Asturias-Spain: "Priority projects in Spanish Coal Regions"

COAL REGIONS IN TRANSITION PLATFORM
Bilaterals and Platform Meetings
Working Group Meetings

Mrs. María Belarmina Díaz Aguado
General Director of Mining and Energy
Regional Ministry of Economy, Industry and Tourism
Principado de Asturias Government

Brussels – 5th-6th November 2018
WHO ARE WE?? TOWARDS MINING 4.0 AND INDUSTRY 4.0

Not only miners... Metal workers

WHAT??
EFFICIENCY+ NEW ACTIVITIES + SUSTAINABLE INDUSTRY+
TECHNOLOGICAL DEVELOPMENT+ ADDED-VALUE PROJECTS +
GREEN CIRCULAR ECONOMY

Strategic Proposal: HOW???

SUSTAINABLE MOBILITY

WATER

ENERGY

EFFICIENCY

SPECIFIC AREAS WITH DIFFICULTIES
WHO ARE WE?? TOWARDS MINING 4.0 AND INDUSTRY 4.0

Not only miners... Metal workers

WHAT??
EFFICIENCY+ NEW ACTIVITIES + SUSTAINABLE INDUSTRY+
TECHNOLOGICAL DEVELOPMENT+ ADDED-VALUE PROJECTS +
GREEN CIRCULAR ECONOMY

Strategic Proposal: HOW???
**Initial requirements**

- **Distance < 50 km**
- **Public access network**
- **Location on main roads and highways**

**CURRENT NETWORK (50 kW)**

1. Llanes
2. Ribadesella
3. Gijón -Roces
4. Gijón -Centro
5. Avilés
6. Cudillero
7. Navia
8. Oviedo (22 kW)
9. Mieres
10. Cangas del Narcea (22 kW)
11. Grado
12. Cangas de Onís
13. Tapia de Casariego
14. Aeropuerto
15. Pola de Laviana
16. Siero

**Payment through mobile APPS**

Fast charging (80% battery in 30 minutes)

**Installed**

- In operation
- To be constructed
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
Project proposal for the development of a Cantabrian e-corridor

To connect the North of Spain and Portugal with main European e-corridors

Cantabrian e-corridor to connect the coal regions between them and with European e-corridors
25 Fast and High Power charging points across the North-West area of the Iberian Peninsula linking this part of the territory with the Atlantic and Mediterranean Core network Corridor

- 20 in Cantabrian Coast
- 5 in North Atlantic Coast

Definition of a model of public-private cooperation

- Public Administrations in coal regions and other necessary ones: Basque Country
- Charging infrastructure manufacturers + mobility services providers,
- Electrical distribution companies
- ICT suppliers.
- Other stakeholders

Estimated investment: 1,5-5 M€

- Public-private cooperation
- Funding:
  - National and regional Administrations
  - EU funds: DG MOVE-B, Coal Platform

Project period: 2 years (from 2019)
Project proposal for the development of a Cantabrian e-corridor

- Initiative would contribute to the improvement of the existing charging infrastructures, but also would be an excellent opportunity to integrate:
  - New High Power Charging (HPC) technology for e-Transport
  - Clean Energy to charge the EVs generated partially by photovoltaic and hydraulic hybridization
  - Interoperable system that will allow the entirely integration: Common APP

ADVANTAGES OF PROPOSAL

- Support of Regional Governments
- Transferability
- Industrial area of sustainable mobility expertise
- Acquisition of new knowledge and expertise of integration of renewable energies hybridization and sustainable transport
- Integration with other mobility infrastructures, mainly those for marine transport
Project proposal for the development of a Cantabrian e-corridor

- Initiative would contribute to the improvement of the existing charging infrastructures, but also would be an excellent opportunity to integrate:
  - New High Power Charging (HPC) technology for e-Transport
  - Clean Energy to charge the EVs generated partially by photovoltaic and hydraulic hybridization
  - Interoperable system that will allow the entirely integration: Common APP

