Ministry of Investment,
industry and trade
of the Republic of Uzbekistan

Investment proposal:
Establishment of a complex for the production of ammonia and methanol based on green hydrogen

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Establishment of a complex for the production of ammonia and methanol based on green hydrogen

Economic and social impact:

- Strategic green industry project for Uzbekistan;
- Import substitution and export-oriented network;
- Environmentally friendly production, creating more than 6 thousand new jobs;
- The reduction in CO_2 emissions is ~1.5 million tons of carbon dioxide per year that is not released into the air (processed in methanol production).
- The share of clean energy solar power plant acts as a 100% renewable energy source.
- Rational use of water resources the water used in the electrolysis process is processed in a closed cycle (80-85% reuse).

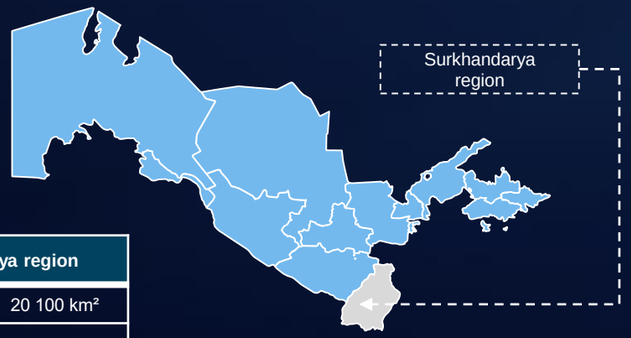
Project description:

The project cost $ 3.2 billion and the project will produce 200,000 tons of ammonia and 300,000 tons of methanol.

The main goal of the project is to establish a modern chemical complex in the Republic, which produces ammonia and methanol using environmentally friendly energy sources.

Due to the availability of water and carbon dioxide raw materials for the implementation of the project, Surkhandarya region is considered desirable.

Location of the project



Surkhandarya region	
Size	20 100 km²
Population	3,0 million

Economic indicators:

Financing: 3 200 million USD

Area: 7 600 hectares

Revenue: $320 million/year

ROI: 7,7 %

NPV: $691 million *(20 years)*

IRR: ~14%

Production indicators:

Ammonia (NH_3):
200 000 tons

Methanol (CH_3OH):
300 000 tons

Technical oxygen:
70 000 tons

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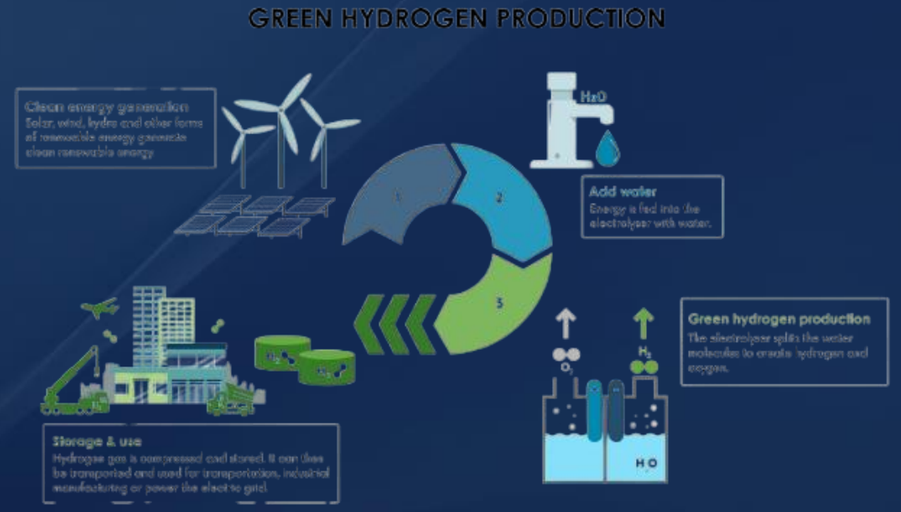
Processing chain & product yield

Key production stages

1. Green hydrogen production (H2):
For the production of 93 thousand tons of hydrogen by electrolysis of water, 837 thousand tons of water are needed, and the cost of PEM electrolyzers, which will be necessary for its electrolysis, will be $ 500 million.

