



Smart Grids,

IEA Dublin 2012

Looking to the Future

ESB Networks



About ESB Networks

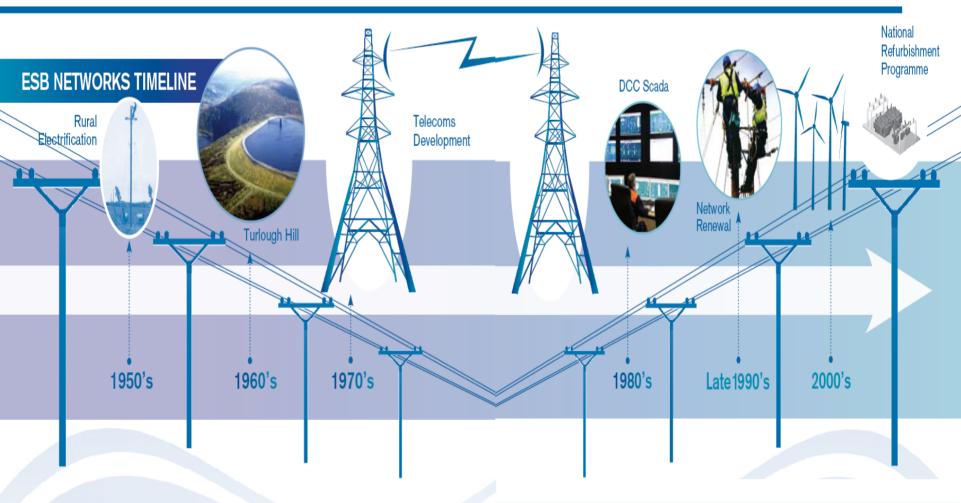


- Distribution for Republic of Ireland
 - > Supplying every home in the country
- Asset Owner Transmission & Distribution
 - Part of ESB Group (€12Bn Inc. Northern Ireland Electricity)
- €7Bn ROI Network Assets

	IRELAND	Y
POPULATION (Million)	4.1	And the Day
ELECTRICITY CUSTOMERS(Million)	2.24	
PEAK DEMAND (GW)	5,090	- and
	177,000	
TRANSFORMER POPULATION	249,00	
Average DOMESTIC USE (kwh)	5500	

The Journey To Date





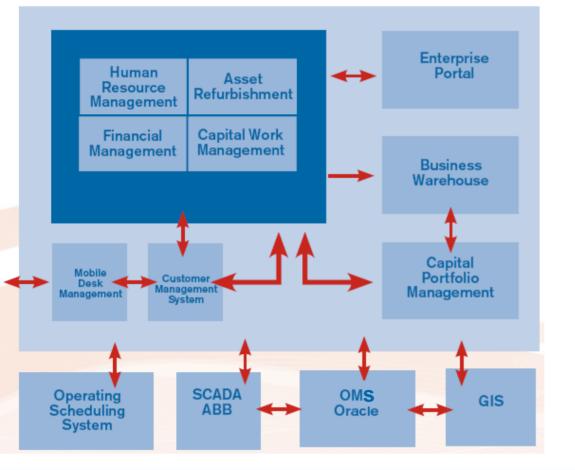


Networks Modernisation of The National 2025 **Electricity Network 10kV Network** 20kV Network Renewal of 90,000KM of MV Network Conversion of 40,000km to 20kv Operation Remote visibility & Control of Network is essential and expanding These devices are a real stepping stone to a Smart Electricity Network Networks

