Financing Innovation

Big Challenge, Big Opportunity

UNECE Conference: Promoting Eco-Innovation
Tel Aviv, 11-13 July 2011

Benj Sykes
Director, Carbon Trust Innovations

An independent not-for-profit set up by UK government in 2001
To date we've:
Saved 30 million tonnes CO_2
Saved £2bn in energy costs
Catalysed over £700m investment
Footprinting
Strategy and advice
Implementation
Finance
Policy think tank
Convened consortia
New ventures
Investments
Incubation

Agenda

- The Context
- The Need
- The Journey to Market
- The Solution
- The Opportunity

THE CONTEXT

Demand for clean technologies is large and growing

- **"Global market for cleantech products and services is currently $284 billion,** growing to over $1.3 trillion in 2017"
  Source: Fuji-Keizai USA, Inc

- "**The wind and solar industries alone - valued at $80 billion in 2008** - are projected to triple in 10 years and employ 2.6 million people." Source: Morgan Stanley

- **"Biofuels industry worldwide will grow to a $75 billion opportunity by 2015"** Source": DuPont

Eco-innovators will provide much of the supply of these technologies

- **"Nearly two-thirds of commercial innovation stems from small companies - a vital source of wealth-generating new products."**
  - Source: Technology Strategy Board

- **There is strong growth in SMEs entering the Low Carbon Technology (LCT) space**
  - 2009/10: 250 applications to Carbon Trust Applied Research
  - 2010/11: 700 applications (pro-rata)

BUT……

- **Only 6% of SMEs will be high-growth businesses**
  - These account for 50% of new jobs
  - The trick is identifying which 6%!
    - Source: NESTA

Those start-ups face specific barriers to commercialisation

	CHALLENGE	IMPACT
Uncertainty of value	Market depends on the value that society and government choose to place on reducing carbon emissions	Less market certainty for investors due to dependence on Government policy
Long timeframes	The timescales to develop energy technologies can be exceptionally long, potentially several decades	Requires significant capital but returns exceed investor time horizons
Difficult to differentiate	It is often difficult to differentiate the end product for low carbon technologies (e.g. electricity)	Lack of typical "early adopter" uptake for initial sales to drive down costs