2. Nitrogen production (NH_3):
One of the main components in the production of ammonia is nitrogen (n_2), which is extracted from the air. For this, an air separation device (ASU) is used.
The air separation device is a technological system that decomposes air by liquefaction and distillation into components - nitrogen (N_2) and oxygen (O_2). Only nitrogen is needed to produce ammonia, but oxygen can also be an additional source of income. The cost of equipment producing 164 thousand tons of nitrogen, which will be necessary for the production of 200 thousand tons of ammonia, is 60 million dollars.

3. Ammonia production (NH_3):
Develop ammonia (Ammonia synthesis unit), the equipment you will need for the test, works in the following order:- electrolysis mixes hydrogen (H_2) and nitrogen (n_2);- the mixed gas is compressed through the compressor to a pressure of 150-250 bar;- gas is heated to 400-500°C in heat exchangers
Develop ammonia (Ammonia synthesis unit), the equipment you will need for the test, works in the following order:- electrolysis mixes hydrogen (H_2) and nitrogen (n_2);- the mixed gas is compressed through the compressor to a presson.



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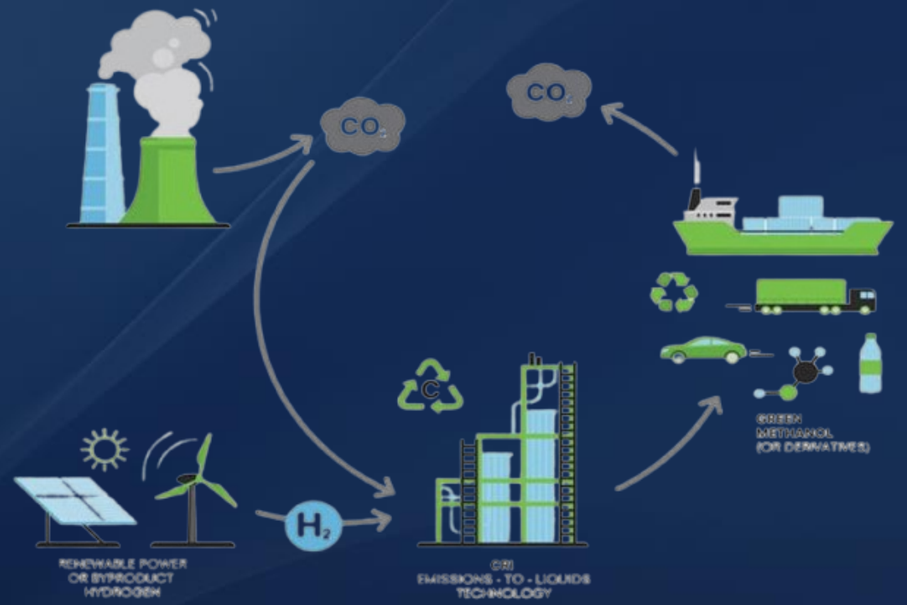
Processing chain & product yield

Key production stages

4. Methanol production (CHOHOH:
Carbon capture (CO_2 capture systems), a system that allows the capture and processing of carbon dioxide gas emitted by large enterprises, is considered the necessary raw material for Methanol, and the cost of this equipment is $ 100 million.
The annual demand for carbon dioxide gas of the project will be 411 thousand tons.
For reference: the capacity of the thermal power plant, located in the Angor District of Surkhandarya region, is 1,560 MW/s, from which an average of 4-5 million tons of carbon dioxide per year is released.
The next step is the process of producing methanol (CH .oh) from hydrogen (H.) and carbon dioxide (CO_2).
Technological stages:
1. Gas mixture preparation: gas flows (hydrogen and Co.) are measured and mixed with precision, the optimal molar ratio is H_2/CO_2 = 3:1 and moisture, dust, oxygen and other impurities are removed.
2. Synthesis (reaction): gas mixture is sent to catalytic reactor, reaction occurs in the presence of $CU–ZnO–Al_2O_3$ catalyst; temperature 200-280°c, pressure: 50-100 bar.
3. Cooling and condensation: the gas from the reactor is cooled, the liquefied methanol and water are separated, and the remaining gases (H_2 and CO_2) are re-sent.
4. Purification (distillation): water, ether, formaldehyde, CO_2 residues inside raw methanol are removed by distillation, resulting in methanol with 99.85% purity.
The cost of this technological equipment is $ 400 million.



