Where Electricity Comes From

The Full Vacuum and the End of the Fire Age

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Abstract

Dutch energy policy asks one question: from whom do we buy the fire? This article asks another one: where does electricity come from when nothing burns?

The answer starts from a vacuum that is full, not empty. A full vacuum is a net under tension. Its strands carry that tension everywhere, all the time. Electricity is that tension closing through a load.

Three groups already work this way. Casimir Inc. in Houston, Garret Moddel in Colorado and Paul Thibado in Arkansas all obtain current from fixed geometry. None of them burns, heats or splits anything.

The article reads their devices in the terms of the net: mesh, one-way passage, closure and stacking. It then works out every number step by step, from one chip to one household to the whole country. It ends with the people who live inside the present energy chain, and what changes for them.

The reader needs no other text to follow the argument. Every step and every number is in this article.

1. The occasion

On 24 September 2026 the Dutch financial daily FD carried a partner piece from Shell. Its title asks whether Dutch energy supply can withstand the present geopolitical uncertainty. Three people speak: László Varró of Shell, Hans Coenen of Gasunie, and Rob Bauer, former commander of the Dutch armed forces and former chair of the NATO Military Committee.

The piece gives three hard facts.

1. Domestic gas production has fallen by 89% since 2013.
2. The Netherlands now depends on global supply chains for about 80% of its energy carriers.
3. More than 70% of its liquefied natural gas (LNG) comes from the United States.

The piece concludes that such concentration with one trading partner is a strategic risk. It asks how to make energy sustainable, available, reliable and affordable.

The question is well posed within its own frame. That frame is the long chain: extract, ship, convert, transport, burn. Every option the piece weighs ends in combustion, heating or fission. This article calls that frame the fire age.

The presence of a former NATO commander is telling. In the fire age, energy is carried across borders. Every border is a point of pressure. So energy becomes a question of defence.

This article leaves the fire age. It does not ask how to secure the chain. It asks whether the chain is needed.

2. Two vacuums

2.1 The empty vacuum

The vacuum of twentieth-century physics is empty. It is the floor of everything. It is the lowest state, set at zero.

In that picture energy exists only as a tremor around zero. The tremors are real. They show up as a small force between two plates placed close together. But the floor stays the floor. To draw energy from it, a device would have to go below zero. That is ruled out by definition.

Every vacuum device therefore meets the same objections. It would break conservation. It would break the second law. It would be "free energy". These objections are not wrong within their frame. They follow directly from the choice to call the vacuum empty.

2.2 The full vacuum

The vacuum of this article is full. The picture used throughout is a fishing net stretched in water.

- The **strands** of the net are the vacuum itself. They are everywhere.
- The strands carry **tension**. The tension is never zero. It is the ordinary state of the net.
- Where strands wind around each other, they form **knots**. Knots are what we call matter.
- Between the strands lie **meshes**. A mesh is an opening of a given shape and size.
- The local state of the net is called $\boldsymbol{\chi}$. The quantities we call constants are functions of χ. They are fixed only where χ is fixed.
- The smallest register of the net has three values: $+1, 0, -1$. This is the **trit**. Charge is a trit on a strand.

Nothing in this net is at rest. Everything is winding. Every winding is held by tension.

2.3 What changes

In the empty vacuum the question is whether there is any energy to draw. The answer is no.

In the full vacuum that question does not arise. The net is under tension everywhere. The question becomes a different one: **where can the tension close?**

A closure is a path along which the tension of the net runs through something and returns. A lamp is a closure. A sensor is a closure. A human nerve is a closure. The fire age creates closures by first lifting matter to a higher state with heat, then letting it fall back. The full vacuum offers closures without the lift.

2.4 How the net is read

The net is not read with arrows of cause and effect. There are no two separate things in a single net between which an arrow could run. The net is read in four ways instead.

1. **Selection by fit.** A mesh keeps what fits its shape. What returns in phase stays. What does not fit passes on.
2. **Identity across scale.** The same winding appears at different depths. A pattern in a small mesh is the same pattern in a large one.
3. **Constitutive relation.** Two quantities that belong together change together, at the same moment. There is no delay and no arrow.
4. **Correspondence.** Two patterns at different places match because they are the same winding seen twice.

The rest of the article uses only these four readings.

3. Three cases that already run

Three groups obtain current from fixed geometry. Each group built and measured its own device. The descriptions below use the builders' own terms first. Section 4 then reads each case in the net.

