# 添付資料 11　バルカン地域 NAMA セミナー参加者リストおよびセミナー資料

List of Participants, Balkan Regional NAMA Seminar Feb. 4 and 5, 2013

| No. | Name | Institution |
|---|---|---|
| 1 | H.E. Toshio Tsunozaki | Ambassador of Japan |
| 2 | N/A | Embassy of Japan |
| 3 | Thomas Nyström | Embassy of Sweden |
| 4 | Ichiro Adachi | JICA Headquarters |
| 5 | Ken Okumura | JICA Headquarters |
| 6 | Daimin Hanadate | JICA Headquarters |
| 7 | Toshiya Abe | JICA Balkan Office |
| 8 | Yumiko Saito | JICA Balkan Office |
| 9 | Natasa Bogojevic | JICA Balkan Office |
| 10 | Rie Kawahara | JICA Evaluation Team |
| 11 | Dejan Trifunović | MEDEP |
| 12 | Danijela Bozanic | MEDEP |
| 13 | Ana Repac | MEDEP |
| 14 | Dragana Radulovic | MEDEP |
| 15 | Predrag Milanovic | MEDEP |
| 16 | Jelena Simovic | MEDEP |
| 17 | Ivana Radosavljevic | MEDEP |
| 18 | Dimitrije Lilic | MEDEP |
| 19 | Vesna Rodic | MEDEP |
| 20 | Predrag Simic | MEDEP |
| 21 | Biljana Djokovic | MEDEP |
| 22 | Milena Djakonovic | MEDEP |
| 23 | Yukiko Maeda | MEDEP/Toshiba |
| 24 | Jasminka Pavlovic | MCU |
| 25 | Nina Vukosavljevic | MCU |
| 26 | Ljiljana Stevanovic | MCU |
| 27 | Danijela Prsic | MCU |
| 28 | Sasa Mart | Ministry of Foreign Affairs |
| 29 | Dusan Gajic | Ministry of Foreign affairs |
| 30 | Jasminka Stankovic Tatarac | Ministry of Foreign affairs |
| 31 | Danica Polic | Ministry of Justice |
| 32 | Rrezart Fshazi | Ministry of Environment, Forests and Water Administration - Albania |
| 33 | Enkelejda Malaj | Ministry of Environment, Forests and Water Administration - Albania |
| 34 | Almira Kapetanovic | Federal Ministry of Environment and Tourism - Bosnia and Herzegovina |
| 35 | Ozren Laganin | Ministry of Physical Planning, Construction and Ecology - Republic of Srpska |
| 36 | Senad Oprasic | Ministry of Foreign Trade and Economic Relations - Bosnia and Herzegovina |
| 37 | Andrej Lakic | Ministry of Sustainable Development and Tourism - the Republic of Montenegro |
| 38 | Djordjije Vulikic | Ministry of Sustainable Development and Tourism - the Republic of Montenegro |
| 39 | Saska Brblic | Ministry of Environment and Physical Planning, Macedonia |
| 40 | Elena Gavrilova | Ministry of Environment and Physical Planning, Macedonia |

List of Participants, Balkan Regional NAMA Seminar Feb. 4 and 5, 2013

| No. | Name | Institution |
|---|---|---|
| 41 | Mihajlo Gavric | EPS |
| 42 | Miroslav Spasojevic | EPS |
| 43 | Dragan Vukotic | EPS |
| 44 | Igor Radovic | Roads of Serbia |
| 45 | Branimir Miletic | Road Traffic Safety Agency |
| 46 | Jelena Tripkovic | Regional Environmental Centre |
| 47 | Tatjana Djuric | Provintial Secretariat for Urban Palnning, Construction and Environental Protection |
| 48 | Valentina Arambasic | Provintial Secretariat for Urban Palnning, Construction and Environental Protection |
| 49 | Smiljana Rankovic | City of Valjevo - Department for Urbanism |
| 50 | Zika Reh | City of Subotica |
| 51 | Damjan Rehm Bogunovic | H. Boll Stiftung |
| 52 | Jelena Petrovic | Belgrade Open School |
| 53 | Marko Andjelkovic | Serbian Academy of Sciences and Arts |
| 54 | Rainer Freund | Delegation of the European Union to the Republic of Serbia |
| 55 | Dejan Rebric | Delegation of the European Union to the Republic of Serbia |
| 56 | Gligo Vukotic | Delegation of the European Union to the Republic of Serbia |
| 57 | Jasmina Vulovic | KfW |
| 58 | Anita Mraovic | GIZ |
| 59 | Wolfgang Schutt | GIZ |
| 60 | Jürg Staudenmann | UNDP |
| 61 | Natasha Martins | UNDP |
| 62 | Snezana Ostojic Paunovic | UNDP |
| 63 | Srdjan Sajn | MP |
| 64 | Vukica Popadic | PE Kolubara |
| 65 | Aleksandar Simic | PE Kolubara |
| 66 | Rade Glomazic | FCG International |
| 67 | Dragan Marinkovic | Serbian Railways |
| 68 | Zlatko Drasko | Serbian Railways |
| 69 | Sasa Zivkovic | Serbian Railways |
| 70 | Andjela Sofic | Belgrade Chamber of Commerce |
| 71 | Ljubinka Kaludjerovic | Standing Conference of Towns and Municipalities |
| 72 | Branislav Zivkovic | Faculty of Mechanical Engineering |
| 73 | Masahiko Fujimoto | JICA Expert Team |
| 74 | Tetsuya Yoshida | JICA Expert Team |
| 75 | Hiroshi Matsuoka | JICA Expert Team |
| 76 | Eiko Watatsu | JICA Expert Team |
| 77 | Svetlana Batricevic | JICA Expert Team assistant |

**Balkan Regional Seminar on Nationally Appropriate Mitigation Actions**

**Upitnik/*Questionnaire***

1. Molimo Vas da naznačite pripadnost. / Please select your affiliation.

   - Ministarstva i vladine agencije/ *Ministries and government agencies*
   - Ambasade i međunarodne organizacije/ *Embassies and international organizations*
   - Ekonomski sektor/ *Economic sector* - Opštine/ *Municipality*
   - Akademije/ *Academic sector* - Drugo/ *Others*

2. Da li se Vaš nivo znanja o projektu NAMA/MRV povećao tokom učešća u ovom seminaru? / *Has your knowledge level of NAMA/ MRV increased by participating in this seminar?*

   Malo/poor ← | 1 | 2 | 3 | 4 | 5 | → Dosta/good

3. Da li je vreme posvećeno svakoj pojedinačnoj prezentaciji bilo odgovarajuće? / *Were the individual time slots allocated to each presentation appropriate?*

   | 1 | 2 | 3 | 4 | 5 |

4. Da li su prezentacije bile prikladne i korektno prezentovane? / *Were the presentation materials appropriate and correctly presented?*

   | 1 | 2 | 3 | 4 | 5 |

5. Da li se znanje stečeno tokom seminara može iskoristiti u Vašoj organizaciji? / *Can the knowledge gained during the seminar be utilized in your organization?*

   | 1 | 2 | 3 | 4 | 5 |

6. Ukoliko ste odgovorili sa 4 ili 5 na prethodno pitanje, molimo Vas naznačite kako se to znanje može iskoristiti. / *If you answered 4 or 5 in the above question, please specify how such knowledge can be utilized.*

7. Koje teme biste voleli da MEDEP predstavi u vezi sa projektom NAMA /MRV na nekom budućem seminaru? / *Which themes and topics would you like MEDEP to present regarding NAMA/ MRV in the future seminar?*

8. Sveukupna ocena seminara / *Overall evaluation of the seminar*

   | 1 | 2 | 3 | 4 | 5 |

9. Molimo Vas da ostavite dodatni komentar, bilo pozitivan ili negativan / *Please write any additional comments, either positive and negative points.*

Hvala na saradnji. / *Thank you very much for your cooperation.*

# Evaluation of Balkan Regional NAMA Seminar (4, 5 February 2013)

**1 Affiliation of questionnaire respondents.**

| | |
|---|---|
| Ministries and government agencies | 13 |
| Embassies and international organizations | 3 |
| Economic sector | 1 |
| Others | 3 |

Total number of respondents = 20

| No. | Questions | Scores | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | Ave |
| 1 | **Has your knowledge level of NAMA/ MRV increased by participating in this seminar?** | | | | | | |
| | | 0 | 1 | 3 | 6 | 10 | **4.25** |
| 2 | **Were the individual time slots allocated to each presentation appropriate?** | | | | | | |
| | | 0 | 0 | 1 | 9 | 10 | **4.45** |
| 3 | **Were the presentation materials appropriate and correctly presented?** | | | | | | |
| | | 0 | 0 | 2 | 8 | 10 | **4.40** |
| 4 | **Can the knowledge gained during the seminar be utilized in your organization?** | | | | | | |
| | | 0 | 0 | 3 | 8 | 9 | **4.30** |
| 5 | **Overall evaluation of the seminar** | | | | | | |
| | | 0 | 0 | 1 | 8 | 10 | **4.47** |

**6 If you answered 4 or 5 in the above question No.4, please specify how such knowledge can be utilized.**

Presented models can help establish our own models and use positive suggestions and impressions
Developing application for new projects
Preparation of appropriate NAMA assessment
General NAMA procedure, all relevant stakeholders, financial possibilities of NAMAs
Practice, referring to legislation
The knowledge about cooperation between different Serbian entities via data management system
To identify actions which could be considered for NAMAs

**7 Which themes and topics would you like MEDEP to present regarding NAMA/ MRV in the future seminar?**

Separate sessions for sectoral NAMAs where we could get more information on project development, goals.
MRV - especailly verification
How MRV is going to function - concretely energy passports and energy managers - how?
Implemented projects and new activities which include long-listed projects
NAMA application procedure and financing
Importance of financial analysis and finance options for NAMA
Tools for project implementation
Energy efficiency
Experience in NAMA development in transport sector
Aquatic ecosystem and water pollution

**9 Additional comments.**

Excellent seminar! Concrete and clear presentations, precise information
It could be a good idea to organize a workshop where the participants could prepare NAMAs in certain sectors with the assistance from countries with vast experience in this field.
The Serbian ministries showed step forward regarding cooperation and coordination being attended by international organizations like JICA and GIZ
It will be useful if the assessments are published and can be seen on the webpage of the ministry
Purposeful seminar, Serbian experience will be helpful for the development of mitigation actions in the countries of the region
Maybe the length of certain presentations should have been shorter and prepare a comparative presentation of all shortlisted projects
It would be useful to present procedures and problems in the process of preparation and implementation of the projects, as well as results (effects)

Република Србија
МИНИСТАРСТВО ЕНЕРГЕТИКЕ,
РАЗВОЈА И ЗАШТИТЕ ЖИВОТНЕ СРЕДИНЕ

Japan International
Cooperation Agency

# AGENDA

"Balkan Regional Seminar on Nationally Appropriate Mitigation Actions"
4. and 5. February 2013,
National Assembly House, Nikola Pasic Square, No.13, Small plenary hall.

| Time | Topic | Speaker |
|---|---|---|
| **Day I: Presentation of Serbian NAMAs to the stakeholders** | | |
| 9:30 – 10:00 | Registration | |
| 10:00 – 10:30 | Opening remarks | - Mr Vladan Zdravkovic, State Secretary, Ministry of Energy, Development and Environmental Protection<br>- His Excellency Mr Toshio Tsunozaki Ambassador of Japan<br>- Mr Toshiya Abe, Resident Representative of Japan International Cooperation Agency Balkan Office |
| 10:30 – 11:00 | Coffee break | |
| | **Part I:** Results of NAMAs Projects | |
| 11:00 – 11:15 | Introduction of JICA Technical Cooperation Project | - Mr Masahiko Fujimoto, Chief Advisor JICA Expert Team |
| 11:15-11:45 | Importance of NAMAs Projects | - Ms Ana Repac, Climate Change Division, Ministry of Energy, Development and Environmental protection |
| 11:45 – 12:15 | Importance of financial analysis and finance options for Serbian NAMAs | - Mr Hiroshi Matsuoka, JICA Expert Team |
| 12:15 – 12:45 | Experience in development of NAMAs in Energy sector | - Mr Miroslav Spasojevic, Public Enterprise Electric Power Industry of Serbia (EPS) |
| 12:45 – 13:15 | Q & A session | |

| | | |
|---|---|---|
| 13:15 – 14:30 | **Lunch break** | |
| **Part II:** Introduction of Serbian NAMAs | | |
| 14:30 – 15:00 | Experience in development of NAMAs in Energy Sector | Mr Predrag Milanovic<br>Ministry of Energy, Development and Environmental Protection |
| 15:00 – 15:30 | Experience in development of NAMAs in Building Sector | Ms Nina Vukosavljević<br>Ministry of Construction and Urbanism |
| 15:30 – 16:00 | Experience in development of NAMAs in Building Sector | Mr Dimitrije Lilic<br>Ministry of Energy, Development and Environmental Protection |
| 16:00 – 16:30 | Experience in development of NAMAs in Transport sector | Mr Igor Radovic<br>Public Enterprise Roads of Serbia |
| 16:30 – 17:00 | Q & A session | |
| 17:00 – 17:10 | Closing remarks | - Ms Danijela Bozanic, Head of Climate Change Division, Ministry of Energy, Development and Environmental protection |

| Day II: Experience and presentation of NAMAs from the Region Countries | | |
|---|---|---|
| 09:00 – 09:30 | Introductory remarks | - Mr Vladan Zdravkovic, State Secretary, Ministry of Energy, Development and Environmental Protection |
| | Climate Change Experience | |
| 09:30 – 10:00 | Republic of Serbia<br>Ms Danijela Bozanic<br>Climate Change Division,<br>Ministry of Energy, Development and Environmental Protection | |
| 10:00 – 10:30 | Republic of Albania<br>Ms Enkelejda Malaj, Mr Rrezart Fshazi<br>Ministry of Environment, Forests and Water Administration | |
| 10:30 – 11:00 | Bosnia and Herzegovina<br>Ms Almira Kapetanovic, Federal Ministry of Environment and Tourism<br>Mr Ozren Laganin, Ministry of Spatial Planning, Civil Engineering and Ecology of the Republic of Srpska | |
| 11:00 – 11:30 | Republic of Montenegro<br>Mr Djordjije Vulikic, Mr Andrej Lakic<br>Ministry of Sustainable Development and Tourism | |
| 11:30 – 12:00 | Republic of Macedonia<br>Ms Daniela Rendevska, Ms Saska Brblic, Ms. Elena Gavrilova<br>Ministry of Environment and Physical Planning | |
| 12:00 – 13:30 | **Working lunch – exchange of ideas for possible future regional cooperation (by invitation only)** | |

"Capacity Development Project on Nationally Appropriate Mitigation Actions (NAMAs) in the Republic of Serbia"

# Introduction of JICA Technical Cooperation Project

Mr. Masahiko Fujimoto
Chief Advisor
JICA Expert Team



## Outline of the JICA Technical Cooperation Project

- Objective of the Project:
  **To develop the capacity of Serbian Government to produce and promote NAMA implementation**
- Outputs:
  **1: General understanding on NAMAs and MRV* is enhanced.**
  **2: Capacity to shortlist MRV-able NAMAs is developed.**
  **3: Capacity to produce documents to promote implementation of NAMAs is developed.**
  **4: Capacity to promote recognition of NAMAs is enhanced.**

  * Measurement, reporting and verification
- Project period: **From November 2010 to February 2013**
- Implementing agency: **Ministry of Energy, Development and Environmental Protection (MEDEP)**
- Institutions concerned: **Ministry of Construction and Urbanism, Ministry of Transport, Public Enterprise Electric Power Industry of Serbia, Public Enterprise Roads of Serbia**



## Project Activity (1)

### Activity 1: To enhance general understanding on NAMAs and MRV

- Collection and analysis of **information on NAMAs and MRV**
  - Collection of **information on the latest progress of international negotiations** regarding NAMA and MRV
  - Development of **Matrix of other countries' NAMAs** (over 120 NAMAs from 40+ Parties)

| No. | Sector | Sub-sector | Party | NAMA | Category | Sub-category | Boundary |
|---|---|---|---|---|---|---|---|
| E-1 | Energy | Biofuel | Ethiopia | Bio-fuel Development for Road Transport and for household use: Project to produce 63.36 million L of ethanol, produce 623.6 million L of biodiesel | Measures | Project | National |
| E-2 | Energy | Biofuel | Ghana | Land preparation incentive use of bio-fuels for mechanized agriculture | Measures | Program | National |
| E-3 | Energy | Biofuel | Chad | Promotion of renewable energy: use of biofuels | Measures | Program | National |
| I-1 | Industry | CCS | Ghana | Improvement of oil and gas production assess, promote and incorporate carbon capture and storage (CCS) in oil and gas production and utilization | Measures | Program | National |
| I-2 | Industry | Energy efficiency | Macedonia | Install biomass boiler in agro-industry, industry sector, and households | Measures | Program | National |
| I-3 | Industry | Energy efficiency | Ghana | Improve power factor correction across industrial and institute energy efficient measures in industrial operations | Measures | Program | National |
| T-1 | Transportation | Biofuel | Ghana | Promote the production and use of bio-fuels as transport fuel | Measures | Program | National |
| T-2 | Transportation | Biofuel | Madagascar | Promote the exploitation and use of biofuels | Measures | Program | National |
| T-3 | Transportation | Biofuel | Sierra Leone | Develop biofuels from sugarcane, corn, rice husk etc. | Measures | Program | National |
| M-1 | Misc. /cross-cutting | General policy and measure | Eritrea | Formulate, implement, publish and regularly update national and, where appropriate, regional programs containing measures to mitigate climate change | Measures | Program | National |

Abstract of NAMA Matrix

Classification
1. Sector/ sub-sector
2. Contents of NAMA
3. Category/ sub-category
4. Reference scenario
5. NAMA target, etc.



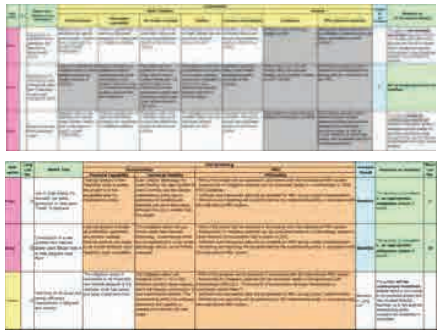
## Project Activity (2)

### Activity 2: To develop capacity to shortlist MRV-able NAMAs

- Analysis on relevant **policies and projects from sub-sectors**

Pilot sub-sectors
1. Energy saving in energy sector
2. Energy saving in transport sector
3. Energy saving in building sector

- Preparation of NAMA long list (contains **69 NAMA candidates including 38 in energy sector, 18 in transport sector, 13 in building sector**)
- Development of **NAMA shortlist** (contains **16 prospective NAMAs**)



Evaluation of NAMA long list

## Project Activity (3)

### Activity 3: To develop capacity to produce documents for promoting NAMA implementation

- Selection of 7 model NAMAs
- Development of 6 NAMA Short Descriptions
- Preparation of NAMA Development Guideline
  - History and current situation of NAMA
  - Importance and Benefits of NAMAs Development
  - NAMA development cycle
  - MRV for NAMA

| No | Sub-sector | NAMA Title |
|---|---|---|
| 1 | Energy | Construction of a 790 MW Ultra Supercritical Lignite Power Plant TPP Nikola Tesla -Unit B3 |
| 2 | Energy | Construction of 9 New Small Hydropower Plants (HPPs) in Serbia |
| 3 | Energy | Introduction 1000 MW of Small Biomass Boilers in Serbia |
| 4 | Energy | Using of Waste Heat from Thermal Power Plant for Heating the City of Belgrade, Serbia |
| 5 | Transport | Rehabilitation of Arterial Roads in Serbia |
| 6 | Building | Improvement of Old Residential Buildings Envelope (Exterior Doors, Windows and Thermal Insulation) in Serbia |
| 7 | Building | Energy Efficiency Improvements in Public Buildings: 23 Schools and 26 Hospitals - Serbian Energy Efficiency Project (SEEP) |



## Project Activity (4)

### Activity 4: To enhance capacity to promote NAMA recognition

- Implementation of **NAMA-MRV Capacity Building Workshops**
  - **Serbian NAMA seminar** : 6 February 2012, 62 participants
  - **Balkan Regional NAMA seminar** : 4 and 5 February 2013
- **Present Project's progress and outcome at international conferences**
  - **Side event in COP17**: 8 December 2011, 32 participants
- **Develop web contents for Serbian NAMAs and MRV**

Serbian NAMA seminar

Side event in COP17



## Project Activity (5)

### Technical training in Japan

- To further **enhance the knowledge and expertise on mitigation actions, MRV system, energy conservation and related policy**
- 2 weeks : from 28 October to 10 November, 2012
- **4 participants from MEDEP, MOT**
- Participants had an **opinion exchange** with **Ministry of the Environment**, **Ministry of Economy, Trading and Industry, Yokohama City**, etc. and visited **Toshiba, Sony, Panasonic, J-Power**, **Nexco,** etc. related to climate change mitigation.

