Pine Chemicals- Global view

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Pine Chemicals- Global View

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Pine Chemicals- Global view

- Definition of pine chemicals in this presentation:

  - All lipophilic extractives of pine trees
  - Gum and wood rosin and turpentine
  - Turpentine and tall oil and their derivatives
  - Sofwood pulping by-products, CST and CTO

Pine Chemicals- Global view

- Contents of this presentation:
- Global Pine Chemicals market value
- Global pine chemicals sources
- Global production
- Global markets
- Future trends
- Pine chemicals in energy use
- Emerging technologies

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Pine Chemicals – Global view

My intention is not to do do like this dog although I am using data from previous studies of PCA and various presentations given at PCA earlier:

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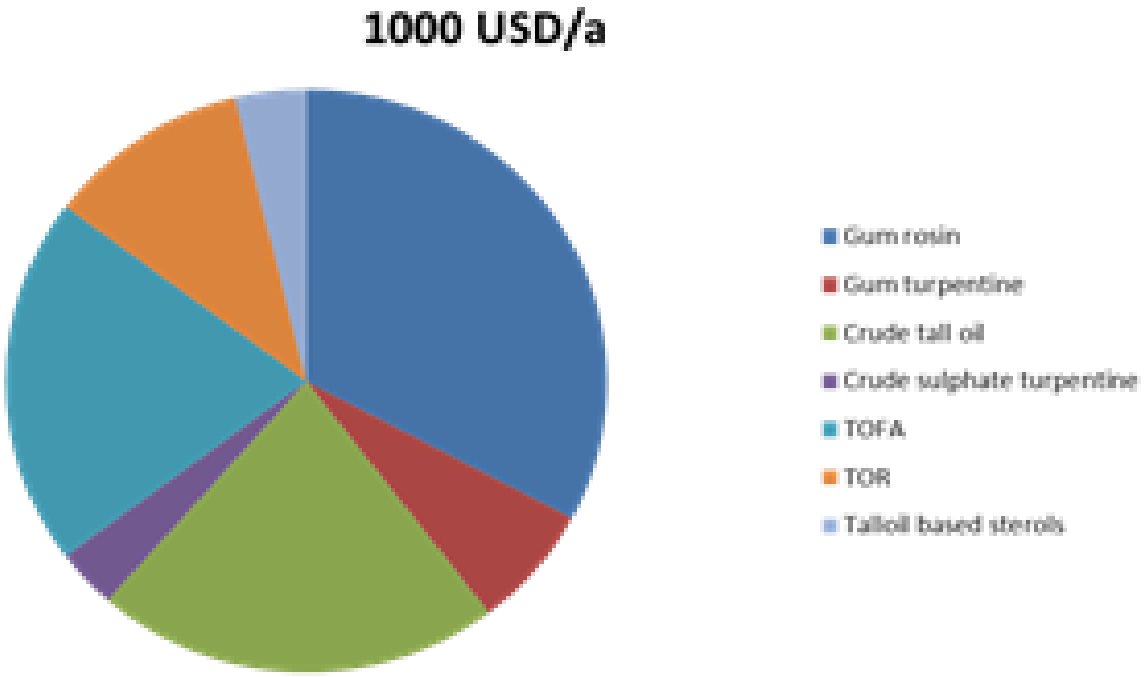
Pine Chemicals- Global market value

- Pine Chemicals market value is about 4 billion USD/a



Pine Chemicals- Global Sources

- Gum rosin production volumes in 2015 are estimated as follows:

China	600 000 MT/a
Indonesia	90 000 MT/a
Brazil	60 000 MT/a
EU	30 000 MT/a
Rest of the world	70 000 MT/a
World total	850 000 MT/a

Pine Chemicals Global Sources

- Gum turpentine production volumes are estimated as follows:

China	100 000 MT
Indonesia	30 000 MT
Brazil	25 000 MT
EU	15 000 MT
Rest of the world	20 000 MT
World total	190 000 MT

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Pine Chemical- Global sources

- Crude tall oil production in 2015 is estimated as follows:

North America (USA & Canada)	980 000 MT
Europe	890 000 MT
Asia	90 000 MT
South America	65 000 MT
Australia & New Zealand	15 000 MT
Rest of the world	20 000 MT
World total CTO production	2 100 000 MT

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Pine Chemicals- Global Sources

- Crude sulphate turpentine production in 2015:

North America (USA & Canada)	110 000 MT
Europe	55 000 MT
Rest of the world	15 000 MT
Total world production	170 000 MT

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Pine Chemicals- Global Sources

