

Smart Grids: Developing and Developed Countries – *More Alike or More Different?*

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Smart Grid – there is no SKU

- One cannot buy a “solution” off the shelf
 - Each utility’s needs vary, based on
 - Legacy
 - Regulatory environment
 - Business case
 - Specific skills
 - Ability to absorb change
- Working on Smart Grids and Smart Metering for 7+ years, one major lesson is:
 - Smart Grid (like IT) is a *process*, not a *product*

What is the “Dumb Grid”?

- Electricity grids are over 100 years old
 - Power flows based purely on physics
 - Measurements are for *billing* purposes, not so much *control*
 - Consumers see averaged if not modified prices
 - We know that power consumed at 5 PM (usually) costs more to supply than at 5 AM

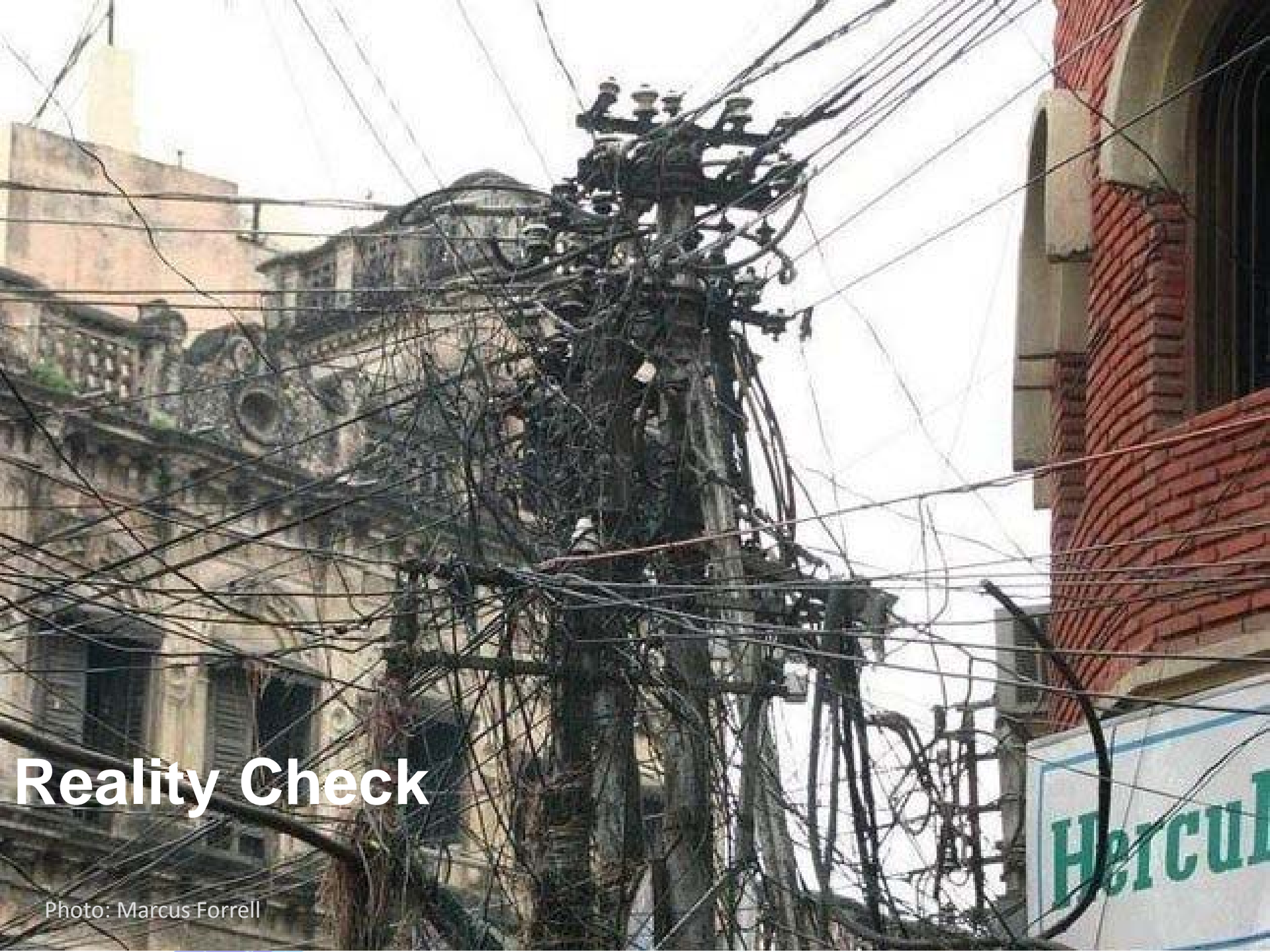
Broader Aspects and Drivers of Smart Grids

