

ASSURING QUALITY FOR NATIONAL PV MARKETS

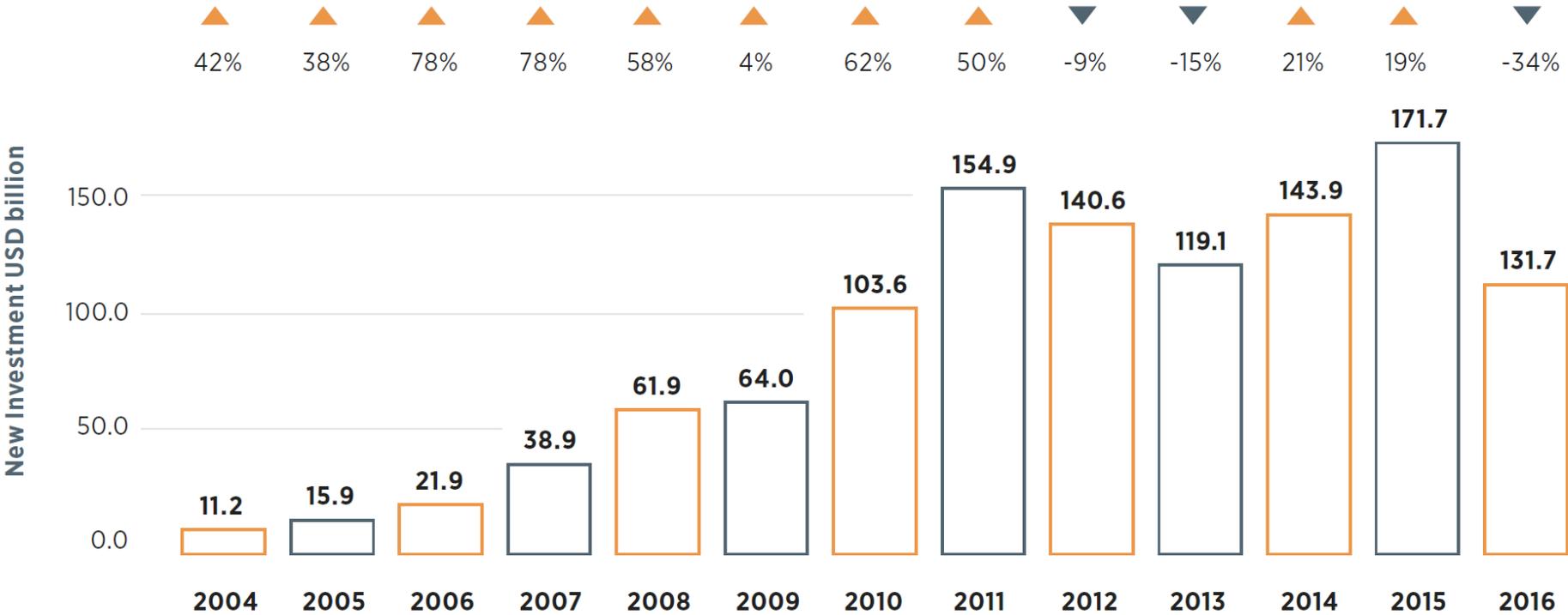


Scaling-up solar PV deployment: implementing projects with
assured quality

1

Technical risk management

Global solar power investments

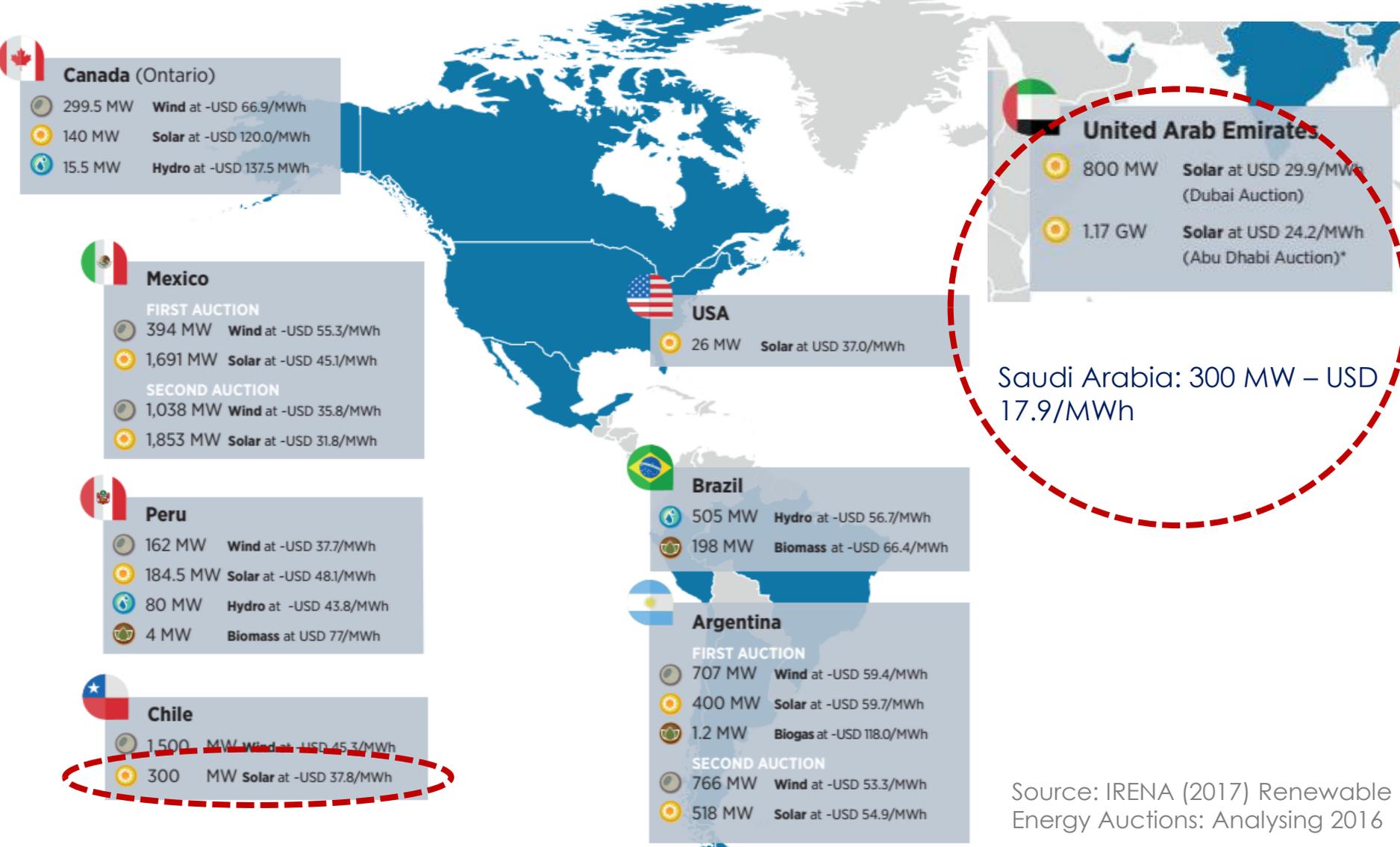


Source: Frankfurt School-UNEP Centre/BNEF. 2017.Global Trends