PLN Smartgrid Overview

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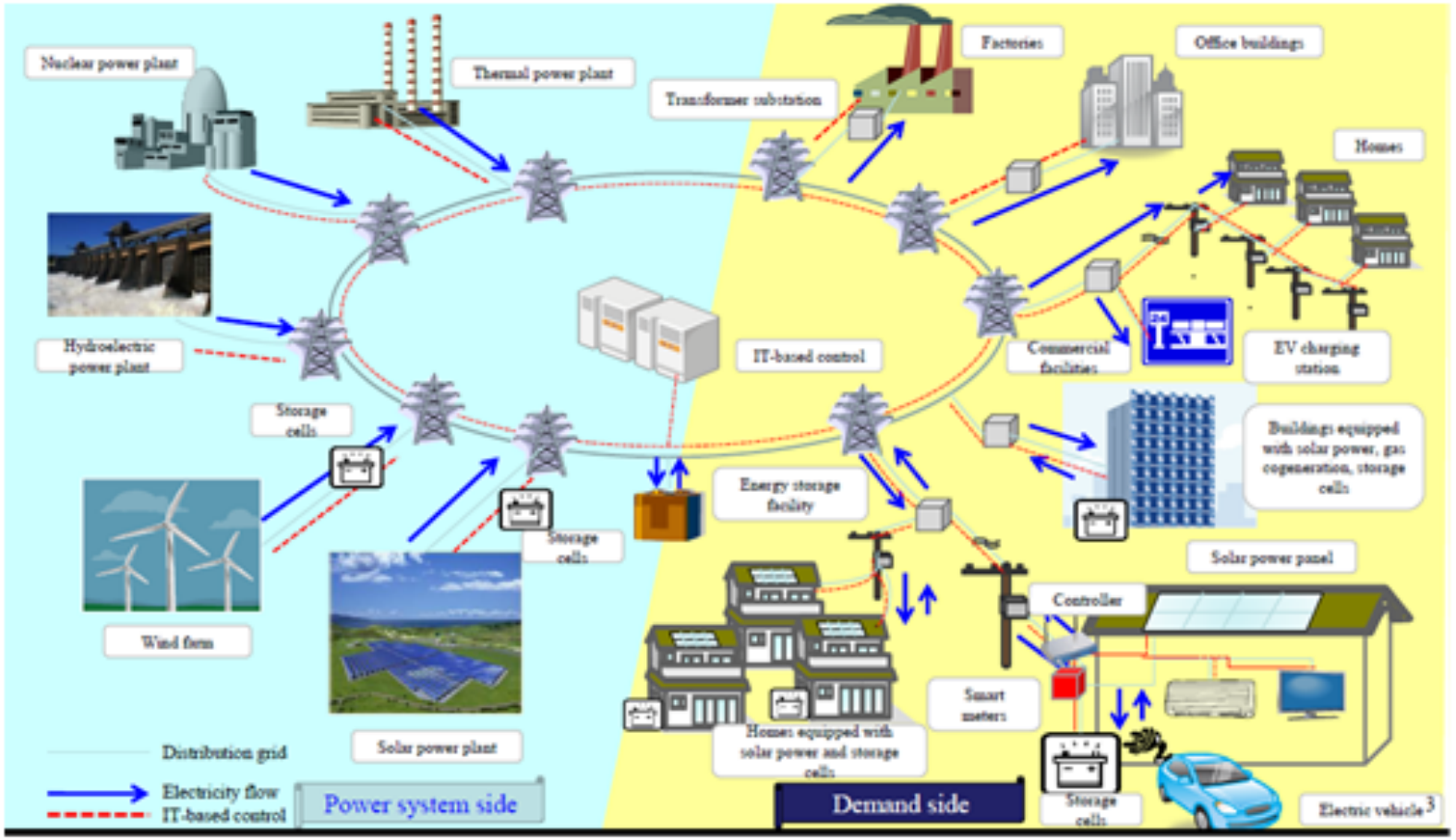


Smart grid is the concept of intelligent power network to meet the need of electrical energy by making use of information technology and communication technology in both directions between electricity producers (power system side) and consumers (demand side). The benefits of smart grid technologies are : energy efficiency, flexible power supply, self healing network capability, customer participation and high quality

Kunci Utama Pengembangan Smart Grid di PLN

1. Peningkatan Efisiensi Energi

- Penurunan rugi-rugi jaringan teknis dan non-teknis
- Meningkatkan kemampuan penyaluran di sistem tenaga listrik
- Integrasi informasi kebutuhan daya listrik dan smart metering
- Mengaktifkan partisipasi pelanggan secara dinamis

2. Kehandalan dan Stabilitas Suplai Tenaga Listrik

- Mencegah black-out dan menurunkan gangguan penyulang
- Asesmen kondisi aset jaringan secara real-time

3. Pengurangan Emisi CO2

- Memungkinkan partisipasi dari sumber energi terbarukan dan pembangkit listrik hybrid ke dalam sistem tenaga listrik
- Integrasi pembangkitan terdistribusi dan mendorong manajemen energi di instalasi pelanggan

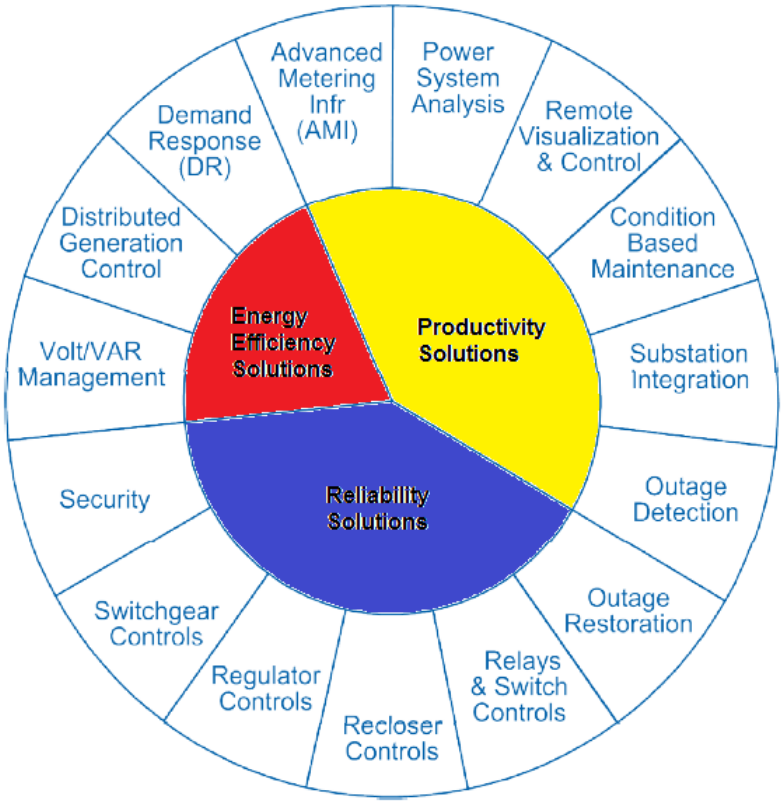
Tujuan Utama Pengembangan Smart Grid di PLN

