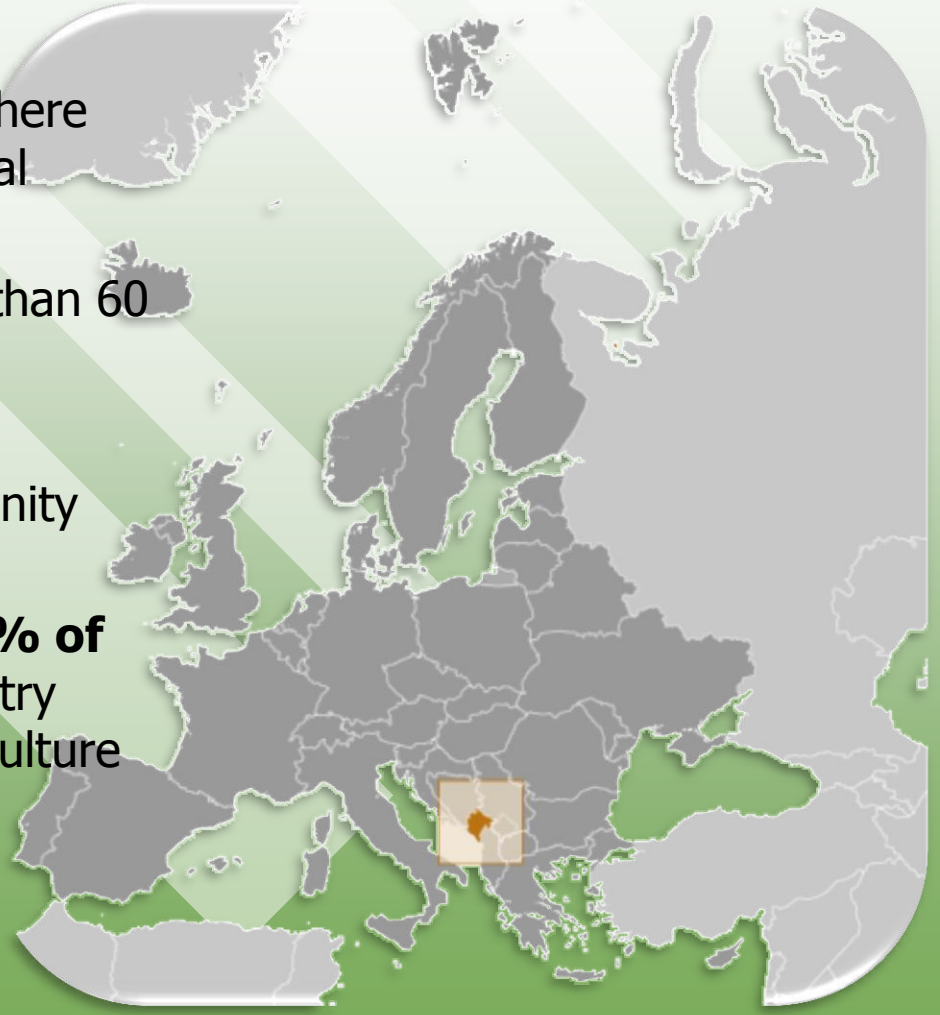
D.Sc. Igor Kovačević

The Project Increasing Resource Efficiency in Water Supply System in Cetinje

International Training Course on Business Planning for Energy Efficiency Projects
Istanbul, 20th June 2013

