

Costing network services for consumers with photovoltaic self-generation

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Introduction

- Most EU grid tariffs mainly based on energy
- Adopting self-consumption reduces clients grid bill substantially
 - France : typical client gains 30€ per self-generated MWh
- But no comparable decrease in long-term network costs
- Rethink : services provided, costing, and pricing
- Research work. Not necessarily the position of Enedis

From services to costs and to tariffs

- 1) Identify the services provided
- 2) Allocate the costs per services
- 3) Allocate costs to clients according to the services they use
- 4) Construct tariffs (price offers) so as to
 - 1) Cover total costs
 - 2) Give good price signals (efficiency)
 - 3) Reflect individual costs (equity)

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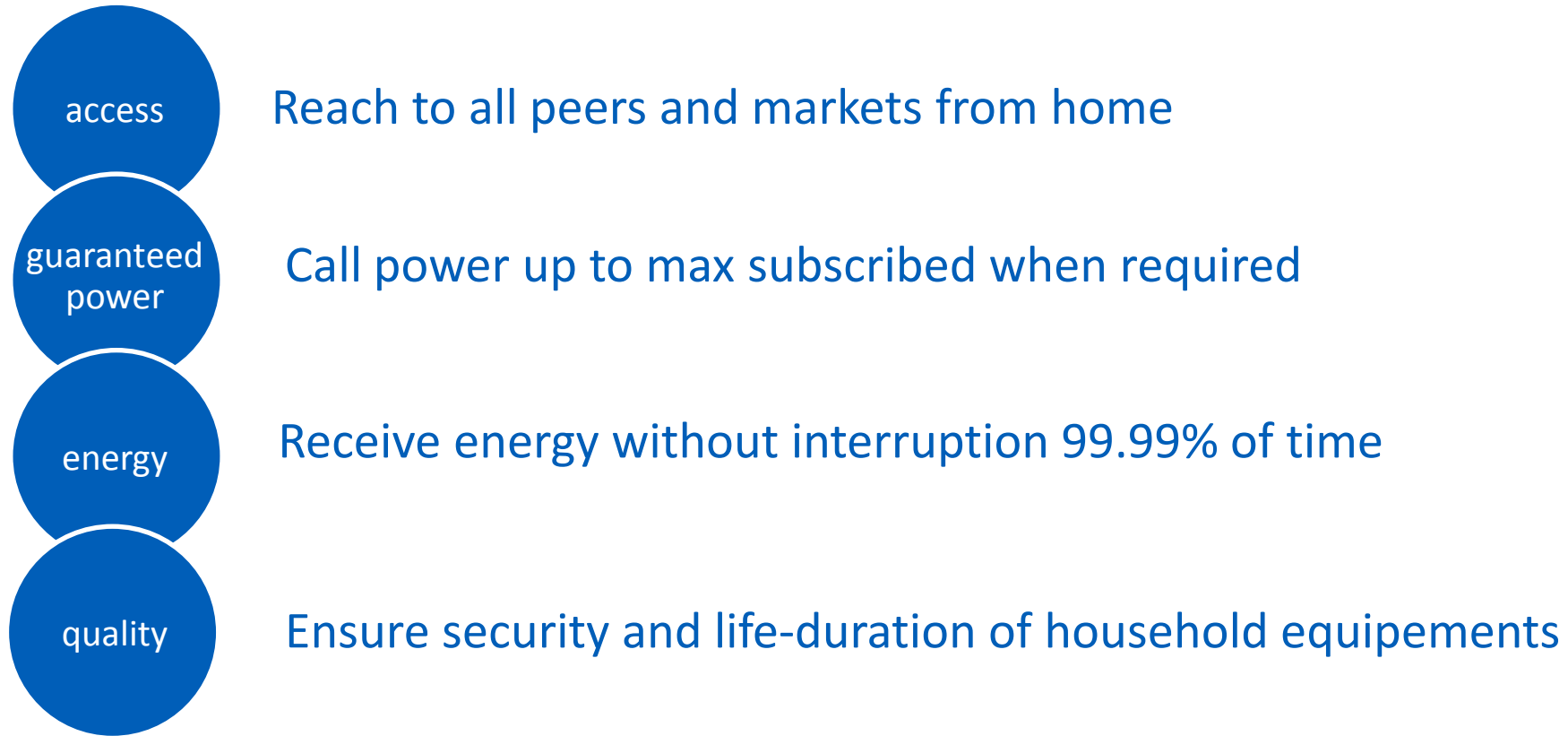
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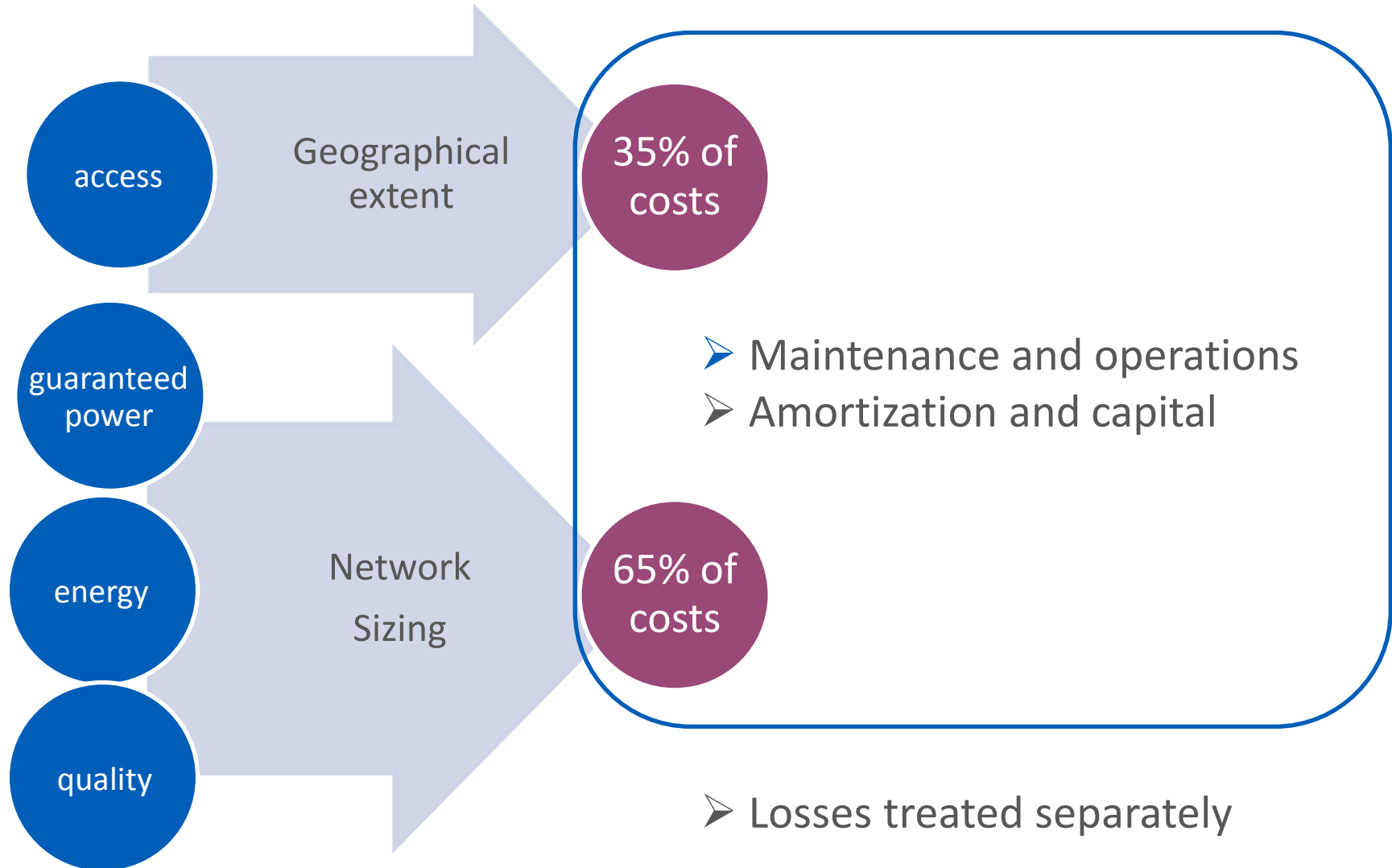
The questions we raise
Illustrate with self-generation

