



European
Commission



J R C T E C H N I C A L R E P O R T S

Findings from the 2010 and 2011 LPIS QA records produced by the MS in the frame of Comm. Reg. No 1122/2009 art. 6.2

Status after the second year of implementation

Wim DEVOS, Agnieszka TARKO, Pavel MILENOV, Romuald FRANIELCZYK

2013

Report EUR 25935 EN

European Commission
Joint Research Centre
Institute for Environment and Sustainability

Contact information

Wim Devos

Address: Joint Research Centre, Via Enrico Fermi 2749, TP 266, 21027 Ispra (VA), Italy

E-mail: wim.devos@ec.europa.eu

Tel.: +39 0332 78 5895

Fax: +39 0332 78 9029

<http://mars.jrc.ec.europa.eu/>

<http://www.jrc.ec.europa.eu/>

This publication is a Reference Report by the Joint Research Centre of the European Commission.

Legal Notice

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

Europe Direct is a service to help you find answers to your questions about the European Union

Freephone number (*): 00 800 6 7 8 9 10 11

(*): Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet.

It can be accessed through the Europa server <http://europa.eu/>.

JRC80784

EUR 25935 EN

ISBN 978-92-79-29473-0

ISSN 1831-9424

doi: 10.2788/883

Luxembourg: Publications Office of the European Union, 2013

© European Union, 2013

Reproduction is authorised provided the source is acknowledged.

Contents

1.	Introduction	4
2.	LPIS QA portal for interaction MS vs EC	5
3.	Screening of the 2010 assessment	7
4.	Screening of the 2011 assessment	9
4.1.	The 2011 screening process	9
4.2.	Reference imagery	10
4.3.	The 2011 screening methodology	13
4.4.	2011 screening activities	14
4.5.	Format screening results	15
4.6.	Content screening results	17
4.7.	Severity of screening issues and impact on the overall quality assessment	19
4.8.	General observations	20
5.	Assessment of declared LPIS quality levels	21
5.1.	Methodology	21
5.2.	Implementation	21
5.3.	Further observations	22
6.	LPIS reports and remedial action plans	23
6.1.	Assessment reports	23
6.2.	Remedial action plans	23
7.	Trends and developments 2010-2011	25
7.1.	ETS methodology	25
7.2.	Quality Management	25
8.	Future outlooks	26
9.	Overall Conclusion	27

1. Introduction

- 1.1.1. In December 2010, the proposal to process the collected LPIS QA inspection records offered two activities (JRC IPSC/G03/P/WDE/wde D(2010)(12454)):
- A methodological screening to investigate the presence of methodological issues;
 - A assessment of declared quality levels to formally confirm or reject the validity of the conclusion of the assessment report.
- 1.1.2. The former options were applied for both the 2010 and 2011 records of all MS (Member States) that had uploaded the required data through the ETS (Executable Test Suite) reporting package. As for a first implementation by the MS, it was not realistic to expect a perfect application of the methodology; the focus was oriented towards training on and an elaborate remediation of the methodological flaws in the assessment by that MS. For 2011, the focus shifted towards factual observations on the inspection records. The actual screening methodology and reporting was slightly different for 2010 and 2011.
- 1.1.3. The latter assessment of declared quality levels was developed and applied in direct response to a decision of one MS to reduce its rate of OTSC controls, based on the declared quality of its LPIS. Assessment of declared quality leveling was applied to both 2010 and 2011 data for this MS, taking into account the difference in quality measures and thresholds applicable for either year.
- 1.1.4. This document provides the findings on both activities and the methodological lessons learnt. The reader should not be tempted to draw conclusion on the performance of individual Member States, apart regarding those few MS who have not delivered records (e.g. Austria) and therefore forfeited the JRC's offer for support and feedback.

2. LPIS QA portal for interaction MS vs EC

2.1.1. The LPIS QA (Land Parcel Identification System Quality Assessment) portal fulfils two critical roles in the LPIS QA setup:

- By creating the sample based on the full population of reference parcels and the imagery zones (CwRS and Aerial) planned for the inspection year, it allows the use of very small sample in combination with operational monitoring activities;
- By accepting the complete inspection files (ETS-reporting package) it enables screening and assessment of declared quality levels activities.

2.1.2. The portal is online 24/7, and its interface depends on the user account:

- Member States manage their own account. The interface provides an electronic dashboard that indicates the status of each file in the particular upload package. When an individual file is uploaded, its format and content can be optionally checked by an online validator. After upload, the MS has to "validate" the package, which triggers checks on completeness, format and content. Validated packages are closed, if issues are detected, automated messages are sent with instruction for corrective actions. In exceptional cases, bilateral communication is started;
- The JRC interface is built around the technical analysis of the closed packages in support of the screening and the assessment of declared LPIS quality levels;
- A DGAgri interface focuses on the status and result of uploads for the sample-pre-selection and ETS-reporting - an online indication of potential issues.

2.1.3. A successful sample pre-selection process is concluded with an e-mail that informs the MS of the key parameters of the campaign (lot size, upload results, CwRS zones) and a location of the inspection list. On the DGAgri interface (Figure 1) these parameters are analysed to yield one of three indicative categories:

- All OK (green/++): the data is consistent;
- Late processing (cyan/+): the process was completed after August 15th, offering ample time to update the reference parcels under the LPIS QA zones using the reference imagery and OTSC inspections. The LPIS assessment for that year is invalid in cases where the quality of this LPIS update, rather than the status, was inspected;
- Attention needed - incomplete (yellow/+): the population size does not match the uploaded number of parcels. This can indicate either an inaccuracy of the scope definition or a failure of the MS to deliver the population. The latter is a tell-tale sign of foul play in combination with late completion.

2.1.4. The ETS reporting package upload can also be monitored via the DGAgri Interface (Figure 1). The colour codes are related to the status (opened, in progress, closed) of the package.