## Achievement

- Established a cooperation structure for formulation and development of NAMA by MEDEP Climate Change Division as a leading actor. Related ministries and agencies for implementing mitigation measures were involved.
- Identified key officers who can formulate and develop NAMA in these ministries and agencies. Capacity of these officers were strengthened through this Project.
- Identified projects as a model for NAMA implementation in the sector of energy efficiency in power, transport and buildings. Prepared documents can be used for effectively seeking support from investors, and made them available as a format.
- Summarized approaches and know-hows for formulation and development of NAMA projects into NAMA Development Guideline. The Guideline was made available for use by project implementing entities.
- Opened up the channels for sharing experiences and know-hows for NAMA formulation among Balkan countries.

**Thank you very much**

**for your attention.**

# Importance of NAMA project

Ana Repac
Climate Change Division
Ministry of Energy, Development and Environmental Protection

## Outline

- NAMA formulation
- Process of:
  - NAMAs development
  - NAMA long&short list selection
  - Short description development
- NAMA Guideline
- Barriers
- Advantages

## NAMA formulation

- NAMA is a part of national action on mitigation of climate change by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in an MRV (measureable, reportable, and verifiable) manner (Decision 1/ CP.13 Bali Action Plan (p.3, FCCC/ CP/ 2007/ 6/ Add.1).
- NAMA international framework is not established yet and fully defined
- NAMA Registry under UNFCCC (prototype version)

## NAMA Registry

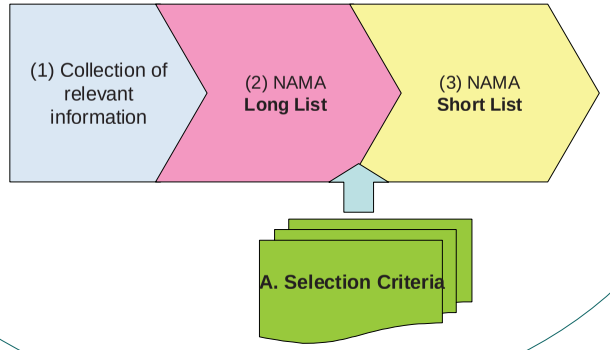
- NAMA Registry contains detailed information on NAMAs submitted by developing countries as well as information on support developed countries are willing to provide.
  - 1. NAMA seeking support for preparation
  - 2. NAMA seeking support for implementation
  - 3. Other NAMAs for international recognition
  - 4. Information on support for NAMAs
- **http://unfccc.int/cooperation_support/nama/items/6945.php**

# NAMA activities in the Republic of Serbia

# Process of NAMA development- Serbia

**Targeted sectors:**

- **Energy production**
- **Transportation**
- **Building**




# (1) Collection of information

➢ **National documents:**

- **Laws** (Law on Energy, Law on Air Protection, Law on construction);
- **Strategies** (Initial National Communication; Energy development strategy by 2015; Energy Development Strategy for the City of Belgrade; Strategy of Railway, Road, Inland Waterway, Air and Intermodal Transport Development, 2008-2015);
- **Action plans** (The First Energy Efficiency Plan, 2010-2012; Biomass Action Plan, 2010-2012);
- **Regulations** (Regulation on energy efficiency in buildings; Regulation on establishing the program for realizing the power supply development strategy up to year 2015, 2007-2012);
- **Documents** (The White Book of the Electric Power Industry of Serbia).

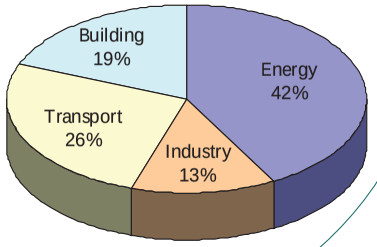
# ➢ Interviews/site visits

| Institution | Location | Topics |
|---|---|---|
| Belgrade District Heating Company | Belgrade | Heat metering, rehabilitation of boilers, fuel change in heat distribution system |
| Belgrade Land Development Public Agency | Belgrade | Sustainable public urban transport |
| Business Association of Serbian District Heating Companies | Kokin Brod | Heat meters for district heating, fuel switch to biomass in heat plants, rehabilitation of district heating |
| District Heating Company Valjevo | Belgrade | Expansion of district heating network |
| Heat plant in Kragujevac | Kragujevac | Fuel switch from coal to natural gas |
| Josanicka Spa, Mataruska Spa | Josanicka, Mataruska | Geothermal for heating public buildings |
| Municipality of Cajetina | Cajetina | Biomass/geothermal for heating |
| MSP IPA 2007 Project | Belgrade | Energy efficiency for municipality |

| Institution | Location | Topics |
|---|---|---|
| Ministry of Infrastructure and Energy | Belgrade | Energy projects, Transport projects |
| Pribojska | Pribojska Spa | Geothermal energy for heating |
| Public Enterprise Electric Power Industry | Belgrade | Power generation projects |
| Public Enterprise Roads of Serbia | Belgrade | Road rehabilitation, bypass road construction, road material recycling |
| Secondary Agricultural School | Vrsac | Energy efficiency for public buildings |
| Serbian Energy Efficiency Agency | Belgrade | Energy efficiency improvement in public buildings |
| Serbian Wind Energy Association | Belgrade | Wind power generation and CDM application |
| Town of Cacak | Cacak | Geothermal, biomass, solar energy |
| Vinca Institute of Nuclear Sciences | Belgrade | Calculation methods for INC |

# (2) NAMA Long List

- **69 potential NAMAs**
  - Energy 29
  - Industry 9
  - Transport 18
  - Building 13




# A. Selection criteria (1)

- **2-steps screening** - different selection criteria

- **1st Screening** – selection criteria:
  **Basic Condition and General**
- **2nd Screening** – selection criteria:
  **Sustainability and MRV**

# 1st Screening (1)

| Step | Category | Criteria | Rationale |
|---|---|---|---|
| 1st Screening | Basic Condition | Distinctiveness | A mitigation action is a clearly defined project, which provides information on expected or identified location and type of activities. |
| | | Information availability | Sufficient data and information on activity are available for mitigation potential related assessments. |
| | | No double-counting | A mitigation action has not applied or been registered into any market mechanism such as CDM in order to avoid double counting of emission reduction. |
| | | Timeline | A mitigation action has not been realized yet and will ensure emission reduction by 2020. |
| | | Voluntary participation | Operating entity is willing to implement the mitigation action under NAMA scheme, and voluntarily take a role of implementing the action. |
| | General | Compliance | A mitigation action is in line with Serbia's national/ sectoral development policy, plan or strategy. |
| | | GHG reduction potential | A mitigation action will lead to the reduction or limitation of GHGs emissions in Serbia. |

# Result of 1st Screening

| Sub-sector | Number of potential NAMAs | 1st Screening passed |
|---|---|---|
| **Energy** | 29 | 10 |
| **Industry** | 9 | 0 |
| **Transport** | 18 | 3 |
| **Building** | 13 | 4 |
| **Total** | **69** | **17** |

# 2nd Screening

| Step | Category | Criteria | Rationale |
|---|---|---|---|
| 2nd Screening | Sustainability | Financial Feasibility | A mitigation action ensures certain level of financial performance that is considered appropriate for operating entity. |
| | | Technical Viability | A mitigation action will use already-proven technology. |
| | MRV | MRVability | A mitigation action will be able to be measured, reported, and verified under expected NAMA scheme.<br>• Emission reduction can be calculated using the internationally approved methodologies such as CDM or IPCC, or methods based on such internationally used methodologies.<br>• Sufficient and transparent data to estimate emission reduction will be available.<br>• A NAMA implementing entity will be able to monitor and report all parameters specified in the methodology. |

# Result of 2nd Screening

| Sub-sector | 1st Screening passed | 2nd Screening passed |
|---|---|---|
| **Energy** | 10 | 10 |
| **Industry** | 0 | 0 |
| **Transport** | 3 | 2 |
| **Building** | 4 | 4 |
| **Total** | | **16** |

➢ **The most potential NAMA do not pass screenings:**

- Undeveloped concrete project
- Insufficient data for assessment of mitigation potential

# Shortlisted NAMAs (1)

| No. | NAMA | Implementing Entity | Type of NAMA/ Boundary | Mitigation Potential ($t\text{-}CO_{2e}$/ year) | Domestic/ Supported |
|---|---|---|---|---|---|
| Energy Sub-sector | | | | | |
| 1 | Construction of a 790 MW Ultra Supercritical Lignite Power Plant TPP Nikola Tesla - Unit B3 | EPS | Project/ Local | 1,337,728 | Supported |
| 2 | TPP Nikola Tesla – Modernization and capacity increase, Unit B2 | EPS | Project/ Local | 355,142 | Supported |
| 3 | TPP Nikola Tesla - Modernization and Capacity Increase, Unit A3 | EPS | Project/ Local | 91,796 | Supported |
| 4 | Construction of a new CHP power plant Novi Sad | EPS | Project/ Local | 1,019,380 | Supported |
| 5 | TPP Kostolac B - Construction of a new Unit, Block B3 | EPS | Project/ Local | 1,390,533 | Supported |

# Shortlisted NAMAs (2)

| No. | NAMA | Implementing Entity | Type of NAMA/ Boundary | Mitigation Potential ($t\text{-}CO_{2e}$/ year) | Domestic/ Supported |
|---|---|---|---|---|---|
| Energy Sub-sector | | | | | |
| 6 | Construction of 9 New Small Hydropower Plants (HPPs) in Serbia | EPS | Project/ Local | 102,343 | Supported |
| 7 | Installation of heat metering device and introduction of heat billing system on the basis of measured consumption in district heating systems in Serbia | Belgrade District Heating Company, Association of District Heating Company | Program/ National | 329,117 | Supported |
| 8 | Introduction 1000 MW of Small Biomass Boilers in Serbia | MEDEP | Program/ National | 414,501 | Supported |
| 9 | Use of Solar energy for domestic hot water production in Heat plant “Cerak” | Belgrade District Heating Company | Project/ Local | 611 | Supported |
| 10 | Construction of a new pipeline from thermal power plant Nikola Tesla A to New Belgrade Heat Plant | EPS, Belgrade District Heating Company, City of Belgrade, MEDEP | Project/ Local | 161,875 | Supported |

# Shortlisted NAMAs (3)

| No. | NAMA | Imple-menting Entity | Type of NAMA/ Boundary | Mitigation Potential ($t\text{-}CO_{2e}$/ year) | Domestic/ Supported |
|---|---|---|---|---|---|
| Transport Sub-sector | | | | | |
| 11 | Rehabilitation of arterial roads in Serbia | MOT, Energy Public Enterprise Roads of Serbia | Project/ Local | 2,617 | Supported |
| 12 | Rehabilitation of regional roads in Serbia | MOT, Energy Public Enterprise Roads of Serbia | Project/ Local | 6,476 | Supported |

# Shortlisted NAMAs (4)

| No. | NAMA | Imple-menting Entity | Type of NAMA/ Boundary | Mitigation Potential ($t\text{-}CO_{2e}$/ year) | Domestic/ Supported |
|---|---|---|---|---|---|
| Building Sub-sector | | | | | |
| 13 | Expansion of existing district heating network and construction of substations in Valjevo | City of Valjevo, District Heating Company Valjevo | Project/ Local | 12,141 | Supported |
| 14 | Improvement of Old Residential Buildings Envelope (exterior doors, windows and thermal insulation) in Serbia | MCU | Program/ National | 503,929 | Supported |
| 15 | Construction of new energy efficient buildings based on energy efficiency regulation in Serbia | MCU | Program/ Regulation/ National | 275,282 | Domestic |
| 16 | Energy Efficiency Improvements in public schools, hospitals and social care institutions in Serbia (Serbian Energy Efficiency Project, SEEP) | MEDEP | Program/ National | 8,326 | Supported |

# NAMAs Portfolio

- **Individual NAMA:**
  - Activity description
  - Nature of Action
  - Boundary and Location
  - BAU Scenario
  - Mitigation Target
  - Mitigation Potential
  - MRV
  - Expected Benefits
  - Finance and Cost
  - Current Status
  - Expected starting date of Action
  - Lifetime
  - Implementing Entity and Contact Information

# NAMAs Short description

| No. | Sub-Sector | NAMA Title |
|---|---|---|
| 1 | Energy | Construction of a 790 MW Ultra Supercritical Lignite Power Plant TPP Nikola Tesla - Unit B3 |
| 2 | Energy | Construction of 9 New Small Hydropower Plants (HPPs) in Serbia |
| 3 | Energy | Introduction 1000 MW of Small Biomass Boilers in Serbia |
| 4 | Energy | Using of Waste Heat from Thermal Power Plant for Heating the City of Belgrade, Serbia |
| 5 | Transport | Rehabilitation of Arterial Roads in Serbia |
| 6 | Building | Improvement of Old Residential Buildings Envelope (Exterior Doors, Windows and Thermal Insulation) in Serbia |
| 7 | Building | Energy Efficiency Improvements in Public Buildings: 23 Schools and 26 Hospitals - Serbian Energy Efficiency Project (SEEP) |

# NAMAs Short description

- **Individual NAMA:**
- Title of NAMA
- Description of the Mitigation Action
- Technologies/ measures
- Location
- NAMA Implementing Entity
- Implementing Schedule
- Expected starting date of Action
- Lifetime
- Current Status
- Coverage
- Finance and Cost
- Description of Support Required
- Expected Mitigation Potential
- Methodologies and Assumptions
- BAU scenario
- Calculation of emission reduction
- Measurement, Reporting, and Verification (MRV)
- Monitoring plan
- Data and parameters to be monitored
- Monitoring plan and structure
- Domestic MRV arrangements
- Contribution to Sustainable Development
- Stakeholder consultation
- Contact information

# NAMAs Guideline

- Background
- History and Current Situation of NAMA
- Definition and Types of NAMA
- International Discussion on NAMA
- Benefits of NAMAs for the Republic of Serbia
- NAMA Development Cycle
- NAMA Development Process in the Republic of Serbia
- NAMA Selection Criteria
- NAMA Short Description
- Methodologies for GHG Emission Reduction Estimation
- Available Methodologies
- Project Evaluation and Financial Analysis
- Types of Project Analysis
- Evaluation of Project
- Project Funding and Financial Analysis
- Incentive and Subsidy
- MRV for NAMA
- MRV for NAMA
- Existing MRV systems
- MRV of Clean Development Mechanism (CDM) under Kyoto Protocol
- MRV of EU-ETS

# NAMAs project organizational structure

➢ NAMA Working group

- Ministry of Energy, Development and Environmental protection; Ministry of construction and urbanism, Ministry of transportation; PE EPS; Road Safety Agency; PE Roads of Serbia; City of Belgrade; Valjevo municipality
- 8 WG meetings

➢ Joint Coordinaton Committee (JCC)

- Ministry of Energy, Development and Environmental protection and JICA
- 6 JCC meetings

# Barriers in NAMAs development

➢ **Lack of:**

- In-country capacities
- Experiences for financial and reduction assessments
- Information and data
- **International MRV requirements**

## Advantages of NAMAs development

- Identification and prioritization of mitigation activities
- Identification of mitigation potential
- Assessment of possibilities for implementation
- Facilitate national action and planning
- Identification of current situation on and improvement of capacities
- Confirmation of emissions reduction
- Improvement of exchange of information and intersectoral cooperation
- Improvement of capacities for future NAMAs development

## Advantages of NAMAs development

- Stratightening country's willingness to emission limitation and economy development in line with its own capabilities and possibilities and in accordance with sustainable development principles
- Increasing opportunities for financing at the international level and implementation of specific actions important for the country
- Building national capacities for both implementation and definition of NAMAs
- Experience monitoring and reporting activities, among else, because the country will be required to follow EU's strict directives

## Thank you for your attention!

Climate Change Division
Ministry of Energy, Development and Environmental Protection

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Capacity Development Project on
Nationally Appropriate Mitigation Actions (NAMAs) in the
Republic of Serbia

# Importance of Financial Analysis and Finance Options for Serbian NAMA

4th February, 2013

JICA Expert Team
Hiroshi MATSUOKA

## Session Agenda

1. Project Evaluation and Financial Analysis
2. Overview of Financial Analysis
   - Basic Concepts
   - Methodology
3. Finance Options for Serbian NAMA



## Project Evaluation and Financial Analysis

### *Why Financial Analysis?*

**Project Analysis**

- Technical feasibility & Financial feasibility
- to determine whether the project is acceptable or to compare with other projects
- Economic analysis: national profitability of project, Financial analysis: commercial profitability from the view point of investors

**Competitive NAMA Project**

- Investors are looking for viable and reliable projects
- Financial analysis is to show the viability and reliability of the projects

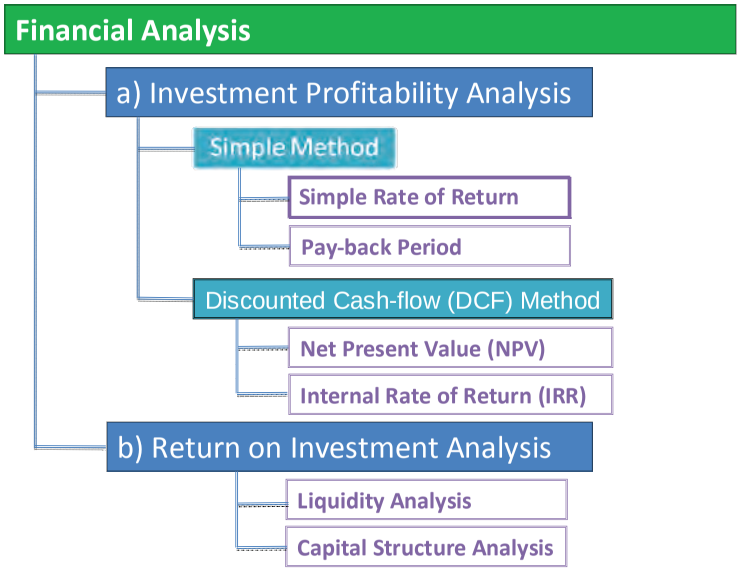


## Basic Concepts of Financial Analysis

- **To provide financial information to investors to make decision**

✓ How much return can be expected?
✓ Profitability
✓ How much is the investment amount?
✓ How many years does it take for the project to produce profit?
✓ How much subsidy is required for the project to be viable?
✓ to set the tariff level

# Methodologies of Financial Analysis






# Financial Analysis: Pay-back Period

## Simple Method

■*do not take into consideration the whole life span of the project but rely on one model period*

■Somehow less precise, but in some cases could be sufficient and the only possible alternative

➢Simple Rate of Return

➢ Pay-back Period



# Financial Analysis: Pay-back Period

## ■ Pay-back Period

*Time needed for a project to recover its total investment through its net cash earnings*

Step 1: Calculate total investment of the project

Step 2: Calculate annual cash earnings

Step 3: Calculate annual net cash flow during the project's life

Step 4: Find out the number of years, in which net cash flow becomes positive.