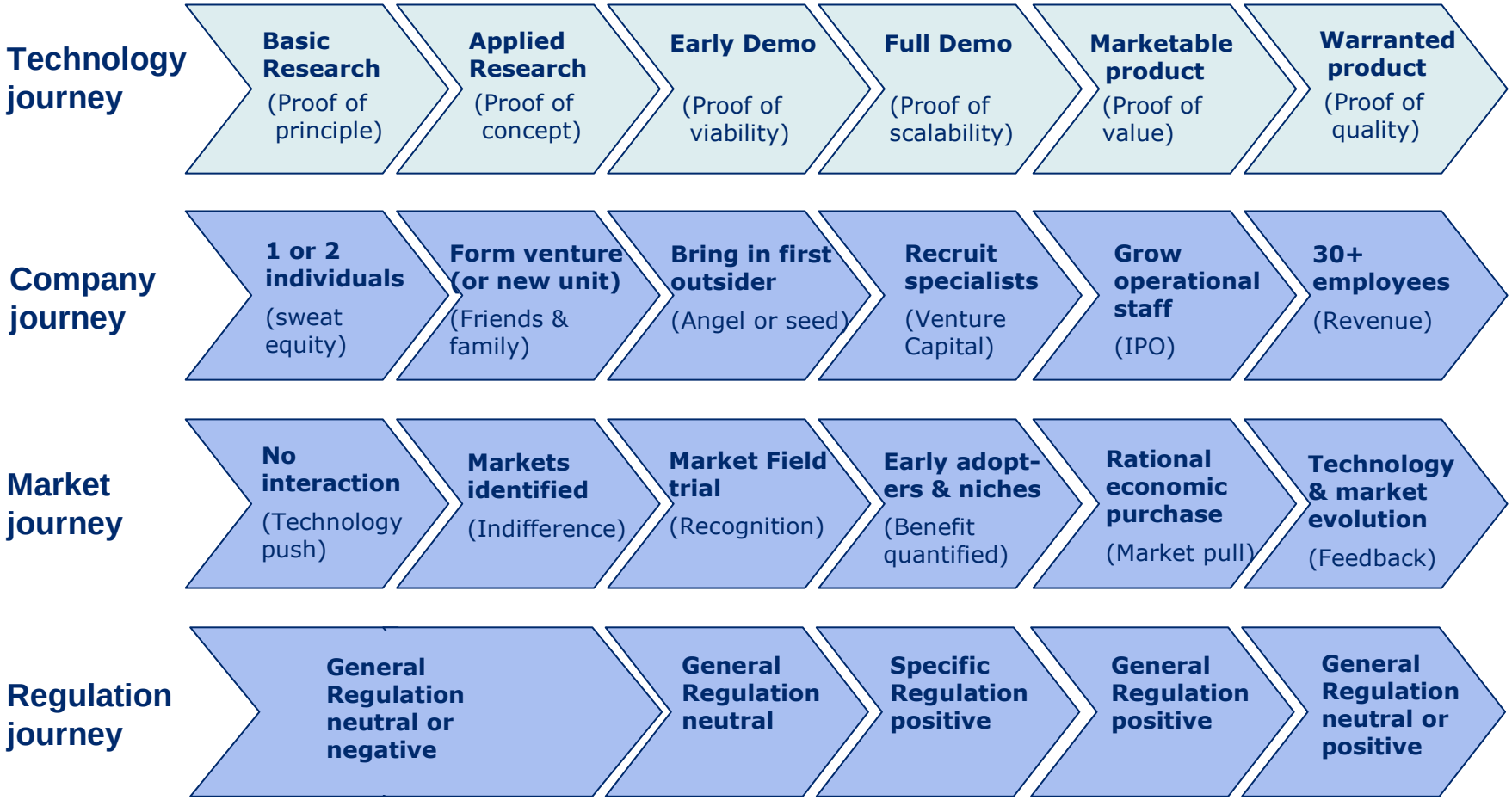
THE NEED

The financing needs of eco-innovative enterprises: what they ask for

- Carbon Trust interviewed 400 entrepreneurs (Spring 2010)

- **Significant gaps in SMEs' understanding of what help they need**

The Innovation process involves multiple journeys to commercialisation



THE JOURNEY TO MARKET

There are different routes for SMEs to succeed

- **Route 1: scale the business and sell products directly**
- **Route 2: partner with a larger player, usually a corporate**
- **Route 3: license the technology, typically to a corporate**

Route 1 challenges - finance

- **Venture Capital investment** in LCT SMEs is falling due to long timescales to exit, high capital requirements and high risk

- **Business angel funding** is holding up well, but pockets are not deep enough

- **Large scale Public Funding** is increasingly focusing on infrastructure investment using mature technologies, and is therefore not relevant to innovative SMEs

Route 1 challenges – funding prototype development through sales

- Often difficult for innovative SMEs to get past corporate procurement departments, especially with prototypes
- The public sector can be highly resistant to purchasing new (unproven) technologies and prototypes
- Some examples of good practice: US Government departments are required to purchase R&D from SMEs, with a view to then purchasing the arising products innovated (US SBIR scheme)

Route 2 challenge – corporate partnering is not easy

- **"Corporations are fragmented and have elaborate protection processes"** (former GSK VP Technology Development, responsible for interacting with SMEs)
  - **No natural owner within corporates for many novel LCTs**
- **Timeframes for corporates don't match SME needs**
- **Hard for SMEs to engage corporates - and hard for corporates to find SMEs**
  - Role for Open Innovation; intermediaries often useful for this
- **"Not Invented Here" syndrome**
- **But…. Corporates increasingly organising or sponsoring competitions for LCT innovators**
- **Overall, LCT corporates are yet to learn how to use SME innovators in the systematic way that big pharma does with biotech, but.. it is changing**

Route 3 challenge – licensing is not easy either

- **IP licensing is the favoured route for university technology transfer**
  - Engaging with potential licensees at this early stage is difficult
  - Requires licensee to complete R&D and take to market
- **Corporate appetite varies**
  - Often focused purely on investment through corporate venture funds
  - Activities tend to wax and wane cyclically
- **Lower returns for SMEs and investors**
  - Can put innovators off pursuing what could be the quickest way to get their clean technology to market

