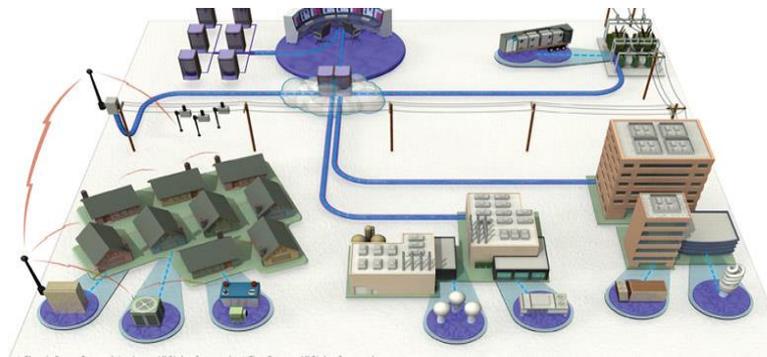


# Smart Meter Pilot Project in Tenaga Nasional Berhad, Malaysia: 3 Different Communication Technology Tested

**Dato' Mohandass S. Nair**  
Director, Smart Billing Project

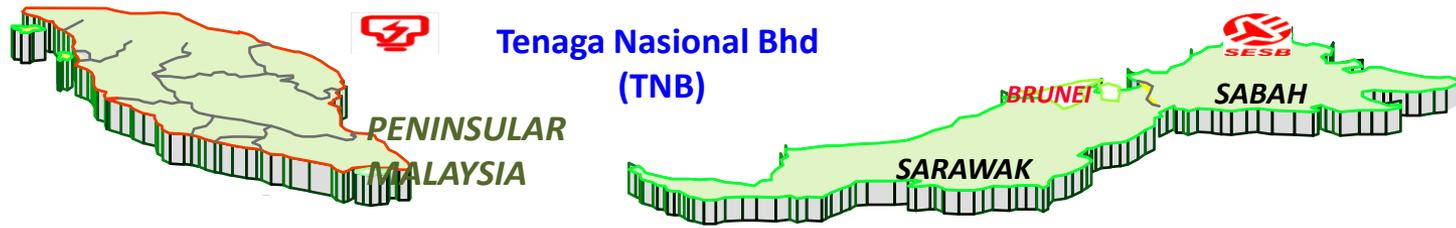
**Tenaga Nasional Berhad**



# Agenda

- Background of Tenaga Nasional Berhad (TNB), Malaysia
  - TNB's Smart Grid Drivers
  - Pilot Project Overview and Implementation
  - Performance of the technologies tested
  - Lessons to Leverage for Full Scale Rollout
  - TNB's proposed nationwide rollout roadmap

Tenaga Nasional Berhad (TNB) is the largest utility company undertaking the role of developing, managing and operating the Generation, Transmission and Distribution of Malaysia's Electricity Supply Industry, with presence in Peninsular Malaysia & Sabah.



<u>Peninsular Malaysia</u> 		<u>Sarawak</u>		<u>Sabah</u> 	
Customers	~8.1 million	Customers	0.504 million	Customers	0.49 million
Installed Capacity	21,060 MW	Installed Capacity	2,930MW	Installed Capacity	1,241 MW
Max Demand	16,901 MW	Max Demand	1,758 MW	Max Demand	917MW

<b>RESOURCES</b>	<b>Employees</b> 	<b>Assets</b> 	<b>Fuel Mix</b>				
	36,146 people	RM 110.7 billions (as of 2014)	53.8%	35.3%	10.3%	0.6%	0.04%
<b>CAPACITY</b>	<b>Customers</b> 	<b>Maximum Demand</b> 	<b>Installed Capacity</b> 				
	8.6 mill (Peninsula & Sabah)	16,901 MW	10,814 MW				
<b>FINANCIAL</b>	<b>CAPEX</b> 	<b>Revenue</b> 	<b>T&amp;D Losses</b> 				
	RM10 Billion (FY 2014/15)	105,000 GWh (FY 2013/14)	8.3% losses (FY 2013/14)				
<b>PERFORMANCE</b>	<b>Electrification</b> 	<b>SAIDI (Distribution)</b> 	<b>SAIDI (Transmission)</b> 				
	Peninsula 99.99% Sabah 90.81%	55 mins	0.1 min				

