Hydropower Solutions

HYPOSO

Hydropower solutions for developing and emerging countries

D5.1
Five webinars in target countries

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Name	**Organization**
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1 Introduction

HYPOSO is a multi-approach project to tackle several objectives; identification and mapping of the European hydropower industry, hydropower stakeholders in the HYPOSO target countries, education of new hydropower experts through capacity building activities and bringing together relevant actors from the EU hydropower sector with stakeholders in the target countries. Interaction with stakeholders is therefore an integral part of the activities, as workshops, capacity building activities and interviews with national/local stakeholders are envisaged in all target countries which are outside the European Union, namely workshops in Bolivia, Colombia and Ecuador in Latin America, and in Cameroon and Uganda in Africa. Additionally, capacity building courses will be carried out in Bolivia and Ecuador, and in Cameroon and Uganda.

2 Overview

The objective of WP5 is the elaboration of comprehensive business case studies (containing pre-feasibility studies, environmental and socio-economic impact assessments economic and economic viability analysis) for selected sites in the target countries.
Based on a pre-selection of high potential hydropower sites made by the local partners together with local stakeholders, the identification and final selection of hydropower sites for business case studies has been executed. Local stakeholders, local project partners and European project partners met via webinar to choose the best sites to be devoted as case studies. The final selection of the sites was based on a consensus decision among the parties. The target was to finally select three sites for each target country.
Per target country, one webinar or workshop was organised.

3 Selection procedure

The final selection of the three high potential hydropower sites was performed following different steps:

1. Development of a selection strategy
2. Application of the selection strategy based on the available data collected for the pre-selected high potential sites (per target country)
3. Definition of a ranking of the pre-selected high potential sites
4. Additional criteria to take into consideration for the final selection
5. Organisation of webinars for European and domestic stakeholder and project partners
6. Final identification of the three high potential hydropower sites per target country

3.1 Selection strategy

Starting from the list of the preselected high potential hydropower sites, a method, based on a numerical approach, has been devised and applied with the aim of identifying the most valuable sites on the basis of the collected information.

Thanks to its quantitative approach, this method has led to the definition of a ranking of the sites which gives an indication about those sites which are most suitable to be devoted as case studies. The approach is based on a series of main criteria and sub criteria coming from the experience of the European project experts in pre-feasibility studies carried out in Africa and in Latin America. This method has been presented and discussed among the project partners before its implementation. It is standard and independent from the available data collected by the local partner.

3.1.1 Main criteria and sub-criteria

The analysis starts from the definition of 12 main criteria:

1. Plant location
2. Hydrologic assessment
3. Topographic data
4. Engineering information level
5. Plant characteristics
6. Project cost evaluation
7. Incomes evaluation
8. Environmental assessment
9. Financial analysis
10. Authorization procedure state and perspectives
11. Social relevance of the energy production
12. Multipurpose use of the water or/and of the plant infrastructures

Each main criterion has been analysed through the evaluation of different sub criteria.

Table 1 - List of sub-criteria concerning the main criterion PLANT LOCATION

1	Plant location
1.1	Already existing plant
1.2	Catchment area identification [km^2]
1.3	River identification
1.4	Intake coordinates
1.5	Powerhouse coordinates
1.6	Existing access road to the main plant parts
1.7	Access road to the main plant parts to be built
1.8	Quite difficult access facilities to the main part of the plant
1.9	Uncultivated land owned by the State
1.10	Land owned by local communities

1.11	Land owned by private people
1.12	Distance of the available main construction material
1.13	Users' number identification ONLY IN CASE OF STAND-ALONE SYSTEM
1.13’	Easy connection to the national grid ONLY IN CASE OF CENTRAL GRID CONNECTED SYSTEM

Table 2 - List of sub-criteria concerning the main criterion HYDROLOGICAL ASSESSMENT

2	Hydrological assessment
2.0	Plant flow rate from international databases
2.1	Assessment based on flow rate record
2.1.1	Location of the available gauge station
2.1.1.1	At the intake structures
2.1.1.2	On the river to be exploited
2.1.1.3	On a river close to the one to be exploited
2.1.2	Measures rate of the flow rate
2.1.2.1	Daily
2.1.2.2	Weekly (or decades)
2.1.2.3	Monthly
2.2	Assessment based on the rainfall and catchment area
2.2.1	Location of the available rainfall data
2.2.1.1	Catchment area of the river to be exploited
2.2.1.2	Catchment area of a river close to the one to be exploited
2.2.2	Measures rate of rainfall data
2.2.2.1	Daily
2.2.2.2	Weekly (or decades)
2.2.2.3	Monthly

The evaluation of the sub criteria in the yellow rows comes from the evaluation of the characteristics written below.

Table 3 - List of sub-criteria concerning the main criterion TOPOGRAPHIC DATA

3	Topographic data
3.1	Site specific survey
3.1.1	Total station detailed survey
3.1.2	Total station survey
3.1.3	GPS survey
3.2	Maps available
3.2.1	Large scale maps 1:1.000 or less
3.2.2	Large scale maps 1:10.000 or less
3.2.3	Large scale maps 1:25.000 or less

3.2.4	Large scale maps 1:50.000 or less
3.2.5	Large scale maps >1:50.000
3.2.6	Sketch map only

The evaluation of the sub criteria in the yellow rows comes from the evaluation of the characteristics written below.

