

PERSONAL INFORMATION

**Edward Someus** (pyrolysis & carbon products S&T senior engineer)



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Nationality Swedish

Gender Male | Date of birth 28/04/1951

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WORK EXPERIENCE

1989 - **Director, Pyrolysis processing and carbon refinery products S&T engineer**

Terra Humana Ltd. H-2472 Kajaszó, BIOFARM, Hungary, [www.3Ragrocarbon.com](http://www.3Ragrocarbon.com)

(Lang Machine Works (est. 1870, ALSTOM Corporation subsidy) HU - SE 1989 Joint Venture, since 2001 independent).

Main activities and responsibilities:

- Company general management since 1989,
- **Pyrolysis technology applied research, development and industrial engineering,**
- **Carbon refinery product development, testing and applications,**
- **Innovative fertilizer and recovered Phosphorus development, testing and applications,**
- Coordinator and key technology designer for four large scale EU RTD and other projects since 2002,
- EU policy support manager related to EC 2003/2003 Fertilizers Regulation revision biochar case,
- Innovation dissemination and marketing,
- Financial and legal management, including technology and innovative fertilizer MS national and EU permitting.
- **EU policy support consultant for Circular Economy incentive and Fertilizers Regulation revision** (COM (2016)157, EC 2003/2003), DG Grow, JRC.
- EIP AGRI and STRUBIAS (struvite-biochar-ash) work group member (JRC).

**Business or sector:** Organic waste recycling industrial technology development (pyrolysis and carbon refinery specialization), industrial engineering and manufacturing

EDUCATION AND TRAINING

1972 - 1978 **M.Sc. Natural and Environmental sciences**

University of Lund, Sweden

Pyrolysis processing and carbon products industrial engineering, manufacturing and applications in the agricultural, environmental and energetic sectors

PERSONAL SKILLS

Mother tongue(s) Swedish

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
Hungarian	B2	B2	B2	B2	B2

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user  
Common European Framework of Reference for Languages

**Communication skills** **Cooperative team worker - team leader – team organizer**; good adaptation ability to **multicultural** environments that is gained through my work experience in several EU countries; **good communication skills** gained through my experience as EU RTD project coordinator since 2002.

**Organisational / managerial skills** Excellent organizer with leadership character, **good experience in team and project management** (EU research coordination of scientific and industrial teams organized with teams 12 – 50 people per project); good experience in logistics; experienced organizer of industrial engineering and industrial construction works.

**Technical skills** Very focused, specialized and exceptional high competence in the fields of pyrolysis industrial technology engineering, carbon refinery, biochar products, innovative nutrient recovery, BIO-NPK-C fertilizer formulations; including quality, analytics, safety, legal/permit, environmental/climate, economical and market/user aspects. High competence to convert science into legalized industrial practice and to meet market demands and users requirements.

**Digital competence**

SELF-ASSESSMENT				
Information processing	Communication	Content creation	Safety	Problem solving
Proficient user	Proficient user	Proficient user	Proficient user	Proficient user

Levels: Basic user - Independent user - Proficient user  
[Digital competences - Self-assessment grid](#)

**Other skills** Building and construction of houses and industrial buildings, Authority permit documentation, animal welfare and horse keeping.

**Driving licence** A BE CE DE (professional driving licence for all and any vehicles, incl. military in Sweden)

## ADDITIONAL INFORMATION

## Experience has acquired at EU and international level

International leading scientific and industrial engineering expert in bio-waste and industrial scale biochar added value processing; valorisation and reuse applications by zero emission pyrolysis and integrated biotech means; innovative fertilizer Phosphorous and Nitrogen nutrient recycling; and restoration of soil natural balance.

Edward Someus/Terra Humana Ltd. is **an expert member of the EIP-AGRI** (run by the European Commission DG Agriculture and Rural Development) **Nutrient Recycling Focus Group**. (<http://ec.europa.eu/eip/agriculture/en/content/nutrient-recycling>). Member of the STRUBIAS (struvite-biochar-ash) work group organized by the European Commission (2016-2018).

