

# Policy Opportunities to Incentivize Innovation for Renewable Energy

*Regional Consultation on Achieving SDGs through Sector-focused STI Policies*

**Michael Williamson**

Section Chief, Energy Division,  
Economic and Social Commission for Asia and the Pacific

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# Outline

1. Renewable energy – a critical component of 21<sup>st</sup> Century sustainable development
2. ESCAP's online policy research tools
3. Why governments support innovation in RE and beyond
4. Understanding the framework for innovation in the RE sector
5. How policies can drive RE innovation
6. Interactive discussion



Image: Abengoa Solar

# We need more renewable energy – a transformative technology to address the challenges of the 21st Century

- Climate change – CO<sub>2</sub> levels highest in 800,000 years
- Approaching or exceeding several “planetary boundaries”
- Increasing population and energy demand
- Energy poverty in many regions
- Energy security concerns from the interplay of energy and geopolitics
- Chronic urban air pollution



Image courtesy NASA




























## **ESCAP's ASIA PACIFIC ENERGY PORTAL**

Interactive data and policy information

**asiapacificenergy.org**

# Policy database in the Portal

-  Nepal
-  New Caledonia\*
-  New Zealand
-  Niue\*
-  Northern Mariana Is.\*
-  Pakistan
-  Palau
-  Papua New Guinea
-  Philippines
-  Republic of Korea
-  Russian Federation
-  Samoa
-  Singapore
-  Solomon Islands
-  Sri Lanka
-  Tajikistan
-  Thailand
-  Timor-Leste\*
-  Tonga
-  Turkey
-  Turkmenistan
-  Tuvalu
-  Uzbekistan
-  Vanuatu
-  Viet Nam

Country: THA x Effective date in: 1990-2018

## DOCUMENT SEARCH

Search documents and content

Search

Title

Content

Search found 136 items

Title	Effective Start Year	Effective End Year	Agency
<a href="#">THAILAND: Energy Industry Act, BE 2550 (2007)</a> National Act Multi-Sector All His Majesty King Bhumibol Adulyadej (Unofficial Translation) ENERGY INDUSTRY ACT B.E. 2550 (2007) Published in the Government Gazette Vol. 124, Part 89 a, dated 10 th December B.E. 2550 (2007)	2007		His Majesty King Bhumibol Adulyadej
<a href="#">THAILAND: Thai ESCO Association Registration Guidelines</a> National Guideline Multi-Sector All ESCO Information Center for Industrial Energy Institute, supported by the Department of Alternative Energy Development and Efficiency, Ministry of Power Guidelines for Registration (unofficial Google translation, original appears below) There are	2003		ESCO Information Center for Industrial Energy Institute, supported by the Department of Alternative Energy Development and Efficiency, Ministry of Power
<a href="#">THAILAND: Energy Conservation Promotion Act. (No.2), BE 2550 (2007)</a> National Act Multi-Sector Other His Majesty King Bhumibol Adulyadej Unofficial translation Unofficial Translation ENERGY CONSERVATION PROMOTION ACT (No. 2) B.E. 2550 (2007) BHUMIBOL ADULYADEJ REX.; Given on the 24th Day of	2007		His Majesty King Bhumibol Adulyadej
<a href="#">THAILAND: The Energy Conservation Promotion Act, BE 2535 (1992)</a> National Act Multi-Sector All The Royal Thai Government (RTG)- His Majesty King Bhumibol Adulyadej THE ENERGY CONSERVATION PROMOTION ACT B.E. 2535 (1992) BHUMIBOL ADULYADEJ, REX., Given on the 23 rd day of March, B.E. 2535;	1992		The Royal Thai Government (RTG)- His Majesty King Bhumibol Adulyadej
<a href="#">THAILAND: ERC Rules and Regulation on Thailand's Solar Rooftop Programme</a> National Rule/Regulation Power Solar Energy Regulatory Commission (ERC), Department of Alternative Energy Development and Efficiency, Ministry of Energy NOTE: Some content may not display correctly, including tables and figures. See PDF for full details. Unofficial GIZ	2013		Energy Regulatory Commission (ERC), Department of Alternative Energy Development and Efficiency, Ministry of Energy
<a href="#">THAILAND: 15-year Renewable Energy Development Plan (2008-2022)</a> National Plan/Strategy Multi-Sector Renewable Department of Alternative Energy Development and Efficiency, Ministry of Energy Original document in Thai Ministry of Energy REDP 2008-2020.pdf The 15-yr Renewable Energy Development	2008	2022	Department of Alternative Energy Development and Efficiency, Ministry of Energy
<a href="#">THAILAND: National Energy Sector Management Overview</a> National Other Other Other National Energy Policy Council (NEPC) The energy sector in Thailand is managed by the National Energy Policy Council (NEPC), established under the National Energy Policy Council Act, B.E. 2535 (1992), with the National Energy Policy Office (NEPO)	1992		National Energy Policy Council (NEPC)
<a href="#">THAILAND: National Energy Policy Council Act, B.E. 2535 (1992)</a> National Act Energy All His Majesty King Bhumibol Adulyadej From the original at the Office of the Co- 1990 : 2018 shed in the Government Gazette Vol1. 109, Part 9, dated 12 th F	1992		His Majesty King Bhumibol Adulyadej