PLN menekankan Pengembangan Smart Grid di PLN meliputi 3 Tujuan Utama sebagai berikut :

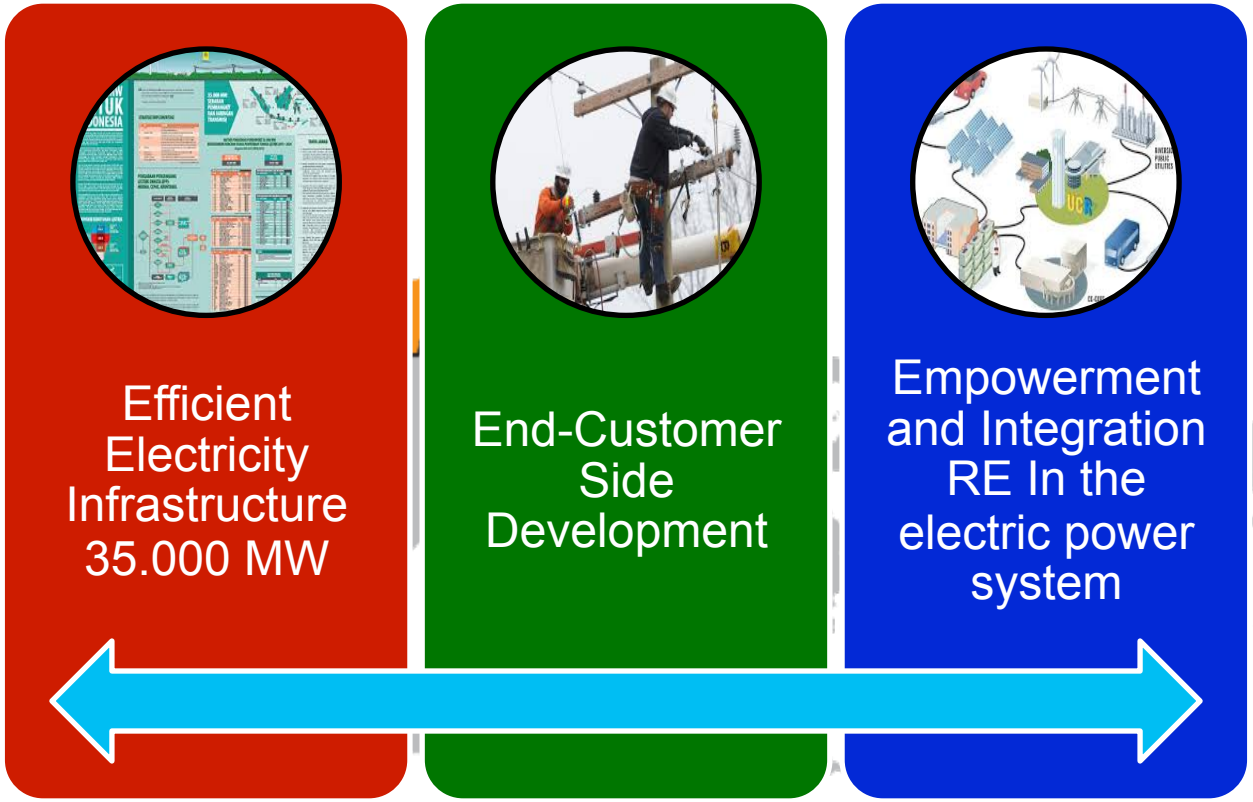
Eficiency Energy Solutions

Productivity Solutions

Reliability of Power Supply Solutions



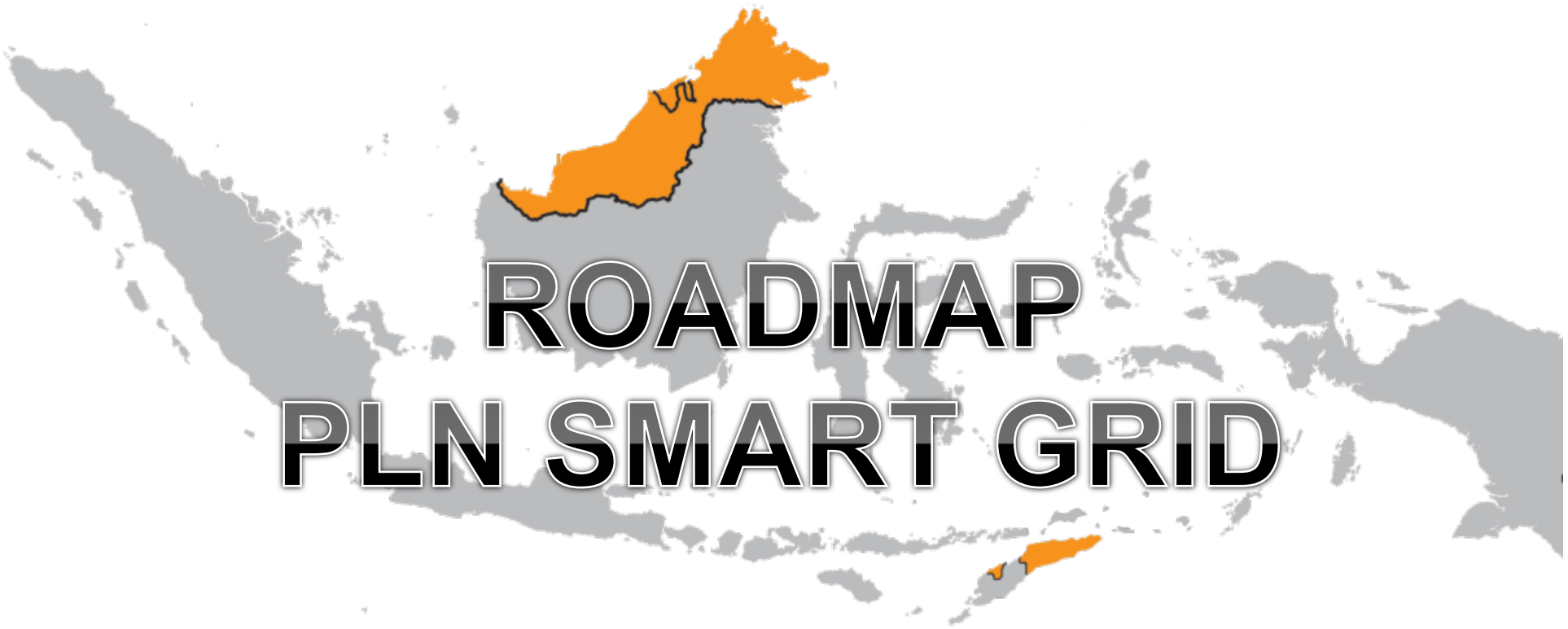
Pentingnya Roadmap PLN Smart Grid



Pengembangan Roadmap PLN Smart Grid dapat mendukung:

1. Program pembangunan infrastruktur listrik 35.000 MW untuk menciptakan sistem yang kuat, fleksibel dan cara yang efisien untuk mendukung operasional perusahaan
2. Mengembangkan teknologi dan skema bisnis yang paling sesuai untuk DSM pelanggan dan untuk mendukung pertumbuhan permintaan & keberlanjutan pasokan listrik
3. Memungkinkan partisipasi dari sumber daya energi terbarukan dan pembangkitan terdistribusi

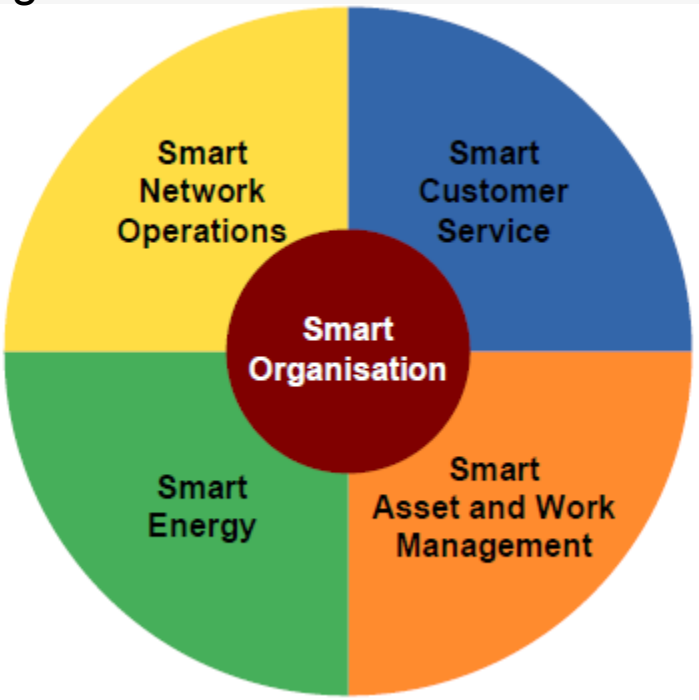
Pengembangan Roadmap PLN Smart Grid



Refer to Siemens Smart Grid Compass and IEC Smart Grid Standardization Roadmap

Framework untuk implementasi PLN Smart Grid

Terdapat 5 Fokus Bidang untuk pengembangan roadmap smart grid :

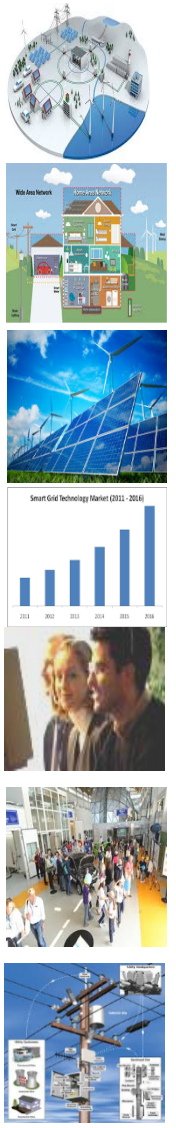


Tujuan : Apa yang ingin dicapai ?
Tujuan bisnis & performance yang ingin dicapai oleh PLN

Kemampuan Bisnis :
Cara-cara yang dapat digunakan PLN untuk dapat menjalankan aktivitas implementasi smart grid

Teknologi : Teknologi apa yang digunakan ?
Berbagai teknologi smart grid yang sesuai untuk PLN

Memanfaatkan tiga dimensi di atas, pemilihan model yang tepat akan menutup kesenjangan antara teknologi dan nilai bisnis.



Implementasi Penyusunan Roadmap PLN Smart Grid

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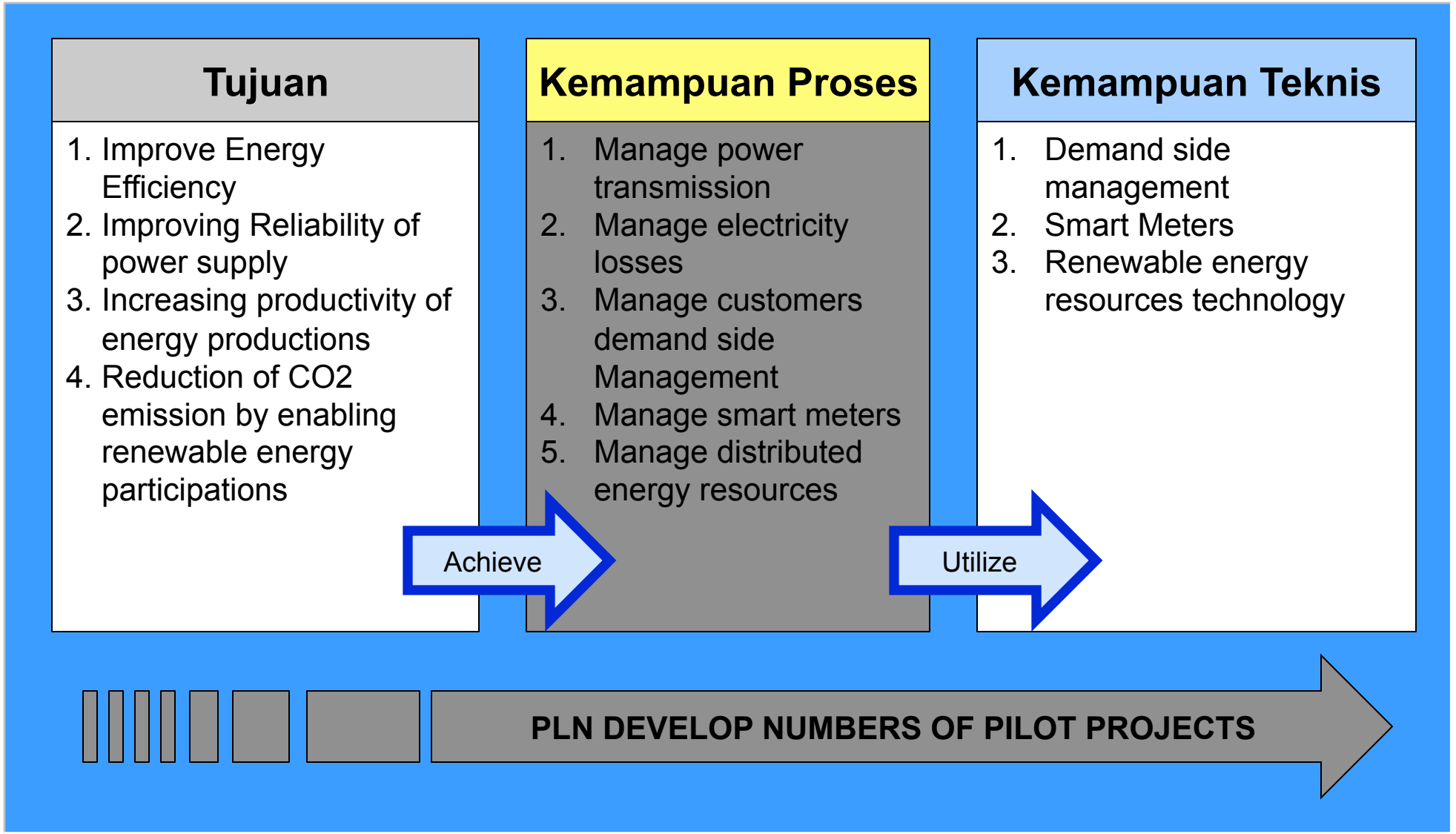
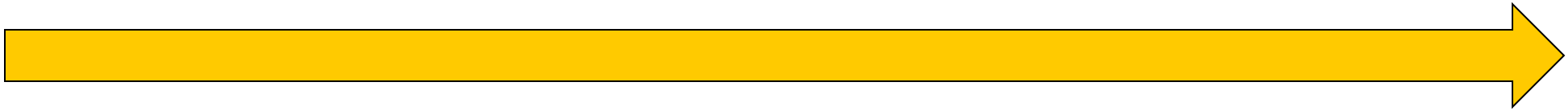


