Selecting for the 95%: Part-Load Efficiency, NPLV, and Why Full-Load kW/TR Is the Wrong Metric

Architecture, Computational Methods, and Field Evidence from MileSoft Chiller Selection Software

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Abstract

A chiller datasheet leads with a full-load efficiency figure, and a chiller spends approximately 5% of its operating life at full load. The remaining 95% is somewhere on the part-load curve, where the machine's behaviour is governed by compressor staging, condenser relief, and the control strategy of the plant it sits in. Selecting on the number printed largest is therefore a systematically wrong basis, and it is wrong in a direction that favours the machine being sold rather than the building being served.

This paper presents the architecture and computational methods of MileSoft Chiller Selection Software, which implements the ANSI/AHRI 550/590 rating method — including its integrated and non-standard part-load formulations — so that a single rating run produces every efficiency figure a consultant, an auditor, or an energy submission may require.

We state the integrated part-load value calculation and its four weighted load points, the distinction between it and the non-standard part-load value evaluated at the project's own condenser conditions, and the bivariate interpolation over certified capacity and power maps that both rest on. We anchor the work in ANSI/AHRI 550/590 and its SI counterpart 551/591, and in Regulation (EU) 2024/573 for the refrigerant trajectory that increasingly decides a selection.

The product's published record reports that chiller plant design compresses from weeks to hours. A four-module deployment at an HVAC OEM, in which this module was one of four, reported programme-level results that this paper does not attribute to this module alone. We close with a capability reference framework for chiller selection tooling.

Keywords: Chiller selection software; AHRI 550/590; IPLV; NPLV; Part-load efficiency; kW per ton; Condenser relief; Certified performance map; Bivariate interpolation; TEWI; F-gas Regulation; Refrigerant phase-down

1 Introduction

A chiller datasheet is designed to be read in a particular order. The full-load efficiency figure — conventionally in kilowatts per ton of refrigeration — is set front and centre, often at a number like 0.55 kW/TR. The integrated part-load value, which describes how the machine behaves across the load band it will actually occupy, is typically some pages further in.

The ordering is not accidental, and it inverts the engineering significance. A chiller spends roughly 5% of its operating life at full load and approximately 95% of it somewhere on the part-load curve. Selecting on the number printed largest optimises for the condition the machine almost never sees.

This paper describes a tool built so that the part-load figures are not a supplementary calculation but an output of the same rating pass that produces the full-load number. The design consequence is that a consultant cannot accidentally compare two machines on the wrong basis, because both bases are always present.

1.1 Why part-load behaviour is not a correction factor

It is tempting to treat part-load performance as a derating of the full-load number — a percentage applied to a rated efficiency. That treatment fails because the mechanisms differ. At reduced load, compressor efficiency changes non-monotonically with staging; condenser water temperature falls with ambient, which improves the cycle; and auxiliary power such as condenser fans and pumps becomes a larger fraction of total input.

The net effect is that two machines with identical full-load efficiency can differ substantially at 50% load, and the ranking between them can reverse. A single scalar correction cannot represent a reversal, which is why part-load efficiency must be computed from the certified performance map rather than inferred from a headline figure.

> If a selection tool reports one efficiency number, it has already decided which 5% of the machine's life matters.

1.2 Contributions

1. A single-pass rating that produces full-load efficiency, the integrated part-load value and the non-standard part-load value from one traversal of the certified performance map.
2. Explicit separation of the standard condenser-relief trajectory from the project's own, with both reported and the applicable one named.
3. Comparison across the load band rather than at the design point, so ranking reversals below 75% load are visible before selection rather than after commissioning.
4. An eight-dimension capability reference framework for chiller selection tooling.

2 Background and Related Work

Two regimes bound a chiller selection: the rating standard that defines what an efficiency figure means, and the refrigerant regulation that increasingly determines which machines remain serviceable across the analysis horizon.