Start date approval date	Nominal population size	Nr of uploaded parcels	Sample pre-select size	Nr of QA zones	
30.07.2012 02.08.2012	1756848	1756848	1250		++
28.06.2012 28.06.2012	455726	455726	800		++
08.05.2012 11.05.2012	65845	11313	500		+
20.03.2012	475162				-
22.01.2013 13.02.2013	287756	287755	800		+
17.09.2012 17.09.2012	540483	9235	1250	2	+
13.07.2012 13.07.2012	83741	83741	500		++
07.11.2012 14.11.2012	2747067	2747067	1250	4	+
30.10.2012 14.11.2012	1756447	1756447	1250	1	+
29.06.2012 03.07.2012	609000	609000	1250	2	++
16.07.2012 16.07.2012	152140	152140	800	3	++
28.06.2012 28.06.2012	681244	681244	1250	2	++
19.06.2012 19.06.2012	441807	441807	800		++
02.08.2012 03.08.2012	1599953	1599953	1250	2	++
19.09.2012 21.09.2012	571431	571431	1250	1	+
14.11.2012 15.11.2012	67099	67099	500		+
28.06.2012 28.06.2012	90988	90988	500		++
08.10.2012 08.10.2012	76734	76734	500	3	+

Upload start date	Upload approval date
09.03.2012	
09.03.2012	14.12.2012
09.03.2012	14.12.2012
09.03.2012	14.09.2012
09.03.2012	04.01.2013
09.03.2012	24.04.2012
09.03.2012	27.04.2012
09.03.2012	03.07.2012
09.03.2012	27.04.2012
09.03.2012	27.04.2012
09.03.2012	09.05.2012
09.03.2012	27.04.2012
09.03.2012	27.04.2012
09.03.2012	26.04.2012
09.03.2012	21.05.2012
09.03.2012	30.04.2012
09.03.2012	30.11.2012
09.03.2012	27.04.2012
09.03.2012	13.11.2012
09.03.2012	03.05.2012
09.03.2012	16.04.2012
09.03.2012	02.05.2012
09.03.2012	27.04.2012
09.03.2012	22.03.2012
09.03.2012	
09.03.2012	14.12.2012

Figure 1. Extracts of the DGAgri interface on the LPIS QA portal. Left: sample pre-selection status view (year 2012), note some very late and incomplete submissions at lines 5 and 6. Right: ETS-reporting status (year 2011), note two missing approvals - these entries could not be screened.

2.1.5. In September 2012, JRC started the development a geodatabase engine inside the LPIS QA portal enabling more sophisticated procedures for data validation, such as multi-annual integrity checks and spatial analysis.

3. Screening of the 2010 assessment

- 3.1.1. The first screening of the ETS packages took place in 2011, but obviously related to the ETS 2010 reporting packages. This chapter summarizes the findings of the report published in January 2012 (<ftp://mars.jrc.ec.europa.eu/LPIS/Documents/LBNA25205ENN.pdf>)
- 3.1.2. The fast screening of the 2010 ETS-packages had two main objectives:
1. Evaluate the inspection methodology and feedback issues and examples into a general revision of the ETS and its documentation;
 2. Identify issues with the application of the inspection methodology for every individual LPIS custodian to enable them to take remediating actions for consecutive inspections.
- 3.1.3. The fast screening activity is not designed to validate the 2010 scores nor to validate the analysis report produced by the individual LPIS custodians. JRC made no attempt to link this screening to the 2010 QE scores. Furthermore, the fast screening of the inspection records did not deliberately seek to inventory particular LPIS problems in a specific LPIS implementation.
- 3.1.4. The number of inspected parcels actually screened varied from 20 to 125 inspected parcels. In general, the larger number of inspected parcels tended to relate to packages that presented little or no systematic issues, pushing the screening to continue until issues were discovered. The lower numbers evidence obvious and frequent issues. However, time constraints caused that the screening performed on the ETS 2010-packages that were approved late were always limited to 20 parcels, regardless the findings, so the number alone could no longer be seen indicative.

The most common ETS inspection errors 2010-2011 identified during the screening of 37 (out of 45) available ETS packages were:

- topological errors in the data base;
- unduly inspected or skipped parcels;
- incorrect clear/unclear boundary determination;
- inappropriate processing of parcels with unclear boundary;
- poor land cover mapping;
- wrong counting eligible of area;
- landscape features scoping (LF not assigned to the reference parcel);
- landscape features mapping;
- landscape feature area derivation;
- non-agricultural land cover determination/counting;
- potential critical defect detection;
- area-based conformance assignment;
- contamination based conformance assignment;

- non-conforming parcel analysis.

For 11 lots, at least one issue was found on every screened parcel.

3.1.5. A rough conclusion on the degree of "inspection correctness" on ETS 2010 inspection is provided by the distribution of the occurrence of errors by lot:

N° OF LOTS SIGNIFICANTLY AFFECTED BY 4 ERRORS:	5
N° OF LOTS SIGNIFICANTLY AFFECTED BY 1 – 3 ERROR(S):	20
N° OF LOTS NOT AFFECTED BY THE SIGNIFICANT ERROR:	12

3.1.6. The feedback from the screening of ETS 2010 packages triggered fruitful bilateral discussions with the Member States on certain conceptual aspects of LPIS Quality Assessment and future update issues. It identified potential ideas in relation to the technical support for CAP post-2013 such as use of the land cover concept, quality assessment of reference orthoimagery and INSPIRE compliant data exchange.

4. Screening of the 2011 assessment

4.1. The 2011 screening process

- 4.1.1. JRC did not implement milestone restrictions on the operations of the LPIS QA portal; all functionality remained operational even after the deadlines for upload expired. Still, the enforcement of these deadlines is an essential and critical condition to guarantee the integrity of the LPIS quality assessment as well as the reliability and comparability of any results. The status of the MS operations is available online for EC officials through the same portal used for the MS to upload data (<https://lpis.jrc.ec.europa.eu/lq>). It provides details on both the sample pre-selection and ETS reporting package upload progress.
- 4.1.2. Time diversification of the sample pre-selection status (SPStat 2011) approval is presented in **Error! Reference source not found.** A. The SPStat 2011 has been approved on time, without any issues for only 4 lots; 29 lots have approved SPStat correctly but with delay; 10 lots merit attention (i.e. the nominal LPIS population size and number of the number of uploaded parcels does not match).
- 4.1.3. Time diversification of the approval of the ETS 2011 reporting package is presented in **Error! Reference source not found.** B. For ETS 2011, 40 lots (out of 43) have been approved. For 2 lots, package elements are present but the package either has not been approved by the LPIS contact or it has been re-opened due to the technical reasons and nor approved at 29/01/2013. One lot has no package defined. Screening is only possible on complete and approved packages.
- 4.1.4. Approval of a package triggers the portal to perform an automatic format and content validation of uploaded files. Invalidated packages are reopened for upload and in 2011, more than half of packages have been approved by the LPIS user in one go, without this necessity to re-open the package. This evidences that most MS have mastered the GML formats required. The "approval" status for ETS 2011 records shows Table 2.