3.1 Casimir Inc., Houston: the MicroSparc chip

Harold "Sonny" White worked for almost two decades on advanced propulsion and vacuum physics at NASA. In 2026 he founded Casimir Inc. in Houston. In May 2026 the company closed a seed round of 12 million dollars to bring its first chip, the MicroSparc, into production.

The specification. The chip measures 5 mm by 5 mm. It is specified at 1.5 volts and 25 microamps. That is about 37.5 microwatts of continuous power. There is no battery, no charging and no external cord. Commercial availability is planned for 2028.

The geometry. The chip is built from many small cavities. Each cavity has two conductive walls a short distance apart. In an ordinary Casimir setup such walls are free to move. They are pulled together and touch. After that nothing more happens. White calls such a cavity a battery, not a generator: it gives one pulse and must then be reset.

The MicroSparc fixes the walls onto a substrate. They cannot move. Along the midplane between the walls stands a row of small pillars, called micropillars. The pillars are electrically isolated from the walls and anchored so they stay put. According to the company, electrons in the walls then pass across the narrow gap to the pillars in one preferred direction. The company calls this a kind of ratchet. A voltage builds between walls and pillars. Connected to an outside circuit, it drives a continuous current.

The measurements so far. The team measured prototype chips over several weeks in dark enclosures sealed against radio signals. They used electrometers that resolve microvolts and attoamps. They report outputs from millivolts to volts, at currents of picoamps. They also mapped the fields inside single cavities with an atomic force microscope in Kelvin-probe mode.

The theory. White's paper "Emergent Quantization from a Dynamic Vacuum" appeared in Physical Review Research on 9 March 2026. It treats the vacuum as dynamic rather than as an empty floor. The geometry itself is laid down in the patent application US20240415034A1.

The programme. For the next two years the company plans to work with several chip fabricators. The aim is to raise the tunnel current and the overall output, and to move toward standard silicon production. It also plans stacked chips that carry up to 100 times more power on the same footprint.

3.2 Garret Moddel, University of Colorado: the forerunner

Moddel's laboratory has made fast metal-insulator-metal diodes for more than twenty years. Such a diode is a sandwich: a metal layer, an insulating layer a few nanometres thick, and a second metal layer.

The device. In the version published in 2021, the lower electrode is nickel and the upper electrode is a thin layer of palladium. On top of the palladium lies an optical cavity: a layer of silicon dioxide or of a photoresist, a few hundred nanometres thick. On top of that lies a mirror of aluminium. So the cavity sits on one side of the diode only.

The result. With no voltage applied, a steady current flows between the two metal layers. A thinner cavity gives a larger current. A companion paper shows that the cavity also changes how easily the diode conducts when a voltage is applied.

The checks. Moddel's group ran eight kinds of tests to see whether the output could come from an error in the setup. All eight came back negative. The group concludes that the device itself produces the output. Their own reading: the cavity suppresses some of the vacuum's optical modes on one side. That upsets a balance between electrons passing in both directions.

The MicroSparc is a further step on this line. Moddel showed that one-sided geometry gives current. White arranges the geometry so the current can be taken off continuously.

3.3 Paul Thibado, University of Arkansas: the neighbour

Freestanding graphene is a sheet of carbon one atom thick. At room temperature it ripples and buckles all the time. Thibado's group placed such a sheet next to a small electrode and connected both to a circuit.

The circuit. A single diode does not work. The physicist Léon Brillouin showed this in 1950: a one-way valve alone cannot harvest the jitter of its own surroundings. Thibado's circuit uses two diodes placed in opposition. Each diode opens a separate path. Together they give a pulsing direct current that does work on a load resistor.

The finding. At room temperature the rippling graphene drives an alternating current in the circuit. The two paths turn it into a pulsing direct current. The group also found that the on-off behaviour of the diodes increases the delivered power. A follow-up paper in 2023 shows that with two opposed diodes the system approaches equilibrium extremely slowly. During that long approach, storage capacitors keep charging.

Why it is a neighbour. This case draws on the ordinary warmth of the room, not directly on the net. Graphene and circuit are at the same temperature. No heat source is used and nothing burns. It shares the pattern of the other two cases: fixed geometry, asymmetry, a one-way passage and no temperature step.

4. The reading in the net

The three devices differ in material and scale. They share one pattern.

- The geometry is **fixed**. Nothing moves.
- The geometry is **asymmetric**. One side differs from the other.
- There is **no temperature step**. Nothing is heated.
- The output is a **steady or pulsing current** through a load.

