



Energy research Centre of the Netherlands

# The Road to Smart Grids

**B. Roossien**

*Presented at the GreenIT workshop, 4 May 2010, Amsterdam*

# The Road to Smart Grids

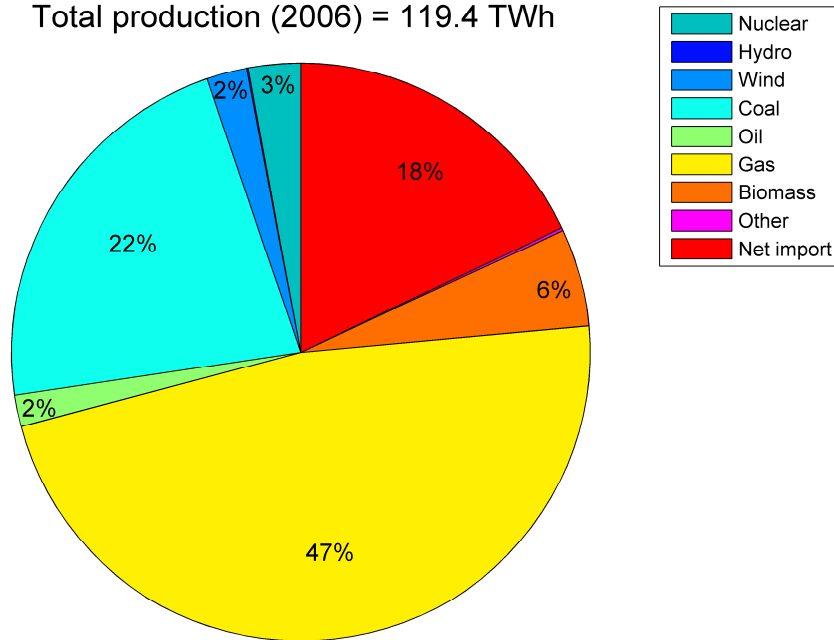
Bart Roossien



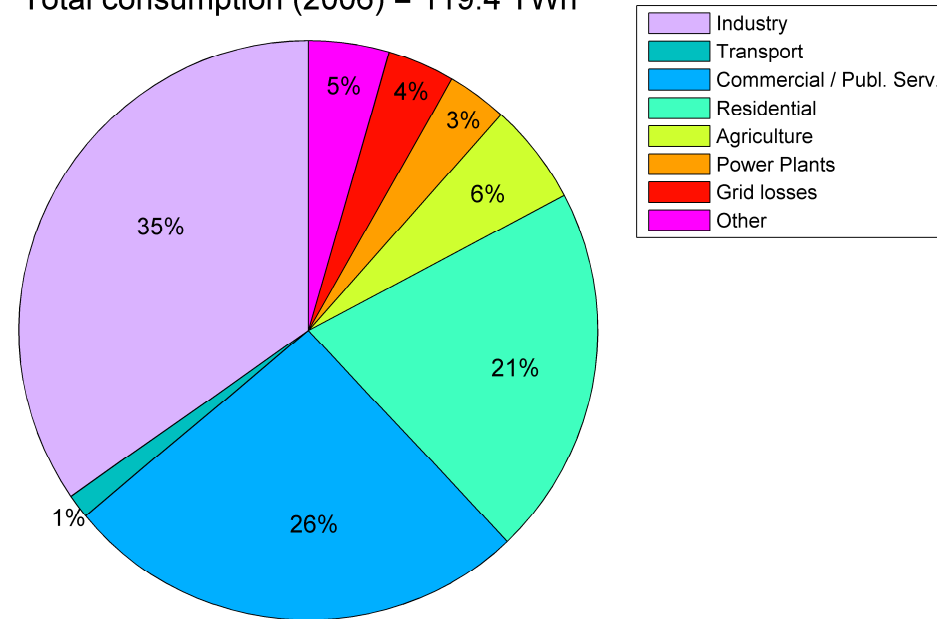




Dutch yearly electricity production composition  
Total production (2006) = 119.4 TWh