A) Sample pre-selection status 2011 approval date			B) ETS 2011 records approval date			
	month	No of lots		month	No of lots	
2011	July	4	2012	March	2	
	August	10		April	18	
	September	16		May	5	
	October	3		June	0	
	November	4		July	1	
	December	4		August	0	
	2012	January		1	September	4
		February		0	October	2
March		1		November	2	
	sum	43		December	6	
				package opened or re-opened (status at 29/01/2013)		3
				sum		43

Table 1. Approval dates of A) Sample pre-selection status 2011 and B) ETS 2011 records.

ETS 2011 records status	
	number of packages
approved once (without re-opening)	25
re-opened (once or more times) and approved	15
re-opened (once or more times) and not approved	1
not approved, package element(s) present	1
not approved, no package element present	1
sum	43

Table 2. ETS 2011 records status.

4.2. Reference imagery

4.2.1. To guarantee an equal environment for the inspection and its screening, for the ETS 2011, two new XML files have been introduced to in the ETS package "last minute". These are:

- Orthoimagery set
(http://marswiki.jrc.ec.europa.eu/wikicap/index.php/LPISQA2012_3.b#OrthoimagerySet.xsd)
- Orthoimagery URL
(http://marswiki.jrc.ec.europa.eu/wikicap/index.php/LPISQA2012_3.b#OrthoimageryUrl.xsd).

These files hold metadata on the reference imagery used for the ETS inspection and define the image delivery. Probably caused by late introduction of the two files, 12 lots (out of 40) had one (or both) of the newly introduces XML files invalid.

4.2.2. By default, all VHR orthoimagery produced from CwRS and LPIS QA images provided by the Commission Services (JRC) should have been delivered to CID (Community Image Data portal, <http://cidportal.jrc.ec.europa.eu/imagearchive/main/>). CID makes that imagery available inside the JRC, but their general purpose WMS service can cause image quality degradation. Therefore, MS have been encouraged to also provide original quality WMS access for the screening operator, guaranteeing equal environments for inspection and screening. Unfortunately, in 2011 only 2 MS has used this opportunity. 27 LPIS custodians used only CwRS imagery and uploaded the orthoimagery on the CID portal.

4.2.3. 11 custodians used aerial imagery (6 of which, German Laender, used aerial exclusively). Aerial imagery was delivered to JRC either via FTP to the LPIS portal or by shipping a HDD.

4.2.4. For the screening of the ETS 2011, JRC optionally consulted two independent ancillary image sources for which licenses have been obtained. These added contextual information (phenology) and a temporal dimension in support of the photointerpretation activities of the screening performer:

- **Bing Maps** (<http://www.bing.com/maps>) aerial imagery results from a single dedicated Microsoft project that flew most of mainland EU during 2010. Its source display is implemented as a base layer in more and more software (ProGIS, ArcGIS and recently also in open-source Quantum GIS software).
- **AeroGRID** (<http://www2.aerogrid.net/wmsService>) is a partnership of aerial survey companies to offer a pan-European compilation of aerial imagery from the different national projects. Imagery access has been provided for: Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Luxembourg, Sweden and United Kingdom. It operates only as a WMS under license.

4.2.5. For this 2011 assessment, BING Maps offers quality advantages over AeroGRID as it offers (mostly) more recent and at Western European level more homogeneous imagery. By contrast, AeroGRID expands more to the East, provides a farther look into the past and is more homogenous within a given Member State. As AeroGRID is expected to update the imagery it serves, the current state of comparison is quite ephemeral.

4.2.6. The usability of both Bing and AeroGRID imagery seems to be complementary and equally (when available) consulted during the screening. In all cases it heavily depends on the availability of metadata, esp. date of capture which both services do not provide by default. Figure 2 and Figure 3 provide some comparisons of the content offered by both.

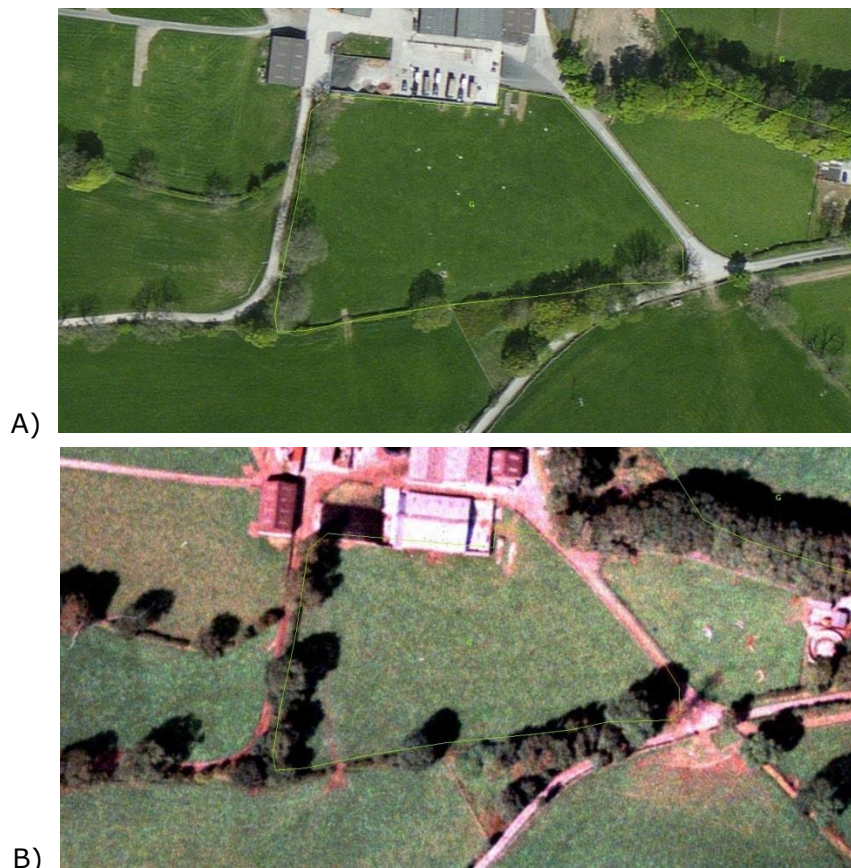


Figure 2. Orthoimage quality visual comparison: A) Bing Maps and B) AeroGRID. Bing offers superior quality.



