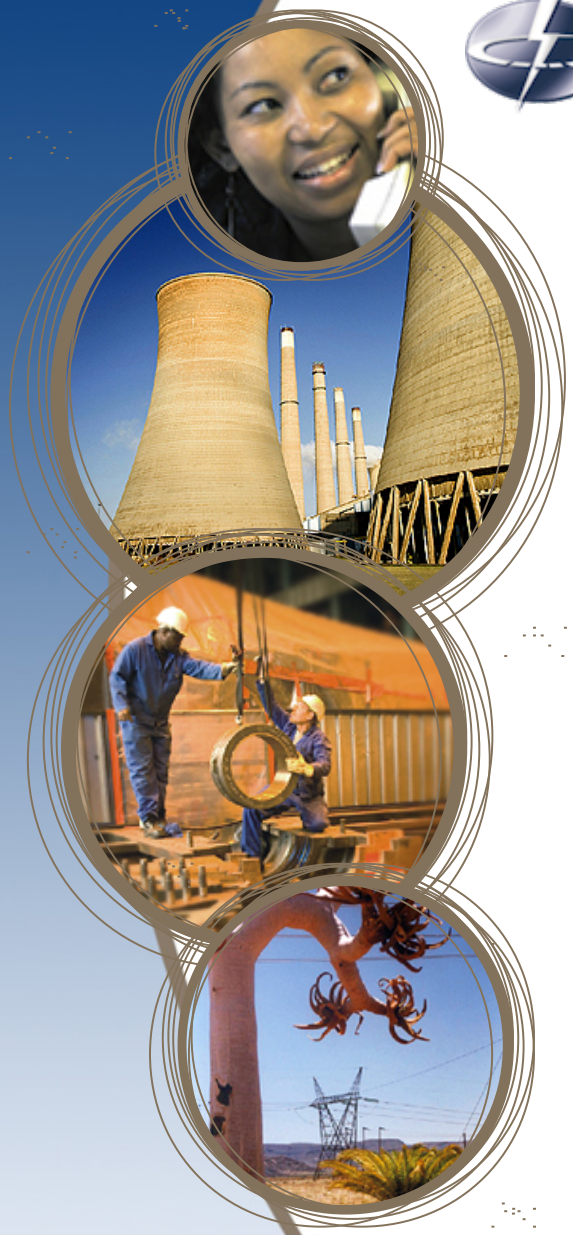


Domestic Load Research Seminar

Demographics of the SA consumer

Presenter Marcus Dekenah

12 November 2014

Powering your w

Contents

- Housing
- Wealth/LSM
- Wealth/LSM/consumption
- Appliance ownership levels
- Definition of named load classes
- Consumption/demand for named load classes

Characteristics of Households Without Electricity

Dwelling Type	%hh	% Non Electrified (by type)
House/cluster house/town house	69%	4%
Traditional hut	8%	37%
Matchbox/improved matchbox/RDP house	8%	6%
Flat	7%	1%
Caravan	3%	0%
Squatter hut/shack	3%	46%
Hostel	1%	12%
Room in backyard	1%	3%
Compound	0%	62%