- CTO fractionation volumes in 2015
- North America (USA &Canada) 720 000 MT
- Europe 820 000 MT
- South America 50 000 MT
- Asia 110 000 MT
- Rest of the world 30 000 MT
- World total CTO fractionation 1 750 000MT

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Pine Chemicals- Global sources

- CST fractionation in 2015:

North America (USA)	90 000 MT
Europe	50 000 MT
Rest of the world	30 000 MT
World total CST fractionation	170 000 MT

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Pine Chemicals in biofuels

	MT/a	Market value 1000USD
CTO based Biodiesel	150 000	125 000
Tall oil pitch	250 000	88 000
Total CTO based biofuels	400 000	203 000

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Pine Chemicals- Future trends

- CTO and CST availability is secured by increasing softwood pulp production
- Softwood pulp demand has increased during last 10 years about 600 000 MT/a
- In the next 3-5 years , based on announced softwood pulp capacity expansions :

- CTO production capacity will increase about 150 000 MT/a
- CST production capacity will increase about 10 000 MT/a

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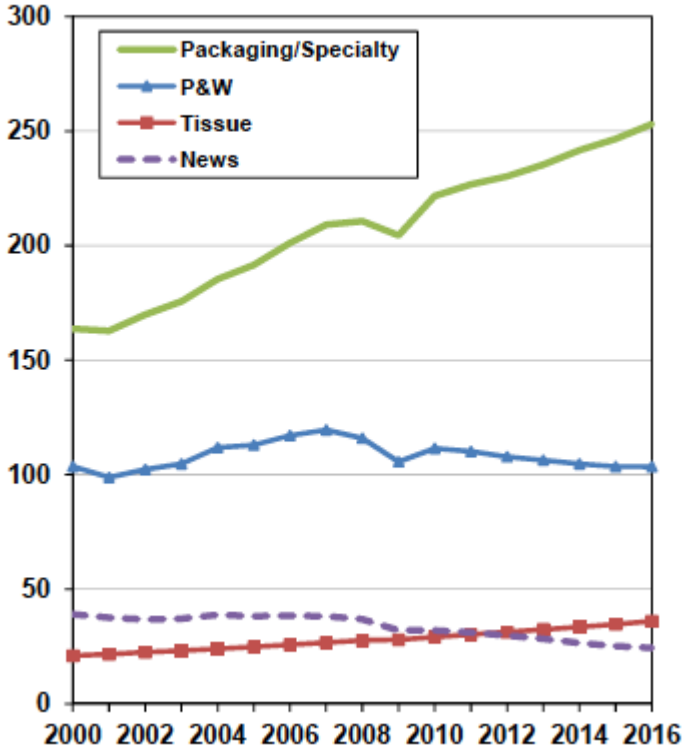
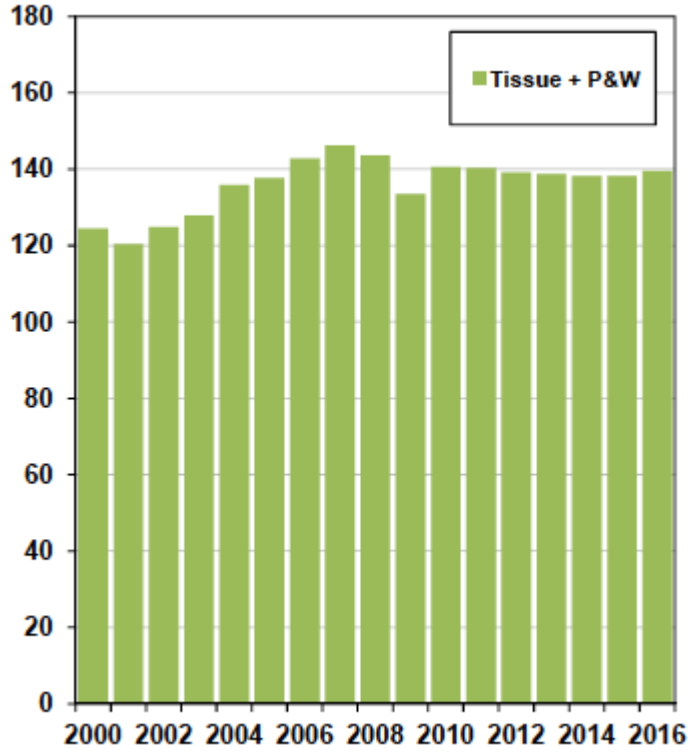
Pine Chemicals –Softwood pulping trends





