FISSAC

FOSTERING INDUSTRIAL SYMBIOSIS FOR A SUSTAINABLE RESOURCE INTENSIVE INDUSTRY ACROSS THE EXTENDED CONSTRUCTION VALUE CHAIN

Exploitation Plan: Exploitation procedures, plans and strategies

Executive summary

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D8.3 The first version of the Exploitation Plan
WP8, T8.2

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***Exploitation**, in this context, refers to the action of making use of and benefiting from project results.*

The Exploitation Plan illustrates what such results are and suggests the strategy of how to make the most use of them. This Exploitation Plan provides:

- The project's exploitable results
- Exploitable results characterization
- Exploitation routes
- Risk assessment
- Technology Readiness Level (TRL) status
- Individual partners' exploitation expectations
- Market analysis

During the M12 General Assembly meeting of the FISSAC project (October 2016), the first Exploitation workshop, organized by the exploitation experts from FENIX, took place. Information provided by partners as well as consortium discussions during the workshop, served as the basis of the first Exploitation Plan.

It is important to note that the Exploitation Plan is closely aligned with the D10.3 "First version of the Data Management plan" and D8.2 "IPR Policy manual", both delivered in M6, and processes the data collected there.

Exploitable results

The first step for developing comprehensive Exploitable Plan is to identify the list of Exploitable Results (ERs) developed within the FISSAC project. The following table summarizes FISSAC's ERs.

N°	Exploitable result	Lead partner
1	FISSAC Model (construction sector). Methodology and software Platform.	Acciona
2	FISSAC Model (other sectors). Methodology and software Platform.	Acciona
3	Methodology + Software Platform	Ekodenge
4	Guidelines & training courses on circular economy planning	ACR+
5	Cement-based products eco-design	AKG Gazbeton
6	Light wall ECO-Tiles (and eco-design)	Keraben
7	Urban porcelain ECO-Tiles (and eco-design)	Keraben
8	Wood Plastic Composites (WPC) eco-design	Ecodek

Exploitation routes

Once the ERs are identified, exploitation routes can be tailored to each. These routes revolve around:

- The use for further research
- Developing and selling new products/services
- Spin-off activities
- Cooperation agreement/Joint Ventures
- Selling IP rights/Selling IP-related business
- Licensing IP rights
- Standardization activities

The exploitable routes of FISSAC's project results are as follows:

ER	Exploitation use
1	• Internal consulting services created by consulting and research partners for applying the FISSAC model • Internal benefits of applying the model to partners participating in the construction value chain: steel, ceramics, glass, chemicals • Joint venture among all or part of the partners providing these services • Spin-off for providing services
2	• Internal consulting services created by consulting and research partners for applying the FISSAC model • Internal developments of partners and benefits of applying the model in their companies: steel, ceramics, cement, glass, chemical, participating in other sectors value chain like automotive, aeronautics, etc. • Joint venture among all or part of the partners for providing the services • Spin-off for providing the services
3	• Utilisation for the studied sectors for decision-making/monitoring • Enhancement of the library and use for broader range of consultancy services • Creating internal consulting services for geo-clustering and logistics • Sales as a software platform • Sales as SaaS – Software as a service
4	• Creation of sustainable construction guidelines specifically for local and regional authorities, to better understand and provide good practice examples on how to set a positive framework for sustainable practices in the construction value chain • Dissemination to local and regional authorities targeted by the FISSAC project • Creating internal training services – direct training and webinars
5	With the successful results of both laboratory studies & industrial production and application phases, it is expected to add the alternative raw materials and techniques to the related BAT reference documents and standards. It is used anywhere that wall blocks used.
6	Worldwide commercialization through: - Direct sale - Distributors - (Licensing)
7	Worldwide commercialization through: - Direct sale - Distributors - (Licensing)
8	A commercially-viable product to help the circular economy

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IPR management

Effective exploitation of the Exploitable Results depends, among others, on the proper management of intellectual property. There are several activities related to IPR, namely, assessment of pre-existing of the project partners, assessment of the results generated during the project, proposition of the optimal IPR protection options, ownership and proper implementation of IPR protection measures.

The IPR protection for each of the ERs, suggested by the FENIX IPR expert, proposes that first four ERs should be protected by the copyright while the last four ERs should file for patent, utility model or industrial design.