4 Fasa Dari PLN Smart Grid Program

ORIENTASI	TUJUAN	ROUTING	NAVIGASI
Dimana Posisi Saat Ini ? Orientasi ruang Smart grid dan memanfaatkan pengalaman global Siemens untuk meningkatkan visi dan Arah kisi-kisi masa depan Smart Grid korporasi	Kemana akan menuju ? Memperbaiki visi grid masa depan dan membumikan nilai2 dari peningkatan struktur program dari visi ini dan arah grid masa depan	Bagaimana untuk mencapai ? nilai lengkap program peningkatan berdasarkan struktur yang ada dan menyediakan dukungan keputusan melalui Kasus bisnis kuantitatif	Bagaimana untuk mempertahankan ? nilai lengkap program peningkatan berdasarkan struktur yang ada dan menyediakan dukungan keputusan melalui Kasus bisnis kuantitatif



Fasa Orientasi dari Pengembangan PLN Smart Grid

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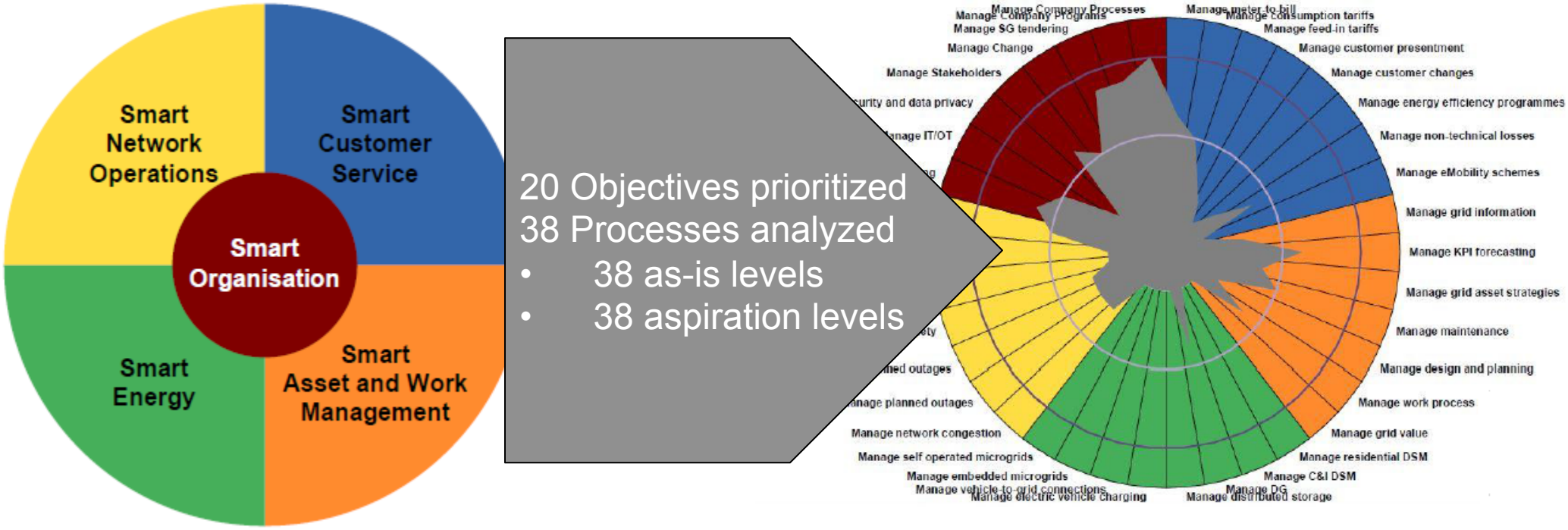

Pada tahap orientasi, harus diketahui kondisi aktual dari Sistem Tenaga Listrik PLN untuk 20 tujuan yang diprioritaskan dan menganalisis 38 proses untuk mengetahui arah Pembangunan PLN Smart Grid

Legenda Tujuan Prioritas

Marking	Prioritization	Description
	Sangat Tinggi	Strategic / very high importance of objective / business capability (improvement required, investment might be necessary without positive business case)
	Tinggi	High importance of objective / business capability (actively looking for improvements, evaluation of business value)
	Rendah	Low importance of objective / business capability (no improvement required)
	Tidak relevan	No importance of the objective / business capability

Setiap faktor tentang tujuan dan kemampuan bisnis dianalisis menggunakan pertimbangan empat hal prioritisasi diatas sehingga dapat diperoleh gambaran tingkat tujuan yang akan dicapai oleh PLN dan tingkat kemampuan bisnis yang dimiliki saat ini