Implications

- **None of the routes is simple or risk-free**

- **This results in**
  - **a slow transition** from SME innovation into products in the market
  - **a high failure rate** and lower commercial benefits

THE SOLUTION

We use different models to support eco-innovative start-ups

Start-up need	Carbon Trust solution
Responsive support to great companies	Entrepreneurs Fast Track
Focused early (research) stage: develop a new (proprietary) technology	Venture creation e.g. organic solar
Focused support to develop a specific supply chain	Convened consortia e.g. offshore wind

We **incubate** start-ups to fast track their commercialisation

- **We have deep knowledge of the cleantech space**
- **We use a proprietary diagnostic tool** to assess start-ups and identify their needs
- **Customised package** of:
  - R&D grant funding
  - Expert advice
  - Networking opportunities
- **Successes include:**
  - **Artemis** (hydraulic gearbox) was recently sold to Mitsubishi as a conerstone of their offshore wind strategy
  - **ACAL** (fuel cells) is now supported by several global automotive OEMs
  - **Kelda** (showers) is now jointly being developed with a major partner

3,000
Start-ups assessed

€130m
Invested in the start-ups within a year of our support

13 to 1
Ratio of investment to spend on support

Organic PV Accelerator

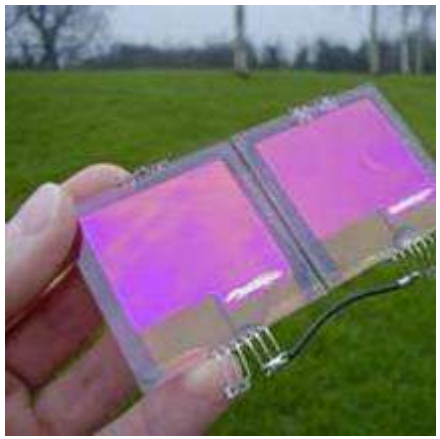
A £5m R&D investment aiming to turn solar energy into a cost effective energy source within 10 years by developing organic photovoltaics (PV)

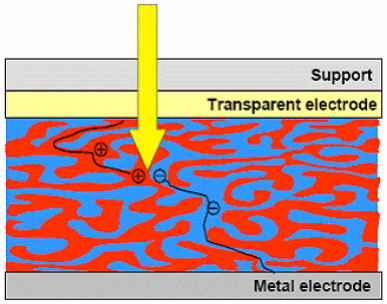
- Novel photovoltaic materials offer the opportunity to use low-cost, high-throughput roll-to-roll printing techniques
- Leveraging the UK's world-class expertise in organic electronics in the Cambridge area in a novel commercial structure with Cambridge University and TTP
- Aims to deploy more than 1GW of organic PV by 2017

