An energy sector perspective to optimizing flow regulation in the Drina River Basin

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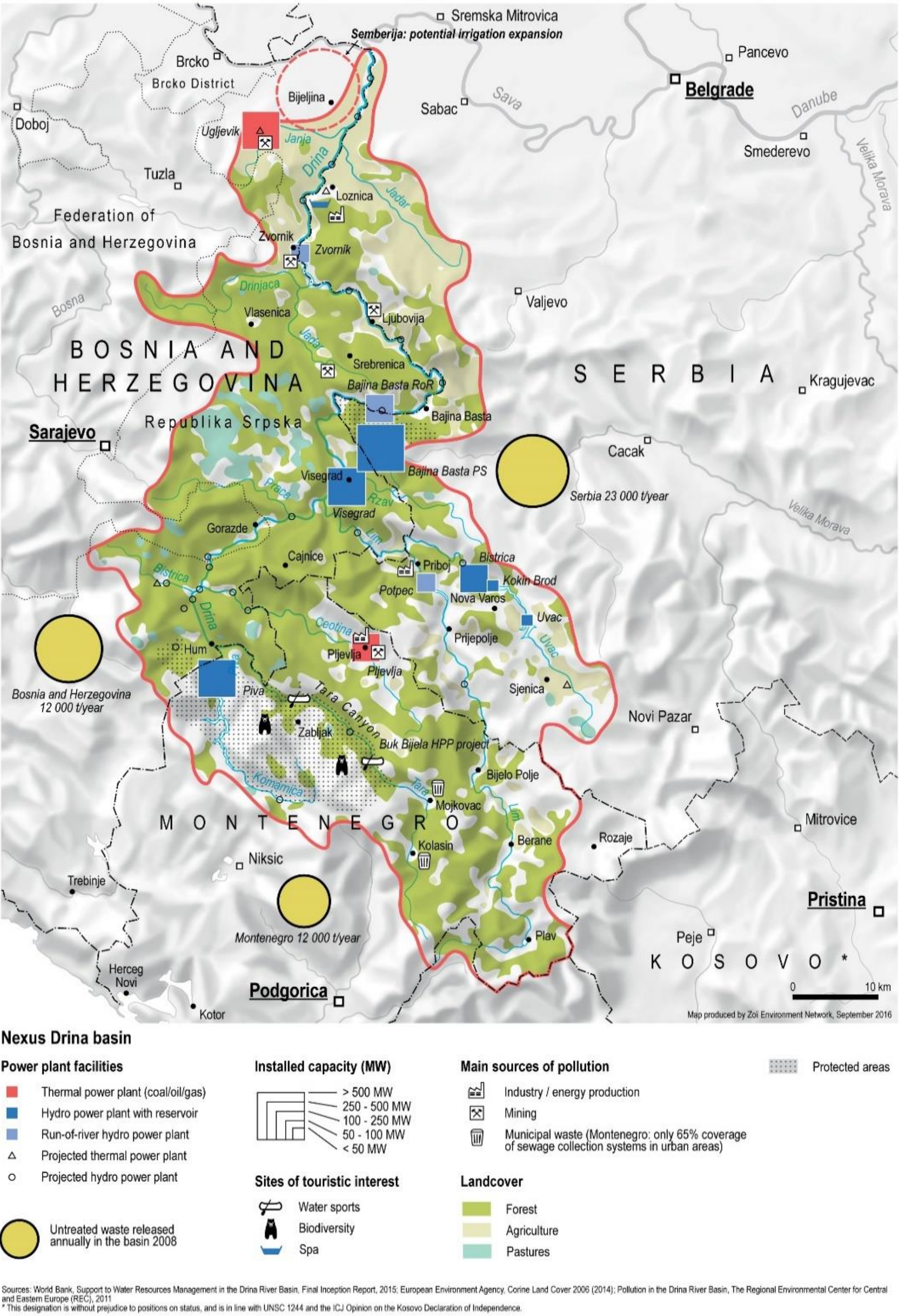
DRINA RIVER BASIN NEXUS ASSESSMENT

