What *is* a lumen, anyway?

Alan Pears on mitigating adverse effects of going off gas, why energy companies don't understand consumers, and communicating energy efficiency more... efficiently!

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Vulnerable consumers and electrification

Social justice groups have rightly expressed serious concern about the possibility that tenants and other vulnerable households may be left trapped on increasingly expensive high-carbon gas supply grids. Yet again, it's the disadvantaged and vulnerable people who risk becoming victims as others electrify and gas network costs are shared by fewer customers.

This need not be a problem, but we must actively address it before it becomes one.

First, some context. Much of the gas distribution system has already been paid for through regulated network pricing. However, maintenance and operating costs remain. Gas consumers already pay substantial fixed charges—I avoided paying $1 a day when I switched from gas. High efficiency electric solutions in energy efficient buildings (maybe with rooftop solar) are often cheaper to buy and/or run, and have lower carbon emissions than gas solutions. (Dean Lombard and Keiran Price discussed this in *Renew* 143, in their piece "Gas versus electricity: Your hip pocket guide".) So there is potential to fund transition—if we implement mechanisms to fund going off gas under long-term shared financing arrangements.

The Grattan Institute[1] suggested recently that gas network operators be amalgamated with electricity networks. This idea offers part of a solution. Costs could be spread, and the network operator should have an incentive to optimise overall costs, while regulators could require them to assist adversely impacted households during transition.

Practical solutions exist: a planned program for replacing gas appliances at end of life and building upgrades during renovations or at time of dwelling resale, assisted by long-term low-interest finance, is logical. Targeted programs to assist the vulnerable to transition are essential.

There could be other approaches. For example, as the density of gas consumers declines, along with gas use on each site, any remaining users could be switched to LPG (bottle gas). Even though LPG is much more expensive than grid gas, the extra cost can be offset by avoiding fixed gas supply charges. If LPG costs 2.5 cents per MJ more than gas but avoids $300 in annual fixed charges, around 12,000 MJ per year of LPG could be used at no extra overall cost. This is enough for up to 100 L per day of gas hot water (from an instantaneous gas unit), along with family cooking.

Future gas prices are likely to be higher anyway, due to international market forces, carbon pricing and/or hydrogen transition.

Where there is a will, there will be a way to avoid this problem.

> ***Fundamentally, people and businesses don't want energy—or technology. What they want is services that offer them value—and that value is a matter of perception.***

Community batteries—another disruptor joins the distributed energy battle

Network operators are finally focusing beyond "poles and wires". Western Australian utilities, still government-owned and with expensive, long, low-customer-density networks, have taken the lead; east coast operators and regulators are following suit.

This change is based on several key factors. Innovative solutions are more practical and economic than in the past, due to technological change and the declining costs of alternative solutions. Policy makers are finally adapting rules (albeit slowly). Network operators

have developed business models to engage profitably with consumers.

Network operators and retailers are looking for workable business models. As a result, they are beginning to cannibalise each other's territory. For example, generator/retailer AGL is installing batteries behind meters as Virtual Power Plants. Network operator Ausgrid is investing in local, grid-level "community batteries". Both are negotiating long-term deals with consumers to share output of on-site PV generation and enhance demand management capability. Several network operators have set up ring-fenced businesses that can compete beyond the limits of their regulated creators. All these models build consumer loyalty with long contracts and undermine competing businesses across the energy market, including many third party innovators.

As Ausgrid's CEO mentioned on RenewEconomy's Energy Insiders podcast (bit.ly/3ty2urK) recently, the nearer to the consumer that smart energy management and storage systems are located, the more of the overall energy supply and demand chain they can optimise, and the higher the potential reliability. No surprise to many outside observers there! This is a long overdue yet radical reframing of industry and regulatory groupthink—as discussed in my previous column (*Renew* 154).

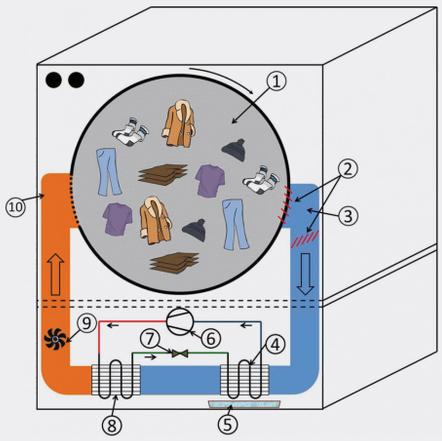
The race between "behind the meter", local networks and large-scale energy solutions is now on for young and old. Will consumers capture a fair share of the benefits?

