

# World Bank Group Support to Kosovo's Energy Sector

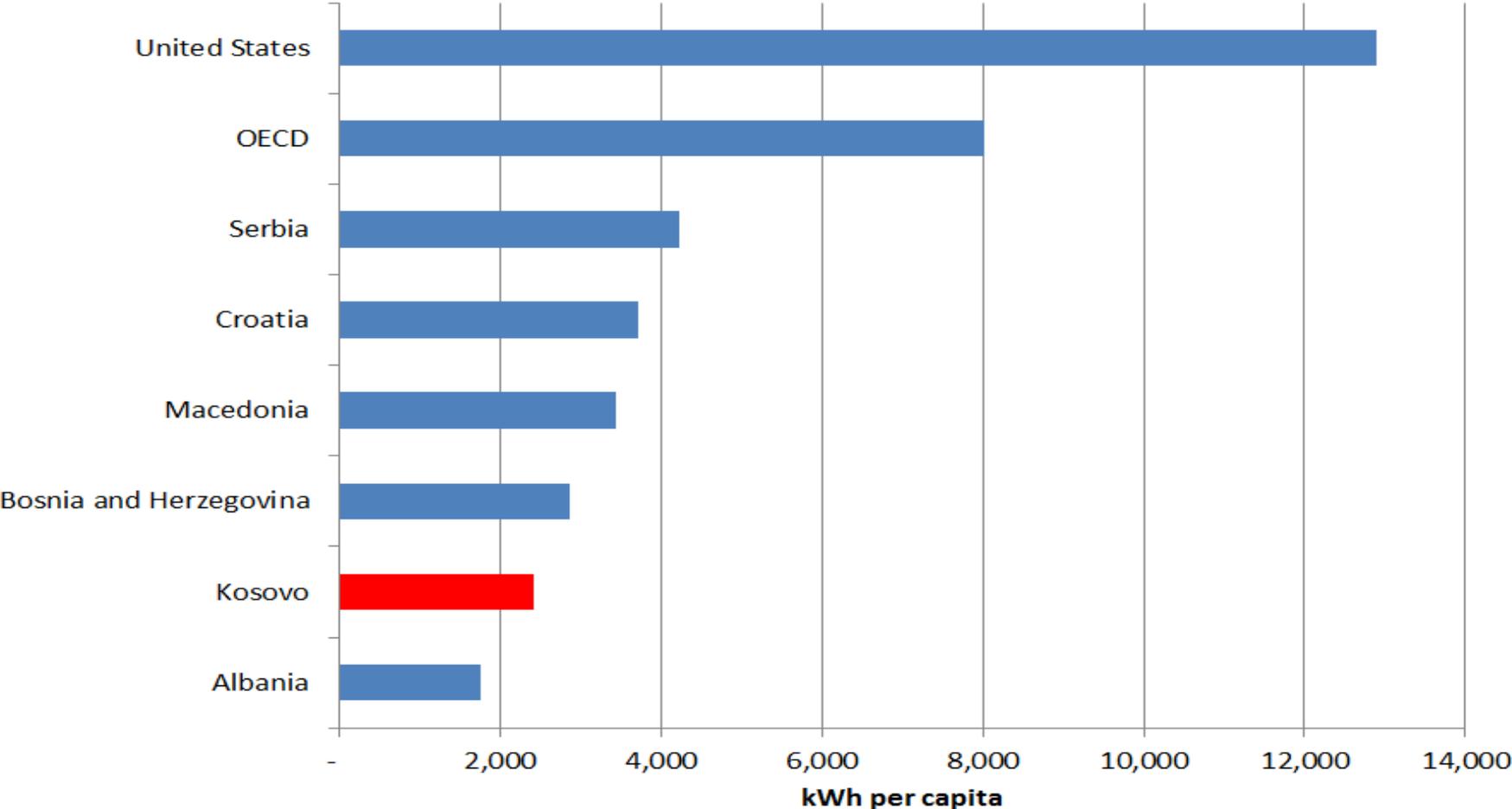


# Kosovo: Post-conflict and Fragile

- Post-conflict fragile country declared independence in 2008.
- Aid and remittance dependent.
- 45% unemployment, 76% youth unemployment , GDP per capita € 2,600.
- 98% of electricity comes from two old lignite-fired power plants.
- 9 out of 10 firms cite electricity as main impediment to investment.
- Electricity supply shortages in the Balkans limit import options.
- Kosovo taking a comprehensive approach to modernizing its energy sector.