2.1 What AHRI 550/590 actually standardises

ANSI/AHRI Standard 550/590, approved as an American National Standard in June 2023 and published with Standard 551/591 as its SI counterpart, applies to factory-made vapour-compression water-chilling and water-heating packages containing one or more compressors. It establishes the test conditions, tolerances and rating requirements under which a published efficiency figure is meaningful.

Its most consequential provision for selection is the part-load formulation. Rather than rating the machine at one condition, the standard defines a weighted combination of four load points — 100%, 75%, 50% and 25% — with weights reflecting the fraction of operating hours an average single chiller spends near each. The weights are the standard's judgement about a typical building, and they are what makes the resulting figure comparable between manufacturers.

The standard also fixes a condenser-relief trajectory: as load falls, entering condenser water temperature is assumed to fall with it along a defined path. This is what makes the integrated value a standardised quantity rather than a project-specific one — and, as Section 4.2 discusses, it is also why the integrated value is frequently the wrong number to judge a specific installation by.

2.2 The refrigerant trajectory as a selection constraint

Regulation (EU) 2024/573 on fluorinated greenhouse gases entered into force on 11 March 2024, repealing Regulation (EU) No 517/2014, with labelling and quota provisions applying from 1 January 2025. It tightens the phase-down of hydrofluorocarbon production and consumption in line with the Montreal Protocol's Kigali Amendment, and sets phase-out dates in sectors where alternatives are technically and economically feasible.

For a chiller selection this converts refrigerant choice from a specification detail into an economic variable. A machine whose refrigerant faces quota contraction over the analysis horizon carries a service-cost trajectory that a first-cost comparison does not show, and total equivalent warming impact — direct refrigerant emissions plus indirect emissions from energy consumed — becomes a reportable quantity rather than an academic one.

2.3 Failure modes of datasheet-driven chiller selection

- Full-load ranking. Machines are compared on rated kW/TR, which describes about 5% of operating life and can invert below 75% load.

- Integrated value used as a project prediction. The standardised condenser trajectory is applied to a plant whose real condenser conditions differ, so the reported figure is comparable but not predictive.
- Single-point comparison. Candidates are evaluated at the design duty only, so a machine that is better at design and worse across the band is selected.
- Auxiliary power omitted. Condenser fan and pump power is excluded or held constant, understating the part-load penalty in air-cooled machines specifically.
- Refrigerant treated as a specification. The phase-down trajectory is not carried into the comparison, so a machine's serviceability risk over twenty years is invisible at selection.

3 System Overview

The module is deployed as a desktop application, a choice that follows from the computation: rating a machine across four load points against a bivariate performance map is materially heavier than a terminal-unit selection, and the interaction is a specialist's rather than a occasional user's.