- Generation
 - Distributed
 - Renewable
- Transmission
 - Improve transfer capacity
 - Reliability (avoid blackouts)
- Distribution
 - {Includes consumption}
 - Area of most effort
 - One aspect is “smart metering”
 - Others include Demand Response aka Load Control

Developing Regions: Real Challenges

- Dramatically higher growth rates of energy demand
 - ~10% annual growth (demand)
 - Shift to “modern” energy sources
- Utilities there have limited R&D or IT skills
 - Struggle with financial and energy losses, including theft

*IF they leapfrog, they may be an **opportunity***



Reality Check

Photo: Marcus Forrell

Drivers for Smart Metering and Grids

• US and Other Developed Countries

- Meter reading
- Grid modernization
- Robustness
- Saving \$\$
 - Deregulation exposed a lot of costs
 - Some consumers saw 20-40% increase in tariffs
 - Needs Time of Use (ToU) if not Real Time Pricing (RTP)

• Indian (Developing Country)

- Power system faces challenges
 - Loses Rs. 1/kWh on average (~2 cents/kWh)
 - Supply << Demand
 - 20+% shortfall
- Growth is a big need
- Theft is a major concern
 - Large segment of load is unmetered (agriculture)
- Reforms ongoing
 - May allow new operating models

Future (or even Subtle) Drivers

- US and Others
 - Carbon and green
 - Bi-directional power
 - (Plug in) Hybrid vehicles
 - New services
 - Home automation
 - Home monitoring
 - Green Power
- India
 - Remove the “human element” in operations
 - The peak is NOT industrial
 - Smart peak management
 - No more load shedding
 - Even in emergencies can allow smart control
 - LEAPFROG

(Re)Thinking the “Smart Grid”

- Nebulous, fluid terms
- Few off-the-shelf products exist
 - The ingredients exist, *but* standardized, modular, scalable, open solutions don't (yet)
 - Niche solutions are expensive
- Enormous number of stakeholders
 - To work, this needs concerted effort of utilities, regulators, vendors, technologists, appliance industry, IT industry, consumer groups, etc.
 - No one group can do this quickly on their own
- Good news is that we have barely begun to reach maturity/saturation of the technology
- International collaboration would be ideal
 - Goal: Standards, ideally, open standards

What is the Smart Grid Maturity Model?

- A management tool to help utilities
 - Identify where they are on the smart grid landscape
 - Develop a smart grid vision and roadmap
 - Prioritize options and support decision making
 - Benchmark themselves against the industry
 - Measure their progress
- SGMM is composed of two dimensions
 - Levels of maturity
 - Domains
- The six *levels of maturity* (Levels 0 – 5) represent the progression of a utility in adopting and deploying smart grid technologies and practices
- The eight *domains* are logical groupings of related capabilities and characteristics at each maturity level



How can the SGMM be used?

• *Strategically*

- To establish a shared picture of the Smart Grid journey
- To communicate the Smart Grid vision, internally and externally
- To use as a strategic framework for business and investment objectives
- To plan for technological, regulatory and organizational readiness
- To benchmark and learn from others

Tactically

- To use as guide to develop a specific roadmap or blueprint
- To assess and prioritize current opportunities and projects
- To use as a decision making framework for investment purposes
- To assess resource needs to move from one level to another
- To measure progress

*A maturity model can move an entire industry forward;
Already been used by some sixty utilities*



Collaboration and *Innovation!*

- No one has all the answers
 - They're either lying or trying to sell you something
- Many of the needed solutions (e.g., smart fridges) don't yet exist
 - Incremental cost is very low
- May also require research and experimentation in *communications technologies* and *business models*
- We should also allow distributed innovation
 - Technology standards would need many stakeholders coming together
 - Adding performance-based standards can allow wider innovation
- Collaboration may be helpful for
 - Testbeds
 - Learning best practices
- Developing countries have global value
 - Markets for new growth
 - Prime deployment targets (limited legacy = leapfrogging)

Thank You!