# Kosovo's Per Capita Electricity Consumption is Low by Regional and International Standards

Electric Power Consumption 2009



# Kosovo Energy Sector: Bank's Engagement

## Ongoing and Under Preparation Projects

- Ongoing environmental clean-up of 40-year-old Kosovo A Power Plant
- Technical Assistance Project for environmental monitoring and institutional capacity, low carbon energy growth strategy, carbon capture and storage

## Projects proposed in the upcoming CAS (2012-15)

- Proposed Energy Efficiency and Renewables Project (energy efficiency in public buildings and capacity building; credit enhancement for wind, solar, geothermal, biomass; financing support for biogas at household level)
- Water Resources Project for improving supply to households, agriculture, power plant
- Proposed Partial Risk Guarantee for private sector investments in new coal-fired power plant (Kosovo Power Project)

# Kosovo – Power Sector Challenges (1)

Persistent shortages and unreliable electricity supply:

- ✓ Peak capacity gap (~ 950 MW by 2017 on closure of Kosovo A).
- ✓ High technical losses (~ 17%, should be less than 8%).
- ✓ High commercial losses (~ 24%, should be less than 5%).
- ✓ Poor billing and collection practices.
- ✓ Imports account for about 10 % of electricity supply; require Government subsidies (peaked at 5% of Govt. Expenditure in 2008).



# Kosovo - Power Sector Challenges (2)

98% of electricity generation in Kosovo comes from two old, inefficient and highly polluting lignite-fired power plants:

- ✓ Kosovo A (345 MW, 40 year old) in poor condition and is the worst single-point source of pollution in Europe. Proposed to be shut down.
- ✓ Kosovo B (540 MW, 27 year old) needs rehabilitation to meet EU environmental standards.
- ✓ Outages in generation and power shortages hurt households and economy.



# The Government's Energy Sector Strategy

Kosovo has launched a comprehensive strategy to meet its energy demand in an environmentally sustainable manner:

- Decommission Kosovo A by 2017 to comply with the Energy Community Treaty to which Kosovo is a signatory (estimated cost of decommissioning € 65 million).
- Develop the country's renewable resources.
- Rehabilitate Kosovo B to comply with EU environmental standards.
- Private Sector investment in new electricity generation capacity.
  - ✓ 600 MW and a new lignite mine - estimated cost - € 1.4 billion.
- Privatize Kosovo's electricity distribution.
- Increase Energy Efficiency
  - ✓ Energy Efficiency Law approved; Pilot projects under implementation.
- Meet Energy Community requirements - regional energy market
  - ✓ Kosovo has ratified the Energy Community Treaty and transposed EU's energy acquis as required under the Treaty into its national legislation.