Table 4 - List of sub-criteria concerning the main criterion ENGINEERING INFORMATION LEVEL

4	Engineering information level
4.1	Pre-feasibility study
4.2	Feasibility study
4.3	Detailed design

Table 5 - List of sub-criteria concerning the main criterion PLANT CHARACTERISTICS

5	Plant characteristics
5.1	Run of river
5.2	Storage
5.3	Installed capacity < 100
5.4	100 ≤ Installed capacity < 1.000
5.5	1,000 ≤ Installed capacity < 10,000
5.6	10,000 ≤ Installed capacity
5.7	Max flow rate
5.8	Average flow rate
5.9	Gross head
5.10	Net head
5.11	Expected annual energy production
5.12	Capacity gradient
5.13	Stand-alone functioning ONLY IN CASE OF CENTRAL GRID CONNECTED SYSTEM

Table 6 - List of sub-criteria concerning the main criterion PROJECT COST EVALUATION

6	Project cost evaluation
6.1	Detailed quantities estimation
6.2	Costs from preliminary offers of possible suppliers
6.3	Costs from similar projects in the country
6.4	Parametric evaluation of the construction costs
6.5	O&M costs detailed evaluation
6.6	O&M costs parametric evaluation
6.7	Possible incentives/contribution on the construction costs of rural lines
6.8	Possible incentive/contribution for investment in rural area

Table 7 - List of sub-criteria concerning the main criterion INCOMES EVALUATION for stand-alone systems

7	**Incomes evaluation** - Price of the energy delivered to isolated grids ONLY IN CASE OF STAND-ALONE SYSTEM
7.1.1	Survey on the users' amount and typical energy consume
7.1.2	Users' willing-to-pay analysis
7.1.3	Mandatory tariffs from the legislation rules
7.1.4	Not justified value

Table 8 - List of sub-criteria concerning the main criterion INCOMES EVALUATION for central grid connected systems

7	**Incomes evaluation** ONLY IN CASE OF CENTRAL GRID CONNECTED SYSTEM
7.1	Plant supplying energy to an insulate grid and to the national grid
7.1.1	Price of the energy delivered to insulated grids
7.1.1.1	Survey on the users' amount and typical energy consume
7.1.1.2	Users' willing-to-pay analysis
7.1.1.3	Mandatory tariffs from the legislation rules
7.1.1.4	Not justified value
7.1.1.4	Price of the energy delivered to the national grid
7.1.1.5	Purchase obligation by law
7.1.1.6	Purchase tariff by law
7.1.1.7	Signed contract with the energy authority/public utility
7.1.1.8	Not justified value
7.2	Plant supplying energy supplying energy to the national grid only
7.2.1	Price of the energy delivered to the national grid
7.2.1.1	Purchase obligation by law
7.2.1.2	Purchase tariff by law
7.2.1.3	Signed contract with the energy authority/public utility
7.2.1.4	Not justified value

The evaluation of the sub criteria in the yellow rows comes from the evaluation of the characteristics written below.

Table 9 - List of sub-criteria concerning the main criterion ENVIRONMENTAL ASSESSMENT

8	**Environmental assessment**
8.1	General overview
8.1.1	Normal environmental requirement
8.1.2	Strong environmental requirement (sensitive environmental area)

8.1.3	Reserved flow evaluation
8.1.4	Sediment transport evaluation
8.2	Preliminary assessment
8.2.1	Preliminary water quality survey
8.2.1.1	*Direct on the river to be exploited*
8.2.1.2	*Literature data on the river to be exploited*
8.2.1.3	*Literature data on similar rivers*
8.2.2	Measures rate of water quality parameters
8.2.2.1	*Six months*
8.2.2.2	*One year or more*
8.3	Analysis of impacts during the construction
8.3.1	Transport impacts
8.3.2	Noise impacts
8.3.3	Pollution impacts
8.3.4	Positive impact on the economy at regional/country level
8.4	Analysis of impacts during the plant operating life
8.4.1	Impact on the water quality
8.4.2	Transport impacts
8.4.3	Noise impacts
8.4.4	Possible pollution impacts
8.4.5	Social impact at village/region/country level
8.4.6	Positive impact on the economy at regional/country level
8.4.7	Avoided climate change gas emission
8.4.8	Other positive environmental issues

The evaluation of the sub criteria in the yellow rows comes from the evaluation of the characteristics written below.

Table 10 - List of sub-criteria concerning the main criterion FINANCIAL ANALYSIS

9	Financial analysis
9.1	Incentives on produced energy
9.2	Financial support for the investors

Table 11 - List of sub-criteria concerning the main criterion FINANCIAL ANALYSIS

10	Authorisation procedure state and perspectives
10.1	Signed agreement with landowners and/or local communities
10.2	Water licence already issued
10.3	Preliminary positive evaluation by local communities
10.4	Preliminary positive evaluation by the relevant authorities

Table 12 - List of sub-criteria concerning the main criterion SOCIAL RELEVANCE OF THE ENERGY PRODUCTION

11	Social relevance of the energy production
11.1	Energy delivered to rural area not connected to the national grid
11.2	Support to existing weak rural grid
11.3	Local communities involved into the plant ownership
11.4	Local investors

Table 13 - List of sub-criteria concerning the main criterion MULTIPURPOSE USE OF THE WATER OR/AND OF THE PLANT INFRASTRUCTURES

12	Multipurpose use of the water or/and of the plant infrastructures
12.1	Additional irrigation/fish breeding facilities
12.2	Road or other plant infrastructures multipurpose use
12.3	Plant sharing a potable water supply grid

Each sub criterion is characterized by:

1. **a maximum rank**, expressed by a percentage. It is fixed, standard. It has been set according to the importance of the sub criterion: higher its importance, higher its weight (and, as consequence, its percentage);
2. **the availability or the possibility to obtain the required data or the presence of the situation** described by the criterion;
3. **the actual rank**, expressed by a percentage. It can be 0 if there isn't the required data set or, vice versa, it can be equal to the maximum rank assigned to the sub criterion.

The final rank associated to the main criterion is given by the sum of the actual ranks of the sub criteria.

