

	EUROPEAN COMMISSION RE SEARCH AND INNOVATION DG	Periodic Report
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Project No: 619039

Project Acronym: DESSIN

Project Full Name: Demonstrate Ecosystem Services Enabling Innovation in the Water Sector

Periodic Report

Period covered: from 01/01/2017 to 31/12/2017

Start date of project: 01/01/2014

Project coordinator name:
Dr. David Schwesig

Version: 1

Date of preparation: 08/03/2018

Date of submission (SESAM): 23/03/2018

Project coordinator organisation name:
IWW RHEINISCH-WESTFALISCHES INSTITUT
FÜR WASSER BERATUNGS-UND ENTWICKLUNGSGESELLSCHAFT MBH

Periodic Report

PROJECT PERIODIC REPORT

Grant Agreement number:	619039
Project acronym:	DESSIN
Project title:	Demonstrate Ecosystem Services Enabling Innovation in the Water Sector
Funding Scheme:	FP7-CP
Date of latest version of Annex I against which the assessment will be made:	17/10/2017
Period number:	3rd
Period covered - start date:	01/01/2017
Period covered - end date:	31/12/2017
Name of the scientific representative of the project's coordinator and organisation:	Dr. David Schwesig IWW RHEINISCH-WESTFALISCHES INSTITUT FÜR WASSERBERATUNGS-UND ENTWICKLUNGSGESELLSCHAFT MBH
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Declaration by the scientific representative of the project coordinator (1)

I, Dr. David Schwesig IWW RHEINISCH-WESTFALISCHES INSTITUT FUER WASSER BERATUNGS-UND ENTWICKLUNGSGESELLSCHAFT MBH , as scientific representative of the coordinator of the project DESSIN and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

The project has fully achieved its objectives and technical goals for the period.

The attached periodic report represents an accurate description of the work carried out in this project for this reporting period.

The public website is up to date.

To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.

All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name	Dr. David Schwesig IWW RHEINISCH-WESTFALISCHES INSTITUT FUER WASSER BERATUNGS-UND ENTWICKLUNGSGESELLSCHAFT MBH
Date	23/03/2018

This declaration was visaed electronically byDavid SCHWESIG(ECAS user name nschweda) on 23/03/2018

1. Publishable summary

Summary description of project context and objectives

What is the context and background of DESSIN?

Water scarcity and water quality are important issues in urban areas across Europe and beyond. New technology or management approaches to tackle these issues are needed. Those approaches are more likely to turn into real innovations that are actually implemented and taken up by the market if there is evidence of their benefits or added value in economic, environmental and societal terms. Therefore, a method to prove the value of new solutions is needed in addition to new technology and management approaches.

What are the main objectives of DESSIN?

DESSIN aimed to demonstrate and promote innovative solutions for water scarcity and water quality / the implementation of the Water Framework directive (WFD), and to show the value of those solutions for the water sector and society by also developing and demonstrating a methodology for the valuation of ecosystem services (ESS) as catalyser for innovation. By this twofold approach, DESSIN was able to demonstrate how innovative solutions in the water cycle can increase the value of the services provided by freshwater ecosystems, enabling a more informed selection of the most promising solutions in regards to their impact on the water body and their economic implications.

How do we do it?

Scientists, public and private water management organisations and end-users, technology providers (SMEs), supporting RTD experts and relevant public authorities within DESSIN tested, validated and demonstrated innovative solutions at five demo sites across Europe with special focus on urban areas. The solutions included technological, monitoring, modeling and management approaches for a more resource-efficient and competitive water sector in Europe, such as decentralized water treatment units, real time control of large scale systems, sewer mining and storage of freshwater in aquifers, among others. The demo sites Emscher (Germany) and Hoffselva (Norway) contributed to ecosystem services related to water quality/Water Framework Directive and the demo sites Westland (Netherlands), Athens (Greece) and Llobregat (Spain) to water scarcity.