Source: AMPS 2011, hh base, Electricity = no

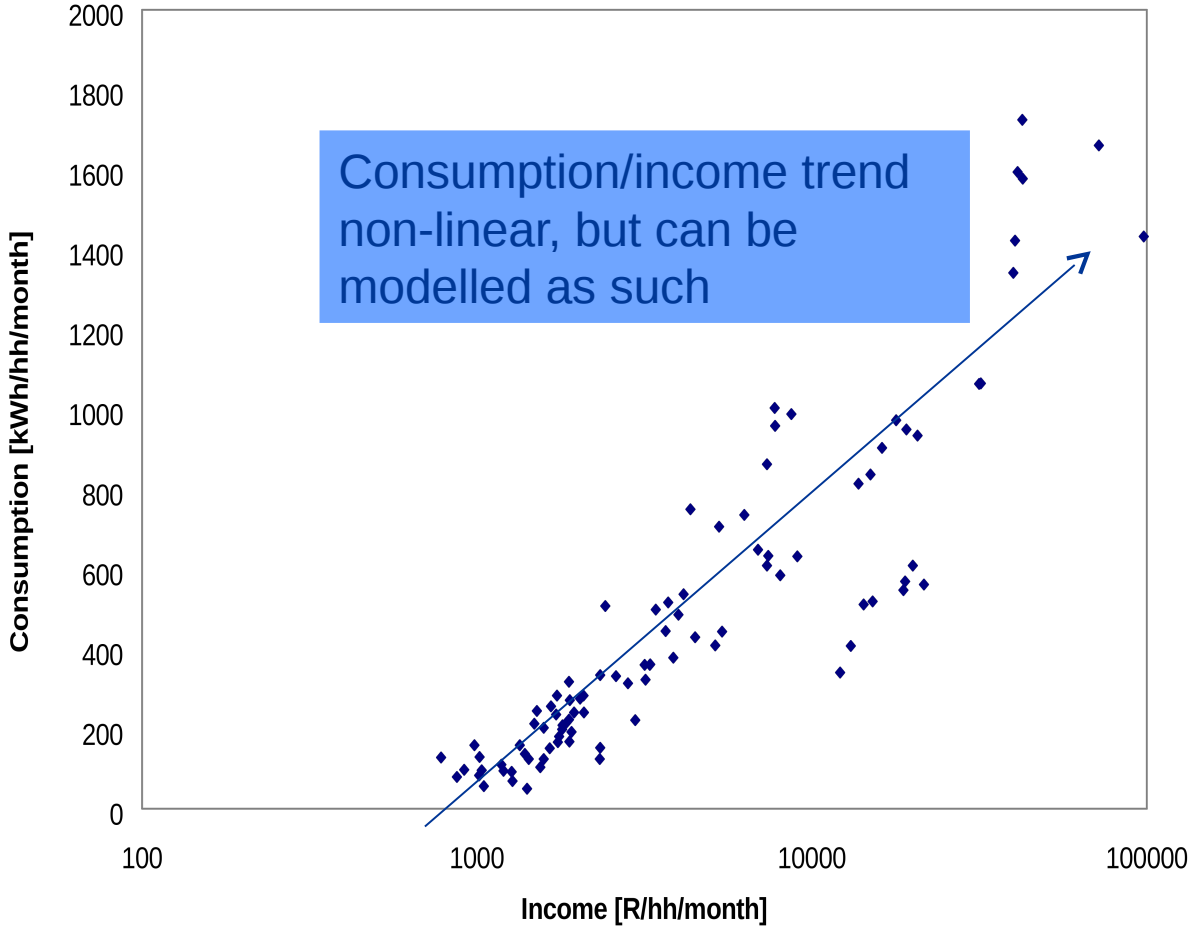
Mapping between HH wealth levels and LSM

	Average income by LSM (R/HH)	% of HH	Cumulative % of HH
LSM 1	1 493	3.0	3.0
LSM 2	1 844	6.4	9.4
LSM 3	2 147	7.7	17.2
LSM 4	3 003	14.3	31.5
LSM 5	4 025	16.2	47.7
LSM 6	7 003	19.4	67.1
LSM 7 - Low	10 461	5.2	72.2
LSM 7 - High	17 753	5.1	77.4
LSM 8 - Low	14 276	4.1	81.4
LSM 8 - High	19 255	4.0	85.4
LSM 9 - Low	24 600	4.4	89.9