Since 2002, Edward Someus has coordinated multiple international research and development programs (EU FP5, EUFP6, EUFP7, CIP-Ecoinnovation) in the specific field of carbon refinery and phosphorus recovery. Edward Someus is inventor of the "3R" Recycle-Reduce-Reuse zero emission advanced pyrolysis technology. The flagship project, REFERTIL ([www.refertil.info](http://www.refertil.info)), is recovering phosphorus and other nutrients from bio-waste via pyrolysis technology and biochar biotechnological formulation. The 3R carbon refinery and phosphorus recovery field pilot plant has been implemented in West Hungary. REFERTIL [refertil.info](http://www.refertil.info), led by Someus providing strong policy support to reinforce interaction between policies, initiatives/economic sectors for circular bioeconomy and EU Fertilisers Regulation revision biochar/Phosphorus recovery/compost cases.

**Membership in platforms/organisations:**

- European Biochar Research Network (eBRN), **Cost Action Biochar** (TD1107), **official national representative**, [cost.european-biochar.org](http://cost.european-biochar.org) (2011-2016)
- European Sustainable Phosphorus Platform, [phosphorusplatform.eu](http://phosphorusplatform.eu)
- Sustainable Phosphorus Platform, [forum/sustainablephosphorusplatform](http://forum/sustainablephosphorusplatform)
- TP organics Technology Platforms, [tporganics.eu](http://tporganics.eu)
- BIOREFINE cluster, <http://biorefine.eu>, Interconnecting projects/people for nutrient cycling years
- Member/active participation in the Hungarian Biomass cluster; Competitive Vegetable production cluster; FAO, Global Soil Partnership

## Interest

- Development of quality/safety standards for Fertiliser Regulation revision. Development of process and product criteria for biochar.
- Identify-list-assess technologies to process different organic sources (biowaste/byproducts) for recovery of nutrients especially N/P.
- Assess the agronomic value of the derived products: nutrient content/availability, application rate, impacts on soils physical/biological properties.
- Evaluation of innovative fertilizers: LCA, S-LCA, SWOT, CBA.
- Assess the environmental safety of the derived products (quality, contaminants loads to soil/water environment linked to the application doses).
- Identification of tools/instruments to help farmers to better evaluate, select/measure the nutrient content/availability for crops and recommendations (best practice guide).
- Analyse economic/technical factors that stimulate or limit the use of these recovered nutrient products in agriculture and indicate how to address them exploring the role of innovation/knowledge transfer.
- Determination of strategies to adapt recovered nutrient products to market demands.
- List of successful business cases that already exist at farm level, local/regional scale. Identification of research needs from practice, gaps in technical knowledge/further research to address nutrient recovery technologies.
- Suggest innovative technologies/solutions/products/projects.

Major projects has been involved

**NUTRIMAN:** Nutrient Management and Nutrient Recovery Thematic Network (H2020 – RUR15 – contract no 818470, coordinator and key S&T tech designer, 2018-2021).

**Role in the project:** Coordinator, science and technology core work senior engineering.

**Project status:** ongoing in ten EU countries with 15 partners.

**REFERTIL:** Reducing mineral fertilisers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products.

**Objective:** EU legislation support by definition of improved compost/biochar standards in the EU27.

**Project Duration:** 48 months, **Starting date:** October 1, 2011.

**Programme:** European Union 7th Framework Programme (2007-2013), FP7-KBBE-2011.1.2-02

**Role in the project:** Coordinator, science and technology core work senior engineering

**Contract/reference number:** 289785, **Project status:** Successfully completed.

**Project website:** www.refertil.info.

**Project status:** Successfully completed, follow up developments and high TRL scale ups made.

**PROTECTOR,** Contract Reference number: ECO/08/238984/ SI2.532247

**Programme:** CIP Eco-innovation, Project Duration: 48 months (2009-2012)

**Role in the project:** Coordinator, science and technology core work senior engineering, Phosphorous recycling.

**Project status:** Successfully completed, follow up developments and high TRL scale ups made.

**PROTECTOR** - Recycling and upgrading of bonemeal for environmentally friendly crop protection and nutrition, **Project Duration:** 42 months (2005-2008).

**Programme:** European Union Sixth Framework Programme (2002-2006), Action: FOOD-2003-T6.6 Recycling and upgrading organic wastes from the food chain in environmentally friendly healthy food production.

**Role in the project:** Coordinator, science and technology core work senior engineering.

**Contract/reference number:** FOOD-CT-2005-514082, **Project status:** Successfully completed.

**Project status:** Successfully completed, follow up developments and high TRL scale ups made.

**TDT-3R MULTI FUEL** - "Multi Fuel Operated Integrated Clean Energy Process: Thermal Desorption Recycle-Reduce-Reuse Technology".