Dutch yearly electricity consumption  
Total consumption (2006) = 119.4 TWh



Source: IEA Statistics 2008

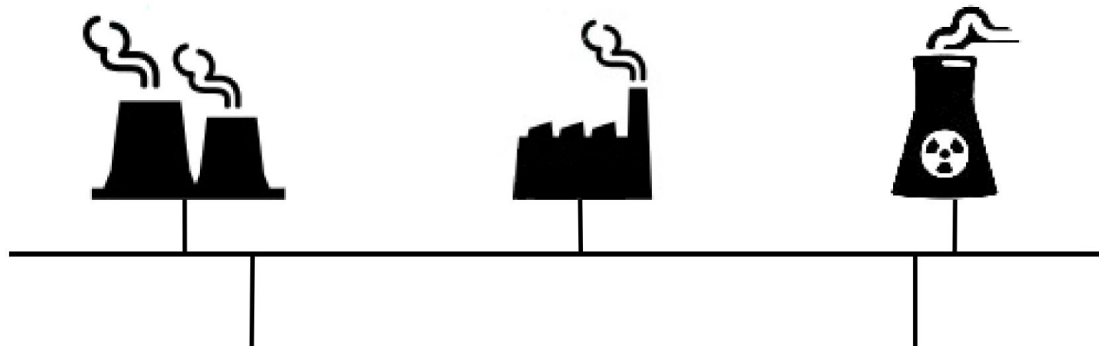


Producers



Consumers

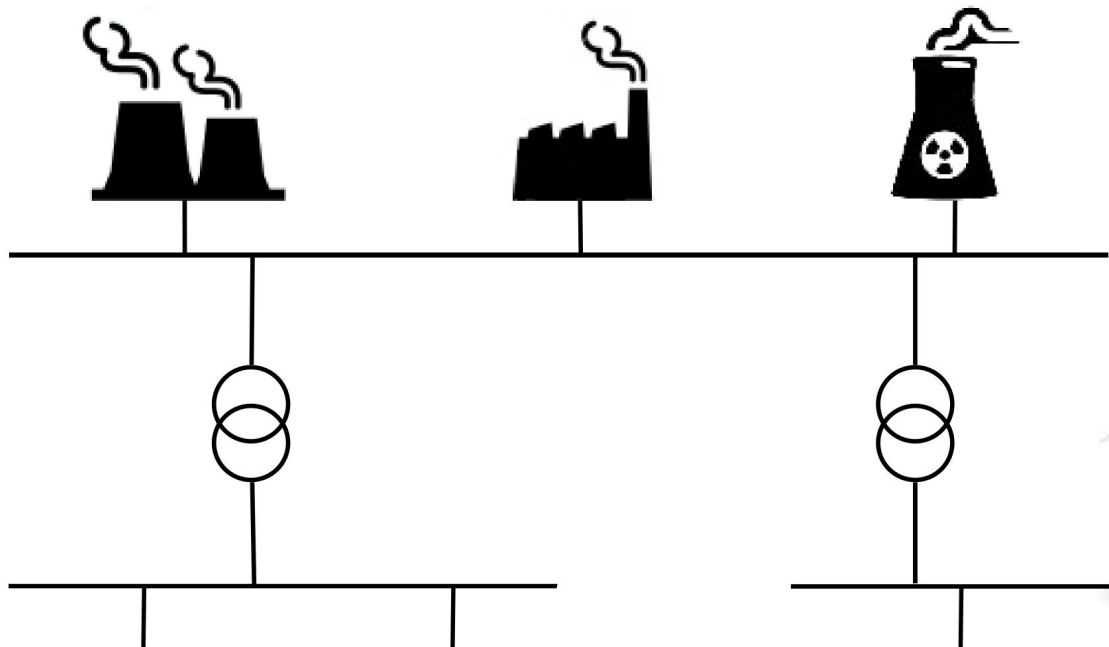
High voltage



380 kV  
220 kV  
150 kV  
110 kV



High voltage



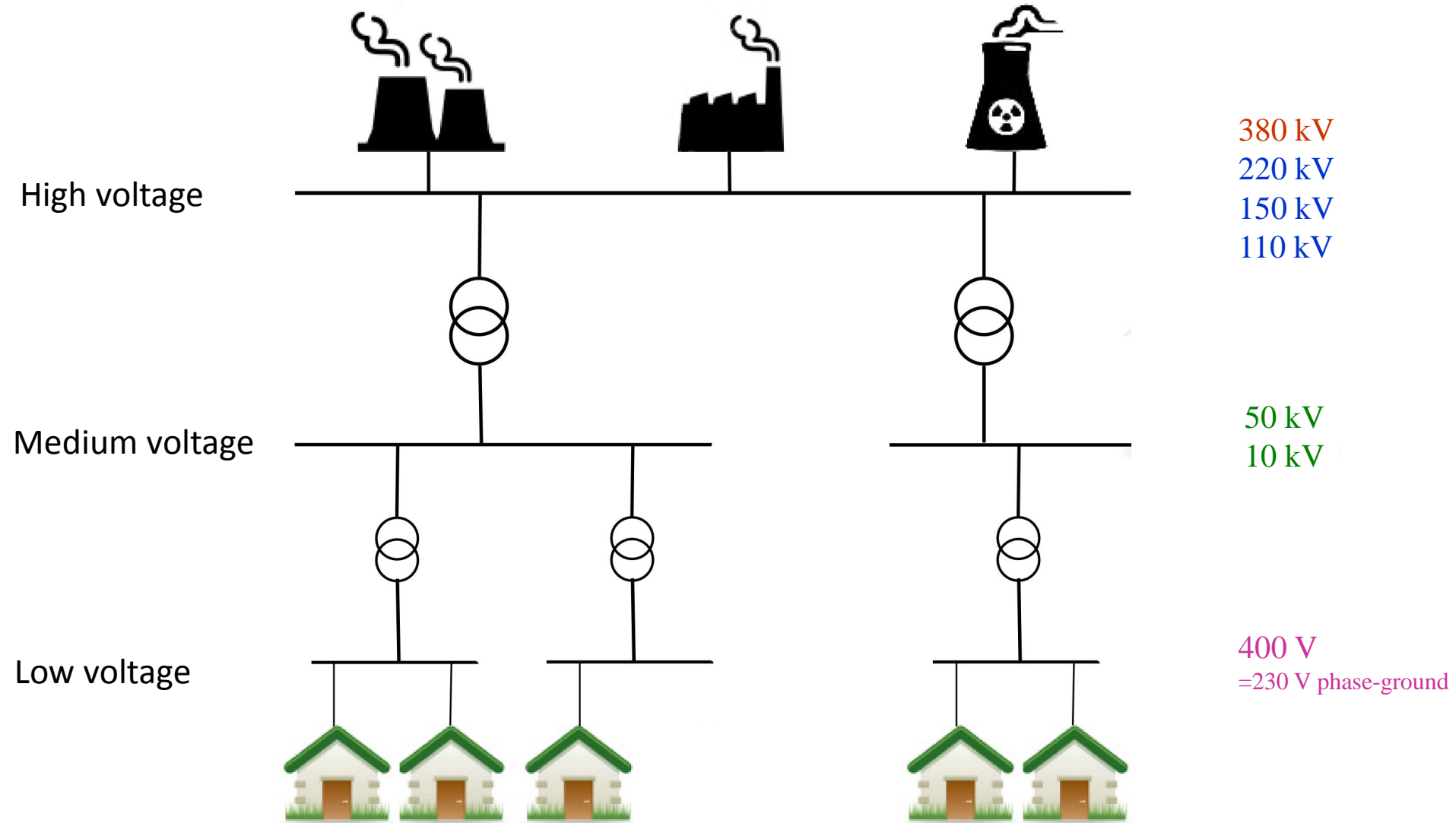
380 kV  
220 kV  
150 kV  
110 kV

Medium voltage

50 kV  
10 kV







**Elektriciteitstransportnet TenneT TSO B.V.**

- 380 kV-station/bovengrondse verbinding/kabel
- 220 kV-station/bovengrondse verbinding/kabel
- 150 kV-station/bovengrondse verbinding/kabel
- - - project NorNed
- - - project BritNed
- - - project 380 kV-verbinding Doetinchem-Wesel
- - - project Randstad 380
- Diemen naam van het station
- grensoverschrijdende verbinding
- TenneT** landelijk bedrijfsvoeringscentrum TenneT