Improving water quality and management of solid waste

Promoting rural development

(Co-)optimizing hydro power plants operation



BACKGROUND

- The Drina River Basin (DRB) extends over 20,320 km^2 shared between: Bosnia and Herzegovina, Montenegro and Serbia.
- The Drina River is the biggest and most important tributary of the Sava river and in turn the Danube River Basin.
- High dependence on Hydro and coal for electricity generation and Lack of investments in non-hydro renewable energy sources.
- Slow implementation of energy efficiency policies.
- Energy poverty and “vulnerable costumers”.
- Low and informal cooperation in hydro power operation (wasn’t the case during former Yugoslavia)

SUGGESTED POLICY DIRECTION

Improving cooperation between the DRB countries on flow regulation in *the operation of hydro power plants, mitigation risks against floods, reducing the stress on hydro and thermal generation through the implementation of energy efficiency measures and non-hydro renewables.*

WHY THERE IS NEED FOR COORDINATION?

1.Missed opportunities in term of electricity generation.

2.Uncertainity about the Impact of hydropower expansion on the flow regime and downstream uses.

3. Urgent need for flood mitigation.

4. Un-utilized electricity trade potential.

WHAT IS NEEDED TO SUPPORT A DIALOGUE ABOUT **FLOW REGULATION?**

Suggested areas of actions:

1. Formal agreement on flow regulation.
2. Improve data sharing and intersectoral communication.
3. Better scheduling of hydro power plants operation.
4. Unified and modern hydro-meteorological forecasting system.
5. Development and continuously updating forecasting models.

WHAT IS NEEDED TO SUPPORT A DIALOGUE ABOUT **FLOOD RISK MITIGATION?**

Suggested areas of actions:

1. Improve cooperation through better emergency preparedness and response planning.
2. Properly operating hydro-meteorological monitoring and the early warning systems.
3. Comprehensive approach that covers: infrastructure, software, modeling tools and building human capacity.

WHAT IS NEEDED TO SUPPORT A DIALOGUE ABOUT **ENVIRONMENTAL FLOW CONSIDERATIONS**?

Suggested areas of actions:

1. Harmonise and enforce environmental flow legislation.

2. Effective monitoring of environmental flow consideration at different phases of projects.

3. Apply ICPDR guiding principles in the development of future hydropower projects and upgrading of existing ones.

Quantification of the benefits of (Co-)optimizing flow regulation

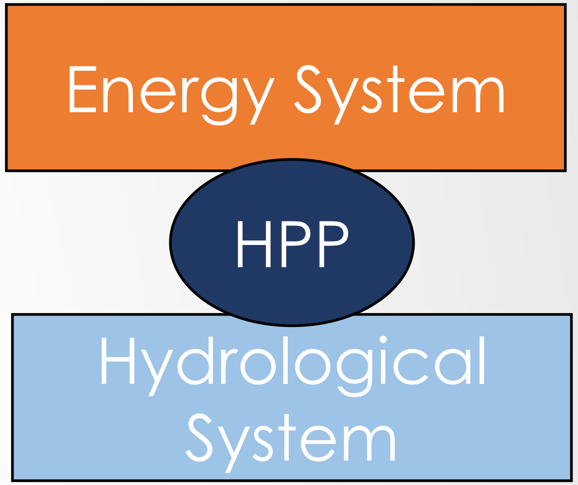
Approach

Developing multi-country model of the three riparian countries (BA, ME and RS) with the focus on Drina river basin, using the **O**pen **S**ource **e**nergy **MO**deling **SYS**tem (**OSeMOSYS**).

Drina Water – Energy Model (DWEM):

Focus:

- Cost optimal electricity generation to meet the demand.
- Soft linking of water flow in electricity generation system.

