LIFE Project Number

LIFE09 ENV/EE/000227

Progress Report no 3

Covering the project activities from 01/09/2010 to 28/02/2013

Reporting Date

15/03/2013

LIFE+ PROJECT NAME or Acronym

OSAMAT

Data Project

Project location	**Estonia**
Project start date:	**01/09/2010**
Project end date:	**31/12/2014**
Total budget	**€2 379 280**
EC contribution:	**€1 142 490**
(%) of eligible costs	**50**

Data Beneficiary

Name Beneficiary	**EESTI ENERGIA AS**
Contact person	**Mr Tõnis Meriste**
Postal address	**Laki 24, 12915, Tallinn**
Telephone	**+ 372 7152893**
Fax:	**+ 372 7152200**
E-mail	**Tonis.Meriste@energia.ee**
Project Website	**http://www.osamat.ee/**

Table of contents

1 Abbreviations

OSAMAT – acronym for „Management of Environmentally Sound Recycling of Oil Shale Ashes into Road Construction Products. Demonstration in Estonia"

EE – Eesti Energia AS

EE NEJ – Eesti Energia Narva Elektrijaamad AS

NC – Nordecon AS

ERA – Estonian Road Administration

MoE – Ministry of Environment

RM – Ramboll

SG – Steering Group

EC – European Commission

OSA – oil shale ash

Cycl - cyclone oil shale ash

EF PF - electrostatic precipitator oil shale ash from pulverised firing

EF CFB - electrostatic precipitator ash from circulating fluidised bed combustion.

KS – cement

2 Executive summary

2.1 General progress

The preparations for the project started in September 2010 with meetings of the beneficiary representatives and official kick-off meeting in October 2010.

The most important activities that have been successfully carried out since the kick off meeting are the compilation of Steering Group, activating and maintenance of the project homepage (www.osamat.ee), choosing of the piloting locations, completion of material laboratory testing, making the receipts for the pilot sites, compilation and finishing of technical design projects.

In autumn 2011 first two sections of Narva-Mustajõe pilot site construction was carried out. During summer 2012 were completed design projects of Narva-Mustajõe third section and Simuna-Vaiatu site and construction permits issued.
In November 2011 a request for changes in OSAMAT project was sent to EC. Decision from the Commission about approval of project modification was received on 4 of June 2012 and the amendment to the Grant Agreement was signed on 12 of September 2012.

In autumn 2012 Narva-Mustjõe third section was constructed and piloting actions at the site could be now considered as completed. There were measurement of bearing capacity, strength development, cover damage and leaching assessment conducted at Narva-Mustajõe one year old sections (see Annex 6.1 and 6.2 for details). The first results are very promising regarding use of ash in road construction as partial substitution of the cement.

Simuna-Vaiatu piloting is planned to be started in May 2013.

During the period Eesti Energia AS and a new partner Eesti Energia Narva Elektrijaamad AS signed up a Partnership Agreement (see Annex 6.3 for details). Also supplement agreement between Eesti Energia AS and Nordecon AS was signed up as a supplement to EE and Nordecon Parnership Agreement (see Annex 6.4 for details).

Dissemination actions include two abstracts submission to the different conferences: one was submitted to International Baltic Roads Conference in Lithuania 2013(see Annex 6.5 for details) and the second –to Oil shale Symposium 2013 (see Annex 6.6 for details). Both abstracts are accepted. Abstracts acceptation will follow with oral or poster presentation at the conferences.

2.2 Assessment as to whether the project objectives and work plan are still viable

Based on the description of the general progress of the project above and descriptions of later chapters the project objectives and the work plan are still viable, however substantial changes in timeframes should be done (see Eesti Energia AS postponement of the project end date request).

2.3 Problems encountered

The plans of the applications depend on the preliminary information about the site. At the Narva-Mustajõe site the preliminary information about the structures of the road was not correct which caused some changes for the applications implemented on site. Layer stabilisation with old road material could not be done because under the paving there was an ash/concrete layer

instead of gravel. Because there would have been too little material for the layer stabilisation if only the paving material was used, it was decided that the mining waste will be stabilised together with the pavement. Appropriate solution was worked out with road engineers and lab technicians, thus this issue does not endanger project overall goals.

The project started with Preparation and Materials actions to ensure the beginning of piloting actions at the sites. Laboratory testing showed that the most promising for the stabilisation are three types of OSA:

- cyclone ash (Cycl)
- electrostatic precipitator ash (EF PF) from pulverised firing
- electrostatic precipitator ash (EF CFB) from circulating fluidised bed combustion.

Based on the laboratory results the appropriate mixtures of OSA, cement and aggregates were worked out to be applied at the sites.

EF CFB ash showed the best results in strength development. According to the Narva-Mustajõe and Simuna-Vaiatu sites' construction designs EF CFB ash supposed to be used alone as a binder, without cement addition. After recipes compilation it became clear that the amount of EF CFB ash needed for piloting at Narva-Mustajõe and Simuna-Vaiatu sites couldn't be taken out from combustion block by 2011 piloting action start for technical reasons.

In September 2011 two sections at Narva-Mustajõe site were constructed with using Cycl and EF PF ashes as a binder. To provide the amount of EF CFB ash needed for piloting there was a decision done by Eesti Energia AS Member Board to install additional equipment to the combustion block to take out the ash. That's why construction of the 3 section at Narva-Mustajõe site and construction of the Simuna-Vaiatu site were postponed to the 2012 year.

2012 year piloting actions were planned to be started in September. Unfortunately force-major situation repeated once again: CFB block where ash loading equipment was installed broke and wasn't in exploitation until the end of December 2012.

Engineers of our company proposed us temporary solution for loading ash in small amounts and in quite long periods of time from another CFB block (company owns 2 CFB blocks). Hot ash had to be cooled down prior to loading to the track for transporting the ash to the site, so loading supposed to take a lot of time. This solution let us to construct at Narva-Mustajõe site only, because it is located right near the CFB block (so long-time loading wasn't a big problem) and the amounts needed satisfied the demands of the engineers.

Simuna-Vaiatu site construction had to be postponed further again. It was not possible to provide the ash for the site under the proposed temporary technical solution because of the distance between the CFB block and the site (150 km) and the amounts of the ash needed (twice more than in Narva-Mustajõe case).

Simuna-Vaiatu piloting is planned to be started in May 2013.

Moving Simuna-Vaiatu site construction to 2013 year means that two year monitoring program (i.e. verification) planed to be done after sites' construction and dissemination actions have to be also moved. The project end date should be postponed until 15 of August 2016 year (see Eesti Energia AS postponement of the project end date request for details)

Unfortunately we have to point out as a problem the fact that we don't get feedback to our requests and progress reports from Commission. We haven't still feedback to Progress Report no 2 (submitted on 30.03.2012), Mid-term Report (submitted on 15.09.2012) and answer to the

05.11.2012 request (regarding costs eligibility connected to partner name change). Feedback and cooperation absence increase the risk of incorrect actions and therefore ineligible costs emergence for us.