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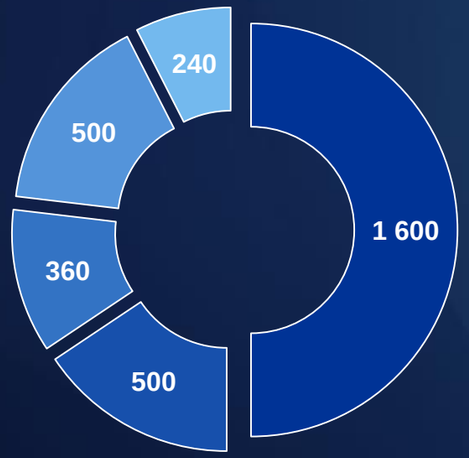
Project expenses

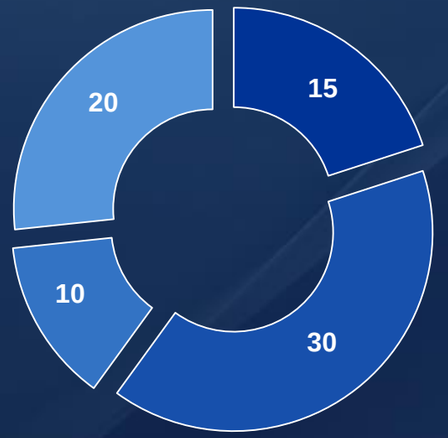
Initial Investment (CAPEX) *(mln dollar)*



Total CAPEX: **$3 200 mln**

- Solar photovoltaic station
- Electrolyzers (hydrogen production)
- Ammonia production complex (with nitrogen extraction)
- Methanol production complex (with carbon dioxide capture)
- Construction, transportation and infrastructure costs

Operating Costs (OPEX) *(mln dollar)*



Total OPEX: **$75 mln**

- Salaries and services
- Technical service, repair, consumables
- Water, auxiliary energy, chemical
- Transportation, logistics and export costs

This financial overview outlines a comprehensive cost structure and strong profitability of the proposed ammonia and methanol production project. The breakdown includes both initial capital investment (CAPEX) and annual operating costs (OPEX), alongside projected revenue and profit estimates.

Product	Capacity	Amount *(million USD)*
Ammonia	200 000 tons	140
Methanol	300 000 tons	150
Technical oxygen	70 000 tons	5
Carbon credits		25
TOTAL		**320**

Annual EBITDA:
= $320 mln - $75 mln = **$245 mln**

The project's strong profitability forecast is underpinned by efficient operations and high market demand, positioning it as a highly attractive investment.