Step 5: The year net cash flow turns zero is the pay-back period. It includes the construction period.



# Financial Analysis: Pay-back Period

## ■ Pay-back Period

| *Year* | *Investment* | *Earnings* | *Capital at the end of a year* |
|---|---|---|---|
| 1 | 100 | | −100 |
| 2 | 100 | | −200 |
| 3 | | 30 | −170 |
| 4 | | 35 | −135 |
| 5 | | 35 | −100 |
| 6 | | 35 | −65 |
| 7 | | 35 | −30 |
| 8 | | 35 | 5 |

*Pay-back period: 7.8 years*

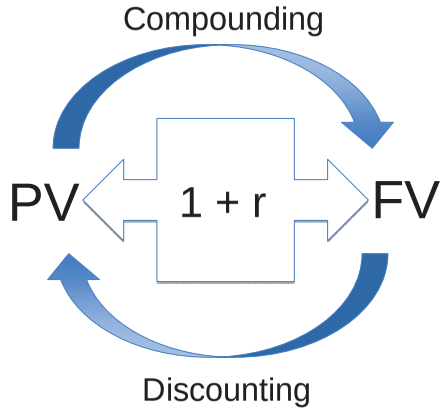
# Financial Analysis: DCF

## Discounted Cash-flow (DCF) Method

- The choice of method depends on the objectives, economic environment and the availability of data
- take into consideration the entire life of a project and the time factor by discounting the future flows and outflows to their present value (NPV)
- Most popular method for the CDM Project; UNFCCC Guideline also uses this method in the financial analysis calculation



# Financial Analysis: DCF




***Why discount?***
*Value of money 100 as of today is different from the value of money 100 as of 4th Feb. 2014*



# NPV and FIRR

- Net Present Value (NPV)

*The difference between the present value of its future cash inflows and outflows*

*Value of future cash flow to be evaluated at present*

$$NPV = \sum_{t=0}^{n} (CI - Co)_t \, a_t$$

$a_t$: *discount factor*

- Financial Internal Rate of Return (FIRR)

*Internal rate of return is the rate of discount that reduces the net present value of a project to zero*



# Discounted Cash flow and NPV, FIRR

- **NPV** (at 8% Discount Rate), **FIRR**

| Year | Investment | O & M | Total Cost | Revenue | NetCashFlow |
|---|---|---|---|---|---|
| 1 | 100 | | 100 | | -100 |
| 2 | 100 | | 100 | | -100 |
| 3 | 50 | | 50 | | -50 |
| 4 | 50 | | 50 | | -50 |
| 5 | | 5 | 5 | 70 | 65 |
| 6 | | 5 | 5 | 70 | 65 |
| 7 | | 5 | 5 | 70 | 65 |
| 8 | | 5 | 5 | 70 | 65 |
| 9 | | 5 | 5 | 70 | 65 |
| 10 | | 5 | 5 | 70 | 65 |
| 11 | | 5 | 5 | 70 | 65 |
| 12 | | 5 | 5 | 70 | 65 |
| 13 | | 5 | 5 | 70 | 65 |
| 14 | | 5 | 5 | 70 | 65 |
| 15 | | 5 | 5 | 70 | 65 |
| Total | 300 | 55 | 355 | 770 | 415 |
| PV | 255 | 36 | 281 | 500 | 86 |
| | | | | FIRR | 12.61% |

Capacity Development Project on
Nationally Appropriate Mitigation Actions (NAMAs) in the
Republic of Serbia

# Finance Options for Serbian NAMA

## Evaluation of the results

### How to evaluate the result?

- FIRR=12.5%; Good or Bad?
- FIRR=9.5%; Good or Bad?
- Investors normally compare the return with other projects.
- One of the parameter is interest rates of deposits, bonds
- PV: Size of the project, and necessary capital investor needs to prepare for investment
- NPV: Amount of return at today's value



## Finance Options

### Investment to low profitability projects

Negative factors
- Low profitability (FIRR)
- Too big in size (investment amount)

Options to assist
- Incentive, Subsidy, Grants
- PPP
- Formation of consortium



## Finance Options

### Project funding and financial analysis

- Funding scheme depends on Type, Size, Risk, Profitability, public necessity, etc., of the project
- To show the viability and reliability of the projects, detail information on the financial analysis is normally required ⇒ *FS study*

### Finance options

- Domestic source
- International Source
- PPP
- Incentive, Subsidy, Grants

## Finance Options

### Domestic source

- Government Budget (central and local)
- Guarantee
- Private investment
- Primary market (bond issuing)
- Bank loan, Private fund
- Concession loan (PPP)

### International source

- Official development assistance (ODA)
- Private loan
- Specific financial tools



## Finance Options

### Specific financial tools

- Debt Equity Swap
- Carbon Credit
- Concession loan
- Incentive, Subsidy, Grant



## Finance Options

### Example of regional economic community program

- Guarantee (Loan Guarantee Instrument for trans-European transport network projects (LGTT), The Multilateral Investment Guarantee Agency (MIGA), etc,)
- EU Programmes:
- Instrument for Pre-Accession Assistance (IPA) (ec.europa.eu/regional policy/funds/ipa
- TACSO Project (Technical Assistance for Civil Society Organizations) (www.tacso.org)
- European Agency for Reconstruction (http://ec.europa.eu/enlargement/archives/ear/serbia/serbia.htm)
- Special Climate Change Fund (SCCF) (www.climatefinanceoptions.org)
- Climate Funds (www.climatefundsupdate.org)
- Green Climate Fund (unfcc.int/cooperation_and_support/financial_mechanism/greenclimatefund)
- Green for Growth Fund for Southeast Europe



## Finance Options

### Incentive and Subsidy

For the project, financially not profitable but economically feasible, government may consider tools to promote private investment

- Incentive such as feed in tariff, development right
- Subsidy
- Concession loan
- Grants

# Finance Options for Project Implementation

## UNFCCC Form: "NAMA Seeking Support for Implementation"

F.1.2 Type of required financial support

- Grant
- Loan (Sovereign, Private)
- Concession loan
- Guarantee
- Equity
- Carbon finance
- Other



F Support required for the implementation of the mitigation action

United Nations Framework Convention on Climate Change

F.1.1 Amount of financial support 0.00
Conversion to USD <to be filled automatically>

F.1.2 Type of required financial support

- ☐ Grant
- ☐ Loan (sovereign)
- ☐ Loan (Private)
- ☐ Concessional loan
- ☐ Guarantee
- ☐ Equity
- ☐ Carbon finance
- ☐ Other <Pls enter Other text here>

F.1.3 Comments on Financial Support <Pls enter Comments on Financial Support here>

F.2.1 Amount of Technological Support 0.00
Conversion to USD <to be filled automatically>

F.2.2 Comments on Technological Support <Pls enter Comments here>

F.3.1 Amount of capacity building support 0.00 ☐ $ (Dollars) ☐ man/hours
Conversion to USD <to be filled automatically>

F.3.2Type of required capacity building support

- ☐ Individual level
- ☐ Institutional level
- ☐ Systemic level
- ☐ Other <Pls enter Other text here>



# Finance Options for Project Preparation

## Example of financial options for preparation

1) Private Investment

2) NAMA Registry "NAMA Seeking Support for Implementation"

3) Donor/international organization scheme

<Example>

- Ministry of the Environment, Japan
  *"Feasibility Study Programme on New Mechanism"*
  *(€400,000 – €650,000/ study)*
  http://gec.jp/main.nsf/en/Activities-Climate_Change_Mitigation-nmfsrepDB-List
- Ministry of Economy, Trade and Industry (METI), Japan
  *"Global Warming Mitigation Technology Promotion Project"*
  *(€400,000 – €1,600,000/ study)*
  http://www.meti.go.jp/english/press/2012/0426_03.html



**Capacity Development Project on Nationally Appropriate Mitigation Actions (NAMAs) in the Republic of Serbia**

# Thank you for your participation!!

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BALKAN SEMINAR ON NATIONAL APPROPRIATE MITIGATION ACTIONS – NAMA
BELGRADE, 4-5 February,2013

# POTENTIAL NAMA PROJECTS TO BE REALIZED IN PUBLIC ENTERPRISE ELECTRIC POWER INDUSTRY OF SERBIA

Miroslav Spasojevic, Advisor
PE EPS Environment Protection

## Construction of a 790 MW Ultra Supercritical Lignite Thermal Power Plant Nikola Tesla – Unit B3

- **Description**
- It is foreseen as condensing type, ultra supercritical steam parameters, with a river water cooling system, mainly designed to operate as the base load. Total power of the unit should be approximately 730 MW at the net connection. The unit will use lignite from the open pit mine Kolubara. The lignite will be delivered as homogenized coal of stated mean calorific value of 6,900 kJ/kg. Minimum expected annual operating time is 7,600 h/year.
- The NAMA will contribute to climate change mitigation as the highly efficient plant emits less GHG than existing TPPs. By its operation, it reduces GHGs that would be otherwise emitted by less efficient grid-connected TPPs in the absence of the mitigation action. The plant is expected to become the first ultra supercritical power plant in Serbia and will result in technology transfer of state-of-the-art clean coal technology

## Technical data

- Data in this table are of indicative nature. Preliminary technical analysis currently ongoing and the detailed technical data will be available by March 2013.

| Parameter | Value | Unit |
|---|---|---|
| Unit power, total/net | ~ 790/730 | MW |
| Net Unit efficiency | ≈ 43 | % |
| Net specific heat consumption | < 9,000 | kJ/kWh |
| Boiler efficiency | ~ 88 | % |
| Live steam flow rate | > 2,000 | t/h |
| Operating range | 40 – 100 | % |
| **Emissions of harmful combustion products** | | |
| $NO_x$ (at 6% O2) | ≤ 200 | mg/Nm³ |
| $SO_2$ (at 6% O2) | ≤ 200 | mg/Nm³ |
| $CO_2$ | ≤ 262 | g/Nm³ |
| Particles | ≤ 30 | mg/Nm³ |

## Location

- TPP Nikola Tesla B is located on the right hand bank of the Sava River, 59 km upstream of Belgrade. The new power plant is located between the villages of Skela and Usce.

## Expected Mitigation Potential

- Ex-ante and ex-post calculation of GHG emission reduction is conducted based on the approved CDM methodology, ACM0013 – "Consolidated baseline and monitoring methodology for new grid connected fossil fuel fired power plants using a less GHG intensive technology."
- **Baseline emissions**

  Baseline emissions are calculated by multiplying the electricity generated in the project plant using lignite fossil fuel ($EG_{PJ,y}$) with a baseline $CO_2$ emission factor ($EF_{BL,CO2}$), as follows:
- $BE_y = EG_{PJ,y} * EF_{BL,CO2}$
- $EF_{BL,CO2} = 3.6 * EF_{FF,co2} / \eta_{BL}$
- $BE_y = 3.6 * 0.10962 / 34.6 * 6,004,000 = 6,847,892\ tCO_2$

- **Project emissions**
- Project emissions are the $CO_2$ emission from combustion of lignite at the new power plant. The $CO_2$ emissions from electricity generation in the project plant ($PE_y$) can be calculated as follows:
- $PE_y = EG_{PJ,y} * EF_{PJ,CO2}$
- $EF_{PJ,CO2} = 3.6 * EF_{FF,co2} / \eta_{PJ}$
- $PE_y = 3.6 * 0.10962 / 43.0 * 6,004,000 = 5,510,164\ tCO_2$
- **Emissions reductions**
- $Er_y = BE_y – Pe_y = 6,847,892\ tCO_2 - 5,510,164\ tCO_2$
- $ER_y = 1,337,728\ tCO_2$ /year

## Measurement, Reporting, and Verification (MRV)

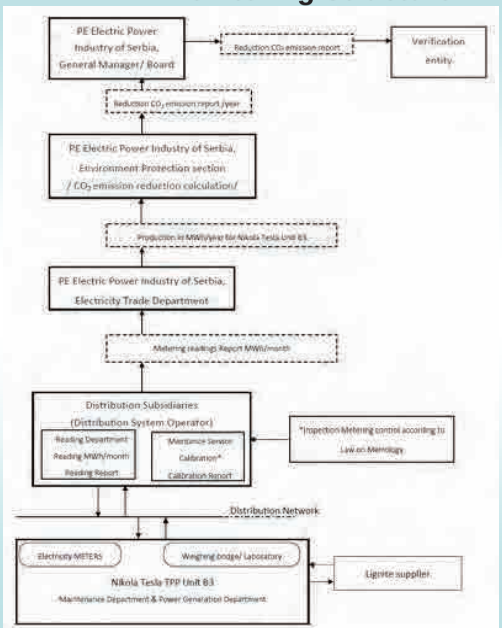
- **Data and parameters to be monitored**:

| **Data / Parameter** | EG y [MWh] |
|---|---|
| Description | Electricity generated by the project power plant in year *y* |
| Measurement procedures | Measured continuously by electricity meter equipped at the power plant and recorded daily. |
| Monitoring frequency | Monthly compiled and aggregated data is recorded on computer. |
| QA/QC procedures | The electricity meters will be periodically calibrated according to the relevant national industrial standards and regulations. Meter readings will be compared to electricity sales receipts. |

| **Data / Parameter** | $FC_{lignite,y}$ [ton/ year] |
|---|---|
| Description | Annual lignite fuel consumption at the power plant in year *y* |
| Measurement procedures | Measured continuously by weighing bridge at the power plant and recorded daily. |
| Monitoring frequency | Monthly compiled and aggregated data is recorded on computer. |

| **Data / Parameter** | $NCV_{lignite,y}$ [GJ/ton] |
|---|---|
| Description | Weighted average net calorific value of lignite fuel in year *y* |
| Measurement procedures | Laboratories in the power plant will measure the value for each fuel delivery. |
| QA/QC procedures | Laboratories will have ISO accreditation and data will be checked according to international standard. |

## NAMA Monitoring Structure




## Contribution to Sustainable Development

- Economic development of the region - Construction of the TPP Nikola Tesla B3 will bring construction of new infrastructure; it also contributes to the power system stability and supply security.
- Employment - Construction of the TPP Nikola Tesla will provide work for many domestic companies. After commissioning and connection to the network, new work places will be available at the power plant and following facilities, as well as the chance for engagement of the companies from the sector of services and maintenance on long-term basis.
- Energy resources – Generation of TPP Nikola Tesla B3 will, due to the higher energy efficiency of the plant, reduce coal consumption for power generation, and significantly reduce need for electricity import.
- Result in reduced emission levels of $CO_2$, $SO_x$ and $NO_x$, comparing to the existing thermo power plants in Serbia.

## Implementing Schedule

| Time span | Activity | |
|---|---|---|
| 2013 – 2016 | Preparatory period | Feasibility Study with Preliminary Design – including Revision by the State Revision Committee, Main Designs, preparation of tender documents, bidding and contracting procedures |
| 2017 – 2020 | Implementation | Construction, commissioning, trial operation and guarantee tests. |

Expected **cost of implementation**: EUR 1,200 million
(more accurate expected cost will be available by March 2013)

**Implementing Entity**: PE Electric Power Industry of Serbia (EPS)

Contact person: Mr. Mihajlo Gavric, Manager of Environmental Protection Sector

## Construction of 9 new small hydropower plants (HPPs) in Serbia

- **Description**

- The NAMA involves construction of 9 new small hydropower plants (HPP) throughout Serbia. The total capacity of 9HPP is 30.40 MW with possible electricity production of 108.3 GWh/year. All of the electricity generated will be supplied to the Serbian electricity grid, which is currently composed mostly of carbon-intensive lignite-fired thermal power plants.
- The NAMA will contribute to climate change mitigation as the hydro power as renewable energy source does not emit any greenhouse gases (GHGs) during operation, and reduces GHGs that would otherwise be emitted from grid-connected power plants in the absence of the mitigation action.

## Technical data

### List of HPPs

| Nº | HPP name | Location | Watercourse | Capacity (MW) | Expected Generation (GWh/y) | Investment (Million €) |
|---|---|---|---|---|---|---|
| 1 | Rovni | Valjevo | Jablanica | 1.25 | 5.2 | 1.612 |
| 2 | Svrackovo | Arilje | Veliki Rzav | 7.65 | 22 | 9.28 |
| 3 | Jezero | Surdulica | Bozicki tunnel | 1 | 4.85 | 2.98 |
| 4 | Mala Vrla 1 | Surdulica | Vrla, Gradska reka | 0.47 | 1.83 | 0.8 |
| 5 | Zavoj | Pirot | Visocica | 0.58 | 2.94 | 1.112 |
| 6 | W. s. | | Water supply | 4.9 | 4.88 | 1.0 |
| 7 | Banjica | Sicevo | Nisava | 2.3 | 12 | 5.9 |
| 8 | Stalac | Stalac | Juzna Morava | 11 | 48 | 29.0 |
| 9 | Sokolja | Kraljevo | Sokolja, Gvozdacka reka | 1.25 | 6.6 | 3.0 |
| Total | | | | **30.40** | **108.3** | **54.684** |

## Location

## Expected Mitigation Potential

- Approved CDM methodology, AMS-I.D. “Grid connected renewable electricity generation”
- **Baseline emissions**

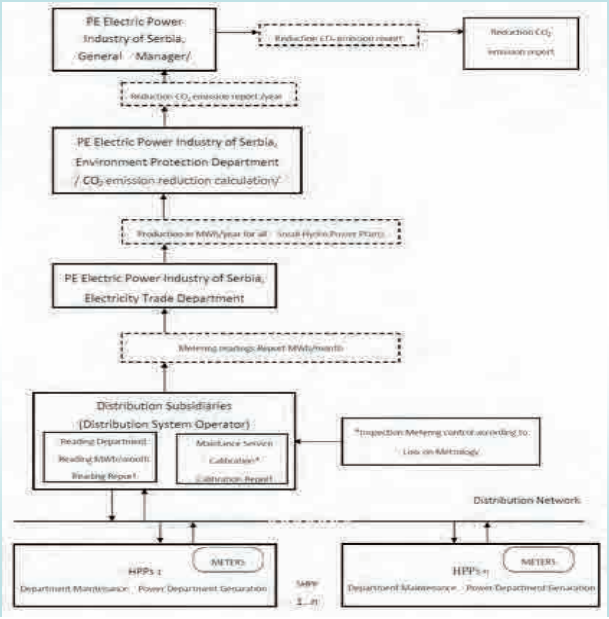
  Baseline emissions are calculated by multiplying the electricity generated in the project plants using grid emission factor:
- $BE = EG_{baseline} * Ef_{grid}$
- $BE = 108{,}300\ MWh * 0.945\ tCO_2/MWh = 102{,}343\ tCO_{2eq}$
- **Project emissions** for small hydro power plants i zero
- **Emissions reductions** $ER_y = 102{,}343\ tCO_2$ /year

## Measurement, Reporting, and Verification (MRV)

- **Data and parameters to be monitored**:

| **Data / Parameter** | $EG_y$ |
|---|---|
| Unit | MWh |
| Description | Quantity of electricity supplied to the grid by 9 HPPs |
| Source of data | Operation centre at generation system |
| Measurement procedures | Measured continuously by electricity meter equipped at each of the HPPs and recorded daily. |
| Monitoring frequency | Monthly Compiled and aggregated data is recorded on computer. |
| QA/QC procedures | The electricity meters will be periodically calibrated according to the relevant national industrial standards and regulations. Meter readings will be compared to electricity sales receipts. |

## NAMA Monitoring Structure




## Contribution to Sustainable Development

- The NAMA is expected to contribute to sustainable development of Serbia and co-benefit in the following manners:
  - » Utilization of renewable energy sources
  - » Reduction of impact on environment
  - » Creation of local employment opportunities
  - » Awareness raising among general public about clean energy

**Implementing Schedule**

2013 to 2016

Expected **cost of implementation**: EUR 54.684 million

| | |
|---|---|
| Simple payback period: | 12.1 years |
| FIRR: | 6.0% (for 40 years) |
| NPV: | - 9,130 EUR |