We kindly ask you to adjust on-time feedback with us.

3 Administrative part

3.1 Description of project management

Eesti Energia AS (EE) as being the project coordinating beneficiary is managing the OSAMAT project. The Project Coordinator of OSAMAT project according to the Grant Agreement is Mr Tõnis Meriste. According to the modification request (submitted on 11.11.11 to EC) Aleksander Pototski became a Project Manager representing Eesti Energia Narva Elektrijaamad AS (EE NEJ – a new associated beneficiary).

Coordinating beneficiary has offices in the capital of Estonia, Tallinn, but also in north eastern Estonia in Baltic Energy station. Associated beneficiary is Nordecon AS (NC) and coordinator from NC is Mr Ain Pähkel. Project co-financer is Estonian Road Administration (ERA) and contact person is Mr Taavi Tõnts.

For external assistance the beneficiaries have conducted a procurement process and as a result the contract has been made with Ramboll (RM):Ramboll Eesti AS and Ramboll Finland OY. External assistant tasks include technical reporting, monitoring, environmental permit procedures, environmental laboratory tests and related documentation with reporting, civil-engineering for design and planning, control of field tests and production of instructions for piloting, quality control and follow-up, reporting for LCA and LCC and other specific tasks described in the project application under the external assistance chapter.

In the Steering Group (SG) are representatives from all the above mentioned institutions but also representative of the Estonian Ministry of the Environment (MoE). The persons participating the SG are Tõnu Aas (EE NEJ), Märt Puust (ERA), Jaanus Taro (NC), Annika Varik (MoE) Peeter Škepast (RM).

There have been several technical meetings between partners and other counterparties.

Numerous meetings have been held between different work teams since the beginning of the project:

16/09/2011 Work progress meeting between EE NEJ, NC, ERA and RM (see the MoM in Monitoring report 2 in Annex 6.2)

27/09/2011 Work meeting between EE NEJ, NC, ERA and RM

08/11/2011 Work meeting between EE NEJ and RM (Subject was request for changes to EC)

10/01/2012 Work meeting between EE NEJ and RM (Status update of request to changes to EC)

25/01/2012 Work meeting between EE NEJ, NC and RM (Status update of request to changes to EC)

06/02/2012 Work meeting between EE NEJ and RM (Answer to EC letter received on 3/02/2012)

13/03/2012 Work meeting between EE NEJ, RM, NC and ERA (Construction permit issuing)

11/06/2012 Work meeting between EE, EE NEJ, RM, NC and ERA (Status update)

26/07/2012 Work meeting between EE NEJ and NC (Construction actions at Narva-Mustajõe site)

11/09/2012 SG-meeting EE, EE NEJ, Nordecon, Ramboll Eesti, ERA.

12/12/12 Work meeting: Narva-Mustajõe site observation on and signing up of official documentation confirming the end of Narva-Mustajõe site construction, EE, EE NEJ, Nordecon, Ramboll Eesti, ERA.

11/03/2013 SG-meeting EE, EE NEJ, Nordecon, Ramboll Eesti, ERA.

During the first reporting period the following reports were compiled and presented to EC:

1. Inception Report (project progress 1.09.2010-15.03.2011)
2. Report of Preparation Action
3. OSAMAT applications and test methods
4. Compilation report of technical, environmental and economical criteria for materials and applications and test procedures
5. Environmental screening/preliminary EIA (in Estonian)

During the second progress reporting period the following reports were compiled:

1. Progress report 1 (project progress 1.09.2010-31.08.2011)
2. Monitoring report 1
3. Preliminary Environmental Impact Assessment Report (modified version)
4. Environmental survey programme
5. Report of civil-engineering and environmental survey
6. Materials report
7. Narva-Mustajõe test section detailed design
8. Written instruction for the implementation of pilot applications 2011
9. Written instructions for the quality control and follow-up of pilot applications
10. Carbon footprint report

During the third progress period (1.09.2010-15.03.2012) the following reports were compiled:

1. Progress report 2
2. Monitoring report 2
3. Intermediate report 2 of Narva-Mustajõe pilot 2
4. LCA and LCC methodology draft

During the fourth progress period (16.03.2012-31.08.2012) the following reports were compiled:

1. Midterm report
2. Intermediate report of Materials action (August 2012)
3. Piloting instructions for Simuna-Vaiatu
4. Instructions for technical follow-up procedures for 2012 pilot sites
5. Road designs for pilot sites of 2012
6. LCA report draft

7. Carbon footprint report 2
8. Environmental survey report draft
9. Monitoring overall report (1,2,3,4 periods)

During the fifth progress period (15.09.2012-15.03.2013) the following reports were compiled:

1. Progress Report no 3
2. Materials actions report (November 2012)
3. Environmental Survey report draft (February 2013)
4. Technical&Piloting report, Narva –Mustajõe site (March 2013). The report contens at the moment Narva-Mustajõe site technical&piloting data and will be supplemented with Simuna-Vaiatu site technical&piloting data after the site construction (planned to start in May 2013).
5. Monitoring report no 5

3.2 Organigramme of the project team and the project management structure

In OSAMAT project Eesti Energia Narva Elektrijaamad AS has been included as associated beneficiary as described in the request for modification.

The Organigramme for the project is given below (Figure 1). The project team consists of members of the beneficiary organisations EE, EE NEJ and NC and co-financer ERA.

Figure 1. General Organigramme of OSAMAT project

3.3 Work teams according to actions

The work teams of each action involve the representatives from all parties. In the following table are given the responsible persons of the work teams.

Action	Eesti Energia AS	Eesti Energia Narva Elektrijaamad AS	Nordecon	Road Administration	Ramboll
Preparations	Mr Tõnis Meriste	Mr Aleksander Pototski	Mr Jaanus Taro	-	Mr Hendrik Puhkim
Materials	Mr Tõnis Meriste	Mr Aleksander Pototski	-	-	Mr Pentti Lahtinen
Applications	Mr Tõnis Meriste	Mr Aleksander Pototski,	Mr Ain Pähkel	Mr Rainer Kuldmaa	Mr Andres Brakmann
Piloting	Mr Tõnis Meriste	Mr Aleksander Pototski	Mr Andrei Anissimov	Mr Rainer Kuldmaa	Mr Andres Brakmann
Verification	Mr Tõnis Meriste	Mr Aleksander Pototski	Mr Ain Pähkel	Mr Rainer Kuldmaa	Ms Liis Tikerpuu
Dissemination	Mr Tõnis Meriste	Mr Aleksander Pototski	Mr Ain Pähkel	Mr Rainer Kuldmaa	Ms Liis Tikerpuu
Management	Mr Tõnis Meriste	Mr Aleksander Pototski	Mr Jaanus Taro	-	Mr Hendrik Puhkim

3.4 Partnership agreements status and key content

Partnership agreement between EE and Nordecon was signed on 31th of May 2011. According to the agreement NC will be responsible for carrying out pilot site construction works. Supplement agreement to EE and Nordecon Partnership agreement was signed up on 02.01.2013. The Supplement agreement specifies site locations, sites'construction volumes and materials used and duties of the sides regarding sites' construction.

