

## CURRICULUM VITAE

**Sally G. Krigstin**

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**Over 25 years of experience in the forest products industry spanning operational management, technical, project management, service delivery and business development disciplines underscores my ability to engage decision makers and conceive innovative product and process solutions.**

### **1. EDUCATION**

Ph.D. "Characterization of Recycled Paper Mill Sludge and Evaluation of Potential Applications

NSERC PGS

University of Toronto, Toronto, Canada.

2008

M.Sc.F. "Analysis of the Thermal Decomposition and Heat Content of Hybrid Salix clones."

NSERC PGS

University of Toronto, Faculty of Forestry, Toronto, Canada.

1986

B.Sc.F. (Wood Science) "Variation in chemical extractives found in Scott's Pine foliage."

University of Toronto, Faculty of Forestry, Toronto, Canada.

1982

### **2. ACADEMIC EXPERIENCE**

#### **Faculty of Forestry, University of Toronto**

- Assistant Professor 2008-present
- Program Coordinator Forest Biomaterials Science 2008-present
- Appointed to U of T Graduate Faculty 2008
- Program Coordinator Master of Forest Conservation 2011-present

#### **Department of Applied Science and Engineering, University of Toronto**

- Coordinator of Certificate in Renewable Resource Engineering 2015-present
- Course Instructor 2011-present
- Course Coordinator – Pulp and Paper Chemistry 2006 & 2007

#### **International Energy Agency (IEA)**

- Secretary, Task 43-Biomass feedstocks for energy markets. 2010-present

#### **School of Integrated Studies, Durham College**

- Instructor - introductory inorganic chemistry

2006

#### **Faculty of Forestry, University of Toronto**

1983-1986

- Instructor for 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> year courses on Forest Products and Wood composites.
- Teaching Assistant and Laboratory Demonstrator for Organic Chemistry

### **3. COURSES**

Bioenergy and Biorefinery Technologies (FOR425, FOR1294)

- Faculty of Applied Science and Engineering, School of Graduate studies

Discovering Wood and its Role in Societal Development (FOR308)

- Faculty of Applied Science and Engineering

Capstone Project in Forest Conservation (FOR3008)

- School of Graduate studies

Internship in Forest Conservation (FOR3007)

- School of Graduate studies. Placed over 130 students in internship positions

Biodiversity of Forest Organisms (FOR3001)

- 1/4 course, School of Graduate studies.

Research Paper/Thesis in Forest Conservation (FOR401)

Forest Products I,II (1985,1986), undergraduate level

Composite Wood Processes and Products (1986), undergraduate level

#### **Other Teaching and Administrative Experience:**

- Accreditation review of Professional Master in Forest Conservation program.
- Designed and develop Renewable Resource Engineering Certificate – Faculty of Applied Science and Engineering.
- Designed and developed major/minor programs in Faculty of Arts and Science at the University of Toronto (Forest Biomaterials Science)
- **Supervision of Highly Qualified Personnel:** Total 47, Undergraduate: 15, MFC's: 10, Master's: 3, Doctoral: 3, Postdoctoral: 2, Other: 15.

#### **4. INDUSTRY-ACADEMIA SYNERGISTIC EXPERIENCE**

Returned to academia in 2003, supported by an NSERC PGS, after 18 years in progressive positions in the pulp and paper industry, to pursue a Ph.D. degree in an area of industrial and environmental significance; authenticate beneficial uses of papermill sludge through characterization and prototyping. The value of the research to industry was validated by the Heffernan Innovation Fellowship award (2 years) and OCE's Market Readiness grant following candidacy term.

#### ***Spin-off Companies***

Co-founded **Natures Affinity Inc.** Manufactures of bio-based binders and coating used to provide water resistance to wood/plant fibre products such as paper and pulp moulded products. Certified as USDA Biopreferred® and safe for food packaging under Health Canada Food Packaging regulation. The company aims to lower carbon footprint of food packaging materials, horticultural products, and consumer products by replacing plastics with natural, biodegradable products. In 2016, company was granted \$350,000 from the Investment in Forest Industry Transformation (IFIT) for 1<sup>st</sup> commercial plant in Newmarket, ON. Company has customers in Europe, North America, and China. Industry collaborators: Pulp Moulded Products, MSIPME.