**Project Duration:** 36 months (2002-2005).

**Programme:** European Union Fifth Framework Programme (1998-2002) - Energy, Environment and Sustainable Development specific programme.

**Role in the project:** Coordinator, science and technology core work senior engineering.

**Contract/reference number:** EU FP5-NNE5-363-2001.

**Project status:** Successfully completed, follow up developments and high TRL scale ups made.

**Nutri2Cycle:** Closing the transition towards a more carbon and nutrient efficient agriculture in Europe (H2020 - SFS-30-2017, SFS-30-2017, 2018 – 2022).

**Role in the project:** Partner. **Project status:** ongoing.

**ECO-ZEO** - Developing a pool of novel and eco-efficient applications of zeolite for agriculture sector

**Project Duration:** 48 months (2012-2016)

**Programme:** European Union Seventh Framework Programme (2007-2013)

**Role in the project:** Partner. **Contract/reference number:** 282865, **Project status:** successfully completed.

**EUPHOROS** - Efficient use of inputs in protected horticulture

**Project Duration:** 48 months (2008-2012)

**Programme:** European Union Seventh Framework Programme (2007-2013), FP7-KBBE-2007-1

**Role in the project:** Partner. **Contract/reference number:** 211457, **Project status:** successfully completed.

#### **EUROPEAN LEGAL EXPERTISE:**

- **Specialized EU policy and law harmonization development consultant** for the European Commission with core competence in the fields of Circular Economy and Fertilizers Regulation revision, work group member of the STRUBIAS (struvite-biochar-ash product developments – managed by DG GROW – JRC Seville) and EIP-AGRI, in the specialized fields of nutrient recovery cases from agricultural and food industrial by-products, including biochar (all types), bio-phosphate and ash products.
- **REACH expert** (Registration, Evaluation, Authorisation and Restriction of Chemicals) for chemically modified (thermal processed) substances, with specialization on ABC Animal Bone Char, Animal Bone Oil, and all types of biochar.
- **Authority permit expert for full industrial scale permitting of thermal processing technologies**, including evaluation of environmental impacts, process safety, energetic efficiency

