Micro Hydro Power
Conception to Completion

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Contents

- RD Energy Solutions
- Introduction to Hydro
- Development Process
- Key Issues
RD Energy Solutions

• All renewables consultancy and installation
  – Biomass
  – Solar
  – Large and small wind
  – Hydro
  – Heat pumps
• BRE Accreditation
Small Scale Hydro

- Small Hydro <10MW
- Mini Hydro < 1MW
- Micro Hydro < 100 kW
- Pico Hydro < 1 kW
- Run of River/Storage
- On/off grid
- Efficient
- Long lasting
- Low running costs
- Low environmental impacts
Power from Water

\[ P = \eta g H Q \]

- \( P \) = Power (kW)
- \( \eta \) = Efficiency
- \( g \) = Acceleration due to gravity (m2/s)
- \( H \) = Head (m)
- \( Q \) = Flow (m3/s)

\[ P = 7 \times H \times Q \]

3 Requirements
- Flow
- Head
- Determination
Layout

- Layouts
  - High Head
    - Penstock
    - Canal and Penstock
  - Low Head
    - Mill Lade
    - Barrage/Weir

- Components
  - Intake
  - Canal
  - Penstock
  - Powerhouse
  - Tailrace
Penstock
Canal and Penstock
Mill Lade
Barrage/Weir
The Process

• Site Selection
• Pre-Feasibility
• [Feasibility]
• Design
• Consents
• Procurement
• Construction
• Operation

• Timescale – At least 2 years
• DIY Potential
Site Selection

- Head
- Flow
- Slope
- Storage
- Access
- Topology
- Terrain
- Grid
- On-Site Load
- Existing Infrastructure
- Environmental Factors
- Ownership
Feasibility

- Head
  - Measurement
- Flow
  - Measurement
- Design Options/Layout
- Turbine Type
- Preliminary Specifications
- Energy Yield
- Environment
Flow Duration Curves

![Graph showing flow duration curves](image-url)
Flow Duration Curves
Flow Duration Curves

![Graph showing Flow Duration Curves]
Flow Duration Curves
Design

- **Sizing Considerations**
  - G83/G59 – 3.7 or 10 kW per phase
  - Double ROC – 50 kW
  - CAR Licence – 100 kW
  - Existing Infrastructure/grid
  - Standard turbine/pipe

- **Maintenance**
- **Environment**
- **Budget**

- **Drawings**
- **Specs**
Consents

- Grid Connection Offer
- CAR Licence
- Planning Consent
- Environmental Statement
- Early Consultation
Procurement

• Dependent on:
  – Approach & budget
    • Rolls Royce v Skoda, 2nd Hand
  – Funding
  – Scale
• Turnkey solution/separate contracts
• Leadtime
• PPA
• VAT @ 5%
Construction

- Potential for DIY and cost saving
- Timing important
- Solvable Problems
Operation

• Maintenance contract/DIY
• Lead times on revenue
• Revenue components
  – Power
  – ROC
  – LEC
  – REGO
Key Issues

• Grid Connection
• Early Consultation
• Finance
  • Grants
  • Debt
• Power/ROC Prices
Thank You

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