogue on national determined contribution (NDC) trajectories in Colombia using strategic games*" is a partnership between the French Development Agency (AFD), LEAF Inspiring Change (LEAF), the Bern University of Applied Sciences (BFH), the Swiss Federal Institute of Technology (ETH) Zürich and the University of Lausanne (UniL). It follows a long-term collaboration between the French Agency for Development and the Colombian Ministry of Finance (MHCP), the National Planning Department (DNP) and the National University of Colombia (UNAL). The collaboration resulted in the development of a macroeconomic model exploring opportunities and vulnerabilities for the Colombian economy in light of the energy transition at both national and global levels (GEMMES). The objectives of the project are to 1) enhance understanding of the transition and its implications for the Colombian economy and 2) facilitate dialogue among Colombian policy makers.

In this context, LEAF led a participatory process to develop a strategy game, named PowerShift, representing the macroeconomic situation of Colombia facing the low carbon transition. The overall project is structured in several phases as described in Figure 1: co-design of the conceptual model, creation of the strategy game prototype with internal crash-tests and game refinements, iterative game testing and scenarios exploration, support of multi-actors' policy dialogue on low carbon transition using the final game.

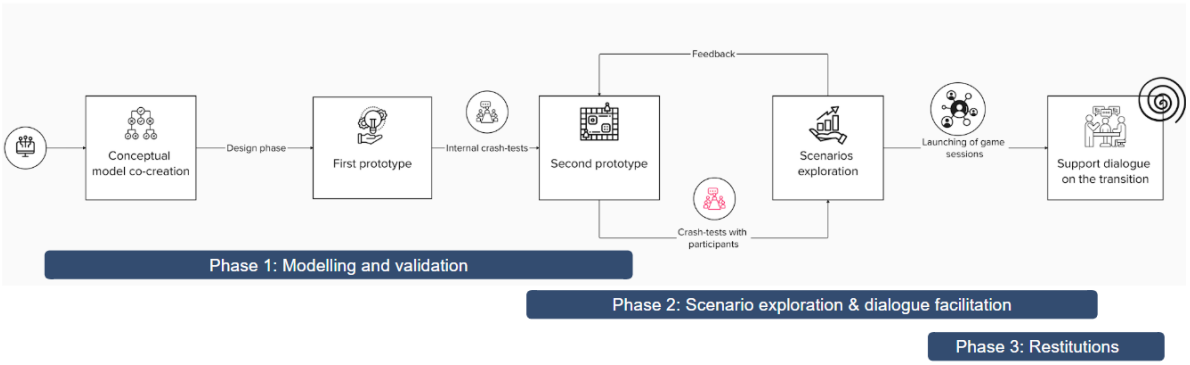

Figure 1: Process flow of the project from co-conceptualisation of the model to support political dialogue towards transition

Monitoring and evaluating the impact of participatory approaches, such as strategic games, presents significant methodological challenges (Hassenforder and Ferrand, 2024; Kriz et al., 2024). Unlike traditional policy interventions or training programs that can be assessed through SMART indicators and measurable outcomes, serious games often target personal and social dimensions that are less tangible, less quantifiable such as substantive knowledge, behavioral or institutional changes (Mayer, 2009; Flood et al., 2018).

Each game session is singular and non-replicable. It conveys a unique set of diverse stakeholders with diverse perspectives and levels of motivation to engage and participate. This leads to highly personal and individualized learning experiences that complicate the use of standardized evaluation methods (Haug et al., 2011). Who comes at the table highly influences the trajectory of the session (Garcia et al., 2022), the game being "open ended",

subject to changes to adapt to players' proposals, interactive and exploratory by nature. Outcomes are unpredictable and vary depending on group dynamics, prior knowledge, levels of engagement, etc…further complicating impact assessment. As with any ex-post interviews, they may be subject to recall limitations and complacency/social desirability bias. These methodological difficulties highlight the need for a mix-method evaluation approach as conducted within PowerShift, as advocated by Kriz et al. (2024).

Throughout the project's implementation, a monitoring and evaluation (M&E) protocol was established to assess the progress and effectiveness of the strategy game approach in meeting its objectives. This protocol strived to ensure accountability, transparency, and continuous learning throughout the project. This M&E report includes a presentation of the logframe with performance indicators, the theory of change, an overview of the data collection methodology, an analysis of key outcomes, identification of challenges, and recommendations for future actions.

2 M&E frameworks and indicators

2.1 Logical framework

The Logical Framework (see Figure 2), which provides the project roadmap, objectives, and how they will be measured, was established in collaboration with AFD at the onset of the project. The diagram visually represents the relationship between activities, outputs, outcomes, and goals in the context of a project aimed at reinforcing high-level and inter-ministerial engagement in transformative dialogue and decision-making for Colombia's low carbon transition. It outlines how specific actions (activities) lead to tangible results (outputs), which then contribute to broader changes (outcomes) and ultimately achieve the overarching goal.

The project comprises four main activities (for a full description of the activities refer to the main project report).

1. Organize **participatory workshops** to develop a conceptual model and collaborate on a strategy set with key stakeholders.
2. Facilitate a series of **game sessions** with relevant stakeholders from different ministries and sectors.
3. Analyze the results of the game sessions and present the findings of the participatory process in **reports and publications**.
4. Organize **restitutions** events of the findings with high-level decision-makers and relevant audiences.

These activities facilitate knowledge expansion and networking across sectors and lead to the following, tangible outputs:

1. The GEMMES model is transformed into a strategy game through a participatory modeling process with key stakeholders. This ensures integration of diverse perspectives and enhances ownership of the models (GEMMES and strategy game) among high-level decision makers.

2. The strategy game is used to support dialogue, examine potential scenarios and gain insight into stakeholder options and decision-making strategies. The game facilitates the elicitation of mental models and provides insight into the underlying tensions and synergies.
3. Finally, the results of the participatory process are disseminated to ensure broad uptake of the process among high-level decision-makers.

This will allow for a more informed and cohesive inter-ministerial dialogue, resulting in:

1. Consolidated scientifically informed frameworks as a basis for decision-making.
2. Enhanced system's understanding of the low carbon transition among decision-makers.
3. Initiated inter-ministerial dialogue processes with high-level decision-makers that enhances trust and creates space for constructive exchange.

Ultimately, the improved engagement and enhanced quality of collaborative decision-making contributes to a reinforcement of high-level and inter-ministerial commitment to transformative dialogue and decision-making on Colombia's transition to a low carbon economy.

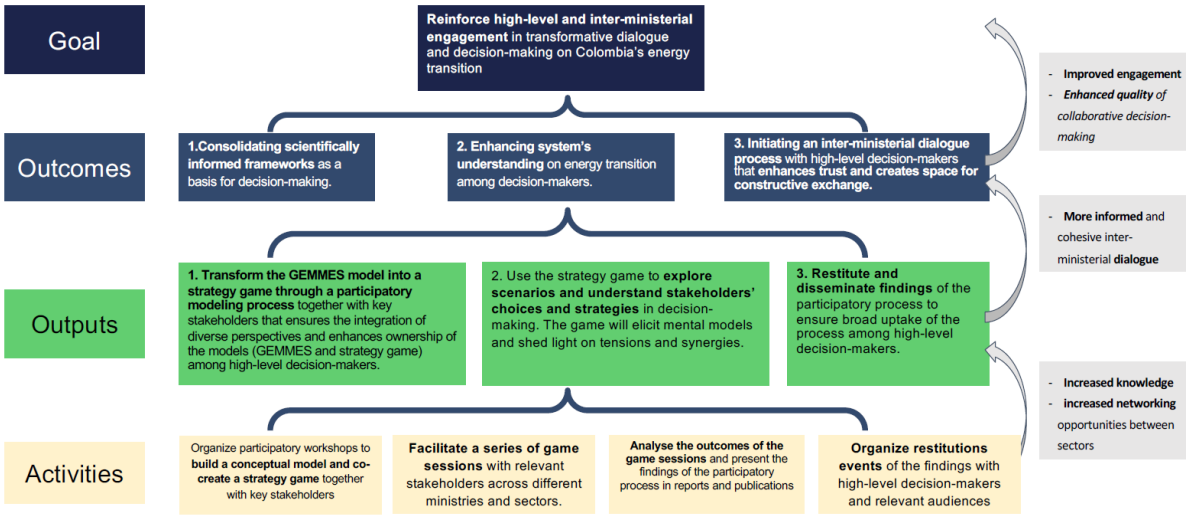

Figure 2: Logical framework of the project with its three main pathways

The theory of change is based on several assumptions critical to the success of the project:

- Stakeholders respond to the invitation to participate in the activities and maintain a high level of engagement throughout the duration of the project.
- Stakeholders use the connections created during the project in their engagement work.
- The content and scenarios used in the strategy game are perceived as relevant and effectively represent the complexities of the low carbon transition.
- Stakeholders apply the insights and knowledge gained from the game and discussions to actual policy-discussions.

We hypothesise that the successful conduction of strategy game workshops leads to increased knowledge, understanding, and networking among participants, which is essential

for improved engagement in policy discussions. Consequently, as participants use the new tools, knowledge and connections, inter-ministerial dialogue becomes more informed and cohesive, influencing the quality of collaborative decision-making.

2.2 Indicators

Table 1 references indicators to measure the effectiveness of the activities, outputs, and outcomes across three dimensions: conduction, usefulness and change. Conduction's indicators evaluate whether activities were carried out as planned, assessing their scope and reach. Usefulness indicators measure how relevant and valuable the activities were to the target audience. Change indicators assess the extent to which the intervention led to intended changes. These dimensions include both quantitative (e.g., number of workshops, publications, and participants) and qualitative (e.g., satisfaction levels, perceived usefulness of tools) measures.

Table 1: Indicators of the project according to three dimensions: conductions, usefulness and changes

Measuring **conduction** of project activities	Nr of conducted game workshops Nr of different ministries present in workshops Nr of actual powerful decision-makers sent to the workshops Nr of publications drafted Nr of restitution events
Measuring **usefulness and effectiveness** of participatory workshops	Level of satisfaction about the game sessions (game is perceived useful for people's work context) Level of satisfaction about the quality of the dialogue held during the workshops % of players reporting an increase in understanding different stakeholders' choices and strategies % of participants perceiving scientific models as tools useful for decision-making Shift in perspective and increase in capabilities (i.e. SEN capabilities)
Measuring **behavioral changes** as a result of participatory workshops	Difference in interactions (% of participants reporting an increase in frequency, quality or number of interactions with other people) % of participants reporting actually using scientific models in decision-making Level of motivation and scope of field of use of scientific models in decision-making % participants reporting taking actions on bottlenecks for constructive collaboration

16

The following table describes the indicators per level of the logical framework. It also specifies, when possible, the baseline values of participants and expected target ones. Baseline values were obtained from the ex-ante questionnaire, as described in the following section. Baseline values were firstly calculated with the data collected before the workshop series in June 2024 and then updated with data collected with the ex-ante questionnaire before the second workshop series in September 2024 (see values marked with * in Table 2). Target values were defined based on the baseline values from June 2024. In one case (value marked with ** in Table 2), the target value resulted to be lower than the updated baseline value. We will discuss that in the Evaluation of the indicators in Table 16.

Table 2: Final version of the Monitoring & Evaluation Framework.

	DESCRIPTION	**INDICATOR**	**DEFINITION** How is it calculated?	**BASELINE** What is the current value?	**TARGET** What is the target value?	**DATA SOURCE** How will it be measured?	**FREQUENCY** How often will it be measured?	**RESPONSIBLE** Who will measure it?	**HYPOTHESES**
GOAL	Reinforce high-level and inter-ministerial engagement in transformative dialogue and decision-making on Colombia's energy transition	Difference in interactions (% of participants reporting an increase in frequency, quality or number of interactions with other people)	Self-reported, qualitative observation by participants in ex-post questionnaires	**44%*** of participants interact with at least two different institutions and **16%*** are satisfied with their level of collaboration and **13%*** consider the collaboration efficient or very efficient.	25% increase in any of those dimensions	Ex-post questionnaires	1x ex-ante, 1x ex-post (3 months after the intervention)	Project lead (PL), M&E	**H1**: High-level and inter-ministerial engagement in transformative dialogue improves decision-making effectiveness in Colombia's energy transition.
OUTCOMES	Initiating an inter-ministerial dialogue process with high-level decision-makers that enhances trust and creates space for constructive exchange.	Nr of different ministries present in workshops		0	4	Questionnaire (Interview), Attendance sheet	1x ex-ante, 1x ex-post (3 months after the intervention)	Project lead (PL), M&E	**H2**: Initiating an inter-ministerial dialogue process with high-level decision-makers increases the

	DESCRIPTION	INDICATOR	DEFINITION How is it calculated?	BASELINE What is the current value?	TARGET What is the target value?	DATA SOURCE How will it be measured?	FREQUENCY How often will it be measured?	RESPONSIBLE Who will measure it?	HYPOTHESES
		% of workshop participants are in a position of power		n/a	50%				frequency and quality of cross-ministerial collaborations on energy transition issues.
		Difference in interactions (% of participants reporting an increase in frequency, quality or number of interactions with other people)		**44%*** of participants interact with at least two different institutions and **16%*** are satisfied with their level of collaboration with and **13%*** consider the collaboration efficient	25% increase in any of those dimensions				
		Level of satisfaction about the quality of the dialogue held during the workshops.		N/A	80%		End of game session / 1x per session		

	DESCRIPTION	**INDICATOR**	**DEFINITION** How is it calculated?	**BASELINE** What is the current value?	**TARGET** What is the target value?	**DATA SOURCE** How will it be measured?	**FREQUENCY** How often will it be measured?	**RESPONSIBLE** Who will measure it?	**HYPOTHESES**
	Enhancing the system's understanding on energy transition among decision-makers.	Shift in perspective and % increase in capabilities (i.e. SEN capabilities)	Measuring shift in perspective Translate the capabilities into measurable indicators (Knowledge, Interlinking, Strategic Analysis, Strategic Engagement, Implementing Strategy)	X	50% have increased across 3 capacities	Questionnaire /Interview, Collective Debriefing	1x ex-ante, 1x ex-post (3 and/or 6 months after the intervention)	M&E	**H3**: Enhancing system understanding of energy transitions among decision-makers **leads to a measurable shift in their perspectives and increases in their strategic capabilities.**
	Consolidating scientifically informed frameworks as a basis for decision-making.	% of participants perceiving scientific models as tools useful for decision-making and % of participants reporting actually using scientific models in decision-making		**78%*** find scientific models being useful or very useful.	75%* / 25%*	Questionnaire / Interview	1x ex-ante, 1x ex-post (3 months after the intervention)	M&E	**H4**: Consolidating scientifically informed frameworks significantly **increases the willingness and ability** of decision-makers to apply

	DESCRIPTION	**INDICATOR**	**DEFINITION** How is it calculated?	**BASELINE** What is the current value?	**TARGET** What is the target value?	**DATA SOURCE** How will it be measured?	**FREQUENCY** How often will it be measured?	**RESPONSIBLE** Who will measure it?	**HYPOTHESES**
		Level of motivation and scope of field of use of scientific models in decision-making		**37%*** use scientific models often or very often.					these frameworks in policy development.
OUTPUTS	Transform the GEMMES model into a strategy game through a participatory modeling process together with key stakeholders that ensures the integration of diverse perspectives and enhances ownership of the models (GEMMES and strategy game) among high-level decision-makers.	Physical model (Game) present or not		0	1	Physical model present yes or no	At the end of the project	PL	**H5.1**: Transforming the GEMMES model into a strategy game **is possible.** **H5.2**: Transforming the GEMMES model into a strategy game through a participatory modeling process **increases ownership and understanding** of the model among high-level decision-makers.
	Use the strategy game to explore scenarios and understand stakeholders'	Nr of conducted game workshops		0	10	Attendance sheets	End of the workshop series	PL	**H6.1**: The use of a strategy game in

	DESCRIPTION	**INDICATOR**	**DEFINITION** How is it calculated?	**BASELINE** What is the current value?	**TARGET** What is the target value?	**DATA SOURCE** How will it be measured?	**FREQUENCY** How often will it be measured?	**RESPONSIBLE** Who will measure it?	**HYPOTHESES**
	choices and strategies in decision-making. The game will elicit mental models and shed light on tensions and synergies.	Level of satisfaction in the game sessions (game is perceived useful for people's work context.		N/A	80%	Evaluation (End of workshop)	1x per game session		workshops **facilitates better understanding** of stakeholders' choices and strategies. **H6.2**: The content and scenarios used in the strategy game are **perceived as relevant and effectively represent the complexities** of energy transition.
		% of players reporting an increase in understanding different stakeholder's choices and strategies		N/A	80%				
	Restitute and disseminate findings of the participatory process to ensure broad uptake of the process among high-level decision-makers.	Nr of publications drafted		0	1	Drafted or published publication	End of project	PL	**H7**: Dissemination of findings from the participatory process increases the uptake and application of these insights in policy-making.
		Nr of restitution events		0	1	Organized event			

2.3 M&E timeline and target groups

The Project is structured around three phases:

1) Modelling: Co-design through participatory workshops;
2) Game play-off: Scenario exploration and dialogue facilitation;
3) Restitution

The monitoring and evaluation processes were put in place for Phase 1 and Phase 2 and spread between February and December 2024. Due to time and financial constraints, the impact of Phase 3 will not be monitored nor evaluated.