Reset





# Innovation - an indispensable tool in sustaining the rise of renewables

- Today's innovative RE technologies – wind, solar PV, energy storage
- Prediction is challenging, perhaps in the next 10 – 30 years?
  - Renewable hydrogen
  - Offshore wind
  - PERC solar PV cells
  - Seaweed as renewable fuel and food
- Innovation is key to realizing these opportunities

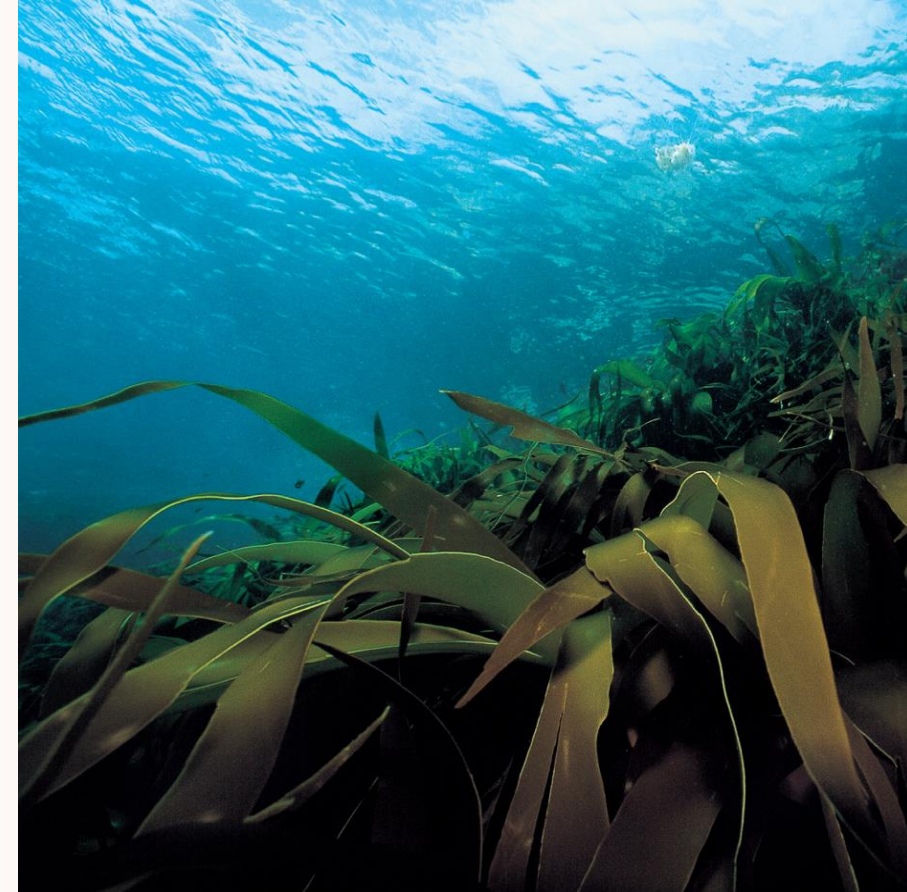


Image: Seaweed Energy Solutions AS

# Five reasons why should governments take a role in supporting RE innovation

1. Public good outcomes from greater use of RE – sustainability, climate change mitigation, clean air, energy security...
2. Enhance competitiveness and create jobs from more innovation-based industries.
3. Address market failures and create value.
4. Bridge the innovation cycle “valley of death”.
5. RE innovation can be easily integrated into ongoing government programs and expenditure
  - tenders for power procurement, infrastructure,
  - PPPs,
  - industry grants,
  - social welfare.