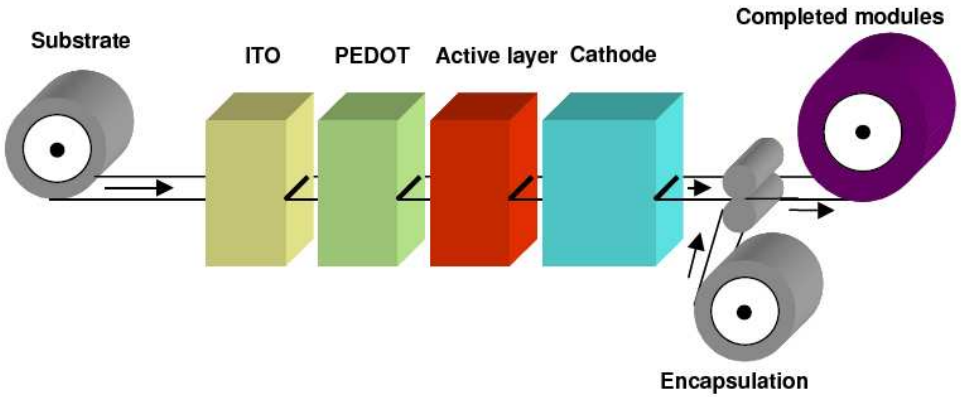
Partners

UNIVERSITY OF CAMBRIDGE

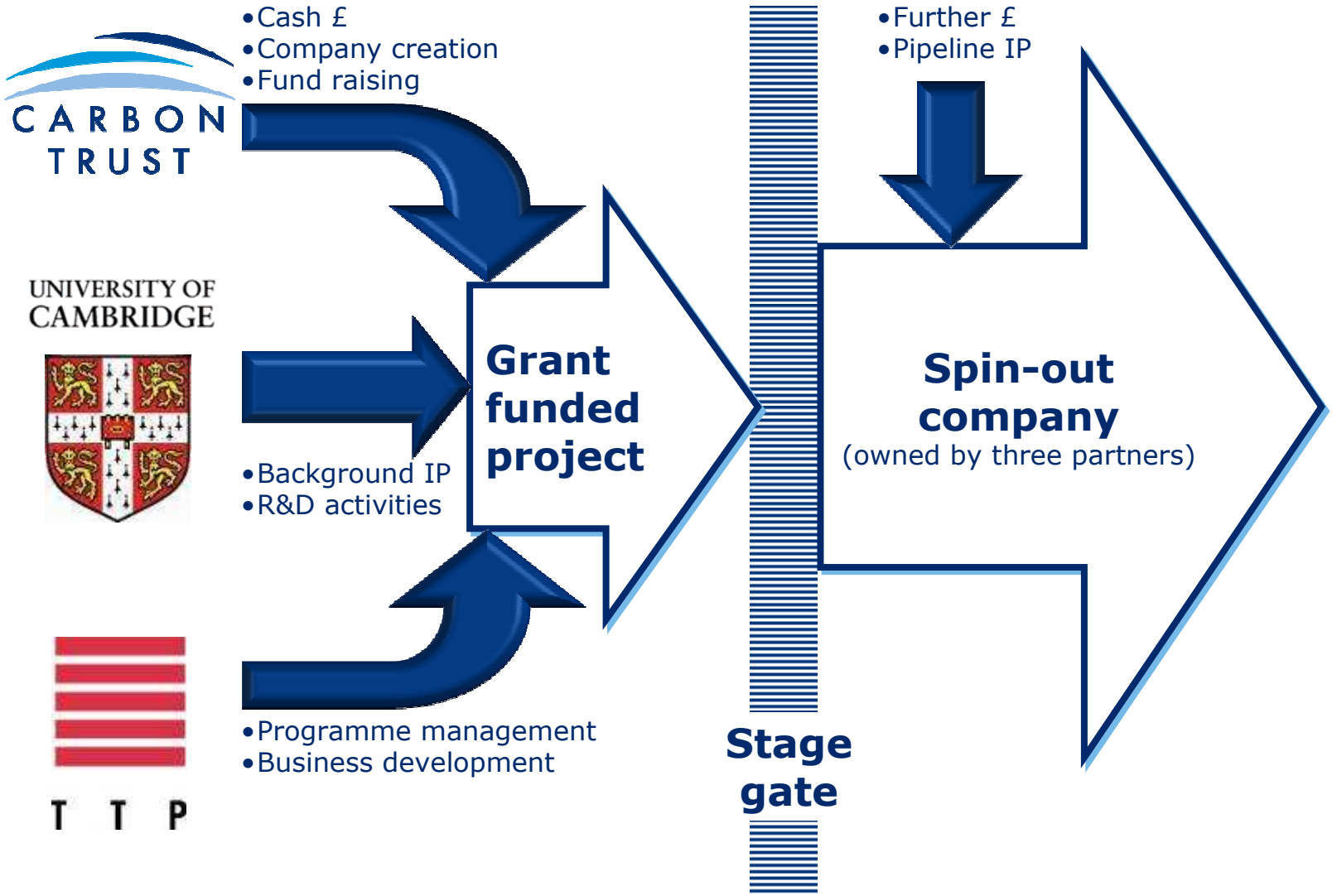
T T P







A new model to commercialise R&D



Outcomes by 2013

- Roll-to-roll OPV pilot plant
- >10% cell efficiency, >8% module, 5 yr life
- Distinctive IP and know how
- Supply chain partnerships

We **convene consortia** to provide focused support to companies in a specific supply chain