ADVANTAGES OF PROPOSAL

- Support of Regional Governments
- Transferability
- Industrial area of sustainable mobility expertise
- Acquisition of new knowledge and expertise of integration of renewable energies hybridization and sustainable transport
- Integration with other mobility infrastructures, mainly those for marine transport
Project proposal for the development of a Cantabrian e-corridor

Desarrollo de las estaciones de recarga FAEN

Instalación fija

Baterías de acumulación

Instalación aislada

Hibridación de soluciones

Experimentación
Project proposal for the development of a Cantabrian e-corridor

• Initiative would contribute to the improvement of the existing charging infrastructures, but also would be an excellent opportunity to integrate:
  – New High Power Charging (HPC) technology for e-Transport
  – Clean Energy to charge the EVs generated partially by photovoltaic and hydraulic hybridization
  – Interoperable system that will allow the entirely integration: Common APP

ADVANTAGES OF PROPOSAL

• Support of Regional Governments
• Transferability
• Industrial area of sustainable mobility expertise
• Acquisition of new knowledge and expertise of integration of renewable energies hybridization and sustainable transport
• Integration with other mobility infrastructures, mainly those for marine transport
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
- Connections with EU gas corridors
- e-Corridor for Natural and National Parks (protected areas)
- Energy self-sufficiency in Redes National Park
- Zero carbon tourism
- Physical Energy storage
- Recovery of Industrial heat:
  - from paper production
  - from great industries
- Biomass applications: “small biomass power plants”
- Improvement in energy efficiency in Public Administration buildings
- Other projects for local supply chain
Project on gas mobility and Connections with EU gas corridors

Connections with EU gas corridors of North of Spain for natural gas, synthetic gas and biogas
Open regional seaports to international routes

1. Connect with other hub seaports in UE.
2. Adapt infrastructures to future traffic needs.
3. Develop new business and added values from the existing natural gas infrastructure.
Train by LNG. First proof of Spain in Asturias. Some routes are not electrified

Project on gas mobility and Connections with EU gas corridors

1. Reduce internal environmental impacts.
2. Reduce internal transport costs and increase the offer of services.
3. Offer alternatives to present transports services.
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
- Connections with EU gas corridors
- E-Corridor for Natural and National Parks (protected areas)
- Energy self-sufficiency in Redes National Park
- Zero carbon tourism
- Physical Energy storage
- Recovery of Industrial heat:
  - from paper production
  - from great industries
- Biomass applications: “small biomass power plants”
- Improvement in energy efficiency in Public Administration buildings
- Other projects for local supply chain
Objective: to connect National Parks in order to ensure electric mobility in areas of environmental value (usually remote areas)

Investment: $300,000
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
- Connections with EU gas corridors
- e-Corridor for Natural and National Parks (protected areas)
- Energy self-sufficiency in Redes National Park
- Zero carbon tourism
- Physical Energy storage
- Recovery of Industrial heat:
  - from paper production
  - from great industries
- Biomass applications: “small biomass power plants”
- Improvement in energy efficiency in Public Administration buildings
- Other projects for local supply chain
Energy self-sufficiency in public installations in Redes National Park

District heating + biomass cogeneration + photovoltaic + electrical mobility

Current situation: Use of individual systems by conventional fuels

0 emissions model + use of local resources + new economical activity and employment

E-Mobility Charging point + Electrical vehicles
High efficiency Lighting
Awareness-raising and spreading strategy.
Area for attraction of ecological tourism
Energy self-sufficiency in public installations in Redes National Park

Biomass generation with 3 multifuel boilers (wood chips or pellets)

- 2 multifuel boilers 100 kW each
- 1 cogeneration module of 20 kWe and 60 kWt

Photovoltaic system of kWp

Installation of 2 semi-fast recharge stations for EV

Awareness-raising and dissemination strategy. Interactive APP.