Partnership agreement between EE and EE NEJ was signed up on 25.10.2012

The key content of the partnership agreement between EE and EE NEJ are the following:

- EE NEJ undertakes to provide renting of mass-stabilisation equipment and operators by organising public procurement to acquire required equipment
- EE NEJ undertakes to provide road construction owner supervision
- EE NEJ undertakes to provide required amount of oil shale ashes needed for implementation of project actions and their transportation to the place of the pilot sites.
- EE NEJ undertakes to hire required amount of personnel needed for implementation of project actions.

It was agreed, that EE is responsible for project coordination.

4 Technical part

The project is planned to be implemented by means of seven distinct but interdependent actions that are listed in the following (Actions 1 – 7).

4.1 Actions

4.1.1 ACTION 1: PREPARATIONS

Preparations include activities that are preliminary activities of the project and ascertain a smooth start of the actual LIFE-project. Most of the preliminary activities started before the LIFE project period but some continued at least during the first months of the LIFE project and some continue to this day.

4.1.1.1 In more detail the activities imply following:

- **Action 1.1** Design and development of new equipment for the project – status: ongoing

As stated in the progress report no 1 EE and NC are still willing to rent the mass-stabilisation equipment instead of purchasing it, detailed information about this issue was given in the request for modifications submitted to EC in November 2011.

During year 2011 there were announced two procurements for mass-stabilisation equipment rental, unfortunately there were no bidders. The third procurement will be launched during autumn 2012.

The piloting done during autumn 2011 did not need rental of any new equipment. The rental of mass-stabilisation equipment is needed for piloting 2013.

Procurement for obtaining mass-stabilisation equipment for stabilisation in 2012 was announced in summer 2012. The winner is Finnish company Biomaa OY. Unfortunately, because of technical problems regarding to EF CFB ash provision, mass-stabilisation works had to be postponed to May 2013. By the present moment a conformation request to Biomaa OY concerning their proposal validity has been sent.

- **Action 1.2** Decision of one or two appropriate piloting sites – status: completed

We have decided that piloting will take place on 2 road sites: Narva-Mustajõe and Simuna-Vaiatu.

- **Action 1.3** Starting the permit procedures with discussions with the environmental authorities – status: completed

ERA has decided not to initiate full EIA. A preliminary environmental impact assessment (EIA) report was compiled for decision-making process (see Progress Report no 1, Annex 6.4). The environmental authorities have confirmed that the licence for handling hazardous waste is not required as OSA is considered as material and not a waste (letter from Viru Region Environmental Board to EE on 22.02.2012 nr V 8-2/12/3980-2, which was also forwarded to EC on 28.02.2012).

- **Action 1.4** Determination of acceptance criteria for materials and applications and preparing of material test programme – status: completed

Detailed info about this action is given in Inception report annex 6.4 (Compilation report)).

- **Action 1.5** Checking of the details of the project plan with respect to the plans of the project proposal and eventual revision on the basis of emerged needs to change something – status: completed

- **Action 1.6** Making and signing consortium agreement between the beneficiaries – status: completed

Partnership Agreement between EE and NC was signed on 31.05.2011. Supplementary agreement was signed on 02.01.2013 Partnership Agreement between EE and EE NEJ was signed on 25.10.2012.

- **Action 1.7** Choices for and agreements with the participants of the Steering Group (SG) of the project are made before start of the LIFE project – status: completed

Info about SG members can be found in Inception reports annex 6.1 (Memo of kick-off meeting).

The progress of the action in 2010 and plans for 2012 are described in the following table:

Indicator	**Planned deadline**	**Actual progress**
Decisions of new equipment for the project	01.09.2010	Completed. Equipment will be rented.
Preparations Action report	15.12.2010	Completed
Compilation (report) of technical, environmental and economical criteria for materials and applications and test procedures	28.02.2011	Completed
Environmental permits	31.05.2011	Completed
Milestones		
• Consortium agreement • Pilot sites chosen • Steering Group ready	1.09.2010	Completed
Starting to compile the report of criteria for materials and applications and about test procedures	01.10.2010	Completed
Report of Preparations Action started and finished	01.09.2010 – 15.12.2010	Completed
Finishing of the compilation report of criteria for materials and applications and about test procedures	01.02.2011	Completed
All complementary data and EIA for the environmental permit submitted	28.02.2011	Completed
Equipment of EESTI ENERGIA and Nordecon are available for field testing latest	31.03.2011	Completed
All other potentially pending preparations activities are finished	31.05.2011	Completed

4.1.2 ACTION 2: MATERIALS

Materials Action is carried out with help of geotechnical and chemical laboratories in order to ascertain appropriate materials based on OSA for the different pilot applications. The Action also demonstrates the required test procedures to ascertain the quality of OSA materials.

Material tests started in 2011 and will be performed until the end of the year 2013.

4.1.2.1 In more detail the activities imply the following:

- **Action 2.1** Sampling of required materials – status: completed

The soil samples, OSA samples and mining waste samples were taken in February 2011 and transported to a chosen laboratory in Finland for testing and laboratory analyses. For carrying out laboratory tests and analyses a separate report has been compiled – OSAMAT applications and test methods (was presented with Inception report as annex 6.3).

- **Action 2.2** Characterisation of the material components – status: completed

We tested in laboratory 4 different type of oil-shale ashes and additionally mining waste. In the laboratory different analyses were made to find appropriate binder mixture for stabilization works. The scope of laboratory works included water content, loss of ignition, active lime, pH, niton, particle size distribution, compatibility, Preparation of the aggregate specimens, preparation of the peat specimens, unconfined compressive strength, freeze-thaw durability test and soft wall permeability test with constant pressure. In order to do testing test pieces were done.

In detail the content and results of material components tests was given in Progress Report 1 Annex 6.7.

- **Action 2.3** Production of functional material recipes – status: completed

Detailed description about test programme for production of functional material recipes was presented in the Inception report annex 6.4.

During 2011 three sections with stabilisation were designed to be constructed, each of them with different oil shale fly ash fraction as a binding agent (3 different recipes). The three different sections were designed as the provider of the fly ash, Eesti Energia, requested experimentation with at least three different fractions (Cyclone ash, EF CFB ash, EF PF ash). However construction of the section with EF CFB ash had to be postponed due to outtaking problems of the ash. The other two sections were constructed as planned. The third section was done in autumn 2012.

