

**CNVP Macedonia**



## **Project for mitigation of climate changes**

### **“Replacing oil for heating with wood chips produced by local forest owners organization”**

#### **Background information**

CNVP Macedonia<sup>1</sup> and National Private Forest Organization in Macedonia (NAPFO) are closely cooperating since 2006 on capacity building and development of NAPFO. In the framework of the cooperation, NAPFO has received training on sustainable forest management including wood products as part of renewable energy sources. During study visit in Austria in 2007 and 2009, representatives of NAPFO have met with new wood products as wood chips and pellets and their use in innovative heating systems. Based on these experiences, in association many times was discussed how to deal and use quantities of wood waste that remains in the forests after harvesting and their economic potential.

In 2010 CNVP and municipality of Berovo were working on investigating possibilities to use locally produced wood as a source for heating of public buildings in Berovo. Feasibility study was prepared on possible use of wood waste as RE source for heating in selected public building in Berovo. The results from the Study have proven positive and recommended use of wood chips as locally produced RE source for heating.

In 2010 NAPFO developed a business plan to reach financial sustainability. One of identified possibilities for NAPFO sustainability was project development. At the end of 2010, with assistance of CNVP, NAPFO has submitted project proposal to GEF SGP in Macedonia. The project has overall objective to contribute to mitigation of climate changes reducing CO<sub>2</sub> emissions. The goal of CO<sub>2</sub> reduction was achieved through shift of the boiler for school heating operating on oil with new system that is operating on wood chips. Beside overall objective of CO<sub>2</sub> emissions reduction, the project has additional objectives:

- promotion of new and innovative systems for heating
- establishment of cooperation of NAPFO and Berovo local authorities
- local economy development through wood chips production produced from local forest resources

Partners in the project of over 47.000 euro value are: NAPFO, Municipality of Berovo, CNVP Macedonia and GEF SGP Macedonia. CNVP Macedonia is contributing in the project with support to organization of workshops on local, regional and national level, promotion of results achieved and most valuable technical assistance in wood chips production: securing the chain of supply of raw material, production of standardized wood chips, training to operators for wood chips production, cost and profit calculation on wood chips production, wood chipper and heating equipment selection and overall monitoring of project results. CNVP has also provided valuable contribution to NAPFO in the process of preparing project document and submission.

#### **Equipment selection**

**Wood chips boiler:** After municipality has selected a school building in Dvorishte for project implementation, CNVP established a contact with company dealing with thermo installation issues, VGG engineering from Skopje. The company has provided a Study for the school facility, estimating the required power for the wood chips boiler and installation works needed. In the process of selection of proper heating equipment for

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<sup>1</sup> CNVP is official spin off organization derived from SNV Balkan forestry program

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the selected school facility CNVP has contacted wide range of producers of boilers. There were several companies offering their products as: HERZ-Austria, Centrometal-Croatia, KWB-Austria, RETIFICA-Macedonia etc. According to power required and offers received for the equipment, the project team decided for the boiler produced by Centrometal-Croatia. The boiler selected is **BIO-CK P Gotfire Unit 100 (60-100kW)**. The boiler is automatically driven and supplied with storage for hot water, tank of 2 tone capacity. The wood chips are feeding the boiler through an automatic system **CRM 3.0**, bringing it from the storage for wood chips in to the boiler system. The boiler has been installed and operational in October 2012.



**Wood chipper:** for the needs of wood chips production, NAPFO and CNVP were contacting many of wood chippers producers. Several offers were received and final decision was to get model of Lindana TP 160 PTO. The chipper is chipping wood with diameter of max 16 cm, has 2 knives, driven by the power of the tractor. The chipper is in range of medium power, but working very smooth on chipping wood waste material as wood processing removals, wood removals after forest harvesting operations, thin material from pre commercial thinning etc.



### **Wood chips production**

For the needs of the project, NAPFO searched and supplied raw material for chipping from different sources. The first source for raw material was small wood processing mills in Berovo. Many of processors have wood removals after processing, which are sold on the market. Usually they are packed in 4 m length packages of wood that can not be further used for processing. Mainly they are from pine and fur species. In 2012 NAPFO has supplied 10 packages of wood removals that secured 40 m<sup>3</sup> of raw material for chipping. In addition NAPFO has supplied raw material from the local monastery community. Finally, NAPFO requested from some of PFO to use their wood removals after harvesting. Many of forest owners allowed the association to chip the wood waste for free. At the end association secured amounts of wood for chipping in total of over 100 m<sup>3</sup> for the season of 2012/2013. At December NAPFO already has delivered 20 m<sup>3</sup> of chips to school facility, has additionally produced 30-40 m<sup>3</sup> chips and around 40 m<sup>3</sup> of wood waste is ready for chipping.



In the process of wood chips production, CNVP has provided assistance to operators on the chipper to take care on the standards for the chips produced. Operators are aware for the standards that chips needs to fulfill on size, moisture and density. Currently NAPFO is producing wood chips with standard ONORM M7 133 (DIN 66 165): G30, W20

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and S200. The average weight of chips produced is 200 kg/m<sup>3</sup>. For reaching desired moisture of the chips, operators are trained to measure the moisture in the material before chipping. For the size of the chips, operators are trained to adjust the size of the chips during chipping, depending on the wood species, length of the pieces, moisture condition etc.