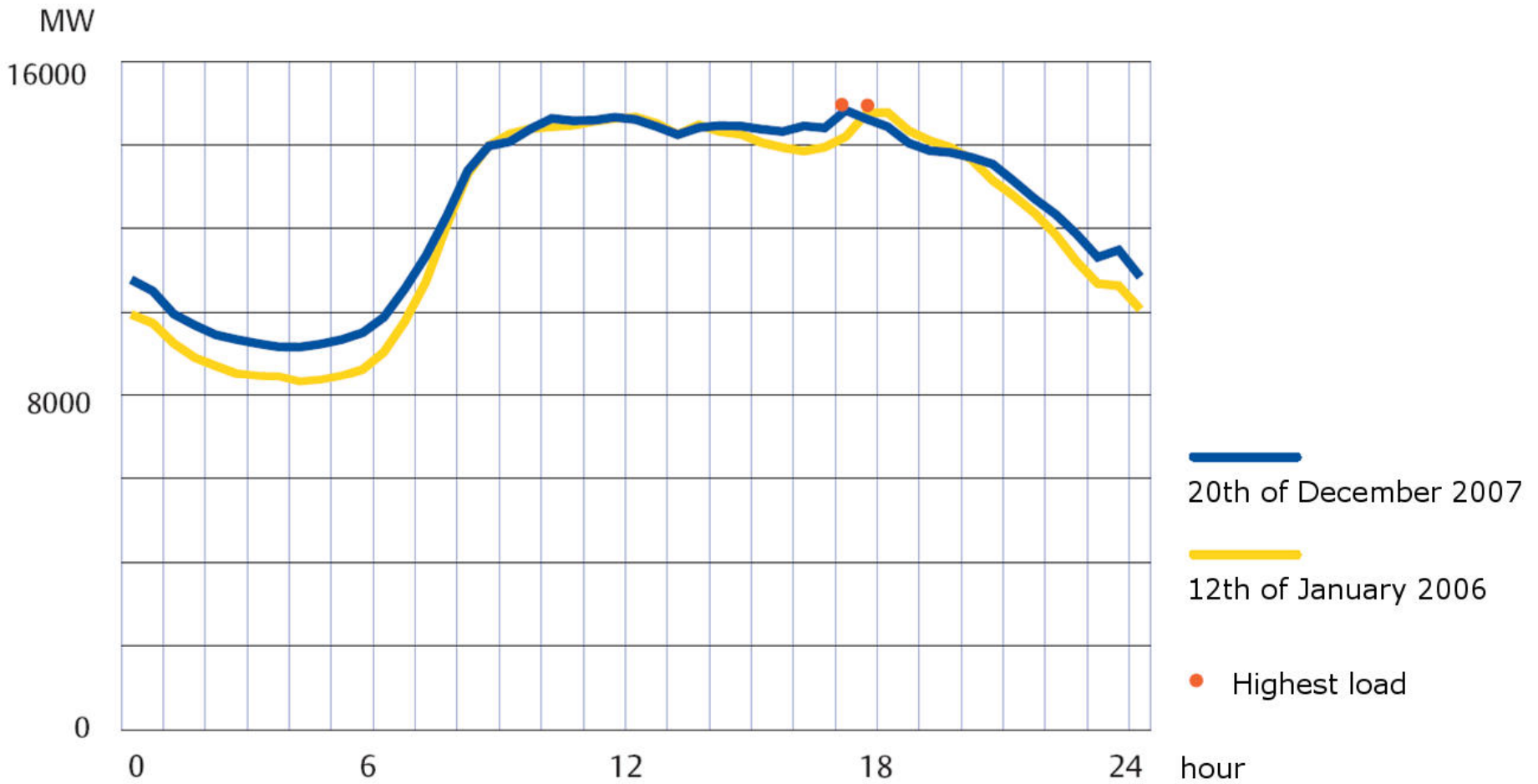
**Elektriciteitstransportnet regionale netbeheerders**

- 150 kV-station/bovengrondse verbinding/kabel
- 110 kV-station/bovengrondse verbinding/kabel

**Centrales (Powerplants)**

- vermogen tussen 60 en 250 MW
- vermogen groter dan 250 MW
- Regionale netbeheerders





