

# Modernization of the energy sector – a pathway towards low-carbon energy and green economy

## Executive Summary

- Modernization of the energy sector neither can be avoided, nor can it be further delayed, it is in states' best interest to undertake the process in the most efficient and cost-effective manner.
- UNECE proposes to develop a tool for assisting states in delivering an effective transition to low-carbon energy and green economy through helping them to plan approaches to modernising their mining and energy sectors.
- In the initial stage, the project focuses on developing a plan for greening the state's economy through modernisation of its fossil fuel based industrial sites by reorienting them towards modern technologies and more efficient use of available resources.
  - Upon the request of a particular industrial site operator, the UNECE, building on experience and expertise of its subsidiary bodies, will develop case-specific recommendations aiming for:
    - Increasing cost-effectiveness and productivity of the site, and thus improving its competitiveness and diminishing relative resource use;
    - Decreasing emissions and other site-related environmental damage;
    - Maintaining, to the greatest extent possible, the current employment level;
    - Diversifying, where possible, the mode of production and resource base.
- In the subsequent stage, the project develops a robust and flexible business model for efficient industrial site's transition, replicable in other industrial sites. The project outcomes will contribute to development of innovation-led socially and environmentally responsible sustainable national energy strategies.

## Background

- The project is conceived as a tool for assisting UNECE member States in delivering on effective transition to low-carbon energy and green economy through helping them to plan approaches to modernising their mining and energy sectors.

In the initial stage, the project will seek to develop a plan for greening the selected State's economy through modernisation of its fossil fuel based industrial sites by reorienting them towards modern technologies and more efficient use of available resources. In the subsequent stage, the project, on the basis of lessons learnt throughout the initial phase, will develop a robust and flexible business model for efficient industrial site's transition, replicable in other industrial sites in like countries or regions. It will also contribute to development of innovation-led socially and environmentally responsible sustainable national energy strategies.

Member States desired for partnering in the project can be characterised as being heavily reliant on fossil fuels and possessing of large integrated industrial sites needing modernization of outdated infrastructure and modes of production.

Modernization of energy sector cannot be avoided, particularly in light of the states' voluntarily made environmental pledges, nor can it be further delayed as the energy infrastructure in many cases is at the very end of its life-cycle. Consequently, since modernization is necessary and inevitable, it is in the state's best interest to undertake it in the most cost-efficient manner. The more profound the transition towards low-carbon energy and green economy that is undertaken by a member State, the more competitive the state's economy will become. It is because in a long run a cleaner modern economy is more cost-effective, for it has an impact not only on the efficiency of the production itself, but also on a wide number of other intertwined issues, which constitute indirect costs to the state, such as e.g. social costs, healthcare costs, reputational cost, etc. Furthermore, while currently greater turn towards renewables may for some states still lack a sufficient appeal and sense of urgency, at some point in time, due to inexorable exhaustion of fossil fuels and their gradual declining market competitiveness, it will become truly unavoidable and necessary. Consequently, a preparation of strategies for future integration of renewables into the state's energy system will benefit any member state, regardless of the composition of its current energy mix.

Because of its experience and multidimensional approach that is due to the multiplicity of its subsidiary bodies, which serve as platforms for cooperation between states, business and industry, UNECE is the best partner for delivering such program. A replicable and flexible transformational business model that it seeks to develop will present states with tools for improving their energy efficiency through application of modern low-emission technologies, switch to more efficient yet available energy resources, more effective use of available resources, and building an integrated economy that is in harmony with the needs and capabilities of the state, its population, and its environmental commitments.

## **Objective of the project**

- To assist UNECE member States in delivering on effective transition to low-carbon energy and green economy through helping them in modernising their mining and energy sectors.
- In the initial stage, the project seeks to develop a plan for greening the selecting State's economy through modernisation of its fossil fuel based industrial sites by reorienting them towards modern technologies and more efficient use of available resources.
- In the subsequent stage, the project, on the basis of lessons learnt throughout the initial phase, will develop a robust and flexible business model for efficient industrial site's transition, replicable in other industrial sites in like countries or regions. It will also contribute to development of innovation-led socially and environmentally responsible sustainable national energy strategies.

## **Partners**

- The project will be developed and implemented in cooperation with interested site operator(s), upon their request and subject to their financial involvement, should there not be such involvement directly on the part of the interested State.
- Should the industrial site(s) interested in participating in the project be state-owned, the projects will be developed and implemented only upon request of the member States in question and subject to its financial involvement.
- For the development and implementation of the project cooperation with relevant international partners will be sought. The desired partners include European Bank for Reconstruction and Development, Asian Development Bank, World Bank, European Union, World Coal Association, International Gas Union, private and state-own companies operating in the relevant fields.