Additionally, DESSIN developed and applied an Evaluation Framework to assess the sustainability aspects of the mentioned solutions and to value changes in ecosystem services (ESS) of water bodies that result from the implementation of these solutions. The ecosystem services approach is a method that enables a standardised evaluation of impacts and benefits from technology and governance innovations in multiple sectors. One of its main advantages lies in its capacity to integrate the economic, environmental and societal dimensions. That means, the ESS methodology enables a monetary valuation of the impact of water management measures based on the new solutions, which makes a direct comparison of measures possible and generates arguments for market uptake and practical implementation.

Description of work performed and main results

DESSIN has developed an Ecosystem Services Evaluation Framework. The framework consists of the DESSIN Cookbook, the Companion Document, a Supplementary Material File and a Case Reporting Template. A preliminary version of this framework was tested and validated at three mature case studies. After this feedback loop and fine-tuning, we have applied the framework at five DESSIN demonstration sites across Europe, and transformed it into a software product to enable ESS and sustainability assessment of different scenarios, supporting better decision making. DESSIN has also delivered two guidance documents to businesses and water innovators on one hand, and to prac

titioners and policy makers on the other, about governance regimes and financing options conducive to innovation in the water sector.

Technical solutions to tackle water quality and scarcity challenges have been developed, tested and improved, in order to prepare and support the demonstration of these solutions in the demonstration sites. These were A) solutions for local treatment and regulation of Combined Sewer Overflow: a new system with modular cross-flow lamella settling units for application in CSO holding tanks, a high-rate filtration (HRF) system for CSO, and a Real Time Control (RTC) system for reducing overflow volumes. Significant results are: 1) extension of the online monitoring system of the lamella settler plant with online turbidity sensors and automatic samplers with remote control actuator; 2) a removal efficiency of about 50% on average and up to 70% by HRF during the first CSO flush; 3) successful implementation and testing of the RTC system to reduce CSO volume in real time; B) Solutions for tackling water scarcity challenges aimed on distributed reuse technologies with focus on sewer mining technologies and Aquifer Storage and Recovery systems (ASR, in one case combined with Reverse Osmosis RO) as potential sources for drinking water, agricultural or industrial water. Results achieved are: 1) the completion of a system architecture with sewer mining software and hardware components and of the communication solutions for collecting, processing and visualizing data; 2) the identification of formation of fine particles in the aquifer's pores as main threats during the RO treatment; 3) a numerical model to simulate the impact of ASR on groundwater quality and quantity including the interaction between surface and groundwater for the Llobregat demonstration case.

These solutions were demonstrated at five sites across Europe (Emscher, DE; Hoffselsva, NO; West land, NL; Athens, GR; and Llobregat, ES). Their benefits and co-benefits were quantified and assessed by using the DESSIN ESS Evaluation Framework. All demo sites have been transformed into showcases e.g. by production of videos, on-site showboards or a walkable route across the demo site with tangible components and information boards. A wide portfolio of additional dissemination tools, strategies and materials has been developed and produced. To support the DESSIN SMEs on their route to market, DESSIN has developed e.g. a market analysis, two business environment reports, and a cooperation document for route to market support established with the individual SMEs. A series of events has been carried out such as individual workshops with the SMEs to further detail the commercialization of the DESSIN products and to support the SMEs in using the ESS Evaluation concept to identify benefits and co-benefits of their technologies (to use them as additional selling proposition). The final event of DESSIN was organised as a public joint workshop together with the two working groups "Ecosystem Services" and "Green Infrastructure" of the European Water Supply and Sanitation Technology Platform (WssTP) in Brussels on 28 Nov 2017, to discuss how Ecosystem Services, Nature-Based Solutions and Hybrid Grey-Green Infrastructure can contribute to innovation in the water sector and help tackle water-related challenges.

Expected final results and potential impacts

The main final results of DESSIN are:

1. An analytical framework to evaluate and account impacts from changes in ESS suitable to the water sector, finally resulting in a ready-to-use ESS evaluation module for practitioners - validated, demonstrated and transformed into a software module.
2. Guidance for practitioners and policy makers linking good practice and lessons-learned for innovation-friendly governance regimes and financing options, within an ESS framework.
3. Solutions for Water Quality / WFD challenges, implemented and evaluated by use of the ESS approach: (i) enhanced efficiency of decentralised treatment of combined sewer overflow by a new cross-flow lamella settlers and innovative high-rate filters, (ii) a fully automated real-time control

system to minimize combined sewer overflow.