In the net this pattern reads in four steps.

4.1 The fixed geometry is a mesh

A cavity a few hundred nanometres wide is a mesh cut into the net. Its shape selects which windings fit.

Take a gap of width *d*. A winding that must fit between two walls can be at most twice the gap long. For a gap of 100 nm, only windings shorter than 200 nm fit. For a gap of 300 nm, the limit is 600 nm. Longer windings do not fit and are not kept.

This is selection by fit. The mesh does not push anything. It keeps what returns in phase within its shape. The rest passes on.

Moddel's result reads directly in these terms. A thinner cavity is a smaller mesh. A smaller mesh excludes more windings. A larger part of the net's tension then passes rather than being kept. The current grows as the cavity shrinks.

4.2 The asymmetry is a one-way passage

A mesh that is the same on both sides keeps and releases the same on both sides. The passages balance. Nothing flows on balance.

In all three cases one side differs from the other.

- In Moddel's device the cavity lies on one side of the diode only.
- In White's chip the walls and the pillars are different structures, and the pillars stand isolated in the middle.
- In Thibado's circuit two diodes in opposition give two separate paths.

One side of the mesh closes differently from the other. What cannot return the way it came passes through the other way. That passing is current.

Charge in the net is the trit on a strand. A current is trits shifting along strands in one direction. The asymmetric mesh is where that shift has only one open path.

4.3 The load is the closure

In the fire age, a power plant first lifts matter to a higher state. Coal and oxygen are brought together at high temperature. Water becomes steam at high pressure. The steam falls back through a turbine. Only the fall is used.

In the full vacuum nothing is lifted. The tension of the net is already there. It needs a path to close. The load provides that path.

A lamp connected to a MicroSparc chip is where the net's tension closes. The chip is where the path is shaped. The lamp is where it runs through. There is no combustion, no hot side and no cold side. There is no step up and no step down. There is only closure.

This is a constitutive relation, not a cause. Tension and closure belong together. When the path is open, they are present at the same moment.

4.4 Stacking is identity across scale

Casimir Inc. plans to stack chips so that up to 100 times more power fits on the same footprint. In the net this is not a trick of packaging.

A mesh repeated in depth is the same winding at more depths. The pattern of one layer is the pattern of every layer. Each layer offers its own closure. The closures add.

This matches a design statement from August 2026. A vacuum generator has no coil, magnet or capacitor at its core. Those parts were designed for fields in an empty vacuum. A vacuum generator is a three-dimensional geometric resonator: a structure in which windings reinforce each other through repeated shape. The MicroSparc is a first flat version of that. The stacked chip is a first step into the third dimension.

4.5 What this reading does not need

The reading above does not need a floor below which nothing can go. It does not need energy to come "from nothing". The net is full. The device does not create tension. It shapes where tension closes.

That is why the objections of section 2.1 do not apply. They are objections to drawing from an empty vacuum. There is no empty vacuum in this reading.

5. The numbers, step by step

All numbers below follow from the MicroSparc specification and from round figures for Dutch energy use. Each step is written out.

5.1 Power per chip

Voltage times current gives power.

1.5 V × 25 μA = 1.5 × 0.000025 W = 0.0000375 W = **37.5 μW**.

5.2 Power per square metre

One chip covers 5 mm × 5 mm = 25 mm^2.

1 mm^2 = 0.000001 m^2, so 25 mm^2 = 0.000025 m^2.

Power per square metre = 0.0000375 W ÷ 0.000025 m^2 = **1.5 W/m^2**.

This power is continuous. It runs day and night, in summer and winter, indoors and outdoors.

5.3 Comparison with a solar panel

In the Netherlands, sunlight delivers about 1,000 kWh per square metre per year on a well-placed surface.

A panel with 20% efficiency turns that into 0.20 × 1,000 = 200 kWh per square metre per year.

A year has 365 × 24 = 8,760 hours.

Average power = 200,000 Wh ÷ 8,760 h ≈ **23 W/m²**.

So:

- One flat layer of MicroSparc chips gives 1.5 W/m². That is about one fifteenth of a solar panel.
- A stack of 100 layers gives 100 × 1.5 = 150 W/m². That is about six and a half times a solar panel, without sun, and at night as well.

5.4 One household

A Dutch household uses about 2,700 kWh of electricity per year.

Average power = 2,700,000 Wh ÷ 8,760 h ≈ **308 W**.

