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Titel	What Do Sauna Stones Actually Do?
Subtitel	Heat storage, surface area, temperature stability, evaporation of Aufguss water and why stone quality matters
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Short answer: Sauna stones are not decoration and they are not the primary source of heat. Their central function is to form a hot, thermally stable interface between the heater and the Aufguss water. They absorb energy from the heating elements or fire, store part of that energy in their mass and provide a large hot surface on which water can be heated and vaporised rapidly. The amount, size, shape, arrangement and material of the stones influence airflow through the heater, warm-up behaviour, thermal reserve and the way water spreads through the stone bed. Good sauna stones must tolerate repeated heating and sudden wetting without excessive cracking or disintegration. Stone quality therefore affects not only the character of Aufguss, but also heater performance, maintenance and safety.

A sauna heater without stones can still produce heat. What it cannot produce in the traditional way is the characteristic thermal reservoir and evaporation surface that make Finnish-style löyly—and modern Aufguss—possible.

The stones sit at the junction between electrical or combustion heat, moving cabin air and liquid water. Their role is therefore simultaneously thermal, hydraulic and structural.

> **The heater produces heat. The stones store, distribute and present that heat to the Aufguss water.**

Where does the heat really come from?

In an electric sauna heater, electrical resistance elements convert electrical energy into heat. In a wood-burning heater, combustion releases chemical energy and transfers part of it through the stove structure to the stones and cabin.

The stones do not generate energy. They absorb energy supplied by the heater and later release it to air, water and surrounding surfaces.

Calling the stones the 'heat source' therefore confuses energy generation with thermal storage.

What does heat storage mean?

Every material requires energy to increase its temperature. The amount stored as sensible heat is approximately described by $Q = m \times c \times \Delta T$, where m is mass, c is specific heat capacity and ΔT is the temperature change.

A larger stone mass can therefore store more energy when heated through the same temperature interval, provided its material properties are comparable.

This stored energy becomes important when the heater experiences a sudden demand—most obviously when water is poured onto the stones.

Why does stone mass matter?

A small stone bed can heat relatively quickly because there is less mass to warm. A large stone bed requires more energy and usually more time to reach operating temperature.

Once hot, however, a large mass contains a larger thermal reserve. This can reduce the relative temperature drop produced by an individual Aufguss and support repeated evaporation.

Stone mass therefore creates a trade-off between warm-up behaviour and thermal reserve.

> **More stone mass does not create more energy. It creates more thermal storage capacity.**

How much energy can stones store?

As an order-of-magnitude example, 80 kg of rock with a specific heat capacity around 0.8 kJ/(kg·K), heated through 250 K, stores roughly 16 MJ of sensible heat.

That is not the amount available exclusively for Aufguss: the stone bed continuously exchanges heat with air, the heater structure and its surroundings.

The calculation simply illustrates why tens of kilograms of hot rock can act as a substantial thermal buffer.

Why is thermal conductivity important?

Specific heat capacity describes how much energy is required to change temperature; thermal conductivity describes how readily heat moves through the material.

A useful sauna stone must not only store heat. Energy must also be able to move from the hotter interior or contact region toward the wetted surface after it has been cooled by water.

Dense igneous rocks used for sauna stones combine useful heat storage, conductivity and mechanical durability. Harvia identifies olivine diabase as a traditional high-density stone that stores and releases heat effectively [1].

What happens when Aufguss water hits a stone?

The water first contacts a surface far above its initial temperature. Energy flows from the stone into the water, heating it toward boiling and then supplying the latent heat required for vaporisation.

The local stone surface cools during this process. Heat from deeper in the stone and from the heater then flows back toward that surface.

An Aufguss is therefore a rapid transient heat-transfer event, not simply water 'turning into steam' because the sauna is hot.

How much energy does evaporation require?

Heating water from room temperature to boiling requires sensible heat; changing the hot liquid into water vapour requires much more additional energy as latent heat.

At atmospheric pressure, the latent heat of vaporisation near 100 °C is approximately 2.26 MJ/kg. If the starting water is around 20 °C, heating and vaporising one kilogram requires roughly 2.6 MJ in total.

For 100 g of Aufguss water, the corresponding order of magnitude is about 0.26 MJ. That energy must come from the hot stones, heater and surrounding thermal system.

Why doesn't the cabin cool when water is poured on?

The stone surface does cool because energy is consumed in heating and vaporising the water. Yet bathers usually feel suddenly hotter.