Solutions for sustainable mobility

Investment≈ 0,5-2 M€
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
- Connections with EU gas corridors
- e-Corridor for Natural and National Parks (protected areas)
- Energy self-sufficiency in Redes National Park
- Zero carbon tourism
- Physical Energy storage
- Recovery of Industrial heat:
  - from paper production
  - from great industries
- Biomass applications: “small biomass power plants”
- Improvement in energy efficiency in Public Administration buildings
- Other projects for local supply chain
Renewable energy storage for renewable power

Pilot project for Physical Energy storage

Magellan & Barents plan a pilot project in an Asturian mine. Storage System by height difference/increase, two storage tanks and compression by slurry pushing another fluid towards a Pelton turbine.

Energy is stored through height increase of slurry (physical way). For high energy demand, slurry goes down pushing against a fluid with goes through the turbine generating electricity at proper time.

Four key points:

1. Dense fluid slurry: Density > 3 g/cm³
2. High pressure bottom tank: slurry / gas
3. High pressure top tank: gas / water
4. High pressure pump and ultra high head Pelton turbine
Renewable energy storage for renewable power

Pilot project for Physical Energy storage

Based on tested tech from Offshore, Mining and Hydro but:

TECHNOLOGY CHALLENGES: Development Economic Institute of Principality of Asturias has given a 850.000 € grant from Regional Institute:
1. Slurry fluidity increasing/decreasing
2. Avoiding slurry stabilization
3. High Pressure tanks behaviour

But there are other

TECHNOLOGY CHALLENGES
(Project managers with EDP)
• Ultra high head turbine
• Power cable
Renewable energy storage for renewable power

Pilot project for Physical Energy storage

Technology can store and generate during hours. Onshore and offshore:

1. Hill + Mine pit (Asturias).
2. Tunnel for emergency ventilators.
3. Avilés Canyon (Asturias).

Hill-Mine pit (Asturias)
- Topographic Height: 2000m=>6000 m water equivalent
- Power at 1 m³/s flow rate: 60 Mw
- Slurry volume for 4 hours: 14.400 m³

Road Tunnel
- Replacement of emergency Diesel gensets for ventilators
- Topographic Height: 340m=>1000m water equivalent
- Power at 1 m³/s flow rate: 10 Mw
- Slurry volume for 4 hours: 14.400 m³

Energy
- 240 Mwh
- 40 Mwh
- 480 Mwh
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
- Connections with EU gas corridors
- e-Corridor for Natural and National Parks (protected areas)
- Energy self-sufficiency in Redes National Park
- Zero carbon tourism
- Physical Energy storage
- Recovery of Industrial heat:
  - from paper production
  - from great industries
- Biomass applications: “small biomass power plants”
- Improvement in energy efficiency in Public Administration buildings
- Other projects for local supply chain
Projects for Industrial heat Recovery

Projects for Recovery of Industrial heat for district heating

Objective: Recovery of Industrial heat from paper pulp industry for urban district heating in Navia

Thermal requirements: 11,868 MWh/year (housing, public buildings and hospital)

Available heat: 30,000 MWh/year
**Projects for Industrial heat Recovery**

**Projects for several networks of industrial heat recovery**

**Objective:** Recovery of Industrial heat from steel industry for industrial parks and urban district heating in Avilés and Gijón

**Requirements:** industrial facilities, housing and public buildings

**Available heat:** residual gases from steel manufacturing and other heat sources
Objective: Recovery of Industrial heat from power plant for urban district heating in Mieres

Requirements: housing and public buildings. Improvement in district heating from other energy sources

Available heat: residual gases from power plant
Projects for Industrial heat Recovery

Several industrial heat recovery Projects for cogeneration

Objective: Recovery of Industrial heat for cogeneration

ENCE
Industrias Doy
Tudela Veguín
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
- Connections with EU gas corridors
- e-Corridor for Natural and National Parks (protected areas)
- Energy self-sufficiency in Redes National Park
- Zero carbon tourism
- Physical Energy storage
- Recovery of Industrial heat:
  - from paper production
  - from great industries
- Biomass applications: “small biomass power plants”
- Improvement in energy efficiency in Public Administration buildings
- Other projects for local supply chain
THERMOELECTRIC BIOMASS POWER PLANT: Rankine or ERC
COGENERATION: 2 MWe and 8 MWt
Rural area
INVESTMENT: 6-8 M€
10 employments in plant and 12 in forests

