Work Plan

Work Package #1 (leader RTU): Project management, Coordination and Communication

Partner	Responsibility / Task	Expected outcome
RTU	1.1. Overall project **coordination and management**. Monitoring activities - ensuring that partners are timely following their responsibilities and verification of effective use of the received funding	2. Project kick-off meeting during ARIES annual meeting in Riga – May 2018 3. Quarterly coordination meetings via Vidyo platform 4. Mid-term review meeting during 2nd ARIES annual meeting in 2019 5. Project closing meeting in 2020
RTU	1.2. Coordination and Communication with relevant **stakeholders**	1. Relevant stakeholders (e.g. shipping companies, Class Societies, engine manufacturers, European Commission, EMSA, IMA, Interatnko; "Scrubbers" Group; Bimco) are directly informed about the project and its results – at least during or following the above mentioned meetings
RTU + all	1.3. Final project report	1. At the end of the project final report is compiled and made available to the relevant stakeholders

Work Package #2 (leader RTU): Integration of the e-beam accelerator into the marine diesel engine exhaust flow system - in the simulated ship environment

Partner	Responsibility / Task	Expected outcome
RKB	2.1. To provide with marine diesel **engine** (in-kind contribution)	1. Functioning marine diesel engine is made available at the Riga Ship yard (e.g. on dry-dock or shore facilities). 2. Adequate marine fuel (e.g. heavy fuel) is provided.
ebeam	2.2. To provide with electron **accelerator** (in-kind contribution)	1. Appropriate accelerator and all supporting systems are made available and are delivered to the Riga Ship yard
RTU INCT FEP ebeam RKB CERN Remon-towa UH	2.3. **Mechanical and electrical design** as well as technical integration of the **process vessel** with an accelerator provided 2.4. Design of the exhaust gas **cooling elements** based on the operational conditions 2.5. Design and integration of the control and **monitoring devices**	1. Design and drawings of the process vessel is provided to RTU and RKB based on the inputs received form the Partners 2. Design of the exhaust gas cooling elements is provided to RTU and RKB based on the inputs received form the Partners 3. Design and integration of the control and monitoring devices is provided to RTU and RKB based on the inputs received form the Partners
INCT FEP ebeam CERN UH	2.6. Different materials resistant for corrosion used for **accelerator windows** and **air curtain** for protection accelerator window to be studied	1. The most appropriate material and design is identified for accelerator windows and air curtain
RTU RKB Remon-towa INCT FEP CERN UH	2.7. **Production and manufacturing** of the process vessel, along with integration, supporting and control elements	1. All components are manufactured and assembled on the engine 2. Accelerator is installed on the process vessel 3. Accelerator windows and curtains are installed 4. Electrical and control elements are installed
INCT RTU UH	2.8. **Installation** of the flue gas measuring devices	1. Measuring devices are provided and installed on the prototype
All	2.9. **Assembly and testing** of all the components	1. Prototype is made ready for the tests

Work Package #3 (leader INCT): Investigation of flue gas flow pattern and process parameter influencing on the removal efficiency of NOx and SO2 using computer simulation

Partner	Responsibility / Task	Expected outcome
INCT	3.1. CFD (computer fluid dynamics) computer simulation will be used to model the **gas flow dynamic** inside the process vessel.	1. Process parameters, experimental - such as gas temperature, flow rate, droplet size, L/G ratio of droplet; based on modeling - process vessel dimension influence on removal efficiency of SO2 and NOx are investigated using MATLAB and KINETIC. 2. Relevant reports are provided in the form of the scientific papers
UH FEP	3.2. Dosimetry – analysis of the electron penetration and distribution in the process vessel by using Mote-Carlo simulations	1. Relevant analysis is made available and reports are provided in the form of the scientific papers 2. The system on ship operational safety conditions are evaluated.

Work Package #4 (leader INCT): Experimental measurements

Partner	Responsibility / Task	Expected outcome
INCT RTU FEP UH CERN	4.1. Experimental measurements and data recording regarding continuous testing of integrated system with the diesel real off gases flow	1. Output parameters like: temperature, flow velocity and gas mixing, window conditions etc are measured and data are recorded
INCT RTU	3.3. Analysis of the experimental results	1. Relevant analysis is made available and along with the conclusions are provided for the final project report

Work Package #5 (leader BIOPOLINEX): Economic analysis

Partner	Responsibility / Task	Expected outcome
BIOPOLINEX	5.1. To conduct a comprehensive business / economic / financial analysis from the point of view of the end user of the technology / installation	1. Relevant analysis and report is made available to the Consortium
BIOPOLINEX	5.2. To conduct a business / economic / financial analysis from the point of view of the plant manufacturer	1. Relevant analysis and report is made available to the Consortium
BIOPOLINEX	5.3. To assess the investment profitability based on discounted cash flows, NPV, IRR ratio as well as the payback period. 5.4. To calculate the break-even point for key financial parameters and to conduct the sensitivity analysis.	1. Relevant analysis and report is made available to the Consortium