UA TRANSMISSION SYSTEM OPERATOR

Gas TSO of Ukraine LLC

Transformation towards EU Green Deal

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UA Gas TSO Hydrogen agenda

H_2 Readiness

The purpose of the assessment is to determine the impact of the H2&CH4 mixture on the materials of pipelines, measuring possibilities of meteorological equipment, safety, other equipment and facilities, and effective operation of the UA GTS.

H_2 Equipment Tolerance

OGTSU have started cooperation with manufacturers of gas turbines on hydrogen tolerance for example: Zorya –Mashproekt (UA) and Siemens (DE).
It`s planned to develop a technical policy of H_2 Tolerance

Hydrogen Testing Facility

OGTSU plans to implement a pilot project for the production testing volumes of hydrogen and synthetic methane on industrial site using low carbon electricity and carbon capture.

UA Hydrogen strategy

OGTSU joined and support developing “High Level Hydrogen Strategy for Ukraine” to contribute in achieving Ukrainian energy, ecological, economic and geopolitical goals.

UA H2 market environment assessment

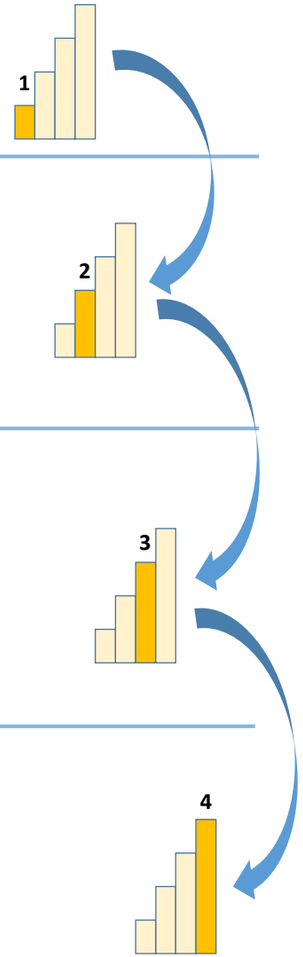
OGTSU joined to the project “Assessment of Potential for a Low-Carbon Hydrogen Economy in the EBRD Region: Demand, Supply and Regulatory Analysis” to support creation H2 supply chains and portfolio of pilot projects

Integration to the EU ecosystem

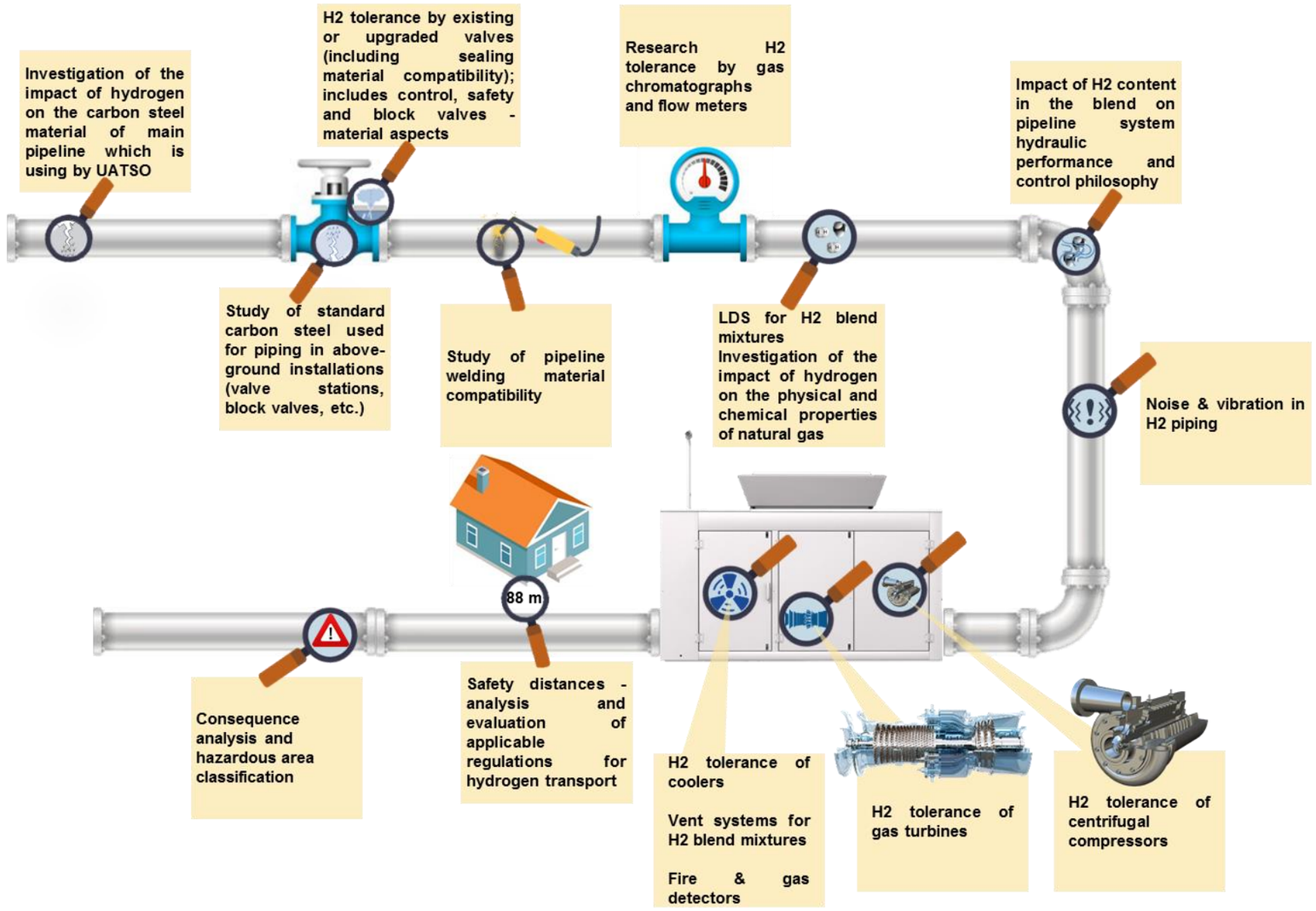
OGTSU became a member of the EC Clean Hydrogen Alliance, Marcogaz, GERG, GIE, UABIO, Ukrainian H2 Council; We are in contact with European Hydrogen Backbone, neighboring TSOs and H2 projects developers