Figure 3. Orthoimage quality visual comparison: A) AeroGRID and B) Bing Maps. Aerogrid offers superior quality.

- 4.2.7. For the majority of the lots, optional data these ancillary data were therefore available for consultation during the screening of the ETS 2011. The screening operator would by default try to access both ancillary data to get familiarised with the conditions of the screened parcel. It became obvious that the more additional sources, the more complete LUI analysis and screening can be performed (Figure 4) and the better inspection. Unfortunately, for some lots, compatibility problems with the spatial reference system prevented the practical use of the ancillary data. Despite this use of ancillary data, all delineation screening checks related to the features visible on the dedicated reference image.
- 4.2.8. The usefulness of such access to “external imagery” clearly exceeds the scope of the screening: any LPIS custodian has a clear benefit to acquire access to all imagery available for his territory. The possible extra cost for a sporadic access to a service easily outweighs the cost of a field visit or the consequences of an irregular application picked up during the OTSC. All public imagery should be accessible to the LPIS custodian under the INSPIRE directive and we trust that the commercial image providers develop appropriate technical services at reasonable prices to make the use of their services also widespread.

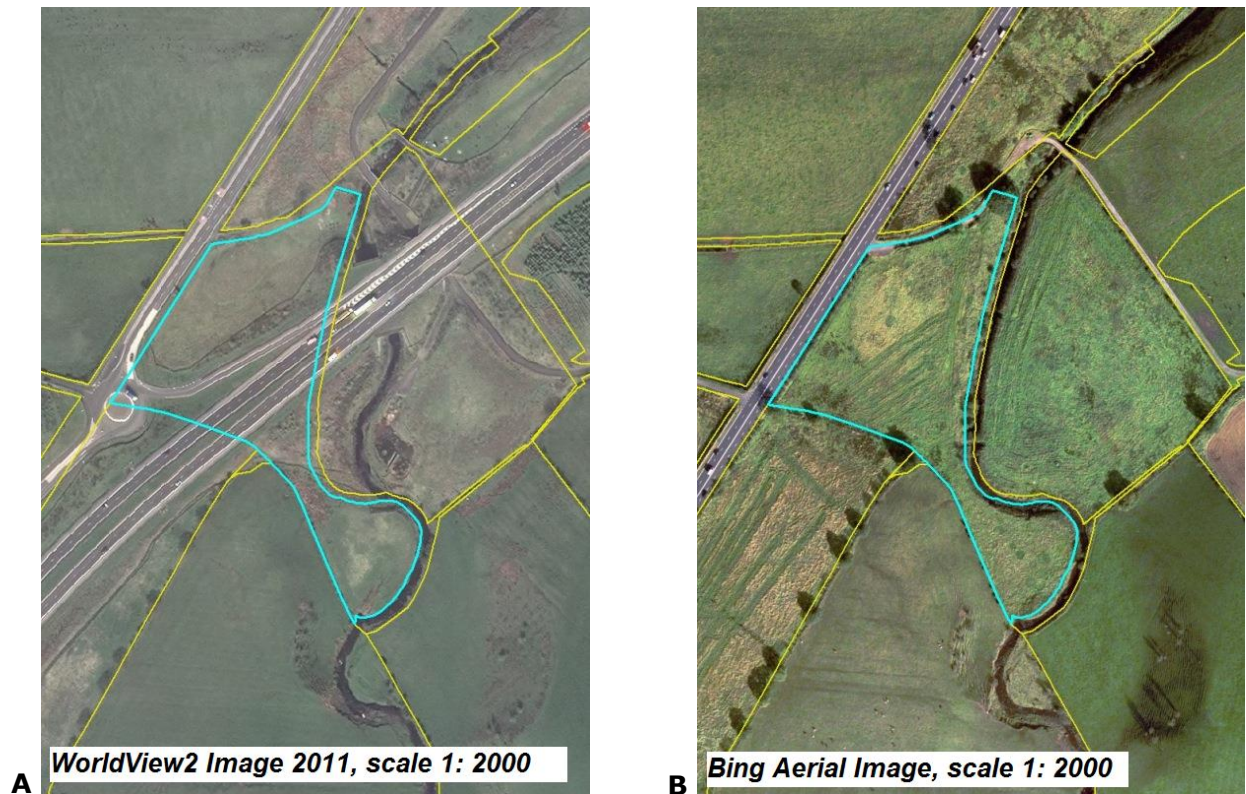


Figure 4. Tracking changes and understanding the LPIS LUI design: A) satellite imagery acquired in 2011 revealing new road construction and B) Bing aerial image, acquired before 2011, representing and explaining the original LPIS LUI design.

4.3. The 2011 screening methodology

4.3.1. During 2011, the JRC validation tool was operated manually on the elements of the ETS package. The validation became automatic for all uploaded data to the portal, starting from September 2012. During the screening, 12 ETS packages have been found invalid (out of 40 packages).

4.3.2. The status file (LPIS sample pre-selection status XML) holds the overview of the inspection process itself. A semi-automatic check performed on this one package element of ETS 2011 revealed number of issues; it was considered not realistic (too time consuming) to check this file manually. The check revealed that 11 lots were correct. 5 lots had some minor issues requiring attention, 9 lots had some parts not in line with the guidance and 15 lots suffered from major issues. The main issues were:

- the sum of ordinal numbers in sample pre-selection status file did not match the sum of natural numbers sequence from 1...n, where n=number of imported RP: i.e. a parcel disappeared (3 lots);
- differences in RPIDs identified in the original sample pre-selection provided by the JRC and sample pre-selection status file delivered in the ETS-report package (7 lots);
- the number of RP in the sample pre-selection of the uploaded ETS-package does not match the number of the original sample pre-selection, i.e. the remainder of the pre-selection that was not inspected or skipped was removed (27 lots). JRC does not consider this high number problematic as it is likely caused by earlier ambiguity in the WikiCAP technical instruction, before proper clarification was included;

- the total of skipped plus inspected parcels does not match the number of parcels with "QCS = true" (34 lots). Also this high number is likely caused by earlier ambiguity in the WikiCAP technical instruction before proper clarification was included.