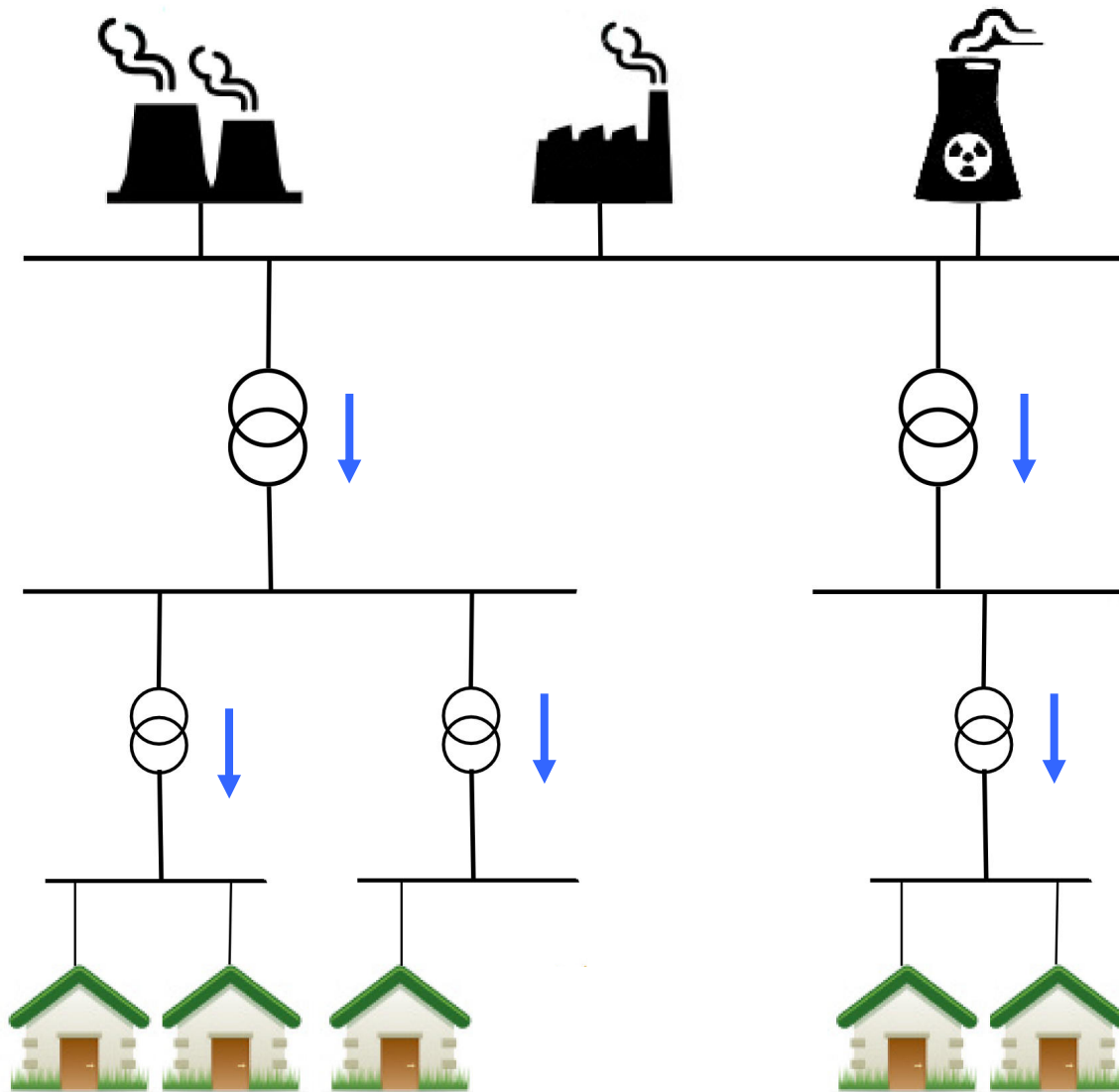
source: Tennet

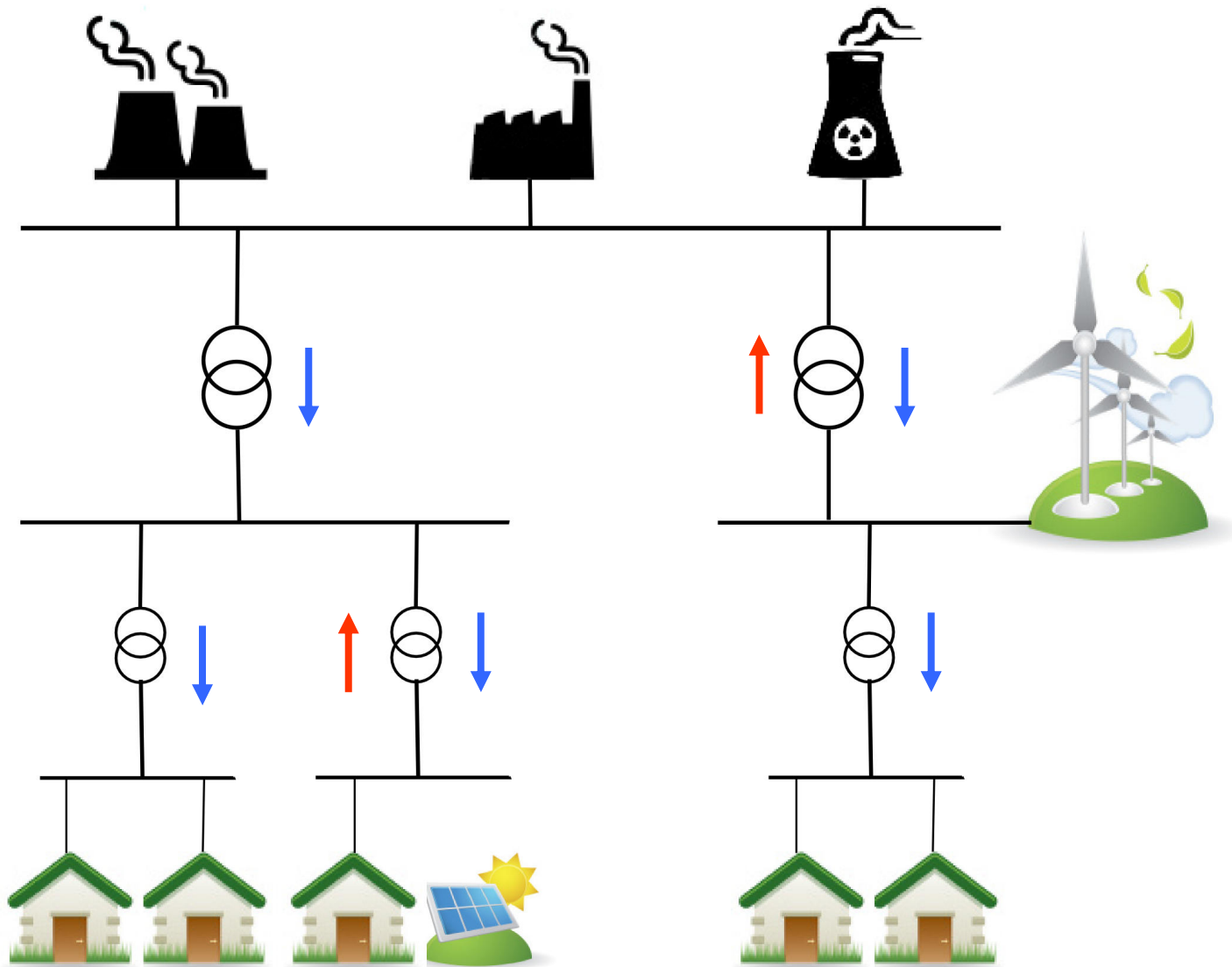
**McHUMOR.com** by T. McCracken