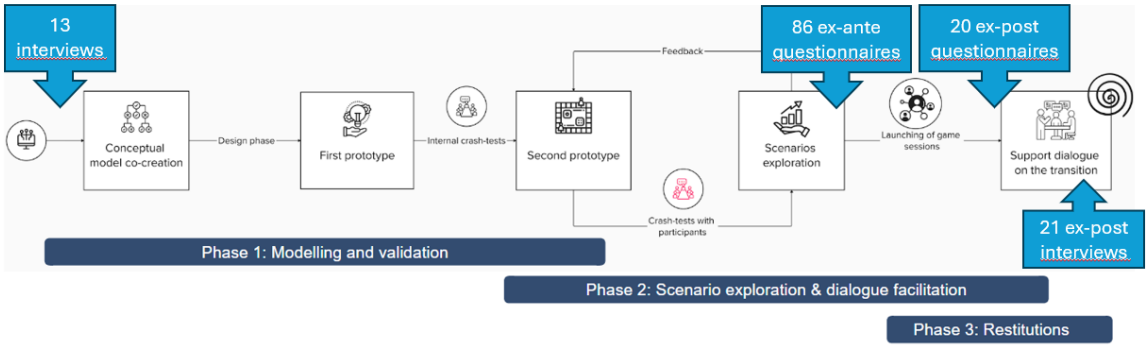

Figure 3: M&E data-collection points throughout the project implementation

During Phase 1 (*Conceptual Model Co-creation/Game design/1st Game prototype/Internal tests*), we conducted a series of in-person and online interviews (See Appendix 1), to gain valuable insights from the "core group" of participants involved in the modelling and co-design process. A total of **13 interviews** took place between February and May 2024. The aim of the open-ended interviews was to learn about participants' perception and baseline knowledge of Colombia's low carbon transition and of the macroeconomic GEMMES model.

During Phase 2 (*Game sessions in June and September 2024*), the M&E protocol focused on the participants who attended the PowerShift game sessions. To keep the cohort homogenous, we decided to only consider the participants who attended one of the nine game sessions. We did not consider the ones who only took part in the crash test sessions when the game was still being finalized.

During the June sessions (3 strategy game sessions), a total of 36 people participated and in the September mission (6 strategy game sessions), a total of 122 participants joined the sessions. During both missions, all participants were asked to fill in a Google form questionnaire **("ex-ante questionnaire") upon arrival at the workshops, just before starting the game session**. This questionnaire was prepared with the intention of understanding perceptions and thoughts regarding the general context of the low carbon transition in Colombia, and the use of strategy games as a tool to promote and support stakeholder dialogue. The questionnaire was completed by **26** participants from the June sessions, and **60** participants from the September sessions.

A follow-up Google form questionnaire ("**ex-post questionnaire**") was sent by email one week after each game session and was answered by **20** participants (8 from the June sessions and 12 from the September ones).

Finally, an **ex-post interview** (in-person or on Zoom) took place three to five months after the sessions. A total of **20** participants responded positively to the invitation (8 from the June sessions, 12 from the September ones). Additionally, a participant from the crash test phase was also interviewed and included in the analysis. The Table 3 below summarizes the numbers and types of data (Google form or interviews) that were collected within Phase 2.

Table 3: Number of participants who completed questionnaires and interviews pre and post game session per mission

	Total number of participants	Ex-ante questionnaire (just before the game)	Ex-post questionnaire (one week after the game via email)	Ex-post interview (three months after the game)
June 2024	36	26	8	8
September 2024	122	60	12	12
Total	**158**	**86**	**20**	**20 + 1**

The Venn diagram (Figure 4) illustrates the distribution of the participants across the three data collection methods: ex-ante questionnaire, ex-post questionnaire and ex-post interview. Data from Phase 1 (ie. interviews with 13 members from the core group of participants) were intentionally excluded from the diagram. These initial interviews were designed to help the LEAF team to gain an overall understanding of the topic, facilitate introductions with key stakeholders, and foster trust building in the process. As such, this phase targeted a deliberately small and specific group of respondents.

Out of our cohort of 158 participants, **95** (60%) filled at least one questionnaire or interview. Due to limited capacities to run the ex-post interviews in an exhaustive manner, only **15** participants (9%) participated in both the ex-ante questionnaire and the ex-post interview.

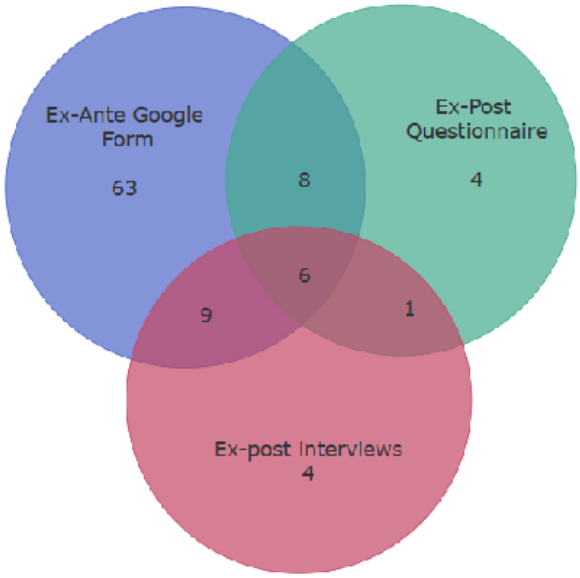

Figure 4: Venn diagram highlighting the distribution of responses across the three data collection techniques

2.4 Conceptual framework

The questionnaires and interview guides were elaborated using the SEN's framework on capabilities and building on a past project LEAF undertook in Senegal as part of Biodev 2030. Drawing on this work, the objectives of the project were translated into three areas of capacity progresses for evaluation:

- Improving participants' capacity to broaden the range of pathways and strategies they identify to pursue the low carbon transition.
- Improving participants' capacity to assess, both individually and collectively, which pathway is to be prioritised.
- Improving their capacity to mobilize the required material and non-material resources, either individually or collectively, to pursue the prioritised pathway(s).

The data collection tools have been structured to reflect five achievable and incrementally empowering levels[1]:

1. **Knowledge'**: interviewees stating that they have gained new information or knowledge (excluding topics related to socio-institutional strategy, which fall under the 'strategic ability' level below).
2. **'Interlinking'**: interviewees reporting that they have developed new relationships with relevant stakeholders during the sessions.

[1] *Sen, A. K. (1992). Inequality Re-examined. Oxford, UK: Oxford University Press*

3. '**Strategic analysis**': interviewees stating that they have gained an enhanced perception or analysis of potential avenues for engagement, which they judge more effective in achieving desired changes.

4. '**Strategic engagement**': interviewees stating that they have decided to engage in a specific, clearly defined course of action they have identified as the most effective for pursuing the energy transition.

5. '**Implementing Strategy**': interviewees stating that they have taken concrete action, either individually or collectively, into avenues they judge relevant for pursuing desired changes.

This spectrum of capacities reflects the main objective of the project, which is to initiate a progressive, and in a large part autonomous, development of capacities: within participatory sessions, new knowledge can be gained and useful relationships can be set, contributing to a more refined strategic analysis. This analysis entails selecting what is judged as the most appropriate avenue for engagement and subsequently implementing it.

3 Results from the M&E analysis

3.1 Overview participants

Information about participants' affiliations and their roles within their organisation was primarily collected through the ex-ante questionnaires (see paragraph 3.3 for more details about the questionnaire). Affiliation refers to the specific organisation participants were representing during the game sessions, while role corresponds to one of four categories proposed in the questionnaire: implementation/operation, consultant/advisor, management and supervision. According to this classification, management and supervision were considered leadership roles, while implementation/operation and consultant/advisor were not. However, this classification proved to be misleading in certain cases. For instance, an advisor to a minister may hold a higher leadership role than someone in a management position within an organization. As a result, the analysis below, which presents the percentage of leadership roles in each session, should be interpreted with caution. Additionally, for participants who did not complete the questionnaire, while affiliation details were retrieved from the attendance list of each game session, it was not possible to obtain information about their specific roles. These roles can change frequently and are difficult to verify through online sources.

The game session workshops, excluding the crash-test sessions, hosted a total of 158 participants from 56 institutions, with an average of 18 participants and 8.3 institutions per session. Women accounted for 49% of participants, and 16% held leadership positions. Among the attendees, 94 were from governmental institutions, averaging 10.4 per session. Representation included academia (3%), financial institutions (11%), international organizations (3%), ministries (28%), national agencies (32%), NGOs (15%), and the private sector (9%). Institutional distribution by sector was as follows: academia (7%), financial institutions (13%), international organizations (7%), ministries (14%), national agencies (16%), NGOs (25%), and the private sector (18%).

In terms of professional roles and positions within their institutions at the time of the workshops, 36.5% of participants were consultants or experts, 23% worked in supervision or advisory positions, 21.5% worked in implementation/operation and 16% in management. For 3%, we could not specify this information.

Table 4: Overview of participants, roles and affiliations in the PowerShift game sessions

Category	Total	% of all participants
Total Participants	158	100%
Total Institutions	56	–
Average Participants per Session	18	–
Average Institutions per Session	8.3	–
Female Participants	77	49%
Governmental Participants	94	60%

Organization Type	Participants	% of all Participants	Institutions	% of all Institutions
Academia	5	3%	4	7%
Financial Institution	17	11%	7	13%
International Organisation	4	3%	4	7%
Ministry	44	28%	8	14%
National Agency	50	32%	9	16%
NGO	23	15%	14	25%
Private Sector	15	9%	10	18%

Position Type	Participants	% of all Participants
Management	25	16%
Supervision / Advisor	36	23%
Consultant / Expert	58	36.5%
Implementation / Operation	34	21.5%
Not specified (n/a)	5	3%

3.2 Insights from Phase 1: ex-ante interviews

3.2.1 Sample selection and participants profiles

Through consultation with the AFD team, a core group of experts was identified as key informants for the ex-ante interviews. The main objective of this activity was for LEAF to better grasp the understanding and perception of Colombian and French experts on the low carbon transition in Colombia prior to the participation in the strategy game sessions. LEAF conducted a series of preliminary in-depth interviews with **13 participants** (see Annex) that were all involved in the participatory modelling process that preceded the game development. These interviews focused on the challenges and opportunities associated with Colombia's shift

towards a low carbon economy. This allowed us to better understand the current situation and the various dimensions of Colombia's low carbon transition. The results from the interviews set the baseline on participants' perception and initial knowledge of Colombia's transition and on the level of acquaintance and use of the GEMMES model.

Of these 13 interviews, five were with members of AFD-France and seven were participants during Phase 1 of the brainstorming sessions dedicated to the creation of the conceptual model (from the Ministry of Finance (2), the National Planning Department (DNP) (4) and the Mines and Energy Ministry (1)). Interview duration was between 45 minutes to 1:30 hours. The interviews with the Colombian participants tended to be longer than an hour, because the strategy game topic was discussed with them in-depth. These interviews also served as an initial opportunity for key participants to meet the project team, and **foster trust building** in the process.

Table 5: Ex-ante interviews

Timeline	between February and May 2024
Number of interviews	13
Type of interviews	open-ended, face to face or Zoom
Duration	45 minutes to 1:30 hours
Profile	AFD-France: 5 Ministry of Finance: 2 National Planning Department: 4 Mines and Energy Ministry: 2

Despite the relatively small sample of interviewees, valuable insights were gained about the different topics above-mentioned. In the following section, we elaborate on some key recurring topics and insights. While we acknowledge the depth, relevance and utility of the responses from the five AFD interviewees, the analysis focuses on the responses of the Colombian respondents, as they were our key target group.

3.2.2 Insights on the strengths and limitations of the GEMMES model

The GEMMES model is seen as a valuable tool that offers a unique approach to economic modeling, particularly in Colombia. Five respondents said that one of its main advantages is that it provides a **different and alternative *(heterodox)* way** to approach macroeconomic modelling and perspective. This is explained by the fact that GEMMES incorporate the demand side in the analysis, unlike traditional models that have historically focused on the production side of the economy:

> *"GEMMES nos da la oportunidad de tener un modelo que es por el lado de la demanda. Generalmente teníamos hasta ahora modelos que eran por el lado de la producción."*

Additionally, as reported by four respondents, GEMMES allows to integrate both **financial and real aspects** of the economy. It has allowed researchers to better understand Colombia's vulnerabilities in the face of external shocks. Indeed, one respondent explained that they used GEMMES to analyze the economic impact of the COVID-19 crisis, the risk rating downgrade of

Colombia, and global conflicts such as the war in Ukraine. In helping better understand macroeconomic impacts, GEMMES is perceived as useful to analyze Colombia's economic vulnerabilities:

> *"Nos permitió analizar cómo nos podía afectar la crisis de Ucrania, o qué pasaría si el país perdía la inversión extranjera."*

Finally, the model was described as a catalyst for policy discussion and planning, as it has been already integrated into energy planning to assess economic consequences of the transition:

> *"Nos permite modelar escenarios futuros, posibles escenarios futuros de comportamientos de nuestra matriz energética.".*

Communicating about the results of GEMMES has been rated as both strengths and limitations depending on the respondents. Some respondents highlighted the role of GEMMES as a **communication tool** to help economists translating complex financial and economic concepts into more comprehensible one for the general audience:

> *"Nos ha permitido hablar con más personas de una manera más sencilla, más fluida, y eso pues a mí me parece importante."*

Two respondents, however, noted that its level of modelled complexity and embedded interactions and feedback loops makes it difficult for non-experts to interpret. One respondent acknowledged that to overcome the difficulty to communicate its findings in a way that policymakers or the public can easily grasp, clear and pedagogical tools are oftentimes needed:

> *"A veces uno cree que está explicando algo muy claro, pero no tanto. Nos toca hacer diagramas de flujo para que la gente entienda el paso a paso de todo lo que hacemos y de todas las implicaciones, entonces A, implica B y implica C y ese, C, implica no se que más. Y así se ha vuelto más sencillo transmitir las cosas".*

Additionally, three respondents noted that GEMMES is not widely known outside technical circles.

These answers comforted us in the endeavour to use GEMMES as the backbone to build the main "reactor" of the game PowerShift as many parallelisms could already be established between the two approaches. They both allow participants to think differently, "out-of-the-box", and to go beyond evident causality loops. They are also tools that thrive to integrate multiple dimensions, scales, sources of knowledge, etc. Finally, the inputs on the communication aspects reinforced the willingness to use the strategy game approach as a more universal translator for complex economic concepts.

3.2.3 Insights on how to tackle the energy transition and its key challenges in Colombia

We noted a strong consensus among the interviewees that the low carbon transition in Colombia must be a **multi-sectoral effort** rather than left to the sole responsibility of the Ministry of Mines and Energy. Three respondents emphasised that all ministries should be

involved, as the transition affects transportation, finance, agriculture, civil societies, among others:

> *"Esto no puede ser una política del Ministerio de Minas y Energía solamente... Tiene que ser transversal a todos los sectores, porque si no, cada sector se pasará la pelota y nadie tomará la responsabilidad completa."*

Four respondents mentioned the lack of institutional coordination as a major hurdle. One respondent pointed out that ministries tend to shift responsibility onto each other, which prevents cohesive action:

> *"Nos la pasamos es tirándonos la pelota de un lado a otro, diciendo:*
>
> *"El sector de Minas y Energía no puede hacer nada porque transporte no hace nada".*

Another recurring theme in the interviews was the necessity of gradually reducing the **country's dependence on fossil fuels** while diversifying energy sources. This view was shared by five respondents who stated that true energy transition means moving away from fossil fuel exports, which currently sustain a large portion of the national budget:

> *"No considero que agregar nuevas formas de energía a la matriz pero seguir siendo dependientes de los fósiles sea transitar."*

The economic dependence on fossil fuels was indeed seen as the most significant challenge by six respondents. The concern is that, without a proper transition plan, the Colombian economy could suffer a severe shock:

> *"Si no hacemos esa transición de forma planeada, en el momento en el que se haga, va a ser una catástrofe económica si no estamos preparados."*

While acknowledging that the country is highly dependent on fossil fuels incomes, participants mentioned the need for economic planning to replace these sources. One respondent pointed out that Colombia does not yet have the infrastructure to replace the revenue streams generated by hydrocarbons.

> *"Colombia tiene una parte extractivista de gas muy alto. Entonces, inicialmente tenemos que poder dar respuesta a esa cantidad de dinero que entra."*

Regulatory uncertainty was, as such, cited as a challenge by two respondents. They noted that Colombia has ambitious energy transition policies, but there is little clarity on how they will be enforced. As one respondent explained:

> *"Yo creo que son muy ambiciosas, han pecado más por exceso que por defecto".*

Raising awareness, increasing public acceptance through incentives and well designed communication campaigns were also mentioned as key for a successful transition. One respondent argued that simply telling people they must change is ineffective; instead, it is necessary to show the benefits of the transition and provide incentives:

> *"Primero hay que crear conciencia, luego mostrar los beneficios, y solo entonces implementar la transición paso a paso".*

As such, the human capital appears as a key factor in implementing the transition. Four respondents mentioned workforce training, education and employment opportunities in the new energy sectors as key levers:

> *"No es solo un tema de cambiar fuentes de energía, sino de reconvertir la fuerza laboral. No podemos dejar a miles de trabajadores sin opciones."*

These insights reinforced the idea to **convey a diversity of actors** across ministries at the table and use the game as a tool to foster cross-institutions partnership while highlighting the need for shared roles and responsibilities. They also provided guidance on the types of energy sources to consider and embed in the game. Two key aspects were the **speed** at which the transition should occur and the relative balance between **different energy sources**. Both were kept as core ideas for the game dynamics.

3.2.4 Insights on respondents' expectations about the strategy game

Most participants expressed enthusiasm about the creation of the strategy game and, as already mentioned, saw it as a vehicle to test and communicate GEMMES' findings to a broader audience. Two were particularly interested in seeing whether the game validates or contradicts GEMMES' assumptions:

> *"Quiero ver si el juego ratifica o contradice lo que estamos pensando con GEMMES".*

Reinforcing the idea of transferring complex concepts to a broader sphere of non-experts, four respondents saw the game as an opportunity to make complex economic issues more accessible. Many people struggle to understand policy discussions, but a game might present them in a more engaging way:

> *"Es otra forma de mostrar los resultados, más fácil de entender."*

3.2.5 Insights on who should participate in the game sessions?

Policy makers and government officials across ministries were most frequently mentioned, as the transition is cross-sectorial:

> *"Esto tiene que involucrar a muchos actores, no solo el Ministerio de Minas y Energía".*

Additionally, academics and technical experts were also seen as key participants. As reminded by one respondent, GEMMES was developed in collaboration with universities, and their continued involvement is important.

