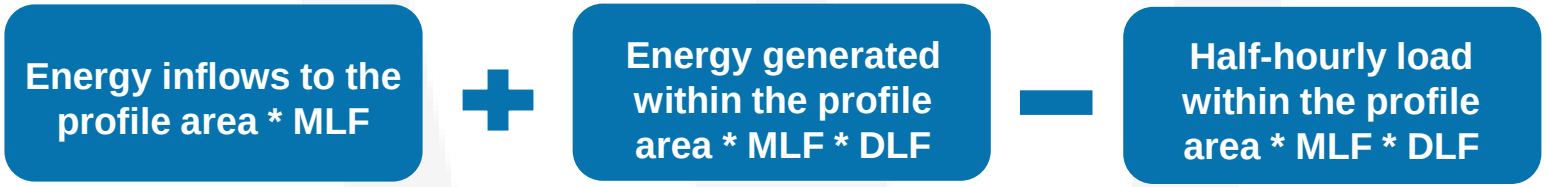
Oakley Greenwood

Load profiling for settlement of accumulation meters

Power of Choice Stakeholders Reference Group
Third Meeting
Melbourne , 11 May 2012

Current AEMO procedure

- Used to settle non-interval metered consumption in the half-hourly wholesale market
- Applies to second tier customers with consumption less than
  - 160MWhpa in VIC, SA, ACT
  - 150 MWhpa in NSW
  - 100 MWhpa in QLD
- NSLP for a given profile area is created as follows:



- Controlled loads are separately profiled; the CLP is subtracted from the remaining consumption of customers with controlled loads

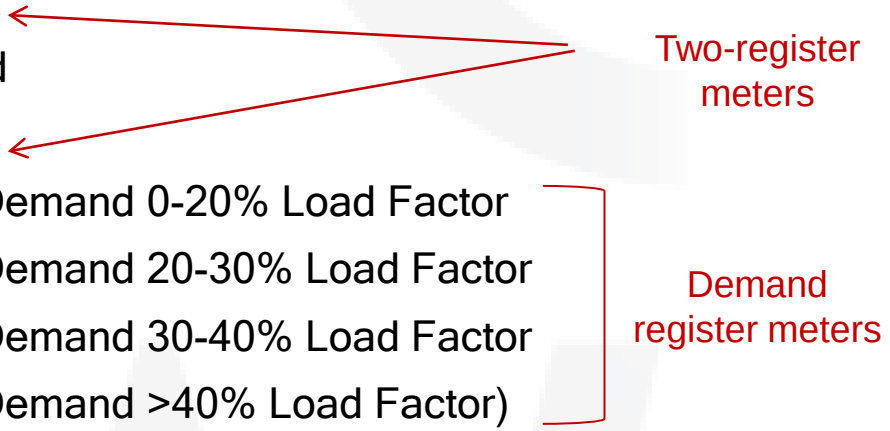
Oakley Greenwood

The UK approach

- 'Profiling Taskforce' established in 1994 to define the number and types of profiles to be used in the Electricity Pool
- Why: "to avoid the huge and prohibitive costs of putting Half-Hourly metering into every supply market customer"
- Applies to all customers below 100 kW Maximum Demand
- '8 generic Profile Classes were chosen as they represented large populations of similar customers'
- All profiles are at half-hour interval level
- Samples are stratified by consumption and weighted by 12 GSP areas)
- Profiles are created for
  - 3 day types (weekdays, Saturday, and Sunday)
  - 5 'seasons' (Autumn, Winter, Spring, High Summer, Summer)
- http://www.elexon.co.uk/wp-content/uploads/2012/01/load_profiles.pdf

UK profile classes

- Half-hourly electricity daily load profiles for 8 standard UK profile class definitions
  - 01 Domestic Unrestricted
  - 02 Domestic Economy 7
  - 03 Non-domestic Unrestricted
  - 04 Non-domestic Economy 7
  - 05 Non-domestic Maximum Demand 0-20% Load Factor
  - 06 Non-domestic Maximum Demand 20-30% Load Factor
  - 07 Non-domestic Maximum Demand 30-40% Load Factor
  - 08 Non-domestic Maximum Demand >40% Load Factor)



- Important differences to the NEM:
  - Monthly bills
  - Demand register meters
- Also worth noting that UK has since made a significant commitment to interval metering – currently engaged in a national rollout whereby all households expected to have smart meters and IHDs by 2020

A proposed alternative – NEDRI (US 2003)

- Cited an important opportunity as being:

  "the role that short-term, price-responsive load can play in real-time and day-ahead power markets . . .