4. Solutions for Water Scarcity, implemented and evaluated by use of the ESS approach: (i) new combination of sewer mining technology with distributed ICT to enable decentralised sewer treatment for irrigation e.g. of urban green; (ii) a solution for sustainable freshwater supply from brackish/saline aquifers by combining Aquifer Storage and Recovery (ASR), desalination and innovative well design; (iii) a flexible ASR system to increase freshwater availability in Mediterranean coastal regions by deep injection systems able to deal with variable water qualities.

5. Maximised market reach of DESSIN solutions by (i) Market analyses for DESSIN technologies; (ii) a sample commercialisation process for DESSIN SMEs; (iii) business environment reports for technologies to tackle water quality and scarcity; (iv) a monitoring & evaluation system for innovations; (v) visitable showcases at five sites in Europe; (vi) promotional and educational material such as videos and leaflets on key results.

We expect that the DESSIN ESS framework will have the following impact:

- Progress in applied ESS science by balancing theoretical and practical elements of the ESS approach and making it useable for the objectives of the WFD;
- Enable more informed decision-making by water managers;
- Promote uptake of innovative solutions for water challenges through transparent and well-structured assessment of their benefits and co-benefits.

We expect that DESSIN solutions for Water Quality Challenges / WFD implementation will have the following impact:

- Reduced pollutant load and volume from CSO overflows;
- Improved water quality in water bodies receiving CSO overflows;
- Facilitate mitigation measures through incremental implementation of local treatment and upgrading the efficiency of existing infrastructures with RTC, rather than large scale expansion of sewer systems;
- Improved aesthetic value of urban water bodies enabling improved recreational and cultural services;
- Safeguard of habitats and protection of aquatic species;

We expect that DESSIN solutions to tackle Water Scarcity Challenges will have the following impacts:

- Enhancing groundwater resources through improved ecological, chemical and quantitative status;
- Safeguarding water supply to areas with intermittent availability and peak demands;
- Reducing ecological and chemical pressures caused by high abstraction;
- Increase operators' competitiveness in the drinking water treatment by substantial reduction of cost and environmental impact of injected water;
- Provision of irrigated urban green spaces in arid/semi-arid regions leading to better microclimate and energy savings for household airconditioning;
- Increased resilience of water supply systems under extreme conditions (scarcity and drought periods, imbalances between demand and resources);
- Service sectors such as tourism, trade or leisure will break water availability constraints;
- Increase reliable fresh water resources of high quality for a sustainable urban, agricultural and industrial development;
- Enhanced potential to supply fresh water from brackish (coastal) areas to decrease the negative effects on surrounding freshwater ecosystems.

Project public website address:

<https://dessin-project.eu/>

2. Core of the report

Project objectives, Work progress and achievements, and project management during the period

The Project Summary Pdf document contains the core of the report.

3. Deliverables and milestones tables

Deliverables (excluding the periodic and final reports)										
Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level	Delivery date from Annex I (proj month)	Actual / Forecast delivery date	Status	Comments
1	State of the art report on ecosystem service evaluation	2.0	11	IWW RHEINISCH-WESTFÄLISCHES INSTITUT FÜR WASSER BERATUNGS-UND ENTWICKLUNGSGESELLSCHAFT MBH	Report	CO	9	08/11/2017	Submitted	
2	Framework for evaluating changes in ecosystem services	2.0	11	ECOLOGIC INSTITUT gemeinnützige GmbH	Report	PU	24	18/12/2017	Submitted	
1	Report on governance regime factors conducive to innovation uptake	2.0	12	KWR WATER B.V.	Report	PU	14	15/08/2017	Submitted	
2	Report on financing approaches conducive to water sector innovation	2.0	12	CETAQUA, CENTRO TECNOLÓGICO DEL AGUA, FUNDACION PRIVADA	Report	PU	14	18/11/2017	Submitted	
3	Manual for practitioners and policy makers	1.0	12	ECOLOGIC INSTITUT gemeinnützige GmbH	Report	PU	18	06/08/2015	Submitted	
1	Quantified ESS for 3 mature sites including recommendations for application	2.0	13	EMSCHERGEN-GESELLSCHAFT	Report	PU	24	07/11/2017	Submitted	
1	Treatment units and instrumentation for CSO treatment solutions	2.0	21	UFT- UMWELT- UND FLUID-TECHNIK DR. H. BROMBACH G	Prototype	CO	12	06/12/2017	Submitted	