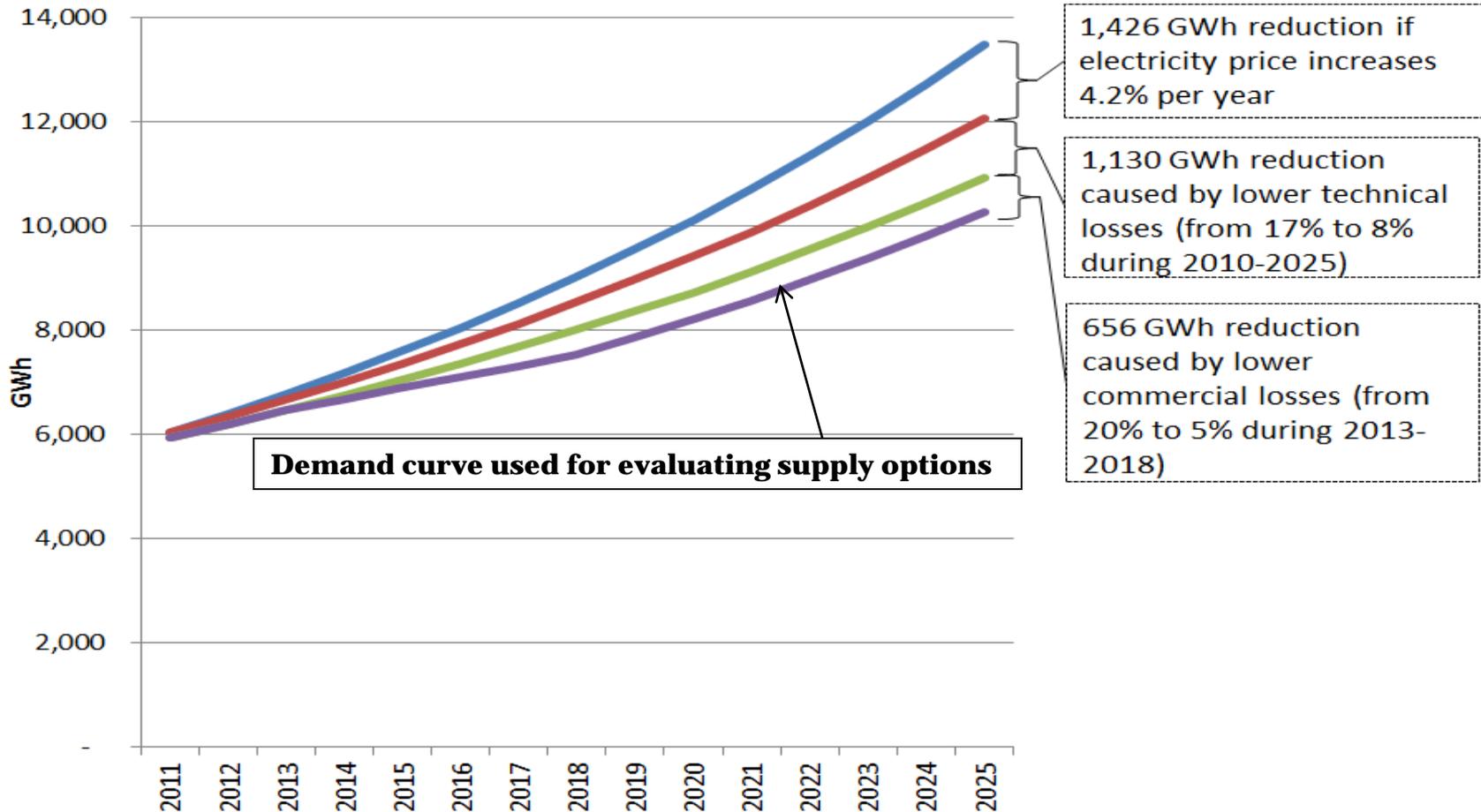
# Assessing Kosovo's Energy Development Pathways

- An energy options study was undertaken to assess the economically optimal means of meeting Kosovo's growing electricity.
- The study concluded that:
  - ✓ Kosovo needs a mix of renewables and thermal to meet its demand for peaking and base-load capacity;
  - ✓ Regional integration will help increase development of renewables;
  - ✓ In the absence of oil and gas, thermal generation from domestic lignite.
- Renewables should be developed but Kosovo has limited potential.
- The World Bank potential support for meeting Kosovo's energy needs with a coal project were assessed by an External Expert Panel.
- The Panel concluded the project, subject to certain modifications, meets the six criteria envisaged in *Strategic Framework for Development and Climate Change*.

