**Polish Digital Resilience Agenda 2040**
a model of strategic preparedness
for the antinomies of digitalisation.

# Scenario: Short blanket

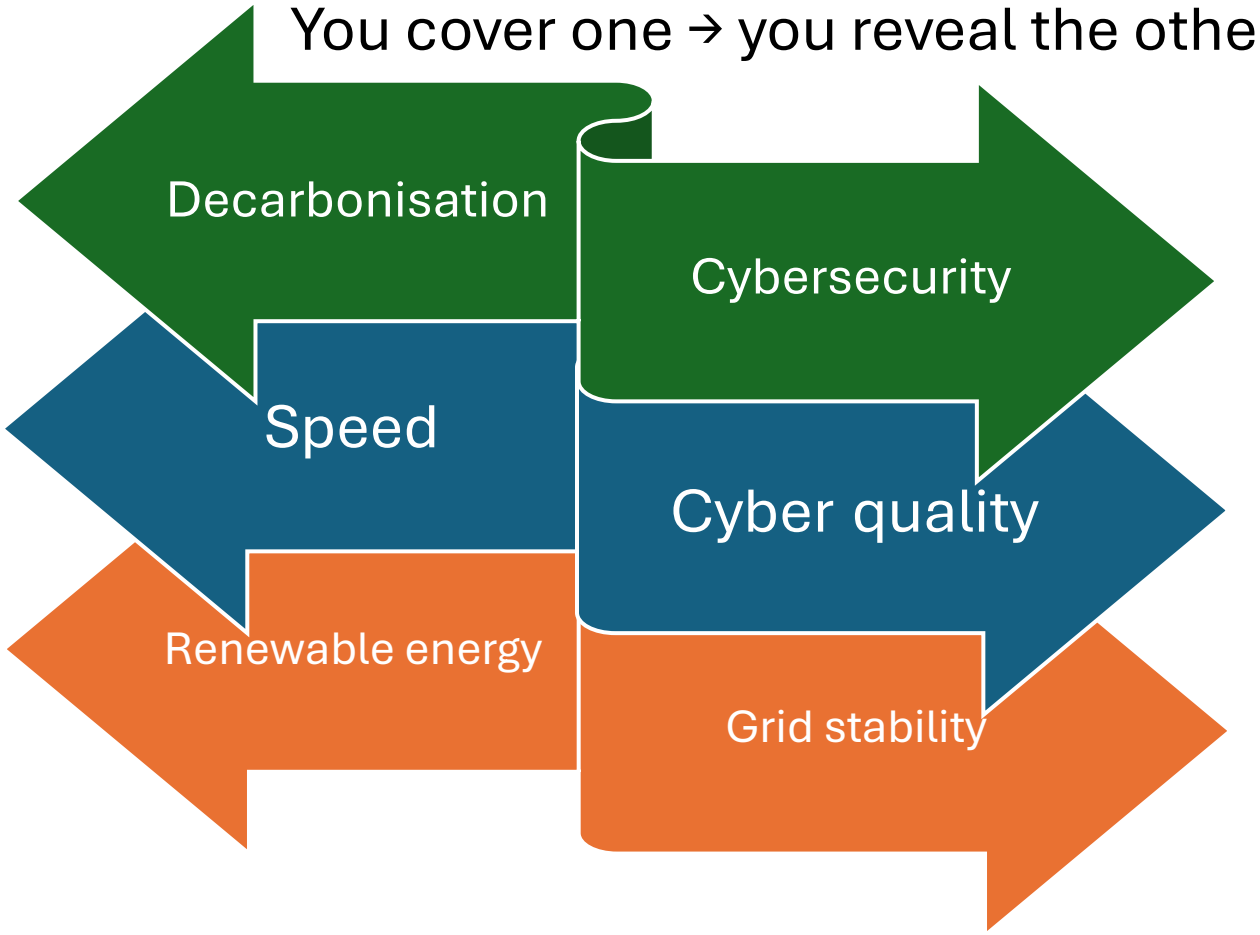
## strategic area: Energy

Scenario of the digital transformation of the Polish energy industry - diagnosis and road map until 2040