in Renewable Energy Investment 2017, <http://www.fs-unep-centre.org>
 Note: Investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.

2016: **131 USD billion**

2030: **2.7 trillion USD in 15 years** | 186 billion USD/yr (1 800 GW)

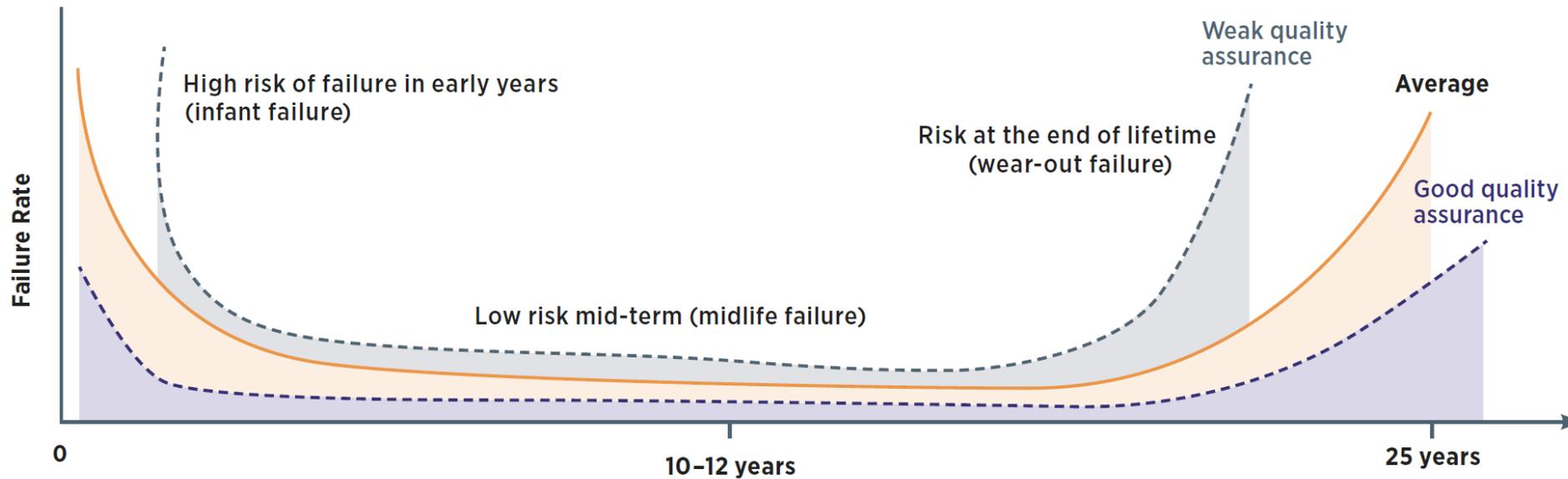
Record PV prices – what will be delivered?