These results evidence that the business logic behind this status file is not always understood. It has to be addressed in future to prevent that the integrity of inspection process could be jeopardized.

4.3.3. The possibility that similar issues would appear for the other files of the ETS package urged for an automatic screening performance done on the package elements before their final acceptance. Development of a complete ETS package content validation has started.

4.3.4. The format check of the screened ETS 2011 packages consisted of:

- a manual check (automated from 09/2012 on) of files validity. This check has been performed with the JRC validator tool;
- a manual check if the file's headers are up-to-date: correctness of followed XSD schema;
- a manual check of the values calculations in the EtsObservations XML;
- a manual check of the presence of all "skipped" parcels in the LpisPolygonState GML file;
- a manual check of the "referenceArea" units in the LpisPolygonZeroState GML files.

4.3.5. The content check was performed during the screening activities, covering:

- parcels flagged as "skipped" (also verifying, where possible, reason for skipping);
- 10 randomly selected inspected parcels (eligible land delineation and presence and correctness of attributes in the EtsObservations XML);

4.4. 2011 screening activities

4.4.1. The screening of the 2011 ETS packages has been performed from August till December 2012. In total 40 packages have been screened and 40 separate "Notes from the screening of the ETS 2011 package" were sent to the individual LPIS MS.

4.4.2. Whereas the reporting on the 2010 ETS package was structured by literally following the inspection methodology, the 2011 screening report focused directly on the inspection results:

- a technical statement on every ETS reporting package element;
- a technical statement on the inspection results of 10 random screened parcels of the inspected set.

4.4.3. The Rapid Field Visit records were not subject to screening. Indeed, this RFV concept has been upgraded to Boundary inspection and Field observation for the 2012 ETS v5.2.

4.4.4. The template of the "Notes from the screening of the ETS 2011 package" is on Figure 5:

Notes from the screening of the ETS 2011 package			
ETS 2011			
LPIS:	XX		
	Package element	Comment	Details
1	EtsInspectionMeasurements	no specific comments	
2	EtsObservations	no specific comments	
3	EtsScoreboard	no specific comments	
4	LpisPolygonZeroState	no specific comments	
5	LpisSamplePreselectionStatus	no specific comments	
6	OrthoimagerySet	no specific comments	
7	OrthoimageryUrl	no specific comments	
Randomly selected, screened parcels:			
	Rp_ID	Comment	Details
1	123456	no specific comments	
2	123456	no specific comments	
3	123456	no specific comments	
4	123456	no specific comments	
5	123456	no specific comments	
6	123456	no specific comments	
7	123456	no specific comments	
8	123456	no specific comments	
9	123456	no specific comments	
10	123456	no specific comments	
comments:			
no specific comments			
attention to some details			
some parts not in line with			
major issues			

Figure 5. The template of the “Notes from the screening of the ETS 2011 package” performed in 2012.

4.5. Format screening results

4.5.1. Issues detected during the ETS 2011 screening with the package elements (for 40 lots):

Major issues (red background):

- GML/XML following the old (invalid for the ETS 2011) schema;
- lack of geometry in the EtsInspectionMeasurements (occurred for 1 lot);
- inconsistency in the naming of the parcels (different Rp_ID in different files);
- not all skipped parcels are present in the Lpis Polygon Zero State file;
- erroneously assigned critical defects: all types set to “true” for all inspected parcels (occurred for 1 lot).

Some parts not in line with the guidance (orange background):

- lack of indication of skipping reason for the parcels in LPIS sample pre-selection status;
- erroneous filling of "commentF1" in LPIS sample pre-election status;
- lack of 100m buffer in the LPIS polygon zero state GML (occurred for 2 lots);
- erroneous calculations (RP_CNF) in Ets observations XML;
- not-checked parcels ("belongsToQC_Sample>false") missing in the LPIS sample pre-selection status file.
- skipped parcels flagged as "belongsToQC_Sample>false" ("true" expected) in LPIS sample Pre-selection status file.

The last two issues can be result of lack of clarity in the technical guidelines. Relevant notification has been done in the WikiCAP website.

Attention to some details required (yellow background):

- CRS issue with the GML vectors (for 1 lot);
- spatial data not delivered in national projection (Ets inspection measurements and LPIS polygon zero state, occurred for 1 lot);
- presence of huge parcels, not always representing the agriculture land in the Lpis polygon zero state GML (occurred for 1 lot);
- "referenceArea" unit is not in hectares in the Lpis polygon zero state GML;
- "Landscape Features" incorporated in the "AgricultureLandCoverFeature" in the Ets inspection measurements GML (occurred for 1 lot);
- GML/XML header not in line with the guidance (occurred for 2 lots);
- issue with the display of the parcels having "holes" inside in the Ets inspection measurements XML (occurred for 1 lot);
- attribute values (RP_CNF) are in wrong format in Ets observations XML;

4.5.2. The summary of screening of the ETS 2011 package content for 40 lots is presented in Table 3 below. A format check of the packages indicates that the majority of files is not affected by any technical issue or is affected by less significant, minor issues only (~30% of files). However, the critical Lpis sample pre-selection status XML is the file with the highest number of major issues detected (15 files). This can partly be attributed to the introduction of semi-automatic, systematic check of this XML. Files "Orthoimagery set" and "Orthoimagery url" results should be treated with caution as they were introduced very late in the process.

No of lots (out of 40 screened)	Package element					
	<i>Ets Inspection Measurements</i>	<i>Ets Observations</i>	<i>Lpis Polygon Zero State</i>	<i>Lpis Sample Pre-selection Status</i>	<i>Orthoimagery Set</i>	<i>Orthoimagery Url</i>
no specific comments	34	25	6	11	24	37
attention to some details required	4	6	20	5	11	1
some parts not in line with the guidance	0	7	7	9	5	1
major issues	2	2	7	15	0	1
sum	40	40	40	40	40	40

Table 3. Summary of ETS 2011 package content screening (for 40 lots).

4.5.3. The files contained minor or major inconsistencies: regarding the acquisition dates mismatch (between CID portal and file itself), declaring WMS service and not supplying the details (URL, password, layer name). A further clarification on the newly introduced files has been added to the WikiCAP guidelines.

4.6. Content screening results

4.6.1. The summary of screening of the ETS 2011 randomly selected parcels (10 parcels for 38 lots) is presented in Table 4 below. Parcel's screening shows that half of screened parcels have been inspected properly; no specific comments had to be indicated. Every 5th parcel revealed major issue during the screening.

