The Use of Cattail Material in Building Construction – Innovative Technological Development, Environmental Relevance and Examples of Application.

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Advantages of Cattail (Typha) for Building Materials:

+ Very special leaf texture with sponge-like tissue with low thermal conductivity $\lambda \approx 0.032 \text{ W/mK}$

+ Structure with extreme high compressive strength

+ Reet-plant with high natural microbiological resistance (no biozide necessary)

+ Low inflammability

$\Rightarrow$ Development of Building Materials
Innovative Technological Development

Development Process:

• Selection of suited species
Innovative Technological Development

Development Process:

- Selection of suited species
- Design of a building material combining all positive properties of Typha
  
  → Magnesite-Bound Building Board
Innovative Technological Development

Development Process:

• Selection of suited species

• Design of a building material combining all positive properties of Typha

⇒ Magnesite-Bound Building Board

• Layout of a first manufacturing process
Innovative Technological Development

For example: heat conductivity

Development Process:

• Selection of suited species

• Design of a building material combining all positive properties of Typha

 ➔ Magnesite–Bound Building Board

• Layout of a manufacturing process

• Optimization of the Material properties
Advantages of the Magnesite–Bond Typha Board:

- **High Compressive Strength at low heat conductivity** \((\lambda \approx 0.052 \text{ W/mK})\)
- good acoustical and fire protection properties
- high heat capacity (Heat protection in Summertime)
- medium diffusion resistance
- capillary active
- good workability with common tools
- easily accepted for cultural heritage
- **100 % compostable**
- low energy input for production
- high sustainability
Environmental Relevance and cultivation

• Prevention of CO$_2$-loss of fens by soil wetness (renaturation) (Part of the total CO$_2$-emission of Germany ca. 4%)

• Bond of CO$_2$ and other greenhouse-gases with its cultivation in fens (ca. 1.2 million ha in Germany)

• Cleaning of nutrient polluted surface water
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• Spread of fen typical species of animals
Environmental Relevance and cultivation

- Possibility for a sustainable husbandry of fens and riparian zones
- High agricultural crop (15-20 t/ha)
- After 2 years harvesting possible
- Harvest in wintertime (advantage for farmer and fen animals)
- Combination with fish farming
- Rhizomes suited for animal feed
- No competition to food production
Examples of Application

Renovation of a half-timbered house in Nürnberg

• Very bad condition of the framework with statical problems
  ➔ energetical measures in combination with stiffening measures necessary
  ➔ Magnesite-Bond Typha-Board
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• U-Value of 0.35 W/m²K with a wall thickness of 20 cm!
Summary and Outlook

• Development of an innovative building material with multiple positive properties

• High environmental advantages with the cultivation of cattail

• Numerous additional products in development:
  - Sandwich elements with extreme bending stiffness (floors, window falls..)
  - Door leaves
  - Substitution for wood (roof beams)
  - Molded installation boards
  - Building blocks
  - Armoring of plaster (see presentation of Georgi Georgiev)

⇒ looking for an investor to develop an effective industrial process and for possibilities to cultivate Typha in Germany!!