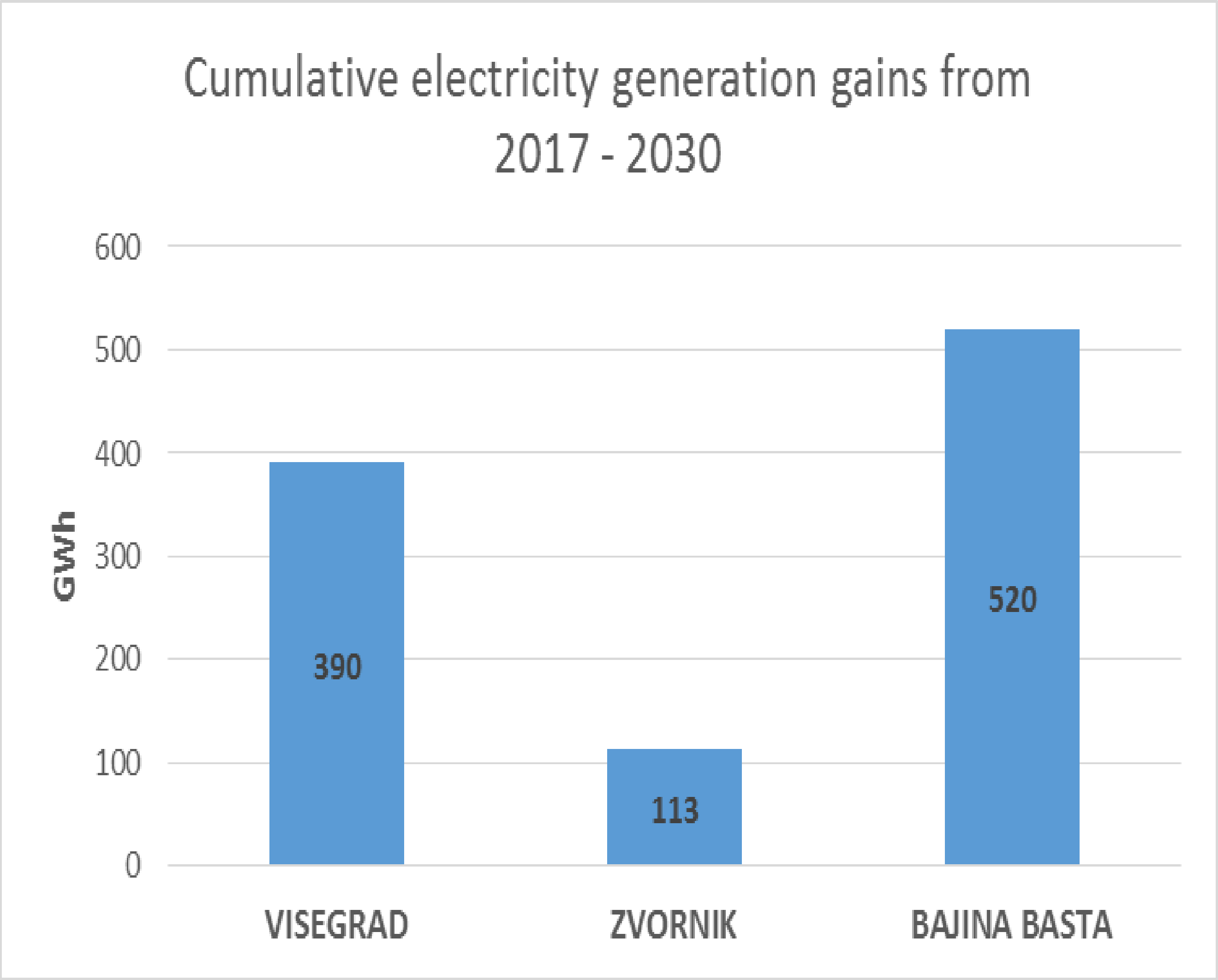


SCENARIO DESCRIPTION

- ***Base scenario (BASE)***: representing the non cooperative operation of HPPs in DRB. Upstream HPPs are operated on a single unit base and those downstream are responding to their best.

- ***Cooperative scenario (COP)***: representing a cooperative planning and operation of all the hydro power plants in the basin.
  - ***Energy efficiency (COP_EE):*** investigates the impact of implementing energy efficiency measures on the electricity generation mix.
  - ***Increased Trade (COP_TRD):*** explores the opportunities of improving interconnections and trade of electricity.

