

C5 WP5: Creating Impact

(JV, all JRP-Partners, REG(RUB), REG(TUBS))

Start month: Jun 2014, end month: May 2017

The aim of this work package is to maximise the JRP's impact by concentrating on effective cooperation with industry and the dissemination of the results from WP1-WP4. This will be done by jointly working with key LNG industrial stakeholders and the collaboration with international standardisation committees and industrial user groups. Efforts will also be made to make the JRP results publically available by organising workshops and conferences and publishing results the on JRP website.

C5.a Description of Work

Task 5.1 Knowledge Transfer (JV, all JRP-Partners, REG(RUB), REG(TUBS))

(Start Jun 2014, end May 2017)

The aim of this task is to establish a flow of information from the JRP to the stakeholder community and vice versa. The following dissemination activities will be undertaken to maximise the impact of the results obtained within this JRP.

Description of activities:

Advisory Group

An Advisory Group will be established to link stakeholder representatives from various relevant backgrounds to this JRP. Advice given by the Advisory Group will be discussed in and with the JRP-Consortium members and appropriate steps will be taken accordingly. Furthermore, the Advisory Group will help identify additional dissemination opportunities, such as conferences, business and science fairs, user groups, etc.

The Advisory Group will be formed within one month after the start of the JRP. The Advisory Group will consist initially of the members from the Advisory Group for the preceding JRP, ENG03 LNG, which currently consists of key representatives of the LNG industry (producers, shippers, import terminal operators, energy companies), and instrument manufacturers. However, further members will be added to the Group during the lifetime of the JRP. Advisory Group meetings will be organised at the kick-off and at the yearly JRP meetings. When needed, ad-hoc (live or virtual) Advisory Group meetings will also be organised. The role of the Advisory Group is to keep the JRP focused on industrial needs, to give advice on overcoming challenges and help inform industry about the JRP results.

The following companies are currently members of the Advisory Group for ENG03 LNG: Krohne altometer, Krohne Ltd., Cameron Caldon, Gasunie, Rasgas, Shell, Kongsberg Maritime, National Grid Grain, Petronas, Enagas, E.ON, Honeywell, Tokyo Gas, Korean Gas Company, Gate terminal, Mustang sampling, Cameron Jiskoot, Scientific Instruments, Endress+Hauser, Elster Instromet, Emerson Daniel, GdF Suez, GE.

Representatives of the relevant ISO and CEN committees will be invited to join the Advisory Group.

JRP website

JV will set up a project website, based on the existing website for JRP ENG03 LNG. The website will be used to broadcast relevant news items as well as upcoming JRP events and will be updated at least every six months. External parties will be able to register their interest on the website. A section of the website will be available to JRP-Partners and used to facilitate the communication and distribution of documents, including project planning and reports, within the JRP-Consortium. The Advisory Group may also use the website for internal discussions and to organise their meetings.

JRP workshops:

During the JRP the JRP-Consortium will organise 3 workshops to be held in Denmark, UK, and the Netherlands. The stakeholder committee and key stakeholders for the LNG industry will be invited to attend these workshops. JRP meetings will also be organised in conjunction with these workshops.

The duration of the workshops will be 1-2 days and will include presentations, training and discussion groups. The workshops will be widely advertised, in advance through the existing networks of the JRP-Partners and Advisory Group and on the JRP website. Presentations and outcomes from the JRP

workshops will be made available on the JRP website. The target number of participants for each workshop is 50-100.

Workshop	Responsible JRP-Partner	Where & When
First workshop for JRP ENG60 LNG II	FORCE	Denmark, May 2015
Second workshop for JRP ENG60 LNG II	NPL	UK, May 2016
Final workshop for JRP ENG60 LNG II	VSL	Netherlands, May 2017

Conferences:

The results from the technical work packages will be disseminated by presentations at conferences. At least 15 conferences with presentation will be given by the JRP-Consortium as outlined below:

Target Conference	WP & Task	Responsible JRP-Partner	Where & When
German thermodynamics conference (Thermodynamik-Kolloquium)	WP4, Task 4.1	REG(RUB)	Stuttgart, 2014
Small scale LNG conference	WP1, Task 1.1-1.3	VSL	The Netherlands, 2014
21. Ulm-Freiburger Kalorimetrietage	WP4, Task 4.4	PTB	Braunschweig-Germany, March 2015
Nineteenth Symposium on Thermophysical Properties	WP4, Task 4.1-4.2	REG(RUB)	Boulder (CO)-USA, June 2015
Thermodynamik-Kolloquium	WP4, Task 4.1-4.2	REG(RUB)	Germany, October, 2015
Gastech	WP1, Task 1.1-1.3	VSL	2015
SAE congress	WP3, Task 3.1-3.4	REG(TUBS)	Detroit-USA, April 2015 or 2016
Gastech	WP1	SP	2015 or 2016
Gas 2016	WP2, Task 2.1	VSL	2015 or 2016
LNG18	WP1, Task 1.1-1.3 WP2, Task 2.1	VSL	Perth-Australia, April 2016
LNG18 (or nforma)	WP1	SP	Perth-Australia, April 2016
National Danish flow metrology work shop	WP1, Task 1.1-1.3	FORCE	Copenhagen-Denmark, Autumn 2016
FLOMEKO	WP1, Task 1.1-1.3	FORCE	2016
Gas 2017	WP2, Task 2.3	NPL	2017, the Netherlands
FLOMEKO or ISSFM	WP1, Task 1.1-1.4	CMI	2016

Publications:

During the course of the JRP, JRP-Partners will submit at least 11 publications to peer-reviewed scientific journals, the target journals and papers are outlined below:

Target Journal	WP, Task	Lead JRP-Partner
Flow Measurement and Instrumentation	WP1, Task 1.1-1.4	CMI

EMRP

Flow Measurement and Instrumentation	WP1, Task 1.2	VSL
Metrologia	WP1, Task 1.3	VSL
Analytical Chemistry	WP2, Task 2.1	VSL
Analytical Chemistry	WP2, Task 2.3	NPL
MTZ	WP3, Task 3.3	REG(TUBS)
Fuel	WP3, Task 3.4	PTB
Journal of Chemical and Engineering Data	WP4, Task 4.1-4.2	REG(RUB)
Journal of Chemical and Engineering Data	WP4, Task 4.1	REG(RUB)
Fuel	WP4, Task 4.3	INRIM
Journal of Thermal Analysis and Calorimetry	WP4, Task 4.4	PTB

Standardisation and technical committees:

The JRP results will be disseminated through representation and direct involvement with standardisation and technical committees. JRP-Partners are involved in a number of relevant standardisation bodies, which are listed in the table below.

Name of organisation, working groups	WP & Task	JRP-Partner(s)	When
ISO/TC28 SC2 and SC5	WP1, Task 1.5	VSL, JV, CESAME	2014 – 2017
OIML/TC8/SC3 and SC6	WP1, Task 1.2 – 1.3	VSL, JV	2014 – 2017
CEN/TC282	WP2, Task 2.1 & 2.3	VSL, NPL	2015 – 2016
ISO/TC28/SC2 and SC5	WP2, Task 2.1 & 2.3	VSL, NPL	2015 – 2016
CEN/TC234 WG11	WP3, Task 3.5	VSL, NPL, PTB	2014 – 2016
ISO/TC to be decided	WP3, Task 3.5	VSL, NPL, PTB	2014 – 2016
ISO/TC193/SC1/WG 13	WP4, Task 4.2	REG(RUB), VSL	2016 – 2017
ISO/TC28/SC5	WP4, Task 4.2	REG(RUB), VSL	2016 – 2017
ISO/TC193/WG18	WP4, Task 4.4	PTB	2015 – 2017
GIIGNL Technical Standing Group	WP1, WP2 and WP4	VSL, JV, FORCE, NPL, PTB, REG(RUB)	2014 – 2017
GERG Programme Committee LNG	WP1, WP2 and WP4	VSL, JV, FORCE, NPL, PTB, REG(RUB)	2014 – 2017

This should lead to input to the following standards & guidelines:

- ISO 6578 Refrigerated hydrocarbon liquids – Static measurement – Calculation procedure
- ISO 20765 Natural gas – Calculation of thermodynamic properties
- ISO 6976 Natural gas – Calculation of calorific values, density, relative density and Wobbe index from composition
- ISO 10976 Refrigerated light hydrocarbon fluids – Measurement of cargoes on board marine LNG carriers
- ISO 8943 Refrigerated light hydrocarbon fluids – Sampling of liquefied natural gas – Continuous and intermittent methods
- EN 12838 Installation and equipment for LNG – Suitability of LNG Sampling System

- OIML R81 Dynamic measuring devices and systems for cryogenic liquids
- OIML R117 Dynamic measuring systems for liquids other than water
- GIIGNL Custody Transfer Handbook

Draft standards and New Work Item Proposal

A draft ISO standard will be produced for 'LNG flow metering systems' (based on the results of WP1) and a new work item proposal (NWIP) will be produced for 'Methane number (MN) calculations' (based on the results of WP3). Both will be disseminated to relevant standardisation bodies, working groups and technical committees.

- The scope of the draft ISO standard for LNG flow metering will be defined with key stakeholders, including the JRP Advisory Group. VSL with JV will write a proposal to create a new ISO working group and obtain support from at least 5 national normalisation institutes (D5.1.9). The proposal will include letters of support and will be sent to the ISO organisation. Following this a first draft and subsequent drafts of an ISO standard for LNG flow metering will be written by JV with input from VSL and Shell (D5.1.10). The draft standard will fall under the responsibility of ISO/TC28.

The scope of the ISO standard for LNG flow metering should include the following:

- LNG dynamic knowledge – Part 1: General requirements for large and small/mid-scale systems
- LNG dynamic measurement – Parts on specific volumetric flow measurement techniques (such as Coriolis and ultrasonic)
- LNG flow measurement – calculation procedure (compared to ISO 6578)
- VSL with input from NPL, PTB, REG(TUBS) and Shell will develop a new work item proposal (D5.1.11) for MN calculations and submit this to a relevant ISO committee for further consideration to be developed as a technical report. VSL with input from NPL, PTB, REG(TUBS) and Shell will draft a technical report (D5.1.12). The technical report will include (a reference to) the method for determining experimentally the MN and a calculation for determining the MN from the LNG composition data, together with a calculation of the associated measurement uncertainty from Task 3.4. Any existing work to introduce the MWM method into a European standard will be taken into account.

Task 5.2 Training (VSL, JV, NPL, PTB, REG(RUB), REG(TUBS))

(Start Nov 2015, end May 2017)

The aim of this task is to provide targeted training to the stakeholder community and JRP-Consortium.

Description of activities:

Training Courses:

- VSL, JV, NPL and PTB, with input from REG(RUB) will jointly develop and organise a one-day training courses for the day preceding the second and final JRP workshops. The training course(s) will be targeted at instrumentation & measurement engineers, process engineers and other persons dealing with LNG measurement processes. The training will cover the basics of metrology, traceability and the LNG custody transfer measurements methods as part of the JRP. The structure of the course will consist of short lectures followed by discussions of a number of cases dealing with the JRP output and the impact on the LNG custody transfer process. The training will be set-up to maximise interaction with trainees in order to try and provide practical field experience. The target number of participants for the training courses is 10-15.
- REG(TUBS) will organise a training course on the determination of the Methane Number from WP3, for industrial stakeholders. The target number of participants is 10-15.

Secondments:

Short technical visits between JRP-Participants will be organised for training and knowledge transfer between JRP-Partners. Secondments and research stays for early-stage researchers will also be offered at VSL and NPL and optionally at other JRP-Partners.

Task 5.3 Exploitation (JV, all JRP-Partners, REG(RUB), REG(TUBS))

(Start Jun 2014, end May 2017)

The knowledge generated in the JRP will consist of: open knowledge that any interested party can have access to and benefit from and which will be disseminated freely; and specific knowledge developed by JRP-Participants.