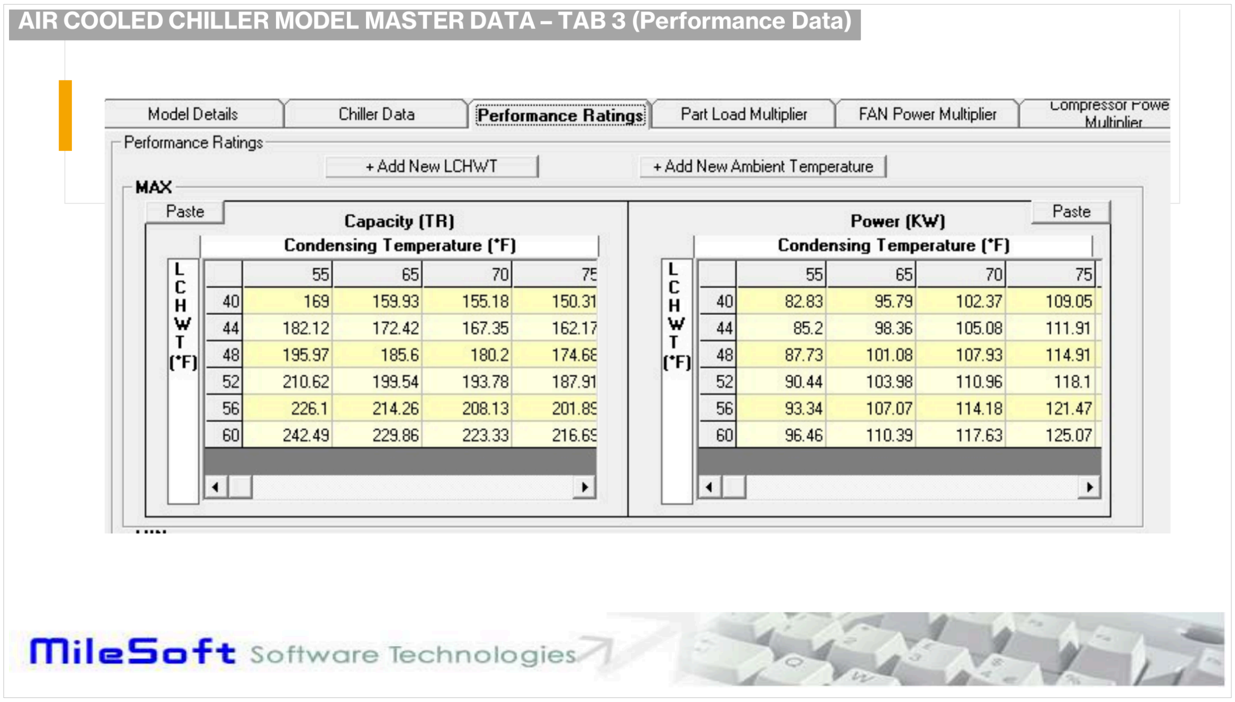

Figure 1. The certified performance map. Capacity and power are tabulated against leaving chilled-water temperature and condensing temperature. Every efficiency figure the tool reports is an interpolation over this surface rather than a coefficient applied to a headline number, which is what allows part-load behaviour to differ in kind between machines rather than only in degree.

3.1 The machine master record

Each machine is described by a structured master record: general data covering compressor type — screw or scroll — refrigerant, oil, evaporator and condenser models, connection sizes and fan data; electrical and physical data; the certified performance ratings themselves; and separate multiplier sets for part-load behaviour, fan power and compressor power.

Holding the multipliers separately rather than folding them into a single derating is what preserves the mechanisms described in Section 1.1. Fan power and compressor power move differently as load falls, and a model that collapses them cannot reproduce a ranking reversal between an air-cooled and a water-cooled machine.

3.2 The rating pass

A rating run takes the project duty — ambient condition, cooler outlet and inlet temperatures, flow rate, evaporator pressure drop and fouling factor — and returns the part-load table at the four standard points together with full-load efficiency and both part-load figures in a single pass.