				ESELLSCHAFT MBH						
2	Validated additional functions for the ADESBA planning tool	1.0	21	SEGNO INDUSTRIE AUTOMATION GMBH	Prototype	CO	36	10/01/2017	Submitted	
3	Technical conclusions from testing during site specific development and specifications for final design	1.0	21	INRIGO AS	Report	CO	36	02/02/2017	Submitted	
1	Guidelines for packaged plant selection and optimisation report	2.0	22	NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA	Report	PU	12	09/10/2017	Submitted	
2	ICT platform for distributed sewer mining (technology)	2.0	22	NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA	Prototype	PU	24	09/10/2017	Submitted	
3	Assessment reversed osmosis membrane clogging by varying redox conditions	2.0	22	KWR WATER B.V.	Report	PU	24	17/08/2017	Submitted	
4	Evaluation of pre-potable water requirements for safe injection into the aquifer through ASR	2.0	22	CETAQUA, CENTRO TECNICOLOGICO DEL AGUA, FUNDACION PRIVADA	Report	PU	20	18/11/2017	Submitted	
5	Software for the evaluation of groundwater and surface water interactions	2.0	22	AMPHOS 21 CONSULTING SL	Other	PU	20	16/11/2017	Submitted	
1	System requirement specification and system design documents	2.0	23	DHI	Report	PU	20	13/11/2017	Submitted	
2	Windows installer that can be used to install the software	2.0	23	DHI	Prototype	CO	28	18/12/2017	Submitted	
3	User guide and system documentation	1.0	23	DHI	Report	PU	29	30/05/2017	Submitted	

1	Conclusions from successful demonstration, and specifications for final design	1.0	31	EMSCHERGEN OSSENSCHAFT	Report	PU	42	20/02/2018	Submitted	
2	Final evaluation of the technological solution in terms of ESS and sustainability	1.0	31	EMSCHERGEN OSSENSCHAFT	Report	PU	42	20/02/2018	Submitted	
1	Design criteria and documentation of performance for local CSO overflow treatment	1.0	32	INRIGO AS	Report	PU	42	25/01/2018	Submitted	
2	Conclusions from the demonstrations with projected effects on water quality, ESS and sustainability	1.0	32	STIFTELSEN SINTEF	Other	PU	42	31/01/2018	Submitted	
1	Valorisation and demonstration of an ASR/RO application	1.0	33	KWR WATER B.V.	Demonstrator	PU	48	23/01/2018	Submitted	
2	Evaluation of the improvement of Ecosystem Services as a result of ASR/RO application	1.0	33	KWR WATER B.V.	Report	PU	48	18/01/2018	Submitted	
1	An optimal configuration small packaged plant for urban sewer mining	2.0	34	CHEMICAL TECHNOLOGY P. DIMOPOULOU - P. TAZES & CO OE	Demonstrator	PU	12	09/10/2017	Submitted	
2	A demonstrated intelligent software-hardware platform for monitoring and control of small packaged plants for urban sewer mining	2.0	34	TELINT RTD Consultancy Services LTD	Other	PU	24	09/10/2017	Submitted	
3	Evaluation and guidelines and recommendation for transfer to other Water Scarcity sites	1.0	34	NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA	Report	PU	48	26/01/2018	Submitted	
1	Evaluation of the results	1.0	35	CETAQUA, C	Report	PU	48	31/01/2018	Submitted	