  Experience [has] demonstrated that a relatively small amount of price-responsive load can enhance system reliability if there are reserve shortfalls and substantially reduce market-clearing prices during tight market conditions, producing significant benefits to consumers."

- Noted that profiling is a barrier:
  - Reduces incentive to the individual customer – any reduction in energy use at times of peak (or in any interval) is effectively spread over all hours of the billing period -- the load reduction is not credited to the appropriate hour
  - Provides no incentive to the Retailer to change customers' load profile, as the benefit will be shared with all retailers

- Identified a number of recommendations required to

  "create sufficient price-responsive load so as to improve the performance, efficiency and reliability of wholesale electricity markets"

NEDRI recommendations for how load profiles could assist

- Regulator should consider requiring DBs to establish and maintain “special” load profiles to ensure that non-interval metered customers who want to participate in demand response programs receive the full financial benefits available from those programs
- Load profiles should be adequate to support “rate design, class and subclass settlement, and other purposes (such as interruptible programs)”
- Assumes the load profiles would be used to:
  - verify the load reductions of the participating customers on a statistical basis, and
  - ensure the Retailer gets the full benefit of the load reduction in the wholesale market (part of which would presumably be shared with the customer to encourage participation)
- Noted that:
  - “Implementation details may need to be worked out”
  - Benefits and costs would need to be considered: *i.e.*, do smaller customers have the potential to reduce their load to a degree great enough to warrant the effort that would be required to establish the new load profiles?

Possible rationale and criteria for profiling in the NEM

- Accuracy (user pays/fairness)
- Provide price signals to inform consumer decision-making
- Provide basis for demand management programs for non-interval metered customers
- Least cost (avoid the cost of metering where profiling can provide an acceptable alternative considering the other criteria)
- Does not create a barrier to further technological improvement

How does current profiling approach stack up?

- Accuracy (user pays/fairness)

  POOR -- Significant inter- and intra-class subsidies

  - Small commercial probably subsidising residential customers
    - Commercial shape flattens residential shape
  - Intra-class subsidies likely between, for example:
    - AC and non-AC residential customers
    - Residential customers with different household occupancy patterns
    - Commercial customers with different operating schedules