**Implementing Entity**: PE Electric Power Industry of Serbia (EPS)

Contact person: Mr. Mihajlo Gavric, Manager of Environmental Protection Sector

## Modernization and Capacity and Efficiency Increase of Unit B2 in Thermal Power Plant Nikola Tesla B

- Rehabilitation and modernization of the steam turbine, condensing plant and cooling system unit, boiler (the firing system and the combustion process by introducing "Low NOx" burners) and auxiliary equipment
- Efficiency improves from 31% to projected 34%
- Capacity increase of 47 MW (620 MW unit)
- **GHG Annual reduction** (based on the approved CDM methodology): 355,142 $tCO_{2e}$
- 
- Implementing Entity: PE Electric Power Industry of Serbia (EPS)
- Contact person: Mr. Mihajlo Gavric, Manager of Environmental Protection Sector

## Modernization and Capacity and Efficiency Increase of Unit A3 in Thermal Power Plant Nikola Tesla A

- Rehabilitation and modernization of the steam turbine, condensing plant and cooling system unit, boiler (the firing system and the combustion process by introducing "Low NOx" burners) and auxiliary equipment
- Efficiency improves from 31% to projected 33%
- Capacity increase of 30 MW (305 MW unit)
- **GHG Annual reduction** (based on the approved CDM methodology): 91,796 $tCO_{2e}$
-
- Implementing Entity: PE Electric Power Industry of Serbia (EPS)
- Contact person: Mr. Mihajlo Gavric, Manager of Environmental Protection Sector

## Replacement and Construction of a New Natural Gas Cogeneration Plant CHP Novi Sad

- The new high-efficient natural gas fired combined cycle (CCGT) cogeneration plant will generate 450 $MW_e$ of electricity supplied to the national grid of Serbia and 300 $MW_{th}$ of heat supplied to district heating plants of Novi Sad municipality, which will replace the existing inefficient cogeneration plant fueled by natural gas and heavy oil.
- **GHG Annual reduction** (based on the approved CDM methodology): 1,019,380 $tCO_{2e}$
-
- Implementing Entity: PE Electric Power Industry of Serbia (EPS)
- Contact person: Mr. Mihajlo Gavric, Manager of Environmental Protection Sector

## Construction of a Super-Critical Lignite Power Plant TPP Kostolac B

- Construction of a new lignite fired thermal power plant in TPP Kostolac B. The new unit B3, will have an installed capacity of 600 $MW_e$ (547 MW at TPP threshold)
- Project efficiency 40,8% what is significantly higher than efficiency of a conventional sub-critical lignite power plant in Serbia.
- **GHG Annual reduction** (based on the approved CDM methodology): 1,390,533 $tCO_{2e}$
-
- Implementing Entity: PE Electric Power Industry of Serbia (EPS)
- Contact person: Mr. Mihajlo Gavric, Manager of Environmental Protection Sector

Thank you

# Introduction 1000 MW of small biomass boilers in Serbia

Predrag Milanović
Ministry of Energy, Development and Environmental Protection
February 2013

# Presentation Index

1. Description
2. Location
3. Technologies
4. Expected GHG Emission Reductions
5. Expected Mitigation Potential
6. Financial Information
7. Measurement, Reporting, and Verification (MRV)
8. NAMA Implementing Entities
9. Implementing Schedule
10. Stakeholder consultation



# Description

- New biomass boilers and replacing the existing small inefficient boilers that are fuelled mainly by fossil fuels
  - 1,000 MW (3,150TJ)
  - Expected range of boiler capacity: 100 kW – 1000 kW
  - average capacity: 250 kW
  - total number around: 4,000
- Wood waste (wood chips) or agricultural waste
- Residential, commercial and industrial sectors



# Location

- Boilers will be installed throughout Serbia if there are biomass available
  - 150 municipalities
    - every municipality will be asked to determine few project locations.
  - private initiatives
    - every potential investor will be able to apply for credit for locations where the project is sustainable.

# Technologies

- According to statistical analysis of boilers in use, it is expected that number of replaced boilers should be in the next proportions

| Type of boilers that will be | Number of boilers | Boilers in use, % |
|---|---|---|
| electrical | 800 | 20 |
| oil | 1200 | 30 |
| gas | 600 | 15 |
| coal | 1400 | 35 |
| **Total:** | **4000** | **100** |

- Potential of biomass
  - estimated available biomass potential is more then 1500 ktoe
  - Estimated amount of consumption by 1000 MW boilers is less then 100 ktoe

| Biomass source | Potential (ktoe) |
|---|---|
| *Wood biomass* | *1,527* |
| Fuel wood | 1,15 |
| Forest residue | 163 |
| Wood processing residue | 179 |
| *Agricultural biomass* | *1,67* |
| Crop residue | 1,023 |
| Residues from fruit | 605 |



# Expected GHG Emission Reductions

- **BAU scenario:** Small biomass boilers are not installed and instead technologies based on electricity, oil, natural gas, coal continue producing thermal energy
- **Methodologies**:
  - Approved CDM methodology, AMS-I.I. *"Biogas/biomass thermal application for households/small users"*
    - Deviation from an applicability condition that limits up to 150 kW per thermal energy generation unit



# Expected Mitigation Potential

- Approved CDM methodology, AMS-I.I. *"Biogas/biomass thermal application for households/small users"*

$$ER_y = \sum_k N_{k,0} * n_{k,y} * BS_{k,y} * EF * \eta_{PJ/BL} * NCV_{biomass} - LE_y$$

$N_{k,0}$ – Number of thermal applications *k* commissioned
$n_{k,y}$ – Proportion of that remain operating in year *y* (fraction)
$BS_{k,y}$ – The net quantity of renewable biomass or biogas consumed by the thermal application *k* in year *y* (mass or volume units, dry basis)
$EF$ – $CO_2$ emission factor ($tCO_2/GJ$)Where: is a fraction representing fuel type *j* used by the baseline thermal applications displaced by biomass/biogas
$\eta_{PJ/BL}$ – Ratio of efficiencies of project equipment and baseline equipment (e.g. cook stove using coal) measured once prior to validation applying the same test procedure (e.g. lab test)
$NCV_{biomass}$ – Net calorific value of the biomass (GJ/unit mass or volume, dry basis)

- **Annual reduction**: 414,501 $tCO_2e$
- **Total reduction**: 10,362,525 $tCO_2e$ (25 years)



# Financial Information

- Expected cost of preparation: EUR 0.5 million
  - support for feasibility study in order to identify the project sites and technical specifications
- Expected cost of implementation: EUR 250 million
  - 250 million EUR for loans which will be distributed as loans with some incentives to the boiler owners
- Financial sources:
  - financial support from Annex-I countries and international organizations through NAMA scheme
  - Development Bank of Serbia will be intermediate and it should provide some sort of incentive

# Financial Information 2

- Assumptions:
  - discount rate 8%
  - without calculating value of $CO_2$
  - 250 EUR / kW
- Financial analysis:
  - Simple payback period: 6.9 years
  - IRR: 12.9 %
  - NRV: 88 million EUR

| Location | Previous type of Boiler | Power, kW | Investment, EUR/kW | Specific investment | Yearly savings, EUR | IRR (25 years) | NPV | Pay back period |
|---|---|---|---|---|---|---|---|---|
| Imaginary | Electricity | 250 | 62500 | 250 | 6854,2 | 8,6% | 2.857 | 9,1 |
| Imaginary | Oil | 250 | 62500 | 250 | 22784,3 | 35,4% | 158.157 | 2,7 |
| Imaginary | Gas | 250 | 62500 | 250 | 5376,1 | 5,5% | -11.552 | 11,6 |
| Imaginary | Coal | 250 | 62500 | 250 | 116,7 | #DIV/0! | -62.826 | 535,7 |



# Measurement, Reporting, and Verification (MRV)

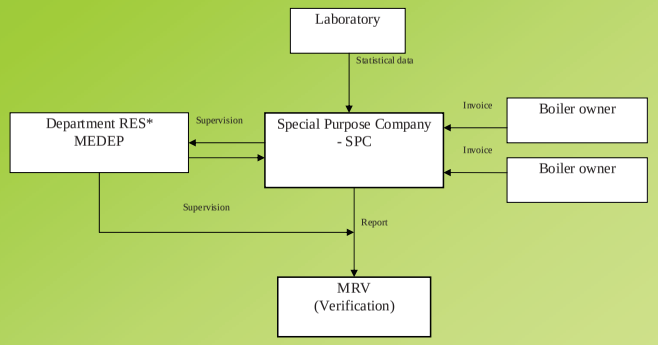
- Measurement
  - Data and parameters to be monitored

$$ER_y = \sum_k N_{k,0} * n_{k,y} * BS_{k,y} * EF * \eta_{PJ/BL} * NCV_{biomass} - LE_y$$

  - Number of thermal application k commissioned
  - Proportion of  that remain operating in year y
  - The net quantity of renewable biomass by the thermal application k in year y
  - Net calorific value of the biomass (dry basis)



# MRV Structure




- * RES: Department for Renewable Energy Sources



# NAMA Implementing Entities

- Ministry of Energy, Development and Environmental Protection – MEDEP
  - Organization and coordinating of all project
- Municipality
  - assist in finding potential sites for the replacement of boilers
- Special purpose company – SPC
  - responsible for the collection of data on biomass consumed by boilers
  - creating reports for reporting and verification
  - partly financed through budget (negotiations with potential financier)
- Boiler owners
  - keeping track of biomass consumption and to periodically send reports to SPC

# Implementing Schedule

- Expected starting date of Action
  - Installation will start in 2015 and operation will start continuously.
  - It is expected the installation be finished in 2019.
- Lifetime
  - 25 years
- Current Status
  - Developing biomass market
    - The contracts with GIZ and KfW for the project “Development of a Sustainable Bioenergy Market in Serbia”
    - Preparation of documents for project and requests for funding a project “Reducing Barriers to Accelerate the Development of Biomass Markets in Serbia” is in final stage. The decision on acceptance of the project by the GEF is expected by the end of September 2013.



# Stakeholder consultation

- The public will be informed about this project through various activity:
  - Public institutions will be questionnaire directly or through local governments
  - Investors will be informed through Chamber of Commerce and Industries of Serbia and its sections
  - The whole activity will be accompanied through media with organizing forums and public discussions



Thank you for your attention!

Predrag Milanović

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Ministry of Construction and Urbanism

# IMPROVEMENT OF OLD RESIDENTIAL BUILDINGS' ENVELOPE

NATIONALLY APPROPRIATE MITIGATION ACTION OF THE REPUBLIC OF SERBIA

## Mitigation Action

- Residential buildings in Serbia built before the 80's consume huge amount of energy for space heating due to lack of any thermal insulation
- The objective of the project:

  rehabilitation of about **10% of the existing residential buildings** in Serbia built in the period from 50's to 80's
- Energy efficiency improvements in selected residential buildings aim to:
  - **reduce heat energy consumption and costs**;
  - **increase the level of indoor comfort and end users' satisfaction**;
  - **reduce GHG emission**.

Ministry of Construction and Urbanism

## Technology/ measures

- Rehabilitation of buildings' envelope – thermal insulation of non-transparent elements including external walls, partitions to unheated spaces, roofs, ceilings, etc.
- Replacement of windows – installing new five-chamber PVC frames, double glazing, low-emissivity glass, filled with argon gas.
- Measures will result in

  decrease of specific annual energy consumption for heating **from 160 kWh/m$^2$y to 70 kWh/m$^2$y**

Ministry of Construction and Urbanism

## Potential Number of sites for NAMA project and Location

- The number of potential sites for NAMA project is about **10,000 residential buildings** located throughout Serbia.
- total surface floor area of 9.66 million square meters (10 % of the total surface)

  (The source of data: Population and housing census in Serbia as well as Statistical Yearbook; surface area of windows and walls was estimated for typical buildings in Serbia built in the period from 1950 to 1980)

Ministry of Construction and Urbanism

## Timeline

- **Implementing Schedule**
  Depending on financial resources dynamic, the project could be implemented continuously or in phases.
- **Expected starting date of Action**
  Buildings rehabilitation will start in 2013. Start of operation will continuously happen as each building's rehabilitation is completed. The reconstruction of app. 10,000 buildings should be finished in 2020.
- **Lifetime**
  Expected lifetime of thermal insulation and new windows is approximately 30 years.



## Current Status

- In 2012, former Ministry of Environment, Mining and Spatial Planning granted funds of 1.3 billion RSD (approximately 13 million Euro) to tenants for rehabilitation of existing buildings.
- Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) Project currently being implemented aims to support the Serbian government by
  - improving the existing legal framework,
  - raising awareness on the importance and benefits of energy efficiency
  - providing information and financial resources.



## Expected Mitigation Potential

- **Annual reduction**: 503,929 $tCO_{2e}$
- **Total reduction**: 15,117,870 $tCO_{2e}$ (30 years)

### Methodologies and Assumptions

- **BAU scenario**: The rehabilitation of existing residential buildings without building envelope thermal insulation is not conducted. Energy efficiency of these residential buildings remains very low.



## Calculation of emission reductions:

**Baseline GHG emission**

- Total floor areas to be rehabilitated in the existing buildings built from the 50's to the 80's: 9,666,000 $m^2$
- Average energy consumption for heating for buildings without thermal insulation built 30-50 years ago: 160 $kWh/m^2y$
- Total annual energy consumption for these buildings: 160 $kWh/m^2y$ x 9,666,000 $m^2$ = 1,546,560,000 kWh/y

## Baseline GHG emission

- Energy is supplied by various sources (% share in the market based on the data from PE "Belgrade District Heating"):

| Fuel/ energy | Share of the market [%] | Final energy [GWh/y] | Conversion factor to primary energy | Primary energy [GWh/y] | Primary energy [TJ/y] |
|---|---|---|---|---|---|
| Electricity | 40 | 618.62 | 1 | 618.62 | 2,227.03 |
| District heating | 40 | 618.62 | 1.3* | 804.21 | 2,895.16 |
| Coal | 10 | 154.66 | 1.3** | 201.06 | 723.82 |
| Natural gas | 10 | 154.66 | 1.1** | 170.13 | 612.47 |
| Σ | | **1,546.56** | | **1,794.02** | **6,458.48** |



## Baseline GHG emission

| Fuel/ energy | Primary energy | $CO_2$ Emission factor | $CO_2$ emission [t $CO_2$/y] |
|---|---|---|---|
| Electricity | 618,620 [MWh/y] | 0.945 [t $CO_2$/MWh] | 584,596 |
| District heating | 2,895.16 [TJ/y] | 71 [t $CO_2$/TJ]* | 205,556 |
| Coal | 723.82 [TJ/y] | 98.6 [t $CO_2$/TJ]** | 71,369 |
| Natural gas | 612.47 [TJ/y] | 56.1 [t $CO_2$/TJ] | 34,360 |
| Σ | | | **895,881** |



## GHG emission after implementing project (10,000 buildings rehabilitated)

- Average energy consumption for heating after buildings rehabilitation (according to the new Regulation on Energy Efficiency in Buildings): 70 kWh/m$^2$y.
- Total energy consumption: 70 kWh/m$^2$y x 9,666,000 m$^2$ = 676,620,000 kWh/y



## GHG emission after implementing project (10,000 buildings rehabilitation)

| Fuel/ energy | Share of the market [%] | Final energy [GWh/y] | Conversion factor to primary energy | Primary energy [GWh/y] | Primary energy [TJ/y] |
|---|---|---|---|---|---|
| Electricity | 40 | 270.65 | 1 | 270.65 | 974.34 |
| District heating | 40 | 270.65 | 1.3* | 351.85 | 1,266.66 |
| Coal | 10 | 67.66 | 1.3** | 87.96 | 316.66 |
| Natural gas | 10 | 67.66 | 1.1** | 74.43 | 267.95 |
| Σ | | **676.62** | | **784.89** | **2,825.61** |

## GHG emission after implementing project (10,000 buildings rehabilitation)

| Fuel/ energy | Primary energy | $CO_2$ Emission factor | $CO_2$ emission [t $CO_2$/y] |
|---|---|---|---|
| Electricity | 270,650 [MWh/y] | 0.945 [t $CO_2$/MWh] | 255,764 |
| District heating | 1,266.66 [TJ/y] | 71 [t $CO_2$/TJ]* | 89,933 |
| Coal | 316.66 [TJ/y] | 98.6 [t $CO_2$/TJ]** | 31,223 |
| Natural gas | 267.95 [TJ/y] | 56.1 [t $CO_2$/TJ] | 15,032 |
| Σ | | | **391,952** |



## GHG emission reduction

- Is calculated by subtracting the baseline GHG emission and calculated emission after buildings' rehabilitation.
- GHG emission reduction = 895,881 - 391,952 = 503,929 [t $CO_{2e}$/y]



# Legal Framework

- Law on Construction and planning (2009)
- Regulations on Energy Efficiency in Buildings (2011) prescribes how to calculate thermal performance of buildings, energy performance for new and existing facilities, categorizes buildings based on energy properties
- Regulation on Certification of Energy Performance of Buildings (2011) prescribes an energy plan for building, an energy audit and certification by accredited companies, submission of "Energy Passport" to responsible entities; re-certification by accredited companies after the measures, submission of revised Energy Passport to responsible entities



## Energy Passport includes the following

- General information of the Building, Energy certificates for buildings
- Data on building, climate condition, HVAC (heating, ventilation, and air conditioning), building envelope
- Data on heating system of the building, heating control system, heat loss of the building, energy needs of the building, energy consumption, $CO_2$ emissions
- Proposals for improvement of the energy efficiency of the building

# Monitoring Plan

- Ministry of Construction and Urbanism will monitor all issued Energy Passports before and after the implementation of measures, and confirm $CO_2$ emission of the building in each Energy Passport.
- Through comparison of the $CO_2$ emission described in each EP (before/ after), $CO_2$ emission reduction will be confirmed.



# Data and parameters to be monitored:

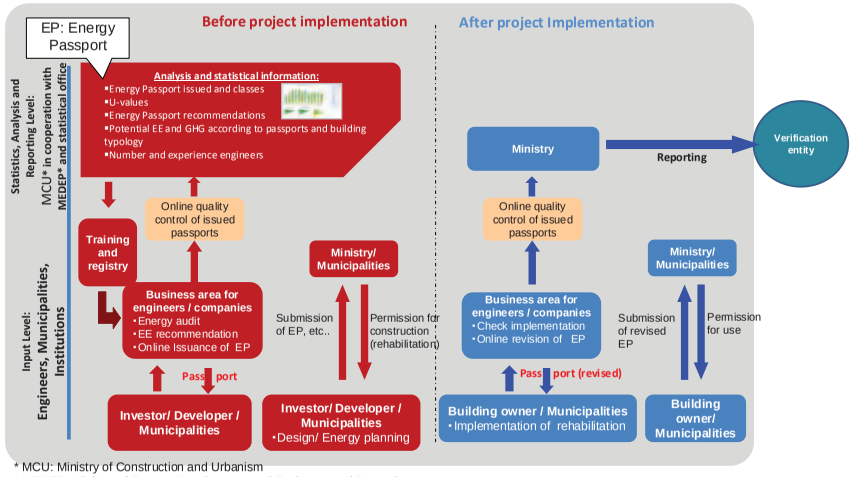
$CO_2$ Emission reduction will be calculated as follows.

- $ER_y = \Sigma n(BEi - PEi)$

- ER y = Emission Reduction in Year y
- n = Number of rehabilitated buildings that are issued with Energy Passport.
- BE i = $CO_2$ Emission before rehabilitation in building i
- PE i = $CO_2$ Emission after rehabilitation in building i



# Monitoring structure of NAMA




* MCU: Ministry of Construction and Urbanism
* MEDEP: Ministry of Energy, Development and Environmental Protection
* EP: Energy Passport



# Domestic MRV arrangements

- Domestic MRV arrangement is currently under development.
- NAMA implementing entity is expected tto be responsible for the Measurement (M) and Reporting (R) activities, which will go through Verification (V) from third party.
- MRV of the proposed NAMA will be conducted in the following manner:

Ministry of Construction and Urbanism will conduct and supervise the Measurement activities based on the monitoring plan in order to calculate the emission reductions achieved by the NAMA.

