Dr. Ing Stefan Ursache

Current trends in renewable energy in rural areas: streamlining production and storage systems

Innovative Green Power

SPIN-OFF
POCCE
Priority Axis 2: Competitiveness through Research, Technological Development and Innovation
Operation: 2.3.1. "Support for innovative start-ups and spin-offs"

- Innovative technological solutions in the field of efficient regeneration and recycling of batteries used in various fields, ranging from those that equip cars to complex energy storage systems used in green power systems or in industrial applications

Traditional renewable energies

- "green" and can be preserved
  - large investments

Rural: Small hydropower plants

- Affordable
  - continuously developing

Rural: Irrigation, street lighting, household

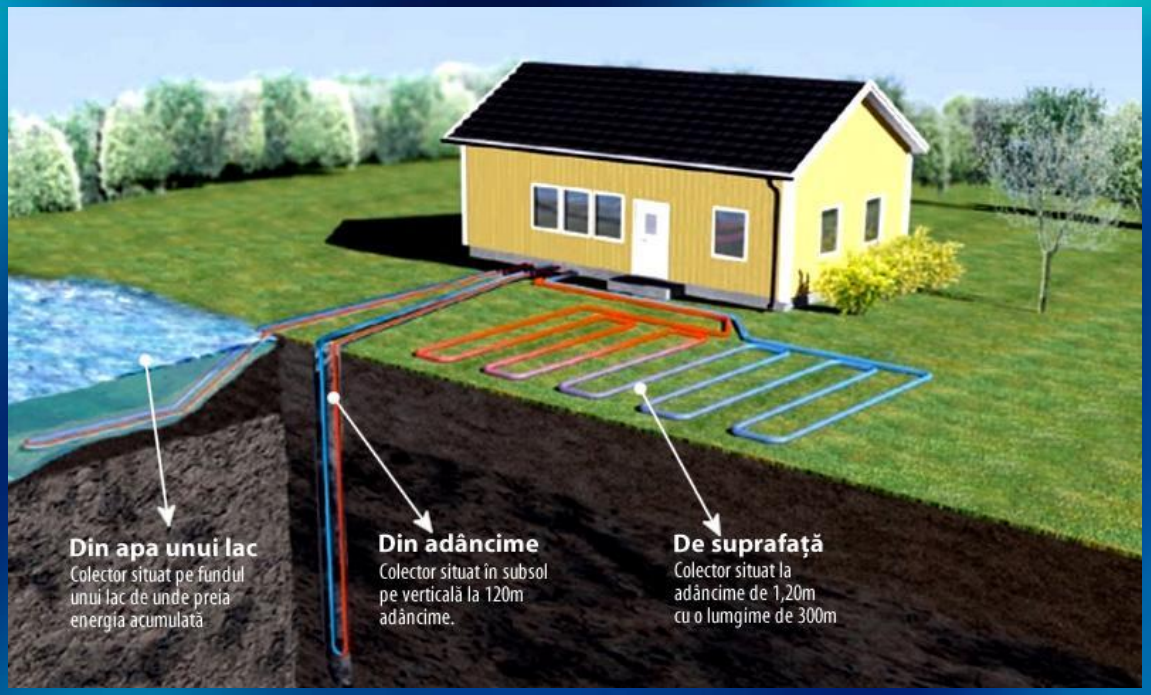
- green certificates
  - "green"

Rural: Irrigation, domestic, eoline parks - the national energy system

Geotermal energy

Collects the heat of the Earth contained in groundwater or in the soil

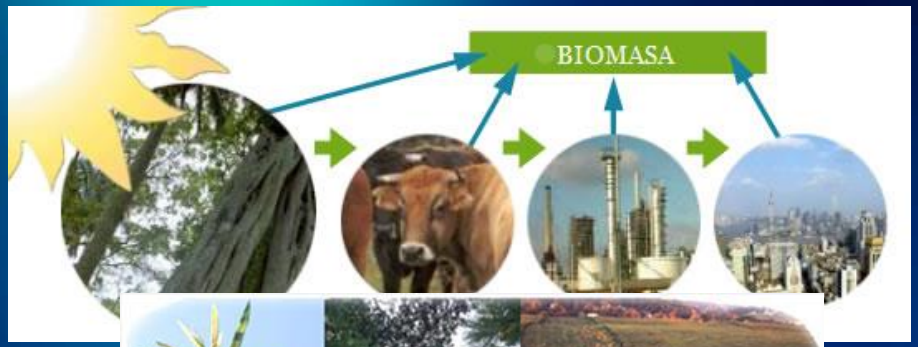
- pretty expensive
- Low efficiency



- ideal for use in hybrid systems: thermosolar / photovoltaic / biomass

Biomass energy

Direct combustion with heat production
Fermentation with biogas (CH4)
Fermentation with the production of bioethanol blended with gasoline can be used for engine operation.
Chemical transformation of biomass of vegetable oil type with biodiesel production used for diesel engines.