Tests showed that large fraction mining waste cannot be used in stabilisation. However the small fraction type mining waste (gravel) can be used for stabilisation and this was implemented on Narva-Mustajõe pilot site.

The aggregate used was a mixture of mining wastes and road material (gravel/sand from Narva-Mustajõe) as it had more suitable grain size distribution than tested stabilised mining wastes or tested stabilised road material alone. Also we used the bitumen from the milled asphalt concrete, which increases the strength formation to some extent.

The aggregate mixture used in piloting will show that it is possible to use these two otherwise not so easily utilisable materials in high quality construction.

There will be 4 „mass stabilisation recipes" applied at the Simuna-Vaiatu site and 3 "layer and road base stabilisation recipes" (the same recipes for both) that have been already applied at Narva-Mustajõe site - 7 recipes in total (see table 1).

Table 1. Layer stabilisation, road base stabilisation and mass-stabilisation recipes.

Recipe number	Recipes
Layer and road base stabilisation	
1	EF PF 6 % + KS 3 %+aggregates
2	Cycl 5 % + KS 5 %+ aggregates
3	EF CFB, 9%+aggregates
Mass-stabilisation	
4	Cycl 200 kg/m3 + KS 60 kg/m3
5	Cycl 200 kg/m3 + KS 70 kg/m3
6	Cycl 200 kg/m3 + KS 80 kg/m3
7	EF CFB, 9%

KS- cement, aggregates - mixture of MWA (mining waste aggregate) and MAC (milled asphalt concrete), Cycl - cyclone oil shale ash, EF PF - electrostatic precipitator oil shale ash from pulverised firing, EF CFB - electrostatic precipitator ash from circulating fluidised bed combustion.

Table 2 explains what recipes in which road section was used/will be used. At Narva-Mustajõe sites the layer stabilisation was done on existing old concrete layer (stabilised layer thickness is 25 cm). For road base stabilisation old concrete layer was removed (stabilised layer thickness is 35 cm).

Table 2. Recipes application at Narva-Mustajõe and Simuna-Vaiatu sites.

Road nr. and name	Section mark	Section	Length	Procedure	Construction finished
13109 Narva-Mustajõe	NM-1	0+50–5+00	450 m	Layer stabilisation, 25 cm New base aggregate: MWA + MAC EF PF 6 % + KS 3 % Old structure (old ash stabilised layer was not removed)	Sept –Oct 2011
	NM-2	5+00–9+50	450 m	Layer stabilisation, 25 cm New base aggregate: MWA + MAC Cycl 5 % + KS 5 % Old structure (old ash stabilised layer was not removed)	Sept-Oct 2011
	NM-3	9+50–10+50	100 m	Layer stabilisation, 35 cm Base aggregate: MWA + MAC EF PF 6% + KS 3% Old structure (old ash stabilised layer was removed)	Sept-Oct 2012
	NM-4	10+50–11+50	100 m	Layer stabilisation, 35 cm EF BL11 NBT 9 % Base aggregate: MWA + MAC Old structure (old ash stabilised layer was removed)	Sept-Oct 2012
	NM-5	11+50–12+50	100 m	Layer stabilisation, 35 cm Cycl 5% + KS 5%	Sept-Oct 2012

Road nr. and name	Section mark	Section	Length	Procedure	Construction finished
				Base aggregate: MWA + MAC Old structure (old ash stabilised layer was removed)	
	NM-6	12+50–15+80	330 m	Layer stabilisation, 25 cm EF PF 6% + KS 3% New base aggregate: MWA + MAC Old structure (old ash stabilised layer was not removed)	Sept-Oct 2012
	NM-7	15+80–16+80	100 m	Layer stabilisation, 25 cm (EF BL11 NBT 9%) New base aggregate: MWA + MAC Old structure (old ash stabilised layer was not removed)	Sept-Oct 2012
17192 Simuna-Vaiatu	SV-1	32+60–33+60	100 m	Mass stabilisation (Cycl200 kg/m3 + KS 60 kg/m3)	TBF 2013
	SV-2	33+60–34+60	100 m	Mass stabilisation (Cycl 200 kg/m3 + KS 70 kg/m3)	TBF 2013
	SV-3	34+60–37+60	300 m	Mass stabilisation (Cycl 200 kg/m3 + KS 80 kg/m3)	TBF 2013
	SV-5	30+20–35+10	490 m	Layer stabilisation, 20 cm (EF CFB, 9%)	TBF 2013
	SV-6	35+10–39+20	410 m	Complex stabilisation (traditional method)	TBF 2013

For 2012 we planned, that there would be a separate test section (in third sections) in Narva-Mustajõe for "road base stabilisation" so the OSAMAT project overall requirement should be fulfilled then. As for the purpose of "construction of new road layer with oil shale mining waste" our last year used technique fulfils that requirement already.

During spring and summer 2012 the materials recipes and material testing for Narva-Mustajõe site has been completed. The results in detail can be found as an Annex 6.7

- **Action 2.4** Determination of the potential variation of the different material components and the effect of the variation on the properties of the materials based on recipes – status: ongoing

Determination of the potential variation of the different material components and testing of the effect of the variation on the properties of recipes has started and the tests are almost ready and the results can be seen in the Materials report (Annex 6.7). Also in order to find out if it is potential to use wet binders that may have been stored outside, then this kind of testing will also be done. So far all the pilots have been made with dry binders (the water addition made only hours before constructing).

- **Action 2.5** Control of the materials to be used in the pilot applications – status: ongoing

The control of the materials was done during the Narva-Mustajõe piloting. This included for example water content tests to determine the need for more water. This is important in relation with the quality of the structure.

The control of the materials is related to the actual piloting (done only hours before the constructing) and for example issues concerning Narva-Mustajõe pilot site so far are written out in the Narva-Mustajõe pilot site Progress report 2 Annex 6.3. Control action applied during September 2012 construction work are specified in Annex 6.1 "Piloting report, Narva-Mustajõe site"

The progress of the actions since 2010 and plans for 2013 are described in the following table:

Indicator	**Planned deadline**	**Actual progress**
Deliverables		
Intermediate reports in Progress Reports (1) (Canceled)	28.02.2011	**Completed**
Intermediate report in Progress Reports (1)	30.08.2011	**Completed**
Intermediate report in Progress Reports (2)	28.02.2012	**Completed**
Intermediate report in Progress Reports (3)	30.08.2012	**Completed,**
Technical Report compiling all the activities and results of the Materials Action during the project years 2010 – 2012	28.02.2013	**Completed** for Narva-Mustajõe site
Milestones		
Start of the Materials Action	01.09.2010	**Completed**
Choice of the laboratory for chemical analysis has been made latest on	15.09.2010	**Completed**
Sampling carried out, materials available and tests have started latest	30.09.2010	**Completed**
Intermediate report (1) for Progress Report started	01.02.2011	**Completed**
Tests for the piloting in 2011 have been finished	31.05.2011	**Completed**
Intermediate report (2) for Progress Report started	1.08.2011	**Completed**
Intermediate report (3) for Progress Report started	1.02.2012	**Completed**
Tests for the piloting in 2012 are finished	31.05.2012	**Completed**

Intermediate report (4) for Progress Report started	01.08.2012	**Completed**
Final Technical Report of Materials Action started	15.01.2013	**Completed** for Narva-Mustajõe site

4.1.3 ACTION 3: APPLICATIONS

Applications Action will ascertain that the piloting Action 4 is based on appropriate and efficient plans to produce successful applications with respect to general civil engineering criteria, and that the project will achieve full and appropriate information and data for the evaluation of the results during the verification procedure of Action 5.