Small biomass power plants
List of energy projects

Improve competitiveness, create employment and to reduce emissions

- Cantabrian e-corridor
- Connections with EU gas corridors
- e-Corridor for Natural and National Parks (protected areas)
- Energy self-sufficiency in Redes National Park
- Zero carbon tourism
- Physical Energy storage
- Recovery of Industrial heat:
  - from paper production
  - from great industries
- Biomass applications: “small biomass power plants”
- Improvement in energy efficiency in Public Administration buildings
- Other projects for local supply chain
Other projects for regional/local supply chain

Actions to be performed:

• Working groups on energy storage related with renewable generation: FAEN

• Great Eolic turbines.

• CO2 capture expertise: INCAR.

• Alternative uses of coal.

• Recovery and recycling of raw materials.

• Improvement of energetic efficiency through low water consumption systems: dry-cool technologies.

• TELESCOPE.

• Water projects
WHO ARE WE?? TOWARDS MINING 4.0 AND INDUSTRY 4.0
Not only miners... Metal workers

WHAT??
EFFICIENCY+ NEW ACTIVITIES + SUSTAINABLE INDUSTRY+
TECHNOLOGICAL DEVELOPMENT+ ADDED-VALUE PROJECTS +
GREEN CIRCULAR ECONOMY

Strategic Proposal: HOW???

SUSTAINABLE MOBILITY

WATER
In the future scenario, all the mentioned activities will be integrated in a process of Circular Economy for the generation of Clean Energy with the aim of keeping employment and industrial activity in Asturias.

Nevertheless, the region requires a transition period (2019-2021) in which it is essential to continue having only one mining well in production in order to keep on carrying out research in the area of eco-combustion by CO₂ capture. During this period of transition, it will also be necessary to adapt La Pereda Power Plant for its new uses.

The Project CoalAst360Economy is supported by the Government of the Principado de Asturias through the Ministry of Employment, Industry and Tourism, which is a member of the Coal Mining Regions in Transition Platform
**Water projects**

- **Give added value to land and industrial areas owned by HUNOSA:** greatest land owner in the region.

- **Resource from forests:** **biomass**, more than 3,800 Ha with over 9,000 t/year, for energetic contracts and services.

- **Mine water as thermal energy source:** Hospital, Research centre and FAEN and other projects. District heating
Future Scenario

2022
Geothermal district heating

District heating through Mine water geothermal energy and forest biomass.

Current Geothermal Case Studies:
- Research Building of The University Campus of Mieres
- Alvarezu Buylla Hospital in Mieres
- Energy Asturian Foundation

New Projects (under construction):

1. District Heating Barredo – Mayacina:
   - Main University Building in Barredo
   - Bernaldo de Quiros High School
   - 2 buildings with 117 and 131 flats in Vasco Mayacina

2. District Heating La Felguera:
1. (GEOTHERMAL District Heating Mieres) CURRENT PROJECT

Pumping capacity: 860 m$^3$/h
Needs of geothermal systems: 530 m$^3$/h
Volume for future development: 330 m$^3$/h
Average performance (COP and EER) ≈ 6 - 8

4MWt installed entre in the 3 buildings turn the project in the greatest one in Spain.

Current (heating)
Hospital VAB: 3.000 kW
Campus University: 724 kW
FAEN: 100 kW

Increase in 2MWt installed for 4 new installations.
1. (GEOTHERMAL District Heating Mieres) CURRENT PROJECT

Increase in **2MWt installed** for 4 new installations.