The reason is that the added water vapour changes heat transfer at the skin. Evaporative cooling becomes less effective, and condensation or increased convective and mass transfer can increase the heat delivered to the body.

The subjective heat pulse therefore does not mean the Aufguss created thermal energy. It redistributed stored energy and changed the mechanism by which the cabin interacts with the skin.

> **Aufguss does not create heat. It changes where the heat goes and how effectively it reaches the body.**

Why surface area matters

Water can evaporate only where it encounters sufficiently hot surfaces. A stone bed made of many irregular pieces offers a large distributed contact area.

Angular split-face stones provide broad fracture surfaces and channels through which water can spread. Harvia specifically notes that split-face stones provide large surfaces for efficient evaporation [1].

Surface area is therefore one reason stone shape matters, but it must be considered together with airflow and packing density.

Why not use one enormous stone?

One large block might have considerable mass but comparatively little external surface area relative to its volume. Water would have fewer hot contact surfaces, and air could not circulate through an internal stone bed.

Multiple stones create gaps for convective airflow and a network of surfaces at different depths.

A functional stone bed is therefore both a thermal mass and a porous flow structure.

Why stone size matters

Smaller stones provide more total surface area for a given mass but can pack more densely and restrict airflow if used incorrectly. Larger stones create larger voids but provide less surface area per kilogram.

Heater manufacturers therefore specify appropriate stone sizes for particular models. Harvia, for example, specifies 5–10 cm angular stones for many electric heaters and larger 10–15 cm stones for certain large heaters and wood-burning units [2,3].

The correct size is a heater-design parameter, not a matter of personal preference.

Why airflow through the stone bed matters

In many electric heaters, cabin air enters the heater, is warmed by the elements and stones, and rises through the stone bed. If the stones are packed too tightly, this convective path is restricted.

Restricted airflow can slow cabin heating and raise element temperatures. Harvia's own comparative test found markedly higher element temperatures with old, tightly packed stones than with correctly loose-packed new stones [4].

Stone arrangement therefore affects both heat transfer to the cabin and thermal stress on the heater.

What did the Harvia test show?

In a 10 m³ test sauna with a 7 kW Cilindro heater, Harvia compared new and old stones arranged loosely or tightly. After one hour, the cabin with new loosely arranged stones was approximately 70 °C, while the new tightly packed configuration was around 60 °C [4].

Maximum element temperature was reported at about 580 °C with new loosely arranged stones, compared with up to about 680 °C with old tightly packed stones [4].

This is manufacturer testing rather than an independent peer-reviewed experiment, but it demonstrates the engineering mechanism clearly: stone condition and packing can materially affect airflow and heater operation.

Should stones be packed tightly?

No. They should be placed according to the heater manual so that they support one another without forming a dense, airflow-blocking mass.

Harvia warns that stone piling has a major effect on both heater safety and heating capability [2].

The objective is neither a loose pile with unstable stones nor a carefully compressed masonry structure. The heater needs stable stones and open air passages.

Why angular stones?

Angular split-face stones interlock reasonably well while retaining irregular gaps for airflow. Their fracture faces also provide substantial wetted surface.

Harvia recommends angular split-face stones such as peridotite, olivine-dolerite and olivine for specified heater models [2].

This recommendation should be understood as heater-specific technical guidance. Some manufacturers also approve rounded stones, usually with defined placement rules.

Can rounded stones be used?

Yes, when the heater manufacturer permits them. Rounded stones allow water to travel more easily between upper stones and reach deeper layers.

Harvia recommends rounded olivine-diabase stones as an upper layer in compatible heaters while retaining angular stones below, particularly where stone capacity is limited [5].

The shape therefore changes the route taken by water and air; it does not create a universally 'better' or 'worse' löyly.

Why does water penetration matter?

If all water evaporates immediately on the first few exposed surfaces, the thermal demand is concentrated near the top of the stone bed.

If part of the water penetrates deeper, it encounters additional hot surfaces and distributes the cooling load through a larger mass.

The perceived character of the resulting vapour pulse can therefore depend partly on stone geometry and the depth at which evaporation occurs.

Do porous stones produce better steam?

Claims about pores and 'soft steam' are common in sauna marketing. Porosity can influence water uptake, surface wetting and thermal behaviour, but 'softness' is a subjective sensory description rather than a single measurable stone property.

Harvia attributes a particularly soft steam to micropores in its heat-treated Elite stones [3]. That is a manufacturer claim and should not be converted into a universal physical law.