Smart Network Operations

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Business Objectives	
Improve Power Quality	
Improve service reliability	
Improve safety & security	
Improve energy delivery efficiency	

Business Capability	
Manage safety	
Manage network congestion	
Manage planned outages	
Manage power quality	
Manage operational customer communication	
Manage unplanned outage	
Manage technical losses	

Smart Customer Service

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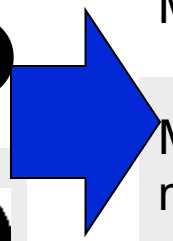
Business Objectives
Improve meter-to-bill efficiency and effectiveness
Manage customer demand for the benefit of the grid
Improve customer satisfaction and engagement
Reduce non technical losses



Business Objectives
Manage meter-to-bill
Manage consumption tariffs
Manage renewable feed-in and net metering tariff
Manage customer presentment
Manage customer changes
Manage energy efficiency programs
Manage e-Mobility Scheme
Manage non technical losses

Smart Asset and Work Management

Business Objectives	
Optimize CAPEX vs OPEX spend on Grid	●
Optimize risk distribution across grid	◒
Improve work process efficiency	◒
Improve availability & quality of asset information	●

Business Objectives	
Manage grid information	●
Manage KPI forcasting	◒
Manage grid asset strategies	◒
Manage maintenance	◒
Manage work execution	◒
Manage design and planning	●
Manage grid value	◒

Smart Energy Management

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Business Objectives	
Enable achievement of emission reduction targets	
Enable achievement of DG targets	
Enable electrification of transportation	
Support customer's desire for localized energy survey	

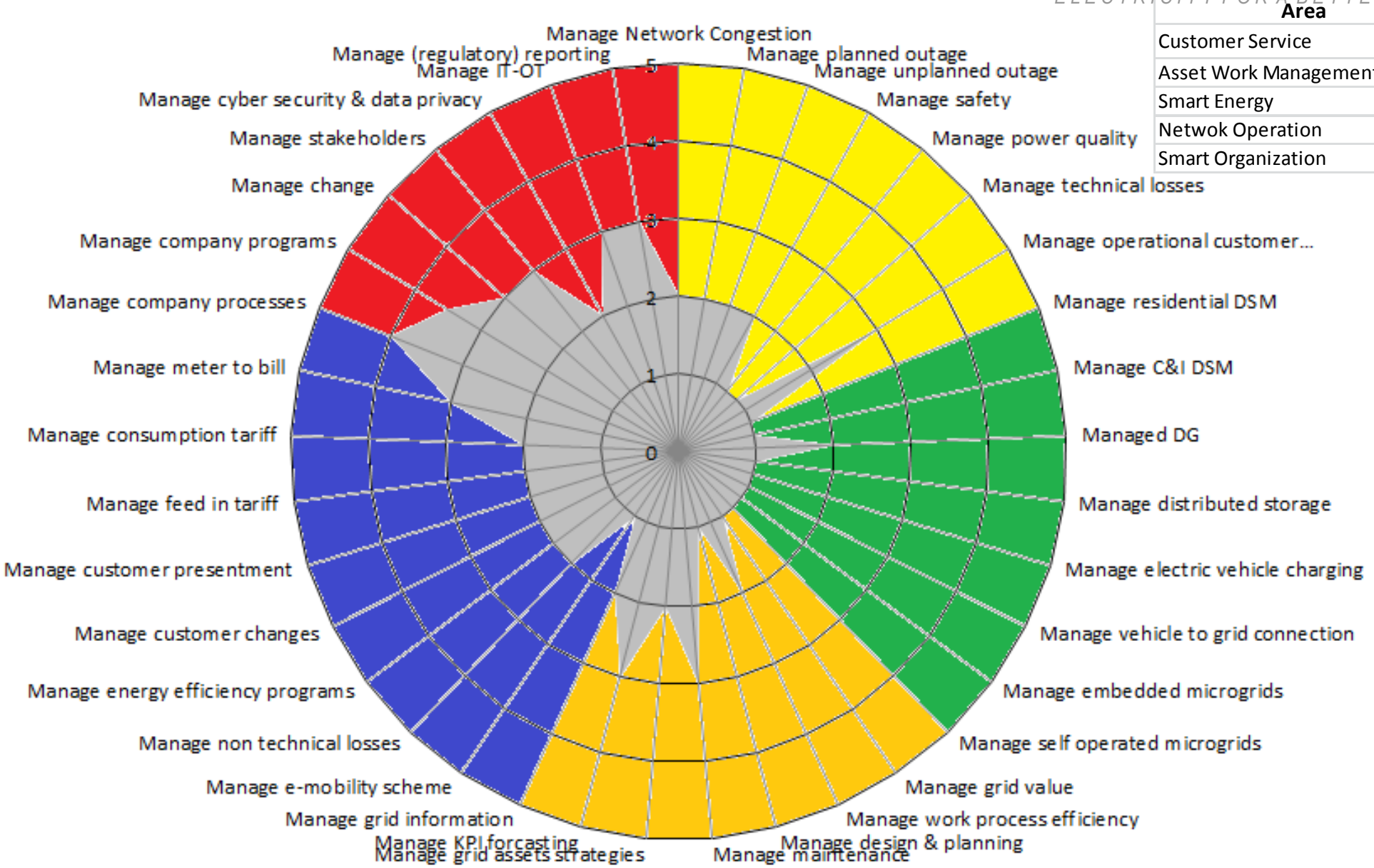
Business Capability	
Manage residential DSM	
Manage C&I DSM	
Manage DG	
Manage distributed storage	
Manage electric vehicle charging	
Manage V2G	
Manage embedded microgrid	
Manage self operated microgrid	

Smart Organization

Business Objectives	
Complexity reduction	●
Flexibility to adapt to changes of business environtment	◒
Improve information security	◒
Optimize stakeholder relationship	●

Business Capability	
Manage tender	◒
Manage company programs	●
Manage company processes	●
Manage regulatory reporting	◒
Manage IT-OT	◒
Manage cyber security and data privacy	◒
Manage stakeholders	◒
Manage change	●

Footprint Kondisi PLN Smart Grid Saat Ini



Contoh : Smart Assets and Work Management

Summary
Maintenance Management derives maintenance programs and actual work task definition from asset management strategies

	Capability Level	Existence
5	Smart maintenance management. Events on individual assets in important grid segments are used in a lifecycle model considering system context to determine additional maintenance measures as needed	
4	Strategic maintenance management. Yearly maintenance budgets are allocated to grid segments. Work orders for individual assets are created based on strategic priority. Measures that exceed budget are postponed	
3	Dynamic maintenance management. Events on key assets are monitored and used to introduce addditional maintenance measures into the maintenance program. This might lead to other measures being postponed	
2	Prioritized work orders, maintenance budget management. Work orders for individual assets are created based on strategic priority. Maintenance measures that exceed the budget are postponed. Introduction of condition assesment on key assets (inspection)	
1	Manual work orders, maintenance budgeting by assets class. Work orders for individual assets are derived from maintenance plans per asset class. Yearly maintenance budgets are planned and allocated to asset classes	
0	Manual work orders, general maintenance budgeting. Work orders are derived from maintenance plans per assets class. All work orders make up the annual maintenance program. Corrective measures are taken as needed.	