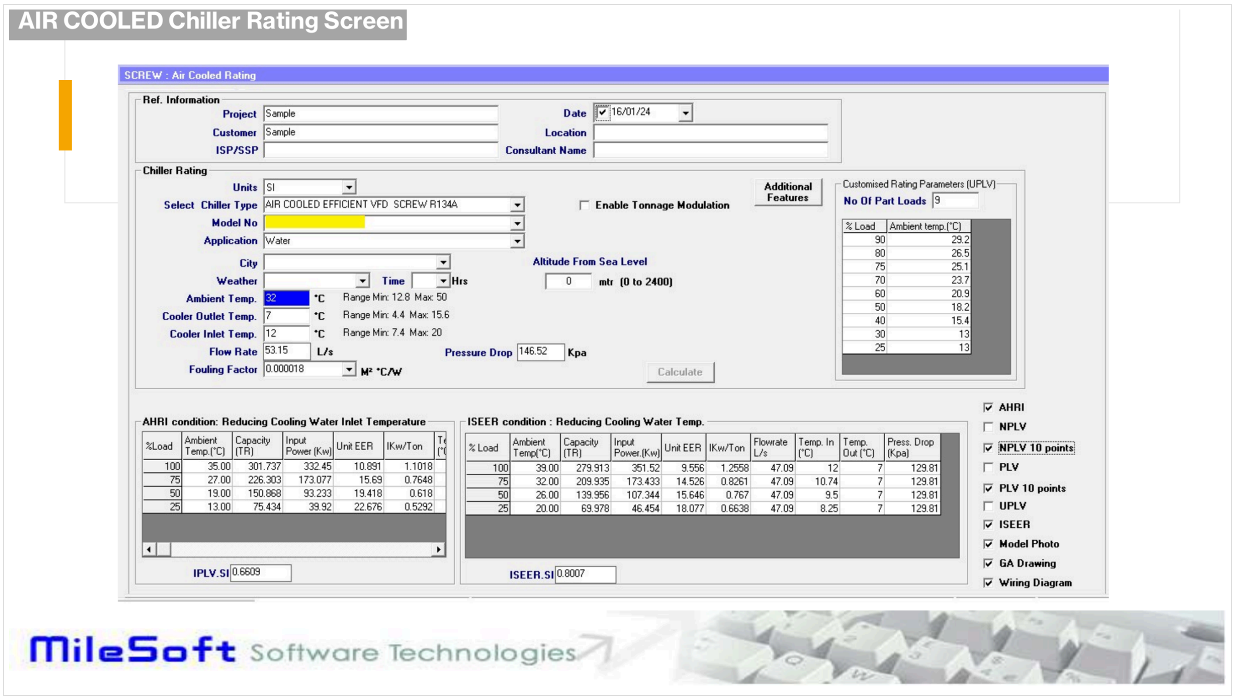

Figure 2. Rating output. The four-point part-load table, full-load efficiency and both part-load values are produced together. Because they come from one traversal of the same certified map, a reviewer who recomputes any one of them from the others will find them consistent — which is the property a defensible submittal needs.

Output formats and accompanying drawings are selectable, and the run is embedded in a project rather than being a standalone calculation, so a rating is retrievable later with the machine data version it used.

3.3 Comparison and plant configuration

Candidate machines are compared side by side on capacity at design conditions, efficiency curves, footprint, sound level and operating range. The comparison spans the load band rather than the design point alone, which is where part-load differences become visible.

Plant configuration is part of the comparison rather than a downstream decision. A machine's part-load behaviour interacts with how the plant stages it — parallel, primary-secondary, or variable-primary arrangements load individual machines differently, so the best machine for one configuration is not necessarily the best for another.

4 Computational Methods

Notation is collected in Appendix A; worked numerical examples in Appendix B.

4.1 The integrated part-load value

The integrated part-load value combines efficiency at four load points into a single figure, weighting each by the fraction of operating hours the standard attributes to it. The formulation is a weighted harmonic combination rather than an arithmetic average, because efficiency expressed as kilowatts per ton is an inverse quantity — averaging it arithmetically would overweight the efficient points.

$$IPLV = 1 \,/\, [\, 0.01/A + 0.42/B + 0.45/C + 0.12/D \,] \qquad \text{(iplv)}$$

where A, B, C and D are the machine's efficiencies at 100%, 75%, 50% and 25% load respectively. The weights are fixed by AHRI 550/590 and reflect the hours an average single chiller spends near each point — note that the 50% term carries the largest weight and the 100% term almost none.

> The weights are the argument. Full load carries a weight of 0.01 and half load 0.45 — so the standard itself asserts that the number on the front of the datasheet describes one percent of the machine's operating hours.

4.2 Integrated versus non-standard: which number predicts

The integrated value applies the standard's own condenser-relief trajectory, which is what makes it comparable across manufacturers. The non-standard part-load value applies the identical weighted formulation at the project's actual condenser-water and ambient conditions.

$$NPLV = 1 \,/\, [\, 0.01/A' + 0.42/B' + 0.45/C' + 0.12/D' \,] \qquad \text{(nplv)}$$

where A' to D' are efficiencies evaluated at the project's own condenser trajectory rather than the standard one. The equation is unchanged; only the conditions at which the four points are evaluated differ.