Source: IRENA (2017) Renewable Energy Auctions: Analysing 2016

Failure risks present in their majority at early and mature stages

Life expectation of modules is 25+ years, however they have to deal with failure PV curve



Lenders' perspective: revenues only important during first 10-15 years

- Risk of infant failures are passed to EPC
- Bankability assessments further minimize risks of midlife failure
 - ✓ Valid renown certifications
 - ✓ Track record of company and modules
 - ✓ Quality of manufacturing facility
 - ✓ Warranty conditions

Holistic View - Quality Covers the Whole System, not Hardware only



Implementation of Quality Schemes covers not only equipment but whole systems
Including Design, Installation, O&M services



TÜV Rheinland

“Every other fault that we detect is due to incorrect installation.”

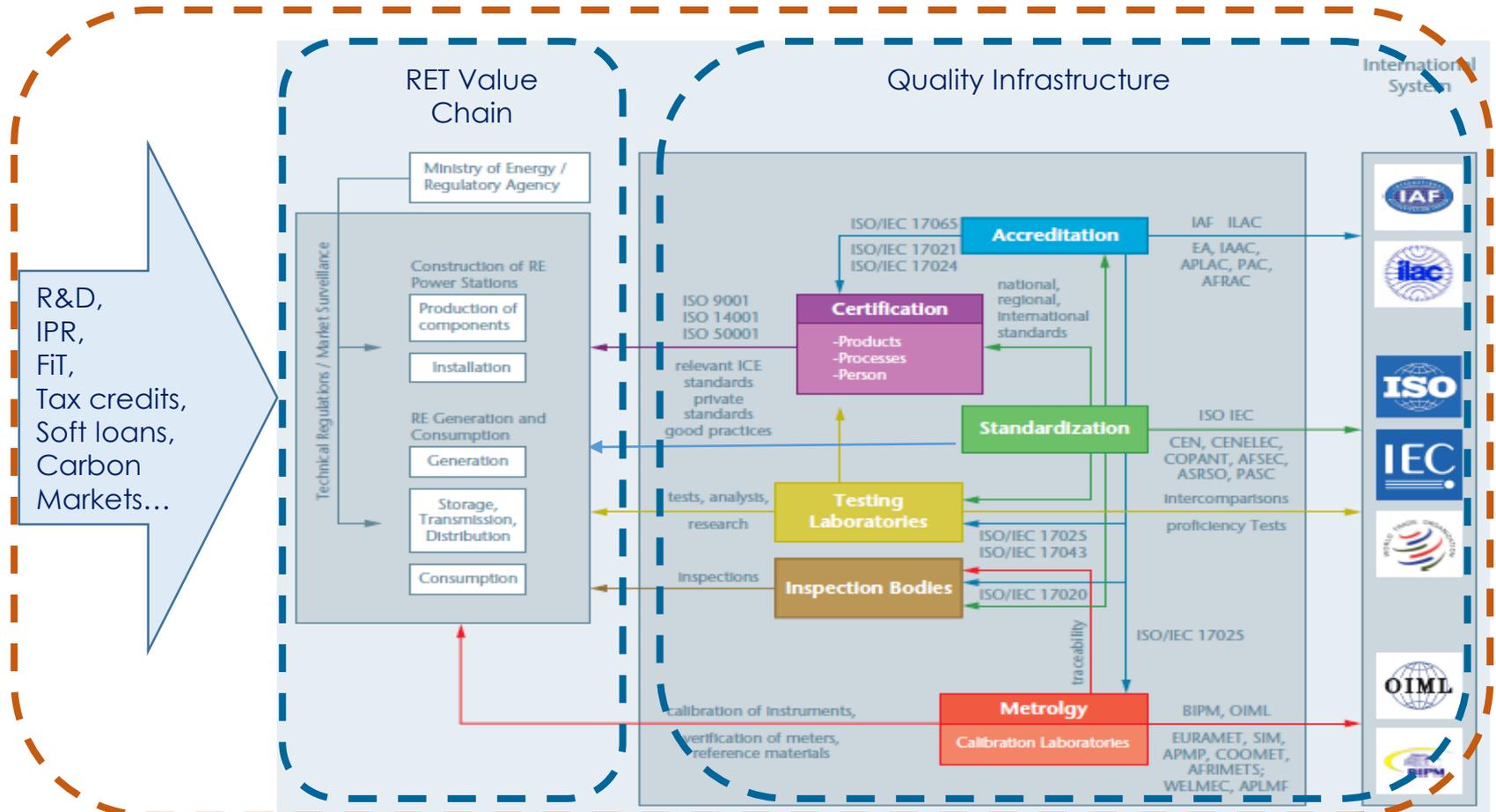
Source: TÜV Rheinland

2

Quality Infrastructure

Which **instruments** do we have to mitigate technical risk, attract investment and public acceptance, and meet expectations by all stakeholders in a USD trillion market?

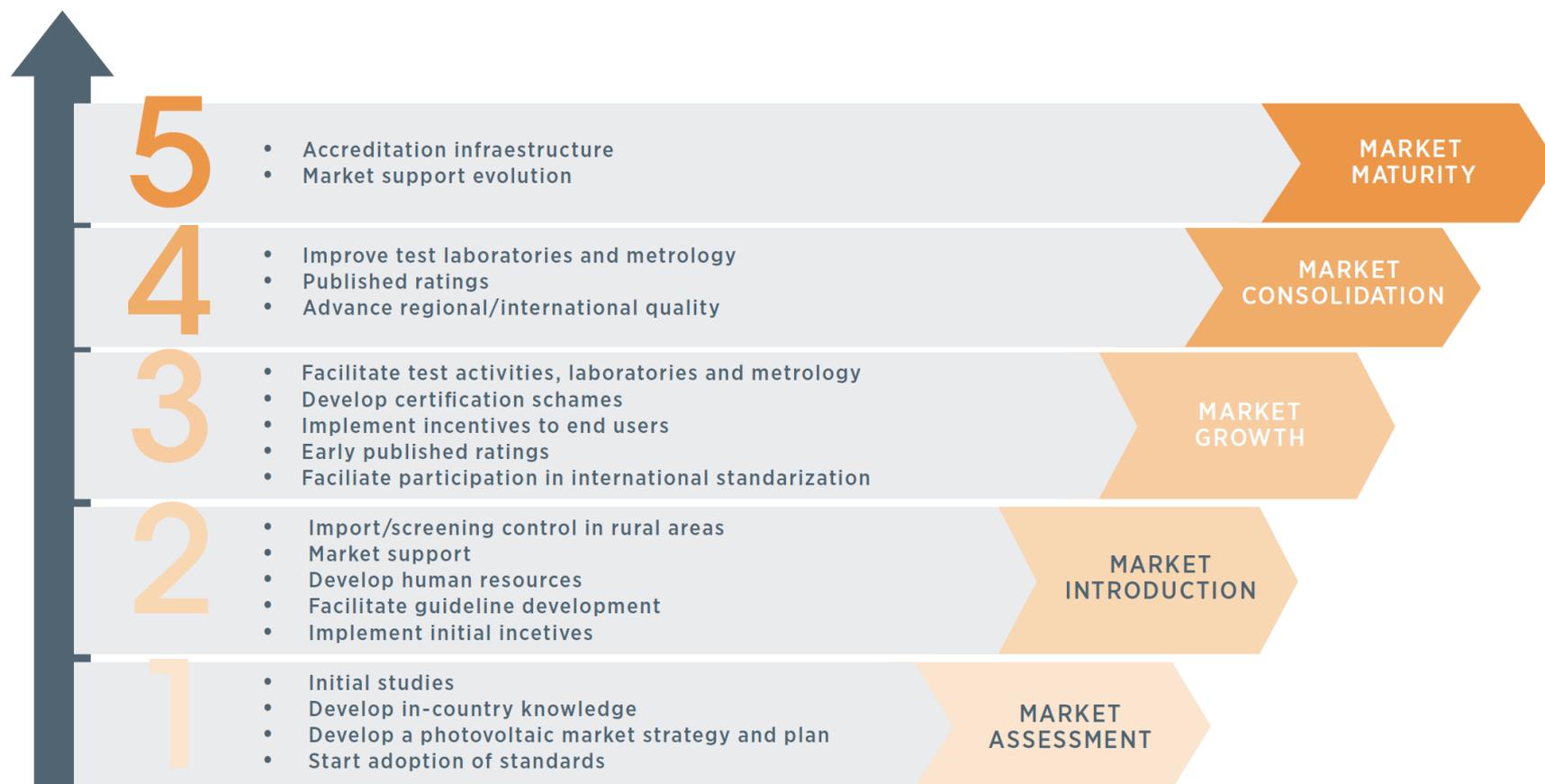
International standards and conformity assessment schemes