# TNB's Smart Grid Drivers

Existing business model imposes **multitude of challenges** towards **sustainability**



## Higher customer demand

Require significant technologies and equipment to meet customer demand



## High dependency on fossil fuels (more than 90% from gas and coal)

Reliance on 100% imported coal - issue on energy security



## Increasing cost of supply

Rationalizing energy subsidies and recovery of higher cost of supply



## Reduction of CO<sub>2</sub> emission & low carbon economy

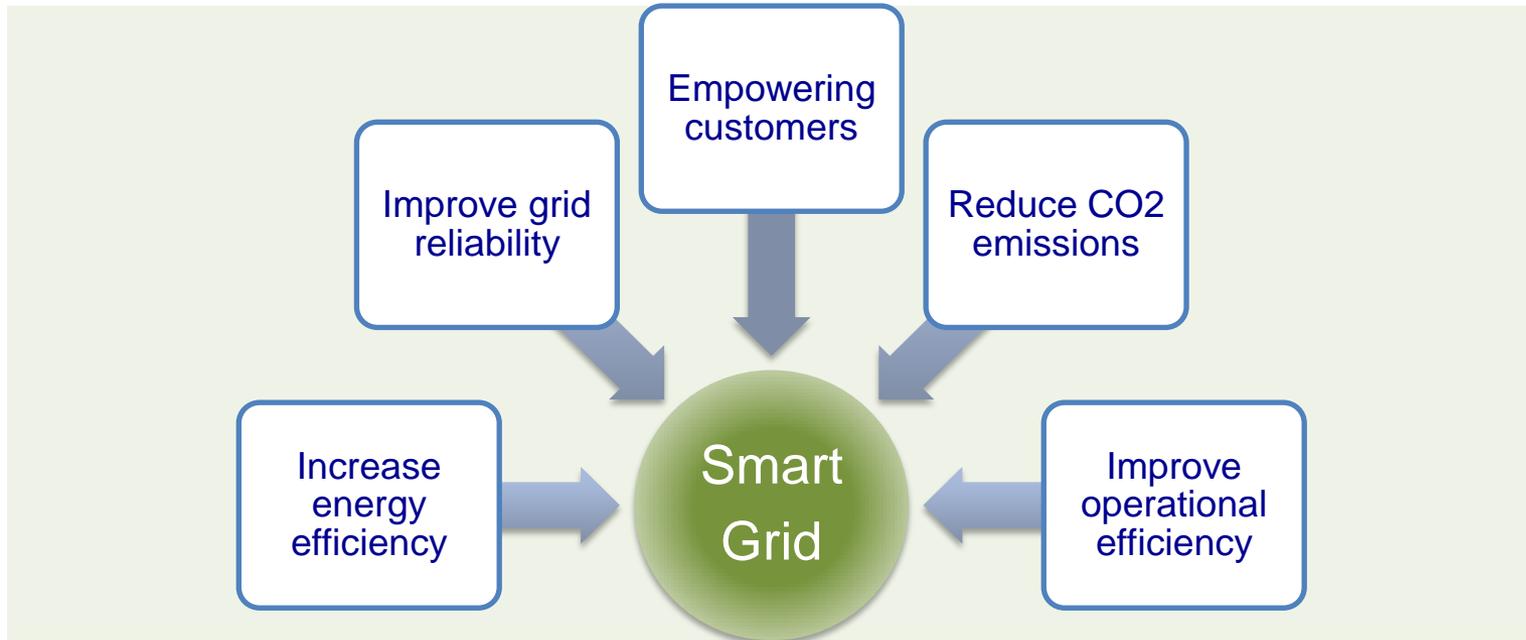
Commitment to reduce up to 40% in emission intensity of GDP in year 2020 compared to 2005 levels