> *"En la universidad hemos trabajado en modelación, esto debe seguir involucrando a expertos en simulación".*

There was also an interest in including civil society and the general public. One respondent suggested that NGOs and non-experts should participate to ensure broader engagement.

"Me gustaría que lo juegue gente que no tenga nada que ver con economía ni política pública."

These discussions provided valuable insights on who should be brought to the table and helped draft the list of potential players. Retrospectively, the actual list of participants partially reflects these initial considerations with the exception of the "general public". This omission aligned with the project's objective, which focused on dialogue among **high-level decision-makers** rather than the broader sensitisation of the general public. However, this objective was not fully achieved. Considering that management positions were not predominant among participants and that most attendees held roles as consultants or advisors to senior executives rather than being decision-makers themselves, the composition of the group fell short of fully meeting the intended target.

3.3 Results from Phase 2: ex-ante questionnaires

All participants to the game sessions were asked to fill in a **Google form questionnaire** (Annex 2) upon arriving at the workshop. This questionnaire was prepared with the intention of understanding perceptions and thoughts regarding the general context of the low carbon transition in Colombia, and the use of strategy games as a tool to promote and support stakeholder's dialogue. It consisted of twelve questions that were either of multiple choice (Likert-scale) or open-ended grouped into 4 main sections: **expectations** from the strategy game workshop; **knowledge** and challenges about the low carbon transition; **dialogue** between stakeholders and the use of **scientific models** to support policy processes.

The questionnaire was completed by **26** out of **36** participants (72%) in June and **60** out of **122** (49%) participants in September, so **86 respondents** in total. Split per session is given in the table below. Some participants attended several sessions, hence the discrepancy between number of participants (counted once) and number of players (account for several participations). Out of the 86 respondents, 39 were female (45%). Participants profiles were: 43 advisors/consultants, 18 managers, 20 implementation/operations and 5 with supervision roles.

Table 6: Number of respondents and total players per session

	June #1	June #2	June #3	Sept #1	Sept #2	Sept #3	Sept #4	Sept #5	Sept #6
Respondents	8	9	7	13	15	8	9	8	9
Total Players	13	10	16	29	21	15	18	15	30

The relative decrease in answers during the second mission can be attributed to several factors. Firstly, as the September game sessions were held at participants' home institutions, many arrived just at the beginning of the session and did not have the time to fill in the questionnaire. With the number of participants per session being higher than in June, there were also more opportunities for engagement in conversations. Some participants also joined a few minutes late when the game had already started, which may have distracted them from completing the questionnaire. Additionally, the person responsible for administering the questionnaire (shared via QR code), was not present at all the September sessions. The other

facilitators were focused on preparing the game and could not dedicate their full attention to the questionnaire task. In contrast, during the June sessions, this step was strictly enforced, with the game not starting until all participants had completed the questionnaire, leading to some sessions starting up to one hour after people's arrivals. The following paragraphs outline the questionnaire questions and provide a detailed analysis of the responses.

3.3.1 Expectations

The two graphs below illustrate the answers to the question: "*what do you expect from the strategy game workshop*?". Instead of an open-ended question, we propose a list of 8 possible answers that were elaborated based on the answers of the ex-ante interviews. Respondents could choose up to 2 options from the given list.

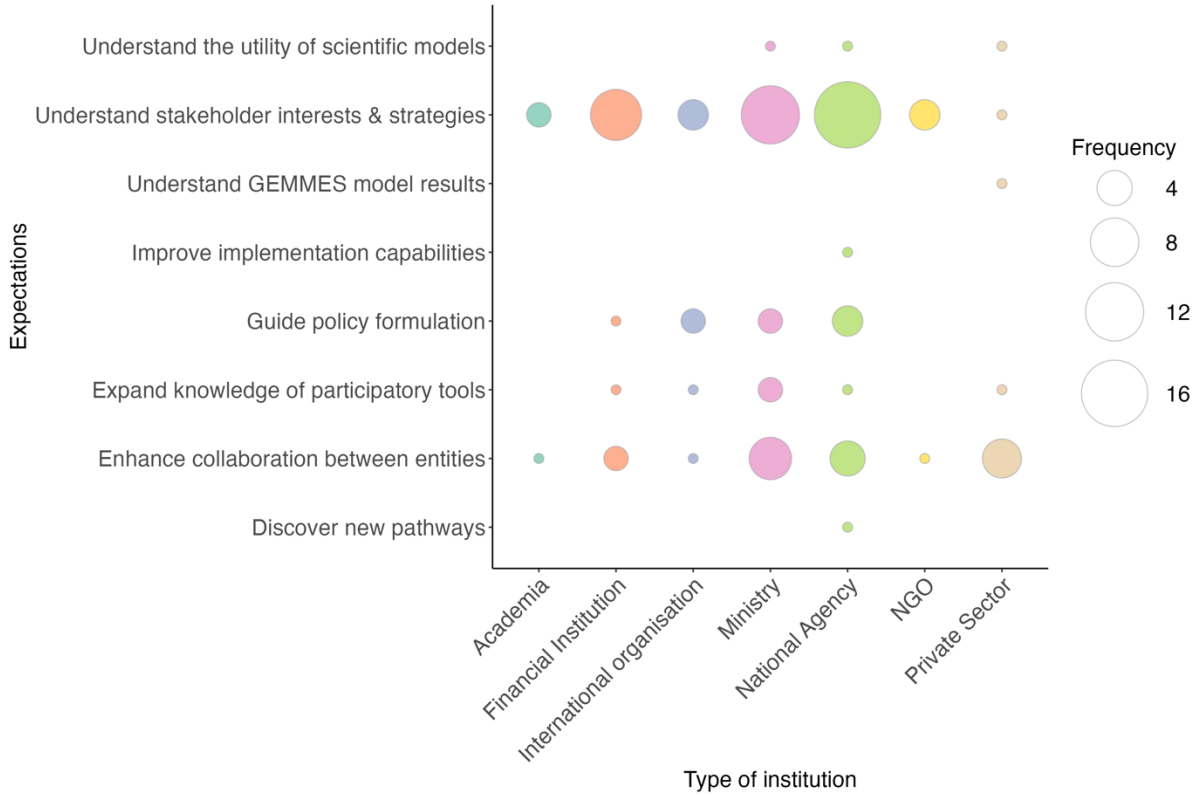

Figure 5: Participants' first choice according to the organisation type of their affiliated institution

The first-choice responses revealed that a significant portion of participants (across roles) emphasised the importance of understanding the interests and strategies of stakeholders in the low carbon transition policy. The second most picked "1st choice" was the opportunities for collaboration. Both aspects emphasise the willingness for social learning and collective actions. Expectations around participatory tools or scientific models were not picked as priority topics.

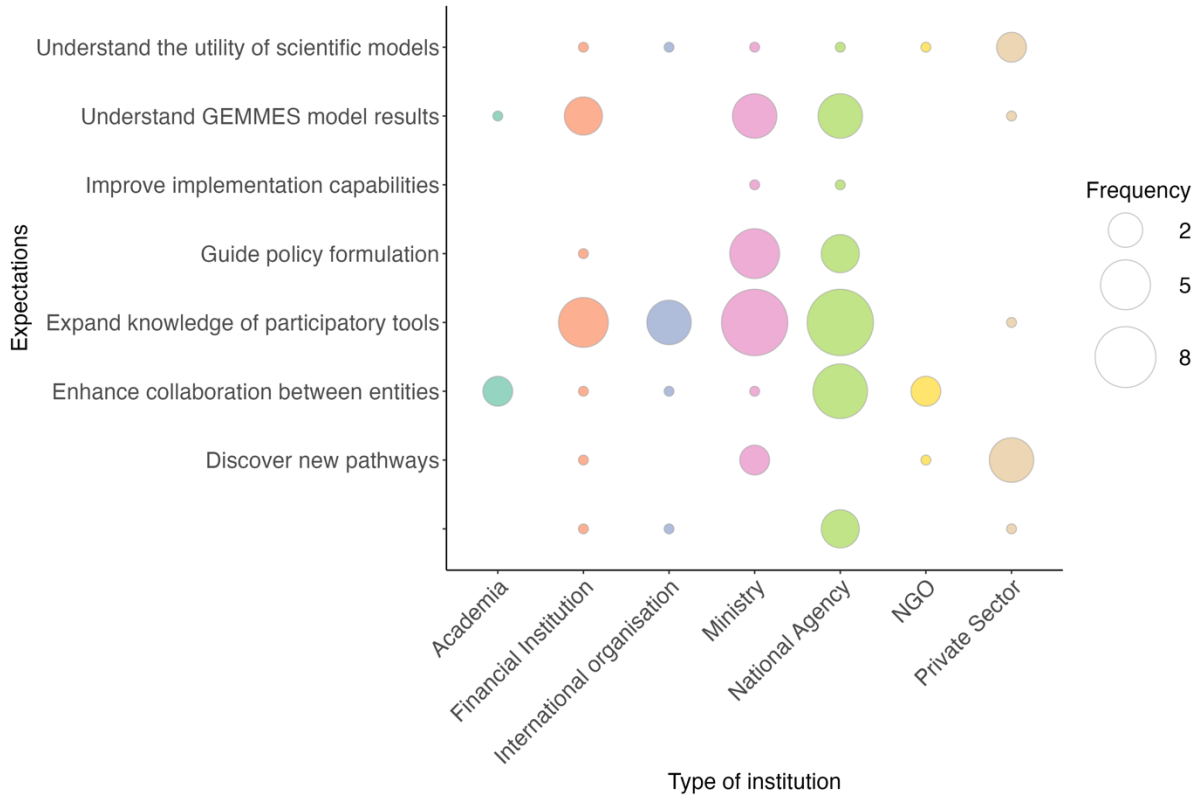

Figure 6: Participants' second choice according to their affiliation

The second-choice responses focused more on the practical aspects, with participants highlighting their willingness to know more about participatory tools, scientific models and GEMMES results.

Together, these insights suggested that participants were eager to enhance both their conceptual knowledge and practical engagement with the subject matter and relevant stakeholders. These results directly refer to knowledge, strategic thinking and interlinking capabilities and confirm the endeavour to monitor and assess changes along these dimensions.

3.3.2 Capacity to explain and drive the energy transition

Following the section on expectations, the questionnaire asked participants to *rate on a scale from 1 to 5 their ability to explain the low carbon transition in Colombia* to a layperson, as well as *their confidence in understanding how Colombia should move forward with the transition* (Table 7)

Table 7: Participants' rating of their ability to explain and confidence to understand how to drive Colombia's energy transition

	1: Very bad (I have little or no knowledge of the subject)	2: Poor, I have basic knowledge, but not enough to explain it clearly.	3: Fair, although it is not a central theme in my work, I have had some opportunities to work on these issues.	4: Good, energy transition is an important part of my work and I have a good knowledge of the topic.	5: Very good, it is part of my daily work and I can explain it clearly.

How would you rate your ability to explain the energy transition in Colombia to the average person?	0 (0%)	12 (14%)	40 (47%)	26 (30%)	8 (9%)
	1: I have no knowledge or understanding of the issue.	2: I have limited ideas about how my sector should address the energy transition in Colombia.	3: I know how my sector should address the energy transition, although I do not have a complete picture of other sectors.	4: I know how my sector should address the energy transition, and I have ideas on how other sectors could do so.	5: I have a deep and clear understanding of how Colombia should address the energy transition in a holistic way.
Level of agreement with the following statement: 'I know how Colombia should address the energy transition', on a scale of 1 to 5:	0 (0%)	22 (25.5%)	36 (42%)	24 (28%)	4 (4.5%)

We plotted both results in a single axis, adding the gender component, to highlight key patterns in self-assessment across both dimensions (understanding and way forward). The highest concentration of responses is at the moderate level (3,3), where 16 participants rated themselves equally on both aspects, suggesting a general sense of competence but with room for improvement. Notably, 17 participants rated themselves highly on both scales (4,4 or above), showing a more balanced and confident group, but with a strong male dominance in this category. Conversely, among those who rated themselves lower in knowledge (3,2), there is a significant female presence (77%). Interestingly, at (3,4) 11 people rated themselves higher on knowing how to face the energy transition than on explaining it, with a slightly higher male dominance. Overall, the data indicates that most participants perceive themselves in the moderate-to-high confidence range, with few extreme responses, while gender distribution varies across different self-assessment levels. There's a notable absence of (1,1) and very low numbers of (2,2) which confirms the general level of expertise in the topic from the participants.

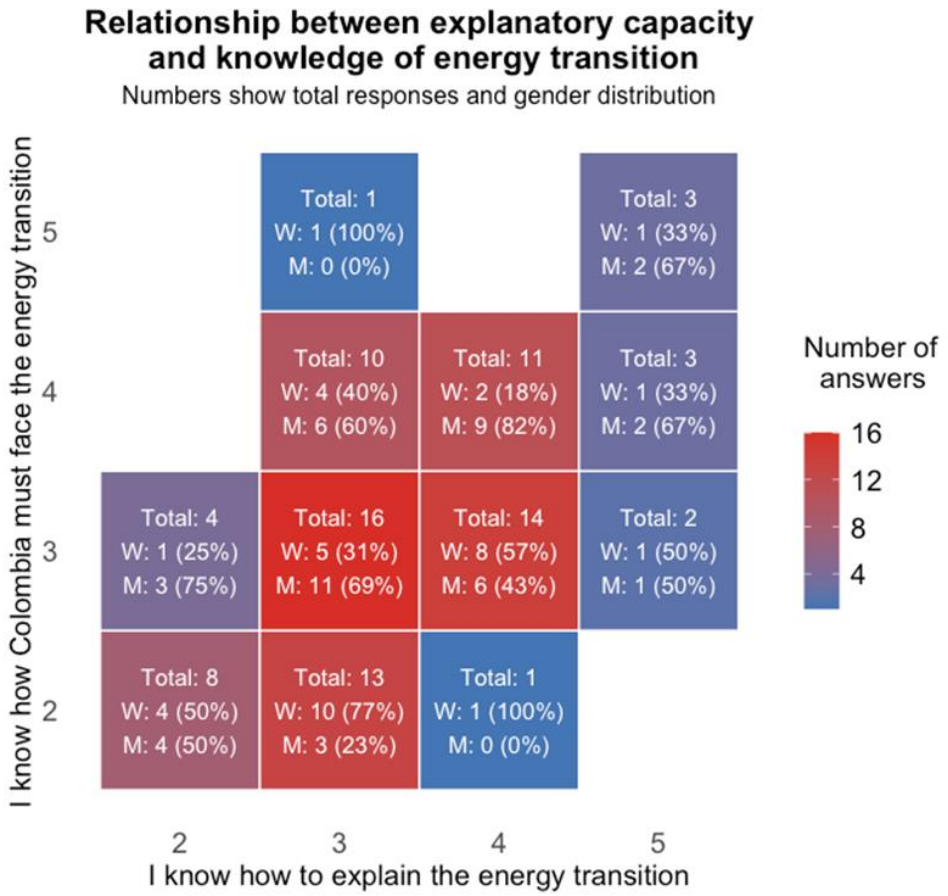

Figure 7: Relationship between explanatory capacity and knowledge of energy transition depending on gender

The findings reveal that most participants rated themselves in the moderate-to-high confidence range regarding both their understanding of the transition and their ability to explain it. The absence of extreme low scores suggests a solid baseline of expertise amongst selected participants, reinforcing the rationale for their inclusion in the workshops. Moderate scores in explanatory skills may indicate the need for enhanced strategic engagement capabilities and needs for capacity-building in communicating complex issues in clear and accessible simple terms.

3.3.3 Obstacles to the implementation of the energy transition and mitigation measures

The responses to the question "*What obstacles do you see to the implementation of the energy transition from your sector's point of view*?" reveal several key challenges. The most frequently mentioned obstacles, across all participants' profiles and positions within their institutions, highlight financial, institutional, regulatory, political and structural barriers. These are cross-cutting concerns. Financial concerns, particularly around securing investment, dominate the responses, with issues such as high implementation costs, uncertainty in financial schemes, and limited capacity for large-scale and/or long-term investments:

> *"El financiamiento, poco interés de otros ministerios que son clave en la transición"*

> *"Los precios altos para financiarse impiden que las empresas puedan tomar los préstamos"*

Some also mentioned that financial institutions are slow in adapting to new technological trends. Political challenges, such as institutional rigidity, shifting government priorities, political uncertainty, and insufficient policy guidelines were cited as major hurdles. Political will and policy stability were identified as crucial for securing a successful transition:

> *"Cambios regulatorios que no posibilitan la inversión"*
>
> *"La ausencia de política pública"*
>
> *"No continuidad de lineamientos políticos"*

The responses also highlight the complexity of navigating the diversity of stakeholders and interests involved, which can lead to conflicts of interest and a lack of cohesive vision. Additionally, the need for better communication, improved quality and availability of information, and stronger political will and advocacy to drive the transition forward was emphasized:

> *"La industria fósil está desplegando una sistemática estrategia de desinformación"*
>
> *"Articulación entre los diferentes sectores para sacar adelante proyectos de transición energética"*
>
> *"1. Poca voluntad política de algunas tomadores de decisiones 2. Poca información y oferta sobre productos e iniciativas de transición energética para los ciudadanos"*

To overcome these challenges, the most recurring suggestions mentioned by participants focused on financing and investment (e.g., sustainable financing, public-private partnerships, green taxonomy) along with education and capacity building (e.g. awareness-raising among sectors that would be involved in the energy transition, meetings, dialogues, talks and consensus-building among key actors to accelerate the transition, community work).

3.3.4 Communications with other ministries and institutions

Table 8: Perceived satisfaction and effectiveness of inter-ministerial collaboration

	1	2	3	4	5
How satisfied are you with the level of collaboration you have with other ministries or entities in the formulation of energy transition policies in Colombia?	5 (6%)	18 (21%)	47 (54.5%)	16 (18.5%)	0 (0%)
How would you assess the effectiveness of your dialogues with other ministries or entities to address cross-sectoral issues on energy transition in Colombia?	4 (5%)	18 (21%)	51 (59%)	12 (14%)	1 (1%)

Most participants (54.5%) indicated a moderate level of satisfaction with the degree of collaboration with other entities in the development of energy transition policies. Additionally, they rated the dialogue with other entities addressing cross-sectoral issues related to the low carbon transition in Colombia as moderately effective.

