Deep mining of hard coal goes through periods of profitability. The European Union’s adopted solution is obvious: to bury unprofitable mines. Thus, future access to strategic raw material e.g. coal, is permanently eroded along with a fatal social impact.

The project comes up with the idea of using the gravitational potential in vertical mining works - pits – for the accumulation of electric energy. It offers two goals:

1. To preserve mines under economically sustainable conditions in a preserved state until it is beneficial to proceed with profitable mining or until the extraction of raw materials executed by different (newly developed) technology.

2. To run a unique power plant to compensate fluctuations in the transmission power system.

The main purpose of the project is the reconstruction of already existing mining equipment. Lifting devices (cages, skips) will accumulate electrical energy in the form of the gravitational potential of the body (weight). The device will be used to supply control power or in conjunction with RES as a flexible power source. All that with a minimal carbon footprint, regardless of exported or domestic fossil fuel.

The project goes hand in hand with synergic, energetic and non-energetic activities. Those will increase the profitability of the conservation state of mine works. Activities form an interconnected closed cycle of energy in the form of power and heat sharing.

The entire complex of activities has an energetic and commercial link to the outside environment, including intensive public engagement.
Deep mines – accumulation of electric power

1. Project goals

1.1. Mines – preservative mode

The way of sustainable run of deep mines in a preservative mode

+ Preservation of future approach to the resource balance sheet reserves of coking coal >100 mil. tones
- Cost of preservative operation of the mines (ventilation, water pumping), maintenance of the mines, premises, technical equipment

1.2. Support of production EE without carbon trace

+ Increase of accumulation capacity in distributional network
+ Supply of regulational power
+ Space expansion for the production of EE from RES

2. Outcomes

2.1. Pragmatic approach

Respecting the legislation, current technique, gear

2.2. Innovative approach

Overlooking technical practicability (respecting object’s and mine’s condition...)

3. Project status

3.1. Accumulation of electric energy, bob manipulation – three priorities

3.1.1. Minimal cost of execution

Production up to 47GWh/year

+ Mine cars with load
+ Current mining plant
- New propulsion
- Fragmented operation
- Operational requirements

3.1.2. Minimal operating costs

Production till 49GWh/year

+ Continuous operation
+ Automatic operation
+ Universal solution
- More extensive reconstruction („endless“ rope, shaft guides)
- Expensive realization

3.1.3. Maximum output

Idealogical proposition

Essential reconstruction of current mechanism

3.2. Ventilation optimization

Reducing of final operational cost, reconstruction of a main ventilation unit

---

Location/TZ

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<th>Stonava</th>
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Total production/year

GWh 47,82

Total production/day MWh 131,03

Total production/hour MWh 13,10

Location/TZ

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info@lektiko.cz
4. **Synergy**

4.1. **Virtualization of energetic source**
- Connection with OZE, virtual elastic source of EE
- Production of EE from fossil fuels – to level the carbon trace

4.2. **Compensation**
- Temporary storage – equalizing of fragmented operation
  (set of standard accumulators, baterries)
- Synchronization of more devices
- Infrastructure – use of current regulation, compensation, control
- Location
- Region (Veolia)

4.3. **Recuperation**
- Operation control via power unit
- Minimizing the loses of mechanical breaking

4.4. **Hydrogen technology**
- Electrolysis, storage of $\text{H}_2$
- Storage – mining area
- Fuel cells

4.5. **Detritus**
- Horizontal well
- Iodinebromine brine
- Thermal bathing

4.6. **Chemical and technological use of coal without mining**
- Pyrolysis
- Products of chemical industry
- Gas cogeneration

4.7. **Methane**
- Degassing
- Cogeneration

4.8. **Mine water’s thermal energy**
- Thermal pump

4.9. **Stirling engine**

4.10. **Appeal on visitors**
- Mines infrastructure, mining production
- Unique technology
- Technical heritage
- Recultivated landscape
- „Mining myths“, real experiences

5. **Material strategy – Coal resources**

5.1. MIT: Resource policy of Czech republic in the field of raw materials and their resources (February 2017)
- >100 mil. tones of coking coal
- Superstrategic resource (coking coal)
- Material approach preservation

6. **Synergical mix**
- Open cycle of sharing of electric energy (electricity management)
- Handing over and utilization of production of heat, cold and ventilation optimization

6.1. **Electro-energetic management**
- Running of electro-energetic inputs and outputs, synchronization and sharing of electric energy

7. **Financing**

7.1. **TACR – Theta**
- Challenge 1 – next round

7.2. **Horizon 2020**
- Small and Medium-sized Enterprises Instrument (50 000 Euro)

7.3. **Other sources of public support**
- Pre-application research for ITI II - MŠMT

7.4. **Private investments**
- OKD – political level

8. **Cooperation**

8.1. **OKD**
- Contract, guarantee partner, a pilot project (Doubrava III)

8.2. **Siemens – drive units**
- Propellant unit, battery

8.3. **ELCOM, a.s.**
- Compensation, infrastructure

8.4. **Program Re-start (Office of the Government Commissioner)**
- Political support

8.5. **VŠB – TUO**
- Personal level

8.6. **ČBÚ**
- Legislation, organization