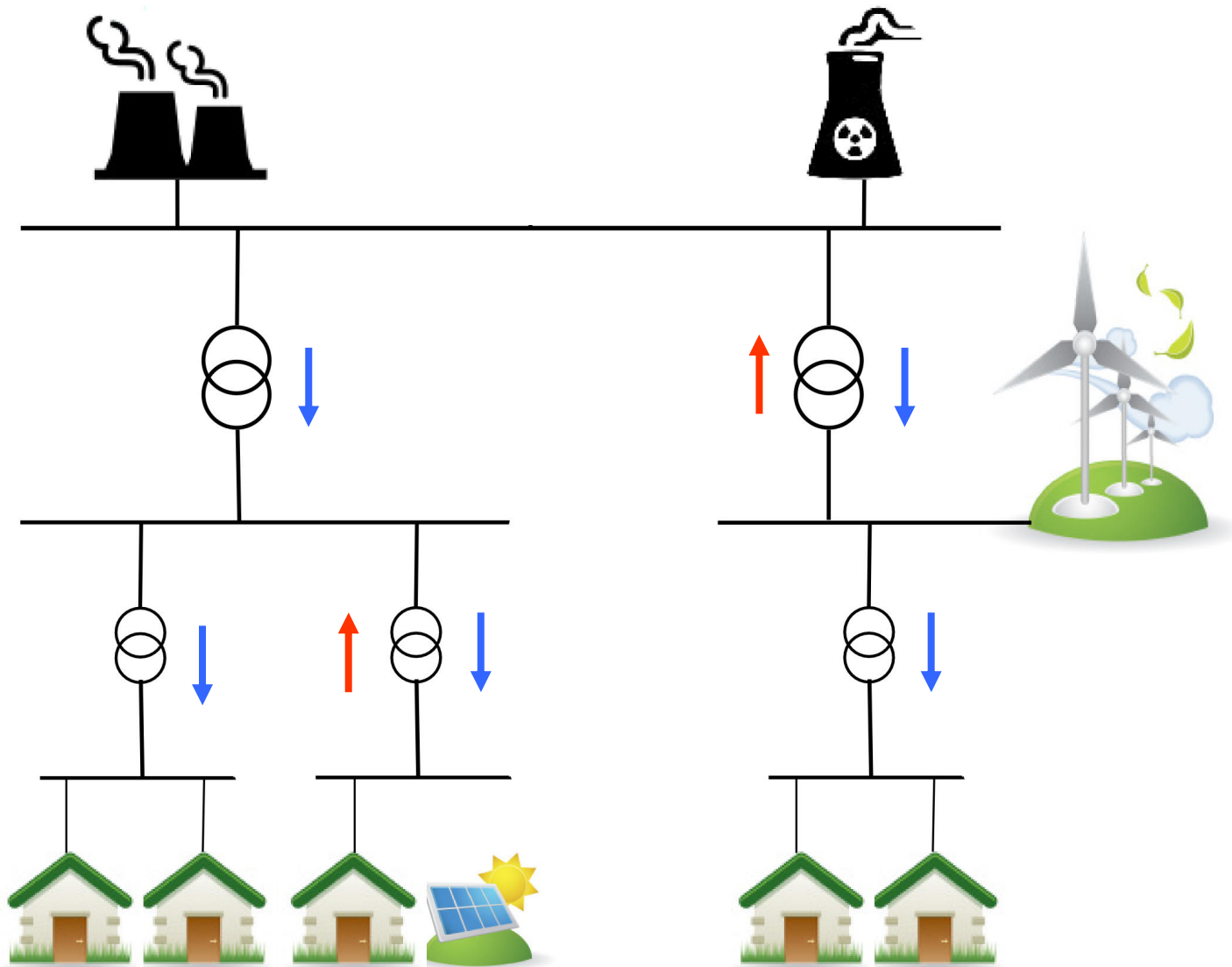
One advantage of being a vampire is that you use electricity in the cheap non-peak hours.