These responses helped establish baseline indicators in Table 2, with **16% of respondents reporting satisfaction with their level of collaboration** and only **13% considering it efficient**. These figures reinforce the initial assumption that strengthening inter-ministerial dialogue is necessary for a more effective transition.

When asked which institutions, ministries and other entities they interacted with regarding the transition in the past month, participants reported a total of 143 connections, with an average connection of 1.66 per participant. The five most connected participants had between 4 and 7 connections (ID 27, 96, 97, 138 and 19).

The five most connected institutions were: Ministry of Mines and Energy (41), Ministry of Environment (24), Ministry of Finance and Public Credit (23), Department of National Planning (19), Ministry of Housing, City and Territory (13).

17 participants (20%) reported having no contact at all, while 31 (36%) reported a single connection.

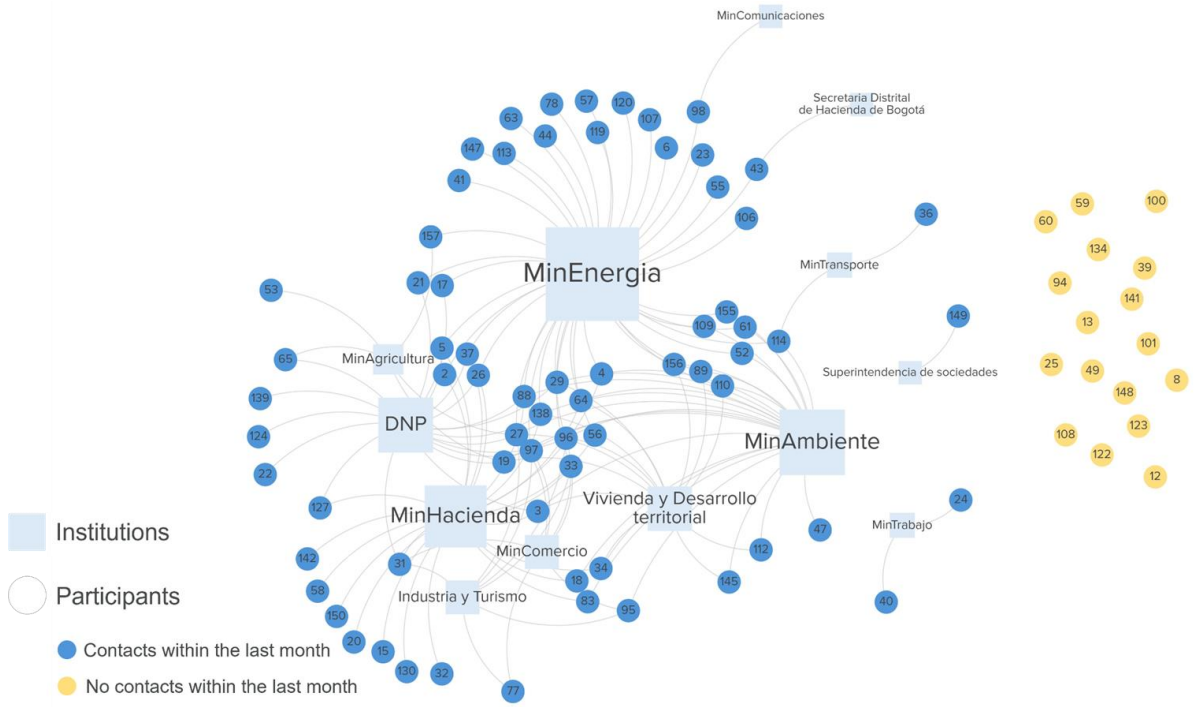

Figure 9: network analysis of participants and their interactions with other institutions, ministries and other entities in the month prior to the game session

These figures served as benchmarks for the baseline data in the indicators table with **44%** of participants having interacted with at least 2 entities in the month preceding the session.

3.3.5 Frequency of use and perceived usefulness of scientific models

Table 9: Perceived usefulness and frequency of use of scientific models by participants

	1	2	3	4	5
Do you think scientific models are useful as a decision-making tool for the low carbon transition in Colombia?	1 (1%)	3 (3.5%)	15 (17.5%)	33 (38%)	34 (40%)
How often do you use scientific models for decision-making?	20 (23.25%)	20 (23.25%)	14 (16%)	21 (24.5%)	11 (13%)

The results indicate that the majority of respondents perceive scientific models as valuable tools for decision-making in Colombia's low-carbon transition. **78% of respondents rated the usefulness of scientific models** at a level 4 or 5, demonstrating strong confidence in their role. Only 4.5% expressed some reserves by selecting 1 or 2, while 17.5% remained neutral with a rating of 3. However, when analyzing the frequency of model usage in decision-making, the responses show a more balanced distribution. While **37.5% of respondents use scientific model**s frequently or very frequently, a significant 46.5% use them rarely or never, and 16% fall in the middle ground.

These results suggest that despite a high perceived usefulness (**78%** of participants), practical application varies significantly (**37.5%** of regular users), possibly due to lack of training, accessibility, expertise, or institutional constraints. The contrast between perception and usage highlights a potential gap between recognizing the benefits of scientific models and integrating them into decision-making processes.

We ran a cluster analysis to look at how participants view and use scientific models in the context of the low carbon transition, in relation to their own knowledge. Specifically, we focused on their ability to explain the energy transition, their knowledge of transition pathways, the perceived usefulness of scientific models, and how often they use these models. We combined these four factors to group participants into different categories, which helps us better understand the patterns in their responses.

To determine the optimal number of clusters, we used the elbow method, which plots the within-cluster sum of squares against different numbers of clusters (k=1 to 10). The elbow plot revealed that three clusters provided the best balance between model complexity and explanatory power. We then applied k-means clustering with k=3, using multiple random starts (nstart=25) to ensure stability of the solution. This iterative algorithm groups participants by minimizing within-cluster variance while maximizing differences between clusters.

To interpret the results, we calculated the mean values (centroids) for each variable within the clusters and visualized them with a radar chart. This visualization was chosen because it effectively displays multivariate data, making it easy to compare each cluster's strengths and weaknesses across all four dimensions.

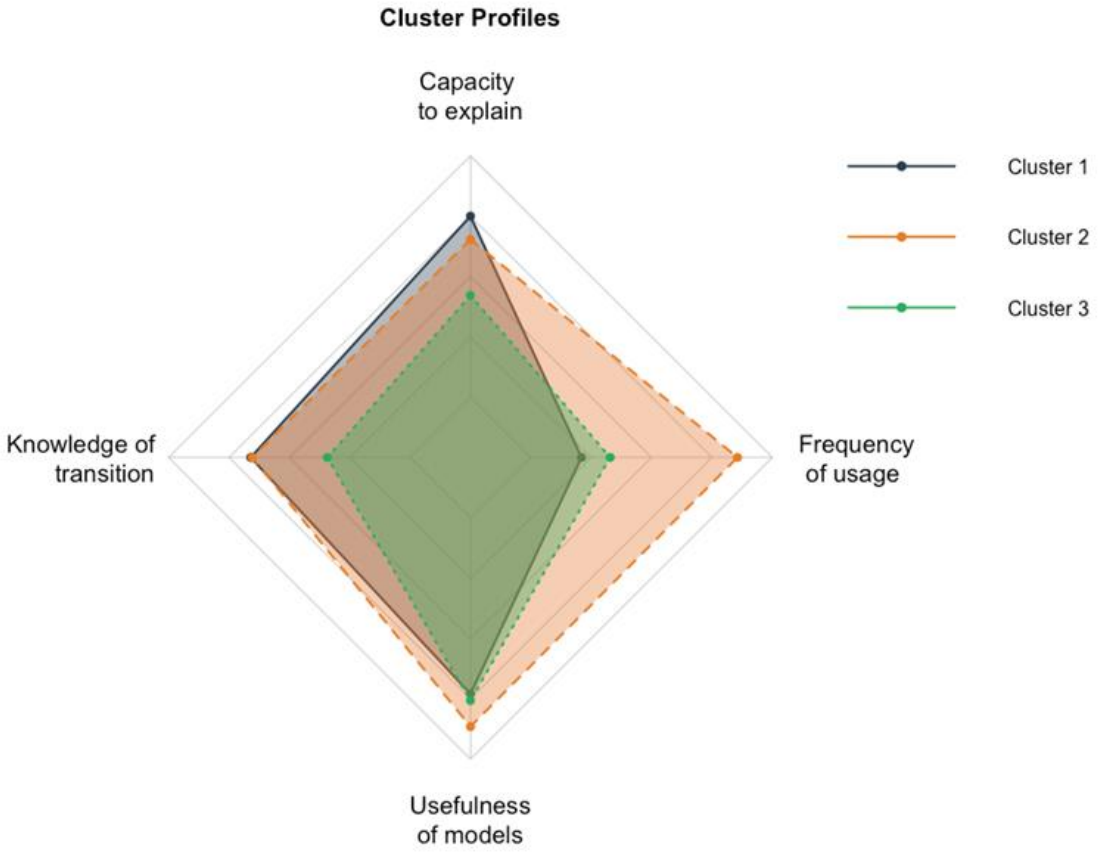

Figure 10: Cluster analysis of participants based on their ability to explain the energy transition, knowledge of transition pathways, perceived usefulness of scientific models, and frequency of model use.

Cluster 1 (dark blue line) groups participants with medium-high ability to explain the transition, a medium-high knowledge on how to tackle it, a high belief in models' usefulness but a very low frequency of model use. They have a solid understanding of the transition and are familiar with technical tools that can support decision-making, but they do not often use models in practice. This group is gender-balanced and has a high proportion of people in directorial or consulting roles.

Cluster 2 (dotted orange line) contains participants with similar ability to tackle the transition compared to cluster 1, but a slightly lower ability to explain it. They hold an even higher belief in models' usefulness but, unlike Cluster 1, use them with a much higher frequency. They hold implementation and consulting roles and are slightly more male-dominated.

Cluster 3 (dotted green line) scored much lower in both the ability to explain and tackle the transition compared to cluster 1 and 2. However, they have a similar rating of models' usefulness while reporting a low frequency of use. They have a balanced gender distribution and mix of roles. In sum, there is a strong correlation between self-assessed knowledge of transition pathways and capacity to explain it. Model usefulness is generally rated medium to high across all clusters, but the frequency of actual model use shows the most variation between clusters.

We also conducted an in-depth analysis on how the different institutional roles of our participants might influence the four metrics (Figure 11).

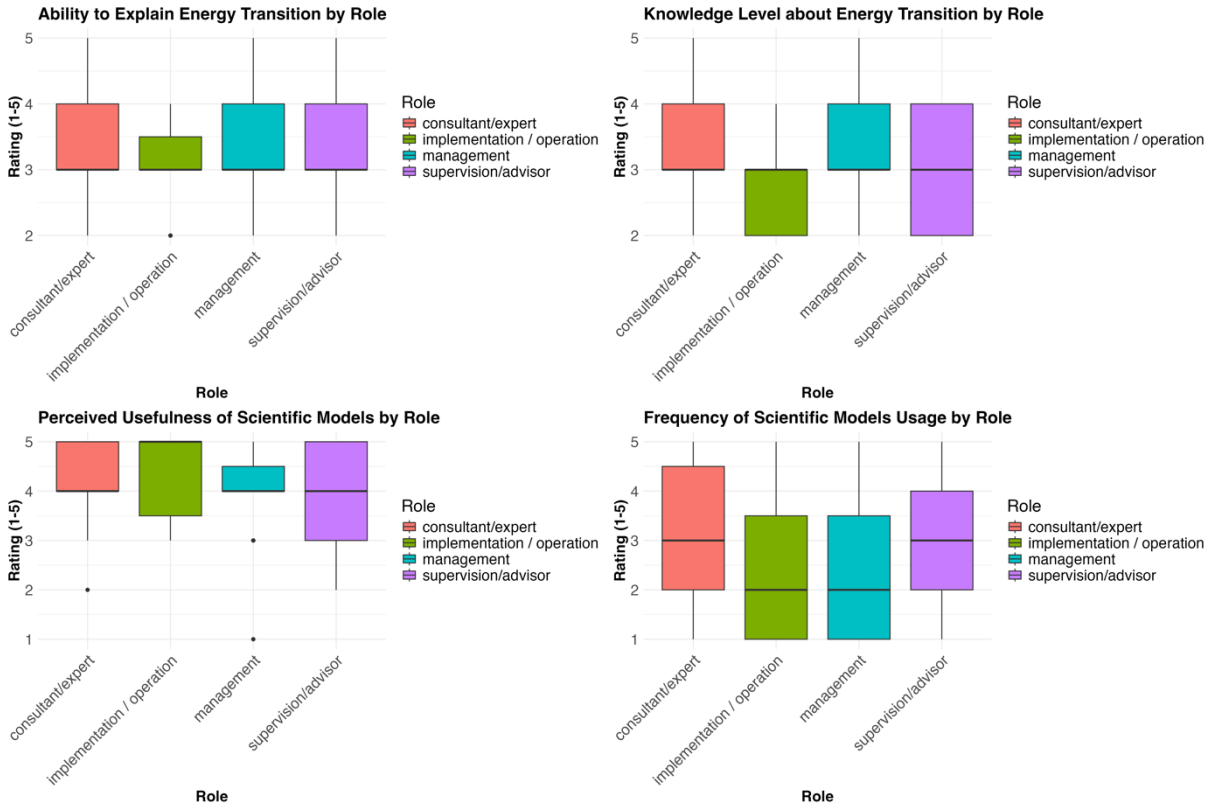

Figure 11: The boxplots illustrate how participants from different institutional roles (consultant/expert, implementation/operation, management, and supervision/advisor) rated four key metrics on a scale of 1-5. The boxes represent the interquartile range (middle 50% of responses), with the horizontal line indicating the median value. Whiskers extend to the minimum and maximum values within 1.5 times the interquartile range, while points represent outliers.

In terms of ability to explain the transition we found that consultants/experts and management demonstrate the highest self-assessed ability while implementation/operation staff show a slightly lower median, suggesting somewhat less confidence in their explanatory abilities. The presence of an outlier in the implementation group suggests some individuals feel significantly less confident than their peers.

Regarding knowledge level about how Colombia should address the energy transition, our analysis revealed more pronounced differences. Consultants/experts and management reported higher knowledge levels, while implementation/operation staff demonstrated noticeably lower self-ratings. Supervision/advisors showed the widest interquartile range, indicating substantial variation in knowledge levels within this role.

When examining perceived usefulness of scientific models, we found strong agreement across all roles. All institutional roles rated models' usefulness highly, with

Implementation/operation staff demonstrating particularly strong belief. Some management respondents deviated from this trend, as evidenced by outliers at the lower end of the scale.

The frequency of scientific models usage revealed substantial differences in actual model usage patterns. Consultants/experts utilized models most frequently, while implementation/operation and management roles reported the lowest usage frequency. All roles exhibited considerable internal variability in usage practices. This finding is particularly noteworthy since implementation staff—who would logically be expected to use scientific models most frequently in their operational work—actually reported among the lowest usage rates.

This analysis highlights a striking disconnect between how useful participants believe scientific models to be (uniformly high ratings) and how frequently they actually use them (generally moderate to low usage). The contrast is most pronounced among implementation staff, who rated models' usefulness the highest while reporting among the lowest usage rates. These patterns suggest significant operational barriers may be preventing model utilization across different institutional roles. However, our initial assumption that implementation/operation staff would be primary users of scientific models may require reconsideration. As noted elsewhere in this report, the role classification system might not perfectly capture actual job functions in practice.

This ex-ante data collected through questionnaires provides useful insight into the correlation between participants' profiles and the project's Theory of Change (ToC). As described in section 2.1, we assume that through strategic engagement, inter-ministerial dialogue and the use of scientific models we can foster more cohesive dialogues and decision-making processes for the energy transition. The ex-ante questionnaire results confirm that our cohort of participants had moderate to high baseline levels of knowledge and confidence in explaining and tackling the transition. It validates the assumption that the game sessions were reaching out to an informed, relevant and well-targeted audience. The perceived usefulness of scientific models and interest in multi-stakeholders dialogue prompt a willingness to engage in systems thinking and collaborative policy-making, two key pathways identified in the ToC. However, the lower ratings of actual uses of scientific models and moderate ratings on existing inter-institutional collaborations suggest existing barriers and hurdles to the full implementation of these outcomes.

3.4 Results from the ex-post questionnaire

A short Google Form questionnaire (see Annex 3) was sent to all participants from the June 2024 and September 2024 game sessions one week after their participation. The questionnaire included four open-ended questions: main surprises encountered during the game session, similarities between PowerShift and the reality, who should play the game, and any additional comments. Despite its brevity, the response rate was low, with only **20 participants** responding. It is worth noticing that the questionnaires were sent by the host institutions and that some participants received them later than a week after the game, which may have contributed to the lower response rates. However, during the June missions, which had a stronger focus on the model behind the game, these same questions were asked during

the debriefing. For a more comprehensive analysis of these questions, please refer to the final project report.

Based on the 20 questionnaires responses received, here are the key themes and insights of interests.