Issues detected during the ETS 2011 screening on these randomly selected, screened parcels (10 inspected parcels for 38 lots):

Major issues (red background):

- "copy-pasting" of the parcel shape;
- parcel inspection omitted (not inspected at all).

Some parts not in line with the guidance (orange background):

- measured area attribute is not relevant with the polygon area of inspected parcel;
- issues with contamination (not indicated or indicated erroneously);

- issues with critical defect indication (not indicated or indicated erroneously);
- issues with waivers (not indicated or indicated erroneously).

Attention to some details required (yellow background):

- decision for the feasibility for inspection issue (some parcels should have been inspected, some parcels should have been flagged as non-feasible);
- erroneous steps taken after the decision of measurement non-feasibility;
- parcels representing Landscape Features only;
- delineation not precise enough;
- mismatch between land cover attribute in Ets Inspection Measurement and Ets Observation files and Eligibility Profile.

Two screened lots (out of 40) had no screening of randomly selected parcels due to CRS problems with the GML vectors and lack of geometry in the Ets Inspection Measurements GML.

No of screened parcels (for 10 randomly screened for 38 lots)				
no specific comments	attention to some details required	some parts not in line with the guidance	major issues	
191	66	41	82	380
50.26	17.37	10.79	21.58	%

Table 4. Summary of ETS 2011 randomly selected parcels screening (10 random, inspected parcels per lot, for 38 lots).

4.6.2. The ETS 2011 screening revealed that (Table 5 below):

- 1 lot had all screened parcels reported as with “no specific comment” and for 12 lots, this was the case for 8 or 9 of the 10 screened parcels. 20 lots had no screened parcel affected by a major issue.
- at the other side of the scale for 8 lots (out of 38) all 10 randomly selected parcels for the screening had some minor or major issue. For 2 lots all 10 screened parcels revealed major issues (in ETS 2010 screening this has been noted for 11 lots).

		Number of lots with screened parcels with:			
		no specific comments	attention to some details required	some parts not in line with the guidance	major issues
No of screened parcels	0	8	16	25	20
	1-2	4	12	8	9
	3-5	6	7	3	2
	6-7	7	1	0	1
	8-9	12	2	1	4
	10	1	0	1	2
	sum	38	38	38	38

Table 5. Number of lots with specific number of screened parcels (in intervals) having assigned issue severity level.

4.7. Severity of screening issues and impact on the overall quality assessment

4.7.1. The severity of a methodological issue described in the screening report is based on their potential impact or risk not on the immediate effect of the observation of that screened parcel in particular:

- Inconsistencies with the sample pre-selection status might be caused by an innocent processing error but also by a deliberate manipulation of the sample;
- A copy-paste might provide a good representation of the LUI, but it does not constitute an independent measurement (Figure 6). Even when it matches the LUI, it still invalidates the statistical processing behind the LPIS QA acceptance thresholds;
- Inappropriate skipping is an obvious way to bias the results (Figure 7).



Figure 6. Two examples of clipping: left - clipped "observation boundary" matches the LUI, right - clipped "observation vector" ignores the road in the south, the resulting observation is manifestly incorrect but enters the data processing.

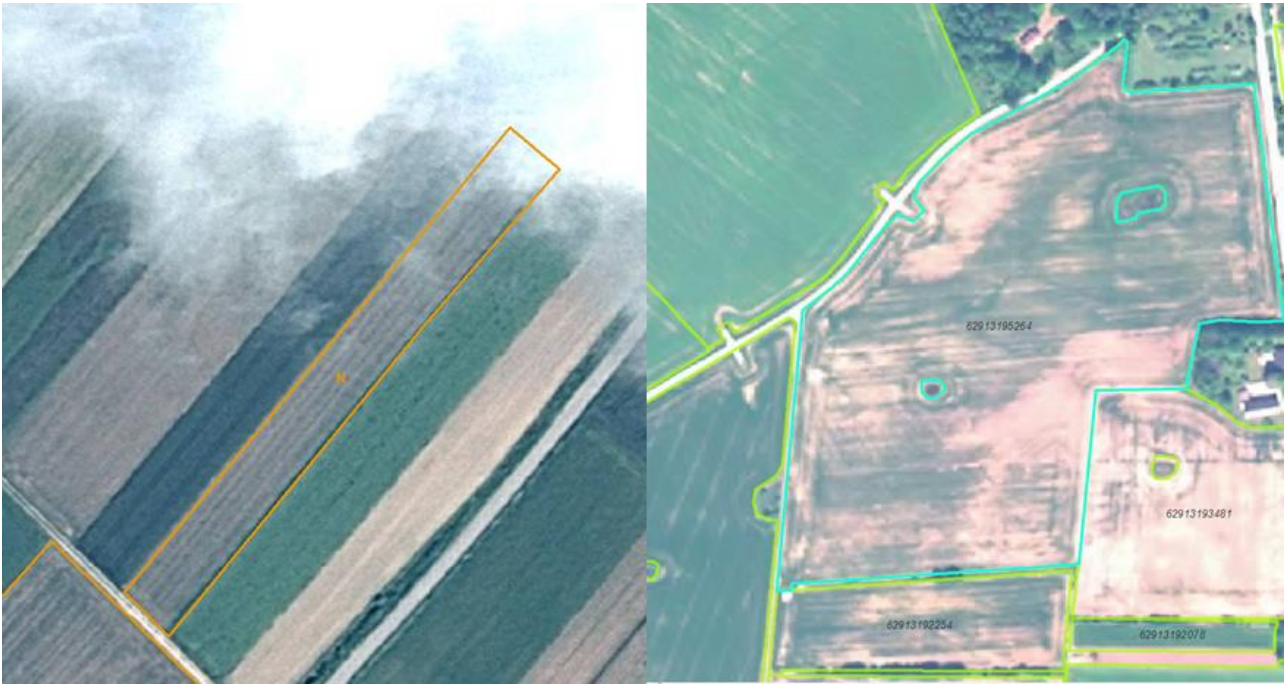


Figure 7. Two examples of incorrect skipping: left - clipped "observation boundary" on an invisible LUI, the result is taken into the assessment as correct although no inspection was ever made, right - clipped parcel although all boundaries are visible and delineable, a complex parcel was thus removed from the inspection to be replaced by results from an easier parcel.