Co-founded **Engineered Biofibres Inc.** Pilot facility for manufacturing EBF pellets, a reinforcing filler for thermoplastic composites from paper machine sludge. The EBF material imparts higher stiffness to plastic and can be produced at lower cost than comparable inorganic /organic fillers. The product has been proven in commercial manufacturing facilities. Industry collaborators (major): Resolute Forest Products, Atlantic Packaging, Georgia Pacific, Absa Resins, Enviroshake, Swiss pllass, Art Moulding.

## ***Government-Academia Interactive Program Lead***

In 2008, was hired as Assistant Professor (CLTA) by the Faculty of Forestry, University of Toronto for a 3 year to build workforce capacity for the Forest Products Industry under the Ontario government's Wood Promotions program. The objective of the externally funded position was to promote a shift in the Ontario forest industry to production of value added and novel high-value forest products by increasing marketing and intellectual capacity. This was to be achieved through promotion and development of human resource capacity to facilitate the shift to a market perspective and to build excitement around new products and processes to attract bright students to this field. To this end, collaborative major and minor undergraduate programs in Forest Biomaterials Science were developed and introduced in the Faculty of Arts and Science. Two new courses were created; Bioenergy and Biorefinery Technologies and Discovering Wood and its Role in Societal Development which are over.

In my role as Assistant Professor I have gained exposure to academic world as it relates to fundamental research, proposal preparation, academic-industry collaboration and institutional research policies. I have made several disclosures to the University from my own research and have worked closely with U of T's research service group on issues such as budgets, IP, commercialization, personnel hiring, etc. Industrial innovation is key focus of my research as evidenced by a number of NSERC engage, OCE TPS awards on which I served as co-investigator.

### **5. INNOVATIONS AND DISCOVERIES**

- I. Hydrophobic Nanocellulosic for Water Resistant Coating – University of Toronto Disclosure Reference No: 10002613. US Patent Pending
- II. Hydrophobic functionalization of lignocellulosics - University of Toronto Disclosure reference No: 10002231. Status – Joint venture company, patent pending. Co-founder Natures Affinity Inc.
- III. Beneficial utilization of sludge residue prepared by a patented drying system - University of Toronto Disclosure reference No: 10001507. Co-founder Engineered Biofibre Inc.

### **6. AWARDS & GRANTS**

- 2016-18 Program of Energy Research and Development (PERD), NRCan (with Canada Wood Fibre Centre and Canmet Energy) \$150,000/year
- 2016 Tooling Artwork Holding Ltd. Service Contract - \$12,000
- 2015-16 Investment in Forest Industry Transformation (IFIT), Natural Resources Canada. Biobinder Demonstration Plant \$350,000.
- 2009-15 NRCan Contribution Program for promoting forest innovation: \$40,000-2015, \$60,000-2014, \$40,000-2013, \$20,000-2012, \$27,000-2011, \$50,000-2010,\$40,000-2009.
- 2015 Haliburton Forest Fund: Market assessment of woody residues. \$3,000
- 2015 Natural Resources Canada Service Contract: \$22,000
- 2014 Natural Resources Canada Service Contract: \$20,000
- 2014 OCE VIP-Development of plantable containers using bio-based fibre material. \$30,000
- 2012-13 Natural Resources Canada Service Contract: \$14,600
- 2012-13 Natural Resources Canada Service Contract: \$20,150



**Shift Technical Assistant** Quebec and Ontario Paper, Thorold, ON 1990-91

Shift supervisory team member overseeing all technical aspects of mill operation. Trained and supported operating personnel in reaching safety, production and quality targets. Optimized and formalized process and machine operating instructions which lead to improved operating efficiency. Led cross-functional team to resolve technical issues and process bottlenecks through process modifications and operator mentorship.

