



Domestic Load Research Seminar

Estimated domestic Demand at National level

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Question: Can we use Domestic LR results to model National Domestic Demand?

- Is the models sufficient?
- Is there sufficient external resources to “tie it all together”?
- Can the results be verified or can bounds of the result be tested somehow?

It would be extremely useful to track domestic profile contribution nationally, traceable to DLR load models

- Distinction between household, dwelling & connection.
- Formulation of a model
- Discussion of inputs
- Sample results
- Areas for improvement

Household is a social construct: “A household consists either of one person living alone or a group of persons, who live together and whose expenditure on food and other household items is jointly managed”.

Dwelling: Any structure intended or used for human habitation.

What is a connection?: Formal electricity supply to an erf by legal authority.

•Source: (
<http://www.saarf.co.za/Definition%20of%20Terms/RAMS%20Definition%20of%20Terms.pdf>
)

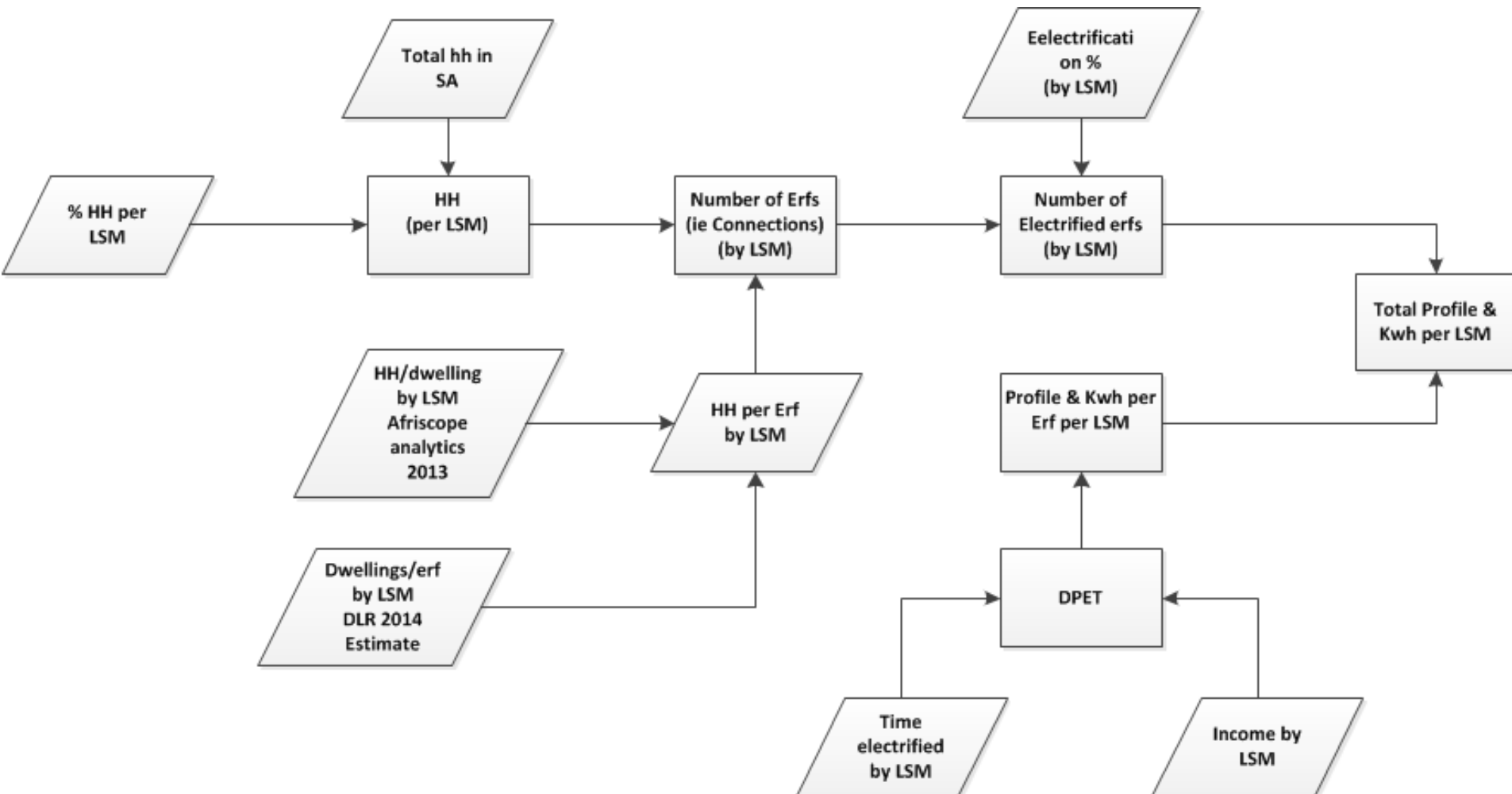
- Several households can occupy a single dwelling.
- Several dwellings can occupy a single Erf
- An Erf may have one or more connections (typically only one).

This construct is tough to evaluate in informal areas.

Research during domestic LR shows that additional dwellings on erven are 95% connected to the “main house” where the meter is placed.

We should measure or characterise the necessary related variables we may need to be using! (ie treat the resources systematically).