Services provided by the grid

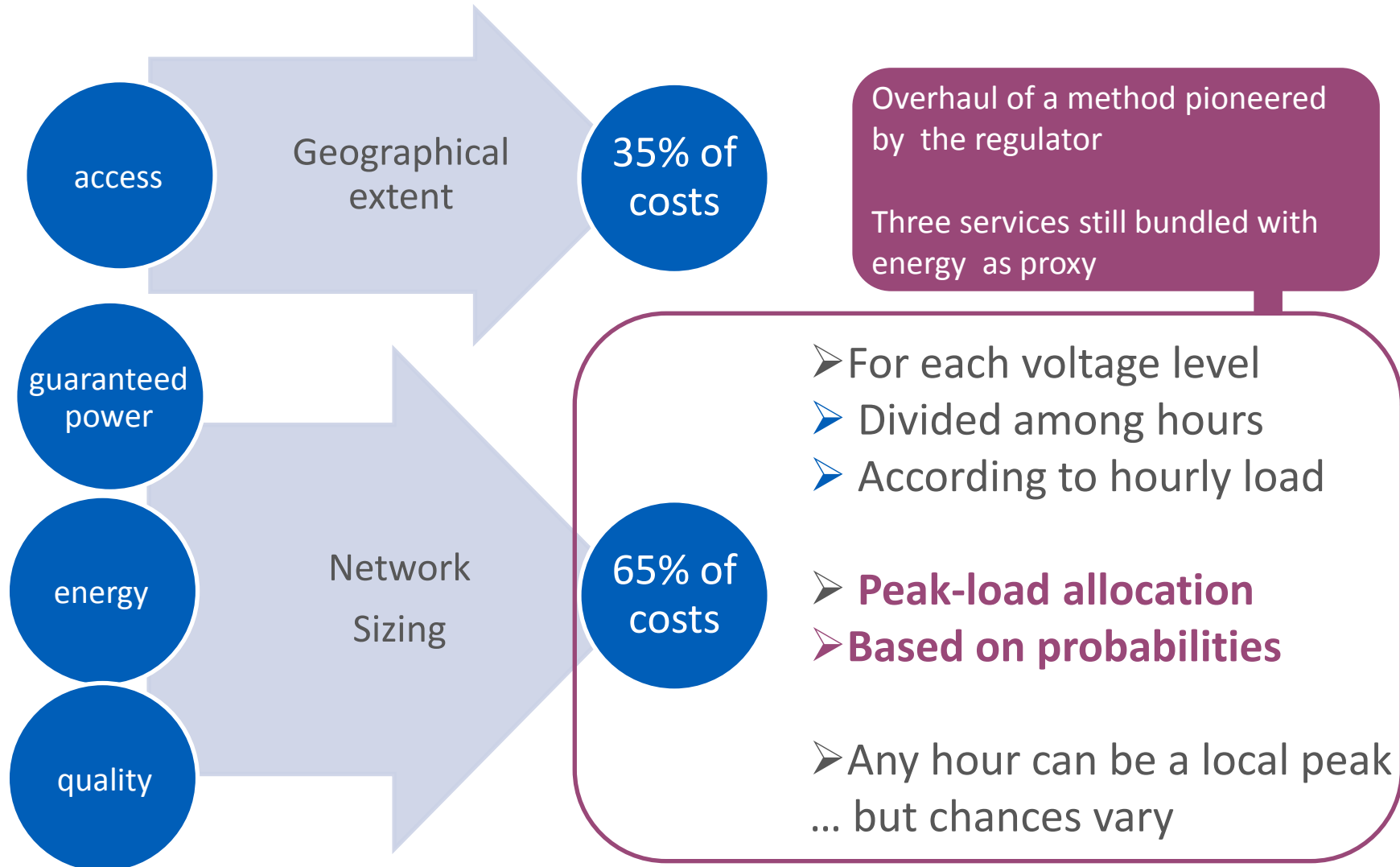


- Clients become able to drop one service and keep the others
- Can no longer be priced through energy as an homogenous bundle

