How Do We Design a Robust Smart Grid?

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Agenda

1. Reflections on Smart Grid
2. Vulnerabilities
3. Conclusions

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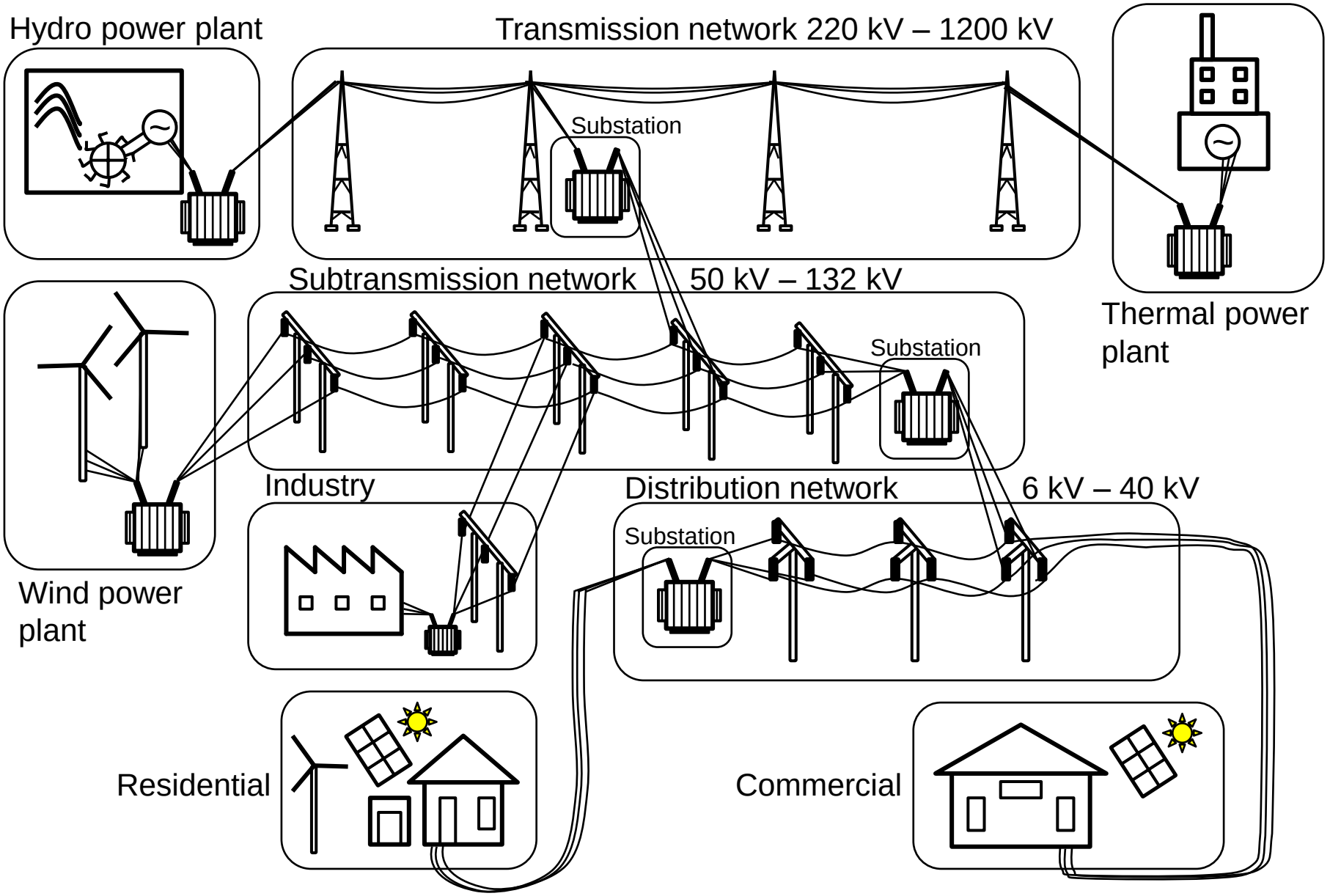
What is Smart Grid?