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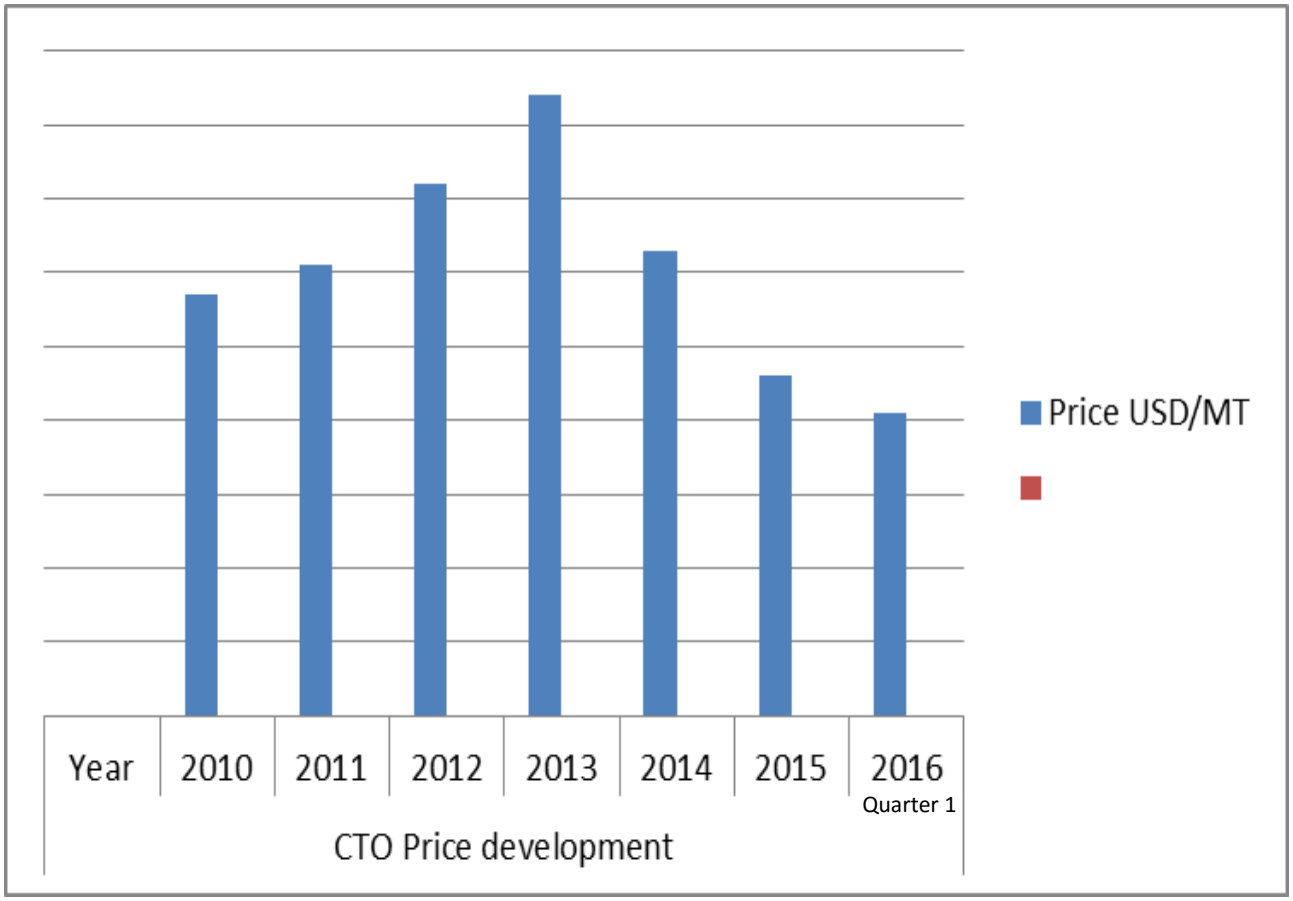
Pine Chemicals- Price development