**Process Engineer** Atlantic Newsprint & Tissue Mills, ON 1991-95

Member of team which commissioned and started up the 1st recycled Newsprint mill in Canada (400 tonne/day) and a 100% recycled tissue mill (70 tpd). Technical and engineering skills developed and tested in fact-paced manufacturing environment to meet Company and investor objectives. Gained extensive experience in coordination, project commissioning, responsible for deliverables, status reporting to management and project issues escalation. Technical projects/challenges included:

- ◆ **Deinking Processes and Auxillary Chemical systems:** Engineered and designed the chemical processes for a 400 tonne/day deinking mill. Chemicals included: hydrogen peroxide, sodium hydrosulphite, caustic, sodium silicate, DTPA, sulphuric acid, Talc, dyes.
- ◆ **Effluent Treatment Plant:** Re-designed secondary treatment plant aeration system to increase the aeration capacity, reduce energy consumption and reduce maintenance costs.
- ◆ **Winder Operation:** Provided technical assistance in resolving paper quality problems by implementing changes to winder operation. Prioritized maintenance and developed a preventative maintenance program.

**Pulp and Paper Marketing Specialist** Honeywell Industrial Automation and Control  
1995 -97

Spearheaded marketing of Honeywell's first offering in on-line Quality measurement and control system in North America (Product manager). Nominated to the IAC Achievers Club Honeywell 1995 for ability to identify and align clients' emerging technology needs with Honeywell's product and service offerings and enhancing the professional image of the Pulp and Paper Marketing/Sales group. Acquired an in-depth understanding of the business-technology interface.

**Quality Assurance and Development Manager** Atlantic Newsprint & Tissue Mills, ON 1997-2003

Demonstrated expert proficiency with strategic planning, project management and process improvements and building high-performance teams to meet company's strategic objectives in areas of environment, H&S and product and process quality. Demonstrated distinctive ability to train and lead efficient, goal-focused teams. Member of site Steering Committee – responsible for driving management change.

- ◆ Direct supervision for 5 Process Engineers and 6 process/quality technicians. Management of all issues related to water treatment plant, site environment and quality management system.
- ◆ Site Liaison with Municipality of Durham Region and Ministry of Environment.
- ◆ Lead public engagement with respect to Soil amendment program using mill waste

## **8. PUBLICATIONS AND PRESENTATIONS**

### ***Refereed Publications***

- Krigstin, S., and S. Wetzel 2016. A Review of Mechanisms Responsible for Changes to Stored Woody Biomass Fuels. *Fuel* V. 175, 1 July 2016: 75-86.
- Krigstin, S., Wetzel, S., Mabee, W. and S. Stadnyk. 2016. Can Woody Biomass Support a Pellet Industry in Southeastern Ontario: A Case Study. *Forestry Chronicle* (accepted for publication (12-2015).
- Acquah, G.E., Krigstin, S., Wetzel, S., Cooper, P., and D. Cormier. 2016. Heterogeneity of forest harvest residue from Eastern Ontario Biomass Harvests. *Forest Products Journal* 66 (3-4): 164-175.
- Sameni, J., Krigstin, S., and M. Sain. 2015. Effect of preparation parameters on the formation of lignin acetate microspheres. *International Journal of Engineering and Innovative Technology (IJEIT)*4(8): 12pp.
- Barrette, J., Thiffault, E., Saint-Pierre, F., Wetzel, S., Duchesne, I. and S. Krigstin. 2015. Dynamics of dead tree degradation and shelf-life following natural disturbances; can salvaged trees from the boreal forest ,fuel' the forestry and bioenergy sectors? *Forestry* 88(3): 275-290.
- Parzei, S., Krigstin, S., Hayashi, K., and S. Wetzel. 2014. Forest harvest residues available in Eastern Canada – a critical review of estimations. *Forestry Chronicle* 90(06): 778-784.
- Khan, S., Krigstin, S., Volpé S. and S.Wetzel 2014. Essential oil composition of forest biomass stored under industrial conditions in Eastern Canada. *Industrial Crops and Products* 56(2014): 35-42.
- Sameni, J., Krigstin, S.G., Derval dos Santos Rosa, Leao, A. and M. Sain. 2014. Thermal Characteristics of Lignin Residue from Industrial Processes. *Bioresources* 9(1), Feb 2014.
- Krigstin, S.G., Tchorzewski, J., Hayashi K. and S. Wetzel. 2012. Current Inventory and Modelling of Sawmill Residues in Eastern Canada. *Forestry Chronicle* 88(5): 626-635.
- Gupta, G., Wetzel, S., Volpe, S. and S. Krigstin. 2011. Enhancing the value of forest harvest residue by fractionation; raw material for particleboard and energy applications. Submitted for review *Biomass and Bioenergy* April 2011.
- Levin, R., Krigstin, S. and S. Wetzel. 2011. Biomass Availability in eastern Ontario for Bioenergy and Wood Pellet Initiatives. *The Forestry Chronicle* 87(1):33-39.
- Krigstin, S.G. and Sain, M. 2008. Determination of the mineral constituents of recycled paper mill sludge. *TAPPI Journal*. v 7, n 6, p 9-14.
- Krigstin, S.G. and Sain, M. 2007. The fractionation of dry recycled papermill sludge to higher value components. *Journal of Biobased Materials and Bioenergy*. v 1, n 3, p 315-322.
- Krigstin, S. and M. Sain. 2006. Characterization and potential utilization of recycled paper mill sludge. *Pulp and Paper Canada*. v 107, n 5, p 29-32.
- Krigstin, S.G., K. Wong and D.N. Roy. 1993. The Contribution of the Chemical Components in Juvenile Hybrid *Salix* spp. To its total energy output. *Wood Science and Technology* 27:309-320.