**Enlargement of generation plant**  **2.000 kW**  
IES Bernaldo Quirós high school: heating  
Building M9: heating + water preheating ACS  
Building M10: heating + water preheating ACS  
University school of Mines: heating

Year 2017: DG Mining and Energy, Low Carbon european fund for regional development (EFRD) funding: 503,125 € for total investment of 1,421,541,51 €.
2. (GEOTHERMAL District Heating La Felguera) FUTURE PROJECT

- **Pumping capacity:** 200 m³/h
- **Power to be installed:** 1,2 MWt

**Requirements:**

- **Sport center “Juan Carlos Beiro”:** 700 kW
- **Buildings (45 flats):** 200 kW
- **Hotel + Geriatric care home:** 700 kW
- **Health centre area 8:** 500 kW

**Year 2018:** DG Mining and Energy, Low Carbon european fund for regional development (EFRD) funding: 1.100.000 € for total investment of 1.700.000 €.
Water projects

Hydraulic energy from mountain mines already closed which have become water storage systems for:

• Hydraulical power plants (up to 50 MW under study)
• Underground mining hydraulical energy

- Usually closed to inhabited areas
- Open tunnels currently draining significant water flows towards rivers: galleries and mine entries became water sources for rivers
- Good geological knowledge
- Calcareous basins: pH non acid \( \approx 7 \)
- Fractured basins: great water deposits
- 8 to 10 areas have been previously analysed  
  - 2 study areas:  
    - Carinsa (Aller Valley)
    - Urbies (Turon-Mieres Valley)

- Each project: 20 to 30 persons during construction, mining expertise.
- Pilot prototype required.
WHO ARE WE?? TOWARDS MINING 4.0 AND INDUSTRY 4.0

Not only miners... Metal workers

WHAT??
EFFICIENCY+ NEW ACTIVITIES + SUSTAINABLE INDUSTRY+
TECHNOLOGICAL DEVELOPMENT+ ADDED-VALUE PROJECTS +
GREEN CIRCULAR ECONOMY

WHAT ELSE????????

SUSTAINABLE MOBILITY

Strategic Proposal: HOW???

WATER
WHAT ELSE? WHAT DO WE NEED FROM EC?

Transition of the existing industrial model in this coal mining region to a new model based on, among others, electromobility industry (transport + energy + IC)

**FINANCIAL SUPPORT: FUNDING**

**SUPPORT: problems we are unable to solve**
WHAT ELSE? WHAT DO WE NEED FROM EC?
WHAT ELSE? WHAT DO WE NEED FROM EC?

What we expect from European Comission?

SOUTH WEST AREA

Loss of population: 7,054 inhabitants lost in last 10 years:
Loss of 15-25% of inhabitants while Spain increased 15%

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cangas</td>
<td>15.127</td>
<td>12.947</td>
</tr>
<tr>
<td>Degaña</td>
<td>1.288</td>
<td>978</td>
</tr>
<tr>
<td>Ibias</td>
<td>1.797</td>
<td>1.362</td>
</tr>
<tr>
<td>Allande</td>
<td>2.169</td>
<td>1.742</td>
</tr>
<tr>
<td>Tineo</td>
<td>11.539</td>
<td>9.700</td>
</tr>
</tbody>
</table>
WHAT ELSE? WHAT DO WE NEED FROM EC?

What we expect from European Commission?

Some projects: FOOD

- Already existing buildings, offices, changing rooms
- Former open pit mine: “Reguero de los Prados” Rengos
- Food transformation industry: In mining area, for 15 people.
  - Honey: all honey production sold for other regions industry
  - Meat: gourmet pre-cooked or Vacuum packaged meat
  - Cheese: Asturias is Spanish region with more designation of origin cheeses: 3 non-industrial cheeses.

- INVESTMENT: 1.5-3 M€.

Some projects: ecoparks
WHAT ELSE? WHAT DO WE NEED FROM EC?

FINANCIAL SUPPORT: FUNDING
SUPPORT: problems we are unable to solve

- New opportunities: New business models identified
- New needs: DISSEMINATION, information and formation
- New requirements and challenges: connectivity, networks, big data
- We are learning: New networks and corridors
- We aim innovation and singular projects
- We need to organise in working groups
- We want to share experiences and best practices

Thank you!!!!
THANK YOU FOR YOUR ATTENTION

Mrs. María Belarmina Díaz Aguado
General Director of Mining and Energy
Regional Ministry of Economy, Industry and Tourism
Principado de Asturias Government
Email: mariabelarmina.diazaguado@asturias.org
Telephone: +34 985 10 66 82

Brussels – 5th-6th November 2018