- Provide price signals to inform consumer decision-making

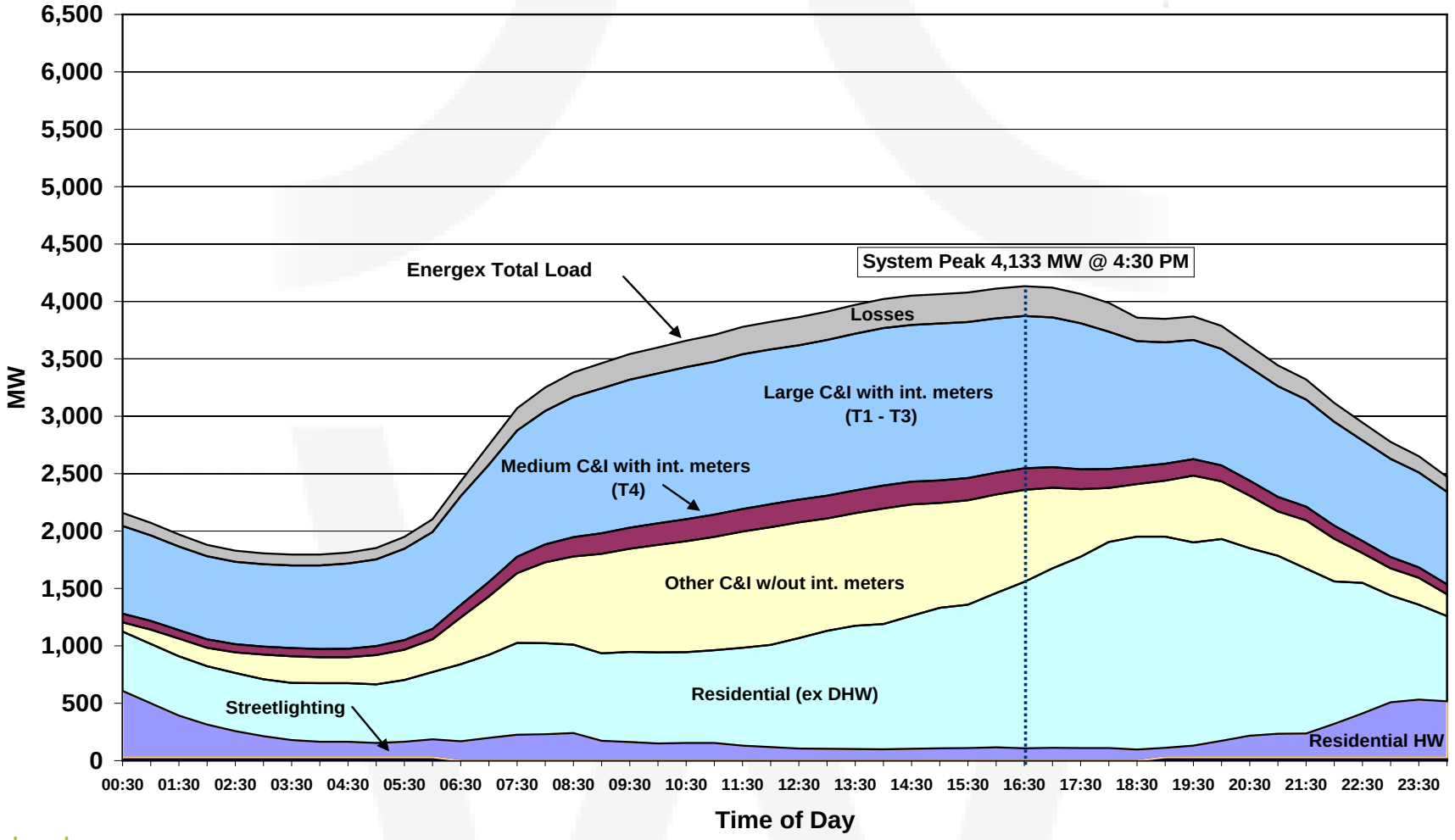
  POOR

- Provide basis for demand management programs for non-interval metered customers

  POOR

on

Composition of Energex system peak demand (24 Jan 2006)



back

Oakley Greenwood

How does current profiling approach stack up?

- Least cost (avoid the cost of metering where profiling can provide an acceptable alternative considering the other criteria)

  ***Mixed** – Has avoided the cost of metering – but performance on other criteria is poor*

- Does not create a barrier to further technological improvement

  ***Good** – No reason to believe the current profiling approach has created a barrier to the use of interval metering*

Alternative approaches for load profiling in the NEM

- Break current load profile by residential and non-residential or specific tariff classes that are still on accumulation meters
- Try to create classes that reflect customers with similar load shapes
  - Small commercial
    - 5 day operation primarily business hours
    - 5 day operation extended hours
    - 6+ days
  - Residential
    - Appliance stock (particularly AC, possibly pool pumps and controlled hot water; PV might be of interest)
    - Household occupancy pattern (household composition as a surrogate)
    - Climate zone (addressed to some extent by current profiling by DB area – probably not adequate in larger DB areas)
- Demand response program samples

How do these alternatives perform against the criteria

Criteria	Residential / Small Commercial	Load shape segments	Demand response program samples
Accuracy (user pays/fairness)	Better than currently	Very good	Good – but mostly limited to participants
Price signals to inform consumer decision-making	No better than now	No better than now	Good
Basis for demand management programs	No better than now	Possibly a little bit better than now	Very good
Incentive to Retailer	No better than now	Possibly a little bit better than now	Very good
Least cost	Very little incremental cost	Potentially very high costs	Moderate costs
Avoids technology barrier	Good	Poor	Poor

Implementation issues

- Residential / Small commercial
  - Presumably mandatory
  - Samples for creating the profile could be developed using same general approach as used for control load profile
- Load shape segments
  - Could be mandatory or opt-in
  - Mandatory would be extremely expensive to set up initially and maintain
    - Would require updates whenever facility occupancy, occupancy pattern, or possibly appliance stock changed
    - Probably highly contentious and open to gaming (which would add to cost and backlash)
  - Opt in would make the NSLP increasingly accurate and probably increasingly unappealing
    - Could provide an entry for demand management service providers (including retailers), but would require verification
- Demand response profiles
  - Chicken and egg problem – but could be addressed to the extent that DBs become more active in broad-based DM programs

Final thoughts

- Residential / small commercial
  - Makes nothing worse and some things marginally better
  - Appears to be low cost
- Load shape segments
  - Probably more trouble than they are worth
- Demand response program samples
  - Good if they happen as a by-product
- As in many other aspects of the NEM, it is hard to satisfy all objectives at once
- Questions remain as to:
  - Where we are going with smart meters and how quickly, and
  - And in light of that, how important are the other potential benefits of ‘better’ profiles and over what timeframe?

Lance Hoch
Oakley Greenwood Pty Ltd
GPO Box 4345
Melbourne 3000
+614 1172 1386

lhoch@oakleygreenwood.com.au

Oakley Greenwood

www.oakleygreenwood.com.au