Aspirations	near term < 3 Years	medium term < 5 Years	long term < 10 Years

Existence	New	Partially Existing	Fully Existing
			

Roadmap PLN Smart Grid Menuju Kelas Dunia

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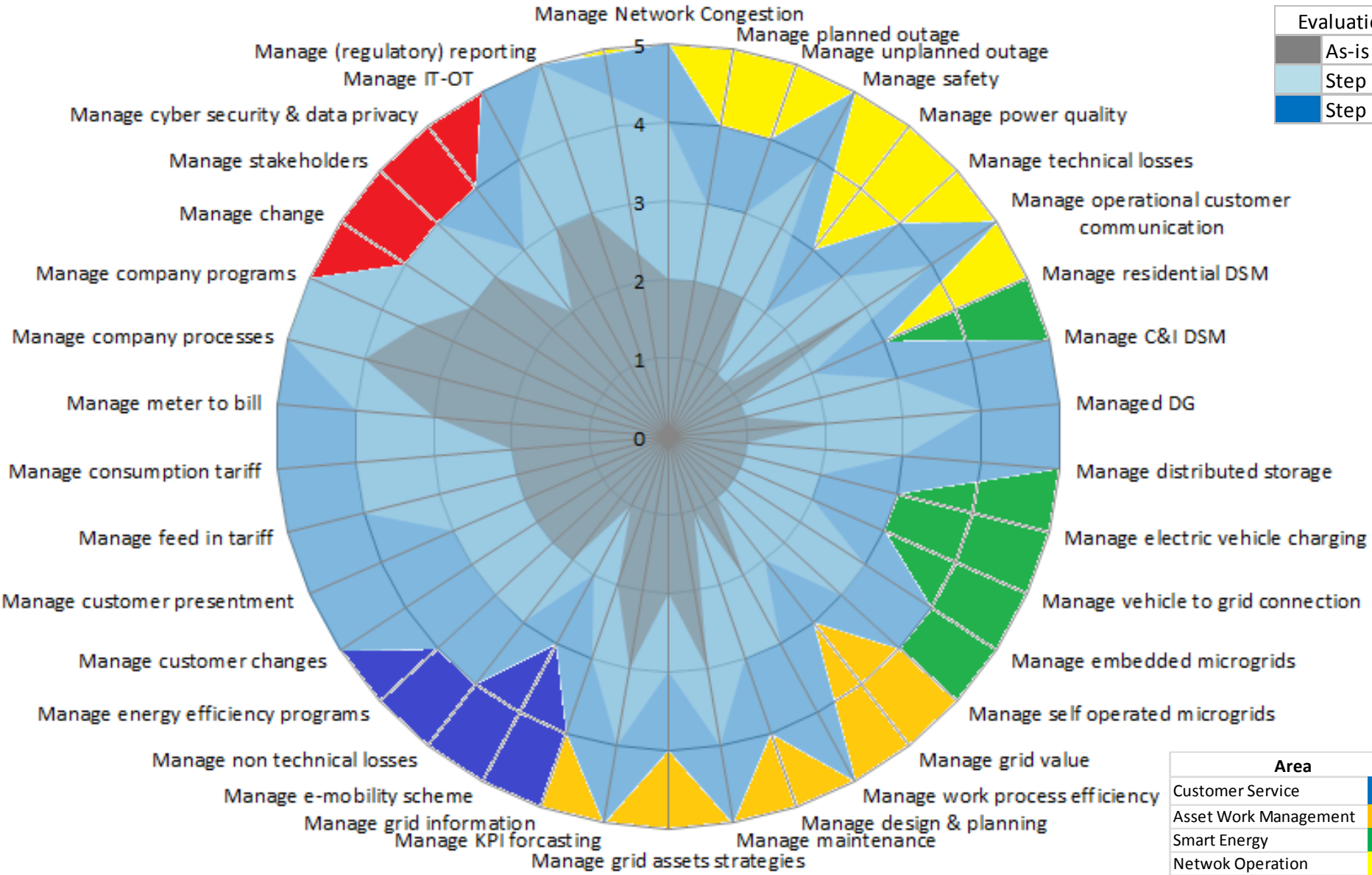
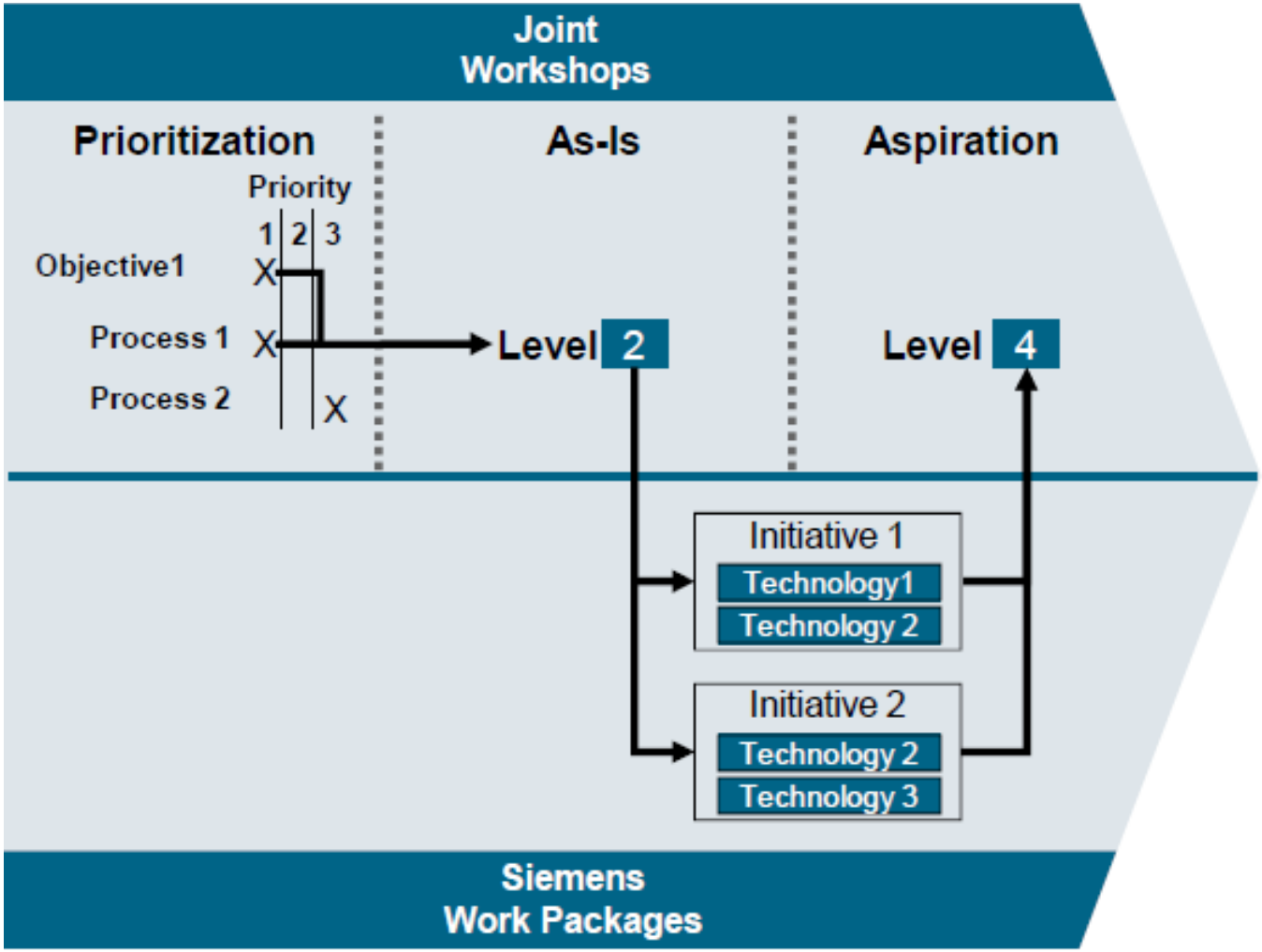