Underpinned by Comprehensive IT & Asset Management Systems

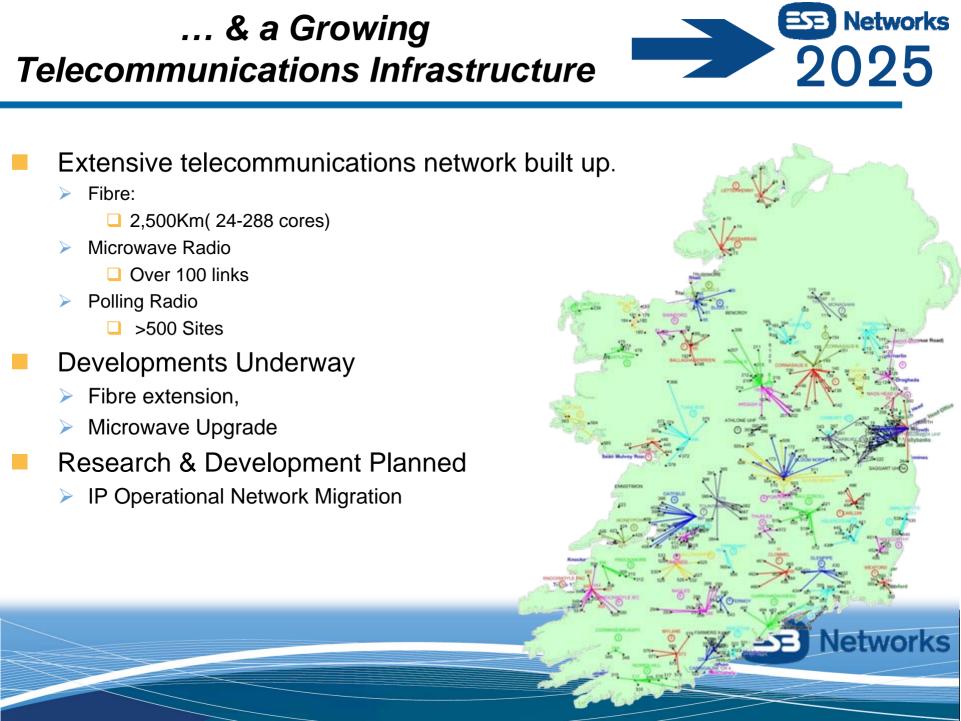


PAS 55 STRUCTURE







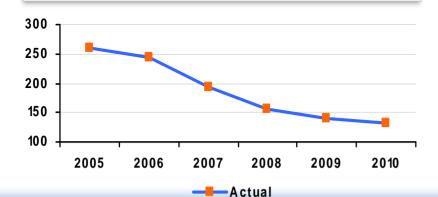


ESB Networks – Already getting smarter!





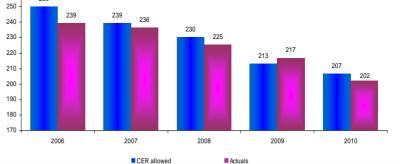
Customer Minutes Lost Trend



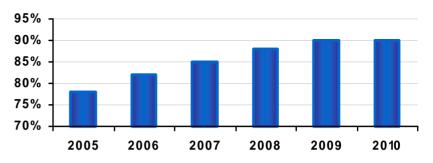
250 239 239 m

270

260



Customer Satisfaction Trend



Actual



Drivers of Change in Electricity Distribution



EU Targets on Energy Efficiency

- 20% reduction in green house gas
- 20% improvement in Energy Efficiency,
- 20% increase in Renewable Energy
- EU Directives -> Smart Metering

Implications for Ireland's Electricity Sector

- 40% Renewables,
- 10% Vehicles fuelled by Electricity,
- Smart Meter programme
- Network Losses reduction

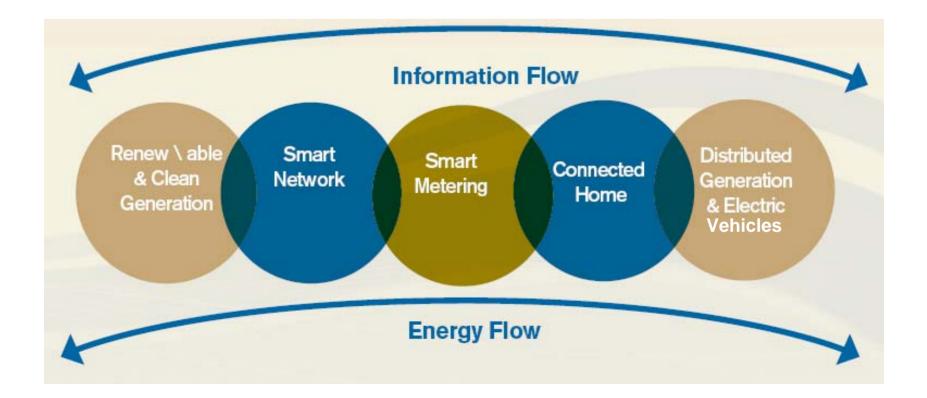
ESB Strategy

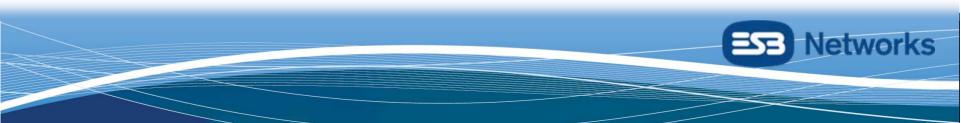
- World Class Sustainable Networks
- A Renewable Business of Scale
- Best Practise Generation Portfolio
- Customer Focused Supply Business
- Significant International Business