### ***Book Chapter***

- Krigstin, S.G., Levin, R. and S. Wetzel. 2011. Greening the Urban Grid: Bioenergy for the Urban Environment, Chapter 25 in *Handbook of Metropolitan Sustainability*. Woodhead Publishing.

### ***Non-Refereed Publications***

- Natural Resources Canada: Current inventory and modeling of sawmill residues in Eastern Canada, summary in *Issues in Forestry Research and Application: 2013 Edition*. Pg. 291

Krigstin, S. and M. Sain. 2005. Recovery and Utilization of Fibre from Recycled Papermill Sludge. *Paper Technology* Vol. 46, No. 7. Pgs. 37-42.

Krigstin, S.G. 2005. Characterization and potential utilization of recycled paper mill sludge. Annual meeting proceedings, Book 1 Montreal, Canada.

Simonetti, M.C. 1987. Waste management improves profitability. *Water and Pollution Control*. Vol. 125, No. 1.

Roy, D.N., G.C. Deka and S.G. Krigstin. 1988. Selection of hybrid willow clones based on their biomass quality and end use. *Research Notes 41*. Proceedings from Willow Breeding Symposium, Uppsala, Sweden, Aug. 31 – Sept. 1, 1987.

### ***Presentations and Posters***

Krigstin, S. 2016. Breaking down certification barriers: growing the pulp moulded industry into new markets. International Moulded Fiber Association Annual Conference. 14-16 April, 2016. Vancouver, Canada. Invited Speaker.

Wetzel, S., Volpe, S., Rosser, D., Krigstin, S., Sameni, J. and K. Johnson. 2015. Storage phase as pretreatment to optimize biomass quality. FPInnovates Innovation and Technology Conference. 25-26 November, 2015. Montreal, Quebec.

Wetzel, S. and S. Krigstin. 2015. Can woody residues support a pellet industry? Eastern Ontario as a Case Study. Canadian Institute of Forestry Webinar. March 11, 2015.

Sameni, J., Krigstin, S., and M. Sain. 2014. Novel Bio-Based Oil and Water Resistant Coating Material for Cellulosic Surfaces. Oral presentation at the 13th International Symposium on Bioplastics, Biocomposites and Biorefining (ISBBB-2014). May 19-24 Guelph, Canada.

Barrette, J., Thiffault, E., Wetzel, S., Duchesne, I. and S. Krigstin Using salvaged trees for the production of bioenergy. Abstract for the Fourth International Forest Biorefinery Symposium February 3-4, 2014 at the Queen Elizabeth Hotel in Montreal.

Sameni, J., Xu, J., Krigstin, S. and M. Sain. 2013. Biobase pots with controlled biodegradation feature for horticultural industry. BioNIB 2<sup>nd</sup> Annual meeting, Nov 22, 2013. University of Guelph. 2<sup>nd</sup> prize poster award.