# The “valley of death”

Figure 1: Stages of Innovation (Illustrative)

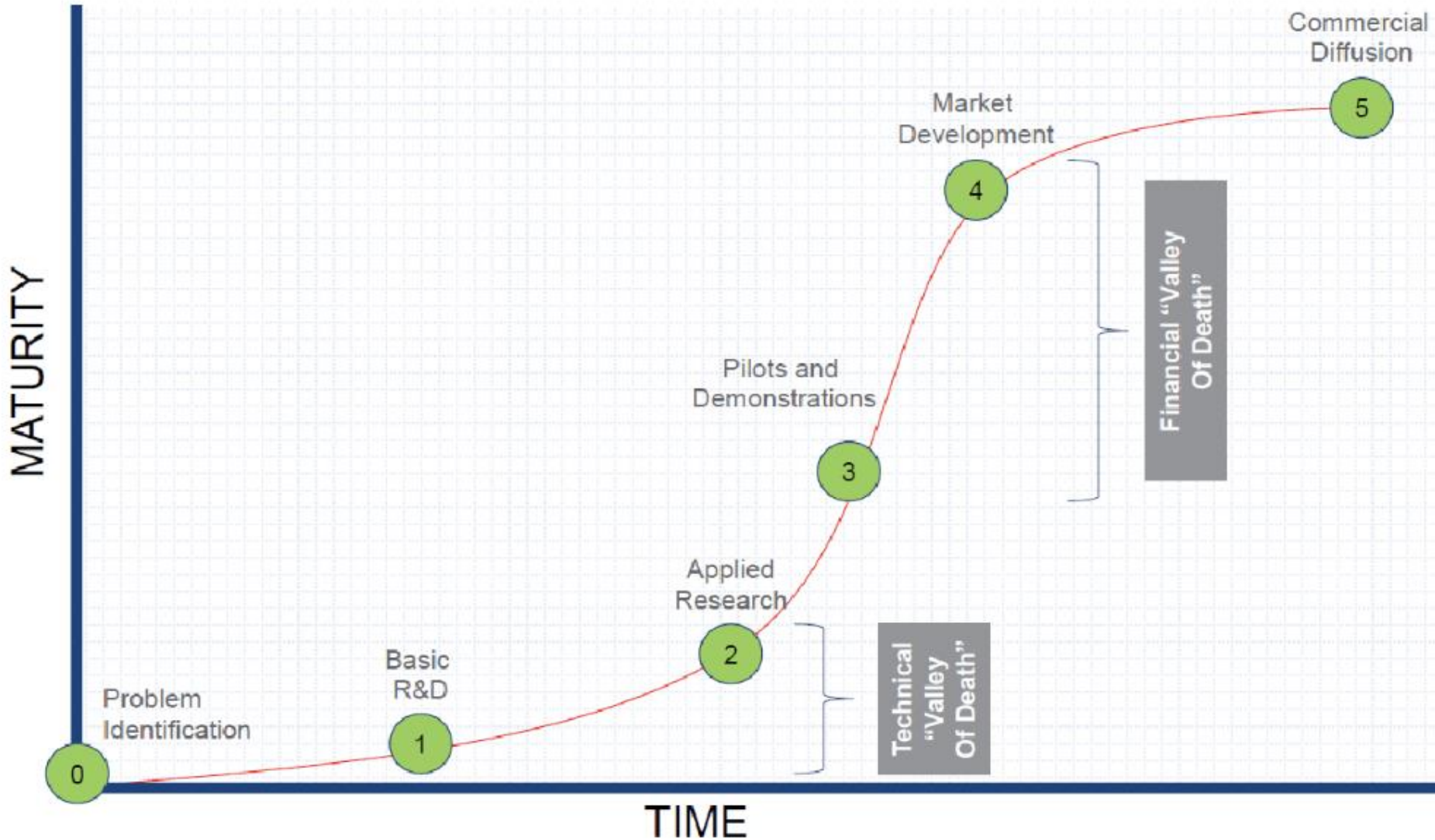


Image courtesy World Economic Forum

# Not always a “better lightbulb” - Innovation examples in Renewable Energy

## Process

Robotic PV manufacturing  
Wind turbine preventative  
maintenance technology

## Product

Tesla Powerwall  
PERC solar cells  
GE Haliade X 12MW wind turbine