The evaluation of each main criterion comes from the determination of three parameters:

1. **an absolute weight,** expressed by a number. It is fixed, standard for all sites. It has been set according to the importance of the criterion: higher the importance of the criterion, higher its weight (and, as consequence, the number);
2. **a rank** coming from the evaluation of each single sub criterion. It represents the final rank associated to the main criterion, given by the sum of the actual ranks of the sub criteria.
3. **the score** associated to each main criterion, as the product between the previous parameters.

Finally, the whole site is characterized by a number, the total score, as the weighted average of the scores of each main criterion.

3.2 Application of the method

A first application of the method has been performed in combination with the first progress meeting of the HYPOSO project at the end of March 2020 in order to present and share the method with all the project partners. At that time, the application of the method was based on the preliminary information collected by the local partners concerning the pre-selected high potential sites per target country with the aim just to show the method and its advantages to all the project partners. Once the method was discussed and agreed by all the project partners, it has been applied based on additional information concerning the pre-selected sites collected by the local partners.

In the following tables, an example of application of the method is shown.

Table 14 - Evaluation of the sub criteria concerning the PLANT LOCATION (main criterion no. 1) for a potential site

1	Plant location	Max rank	Y/N	Actual rank
1.1	Already existing plant	50%		0%
1.2	Catchment area identification [km^2]	20%		0%
1.3	River identification	2%	X	2%
1.4	Intake coordinates	2%	X	2%
1.5	Powerhouse coordinates	2%	X	2%
1.6	Existing access road to the main plant parts	5%	X	5%
1.7	Access road to the main plant parts to be built	2%	X	2%
1.8	Quite difficult access facilities to the main part of the plant	0%		0%
1.9	Uncultivated land owned by the State	5%		0%
1.10	Land owned by local communities	10%		0%
1.11	Land owned by private people	5%	X	5%
1.12	Distance of the available main construction material	4%		0%
1.13	Users' number identification	5%		0%
	FINAL RANK 1			**18%**

Table 15 - Final evaluation of a potential site

ID	MAIN CRITERIA	Weight	Rank	Score
1	Plant location	10	18%	1,80
2	Hydrological assessment	13	85%	11,05
3	Topographic data	13	100%	13,00
4	Engineering information level	6	100%	6,00
5	Plant characteristics	6	40%	2,40
6	Project cost evaluation	6	40%	2,40
7	Incomes evaluation	10	0%	0,00
8	Environmental assessment	10	15%	1,50

9	Financial analysis	3	0%	0,00
10	Authorisation procedure state and perspectives	13	0%	0,00
11	Social relevance of the energy production	5	70%	3,50
12	Multipurpose use of the water or/and of the plant infrastructures	5	20%	1,00
	TOTAL SCORE OF THE WHOLE SITE	100		42,65

3.3 Resulting rankings

Thanks to the quantitative approach of the method, its application has led to the definition of a ranking of the preselected sites, from that site characterized by the highest score to that site characterized by the lowest score. It has allowed to prioritize the sites according to the total score based on the available data and to give an indication about the best sites to consider as case studies.

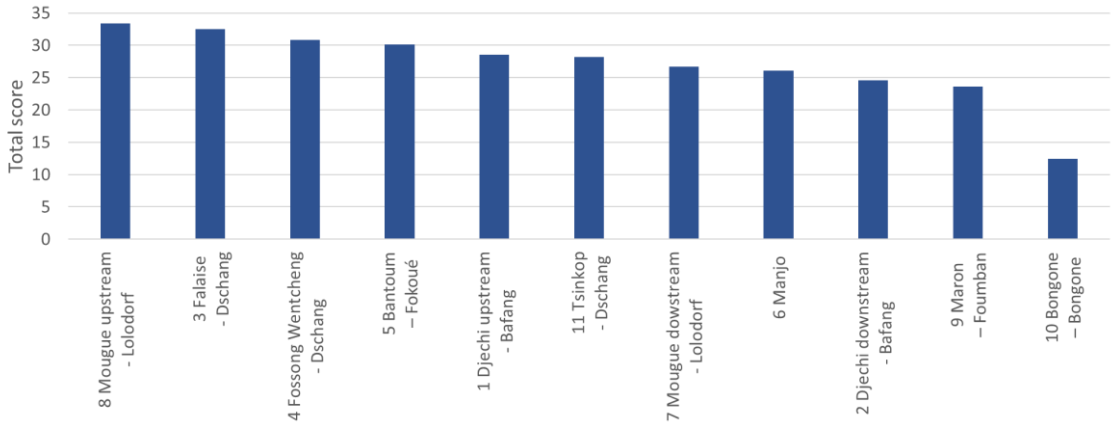

Figure 1 - Ranking of the preselected potential sites in Cameroon

3.4 Additional criteria

In order to get the most suitable selection of the sites, in terms of compliance with the HYPOSO objectives and in terms of saving time and money, additional criteria have been taken into consideration for the final selection.

3.4.1 Time for the sites visit

The visits of the selected sites were planned in combination with the other on-site activities (i.e. the capacity building courses (WP 4) and, in some cases, the workshops on the framework conditions for hydropower (WP 6)). It was important to schedule the visit taking into account 2 main aspects:

- The participation of the sites' owners/developer who guided the HYPOSO experts during the surveys
- The time and the budget foreseen in the project: indicatively, the visit to a site took two days (exception made for the transfers) in order to end these on-site activities within a relatively short time.

3.4.2 Expectations of the local community

In order to comply with what the Grant Agreement states, among the series of criteria to take into account for the final selection of the sites, also the expectations of the local community are an unavoidable requirement. For this reason, a focus has been laid on the active involvement of the public: the local stakeholders were invited to the webinars, together with the project partners in order to give them the chance to evaluate the catalogue of features and criteria to create a consensus decision. The identification of the community with the project will ensure the long-lasting functionality and avoid opposition.