For scientific description, it is safer to discuss water distribution, surface temperature, evaporation rate and stone-bed thermal reserve.

What makes a good sauna stone?

A suitable stone needs adequate thermal capacity, useful conductivity, mechanical strength and resistance to repeated thermal cycling.

It must also be chemically and structurally appropriate for use at sauna-heater temperatures. Manufacturers test selected stone types for durability and suitability; Harvia states that its stones undergo quality control in cooperation with the Geological Survey of Finland [1].

Random stones collected outdoors cannot be assumed to meet these requirements.

Why ordinary garden stones are a bad idea

Unknown stones may contain cracks, weak mineral structures, weathered zones or inclusions that respond poorly to repeated heating and rapid wetting.

A stone that fragments can obstruct airflow, fall onto heating elements or produce small debris inside the heater.

The safe approach is therefore to use stones specifically approved for the heater rather than selecting rocks by appearance.

Can sauna stones explode?

Stones can crack or fragment under thermal stress, particularly if they contain defects or are unsuitable for repeated heating and wetting. Dramatic 'explosion' stories are often exaggerated, but fragmentation is a genuine reason for stone selection and inspection.

Rapid local cooling during Aufguss creates temperature gradients within the rock. Repeated cycles can propagate existing cracks and gradually weaken the stone.

Good stone quality reduces this risk but does not make stones permanent.

Why stones deteriorate

Every heating and cooling cycle produces thermal expansion and contraction. Aufguss adds abrupt local cooling at the wetted surface.

Over many cycles, microcracks can grow, edges can break away and the stone can become more friable. Fine debris then settles deeper in the heater and may restrict airflow.

Deterioration is therefore both a material-aging issue and an airflow issue.

How can you tell that stones are worn?

Warning signs include visible cracking, crumbling surfaces, small fragments accumulating beneath the heater and stones that break easily when handled.

During maintenance, stones should be removed rather than merely inspected from above. This also allows dust and fragments to be cleared and the condition of the heating elements to be checked where permitted by the manufacturer.

Reusable stones can then be restacked correctly.

How often should stones be replaced?

There is no universal calendar interval that fits every sauna. A private sauna used twice a week and a public sauna running all day expose their stones to very different numbers of thermal and Aufguss cycles.

Harvia currently recommends annual replacement as general consumer guidance and highlights more durable heat-treated stones for intensive public use [1,3].

A more technical approach is to inspect regularly and replace stones according to condition, usage intensity and manufacturer instructions.

Why public saunas are different

Commercial heaters may operate for many hours per day and receive repeated Aufgüsse. Their stones undergo far more thermal cycles and water contacts than those in a lightly used home sauna.

Stone durability, maintenance frequency and access for inspection therefore become operational issues.

Heat-treated olivine-diabase products are specifically marketed for this intensive duty because the treatment is intended to extend service life [3].

Can old stones increase energy use?

They can indirectly. As stones fracture and settle, the bed may become denser and airflow through an electric heater can deteriorate.

The heater then transfers heat to the cabin less effectively. In Harvia's test, correctly arranged new stones produced faster cabin heating than tightly packed old stones [4].

The result should not be interpreted as a fixed percentage energy penalty for all old stones; the mechanism depends on the heater and condition of the stone bed.

Do stones regulate temperature?

They do not regulate in the control-system sense—the thermostat and controller do that. But their thermal inertia buffers rapid temperature changes.

A large hot stone mass changes temperature more slowly than a small one when exposed to the same short disturbance. This can smooth the thermal response to individual Aufgüsse.

Thermal stability is therefore partly a passive consequence of heat capacity.

Can more stones compensate for a weak heater?

No. More stones increase the amount of energy that must be supplied during warm-up. They cannot create power that the heater does not have.

A heater with insufficient electrical or combustion output may simply take longer to heat a larger stone mass.

Heater power determines the rate of energy supply; stone mass determines part of the system's storage capacity.

> **Power and storage solve different problems. Kilowatts cannot be replaced by kilograms of stone.**

Can a powerful heater compensate for too few stones?

Not completely. High electrical power can heat the air and the remaining stones rapidly, but a small stone mass provides less thermal reserve and less evaporation surface.

The heater is engineered for a specified quantity and size of stones. Operating outside that design can alter airflow, element temperature and Aufguss behaviour.

Correct stone loading is therefore part of the heater specification.

Do stones determine the sauna temperature?