The distinction is frequently misunderstood as one of rigour, as though the non-standard value were less official. It is the reverse: the integrated value is the comparison metric and the non-standard value is the prediction. A plant with limited condenser relief — a dry cooler in a hot climate, or a constant-temperature condenser loop — will not realise the integrated value, and quoting it as an energy forecast overstates performance.

Both are reported, and the applicable one is named. AHRI 550/590 itself cautions that a comprehensive hourly analysis remains the most accurate predictor for a specific installation; the non-standard value is a defensible middle position between a single point and a full simulation.

4.3 Interpolation over the certified map

Every efficiency figure above is obtained by evaluating the machine on its certified performance surface, which tabulates capacity and power against leaving chilled-water temperature and condensing temperature. Project conditions rarely coincide with tabulated points, so the engine interpolates bilinearly between the four surrounding certified values.

$$Q(t\_chw, t\_cond) = \text{SUM over the four surrounding certified points of } w(i,j) \times Q(i,j), \text{ with the weights summing to 1} \quad \text{(interp)}$$

the weights follow from the fractional position of the project condition within the tabulated cell. Power is interpolated on the same grid, so efficiency is a ratio of two interpolated quantities rather than an interpolated ratio — which matters, because the two are not equal.

The engine interpolates within the certified envelope and does not extrapolate beyond it. This is a deliberate refusal: a machine's behaviour outside its certified range is not described by the data, and producing a number there would create a claim the manufacturer has not made. Where a project sits outside the envelope, the tool reports that rather than answering.

4.4 Total equivalent warming impact

Where a project is judged on carbon rather than energy alone, direct and indirect contributions are combined. The direct term is refrigerant released over the machine's life; the indirect term is emissions from the electricity it consumes.

$$TEWI = [\ GWP \times m(refrigerant) \times (\ leak\ rate \times years + (1 - recovery\ fraction)\ )\ ] + [\ years \times E(annual) \times grid\ carbon\ intensity\ ] \quad \text{(tewi)}$$

where GWP is the refrigerant's global warming potential, m the charge, L the annual leak rate, n the service life, alpha the end-of-life recovery fraction, E the annual energy consumption and beta the grid carbon intensity.

The structure explains why the refrigerant phase-down under Regulation (EU) 2024/573 changes selections rather than merely labelling them. A high-GWP machine carries a direct term that a more efficient cycle may not offset, and a refrigerant facing quota contraction carries a service-cost risk that neither term captures.

5 Reported Outcomes and Field Evidence

Three kinds of number are separated, as in the other papers in this series: figures published for this module, a deployment result belonging to a multi-module programme, and a modelled scenario.

5.1 Figures published for this module

The product's own record states that chiller plant design compresses from weeks to hours while retaining AHRI-grade certification in every selection, and that all performance lookups and calculations comply with AHRI Standard 550/590 so selections hold up in tenders, energy-rating documentation and commissioning reports.

The published record also carries this paper's central empirical premise — that chillers operate at part load approximately 95% of their life, so selecting on full-load kW/TR is a systematically wrong metric. That is a claim about equipment behaviour rather than about the software, and it is the reason the tool's architecture is what it is.

5.2 A deployment in which this module was one of four

MileSoft's published HVAC case study describes a deployment at an HVAC OEM in which Chiller Selection was installed alongside AHU Selection, FCU Selection and Lifecycle Cost Analysis, and is described there as providing AHRI 550/590-compliant selection with part-load analysis for accurate efficiency claims. The programme reported a 70% reduction in selection-cycle time and a 12 percentage-point uplift in proposal-to-order conversion.

> Those figures belong to the four-module programme. No attempt was made to isolate the contribution of Chiller Selection, and this paper does not claim them for it.

The conversion figure is nonetheless mechanistically interesting for this module. Where a tender is decided on lifetime energy, a submittal that reports both part-load figures and names the applicable one is a stronger document than one quoting a single efficiency — but the published data cannot separate that effect from the other three modules.