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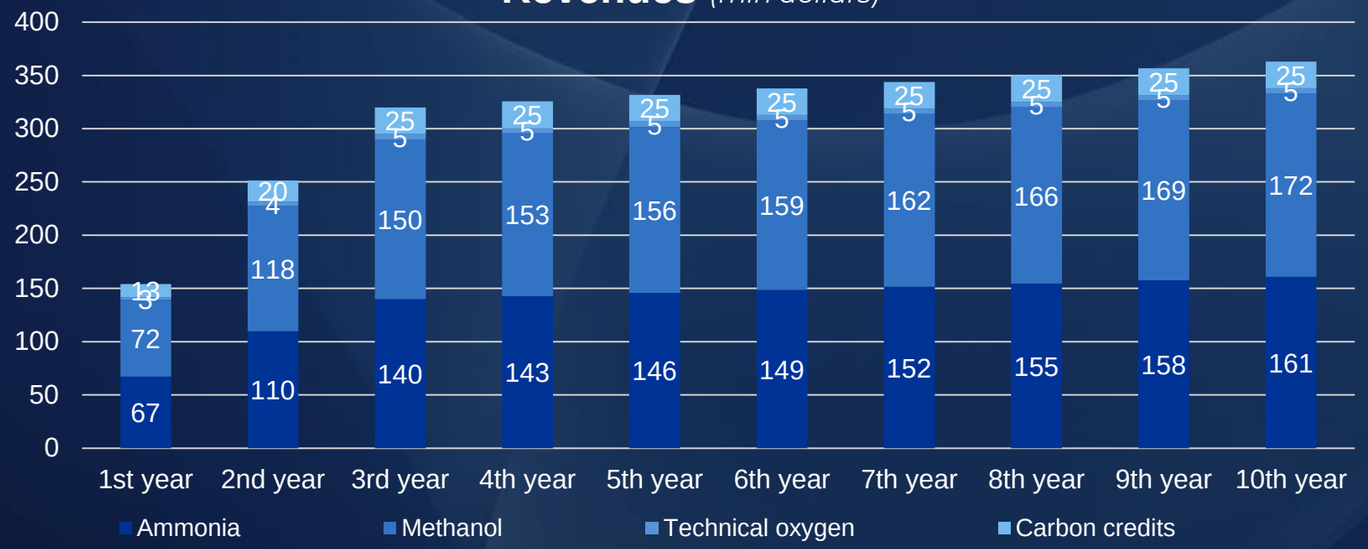
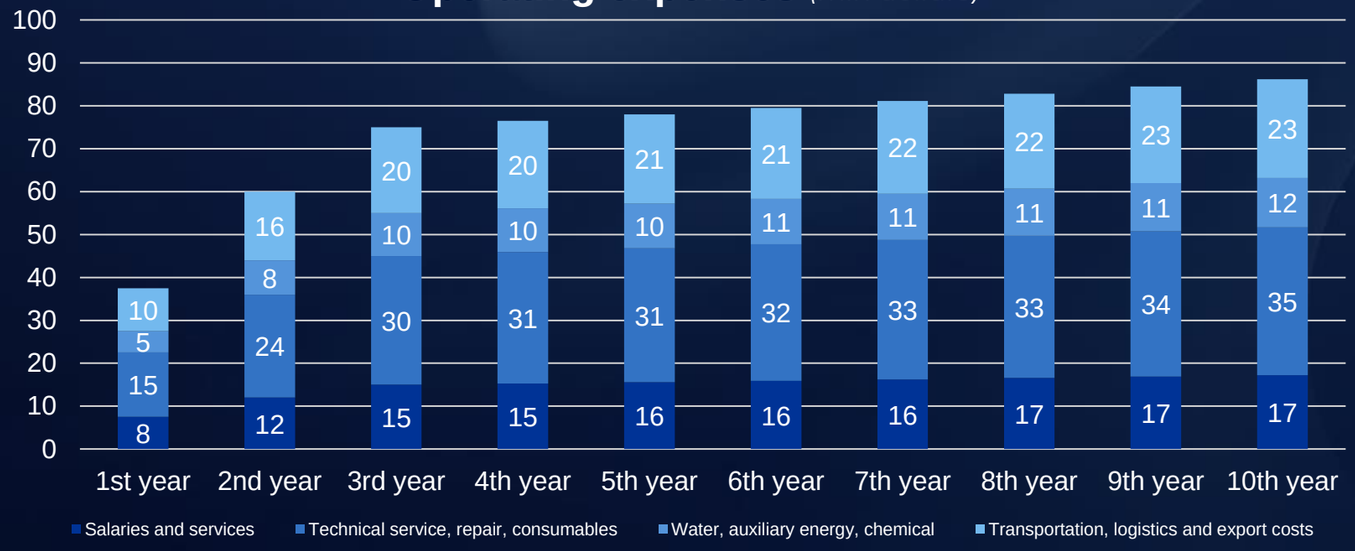
Financial indicators
(10-year projection)

Revenues *(mln dollars)*



Operating expenses *(mln dollars)*



Total 20-year cash flow:
$2 251,7M after full CAPEX recovery

NPV (10% discount rate):
NPV= **$691 million** *(Favorable!)*

IRR (Internal rate of return): **≈ 14%**

Payback period (PP):
= **13,1 years**

Profitability index (PI):
=(NPV+CAPEX)/CAPEX=($691M+$3200M)/$3200M= **1,22**

Return on investment (ROI):
= **6,6** *(20 years)*