Report prepared by the Ministry of Construction and Urbanism containing

1) the detailed result of the monitoring activities conducted based on the monitoring plan,

2) the result of emission reduction calculation,

3) any support received under NAMA scheme from Annex-I countries or international organizations regarding financial support, technical support, or support on capacity building.



# Finance and Cost

- Expected cost of preparation: EUR 5 million (General design or/and Feasibility study for each of the buildings)
- Expected total cost of implementation: EUR 723.48 million
- The details regarding the financial sources necessary will be analyzed in the Feasibility study.
- The financial mechanism will be decided upon the completion of the Feasibility study.



# Support Required

| Type of Support | Support required for Preparation | Support required for implementation |
|---|---|---|
| **Financial** | EUR 5 million | EUR 723.48 million |
| **Technical** | x | x |
| **Capacity Building** | x | x |

- Total cost of the project EUR 723.48 million of which EUR 144.696 million (20 % of the total cost) - covered by building owners.
- total expected amount of support required is EUR 578.784 million (80 % of the total cost)
- state would ask a grant to offer it to the owners as a form of state subsidy in total of EUR 217.044 million (30 % of the total cost)
- some sort of non-commercial loan in total of EUR 361.74 million (50 %).



# Contribution to Sustainable Development

Positive economic, social and environmental effects:

Involvement of local partners in production of construction products, project design and execution of works

Increase in demand and production of construction products, in revenue and employment of local companies

Economic development of all regions of Serbia

Involvement of stakeholders at local level (enterprises, certified engineers, local authorities for issuing building permits).

Positive environmental impact (reduction of energy consumption, reduction of GHG emissions)

Better living conditions

Increase of indoor comfort and end users' satisfaction.

- Hvala na pažnji!
- **ありがとうございました！**

Republic of Serbia
Ministry of Energy, Development and Environmental Protection

# Energy Efficiency Improvements in Public Buildings: 23 schools and 26 hospitals
# - Serbian Energy Efficiency Project (SEEP) -

Dr Dimitrije Lilic

**"Balkan Regional Seminar on Nationally Appropriate Mitigation Actions"**
**4. and 5. February 2013**

**National Assembly House,**
**Nikola Pasic Square, No.13,**
**Small plenary hall**



## SERBIA – Title of NAMA

***Energy Efficiency Improvements in Public Buildings: 23 schools and 26 hospitals***
***- Serbian Energy Efficiency Project (SEEP) -***

The overall goal of the Project is to provide optimal conditions for the people living and working in public buildings:

- **23 schools and**
- **26 hospitals,**

in an energy efficient and sustainable manner.

***Belgrade - SERBIA***



## Description of the Mitigation Action

The total potentially refurbished area of the:

- **23 schools** is ***76,483 m²*** with expected $CO_2$ emission reduction of ***2,142 tones/annually*** and
- **26 hospitals** is ***143,825 m²*** with expected $CO_2$ emission reduction of ***6,184 tones/annually.***
- **23 schools and 26 hospitals** is ***220,308 m²*** with expected $CO_2$ emission reduction of ***8,326 tones/annually***.
- **Total reduction**: 208,150 $tCO_{2e}$ (25 years)

***The NAMA will contribute to climate change mitigation as refurbished Public buildings will use less energy and consequently emit less $CO_2$ for about 8,326 tones/annually during their life cycle that would be emitted in absence of the mitigation action.***



## Technologies/ measures

The measures proposed can be divided into two general groups:

1. Upgrading the building envelope (e.g. insulating walls, roofs, ceiling, basement; replacing windows; etc.);
2. Upgrading the heating system (equipment and controls – both central plant and local terminal units);

Detailed list of the measures proposed on 23 schools and 26 hospitals are given in tables in annex of the MAMA Short Description.

# List of target schools

| No | Name of the Building | Location | Area (m²) | Investment cost (EUR) | Pay back period years | Proposed measures |
|---|---|---|---|---|---|---|
| 1 | Secondary school "Besedeš Jožef" Kanjiža | Senta | 2,623 | 291,415 | 7.5 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol |
| 2 | Secondary school "Đura Jakšić" Rača (fiskultura sala) | Kragujevac | 1,455 | 110,580 | 5.4 | 1.Window Replacement in the gym 2.Wall and roof Insulation 3.Thermocontrol 4.Boiler reconstruction |
| 3 | Primary school "Vuk Karadžić" Lovćenac | Vrbas | 3,502 | 310,000 | 17.8 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Gas burner |
| 4 | Aeronautical-technical school "Petar Drapšin" Beograd | Beograd | 2,700 | 202,770 | 11.0 | 1. Window Replacement 2. Mechanical works |
| 5 | Secondary school "Lazar Nešić" Subotica | Subotica | 5,670 | 207,511 | 5.6 | 1.Window Replacement 2.Thermocontrol |
| 6 | Primary school "Veljko Vlahović" Pečenjevce | Leskovac | 1,632 | 131,375 | 7.8 | 1.Window Replacement 2.Wall Insulation 3.Thermocontrol 4.Boiler Replacement |
| 7 | Primary school "Čeh Karolj" Ada | Senta | 3,208 | 258,245 | 11.1 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.New boiler room |
| 8 | Primary school "Čibukovački partizani" Kraljevo | Kraljevo | 2,667 | 236,296 | 9.8 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Balancing |
| 9 | Primary school "Svetozar Marković" Lapovo | Kragujevac | 1,465 | 111,340 | 6.3 | 1.Window Replacement 2.Wall and Ceiling Insulation 3.Thermocontrol |
| 10 | Primary school "Janko Veselinović" Crna Bara | Šabac | 898 | 72,378 | 10.5 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Boiler Replacement |
| 11 | Primary school "Vuk Karadžić" Bačko Dobro Polje | Vrbas | 1,630 | 89,650 | 10.8 | 1.Wall and roof Insulation 2.Partial Replacement of Windows and Doors 3.Thermocontrol |
| 12 | Primary school "Dimitrije Todorović" Knjaževac | Knjaževac | 4,040 | 460,560 | 20.2 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Balancing |
| 13 | Primary school "Borivoje Milojević" Krupanj | Krupanj | 1,019 | 76,526 | 5.9 | 1.Window Replacement 2.Thermocontrol 3. Balancing 4.Heat Pipeline Reparation |
| 14 | Primary school "Vuk Karadžić" Kladovo | Kladovo | 6,376 | 478,837 | 16.2 | 1.Window Replacement 2. Roof Insulation 3.Thermocontrol 4. Balancing |
| 15 | Technical school "Rade metalac" Leskovac | Leskovac | 8,277 | 455,235 | 14.9 | 1.Window replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Balancing |
| 16 | Primary school "Jovan Cvijić" Kostolac | Kostolac | 4,958 | 272,250 | 12.9 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4. Balancing |
| 17 | Primary school "Hristo Botev" (Moše Pijade) Dimitrovgrad | Dimitrovgrad | 4,853 | 266,915 | 14.5 | 1.Window Replacement 2.Thermocontrol 3. Balancing 4.Boiler Replacement |
| 18 | Secondary school "Miloš Savković" Arandelovac | Arandjelovac | 1,960 | 78,400 | 6.8 | 1.Wall and roof Insulation 2.Thermocontrol |
| 19 | Primary school "Filip Filipović" | Čačak | 3,910 | 346,426 | 13.4 | 1.Window Replacement 2. Wall and roof Insulation 3.Thermocontrol 4. Balancing |
| 20 | Primary school "Ljupče Španac" Bela Palanka | Bela Palanka | 3,153 | 173,415 | 11.1 | 1.Window Replacement 2.Wall and roof Insulation |
| 21 | Agriculture and Forestry Secondary School "Josif Pančić" Surdulica | Surdulica | 3,475 | 139,000 | 17.9 | 1.Wall and roof Insulation 2.Thermocontrol 3. Balancing |
| 22 | Secondary Economic School Valjevo | Valjevo | 3,714 | 69,160 | 5.6 | 1.Only works in boiler room (windows replaced in 2003, brick facade, flat roof in good condition) |
| 23 | Primary school "Vuk Karadžić" | Loznica | 3,298 | 131,920 | 17.4 | 1.Wall and roof Insulation 2.Thermocontrol |
| Average | | | 3,325 | 216,096 | 11.3 | * Windows have already been replaced if not given |
| Total | | | 76,483 | 4,970,204 | - | |



# List of target hospitals

| No | Name of the Building | Location | Area (m²) | Investment cost (EUR) | Pay back period years | Proposed measures |
|---|---|---|---|---|---|---|
| 1 | Medical Centre Gornji Milanovac | Gornji Milanovac | 4,714 | 188,560 | 3.9 | 1.Window Replacement 2.Roof Insulation 3.Thermocontrol |
| 2 | Rehabilitation Institute "Dr Miroslav Zotović" Sokobanjska 13, Beograd | Beograd | 17,500 | 262,500 | 5.1 | 1.Gas Boiler Room 2.Thermocontrol |
| 3 | Medical Centre Kuršumlija | Kuršumlija | 1,522 | 63,091 | 3.0 | 1.Wall and roof Insulation 2.Thermocontrol 3.Balancing |
| 4 | Special Rehabilitation Hospital "AGENS" Mataruška Banja | Kraljevo | 5,939 | 478,683 | 6.7 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Gas Boiler Room |
| 5 | Institute for Thyroid Gland and Metabolism "Čigota" Zlatibor (Block A) | Zlatibor | 2,425 | 195,455 | 6.5 | 1.Window Replacement 2.Roof Insulation 3.Thermocontrol 4.Gas Boiler Room |
| 6 | Clinical Centre (Orthopaedic Ward and Traumatology) Novi Sad | Novi Sad | 1,520 | 60,800 | 3.8 | 1.Window Replacement 2. Roof Insulation 3.Thermocontrol |
| 7 | General Hospital Leskovac | Leskovac | 2,425 | 160,292 | 6.6 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Balancing |
| 8 | Medical Centre Prokuplje | Prokuplje | 2,776 | 183,493 | 4.5 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4. Balancing |
| 9 | Special Hospital "Ozren" (Department of Thoracic Medicine) Sokobanja | Sokobanja | 5,936 | 478,442 | 13.4 | 1.Partial Window Replacement 2.Ceiling Insulation 3.Thermocontrol 4.Boiler Reconstruction |
| 10 | Special Hospital "Sveti Vračevi" Novi Kneževac | Kikinda | 3,489 | 167,921 | 7.9 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4. Pipe insulation |
| 11 | Medical Centre Zaječar | Zaječar | 3,476 | 235,673 | 3.5 | 4.Heat Pipeline Reparation 5. Boiler Room Reconstruction |
| 12 | Special Rehabilitation Hospital (Children's Ward) Banja Koviljača | Loznica | 1,502 | 60,080 | 6.5 | 1.Window and Door Replacement 2.Roof Insulation 3.Thermocontrol 4.Balancing |
| 13 | Medical Centre Užice | Užice | 26,244 | 787,320 | 11.9 | 1. Window Replacement 2.Thermocontrol |
| 14 | Medical Centre "Kosta Stredojević Šijuka" Kikinda | Kikinda | 11,575 | 347,250 | 9.3 | 1.Window Replacement 2.Thermocontrol 3. Pipe Insulation 4.Balancing |
| 15 | Polyclinic Kula | Vrbas | 2,520 | 138,300 | 6.4 | 1.Wall and roof Insulation 2.Thermocontrol 3.Gas Boiler Room |
| 16 | Special Hospital «Rusanda» Melenci | Zrenjanin | 10,533 | 526,650 | 12.3 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Heat Pipeline Reparation |
| 17 | Polyclinic Novi Kneževac | Kikinda | 1,078 | 109,872 | 17.3 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Gas Boiler Room |
| 18 | Medical Centre "Dr Dragisa Mišović" Čačak / Polyclinic Ivanjica | Čačak | 3,301 | 218,196 | 11.2 | 1.Window Replacement 2.Wall Insulation 3.Thermocontrol 4.Balancing |
| 19 | Special Hospital "Dr Borivoje Gnjatić" Stari Slankamen | Novi Sad | 6,857 | 351,764 | 12.0 | 1.Window Replacement 2.Wall and roof Insulation 3.Thermocontrol |
| 20 | Blood Disease Institute "Anemija" Ivanjica | Ivanjica | 5,614 | 224,560 | 7.0 | 1.Partial Window Replacement 2.Wall and roof Insulation 3.Thermocontrol 4.Balancing |
| 21 | Medical Centre Bor | Bor | 4,194 | 153,500 | 5.7 | 1.Wall and roof Insulation 2.Thermocontrol 3.Balancing |
| 22 | Clinical Hospital Centre (pharmacology) Kragujevac | Kragujevac | 582 | 18,915 | 4.5 | 1.Window Replacement 2.Ceiling Insulation |
| 23 | Medical Centre | Jagodina | 7,920 | 316,800 | 10.1 | 1.Roof Insulation 2.Thermocontrol 3. New Boiler |
| 24 | Medical Centre «Dr Milenko Marin» (psychiatric ward), Loznica | Loznica | 690 | 25,254 | 15.0 | 1.Wall and roof Insulation 2.Thermocontrol 3.Balancing 4. Pipe insulation |
| 25 | Medical Centre "Dr Radivoje Simonović" Sombor | Sombor | 6,181 | 80,165 | 8.1 | 1.Door replacement 2.Thermocontrol 3.Heat Pipeline Reparation |
| 26 | Polyclinic Ljubovija | Ljubovija | 3,312 | 99,369 | 9.7 | 1.Roof Insulation 2.Thermocontrol 3.Balancing |
| Average | | | 5,532 | 228,189 | 8.2 | * Windows have already been replaced if not given *Thermocontrol - replacement of all radiators' valves and thermostatic valves |
| Total | | | 143,825 | 5,932,905 | - | |



# Locations

23 locations of schools and 26 locations of hospitals

*SCHOOLS*

*HOSPITALS*

NOTE: *Numerations are according Lists of target schools and hospitals*



# NAMA Implementing Entity

## *Ministry of Energy, Development and Environmental Protection - MEDEP*

Implementation and Measurement, Reporting, and Verification (MRV) process should be implemented in cooperation with:

- ***Energy Managers*** – when system of energy managers will be established. By new Law on Efficient Use of Energy (draft) should be established this system.
- ***Local Governments*** – responsible for schools
- ***Hospital's management*** – responsible for hospitals

# NAMA – Implementing Schedule

**Expected starting date of Action**

- *Buildings rehabilitation will start in 2013 or when the project will accept.*
- *Depending on financial resources dynamic, the project could be implemented continuously or in phases.*

**Lifetime**

- *25 years for installed envelopes*
- *According by manufacturers specified life time of the installed equipments*

**Current Status**

- *Preliminary energy audits for target 49 public buildings completed in 2007 and 2009*
- *Seeking the financial source*
- *As project is not yet accepted there is no coordination with local governments responsible for schools and hospital's management. Only previously coordination was in the frame of the project SEEP 2.*

**Coverage**

- *Sector: Buildings*
- *GHG Gases: $CO_2$*



# NAMA – Financial Information

➢ Expected cost of **preparation**: **1,60 million euro**

Expected cost of preparation is about **15% of Total expected cost** for implementation:

- *Detailed audits - checking of the primary defined EE measures by Preliminary audits carried out before several years,*
- *Preparation of project documentation,*
- *Building Certification,*
- *Tendering,*
- *Supervision*

➢ Expected cost of **implementation**: **10.90 million Euros**.

- for 23 schools is ***4.97 million euro***,
- for 26 hospitals is ***5.93 million euro***

NOTE: *see Attachment for the investment cost of each building*

➢ Expected **incremental cost** of implementation: N/A

➢ **Financial sources**:

- *Not identified, but soft loan, donations, grants, etc. are possible.*
- *Also, ESCO model are one of the option for financing.*
- *One part of financial sources could be provided by building owners.*

➢ **Financial analysis**: NOTE: *see Attachment for expected investment cost and payback period for each of the building.*



# NAMA – Calculation of emission reduction

Estimation of GHG emission reductions was conducted using the available monitored data from the previous energy efficiency improvement projects by the same NAMA implementing entity called "Serbian Energy Efficiency Project I (SEEP I)" and "Serbian Energy Efficiency Project II (SEEP II)."

| Building type | Project name | Number of monitored buildings | Total area of the building ($m^2$) | $CO_2$ emission reduction (kg $CO_2/m^2y$) |
|---|---|---|---|---|
| **Schools** | SEEP I | 16 | 51,589 | 29 |
| | SEEP II | 9 | 32,876 | 27 |
| | | | Average | **28** |
| **Hospitals** | SEEP I | 12 | 69,577 | 39 |
| | SEEP II | 17 | 75,915 | 47 |
| | | | Average | **43** |

Total expected annual $CO_2$ emission reduction from schools:
$\triangle CO_2 = 76{,}483\ m^2 \cdot 28\ kg\ CO_2/m^2y = 2{,}142\ t\ CO_2/y$

Total expected annual $CO_2$ emission reduction from hospitals is:
$\triangle CO_2 = 143{,}825\ m^2 \cdot 43\ kg\ CO_2/m^2y = 6{,}184\ t\ CO_2/y$



# Monitoring plan and structure

**Monitoring plan**

For rehabilitated old buildings, Regulation on Certification of Energy Performance of Buildings requires from building owners to obtain the "**Energy Passport**" by accredited companies.

**Energy Passport** includes the following information:

- *General information of the building, energy certificates for buildings*
- *Data on building, climate condition, HVAC (heating, ventilation, and air conditioning), building envelope*
- *Data on heating system of the building, heating control system, heat loss of the building, energy needs of the building, energy consumption*
- ***$CO_2$ emissions from the building (automatically calculated)***
- *Proposals for improvement of the energy efficiency of the building*

Through ***comparing $CO_2$ emissions*** described in each Energy Passport (audit), which is ***calculated before and after rehabilitation*** takes place, ***$CO_2$ emission reduction will be confirmed***.

# Monitoring plan and structure

**Energy manager *)** will also be responsible for reporting the calculated amount of $CO_2$ emission reduction of each rehabilitated public building to Ministry of Energy, Development and Environmental Protection (MEDEP).

The government of Serbia in cooperation with GIZ is currently developing an online system to manage all the issued Energy Passports and $CO_2$ emissions data contained in these Energy Passports, which will make the monitoring activity even more efficient and transparent.

