Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA



Going off grid - is Tesla's Powerwall revolutionary, or just hype?

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SMC Background Briefing
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‘Take home’ message

- Hype
  - Almost certainly… but Tesla has delivered previously
  - And hype can ‘change’ the market
- Revolutionary
  - Perhaps but too soon to tell
  - And even if not revolutionary can start driving fundamental change
- Off the grid
  - One possibility of course
  - *But likely to be the most appropriate role in only a few cases, while its value proposition extends to many and varied on-grid roles as well*

Nothing so new about distributed storage

JOURNAL
OF THE
SOCIETY OF
Telegraph-Engineers and Electricians.

Founded 1871. *Incorporated* 1883.

VOL. XVII. 1888. No. 73.

The One Hundred and Seventy-seventh Ordinary General Meeting of the Society was held at the Institution of Civil Engineers, 25, Great George Street, Westminster, on Thursday, April 12th, 1888—Mr. EDWARD GRAVES, President, in the Chair.

The minutes of the previous meeting were read and approved.

The names of new candidates were announced and ordered to be suspended.

Donations to the Library were announced as having been received since the last meeting from Messrs. J. B. Baillière et Fils; Messrs. De La Rue & Co.; C. H. W. Biggs, Member; and R. H. Krause, Member; to whom the thanks of the meeting were heartily accorded.

The following paper was then read:—

CENTRAL STATION LIGHTING: TRANSFORMERS *V.* ACCUMULATORS.

By R. E. CROMPTON, Member.

The present paper is the outcome of the discussion which took place on Messrs. Kapp's and Mackenzie's papers on transformers, recently read before this Society. I was asked to give facts and figures in support of the statement I then made, that I believed the distribution of electricity by transformers offered no special advantages over other methods, particularly over distribution by means of accumulators used as transformers.

But Tesla has experience, scale and 'smarts'

COST OF 10,000 LIGHT, OR 600-KILOWATT, PLANT.

A.T.—ALTERNATING TRANSFORMER DISTRIBUTION.

	£
Generating Station, Buildings, Chimney Shaft, Water Tanks, and General Fittings	11,000
Dynamos and Exciters — 865 Kilowatts, including spare sets, divided as convenient ...	5,540
Motive Power, *i.e.*, Engines, Boilers, Steam and Feed Connections, Belts, &c., at £8 12s. per I.H.P.	12,470
500 Transformers, *i.e.*, one to every pair of houses, at £15 each	7,500
2,000 yards Primary or Charging Main, exterior to area of supply, at £308 per 100 yards	6,160
20,000 yards Distributing Main, 50 m/m. sectional area, at £91 7s. (*see* Table 1)	14,270
Regulating Gear	500
	£57,440

B.T.—ACCUMULATOR TRANSFORMER DISTRIBUTION.

	£
Generating Station, Buildings, Chimney Stack, Water Tanks, and General Fittings	8,000
Dynamos — 600 Kilowatts, in 6 sets of 100 Kilowatts each...	4,800
Motive Power, *i.e.*, Engines, Boilers, Steam and Feed Connections, &c., at £8 12s. per I.H.P.	8,600
4 Groups of Accumulators, in all 240 cells, in series, at £40 per cell, including Stands ...	9,600
2,000 yards Charging Main, at £306 17s. 6d. per 100 yards (*see* Table 2)	6,137
20,000 yards Distributing Main, 161·25 m/m. sectional area, at £100 12s. 6d. (*see* Table 2) ...	20,125
Regulating Gear	2,500
	£59,762

Distributed storage has a range of possible value propositions

- Improved customer reliability
- Reduced network peak demand, hence expenditure
- Reduced generation capacity requirements
- Facilitating integration of generation technologies with energy storage challenges – PV, but also ‘baseload’ plant
- Ancillary service provision
- ‘leaving the grid’ options

- *But note there are other means of providing all of these services - electricity industry functioning ok without it*

Commercial context supports only some of these value propositions at present

- Improved customer reliability – UPS market well established
- Customer arbitrage around their TOU tariffs and peak demand charges… if they face these
- Increased self-consumption of PV generation paid a low 'export' rate, the current context for new household PV

However

- Network value?
- Ancillary services?
- Contingency management?

Numerous and growing assessments of commercial viability in Australia

- Appears to be a highly prospective market

However

- All market forecasts are wrong
- Those that are least wrong sometimes just chance
- But they can still be useful

- Require making assumptions about future commercial context… but this context is changing eg. Network tariffs

Nothing new about the 'death spiral'?