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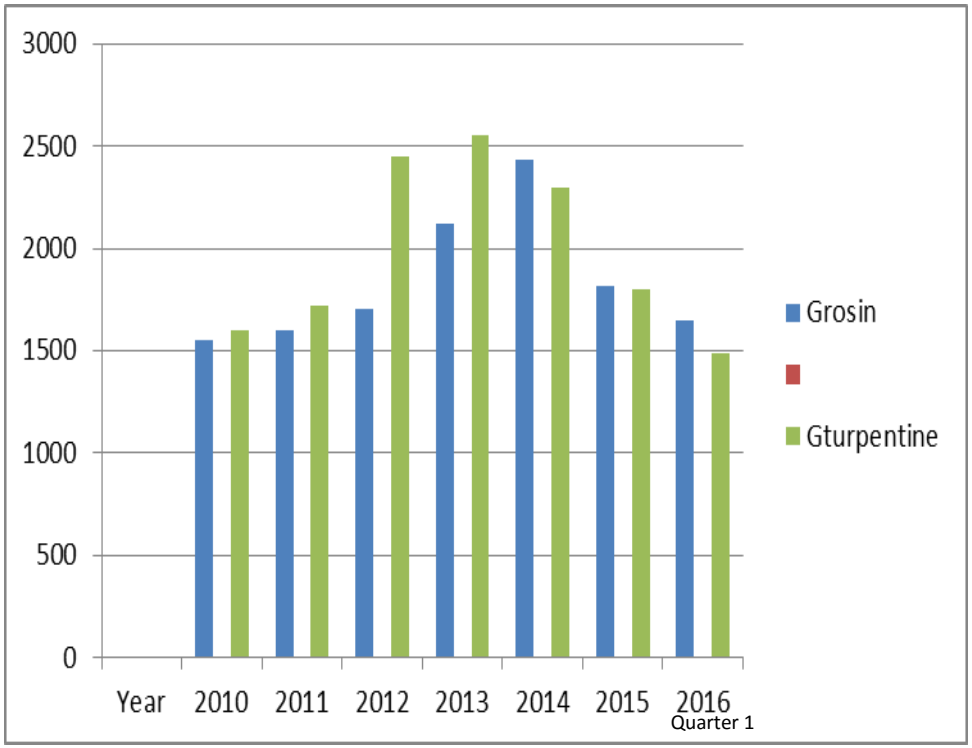
Pine Chemicals-Price development

- Gum rosin and turpentine price development (USD/MT):



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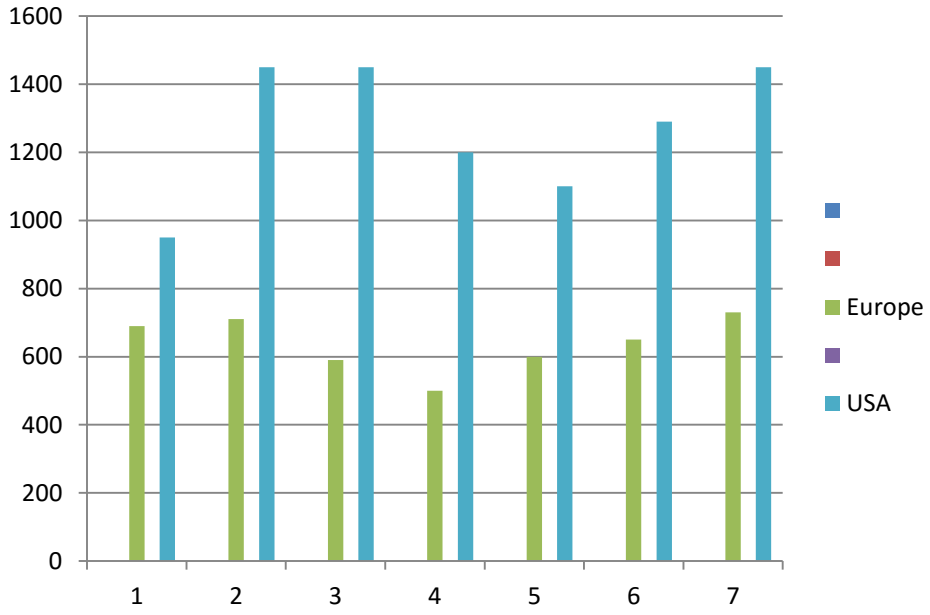
Pnine Chemicals-Price development

- Crude sulphate turpentine price development USD/Mt during the last 7 years:



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Pine Chemicals-Global market trends

- Rosin markets
  - Adhesines growth 3-4%/a
  - Inks stable or negative 1-2 %
  - Others growth 4-5 % /a
- Turpentine markets
  - -fragrance chemicals 6-8%/a
  - -adhesives 2-3%/a
- Sterol markets
  - -food applications 1-2%/a
  - -pharmaceutical raw materials 8-10%/a

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Pine Chemicals- Global market trends

- Tall oil based biofuel markets
  - Biodiesel growth > 10%/a
  - Heating oils growth 1-2%/a
- Tall oil fatty acids markets
  - Biofuels use of TOFA growth >10%/a
  - Paints and coatings 1-2%/a
  - Other applications marginal growth

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Pine Chemicals- Emerging Applications

- Use of DTO in feed products
- Use of TOFA to replace sulphur in diesel fuels
- Use of wood sterols in pharmaceutical raw materials
- USE of CTO and TOFA in oil based fracking chemicals
- Use of wood rosin in wound care products
- Use of TOP in asfalt rejuvenation and in firelogs