4.1.3.1 In more detail the activities imply following:

- **Action 3.1** Geotechnical and –environmental site investigations – status: completed

Results of geotechnical and environmental site investigations are given in Progress report no 1 annex 6.6 "Report of civil-engineering and environmental survey".

- **Action 3.2** Design and planning uses materials data from Action 2 for the dimensioning of the different pilot structures – status: completed

Narva-Mustajõe technical design was accepted in summer 2011 and construction permit was issued on 10th of August 2011. In parallel we prepared the technical design of Simuna-Vaiatu pilot site and this activity was finished in summer 2012. This action was put on hold based on the decision made at the meeting 16/09/2011. The technical design of Narva-Mustajõe section 3 and Simuna-Vaiatu pilot site has been completed during summer 2012, the construction permits have been issued (N-M 20 July 2012 and S-V 1 August 2012). Technical designs are performed in Mid-Term report, Annex 6.3.

- **Action 3.3** The pilot implementation of each structure – status: completed

The plans and written instructions were made for the Narva-Mustjõe pilot in Estonian (Attached to Progress report no 2, annex 6.3). The making of the plans and instructions for the Simuna-Vaiatu pilot has been completed and the report can be found in Mid-Term report, Annex 6.4 (Piloting Simuna-Vaiatu instructions for mass stabilisation).

- **Action 3.4** Quality control activities before and during pilot implementation as well as follow-up – status: ongoing.

Written instructions for quality control and follow-up activities for mass stabilisation can be found as annex 6.10 of Progress report no 1. There has been compiled a "Technical follow-up procedures" guideline for layer and mass stabilisation (Mid-Term report, Annex 6.5). Quality control activities on Narva-Mustajõe and Simuna-Vaiatu will be based on above mentioned documents.

- **Action 3.5** Field tests are carried out in order to control and to manage new equipment, construction methods and technologies – status: ongoing

The field tests are done during the piloting and follow-up activities. Samples from Narva-Mustajõe third sections constructed in 2012 were analysed on unconfined compression strength development, also freeze-thaw durability and leaching tests were done. In November 2012 soil and surface water samples were taken from the section for environmental assessment.

Evaluation of technical aspects of Narva-Mustajõe two sections constructed one year ago (in autumn 2011) included load bearing capacity measurement, damage assessment, drilled samples unconfined compression strength testing. Evaluation of environmental aspects include comparison of background water and soils samples data with one year data received from soils and water samples taken in August 2012.

Detailed information about technical aspects of 2011-2012 years construction is in Annex 6.1.

Detailed information about environmental aspects of 2011-2012 years construction is in Annex 6.2.

The progress of the actions since 2010 and plans for 2013 are described in the following table:

Indicators	**Planned deadline**	**Actual progress**
Deliverables		
Report of civil-engineering and environmental survey	28.02.2011	**Completed**
Written instruction for the implementation of pilot applications 2011	31.05.2011	**Completed**
Written instructions for the quality control and follow-up of pilot applications	31.05.2011	**Completed**
Written instruction for the implementation of pilot applications 2012	31.05.2012	**Completed**
Written instructions for the quality control and follow-up of pilot applications 2012	31.05.2012	**Completed**
Milestones		
Start of the Applications Action	30.09.2010	**Completed**
Civil-engineering and environmental survey finished and reporting started	30.11.2010	**Completed**
Planning, designing and production of instructions for piloting 2011 finished	31.05.2011	**Completed**
Planning, designing and production of instructions for piloting 2012 finished	31.05.2012	**Completed**

4.1.4 ACTION 4: PILOTING

Piloting Action is going to demonstrate the practical implementation of different types of civil-engineering applications with materials based on OSA.

Layer stabilisation is in progress and mass stabilisation piloting has not started, however all the designing has been completed and construction permits have been issued. Narva-Mustajõe pilot site construction finished in November 2012. Simuna-Vaiatu pilot site construction is planned to be started in May 2013.

4.1.4.1 In more detail the activities imply following:

- **Action 4.1** Layer and road base stabilisation – status: completed

Layer stabilisation with binders based on OSA was done in autumn 2011 (first and second sections) and in autumn 2012 (third section). The lengths of experimental sections and OSA type used are the following:

OSA	Total length of the sections with OSA type used, m
Cyclone	780
EF PF	650
EF CFB	200

The final total length of the structure is 1630 m.

- **Action 4.2** Mass stabilisation – status: is planned to start in 2013 at Simuna-Vaiatu pilot site

Mass-stabilisation piloting (pilot site length is 0,9 km) has not started, however the design (including proper recipe) is completed and construction permit has been issued.

- **Action 4.3** Mixtures of different types of fractions of oil-shale mining waste were planned to be stabilised and tested as aggregate for structural road base course. Test showed that large fraction mining waste cannot be used in stabilisation. The best results (laboratory testing) as aggregates to be used in layer stabilisation and road base construction gave a mixture of 16-32 mm mining waste fraction and milled asphalt concrete. This aggregate (mixture) was used in the total length of the pilot section (1630m).

The progress of the actions since 2010 and plans for 2013 are described in the following table:

Indicators	**Planned deadline**	**Actual progress**
Deliverables		
Pilot Report including descriptions of applications	28.02.2013	**Ongoing.** Pilot report includes description of piloting actions at Narva-Mustajõe site in 2011-2012 years. Piloting actions at Simuna-Vaiatu site haven't been started.
Milestones		
Start of action	01.03.2011	**Completed**
Final securing of the timetable, materials and equipment for pilot 2011	31.05.2011	**Completed**
Piloting 2011 starts 01/08/2011 and is finished	15.12.2011	**Completed**
Final securing of the	31.01.2012	**Done,** postponement of the project end

timetable, materials and equipment for pilot 2012		date is needed (see Eesti Energia AS postponement of the project end date request).
Piloting 2012 starts 01/04/2012 and is finished	15.10.2012	**Ongoing.** Piloting at Narva-Mustajõe site is finished in November 2012. Piloting at Simuna-Vaiatu site is planned to start in May 2013
Start of Pilot Report	31.10.2012	**Started.** Pilot report includes description of piloting actions at Narva-Mustajõe site in 2011-2012 years. Piloting actions at Simuna-Vaiatu site haven't been started.