## Increasing pressure on energy security

Availability and reliability of energy resources

# TNB's Smart Grid Drivers

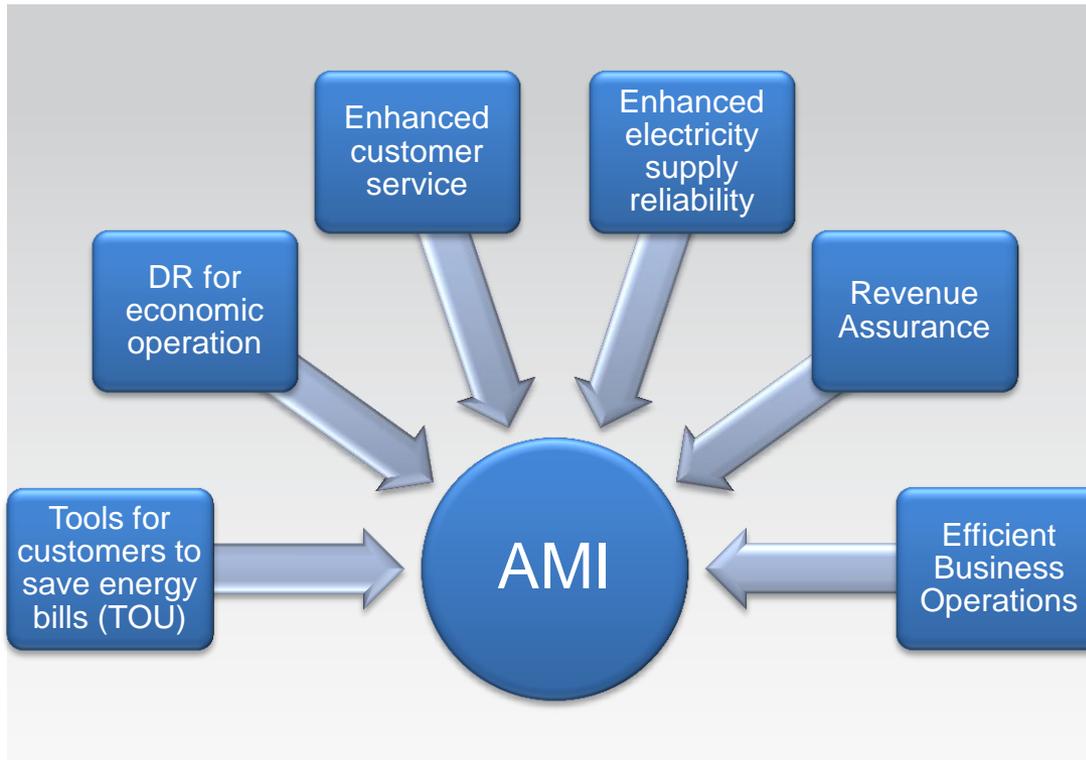


“Upgrading capability of the existing electric power grid by deploying more automation and ICT technologies to enable the grid to operate more efficiently and reliably and offer additional services to consumers to save money and reduce CO<sub>2</sub> emissions”

