

February 2018

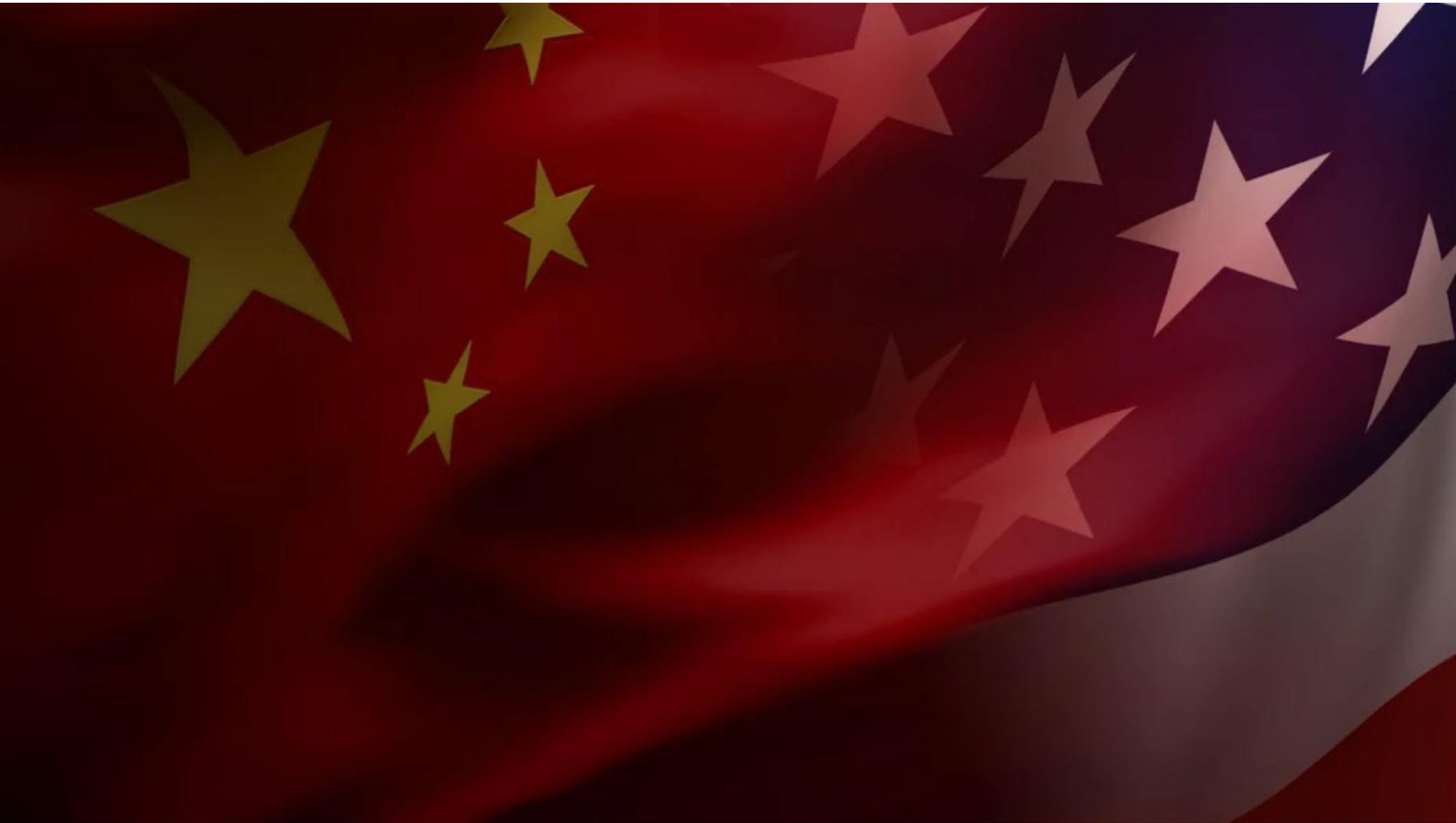
# India Energy Congress 2018

## 2030 - Impact on energy









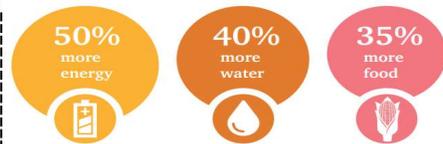
# Delphi Energy Future - 2040

- Climate action gains momentum
  - China and India are changing course
  - Global climate treaty is delivering effective results
  - A functioning climate regime is driving investments
- Technological innovation
  - Demand for fossil energy sources is dropping sharply
  - Causes of the decline in demand
  - The consequences:  
Producing countries are destabilised
  - Storage is the game changer
- Africa: Technology enables import independence
  - Blooming landscapes or continued urbanisation
  - New regulatory regimes have emerged
  - Economic emancipation of the energy transition