5.3 Modelled engineer-hour recovery

Table 1. Published model parameters and the default-case result. Every input is adjustable; these are the published defaults.

Parameter	Default
Manual selection time	90 minutes
Selection time in MileSoft	15 minutes
Selections per month	25
Engineer-hours released per year	375

The 90-minute manual baseline is worth examining. It is plausible for a full-load selection from a datasheet; it is optimistic for a selection that computes both part-load figures by hand across four load points and a condenser trajectory. If the comparison were like for like the modelled saving would be larger, so the published figure is conservative in a direction that is easy to miss.

6 Discussion

6.1 The weights carry the argument

The most persuasive artefact in a chiller selection debate is not a vendor's claim but the standard's own weighting. AHRI 550/590 assigns 0.01 to full load and 0.45 to half load. That is a formal statement, by the body that defines how these machines are rated, that the headline figure describes one percent of operating hours.

This matters for how a selection tool should present results. A tool that reports the integrated value alongside full-load efficiency is not offering a second opinion; it is reporting the standard's own judgement about which condition matters. Presenting only the full-load number is the editorial choice, not the reverse.

6.2 Comparability and prediction are different jobs

The integrated and non-standard values are frequently discussed as though one were more authoritative. They answer different questions. The integrated value exists so that two machines can be compared on equal terms, which requires a fixed condenser trajectory belonging to no particular building. The non-standard value exists to predict what a specific plant will do.

A tool that reports only the integrated value can support a procurement decision but not an energy forecast. One that reports only the non-standard value can forecast but cannot defend a comparison. Reporting both, and naming which applies to the question being asked, is the only presentation that serves both audiences without misleading either.

6.3 A capability reference framework for chiller selection tooling

Table 2. Capability reference framework. Each dimension is answerable by demonstration against a running system.

Dimension	Question the tool must answer by demonstration
D1 Part-load as output	Are IPLV and NPLV produced by the same rating run as full-load efficiency, or separately?
D2 Trajectory separation	Does the tool distinguish the standard condenser trajectory from the project's, and name which applies?
D3 Certified interpolation	Is efficiency computed from a certified capacity and power map, or from a coefficient on a headline figure?
D4 Envelope refusal	Request a duty outside the certified envelope. Does the tool extrapolate, or refuse?
D5 Auxiliary power	Is condenser fan and pump power modelled separately across the load band?
D6 Band comparison	Compare two machines. Is the comparison shown across the load band or only at design?
D7 Refrigerant trajectory	Does the comparison carry GWP and phase-down exposure, or treat refrigerant as a specification?
D8 Reproducibility	Re-rate a machine selected a year ago. Does it reproduce, with the machine data version it used?

D4 is the most diagnostic and the least often asked. A tool that silently extrapolates beyond the certified envelope is producing a performance claim the manufacturer never made.

6.4 Generalisability

The part-load argument generalises to any equipment whose duty varies and whose efficiency is non-linear in load — chillers, large direct-expansion plant and heat pumps. It generalises poorly to constant-duty process cooling, where full-load rating is the correct basis. The published weights are specific to AHRI 550/590's model of an average single chiller and should not be applied to a plant with an atypical load profile without re-deriving them.

7 Threats to Validity and Limitations

1. The 95% premise is a published claim, not a measurement reported here. It is stated in the product's own record as a general property of chiller operation; no load-duration data from a specific plant is presented to support it, and it will not hold for every building.
2. Vendor-reported outcome. 'Weeks to hours' is a qualitative compression claim without a baseline definition, a sample, or a distribution.

3. Confounded deployment result. The programme figures in Section 5.2 belong to a four-module deployment with concurrent process change.
4. Interpolation is not measurement. Bilinear interpolation over a certified map is a defensible engineering approximation, but a machine's real behaviour between certified points is not guaranteed to be linear in either variable.
5. AHRI's own caveat applies. The standard cautions that a comprehensive hourly analysis remains the most accurate predictor for a specific installation. The non-standard value is a middle position, not a substitute for simulation.
6. TEWI inputs are uncertain. Leak rate, recovery fraction and grid carbon intensity are all assumptions with wide plausible ranges, and the result is sensitive to each.
7. No cost data. Licence and implementation costs are not reported, so no return-on-investment conclusion is drawn.