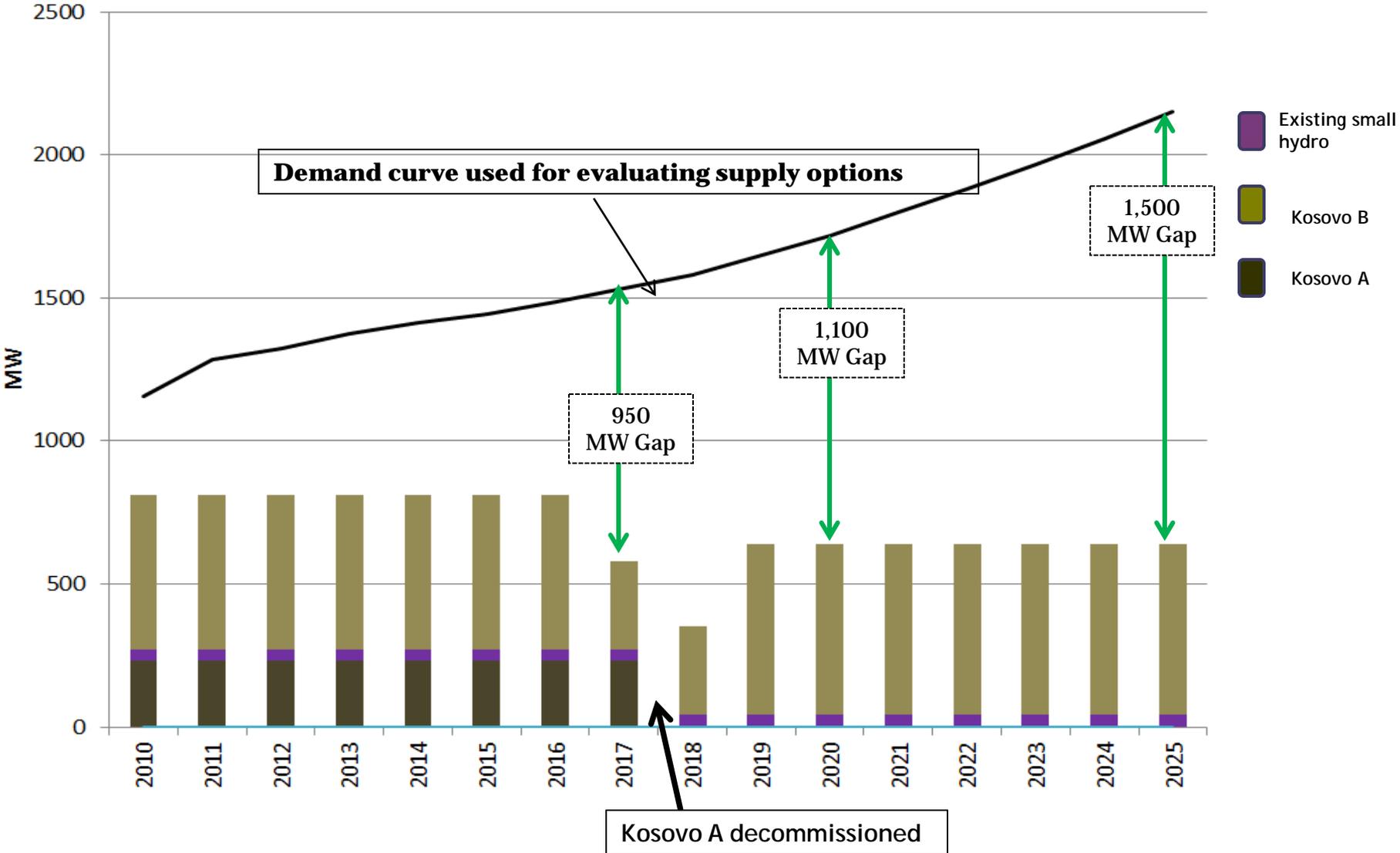
# The Options Study—The Approach

- Demand forecast (reduce through energy efficiency, reduction of losses, price adjustments).
- Supply options (renewables as a priority, lignite as a residual to fill the gap).
- Alternative power supply plans (a mix of both renewables and thermal).
- Comparison of costs (incl. environmental and health costs).
- Sensitivity analysis (to test robustness of selected alternative).