# Megatrends

## Climate change and resource scarcity

With a population of 8.3 billion people by 2030, we'll need...



## Rapid urbanisation

- 50% live in cities
- 1.5 mn added every week; close to 5 Bn by 2030

## Shift in global economic power

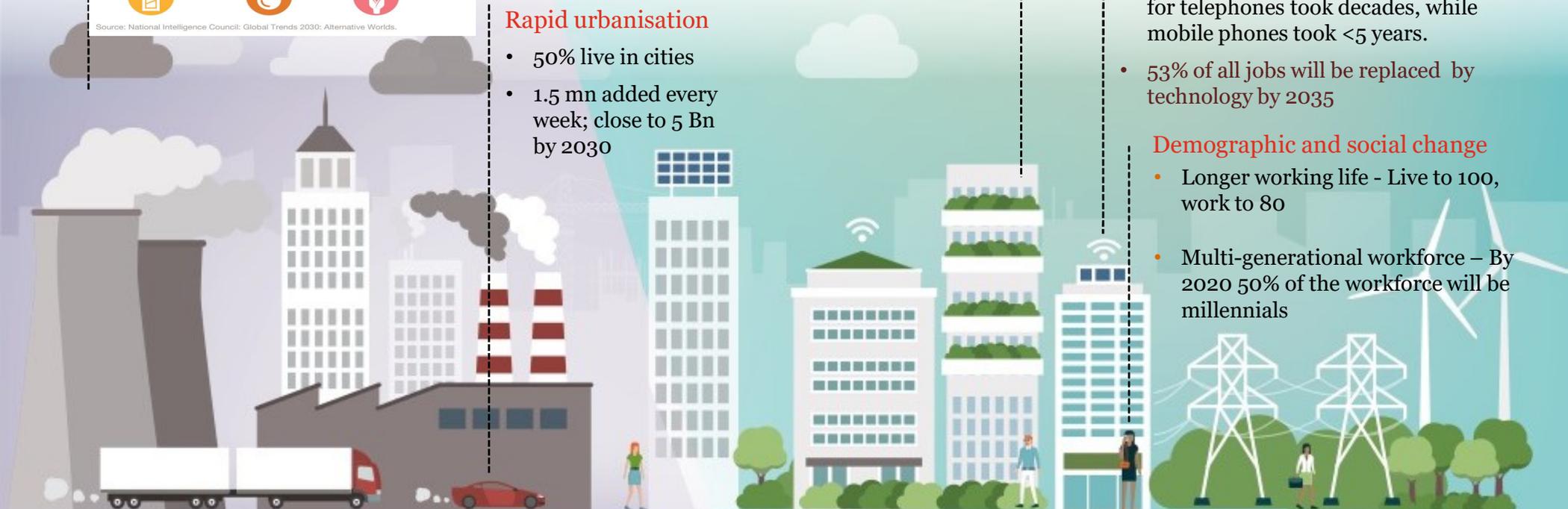
- By 2030 the E7 purchasing power will overtake the G7

## Technological breakthroughs

- Costs of new technologies falls dramatically and adaptation speed rises.
- Achieving a 50% penetration rate for telephones took decades, while mobile phones took <5 years.
- 53% of all jobs will be replaced by technology by 2035

## Demographic and social change

- Longer working life - Live to 100, work to 80
- Multi-generational workforce – By 2020 50% of the workforce will be millennials