Description of activities:

The IP outputs of the JRP will be available to JRP-Partners, and will be agreed as part of the JRP Consortium Agreement. The potential for commercialisation of the JRP results will be carefully investigated and an exploitation plan will be produced by the JRP-Consortium following the JRP kick-off meeting. The exploitation plan will be updated, as necessary, during the lifetime of the JRP and discussed at JRP meetings.

C5.b Labour Resources for WP5

	1- VSL	2- CESAME	3- CMI	4- FORCE	5- INRIM	6- JV	7- NPL	8- PTB	9- SP	10- Shell	11- REG(RUB)	12- REG(TUBS)	TOTAL
WP5	3.5	0.5	0.5	0.5	0.5	1.0	1.7	0.5	0.5	0.5	0.5	0.5	10.7

C5.c Summary of Deliverables for WP5

Deliverable number	Deliverable description	Participants (Lead in bold)	Deliverable type	Delivery date	Dependent on
5.1.1	JRP Advisory Group established and yearly meetings organised	VSL , all JRP-Partners	Meetings	Jun 2014, May 2015, May 2016, May 2017	
5.1.2	Project website created and updated at least every 6 months	JV , all JRP-Partners	Website	Aug 2014, Feb 2015, Aug 2015, Feb 2016, Aug 2016, Feb 2017, May 2017	
5.1.3	1-day JRP Workshop organised by FORCE (target at least 50 attendants)	FORCE , all JRP-Partners,	Workshop	May 2015	
5.1.4	1-day JRP Workshop organised by NPL (target at least 50 attendants)	NPL , all JRP-Partners	Workshop	May 2016	
5.1.5	2-day JRP Conference organised by VSL (target at least 100 attendants)	VSL , all JRP-Partners	Workshop	May 2017	

5.1.6	At least 15 conference presentations by JRP-Consortium members	JV , all JRP-Partners	Presentations	Nov 2015 May 2017	
5.1.7	Submission of a least 11 scientific publications in peer-reviewed journals	JV , all JRP-Partners	Papers	Nov 2015 May 2017	
5.1.8	Input to at least 12 technical and/or standardisation committees	JV , all JRP-Partners	Meetings	May 2017	
5.1.9	Proposal to create a new ISO working group with letters of support from at least five national normalisation institutes sent to the ISO organisation	VSL , JV	Document	Nov 2014	
5.1.10	First draft and subsequent drafts of the new ISO standard on LNG flow meters	JV , VSL, Shell	Document	Nov 2015, May 2016, Nov 2016, May 2017	
5.1.11 (REG(TUBS) D13)	NWIP for MN calculations submitted to a relevant ISO committee	VSL , NPL, PTB, REG(TUBS), Shell	Document	May 2016	
5.1.12 (REG(TUBS) D14)	ISO technical report drafted for MN calculations	VSL , NPL, REG(TUBS), PTB, Shell	Document	May 2016	
5.2.1	Two, 1-day training courses organised on the basics of metrology, traceability and the LNG custody transfer measurements methods as part of the JRP	VSL , JV, NPL, PTB	Training	May 2016, May 2017	
5.2.2 (JRP(TUBS) D15)	Training course on the determination of the Methane Number	REG(TUBS)	Training	May 2016	
5.3.1	Exploitation plan for ENG60	JV , all JRP-Partners	Exploitation plan	Nov 2014	

C6 WP6: JRP Management and Coordination

(VSL, all JRP-Partners, REG(RUB), REG(TUBS))

Start month: Jun 2014, end month: May 2017

The aim of this work package is to manage the joint research project in an effective and efficient manner. The following management levels will be involved:

- **Task leaders** are responsible for delivering the Task and to manage the budget, quality and planning of the deliverables within their Task and for coordinating the efforts of the JRP-Partners in the Task.
- **WP leaders** are responsible for coordinating the Tasks within their work package, to monitor and report the overall work package progress to the JRP-Coordinator.
- The **JRP-Coordinator** is responsible for coordinating the knowledge progress of all work packages, to manage the interdependencies between work packages and Tasks, to respond to questions from JRP-Partners, preparing technical progress and financial reports to the EMRP-MSU, representing the JRP-Consortium and managing the JRP's stakeholders.