Terdapat 135 Opsi Inisiatif Telah Dikembangkan



Inisiatif PLN Smart Grid Kelas Dunia (1)

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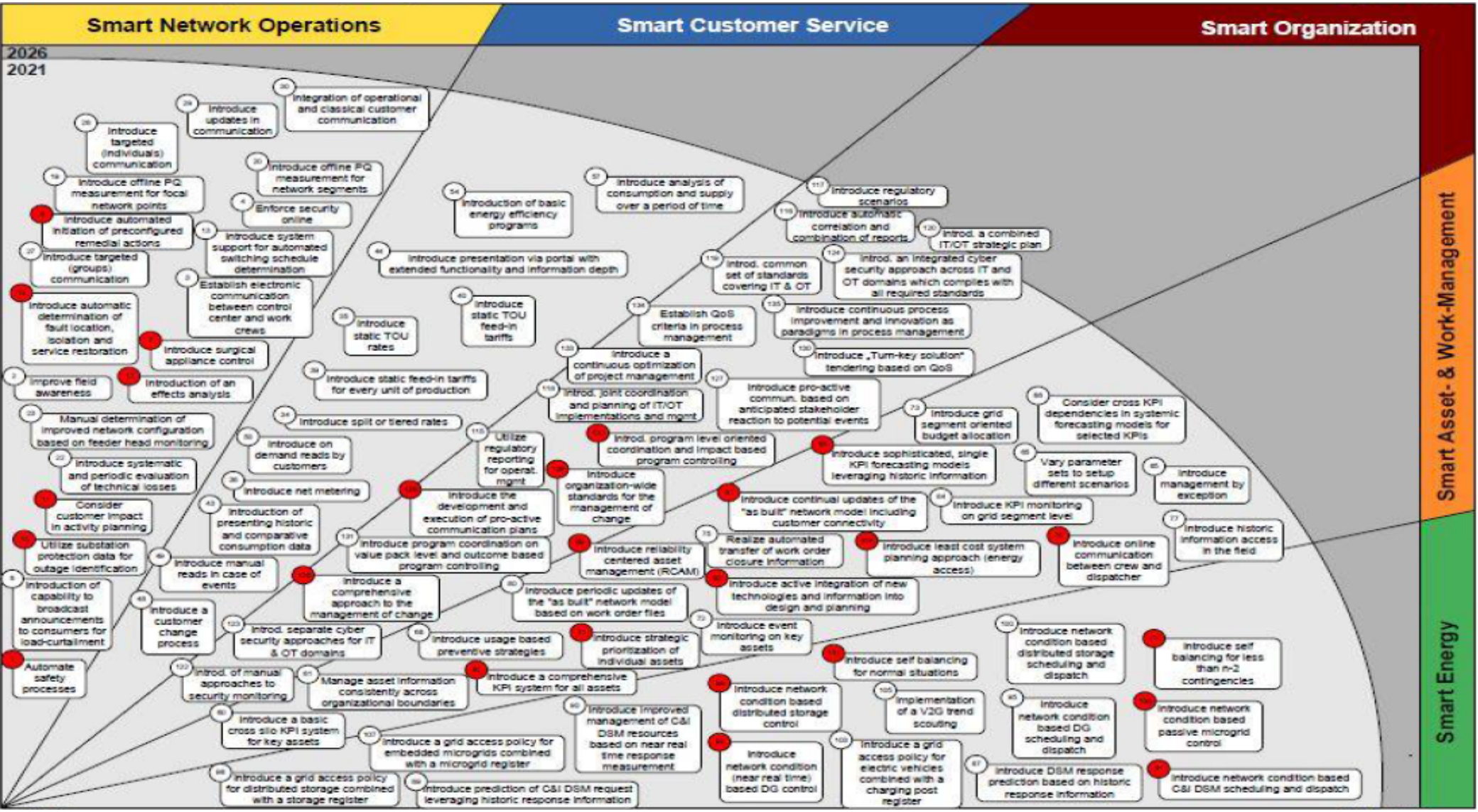
SIEMENS

Smart Grid Roadmap of PLN Today - 2021



Inisiatif PLN Smart Grid Kelas Dunia (2)