- **We know how to bring industry together to collaborate**

- **Offshore wind accelerator** (reducing costs by 10%)
  - Eight partners have 30GW of licensed capacity in UK waters ($90bn)
  - Cost-effective for partners: £12 invested for every £1 they spend
  - Novel foundations selected and de-risked and soon to be installed

- **Industrial Energy Efficiency Accelerator** (step-change reductions)
  - Convened over 100 companies in 12 sectors including dairies, asphalt and bricks
  - 30% reduction in energy costs on average

THE OPPORTUNITY

One perspective - Corporates

- **For corporates, the opportunity to engage with cleantech and risks associated with not doing so are significant**
  - Up to **65% value-at-risk** for badly positioned, laggard companies and up to **80% value creation opportunity** for well positioned, proactive companies; [1]

- **Investing in cleantech can meet many corporate objectives**
  - Build business unit **platforms for emerging growth markets**
  - Quickly **develop corporate expertise** beyond core business
  - **Save cost of investing in R&D** in that technology area

- **Corporates have resources to capture the opportunity**
  - **Global reach** mitigates against the regulatory uncertainty
  - **Brand association drives uptake** of new cleantech products
  - Strong channels to market provide **scale and enable cost reduction**

1 Source: McKinsey/ Carbon Trust

In summary

- **There are many barriers – financial and other – to the success or eco-innovators**
- **There is no silver bullet to ensure success**
- **Financing support must be seen in the context of eco-innovators' wider needs**
- **Public funding must be leveraged with private funding**
- **It's a huge challenge, but it's also a massive opportunity**

1 Source: McKinsey/ Carbon Trust

Benjamin Sykes
Director, Carbon Trust Innovations

CASE STUDIES

Entrepreneurs Fast Track: Artemis / Mitsubishi

From automotive to offshore wind

- Started out developing **hydraulic transmission system** for auto applications
- We worked with Artemis to **identify a quicker, lower risk route to market** in stationary applications (wind power)
- Carbon Trust support helped to develop the product for the wind market
- Artemis was **recently sold to Mitsubishi as part of wider £100m investment** into offshore wind
- Artemis technology is now a key part of Mitsubishi's offshore wind strategy

"The Carbon Trust really helped to show that we as a company and our technology are credible … The projects made us focus and set clear milestones to report against … The Carbon Trust is very important to a small early stage company, particularly considering the risks associated with introducing a new technology into wind turbines"

Win Rampen
Managing Director, Artemis

Entrepreneurs Fast Track: G-Volution / Lafarge

Facilitating engagement with fleet owners

- Unique dual-fuel 'Optimiser' technology to **reduce emissions and fuel costs**
- Needed to engage with major hauliers and other corporates customers to raise profile and prove business model
- **Carbon Trust support included a high-profile roundtable** with 10 major potential customers
- G-Volution has taken orders for 20 units from these customers
- **LAFARGE is now a client**, looking to introduce LPG dual fuel systems to its tipper truck fleet
- Initially, one truck will be fitted with a view to more vehicles being converted if the trial is successful

"As a direct result of Carbon Trust's support we got trials and orders from five of the largest fleets in the UK."

Chris Smith
CEO, G-Volution

"We estimate the dual fuel system will offer an immediate saving of 10 per cent…clearly this makes sense from an economic and environmental perspective"

John Dargie
Head of distribution and transport,
Lafarge Aggregates & Concrete UK

Offshore wind accelerator (SPT Offshore & Wood Group / major developers)

New foundations for 30-60m water depth

- Collaborative R&D programme **to reduce costs of OW by 10%**
- **Partners have 60% UK market share**
- In 2009 launched international competition for novel foundations; **over 100 entries received from around the world**; seven finalists selected for feasibility studies; four shortlisted based on suitability for R3
- **SPT Offshore's Self Installing Wind Turbine arguably the most innovative**: integrated foundation/turbine fabricated at port and shipped on standard barge
- **SPT is now in the spot-light with major industrial potential customers**
- Next step: further FEED design work / demonstration to prove bankable concept

"All the energy companies have similar goals: to reduce costs of offshore installations…it makes a great deal of sense for DONG Energy to participate in the OWA: now we have a catalogue of ideas to improve future off shore wind installations."

Jørn Scharling Holm
Technology Development Manager,
Renewables, DONG Energy