4.7.2. It is the JRC's opinion that to ensure comparability of the results and equality in treatment between the Member States, not a single major methodological issue should ever be detected during this screening. The previous paragraph illustrates there is no point to continue discussing the severity on a case by case basis; it is about totally eliminating a well document risk. If, after two years of screening feedback to the Member States, these issues remain recurrent, it should be interpreted as an act of poor faith.

4.8. General observations

4.8.1. The overall technical quality, consistency and understanding of the ETS seem to be rising:

- Issues detected during the ETS 2011 screening with the package elements and with the randomly selected, screened parcels are less frequent, e.g. the missing 100m buffer in Lpis Polygon Zero State occurred only twice in ETS 2011 while it had been observed for 7 lots in 2010.
- land cover mapping is more generally applied: the number of lots that held > 70% "copy-pasted" parcels nearly halved from 9 in 2010 to 5 in 2011.

4.8.2. Currently manual screening is focusing mainly at the implementation of technical aspects and guidelines in the ETS packages by individual LPIS custodians. This lot by lot approach limits the potential for analytic processing and comparison at a pan-European scale. Automatic ETS screening will prevent more of the inconsistencies and ensure that only technically correct packages can be approved. This would enable an "operator-aided-screening" where "problematic" inspection records will be automatically picked-up and checked in order to clarify methodology and eventually correct if necessary.

5. Assessment of declared LPIS quality levels

5.1. Methodology

5.1.1. To validate alleged conformity statements reported by a Member State, JRC developed a methodology based on "ISO 2859-4: Sampling procedures for inspection by attributes — Part 4: Procedures for assessment of declared quality levels." This involves an independent, formal, systematic inspection of an independent sample from the LPIS concerned. This limiting quality ratio (LQR) sampling scheme operates on a 10% probability of accepting undue "conforming reports" with actual quality levels LQR times worse than the declared quality level (DQL). The risk of contradicting truthful "conforming reports" is smaller than 5%.

5.1.2. A completely independent sample of the LPIS is currently not available without asking the MS access to the full population of reference parcels. However the LPISPolygonZeroState.gml holds much more parcels on top of the sample inspected by the MS and these were found appropriate for this purpose. To index the ISO 2859-4 scheme, the declared quality levels were set to the conformance thresholds set for each quality element in the corresponding ETS version (i.e. not the respective scores). The pre-scribed sample to be independently inspected on LQR level III is:

- (QE4): 125 RPs to be inspected DQL = 1% with $n_{acc} = 3$ for and LQR = 5.27;
- (QE2-QE3): 20 RPs to be measured for DQL = 6.5% (the next higher tabulated value for DQL is taken, as no value is available for 5%) with $n_{acc} = 3$ and LQR = 4.68;
- (QE1): number to be determined via ISO3951-1, level 1, σ (dependent on LPIS size);
- (QE5-QE6-QE7): not considered due to lack of supporting IACS data.

5.1.3. Ancillary data such as Google maps and Bing were used in support of the photointerpretation and to make an "educated guess" on the causes of non-conformities. Working assumptions were made and checked to counter the remaining constraints on the required independent inspection.

5.2. Implementation

5.2.1. This assessment of declared LPIS quality levels was then performed on the ETS reporting packages of both 2010 and 2011 of one selected Member State. Unfortunately, the Member State's claim that its LPIS had "sufficient quality" by being conforming to the LPIS QA criteria had to be dismissed for both years.

5.2.2. Although the exercise could be completed, the methodology application was to some extent hampered by:

- For this particular LPIS: an incomplete ETS reporting package with missing "GIS_PARCEL_LAND_COVER" and degraded VHR data;
- In general, unavailability of field observations and inaccessibility to LPIS data such as "date of RP validity" and to supporting information.

5.3. Further observations

- 5.3.1. The exercise also showed that, despite the ETS version differences, the score for quality elements based on visual check and consultation with ancillary data was comparable for the both years. This suggests that the ETS methodology -or at least its stable observation component based on a land cover inventory - is robust enough to provide reliable results and not prone to minor variations in the methodology itself.
- 5.3.2. The assessment of declared LPIS quality levels offered interesting insights regarding the LPIS design involved and on how it interacts with the ETS methodology. The experience shows that one can easily dismiss any claims that ETS disfavours this particular design in comparison to other designs.
- 5.3.3. Availability of an accurate and complete ATS report is essential for the correct conduction of any ETS (be it the original by the Member State or JRC's assessment of declared quality levels). The assessment of declared LPIS quality levels would benefit from the data available in the ETS log file, currently not reported. The quality of the reference data is, as it is for the OTSC, critical for the LPIS QA too.
- 5.3.4. The independent assessment of declared LPIS quality levels requires good infrastructure and relative to its size a lot of time for preparation, esp. on image preparation, data handling, and CRS and coordinate transformation issues. Providing a WMS by the MS would greatly facilitate these assessments of declared quality levels.

6. LPIS reports and remedial action plans

As documented several times above, the JRC screening was not targeted at validating scores and results of the 2011 LPIS quality assessment. The following tables and observation therefor relate to the content of the reports delivered by the Member States “as is”.

6.1. Assessment reports

6.1.1. A provisional analysis of the reports’ content was presented during the LPIS workshop in Malta in June 2012.

6.1.2. The number of methodological reservations mentioned in the assessment reports dramatically decreased on all accounts (Table 6). However, it seems 6 LPIS inspection did not fully comprehend the consequence of the upgrade from ETS v4.3 (2010) to ETS v5.1 (2011).

issue	2010 (31 reports)	2011 (40 reports)
scoping (general or specific)	11	6
land cover versus eligibility	2	0
understanding causal processes	7	1
applying acceptance number A _c	21 ?	12 ?
mitigate observed issues	7	5
using ETS v5.1	not applicable	6

Table 6. Number of Methodological reservations apparent in the assessment reports, status June 2012.

6.1.3. The ration of MS that considered themselves conforming on all applicable quality criteria increased from nearly 1/3 in 2010 (actually 9/31) to half in 2011 (20/40). 4 Member States explicitly reported improvement from 2010 to 2011 and only 3 Member States request a revision of the quality thresholds where 10 did so in 2010.