Different country context to develop a QI

- 11 Countries from Developed and Developing Countries
- 3 PV Systems: off-grid applications, distributed generation, and utility scale

INCREASING QUALITY ASSURANCE



The benefits of QI services outweigh their costs

Quality infrastructure service	Cost	Benefit
Development: Solar resource and yield uncertainty		
Energy Production Assessment (EPA) based on measured irradiance data	Measuring local irradiance for at least one year	Reduction of uncertainty in EPA from 8% to 6% leads to an increase in P90 values by 3%. Rewarded through improved loan conditions.
Preconstruction: Prevention of low plant yields		
Batch acceptance testing for wholesale and utility projects	The cost of a batch acceptance test (Typically USD 50 000–55 350 for a 20 megawatt (MW) plant)	A reduction of the degradation rate from 0.75% a year to 0.4–0.6% a year in a project's financial model (Resulting in USD 450 000–1 000 000 of increased revenue over 25 years for a 20 MW plant)
Construction: Performance testing		
Includes independent testing in engineering, procurement and construction contracts on photovoltaic systems performance	The cost of batch testing for a 20 MW plant is USD 276.75– 553.50/MW	Photovoltaic module manufacturers deliver modules exceeding contracted performance by 2–3% when batch testing is announced. (Earning an additional EUR 4 000–6 000/MW a year increased generation for a 20 MW plant) (USD 4 428–6 642/MW/year)
Operation and maintenance		
Potential induced degradation (PID) reduction. Inspections to detect, classify and mitigate PID effects	Cost of inspection and corrective actions (for a 6 MW plant in Western Europe: EUR 2 500–4 000/MW) (USD 2 767.5–4 428/MW)	Tackling PID reduces underperformance of 3–5%; however, recovery is not immediate (for the 6 MW plant, EUR 6 000–10 000/MW/year) (USD 6 642–11 070 MW/year)

1



POLICY OBJECTIVES

- Economic and affordable photovoltaic system
- Support development goals
- Reliable photovoltaic systems
- PV integrated in power systems

2

HOW QUALITY INFRASTRUCTURE SUPPORTS THE POLICY OBJECTIVES



- Attracts investment through risk mitigation
- Increases public acceptance
- Encourage efficient services
- Fosters good practices
- Promotes consumer protection

