





OSHPC BARKI TOJIK



### Objectives of the implementation studies

- Establish detailed project schedule and cost estimate for each alternative
- Input data for economic and financial analysis

### Structure of presentation

- Project schedule
- Cost estimate











## Project

#### Objectives:

- Produce the schedule of works for each dam alternative [1290; 1255; 1220] m asl;
- Identify critical activities and critical path.

#### – Methodology:

- Software: MICROSOFT PROJECT;
- Identify the main works (hydraulic tunnels, powerhouse, );
- Identify the main task (excavation, concrete lining, ) for each work, and evaluate their duration.
- A detailed implementation schedule (about 270 items)
  - Contract activities (technical specifications, tender, evaluation and contract Award, mobilization);
  - Roads, site installations, transportation structures;
  - River diversion structures and sequences, flood management structures;
  - Power system structures;
  - Dam works.





# Project schedule Vain hypotheses

- Embankment works:
  - 9 months per year, with 3 months of stoppage because of weather conditions (rain, snow and frost);
  - Shell: 11 months per year because of frost.
- Open air works:
  - Aggregate processing: 11 month per year because of frost;
  - Open air concrete: 11 months per year because of frost
- 25 working days per month
- 18 working hours per day.
- Construction rates:
  - Underground works: tunnel excavation and lining (12.5 m/week);
  - Dam: material placement rates (300 000 to 800 000 m3/month)





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#### Two critical paths identified

- Early generation phase
  - Powerhouse cavern stabilization works;
  - Powerhouse excavation of units 5 and 6;
  - Concrete and installation of units 5 and 6.
- Main dam works
  - Construction/rehabilitation of transport facilities;
  - Core foundation abutment excavation;
  - Core foundation excavation below elevation 1000 m asl;
  - RCC slab located under the core;
  - Core / embankment.





#### <del>Moject Schedule – Conclusion</del>

- Two contract periods in order to reduce as much as possible the overall construction time:
  - Pre-contract (2 years);
  - Main contract (between 8 years and 11,6 years).
- Total duration of construction:
  - Between 10 and 13,5 years from TEAS validation and decision to proceed with the Project;
- Early generation phase:
  - 6 years after river diversion for 1290 and 1255 alternatives;
  - 6,8 years after river diversion for 1220 alternatives.
- A realistic schedule, that nevertheless requires:
  - A good coordination of all activities;
  - An adequate mobilization of equipment and labour as soon as construction begins.





# Cost estimate





### Cost estimate

- Objectives:
  - Terms of References:
  - Establish a detailed Cost estimate for each alternatives (9)
    - 3 dam alternatives: FSL = [1290; 1255; 1220] m asl;
    - 3 installed power capacities: High, Intermediate, Low.
- Methodology:
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  - Define a list of Unit prices;
  - Establish Bill of quantities;
  - Cost = Sum of (Unit prices \* Quantities).
- Hypothesis:
- Basic case: alternative 1290 m asl (a specific analysis);









# Cost estimate Methodology

- Civil works
- Basic wages of labour;
- Basic costs of materials delivered to the site;
- Capital and operating costs of the construction equipment;
- Site construction contingencies;
- Overhead and profits.
- Permanent equipment
- E&M:
- Based on installed capacity: cost per KW;











# Cost estimate - Dam works-evaluation

- Evaluation takes into account:
- Material:
  - Type (rockfill, alluvium shell, core, )
  - Sources of materials
  - Material stockpiles





TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT

# Implementation studies - Conclusion

- Input data for economic and financial analysis are:
- Cost estimate:
  - Total cost of the project;
  - Local and foreign components.
- Implementation schedule:
  - Total duration of construction: between 10 and 13,5 years from TEAS validation and with the Project;
- decision to proceed

Capex disbursement curve.





# THANK YOU FOR YOUR ATTENTION



