



# LOCAL INPUT CAN GET THE MOST OUTPUT FROM RENEWABLE GENERATION

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# SUMMARY

Changes in generation plant are unavoidable

Skill requirement

Projects:

Development cycle

Typical skills shortfall

Opportunities and realistic expectations for local contribution

# CHANGES

Close to 1 in 2 RE generators we've seen in the Pacific did not last their design life, or are performing at less than 90% of expected capacity...

And transition to new technology is accelerating...



# CHANGES

## Generation

- Solar / wind / hydro / bioenergy
- Storage
- Control
- Independent power producers
- Modelling and forecasting



## Distribution

- Embedded generation
- Smart meters
- Tariffs
- Islanding and off-grid
- Communications
- Power systems modelling
- Protection
- Electric vehicles

# COMPLEX EQUIPMENT AND SYSTEMS

## Failure is not an option. Risks:

- Abandoning government policy and RE targets
- Possible liabilities to IPPs or investors
- Customer defection

## Requires critical mass of:

- Community energy literacy
- Skilled local managers, technical specialists, and administrators
- Access to specialist support



# TEAMS AND SKILLS REQUIRED – NOT REALLY NEW

Strategic and policy

Technical advice

Sponsors

Specialist studies

Financial

Legal

Procurement

Engineering design

Civil construction

Mechanics

Electrical

Manual labour

*Control system and SCADA*

Transport and logistics

Project management

Site management

Asset management

Billing and administration

Operations and maintenance

IT and communications



# BATTERY CONSTRUCTION



# BIOENERGY PLANT





# WHAT IS NEW

More documentation

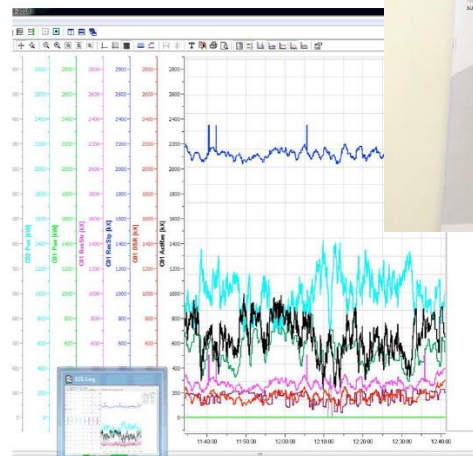
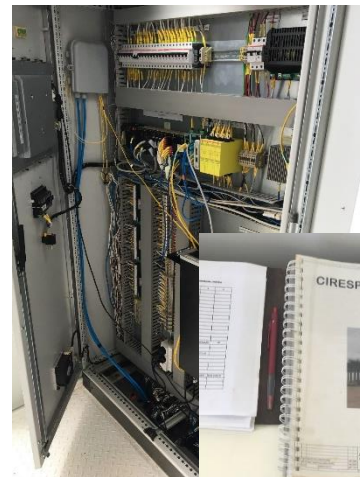
More types of equipment and operating procedures