3.4.1 Surprising Aspects of the Game

Most participants were surprised by how **realistic** the game felt, particularly in how it reflected decision-making dynamics and interactions between different stakeholders:

> *"El juego se asimiló mucho en la composición de la sociedad"*
>
> *"Genera actitudes parecidas a las de la realidad"*
>
> *"El juego poco a poco se va tornado serio"*

The **complexity of negotiations** and the understanding of each others' viewpoints were also highlighted:

> *"La complejidad resultante al darse la interacción entre diferentes sectores"*
>
> *"La ausencia quasi completa de collaboracion amplia entre los diferentes jugadores/sectores. Se olvide el objetivo final de bajamiento de las emisiones para enfoquarse con sus propios deseos"*
>
> *"permitiendo visibilizar diferentes puntos de vistas"*

3.4.2 Similarities Between the Game and Reality

Participants identified several parallels between the game and real-world governance in Colombia through multiple aspects: complexity of the decision-making processes, sectoral dynamics, and social challenges. The game managed to reproduce the uncertainty linked to external variables and their immediate effect on decision-making forcing players to navigate through unstable conditions.:

> *"La incertidumbre ante los cambios en variables externas y el efecto inmediato en las decisiones."*

The game also depicted the structural complexity of society, which often prevents consensus and forces decision-makers to adopt difficult measures that do not satisfy all stakeholders:

> *"La estructura compleja de la sociedad que muchas veces hace que no se pueda llegar a consensos fácilmente y se tengan que tomar duras decisiones que no dejan contentos a todos los actores."*

The game illustrated the dependence on fossil fuels and the impact this has on communities:

> *"Las repercusiones de eliminar la producción de petróleo"*
>
> *"La complejidad en la toma de decisiones, la dependencia de combustibles fósiles, la afectación en las comunidades"*

Another important point highlighted by one respondent was how the game managed to reproduce the misinformation in decision-making where the lack of accurate information or the spread of misleading narratives can steer decisions in counterproductive directions:

> *"La desinformación para tomar decisiones"*
>
> *"Factores de conflicto como las falencias en el dialogo multipartita"*

Social dynamics and resource scarcity in the game were also mentioned as being well captured:

> *"La disponibilidad de recursos escasos, la naturaleza humana para ejercer el poder, el relacionamiento de los sectores sociales".*

Respondents highlighted the similarities between the game and real life in the importance of multi-stakeholder dialogue and multi-sectoral approaches and the challenges that come with it:

> *"Es importante la comunicación tanto del Estado, con la población y el capital privado, para la ayuda mutua, con una buena comunicación se entiende la problemática de todos los participantes."*

The perception of realism, as expressed by respondents, was reinforced during the debriefings of each session, where participants repeatedly mentioned how the game reflected the complexities they face in real-world decision-making processes. Participants experienced issues such as sectoral dynamics, societal challenges and the uncertainty inherent to policy making. These insights are not coincidental, the game was co-constructed with stakeholders and experts, and rigorously tested through crash test sessions, ensuring that it echoes the institutional and socio-economic context of Colombia.

3.4.3 Who Should Play the Game?

As already discussed in the ex-ante reflections (see section 3.2.6), respondents emphasized the importance of involving government officials and academics in the game sessions, reflecting the cross-sectoral nature of the energy transition challenges but also the "academic/technical" background of the GEMMES models.

Most participants answering the same question during the ex-post questionnaire largely echoed these priorities but introduced a few distinctive additions. Indeed, while they reinforced the idea that the game would be beneficial for government officials—including ministers, senators, and policymakers—to improve their understanding of systemic decision-making, some respondents suggested that local communities and business leaders should also be involved. This would foster more participatory governance and informed discussions about sustainability with on-the-ground perspectives. Some also mentioned that academics and researchers could use the game for educational and research purposes particularly for teaching systemic thinking and decision-making. These insights highlight a broader recognition of the game's versatility, not only as a policy-tool but also as a catalyst to foster participatory engagement and support education purposes on sustainability and complex systems issues.

3.4.4 Additional Comments

Participants were free to add extra comments. 10 participants provided positive feedback on the game and the facilitation team, thanking them for their excellent job:

> *"Agradecerles por esta muy importante experiencia"*
>
> *"Excelente dinamica!!!"*
>
> *"Felicitarlos por el diseño, desarrollo y profesionalismo con el que se desarrolló el taller PowerShift"*
>
> *"Es un juego muy inteligente muchas gracias, muy bien el trabajo de la moderación".*

Some emphasized the importance of expanding the game's reach, suggesting that more people should experience it and also highlighted the need to play longer (1 day, at least 4 rounds) to experience the full transition:

> *"Me hubiera gustado jugar una fase seria realmente mas pensada y estratégica. por eso creo que el tiempo no es mucho cuando es la primera vez que se juega."*
>
> *"El tiempo de juego fue muy corto (dos rondas en una sesión) para que los participantes generaran acciones que ayudaran a entenderlo mejor, se requieren por lo menos 4 rondas de juego en una sola sesión."*
>
> *"Sería importante poder hacer el ejercicio con cada sector."*

Despite the limited length of the questionnaire and a modest response rate, participants consistently perceived the game as a realistic representation of Colombia's energy transition challenges, an impression that reinforces the feedback shared during the debriefings. This perception of realism can be largely attributed to the co-construction and validation process, which included iterative crash test sessions with stakeholders. Participants experienced the complexities of decision-making processes under uncertainty, the sectoral dynamics issues, and the societal challenges. They highlighted the value of the game as both a policy and an educational tool, recommending its use by public officials, business leaders, and researchers alike.

3.5 Results from the ex-post interviews

3.5.1 Sample selection and participants profiles

Due to budget constraints for the M&E component, limited associated human resources (only one LEAF consultant based in Colombia) and a tight timeline, conducting a full ex-post analysis with interviews for all 158 participants was not feasible. In coordination with the AFD team, we identified a list of 51 key participants to target in priority, based on their level of engagement, position and role within their institutions. Most participants were contacted between 2 and 8 weeks after the game session by email and phone. Out of the 51 individuals reached out to, we successfully conducted **21 ex-post interviews**. As presented in the Venn diagram (Figure 4), only 15 of those 21 had filled the ex-ante questionnaire, limiting our ability to undertake sound statistical analysis. All the interviews took place on google meet, with an average

duration of 30 minutes. Out of the 21 participants who responded positively, 7 are women (30%).

The questionnaire (see Annex 4) served as a guiding framework for conducting the interviews. It was designed with a mix of qualitative and open-ended questions and covered the five dimensions of the Sen's capabilities (knowledge, interlinking, strategic analysis, strategic engagement, implementing strategies). Given the high-profile nature of most targeted respondents and their limited availability, we intentionally kept it brief, informing participants in advance that the interview would take approximately 30 minutes to encourage participation. Interviews were recorded, transcribed and statements were coded according to the five dimensions of the Sen's capabilities.

3.5.2 Degree of satisfaction with the session

All 21 participants reported a degree of satisfaction of 3 (neutral) or higher. Only 1 person (5%) reported a neutral level of satisfaction, while 6 people (28.5%) were satisfied, and 14 people (66.5%) were very satisfied.

Our initial target in the log frame was an 80% satisfaction rate, and the results exceeded this target, with **95% of participants being satisfied to very satisfied**.

One participant answered 3 (neutral) about the experience because of two main issues outlined during the interview: logistical disruptions and limited playtime. In this specific session, noise conditions due to military activities around the building were perceived as disruptive and there were punctuality issues that delayed the start of the activity. The second issue was directly linked to the game's limited playtime. The experience was perceived as too short (1h30). The respondent believed that playing additional rounds (a third or fourth) would have allowed for a deeper understanding of the game and better interactions between public and private sector players, as well as national and subnational actors.

3.5.3 Assessment of Sen's capabilities

The rest of the questionnaire was built around the five capabilities, with each capability featuring a 5-point likert scale question followed by an open-ended question. Interviews were recorded, transcribed and a total of **519 statements** were extracted and coded according to the five dimensions of capabilities.

The radar chart below (Figure 12) displays the average scores across the five dimensions, measured on a scale of 1 to 5. The strongest outcome is given by the acquisition of new knowledge (3.80/5), indicating that participants found the game particularly effective as an educational tool for understanding low carbon transition concepts. This was followed by the ability to envision a range of possible scenarios and options (3.42/5), suggesting the game successfully expanded participants' strategic thinking about potential futures. Vision of priority paths showed moderate effectiveness (3.18/5), reflecting participants' enhanced ability to identify key directions for energy transition in Colombia. Notably weaker were the creation of new relationships (2.64/5) and generation of concrete actions (2.56/5), indicating limitations in the game session's ability to foster networking or catalyze tangible initiatives.

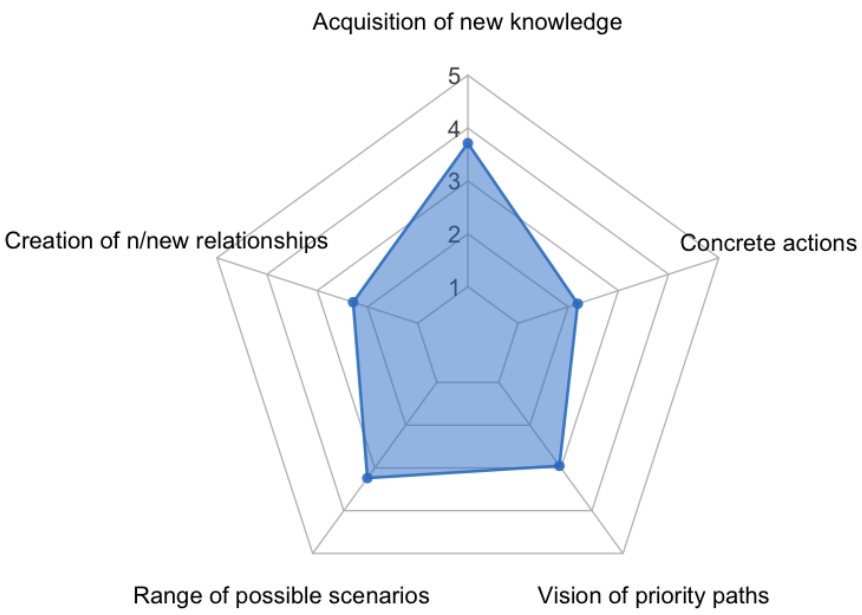

Figure 12: Radar graph displaying the average scores across the five dimensions

The correlations between these dimensions (Figure 13) reveal interesting dynamics: knowledge acquisition strongly correlates with expanded scenario thinking (0.82) and moderately with clearer vision of priorities (0.51), suggesting that learning directly enhances strategic planning capabilities. However, the negative correlation between knowledge and concrete actions (-0.07) highlights a gap between understanding concepts and implementing them. Interestingly, relationship building shows a moderate correlation with concrete actions (0.45), suggesting that the connections formed during the game, though limited, may serve as an important pathway to practical implementation.

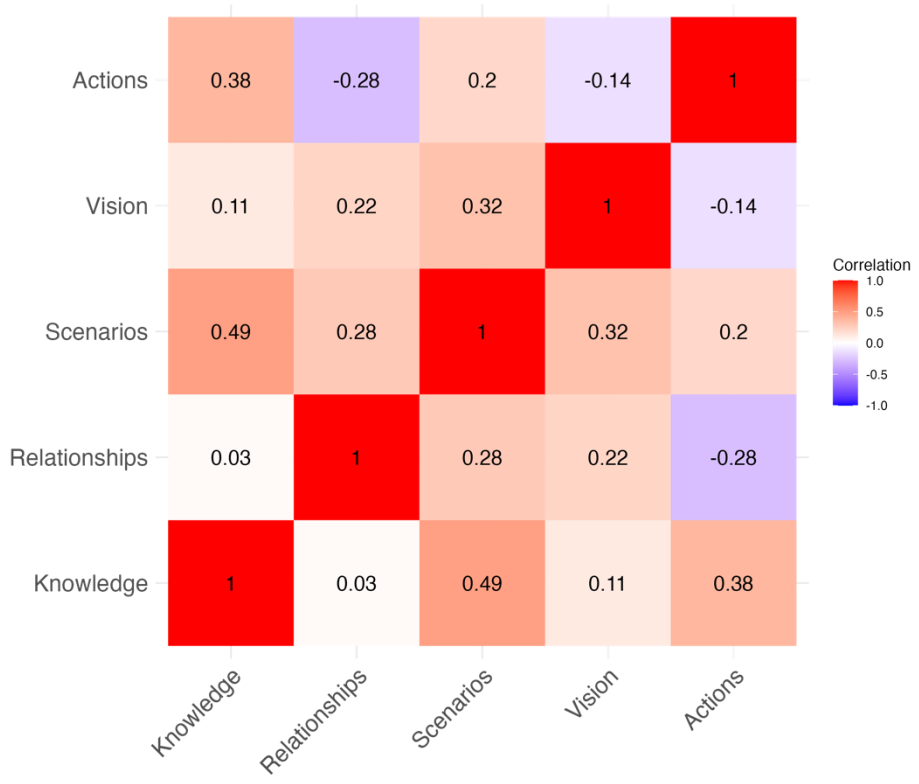

Figure 13: Correlation matrix between the five dimensions

The table below shows the distribution of statements as well as the number of participants who mentioned at least one statement per dimension.

Table 10: Distribution of statements and number of participants mentioning one or more statements per SEN dimension

	Knowledge	**Interlinking**	**Strategic Analysis**	**Strategic engagement**	**Implementing strategy**
Total number of statements	216	40	141	85	37
% of the statements	42	8	27	16	7
Number of participants per capability	21	10	21	21	14

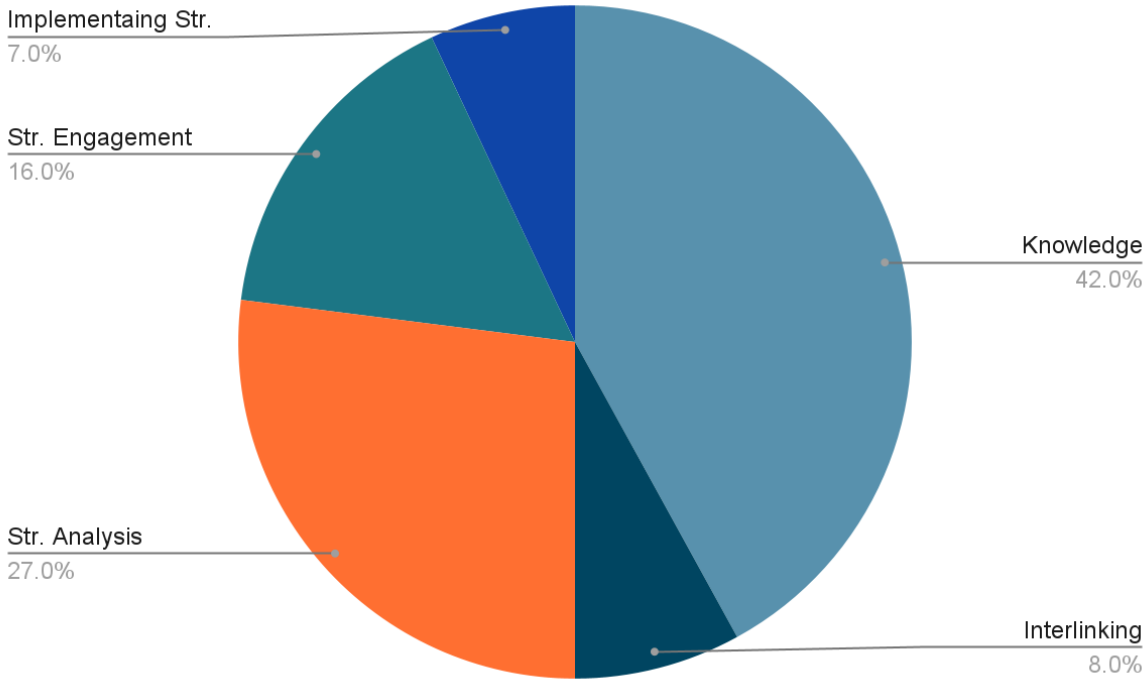

Figure 14: Pie chart visualising the distribution of participant statements across different SEN dimensions.

Most of the statements (42%) fell into the first category (*knowledge acquisition*) meaning that respondents were most focused on this aspect during the ex-post interviews. Statements addressing *strategic analysis* and *engagement* were found in smaller proportions, at 27 and 16% respectively. Statements linked to *interlinking* and *implementing strategy* accounted for only 8 and 7% respectively.

The boxplot below (Figure 15) illustrates the distribution of statement counts across the five categories, highlighting both median values and individual participant data points. Knowledge acquisition shows not only the highest median count but also the most consistent responses across participants, as indicated by the compact interquartile range. Strategic analysis displays more variability, with several participants making significantly more strategic analysis statements than most other participants. The stacked bar chart (Figure 16) reveals interesting individual patterns: while knowledge acquisition dominates for most participants, some individuals show distinctly different profiles. For instance, several participants demonstrate more balanced distributions across categories, while others show particular strength in strategic analysis. Implementation strategy shows the greatest variation proportionally, with some participants reporting significant emphasis in this area while others reported none at all.

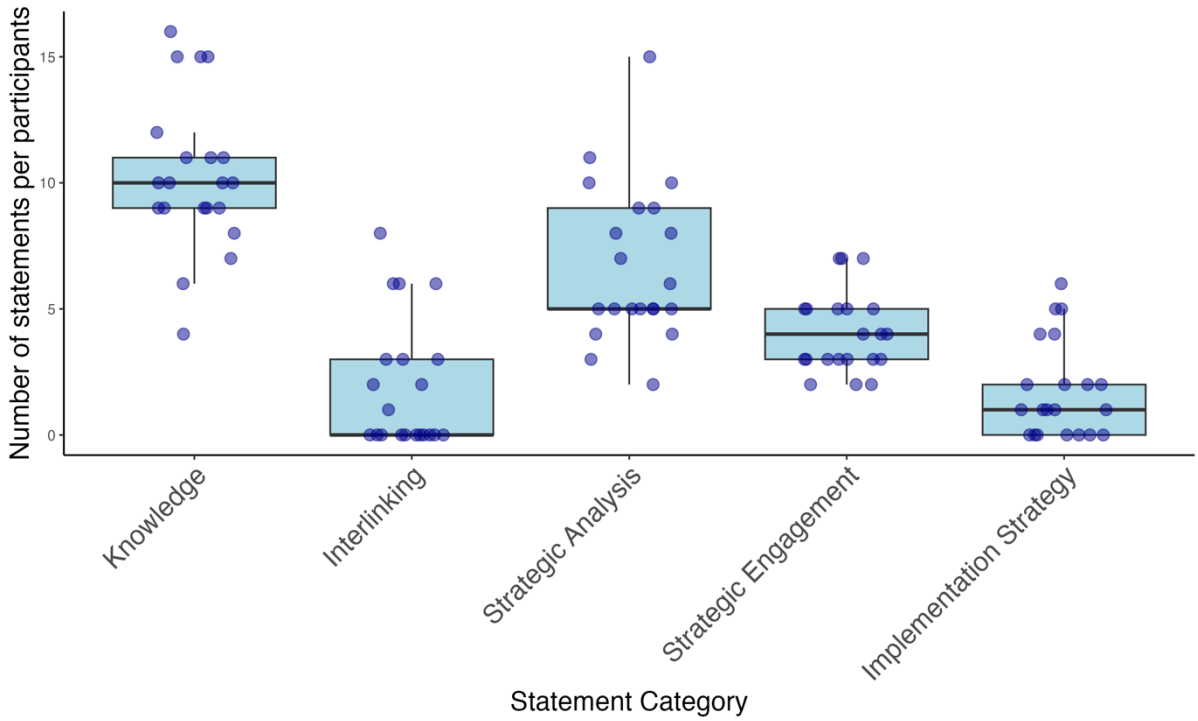

Figure 15: The boxplot shows the distribution of statement counts across the five dimensions. Each box represents the interquartile range (middle 50%) of the data for that category, with the horizontal line inside the box showing the median value. The blue dots represent individual participant data points, with one dot per participant per category.