# Disruptive dynamics impacting energy sector

## Production service model

### “Outdated or stranded”

Out-dated or out-of-market assets will lead to stranded investments

## Customer behaviour

### “Grid provides back up”

Less need for utilities, consumers produce and store energy themselves

## Government and regulation

### “Caught in the crossfire”

Shifting policy goals and regulatory risk undermine business

## Competition

### “Outflanked and outpaced”

More nimble and able competitors seize key revenue segments

## Distribution channels

### “Digitalised intervention”

Innovative digital platforms match demand and supply become dominant



# 14th PwC Global Power & Utilities survey

*“anticipate major or very major business model transformation by 2030”*



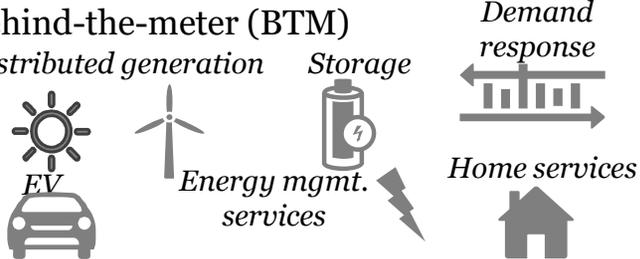
*“expect to see a medium to very high level of market disruption by 2020”*