## Organizational

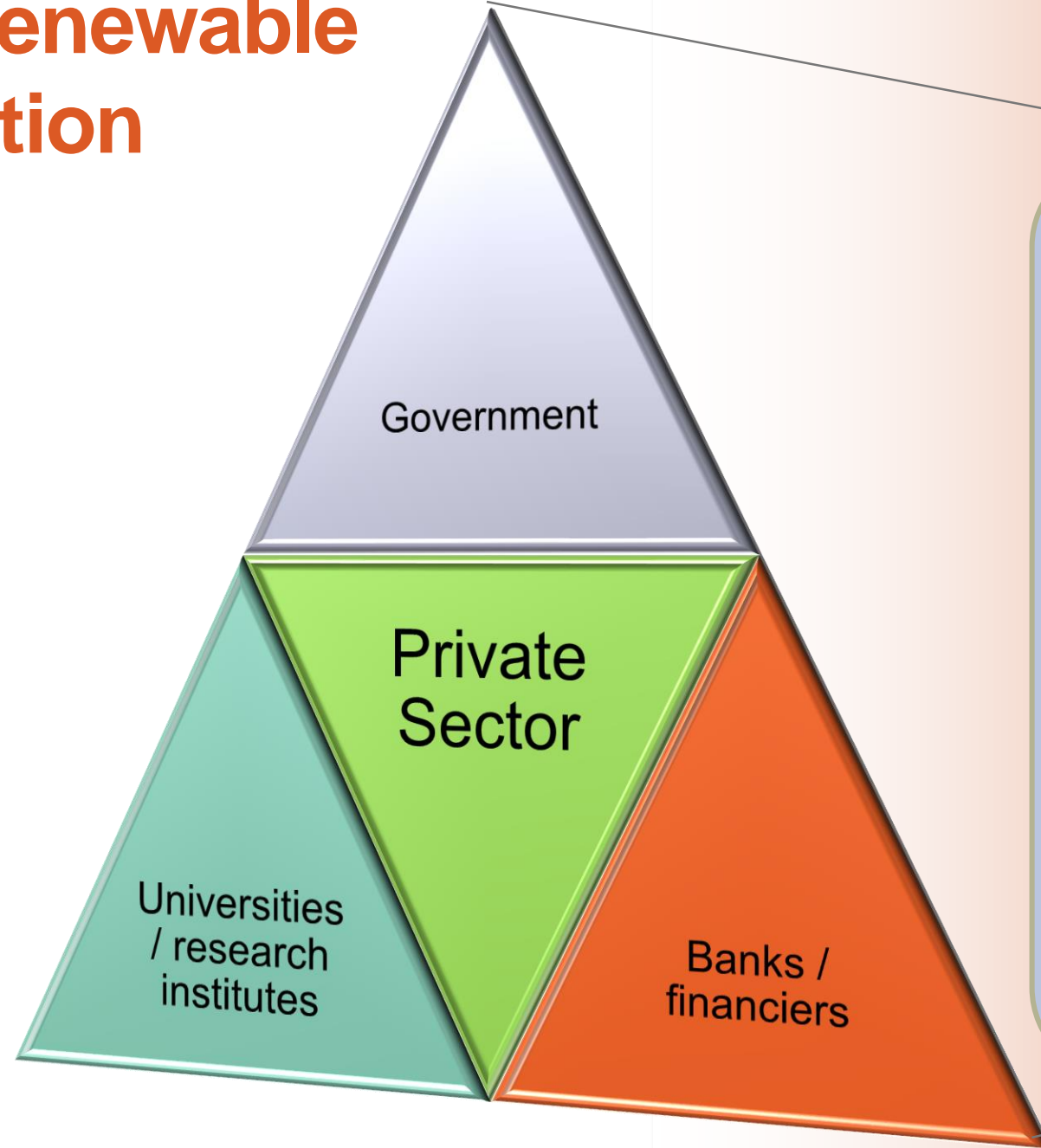
Contracting/sourcing  
Partnerships, mergers, acquisitions  
Tax strategies  
Green bonds, yieldcos

## Market

Hybrid wind/PV bidding  
Firming contracts  
Blockchain transactions

# Actors in the renewable energy innovation ecosystem

*Government policy interventions must recognize the role of all the stakeholders in the ecosystem and tap into their capacity for change*