UA Gas TSO Hydrogen New Horizons:

Background	**2020 - 2021**	• Support of development of UA High-level H2 strategy and Market Assessment; • Agreement on technical assistance form the EU to H2 readiness of GTS; • Roadmap, action plan and ToR developing.
Research & Development	**2022 - 2025**	• Assessment of technical, economic and legal feasibility of the H2 readiness of existing gas transmission infrastructure; • Construction of Hydrogen testing facility; • Lab testing of different types of pipes and equipment; • Operation and testing of H2 technology cluster; • Hydrogen investments masterplan.
Assistance of OGTS in clusters creation	**2025 - 2030**	• Integration of pilot projects to the gas grid; • Consolidation of operating experience and scaling approaches; • Repurposing the existing transmission pipelines/facilities to creation dedicated transmission system for hydrogen (hydrogen blend and pure); • Developing renewable and low-carbon hydrogen Ukraine - EU value chain • Support of Ukrainian industry transition to H2 supply projects
Scaling	**2030 - 2035 +**	• Targeted investments in new dedicated hydrogen pipelines and compressor stations. • Developing renewable and low-carbon hydrogen Ukraine - EU value chain • Integration to European Hydrogen Backbone infrastructure • Domestic industry hydrogen supply (ammonia, steel) • Development of necessary infrastructure (fuel stations) for H2 transport



H2 Readiness



- **Summary of the Project**

  OGTSU considers in its strategy a special focus on the decarbonization of the gas transmission system's infrastructure and the economy of Ukraine as a whole. In planning its development, the company pays additional attention to the technological, regulatory, and economic aspects of implementing innovative solutions to ensure clean development according to the EU "Green Course" and the transition to the transportation of renewable gases by main pipelines, especially hydrogen. To this end, the gas OGTSU plans to implement a research program with the involvement of leading institutions of Ukraine and the EU in the following areas in 2021-2022. This R&D will provide a systematic approach to determining the potential of the GTS of Ukraine's existing infrastructure for the transportation of a mixture of natural gas and hydrogen.

  The purpose of the R&D is to determine the impact of a mixture of natural gas with hydrogen on the materials of main gas pipelines and equipment of the gas transmission system, measuring possibilities of meteorological equipment, safety, and effective operation of the UA GTS and one equipment and facilities.