3.4.3 Variety of schemes

Another requirement for the best sites' selection set out in the Grant Agreement is that the selected locations should differ as good as possible in head and flow (high/low head, installed capacity range) and in type (weir type, diversion type, grid connected/stand-alone). Moreover, although each site is very specific and individual, these business case studies shall be exemplary and replicable in the target regions.

3.4.4 Partnership Agreement

In order to ensure the selected site for HYPOSO purposes, a Partnership Agreement between the site's owner/developer and the HYPOSO consortium is an important precondition for the work. It is a legally non-binding friendly document to be signed by the site's owners/developers and HYPOSO partners. The countersigners hold the rights for the sites, and with this agreement they express their interest in receiving the prefeasibility study for their sites. Thus, this agreement is a commonly accepted document, which states that HYPOSO is allowed to carry out the work and visits needed to perform the prefeasibility studies. It has to be provided after the selection of the site as case study and in general, before proceeding with the further tasks.

3.4.5 Reserve site

Besides the 3 selected sites, an additional site per target country was selected as "reserve" site. Despite this site was not firstly included in the list of selected sites to be considered as case studies, in some cases one of the 3 selected sites was excluded from the list due to external problems (i.e. difficulty to gather important information, difficulty to receive the partnership agreement, decision of the project developer to use the site for other exploitations) and it was immediately replaced by the "reserve" site without spending additional time in finding another suitable site.

3.5 Project developer's webinars for case studies

In order to comply with what the Grant Agreement states and therefore, to focus on the active involvement of the public, per target country one webinar was organised within the high potential site selection procedure. Domestic stakeholders and project partners met to select the really best locations. Besides the European and local project partners, the webinars were attended by representatives of local institutions such as Ministry of Energy, investors, projects' developers, local engineering companies, local authorities and researchers.

The webinars were organised by Frosio Next (FN), as leader partner of the work package number 5 inviting local stakeholders, local project partners and European project partners. Each webinar took approximately 1,5/2 hours and the agenda is shown in Table 16.

Table 16 - Agenda of the project developer's webinars

Nr. º	Topic
1.	The HYPOSO project: general overview and objectives
2.	General overview of WP5: objectives and activities' description
3.	Detailed presentation of the numerical approach used to the identify the most suitable sites to be devoted as case studies among the preselected potential sites
4.	Explanation of the outcomes
5.	Presentation of additional criteria to take into consideration for the final selection
6.	Description of the next activities to be performed on the selected sites
7.	Q&A
8.	Discussion

3.5.1 Webinar in Cameroon

The webinar in Cameroon was held on Monday, 21 September 2020 from 11:00 to 13:00 (WAT - West African Time) - from 12:00 to 14:00 (CET – Central European Time). Among the Cameroonian stakeholders which attended the webinar, there were members of Ministry of Energy of Cameroon, members of ARSEL (Regulatory Board), members of SHW (la société solarhydrowatt sarl) and members of EDC (Electricity Development corporation). Besides them, some European project partners joined the webinar. After a presentation performed by Frosio Next concerning the numerical method, its application and results, the additional criteria to take into account for the final selection, a proactive discussion took place. Collected all the needed information and the suggestion of the participants, the local stakeholders together with the project partners evaluated the catalogue of features and criteria to create and made a consensus decision concerning the three high potential sites. Some pictures taken during the webinar are shown below.

Figure 2 - Picture taken during the webinar for the Cameroonian sites

Figure 3 - Picture taken during the webinar for the Cameroonian sites

3.5.2 Webinar in Uganda

The webinar in Uganda was held on Wednesday, 23 September 2020 from 11:00 to 13:00 (EAT – East African Time) - from 10:00 to 12:00 (CET – Central European Time). Among the Uganda stakeholders which attended the webinar, there were members of HPAU (Hydro Power Association of Uganda), members of the Uganda Development Bank, members of Ministry of Energy and Mineral Development and several engineering experts. Besides them, some

European project partners joined the webinar. Also in this case, the webinar was held following the structure described in Table 16.

Figure 4 - Picture taken during the webinar for the Ugandan sites

Figure 5 - Picture taken during the webinar for the Ugandan sites

3.5.3 Webinar in Ecuador

The webinar in Ecuador was held on Tuesday, 27 April 2021 from 9:00 a 11:00 (ECT – Ecuadorian time) – form 15:00 a 17:00 (CET – Central European Time).

Among the Ecuadorian stakeholders which attended the webinar, there were members of MERNNR (Ministerio de Energía y Recursos Naturales No Renovables de la República del

Ecuador), members of ARCERNNER (Agencia de Regulación y Control Energía y Recursos Naturales No Renovables), members of MAAE (Ministerio del Ambiente, Agua y Transición Ecológica), potential investors and researchers.
Also in this case, the webinar was held following the structure described in Table 16.