# Strategic metaphor: short quilt

**Resources to be allocated: capital, staff, time.**

You cover one → you reveal the other

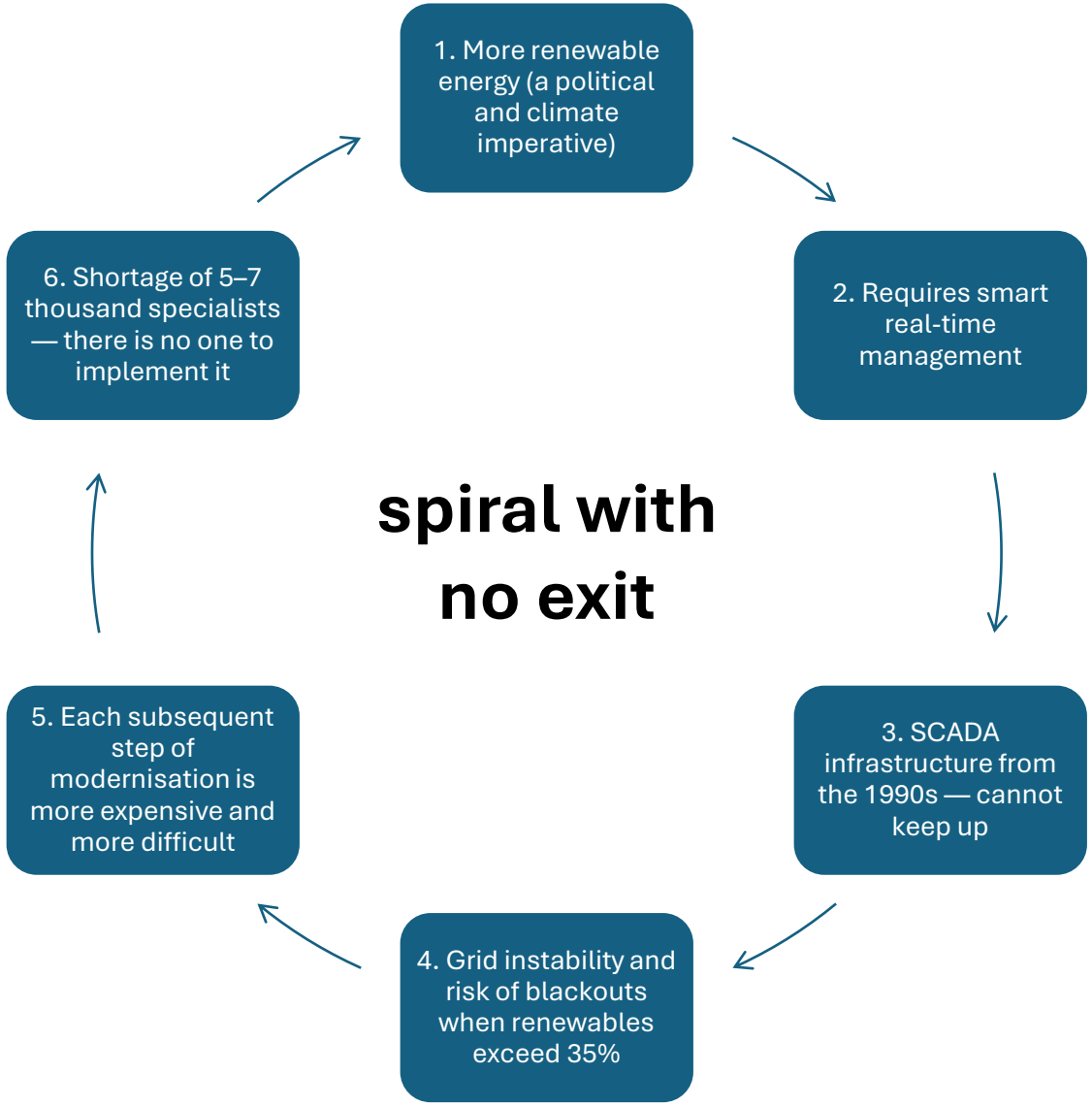



*"Limited financial, human and time resources must be allocated with surgical precision - any omission exposes a critical weakness of the state."*

**Three vectors of change forcing choices:**

- **Decarbonization — moving away from coal towards variable renewables**
- **Deregulation — passive consumers → active prosumers**
- **Convergence — blurring the boundaries of energy, transport, heating**