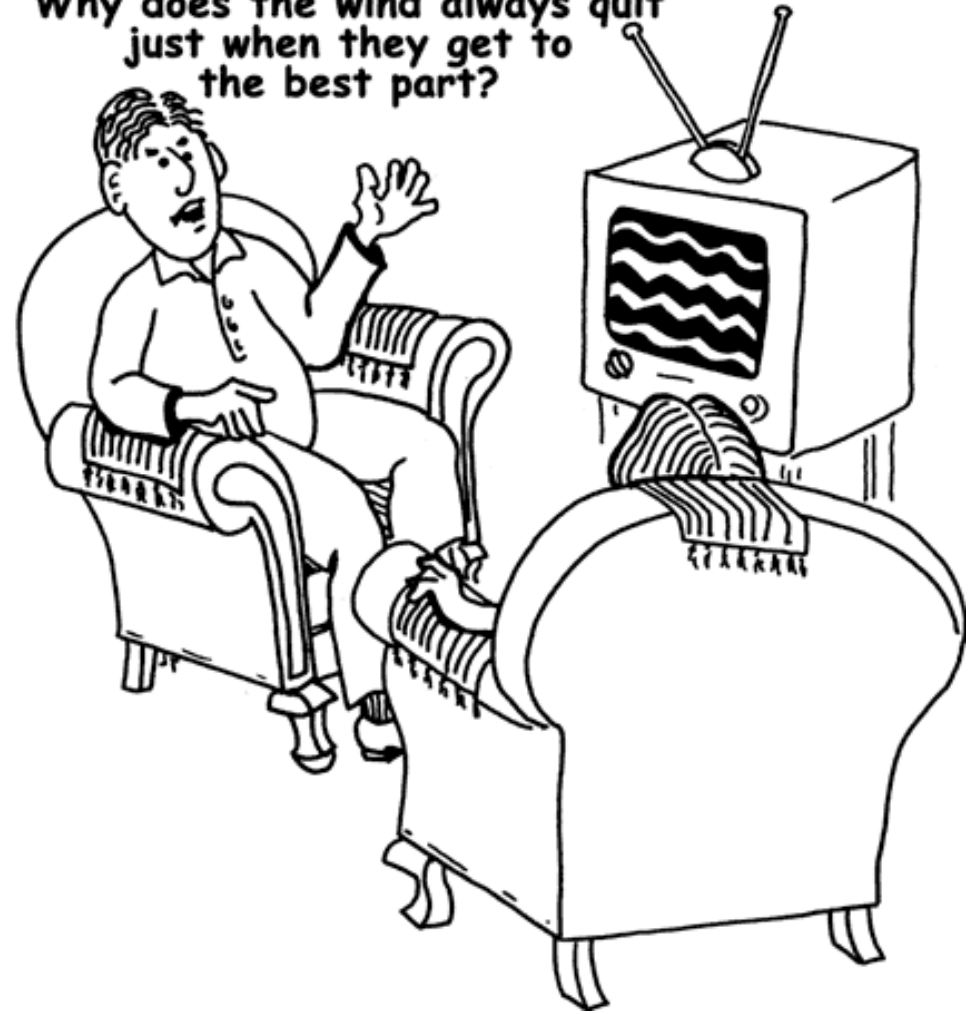




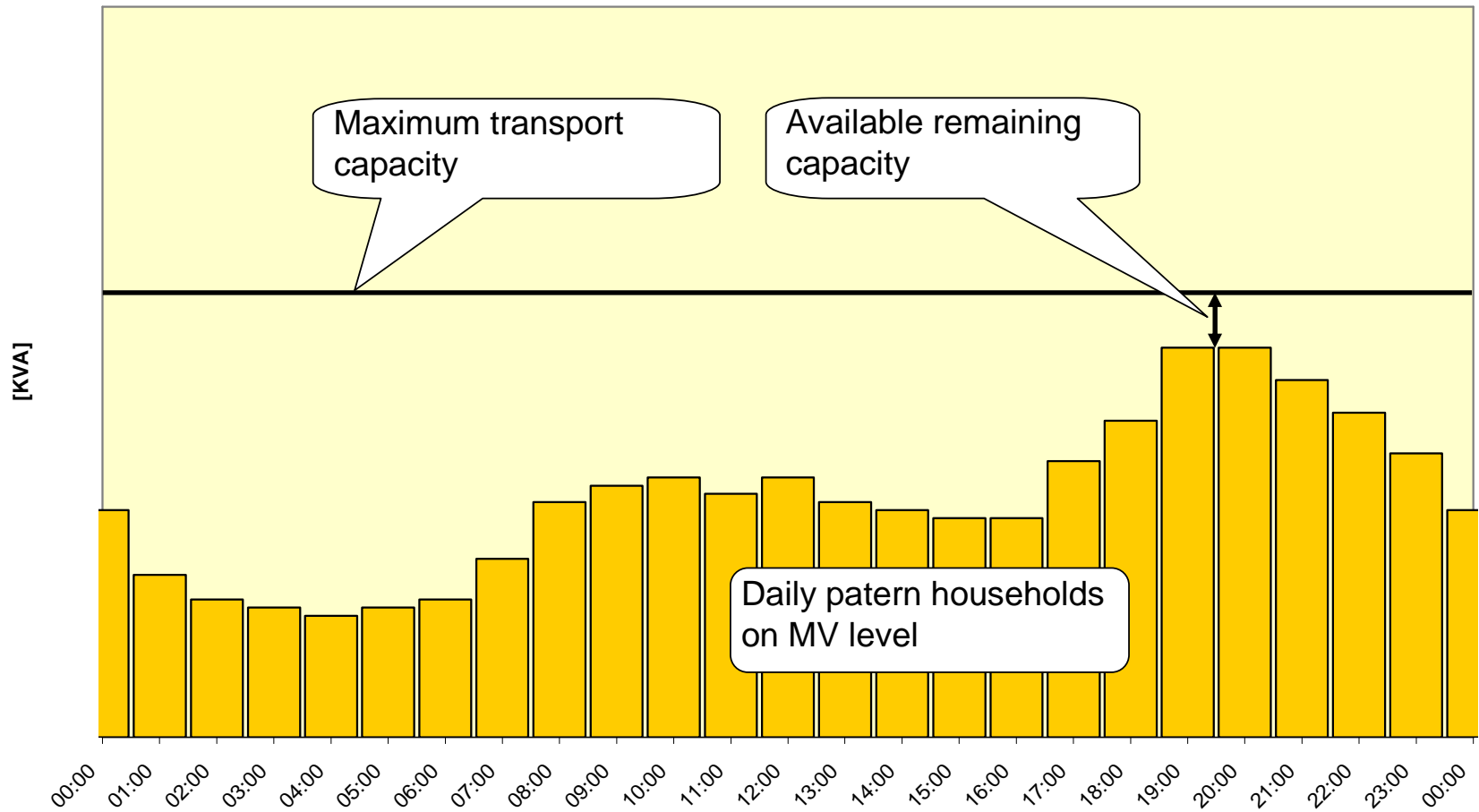




Why does the wind always quit  
just when they get to  
the best part?