1. Making demand flexible – not only production

What is Smart Grid?

2. New technologies in networks for reliability, efficiency, etc.


Hydro power plant
Transmission network 220 kV – 1200 kV
Substation
Thermal power plant
Subtransmission network 50 kV – 132 kV
Substation
Wind power plant
Industry
Distribution network 6 kV – 40 kV
Substation
Residential
Commercial

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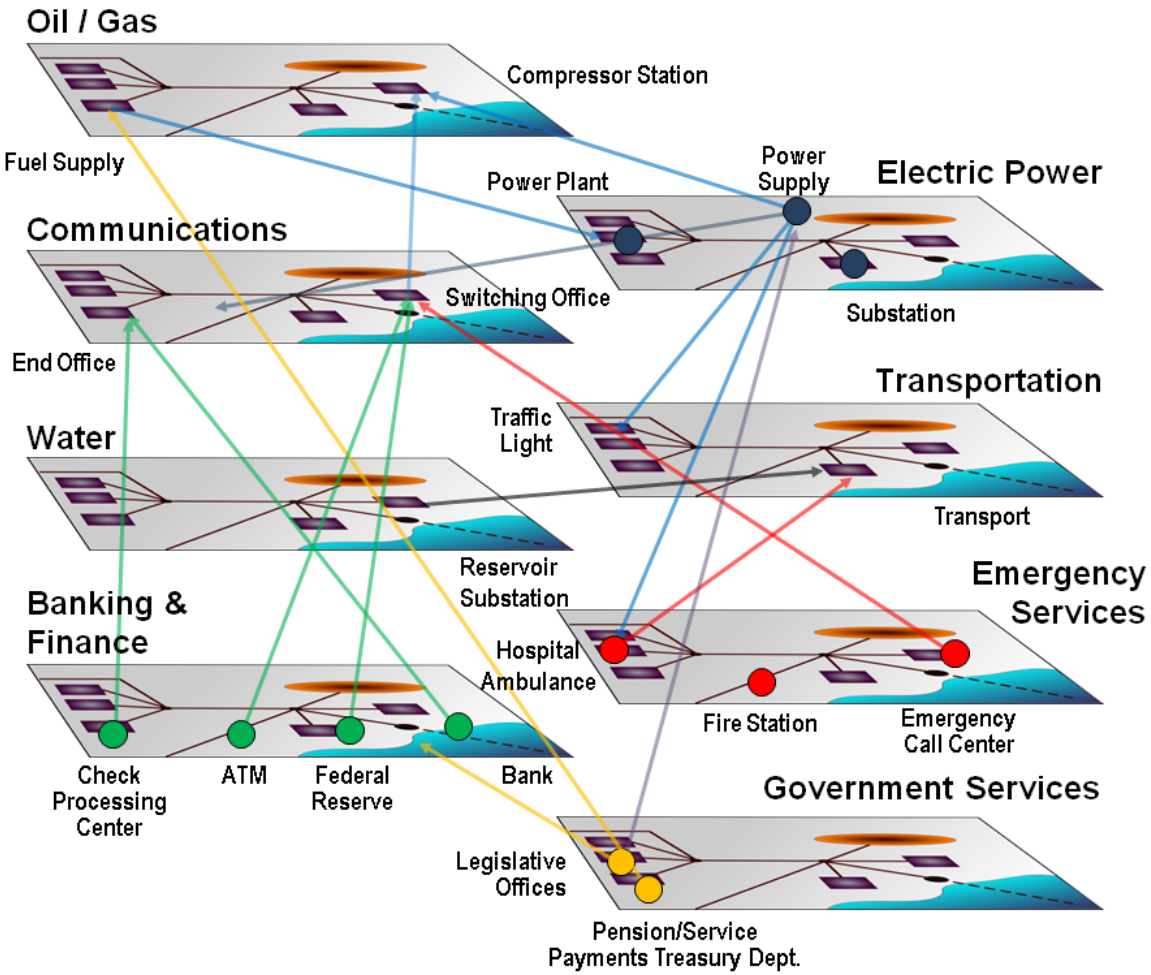
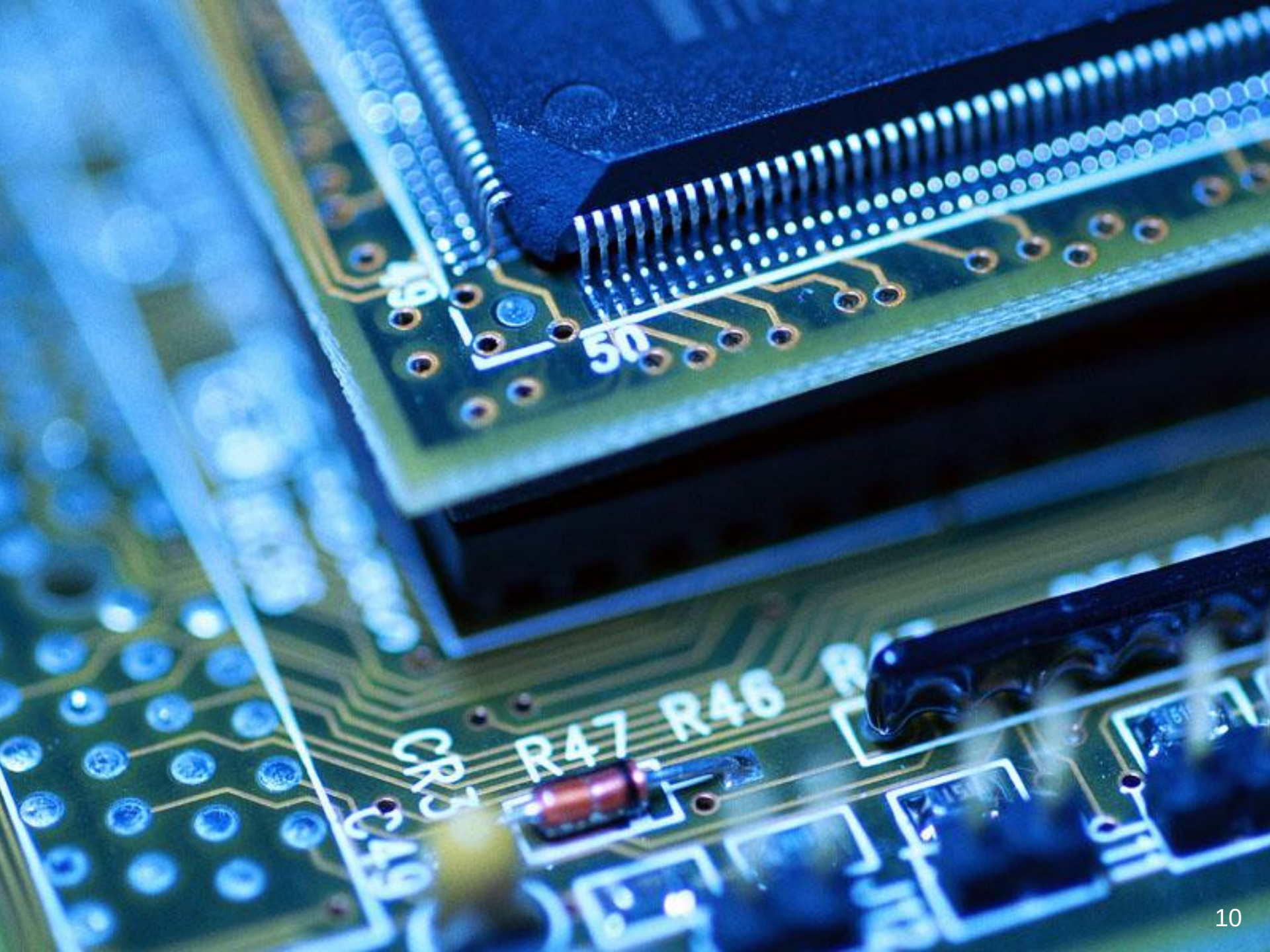
Critical Infrastructures



www.empcommission.com


50
R47
R46

Source: http://en.wikipedia.org/wiki/High-voltage_direct_current


London 20th September 2010
EIS
SUMMIT
The Electric Infrastructure Security Summit
THE HENRY JACKSON SOCIETY
THE HON. TRENT FRANKS
THE RT. HON. JAMES ARBUTHNOT MP
THE HON. YVETTE CLARKE