# The digital instability trap




**The four pillars of the trap:**

1. 1990s SCADA dominance – one-way, prosumer blind
2. **Fragmentation - "islands of automation" without interoperability → losses of PLN 15-20 billion by 2040**
3. **Staff deficit — 200-300 graduates per year vs. 5,000-7,000 needed**
4. **Cyber Vulnerability - Level 2.1/5 against state and hybrid threats**

# The effects of inaction: what we lose without action

**Risk of blackouts**

Renewable energy sources exceeding 35% without digitalisation – system destabilisation

**Losses due to IT fragmentation**

PLN 15–20 billion by 2040

**Lost market benefits**

PLN 2–4 billion annually (lack of energy arbitrage)

**Total cost of inaction**

PLN 80–115 billion in direct losses by 2040

**Loss of competitiveness**

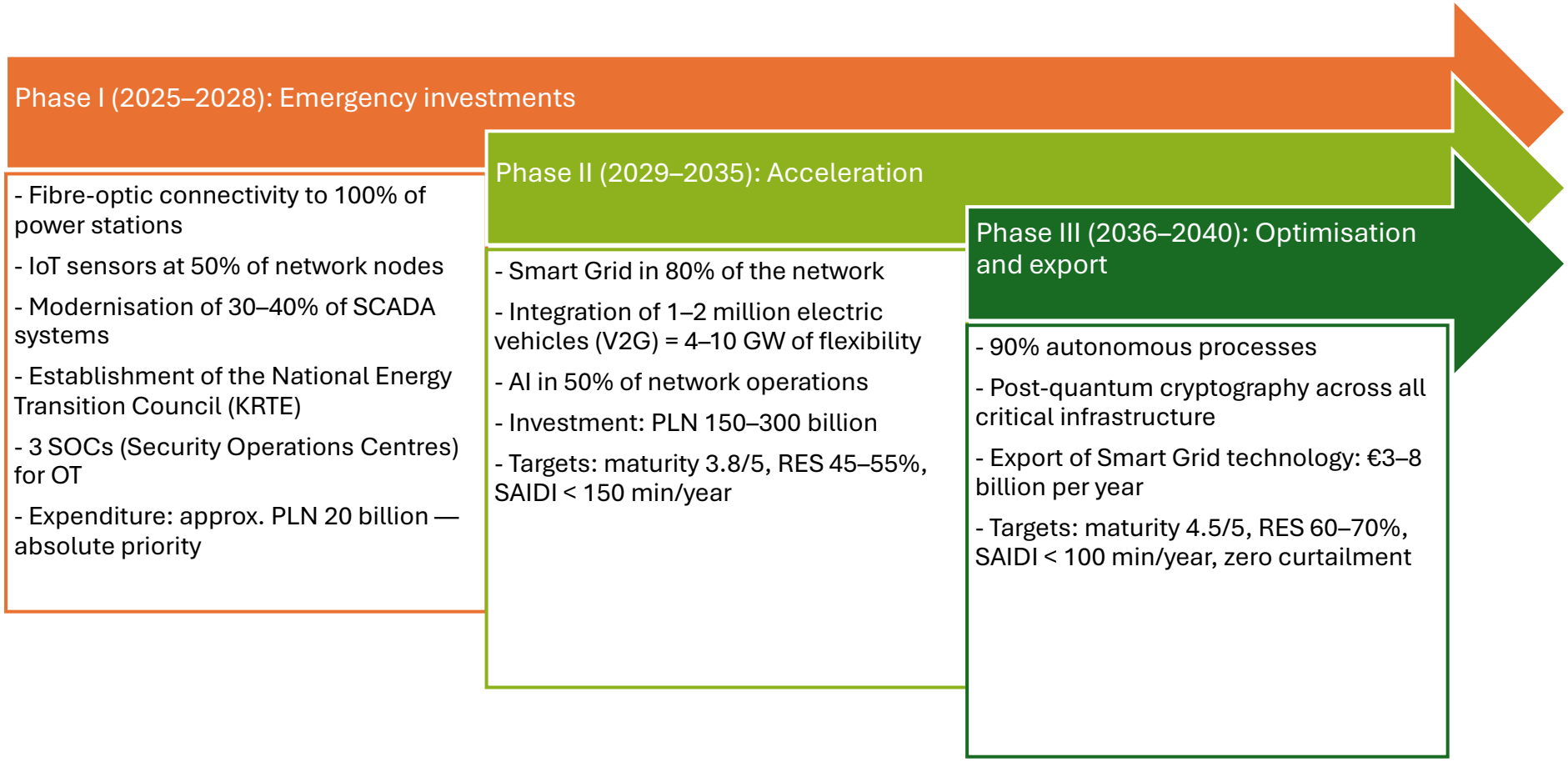
Inability to attract high-tech industry

**Security threat**

Critical infrastructure = target of a hybrid attack

Key argument: Passivity costs more than transformation and threatens a systemic catastrophe

# Roadmap 2025–2040: three phases



# Cybersecurity: a new dimension of defense

**Current status:**

- OT readiness level: 2.1/5 (NIST) — basic, inadequate
- Reliance on foreign control systems: backdoor risk
- Shortage of IT/OT security specialists: a shortfall of 5,000–7,000

**Threats:**

- Organised criminal groups + state-sponsored actors
- Attacks on SCADA → physical paralysis of the distribution network
- Future quantum threats and post-quantum cryptography

**Strategic response:**

- Construction of 3 SOC centres for OT infrastructure
- Endogenous control algorithms
- Post-quantum cryptography as the Phase III standard

# Two variants of the sector in 2040

| | Transformation | Passivity |
|---|---|---|
| **Digital maturity** | 4,5 / 5 | ~2.5/5 |
| **Renewables in the mix** | 60–70% | max. 35% (without blackouts) |
| **SAIDI** | < 100 min/year | Growing blackouts |
| **Curtailment** | Zero | Renewable energy disconnections |
| **Technology export** | EUR 3–8 billion/year | Lack |
| **EVs on the grid** | 1–2 million (4–10 GW) | Marginal |
| **Financial losses** | Avoided | PLN 80–115 billion |
| **Security** | Digital sovereignty | Critical vulnerability |

# Recommendations

Immediate launch of Phase I — window of opportunity: 2–3 years

Establishment of the National Energy Transition Council — central coordination of the transition

A large-scale recruitment programme — training 10 times as many IT/OT specialists each year