# Energy Generation Required To Meet Demand (GWh)



# Generation Capacity Required To Meet Peak Demand (MW)



# Power Supply- limited Options in the Medium Term

- Domestic resources:

- ✓ Limited renewables (details on the next slide);
- ✓ No domestic gas resources, no gas infrastructure;
- ✓ For import nearest possible connections in Nis (Serbia) or Sofia (Bulgaria), long-term possibilities when Balkans gas-ring is developed;
- ✓ Regional Generation Investment Study (2004 and 2007) showed Kosovo lignite to be the least-cost plant for the region.

- Imports:

- ✓ Transmission constrained;
- ✓ Supply shortages (eased due to financial-crisis-induced lower demand), shallow market, winter peak, volatile prices;
- ✓ Ageing infrastructure, limited investments in new capacity;
- ✓ More details on next slide.

## Regional Market: Supply Constrained and Shallow

	Demand and Supply
Albania	98% Hydro; Highly import dependent (24- 40% over the last years); Load shedding required since 1997.
Bosnia and Herzegovina	60% thermal, 40% hydro; Net exporter about 4 TWh in recent years (surplus likely to reduce).
Bulgaria	60% thermal, 7 % hydro, 35% nuclear, Net export amounted to 5.4 TWh of electricity in 2008.
Croatia	Mix between thermal and hydro, Import dependent (deficit to grow to 9.5 TWh by 2020).
FYR Macedonia	75% thermal, 25% hydro. Import about 2.5 TWh import of 8.5 TWh consumption.
Montenegro	40% thermal (lignite), 60% hydro, imports (about one third of supply).
Romania	55% thermal, 30 % hydro, 15 % nuclear, Net export amounted to 4.4 TWh of electricity in 2008.
Serbia	75% thermal (mostly coal), 25% hydro, Relatively well balance between supply and demand.
Kosovo	97% thermal (lignite), 3% hydro, Import dependent (5 to 10%), Load shedding.

# Supply Options—Renewables

- **Large hydro:** 305 MW Zhur plant could be built by 2017 to serve peak demand, but provides only 425 GWh (16% capacity factor).
- **Small hydro:** 18-20 sites with about 60 MW total capacity (53% Capacity factor).
- **Wind:** REPIC (Switzerland) funded study indicated low potential (site specific studies may reveal some economically viable potential).
- **Biomass and biogas:** Biomass from forestry products and residue a possible source of distributed (not grid connected) generation; manure-based biogas from livestock a possible source of distributed lighting and heating. One study has identified potential for 80 MW of biogas, and 20 MW of biomass.
- **Solar PV:** Studies have identified potential of roughly 80 MW, but at very high cost; solar water heating to be encouraged.
- **Geothermal:** 2008 EC report found low potential for electricity generation but additional exploration planned.

# Alternative Power Supply Plans Evaluated to Meet Capacity Gap

Three alternatives evaluated. Each alternative has an RE package:

- RE package same for each alternative supply plan:
  - ✓ 305 MW Zhur plant;
  - ✓ 60 MW small hydro;
  - ✓ 250 MW wind;
  - ✓ 20 MW biomass;
  - ✓ 70 MW biogas.

*Renewable capacity is inadequate to meet the gap.*

- and one of the fossil fuel options:
  - ✓ 600 MW lignite plant (2x300 MW);
  - ✓ 575 MW CCGT natural gas plant;
  - ✓ 575 MW CCGT light fuel oil plant.