111TH CONGRESS
2D SESSION

H. R. 5026

AN ACT

To amend the Federal Power Act to protect the bulk-power system and electric infrastructure critical to the defense of the United States against cybersecurity and other threats and vulnerabilities.

Passed the House of Representatives June 9, 2010.

The Act H. R. 5026

Protection requirements against

- Cyber attack
- Electromagnetic pulse
- Geomagnetic storm
- Physical attack

The Act H. R. 5026

- Standards important in the Act
- August 2010: FERC has approved nine Critical Infrastructure Protection Reliability Standards developed by NERC[1].

FERC – Federal Energy Regulatory Commission

NERC – North American Electric Reliability Corporation

[1]Source: http://smart-grid.tmcnet.com/news/2010/08/06/4942936.htm

What about Smart Meters?

Source: EVB Energy Ltd
(picture from Wikipedia)

AFTONBLADET

Textstorlek: 1 2 3

Erroneous electronic meter

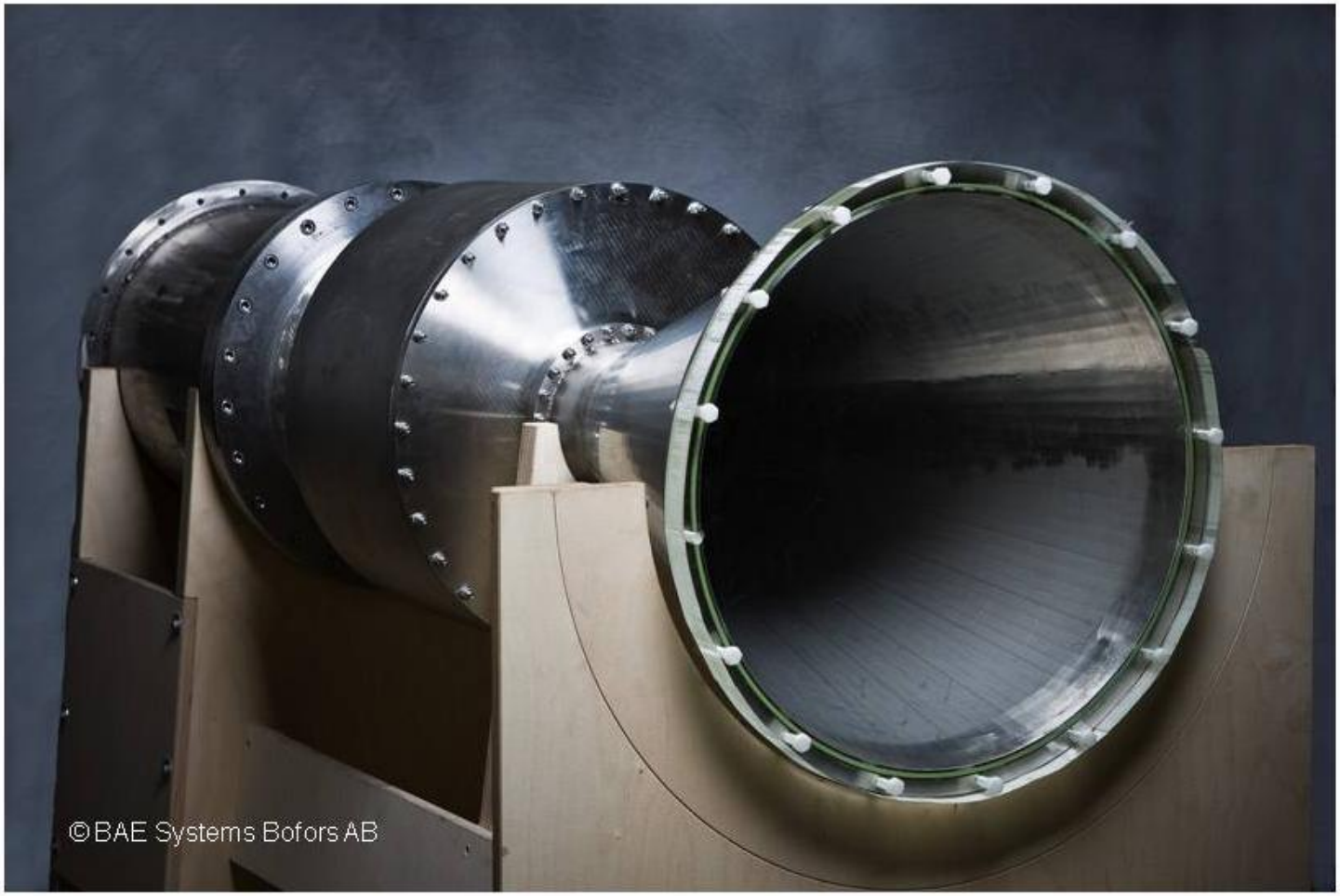
FICK BETALA 14 000 MER Familjen Green i Hedemora fick en ny Actaris-mätare. Då började deras elförbrukning skena – trots att de vidtagit en rad besparande åtgärder. Från oktober till april – sex månader – påstår elbolaget att de förbrukat 16 300 kilowattimmar. ”Det är vad vi förbrukat per år de senaste sex åren”, säger Jannike Green. I pengar betyder det 34 000 kronor om året i stället för normalt knappt 20 000 kronor. Men Hedemora Energi säger sig inte känna till några problem med de nyinstallerade Actaris-mätarna. ”Vi har inte fått in några klagomål”, säger vd Sven-Erik Svanh.