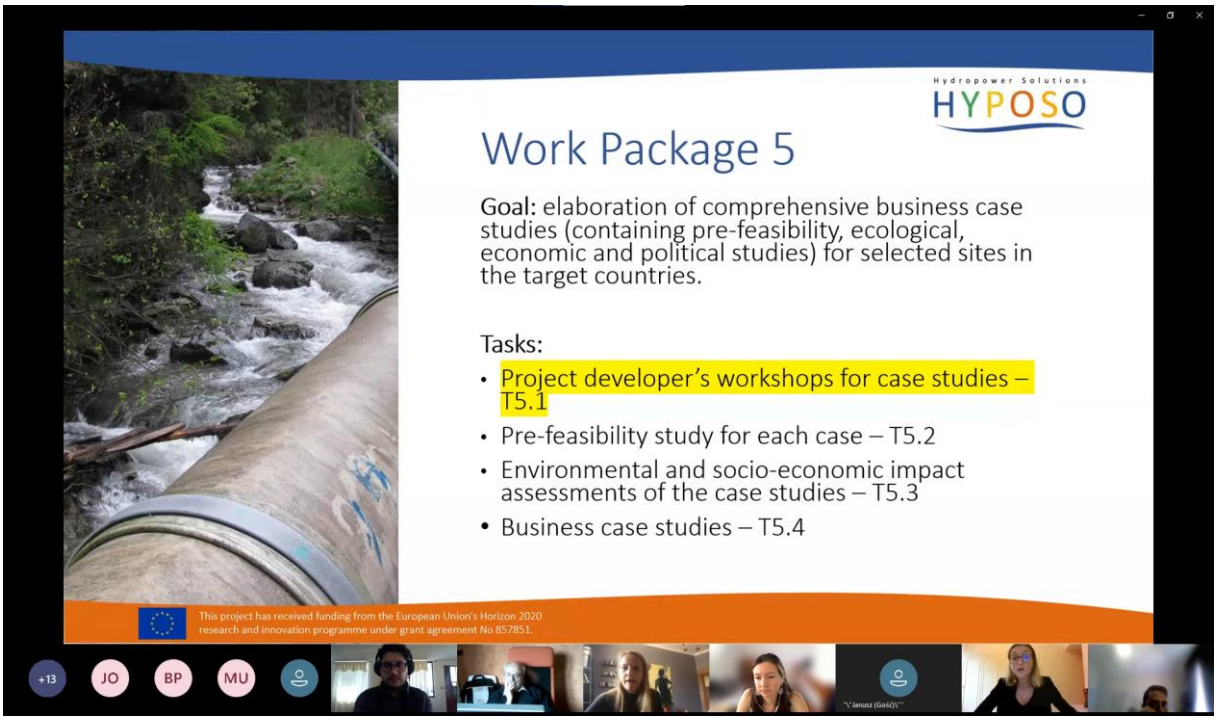

Figure 6 - Picture taken during the webinar for the Ecuadorian sites

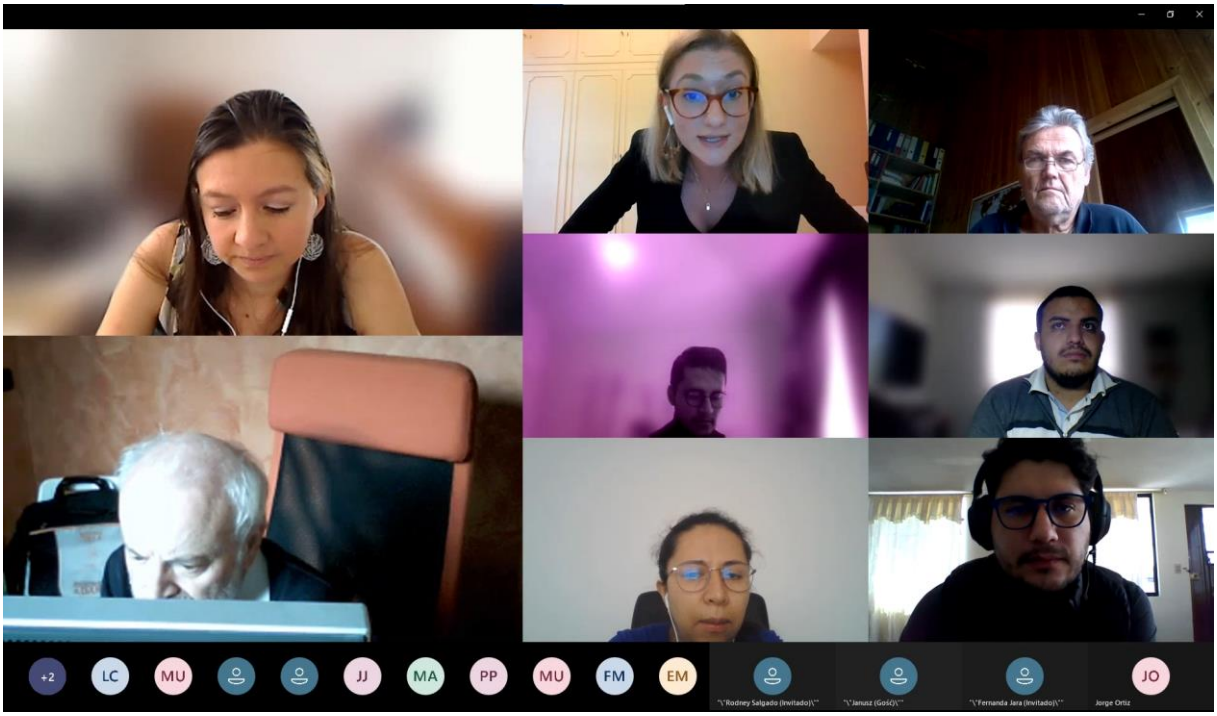

Figure 7 - Picture taken during the webinar for the Ecuadorian sites

3.5.4 Webinar in Bolivia

The webinar in Bolivia was held on Wednesday, 16 March 2022 from 08:30 – 10:30 (BOT - Bolivian time) – from 13:30 – 15:30 (CET – Central European Time).

Among the Bolivian stakeholders which attended the webinar, there were members of ME (Ministry of Oil and Energy), members of MMAYA (Ministry of Water and Environment), members of CNDC (National Agency of Energy Distribution), members of the national electricity company (ENDE-CORANI and ENDE-CORPORACION) and researchers of UMSS (Universidad Mayor de San Simon).

Also in this case, the webinar was held following the structure described in Table 16.