ESB Networks Integrated Future Smart Networks Model



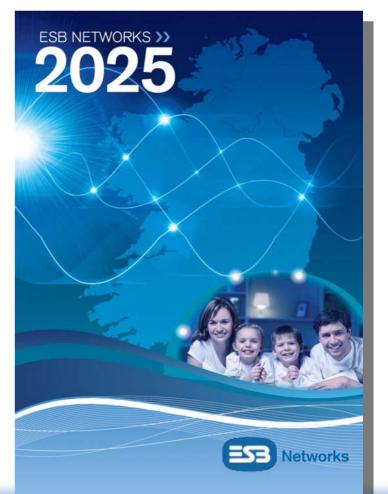




Developing Smart Networks for 2025

Networks 2025

- Define the ultimate goals
- Provide a focused R&D path
- Enable long term planning
- Ensure value of smart investment
- Consider participants and provide for inclusion
- Define and enable KPIs
- A living plan delivering a better tomorrow!





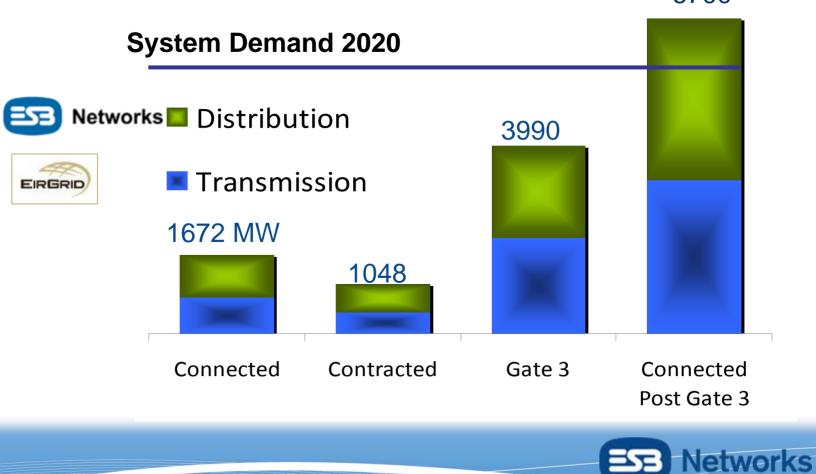
Key Enablers towards 2025





Wind Connections MW 2012





6700

ESBN Wind R&D Projects Completed





- Exploration of
 Voltage/VAr control on
 Distribution-connected
 windfarms
- Use of voltage regulators to limit voltage rise
- Single/Fewer transformer cluster stations for windfarms



Integrating Renewables



>> enable over 5,000 MW of wind Generation capacity to supply the Irish grid – with over

2500mw on the Distribution System

>> help industry meet Irish targets of **500** Ocean and **200** Ocean and Energy by 2020, enabling technology

development, connection and demonstration



- Minimise generation connection costs through innovative but secure connections
- Minimise the impact of renewables on voltage quality using the dynamic reactive capabilities of wind farms
- Facilitate active management of DSO System to vary system configuration and operation to maximise hosting capacity
- Facilitate maximum levels of active Customer Load Management, matching flexible customer loads to variable Generation
- Target is **5000**MW by 2025



