Thatch: a heritage legacy

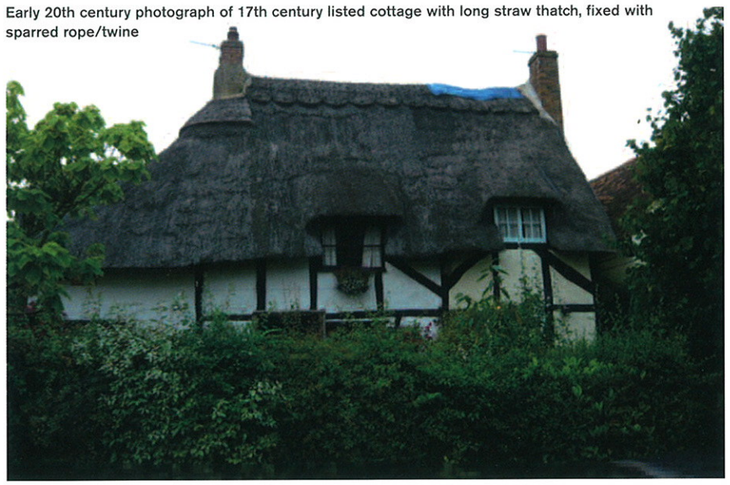
Nick Kelly looks at the benefits of this historic material

Thatch has caused many disputes between practitioners and conservationists. Arguments rage about loss of historic fabric, local character and regional styles and the use of alternative materials, while the use of traditional alternative materials has all but died out.

Thatch is a highly sustainable environmental material, much more than the populist halcyon image of times past, though that popularity has undoubtedly fuelled both political and financial support for its conservation. It reflects our heritage, allows historic buildings to breathe, profitably supports rural industry and biodiversity, is picturesque and blends gracefully into the landscape.

Pictures supplied by Nick Kelly

Early 20th century photograph of 17th century listed cottage with long straw thatch, fixed with sparred rope/twine



One hundred years later, 'modernised' with raised block-cut patterned ridges, held by decorative liggers, and new wallhead dormer windows. Right side now finished with wheat reed, left with water reed, variously repaired, all under galvanised steel netting

Consideration of the environmental benefits assesses the costs of production, construction, operation and maintenance, and disposal of materials. Against these are the costs of energy, resources, waste, emissions and recyclability, all balanced with the material's performance and durability.

Its cultivation and harvesting demand very little energy use: it requires no greater tending than most cereal crops, produces less waste during cutting, threshing and combing than other manufactured roofing products, and subject to local (UK) sourcing expends less fuel energy in its delivery to site. Notably, though, the thatching industry currently imports around 80% of water-reed from Eastern Europe and China – clearly a target for environmental cost reduction.[1]

This biologically renewable material releases no pollution (unless chemically treated) except a chemically neutral dust, while locking up CO_2 from the air during growth, and supports animal, bird, insect and amphibian habitats.

Laying and fixing is labour-intensive, though the human energy cost is negligible in energy-use calculations. Wastage and emission ratings are very low, combined with low mechanical plant energy demands, minimal packing materials and the recyclability of waste, and construction energy costs.

There is an increasing tendency to use concealed stainless steel sways, and an established use of galvanised steel netting to prevent thatch removal and burrowing by vermin. Steel is an extremely high energy-cost material, and other durable, natural, more traditional alternatives (such as hazel) should be considered.

Excepting around finishing details, netting is now considered unnecessary on water reed and experimental data suggests that this may also be the case for wheat reed. Netting hampers the shedding of water from the roof and the removal of moss growth, though the 'removal' argument rages on.

The roof's durability is affected by pitch, material quality, climatic conditions and the thatcher's skill. Like other organic traditional building materials, thatch has good moisture-regulating capabilities, absorbing and desorbing moisture at the surface, allowing the building to breathe, but at a managed rate of decay.

Durability is affected by cultivation conditions during its growth. Nitrates and other artificial fertilisers accelerate growth and create a weaker stem cell structure, a practice which continues, although this has been known since 1979. Organic materials, grown locally in the environmental conditions in which they will subsequently be used, whether water or wheat reed, consistently prove the most durable and environmentally sustainable.[2]

The hollow stems of thatch trap air and control the passage of heat, making it a highly effective natural insulant, keeping buildings warm in winter and cool in summer. Some additional energy costs are unavoidable in the interim renewal of ridges, and the maintenance of chimneys from where most thatch fires start, but even then the environmental benefits remain. Evidence suggests that thatch is at no greater risk of catching fire, although any risk can be reduced by chemical treatment (at environmental cost). (Thatch fires are more difficult to extinguish, due to its natural propensity to dispel water.)

Its sensitive disposal is considered carbon neutral, as any CO_2 absorbed when alive is released when burnt, disposed of in landfill or mulched, at the end of its useful life. If composted organically, the material can biologically regenerate soil in the medium to long-term, locking the carbon in. In this way, thatch can actually be carbon-negative by reducing CO_2 in the environment, and minimising the demand for manufacture, transport and artificial fertilisers.

Comparisons of roof coverings show life cycles of 30-45 years for wheat straw that has been applied by skilled craftsmen. The better results are mainly attributed to the older wheat varieties no longer available due to National Institute of Agricultural Botany controls: these limit trade to the shorter-stemmed plants with better grain yields, which bear little similarity to traditional varieties.

Despite the headline lifespan figures of the more rigid roof coverings (see Table 1), thatch remains popular and, when the environmental benefits are taken into account, it maintains a clear lead and compares favourably financially.

Undoubtedly, the perception of thatch as an expensive roofing finish has been skewed by recent poor performance figures of imported, nitrate-rich materials, necessitating more frequent renewals. Though the problem has been largely rectified, thatch is considered publicly to be the poorer cousin, but it is the only industry-standard roofing material to approach compliance with government targets for zero-carbon house building.

Fifteenth century unlisted cottage with long straw thatch, containing possible medieval basecoats, showing vermin runs below netted covering

	Energy use MJ/m²	Water consumption litres/m²	Global warming potential	Acid pollution grammes/m²	Durability years	Embodied energy kWh/m²
Clay roof tile	0.030	6.40	9500	100	50-70	75-120
Concrete roof tile	0.030	2.55	8515	65	50-60	12-26
Natural slates	0.000075	0.075	60	nil	75-100	6-12
Water reed	negligible	negligible	negligible	negligible	40-60	1.5
Wheat reed	negligible	negligible	negligible	negligible	30-40	1.5
Long straw	negligible	negligible	negligible	negligible	30-45	2.25
	Product engery cost		Production environmental effects		Management costs	

Table 1: Key indicative environmental properties of roofing materials *Based on Berge[3] and Letch[1]*

Thatch growing is a profitable market (recently commanding £1,500/tonne), providing opportunities to regenerate rural economies, manage a living landscape and sustainably harvest wheat straw and water reed as primary crops.

In summary, notwithstanding its primary importance in the informed management of historic buildings, thatch offers popular aesthetic appeal, profitability to all parties involved, low-tech management solutions, durability, and outstanding environmental and ecological credentials.

The unanswered question is why we don't use more of it within the wider construction industry? Perhaps as the environmental agenda translates into cost penalties and its benefits are rediscovered, we will.

Nicholas Kelly
Building Surveyor
Englefield Estate
nick.kelly@englefield.co.uk

Further information

References

[1] Letch, S 2008 pp238-240 *Roofing with Thatch*, from *The Green Building Bible, Volume 1*
[2] Letts, J 2007 p12 *Growing Straw for Thatching: a Guide.*
[3] Berge, B 2000. pp 20-41 *The Ecology of Building Materials*