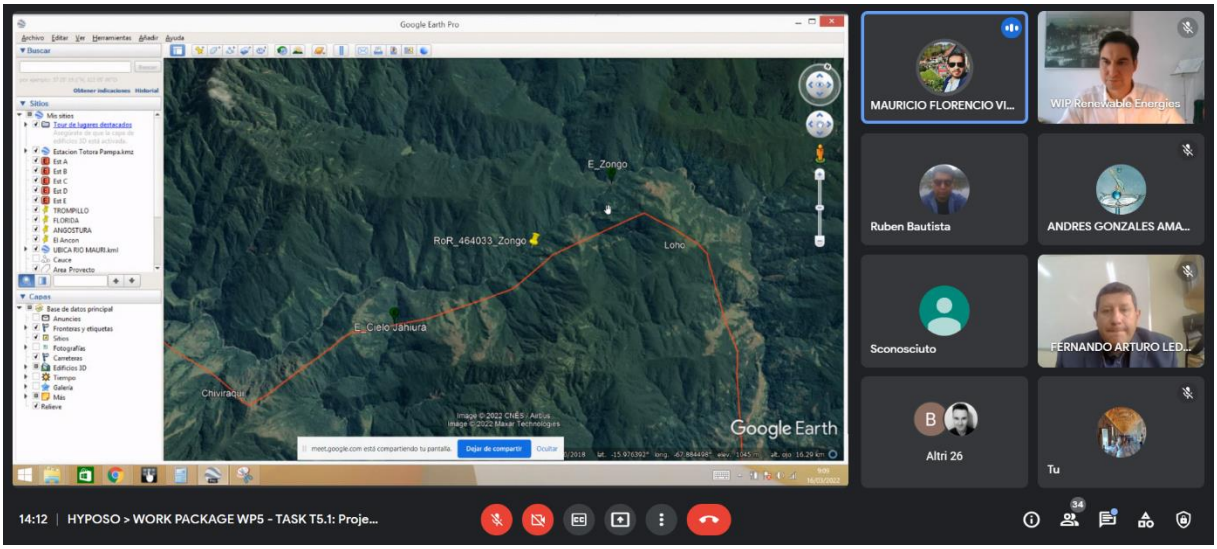

Figure 8 - Picture taken during the webinar for the Bolivian sites

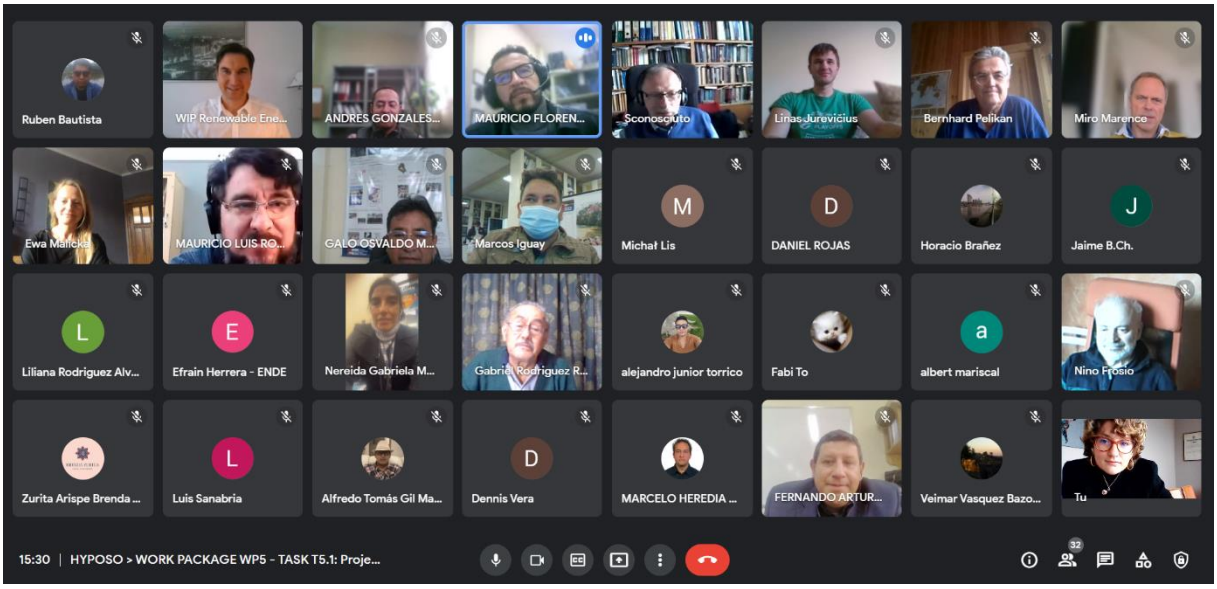

Figure 9 - Picture taken during the webinar for the Bolivian sites

3.5.5 Webinar in Colombia

The webinar in Colombia was held on Friday, 13 May 2022 from 10:00 – 12:00 (COT - Colombian time) – from 17:00 – 19:00 (CET – Central European Time).

Among the Colombian stakeholders which attended the webinar, there were members of UPME (National Planning Authority - Energy and Mining), members of CRC (Environmental Regional Authority), equipment manufacturers and suppliers and project developers.
Also in this case, the webinar was held following the structure described in Table 16.