More modelling, data processing and analytics

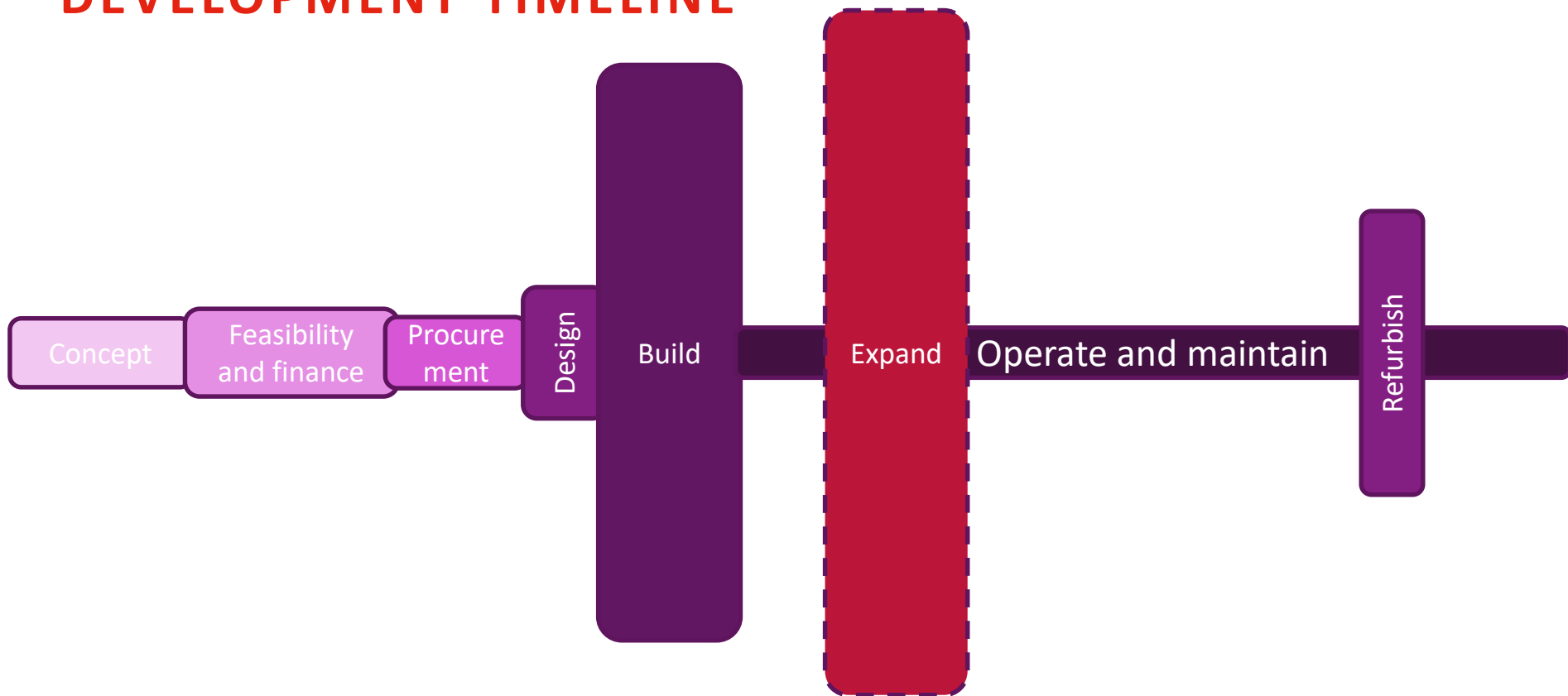
More flexibility and options

More tariffs, generators, and customer choice

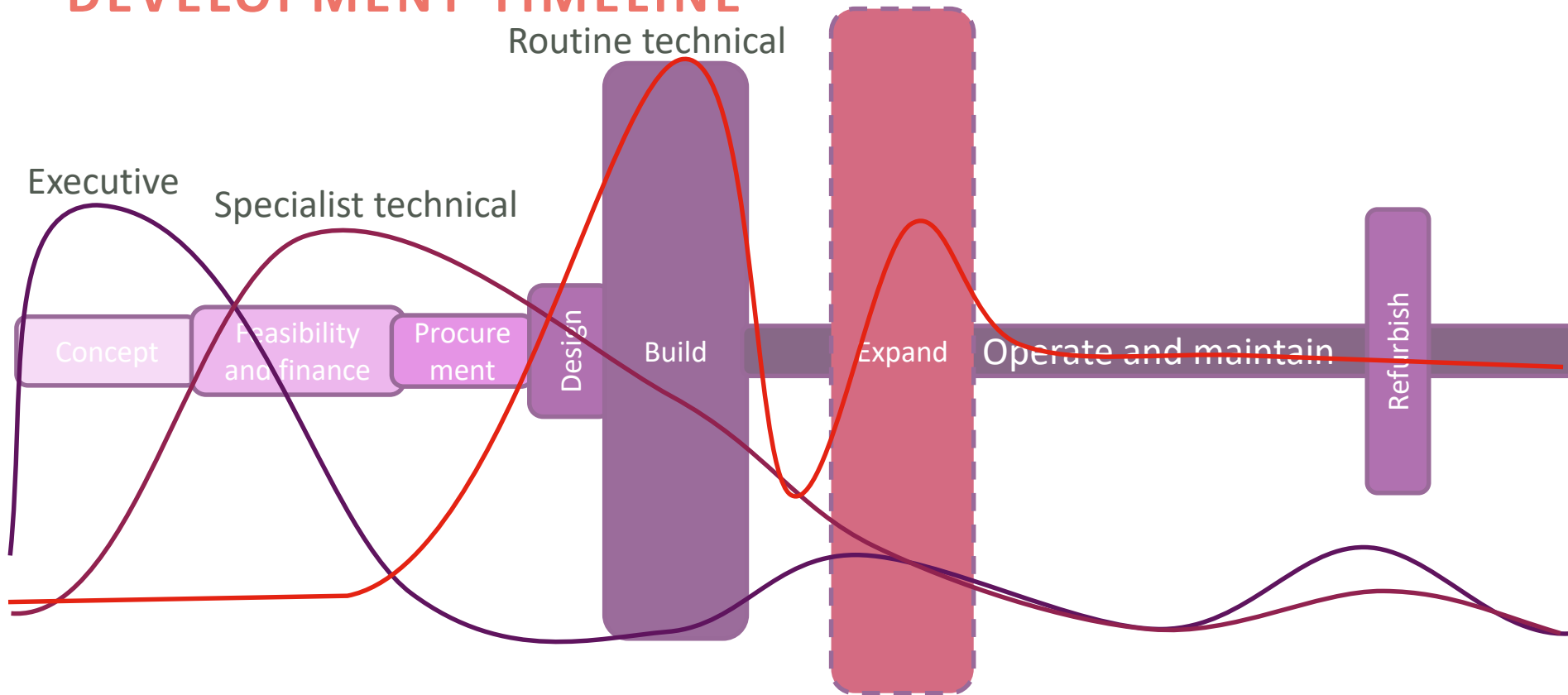
Much greater variety of failure modes



# DEVELOPMENT TIMELINE



# DEVELOPMENT TIMELINE



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# PEOPLE ARE THE CRITICAL RESOURCE

Hardware is mass produced – consumer / industrial grade

- Component level equipment ‘off-the-shelf’
- Everything else comes down to people

# WHERE TO SOURCE PEOPLE

## Typical recommendations on development projects for international support

- Procurement support
- Compliance
- Project management
- Engineering oversight
- Single responsibility construction
  - Imported equipment