6.1.4. The JRC’s first, albeit subjective, opinion of the usefulness of the report as a self-assessment tool raised from 2/3 in 2010 to 3/4 in 2012. Reports where the JRC did not find evidence of mitigation or denial or that showed that the LPIS indeed acquired insights from this exercise were considered useful.

6.2. Remedial action plans

6.2.1. The content of the remedial action plans evidenced a leap forward in the self-assessment results of the LPIS QA (Table 7). Whereas the 2010 remedies strictly addressed to the “symptoms” discovered during the LPIS QA such as correcting non-conformities and strengthening existing procedures, 2011 saw the emergence of 5 new types of actions. These new actions were systemic remedies, targeting improvements of the system as a whole.

remedial action	2010 (31 reports)	2011 (40 reports)
"do nothing"	4	15
correct the found non-conformities	2	7
apply database changes	14	14
improve farmer's input	8	4
improve OTSC feedback	6	4
start-strengthen intergov collaboration	6	10
start-strengthen periodic refresh	17	15
continue "acute update"	10	5
<i>do at least 2 of the last 5 above</i>	<i>20</i>	<i>19</i>
set up quality system	-	6
improve documentation & training	-	9
strengthen IT processes	-	4
strengthen organization	-	5
substitute VHR with aerial	-	1

Table 7. Number of Methodological reservations apparent in the assessment reports, status June 2012.

- 6.2.2. The larger number of LPIS custodians that do not launch specific action is an obvious consequence of the larger number of systems that pass the 2011 criteria.
- 6.2.3. Nearly 1 out of 4 systems realised that they had to improve documentation and strengthen their internal processes. These are clear evidences that they are enacting on an explicit or implicit quality policy. The emergence of such internal quality policies is the very closing stone for the LPIS QA as a self-assessment tool. They guarantee that the methodology of annual inspections and analysis of the results lead to internal management decisions to address the weaknesses found.

7. Trends and developments 2010-2011

7.1. ETS methodology

- 7.1.1. The number of lots available for screening has increased from 37 in 2010 37 to 40 in 2011. Reporting packages for only 3 lots were not delivered. Two of these were no delivered in 2010 either and so had no formal nor informal feedback on their inspection.
- 7.1.2. The overall technical quality, consistency and understanding of the ETS seem to be rising as illustrated by the reduction of the some bad practices and the increasing number of correctly inspected parcels in the delivered packages.
- 7.1.3. JRC provided the Member States feedback on the 2011 packages on a factual basis, implying a thorough understanding by both parties of the inspection workflow. Bilateral follow-up further proved that the awareness of the assessment methodology is rising: questions referred more to the details of the methodology rather than to the general concepts as earlier. Some comments prove MS to be attentive readers of the WikiCAP able to spot inconsistencies in the technical guidelines.

7.2. Quality Management

- 7.2.1. After a trial year and two years of screening feedback, the self-assessment objective of the LPIS QA can be considered operational. Most Member States implement both symptomatic and systemic actions to address their weaknesses and strengthen their operation. On this objective, LPIS QA seems to have nearly reached maturity.
- 7.2.2. On the second LPIS QA objective, to provide an objective and comparable view of the status of LPIS quality over Europe, 2011 has seen little progress apart from the improvements of the LPIS QA portal. These facilities to monitor progress and so prevent biases in the results offered by the LPIS QA portal were not implemented in an operational and pro-active manner.
- 7.2.3. Similarly, little or no progress was made regarding the motivation and review of the thresholds' based on fitness for purpose. Such analysis was requested by the peer review panel by the end 2011 and should differentiate quality expectations according to different purposes or decision processes.

8. Future outlooks

- 8.1.1. Progress on the LPIS QA and its validators should facilitate even stronger data harmonisation and some embryonic, automatic screening of the uploaded data.
- 8.1.2. Some improvements and errata corrections of ETS v5.2 can be expected for the 2013 assessment. In absence of the detailed analysis of fitness for purpose of the LPIS quality requirements, no major revisions should be expected.
- 8.1.3. The CAP 2014 reform will introduce several payment schemes to replace the single payment and single area payment scheme. One of these replacements, the basic payment, seems so similar that it will probably require very minor changes to the ETS methodology. Others, such as the green payment, are still very fuzzy regarding implementation requirements, but will probably require an additional eligibility profile as well as separate processing of ETS observations. It remains to be seen whether the ETS land cover observations process itself will need modification. In any case an update of the LPIS core model (LCM) and its derived ATS will be unavoidable.

9. Overall Conclusion

9.1.1. During 2012, LPIS QA involvement of the JRC continued, mainly focussing on

- The upload and screening of the 2011 LPIS QA inspection records;
- The provisions of the 2012 LPIS QA inspection samples.

9.1.2. Technical analysis of these processes and data showed the methodology is understood by a majority of Member States and progress is being made in the application thereof. A number of Member States have come full circle by installing internal quality systems. The near future will bring further automation by the on-going technical developments of the LPIS QA portal and error correction of the methodology.

9.1.3. In the middle term, developments will depend on the requirements of the 2014 CAP reform and the operational involvement of DGAgri in the annual LPIS QA cycle.

European Commission

EUR 25935– Joint Research Centre – Institute for Environment and sustainability

Title: Main Title of the Report: Findings from the 2010 and 2011 LPIS QA records produced by the MS in the frame of Comm. Reg. No 1122/2009 art. 6.2

Author(s): Wim DEVOS, Agnieszka TARKO, Pavel MILENOV, Romuald FRANIELCZYK

Luxembourg: Publications Office of the European Union

2013 – 29 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (online)

ISBN 978-92-79-29473-0

doi: 10.2788/883

Abstract

This document reports on the JRC activities on and developments of the LPIS quality assurance (QA) framework during 2012. It coincided with the implementation of the first LPIS quality assessment by the Member States for the 2011 reporting year.

This second year of implementation witnessed the refinement of the screening methodology and the development of a assessment of declared quality levels procedure, both supported by further automation of the LPIS QA portal.

Two years of LPIS QA implementation was sufficient for a number of Member States to capitalize on the self-assessment possibilities of the framework and lead to the inauguration of some true national quality policies that cover many aspect of the LPIS management.

Further analysis and a fine tuning of the quality control parameters remain necessary if the LPIS QA findings are to be applied on decisions regarding the performance of LPIS in IACS as a whole.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.



ISBN 978-92-79-29473-0



9 789279 294730