> The first limitation deserves emphasis because the whole architecture rests on it. If a particular plant genuinely runs near full load, the conventional metric is the right one and this tool's advantage largely disappears.

8 Future Work

- Load-duration evidence. Publishing measured load-duration curves from instrumented plants would replace the 95% premise with data and would show how widely it varies by building type.
- Bin-energy modelling as standard output. Producing an hourly or bin-weighted energy estimate alongside the two part-load figures would answer the caveat AHRI 550/590 itself raises.
- Interpolation error bounds. Reporting the uncertainty introduced by interpolating between certified points would let a reviewer distinguish a genuine efficiency difference from an artefact of the grid.
- Plant-level staging. Part-load behaviour is currently evaluated per machine; modelling how a parallel or variable-primary arrangement stages several machines would show plant efficiency rather than machine efficiency.
- Refrigerant transition costing. Carrying quota-contraction risk into the lifecycle comparison as a cost trajectory, rather than reporting GWP as a static attribute, would make the phase-down a selection variable rather than a label.

9 Conclusion

The number on the front of a chiller datasheet describes about one percent of the machine's operating hours, and the standard that governs the rating says so explicitly in its own weighting: 0.01 at full load, 0.45 at half load. A selection process that ranks machines on full-load kilowatts per ton is therefore not making a small approximation — it is optimising for a condition the equipment almost never occupies.

This paper has described a tool in which the part-load figures are outputs of the same rating pass as the full-load number, computed by interpolation over the certified capacity and power map rather than by a coefficient on a headline value; in which the standard condenser trajectory and the project's own are kept distinct so comparison and prediction are not confused; and in which refrigerant phase-down enters the comparison as an economic variable rather than a specification line.

The capability reference framework of Section 6.3 is offered as the durable contribution, and its fourth question is the one most worth asking of any selection tool: request a duty outside the certified envelope, and see whether it extrapolates or refuses.

Appendix A Nomenclature

Table 3. Symbols and abbreviations used in this paper.

Symbol / term	Meaning
IPLV	Integrated part-load value, evaluated on the standard condenser trajectory
NPLV	Non-standard part-load value, evaluated at the project's own conditions
A, B, C, D	Machine efficiency at 100%, 75%, 50% and 25% load on the standard trajectory
A', B', C', D'	The same four points evaluated at the project's condenser conditions
kW/TR	Kilowatts of input power per ton of refrigeration — an inverse efficiency measure
t(chw)	Leaving chilled-water temperature
t(cond)	Condensing temperature, or entering condenser water temperature
Q	Cooling capacity at a given pair of temperatures
w(i,j)	Bilinear interpolation weight for a surrounding certified point
TEWI	Total equivalent warming impact — direct plus indirect emissions
GWP	Global warming potential of the refrigerant
m(refrigerant)	Refrigerant charge mass
L	Annual refrigerant leak rate as a fraction of charge
alpha	End-of-life refrigerant recovery fraction
beta	Grid carbon intensity, mass of CO2 equivalent per unit of electricity
n	Service life in years
E(annual)	Annual electricity consumption

Appendix B Worked Numerical Examples

Appendix B.1 Computing the integrated part-load value

A machine returns efficiencies of A = 0.560, B = 0.505, C = 0.470 and D = 0.610 kW/TR at 100%, 75%, 50% and 25% load respectively. Note the rise at 25% — part-load efficiency is not monotonic, because compressor staging and auxiliary power dominate at low load.

Applying Equation (iplv): the reciprocal terms are 0.01/0.560 = 0.017857, 0.42/0.505 = 0.831683, 0.45/0.470 = 0.957447 and 0.12/0.610 = 0.196721. Their sum is 2.003708, so IPLV = 1 / 2.003708 = 0.499 kW/TR.