Number of chips needed = 308 W ÷ 0.0000375 W ≈ **8.2 million chips**.

Area of one flat layer = 308 W ÷ 1.5 W/m² ≈ **205 m²**. That is more than the floor area of an average house.

Footprint with a 100-layer stack = 205 m² ÷ 100 ≈ **2 m²**. A door measures about 0.9 m × 2.1 m ≈ 1.9 m². The stack for one household is about the size of a door. It can stand in the meter cupboard.

5.5 How much patterned surface that is

Chips are made on round silicon wafers. A standard wafer has a diameter of 300 mm, so a radius of 0.15 m.

Wafer area = π × 0.15² ≈ 3.1416 × 0.0225 ≈ 0.0707 m².

Chips per wafer, ignoring the edge = 0.0707 m² ÷ 0.000025 m² ≈ 2,800.

Wafers per household = 8.2 million ÷ 2,800 ≈ **2,900 wafers**.

Stacking reduces the footprint by 100. It does not reduce the amount of patterned layer: 100 layers of 2 m² are still 205 m² of mesh. For one household that is about 2,900 wafers of patterned surface.

This number shows where the work lies. The mesh cannot be etched like a processor for every household. It must be laid down like a printed foil. The geometry is simple and repeats. That is what makes printing possible.

5.6 The whole country

Dutch electricity use is about 120 TWh per year.

Average power = 120,000,000,000,000 Wh ÷ 8,760 h ≈ 13,700,000,000 W = **13.7 GW**.

Area of one flat layer = 13,700,000,000 W ÷ 1.5 W/m² ≈ 9,100,000,000 m² = **9,100 km²**.

The Dutch land area is about 33,700 km². One flat layer for all Dutch electricity would cover about 27% of the land.

Footprint with a 100-layer stack = 9,100 km² ÷ 100 = **91 km²**. Spread over about eight million households, that is the door in each meter cupboard from section 5.4, plus the needs of work and industry.

5.7 Where the builders stand now

The figures above use the specified target of 25 μA per chip. The prototypes measured in Houston gave currents of picoamps. One picoamp is 0.000000000001 A.

Ratio = 25 μA ÷ 1 pA = 0.000025 ÷ 0.000000000001 = **25,000,000**.

So the present prototypes pass roughly one twenty-five-millionth of the target current. In the net this ratio is the measure of how much of the mesh closes today. Most of the cut mesh does not yet offer an open path. The Houston programme for the next two years works exactly on this gap: more tunnel current per cavity, and more cavities that close.

No outside laboratory has yet repeated the Houston measurements. Moddel's cavity current has been published since 2021 and is discussed by theorists elsewhere. Thibado's graphene current has been published since 2020.

The direction does not depend on how fast the gap closes. The three cases show the same pattern in three materials. The numbers show the scale that pattern reaches when it closes.

6. What changes for people

6.1 The long chain

The FD piece describes a long chain. It is worth following it once, from the people inside it.

For fifty years gas came from under Groningen. It came from under the houses of the people who live there. Their houses cracked. Many of them lived for years in uncertainty over repairs, compensation and safety. Production has now fallen by 89% since 2013.

The gas now comes by ship, much of it from Texas and Louisiana. It is cooled to a liquid for the crossing. It arrives at terminals in Eemshaven and on the Maasvlakte near Rotterdam. There it is warmed back into gas. Gasunie carries it through its pipelines to power plants, factories and homes. In a power plant it is burned. Heat raises steam. Steam drives a turbine. The turbine drives a generator. Only then is there electricity.

Every link has workers. Every link has contracts. Every crossing has a border. Every border is a point of pressure. That is why the energy question now reaches NATO.

6.2 The short chain

A door-sized stack in the meter cupboard has no chain. There is no field to drill, no ship to cross, no terminal to warm, no pipeline to guard. There is no fuel to buy and no border to cross.

With the chain, much of what now organises energy dissolves: the import terminals, the long-distance pipelines, the trading desks, the price shocks passed on to households, and the security debate about sea lanes and suppliers. Institutions built to manage the long chain have no chain left to manage.

6.3 What disappears and who remains

This is also a loss. It should be named as such.

Thousands of people in Groningen, the Eemshaven, the Rotterdam port and the pipeline network built a working life around the chain. Engineers who know flows and pressures. Operators who know when a valve sticks. Safety staff who know what gas does when it escapes. Their communities grew around the terminals and the stations.