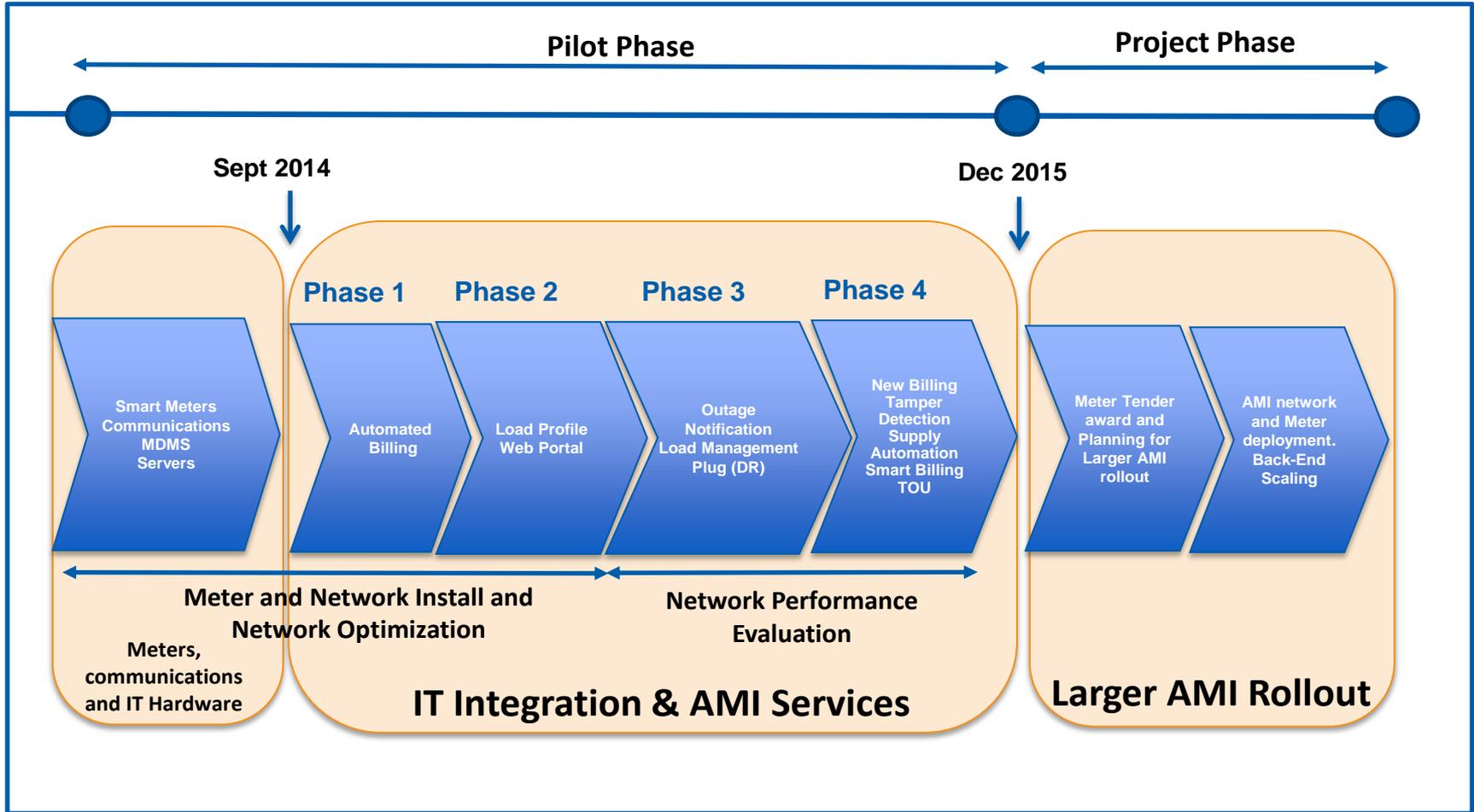
– TNB Smart Grid Steering Committee  
(Sept 2010)

# TNB Smart Meter Pilot Project

- The pilot project is funded by the Malaysian Government (MESITA Fund)
- Implementation of 1000 smart meters in the states of Melaka and Putrajaya
- The project is part of TNB's smart grid Initiative