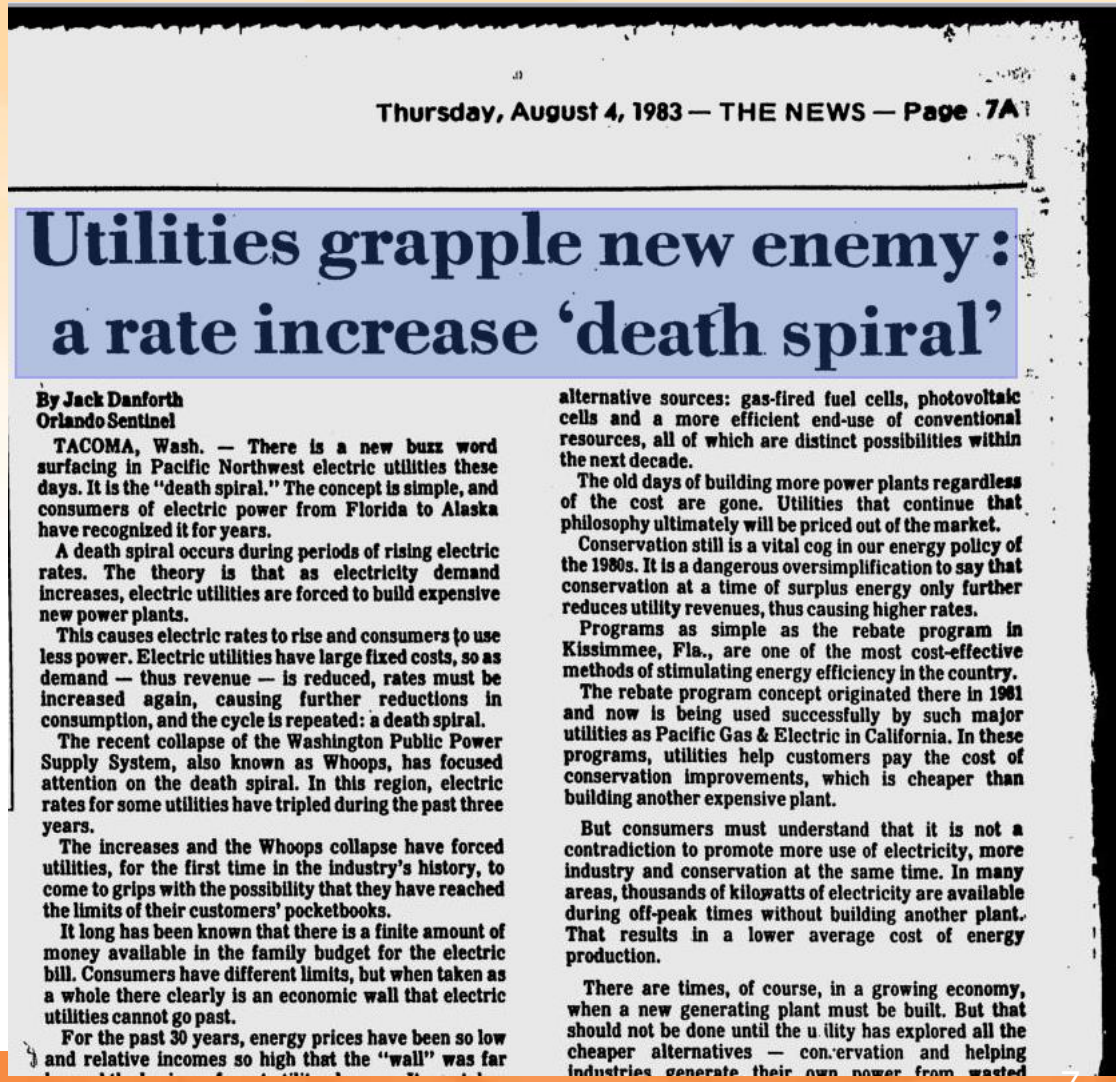
Argued that rising prices encourage end-users to reduce consumption or even leave, meaning fixed costs have to be recovered from less and less consumption and/or customers

Savings from demand reduction depend critically on energy/network tariffs

End-user departure depends critically on DG technology progress, particularly storage

More of an issue for electricity or gas?

(via google news archive)



Thursday, August 4, 1983 — THE NEWS — Page 7A

Utilities grapple new enemy: a rate increase 'death spiral'

By Jack Danforth
Orlando Sentinel

TACOMA, Wash. — There is a new buzz word surfacing in Pacific Northwest electric utilities these days. It is the "death spiral." The concept is simple, and consumers of electric power from Florida to Alaska have recognized it for years.

A death spiral occurs during periods of rising electric rates. The theory is that as electricity demand increases, electric utilities are forced to build expensive new power plants.

This causes electric rates to rise and consumers to use less power. Electric utilities have large fixed costs, so as demand — thus revenue — is reduced, rates must be increased again, causing further reductions in consumption, and the cycle is repeated: a death spiral.

The recent collapse of the Washington Public Power Supply System, also known as Whoops, has focused attention on the death spiral. In this region, electric rates for some utilities have tripled during the past three years.

The increases and the Whoops collapse have forced utilities, for the first time in the industry's history, to come to grips with the possibility that they have reached the limits of their customers' pocketbooks.

It long has been known that there is a finite amount of money available in the family budget for the electric bill. Consumers have different limits, but when taken as a whole there clearly is an economic wall that electric utilities cannot go past.

For the past 30 years, energy prices have been so low and relative incomes so high that the "wall" was far

alternative sources: gas-fired fuel cells, photovoltaic cells and a more efficient end-use of conventional resources, all of which are distinct possibilities within the next decade.

The old days of building more power plants regardless of the cost are gone. Utilities that continue that philosophy ultimately will be priced out of the market.

Conservation still is a vital cog in our energy policy of the 1980s. It is a dangerous oversimplification to say that conservation at a time of surplus energy only further reduces utility revenues, thus causing higher rates.

Programs as simple as the rebate program in Kissimmee, Fla., are one of the most cost-effective methods of stimulating energy efficiency in the country.

The rebate program concept originated there in 1981 and now is being used successfully by such major utilities as Pacific Gas & Electric in California. In these programs, utilities help customers pay the cost of conservation improvements, which is cheaper than building another expensive plant.

But consumers must understand that it is not a contradiction to promote more use of electricity, more industry and conservation at the same time. In many areas, thousands of kilowatts of electricity are available during off-peak times without building another plant. That results in a lower average cost of energy production.

There are times, of course, in a growing economy, when a new generating plant must be built. But that should not be done until the u ility has explored all the cheaper alternatives — con ervation and helping industries generate their own power from wasted

Leaving the grid

- The grid is a very valuable asset – not because we've spent a lot of money on it, but because of the service it provides
- Do not under-estimate the costs and challenges of off-grid supply
- *However, distributed storage and generation providing an increasingly attractive option – will discipline network pricing*

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Thank you… and *questions*

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www.ceem.unsw.edu.au