*“say their main home market will be more than ‘50% transformed’ by 2030.”*

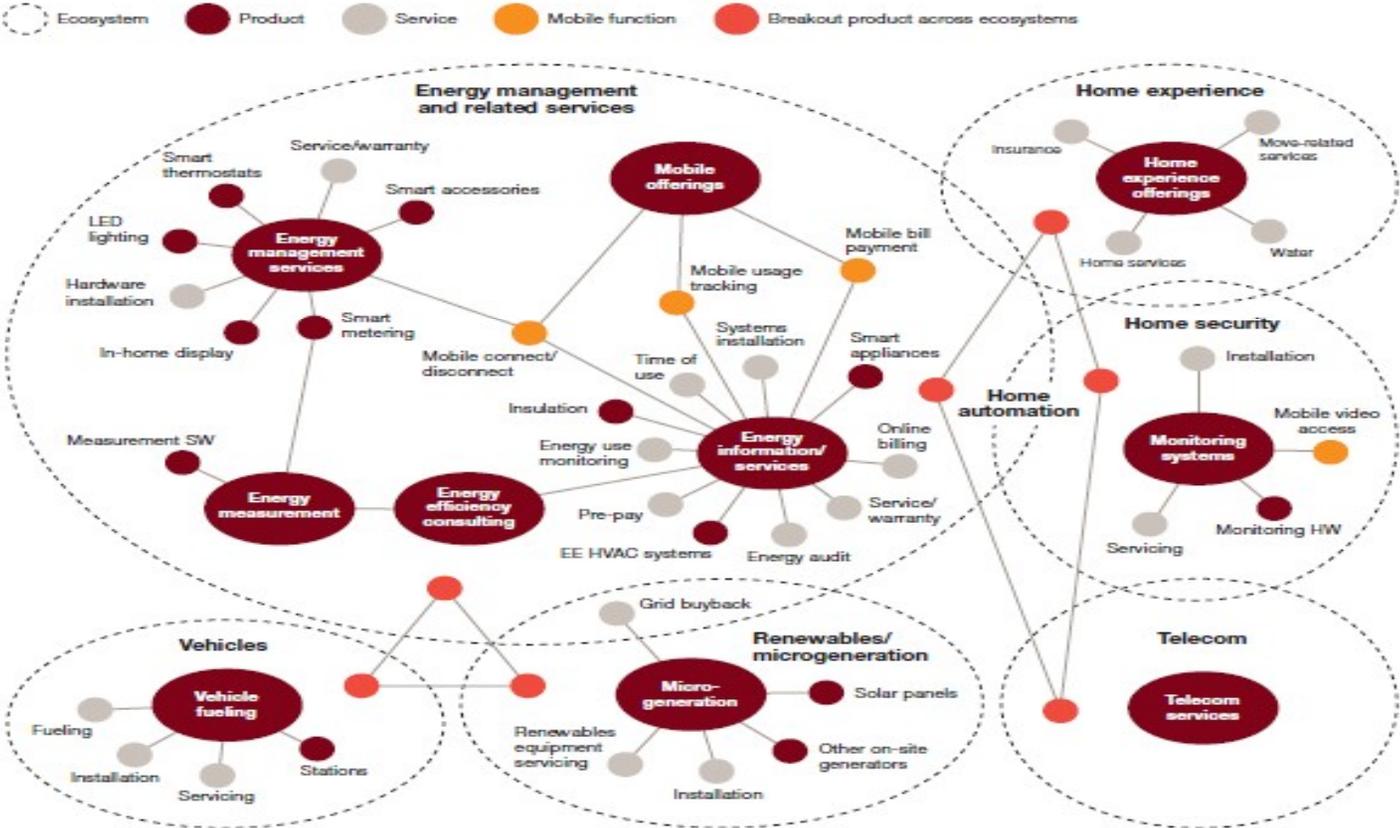


# Value pools will shift “downstream” towards behind-the-meter segments

	Centralised generation	Transmission & distribution	Trading & retail	Metering	Behind-the-meter (BTM)
					
Value					
Drivers of value shift	<ul style="list-style-type: none"> <li>• From power provider to power guarantor</li> <li>• Falling demand as result of economic crisis, manufacturing declines and energy efficiency</li> <li>• Significant overcapacity in fossil-fuel-fired gen.</li> <li>• Low plant utilization</li> <li>• Growth in higher-priority renewables</li> </ul>	<ul style="list-style-type: none"> <li>• Due to multi-directional and volatile energy flows, 50% more network capacity is required to meet similar demand</li> <li>• Reducing demand for grid power</li> <li>• Emerging role of the complex system operator</li> </ul>	<ul style="list-style-type: none"> <li>• Falling demand</li> <li>• Fierce price competition</li> <li>• Increasing customer churn</li> <li>• Expanding into energy services</li> <li>• Increasing pressure from trading regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Growth in advanced metering (infra) to optimize demand patterns</li> <li>• New data-driven services, e. g. energy advisory, demand response</li> </ul>	<ul style="list-style-type: none"> <li>• Higher competition upstream – more power to consumers</li> <li>• Maturing DG, storage and EV technologies – new growing market for installation, leasing and service</li> <li>• Increasing level and volatility of power prices increases value of energy management services</li> <li>• Demand for usage insights and control solutions</li> <li>• Demand for holistic home services</li> <li>• Emergence of local island grids</li> <li>• Residual demand visible for upstream player – exposed to risk of surges in demand or supply</li> </ul>

# Evolving energy ecosystem

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# Ecosystem – customer

...(2/4)



## Changing consumer needs

The traditional customer focus of the industry has been on 'performance-based satisfaction'...



...the future focus will be directed to enhanced 'engagement and solutions'



### Over the next ten years the utility customer...

### Key questions for utilities



Will be digital, connected, and social

- Social media
- Mobile connectivity
- Smart meter-enabled
- Big data

- Are we prepared for the connected, mobile customer?
- How do we better engage with our smart meter-enabled customer?
- How will we manage and extract insights from an avalanche of data?



Will demand – and receive – greater choice

- Choice of energy supply
- New products and services
- Payment options
- "Green" choices

- What options and choices – energy supply, green solutions, payment options – should we make available to our customers in the future?
- What new products and services should we offer, and how do we innovate, manage, and build a portfolio of services?



Will be empowered with information and the ability to self-manage energy usage

- Self service
- Instant information access
- Tools and guidance to manage energy usage

- How will the customer of the future interact with us?
- How do we provide instant access to information that our future customers will expect and demand?
- What tools should we make available to empower our customers?



Will demand a better overall experience

- One-to-one engagement
- Customer satisfaction
- Customer loyalty/defections

- How do we deliver an experience that is on par with other services our customers enjoy?
- How do we improve brand health as our customers' needs change?
- As customers have more alternatives, how do we drive loyalty?