# Implementation Stages and Progress

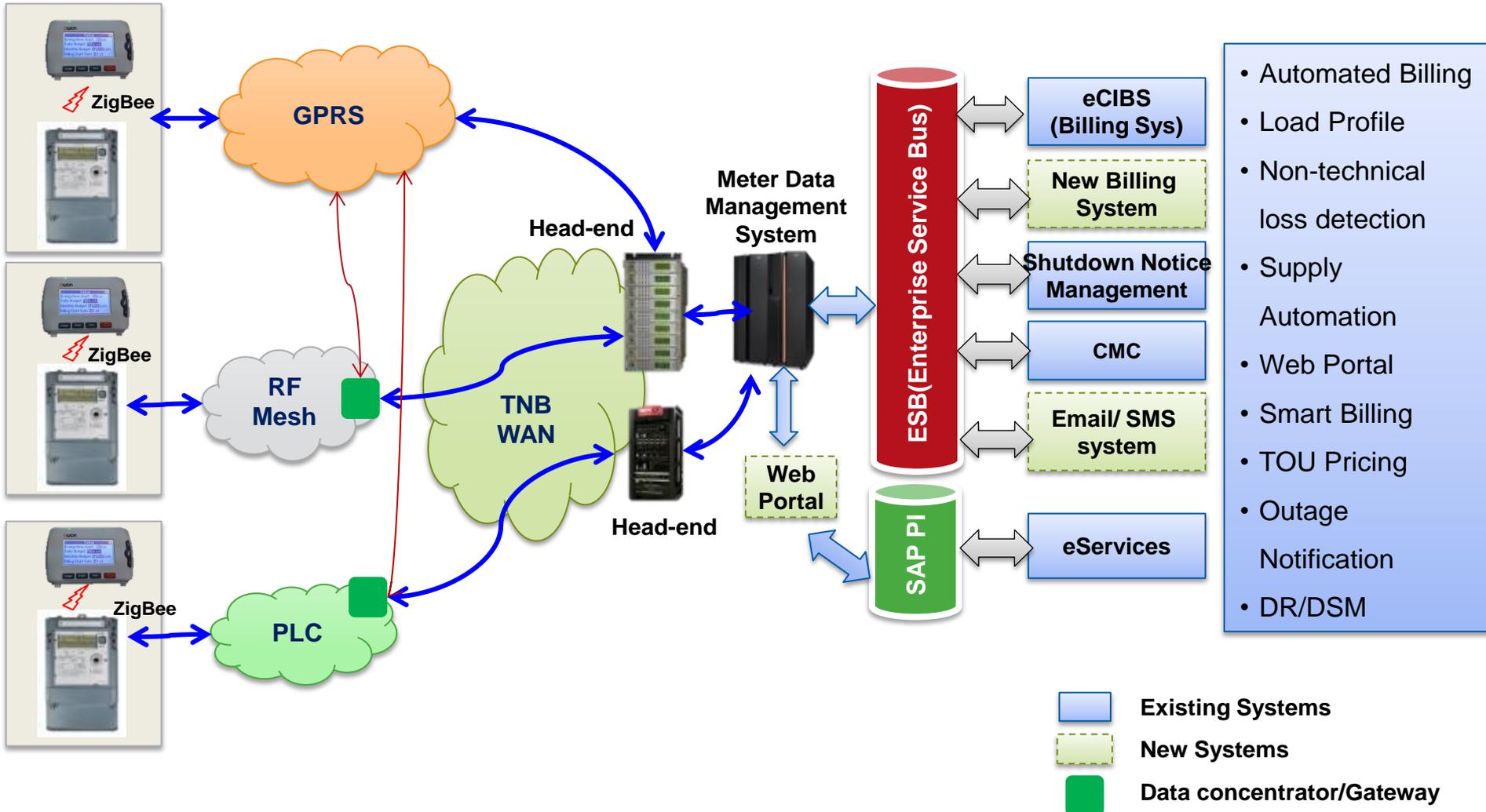


# AMI Pilot Project System Design and Services

Metering, Communications & MDMS

IT Infrastructure & Integration

AMI Services





RF Network	
Issue	Solution
Meter data arrived late at Trilliant Head End from RF Collector in Melaka due to weak RF links	<ol style="list-style-type: none"> <li>1. Installation of repeaters to improve weak RF links back to the RF collector</li> <li>2. Creation of additional tasks on HES to transfer these late meter reads to the MDMS.</li> <li>3. Enable MDMS to process Head End data until 6.00pm for the late meter reads.</li> </ol>
Cellular RF Collector unreachable due to third party network issue (poor GPRS coverage)	Replace GPRS/2G sim card with 3G sim card to achieve better network availability

PLC Network	
Issue	Solution
PLC DCU unreachable due to third party network issue (poor GPRS coverage)	Replace GPRS/2G sim card with 3G sim card (with external router) to achieve better network availability
LAN interface on PLC DCU Putrajaya was down	Remote restart LAN port interface

GPRS Network	
Issue	Solution
59 smart meters using GPRS as backhaul communication not reporting consistently to the HES (49/59 not reporting at all)	Third party network operator increased its backhaul capacity to address network congestion issue in Melaka and Putrajaya
6 trouble meters not reporting daily until October 2015 due to backlog LP data stored in the meter – data too big to be pushed to HES via GPRS network	Solution proposed – next software upgrade on the current HES will allow staggered retrieval of meter data that will solve this problem

# Lessons to Leverage

## AMI Implementation is Far Reaching

- Many business processes are transformed
- Various systems (new and legacy) involved
- Important to setup a separate team/department dedicated to the project

## Important to clearly identify business requirements

- Ensure technology chosen supports business requirements (ie real time events, etc)
- Important to find the right balance between performance requirements and commercial impact