Khan, S., Krigstin, S., Volpe, S., and S. Wetzel. 2013. Value of essential oils from stored forest biomass in Eastern Canada. Bioeconomy Research Highlights Day 2013. Hosted by OMAF and MRA at University of Guelph (Nov 27, 2013) Poster

Gupta, G., Krigstin S., and S. Wetzel. 2013. A survey of chloride content of Great Lakes St. Lawrence Forest Biomass, as source of EU export pellets. Bioeconomy Research Highlights Day 2013. Hosted by OMAF and MRA at University of Guelph (Nov 27, 2013) Poster

Sameni J., Xu, J., Krigstin, S. and M. Sain. 2013. Biobase pots with controlled biodegradation feature for horticultural industry. Bioeconomy Research Highlights Day 2013. Hosted by OMAF and MRA at University of Guelph (Nov 27, 2013) Poster

Krigstin, S.G. 2013. Doing more with Eastern Canada's Forest Resource. Forest Products Society Annual General Meeting "The Global Forest Products Market Place – Can Eastern Canada Compete?" May 29 – 30, 2013. Fredericton, NB (invited speaker)

Krigstin, S.G. 2013. Hydrophobic pulp moulded products – meeting the demand for sustainable products. IMFA's 16<sup>th</sup> International Molded Fiber Packaging Seminar. April 25-26, 2013. Toronto, Canada. (invited speaker)

Krigstin, S.G., Gupta, G. and S. Wetzel. 2012. Innovative utilization of forest harvest residue: examining effects of fractionation and storage on raw material quality for panel products and energy. Forest Product Research Society 66<sup>th</sup> International Convention. June 3-5, 2012. Washington, D.C.

Krigstin, S.G., Sameni, J. and M. Sain. 2012. Commercialization of Lignin-Based Products for the Horticultural Market. 12<sup>th</sup> International Conference on Biocomposites. May 6-8, 2012 Niagara Falls, Canada.

Krigstin, S.G., Wetzel, S. and D. Cormier. 2011. Valuation of Biomass Harvesting in Eastern Ontario Mixedwood Stands. All About Bio-Energy: Suppliers, Manufacturers and Small Communities. Bancroft/Pembroke, ON. February 15-16, 2011.

Krigstin, S.G., Wetzel, S. and D. Cormier. 2010. The role of integrated feedstock management in establishment of new markets. Natural Resources Canada meeting November 2010, Jasper, AB.

Krigstin, S.G., Wetzel, S. and D. Cormier. 2010. Valuation of Biomass Harvesting in Eastern Ontario Mixedwood Stands. I.E.A. Task 43, Kamloops, B.C. June 1-4, 2010.

Krigstin, S.G. 2009. Implications of Biomass Quality on Pellet Production from Trial Harvests in Eastern Ontario. Harnessing Biomass: From the Forest to the Market Place. Nipissing University. October 22-23, 2009.

Levin, R. and S.G. Krigstin. 2009. The Forest Industry in Eastern Ontario: Economic Downturn & Bioenergy Potential. Harnessing Biomass: From the Forest to the Market Place. Nipissing University. October 22-23, 2009.

Dunham, K. and S.G. Krigstin. 2009. An Operational Biomass Harvest in South-Eastern Ontario. Natural Resources Canada.

Krigstin, S.G. and M. Sain. 2007. Utilization of Recycled Papermill Sludge for Value-Added Bio-Products. 9<sup>th</sup> Annual Society of Plastics Engineers of Ontario Industry University Night. Poster Session, March 15, 2007. Toronto, Ontario.

Krigstin, S.G., and Sain, M. Exploration into the Fractionation Potential of Recycled Papermill Sludge for Developing Engineered Bio-Materials. 13<sup>th</sup> Annual Graduate Student Research Conference. Applied Chemistry and Chemical Engineering, University of Toronto, June 19, 2006.