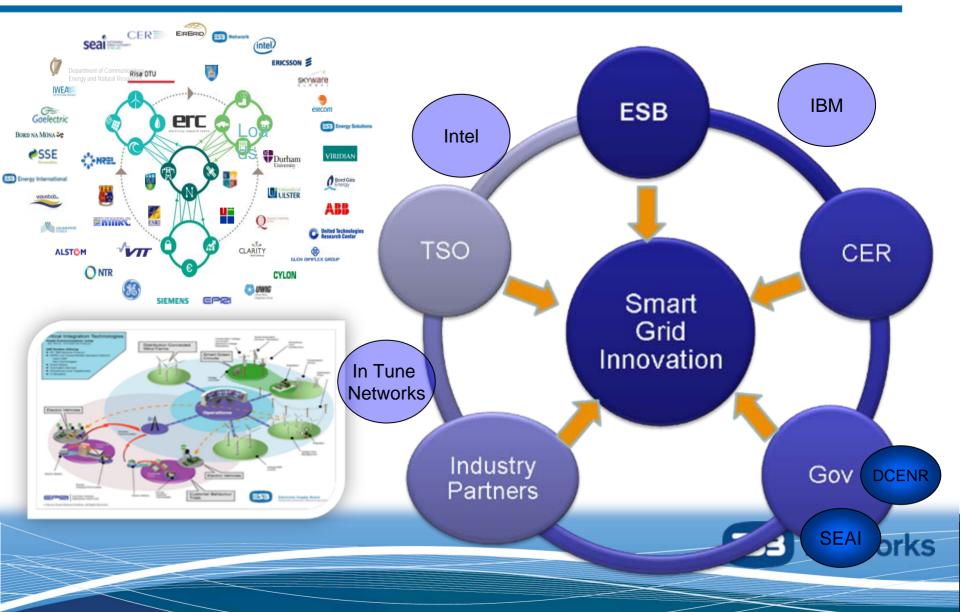
Key Enablers towards 2025





Collaborative Research Focused on Common Goals





Working With Partners





ESB Networks will work with:

- The CER to ensure the best interest of all Irish electricity customers and users are met.
- The TSO to manage more complex distribution and transmission system interdependence
- The Irish Government and SEAI to develop environmental strategy
- Academia and Industry to progress Innovation.
- The Irish Wind Energy Association and other key stakeholders
- Suppliers to facilitate new products and services



Key Enablers towards 2025

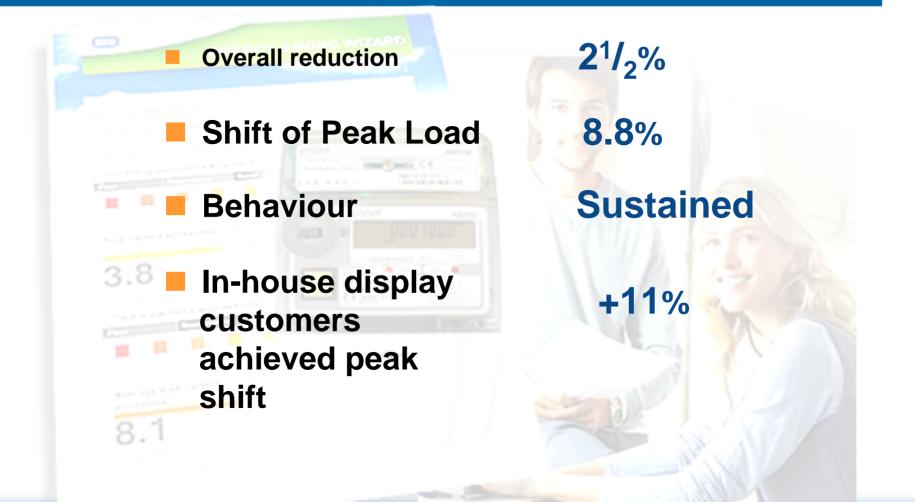








Results





Enabling Customers & Serverks New Technologies – Smart Metering 2025



- **Energy Measurement**
 - Half-hourly profile data
 - Different tariffs and registers including Import, export and watt-less



- Condition monitoring
 - Power outages and voltage
 - Tamper alerts



All data to be collected from the meter at least once per day



Operations

- Remotely and locally operable switch
- Controllable circuit for storage heating



Technology

- Integrated Communications module will provide and manage a Home area network and act as a hub for gas
- Strong Encryption and Security mechanisms