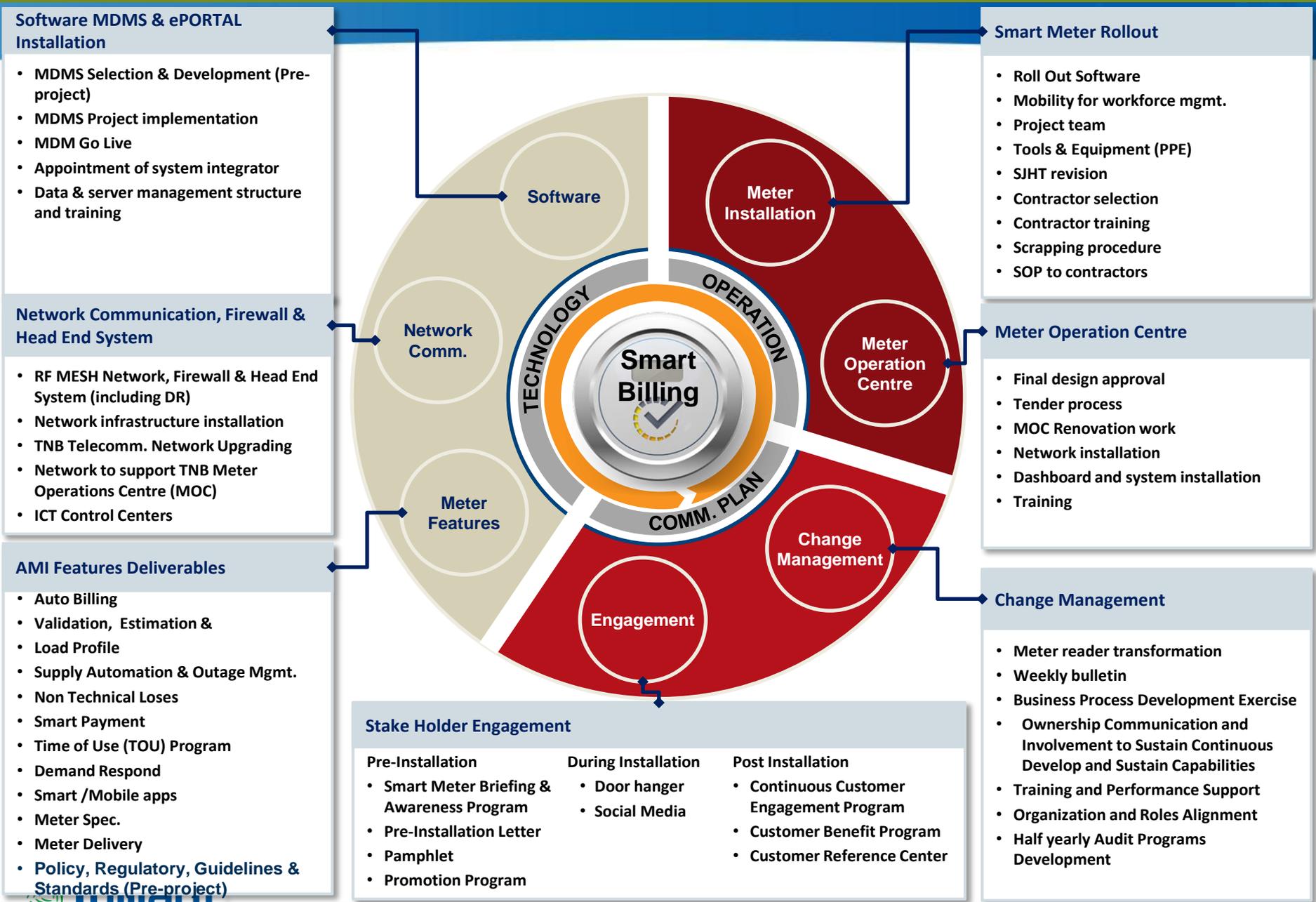
## Communications Network Deployment

- Allocate time for appropriate network planning and optimization
- Outage detection and other real time event requirements have an impact on technology and network coverage required
- If using public cellular, work with Telco providers to ensure adequate connectivity and performance

## Customer/ Stakeholder acceptance

- Ensure the customer is at the center
- Start engagement activities early
- Get buy-in from Government, Regulators and other stakeholders