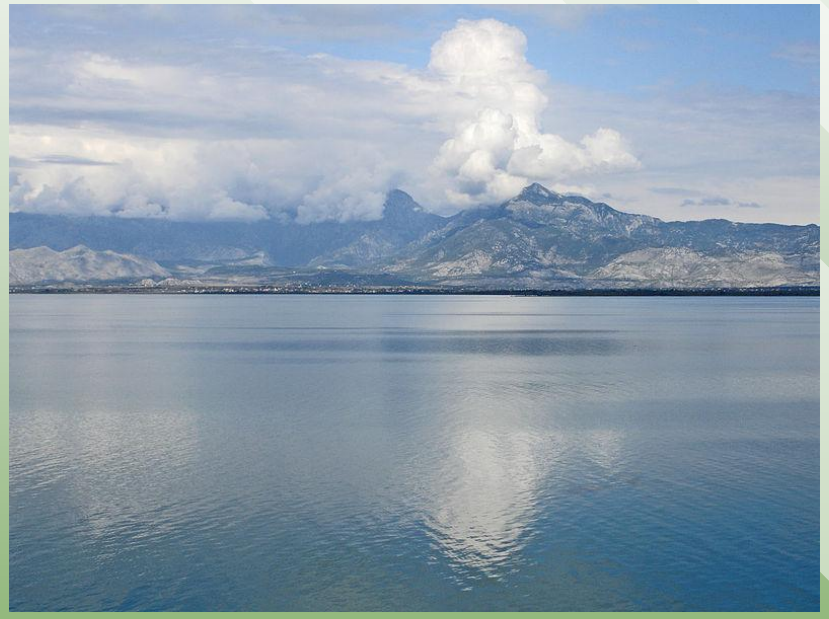
I.1. Facts of Montenegro

- **Southeast European country**
- **Population of 625 000** people, where about ¼ of population lives in capital Podgorica
- **Area 13 812 km²**, of which more than 60 % is mountain region
- Candidate country for EU
- Contracting party of Energy Community Treaty
- Montenegro invests in tourism, **70 % of GDP is from services**, while industry (aluminum, iron and coal) and agriculture are only around 15 % of GDP each



I.2. Water Resources

- Skadar lake je biggest water fresh water on Balkan peninsula, shared between Albania and Montenegro

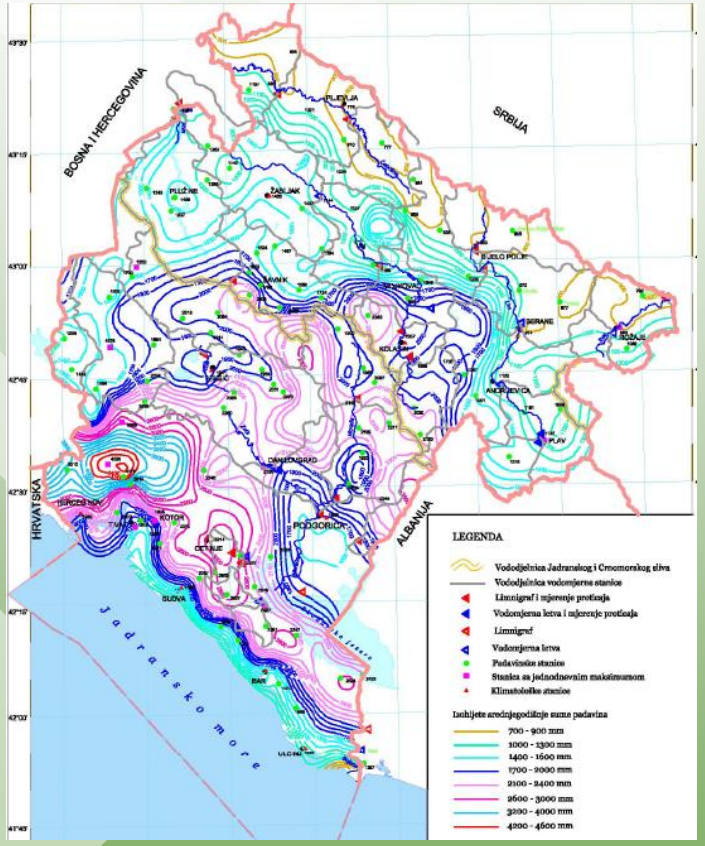


Skadar lake

- Surface varies between 400 km^2 to 525 km^2 and
- Water volume between 1,75 i 4,25 km^3

I.2. Water Resources (cont.)