3



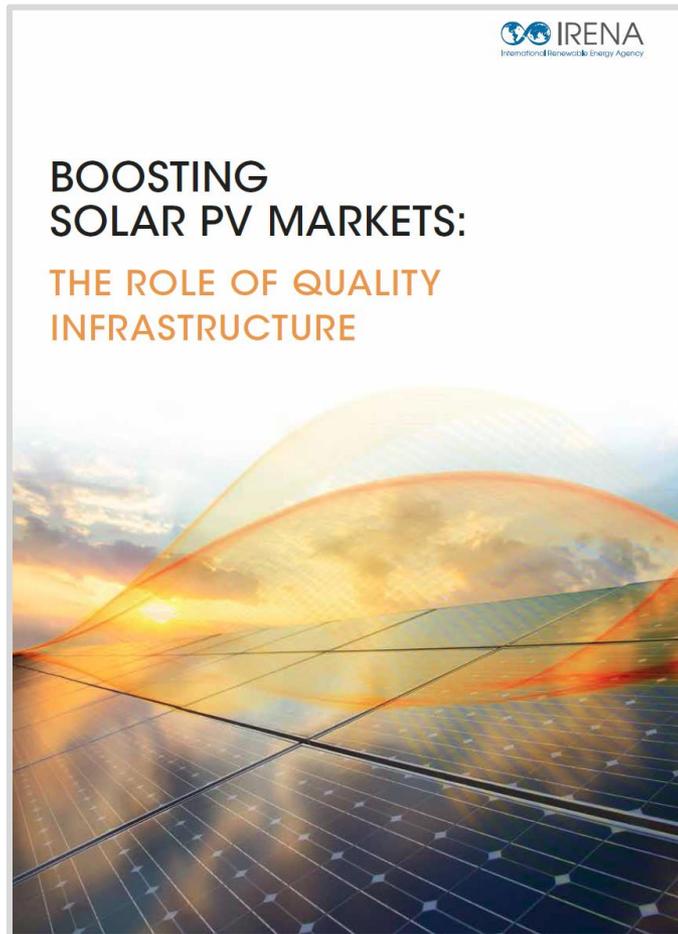
WHERE TO APPLY QUALITY INFRASTRUCTURE

- White papers
- Guidelines
- Regulations
- Incentives
- Industry guidebooks
- Vocational Training

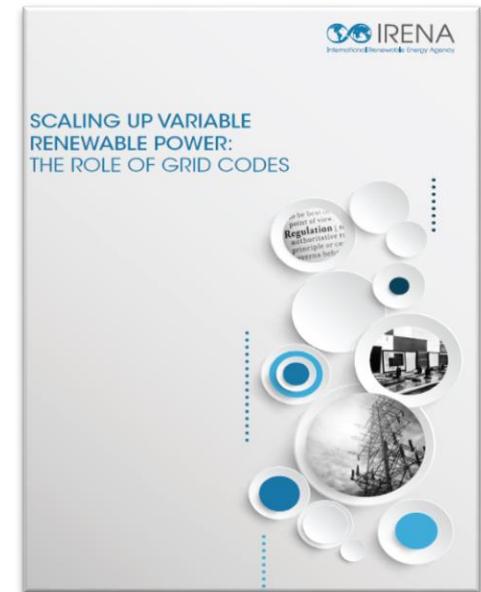
3

IRENA Contribution

Supporting countries to develop and implement QI for RET



<http://Inspire.irena.org>
g



Download for free today:
www.irena.org/publications



Requests

- ✓ **China:** Technical standards for Offshore Wind technology
- ✓ **Japan:** quality control for PV and Wind technologies in extreme weather conditions
- ✓ **Latin American region:** In cooperation with PTB, quality control for solar thermal and PV systems
- ✓ **MENA region:** In cooperation with EU GCC testing for PV systems
- ✓ **UAE:** International Standards for PV systems
- ✓ **Mauritania:** Request for support on grid connection codes
- ✓ **Colombia:** Grid codes
- ✓ **Tanzania:** Solar thermal

- ✓ **International Electrotechnical Commission - IEC:** Workshops for Countries on use of standards, INSPIRE



- ✓ **German Metrology Institute- PTB:** Quality infrastructure support, Workshop in Costa Rica, Green climate dialogue in Germany



- ✓ **ENTSO-E, SolarPower Europe and Solar United:** PV and grid codes



- ✓ **Solar Bankability**

- ✓ **WWEA:** Standards in small wind technologies



- ✓ **EU GCC Clean Energy Technology Network :** GCC Inception meeting & training-Solar Photovoltaic Testing Centres Network



Take away messages

- ❖ We entered into an era of low equipment cost | quality infrastructure is critical to mitigate risks and achieve the **expected LCOE**
- ❖ **Quality is not about hardware only**, but a system approach is needed
- ❖ Progress on standards and conformity assessment schemes need to **accelerate the pace** to meet the existing and NEW markets needs
- ❖ **Cost – benefit** ratio of assuring quality is positive
- ❖ International and regional **cooperation networks** strengthen and accelerate the development and implementation of QI for PV systems
- ❖ **QI supports effectiveness of policies** for PV markets – all white papers should include the role of QI

Quality pays!

We are collecting illustrative cases on the impact of
QI on RE markets.

Interested in sharing your case?

Please contact:

Roland Roesch (Rroesch@irena.org)

Francisco Boshell (Fboshell@irena.org)

Alessandra Salgado (Asalgado@irena.org)