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Pine Chemicals- Emerging technologies

- Improved recovery systems

  - Better tapping and collection techniques im gum rosin and terpene productions

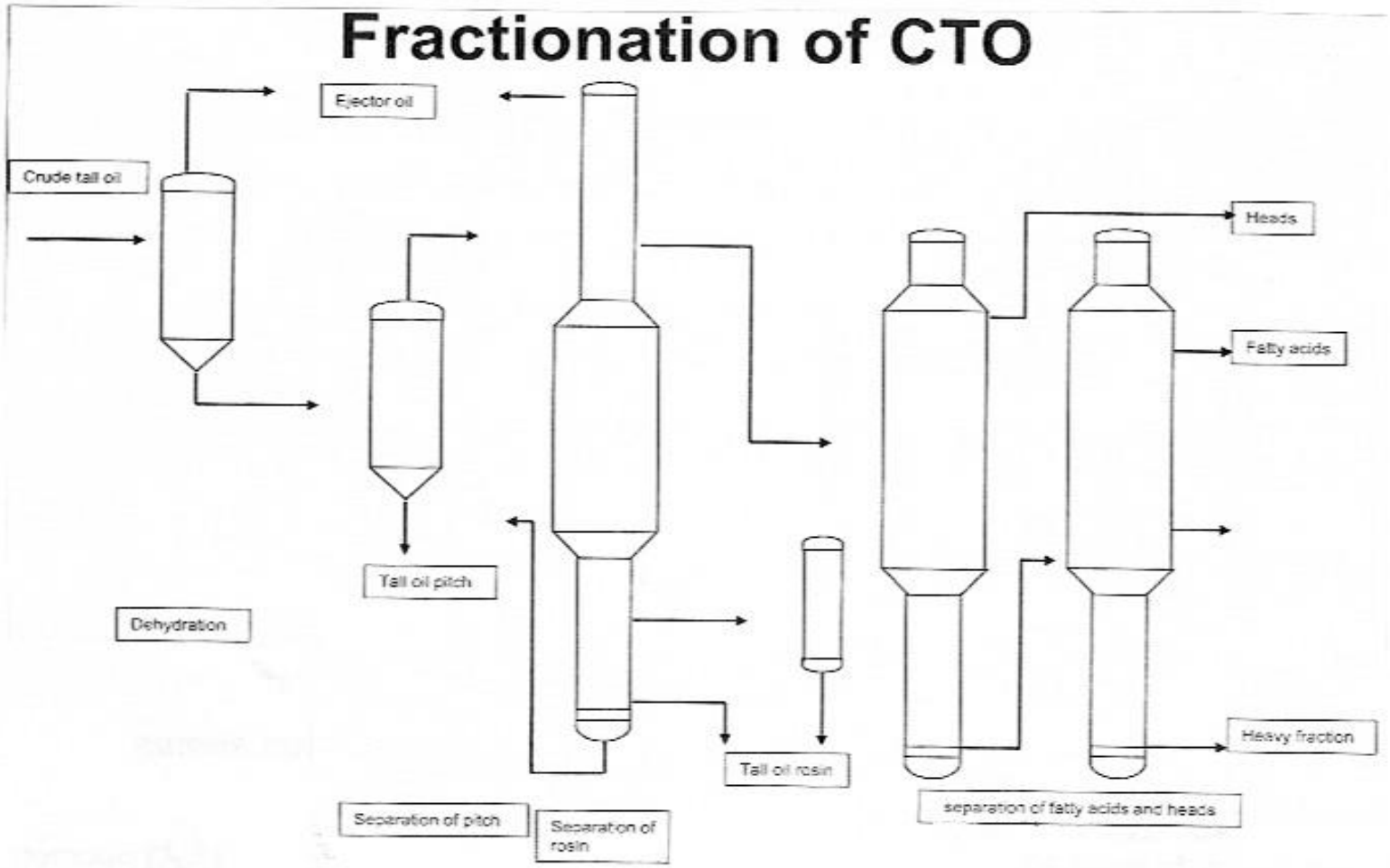
  - Making wood rosin and turpentine extracts from forest residues used in bionergy combined heat and power plants

- New ways to fractionate products

  - CSS distillation

  - TOR distillation combined with biodiesel plant

Pnie Chemicals- CTO distillation



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Pine Chemicals- Global view

- Summary
- Pine Chemicals have a good future, many new potential markets and they represents an important part of world chemical industry
- Pine chemicals raw materials are bio based , carbon neutral products of renewable sources.
- Pine Chemicals industry has a sustainable basis to operate and develop new products and markets!
- Thank you!

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