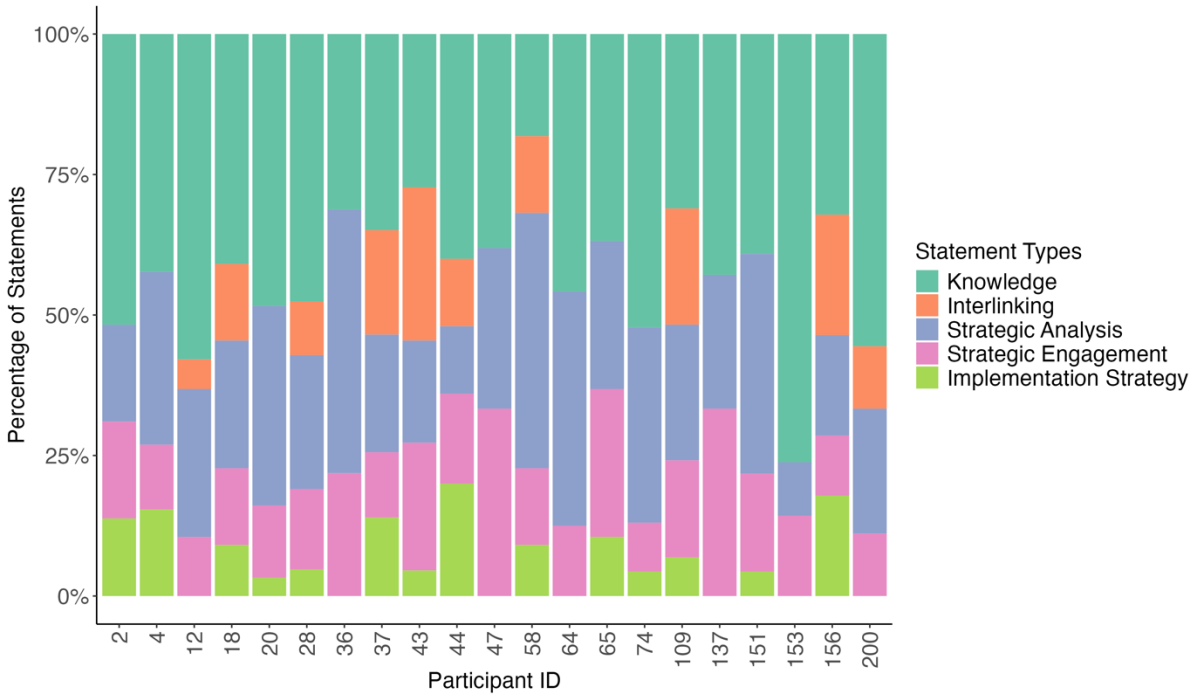

Figure 16: The stacked bar chart displays the percentage distribution of statement types for each participant. Each vertical bar represents 100% of a participant's statements, with colored segments showing the proportion belonging to each category. This graph shows how different participants allocate their focus across statement categories.

These results confirm the findings from the quantitative analysis and align with the expected impacts of the game. They highlight the game's effectiveness in **enhancing participants'**

substantive knowledge and improving strategic and critical thinking. However, the game had a more limited impact on fostering concrete networking opportunities or direct engagement.

This has to be seen in the light of how participants engaged in the project: most joined as part of their teams or institutions or participated in the context of a stand-alone event. If not already colleagues, participants had no special ties with each other. While this provided a networking opportunity, a single-event engagement has limited power to strengthen ties between participants. This could look different if participants had been engaged in several game sessions or if they had been part of an active working group. It is worth noting that a subset of participants had been involved since the early stages of the project, contributing to the game's design (co-conception phase) and attending several sessions. However, the design sessions were conducted online, which reduced opportunities for interaction and networking.

Despite these limitations, participants increased their capabilities in at least 3 categories. Specifically, 5 participants (24%) reported positive progress in 3 capabilities (excluding interlinking and implementation), 8 participants (33%) improved across 4 capabilities and 8 participants (43%) replied positively across all categories. In the following sections, we will analyse the results and insights per capability.

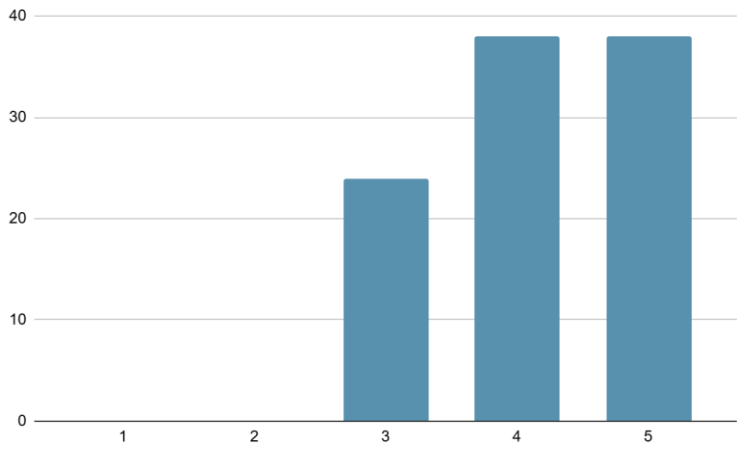

Figure 17: Percentage of participants per number of capabilities validated

The 5 participants (24%) who validated 3 capabilities display the same profile. They all validated: knowledge, strategic thinking and strategic engagement. Out of the 8 participants who validated 4 capabilities, 6 failed short on "interlinking" while 2 did not validate "implementing strategy".

We originally targeted a 50% increase in at least 3 capabilities. Results suggest that 100% of the participants benefited from the game experience to increase their knowledge, strategic analysis and strategic engagement capabilities.

3.5.4 Acquisition of new knowledge

Table 11: SEN dimension: Acquisition of new knowledge

How much has your participation in Powershift contributed to the **acquisition of new knowledge**?				
1 - Not at all	2 - A little	3 - Moderately	4 - Much	5 - Very much
0 (0%)	2 (10%)	5 (24%)	11 (52%)	3 (14%)

66% of the cohort found the game to be a significant or very significant source of new knowledge, reinforcing its effectiveness as an educational and experiential learning tool. Despite the high level of expertise from the participants, none indicated that they had not gained any new form of knowledge.

Analyzing the small samples of 15 participants who had filled the ex-ante questionnaire and were interviewed as part of the ex-post step, 10 had originally ranked as "average" their ability to explain the energy transition in the ex-ante form (while the other 5 had self-assessed their capacity at 4 or 5). Out of these 10 respondents, 7 have indicated a gain in knowledge in the ex-post interviews (answer 4 or 5). From the 5 respondents who self-assessed themselves as "knowledgeable" (answer: 4 or 5), 2 still indicated an increase in knowledge (answer 4 or 5) after the game.

Qualitative analysis

210 statements were extracted from the interviews in line with the new knowledge acquisition. Numbers of statements per participant ranged from 18 to 43, with an average of 24 per participant.

We analyzed the key topics and recurring themes through word count and coding. The analysis revealed five major areas in which participants report to have acquired new knowledge: **critical thinking** on complex systems, **empathy** and social dimensions, **collaboration** and stakeholders' interaction, **strategic thinking** and the link between **economic and social issues** in the energy transition.

The game was instrumental in acting as a **learning tool** to foster critical thinking. Most statements directly reference how it helped players **understand** the complexity of the energy transition, the interlinkedness of all sectors and the roles of each stakeholder. Participants focused on "how" things work, emphasizing process-based learning:

> *"El juego me permitió comprender mejor las implicaciones de las decisiones de políticas públicas sobre la transición energética, cómo estas afectan a la sociedad y el ambiente, y cómo los diferentes sectores (hogares, industria, estado) están interrelacionados en este proceso."*
>
> *"La transición energética es un proceso complejo que incluye múltiples actores y retos técnicos."*
>
> *"El juego permitió observar que los problemas subyacentes a la transición energética son complejos y requieren soluciones más profundas."*

> *"Es entender lo complejo que va a ser, sí. O sea, que realmente es muy complejo y asusta incluso saber si estamos preparados"*

They also emphasized how the game bridged the gap between **theory and practice**, allowing them to grasp abstract concepts in a tangible manner and applied setting:

> *"Fue una herramienta muy útil para entender cómo funcionan las políticas energéticas en un contexto práctico."*

> *"Entendí cómo las decisiones tomadas dentro del juego afectan las emisiones de gases, el bienestar social y la economía en general, lo cual me permitió visualizar de forma más práctica lo que se discute en teoría."*

Also, the game allowed players to question **preconceived ideas** and think critically about policies and strategies.

> *Me di cuenta de que algunas de mis ideas preconcebidas sobre la transición energética eran erróneas y simplificadas."*

> *"El juego me obligó a sintetizar y reflexionar sobre diferentes enfoques para reducir las emisiones sin afectar el desarrollo económico."*

> *"Me di cuenta de que, aunque hay soluciones técnicas, las decisiones humanas son complicadas por las limitaciones económicas y políticas, lo que dificulta el avance en la transición energética."*

> *"Me di cuenta de que algunas de mis ideas preconcebidas sobre cómo debía comportarse cada actor cambiaron al entender mejor sus restricciones y motivaciones."*

A significant learning outcome was the **development of empathy**, through personal and social learning, particularly in understanding the challenges faced by affected communities. Participants emphasized how, by being in the shoes of "others" during the game, they felt **empathy** towards other actors as they experienced first hand how different sectors and communities might be impacted by the energy transition. The game helped gaining a more nuanced understanding of the social impacts of the energy transition.

> *"El tema de la empatía funciona muy bien y creo que a muchas personas en el gobierno nacional les vendría bien este ejercicio para que tengan en cuenta esa perspectiva."*

> *"Me permitió empatizar mejor con las comunidades afectadas por el cambio climático y entender sus preocupaciones."*

> *"Ahora veo más claramente cómo las decisiones de transición energética pueden beneficiar o perjudicar a ciertos grupos de población."*

> *"El juego me permitió comprender mejor el papel de los distintos actores en la transición energética y cómo sus intereses a veces convergen o chocan."*

> *"Fortaleció mis habilidades blandas al interactuar con otros jugadores y comprender distintos enfoques."*

> *"El juego me permitió sensibilizarme sobre los desafíos de la macroeconomía relacionados con la transición energética, al ver cómo cada actor (gobierno, empresario, consumidor) enfrenta diferentes dificultades."*

Participants realized that the low carbon transition requires strong alliances and active dialogue among different sectors and stakeholders. The game showcased how **collaboration** is necessary to drive impactful change. They reported gaining new insights into how different stakeholders interact, emphasizing the importance of alliances and dialogue in designing sustainable policies:

> *"Identificamos la necesidad de alianzas con el sector privado para acelerar la implementación de proyectos de transición energética."*

> *"El juego me ayudó a ver la importancia de negociar y encontrar puntos en común entre diferentes intereses"*

Players experienced extreme time pressure during game rounds, where they were required to quickly understand complex issues, make decisions, build alliances, and persuade others. The game embeds complex trade-offs at its core, challenging players to balance environmental, economic and social issues in their decision-making. In the ex-post interviews, respondents highlighted the importance of negotiation, active listening and **strategic decision making** under pressure.

> *"El juego fortaleció mis capacidades de negociación y resolución de conflictos en escenarios complejos."*

> *"Aprendí a tomar decisiones bajo incertidumbre, considerando múltiples factores en juego."*

> *"Me di cuenta de que la política energética no es solo técnica, sino que también implica estrategias de negociación y diplomacia."*

> *"El juego me obligó a sintetizar y tener una escucha activa para encontrar puntos en común con otros jugadores."*

> *"Fue una excelente herramienta para mejorar mis capacidades de negociación y relacionamiento con diferentes sectores."*

Participants connected the issues of the low carbon transition with economic decisions and its social implications for communities, especially vulnerable ones. They mentioned the balance between private sector involvement and community needs, and how to reconcile both. The game helped participants better grasp the role of the private sector, corporate responsibility and partnerships. The game showcased how social and economic factors are deeply connected:

> *"Identificamos la necesidad de involucrar al sector privado para lograr modelos sostenibles de transición energética."*

> *"El juego me ayudó a entender cómo equilibrar las necesidades de las comunidades con los intereses económicos del sector privado."*

Interestingly, the two participants who answered "2 - little knowledge acquisition" to the 5-Likert scale question still mentioned respectively 4 and 8 statements related to knowledge

All participants reported an increase in "knowledge" capabilities. The game enhanced critical thinking, collaboration, and strategic decision-making, while bridging the gap between theory and practice. It challenged preconceived ideas, highlighted the importance of alliances and negotiation, and reinforced the complex trade-offs in real-world decision-making. Participants also mentioned gaining a deeper understanding of the social and economic impacts of the energy transition, particularly on vulnerable communities and the private sector's role.

3.5.5 New Relationships

Table 12: SEN dimension: Creation of new relationships

To what extent has your participation in Powershift facilitated the creation of **new relationships** with other entities involved in the energy transition in Colombia?				
1 - Not at all	2 - A little	3 - Moderately	4 - Much	5 - Very much
9 (43%)	3 (14%)	3 (14%)	6 (29%)	0 (0%)

9 participants (43%) reported no gain, the other 11 respondents are distributed between a little and much. No participant answered "very much". The average score of 2.64/5 reflects the overall limited impact on relationship-building, making this the second-lowest rated dimension.

Analyzing the small samples of 15 participants who had filled the ex-ante questionnaire and were interviewed as part of the ex-post step, 10 had originally reported being in contact with maximum 1 institution. In the ex-post interview, 7 mentioned that they created new relationship opportunities (moderately and much) thanks to their participation in the session. Participants who self-reported being well connected in the ex-ante questionnaire didn't score high in interlinking improvement.

Qualitative analysis

40 statements were coded in the interlinking category, from 10 participants, with a number per participant ranging from 1 to 8 (average: 4). Main sources of interlinking and networking opportunities were: government collaborations, engagement with private sector, cross-sectoral engagement.

The graph below showcases the new network connections resulting from the PowerShift serious game session. Light blue bubbles are the home institutions of the 10 respondents (2 respondents were from the same institution). Dark blue bubbles are the newly added connections with institutions that were present at the workshop and were later engaged through follow-up interactions, as reported in ex-post evaluation interviews. Green bubbles are institutions not present in any of the game sessions. This expansion demonstrates how the PowerShift session served as a catalyst for broader stakeholder engagement, fostering new connections and dialogues across sectors—including government, academia, industry, and international organizations—beyond the immediate circle of participants. Except for 3

interactions (purple arrows) that reinforce the intra-institution network, all other arrows (orange) are pointing towards external entities.

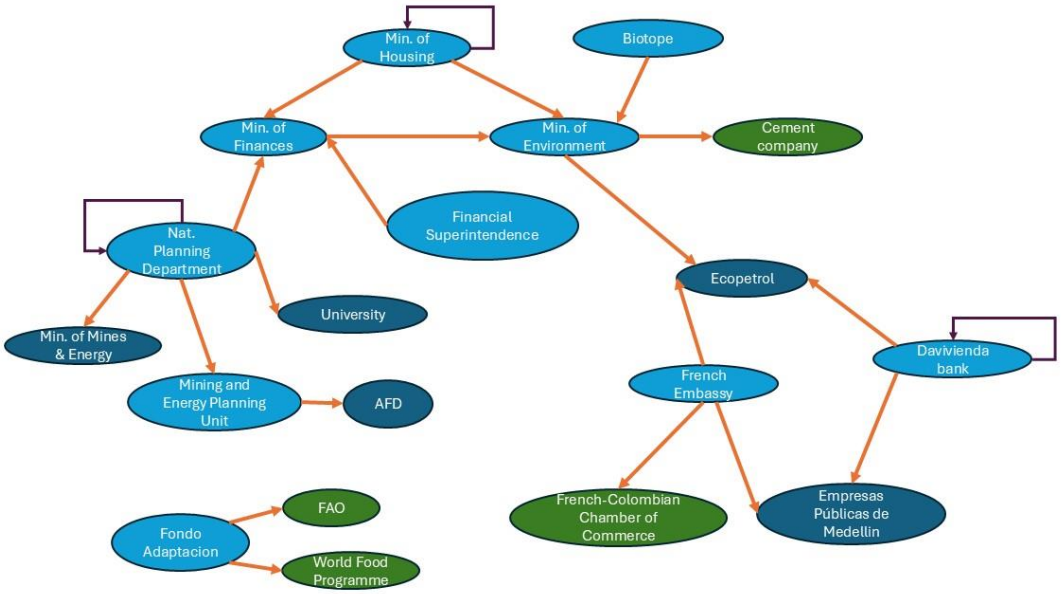

Figure 18: new intra and inter connections with other entities. Light blue bubbles are respondents' home institutions. Dark blue and Green bubbles are respondents' answers to newly established connections.