And where might this lead?

This development has caused me to reflect on the long-standing cultural chasm between the energy-supply industry and consumers. Mainstream energy-sector thinking is still centred on a belief in the central importance of the energy sector and that people and business need their product—delivered on their terms. Much of the focus is on wholesale markets, transmission and distribution.

But retail energy-market consumers are fundamentally different beasts, driven by very different forces. In wholesale markets, the core businesses are system optimisation, energy prices and energy supply-related investment optimisation. In retail consumer markets, energy is a minor (often trivial) factor in decision-making—as long as it's reliable, affordable and customer-friendly. In those markets, energy demand is usually an outcome of decisions dominated by other factors. Wholesale energy comprises a small proportion of total energy costs, and a tiny proportion of business and household input costs, as long as networks are regulated. So it's not really surprising that the energy sector is repeatedly shocked at unexpected behaviour downstream.

Fundamentally, people and businesses don't want energy—or technology. What they want is services that offer them value—and that value is a matter of perception. For example, we invest in cars and appliances that are used for just a few hundred hours each year and depreciate rapidly in value—but nevertheless, we perceive them to be valuable or essential.



1. Drum
2. Filter
3. Warm humid air
4. Evaporator
5. Condensate
6. Compressor
7. Expansion device
8. Condenser
9. Blower
10. Hot dry air

A basic schematic of a heat pump dryer.

Image: US Department of Energy

Customers' perceptions of value are complex and potentially fast-changing, and are shaped by a huge number of factors: past experience, peer-group pressures, advertising-driven fantasies and affordability. The energy implications of decisions are often invisible, and thus energy-related (and technological) factors are generally secondary, if they're considered at all.

Almost all energy-supply interruptions happen in local networks so, as Ausgrid has noted, supply-side infrastructure can't guarantee reliable service delivery. If a user-friendly energy storage/on-site supply/EV-connected/high efficiency/smart demand management/low peak demand appliance package became available, many consumers could be interested. Powerful incumbents, politicians and analysts trapped in past technology constraints will struggle to block change.

This brings us back to the reality that retail consumers think very differently from energy suppliers and energy policy makers. If someone offers the right energy package, they could capture a big market, especially in a bushfire-threatened fringe of grid areas or high-rise apartment buildings, where impacts of supply failure are worrying.

Many businesses and councils are already installing rooftop solar or signing long-term Power Purchase Agreements with renewable energy generators to secure long-term, stable, reasonable energy prices. This allows them to bypass the chaos of the energy sector and focus on core business while demonstrating to their audiences that they care about climate change.

Communicating efficiency

I was approached recently by an RMIT colleague with a question: what is a lumen, and how can I tell what LED lamp I should buy to provide the right amount of light when replacing my old lamps?

This highlights a common problem: how to communicate energy efficiency. My response was that if he divides the incandescent lamp watts he is replacing by 15, he will get about the same light. This is very rough, but it was simpler than explaining what a lumen and lux (lumens per square metre) are.

I looked at the boxes of two new LED lamps in a supermarket. One gave no equivalence indication, and the other stated the 806 lumen lamp was "50 W equivalent"—in the fine print. But who reads that?

Another example appears on the clothes dryer page of the appliance energy rating web site (bit.ly/2NsfLCC). The term "condenser dryer" is used for both efficient heat pump dryers (6 to 10 Stars, like in the figure above) and inefficient, water-wasting condenser dryers, which use cold tap water to condense water vapour in the hot exhaust air. The web calculator now mentions heat pump dryers in brackets, but they are not listed separately, nor are they clearly identified in the listing. One condenser dryer I checked scored 3 Stars and consumed 58 L of cold tap water while drying. Heat pump dryers score up to 10 Stars and use no water—indeed, many of them collect water they recover from the clothes.

We need to do much better.

REFERENCES:

[1] Wood, T and Dundas, G (2020), "Flame out: the future of natural gas", Grattan Institute, grattan.edu.au/report/flame-out-the-future-of-natural-gas/