Will adopt technologies that will impact the energy infrastructure

- Distributed generation
- Net metering
- Electric vehicles
- Smart devices

- As customers adopt new technologies, how do we ensure we can meet demand and maintain service levels?
- What is our strategy for smart energy technologies?
- What is our play (if any) "behind the meter?"

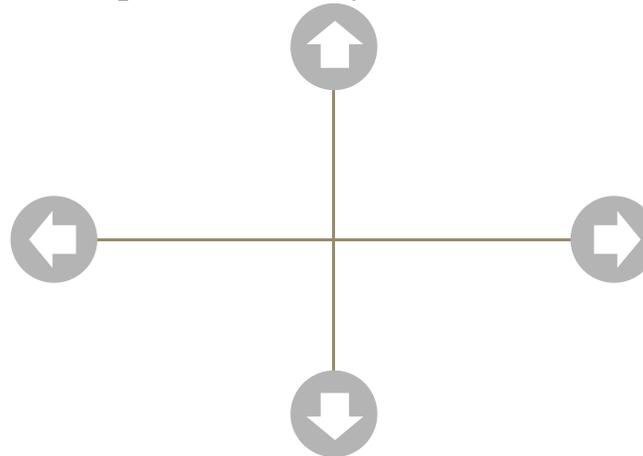
**Business fragmentation:** *Small is powerful.*

Large businesses lose their dominance as customers seek relevance and organisations find scale a burden rather than a benefit. Social bubbles and affinity groups take on a new importance. Many could not exist without digital platforms

**Collectivism:**

*Fairness and equality dominates.*

The common good prevails over personal preference, e.g. collective responsibility for the environment, social good and “fairness” over individual interest.



**Individualism:**

*Where “me” first rules.*

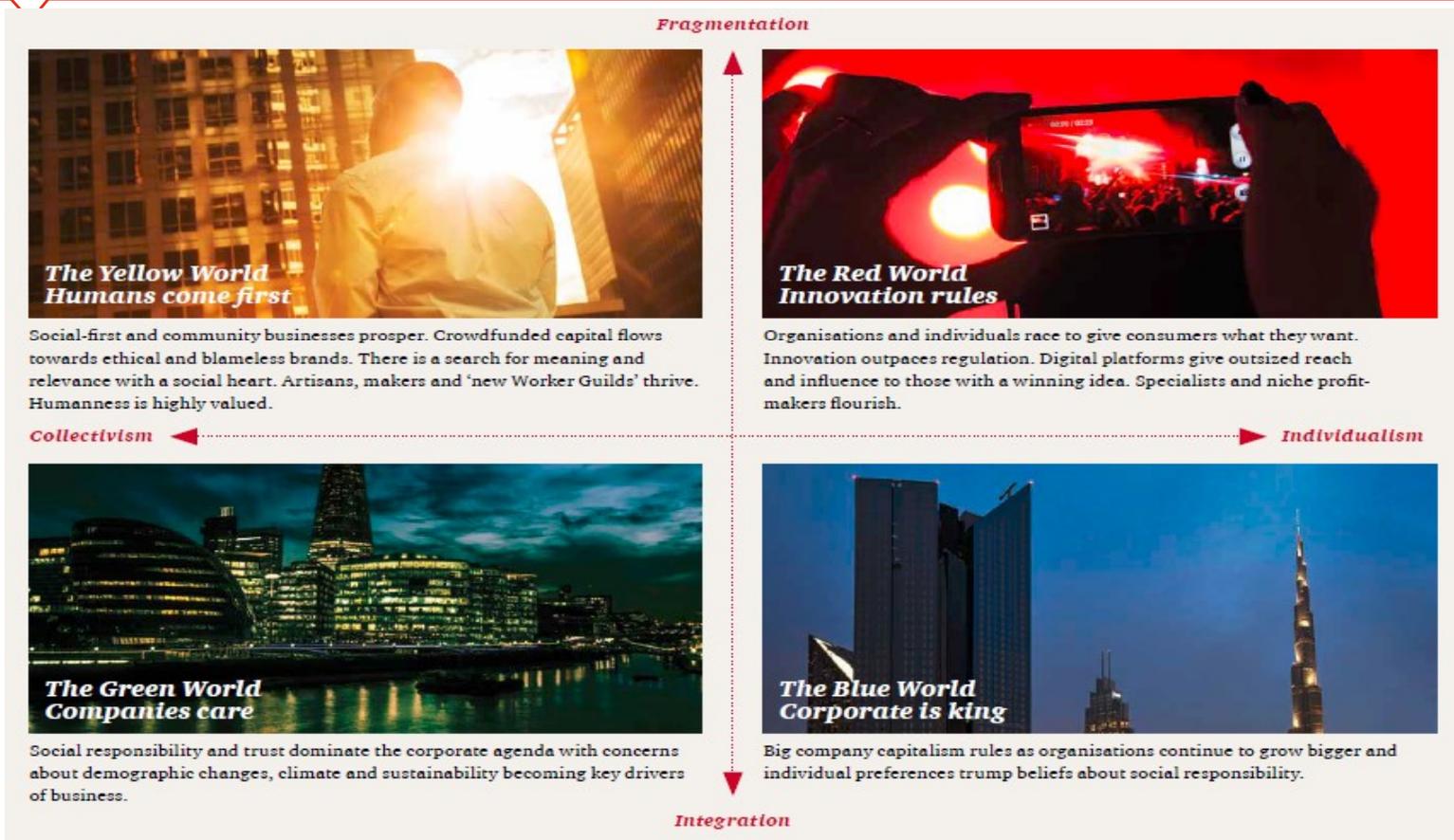
A focus on individual wants; a response to the infinite choices available to consumers.