The integrated figure of 0.499 is better than the machine's efficiency at any of the four points except 50% load. That is not an error: the weighted harmonic combination is dominated by the 50% term, which carries a weight of 0.45. A datasheet leading with 0.560 kW/TR understates this machine by 11%.

Appendix B.2 A ranking reversal below 75% load

Machine X: A = 0.540, B = 0.520, C = 0.535, D = 0.700. Machine Y: A = 0.575, B = 0.500, C = 0.455, D = 0.590.

At full load X is better — 0.540 against 0.575, a 6% advantage that a datasheet comparison would settle on. Applying Equation (iplv) to each: X gives 0.01/0.540 + 0.42/0.520 + 0.45/0.535 + 0.12/0.700 = 0.018519 + 0.807692 + 0.841121 + 0.171429 = 1.838761, so IPLV(X) = 0.544. Y gives 0.017391 + 0.840000 + 0.989011 + 0.203390 = 2.049792, so IPLV(Y) = 0.488.

The ranking reverses. Y is 6% worse at full load and 10% better on the integrated basis, because it is markedly stronger at half load where nearly half the weight sits. A selection made on the datasheet picks the machine that will consume more energy across the life of the building.

> This is the whole argument in two columns of numbers. It is also why a comparison must be shown across the band rather than at the design point — the reversal is invisible in a single-point table.

Appendix B.3 Why the project's condenser trajectory changes the answer

Take Machine Y installed on a plant with limited condenser relief — an air-cooled arrangement in a hot climate where entering condenser temperature falls far less at part load than the standard trajectory assumes. Evaluated at the project's conditions, its four points become A' = 0.575, B' = 0.535, C' = 0.520 and D' = 0.680.

Applying Equation (nplv): 0.01/0.575 + 0.42/0.535 + 0.45/0.520 + 0.12/0.680 = 0.017391 + 0.785047 + 0.865385 + 0.176471 = 1.844294, so NPLV(Y) = 0.542.

Y's integrated value was 0.488 and its non-standard value on this plant is 0.542 — 11% worse. The machine has not changed; the assumption about condenser relief has. Quoting 0.488 as an energy forecast for this installation would overstate performance by that margin, and the resulting lifecycle comparison would favour the wrong machine. This is the distinction the tool exists to keep visible.

Appendix B.4 The published engineer-hour model

MileSoft's published model assumes a manual chiller selection takes about 90 minutes against about 15 minutes in the tool, at 25 selections per month.

Time saved per selection is (90 — 15) / 60 = 1.25 h. Annual selections are 25 x 12 = 300. Engineer-hours released are 1.25 x 300 = 375 h per year.

As Section 5.3 notes, the 90-minute baseline most plausibly describes a full-load selection from a datasheet. Computing both part-load figures by hand — four load points on two condenser trajectories, each interpolated from a certified map — is not a 90-minute task. The model therefore compares an incomplete manual selection against a complete automated one, which understates rather than overstates the saving.

Data provenance

Every quantitative claim in this paper resolves to one of the entries below. Figures marked as modelled estimates are not deployment measurements; their assumptions are stated.

Metric	Reported value	Provenance
Share of operating life spent at part load, chillers	approx. 95%	**Product specification** /products/chiller — Stated in the Chiller blog post; the basis for selecting on IPLV/NPLV rather than full-load kW/TR.
Engineer-hours released per year, chiller selection	375 h/yr (modelled)	**Modelled estimate** A manual chiller selection takes ~90 min; ~15 min in MileSoft; 25 selections per month, 300 per year; Model and defaults published in src/data/roiModels.ts
Selection-cycle time	approx. 70% reduction	**Operator-reported — A EUROVENT-certified AHU manufacturer**
Proposal-to-purchase-order conversion	+12%	**Operator-reported — A EUROVENT-certified AHU manufacturer**

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