Participants increased engagement with **government institutions**, particularly ministries (environment, mines and energy) and financial authorities, facilitating future policy and funding discussions.

> *"Durante las sesiones de juego, se facilitó la colaboración con el Ministerio de Ambiente y Minas, lo cual abrió la puerta a futuras conversaciones sobre proyectos de comunidades energéticas. Tuvimos reuniones con el Ministerio de Ambiente y Minas, donde discutimos cómo el financiamiento verde puede apoyar a las comunidades más vulnerables y facilitar proyectos que generen menos dependencia de la economía extractiva."*

> *"A través de los talleres previos se logró conectar con personas de Upme, Minas y Hacienda, identificando actores clave."*

> *"Tuve la oportunidad de conocer a gente del Ministerio de Hacienda que tampoco conocía [...] importante para hablar de presupuestos y necesidades financieras de los proyectos."*

Connections were established with major **private-sector entities and financial institutions**, including Ecopetrol, EPM, and investment funds.

> *"Establecí contactos con personas de empresas clave como EPM y Ecopetrol, así como de la Cámara de Comercio Franco-Colombiana."*

> *"Ecopetrol y EPM son empresas que ya tienen un plan de descarbonización, y después de esa reunión, sí tuvimos reunión con ellos."*

> *"Reconocimos a personas de fondos de inversión como los bancos franceses, lo cual enriqueció el ejercicio."*

Statements refers to the initiation of a **cross-sectoral dialogue** and collaboration, expanding networks beyond national institutions to international organizations.

> *"Las reuniones con varios sectores nos permitieron discutir cómo el financiamiento verde podría integrarse en los proyectos de economía popular, y este tipo de networking generó nuevas conexiones para trabajar en temas de transición."*

> *"A través de las actividades, seguimos conectados con otros sectores clave que están involucrados en la transición energética, lo cual ha sido valioso para compartir ideas y mejores prácticas."*

> *"El juego permitió el intercambio de ideas con personas de diferentes sectores, fortaleciendo las relaciones y creando redes que serán útiles para proyectos de transición en el futuro."*

> *"Después de PowerShift, he participado en reuniones con representantes de otras organizaciones, como la FAO y el Plan Mundial de Alimentos."*

While some participants did not establish new relationships, they found value in reinforcing **existing professional connections**.

> *"Aunque las interacciones no han aumentado en frecuencia, se han mantenido contactos relevantes para futuros proyectos."*

> *"El taller no logró establecer un networking significativo entre nuevos participantes, pero sí fortaleció conexiones existentes."*

> *"Saqué contactos que pueden facilitar la vinculación para proyectos futuros relacionados con la transición energética."*

The workshop created networking opportunities that led to conversations on future **business or project collaborations**.

> *"De hecho, en ese espacio conocí a una par de otra entidad que tuvimos una serie de conversaciones para desarrollar negocios conjuntamente."*

We initially asked in the ex-ante questionnaire about the number and list of institutions participants interact with, and how satisfied they are with the level and efficiency of the collaboration. We shorten the ex-post question related to interlinking, directly assessing whether PowerShift facilitated network expansion. As a result, we can only indirectly measure outcomes against the targeted 25% in any of these dimensions. The ex-post interviews showed that **29%** of participants felt that PowerShift significantly facilitated the creation of new relations and another **14%** reported a moderate increase.

3.5.6 Strategic analysis

Table 13: SEN dimension: Strategic analysis

To what extent has your participation in PowerShift broadened the range of **possible scenarios and options** for the energy transition in Colombia?

1 - Not at all	2 - A little	3 - Moderately	4 - Much	5 - Very much
1 (5%)	3 (14%)	7 (33%)	10 (48%)	0 (0%)

17 (81%) of participants reported a moderate to much increased capability in strategic thinking, reinforcing the game's ability to foster critical thinking by expanding mental models. Only one participant reported no increase, and no participant rated as highest their increase in strategic thinking. With an average score of 3.42/5, strategic analysis represents one of the game's stronger outcomes, suggesting its effectiveness in expanding participants' thinking about potential futures.

Qualitative analysis

141 statements were coded from all 21 participants, with a range between 2 and 15 statements per participant (average: 7). Even the respondent who answered 1 to the above question could still mention 2 statements in this category. Key topics linked to increased strategic thinking encompassed: low carbon transition through the lens of a cross-sector approach, strengthening policy analysis skills, enhancing empathy for stakeholders, improving negotiation and communication abilities, and deepening economic awareness. Participants developed a more holistic and pragmatic understanding of the energy transition.
Many participants reported an increased awareness of the cross-sectoral dimension of the low carbon transition which cannot be led by a single sector. Participants stated that it must be a collaborative effort between the government, private sector, and communities. Many emphasized the need for alliances to create inclusive projects that balance economic and environmental priorities:

> *"Aumenté mi habilidad para identificar las múltiples estrategias y caminos posibles para lograr la transición energética, adaptando los conocimientos teóricos a situaciones prácticas que surgen en el proceso."*

> *"Identificamos la necesidad de alianzas con el sector privado, el estado y las comunidades para generar proyectos de transición más inclusivos, que atiendan tanto las necesidades económicas como ambientales."*

> *"En el juego se destacó la importancia de tener aliados estratégicos en diferentes sectores, ya que la transición no puede ser liderada solo por el estado, sino en conjunto con actores clave como el sector empresarial."*

There was also an acknowledgment that businesses, if committed to sustainability, can play a pivotal role in advancing the transition by developing cleaner technology and promoting labor reconversion in affected sectors:

> *"El sector privado, si está comprometido con la sostenibilidad, puede ser un aliado fundamental en la transición energética, ayudando a crear tecnología más limpia y fomentando la reconversión laboral en sectores afectados por la transición."*

These reflections highlight a shift toward a more integrated approach to policy-making, where partnerships are seen as a key enabler of success.

Participants reported an increased ability to critically analyze policies and assess their broader social, economic, and environmental implications. The exercise provided an opportunity to develop structured thinking, at multiple scales and levels, enabling them to engage in more meaningful policy discussions.

> *"El juego me permitió desarrollar la capacidad de analizar con mayor profundidad las implicaciones de las decisiones políticas relacionadas con la transición energética, sobre todo en cuanto a los efectos en el bienestar social y las emisiones de carbono."*

> *"La experiencia del juego me hizo más consciente de cómo los actores comunitarios pueden jugar un rol más activo en la transición energética, algo que no había considerado tanto antes."*

> *"Mejoré mi habilidad para considerar el impacto sistémico de decisiones en diferentes niveles."*

> *"El ejercicio fortaleció mi capacidad de estructurar ideas y entablar diálogos efectivos sobre las políticas públicas, especialmente en lo que concierne a la reindustrialización y la transición económica hacia modelos más sostenibles."*

As already mentioned in the "knowledge" category, a significant outcome of the exercise was a shift in perspective and empathy, particularly in how participants understood the challenges faced by different stakeholders. It led to more nuanced policy perspectives:

> *"Me permitió empatizar mejor con las comunidades que enfrentan decisiones difíciles, como la deforestación por necesidad económica, lo que antes veía de manera más simplista."*

> *"Creo que el sector privado, las comunidades y el gobierno deberían trabajar más en conjunto, fortaleciendo alianzas para lograr una transición más ordenada."*

Another crucial insight from the game was the increased awareness of market-based mechanisms and the financial realities of the energy transition. Participants became more conscious of economic constraints and financial barriers, particularly in accessing green financing.

> *"Nos dimos cuenta de que muchas personas no tienen la formación adecuada para acceder a los recursos de financiamiento verde, por lo que es fundamental mejorar la gestión de la información en ese sentido."*

The importance of market confidence was also highlighted, especially in the context of carbon markets.

> *"Es necesario restablecer la confianza en los mercados de carbono en Colombia, especialmente tras algunos proyectos fallidos."*

Additionally, the game helped participants visualize how economic and policy decisions impact industry, employment, and social stability.

> *"Pude reflexionar sobre cómo cada decisión afecta a la gente, desde el empleo hasta la sostenibilidad."*

81% of participants reported a moderate to much increased capability in strategic thinking, reinforcing the game's ability to foster critical thinking by expanding mental models. Participants could envision multiple pathways for the energy transition. The game allowed them to recognize the importance of alliances between government, private sector, and communities, acknowledging that the transition cannot be led by a single actor. The game also enhanced their ability to analyze policies holistically, considering their economic, social, and environmental implications.

3.5.7 Strategic engagement

Table 14: SEN dimension Strategic engagement

To what extent has your participation in PowerShift **clarified your vision of the priority paths** to follow in the energy transition in Colombia?				
1 - Not at all	2 - A little	3 - Moderately	4 - Much	5 - Very much
1 (5%)	6 (29%)	7 (33%)	7 (33%)	0 (0%)

The data shows that 66% of participants reported moderate to significant clarification of their vision regarding priority paths for Colombia's energy transition (ratings of 3-4). However, a notable 34% reported little to no improvement in this area (ratings of 1-2). No participants gave the highest rating of 5, suggesting room for improvement in this dimension. The average score for strategic engagement (3.18/5) positions it in the middle range of the five measured capabilities, higher than relationship-building and concrete actions but lower than knowledge acquisition and scenario thinking.

Qualitative analysis

85 statements were coded in the strategic engagement category from all 21 participants, ranging between 2 and 7 per participant (average: 4). Even the respondent who answered 1 to the above question contributed statements in this category. Key topics linked to enhanced strategic engagement included: localization and territorialization of low carbon transition initiatives, identification of sector-specific prioritization needs, practical application of learnings in professional contexts, integration of technological advancement with infrastructure development, expanded consideration of cross-sectoral interdependencies, and recognition of international cooperation opportunities.

Participants developed a clearer understanding of the importance of grounding high-level political strategies at the local and community level. Specific regions like Sierra Nevada and Chocó were identified as potential areas for territorialized solutions.

> *"Se puede decir que me quedó una visión más clara sobre la importancia de aterrizar todo lo que se está trazando en el nivel político al nivel local y comunitario."*
>
> *"Se identificaron áreas en las que sería posible territorializar soluciones, como en la Sierra Nevada y el Chocó."*

The game helped participants identify key sectors that require focused attention, particularly transportation, residential areas, and addressing labor implications of the transition.

> *"Se identificó la necesidad de priorizar el sector transporte y residencias, además de atender las implicaciones laborales de la transición."*

> *"La necesidad de priorizar el sector social para lograr una transición energética más inclusiva."*

Several participants mentioned plans to incorporate game insights into upcoming professional activities, including presentations and policy formulation.

> *"Tengo algunas presentaciones próximas sobre la transición energética, y planeo aplicar lo que aprendí en el juego para hacer las narrativas más comprensibles y claras."*

> *"En el futuro planeo aplicar lo aprendido en la valoración económica ambiental para informar políticas públicas."*

Participants recognized the need to balance technological advancement with addressing fundamental infrastructure gaps.

> *"Se busca integrar tecnologías avanzadas mientras se resuelven problemas estructurales como la falta de puertos adecuados para offshore."*

The game helped participants understand complex connections between sectors, such as the relationship between water, agriculture, and energy.

> *"El juego nos ha ayudado a ver más claramente las vías para avanzar, y estamos incluyendo nuevas ideas en nuestras proyecciones, como el impacto del agua en la agricultura y la energía."*

Recognition of the potential role of international partnerships in providing technical assistance for sustainability initiatives.

> *"La cooperación internacional puede ser clave para la asesoría técnica en sostenibilidad."*

66% of participants reported moderate to significant clarification of their vision regarding priority paths for Colombia's energy transition. The qualitative insights reveal that the game helped participants develop more concrete, sector-specific, and locally relevant visions for energy transition priorities in Colombia. They reported the need to adapt high-level policies to regional contexts. They identified key sectors for prioritization, including transportation and residential areas, while also recognizing the importance of balancing technological advancements with infrastructure development.

3.5.8 Implementing strategy

Table 15: SEN dimension Implementing Strategy

To what extent has your participation in PowerShift prompted you to **take concrete actions** in relation to the energy transition in Colombia?				
1 - Not at all	2 - A little	3 - Moderately	4 - Much	5 - Very much
8 (38%)	4 (19%)	6 (29%)	3 (14%)	0 (0%)

The data shows that 38% reported no direct actions and another 19% answered “a little”, suggesting little to no impact, making this the lowest-rated dimension among the five capabilities. 29% reported moderate increase and only 14% reported significant implementation outcomes (ratings of 3-4). No participants gave the highest rating of 5. The average score of 2.56/5 reflects the limited tangible outcomes following the game session, consistent with the challenge of translating insights into action, especially after only one single session.

Qualitative analysis

37 statements were coded in the implementing strategy category from 14 participants, ranging from 1 to 6 statements per participant (average: 2.5). Even among respondents who gave low ratings, some could still identify potential pathways to concrete actions. Key implementation themes that emerged included: project development and collaborative initiatives, policy integration and application, knowledge dissemination and communication improvements, and nascent cross-sectoral partnerships. The game served primarily as a catalyst for planning rather than immediate implementation.
Participants described collaborative project development initiatives that were spurred by the game, including initial discussions on community energy projects and green financing mechanisms. Several mentioned specific meetings that followed the session:

> *"Los esfuerzos de colaboración con Francia y otros países interesados en tecnología nuclear y offshore han comenzado como resultado del taller"*

> *"El contacto con [X] y la cooperación internacional derivaron en reuniones concretas con resultados iniciales."*

Some participants indicated integration of game insights into policy planning, noting how they were applying these concepts to their professional work.

> *"Vamos a lanzar una serie de notas de política sobre temas relacionados con la transición energética, utilizando elementos aprendidos en el juego para comunicar los resultados de manera más efectiva"*

> *"La idea es incorporar los resultados del taller en los planes de acción anuales para garantizar la ejecución y presupuestación necesarias."*

A notable outcome was improved communication strategies for complex energy transition concepts, with participants reporting:

> *"A partir del juego, hemos estado implementando acciones políticas basadas en lo que hemos aprendido, creando narrativas más claras y concretas para las notas de política que estamos desarrollando."*

The results suggest that while immediate concrete actions were somehow limited, the game influenced how participants would communicate and frame energy transition issues going forward. The relative weakness of this dimension compared to knowledge acquisition and strategic thinking confirms the implementation gap identified in the quantitative data, suggesting that more game sessions with targeted working groups are needed to translate insights into concrete actions. A well structured, multiple-days workshop would help ensure

that the valuable strategic thinking developed during the sessions can be effectively converted into tangible initiatives and policy implementations.

3.6 Observation of further project impact

Following the launch of PowerShift workshops, several institutions (national agencies, ministries, financial bodies, NGO, Academia) requested meetings to explore potential future collaborations. During workshops in Colombia, several endeavours to engage either methodologically or institutionally with AFD emerged. An environmental consulting firm showed interest in organizing game sessions to engage the private sector. Some ministries expressed openness to new collaborations and joint studies particularly concerning financial risks related to biodiversity. Another ministry showed interest in adapting the PowerShift game to local territories and integrating it into a university project, potentially as part of a Cátedra Nacional. AFD connected parties with strong interest in the GEMMES tool. A ministry was open to organizing a session tailored for directors and experts. Academia also expressed interest, particularly in using the game as an educational tool for younger generations.

Shortly after the workshops in Colombia
A financial institution expressed interest in supporting the organization of game sessions as part of international conferences planned in Paris in 2024 or 2025. This initiative did not materialize in 2024, but might be considered again in 2025. The cross-sector environmental group on territorial management at UPME and the AFD office in Bogotá initiated discussions to explore potential support for local projects. The game was mentioned by an ONG during follow-up meetings. Some further projects, game developments and sources of funding are currently being discussed between AFD and national and international partners.

From a monitoring and evaluation perspective, it is challenging to measure or systematically document the numerous informal initiatives that the project has catalysed. Consequently, the indirect impact of the project is not easily quantifiable. However, the observations reported here indicate a high level of interest in the approach promoted by the project, underscoring its perceived relevance for stakeholder and policy dialogue processes.

3.7 Evaluation of the indicators

The table below summarized the results against the original baselines and targets figures and provide some additional explanatory comments.

Table 16: Assessment of how well the project activities have met their targets and contributed to the intended project impact.

	DESCRIPTION	**INDICATOR**	**BASELINE** What is the current value?	**TARGET** What is the target value?	**RESULT** What has been achieved?	**COMMENTS**
GOAL	Reinforce high-level and inter-ministerial engagement in transformative dialogue and decision-making on Colombia's energy transition	Difference in interactions (% of participants reporting an increase in frequency, quality or number of interactions with other people)	44%* of participants interact with at least two different institutions and 16%* are satisfied with their level of collaboration with and 13%* consider the collaboration efficient or very efficient.	25% increase in any of those dimensions	**43%** reported that participating in a Powershift game session moderately to significantly facilitated the creation of new relationships with other entities involved in the energy transition in Colombia.	We did not repeat this indicator measurement in the ex-post questionnaire to prioritize SEN capabilities. Also, a single game session participation seems insufficient to assess direct impact on collaboration. However, qualitative ex-post interviews indicate the project facilitated networking, which may indirectly enhance collaboration.

	DESCRIPTION	INDICATOR	BASELINE What is the current value?	TARGET What is the target value?	RESULT What has been achieved?	COMMENTS
OUTCOMES	Initiating an inter-ministerial dialogue process with high-level decision-makers that enhances trust and creates space for constructive exchange.	Nr of different ministries present in workshops	0	4	Participants from 8 different ministries in total (28% of all participants), plus 9 national governmental agencies (32% of all participants). On average, 5 different organisation types were present in a workshop in June, and 2.3 in September (where workshops were organized for homogenous organisation types, on purpose). The aim to initiate inter-ministerial dialogue is therefore fulfilled. Additionally, the workshops created space also for cross-sectoral dialogue with 56 institutions present in total, and participants affiliated to around 8 different institutions per session.	