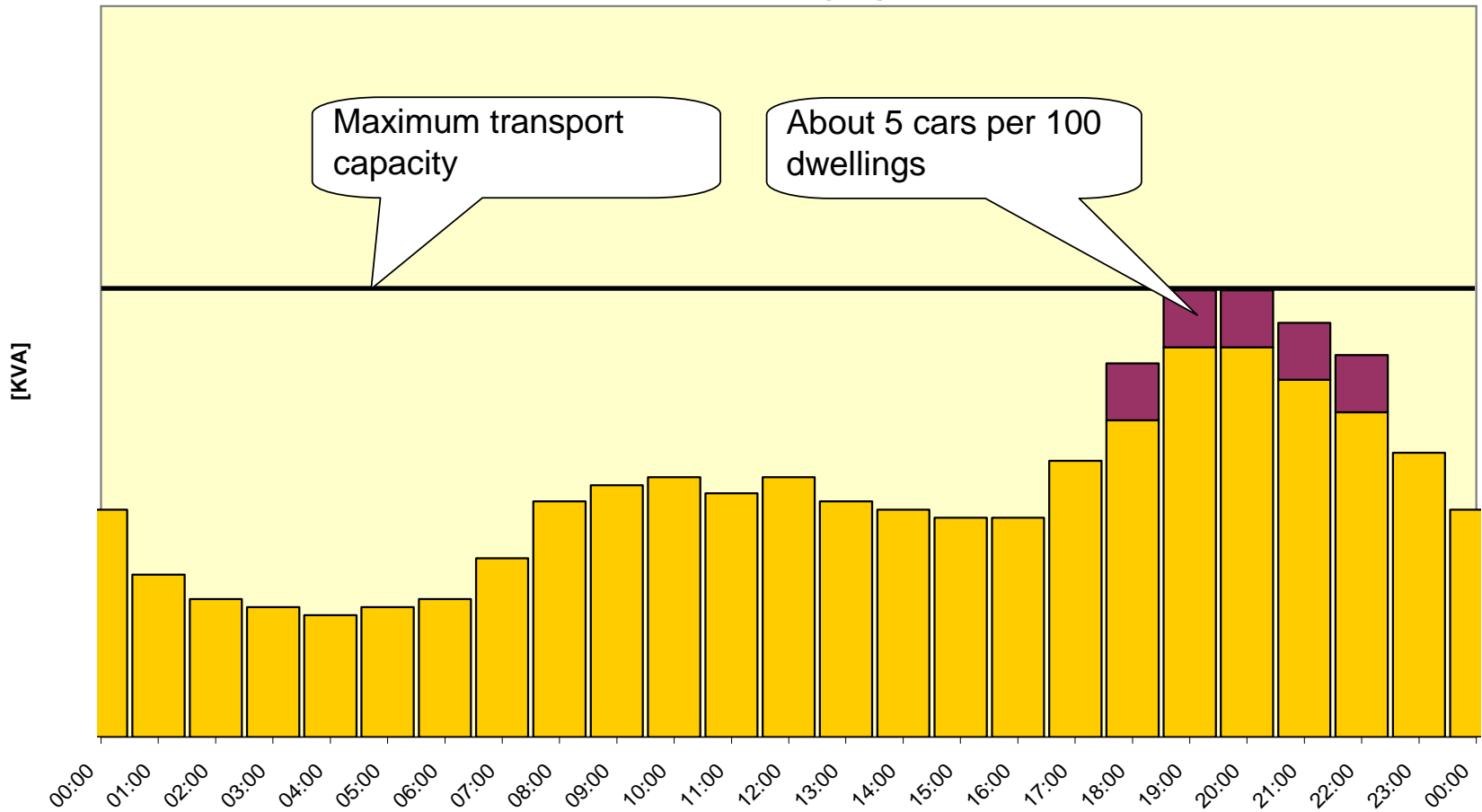


## Uncontrolled charging



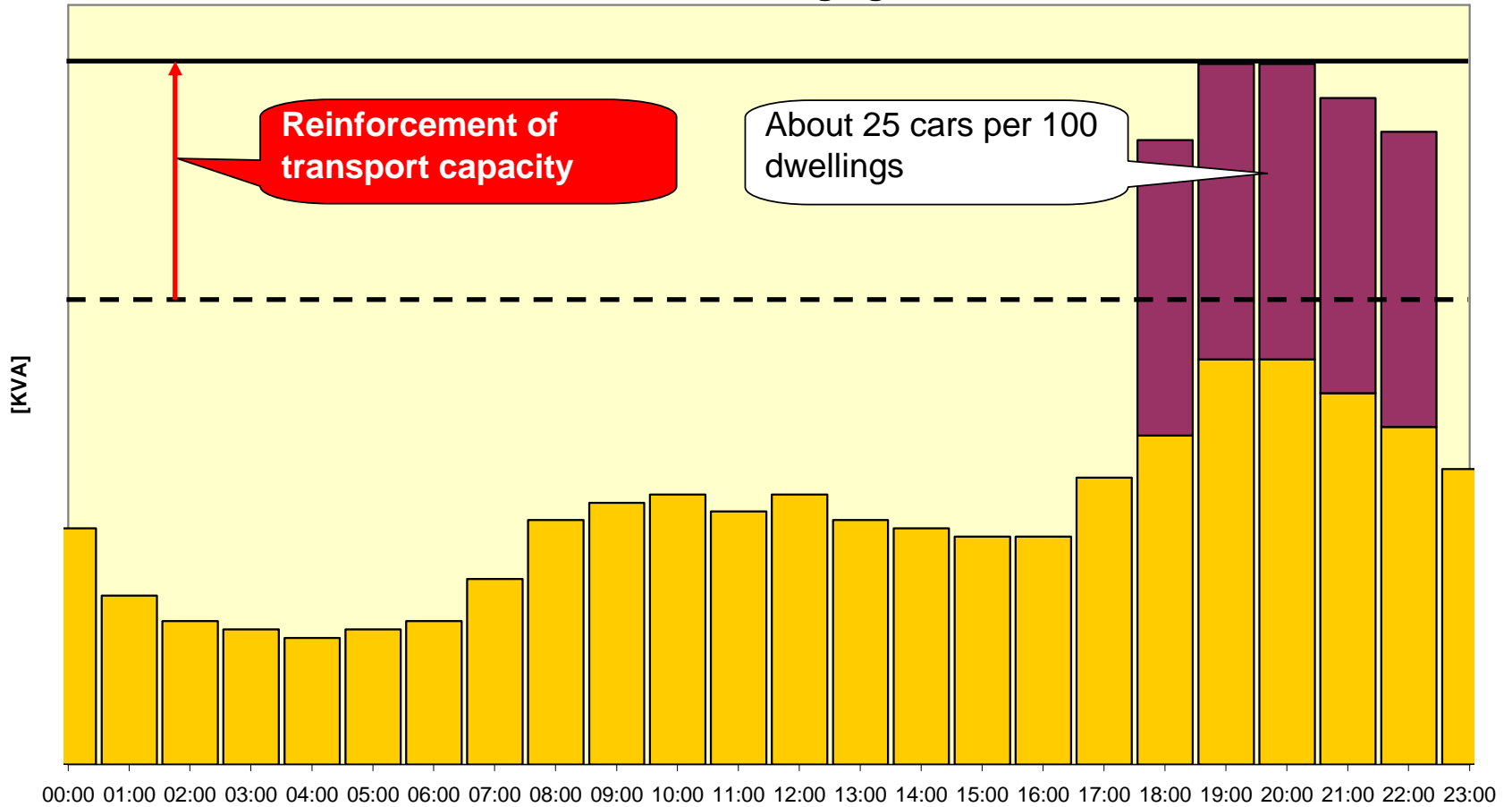
Source: ITM Project

### Uncontrolled charging 5 hours charging



Source: ITM Project

### Uncontrolled charging 5 hours charging



Source: ITM Project