	and impacts on ESS of a flexible ASR system, and recommendations for transfer			ENTRO TECN OLOGICO DEL AGUA, FUNDACION PRIVADA						
2	Economic analysis and proposed payment regulation of the identified ecosystem services	1.0	35	AMPHOS 21 CONSULTING SL	Report	PU	48	22/02/2018	Submitted	
1	Project branding (logo and templates)	1.0	41	CETAQUA, CENTRO TECN OLOGICO DEL AGUA, FUNDACION PRIVADA	Other	PU	3	31/03/2014	Submitted	
2	Official website launch	1.0	41	IWW RHEINISCH-WESTFALISCHES INSTITUT FÜR WASSERBERATUNGS-UND ENTWICKLUNGSGESELLSCHAFT MBH	Other	PU	3	31/03/2014	Submitted	
3	Content for dissemination and promotional material, including a policy brief, a video and re-usable illustrations	2.0	41	CETAQUA, CENTRO TECN OLOGICO DEL AGUA, FUNDACION PRIVADA	Other	PU	48	07/02/2018	Submitted	
4	Established showcases at five demo sites	1.0	41	KWR WATER B.V.	Demonstrator	PU	36	22/12/2016	Submitted	
1	Market analysis (inside-out) for ESS software and solution packages	2.0	42	ADELPHI RESEARCH GEMEINNUTZIGE GMBH	Report	RE	12	01/09/2017	Submitted	
2	Sample Commercialization Process Maturity models and capacity building on strategies for SMEs	1.0	42	ADELPHI RESEARCH GEMEINNUTZIGE GMBH	Other	RE	48	25/01/2018	Submitted	
3	Two business environ	2.0	42	ADELPHI RE	Report	RE	10	01/09/2017	Submitted	

	ment (outside-in) reports a) Scarcity b) Quality / WFD			SEARCH GEM EINNUTZIGE GMBH						
4	Recommendations from the open ESS channels: European platforms, roundtables, conferences and web platform	1.0	42	ADELPHI RE SEARCH GEM EINNUTZIGE GMBH	Report	PU	48	31/01/2018	Submitted	
5	M+E system for innovation and continuous monitoring of framework conditions and outcomes	1.0	42	ADELPHI RE SEARCH GEM EINNUTZIGE GMBH	Demonstrator	PU	48	31/01/2018	Submitted	

Milestones

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement date	Comments
01	Kick-off meeting	51, 52	IWW	31/01/2014	Yes	28/01/2014	Meeting held 28/29 Jan 2014 Brussels
02	Logo and applications are designed	41	CETaqua	31/03/2014	Yes	31/03/2014	book of style, logo, templates are available, brand in use
03	Analytical framework for governance regimes	12	Ecologic	30/04/2014	Yes	30/04/2014	internal document available
04	Concept for the development and construction of the model setup of cross-current lamella settler	21	UFT	30/04/2014	Yes	25/07/2014	internal document available
05	Design of HRF solution for pilot testing in laboratory	21	INRIGO	30/04/2014	Yes	28/04/2014	internal document available
06	Blog and social networks are set up and first content is provided	41	IWW	30/04/2014	Yes	19/03/2014	blog and social media channels are online and continuously updated
07	Concept for optimized encapsulated ADESBA modules	21	SEGNO	30/06/2014	Yes	11/07/2014	internal document available
08	Target audience and ex	41	IWW	30/06/2014	Yes	25/07/2014	first version internally

