Combatting Mould:

Root causes, mitigation, and prevention

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COMBATTING MOULD

Mould occurs in many northern homes, poses a health hazard and greatly reduces housing sustainability. Mould can be mitigated or prevented by addressing the combination of technical and human factors that enable it to grow.

How does mould form? Mould can grow indoors in warm and moist areas with inadequate ventilation. Humid air condensing on cold surfaces can create optimal conditions for mould to grow. Mould is a serious indoor air quality problem as it projects spores, which commonly feed on wood products, drywall and fabric, but also on dusty surfaces, into the air and is toxic to humans. Northern homes with high occupancy rates, poor ventilation, and inadequate insulation are highly susceptible to mould.

RECOMMENDATIONS

- **Identify root causes of mould**:
  - Thermal imaging and air quality (relative humidity) monitoring can help identify moisture issues before mould problems occur. Addressing these root causes can stop mould from developing or persisting. Treating only the symptoms, for example, by cleaning mould, painting over it, or removing affected drywall or wood, is not a long-term solution.

- **Implement improved cold-climate housing design elements** in new and old housing:
  - Retrofit existing buildings to improve insulation and moisture barriers. Spray polyurethane foam insulation as an effective insulator to create a moisture barrier. Other options include building additional continuous insulation around the outside of buildings to reduce thermal bridging.[1]
  - Build tight and ventilate right. Inadequate ventilation is a major cause of moisture issues and mould. Develop better ventilation technology – ventilation systems that are designed and certified for Arctic conditions. Consider the actual number of occupants and their lifestyles.
  - Incorporate cold-climate design elements in new construction. Examples include superior insulation, wall design with drained and ventilated assemblies, improved vapour barriers, specialized soffit venting to reduce snow accumulation in interior spaces, and high-performance quadruple glazed windows.

- **Educate and train owners and occupants** to mitigate and prevent mould:
  - When mould appears, don’t wait to act. Under the right conditions mould can double in size in as little as 24 hours. Some mould can go dormant when dry and start to reproduce as soon as it gets moist again.
  - Provide owners and occupants with training and support to understand the science of condensation and mould growth and information on how to adjust their behaviours to prevent it. Work with community partners to address overcrowding in northern housing, to minimize associated impacts such as increased humidity and mould growth within homes.

1 Atchison, J. 2018. Building Envelope Design - Best Practices: Challenges for Mould Mitigation. 2018 Northern Housing Forum, Yellowknife.

CONDITIONS FOR SUCCESS

- **Address overcrowding:** When occupancy rates exceed ventilation system capacity, humidity levels rise, which contributes to mould growth. More housing is needed to address chronic overcrowding. New home design should reflect northern lifestyles and include planning and technologies that can account for varying/high occupancy and high use indoor activities.
- **Influence behaviour:** Educating owners and occupants can lead to changed behavior and can help prevent and mitigate mould quickly and with less disruption and cost than retrofits and new construction.
- **Develop local capacity:** A local workforce with skilled tradespeople is essential to help deliver retrofits and maintenance in a timely and cost-effective manner while creating local employment.
- **Require cold-climate design:** Provide information and training to contractors on cold-climate building techniques and materials and emphasize their long-term cost effectiveness. Changes to building codes or conditions on federal funding for housing construction can help enforce uptake of these techniques and technologies.

SUCCESS STORIES

The REMOTE Wall System (Residential Exterior Membrane Outside-Insulation Technique) is a leading building practice that addresses moisture problems, heat loss, and thermal bridging. REMOTE wall construction uses rigid foam board to improve insulation on the exterior of the home, while the arrangement of insulation and vapour barrier protects the structure from moisture build-up. Mechanical ventilation systems must be used since this design is very air-tight. The **Cold Climate Housing Research Center** has developed a manual on REMOTE Walls.[2]

The **Nunavut Housing Corporation** uses thermal imaging to detect thermal bridging in homes. Thermal bridging creates cold zones where humidity condenses, leading to moisture buildup and mould growth. Adding or improving insulation in these problem spots can prevent future mould growth.

The **Hydaburg Tribe** in Alaska developed a super-insulated, ultra-airtight home with high performance windows and drained and ventilated assemblies for roofs and outer walls, to move water away from the home. In-home monitoring equipment provides residents with real-time temperature and humidity information to help them understand how their activities affect the functioning of the house. The local community was involved in the project from the start, creating a sense of engagement and ownership and a real interest in knowledge and capacity development.[3]

2 Cold Climate Housing Research Center (CCHRC). 2013. "Remote: A Manual." URL: http://www.cchrc.org/sites/default/files/docs/REMOTE_Walls.pdf

3 Building Science Corporation. 2018. Building in Extreme Cold. https://buildingscience.com/documents/insights/bsi-031-building-in-extreme-cold