## Bommelerwaard (NL) December 2007



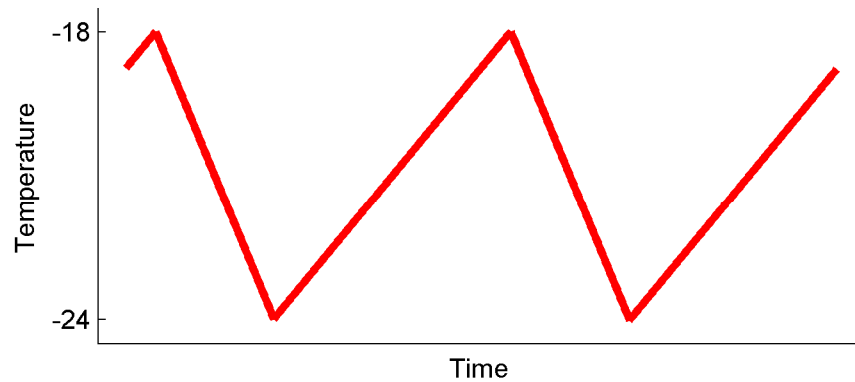
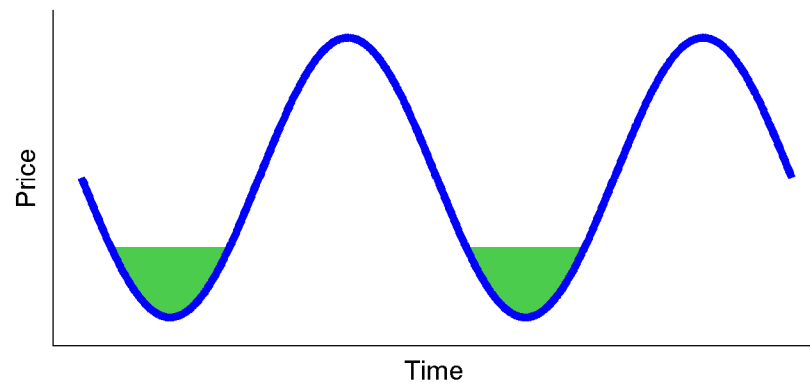




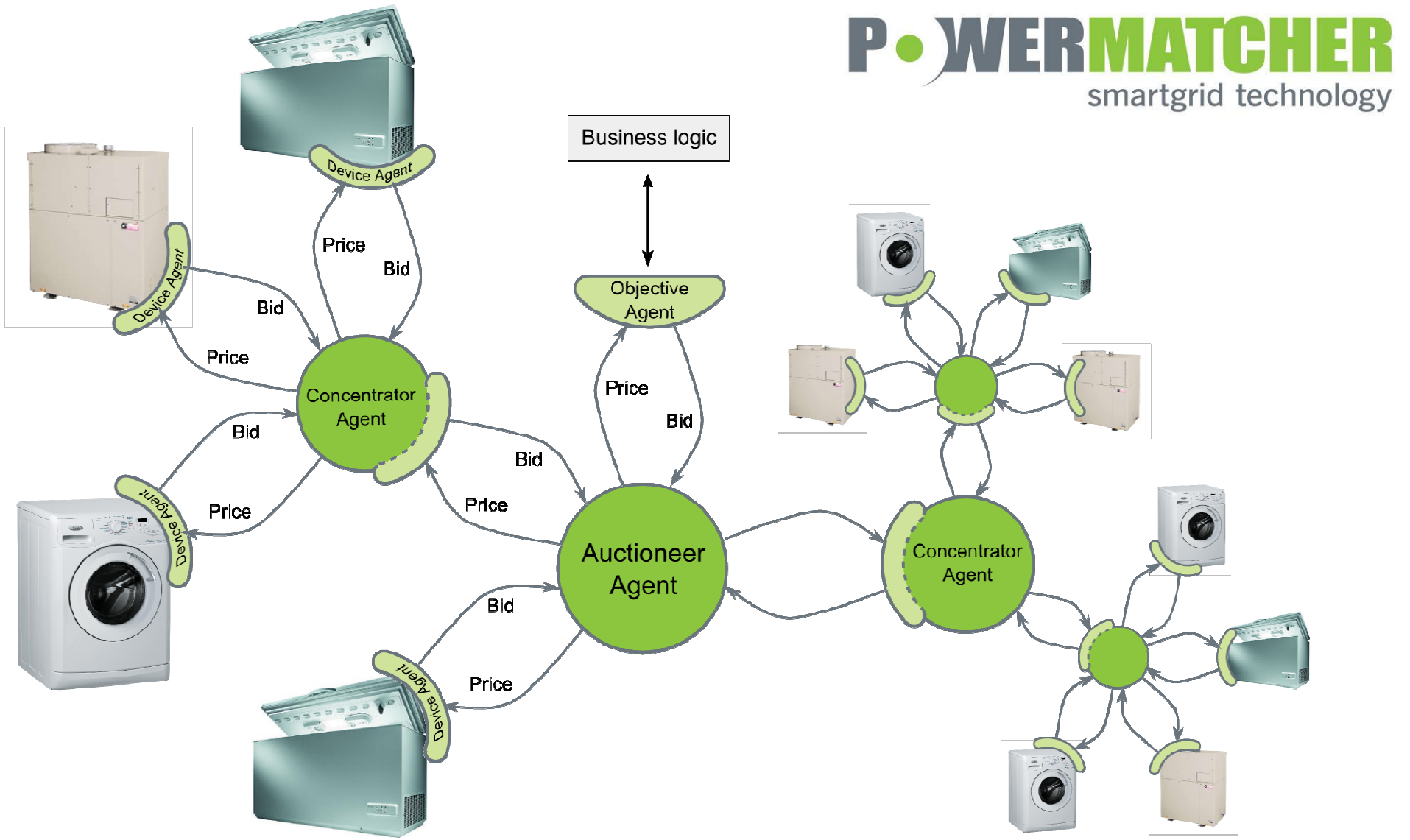




-18°C ? or -24 °C ?















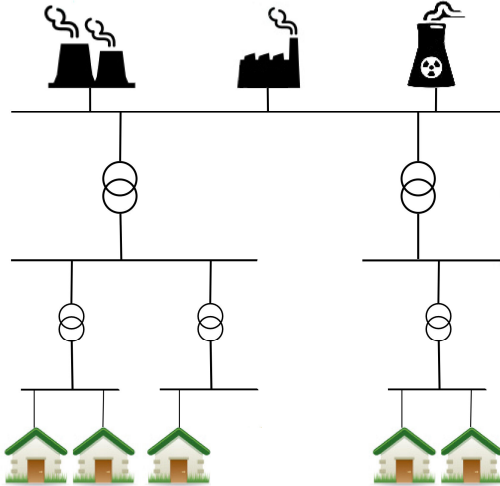








## Summary





***I WANT YOU!  
TO REALIZE  
SMART GRIDS***