# Policy interventions – choosing the “right tool”

## Technology Push

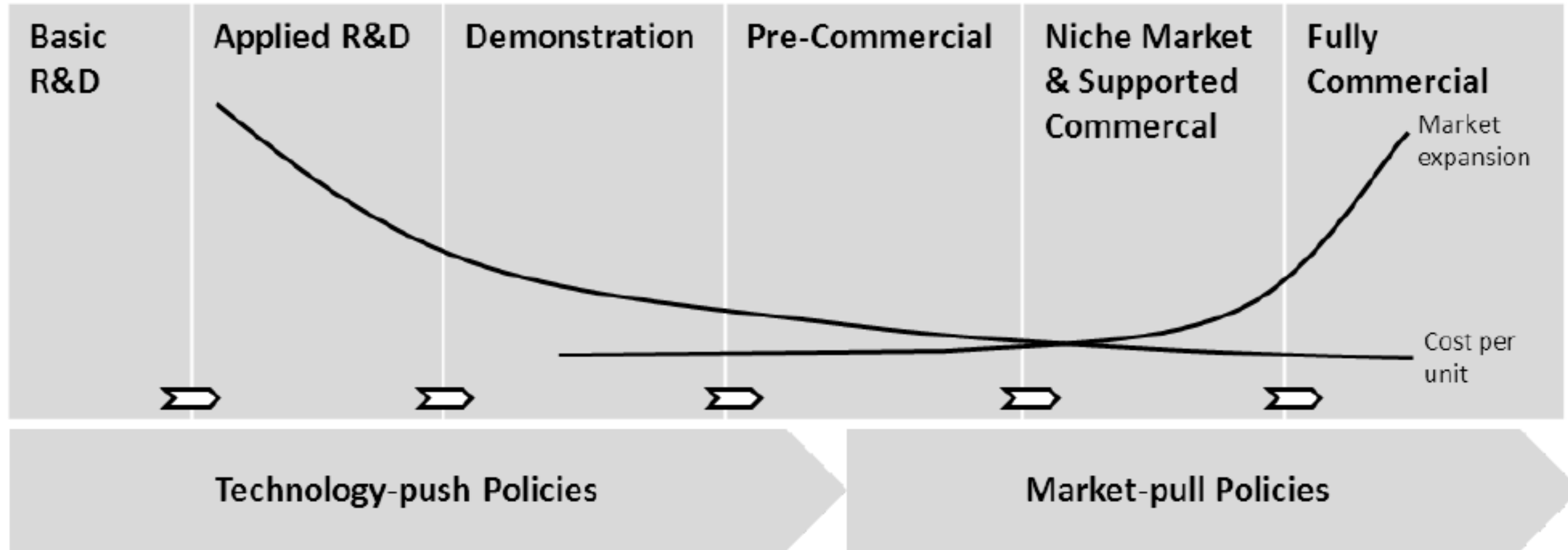
- R&D funding
- Demonstration and pilot projects
- Commercialization funding
- Venture capital

## Market Pull

- Feed-in tariffs
- Tax credits
- Reverse auctions
- Renewable portfolio standards with certificate trading
- Emissions trading schemes



*Policy frameworks require both – but what is the right balance?*



Source: Michael Grubb

# Policy interventions – choosing the “right tool” (cont’d)

- Balance of both “push” and “pull” policies needed
- Each can complement each other to bridge the “valley of death”
- Can we offer the “three L’s” in new policies – long, loud and legal?
- Some considerations:
  - ❑ Strategic advantages, endowments, scale and size of each economy
  - ❑ How to avoid “picking winners” in allocating R&D funding?
  - ❑ The right mix of *complementary policies* to support RE innovation policy - skills and training, finance, technical standards or unhelpful fossil fuel subsidies?

# Useful Case Studies

- **Germany's EEG (2000 – present)**
  - ❑ Feed-in tariffs for RE technologies
  - ❑ Build scale in market, trigger learning curve cost decline
  - ❑ Industry invested in product, process and organisational innovation
- **Reverse auctions – India, Australia, China, South Africa, Dubai, Mexico, Peru etc.**
  - ❑ Increased competition
  - ❑ Price discovery
  - ❑ Promotes broader based innovation through output specification
- **Australia's Clean Energy Bill (2012-14)**
  - ❑ Cap and trade emissions trading scheme
  - ❑ Stimulates innovation in lowering emissions from energy sector through market signals
  - ❑ Taps into competition among market players

# In closing: innovation has come a long way!



Jacob's 2.5 Kw wind turbine USA, circa 1940



# Thank You Questions?