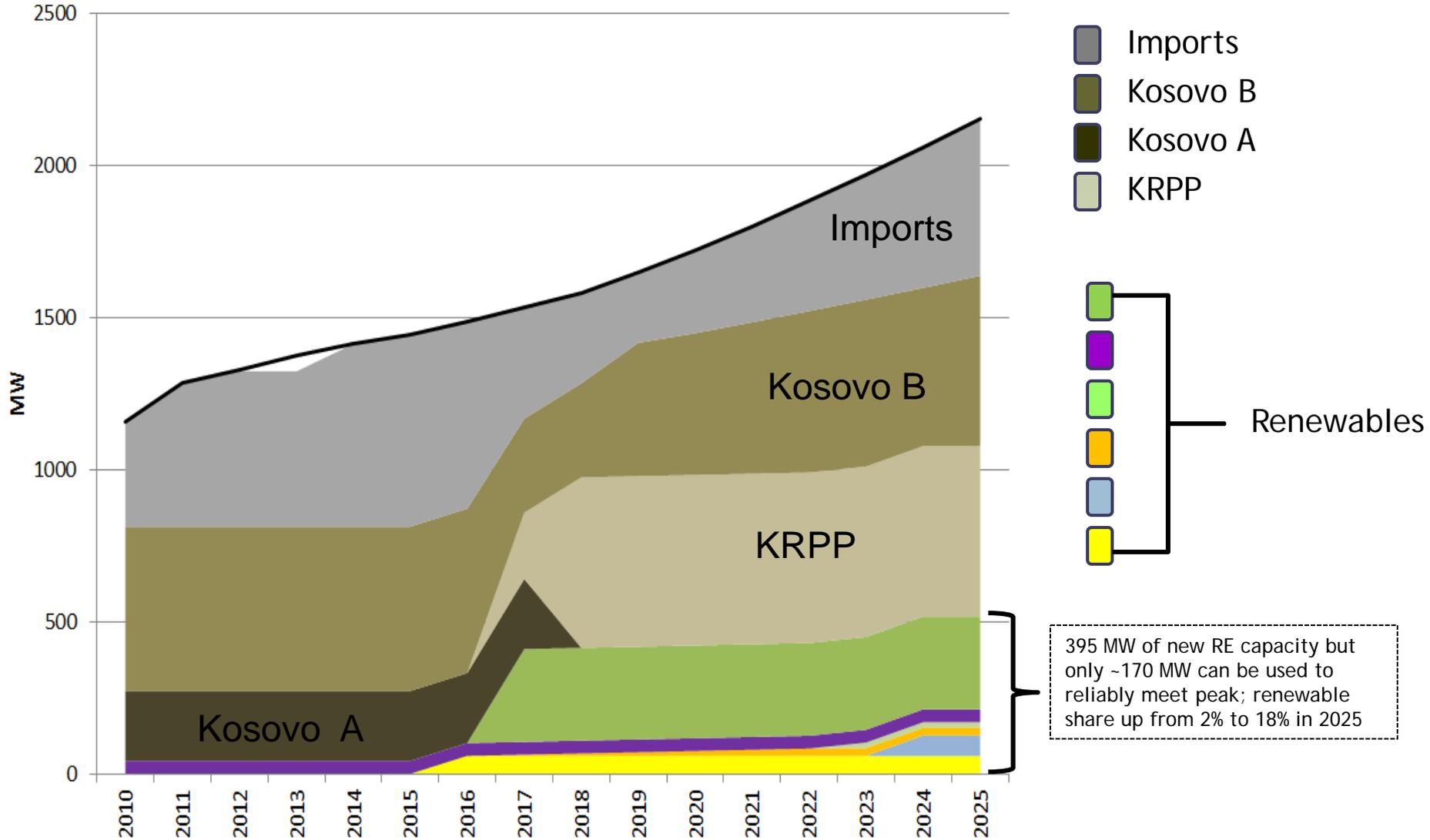
# Supply Options: Externalities

- Externalities:
  - ✓ Study accounts for the costs of negative externalities: The global and local environmental and health consequences of the thermal plant options (cost of compliance with EU standards already included).
  - ✓ The global externality is reflected in a price for carbon emissions. We have assumed: €15/ton in 2010 (*current market price €7-8/ton*) , €23/ton by 2025, and €26/ton by 2030 (International Energy Agency).
  - ✓ Local negative externalities: €3.50/MWh for the lignite plant, €0.60/MWh, and €1.31/MWh for fuel oil.