Tentative costing of distribution grid services



Hourly unit costs for network use



Peak-load costing of hourly use of the network

Example : allocation of Medium Voltage costs among hours

Probability of hour being in top 5% quantile

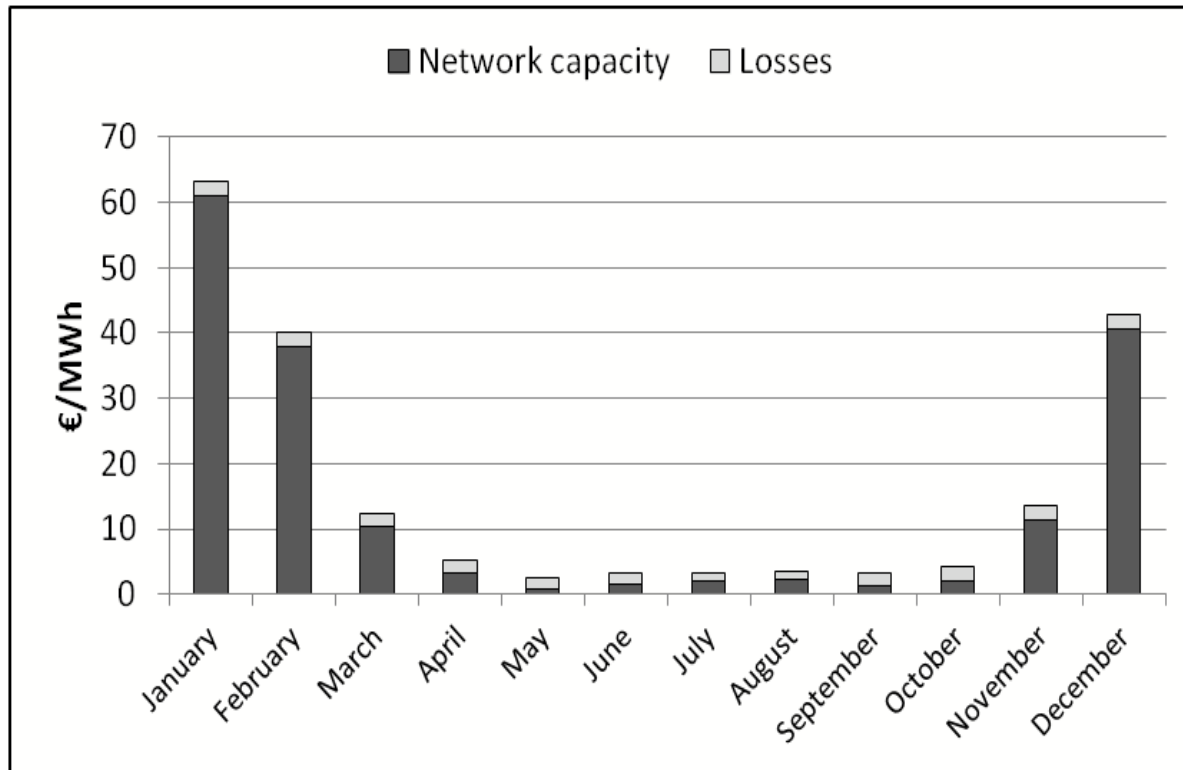
For the load of any of the 2000 substations