- **Authority permit expert for application of chemically modified substances in the agriculture** (ABC and all types of biochar).
  - Works published on nutrient recovery**
  - Edward Someus, Massimo Pugliese; Concentrated Phosphorus Recovery from Food Grade Animal Bones; Sustainability 2018, 10, 2349; doi:10.3390/su10072349, [www.mdpi.com/journal/sustainability](http://www.mdpi.com/journal/sustainability).
  - Edward Someus, Massimo Pugliese, Joeke Postma, Henning von Alten, Lea Lavric. REFERTIL—compost and biochar testing, [BioRefine Bulletin, 2015 Issue 3](#).
  - J. Postma, F. Clematis, E. H. Nijhuis, E. Someus, Efficacy of four phosphate-mobilizing bacteria applied with an animal bone charcoal formulation in controlling *Pythium aphanidermatum* and *Fusarium oxysporum* f.sp. *radicis lycopersici* in tomato, Elsevier, Biological Control 67 (2013) 284–291, 19 July 2013, [www.elsevier.com/locate/ybcon](http://www.elsevier.com/locate/ybcon).
  - Sebastian Meyer, Lorenzo Genesio, Ines Vogel, Hans Peter Schmidt, Gerhard Soja, Edward Someus, Simon Shackley, Frank G A Verheijen, Bruno Glaser; Biochar standardization and legislation harmonization. Journal of Environmental Engineering and Landscape Management, Published on 25 Jan 2017.
  - Ferenc Lónyi, József Valyon, Edward Someus, Jenő Hancsók, Steam reforming of bio-oil from pyrolysis of MBM over particulate and monolith supported Ni $\gamma$ -Al $2$ O $3$  catalyst, Fuel 10/2013; 112:23–30. DOI:10.1016/j.fuel.2013.05.010.
  - Edward Someus, Zoltán Palotai, Zsolt Hantosi, Gábor Bordós; Food safety importance of biophosphate applications in safe food crop productions, Food Safety News, Published on 31 Dec 2016.
  - Caroline De Smedt, Edward Someus, Pieter Spanoghe; Potential and actual uses of zeolites in crop protection. Pest management science, Published on 26 Feb 2015.
  - Postma J., Nijhuis E.H., Someus E., 2010. Selection of phosphorus solubilizing bacteria with biocontrol potential for growth in phosphorus rich animal bone charcoal. Applied Soil Ecology, [www.elsevier.com/locate/apsoil](http://www.elsevier.com/locate/apsoil)
  - G. P. Warren, J.S. Robinson and E. Someus, Dissolution of phosphorus from animal bone char in 12 soils, Nutrient Cycling in Agroecosystems, Volume 84, Number 2/ Jun, 2009, Springer Netherlands. <http://www.springerlink.com/content/4876u47123372264/>
  - E. Someus, Food crop mineral deficiency and disturbance stress mitigation in temperate climatic regions by economical and environmental valorization of agricultural by-products, Nova Science, New York, 2009. [https://www.novapublishers.com/catalog/product\\_info.php?products\\_id=8372](https://www.novapublishers.com/catalog/product_info.php?products_id=8372)
  - E Someus, "Plant derived feed additive: recent scientific results and regulatory development, successful EU projects and partners for scientific cooperation" FEED –SEG Symposium, January 14-15, 2008, Hungary, <http://www.matchmaking.at/feedseg/>
  - T. Ohlsson, K. Lienemann, H. Aiking, P. Bindraban, R. Clift, K. Fikiin, M. Guiramand, N. Hedges, C. Noell, B. Notamicola, F. de Ruijter, A. Sagenmuller, E. Someus, C. Walter. Priority research challenge 2: Solutions for sustainable food chains. Published on 01 Jan 2008.
  - E. Someus, "TOWARDS ZERO EMISSION: Economical Conversion of Low-grade Coal to Clean Coal by Low Temperature Carbonization Pretreatment Process" Twenty-seventh Annual International Conference on Thermal Treatment Technologies; May 12-16, 2008, Montreal, Quebec, Canada, Air & Waste Management Association, USA, University of Maryland, USA, United States Department of Energy. [www.awma.org/](http://www.awma.org/), <http://www.awma.org/go/it308>.
  - J. Kruse, P. Leinweber, F. Godlinski, E. Someus, "Speciation and quantification of inorganic and organic P forms in environmental samples by P L-edge XANES" University of Rostock, Germany, Agriculture & Agrifood Canada, Lethbridge Research Station.
  - Postma, E. Nijhuis, F. Clematis, E. Someus "A new carrier for biocontrol agents", Wageningen University Research, Plant Research International B.V, P.O. Building nr. 107, Droevendaalsesteeg 1, 6708 PB Wageningen, The Netherlands.
  - Someus, "3R biotechnology integrated industrialized biochar production" 2008 Conference of the International Biochar Initiative, Biochar, Sustainability and Security in a Changing Climate, Newcastle, United Kingdom, September 8-10, 2008, [www.biochar-international.org](http://www.biochar-international.org)
  - J Postma, E Nijhuis, F Clematis, E Someus, "Recycling and upgrading of bone meal for environmentally friendly crop protection and phosphate fertilization" ORBIT Conference, October 13-15, 2008, Moving Organic Waste Recycling Towards Resource Management and for the Biobased Economy, Wageningen, The Netherlands. Wageningen University Research, Plant Research International B.V, P.O. Building nr. 107, Droevendaalsesteeg 1, 6708 PB Wageningen, The Netherlands <http://www.orbit2008.de>
  - C Baum, P Leinweber, K Eckhardt, E Someus, M Halasz, "Auswirkungen der Applikation von mit *Trichoderma harzianum* inokulierter Knochenkohle auf die mikrobielle Biomasse, Enzymaktivitäten und die Zusammensetzung der organischen Substanz des Bodens (Effects of the application of animal bone charcoal inoculated with *Trichoderma harzianum* on the soil microbial biomass, enzyme activities and the composition of soil organic matter), German Community of Soil Science Conference in Osnabrueck, February 25, 2008.
  - M Polgari, J Hein, M Toth, A Brukner-Wein, T Vigh, E Someus, M Halasz, L Biro, "Genesis of a regionally extensive celadonic chert/ironstone bed overlying Upper Lias Manganese deposits" (SED-2007-OM-176), Sedimentology, International Association of Sedimentologists.