# Alternative Power Supply Plans— Conclusion

- Lignite+RE plan: most economic even under various scenarios with:
  - ✓ lower demand;
  - ✓ higher lignite costs and lower gas costs; and
  - ✓ carbon prices being 55% above IEA forecast (reaching € 35/ton by 2020 and € 40/ton by 2025).
- To close the energy gap, Kosovo should pursue a plan that includes:
  - ✓ loss reduction;
  - ✓ energy efficiency;
  - ✓ renewable resources; and
  - ✓ a domestic lignite-fired power plant.

# Thermal+ RE Alternative: Share of Renewables up from 2% to 18%



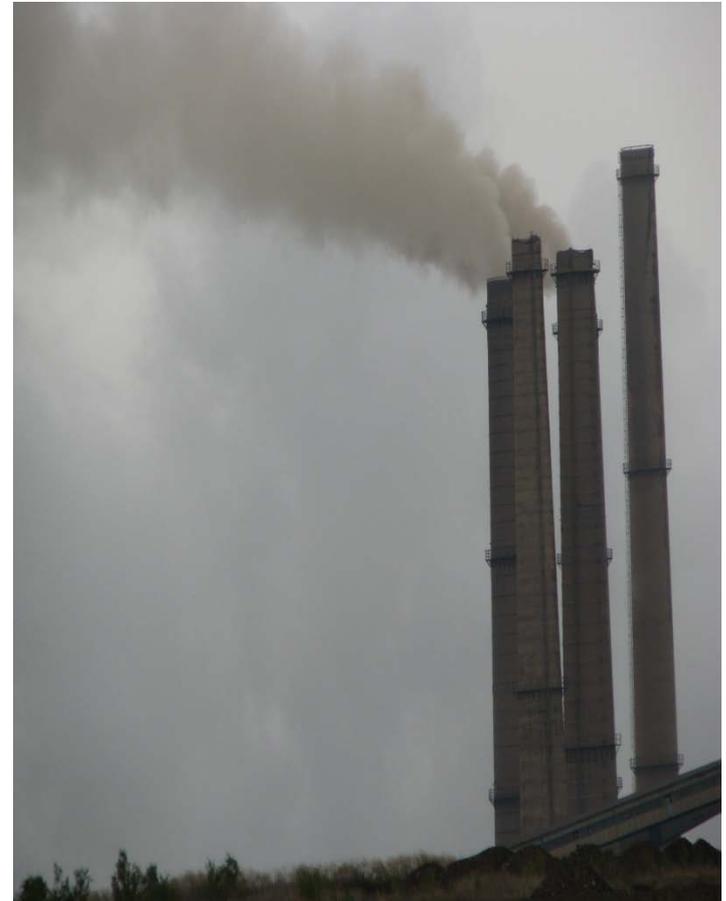
# The Proposed Kosovo Power Project

- Kosovo Power Project is expected to comprise:
  - ✓ Lignite-fired, 600 (2x300) MW new installed capacity
  - ✓ Rehabilitation of Kosovo B power plant
  - ✓ Bring Kosovo B in compliance with EU standards
  - ✓ Convert Kosovo B into combined heat and power plant (CHP)
  - ✓ Develop new lignite mine to fuel new and old power plant

# Kosovo Power Project: Environmental Benefits

Environmental benefits: Replacing Kosovo A and rehabilitating Kosovo B will reduce emissions:

- 95% of annual dust emissions from about 20,000 tons to 6-700 tons.
- 70% of annual emissions of sulfur and nitrogen oxides from about 13,000 tons each to less than 4,000 tons each.
- No increase in carbon emission per unit of electricity produced.