## **Selection of partners**

- In the initial phase, the project will focus on one or two sites located in a UNECE member State(s), whose economy is heavily dependent on fossil fuel extraction and/or in which fossil fuels constitute over 50% of the energy mix.
- Member States desired for partnering in the initial phase would be characterised by heavy reliance on fossil fuels and possession of big industrial sites in need for modernization of their outdated infrastructure and mode of production. The selected State(s) should match the following criteria:
  - Have a number of large fossil fuel based industrial sites requiring transition;
  - Be in an early stage of transition to green economy;
  - Experience multi-layered difficulties in modernizing its mining and energy sectors;
  - Be in need of finding a solution allowing for meeting their international obligations to reduce emissions;
  - Have long history of cooperation with UNECE;
  - Be in a position to be an example for number other member States that face similar difficulties (i.e. be promising in terms of replicability of the mechanisms applied and results achieved).

## **Arguments for securing partners involvement**

### **States:**

- Modernization of energy sector is unavoidable in order to meet voluntarily made environmental pledges.
- Modernization of energy sector cannot be further delayed as the energy infrastructure is in many states already at the very end of its life-cycle. Consequently, since modernization is about to happen anyway, it is in the State's best interest to undertake it in the most efficient manner.
- The more profound the transition towards low-carbon energy and green economy that is undertaken by the partners, the more competitive the state's economy will become.
- A cleaner modern economy is in the long run more cost-effective, for it has an impact not only on the efficiency of the production itself, but also on a wide number of other intertwined issues, which constitute indirect costs to the state, such as e.g. social costs, healthcare costs, reputational cost, etc.
- Transition aims at improving efficiency through application of modern low-emission technologies, switch to more efficient yet available energy resources, more effective use of available resources, and building an integrated economy that is in harmony with the needs and capabilities of the State, its population, and its environmental commitments.
- While currently greater turn towards renewables may for some states still lack a sufficient appeal and sense of urgency, at some point in time, due to progressing exhaustion of fossil fuels and their gradual market non-competitiveness, it will become truly necessary. Consequently, a preparation of

strategies for future integration of renewables into the state's energy system would be of benefit to any state, regardless of the composition of its current energy mix.

- The project will provide for transfer of knowledge and technology to the recipient State.
- The project will develop a replicable transformational business model that will be growth oriented as well as socially and environmentally responsible.
- Because of its experience and multidimensional approach that is due to the multiplicity of its subsidiary bodies, which serve as platforms for cooperation between states, business and industry, UNECE is the best partner for delivering such program.

#### *Operators/Industry/Business:*

- It is better to spend money on transition, which offers future returns, rather than on either fines for not meeting environmental standards or for increasingly more costly emission allowances.
- The industry is under increasing pressure to demonstrate their commitment to decarbonisation. The project presents fossil fuel and energy companies with an opportunity to introduce innovative solutions that can offer sizable return in investments by promoting new low carbon products and services.
- The project, by presenting site operators with innovative solutions and technologies, will help them to reduce costs currently incurred by safety and environmental controls, thus increasing their profitability and competitiveness.
- The project will identify regulatory obstacles to the transition and suggest to States proactive policies to remedy them. Consequently, it will help to free operators from the regulatory trap that in many cases prevent them from undertaking transition and thus oftentimes keep them tailored to the uncompetitive, inefficient, and non-profitable approach to resource use and mode of production.
- The program will explore various available pathways towards better efficiency and competitiveness of the selected site(s).
- Because of its experience and multidimensional approach that is due to the multiplicity of its subsidiary bodies, which are platforms for cooperation of states, business and industry, UNECE is the best partner for delivering such program.

#### *European Bank for Reconstruction and Development, Asian Development Bank, World Bank European Union:*

- The project will help in development of UNECE member States and will help them in transition towards green economy. By developing a model for transition, it will assure replicability and sustainability of the results, thus helping states in making a real progress in the targeted fields.
- The project will help States to improve competitiveness of their economies.
- The project will provide for transfer of know-how and technology, thus improving the knowledge base in the recipient State(s).
- The problem of pollution is transboundary in nature and therefore addressing it, particularly in the most polluting states, is in the interest of the whole international/regional community.
- The project will improve quality of life of member States' citizens by:
  - Lowering energy prices resulting from better productivity of industrial sites and more efficient use of resources;
  - Providing a basis for creation of new green jobs;
  - Lowering pollution and moving towards zero waste solutions.

#### **UNECE Role**

- Upon the request of the host site operator(s) having interest in developing a model for a feasible and efficient transition of its industrial site(s), the UNECE, building on experience and expertise of its six subsidiary bodies specializing, respectively, in natural gas, coal mine methane, energy efficiency, clean electricity production, renewable energy, and resource classification, will develop case-specific recommendations for a selected site, serving as a sample to be replicated in other cases. Recommendations will aim for:
  - Informing the future national energy strategy;
  - Increasing cost-effectiveness and productivity of the site, and thus improving its competitiveness and diminishing relative resource use;
  - Decreasing emissions and other site-related environmental damage;
  - Maintaining, to the greatest extent possible, the current employment level;
  - Diversifying, where possible, the mode of production and resource base.