Source: AMPS 2011, hh rebased to 2013

See Eskom Geo-based load forecast Std: p44 for comprehensive mapping table

Exploratory Data Analysis – Income vs. kWh



Source: NRS034 LR project, 2010

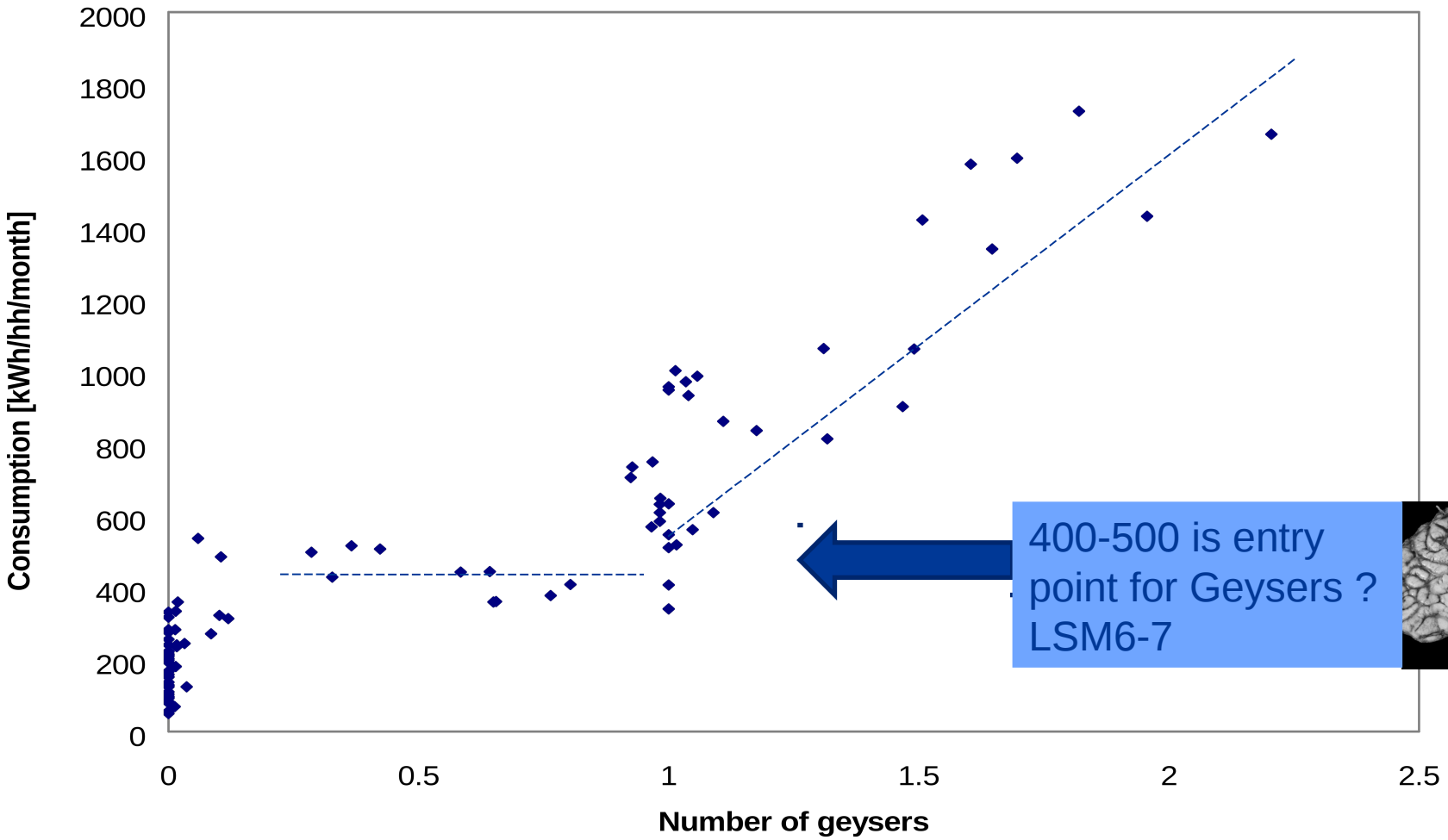
Mapping between HH wealth levels and LSM

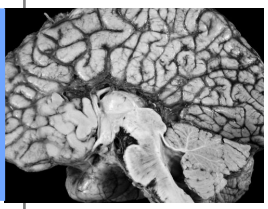
	Average income by LSM (R/HH)	% of HH	Cumulative % of HH	Consumption (Year 7)
LSM 1	1 493	3.0	3.0	121
LSM 2	1 844	6.4	9.4	158
LSM 3	2 147	7.7	17.2	160
LSM 4	3 003	14.3	31.5	220
LSM 5	4 025	16.2	47.7	275
LSM 6	7 003	19.4	67.1	418
LSM 7 - Low	10 461	5.2	72.2	553
LSM 7 - High	11 753	5.1	77.4	590
LSM 8 - Low	14 276	4.1	81.4	638
LSM 8 - High	19 255	4.0	85.4	735
LSM 9 - Low	24 600	4.4	89.9	800?

Source: AMPS 2011, hh rebased to 2013

Use DPet Model to estimate consumption!