## Rationale for WBG support for the Proposed Project

- Kosovo cannot shut down Kosovo A and meet its energy demand without a new thermal power plant.
- WBG can help in ensuring that any new plant meets the highest efficiency and environmental standards.
- Kosovo not yet creditworthy, not yet a member of EBRD and EIB.
- IDA envelope too small (US\$58 million CAS 2012-15) to support public sector investment in large power generation infrastructure.
- A PRG and involvement of MIGA and IFC would leverage WBG resources to facilitate private sector investment in Kosovo.

# External Expert Panel Review

- The External Expert Panel assessed and concluded that, subject to certain modifications (higher efficiency, technology-neutrality), the project complies with six screening criteria for World Bank support of fossil fuel power:
  1. Demonstrate development impact of the project (energy security, reducing power shortage, increasing access for the poor);
  2. Assistance is being provided to identify and prepare low-carbon projects;
  3. Energy sources are optimized, looking at the country's needs through EE and conservation;
  4. After full consideration of the viable alternatives to the least cost options, and when no additional financing for the incremental cost is available from donors;
  5. Use the best available appropriate technology to allow for high efficiency, and therefore, lower GHG emission intensity; and
  6. Incorporate environmental externalities in project analysis will be developed.

*Options Study and Expert Panel report disclosed in English and Albanian, and disseminated in public events in Pristina.*

# External Expert Panel

- An External Expert Panel appointed to assess compliance of the project with six criteria of Strategic Framework for Development and Climate Change for Bank support to fossil fuel project.
- The Panel members are:
  - ✓ **Dr. Derek Taylor**, Former Advisor to the EC DG Energy
    - Key contributor to the European Commission's energy and climate change policy (and the move to a low-carbon economy). Chaired many working groups on topics such as clean (low-carbon) energy, clean coal technology, CCS, etc. Currently European Regional Representative for the Global Carbon Capture and Storage Institute (GCCSI).
  - ✓ **D.Sc. Janos Beer**, Professor Emeritus of Chemical and Fuels Engineering at MIT
    - Honors and Awards : The US Department of Energy's Homer Lowry Award; Energy Systems Award, American Institute of Aeronautics and Astronautics; Honorary Doctorate, University of Technical Sciences of Budapest, Hungary.
  - ✓ **Prof. Wladyslaw Mielczarski**, Power System planning professor in Poland
    - Nominated by the President of Poland in 2002 for his achievements in liberalization of the power supply industry in particular the design of the Polish electricity market structure and the rules. An expert in power system planning and electricity markets.

# Preparatory and Analytical Work to Support the Proposed Project

- Options analysis for power supply
- Appointment of Expert Panel
- RFP and RAP
- Transaction and Legal Advisory work
- Zhur Hydro Power Plant Pre-feasibility study
- Strategic Environmental and Social Assessment (SESA)
- Feasibility study for transmission
- IFC Technical Assistance work for KEDS privatization

WB supported



- Study for Decommissioning of Kosovo A Power Plant
- Studies to support the development of new generation capacities and related transmission

European Commission



- Kosovo B Investment Requirements and Rehabilitation Feasibility Study

USAID



- Regional studies
- Generation Investment Study (GIS)
- GIS update
- The Future of Natural Gas Market in Southeast Europe (SEE)

Multidonor

- Feasibility Study for Connecting Kosovo B Power Plant to CHP
- Improvement of District Heating in Kosovo
- Financing of new 400kv transmission line

KfW



- Feasibility study for the development of wind energy in Kosovo

Swiss REPIC

- Energy Efficiency training
- Energy Efficiency training for Auditors

GTZ



- Pre-feasibility for Identification of Small HPPs in Kosovo

DANIDA