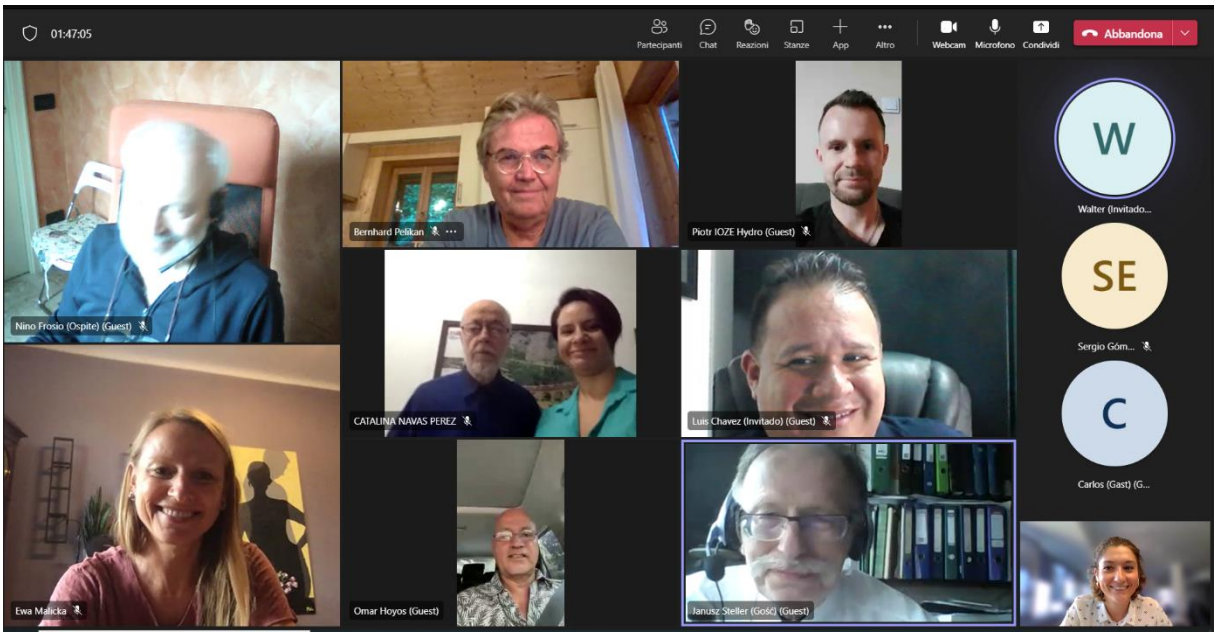

Figure 10 - Picture taken during the webinar for the Colombian sites

3.6 Final identification of the three high potential hydropower sites per target country

The final selection of the 3 high potential sites to be considered as case studies strictly depended on the opinion and requirements of the local stakeholders. Despite the application of the simplified multicriteria approach led to the identification of those sites which should be preferred to be devoted as case studies based on the preliminary availability of data, the involvement of the local institutions in the project was essential to ensure the long-lasting functionality and avoid oppositions. At the same time, their support was an unavoidable requirement in order to comply with the HYPOSO tasks. For this reason, the final selection was taken by the local stakeholders, after a technical review provided by the experts of the HYPOSO project.

3.6.1 Selected sites in Cameroon

For this country, the selection of the sites was strictly bounded by the constraints from the political point of view and from the institutional point of view, as well as, by the technical aspects. With the aim of ensuring the support of most of the key stakeholders in order to count on them for the sustainability of the action in the long term, the final selection was based on the availability of data and on the guarantee of the local stakeholders to support HYPOSO activities. The 3 final selected sites are located in Southern Cameroon and in Western Cameroon.

Figure 11 - Selected sites to be considered as case studies in Cameroon

3.6.2 Selected sites in Uganda

For this country, the local stakeholders pointed out the need to ensure regional balance concerning the sites involved in HYPOSO project in order to promote the electrification of the rural areas in different parts of the country. In this regard, the selected sites are located in different parts of Uganda, as well as they represent different hydraulic and hydrological schemes. The 3 selected sites are located in 3 different parts of Uganda.