Exploratory Data Analysis - Geyser





Appliance Ownership by LSM

	Appliance	LSM 1	LSM 2	LSM 3	LSM 4	LSM 5
	Air con	0%	0%	0%	0%	0%
	Pool	0%	0%	0%	0%	0%
	Geyser	0%	0%	0%	1%	7%
Laundry	Auto front load wash machine	0%	0%	0%	0%	1%
	Auto top load wash machine	0%	0%	0%	0%	3%
	Twin tub/semi-auto wash machine	0%	0%	0%	1%	5%
	Tumble dryer	0%	0%	0%	0%	0%
	Dishwash machine	0%	0%	0%	0%	0%
Cooking	Electric hotplate	**62%**	**75%**	**85%**	**68%**	**44%**
	Electric Stove	0%	1%	5%	**27%**	**60%**
	Microwave oven	0%	0%	3%	**17%**	**48%**
	Other (coal or gas stove)	67%	38%	21%	12%	8%
	Free standing deep freezer	0%	4%	4%	4%	7%
	Fridge or combined Fridge-freezer	0%	8%	64%	79%	94%
Entertainment	DVD	0%	**12%**	**29%**	**39%**	**53%**
	HIFi/Music centre	**57%**	**38%**	**42%**	**46%**	**53%**
	Home theatre	0%	5%	3%	9%	**18%**
	TV	0%	**56%**	**80%**	**90%**	**97%**
	VCR	0%	1%	0%	2%	3%
	Laptop computer	0%	0%	0%	0%	0%
	desktop computer	0%	0%	0%	0%	1%
	Sewing machine	0%	0%	1%	2%	2%
	Vacuum /Floor polisher	0%	0%	1%	0%	1%

Source: AMPS 2011, hh basis

See Eskom Geo-based load forecast Std: p43 for comprehensive appliance table

Definition of named customer classes

- Observable characteristics (housing type and size)
- Infrastructure(Roads, water delivery..)
- Household income
- Demand & consumption

Example of defined customer class: Township 5_6

Customer Characteristics	
AMPS LSM Class	LSM 5&6
Income Range	3,200 to 7,800
Derivation of Income	Derived from working in cities and towns, pensions and some informal employment.
Description of Dwellings	Consist of low-income flats at the bottom-end of the scale to old township houses and newer government schemes (mid-scale) to small semi-detached houses (upper end of the scale). Built floor area of the main dwellings is generally 50-80 m^2. Includes improved matchbox style.
Type of Roads	Mostly tarred.
Water Reticulation	Reticulated into most houses, half of which eventually have working electric hot-water geysers.