Krigstin, S. and M. Sain. Utilization of Recycled Papermill Sludge for Value-Added Bio-Products. Ontario Centres of Excellence, Discovery 2006 - Bridging the Innovation to Commercialization Gap. Poster Session, February 7, 2006 [No.18]. Toronto, Ontario.

Krigstin, S. and M. Sain. Utilization of Recycled Papermill Sludge for Value-Added Bio-Products. 2006. Canadian Pulp and Paper Graduate Student Seminar. 92<sup>nd</sup> PAPTAC Annual Meeting, Montreal, PQ, February 9, 2006.

Krigstin, S.G., and Sain, M. Beneficial Utilization of Pre-treated Paper Mill Sludge. 12<sup>th</sup> Annual Graduate Student Research Conference. Awarded the Best Paper of the Conference. Applied Chemistry and Chemical Engineering, University of Toronto, June 9, 2005.

Burns, A.G., Narayan, S., Krigstin, S.G., Dungeat, D. 2005. High Efficiency Mechanical Drying of Newsprint De-Inking Sludge Using the KDS Micronex™ Vertical Shaft Mill at the Atlantic Packaging Mill (Whitby, Ontario). 3<sup>rd</sup> Canadian Organic Residuals and Biosolids Management Conference. June 1<sup>st</sup>-4<sup>th</sup>, 2005 in Calgary, Alberta

Krigstin, S and M. Sain. 2005. Beneficial utilization of Pre-treated paper mill sludge. Environmental Consortium meeting, Dept. Applied Chemistry and Chemical Engineering, University of Toronto, May 10, 2005.



Krigstin, S.G. and Sain, M. Characterization and Potential Utilization of Recycled Paper Mill Sludge. 91th PAPTAC Annual Meeting, Montreal, PQ, Feb., 2005

Krigstin, S.G. 1991. Print characteristics of 100% recycled newsprint. Printing Session. Paptac annual meeting, Montreal, Canada

Krigstin, S.G. and D.N. Roy. 1985. Contribution of the chemical components in juvenile hybrid Salix spp. To its total energy output. Chemistry Technical Session, 39th Annual Forest Products Research Society Meeting, Orlando, Florida, June 1985.

Krigstin, S.G. and D. N. Roy. 1984. Energy Output of Hybrid Willow. United Nations International Poplar Commission, 17th Session, Ottawa, Canada.

### **PROFESSIONAL AFFILIATIONS AND ACTIVITIES**

- Canadian Institute of Forestry, Southern Ontario Section Executive member 2012 -
- Forest Products Society, Eastern Canadian Section Board of Director Trustee & Treasurer, 2012-
- Faculty of Forestry Alumni Association – Executive member & Treasurer, 2016 –
- Co-Chair Health and Safety Committee, Faculty of Forestry, 2012-2014, 2015-
- Techno Training Program – Impact Centre – University of Toronto. 2014
- Inauguration of the International Year of the Forests, Jan 2010. Paris, France - Exhibit.
- UNECE Timber Committee and the Society of Wood Science and Technology, Oct 11-14, 2010 - Exhibit
- Biotechnology Career Fair, Runnymede PS, ON. April 2010 & 11 - Workshop presentation
- SHSM Program development on Green Industries for Don Mills Collegiate, ON. April 2011-August 2011. - Workshop development and presentation.
- Arts & Science Career Day, Toronto, ON. Annually. - Full exhibit
- Organize annual graduate student research day
- Outreach – prepare and deliver educational outreach to elementary and high school students.
- Bring your sons and daughters to work organizer
- Member of Faculty of Forestry Deans Review & Selection Committee
- Technical Advisory Group member Ontario East Wood Centre
- Invited speaker for the Edwardsburgh/Cardinal Eco-industrial site/Wood Centre Project, Brockville, Ontario, Dec 5, 2008, February 23, 2007
- Teaching Assistants' Training Program, University of Toronto. 1)Evaluating written work, 2)Teaching to different learning styles, 3)First time TA: Science and Engineering
- Member of Advisory Committee at Durham College for the Paper Recycling and Processing Technologists program
- Founding member of South Durham Industrial Society
- Volunteer member of Markham's Waste Management Committee; Member of Flexographic Printing Round Table Group – Providence Journal – Providence Rhode Island.