INSIGHTS - GAINS IN ELECTRICITY GENERATION (COP – BASE)



UVAC RIVER

Uvac (213 MCM)

Kokin Brod (250 MCM)

Bistrica (7.6 MCM)

LIM RIVER

Potpec (27.5 MCM)

PIVA RIVER

PIVA (880 MCM)

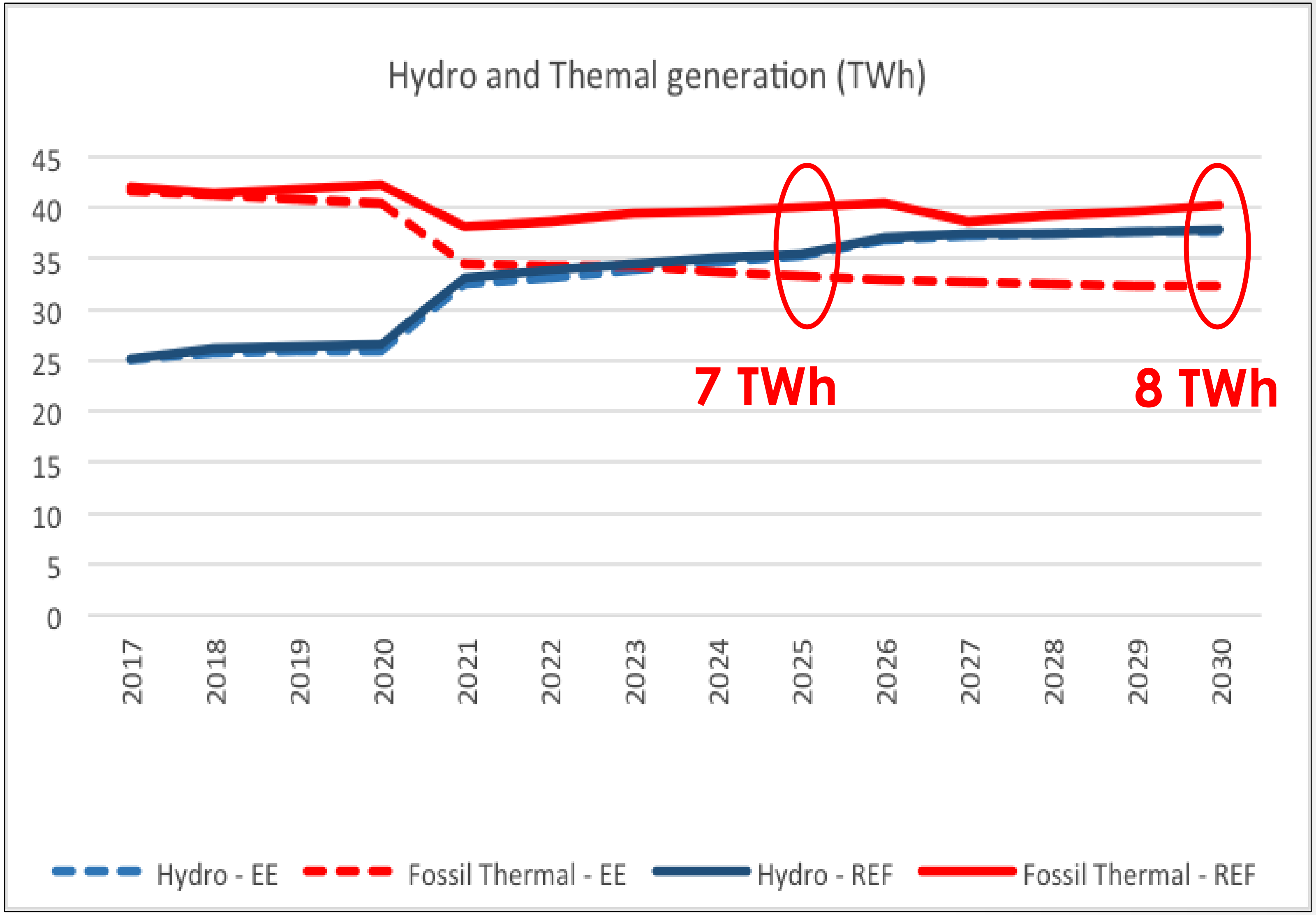
DRINA RIVER

Visegrad (161 MCM)