Their knowledge does not vanish. Knowing how flows behave, where pressure builds and where a system fails is exactly the knowledge the mesh needs. The work moves. It leaves the port and the pipeline. It goes to where the mesh is laid down, stacked and connected: in the street, the building, the workshop. The work becomes small in scale and close to home.

6.4 Groningen

For Groningen the shift has a particular meaning. The province gave its gas for half a century. In return it received subsidence, cracks and years of dispute. An energy source that asks nothing from the ground under anyone's house ends that exchange. Nothing needs to be taken from below a village for a lamp to burn in it.

6.5 The household

For a household the change is quiet. The electricity bill disappears as a monthly worry. The meter cupboard holds a slab instead of a meter. A power cut elsewhere does not reach the house, because the house is not connected to elsewhere for its power. The grid, where it remains, carries exchange between neighbours rather than supply from far away.

7. The FD question, answered in the net

The FD piece asks: how do we make energy sustainable, available, reliable and affordable, now and later?

In the net the four words read as follows.

- **Sustainable.** Nothing is burned and nothing is consumed. The net's tension is not used up by closing. It is the ordinary state of the net.
- **Available.** The net is everywhere. Every building stands in it. Availability is a matter of where the mesh is laid, not of where fuel is found.
- **Reliable.** A fixed geometry has no moving parts and no fuel supply. It does not wear by burning. The builders in Houston specify no degradation over time.
- **Affordable.** The cost lies in laying the mesh once. After that there is no fuel to buy.

The geopolitical question changes with it. Energy dependency is a dependency on a chain. Where there is no chain, there is no dependency to defend.

8. Closing

The fire age asked where to buy heat. The net asks where tension can close.

Three builders already answer the second question. Moddel showed in 2021 that one-sided geometry gives current with no voltage applied. Thibado showed that two opposed paths give a steady current from ordinary room warmth. White's group fixes the geometry so the current can be taken off without pause.

The numbers show the scale. One flat layer gives 1.5 W/m². A hundredfold stack gives 150 W/m². One household needs a stack the size of a door. The whole country needs a footprint of about 91 km².

Between the picoamp of today and the microamp of the specification lies a factor of 25 million. That factor is how much of the mesh does not yet close. It is the work of the next years.

The direction is already set. It is set in the mesh.

Annotated references

FD / Shell partner content (2026). "Is onze energievoorziening bestand tegen de huidige geopolitieke onzekerheid?" *Het Financieele Dagblad*, partner section, 24 September 2026. With László Varró (Shell), Hans Coenen (Gasunie) and Rob Bauer (former chair, NATO Military Committee). *Why read?* It states Dutch import dependency in three hard numbers: 89% less domestic gas since 2013, 80% dependency on global supply chains, more than 70% of LNG from the United States. It is also a clear example of the energy question asked entirely within the long chain. *Reading advice:* Read it as partner content from a supplier. Read it next to section 6 of this article.

Casimir, H.B.G. (1948). "On the attraction between two perfectly conducting plates." *Proceedings of the Koninklijke Nederlandse Akademie van Wetenschappen* 51, 793–795. *Why read?* The Dutch origin of the whole line. Casimir wrote it at the Philips laboratory in Eindhoven. It shows that geometry alone, two plates and a gap, changes what the vacuum does. *Reading advice:* Three pages. Read the first page for the setup. The geometry is the point, not the formula.

Lamoreaux, S.K. (1997). "Demonstration of the Casimir force in the 0.6 to 6 μm range." *Physical Review Letters* 78, 5–8. *Why read?* The first precise measurement of the force Casimir described, fifty years after his paper. Lamoreaux built the apparatus himself with a torsion pendulum. *Reading advice:* Read the description of the apparatus. It shows how small and how real the effect of a mesh is.

Wilson, C.M., et al. (2011). "Observation of the dynamical Casimir effect in a superconducting circuit." *Nature* 479, 376–379. *Why read?* A group at Chalmers in Gothenburg changed the effective length of a cavity very fast and saw light appear from it. It is the moving counterpart of the fixed meshes in this article. *Reading advice:* Read the abstract and the first figure. Contrast the moving mirror with the fixed walls of the MicroSparc.

Moddel, G., Weerakkody, A., Doroski, D., Bartusiak, D. (2021). "Optical-cavity-induced current." *Symmetry* 13, 517. Open access. *Why read?* The first published device that gives current at zero bias from a cavity on one side of a diode. It contains the eight artefact tests in full. It is the direct forerunner of the MicroSparc. *Reading advice:* Start with the figure that shows current against cavity thickness. Then read the section on the tests.