We will have one of the most ambitious roll outs in Europe

IHD for all

Embedded HAN

Integrated with Gas Meter Consumption available to home

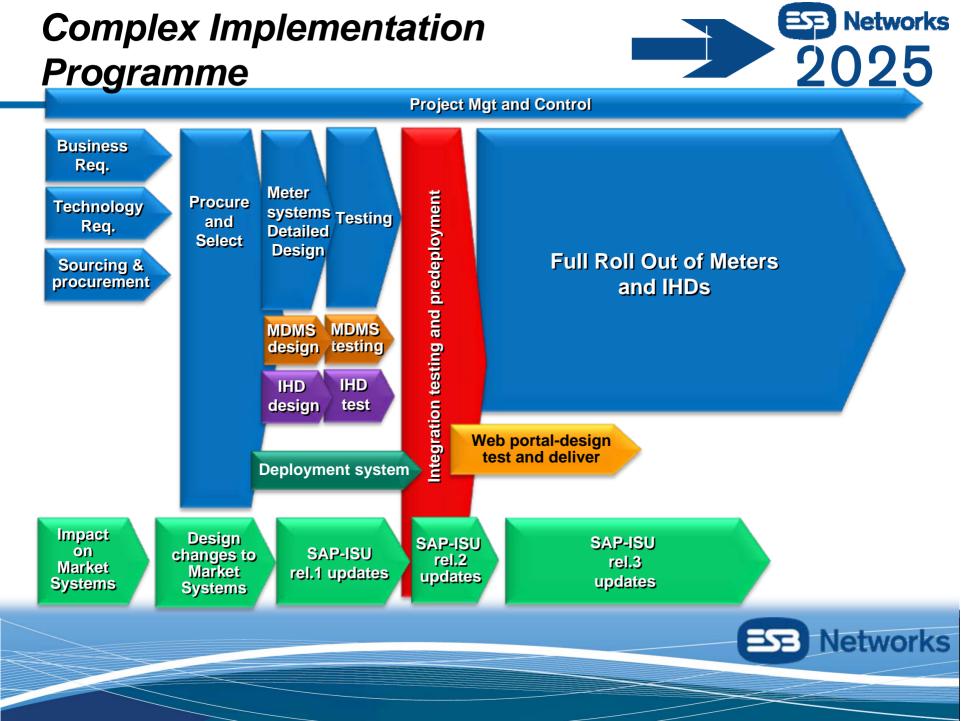
Daily profile reading

Automatic Meter Reading Continuity mgt support Remote meter operation Event monitoring Remote tariff configuration

We have some of the greatest telecoms challenges -



Networks



Ecar Ireland Programme

E Networks 2025

- EV targets 2020:
 - 10% of all vehicles electric
 - 10% of all road energy transport will be renewable
- Supply of electric cars
 - MOU signed with Renault-Nissan
 - MOU signed with Mitsubishi
 - MOU signed with PSA
 - MOU signed with Toyota
 - Other MOUs in the pipeline
- Government incentives
 - €5000 grant
 - Zero VRT
 - Lowest road tax band
 - Accelerated Capital Allowance (Businesses)
- ESB is rolling out the infrastructure











Charging infrastructure



Home charging



Workplace charging

Fast charging













33

Networks

Commercial Hosting Locations

Networks 2025

- Service Stations
 - Topaz
 - Maxol
 - Gulf Oil
 - Great Gas 24
 - Texaco
- Retailers
- Retail Parks
- Park and Ride
- Business Parks
- Commuter Stations













Charge Point Status

- **160 + Public Charge Points**
- 100 + designed, awaiting delivery
- 270 Home / Workplace Charge Points
- > 400+ TOTAL TO DATE
- 1500 Public Charge Point Target



ESE Networks

Other Project Partnerships



- **EPRI Smart Grids**
 - EV on Distribution Network
- Northern Ireland Plugged-in-Places
- Green eMotion
 - Largest European project
- **Enevate**
 - > Fleets
- Mobi.Europe
 - > ICT
 - Ireland, Amsterdam, Portugal, Spain
- Plus others