- With an average outflow of 40 l/sec/ km^2, Montenegro ranks among the top 4 % of countries with the highest average outflow
- Given that at least 95.3 % of Montenegro's waterways originate in its territory
- 30 425 m^3/year is available to each citizen of Montenegro, which makes Montenegro one of the wealthiest countries in Europe in terms of water.
- Average annual precipitation varies in Montenegro in range from 700 to 4600 mm/an, the most in Europe
- **Precipitation in Cetinje is cca 4000 mm**



Precipitation map of Montenegro

Montenegro

1. Business Description

- Water Supply System of Cetinje, local governmental service

Object	Level msl
PS „Podgorska vrela“	172
BC „Višnjica“	503
BC „Velja gora“	828
WS „Obzovica“	828
PS „Uganjska vrela“	686
BC „Lašor“	754
big R „Zagrablje“	691
small R „Zagrablje“	695
R „Sandin vrh“	730

- PS (mont. CS) – Pumping Station
- BC (PK) – breaking chamber
- R – reservoar

- Current System Status:
  - High level difference between pumping station and reservoar, **cca 650 m**
  - system is very long, cca 20 km
  - old and bad opareted
  - leakage is high...

Montenegro

2. Nature of the Project

- The Project: Improvement of Resource Efficiency in Water Supply System in Cetinje
- Scope of the Project
  - PART I: Implementing Energy Management System – ISO 50001
    - ✓ creating energy policy and planning
    - ✓ implementation and operation, checking and
    - ✓ management responsibility and review
  - PART II: Implementing basic energy efficiency measures
    - ✓ detailed energy audit
    - ✓ reactive energy compensation
    - ✓ supply pipes reconstruction
- Rationale of the Project – Increasing resource efficiency in water supply system

Electricity consumption of water supply system in Cetinje, period 2010– 2012 years

Pumping Station	2010		2011		2102	
	Active [GWh]	Reactive [GVA]	Active [GWh]	Reactive [GVA]	Active [GWh]	Reactive [GVA]
PS Podgor	15.448	5.405	17.005	6.26	**15.005**	5.263
PS Vrela	0.748	0.477	0.349	0.215	**0.420**	0.273
Total	**16.196**	**5.882**	**17.354**	**6.475**	**15.425**	**5.536**

3. Benefits

- Energy and Environmental Improvements – Energy consumption reduction and consequently CO_2 emission reduction
- Import substitutions – Reduction of electricity import at local and national level
- Productivity Improvements – Improve security of water supply and decreasing energy cunsumption
- Manager development – Establishment of Energy Management System

4. Sponsor

- The Sponsor – Water Supply System of Cetinje, local governmental institution
- Sector: Service
- No the Project's Partners

- Objectives – Water Supply System of Cetinje is going to be the major and only supply water system in municipality in long-term period

Role of the Bank – The bank is lander of the Project

5. Project Costs

- The total Project cost: 300.000 €
  - Energy menagment system – 20.000 €
  - Datialed energy audit and Reactive energy compensation – 40.000 €
  - Supply pipe reconstruction – 240.000 €

- Type and Amount of Finance Required: debt 240.000 € or 80 % of total amount
- Sponsor's own resource 60.000 € or 20 % total amount

- Lifetime of the Project, minimum 20 years
- Expected Implementation Time – 12 months
  - Energy Management System, 6 months, from begining of the Project
  - Energy Efficiency Measures, 8 months, 4 months from begining
- Expected savings per year, 10 % of energy consumption ~ 1,5 GWh or 120.000 €
- Energy price 8.0 c€/kWh
- Simple pay back is 2,5 years

Montenegro

Thank you for your attention!

D. Sc. Igor Kovačević
Independent consultant
Montenegro
+38269617790
icosrle@hotmail.com