Not by themselves. Cabin temperature results from heater power, control settings, room heat loss, ventilation, geometry and thermal mass.

The stones influence how heat is stored and transferred, but the thermostat or control system ultimately determines heater operation in an electric sauna.

A cabin with more stones is not automatically hotter.

Do darker stones radiate more heat?

At sauna temperatures, surface emissivity can influence thermal radiation, but stone colour visible to the eye is not a useful standalone predictor of total heater performance.

Geometry, surface temperature, exposed area and material properties matter more than simply choosing a dark-looking rock.

Marketing descriptions based on colour should therefore not replace technical suitability.

What happens if water misses the stones?

Aufguss water should be applied to the hot stone bed as intended by the heater manufacturer. Water reaching inappropriate heater components can create thermal stress, electrical problems or corrosion depending on the design.

The stones provide the controlled interface that allows liquid water to encounter a large hot surface without being poured directly onto heating elements.

Correct stone arrangement therefore has a protective function as well as a thermal one.

Why stone temperature matters more than air temperature for Aufguss

Cabin air at 90 °C cannot by itself supply the intense local heat flux needed to vaporise a poured quantity of water rapidly. The stone surfaces are much hotter and contain stored energy immediately available at the point of contact.

This is why a sauna can display a high air temperature yet produce poor Aufguss if the stone bed is inadequately heated.

A thermometer in the cabin measures the air environment, not the thermal readiness of the stones.

What happens between Aufgüsse?

After water cools the stone surfaces, heat flows from deeper regions and from the active heater back toward the cooled areas.

This recovery takes time. If Aufgüsse are repeated faster than the heater and stone mass can recover, surface temperatures can progressively fall.

Professional Aufguss planning therefore needs to respect heater recovery rather than treating every round as thermally independent.

Do stones affect the character of löyly?

Yes, indirectly and in combination with heater design. Stone mass, exposed surface, geometry, temperature and water penetration affect the rate and location of evaporation.

A large hot stone mass can support substantial evaporation without as sharp a local temperature fall. Rounded top stones can allow water to penetrate deeper; angular stones provide broad fracture surfaces and airflow paths [1,5].

But the bather's experience also depends on water quantity, cabin volume, ventilation, temperature, fanning and position. The stones are one part of the system.

What should professional operators check?

They should know the heater manufacturer's required stone type, size and quantity; inspect stone condition; remove fragments; restack the bed correctly; and ensure that heating elements are not exposed contrary to the installation instructions.

They should also observe changes in warm-up time and Aufguss performance, because these can signal altered airflow or deteriorating stones.

Maintenance should be documented in high-use facilities rather than waiting for obvious heater failure.

A useful technical model

The stone bed performs four linked functions: it stores thermal energy, provides evaporation surface, permits convective airflow and buffers short-term thermal disturbances.

Stone quality and arrangement determine how well these functions coexist. Dense packing may provide mass but obstruct airflow; too little stone may improve airflow but reduce storage and evaporation surface.

The heater manufacturer's design is therefore a balance, not an invitation to maximise one variable.

> **Storage + surface + airflow + durability: these are the four technical jobs of sauna stones.**

So, what do sauna stones actually do?

They transform the heater from a simple hot appliance into a thermal reservoir and controlled water-evaporation system.

Their mass stores heat, their surfaces transfer that heat to Aufguss water, their arrangement creates air and water pathways, and their material quality determines how reliably they survive repeated thermal shock.

They do not create heat, purify the air or magically determine löyly quality on their own. Their effect emerges from interaction with heater power, stone temperature, water quantity, ventilation and cabin geometry.

Conclusion

Sauna stones are functional engineering components. Their importance lies not in tradition alone but in heat capacity, surface area, conductivity, airflow and resistance to thermal cycling.

A good stone bed stores enough energy to support Aufguss, exposes sufficient hot surface for evaporation and still allows the heater to move heat effectively into the cabin.

Stone quality matters because the material must repeatedly tolerate high temperatures and sudden wetting without excessive deterioration. Correct size and stacking matter because even excellent stone can perform poorly when it obstructs the heater's designed airflow.

The simplest description is therefore also the most accurate: the heater supplies the energy; the stones make that energy usable for stable sauna heating and controlled Aufguss.

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Editorial note: Stone type, size, quantity and placement must always follow the technical instructions for the specific heater. Manufacturer claims about subjective löyly characteristics are distinguished here from general heat-transfer principles.