

FORIC

Forest as a Resource Industrial College



Competence development for regional renewal

The market conditions of the Swedish forest industry are rapidly changing. Worldwide adaptation to deal with the climate change will increase the importance of biomaterial resources. Substitution for fossil-based energy, chemicals, and materials will lead to the more diverse use of renewable biomaterial, wood included. This creates possibilities to broaden the product portfolio from the forest industry to include bio-based chemicals, biofuels, electric power, and new bio-based materials.

Many such new products are outside of the core business of the current industry, so that product innovation must be combined with production process development, creations of new business models and enhanced business relationships to establish a new type of industrial symbiosis. At Mid Sweden University, we call this process ***Transforming the Industrial Ecosystem.***

The industrial graduate school FORIC acts since its establishment in 2014 as a unique PhD school designed to support this transformation. It offers an exclusive multidisciplinary environment where industry-employed students work together with senior scientists from the academy and industry to create knowledge and competence in terms of crucial aspects that relate to the ongoing industrial transformation.

The paper industry needs to adopt to changing markets. For example:

- Decreased production of printing paper
- Increased production of paperboard
- Increased production of tissue
- Falling energy prices (increased energy supply)
- Reduced value of bioenergy
- Decreased production of recycled pulp and groundwood pulp
- Increased production of chemical pulp and CTMP
- Increased efficiency in the pulp production both in sulphate pulp, TMP and CTMP
- Great interest in producing products from residual streams

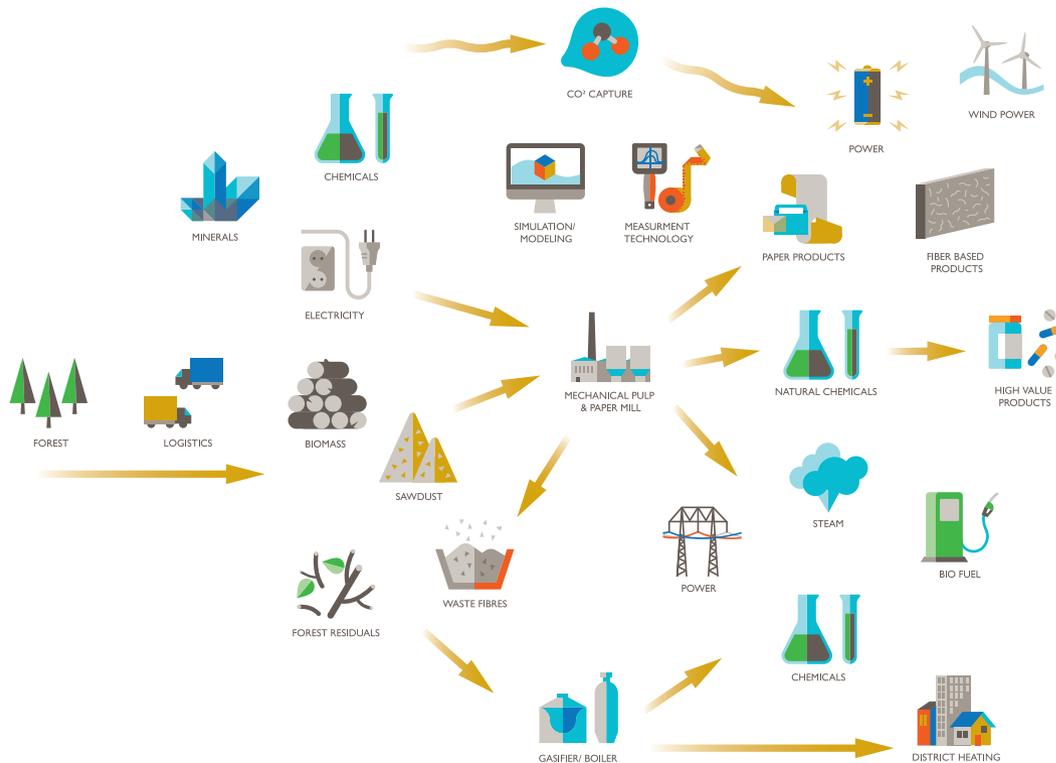
Our goal in FORIC is to contribute to these changes in different ways.

FORIC is led by Professor Per Engstrand and is the kernel for a growing network of different projects. The PhD students work with projects about business opportunities and value chains around the core of pulp, paper and timber manufacturing. Interactions between the projects and the regional innovation clusters build an innovation network that drive the transformation of the industrial ecosystem with a focus on the new bioeconomy.

Transforming the Industrial Ecosystem describes a vision for regional renewal and growth. It combines the industrial strengths of the mid-Sweden region with the dynamic force that Mid Sweden University represents. The university attracts and educates young people to work in the region and sustain industrial competitiveness. Through its research and knowledge transfer the university facilitates renewal.

When acting in symbiosis, the current industrial core and the new businesses at its edges can become an effective ecosystem that continuously renews itself.