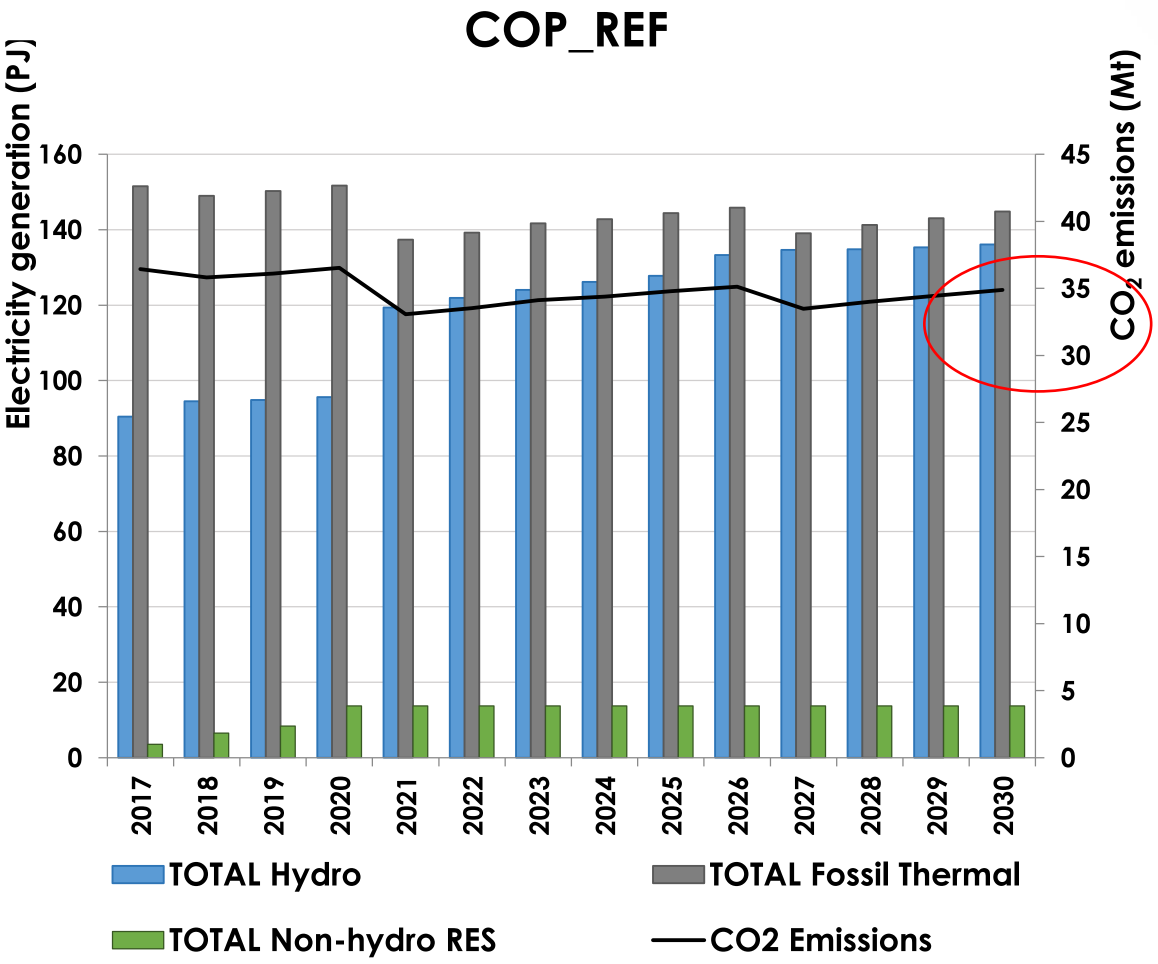
Bajina Basta (218 MCM)