Moddel, G., Weerakkody, A., Doroski, D., Bartusiak, D. (2021). "Casimir-cavity-induced conductance changes." *Physical Review Research* 3, L022007. *Why read?* The companion measurement. The same one-sided cavity changes how easily the diode conducts. Together with the *Symmetry* paper it shows the mesh selecting. *Reading advice:* Short letter. Read it straight after the *Symmetry* paper.

Ford, L.H. (2022). "Electric field and voltage fluctuations in the Casimir effect." *Physical Review D* 105, 065001. *Why read?* A theorist takes Moddel's device seriously. He asks what fixed reflecting walls do to the field around a charge. Useful as a bridge from the empty vacuum to the fixed mesh. *Reading advice:* Read section IV only. It summarises the Moddel experiment in two pages.

Thibado, P.M., et al. (2020). "Fluctuation-induced current from freestanding graphene." *Physical Review E* 102, 042101. *Why read?* A working circuit with two opposed diodes that delivers pulsing direct current from rippling graphene at room temperature. No heat source is involved. *Reading advice:* Read the circuit figure first. The two paths are the core.

Thibado, P.M., Neu, J.C., Kumar, P., Singh, S., Bonilla, L.L. (2023). "Charging capacitors from thermal fluctuations using diodes." *Physical Review E* 108, 024130. *Why read?* It shows why one diode fails and two opposed diodes succeed. It is the clearest text on asymmetry as a one-way passage. *Reading advice:* Read the abstract and the conclusion. The ultraslow approach to equilibrium is the finding to hold on to.

Brillouin, L. (1950). "Can the rectifier become a thermodynamical demon?" *Physical Review* 78, 627–628. *Why read?* The classic argument that a single one-way valve cannot harvest its own surroundings. Thibado's two-diode circuit answers it. Reading both together shows how geometry changes the answer. *Reading advice:* Two pages. Read it before the 2023 Thibado paper.

White, H. (2026). "Emergent Quantization from a Dynamic Vacuum." *Physical Review Research*, published 9 March 2026. *Why read?* The theory behind the MicroSparc. White treats the vacuum as dynamic rather than as an empty floor. That is a step toward the full vacuum of this article. *Reading advice:* Read the introduction and the conclusion. The middle is classical wave mechanics and can be skipped on a first reading.

Casimir Inc. (2026). Press release of 12 May 2026 and technology page, casimir.inc. Patent application US20240415034A1. *Why read?* The builders' own description of the fixed walls and the micropillars, and the specification of 1.5 V at 25 μA on a 5 mm chip. The patent lays out the geometry in detail. *Reading advice:* Read the technology page first. Then read the patent drawings, not the claims.

The Debrief (2026). "Free Energy from the Vacuum? Warp Drive Pioneer Unveils Battery-Free 'MicroSparc' That Allegedly Draws Power from the Quantum Vacuum." 12 May 2026. *Why read?* The most technical press account. It contains White's own explanation of why a moving cavity is a battery and a fixed one is not, and the description of the prototype measurements.

Maxwell, J.C. (1873). *A Treatise on Electricity and Magnetism*. Oxford: Clarendon Press. Volume II, articles 591–619. *Why read?* Maxwell wrote electricity as the state of a medium, with a scalar register alongside the vector. That scalar register is where charge sits as a trit in the net. *Reading* *advice:* Read articles 591–619 in the quaternion form Maxwell used. The later vector form of Heaviside and Gibbs drops the scalar part.

Konstapel, J. (2026). "Vacuum.Net Theory en Maxwell's Erfenis." constable.blog, 20 September 2026. *Why read?* The reading of Maxwell's scalar register as the trit of the net. Section 4.2 of this article rests on it.

Konstapel, J. (2026). "De Volledige Afleiding van de Vacuum.Net Theorie." constable.blog, 14 September 2026. *Why read?* The full derivation of the net: strands, knots, χ as state and constants as functions of χ. Sections 2.2 and 2.4 of this article summarise it.

Konstapel, J. (2026). "Why Vacuum.Net Is a Swarm." constable.blog, 23 September 2026. *Why read?* It shows how closure without central alignment works across the net. The stacking of section 4.4 is one case of it. *Reading advice:* Read it after this article, as the wider frame for stacking and identity across scale.