Rural: brichetare resturi vegetale - culturi

Unconventional energies energy

Energy from vibrations

- Can be collected by piezoelectric systems

Innowattech Israel – Prof. Dr. Haim Abramovich

Battery storage

Nickel Cadmium
• The positive electrode is made of Cd and the negative electrode is made of Ni •
• Pollution
• Memory effect

NiMh
• The anode is made of Mh
• Has a negligible memory effect • They are less able to produce a maximum power
• They are expensive

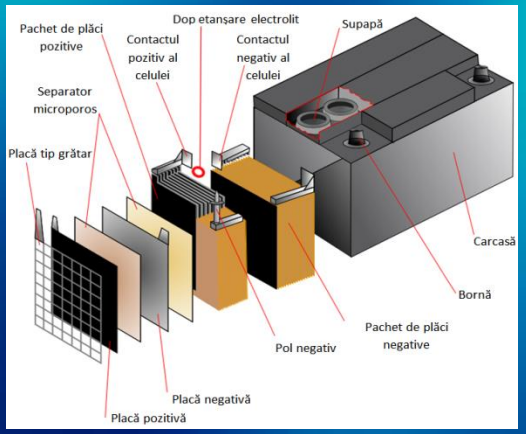
Lithium-Ion
• It is a more recent technology
• They are vulnerable to overcharging
• The unloading curve suddenly

Liqiud metals: Technology in development

Acid-lead accumulator batteries
The most common type of rechargeable battery

• Water and lead sulphate are formed at discharge, water dilutes sulfuric acid (electrolyte) so that the specific mass of the electrolyte decreases as the battery is discharged
• Reverse reactions occur during loading
• There are different types of batteries

Cell apx. 2V
Batteries: 12 V, 24 V, 48 V, 96 V



Lead-acid battery problemse

Several degradation processes can agitate the battery. Some are reversible and others lead to irreversible battery degradation.

Battery aging mechanisms are processes that affect their correct performance.

The main phenomena affecting lead-acid batteries are corrosion and sulphation. Corrosion is irreversible and when the battery occurs, the battery needs to be replaced. Gas also has an impact on water loss and reduces battery life.

The hard sulphation phenomenon

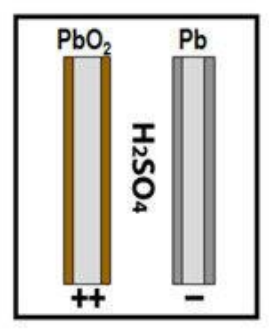
The phenomenon of release of the active material

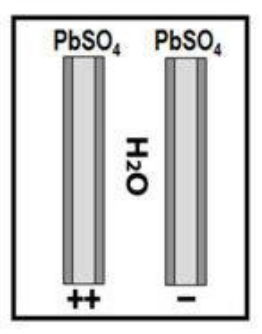
Corrosion of electrodes phenomenon

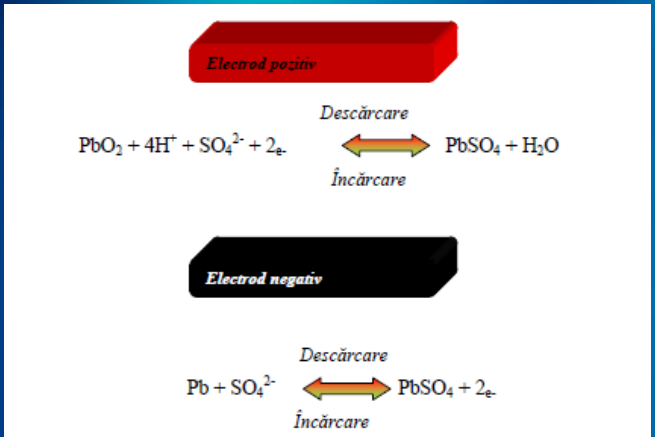
The phenomenon of stratification of the electrolyte
The phenomenon of degassing and drying of the electrodes

Regenerating lead acid batteries

Desulphation - Reverse Sulfation Process - Reversible







Normal condition Sulfated state

Regenerating lead acid batteries

Combined microwave-pulse current process