- **Implementation period**

  2021-2022

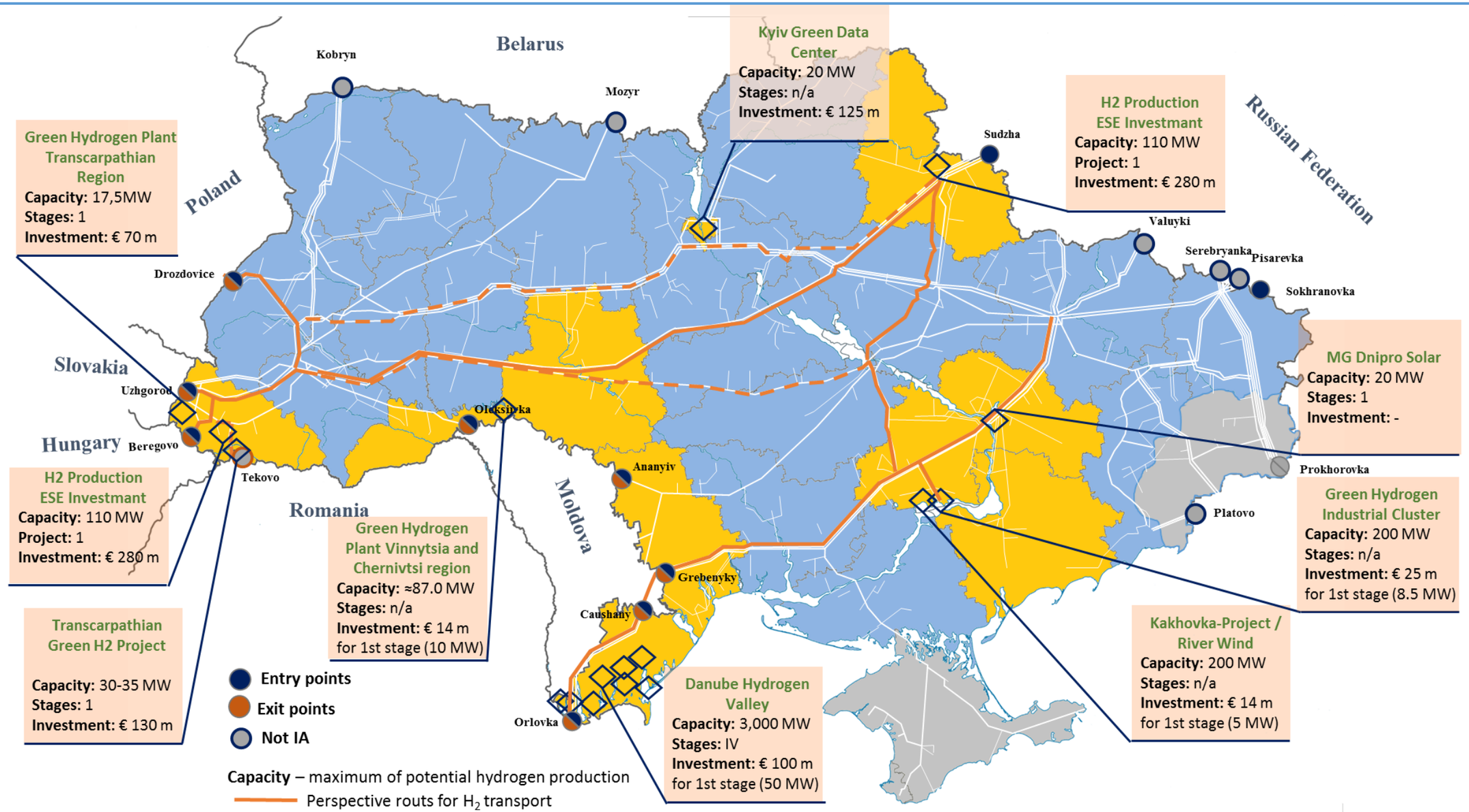
- **Current status**

  Pre-feasibility study

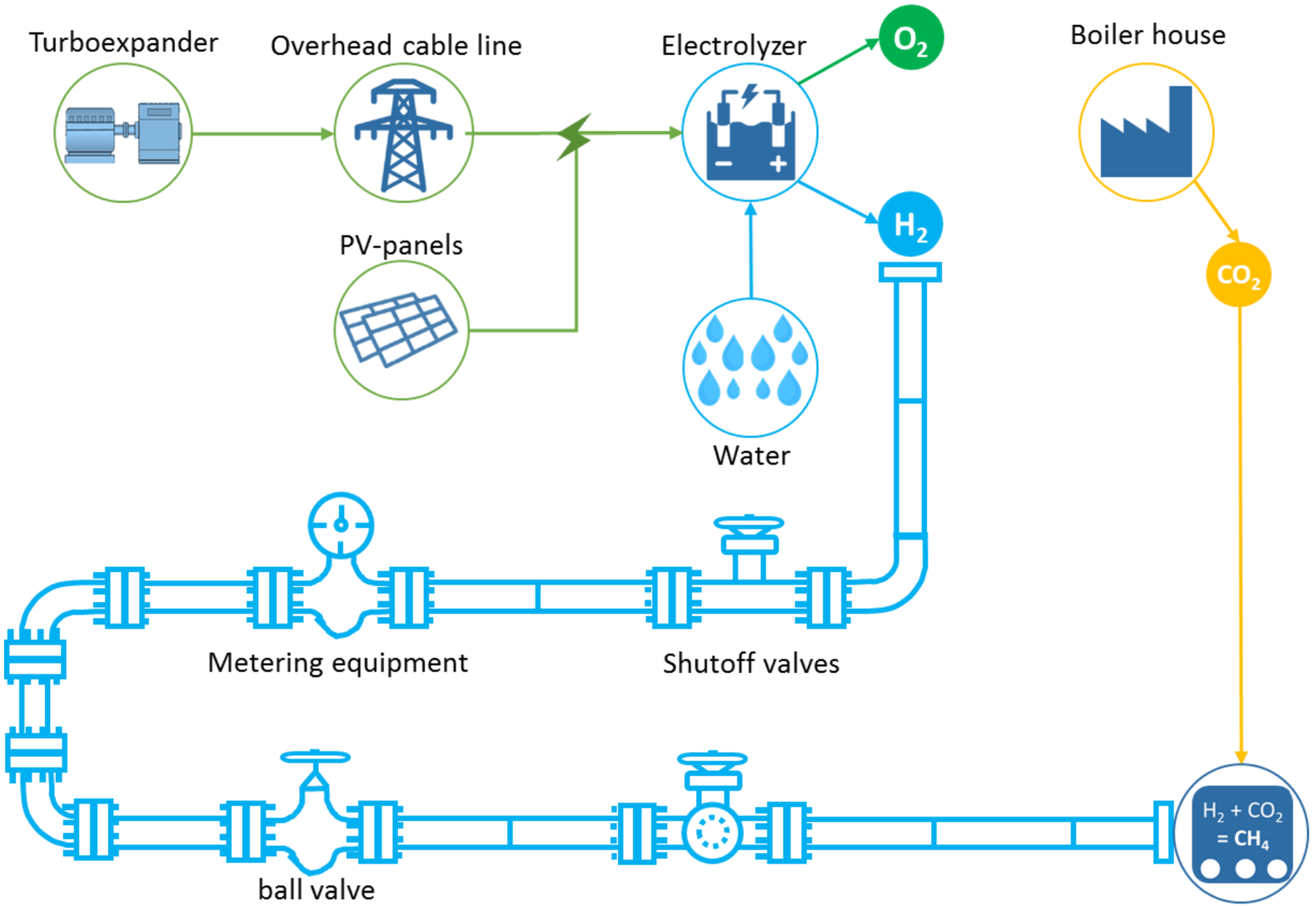
- **Which partners we need**

  Technical partners, which have experience in implementation of similar projects.
  Research organization
  International financial institutions to sponsorship the project.

Map of potential clusters



Pilot project – Hydrogen testing facility



- **Summary of the Project**

  Gas TSO of Ukraine LLC plans to implement a pilot project for the production of testing volumes of hydrogen and synthetic methane on industrial site using electricity obtained on the installed at gas distribution station "GRS-7 Dnipro“ existed turboexpander and rooftop PV power station. Volume of CO_2 need for this project for SynCH4 production will be obtained by capturing emissions from the boiler house, which is located on this industrial site. The option of capturing CO_2 from the air is also being considered.

  Hydrogen tech cluster creates opportunity for testing different types of pipes, valves, seals, measuring equipment for compatibility with hydrogen (marked blue at the chart).

  Brownfield transformation project involves installation of the Electrolyzer and Methanation unit and CO2 capture unit, construction of additional pipeline system and new water treatment system, reconstruction of electricity supply system on existing industrial site at city Dnipro.

  The project will lay the foundations for attracting modern clean technologies to Ukraine, GAS TSO infrastructure retrofitting, acquiring new skills and knowledges, stuff retraining.

- **Implementation period**

  2021-2024

- **Current status**

  Pre-feasibility study

  Currently OGTSU together with comany **KHIMOD (French green tech company)** developed a technical model of the project .

Thank you for attention!

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