An OT cybersecurity strategy as part of a national defence strategy

Treating digitalisation as an investment, not a cost — a budgetary priority

# Conclusion: surgical precision of allocation

*"This is not an energy transformation - it is a digital modernization of state security."*

**Old way of thinking**

- Digitalisation = an IT project
- Renewable energy = environmental protection
- The cost of transformation

**New way of thinking**

- Digitalisation is a matter of national security
- Renewable energy without digitalisation – a threat to the grid
- The cost of inaction is higher

Ministerstwo Nauki i Szkolnictwa Wyższego

**Polish Digital Society**
http://cyfryzacja.org

The project is financed from state budget funds allocated by the Minister of Education and Science under the "Science for Society II" Program._x000B_Funding: PLN 1,467,000, Total value: PLN 1,467,000

# Postscript: one-page script

The scenario answers the brutal question: where do we really start from? And the answer is shocking. The Polish energy industry is not on the threshold of transformation - it is on the edge of the "digital instability trap". Digital Maturity Index: 2.1 out of 5. Distance to Denmark: 15 years. 70-80% of network operators manage critical infrastructure on SCADA systems from the 1990s. We educate 200-300 specialists a year when we need 5,000-7,000 of them immediately.

The "short quilt" metaphor in the title is precise and unforgiving: you have limited resources - money, people, time - and you have to choose what you cover. Every choice reveals something. You cover decarbonization - you expose security. You cover cybersecurity - you expose system integrity. If you invest in renewable energy without digitalisation - you risk blackouts with a renewable energy share above 35%.

The central mechanism is the digital instability trap — a self-reinforcing spiral: the more renewables (political necessity), the more the system needs intelligent management; the more it depends on digitalisation, the more susceptible it is to failures due to outdated infrastructure; the more susceptible - the more expensive each subsequent step. Without breaking this loop, renewable energy investment itself becomes a security threat.

The stakes are clear: the transformation costs PLN 400-900 billion. Passivity costs PLN 80-115 billion in losses - plus a potential systemic catastrophe. The window of opportunity closes in 2-3 years.