	exploitation strategy						available, document to be continuously expanded
09	individual meeting with each SME and technology developer of DESSIN to identify potential internal networking and specific market needs	42	adelphi	30/06/2014	Yes	23/06/2014	first round completed June 2014, 2nd round completed after PSB18 meeting
10	First newsletter published	41	CETaqua	30/06/2014	Yes	09/07/2014	distributed by E-mail in July. Available at website in September
11	Mode of collaboration with EIP water clarified	51	IWW	30/06/2014	Yes	10/09/2014	WAMT decision to continue membership and collaboration with EIP AGES; contribute to work of ESE
12	First version of evaluation methodology available for testing at mature sites	11	Ecologic	31/12/2014	Yes	08/04/2014	internal document available
13	Completed integrated system architecture design	22	NTUA	31/12/2014	Yes	27/05/2015	achieved, see blog entry 27 May 2015
14	Instrumentation installed in demonstration units, tested and functioning flawlessly by LKI	21	LKI	31/12/2014	Yes	27/05/2015	achieved, see blog entry 27 May 2014
15	Evaluation of freshkeeper completed and benefits quantified	22	KWR	31/12/2014	Yes	01/06/2015	is part of draft version of D22.3, made available to partners via intranet
16	Selection of the most suitable pre-potable water and expected impact	22	CETaqua	31/12/2014	Yes	30/04/2015	publicly available at website as D22.4a (part of D22.4)
17	Formal presentation of DESSIN to the ESS European Roundtables and Platforms	42	adelphi	31/12/2014	Yes	04/11/2014	presentation at EIP workshop on ESS
18	Indicator system developed	42	adelphi	31/12/2014	Yes	19/01/2015	report on M&E approach and initial indicator system developed, to be reviewed by M25 and final

							alised M48
19	Completed installation of HRF unit with monitoring instrumentation and data communication	32	INRIGO	31/01/2015	Yes	27/05/2015	achieved together with MS14
20	Completed installation of RO membranes in the demonstration sites	33	KWR	30/04/2015	Yes	14/07/2015	achieved. See blog entry at website (14 July 2015)
21	Internal recommendations on the application of the ESS method	13	EGLV	30/06/2015	Yes	18/04/2016	internal document (MS21+MS26) available
22	Completed installation of full-scale cross-current lamella settlers	31	EFT	30/06/2015	Yes	22/07/2015	see blog entry of 22 July 2015
23	Completed installation of full-scale RTC system	31	SEGNO	30/06/2015	Yes	30/06/2016	achieved. see blog entry of 1 July 2016
24	Completed installation of AMI-SM technologies	34	EYDAP	30/06/2015	Yes	24/08/2015	achieved
25	First periodic report	51,52	IWW	30/06/2015	Yes	28/09/2015	submitted; accepted by EC after revision: 10/11/2015
26	Applicability of evaluation methodology is tested and approved	11, 13	SINTEF	30/09/2015	Yes	18/04/2016	internal document (MS21+MS26) available
27	Implementation of web platform	42	adelphi	31/12/2015	Yes	18/12/2015	web platform online
28	Completed installation of container with cross-flow lamella settling unit	32	UFT	31/01/2016	Yes	17/08/2016	plant put in operation
29	Completed installation of ASR pipelines	35	CETaqua	30/06/2016	Yes	30/06/2016	achieved.
30	Identification of beneficial impacts and its role as ecosystem services	35	CETaqua	30/06/2016	Yes	31/12/2016	achieved.
31	Completed water quality monitoring and data g	31	EG	31/12/2016	Yes	31/07/2017	achieved

	athering						
32	Completed water quality monitoring and data gathering	32	SINTEF	31/12/2016	Yes	31/10/2017	achieved
33	Second periodic report	36	IWW	31/12/2016	Yes	28/02/2017	Submitted within the required 60 days timeframe after formal end of 2nd reporting period.
34	Final report	51, 52	IWW	31/12/2017	Yes	23/03/2018	achieved

4. Explanation of the use of the resources

The **explanation on the use of resources** was removed from the scientific periodic reports in SESAM. These details now have to be entered in the cost statement forms in FORCE instead.

Attachments	24-DESSIN-M48-report-narrative-2018-03-16.pdf
Grant Agreement number:	619039
Project acronym:	DESSIN
Project title:	Demonstrate Ecosystem Services Enabling Innovation in the Water Sector
Funding Scheme:	FP7-CP
Project starting date:	01/01/2014
Project end date:	31/12/2017
Name of the scientific representative of the project's coordinator and organisation:	Dr. David Schwesig IWW RHEINISCH-WESTFALISCHES INSTITUT FÜR WASSERBERATUNGS-UND ENTWICKLUNGSGESELLSCHAFT MBH
Period covered - start date:	01/01/2017
Period covered - end date:	31/12/2017
Name	
Date	23/03/2018

This declaration was signed electronically by David SCHWESIG (ECAS user name nschweda) on 23/03/2018