Load characteristics .. Township 5_6

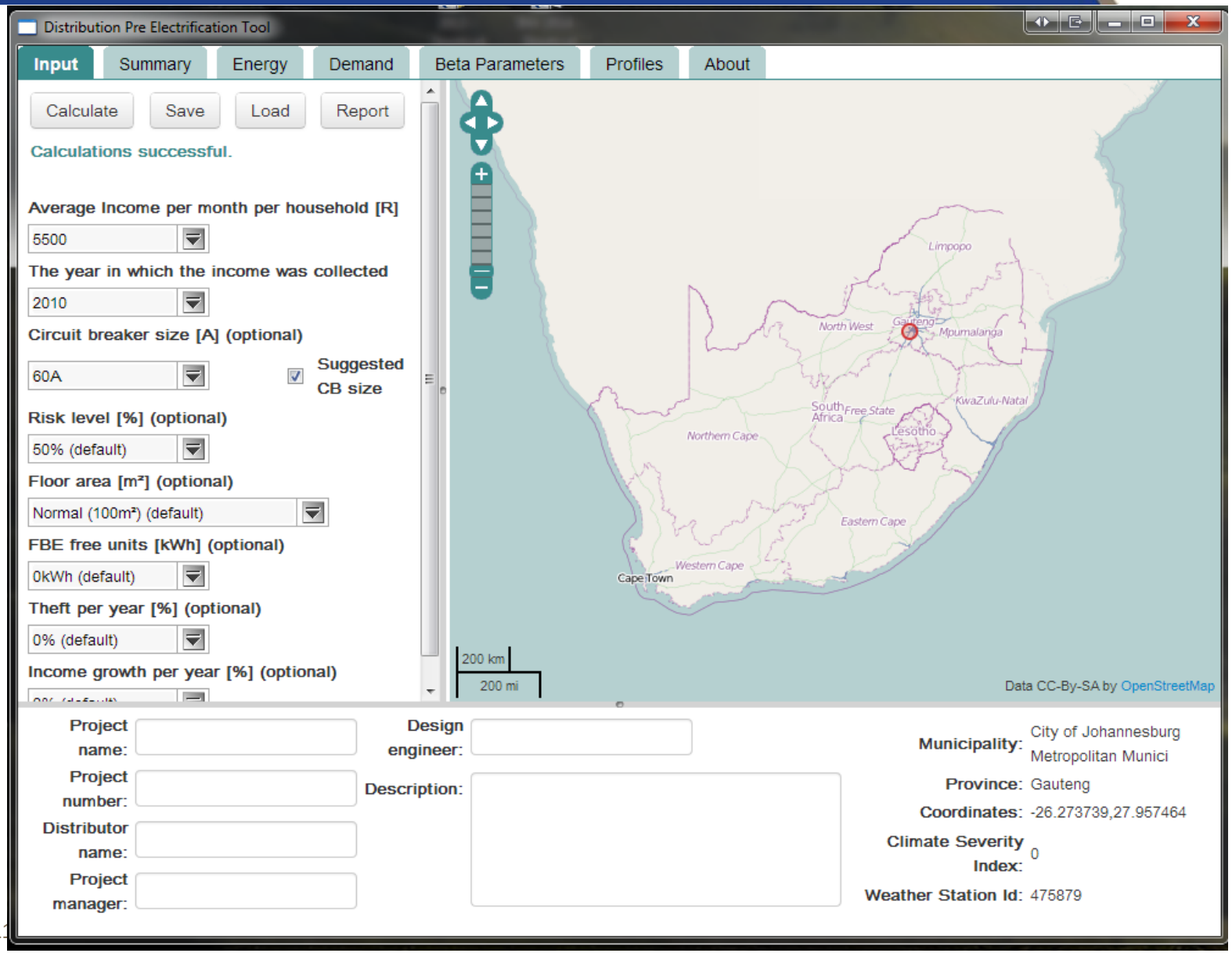
GLF Load Characteristics (Hourly)				
Load Profile	Load factor = 0.38 (Year 7)			
Load Growth	Growth-curve name	Curve type	Saturation	
			Admd	kWh
	Township 5_6 (customer)	Per connection	1.69	470