**Corporate integration:** *Big business rules all.*

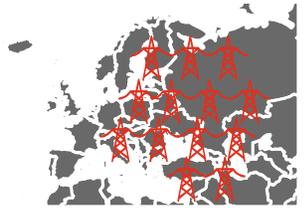
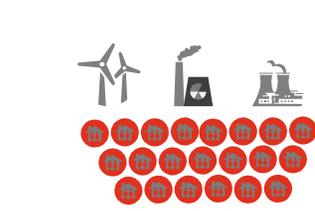
Companies get bigger and more influential - the biggest have more influence than some nations. Brands span many business areas.

# Ecosystem – Workforce 2030

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# Transformational market models will emerge

Market models	Regional super-grid		Green command and control		Ultra distributed generation		Local energy systems	
								
Characteristics	low	high	low	high	low	high	low	high
Ave generator size	█		█		█		█	
Consumer role	█		█		█		█	
Government intervention	█		█		█		█	
Service delivery digitalisation	█		█		█		█	
New entrant opportunities	█		█		█		█	
Local factors	<ul style="list-style-type: none"> <li>• Mature national infrastructures</li> <li>• Limited indigenous fuel sources</li> <li>• Clear cost benefits of market integration</li> <li>• Political stability</li> </ul>		<ul style="list-style-type: none"> <li>• Limited private sector involvement</li> <li>• Government direction on capital investment</li> <li>• Reliability and price stability are valued over cost</li> </ul>		<ul style="list-style-type: none"> <li>• Mature infrastructure</li> <li>• Strong customer engagement in micro-generation</li> <li>• Interest from private capital</li> <li>• Average/peak demand differential</li> </ul>		<ul style="list-style-type: none"> <li>• Sufficient private funding</li> <li>• Rural electrification policy</li> <li>• Interest from private capital</li> <li>• Local communities taking control</li> </ul>	

## Going ahead

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### ***Act now.***

This isn't about some 'far future' – change is already happening, and accelerating.

### ***No regrets and bets.***

The future isn't a fixed destination. Plan for a dynamic rather than a static future. You'll need to recognise multiple and evolving scenarios. Make 'no regrets' moves that work with most scenarios – but you'll need to make some 'bets' too.

### ***Make a bigger leap.***

Don't be constrained by your starting point. You might need a more radical change than just a small step away from where you are today.

### ***Own the automation debate.***

Automation and Artificial Intelligence (AI) will affect every level of the business and its people. It's too important an issue to leave to IT (or HR) alone. A depth of understanding and keen insight into the changing technology landscape is a must.