The graduate school started with 13 industrial PhD students and is already showing good results, with a publication rate above planned. The second admission of PhD students will start in 2016.





FORIC is a graduate school in close cooperation with the industries and companies in Sweden where PhD students are employed by the companies and do their research studies part time. Our goal is to create a network of value streams around bio-based industries and increase the competitiveness of the partner companies. These researchers and projects started in FORIC 2014. Read more on miun.se/foric

Research projects in FORIC 2014

Research project in FORIC	Researcher	Company
Wood preservative treatment and modification techniques; identification, evaluation and assessment of barriers and key success factors for large-scale commercialization	Jonas Johansson	SCA Timber AB
New use for bio-sludge from pulp and paper industries	Robert Norgren	Ragn-Sells AB
Methane measurement system and analysis	Bakhran Gaynullin	SenseAir AB
Technical and economical systems modelling of a mechanical pulping based bio refinery	Alexander Hedlund	FrontWay AB
Improved fines material control	Mathias Lundberg	PulpEye AB
Modified fibre process for improved final product properties	Hafizur Rahman	SCA Forest Products AB
Integrated energy solutions	Anna-Karin Stengard	Sundsvall Energi AB
Industrially feasible methods for production of nanocellulose for chemical pulps	Carl Moser	Valmet AB
Cost-effective nanolignocellulose as substitute for CMC in multi-layer fibre applications	Sinke Henshaw Osong	MoRe Research and Mid Sweden University
Connecting high yield pulp properties with functional product properties	Olof Ferritsius	Stora Enso and Mid Sweden University
Development of a domestic forest based tanning agent	Mats Paulsson	Sylvestris AB
Fibrillar chemical pulp fines to enhance paper board strength	Elisabeth Björk	Inventia AB
Value creating and efficiency in wood supply chains	Magnus Larsson	Skogforsk/Stiftelsen skogsbrukets forskningsfond

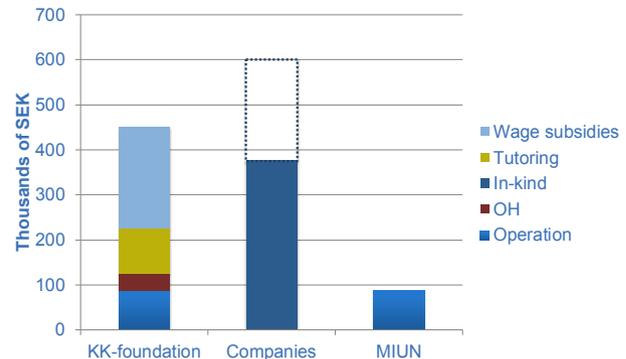
Budget for a PhD Student

FORIC is planned to run for eight years, from 2014 to 2021. It is supported and partly financed by the Knowledge Foundation (in Swedish: KK-stiftelsen). All PhD students will present a Licentiate Thesis and ten of them are planning to present a Doctoral Thesis in their subject during their research education. The university investigates approx 100 000 SEK annually in each PhD student. In the diagrams, you can follow funding per full time PhD student/year and a tentative industry budget for fulltime employment equivalents.

Supervisors in FORIC

- Aron Larsson – Researcher RCR Miun
- Leif Olsson – Researcher RCR Miun
- Claes Mattsson – Researcher STC Miun
- Göran Thungström – Researcher STC Miun
- Morgan Fröling – Professor FSCN/STC Miun
- Olof Björkqvist – Researcher FSCN Miun
- Håkan Edlund – Professor FSCN Miun
- Birgitta Engberg – Researcher FSCN Miun
- Per Engstrand – Professor FSCN Miun
- Erik Hedenström – Professor FSCN Miun
- Myat Htun – Professor FSCN Miun
- Louise Logenius – Researcher FSCN Miun
- Magnus Norgren – Professor FSCN Miun
- Sven Norgren – Researcher FSCN Miun
- Kerstin Sunnerheim – Researcher FSCN Miun
- Mikael Lindström – Professor KTH

Funding per full time PhD student/year



Tentative Industry Budget

Thousand SEK/year, fulltime employment equivalents

Income		
Wages subsidy	225	
Internal Costs		
Salary PhD, student	500	28 000 SEK/month + LKP
Industrial supervisor	50	50 hours in-kind cost
Meetings and travel	30	In-kind cost
Office room	25	In-kind cost
Auxiliary costs	50	In-kind cost, e.g. mill trial costs.
Gross cost	655	Thousand SEK / full time year
Net cost	430	655-225 SEK / full time year

Contact persons FORIC

"We have very good experiences from earlier research schools at Mid Sweden University. The research school is a very good complement to our own R&D development and it increases our competence."

Folke Österberg, SCA Forest Products AB

"The research school FORIC is a clear example of the force in initiative for bioeconomics in our region."

Mats Ullmar, BioBusiness Arena



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Knowledge Foundation