Total $CO_2$ emission reduction (ER) from all target schools and hospitals will be calculated as follows.

$$ER = ER_{school} + ER_{hospital}$$
$$ER_{school} = \Sigma\,(BE_{school} - PE_{school})$$
$$ER_{hospital} = \Sigma\,(BE_{hospital} - PE_{hospital})$$

*) *Energy Managers – By new Law on Efficient Use of Energy (draft) should be established Energy Management system.*



# Monitoring plan and structure

## Data and parameters to be monitored:

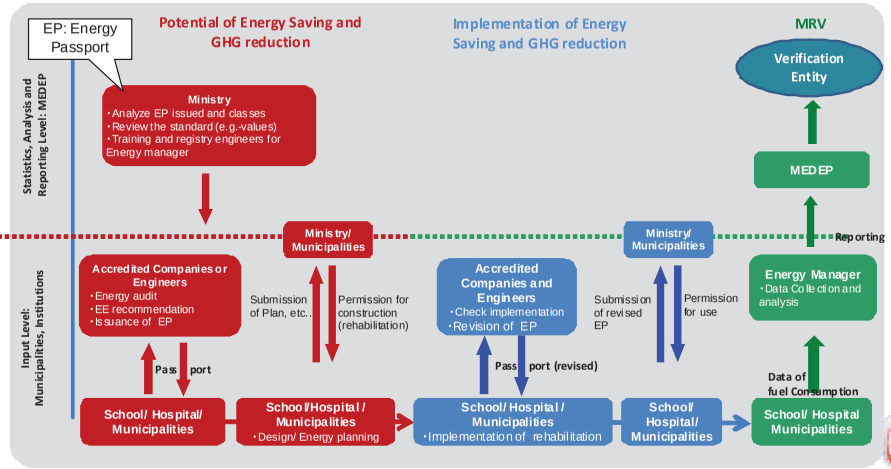
| Data / Parameter | ER |
|---|---|
| Unit | kg-$CO_2$/ year |
| Description | Amount of $CO_2$ emission reduction achieved through installing energy saving measures at each building |
| Source of data | -Energy Passport (audit) issued to each rehabilitated building before rehabilitation<br>-Energy Passport issued to each rehabilitated building after rehabilitation |
| Measurement procedures | Energy Manager will monitor all Energy Passports (audit) issued before and after implementation of rehabilitation works, and confirm $CO_2$ emissions of the building. Through comparison of the $CO_2$ emissions described in each Energy Passports (before/ after), $CO_2$ emission reduction will be calculated. |
| Monitoring frequency | Yearly |



# Monitoring plan and structure

MRV process should be established and implemented in cooperation with:

- −Ministry of Energy, Development and Environmental Protection (MEDEP)
- −Energy Managers
- −Local Governments – responsible for schools
- −Hospital's management – responsible for hospitals






# Monitoring plan and structure

**Domestic MRV arrangements**

- Domestic Measurement (M), Reporting (R) and Verification (V) arrangement of Serbia is currently under development.
- It is expected that the MRV of the proposed NAMA will be conducted in the following manner:
  1. MEDEP will supervise the Measurement activities based on the above-mentioned monitoring plan in order to calculate the emission reductions achieved by the NAMA.
  2. MEDEP will prepare a Report that contains information on:
     - the detailed result of the monitoring activities conducted based on the monitoring plan,
     - the result of emission reduction calculation based on the above mentioned methodology, and 3
     - any support received under NAMA scheme from Annex-I countries or international organization regarding financial support, technical support, or support on capacity building.

# Contact Information

## Implementing Entity

| | |
|---|---|
| Entity Name | Ministry of Energy, Development and Environmental Protection |
| Contact Person | Dimitrije Lilic |
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| Phone | +381-11-3131-955 |
| E-mail | dimitrije.lilic@merz.gov.rs |

## NAMA Coordinating Entity

| | |
|---|---|
| Entity Name | Ministry of Energy, Development and Environmental Protection |
| State Secretary: | Mr. Vladan Zdravkovic |
| Contact Person | Ms. Danijela Bozanic |
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| Phone | +381-11-3131-355 |
| Fax | +381-11-3131-355 |
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# *THANK YOU FOR YOUR ATTENTION!*

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# Capacity Development Project on Nationally Appropriate Mitigation Actions (NAMAs) in the Republic of Serbia

## Transport Sub-sector Projects



## 1. Foreword

**Basic facts (OECD):**

- Transport-sector CO2 emissions represent 23% (globally) and 30% (OECD) of overall CO2 emissions from Fossil fuel combustion. The sector accounts for approximately 15% of overall greenhouse gas emissions.
- Global CO2 emissions from transport have grown by 45% from 1990 to 2007, led by emissions from the road sector in terms of volume and by shipping and aviation in terms of highest growth rates.



- Global CO2 emissions from transport are expected to continue to grow by approximately 40% from 2007 to 2030 – though this is lower than pre-crisis estimates.
- In certain ITF member countries for which estimates can be made, road freight accounts for up to 30% to 40% of road sector CO2 emissions though the breakdown amongst freight vehicle classes varies amongst countries.



## 2. Summary of Shortlisted SERBIAN NAMA-s:

– Energy Sub-sector – 10 Projects

– Building Sub-sector – 4 Projects

**– Transport Sub-sector – 2 Projects:**

- Rehabilitation of 19 arterial roads in Serbia
- Rehabilitation of 129 regional roads in Serbia

Implementing Entity: MIE, PE “Roads of Serbia”

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## 3. Road maintenance and GHG Reduction

References and conclusions:

EAPA & EUROBITUME, Environmental Impacts and Fuel Efficiency of Road Pavements, Industry Report, March 2004:

- Optimal maintenance of roads is a tool to reduce fuel consumption and greenhouse gas emission
- Reducing the rolling resistance loss can contribute significantly to the overall fuel need: **the smoother the road, the lower the fuel consumption!**



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- Different surface characteristics (pavement texture) provides a major contribution to the rolling resistance

Study in Sweden:

- An uneven road may increase fuel consumption by up to 12% relative to an even road.
- A rough macrotexture may increase fuel consumption by 7% relative to a very smooth macrotexture.
- Fuel consumption for a car may be influenced as much as 12% by road surface characteristics within the tested range.



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Study in USA:

- A decrease in pavement roughness decreased the fuel consumption of the trucks. Under otherwise identical conditions, trucks used 4.5% less fuel/km on smooth post-rehabilitation pavement than on rough pre-rehabilitation pavement.

- Different textures of road surfaces influence fuel consumption for passenger cars by up to 10%.



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GENERAL CONCLUSION:

- During construction, maintenance and operation of roads the energy consumption and the greenhouse gas emissions are lower for asphalt than for concrete pavements. But **it is the traffic on road that accounts for the major part** (> 95 or 98% depending on traffic volume) **of the total energy consumption and greenhouse gas emission**, and here the differences between pavement types as such (asphalt or concrete) are not significant.

- More important for the fuel efficiency are pavements in good condition with good surface characteristics (texture and roughness).
- **Optimal maintenance of the roads is therefore the means to limit fuel consumption and greenhouse gas emission**.



## ADB Evaluation Study - Reducing Carbon Emissions from Transport Projects

- **Traffic management** and **speed optimization** can cut CO2 emissions. Reductions in CO2 of about 20% can be obtained by techniques to mitigate congestion, manage excess speeds, and smooth traffic flow.
- **Road maintenance** projects can significantly reduce Carbon Dioxide Emission Rates. ADB has funded many road maintenance projects (**periodic maintenance**) that involves surface and roughness improvement elements



- **A rough road slows down traffic and reduces efficiency**, increasing fuel use and CO2 emissions by 5%–10% or more.
- Key Findings: **Periodic maintenance projects have a major impact on carbon emissions reductions**.
- ADB Road Maintenance Projects ensured **reducing of road user costs, discomfort, pollution, and travel time delays**.



## Road Rougness (IRI)

- Road roughness is an expression of surface irregularity, and affects ride quality and fuel consumption
- Table A5.2. captures the impact of roughness on fuel consumption. Roughness is measured in units of meters of deviation from a flat surface per km.

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Table A5.2: Impact of Road Roughness on Fuel Consumption[a]

| Roughness (m/km) | Impact on Fuel Consumption |
|---|---|
| 2 | 1.00 |
| 3 | 0.99 |
| 4 | 0.98 |
| 5 | 0.98 |
| 6 | 0.97 |
| 7 | 0.96 |
| 8 | 0.95 |
| 9 | 0.95 |
| 10 | 0.94 |
| 11 | 0.93 |
| 12 | 0.92 |
| 13 | 0.92 |
| 14 | 0.91 |
| 15 | 0.90 |

km = kilometer, m = meter.
[a] Multiplication factor for fuel consumption (kilometer per hour). It shows decrease in fuel efficiency with increasing roughness.
Source: Asian Development Bank. 2009. *Green Transport – Resource Optimization in the Road Sector in the People's Republic of China*. Manila.



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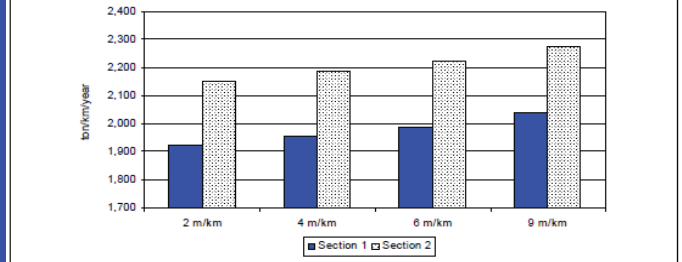
- The emissions (CO2 tons/km/year) increased by 1.6% when the road roughness increased from 2 to 4 m/km. When the road roughness increased from 2 to 9 m/km, the emissions increased by 5.8%.

Figure A5.1: Impact of Road Roughness on Carbon Dioxide Emissions for Two Sections of Controlled Access Highway in India




km = kilometer, m = meter.
Source: Independent Evaluation Department estimate based on review of National Highway Authority of India project documents and reports for Salem–Namakkal highway.



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- Roughness also indirectly affects fuel consumption by altering vehicle travel speeds. However, models currently used for project appraisal (whether for expressways, rural roads, or urban roads) mostly rely on the Volume–Capacity ratio to estimate traffic speeds, disregarding the impact of roughness on speed. A proper evaluation of CO2 emissions and other speed-dependent parameters needs to consider how roughness can indirectly affect CO2 by affecting traffic speeds.



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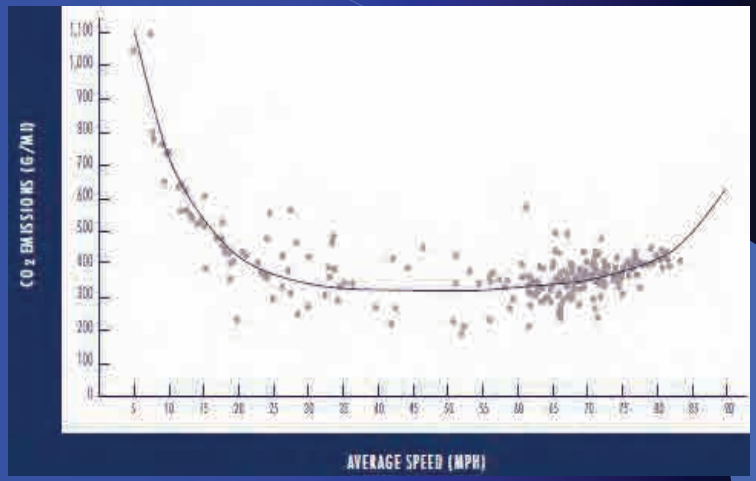
- Very low average speeds generally represent stop-and-go driving, and vehicles do not travel far. Therefore, the emission rates per mile are quite high. (When a car's engine is running but it is not moving, its emission rate per mile reaches infinity.) Conversely, when vehicles travel at much higher speeds, they demand very high engine loads, which require more fuel, and which therefore lead to high CO2 emission rates. As a result, this emissions-speed curve has a distinctive parabolic shape, with high emission rates on both ends and low emission rates at moderate speeds of around 40 to 60 mph.








- If congestion reduces the average vehicle speed below 45 mph, CO2 emissions increase. Vehicles spend more time on the road, which results in higher CO2 emissions. Therefore, in this scenario, **congestion mitigation programs** will directly reduce CO2 emissions.
- If moderate congestion brings average speeds down from a free-flow speed over 70 mph to a slower speed of 45 to 55 mph, this moderate congestion can reduce CO2 emissions.





- If congestion mitigation raises average traffic speed to above about 65 miles per hour, it can increase CO2 emissions.
- **Smoothing the stop-and-go pattern of traffic so that cars move at a relatively constant speed will reduce CO2 emissions.**





## 4. CO2 Emission Calculation Methods

### COPERT 4

- COPERT 4 Software is used for determining of Fuel consumption and CO2 Emissions. COPERT 4 is a software tool used world-wide to calculate air pollutant and greenhouse gas emissions from road transport. The development of COPERT is coordinated by the European Environment Agency (EEA), in the framework of the activities of the European Topic Centre for Air Pollution and Climate Change Mitigation.

- COPERT 4 estimates emissions of all major air pollutants produced by different vehicle categories (passenger cars, light commercial vehicles, heavy duty trucks, busses, motorcycles, and mopeds) as well as greenhouse gas emissions (CO2, N2O, CH4).

Inputs:

- AADT (Average Annually Daily Traffic) ... veh/24h
- AAT (Average Annual Trip for each vehicle categories) … km
- SFC (Specific Fuel Consumption for each vehicle categories) …… gr/km



- Main equation: E, CO2 = C * FC , where
- E, CO2 (CO2 Emission) ……. ton/year
- C (group of constant values)
- FC (fuel consumption) ……...ton/year

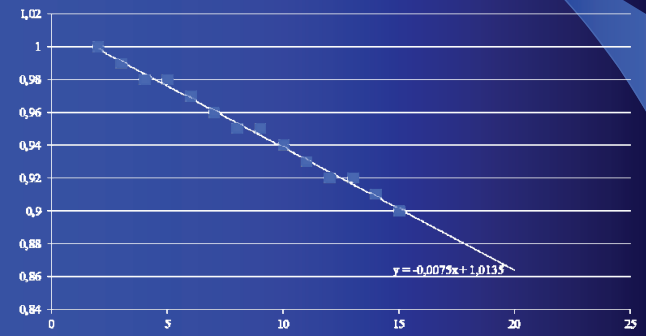
Key Conclusion:

**CO2 Emission is in direct proportion with Fuel Consumption!**



CO2 savings after rehabilitation, by using ADB method for modeling

Impact of Road Roughness (IRI) on Fuel Efficiency:






Inputs:

- IRI (for each road section) …….. mm/m

Main equation: **FC, with rehab = FC, bau * FE** , where

- FC, with rehab (fuel consumption after rehabilitation) ……...ton/year
- FE = f(IRI) (fuel efficiency)
- FC, bau (fuel consumption in case of no rehabilitation) ……...ton/year

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**CO2 savings after rehabilitation, by using CMP method for modeling** - increasing traffic speed from 40km/h to 80 km/h

- CMP – Congestion mitigation program
- Method is based on conclusions presented in "Traffic Congestion and Greenhouse Gasses" publication, Center for Environmental research and Technology at the University of California



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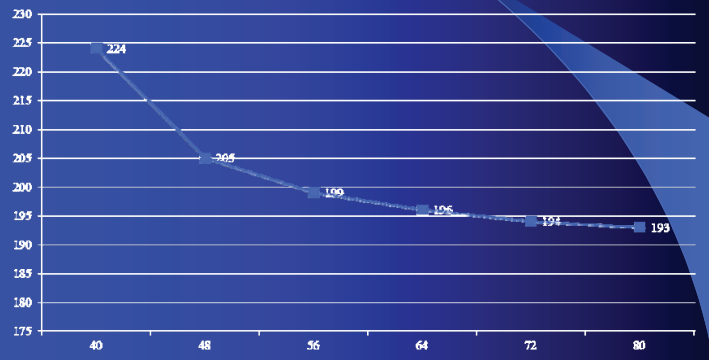
CO2 Emission / Average SPEED plot



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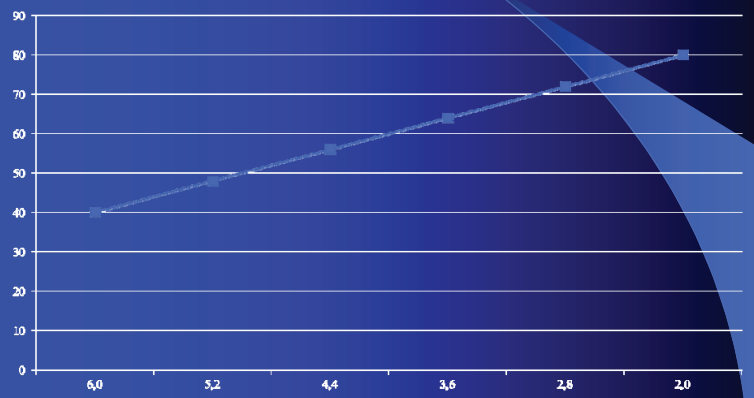
IRI / Average SPEED plot



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- IRI (current value, for each road section) …….. mm/m
- IRI, ar (value after rehabilitation, = 2 mm/m)
- AS (current average traffic speed, for each road section) ……..km/h
- AS, ar (requested average traffic speed, after rehabilitation, = 80 km/h)

Calculation of Emission:

- ECO2, bau (CO2 Emission, in case of no rehabilitation) = f (AS) ……. gr/km
- ECO2, ar (CO2 Emission, after rehabilitation) = f (AS, ar) …… gr/km

## Serbian Arterial / Regional road selection

- Data for each selected road section were taken from "Program Analyses of State Road Network and Transport Rehabilitation Project Performance Indicators", PERS, 2011. Data analyzed by using software HDM-4 and HIMS
- Mostly road sections with IRI greater than 6 were selected, due to the COPERT 4, ADB and CMP Emission Calculation Methods.
- Road database already prepared by PERS as a source of relevant data (AADT, vehicle by type, IRI)
- Roughness detection is measured on each road section



## Project details, modeling results and CO2 reduction potential

- Arterial Road Rehabilitation Project should take place on 19 different arterial road sections throughout the country. Total length of all proposed road sections is 324 km. Estimated cost of the Project is **65 Mil.€**
- Regional Road Rehabilitation Project will take place on up to 129 different regional road sections throughout the country. Total length of all proposed road sections is 2.768 km. Estimated cost of the Project is **500 Mil.€**



- Mitigation Target is improved fuel consumption level by all vehicles that is achieved by running speed of 80 km/h, or the International Roughness Index (IRI) of the proposed roads are improved up to the value of 2.0 m/km
- Type of GHGs reduced: $CO_2$
- Annual reduction, arterial road rehabilitation project: **2,617 $tCO_{2e}$** ( av. 3.62% )
- Total reduction, arterial road rehabilitation project: **52,340 $tCO_{2e}$** (20 years)



- Annual reduction, regional road rehabilitation project: **6,476 $tCO_{2e}$** ( av. 3.1% )
- Total reduction, regional road rehabilitation project: **129,520 $tCO_{2e}$** (20 years)

Basic Financial Feasibility Comments (in NAMA Short List Projects) shows that although the total investment cost is large, program analysis and financial analysis concludes that the **justification of the investment in the set of actions is confirmed**!

## 5. Current Project Status

- Detailed Financial Analysis – Commercial Profitability
- Discounted Cash-Flow (DCF) Method, including Net present Value (NPV) and Internal Rate of Return (IRR) for each candidate project
- Economic Analysis – National Profitability
- Determining of Project Benefits as inputs for Financial Analysis (VOC Savings, Time saving, CO2 Emission Reduction, etc.)



## 6. Remaining Steps (in case of ensuring investment in NAMA Transport Sub-projects)

- Producing of Detailed design and adequate Monitoring Program
- Rehabilitation Permit obtained from Ministry incharged
- Zero Monitoring of CO2
- Road rehabilitation works
- Monitoring of CO2 after rehabilitations



## 7. Reasons for investing in Serbian NAMA Transport Sub-Projects

- Air pollution from transport, manufacturing industries and construction increases;
- The total annual damage caused by air pollution and greenhouse gas emissions is estimated to range between 1.8%-5.5% of GDP.
- Serbia ratified the Kyoto Protocol during the fall of 2007.