# Smart Billing Project Full Deployment Overview



- Software MDMS & ePORTAL Installation**
- MDMS Selection & Development (Pre-project)
  - MDMS Project implementation
  - MDM Go Live
  - Appointment of system integrator
  - Data & server management structure and training

- Smart Meter Rollout**
- Roll Out Software
  - Mobility for workforce mgmt.
  - Project team
  - Tools & Equipment (PPE)
  - SJHT revision
  - Contractor selection
  - Contractor training
  - Scrapping procedure
  - SOP to contractors

- Network Communication, Firewall & Head End System**
- RF MESH Network, Firewall & Head End System (including DR)
  - Network infrastructure installation
  - TNB Telecomm. Network Upgrading
  - Network to support TNB Meter Operations Centre (MOC)
  - ICT Control Centers

- Meter Operation Centre**
- Final design approval
  - Tender process
  - MOC Renovation work
  - Network installation
  - Dashboard and system installation
  - Training

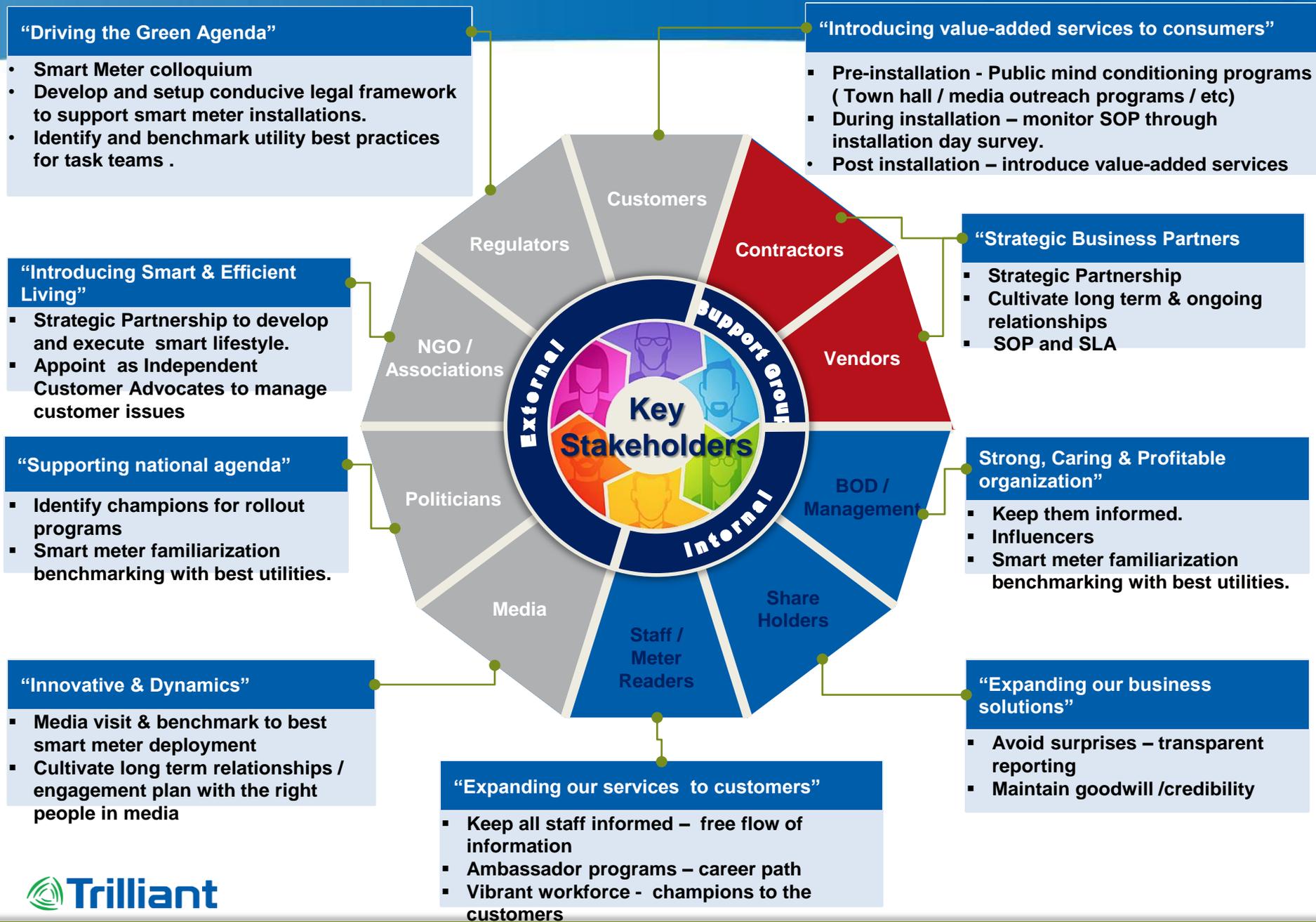
- AMI Features Deliverables**
- Auto Billing
  - Validation, Estimation &
  - Load Profile
  - Supply Automation & Outage Mgmt.
  - Non Technical Loses
  - Smart Payment
  - Time of Use (TOU) Program
  - Demand Respond
  - Smart /Mobile apps
  - Meter Spec.
  - Meter Delivery
  - Policy, Regulatory, Guidelines & Standards (Pre-project)