	DESCRIPTION	INDICATOR	BASELINE What is the current value?	TARGET What is the target value?	RESULT What has been achieved?	COMMENTS
		% of workshop participants are in a position of power	0	50%	Roles were unknown for 36% of the participants. Of those that are known, around 20% had clear leadership roles. This indicator falls short on the target.	Mobilising people in leadership positions proved to be challenging. For instance, a session mainly targeting vice-ministers saw last-second cancelling of many vice-ministers. We hypothesize that people in leadership roles can more easily be mobilized for a workshop with a concrete, action-oriented objective rather than for “discovery and learning”. For future workshops, this could be taken into account.

	DESCRIPTION	INDICATOR	BASELINE What is the current value?	TARGET What is the target value?	RESULT What has been achieved?	COMMENTS
		Difference in interactions (% of participants reporting an increase in frequency, quality or number of interactions with other people)	44% of participants interact with at least two different institutions and 16% are satisfied with their level of collaboration with and 13% consider the collaboration efficient or very efficient.	25% increase in any of those dimensions	**43%** reported that participating in a Powershift game session moderately to significantly facilitated the creation of new relationships with other entities involved in the energy transition in Colombia.	We did not repeat this indicator measurement in the ex-post questionnaire to prioritize SEN capabilities. Also, a single game session participation seems insufficient to assess direct impact on collaboration. However, qualitative ex-post interviews indicate the project facilitated networking, which may indirectly enhance collaboration.
		Level of satisfaction about the quality of the dialogue held during the workshops	N/A	80%	During the game debriefing, participants generally expressed high satisfaction about the game and the quality of discussion generated during the game. This was confirmed in the ex-post questionnaire where **95%** of participants were satisfied with the session.	

	DESCRIPTION	INDICATOR	BASELINE What is the current value?	TARGET What is the target value?	RESULT What has been achieved?	COMMENTS
	Enhancing system's understanding on energy transition among decision-makers.	Shift in perspective and % increase in capabilities (i.e. SEN capabilities)	X	50% have increased across 3 capacities	**100%** have increased across 3 capacities.	
	Consolidating scientifically informed frameworks as a basis for decision-making.	% of participants perceiving scientific models as tools useful for decision-making and % of participants reporting actually using scientific models in decision-making	78%* find scientific models being useful or very useful. 37%* use scientific models often or very often.	75% / 25%* **Target value resulted to be lower than the updated baseline values after the second workshop series in September 2024. The target value hence became obsolete. It indicates, however, that the openness towards scientific models and the level of motivation to use them was generally high.*	During game debriefing, some participants mentioned that the session confirmed the value of data and models like GEMMES to support decision-making. Due to the fact that participants only attended a 3 hours game session, it was not possible, nor intended, to train them on the practical use of neither the PowerShift game nor the GEMMES model.	Ex-post measurement of this indicator was excluded as baseline values already showed strong support for scientific models.
		Level of motivation and scope of field of use of scientific models in decision-making				
OUTPUTS	Transform the GEMMES model into a strategy game through a participatory modeling process together with key stakeholders that ensures the integration of diverse perspectives and enhances ownership of the models (GEMMES and strategy game) among high-level decision-makers.	Physical model (Game) present or not	0	1	1 physical game & design exists	

	DESCRIPTION	INDICATOR	BASELINE What is the current value?	TARGET What is the target value?	RESULT What has been achieved?	COMMENTS
	Use the strategy game to explore scenarios and understand stakeholders' choices and strategies in decision-making. The game will elicit mental models and shed light on tensions and synergies.	Nr of conducted game workshops	0	10	12 (3 crashtests, 9 game sessions in Colombia) Additionally, 2 game sessions were held in Zürich and Paris.	
		Level of satisfaction in the game sessions (game is perceived useful for people's work context)	N/A	80%	During the game debriefing, participants generally expressed high satisfaction about the game. They were often surprised about the high realism of the game. This was confirmed in the ex-post questionnaire where **95%** of participants expressed their satisfaction with the game session. A proof of that was also that several participants expressed interest in bringing the game into their own institution. Two of the 6 sessions in September were hosted by participants from the June session.	
		% of players reporting an increase in understanding different stakeholder's choices and strategies	N/A	80%	7 out of 10 people who were part of the "ex-ante+ex-post" cohort reported a general increase in knowledge.	We did not directly measure this indicator quantitatively, but from the qualitative analysis and the

	DESCRIPTION	INDICATOR	BASELINE What is the current value?	TARGET What is the target value?	RESULT What has been achieved?	COMMENTS
					The qualitative analysis showed a significant learning outcome on the development of empathy and understanding of the challenges faced by different stakeholders. Experiencing the trade-offs from perspectives of different stakeholders was mentioned as a key learning also during the debriefings of the game sessions. Some participants deliberately attended several times to experience another perspective, and many have mentioned that they would have liked to play again in another role.	outcomes of the debriefings, it becomes clear that there was significant learning on this aspect.

	DESCRIPTION	INDICATOR	BASELINE What is the current value?	TARGET What is the target value?	RESULT What has been achieved?	COMMENTS
	Restitute and disseminate findings of the participatory process to ensure broad uptake of the process among high-level decision-makers.	Nr of publications drafted	0	1	2 onepagers reporting on outcomes of the missions 2 videos showing the game dynamics and facilitate dissemination of the game 1 project page on AFD project page (done by AFD) 1 NDI shared with high-level and diplomatic audience (by AFD) 1 proposal submitted to a conference (rejected) 1 draft publication aim to be submitted in May 2025 3 Linkedin Posts by LEAF (June, September, November)	It was decided to opt for a peer-reviewed publication with the aim to submit in May 2025. Apart from that, several dissemination material have been produced to facilitate communication about the project and the product (PowerShift game)
		Nr of restitution events	0	1	2 restitution online webinars (scheduled for April 2025)	

4 Discussion

The project described in this report facilitated dialogue and strategic thinking on Colombia's low carbon transition, engaging a diverse group of 158 stakeholders through a series of 9 strategy game sessions. The monitoring and evaluation (M&E) process was put in place at the onset of the project and accompanied the deployment of the approach throughout its duration. The M&E study followed a mix-method data collection approach, with several interventions at various stages of project development to capture and document changes as precisely as possible.

Strengths of the strategy game approach as assessed through the M&E protocol

The M&E framework provided valuable insights into participant experiences and project outcomes. The use of pre- and post-session questionnaires and interviews allowed for an in-depth analysis of changes in knowledge, perspectives, networking and engagement levels. Additionally, the integration of Sen's capabilities framework helped to structure "impact" into five areas - knowledge, interlinking, strategic analysis, engagement, and implementation - offering a nuanced understanding of how learning from the game translated into change in participants' mental models, networking capabilities and willingness to take concrete actions. While this approach does not claim to be exhaustive in its ability to fully measure impact, this mixed-methods approach enhanced the depth of the findings, offering a more holistic understanding of the project's effectiveness.

Participants of the ex-post interview expressed a 95% degree of satisfaction with the experience of the game. We advocate that this very high positive feedback is linked to the "unconventional", immersive and interactive nature of the strategy game experience. It provides a safe and participatory space that enables collective thinking on the complexities of the low carbon transition by simultaneously engaging both intellectual and emotional reasoning, two key factors in experiential learning (Kolb, 1984; Wenzler & Chartier, 1999).

However, for participants to fully engage and be willing to "let go" in such settings, trust in the process is paramount. The long-standing partnership between AFD and key Colombian stakeholders played a crucial role in fostering trustful relationships with the LEAF team. AFD convening power was also instrumental in securing the attendance of high-level decision-makers. Additionally, the creation of the "safe space" atmosphere was fostered by skilled facilitation, a critical factor in enabling meaningful dialogue, addressing potential power imbalances and ensuring active and inclusive participation (Dorn, 1989; Mayer, 2009).

The PowerShift game effectively broadened participants' understanding of the low carbon transition, with 66% of participants in ex-post interviews reporting significant knowledge gains (H6.1, H6.2). The game facilitated critical thinking and perspective shifts, enabling participants to navigate the complexities of decision-making under uncertainty (H3). Players gained insights into a wide range of transition challenges, such as economic dependencies, political obstacles, and institutional coordination issues.

Many reported increased empathy towards other stakeholders, particularly in understanding the economic and social implications of energy policies. Serious games have proven useful in enhancing emotional engagement and changes of perspectives, fostering deeper understanding of diverse viewpoints (Flood et al., 2018; den Haan & van der Voort, 2018). By stepping into each others' shoes, participants were able to grasp the constraints, motivations and trade-offs faced by different sectors, leading to more nuanced dialogues. Participants also reported improvements in negotiation, communication and dialogue skills (H3, H6.1, H6.2). These results confirm prior research that highlights the role of strategy games in developing empathy, trust and collaboration (Mayer, 2009; Reckien & Eisenack, 2013).

Additionally, 81% of participants in ex-post interviews reported to consider a broader range of pathways, indicating that the game expanded their strategic thinking (H3). Through the interactive nature of playing, participants get to explore a set of policy options and trade-offs related to the low carbon transition and experience first-hand their implications on the system and other stakeholders. While expanding mental models of participants, the game also allows them to refine their strategic projection on how to tackle the transition.

The game had a more moderate impact on concrete policy engagement and collaboration. While 43% of participants reported taking some form of strategic action after playing, 57% saw limited direct implementation impact. This suggests that while the game was successful in fostering dialogue, sustained engagement beyond a single session may be required to translate insights into policy and institutional changes. These results are in the line with the recent claims from Kriz et al. (2024).

One of the strongest aspects of PowerShift was its ability to engage a wide range of stakeholders, including policymakers, advisors, private sector representatives, and NGOs. The game format facilitated multi-sectoral dialogue, allowing participants to explore different perspectives and challenge their assumptions. This aligns with the project's goal of fostering cross-institutional engagement and systems thinking, key elements for a just and inclusive energy transition.

The PowerShift game also proved to be an effective tool for translating complex macroeconomic and policy issues into an accessible, interactive experience (H5.1). Many participants noted that the game helped them visualize the challenges of the low carbon transition more concretely, fostering a deeper appreciation of economic and policy trade-offs. As a complementary approach to GEMMES, participants found value in simplifying and presenting complex economic data through an "embodied" experience (H4, H5.2). They valued the interactive nature, which allowed them to experience policy-making dynamics firsthand. Linked to that, there was a strong realization that economic models and policy results need to be communicated effectively to broader audiences (H4).

Limitations of the strategy game approach and the M&E protocol

The project also encountered challenges that limited its broader impact. A key limitation was the short duration and single-session format of the game sessions, which restricted participants' ability to move from experiencing and reflecting on the transition's challenges to co-developing coping strategies and pathways forward. While the game provided valuable

insights in a compressed time frame, a longer or multi-session format might be necessary to foster deeper engagement, sustained collaboration and collective decision-making beyond gameplay. Extending the experience over multiple interactions might allow more tangible impacts across the Sen's capabilities framework and transform the integration of in-game insights into real-world decision-making.

Another limitation was the relatively low impact on inter-institutional collaboration (H1, H2 not validated, see below). Although the game created networking opportunities, only 43% of participants reported forming new relationships, and many of these were not sustained beyond the session. This suggests that while the game can serve as a starting point for dialogue, additional mechanisms - such as follow-up working groups or policy labs - may be needed to translate insights into coordinated action. As stated by Wily Kriz (Kriz et al. 2024), "*the game is just the first step; serious game should also have a serious transfer*". There is increasing recognition that simply using a game in order to create the transfer is not enough (Dernat et al., 2022).

We initially hypothesized that high-level, inter-ministerial engagement in transformative dialogue would enhance decision-making effectiveness in Colombia's energy transition (H1) and improve the frequency and quality of cross-ministerial collaboration (H2). This assumption relied on participants being actively involved in an ongoing policy making process, where participation in our project would make their engagement more effective.
However, most participants were not part of an active decision-making process, nor was joint action required from them. As a result, we cannot assess whether the project improved their decision-making effectiveness. Moreover, since participation was a one-time event, it is no surprise that low impact on collaboration frequency or quality was observed.
We anticipate different outcomes if participants were part of an established working group or multi-stakeholder platform operating independently of the project. Based on past experience, in such settings the strategy game approach tends to yield greater impact on decision-making and collaboration.
For future projects, we recommend better assessing participant relationships and the project's context to refine the theory of change and underlying hypotheses in this regard.

Most participants in high-level positions with very limited time capacities to engage in follow-up meetings had a strong influence on the structure of the ex-post interview and questionnaire. Despite efforts to keep it as short as possible, the ex-post questionnaire response rate was relatively low, which limited the breadth of feedback obtained. To ensure a reasonable sample of ex-post interviews, trade-offs were made between quantitative and qualitative questions and some topics were prioritized over others. For example, the discussions around the perceived usefulness and frequency of use of scientific models were not asked again in the ex-post interviews. Baseline figures obtained through the ex ante questionnaire already indicated a high level of perceived usefulness.

It is important to note that the coding procedure to categorise interview statements introduces some degree of subjectivity and often relies on interpretative skills to unambiguously distinguish between "knowledge" acquisition, "strategic analysis" and "strategic projection". Categorizing qualitative data can be cumbersome and inherently debatable. Additionally, self-

assessment methods used in the evaluation protocol might have introduced bias or overestimation of learning outcomes.

Finally, the timing of the M&E sequence plays a critical role in determining the breadth and depth of insights that can be directly attributed to the strategy game experiment. Conducting the M&E shortly after the intervention (max. 1 month) would allow for a more accurate recording of participants' immediate recollection and learning outcomes. However, evaluation performed with a longer-term framework (6 to 9 months) could better capture behavioural changes and broader impacts on decision-making and policy influence. Despite these advantages, delaying evaluation activities come with significant practical challenges. The longer the time gap between the end of the strategy game activities and the completion of the M&E, the harder it gets to track participants – especially those who might have changed job position – and attribute changes directly to the intervention.

Recommendations for future work

Monitoring and evaluating the impact of strategy game approach remains an evolving field of research without fully established or standardized methodologies (Kriz et al., 2024). Drawing from M&E experiences in past projects and insights gained from PowerShift, we propose the following recommendations for future work attempting to use strategy games to foster better policy dialogues on complex issues.

- Begin the process with ex-ante interviews to develop a shared language among the core team. Those interviews should help identify key topics and help to build the theory of change and logical framework, ensuring alignment on objectives and expectations between the client and the consultant. Moreover, this initial phase helps set a foundation for trust, fostering clear communication and mutual understanding, which is critical for the successful collaboration throughout the project.

- Implement an ex-ante questionnaire in person, at the start of the game session, but limit it to a core set of quantitative questions linked to key indicators. Keeping the questionnaire brief should allow higher response rates as participants are not overwhelmed with ex-ante assessments. As the analysis on ex-ante results progresses, some indicators may prove less relevant, highlighting the need for an adaptive evaluation protocol.

- Systematically reserve five minutes at the end of the game for participants to provide direct feedback through an online ex-post questionnaire accessible with QR code. This assessment should primarily focus on quantitative questions to capture satisfaction and initial "after game" impressions efficiently. The questionnaire should mention if participants are willing to be contacted at a later stage for an ex-post interview.

- Ex-post interviews are essential, as they provide the only means to assess changes in mental models and behaviours. While it may not be possible to interview every participant, it is important to carefully and strategically select priority respondents in collaboration with the client. To ensure efficiency, interviews should maintain a balance between quantitative and qualitative insights, keeping the duration concise, yet

insightful. Other forms of ex-post engagement, like focus groups, might be envisioned if the focus is on organisational, institutional or collectives' changes.

- Capturing diffuse and indirect impacts is challenging, unless they are proactively and consistently reported by informants within the group. As a result, these impacts will likely be documented on an ad-hoc and opportunistic basis, depending on the occurrence of follow-up meetings, calls, emails where emerging insights can be exchanged.

5 Conclusions

The *PowerShift* game successfully engaged high-level decision-makers and facilitated inter-ministerial dialogue about Colombia's low carbon transition. 158 participants from 56 institutions took part in the 9 workshops, with an average of 18 participants per session. The workshops promoted a multi-sectoral approach, involving ministries, national agencies, financial institutions, NGOs, academia, and the private sector. The Monitoring and Evaluation protocol accompanied the deployment of the strategy game approach throughout the duration of the project. Out of the 158 participants, 95 took part in at least one questionnaire or one interview. 21 participants accepted to be interviewed a few weeks after their game session and served as a benchmark to evaluate the impact of the game across the five capabilities dimensions.

The game was seen as highly realistic, mirroring real-world governance and decision-making challenges. It successfully bridged theoretical knowledge with practical application, allowing participants to grasp the complexity of multi-stakeholder negotiations, social implications, and economic trade-offs in the energy transition (H5.1, H6.1, H6.2). Through experiential learning, participants developed critical skills in collaboration, negotiation, and strategic thinking, reinforcing the importance of holistic approaches to sustainability (H3).

Overall, PowerShift proved to be more than just a theoretical exercise - it was a dynamic learning experience that helped participants grasp the interconnectedness of energy transition, negotiation, and social impact (H6.1, H6.2). By fostering collaboration, critical thinking, and strategic decision-making, the game effectively equipped players with skills and perspectives that are directly applicable to real-world sustainability challenges (H3). While some participants shifted their perspectives and extended their networks, others strengthened their existing knowledge and gained a more structured understanding of the challenges ahead (H6.1, H6.2). However, time constraints, leadership engagement challenges, and the limitations of self-reported data suggest that future initiatives should include longer follow-up periods, more structured post-game engagement, and expanded participant outreach. Better understanding participants' relationship and collaboration needs pre- and post project participation would help to improve the intervention design based on a more accurate theory of change.

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7 Annexes

7.1 Separate Annex Documents

The Annex documents listed below can be found in a dedicated G-Drive folder under this link.

Annex 1 – Ex-Ante Interview Guide
Annex 2 – Ex-Ante Questionnaire (Google)
Annex 3 – Ex-Post Questionnaire (Google)
Annex 4 – Ex-Post Interview Guide