Green

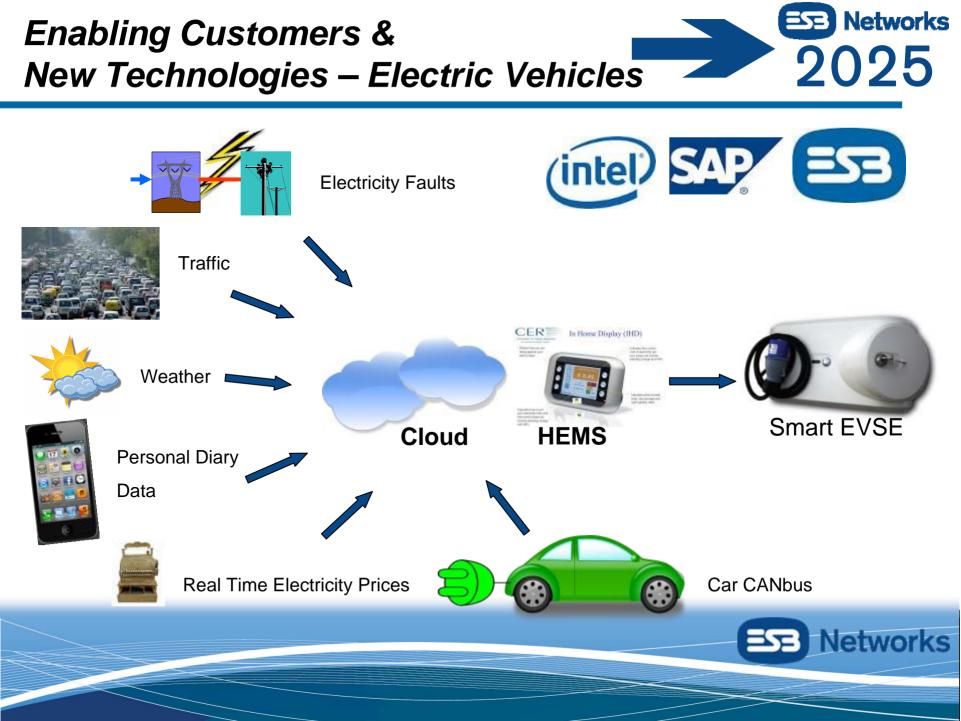
eMotion



European Network of Electric Vehicles and Transferring Expertise

Accelerating E-Mobility

Networks



Electric Vehicle Field Trials

30

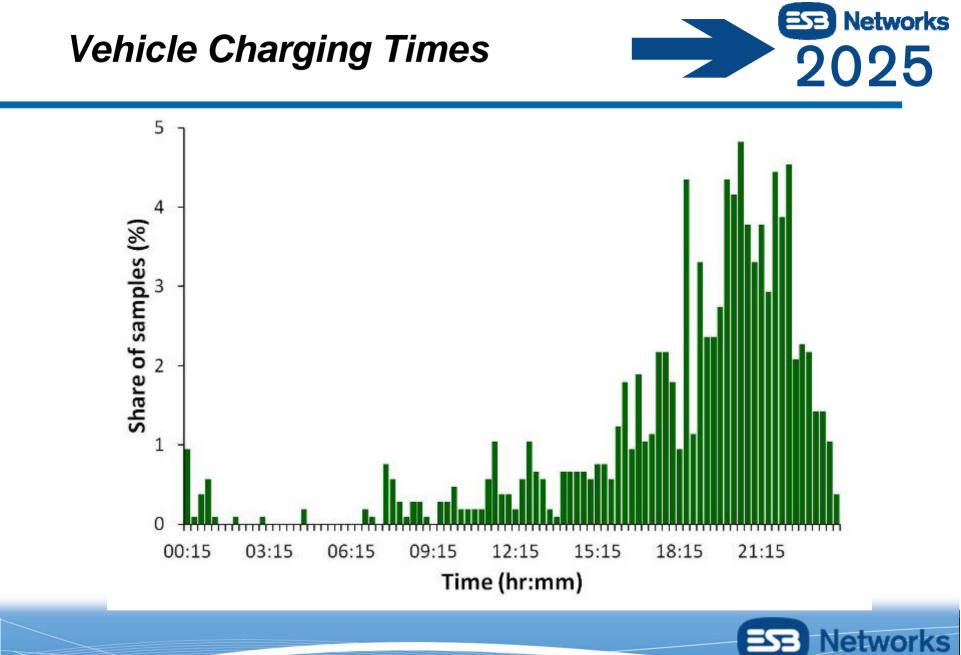
- Impact Assessment on existing residential LV distribution network
 1 Feeder with 72 Customers
- Most testing network conditions
- Simulation Tools being developed