## Conference abstracts

- [Edward Someus, Different types of biochar products for agronomic applications as soil improver and innovative fertilizer](#); Biochar in Poland: Biochar in Poland – science, technology, business 2016, May 30-31, 2016, Warszawa, Poland
- [Edward Someus, EU and Member State legal, permit and quality requirements for biochar import, manufacturing, placing on the market and use above >1 ton/year capacity](#); Biochar in Poland: Biochar in Poland – science, technology, business 2016, May 30-31, 2016, Warszawa, Poland
- [Edward Someus, Development of EU/MS/REACH mandatory permits and policy support towards improved European regulations and law harmonization for biochar industrial production, safe products and placing on the market \(abstract\)](#), Final meeting EU-COST Action "Biochar" and 76. Symposium Des Ans e.V., "Understanding biochar mechanisms for practical implementation", 28th-30th September 2015, Hochschule Geisenheim University. ISBN 978-3-924618-47-6
- [Edward Someus, REFERTIL project summary \(abstract\)](#), Final meeting EU-COST Action "Biochar" and 76. Symposium Des Ans e.V., "Understanding biochar mechanisms for practical implementation", 28th-30th September 2015, Hochschule G
- [Edward Someus, Dr. Zoltan Palotai, Dr. Zsolt Hantosi, Gabor Bordos, Refertil biochar analytical accreditation \(abstract\)](#), Final meeting EU-COST Action "Biochar" and 76. Symposium Des Ans e.V., "Understanding biochar mechanisms for practical implementation", 28th-30th September 2015, Hochschule Geisenheim University. ISBN 978-3-924618-47-6
- Edward Someus, Introduction of the Refertil project; Advance Compost and Biochar Processing: Solution for Economical Phosphorus Recovery Conference, 17-18 September 2015. Toledo, Spain, [Conference presentation abstract booklet, p.4.](#)
- Edward Someus, ABC-Animal Bone bioChar, a high grade recovered P-fertiliser; Advance Compost and Biochar Processing: Solution for Economical Phosphorus Recovery Conference, 17-18 September 2015. Toledo, Spain, [Conference presentation abstract booklet, p.5.](#)
- Edward Someus, Summary of the REFERTIL policy support work and biochar permitting; Advance Compost and Biochar Processing: Solution for Economical Phosphorus Recovery Conference, 17-18 September 2015. Toledo, Spain, [Conference presentation abstract booklet, p.20.](#)
- Edward Someus, Introduction of the REFERTIL project; Compost and Biochar Safety, Economy and EU law Harmonization Conference, REFERTIL - FERTIPLUS joint Conference, June 23, 2015 Brussels, Flemish Government Building, [REFERTIL presentation abstract booklet, 2015, p.2.](#)
- Edward Someus, Biochar processing technology improvements towards economical industrial scale; Compost and Biochar Safety, Economy and EU law Harmonization Conference, REFERTIL - FERTIPLUS joint Conference, June 23, 2015 Brussels, Flemish Government Building, [REFERTIL presentation abstract booklet, 2015, p.3.](#)
- Edward Someus, Summary of the REFERTIL policy support work; Compost and Biochar Safety, Economy and EU law Harmonization Conference, REFERTIL - FERTIPLUS joint Conference, June 23, 2015 Brussels, Flemish Government Building, [REFERTIL presentation abstract booklet, 2015, p.5.](#)
- Edward Someus, Conversion of science into industrial practice: biochar scale up, industrialization and authority permit; Compost and Biochar Safety, Economy and EU law Harmonization Conference, REFERTIL - FERTIPLUS joint Conference, June 23, 2015 Brussels, Flemish Government Building, [REFERTIL presentation abstract booklet, 2015, p.10.](#)
- [Edward Someus, Animal Bone bioChar as concentrated organic Phosphorus fertiliser, European Sustainable Phosphorus Conference - March 5-6, 2015, Berlin, Germany, Conference booklet](#)
- [REFERTIL project factsheet, Circular approaches to phosphorus: from research to deployment, Directorate-General for Research and Innovation, 2015. Summary report of the workshop "Circular approaches to phosphorus: from research to deployment"](#)
- Edward Someus, REFERTIL: Recycling and economical reuse of concentrated "ABC" Animal Bone bioChar organic phosphorus fertiliser natural product in horticulture; International conferences on Innovative Technologies in organic horticultural production, October 22-24, 2014 Skierniewice, Poland, Book of abstracts, Research Institute of horticulture, [Conference Book of Abstracts \(page 27\)](#)
- [Edward Someus, REFERTIL: biochar policy support and economic aspects in the EU](#); Green Carbon Conference, 1-3 April, 2014, Brussels, Belgium, Book of abstract, ISBN-10: 84-695-9850-3, p.72
- [E. Someus, 2013 Reducing mineral fertilisers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products Improvement of comprehensive bio-waste transformation and nutrient recovery treatment processes for production of combined natural products](#), Terra Preta Sanitation Conference, Hamburg, Organised and published: Institute of Wastewater Management and water protection at Hamburg University of Technology.