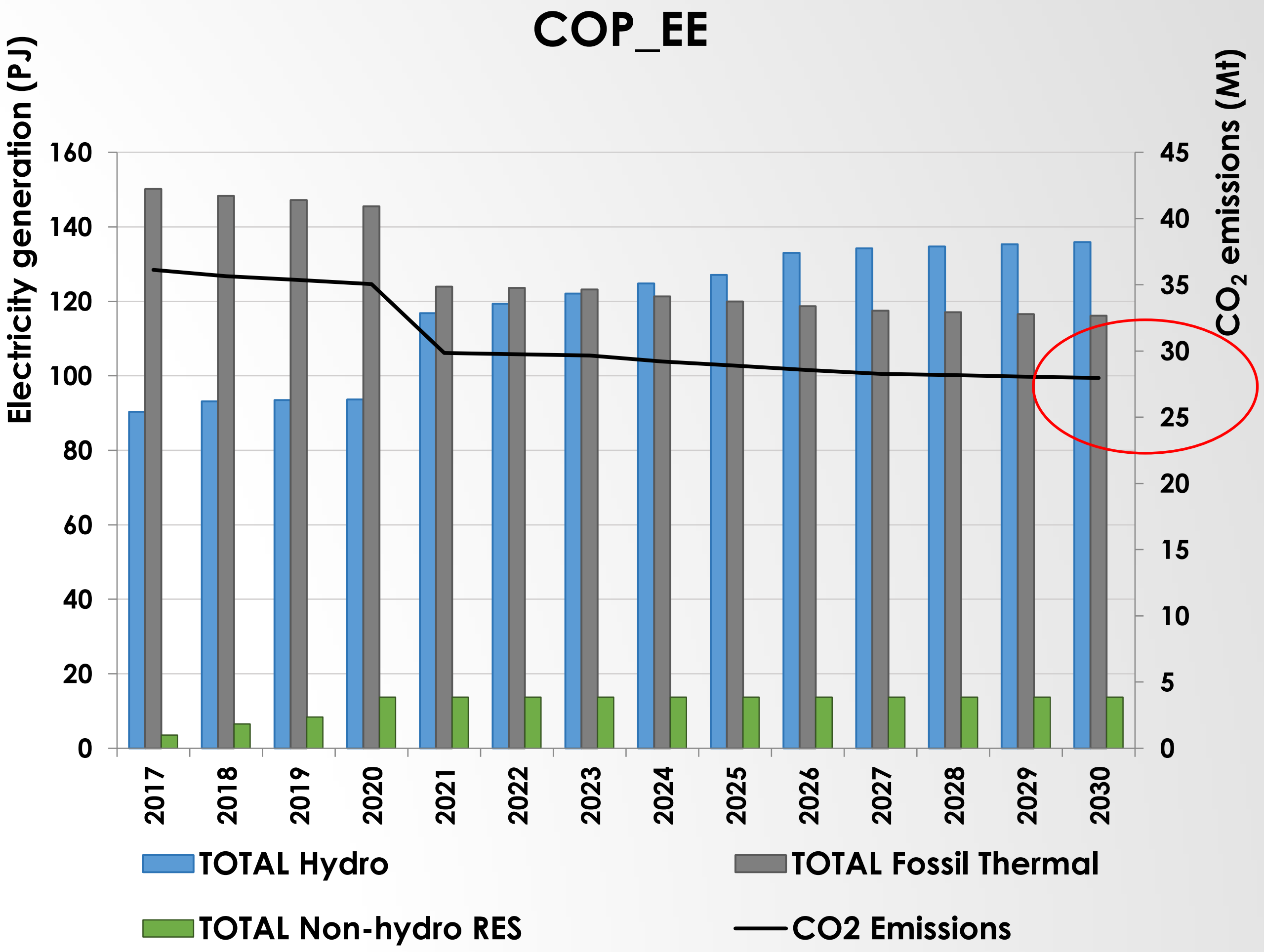
Zvornik (89 MCM)

INSIGHTS - ENERGY EFFICIENCY



INSIGHTS - ENERGY EFFICIENCY





Key Model limitations and future work

This indicative analysis can be further improved with:

- **Site specific data** related to (electricity generation, electricity trade and transmission losses and targets, water flow ..etc)
- Clear vision about **future projects** (hydro, non hydro RE and thermal)
- The model is electricity driven which means it operates the system to meet the specified demand tacking into account water availability. For more hydrological focused insights, detailed **hydrological modelling required**.

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