Schema for National domestic profile estimation



Results of household per dwelling survey

| | COMMUNITY CLASSIFICATION | | | | |
|-----|--------------------------|--------|-------|--------------|---|
| LSM | INFORMAL | TRIBAL | URBAN | SMALLHOLDING | ESTIMATED VALUE FOR NATIONAL MODELLING (MD) |
| 1 | | | | | |
| 2 | | | | | |
| 3 | 1.5 | 1.3 | 1.5 | 1.4 | 1.5 |
| 4 | | 1.1 | | | 1.1 |
| 5 | 2.3 | 1.0 | 2.0 | 0.6 | 2.0 |
| 6 | 4.0 | 1.4 | 2.3 | 6.0 | 3.0 |
| 7 | | | 1.1 | | 1.1 |
| 8 | | | | | |
| 9 | | | 2.0 | | 2.0 |
| 10 | 2.7 | | 3.3 | 4.4 | 3.0 |

Source:

Domestic dwelling density study presented DUEE 2014, augmented with households added from Afriscope set (J Booysen).

Key: Yellow = apparent outlier

Dwellings per Erven (DLR 2014 initial estimate)

| LSM | % | N (hh) | HH/Dwelling | Dwelling/Erff |
|-----|--------------|--------------|------------------|----------------|
| | (Amps 2013B) | 14 977 634 | (Spot 5 /Census) | (DLR 2014 est) |
| 1 | 2.00% | 299 553 | 1.9 | 2 |
| 2 | 4.00% | 599 105 | 1.8 | 2 |
| 3 | 6.00% | 898 658 | 1.5 | 1.3 |
| 4 | 13.00% | 1 947 092 | 1.1 | 1.3 |
| 5 | 17.00% | 2 546 198 | 2 | 1.3 |
| 6 | 23.00% | 3 444 856 | 3 | 1 |
| 7 | 12.00% | 1 797 316 | 1.1 | 1 |
| 8 | 8.00% | 1 198 211 | 1.5 | 1 |
| 9 | 9.00% | 1 347 987 | 2 | 1 |
| 10 | 6.00% | 898 658 | 3 | 1 |

Key: Green = extrapolated points, Yellow = DLR 2014 survey data.

Estimated number of connections in SA (2013)

| LSM | Est connections | Electrification % (AMPS 2013B) | Estimated electrified Erven |
|-----|------------------|-----------------------------------|--------------------------------|
| 1 | 78 830 | 30% | 23 648.90 |
| 2 | 166 418 | 42% | 69 895.63 |
| 3 | 460 850 | 73% | 336 420.70 |
| 4 | 361 603 | 93% | 1 266 290.87 |
| 5 | 979 307 | 98% | 959 720.70 |
| 6 | 148 285 | 99% | 1 136 802.42 |
| 7 | 633 924 | 100% | 1 633 923.71 |
| 8 | 798 807 | 100% | 798 807.15 |
| 9 | 673 994 | 100% | 673 993.53 |
| 10 | 299 553 | 100% | 299 552.68 |
| | 7 601 570 | 93% | 7 199 056 |

Putting it all together... Consumption by LSM

| LSM | DT PET 2012 Estimate | |
|--------------------------------------|----------------------|----------------------|
| | Year 1 (kwh/mth) | Year 15 (kWh/mth) |
| 1 | 100 | 140 |
| 2 | 121 | 169 |
| 3 | 138 | 192 |
| 4 | 176 | 246 |
| 5 | 234 | 322 |
| 6 | 382 | 498 |
| 7 | 517 | 640 |
| 8 | 623 | 727 |
| 9 | 1036 | 1480 |
| 10 | 1785 | 2550 |
| 42, 171, Annual Kwh Est. 635, 049 | | 55.850, 339, 224 |

National load estimate (Mean winter weekday)

| LSM | TIME OF DAY | | | |
|-----|---------------|----------------|----------------|----------------|
| | 17h00 | 18h00 | 19h00 | 20h00 |
| 1 | 203 | 095 | 804 | 385 |
| 2 | 474 | 765 | 861 | 20 969 |
| 3 | 655 | 297 | 389 | 124 476 |
| 4 | 168 | 797 | 134 | 557 168 |
| 5 | 832 | 193 | 402 | 575 832 |
| 6 | 1 091 330 | 1 330 059 | 1 330 059 | 1 182 275 |
| 7 | 2 124 101 | 2 581 599 | 2 679 635 | 2 467 225 |
| 8 | 1 198 211 | 1 469 805 | 1 525 722 | 1 429 865 |
| 9 | 2 371 308 | 2 853 836 | 2 793 094 | 2 565 905 |
| 10 | 1 735 104 | 2 027 242 | 1 992 869 | 1 859 554 |
| | 9,783, | 11,828, | 11,858, | 10, |
| kW | 385 | 688 | 970 | 789,653 |

- The results are un-tuned. Direct result of DLR load models and aux variables to Amps data.
- East/ west effects are missing.
- The upper income load models are a tough call.
- Regional variants of these main estimators could be improved

- Household splits by LSM: Yes, AMPS surveys
- HH/dwelling by LSM: Yes, AfriScope /Spot 5 Spatial analysis
- Dwellings/erf by LSM: Maybe, estimate from Domestic LR 2014
- Number of connections: Yes, can estimate by LSM.. Can confirm by NERSA licensee reports
- Electrification levels by LSM: Yes ..AMPS & Census
- Age of connections: Estimate from NERSA connection reports
- Total kWh check: Yes, can confirm lower bound by NERSA licensee reports.

THANK YOU!!!