## Conference abstracts (cont.)

- Pugliese M., Someus E., Gullino M. L., Garibaldi A., REFERTIL: improvement of comprehensive bio-waste transformation and nutrient recovery treatment processes for production of combined natural products. Proceedings of the 1st Mediterranean Biochar Symposium., 17-18, January 2013. (abstract).
- J. Postma, E.H. Nijhuis and E. Someus, 2013. Efficacy of phosphate-mobilizing bacteria to control plant pathogens in tomato when applied with an animal bone charcoal formulation. Acta Phytopathologica Sinica 43 (supplement) August 2013 p. 403. (Abstract), ICPP Conference, [http://www.isppweb.org/Abstracts/INTERNO\\_ICPP\\_2013.pdf#page=40](http://www.isppweb.org/Abstracts/INTERNO_ICPP_2013.pdf#page=40)

## Conference presentations

- Someus, "3R biotechnology integrated industrialized biochar production" 2008 Conference of the International Biochar Initiative, Biochar, Sustainability and Security in a Changing Climate, Newcastle, United Kingdom, September 8-10, 2008.
- [WG1 - Edward Someus: Biochar standardization and law harmonization proposal related to fertilizer regulation revision](#), Regions at work for the Bio-Economy, How to help entrepreneurs to convert bio-waste into efficient fertilisers in a fair regulatory framework and financially de-risked environment, 7-9 July 2014, Rennes, France.
- [WG2 - Edward Someus, Jose Maria Gomez: Compost and biochar technical aspects, research and scaling up needs](#), Regions at work for the Bio-Economy, How to help entrepreneurs to convert bio-waste into efficient fertilisers in a fair regulatory framework and financially de-risked environment, 7-9 July 2014, Rennes, France.
- [WG3 - Edward Someus: Conversion of biochar science into industrial replication model and commercial practice](#), Regions at work for the Bio-Economy, How to help entrepreneurs to convert bio-waste into efficient fertilisers in a fair regulatory framework and financially de-risked environment, 7-9 July 2014, Rennes, France.
- [Edward Someus: Recycling treated organic waste as compost and bio-char products for reducing mineral fertilisers and chemicals use in agriculture - REFERTIL \(presentation\)](#); BUSINESS DIALOGUE - 12 June 2014, 8:30h – 14:30h, Rue de la Science 14, Brussels
- [Edward Someus: Biochar commercialization and legislation in the EU \(presentation\)](#), E2BEBIS – Environmental and Economic Benefits from Biochar Clusters in the Central Area. Prague, Czech Republic, 14-15-November, 2013.
- Edward Someus: The EU Fertilizer Regulation - Possible inclusion of a Biochar as a fertiliser and/or soil additive into the new regulation (presentation); International Soil Platform, 26-28 September, 2013.
- Edward Someus: REFERTIL - Compost and biochar EU28 standardization for low carbon economy and reducing mineral fertilisers/chemicals use in agriculture (presentation); Bridge-BioBased Public Private Partnership, Stakeholder event, 4th July, 2013, Budapest, Hungary
- Edward Someus: Improvement of comprehensive bio-waste transformation and nutrient recovery treatment process for production of combined natural products (REFERTIL) (presentation); European Economic and Social Committee Agriculture, Rural Development and environment section, 25 March, 2013., Brussels, Belgium.

**Science and technology work field area of Edward Someus:** from TRL6 towards high RMI (TRL7-9) and full industrialization/commercialization of research results and knowledge. Conversion of science into economical industrial practice.

