CA22110 - Cooperation, development and cross-border transfer of Industrial Symbiosis among industry and stakeholders

LIAISE | Cooperation, development and cross-border transfer of industrial symbiosis

Unlocking the Power of Industrial Symbiosis

Experiences, challenges and solutions for circular economic industrial symbiosis towards zero emission and energy efficient implementation of sustainable development goals.

3R Recycle – Recover – Reuse

Zero emission and enegy independent integrated solutions

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EXPERIENCES: 3R-BioPhosphate Ltd. (since 1989)

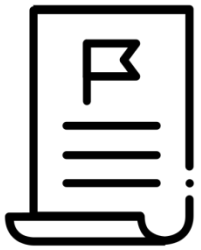
COMPANY

S&T RTD, INDUSTRIAL ENGINEERING & MANUFACTURING

Multinational ALSTOM POWER subsidy JV (independent since 2002)

CE upcycling of by-products with new generation processing

Converting applied science into User driven industrial practice



MISSION

Zero emission and energy independent pyrolysis technology

CREATION OF FINANCIAL VALUES & NON FINANCIAL BENEFITS + MARKET COMPETITIVE ADVANTAGES to USERS & VALUES CHAIN STAKEHOLDERS

VISION

GLOBAL MARKET EXPLOITATION + RAPID EU & GLOBAL EXPANSION of the TRL9 replication model at scale of economy and make multiple replicated industrial projects.

Industrial Symbiosis Challenges 1:

TRL + BRL + CRL + IRL status of the RTD action results

TRL & IRL & CRL EVOLUTION schedules and capabilities Status of RTD progress - "RMI" Research Maturity Index	Implementation factor %	Implementation risk %	Evidence
TRL 1-3 = IDEA = basic principles, concept formulated	0-1%	100%	THESIS: theoretical assumptions
TRL 4 = technology validated in laboratory	<3%	>97 %	
TRL 5-6 = PILOT technology validated and demonstrated in relevant environment high technical risk/full commercial risk	<25%	>90%	
TRL 7= PROTOTYPE demo in operational environment	60-75%	40-70%	**Prototype demonstrated**
TRL8 = FIELD DEMO system complete and qualified	75-90%	15-25%	**Industrial validated**
TRL 9 = actual system proven - full scale industrial replication model ready for market competitive commercial deployment = commercial replication model.	95-99%	1-5%	**Market validated**

Low RMI operational area

RTD risk break-even point

High RMI operational area

TRL + concepts developed by the US DoE, DoD, NASA, OECD in the 1980's and EU applied since 2014.

Industrial Symbiosis Challenges 2

Core questions rised from industrial, financial and market players?

1) **What is the true value TRL + BRL + CRL + IRL status** of the S&T RTD action results?
2) **Will the S&T RTD result new generation & User driven market competitive solutions/products** that meet rapidly changing market demands & acceptance in scale of economy?
3) **Will the S&T RTD results create financial values and non-financial benefits** in practice for the value chain stakeholders? What are the market opportunities and risks for the RTD action results ?
4) **Does the S&T RTD action results present business and market valorization plan** with CAPEX/OPEX?
5) **Are the S&T RTD action results lawfully** EU/MS Authority permitted and accredited documented?

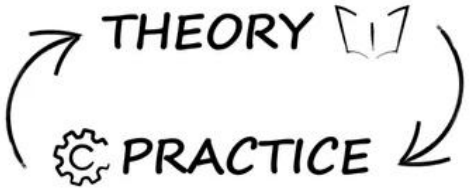
Core questions rised from S&T RTD vendors and scientific partners?

1. **Will the S&T RTD result: promising enabling solution** for improving environmental sustainability while simultaneously achieving economic benefits? ... **Or results are for thesis publication only?**
2. **Will the S&T RTD result: removal of complex barriers** for the environmental, economic, technical, regulatory, organisational, social and cultural aspects?
3. **How to link theory and practice**, and make cross-sector and cross-cycle collaborations?
4. **How to implement the complex Sustainable Development Goals** under Industrial Symbiosis?
5. **How to enhance the awareness and acceptance of Industrial Symbiosis** in practice?

PAIN POINTS

„There is nothing as difficult as making new things start to work; *nothing so difficult as directing it; nothing as insecure as success than to try to introduce a new order of things. Whoever makes the change will find resistors who succeed well in the old tracks and will only gain insufficient supporters who can possibly work in this new order*" **Niccolo Machiavelli** (year 1469).

- ✓ **In theory,** the difference between theory and practice is small.
- ✓ **In practice,** the difference between theory and practice is large



"***The value of an idea lies in the using of it„*** **Thomas A Edison** (1847 – 1931)

SOLUTIONS

1) "***The significant problems we face cannot be solved at the same level of thinking we were at when we created them***" **— Albert Einstein**
2) **Product is first** that represent high market and economical/commercial value, and User demand – **that is the core KPI.**
3) Make clear understanding how or if S&T RTD results can be truly converted into industrial practice.
4) Industrial, financial and value chain stakeholders expecting market + business + commerical applicable S&T RTD results, not publications.
5) S&T research results on environment and climate are important, but nowdays the high performance of these are considered as minimum standards and not as stand alone elements in the core KPI equation.

Conclusion to take away

In a world with finite resources there is no infinite development opportunity with sustainability unless full upcycling and circular economy is implemented.

Upcycling means zero emission and energy independent circular transformation of unexploited materials into new and high added value products,
perceived to be of greater User/market benefits, higher quality/safety and environmental/climate value.

https://BioPhosphate.net https://3Rbiofarm.com

PS: for consideration

- ✓ **Theory** is when you know everthing but nothing works.
- ✓ **Practice** is when everything works but no one knows why.
- ✓ In our lab, **theory and practice are combined**: nothing works and no one knows why.