- Insufficient financing of environmental investments: Financing the implementation of the National Environmental Strategy is a key challenge. According to the estimates in the NES, annual expenditures to reduce negative impacts on the environment will need to increase from on average 0,3% of GDP between 2001 and 2005 to around 2% of GDP during the coming years. This increase would be in line with the levels in other transition countries.
- **The highest expenditure will be** required in the following sectors: energy (29%), waste (24%), water (21%), and **transport (12%).**

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**Expected CO2 Savings in NAMA Transport Projects are:**

- For Serbian Arterial Road Rehabilitation Project (19 arterial road sections in Serbia)
  **up to 11% (av. 3.6%), 52.340 $tCO_{2e}$**
- For Serbian Regional Road Rehabilitation Project (129 regional road rsections in SerbiA
  **up to 8% (av. 3.1%), 129.520 $tCO_{2e}$**



ЈАВНО ПРЕДУЗЕЋЕ ПУТЕВИ СРБИЈЕ

## References:


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- Evaluation Study – Reducing Carbon Emissions from Transport Projects, Asian Development Bank, 2010




ЈАВНО ПРЕДУЗЕЋЕ ПУТЕВИ СРБИЈЕ


- Traffic Congestion and Greenhouse Gases, Matthew Barth and Kanok Boriboonsomsin
- Serbia Environmental and Climate Impact Analysis, School of Economics and Commercial Law, Goeteborg University, 2008
- COPERT IV Model for calculation of GHG in road transport, Traffic Engineering Faculty, Belgrade University, 2010

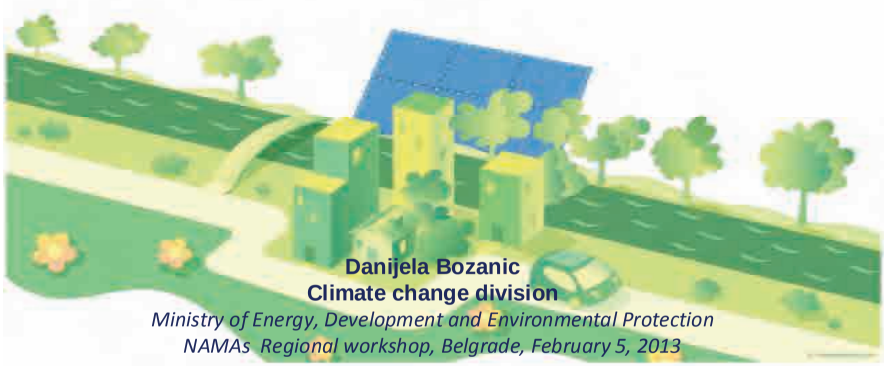



ЈАВНО ПРЕДУЗЕЋЕ ПУТЕВИ СРБИЈЕ

# Хвала на пажњи!
# *Thank You!*

- Питања:
- *Questions:*

# Mitigation activities in the Republic of Serbia



**Danijela Bozanic**
**Climate change division**
*Ministry of Energy, Development and Environmental Protection*
*NAMAs Regional workshop, Belgrade, February 5, 2013*

# Structure - national level

- **Ministry in charge for environment – UNFCCC Focal Point**
- **Climate change division** – 2007
- **Division for sustainable development and climate change in energy sector** – 2008
- **Climate change centre for adaptation** – 2007/2008
- **Organizational units:** air quality (F-gasses), energy efficiency, RES, legal economical and technical affaires in regard to oil and gasses,…

# Multisectoral nature

- Ministries in charge for: **energy, industry, agriculture, transport, water, science,…**
- **Local communities**
- **Associations of industries**
- **CSOs**
- **Ministry of Energy, Development and Environmental Protection** – Mitigation
- **Mitigation - Two tracks:**
  - **UNFCCC - Mitigation**
  - **EU - Adaptation**

# Realized

- Ratification of the **Kyoto Protocol** – 2008
- **DNA** - 2008
  - 5 CDM projects – CDM EB
- **Support to the Copenhagen Accord**
- **Initial National Communication** – 2010
  - GHG Inventory – 1990&1998
  - Mitigation possibilities until 2015
- Sector based, study, 2020:**"Efficient ways for GHG emissions reductions within the post-Kyoto framework in Serbia"** – Government of Spain
- **Sectoral documents and laws** – harmonization with the EU acquis
- **Raising awarness&Cooperation improvement** – Governmental institutions, CSOs, local communities

## *On–going (1)*

- **”Capacity development project on Nationally Appropriate Mitigation Actions (NAMAs)”** - JICA
  - 16 prioritized energy efficiency actions in energy production, buildings and transportation sector
  - 6 prepared for NAMAs Registry
  - *Guideline for development of NAMA* – support for the future actions
  - Improved cooperation – Governmental institutions and public utilities
  - Expected: Legal and institutional framework

## *On–going (2)*

- **”Second National Communication”** - GEF project /UNDP
  - GHG Inventory (2000 – 2009/2010)
  - Long-term framework mitigation strategy (EU Roadmap 2050)
  - Adaptation programme (EU White paper)
- **”BUR** - Biannual Reporting” - GEF project /UNDP
  - End 2014
- **”Creation of a monitoring, reporting and verifying system for the successful implementation of the EU ETS”** – IPA 2012
- **”Establishment of reporting system for the EU Directive 2009/29/EC (EU ETS)”** - Government of Norway
  - Beneficiary: Industry

## *Global and regional*

- **Regional:“Low Carbon South East Europe”** - South East Europe Transnational Cooperation Programme
- **Regional: “MoU capacity building for low carbon strategies development (EC-LEDS)“-** USAID
- **Virtual regional climate change centre for adaptation** – HMS Serbia
- **Global: “The en.lighten initiative: a global partnership”** - UNEP

## *Planned*

- **“Support for development of climate change strategy, with action plan”** – unallocated, IPA 2012
- **“Establishment of a mechanism for monitoring, reporting, reviewing and verifying GHG emissions and other information relevant to climate change”** – IPA 2013
- **Workshop on EU Effort Sharing Decision (406/2009/EC)** – GIZ/German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- **STAR GEF-5 use**

## *In addition (1)*

- **Energy Sector Development Strategy until 2015**
- **Energy Sector Development Strategy until 2025, with the projections until 2030**
  - Relevant requirements of the EU Climate and Energy Package
- **Action plan for GHG emission reduction from international air transportation** (ICAO Resolution A37-19)
- **"Implementation of Energy Component of the National Strategy for Sustainable Development** - Support to sustainable development in the energy sector
- **First National Energy Efficiency Action Plan** (Directive 2006/32/EC) - 2010
- **"Preparation of Second Energy Efficiency Action Plan and Development of Energy Indicators"** - IPA 2012

## *In addition (2)*

- **Simplified National Renewable Energy Action Plan** (Directive 2009/28/EC)
- **"Development of Renewable Energy Framework in the Republic of Serbia"** - G2G Netherlands – Serbia
  - Development of a National Renewable Energy Action Plan (Directive 2009/28/EC and Decision 2009/548/EC )
  - Development of a new mechanism for streamlining the Serbian rules relating to procedures, permissions and licenses
- **Second monitoring plan in compliance with Directive 2008/101/EC**
  - submitted by 31 March 2012 - National airline company "JAT"

## *TAIEX*

- **"EU ETS – MRV obligations"** , 7-8 May 2012 - Governmental institutions, industry, public utilities, CSOs
- Expert mission: **"Technical assistance for preparation of transposition of Monitoring Mechanism Decision (280/2004/EC) and development of Climate acquis approximation plan"**
- Workshop: **"Challenges and opportunities for transposition of the EU Climate and Energy Package"** - Example of EU Member states good practices
  - Common for EU ETS, RES, EE planning

## *ADAPTATION*

- **Already vulnerable**
- **No legal obligation**
- **Experienced scientists**
- **Balance mitigation-adaptation**
- **Climate change centre for adaptation** – HMS
  - Regional/virtual

## *The most important*

- Data quality and quantity
- Knowledge and skills
- Awareness
- Adaptation – recognition
- Exchange of information and lessons learnt
- Cooperation among stakeholders
- Joint effort
- Sub-regional and regional cooperation

## *THANK YOU FOR ATTENTION!*

***CLIMATE CHANGE DIVISION***

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# Climate Change Albania

MINISTRY OF ENVIRONMENT,
FORESTRY & WATER ADMINISTRATION

BELGRADE
4-5 FEBRUARY 2013

PRESENTED BY ENKELEJDA MALAJ
DIRECTOR OF EU INTEGRATION & PROJECTS

## General view of current policy

- Albania non-Annex I Party to the UNFCCC;
- eligible for financing for the preparation of National Communications (NC);
- GEF/UNDP project enabled Albania prepare its Initial National Communication (INC), submitted in July 2002;
- SNC was submitted in November 2009;
- SNC built on INC and 2004 Technology Needs Assessment (TNA);

## General view of current policy

- TNA identified technology transfer needs for climate change mitigation and adaptation;
- SNC extended the inventory of anthropogenic GHG emissions and removals to 1990-2000, 2000 being the base year;
- SNC provided estimates for industrial GHG (HFCs, PFCs &$SF_6$
- 6 main GHG-emitting sectors: energy, industrial processes, agriculture, waste;
- Inventory: basis for the GHG mitigation analysis, extended to 2025; pronounced focus on energy and transport (main emitting sectors);

## General view of current policy

- SNC assessment of vulnerability and adaptation options focused on the Drini River Cascade (area from Kukës up to the Lezha Plain);
- Assessing vulnerability: 3 time horizons were considered: 2025, 2050 and 2100;
- SNC provided a list of adaptation options up through 2025;

## General view of current policy

- Total GHG emissions in Albania in 2000 were 7619.90 Gg;
- Main contributing sectors: Energy (44.00%), Agriculture (27.12%) &Land Use Change and Forestry (21.60%);
- LUCF is significantly reducing, while energy & waste rising;
- Transport: fastest growing sector;
- GHG emissions per capita in Albania were 2.47 tones $CO_2$ eqv. per capita, 4-5 times lower than average industrialized countries;
- >90 % of electricity is produced by hydro power plants and most energy is consumed as electricity;

## General view of current policy

- 3rd National Communication started June 2012 ;
- Major objectives: update annual GHGs Inventory 2000-2005;
- Focus on main emitting sectors/gases (transport);
- models to regionalize climatic forecasts and apply on coastal region;
- state-of-the-art GHG mitigation modeling frameworks will be used to develop a national low carbon development strategy;
- National circumstances will be updated, as well as steps to implement the Convention;
- Continue to build institutional capacity for implementing the Convention in Albania, education & awareness;

## General view of current policy

- Government of Albania has considered the preparation of NCs as a highly valuable exercise and has put substantial resources and efforts into it;
- Many institutions & specialists were trained and institutional capacity built and sustained;
- To ensure country ownership, NC projects do extensive stakeholder consultations, so that goals and objectives are consistent with national sustainable development priorities;

## General view of current policy

- In line NC findings, climate change was addressed into various policy papers :
  - National Energy Strategy - 2003;
  - Environmental Cross-cutting Strategy 2007-2013;
  - National Strategy for Development and Integration (NSDI) 2007-2013;
  - Albanian Policy Paper and its related Action Plan for Carbon Finance - 2009;
  - Albanian Adapation Health Strategy – 2011;
  - Action Plan for Reducing Vulnerability to Climate Change in Albanian Agricultural Systems, etc.

## General view of current policy/actions

- New resources have been mobilized on priority areas/technologies like:
- the Carbon financing project – WB;
- Albanian Program on Solar Water Heating Market Transformation – UNDP;
- Identification and implementation of Adaptation Response Measures in the Drini –Mati River Deltas UNDP;
- Public awareness related projects, etc.

## Future mitigation policy (incl. legal &institutional system)

- Development of a climate change mitigation plan based on a national stakeholder-driven process to:
- identify, prioritize, and characterize the costs and benefits of GHG mitigation strategies in transport and energy related sectors,
- incorporating mitigation strategies formulated through NAMA project conceptualization

## Future mitigation policy (incl. legal &institutional system)

- Revision of several pieces of legislation: (PRTR, laws on Forestry, & waste management, with reporting obligation from operators and institutions;
- Train the Environment Agency on mitigation analysis and policies as per respective sectors;
- Albania is drafting a new National Strategy for Development and Integration (NSDI) for 2013-2020
- 'Low emission development strategies' (LEDS) will get introduced as a path to sustainable development;
- The LEDs approach will have a long term component that includes a strategic vision, and a short and medium-term component that lists specific actions to be undertaken to get on a low carbon pathway through National Appropriate Mitigation Actions (NAMAs);

## Current status of NAMAs

- As yet no identified NAMAs, but there are detailed GHG abatement measures (in energy/transport, land use change and forestry, agriculture and waste sectors);
- Efforts in the frame of regional EU RENA initiative to train and preparations for the MRV system, both at the level of legislation and capacity building;
- Several NAMAS will have to be identified and 1 or 2 will get implemented with UNDP support;

## Assistance needs

- Assistance needed to promote mitigation actions: financial, technical support, capacity building, etc.
- Capacity building activities to enable mitigation analysis and NAMA identification;
- Financial support to implement NAMAs after their screening/identification;
- JICA could help transfer experience;

- Thank you for your attention!

Balkan Regional Seminar on Nationally Appropriate Mitigation Actions"
4. and 5. February 2013

**"Presentation of NAMAs from the Region Countries"**
**Experiences from Bosnia and Herzegovina**

**Ozren Laganin**
Ministry of Physical Planning, Civil Engineering and Ecology of Republic of Srpska, Banja Luka BiH, UNFCCC BiH Focal Point

**Almira Kapetanović**
Federal Ministry of environment and tourism, Sarajevo, BiH

## Introduction

Bosnia and Herzegovina became a party to the United Nations Framework Convention on Climate Change on December 6, 2000, and ratified the Kyoto protocol on April 16, 2007.

The work on preparation of the INC started in 2008, and has been finalized in October 2009, while the preparatory work on Second national communication (SNC) started in 2010, and the draft document is finalized.



## Introduction

Relying on its own capacities, the country made significant efforts to initiate and continue its work on preparation of national communications, since 2004 when it became eligible for GEF financial support.

The GEF then approved funding through UNDP to finance preparation of the document:"Self assessment for preparation of a Project Proposal for Preparation of Initial National communication of BiH to the UNFCCC".

This project has supported establishment of the ad-hoc technical bodies : BiH Climate Change Committee (32 experts) the Sub-committee for climate change, (10 members from the competent ministries), and the Technical Secretariat (5 members), that jointly with the ESC and a UNFCCC FP for BiH have prepared Project proposal for the INC to which GEF has approved financing in 2007 (405.000 USD)



## Introduction

**Project proposal for the SNC was prepared by the local expert team, and approved in 2010** (USD 500.000)

For providing additional strategic documents (LEDS and NAS), additional financial support of cca. USD 150.000 were approved from UNDP and country contributions

## Key Outcomes

In parallel with developing SNC, BIH has drafted joint low- carbon development (LEDS) and adaptation ( NAS) strategy, with financial support from GEF/administered by UNDP.

By joining strategic frameworks for mitigation and adaptation with the SNC, the country made certain steps ahead in meeting mitigation as well as biannual reporting obligations of Non Annex I parties, as proposed by Bali action Plan and Copenhagen agreement

It is expected that both **Planned outputs and activities for delivering the Adaptation Strategy as well as proposed** NAMAs resulting from the emission reduction strategy jointly with the appropriate system of Monitoring, Reporting and Verification (MRV), will allow access to the fast-start financing as well as long-term financing of climate change activities



## Key Challenges

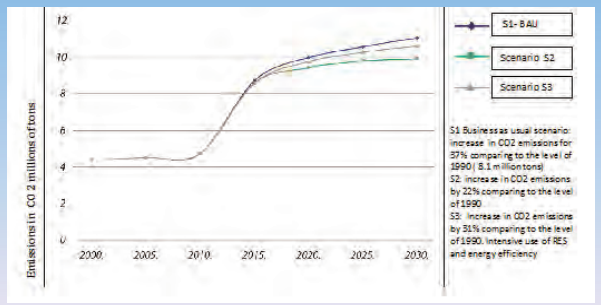
Key challenges encountered in the NC, regarding mobilizing financial resources through the NC may be summarized as following:

a) <u>Institutional/capacity related challenges</u>: insufficient coordination between competent institutions, need for establishment of better connections between governments and researchers, non-existence of the government institutions capable of fiduciary functions (procurement etc.)
b) <u>GHG data and projections</u> : poor GHG data availability because of lack of monitoring and annual emission data collection. Due to traditional coal based power production, emissions will increase (fig.1)
c) <u>a roadmap to EU</u>: two major areas of uncertainty: pace of public administration reform and approximation of the legislation with the EU *acquis communautaire*.



## Key Challenges

The amount of lignite based power generation increases nearly constantly. In case that all planned thermal power plants are built, the current installed capacity of 1.765 MW will be replaced by 3.200 MW, increasing the total emissions by 4,85 Mt $CO_2$ annually even with an improvement of efficiency from 30 to 40 %.






## Recommendations or approach used to address identified challenges

A) Capacity building

- technical capacity building will have to continue in order to achieve GHG emission reduction measures.
- implementation framework for the future NC 's and implementation of LEDS strategy, may be directed to (i) providing the necessary capacity building and coordination of institutions or (ii) developing NAMAs as much as possible in such a way that they will not critically depend on the government institutions.

# Recommendations or approach used to address identified challenges

B) Mitigation measures

due to uncertainty related to the GHG availability , it is difficult to set out clear mitigation objective in terms of quantitative emission reductions compared to the base year 1990.

In accordance with the SNC, areas with the largest potential for qualitative mitigation actions are electricity production, energy efficiency in buildings, heating and transport, and to the certain extent waste management, forestry and agriculture, taking into consideration the following criteria:

a) Ensuring Co – benefits (poverty alleviation, meeting EU standards),
b) Ensuring Cost effectiveness
c) Availability of private capital or international funding for investment, and
d) Absence of institutional and/or administrative barriers



# NAMAs

According to their characteristics they should be divided into:

- Unilateral NAMAs – policies and actions that BiH will implement on its own and do not require international assistance
- Donor assisted NAMAs – measures and projects for which BiH will seek support of other UNFCCC parties and will be subject to MRV
- Creditable NAMAs – not yet formally agreed for the period 2012 – 2020, these would be projects that generate emission reduction credits that can be traded in the international carbon market (e. g. CDM), attracting private investment or investment under flexible mechanisms.



# Challenges and coping mechanisms

| Key identified Challenges | Coping mechanisms/Solutions |
|---|---|
| 1. Institutional and capacity limitations<br>2. GHG availability<br>3. EU accession roadmap | 1. Setting up operational structure that allows effective work on NC preparation and designing project proposals to address key weaknesses . It is important to continue capacity building activities and maintain country ownership of NCs<br>2. Improve projection technologies, improve data collection on transport and building heating systems, work on technical capacity improvement<br>3. Setting up achievable and realistic timeframe for taking up low-carbon activities, with improved attraction of investments in energy efficiency in buildings, sustainable transport, new generation of thermal power plants and renewable energy sources for both heating and electricity production. |



# Overview of proposed NAMAs

| Specific objective | Action | Est. emission reduction (Mt $CO_2$ eq/a) |
|---|---|---|
| **Capacity building** | | |
| **Build the institutional and professional capacity for implementation, monitoring, reporting, and verification of the strategy, the mitigation actions and for managing the process of EU accession and change of status under UNFCCC (to Annex I) by 2025.** | Capacity building for country and entity level authorities responsible for various aspects of climate change mitigation policy, including establishing annual emission statistics. | Enabling activity |
| Transpose and implement the EU *Acquis Communautaire* in the fields of climate change, energy efficiency and environment by 2020. | Capacity building in EU climate, energy efficiency and environmental policy at all levels. | Enabling activity |
| | Establishing the country framework for EU ETS. | Enabling activity |
| Implement at least 10 supported and/or credited NAMAs by 2025. | Designating, strengthening and operation of designated country authorities for the management of NAMAs. | Enabling activity |

# Overview of proposed NAMAs

| Specific objective | Action | Est. emission reduction ($Mt\ CO_2$ eq/a) |
|---|---|---|
| *Electricity generation* | | |
| **Improve the efficiency of energy generation in all coal-fired power plants to at least 40% by 2025.** | Replacement of existing coal-fired power plants with new more efficient ones. | 6.5 |
| | Installation of equipment for methane combustion and energy co-generation in underground coal mines. | 0.15 |
| **Install 150 MW new capacity for electricity generation using hydropower and wind.** | Use of renewable energy potential for electricity generation. | > 0.26 |



# Overview of proposed NAMAs

| Specific objective | Action | Est. emission reduction ($Mt\ CO_2$ eq/a) |
|---|---|---|
| *Buildings* | | |
| **Reduce average heating demand of housing from over 200 kWh/m²a to 100 kWh/m²a by 2025.** | Transposition and implementation of the 2010 EU Directive on energy performance of buildings and training of professionals in the construction sector for the application of new legislation and the principles of designing energy-efficient and 'green' buildings. | 0.21 |
| | 'Green' public procurement in buildings. | 0.21 |
| | New act on management and maintenance of multi- residential buildings. | |
| | Support to completing unfinished housing (initially refugees and internally displaced persons). | |



# Overview of proposed NAMAs

| Specific objective | Action | Est. emission reduction ($Mt\ CO_2$ eq/a) |
|---|---|---|
| *District heating* | | |
| **Phase out fuel oil and coal for home and district heating and replace them with energy efficiency gains, biomass, thermo solar, geothermal and electricity by 2020.** | Law on production, distribution and supply of thermal energy. | 6.5 |
| | Use of biomass (wood waste) in distributed co-generation plants (including Livno, Gradiška and Prijedor). | 0.15 |
| **Introduce individual metering for heat consumption in all district heating systems by 2020.** | Installation of individual heat metres in multi-residential buildings and creation of the conditions for payment based on actual consumption of heat. | > 0.26 |
| *Transport* | | |
| **Reduce transport emissions by 10% in relation to the 'take no action' scenario by 2025.** | Railroad transportation: Improvement and promotion (RATIP). | |
| | Public transport: Introduction and improvement (PUTII). | |
| | Promotion of Car-sharing (PRO-CASH) | |
| | Urban planning in terms of transportation (UPITT). | |

# Lessons Learned

- There are number of specific mitigation objectives, that have been identified in the INC and SNC, and their implementation should continue.
- Certain level of future growth of emissions is inevitable, but it is more socially and economically desirable to move towards to more sustainable patterns of production, consumption and lifestyle rather than just copying the already obsolete patterns of the EU of the past decades
- Non-annex I status of the country requires clear strategy goals and concrete actions in setting reduction targets by the time of EU membership

# Lessons Learned

Through implementation of LEDS and NAS strategies, the country will take steps in mobilising different forms of international investment in energy efficiency in:
buildings, sustainable transport, new generation of thermal power plants and renewable energy sources for both heating and electricity production.