**“RMI” Research Maturity Index = TRL**

**Technology Readiness Levels “TRL” – Investment Readiness Levels “IRL”**

For objective driven natural and environmental science & technology/product evolutions

	TRL & IRL EVOLUTION schedules Status of RTD progress	TRL / IRL Implementation		Scientific Evidence level
		factor %	risk %	
↓ EU Community S&T - RTD maturity progress	<b>TRL 1-3 = IDEA</b> = basic principles, technology concept formulated	0-1%	100%	THESES: theoretical assumptions
	<b>TRL 4 = technology validated in laboratory</b>	<3%	>97 %	
	<b>TRL 5-6 = PILOT</b> technology validated and demonstrated in relevant environment <b>IRL5-6 = validate revenue model &amp; market fit</b> high technical risk/full commercial risk	<25%	>90%	
		<b>RTD risk break-even point</b>		
↓	<b>TRL 7= PROTOTYPE</b> demo in operational environment <b>IRL 7 = prototype viable product</b>	60-75%	40-70%	Demonstrated
	<b>TRL8 = FIELD DEMO</b> system complete and qualified <b>IRL 8 = validate value delivery</b>	75-90%	15-25%	Proven demonstrated, industrial validated
	<b>TRL 9 = actual system proven</b> in operational environment <b>FULL INDUSTRIAL REPLICATION MODEL</b> <b>IRL 9 = identify and validate metrics</b> The TRL9/IRL9 is the first full industrial/commercial replication model. Demonstrate conversion of science into practice: competitive manufacturing, industrial training, user/market uptake and exploitation in practice	95-99%	1-5%	Market validated Commercial replication and franchise model
	<b>Industrialized and market competitive commercialized innovation</b>	97-99%	1-5%	Commercial replicated

The TRL (also known as Technology Readiness Assessment) is based on the EU Commission Decision C(2014)4995 and US official methods. The IRL is based on the OECD (The Organisation for Economic Co-operation and Development) and other large financial institutions methods.  
 "The value of an idea lies in the using of it." Thomas Edison  
 "You can never solve a problem on the level on which it was created". Albert Einstein

**3R/ABC – Bio-Phosphate recovery - www.3Ragrocarbon.com – Edward Someus**

TRL Technology Readiness Levels - IRL Investment Readiness Levels = RMI Research Maturity Index

↓ 3R EU Community RTD/S&T programme	<b>TRL 1-3 = IDEA</b> (basic principles, technology concept formulated) (1985-1989), laboratory pyrolysis	
	<b>TRL 4 = technology validated in LAB</b> (1989-2001), mobile pyrolysis pilot plant	
	<b>TRL 5-6 = PILOT</b> technology validated and demonstrated (high technical risk/full commercial risk)	
	<b>IRL5-6 = validate revenue model &amp; market fit. FP5= NE5/363/2001 (2002-2005)</b>	<b>RTD risk Break-even point</b>
	<b>TRL 7= system PROTOTYPE</b> demo in operational.environment.- <b>IRL 7 = prototype viable product</b>	
	<b>FP6 = 514082 (2005-2009) - Industrial scale field demo operations for long term tests since 2005</b>	
	<b>TRL8 = FIELD DEMO</b> system complete and qualified - <b>IRL 8 = Proven demonstrated, industrial validated (2011-2018)</b>	
	<b>FP7 = 289785 REFERTIL - STATUS: SUCESSFULLY COMPLETED</b>	
	<b>TRL 9 = FULL INDUSTRIAL replication and franchise model</b> - <b>IRL 9 = identify and validate metrics</b> Market validated, commercial replication and franchise model <b>2019/2020.</b>	<b>3R RMI in 2018 above &gt;TRL8+</b>
Manufacturing, industrial training & user/market uptake, commercialization, market exploitation. Sales of output products beyond 2021 €15 million/year, business expansion and additionally sales of franchise models. Extensive market valorization and market capitalization of the 3R technology and products to reach immense market and economic values.		
<b>Industrialized and commercial replicated innovation</b>		
Commercial and export activities after successfully completed TRL9 to EU, Australia, Japan, USA, Canada.		

The TRL (also known as Technology Readiness Assessment) is based on the Commission Decision C(2014)4995 and US official methods. The IRL is based on the OECD (The Organization for Economic Co-operation and Development) & other large financial institutions methods. **Phosphate products are critical raw materials that are crucial to Europe's economy.** Reliable and unhindered access to concentrated Phosphorus raw materials is a growing concern within the EU and across the globe (European Commission COM/2017/0490 final)