LV costs with top 0,5% , HV top 20%

→ Compounded unit cost for using LV in an hour

Add HV and MV weighted by induced flows

Unit costs for LV use – monthly aggregation

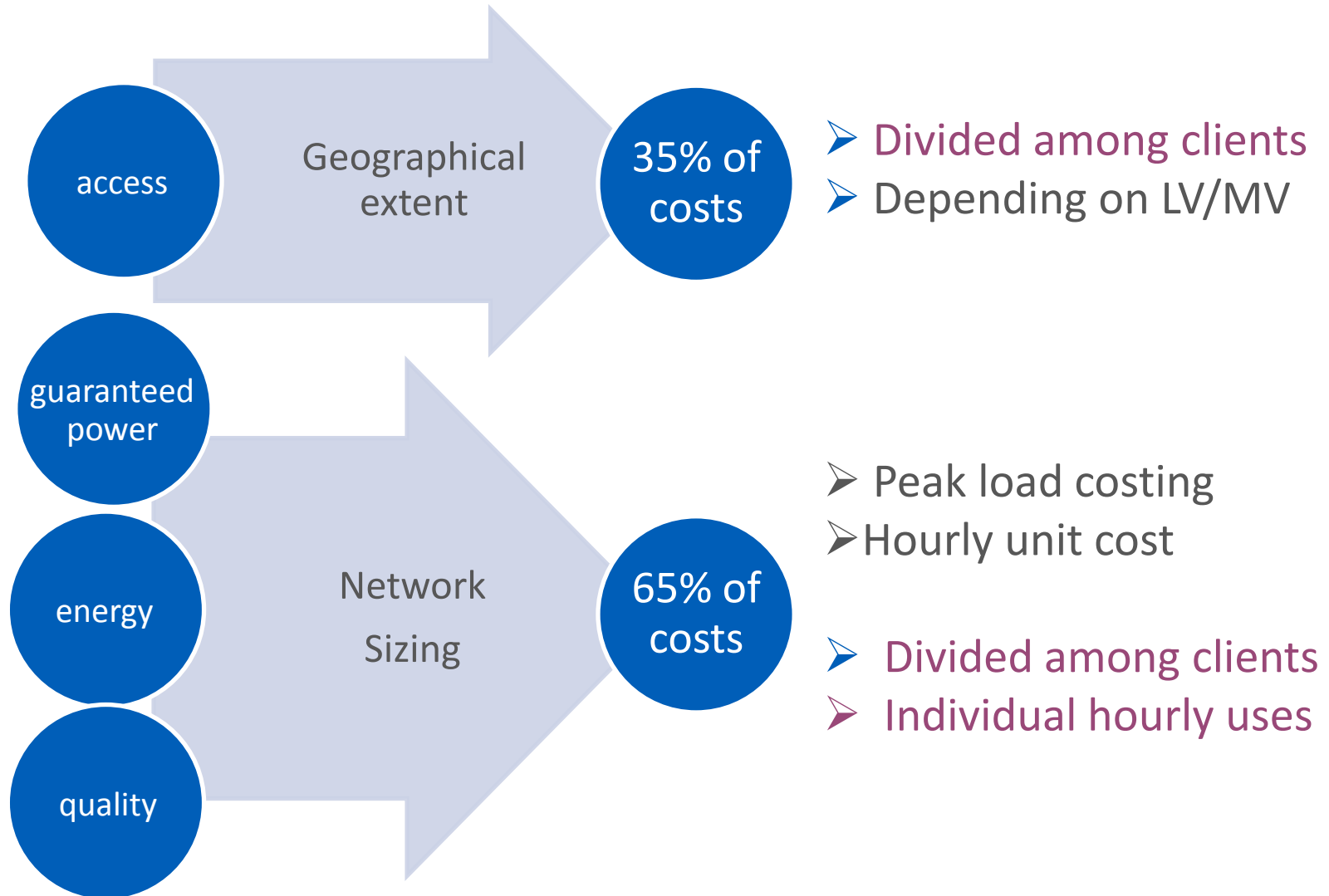


Summer costs close to short-term marginal costs (losses)

Additional costs from some networks with summer peak loads

(For illustration. Paper results based directly on hourly costs)

Costing of clients based on services required



Interpretation of the costing

Costs allocated to a client : according to the likelihood that

- the services required may contribute to future investments
- including the network renewal to maintain access

- an allocation of billable costs
- may not match the grid value or long-term marginal cost i.e. present value of a permanent increase in services requirement

Results for typical clients

User group	Type	Annual self-consumption MWh	Self-consumption / Production	Self-consumption / Consumption	Reduction in cost attribution, per self-consumed MWh
Residential (LV)	Low consumption	1.3	46%	37%	-14€
	Temperature-sensitive	2.2	64%	19%	-15.7€
Farm (LV)	Crop	5.2	72%	9%	-13.4€
	Cattle	88	96%	21%	-12.1€
Business	Hypermarket	242	94%	27%	-12.3€
	Industry (HV)	344	100%	1%	-7.8€

Clients who adopt PV self-consumption

Reduced use of the energy delivery service

Less costs allocated, around 13 €/self generated MWh (LV clients)

Average over summer (large self-consumption low grid value) and winter

Less than half the individual gain from reducing network bill

Conclusions

Case for clarifying the services provided

Renewed method for costs allocation

- But we still treat power as energy

Can be used to analyse clients bills

Application to self-consumption
consistent with widespread concerns

- Current grid tariffs
 - overcharge energy
 - undercharge fixed and power components
- Borenstein 2016, Pollitt 2016, Simshauser 2016

Perspectives

- Consider large penetration of PV self-generation
- Tend to lower the value per self-generated MWh (decreasing marginal returns)
- Applications to shared self-generation
- Develop comparison w. Cohen et al. 2016



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