Those strategies will include well defined action plans for implementation, in accordance with the implementation circumstances and the formerly established framework CCAP.

It is very important to continue mobilizing financial resources through NCs process



# Next steps

Establishing a working system of monitoring emissions and mitigation actions, as well as of evaluating and adjusting mitigation measures, is one of the first priorities of the Low carbon development Strategy , aimed to attract any funding for the NAMAs



# Next steps

In addition to NAMAs, UNFCCC Focal point jointly with other relevant institutions for UNFCCC, needs to initiate preparation of the following projects, for which financial sources should be mobilized:

- Creation of the national inventory system and estimations of changes of the GHG emission at the level of the enterprises, entities and the whole country;

- Initiation of the national Programme and projects for capacity building under the Programme of the World Meteorological Organization, in the fields of climate monitoring and climate extreme detection, early warning and forecasting, as wall as climate data construction and management, using advanced methods and technologies

- Initiation of the projects with financial support of the GEF in the climate change focal area, regarding the energy efficiency and energy conservation, promoting the adoption of renewable energy, and promoting environmentally sustainable transport



# Thank you for attention!!!

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BALKAN REGIONAL SEMINAR ON NATIONALLY APPROPRIATE MITIGATION ACTIONS

4. and 5. February 2013,

Belgrade, Serbia

## OUTLINE

- STATE OF PLAY IN CC-UNFCCC, KYOTO PROTOCOL AND EU ACCESSION STATUS
- IMPORTANCE OF NAMAs
- PLANNING AND APPROACHES IN FORMULATION OF NAMAs IN MONTENEGRO
- MECHANISMS FOR FORMULATION OF NAMAs IN MONTENEGRO

## STATE OF PLAY IN STATE OF PLAY IN CC

- MONTENEGRO RATIFIED THE UNFCCC BY SUCCESSION IN 2006, AND IT IS A NON-ANNEX I PARTY OF THE CONVENTION SINCE 27 JANUARY 2007.
- MONTENEGRO BECOME MEMBER OF THE KYOTO PROTOCOL 1 IN SEPTEMBER 2007, AND WILL TAKE NECESSARY STEPS TO RATIFY KYOTO PROTOCOL 2.
- FUTURE GLOBAL CLIMATE REGIME TO BE AGREED BY 2015 AND TO BE IMPLEMENTED AFTER 2020. ACTION WILL BE REQUIRED BY ALL.
- MONTENEGRO HAS STARTED OFFICIAL ACCESSION NEGOTIATIONS IN JULY 2012. EXPLANATORY MEETING FOR CHAPTER 27-ENVIRONMENT AND CC IS TAKING PLACE THIS WEEK FROM 4-8 FEBRUARY.

## IMPORTANCE OF NAMAs

- INSTRUMENT FOR IMPLEMENTATION OF WIDER STRATEGIC PLANNING (EU, UNFCCC, etc.)
- ASSESSMENT OF POTENTIALS FOR GHG EMISSION REDUCTION IN THE COUNTRY
- CONCRETE ACTION IN REDUCTION OF GHG EMISSIONS TAKING INTO ACCOUNT SUSTAINABLE DEVELOPMENT CRITERIA AND CO-BENEFITS
- MOBILAZING FINANCE RESOURCES FOR IMPLEMENTATION (MATCHING OF SUPPORT AVAILABLE- UNFCCC NAMA REGISTRY)- ESPECIALLY IN THIS MOMENT WHEN CDM IS PART OF THE HISTORY AND NO OTHER MB MECHANISM IS AVAILABLE

MONTENEGRO
MINISTRY OF SUSTAINABLE DEVELOPMENT AND TOURISM

## PLANNING AND APPROACHES IN FORMULATION OF NAMAs IN MONTENEGRO

- FIRST OF ALL WE WILL LOOK WHAT IS ALREADY THERE. THERE IS SOME NATIONAL STRATEGIES WHICH ALREADY HAVE TARGETS- THEREFORE "POLICY NAMAs" ARE ALREADY THERE, e.g. RENEWABLE ENERGY TARGET OF 33% THROUGH ENERGY COMMUNITY
- SETTING UP OF CLEAR CRITERIA FOR NAMAs SELECTION
- "LEARNING BY DOING" FOR EVERYTHING ELSE- PREPARATION OF THE NAMA PORPOSALS, MRV, etc.

MONTENEGRO
MINISTRY OF SUSTAINABLE DEVELOPMENT AND TOURISM

## MECHANISMS FOR FORMULATION OF NAMAs IN MONTENEGRO

- SECOND NATIONAL COMMUNICATION TO THE UNFCCC:

➢ CAPACITY BUILDING NAMA (MRV)

➢ AT LEAST OTHER TWO HIGH-PRIORITY NAMA (most probably in the RES sector)

- LOCSEEE

➢ BUILDING SECTOR NAMA

MONTENEGRO
MINISTRY OF SUSTAINABLE DEVELOPMENT AND TOURISM

Thank you for your attention!

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# Status of NAMA and MRV in Republic of Macedonia

Ministry of Environment and Physical Planning

**Mrs. Elena Gavrilova**

**Mrs. Sashka Brblikj**

## List of NAMAs derived from the SNC to the UNFCCC:

| GOALS | ACTIONS |
|---|---|
| **I. GHG emission reduction in electric power sector** | |
| I.1. Harmonization and implementation of EU legislation in Energy and Climate | - Energy and Climate Package<br>- Liberalization of energy markets (electricity and gad) |
| I.2. Ensuring stability in energy supply with investments activities for building new big HPP | - HPP Boskov Most<br>- HPP Galiste<br>- HPP Cebren |
| I.3. Ensuring stability in energy supply with investment activities for building new thermal power plants on gas | - CHP Skopje 230MW<br>- CC gas (200-300MW) |
| I.4. Increasing the share of renewable in the energy sector | - Small HPP<br>- Wind power plants<br>- Biomass electricity and PV panels |
| I.5. Improvement of the energy efficiency | - Building of CHP<br>- Measures for reducing the losses in transmission and distribution of electricity<br>- Introducing of efficient lamps and electric appliances<br>- Subsidies or investments in EE |

| **II. GHG emission reduction in the industrial, energy transformations and heating sector** | |
|---|---|
| II.1. Reduction of the use of carbon intensive fuels | - Replacement of coal wit liquid or gaseous fuels<br>- Replacement of liquid fuels with gaseous fuels |
| II.2. Improvement of the energy efficiency and energy savings | - Improvement of the EE in boiler plants, replacement of old equipment<br>- Installation of automatic control systems, better insulation<br>- Reduction of looses in system, improvement of the performances of the thermal cycles. |
| II.3. Increasing of the contribution of renewable energy sources in the country's energy balance | - Utilization of waste biomass as an energy source and as a raw material for production of briquettes and pellets , installation of boilers on waste biomass<br>- Revitalization and expanding of the geothermal system Geoterma Kochani<br>- Introduction of solar energy systems for heating and hot water supply |
| III.4. Awareness raising of the final consumers | - Measurements of energy saving in households<br>- Reduction od energy use for heating<br>- Measurement equipment and charging in accordance to the consumption |

| **III. GHG emissions reductions in the transport sector** | |
|---|---|
| III.1. Improvement of the overall efficiency in the transport sector and energy efficiency of the vehicles | - Revitalization, extension and better maintenance of the road and railway infrastructure<br>- Electrification of the railway network<br>- Modernization of the vehicle fleet<br>- Motivation for wider use of alternative fuels and other power systems (LPG, CNG, biodiesel, hybrid vehicles etc.) |
| III.2. Improvement of the public urban and inter-city transport | - Improvement of the planning, organization and control of the traffic<br>- Measures for regulation of the traffic in central urban areas<br>- Modernization of the equipment in the public transport<br>- Synchronization of the road signalization |
| III.3. Harmonization of the national legislative with the EU directives | - Energy and climate package (biofuels)<br>- Regulation of the fuel quality in accordance with the EU norms |

| IV. GHG emissions reduction in the waste sector | |
|---|---|
| IV.1. GHG emission reduction at the existing landfills | - Technical improvement of the existing landfills<br>- Installation of methane recovery and flaring systems at selected landfills |
| IV.2. Improvement of the possibilities for efficient methane collection | - Construction of regional solid waste disposal sites |
| IV.3. Reduction of nitrous oxide (N2O) emissions | - Implementation of legal measurements for restriction of the activities that include uncontrolled burning of the waste<br>- Raise public awareness for restriction of uncontrolled burning of the waste |
| IV.4. Reduction of the methane missions from wastewater | - Expansion of the wastewater treatment plant network |

| V. GHG emissions reduction in the agriculture and forestry | |
|---|---|
| V.1. Enabling favorable pre-conditions for GHG emission reduction (laws, bylaws, institutional measures, support measures) | - Transposition and implementation of EU CAP legislation<br>- Institutional and legal reforms in irrigation sector<br>- Increasing of the institutional and individual capacities for application of the available EU funds<br>- Development od system for application of Good Agricultural Practices and financial support for farmers to use mitigation technologies |
| V.2. Introduction/development of GHG mitigation technologies in agriculture | - Installation of methane recovery and flaring technologies at selected farms<br>- Support program for development of new mitigation technologies and introduction of practices that use the agricultural potential for renewable energy |
| V.3. Strengthening the national and local capacity for carbon financing | - Trainings for CDM potential in agriculture and preparation of CDM documentation |
| V.4. Education of experts/farmers/decision makers for application of mitigation measures | - Current curricula upgraded with CC mitigation issues<br>- Training of farmers for new technologies |
| V.5. Implementation of the national strategic documents in the forestry | - Forestation and re-forestation<br>- Prevention measures against fires<br>- Prevention of illegal cut |

# Legal aspects and other activities

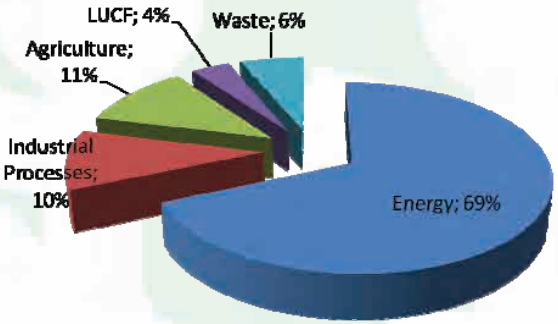
- No legal definition on NAMAs in national legal system
- No project implemented by this name
- Other NAMAs related activates are ongoing or planned

# Present and future CC projects

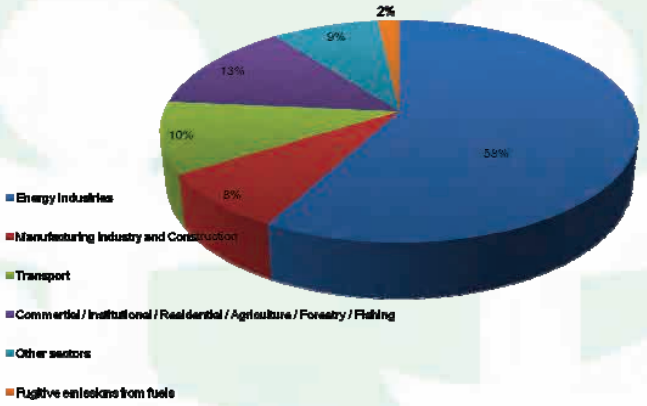
- The Third National Communication to the UNFCCC (2012 – 2013)
- Roadmap for introduction of Monitoring Reporting and Verification of GHG emissions under EU ETS in Republic of Macedonia (2012)
- Capacity-building to facilitate the implementation of the EU Emission Trading Scheme in Macedonia (2012 – 2015)
- Macedonian Green Growth and Climate Change Analytic and Advisory Support Program
- Biannual Update Report – in application phase

## Third National Communication to the UNFCCC - preliminary data

- GHG Inventory 2003 – 2009




## GHG Emissions from Energy Sector - preliminary data




## Assessments and proposals for NAMAs in TNC

NAMAs:

- Energy
  - **Transport - Climate Change mitigation potential of the Macedonian transport sector**
  - **EE in public buildings**
- Waste

Mitigation assessments:

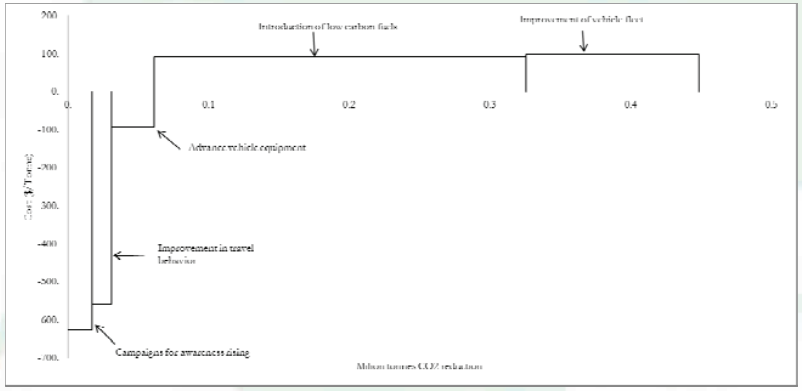
- Agriculture
- LULUCF

## Climate Change mitigation potential of the Macedonian transport sector

Methodology for assessment

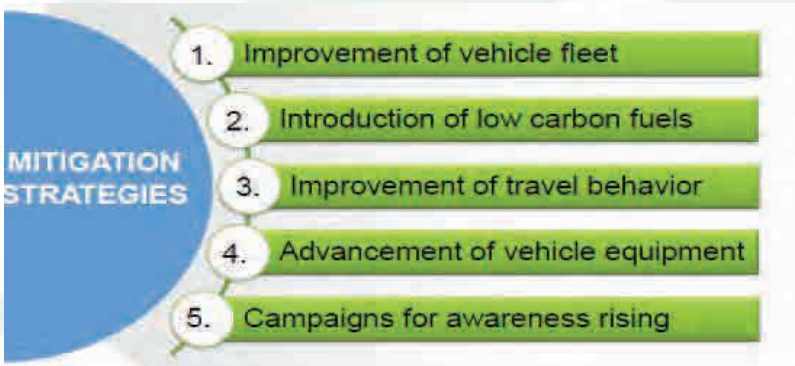
- ***What?*** Assessment of mitigation potential of the national transport sector
- ***How? bottom-up approach***
- ***Evaluate*** the appropriate ***mitigation options*** in terms of their ***environmental effectiveness*** (volume of GHG emissions reduction) and ***economic effectiveness*** (specific cost of reduction)
- ***Participatory process*** was initiated in order to reflect the country specifics into prioritization of the mitigation strategies in national transport sector.

## Preliminary results from Climate Change mitigation potential of the Macedonian transport sector




Marginal cost curve of the transport mitigations strategies for the year 2020

## Preliminary results in transport sector




## MRV processes in TNC to the UNFCCC

## Status and planed activities of MRV of GHG emissions and actions in R. Macedonia

Legal aspects on MRV of GHG will be prepared

MRV on actions and measures will be proposed (through indicators and legal setting of responsible party)

## MRV mechanisms developed from TNC

- Preparation of legal provisions for GHG inventories - Legal Assessment Report for GHG Inventory Data Collection
- Roadmap for Adoption of National Emission Factors and recommendations for harmonization of emission factors between UNFCCC and CORINAIR methodologies and reporting guidance in R. Macedonia
- Development of GHG/CORINAIR Country Specific Emission Factors
- EMI - reporting software

## MRV related activities of GHG emissions under EU ETS

- This activities are lead by recommendations from EU progress reports and nationally adopted recommendations
- A Roadmap for introduction of MRV of GHG emissions under EU ETS has been adopted
- First recommendation from the Roadmap has started to be implemented by Norwegian government support (project on capacity-building to facilitate the implementation of the EU Emission Trading Scheme in Macedonia)

## Scope of the roadmap for introduction of MRV of GHG emissions under EU ETS

| | | |
|---|---|---|
| introducing a legal basis for implementation of the EU ETS | preparing of list of installations participating in EU ETS | building of expert capacity of all stakeholders |
| GHG permits issuing | accreditation of Verification Bodies | establishment a Registry for GHG emission allowances. |
| one-year monitoring of GHG emissions by operators of installations in accordance with issued GHG permits and monitoring plans | preparation of annual GHG emission reports by operators of installations | verification of annual GHG emissions |

## Capacity-building to facilitate the implementation of the EU Emission Trading Scheme in Macedonia

Partners:

- Norwegian Ministry of Foreign Affairs (MFA)
- Climate and Pollution Agency (Klif) - Norway
- Ministry of Environment and Physical Planning R. Macedonia.

- Objective 1 - Building administrative capacities for introduction and implementation of the EU ETS
- Objective 2 - Develop and start implementing a detailed work-plan for a pilot cap and trade scheme for greenhouse gas emissions.

# BUR - Biannual Update Report

- Development of National Appropriate Mitigation Actions (NAMAs) for various sectors
- Development of mechanisms for Measuring, Reporting and Verification (MRV) as means for tracking the progress of NAMAs
- Strengthening of the national capacities for GHG mitigation potential including analyses for potential targets for emission limitation/reduction

# Macedonian Green Growth and Climate Change Analytic and Advisory Support Program

- Assessing the economic costs and benefits of a shift to greener growth, taking into account projected climate change
- Prioritizing for implementation actions identified by the National Strategy for Sustainable Development (NSSD) and supplemented by the Program's recommendations.
- Assessment studies and working groups in area of **water resources, energy, agriculture, urban issues, air pollution, transport, social and economical dimension.**

# Information on assistance needed to promote mitigation actions

- Capacity building for identification of NAMA potentials
- International support and Good Proactive Guidance for developing of NAMA proposals
- Sources for NAMA financing
- Technical support for development of MRV mechanisms of the identified NAMAs

# Thank you!

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www.moepp.org.mk
www.unfccc.org.mk