

3R Environmental Technologies Ltd.

Recycle & **R**educe & **R**euse for **P**revention & **P**rotection & **P**reservation

"3R" - The Innovative Product of Europe

Innovative Technology Development Program History and Proven Results

Inventor: Edward Soméus

January 2, 2008

BACKGROUND:

- 1972-1979 Edward Soméus: University of Lund, Sweden (Natural and Earth sciences, graduated in 1978, M.Sc., Environmental Scientist and Engineer).
- 1980 The 3R technology idea: horizontally arranged indirectly heated systems (indirectly heated rotary kiln for low temperature carbonization of organic substances and activation of char)
- 1980-1986 Pre evaluation: scientifically research, laboratory bench tests

THE 3R DEVELOPMENT

- 1986→ Evaluation of competitor state-of-the-art, evaluation of patents, initial market research for future full scale application feasibility
- 1986-1989 Pilot Plant engineering concept design (LángCarbon Ltd. – est. 1989 - a joint venture with Lang Machine Works (established in 1875). New name of the LangCarbon Ltd. Terra Humana Clean Tech Engineering Ltd.). RTD and development key word: use no exotic design and materials.
- 1989-1990 Pilot Plant manufacturing of novel components, such as the indirectly heated rotary kiln of 0,5 m³/h continuous capacity and the off-gas treatment. Other full scale components are commercially available.
- 1988-1990 Full scale industrial application feasibility study and pre design
- 1990-1994 **PILOT - RESEARCH PLANT TESTS - PROVEN RESULTS: confirmed proof of evidence for main components for the technical and economical efficiency of the construction, focused on test of 3R technology specific design elements: (1)indirect heat transfer, (2)achieved very high material core temperature 750 °C in carbonization phase, (3)separation of carbon – gas-vapour phase, (4)sealings and air tight construction, (5)continuous input and output, (6)flexible operation mode, (7)high operational safety (8)high carbonizatio efficiency and high end product quality (BET 600 – 1100 m²/g).**
- 1993→ **PCT patenting program:** Method and Apparatus for Treatment of Waste Materials, Including Nuclear Contaminated Materials (patented in the USA, 1998, No. 5,707,592). Sole inventor: Edward Someus
- 1994-2001 **Full scale detailed engineering design and work out of alternative industrial applications (detailed engineering design for 0,8 m³/h, (5760**

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- m³/year throughput)** and pre design for 2,5 m³/h and multiple reactor installations).
- 1999-2003 Process method and industrialized full scale technology engineering design development of animal bone charcoal integrated solid state fermentation and formulation biotechnology.
- 2002 EU FP5 NNE5/363/2001 Clean Coal project for specific energy application of combined coal and biomass programme (three years programme starting from August 1, 2002, total cost € 2,25 million).
- 2003 June 23 Patent application for Phosphorus recovery from animal bone charcoal for biocontrol and natural P supply purposes. Sole inventor: Edward Someus
- 2004 June 23 PCT patent application for world wide all countries
- 2004 August 19 **ISO 9001 and ISO 14001 certified** for subjects: Research, development and implementation of pyrolysis technologies. Application of pyrolysis technologies for production, surface modification and regeneration of carbon products.
- 2004 EU compatible Authority permitting of industrial operations for the 3R installation in West Hungary (Polgardi). The industrial plant meets the requirements of the US EPA U.S. RCRA Miscellaneous Units 40 CFR 264 Subpart X as well.
- 2004 December **Finalization of the comprehensive 3R carbonization industrial demonstration and production plant's erection for Clean Coal energetic material treatability study application and production of 500 t/year animal bone charcoal.**
- 2005 March The RTD project EU FP6 514082 PROTECTOR is EC contracted and starting March 1 (12 partners from 8 countries). The low input farming RTD and demonstration project is aiming to develop biocontrol agents against soil borne plant pathogens in the vegetable cultivations and provide natural plant nutrition. (42 months programme, total cost € 2,63 million).
- 2005 Jan – July Successful execution of Clean Coal pilot testing** (111 tons coal and biomass throughput)
- 2005 September Completion of the final scientific and technical report submission for successfully completed NNE5/363/2001 EUFP5 project.
- 2006 February The EU Commission DG Transport and Energy accepts final scientific and technical report for NNE5/363/2001 and congratulates for the achieved results.**
- 2006 October ISO 9001 and ISO 14001 certified for agro biotechnology as well.**
- 2007→ 3R Clean Coal Energy: US/UK licensed and London Stock Exchange listed, symbol: NVR.**
- 2008 AGROCARBON: application development completed and successfully full scale tested. Reports and publications launched Autumn 2008.**

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