4.1.5 ACTION 5: VERIFICATION

Verification Action is needed to give the project stakeholders proof that the methods, materials and applications based on OSA are environmentally safe and technically and economically feasible. The Action uses instructions from Action 3 and reported information and data from Actions 2 and 3.

4.1.5.1 In more detail the activities imply the following:

- **Action 5.1** Quality control procedures during the pilots – status: ongoing

2011 and 2012 year piloting at Narva-Mustajõe was accompanied by quality control actions. They include measurements and recoding of the depth, width and cross fall of the stabilisation layer, water content measurement during construction, load bearing capacity measurements, unconfined compress strength measurements, materials and volumes control used in construction. Results of the measurements are presented in Technical&Piloting report, Annex 6.1

Quality control actions at Simuna-Vaiatu will start with the site construction.

- **Action 5.2** Long-term follow-up procedures – status: ongoing

Follow-up actions include:

- Load bearing capacity measurements before construction, 28 and 90 days, one and three year after construction
- Unconfined compression strength measurements of drilled samples 28 and 90 days
- Paving quality measurements (damage assessment)

Follow-up procedures for layer stabilisation sections continue up to two years after the construction (meaning for site constructed in 2011 up to 2013 and for site constructed 2012 up to 2014). For mass-stabilisation the follow-up actions are meant to take place in 2014 and 2015 years.

One year follow –up results are presented in Technical&Piloting report, Annex 6.1

Follow-up activity at Simuna-Vaiatu starts after Simuna-Vaiatu site construction.

- **Action 5.3** Environmental life-cycle assessment and life-cycle costing of the pilot applications – status: ongoing

The assumptions for the LCA and LCC are made and the methodology of the process is decided. Draft version with LCA and LCC report can be found as annex 6.7 in Mid-Term report. We plan to continue with studies and work on the draft report version.

The progress of the actions since 2010 and plans for 2013 are described in the following table:

Indicators	**Planned deadline**	**Actual progress**
Deliverables		
N/A during this reporting period	-	-
Milestones		
Start of the Action	01.03.2011	**Completed**
Environmental background values: start by sampling and finished with results	15.06.2011	**Completed**
Plans and choices for LCA and LCC available	30.06.2011	**Completed**
Start of Quality Control at pilot site 2011	01.08.2011	**Completed**
Start of LCA and LCC studies	01.08.2011	**Completed**
Quality Control at pilot site 2011 finished	15.12.2011	**Completed** for the constructed part of Narva-Mustajõe pilot site
Start of Follow-up at pilot site 2011	31.01.2012	**Completed**
Start of Quality Control at pilot site 2012	01.04.2012	**Completed** for Narva-Mustajõe site. Quality control at Simuna-Vaiatu site starts with construction (planned as May 2013).
Quality control at pilot site 2012 finished	15.10.2012/ 05.2014	**Completed** for Narva-Mustajõe site. Quality control at Simuna-Vaiatu site starts with construction (planned as May 2013).

Start of Follow-up at pilot site 2012	31/01/2013	**Started at** Narva-Mustajõe site. Starts at Simuna-Vaiatu site after construction (construction planned in May 2013).

4.1.6 ACTION 6: DISSEMINATION

Dissemination Action is going to disseminate and communicate the results of the project to the target groups of the project so that the knowledge gained during the project can benefit whole Europe.

4.1.6.1 In more detail the activities imply the following:

- **Action 6.1** Webpage – status: ready and updating ongoing (www.osamat.ee)
- **Action 6.2** LIFE notice boards with LIFE-logo at piloting sites – status: ready and ongoing.

Notice board on Simuna-Vaiatu pilot area will be installed before the pilot construction.

- **Action 6.3** DVD-presentation – status: ongoing

Materials' gathering for DVD presentation is continuing this year according to project activities. Filming of Narva-Mustajõe stabilisation works was carried out in autumn 2011. Film crew is waiting for the next field activities to start.

- **Action 6.4** Guidelines for the European practice – status: start of compilation should be postponed to 2015 year (see Eesti Energia AS postponement of the project end date request).
- **Action 6.5** Layman's report – status: start of compilation should be postponed to 2015 year (see Eesti Energia AS postponement of the project end date request).
- **Action 6.6** Also slide presentation about the project methods and results – status: ongoing
- **Action 6.7** Road Shows will be arranged to specified small target groups in some European countries – status: start of compilation should be postponed to 2015 year (see Eesti Energia AS postponement of the project end date request).
- **Action 6.8** International Workshop will be arranged in Estonia in spring-summer 2015 – status: start of compilation should be postponed to 2014 year (see Eesti Energia AS postponement of the project end date request).
- **Action 6.9** All other published articles, reports and conference papers about the project – status: ongoing

We have been participating with presentations at the following conferences:

1. Ash Utilisation 2012 – Ashes in Sustainable Society, Stockholm, Sweden, 25-27 January, 2012
2. Jordan International Oil Shale Symposium, Dead Sea, Jordan, 7-9 May, 2012.
3. Nordic Geotechnical Meeting, 9-12.05.2012 in Copenhagen;
4. WASCON 2012, 30.05-1.06 in Gothenburg

5. 12th International Symposium "Topical Problems in the Field of Electrical and Power Engineering", Doctoral Scholl of Energy and Geotechnology, Kuressaare, Estonia, 11-16.06.2012

We presented OSAMAT project activities and result at different conferences:

- ✓ Results (laboratory) of stabilisation of road structure in poster presentation at "Ash utilisation 2012" conference that was held in Stockholm, Sweden on 24-27 of January 2012. The poster is attached as Annex 6.5 of Progress report 2
- ✓ Results (laboratory) of stabilisation of peat at „Winter Academy 2012" organised by Tallinn University of Technology, Estonia that was held on 12 of March 2012. Presentation slides are attached as Annex 6.6 (please see pages 12, 13, 14) of Progress report 2
- ✓ Overview of the OSAMAT project activities at "20th International Symposium on Mine Planning and Equipment Selection" that was held in Almaty, Kazakhstan on 12 of October 2011. Presentation slides are attached as Annex 6.7 (please see pages 6, 7) of Progress report 2.
- ✓ Introducing OSAMAT project activities to the collegium of scientists from Tallinn University of Technology, Estonia for further collaboration on 28 of October 2 011. Presentation slides are attached as Annex 6.8 (please see pages 6, 7, 8) of Progress report 2.
- ✓ Introducing OSAMAT project laboratory results (peat stabilisation) in scientific article Koroljova, A.; Pototski, A. (2012). Use of Oil Shale Fly Ash as a Binder Material in Stabilization of Soft Soils. Lahtmets, R. (Toim.). 12th International Symposium "Topical Problems in the Field of Electrical and Power Engineering", Doctoral Scholl of Energy and Geotechnology, Kuressaare, Estonia, 11-16.06.2012 (173 - 175). Tallinn: Elektriajam
- ✓ Overview of the OSAMAT project activities at "Jordan International Oil Shale Symposium " that was held in Dead Sea, Jordan. Presentation slides are attached as Annex 6.10 (please see pages 8,9,10) of Progress report 2.
- ✓ Abstract to International Baltic Roads Conference in Lithuania 2013. "Utilisation of oil shale mining and combustion by-products in ecological road construction". Detailed information will be presented orally or in poster at the conference (Annex 6.5).
- ✓ Abstract to Oil shale Symposium 2013. "Oil shale ash use in road construction: field application analysis within OSAMAT project". Detailed information will be presented orally or in poster at the symposium (Annex 6.6).

- **Action 6.10** Public local and national events – status: ongoing

Public events are arranged according to progress of pilot sites construction works. The public demonstration will take place in the beginning of mass-stabilisation works on Simuna-Vaiatu section, as this is the most unique method used and also the most interesting to watch. The arrangements for mentioned public event will start as soon as the date when the mass-stabi. works start on the pilot section is clear. We will seriously consider on holding two local events including press releases.

The progress of the actions since 2010 and plans for 2013 are described in the following table:

Indicators	Planned deadline	Actual progress
Deliverables		
Press release about the project and piloting	01.07.2011	**Completed**
Conference papers and posters submitted for Oil Shale symposium in Estonia 2012	31.03.2012	The event did not take place, instead OSAMAT was presented at Jordan International Oil Shale Symposium
Conference papers and posters submitted for Wascon in Sweden 2012	31.03.2012	**Completed**
Milestones		
Start of the Action	01.09.2010	**Completed**
Starting to create the Webpage	15.09.2010	**Completed**
Webpage ready for use	31.10.2010	**Completed**
Manuscripts for the DVD start	31.10.2010	**Completed**
Starting to prepare the slide presentations	15.01.2011	**Completed**
Preparing of paper and poster for the conference in 2011 start	15.01.2011	**Completed**
Oil Shale Symposium in Estonia 2011	31.03.2011	**Symposium did not take place**
Start arrangement of LIFE notice boards for pilots 2011 and 2012	30.04.2011	**Completed**
1st version of slide presentations finished	30.04.2011	**Completed**
Arrangements for Local event for piloting start	31.05.2011	**Not started,** will take place when construction works are scheduled to start (June 2013)
DVD production about the project, its methods and results start	30.06.2011	**Completed**
Local event(s) at piloting site(s)	15.07.2011	**Not started,** local event will take place when mass-stabilization works are carried out on Simuna-Vaiatu test section

Indicators	Planned deadline	Actual progress
Preparing of paper and poster for the conference in 2012 start	15.01.2012	**Completed**
Oil Shale Symposium in Estonia 2012	31.03.2012	**Symposium did not take place**
Wascon in Sweden 2012	31.03.2012	**Completed**
2nd version of slide presentations finished	30.04.2012	**Completed**
Preparing of paper and poster for the conferences in 2013 start	15.01.2013	**Like planned**

4.1.7 ACTION 7: MANAGEMENT

Management Action is active throughout the project period. It involves the overall management and co-ordination of the project according to the details of the project plan and financial budget and with respect to the contract with the Commission.

4.1.7.1 In more detail the activities imply following:

- **Action 7.1** Consortium Agreement – status: completed

Partnership Agreement between EE and NC was signed 31 May 2011. Partnership Agreement between EE and EE NEJ was signed on 25.10.2012.

- **Action 7.2** The Steering Group – status: completed

Info about SG members can be found in Inception reports annex 6.1 (Memo of kick-off meeting).

- **Action 7.3** Carbon Footprint – status: ongoing

The first version of Carbon Footprint report was presented as annex 6.11 in Progress report no 1. The second version of Carbon Footprint report can be found as Annex 6.8 Mid-term report.

- **Action 7.4** The activity reports – status: ongoing

The progress of the actions since 2010 and plans for 2013 are described in the following table:

Indicator	Planned deadline	Actual progress
Deliverables		
Consortium agreement of the beneficiaries	1.09.2010	**Completed**

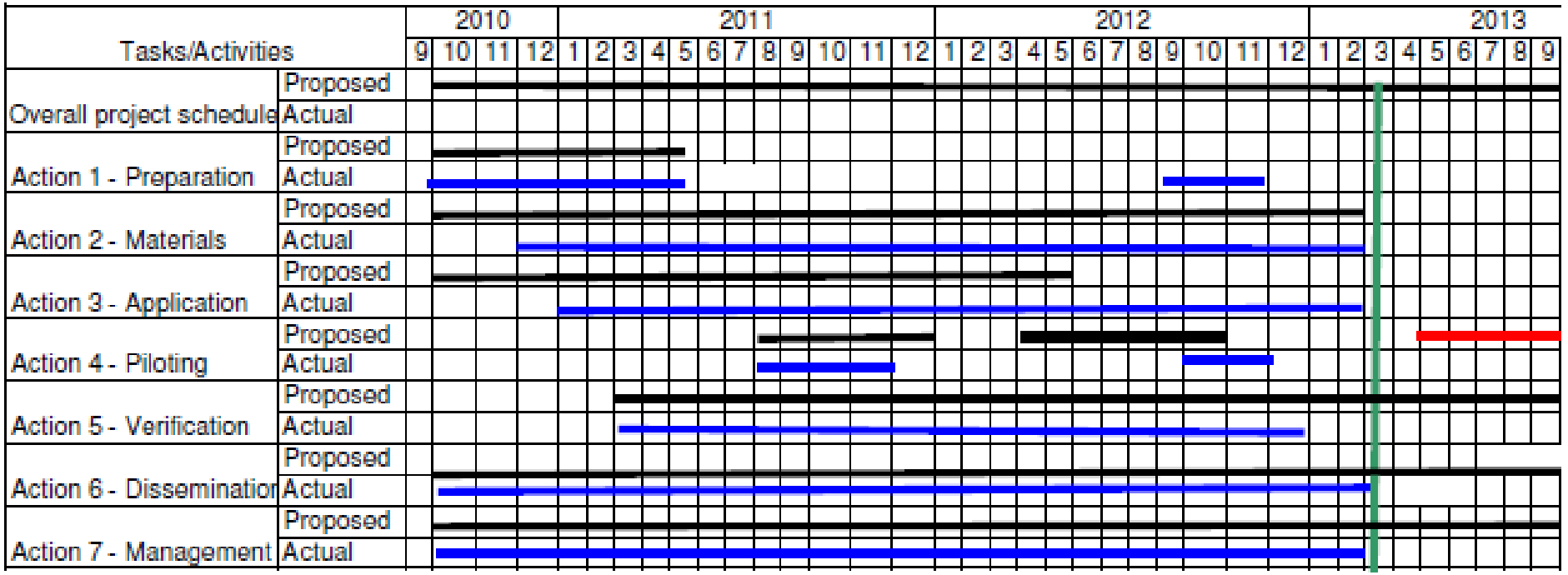
Inception Report	15.12.2010	**Completed**
		Inception report contains the material and progress of period from September 2010 up to March 2011. Progress report nr 1 was submitted on 15.09.2011 instead of Progress report nr 2.
Inception Report with Carbon Footprint report Nr 1 and Monitoring Report Nr 1	15.03.2011	**Completed**
Progress Report 2 and Monitoring Report Nr 2	15.03.2012	**Completed**
Midterm Report with payment request with Carbon Footprint report Nr 2 and Monitoring Report Nr 3	15.09.2012	**Completed**
Progress Report Nr 3 and Monitoring Report Nr 5	15.03.2013	**Like planned**
Milestones		
SG meeting (1); kick-off meeting	3.09.2010	**Completed**
Start to create the methodology for Carbon Footprint data gathering, calculations and benchmarking	15.09.2010	**Completed**
Start to compile Inception Report	15.11.2010	**Completed**
Start to compile Progress Report and Monitoring Report Nr 1	15.01.2011	*Deadline for the Inception report was changed to 15.03.2011 and therefore progress report was cancelled for the same date.*
SG meeting (2)	1.03.2011	**Completed**
Start to compile Progress Report Nr 1, Carbon Footprint report Nr 1 and Monitoring Report Nr 1	15.07.2011	**Completed**
SG meeting (3)	01.09.2011	**Not completed,** but there have been taken place several meetings between SG members
Start to compile Progress Report Nr 2 and	15.01.2012	