Technology Readiness Level (TRL)

The TRL scale is a metric for describing the maturity of a technology. Its scale consists of 9 levels representing the progress in the development of a technology, where level 1 refers to an idea of a product while 9 represents the full deployment of the product in the market. The following table summarizes the expected development of each of the ERs within FISSAC:

ER	From TRL	To TRL
1	3	9
2	3	9
3	6	9
4	5	9
5	4	6
6	5	7
7	5	7
8	5	6

Partners' role in the project and their BFMULO

Acciona: coordinates and leads the management of the FISSAC project as a promoter and close point of the extended construction value chain. Acciona also participates in the development and demonstration of the FISSAC implemented technologies and model.

ACR+: leads the dissemination work package as well as social engagement and acceptance task.

AKG Gazbeton: participates in the development of new products based on secondary raw materials as well as in demonstration of FISSAC implemented technologies and products.

Befesa: participated in activities related to life-cycle analysis of aluminium and it will act as secondary raw material supplier.

British Glass: provides knowledge in the field of glass and participates in replicability activities.

CBI (now RISE): contributes to the development of ER1, 2, and 5.

ICV-CSIC: participates in reformulation of ceramic tiles composition and reduction of raw materials consumption by introducing waste in the ceramic tiles composition formula. ICV also contributes to the design of new materials and will provide demonstration of FISSAC implemented technologies and model.

CSM (now RINA Consulting): provides detailed characterization of materials and participates in defining the best mixture for eco-cement as well as serving as technical support in eco-cement development.

D'Appolonia (now RINA Consulting): acts as a technical leader for the development of one module of the ICT, at the same time, leads WP7. RINA Consulting also focuses on environmental technology verification task.

Ecodek: consults on material composition, process flow, tooling design and leads the prototyping and validation of wood plastic composites manufactured with secondary raw materials.

Ekodenge: participates in sustainable design and environmental management. EKO is the lead partner of the FISSAC model for industrial symbiosis.

Fenix: contributes to the development of new business models for industrial symbiosis and exploitation activities.

Feralpi: acts as secondary raw material supplier of steel

FUNAB: participates in the development and demonstration of FISSAC implemented technologies and products

Geonardo: participates in developing the software platform tool

GTS: acts as secondary raw material supplier of glass

Hifab: is responsible for development and establishment of a Living Lab in Sweden and demonstrating the replicability potential of FISSAC model.

Keraben: participates in validation and demonstration of industrial symbiosis principles within the ceramic sector and conducts a close loop recycling pilot with aluminium and natural stone waste. KER also participates in the development of new products based on secondary raw materials and in demonstration of FISSAC implemented technologies and products.

OVAM: represents regional government body, assists in drawing up conclusions of the reports and provides information from the governmental institutions.

RISE: is responsible for ecological and economic evaluation of the developed processes in WP3. RISE also evaluates non-technical opportunities and obstacles for different business models.

Símbiosy: assists as an industrial symbiosis expert in the management tools.

TCMA: participates in the development of new products based on secondary raw materials and demonstration of FISSAC implemented technologies and products. TCM collaborates on the demonstration of the replication of FISSAC model.

Tecnalia: participates in setting the basis for the industrial symbiosis as well as in the development of new products based on secondary raw materials and demonstration of FISSAC implemented technologies and products.

Trinius: participates in eco design of the new products by considering the economic, environmental, technical perspectives as well as market factors and innovation points

UNE: advices, manages and develops activities related to standardization.

To evaluate the involvement of each partner in the related ER, the BFMULO analysis was applied. The BFMULO matrix consists of:

- B – IPR's on background information
- F – IPR's on foreground information
- M – Making the result
- U – Using the result
- L – Licensing the result
- O – Other exploitation means

The FISSAC partners expressed their exploitation intentions as follows:

Partner	ER1	ER2	ER3	ER4	ER5	ER6	ER7	ER8
ACC	B,F,U,O	B,F,U,O	F,O	-	-	-	-	-
ACR+	-	-	-	O	-	-	-	-
AEN	-	-	-	-	-	-	-	-
CSIC	-	-	-	-	-	B,F,U,L,O	B,F,U,L,O	-
AKG	O	O	-	-	B,F,M,U,O	-	-	-
BEF	U,O	U,O	U,O	-	B,M,U	-	B,M,U	-
BGM	B	B	-	U	-	-	-	-
CBI	F	F	F	O	U	B	B	B
CSM	B	B,F	F	U	F	-	-	-
DAP	B,F,M,U,L,O	B,F,M,U,L,O	B,F,M,U,L,O	-	-	-	-	-
EKO	F,O	F,O	B,F,U,O	-	-	-	-	-
FAB	U,O	U,O	U,O	-	B,M,U,O	-	-	-
FEN	B,F,O	B,F,O	-	-	-	-	-	-
FER	B,U,O	B,U,O	B,U,O	-	B,M,U	B,M,U	B,M,U	B,M,U
GEO	-	-	B,F,U,O	-	-	-	-	-
GTS	B	B	-	U	U	-	-	-
TRI	B	B	-	U	B,U	B,U	B,U	B,U
HIF	B,O	B,O	B,O	B,F,U,O	-	-	-	-
KER	-	-	-	-	-	B,F,M,U,L	B,F,M,U,L	-
OVA	U	U	O	O	-	-	-	-
RIN	-	-	-	-	-	-	-	-
SP	U	U	-	U	-	-	-	-
SYM	B,U	B,U	B,U	B,U	-	-	-	-
TCM	B,U	B	-	U,L	M,U,L	-	-	-
TEC	B,U,O	B,U,O	B,U,O	-	B,U,O	B,U,O	B,U,O	B,U,O
VAN	-	-	-	-	-	-	-	U

Risk assessment

To manage and mitigate risks, which might represent a threat to the project, it is necessary to identify them first. Once the risks are pointed out, one ought to evaluate the likelihood of their occurrence and estimate the impact they might have on the FISSAC project. At the same time, it is crucial to define actions which could prevent the identified risks.

The risks identified were divided to six categories – technological risks, partnership risks, market risks, IPR/Legal Risks, management and financial risks, environmental, regulation, safety and other risks – and evaluated according to the level of threat they might bring (from insignificant to catastrophic). Last, the likelihood of appearance of each risk was assessed. Altogether, these data provided information on the status of each risk ranging from "low" to "unacceptable".

Likelihood	Impact				
	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Low	Moderate
Unlikely	Low	Low	Moderate	Moderate	High
Moderate	Low	Moderate	Moderate	High	Very high
Likely	Low	Moderate	High	Very high	Unacceptable
Certain	Moderate	High	Very high	Unacceptable	Unacceptable

The initial Exploitation Plan revealed that there are 10 low, 23 moderate, 9 high, 2 very high and 0 unacceptable risks associated with the FISSAC project.

Market assessment

To properly evaluate FISSAC's ERs and their prospect position on the market, market assessment is essential to be performed. This assessment identifies and examines relevant markets and evaluates the opportunities for the ERs.

The industries identified with significant potential for industrial symbiosis are: Ferrous metal industry, non-ferrous metal industry, chemical industry, automotive industry, cement industry, and construction industry. The markets analysed were European "Green market", secondary raw material market and to it linked material flows assessment.
It especially focused on light and urban stoneware ceramic tiles and eco-cement and green concrete and it analyzed:

- Market (demand, volume, competitors, future trends)
- Industry (production, main players and producers – potential stakeholders for IS)
- Related/overlapping patents
- Competing products/projects
- Other commercial initiatives
- Other related information

Last but not least, the networks/projects dealing with similar topic as the FISSAC does were identified.

Industrial symbiosis network name	Location	Types of waste used for industrial symbiosis
Guitang Group	China	5,6
Biopark Terneuzen	Netherlands	21,22
Harjavalta Industrial Eco-Park	Finland	4,8,9,10
Bazancourt-Pomacle	France	21,22
Kawasaki eco-industrial park	Japan	8,12,14,18,21,22,28
Fujisawa eco-industrial park	Japan	5,14,21,22,24
Kalundborg	Denmark	4,5,21,22,33
Kwinana	Australia	4,8,29,33
Barceloneta	Puerto Rico	1,5,7
Nanjangud	India	4,12,28,33
Östergötland	Sweden	12,13,14,24,33
Guayama	Purto Rico	33
Taiheiyo Cement	Japan	8,12,13,14,28,29
Midlands foundry sand	United Kingdom	29
Tunweni	Namibia	21,22
Cambridge tyres	United Kingdom	13
Styria	Austria	3,8,12,13,29
Gladstone	Australia	33
Tampico	Mexico	4,14
NISP UK	United Kingdom	0
La Borsa de Subproductes de Catalunya (BSC)	Spain	5,7,12,14,28
BPS	United States	8,21,33
SMILE	Ireland	12,14,15,18,28
OWM	Portugal	28
ZeroWIN research project	EU-27 (FP7	15,18,28

Conclusion

This Deliverable, as the name hints, was the first version of the Exploitation Plan. The plan will be updated along the project with new developments and will be supported by the updated data gathered during the upcoming exploitation workshops.