See Appendix A, GLF standard

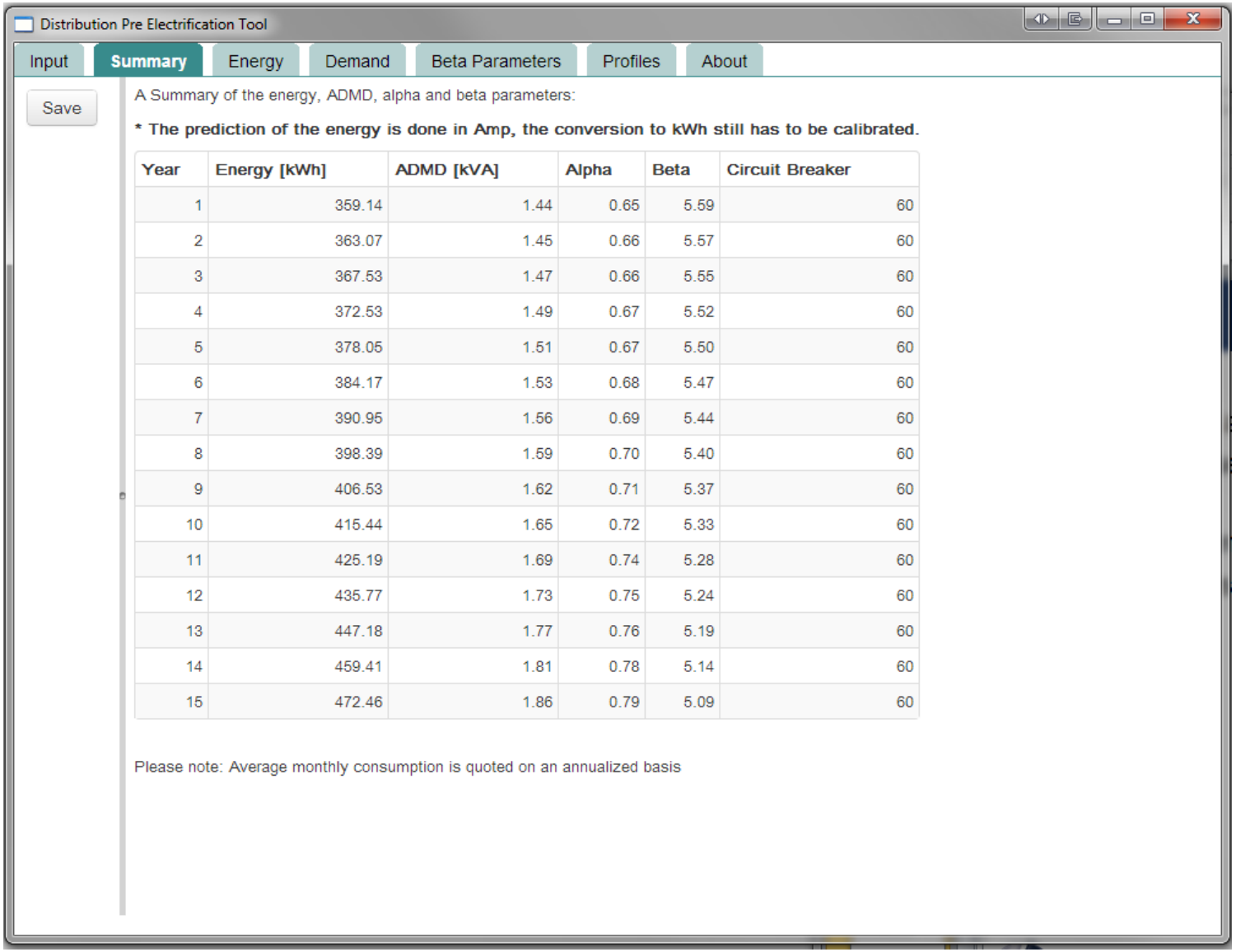
Draft NRS 034 Load parameters

Class ID	Class Name	Estimated Parameters, Year 7						
		Add [kWh]	ADMD [kVA]	alpha	beta	Circuit breaker [A]	mu	sigma
1	Rural settlement Non-urban, scattered	91	0.43	0.179	1.728	20	1.88	3.42
2	Rural villages	91	0.43	0.179	1.728	20	1.88	3.42
3	Informal settlement	217	0.91	0.247	1.008	20	3.94	5.29
4	Township area	391	1.56	0.692	5.437	60	6.77	7.11
5	Urban residential I	575	2.25	0.911	4.687	60	9.77	8.62
6	Urban residential II	788	3.04	1.119	3.956	60	13.23	10.09
7	Urban Townhouse I complex or duplex	704	2.73	1.044	4.230	60	11.87	9.54

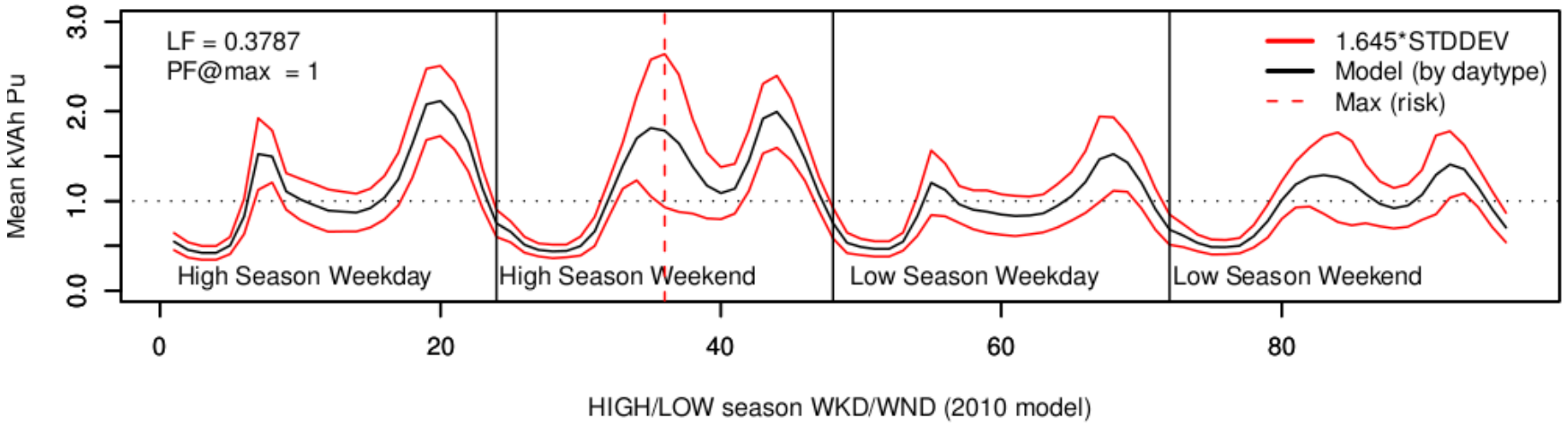
OK so lets verify..