## Scope

- The project will focus on innovative technologies and new business models for sustainable development the following areas:
  - Sustainable energy production;
    - Fossil fuel (coal, oil, gas) based energy;
      - Clean coal technologies;
      - High efficiency low emission technologies;
      - Coal Mine Methane, Coal Bed Methane, Abandoned Mine Methane, Surface Mine Methane;
    - Renewable energy;
      - Solar, hydro, wind, bio fuels;
      - Secondary resources (e.g. waste);
    - Energy Efficiency;
  - Fossil fuels extraction;
    - Coal, oil and gas;
      - Coal Mine Methane, Coal Bed Methane, Abandoned Mine Methane, Surface Mine Methane;
      - Unconventional oil and gas;
  - Selection and effective use of available resources;
    - Enabling role of coal mine methane projects in restructuring coal mining industry;
    - Integrating the development of unconventional resources like shale gas;
    - Interplay of renewables and gas;
  - Environmental protection;
    - Pollution;
    - Resource depletion;
    - Towards zero waste solutions;
  - Policy drivers and regulations of the relevant subject areas;
  - Financing possibilities.

## Means to achieve the goals of the project

- The Project will be developed in phases with a defined key-milestone approach.
- In the first phase, the project will focus on one (or two) particular selected industrial site(s) that are in need for transition.
- The assessment of the selected site(s) will be conducted in order to determine:
  - The current mode of production, including value-chain analysis, as well as its profitability and sustainability (economic aspect of transition);
  - Available alternative approach to resource development and production (economic and environmental aspects);
  - The resources used (economic and environmental aspects);
  - Available alternative resource base (economic and environmental aspects);
  - The current technology used (economic aspect);
  - Availability of alternative technologies and feasibility of implementing them (economic aspect);
  - The current efficiency of the site (economic aspect);
  - Available measures for site efficiency improvement (economic aspect);
  - The quality of the workforce (economic and social aspects);
  - Available means to increase quality of the workforce and feasibility of retraining the personnel (economic and social aspects);
  - The environmental damage caused (environmental aspect);
  - Potential for diminishing the environmental damage (environmental aspect).
- Evaluation of available domestic and international sources of financing the recommended improvements will be conducted (economic aspect).
- Evaluation of the applicable domestic regulations will be made in order to determine (legal aspect):
  - Legal obstacles to implementation of the recommended measures (legal aspect);
  - Legal, administrative and other obstacles to obtaining funds for implementation of the recommended measures (economic and legal aspects);
  - Policies that should be adopted to remedy the above-mentioned obstacles (legal aspect).
- The current mode of production, the current technology used, the current efficiency of the site, the resources used, the quality of the workforce, and the environmental damage caused will be assessed

on the basis of the documents provided by the site operator as well as through the onsite investigation.

**Expected results of the project:**

1. Detailed assessment of the industrial site(s) selected for the project.
  - 1.1 Examination and evaluation of the profitability and sustainability of the current mode of the site's production.
  - 1.2 Examination of the technology used on the site, and evaluation of its effectiveness.
  - 1.3 Examination of the resource base utilized for the production and assessment of its suitability, on the basis of the input-output ratio and the caused environmental damage.
  - 1.4 Assessment of the quality of the workforce.
2. Exploration and identification of the measures available for improving efficiency and sustainability of the selected site.
  - 2.1 Assessment of the available resources and alternative modes of production.
  - 2.2 Assessment of the available alternative technologies and of feasibility of implementing them.
  - 2.3 Assessment of the available measures for site efficiency improvement.
  - 2.4 Assessment and evaluation of the available alternative resource base.
  - 2.5 Assessment of the available means to improve skills and productivity of the workforce and of feasibility of retraining the personnel to facilitate transition.
  - 2.6 Assessment of the potential for diminishing the environmental impact.
  - 2.7 Assessment of alternate business models by testing minimum viable products
3. Development of technical conclusions and recommendation for the selected site.
  - 3.1 Analysis of various scenarios together with their advantages, costs and the impact on the environment.
4. Detailed assessment of the national energy and low-carbon strategy as well as of relevant applicable domestic laws and regulations.
  - 4.1 Assessment of the legal obstacles to implementation of the recommended measures.
  - 4.2 Assessment of the legal, administrative, institutional and other obstacles to obtaining funds for implementation of the recommended measures.
  - 4.3 Proposal of policies that should be adopted in order to remedy the above-mentioned obstacles.
5. Detailed economic assessment and identification of available sources for financing the implementation of the recommended measures.
  - 5.1 Description of the most efficient avenues for securing funds for implementation of the recommended measures.
6. Detailed report summarizing project findings and recommendations in technical, economic, regulatory, environmental, and finance dimensions

**Implementing body:**

- The project will be implemented by the six Groups of Experts of the UNECE Sustainable Energy Division working together.
- The cooperation between the Groups will take place under the supervision of the UNECE Sustainable Energy Committee.
- Coordination of activities will be done by regular meetings (or conference calls) of the Chairs of the Group of Experts.
- The Chairs of the Group of Experts will constitute the Bureau of the Project.
- The Bureau of the Project will be chaired by the Chair of the Group of Expert on Coal Mine Methane.
- Other Divisions of the UNECE might be involved, subject to their interest and relevance to the project.