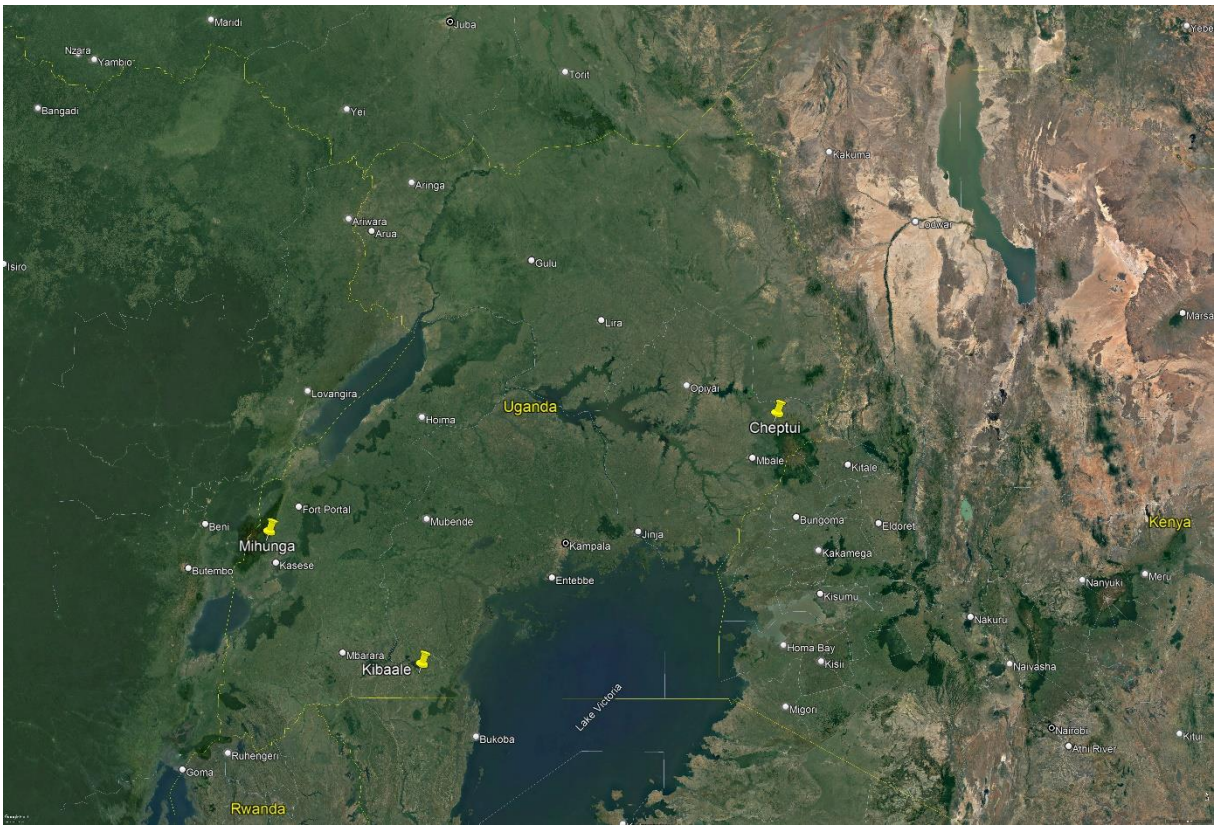

Figure 12 - Selected sites to be considered as case studies in Uganda

3.6.3 Selected sites in Ecuador

The Government of Ecuador, through the Ministry of Energy and Non-Renewable Natural Resources – MERNNR, is committed to the diversification of the energy matrix and the inclusion of new sources of clean and accessible generation, as well as the efficient consumption of electricity. In relation to HYPOSO, the Ministry of Energy and Non-Renewable Natural Resources stated the need to give priority to those projects that are in the basin that discharges to the Pacific Ocean and that the energy delivery (plant factor) of the project should preferably be greater than 60%. Taking into consideration these recommendations, the final selected sites are located in the country as shown in Figure 13.

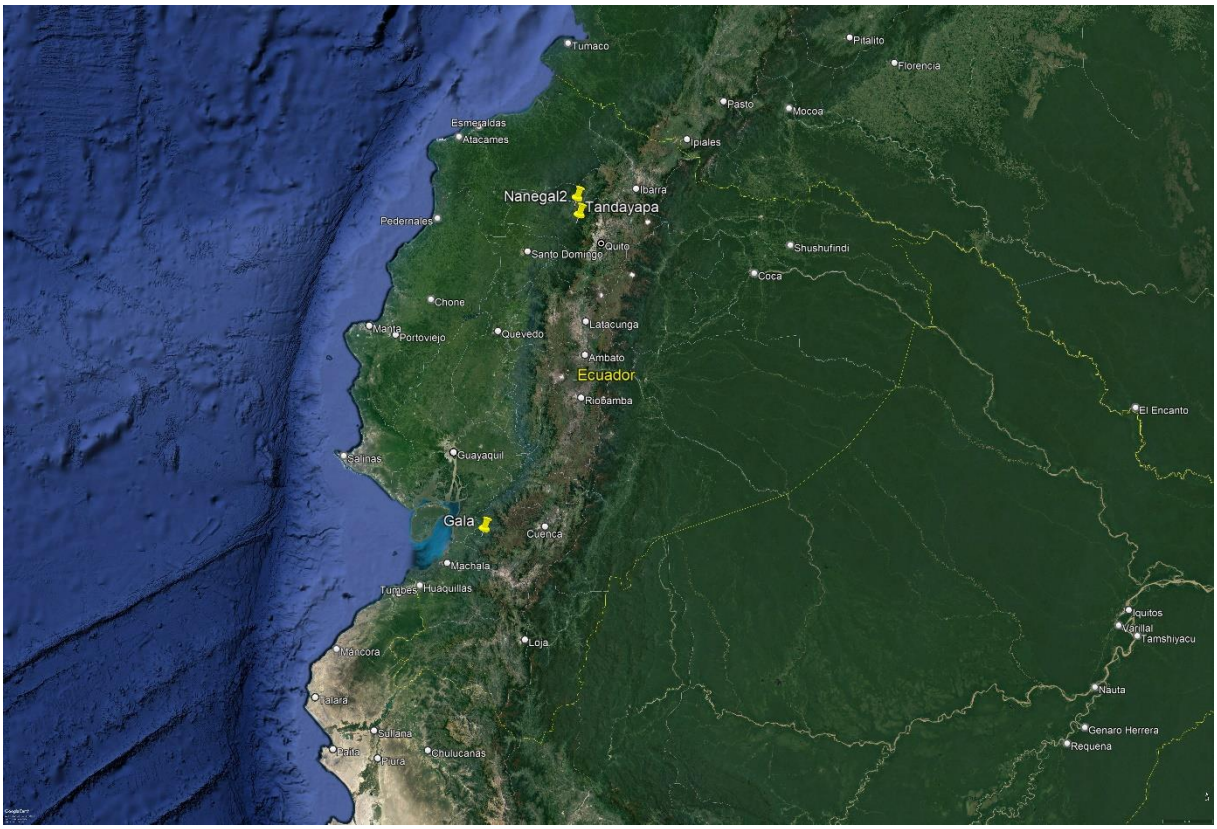

Figure 13 - Selected sites to be considered as case studies in Ecuador

3.6.4 Selected sites in Bolivia

For this country, the involvement and the support of the members of the national electricity company was essential to find the best locations to be devote das case studies. The cooperation among them and the project partners led to the selection of the 3 sites shown in Figure 14.

Figure 14 - Selected sites to be considered as case studies in Bolivia

3.6.5 Selected sites in Colombia

The selection of the 3 Colombian sites to be devoted as case studies has been the result of a long discussion among the project experts, the local partners and the project developers. This fruitful collaboration among the parties ended up with the identification of the sites shown in the picture below.

Figure 15 - Selected sites to be considered as case studies in Colombia

4 Time schedule of the activities foreseen in WP5 – T5.1

According to the changes in the project time schedule due to the Covid19 pandemic, the selection of the three high potential sites has been split into two parts.

The first selection regarded the 6 African sites (3 Ugandan sites and 3 Cameroonian sites) and it ended in September 2020 before the sites' visit in the African countries (held in August 2021 for the Ugandan sites and in January 2022 for the Cameroonian sites). The selection of the 9 Latin American sites have been carried out after the sites' visit in Africa and it ended in May 2022 before the sites' visit in Latin America (performed in July – August 2022).