Estimation summary..



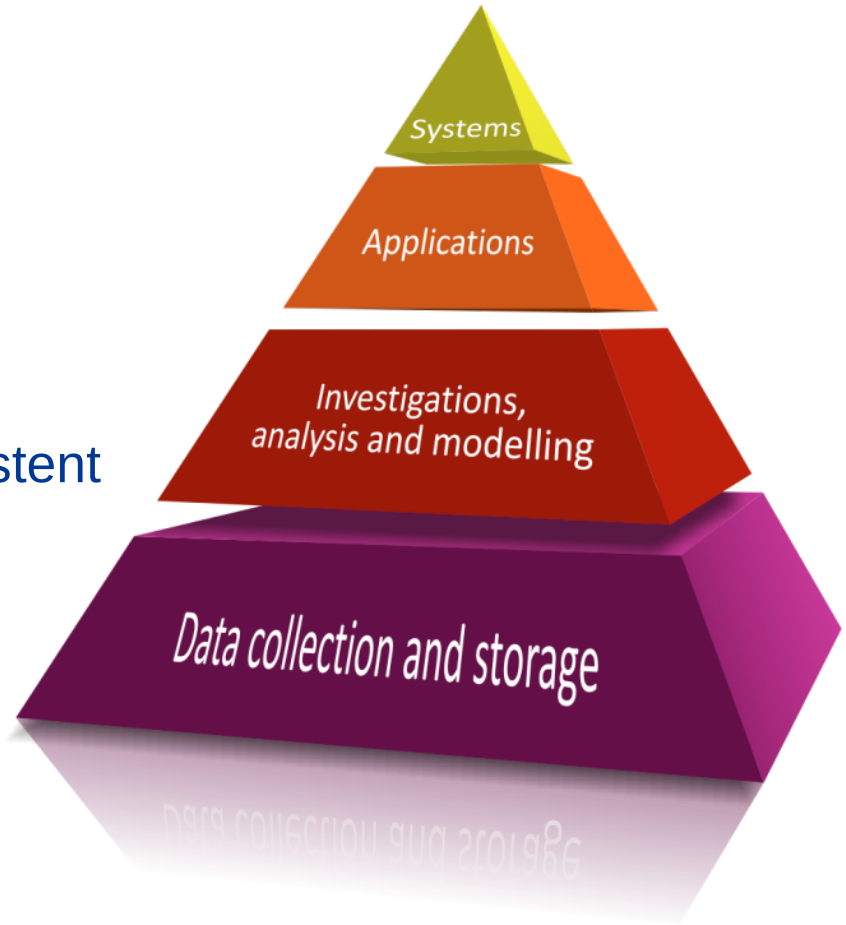
Profile view



- A “seasonal version” of same DPET load shape will be found in GLF load sub-class library.
- A “localised” version of GLF will be found in DProfile mixer for same given consumption level
- All the tools referencing this consumer class (ie demographic) are based upon same underlying load models.
- Their visualisation may differ depending upon the analytic required for their application.

Summary

- Customer demographic
- Customer grouping (Customer class)
- Load models
- Business application
- The Business applications are Consistent



Conclusions

- More business applications will launch from this set of data consistent models
- Each update of models will trigger upgrades/refresh in the subtended systems.
- At this “Golden Moment”, all User Apps are synchronised.
- Now it is about maintenance!

Acknowledgments

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THANK YOU!!!