### ***People not jobs.***

Organisations can't protect jobs which are made redundant by technology – but they do have a responsibility to their people. Protect people not jobs. Nurture agility, adaptability and re-skilling.

### ***Build a clear narrative.***

How your employees feel affects the business today – so start a mature conversation about the future.

# Discussion agenda

01

How are you preparing for disruptions in energy market?



02

Are you embracing change, new ideas and a bias for action?



03

How do you see role of governments and regulators?



# Discussion agenda

- How do you see the disruptions impacting India and various stakeholders in energy sector?
- What will be the shifts in energy consumption patterns and the resultant demand for energy resources look like by 2030?
- What actions are being taken to ensure that our production and supply models are compatible to the emerging energy demand?
- Innovation to growth are you taking to capture and enhance value for your stakeholders in your business plan while building future scenarios?
- Emerging market design, business models and competition?
- Is the investments made in people, digital technologies, innovation and data science sufficient?
- Are you making your customers 'energy literate' and 'empowered'?
- What new services offerings are made to raise customer satisfaction and loyalty?
- How robust are the existing policies and regulatory framework to providing its citizen with reliable, sustainable and affordable energy?
- Aligning to one policy vision and execution - Energy elements in concurrent list and regulatory set ups at state level
- Owned and controlled by the Government. Does this impact ushering in innovation, competition and choice for customers?
- How should the regulatory institution evolve to facilitate comprehensive reforms?

# Thank you!

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## Energy Systems



An **'all electric society'** will have become a reality.

Energy supply system will be **structured in a cellular way**.

**Highly efficient 'sustainable cities'** will emerge – Prosumers in smart micro grid systems ('neighborhood generation').

Distributed generation with renewables using battery storage will lead to **emergence of new democratic self-governance structures at local level**.

Chances of **cyber security breaches will increase** and pose grave threats to reliability of power systems.

Economic profitability, investors' interests & independence key **considerations to build sustainable energy systems**.



## Policies

Governments and consumers will be more concerned about carbon emissions and, therefore, will be **more interested in sustainable energy systems**.

**Influence of the middle classes in emerging economies**, esp. China and India, will be a significant factor that will lead to more climate and environment-friendly policies.

States will be involved in energy supply activities given that **energy security and sovereignty will be the key goals** underlying national energy policies.

New multilateral governance structures will have been created to facilitate the **cross-border integration of energy systems and joint infrastructure investments**.

# Delphi Energy Future 2040

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## Demand



**Global energy demand will double** by 2040.

Vast share of energy demand growth will take place in developing and emerging economies leading to **cost effective renewable solutions**.

Private households will have stepped up their **use of convenience solutions** (mobility, increased automation of homes, heating, etc.)

**Internet of things** will come close to coordinating power generation and consumption with a majority of electrical appliances.

**EVs capable of travelling up to 3,000 km** on single charge will be available.



## Energy Sources

**By 2040, the falling demand for fossil energy sources** in industrialized and emerging countries will have destabilized producing countries.

**Decentralized energy generation and distributed generation** with renewable energies using battery storage will proliferate.

**Battery storage facilities providing frequency control** services will have taken over the role of conventional power stations.

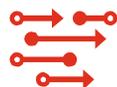
**Power generated from renewable sources will also provide mobility and heating** and will displace petroleum and natural gas from industrial processes.

**High-performance customer generation facilities will be sold in retail stores** and can be installed in a matter of minutes.

# Delphi Energy Future 2040

...(3/3)

## Power Markets



Markets characterized by a **high level of disintegration, load-profiled customers and real-time pricing.**

Smart meters and appliances will **enable users to optimize their consumption.**

Energy will be traded in **fully automated trading systems based on complex algorithms.**

Power markets will lead to energy supply being decentralized and flexible leading to **emerging structures more resilient to crises and acts of terrorism.**



## Financing & Pricing

Decentralized energy system would have led to **majority funding being availed by small crowd- and community-based funds or microfinancing.**

**Effective regional systems for pricing to be in place.**

**Unit price of electricity will become of secondary importance** in view of the low marginal costs of renewable generation.

**Consumers will pay a flat rate of fees for electricity** which will depend upon their average consumption.