Monitoring Report Nr 2		**Completed**
SG meeting (4)	01.03.2012	**Not completed,** but there have been taken place several meetings between SG members
Start to compile Midterm Report with payment request, Carbon Footprint report Nr 2 and Monitoring Report Nr 3	15.06.2012	**Completed**
SG meeting (5)	01.09.2012	Took place at 11 of September 2012 (Mid-Term report, Annex 6.9)
Start to compile Progress Report Nr 3 and Monitoring Report Nr 5	15.01.2013	**Like planned**
SG meeting (6)	01.03.2013	**Like planned**

4.2 Envisaged progress until next report.

A Gantt chart which illustrates OSAMAT project progress since 1.09.2010 until 28.02.2013 and planned actions from 1.09.2010 up to 15.09.2013 is given below.

Piloting at Simuna-Vaiatu pilot site (red line) is planned to be started in May 2013.



4.3 Impact

During autumn 2011 an issue was raised concerning a need for waste licence for OSAMAT project piloting activities. Environmental Board had an opinion that this licence is needed when OSA is used in construction activities. We made a thorough explanation, that OSA is material according to REACH regulation. For example Estonian cement production industry is using OSA as material and not as waste in production process and this is accepted by environmental authorities.
As a result of productive discussions with the Environmental Board, they have issued a letter stating that waste license is not needed when OSA is used as certified material in construction works.
There are important environmental aspects to promote the use of OSA for stabilisation. Estonia like most certainly many other countries of Europe has to import high volumes of expensive and high-quality aggregates for the infrastructure projects. An efficient additive like OSA gives a low-cost alternative for the societies: Instead of the conventional use of high amounts of high-quality natural aggregates the projects can be implemented by combining stabilisation techniques and the use of existing lower-quality and on-site soil materials. Using OSA for infrastructure development is environmentally beneficial due to reduced atmospheric emissions and improved protection of landscape, natural gravel and rock resources, and groundwater sources.

4.4 Outside LIFE:

We have initiated in parallel other OSA-related projects.

For example studies in Klaipeda, Kokkola and Jätkasaari harbours were finalised in autumn 2011 and the results showed that OSA can be used successfully for stabilisation works. Study reports will be available in the OSAMAT project website.

The additional studies made for OSA usage outside OSAMAT will act as supportive examples for current LIFE projects innovativeness and helps to show more clearly the benefits of OSA usage as a construction material.

5 Financial part

5.1 Costs incurred.

Budget breakdown categories	Total cost in €	Costs incurred from the start date to 28.02.2013 in €	% of total costs
1. Personnel	609 655	302 459	49,6
2. Travel and subsistence	20500	6 246	30,5
3. External assistance	832 132	440 151	52,9
4. Durable goods			
Infrastructure	0		
Equipment	0		
Prototype	0		
5. Land purchase / long-term lease			
6. Consumables	641 993	354 235	55,2
7. Other Costs	123 000	35 259	28,7
8. Overheads	152 000	44 780	29,5
TOTAL	**2 379 280**	**1 183 129**	49,7

Financial break-down by Actions (including overhead costs):

Action number and name	Foreseen costs	Spent so far	Remaining	Projected final cost
Action 1 "PREPARATIONS"	37950	37 950	0,0	37 950
Action 2 "MATERIALS"	112 650	105 681	6 969,4	112 650
Action 3 "APPLICATIONS"	99 975	86 775	13 199,8	99 975
Action 4 "PILOTING"	1 519 205	674 297	844 907,5	1 519 205
Action 5 "VERIFICATION"	170 300	83 085	87 215,1	170 300
Action 6 "DISSEMINATION"	132 400	54 649	77 751,0	132 400
Action 7 "MANAGEMENT"	154 800	95 912	58 887,8	15 4800
Overheads	152 000	44 780	107 220,4	152 000
TOTAL	**2 379 280**	**1 183 129**	**1 196 151,0**	**2 379 280**

5.2 Auditor Data

Independent auditor data are the following:

Name:	KPMG Baltics OÜ
Address:	Narva mnt. 5 Tallinn 10117 Estonia
Contact person:	Idrek Alliksaar
Contacts:	phone +372 6 268 700, fax +372 6 268 777, www.kpmg.ee

6 Annexes

6.1 Technical&Pilot report including description of applications at Narva-Mustajõe site

6.2 Environmental Survey, February 2013

6.3 Copy of Eesti Energia AS and Eesti Energia Narva Elektrijaamad AS Partnership Agreement

6.4 Copy of supplementary agreement between Eesti Energia AS and Nordecon AS

6.5 Abstract to International Baltic Roads Conference in Lithuania 2013

6.6 Abstract to Oil shale Symposium 2013

6.7 Materials actions report, November 2012