Foto: HENRIK HANSSON

De blåstes av sin elmätare

Aftonbladet 11 June 2009

Intentional Electromagnetic Interference (IEMI) Device



SafePowNet –
Assessment and Mitigation of Risk for Disabling Control Centers of Large Power Networks by Intentional Radiofrequency Interference.

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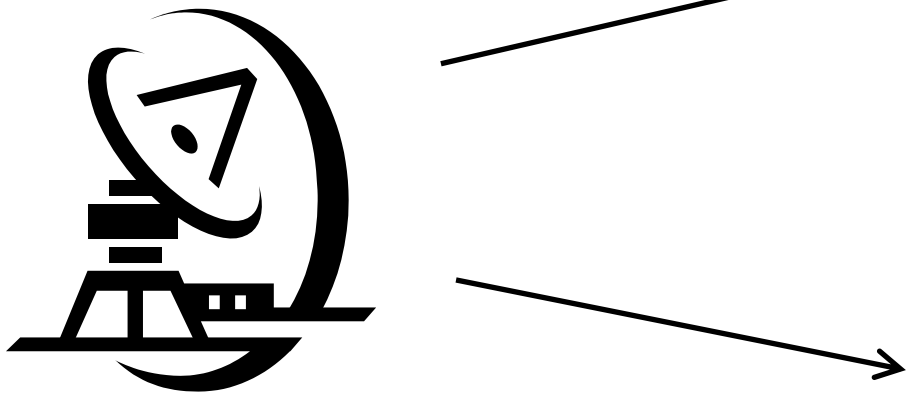
A **hidden weapon radiating** an electromagnetic disturbance at a CC or substation may **affect the performance and stability** of the power grid.



Power equipment

Control centrals

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Conclusions

- Smart Grid → Electronics and Computers
- Increased vulnerability a risk
- Standards a key for a robust Smart Grid

ELSÄKERHETSVERKET

– SAFE AND INTERFERENCE-FREE ELECTRICITY

Swedish National Electrical Safety Board

is the regulatory and supervisory authority for electrical safety and electromagnetic compatibility (EMC)