  - May prefer use of local labour

**Otherwise, expectation is for local contribution**

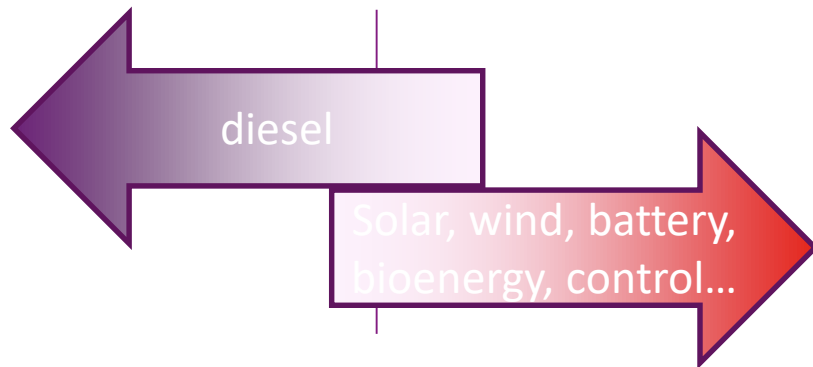


# BACK TO BASICS – DEVELOPMENT AND TRAINING

Transformation is inevitable - Driven by the opportunity for clean, sustainable energy

Last 30 years

Next 30 years



It is a long term game – strategy needs to suit



# BACK TO BASICS – DEVELOPMENT AND TRAINING

Education basics

Grow community energy literacy

Capacity base with training fundamentals

- Safety, electrical

Mentoring and opportunities for talented staff

Opportunities to explore and move seamlessly between local and international roles

Prestige and respect

Networking, knowledge sharing and secondment



# OLD AND NEW – SIDE BY SIDE



# OLD AND NEW – SIDE BY SIDE





# OLD AND NEW – SIDE BY SIDE