Networks

2025



Customers & New Technology



2.2 Million

Smart Meters in all Irish homes and businesses by 2018

Helped Irish customers reduce consumption by 2.8% by using Smart Meters real time information

Government target of 10% EV penetration by 2020 10% 250,000 vehicles

Delivered by:

- Working with the CER and the Industry & customers to design a Smart Metering solution that meets Ireland's needs
- Learning from other countries Smart Meter Implementations
- Delivering a well managed and efficient Smart Meter Roll out programme
- Enabling Electric Vehicles though delivering charge points to facilitate their introduction
- Delivering R&D to deliver solutions to minimise the Network Investment and maximise the benefits of Electric Cars



Key Enablers towards 2025





R&D Strategy & Networks Innovation



Summary of R&D projects Focus to date

- Self Healing Network Automation
- Closed Loop Pilots
- Dynamic Sectionalising
- Voltage Conservation Reduction
- Low Loss Transformers
- > 20kV Conversion
- Innovative Protection and Fault Diagnostics
- Power Check App
- Wireless Telecoms Trials



Innovative Network Operations



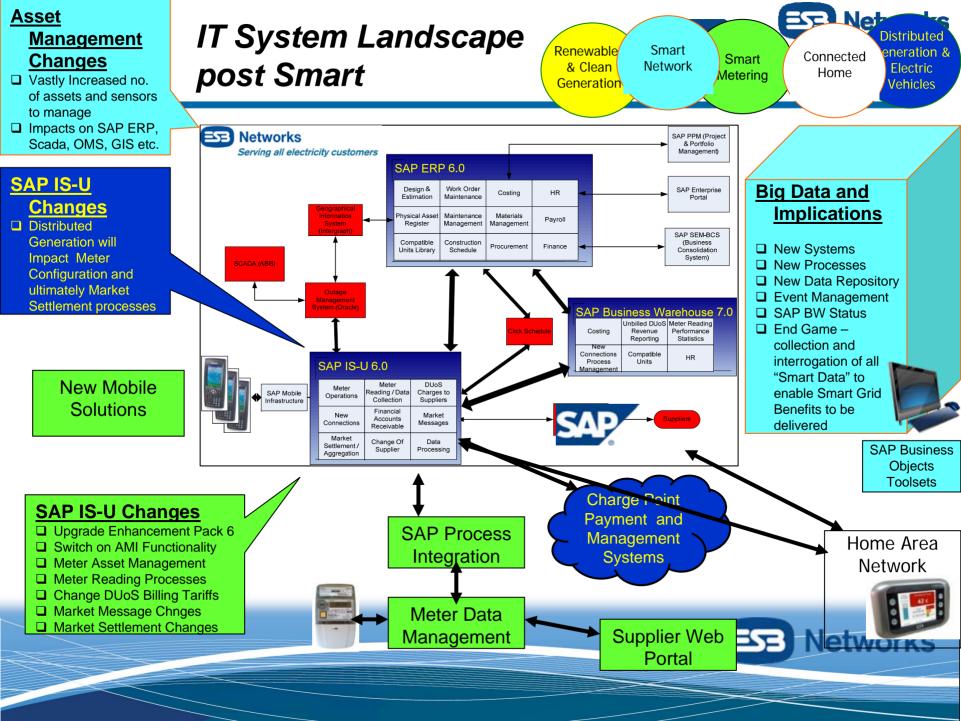
Customer power loss due to faults will be reduced to less than 100 minutes per year – **80%** reduction on 2001-2005 levels

99% of Networks will be within Voltage Standard

Through Innovation and Excellence in Operations, electricity consumption will be reduced by up to 3% independent of customer action **Delivered by:**

- Increased Remote Operational Sensors from 2,000 ->13,000
- Developing a Communications Infrastructure to enable Dynamic Control
- Nationwide deployment of Self Healing Network
- Reducing load by 3% though Innovation and excellence in Operation
- Efficiently integrating data from 2.2m smart meters to benefit operation optimisation





Key Enablers towards 2025





Delivering Efficiently within & Regulation targets







Developing Smart Networks for 2025





Integrating Renewable Generation

Partnership Across The Industry

Smart Operations And Telecoms

Customers And New Technology

Delivering On Price And Regulation





Thank You