- Change Management**
- Meter reader transformation
  - Weekly bulletin
  - Business Process Development Exercise
  - Ownership Communication and Involvement to Sustain Continuous Develop and Sustain Capabilities
  - Training and Performance Support
  - Organization and Roles Alignment
  - Half yearly Audit Programs Development

**Stake Holder Engagement**

Pre-Installation	During Installation	Post Installation
<ul style="list-style-type: none"> <li>• Smart Meter Briefing &amp; Awareness Program</li> <li>• Pre-Installation Letter</li> <li>• Pamphlet</li> <li>• Promotion Program</li> </ul>	<ul style="list-style-type: none"> <li>• Door hanger</li> <li>• Social Media</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous Customer Engagement Program</li> <li>• Customer Benefit Program</li> <li>• Customer Reference Center</li> </ul>

# Stakeholder Engagement Plan



- **TNB Board of Directors has endorsed the proposed nationwide implementation of Advanced Metering Infrastructure (AMI) of eight (8) million smart meters over five (5) years beginning 2015**

Evaluation phase on technologies, customers, partners, processes and risks mitigation before embarking on the nationwide roll-out

**PILOT**  
Pilot Smart Meter Project implemented in Melaka & Putrajaya (1000 smart meters)  
2014-15

**1<sup>st</sup> PHASE**  
Smart Meter roll-out for the state of Melaka  
2016

**2<sup>nd</sup> PHASE**  
Nationwide implementation  
2017

**COMPLETE**  
2021

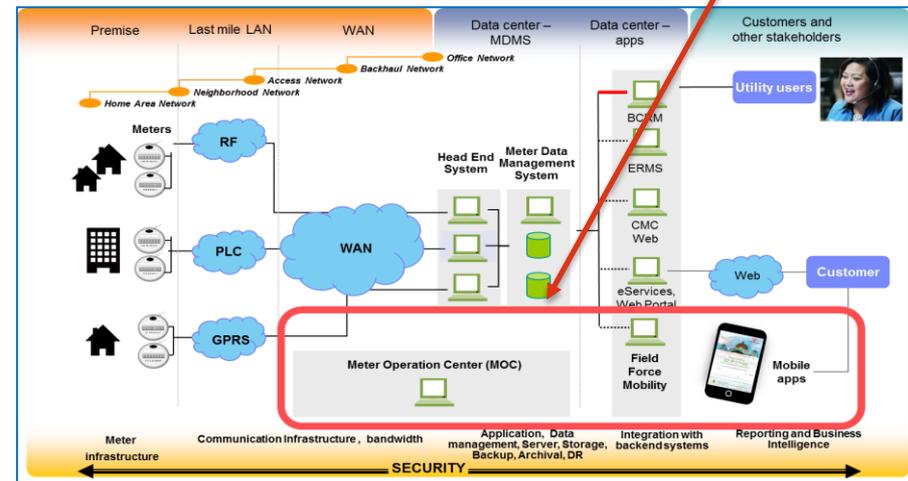
8.3 million

2 million

300 thousand

Industrialised Process Established in Phase 1

Annual Meter Rollout



**THANK YOU**