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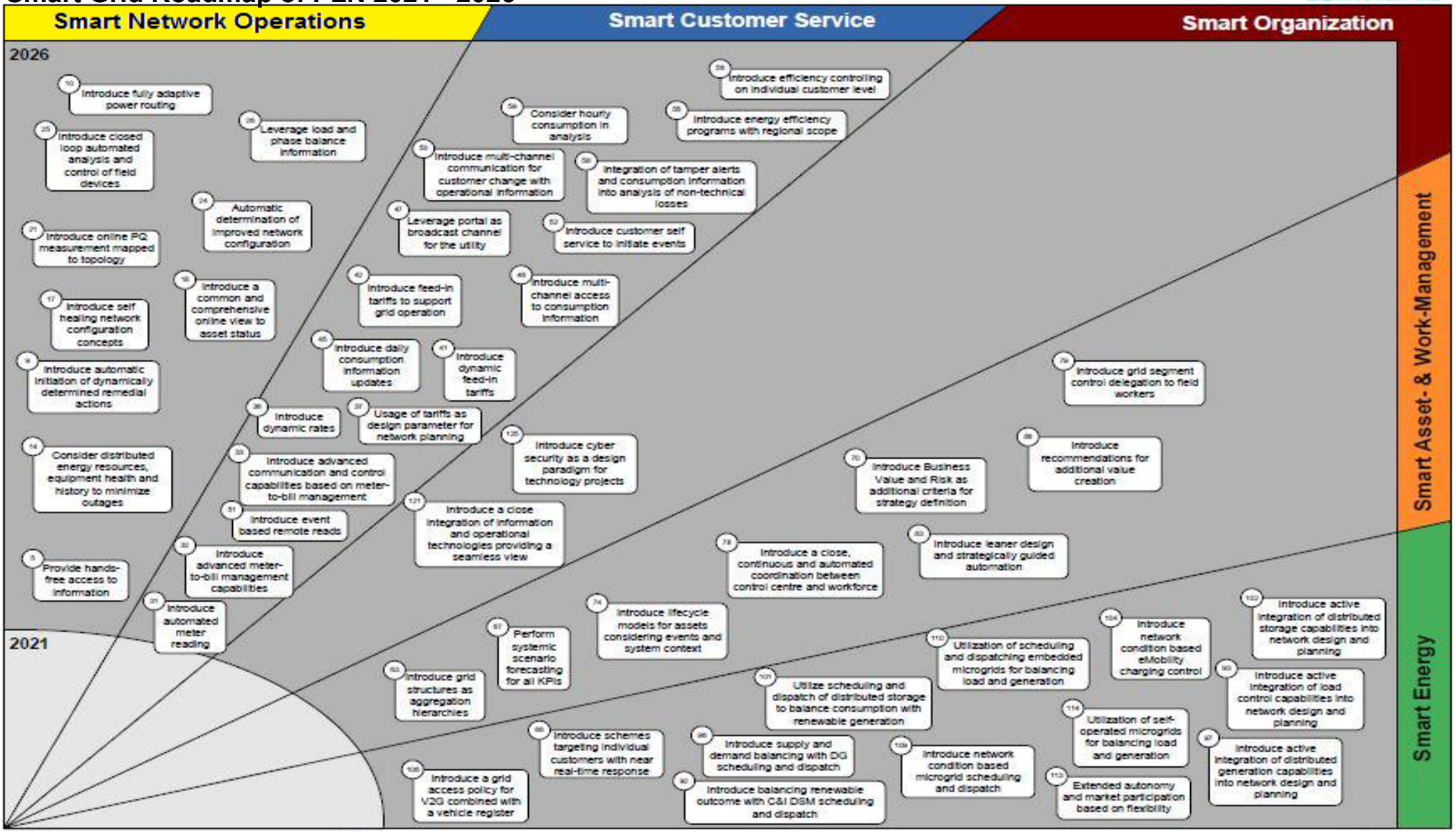
SIEMENS

Smart Grid Roadmap of PLN 2021 - 2026



2016 2021 2026

Implementasi PLN Smart Grid : 3 Sistem Utama

Main System Smart Grid	• Mature energy supply infrastructure, transmission & distribution upgrade • Avoidance of blackouts & increased capability in Java Bali system • Eficient planning of energy systems and efficient asset management • Establishment of state-of-the-art management processes • Pelayanan pelanggan tingkat advance
Medium Sized Smart Grid	• Peningkatan kehandalan sistem tenaga llistrik • Peningkatan pelayanan pelanggan • Pengembangan struktur transmisi & distribusi • Operasi sistem islanding dengan integrasi RE skala besar
Small Island & Rural Smart Grid	• Suplai tenaga listrik dengan akses off dan on-grid • Pelayanan tingkat dasar • Least cost energy system dengan sumber RE menggantikan pembangkit diesel • Tipe Sistem Micro-grid

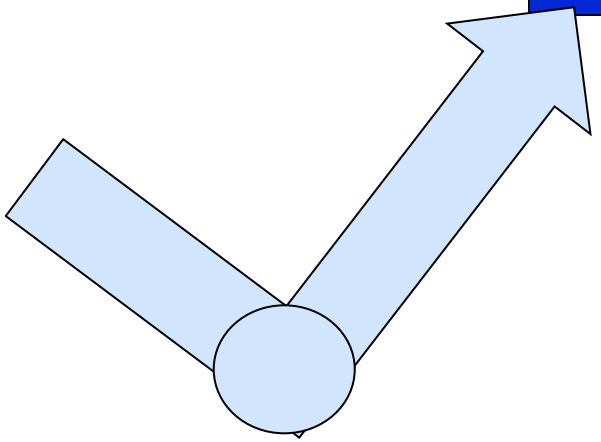
Implementasi Smart Grid di Indonesia : Sistem utama, Medium dan Pulau-Pulau Kecil dan Pedesaan

Penciptaan Nilai Pada Pengembangan PLN Smart Grid

Dalam Implementasi Smart Grid adalah sangat penting untuk menerapkan penciptaan nilai dan menghindarkan cara copy dan paste

Dari :

- **Replikasi dari konsep**
- **Implementasi langsung dari teknologi**
- **Asumsi transferability**
- **Risiko tinggi dari transferability secara langsung**
- **Harapan untuk sukses**
- **Klaim sinergi**



Menuju :

- ❑ **Replikasi penciptaan nilai (value creation)**
- ❑ **Unlocking the benefits of the proven solutions into new context**
- ❑ **Menjamin implementasi Smart Grid**
- ❑ **Mengimplementasikan hal yang paling sesuai**
- ❑ **Memaksimalkan sinergi**

Beberapa Proyek Smart Grid PLN

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Saat ini, terdapat 10 Proyek Smart Grid yang sedang dalam tahap implementasi di PLN, beberapa proyek mengambil fokus pada pengembangan integrasi pembangkit renewable energy kepada sistem tenaga listrik, dan sejumlah proyek lainnya terkait pada pengembangan Smart Grid energy management dan power quality.

Thank You...