### **Cost and profit calculations**

In process of training the staff on chips production, CNVP has developed a small pilot exercise for the wood waste collection and chipping. The objective of the exercise was to test on different plots all steps that are needed for wood waste collection, time spent and costs produced (fuel, day fees, other). While exercise was ongoing, CNVP staff was recording all important details that were used later to analyze and obtain results for the cost and profit in chips production. For recording the data during exercise, CNVP was using form to fill in data and time spent for every specific action in the process of chips production. Form and procedures for field testing are attached in **the Annex** of this document.

### **Workshops for raising awareness and sharing results** \*for example chips spent

#### **Some learning points**

1. Before developing a project, very important step is to prepare thermo project for the building. This is important to get required power of the boiler, projection of installation works and materials needed. One of very important details is chimney construction. If old chimney is existing, it is important to check if will be useful and fit for the new system;
2. For the wood chips bunker additional cost was derived to prepare small project for construction, apx. 100 euro. It is important to check local regulations for permissions or other papers needed for constructing wood chips bunker (if there is no space where to storage produced chips in the building).
3. During implementation of the project, one of important steps is to train the operator that will take care for maintenance of the boiler system. Once in a day is needed to empty a tank where ashes are collected. Beside that, operator needs to be trained to follow how system is functioning, recognize malfunctions, repair small things and report to producer on bigger errors in the system.

### **Conclusions**

With implementation of this project several important objectives are fulfilled:

A) Promotion of innovative product: NAPFO brought on the market new technology and new product. NAPFO is the first producer of wood chips on the market, selling wood chips as product that is fulfilling standards required for that kind of product.

B) Promotion of innovative way of heating: with this project new equipment is promoted. The system of heating provides savings and comfort to the end users.

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C) Development of local economy: within the project implementation NAPFO has two operators part time engaged. For the chips production local wood resources have been used.

D) Local partnership development: with implementation of the project, relations among municipality and NAPFO become stronger. Possibilities for future cooperation on similar projects are now stronger.

E) Knowledge brokering: NAPFO is ready to present and share the results from the project implementation. Neighboring municipalities can learn from the results of this project.

F) Contribution to mitigation of climate changes: implementation of the project is seen as a concept for local contribution in mitigating climate changes. Many of public buildings are still heated by fossil fuels, while many municipalities have easy accessible wood locally produced. Multiplying this project will contribute to global objective in mitigating climate changes.

### ANNEX 1: Data recording form

Cadastre area \_\_\_\_\_ Land parcel nr. \_\_\_\_ \_\_\_\_\_ ha date \_\_\_\_\_

Type of forest:  high forest  coppice

Tree species: \_\_\_\_\_  
(describe type, all species)

Management type:  one age  multilayer

Harvested at \_\_\_\_\_ marked quantity \_\_\_\_ m<sup>3</sup> transported \_\_\_\_ m<sup>3</sup>  
(month, year)

Harvesting type:  clear cut  selective  thinning

Test field area \_\_\_\_\_ m<sup>2</sup> slope \_\_\_\_ % road distance \_\_\_\_\_ m

Time spent to arrive to plot \_\_\_\_\_ min distance to plot \_\_\_\_\_ km

### COLLECTION

Start time \_\_\_\_ end time \_\_\_\_ spent time \_\_\_\_ min

Average distance for collection \_\_\_\_ m collected amount \_\_\_\_\_ spatial m.

Type and moisture of wood waste \_\_\_\_\_

\_\_\_\_\_  
(length, thickness, structure prevailing)

Tool used: \_\_\_\_\_

Fuel spent: \_\_\_\_\_

### CHIPPING WOOD

Start time \_\_\_\_ end time \_\_\_\_ spent time \_\_\_\_ min

Quantity produced \_\_\_\_ spatial m. Weight per volume \_\_\_\_ kg/ spatial m.

Fuel spent: \_\_\_\_\_

Note: if chips produced is transporting after, to measure distance to point of loading off, fuel and time spent. Then again to measure distance, time spent to arrive to new test plot and fuel spent.

## **Annex 2: PROCEDURES FOR WOOD WASTE COLLECTION (pilot exercise)**

### **Type of test plots:**

- collection of wood waste after clear cut;
- collection after selective cut;
- collection after pre commercial thinning;
- sanitary cut on dry stand wood damaged by under bark beetle;

For the first three cases to select two plots each. On the spot will be selected test field of 800-1000m<sup>2</sup>. On the fourth case is needed to select also two plots, but on smaller area (100m<sup>2</sup>). For all of plots to secure data from official documents (small management plans).

Collection of wood waste will be implemented by two operators, equipped with tools (axes, motor chainsaw, axle pin). Operators will cut, collect and pull out of forests wood waste to wood chipper. Time and procedures (steps, features) during collection will be recorded.

Collected wood waste before chipping will be measured and recorded by volume, structure (length, thickness) and moisture. Time needed for chipping will be also entered in the form. Chips will be storage directly at side car and transport to any location needed. The quantity of transported chips will be entered in the form. There will be a transport document issued also.

### **Measurement:**

- distance of plot from Berovo (both ways);
- fuel and amortization (25% from fuel), cost for driving to plot and transport of chips on the way back, as fuel for chipping;
- fuel, oil and amortization (25% from fuel) of motor chain saw, eventually mechanization used in pulling wood out of forest;
- time consumed for every operation: travel to plot, prepare for work, wood waste collection, chipping and transport on way back;
- moisture of wood waste before chipping (few tests);
- weight of chips (kg/m<sup>3</sup>);

### **Important:**

- lead in implementing procedures on the field will be done by CNVP advisor;
- forms ready to enter data;
- moisture meter, measure rope, watch;
- legal documents issued;