

Opportunity Recognition

Dr Shai Vyakarnam

What is opportunity recognition?

Kirzner

Schumpeter

We know about the successes...

iPAD

Easyjet

Beatles

Taj Mahal and the other Wonders of the World

Penicillin

Religious ideas!

Chocolate

Coffee

Fashion

Mobile phones

Bond Movies

Ones that got away!



In reality what we see..Opportunity co-creation (Effie's work)



- Shape and co-create the opportunity –
- Business models – value chains
- Technology from lab to product
- Create products and services – people will pay for
- Make bets

What boxes should it tick?

Emotional

- Excite the founder to commit
- Belief

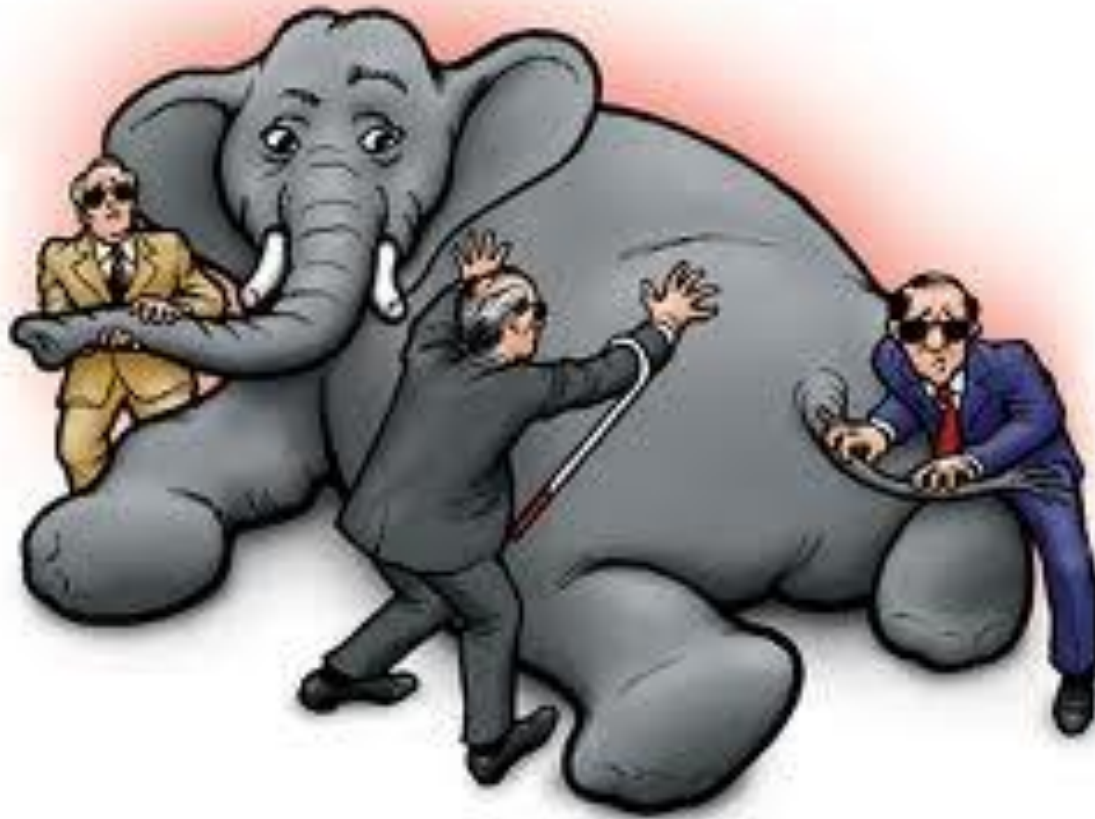
Intellectual

- Understand it – deeply

Rational

- Early evidence of markets and customer need
- Affordable loss (risk)

Three perspectives of opportunity



Recognising Opportunities

Prof Sir Richard Friend FRS

Cavendish Professor at the University of Cambridge



Dr Simon Bransfield Garth

CEO, Azuri and Eigh19



Dr Seena Rejal

Chairman, Cambridge Policy Associates



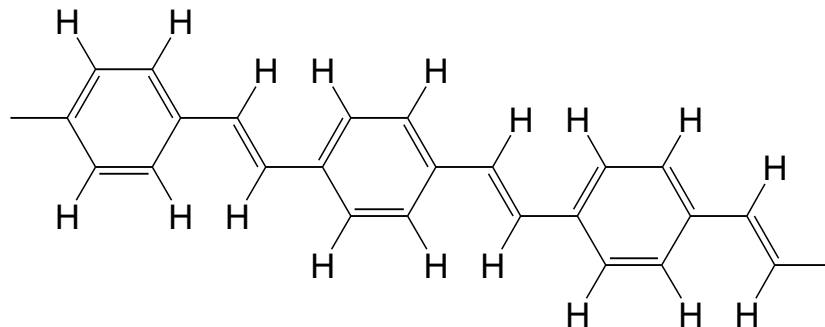
Plastic Electronics: the technology landscape

Richard Friend

Cavendish Laboratory

University of Cambridge

PPV: the prototypical fluorescent semiconducting polymer:

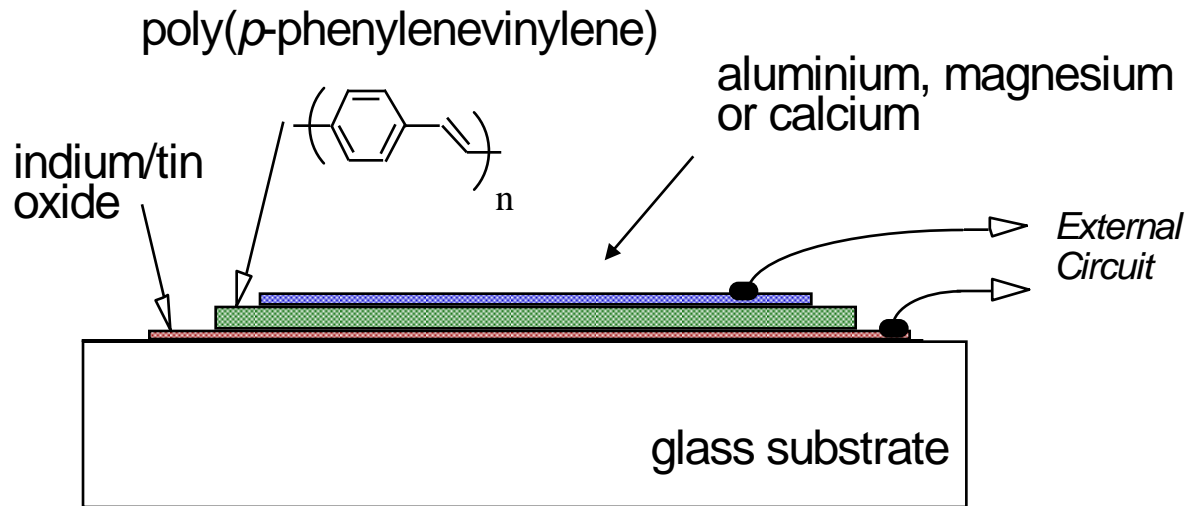


Delocalised π -electrons provide both conduction and valence bands



Solutions of a range of semiconducting polymers:

Polymer Light-Emitting Diodes



Jeremy Burroughes, Donal Bradley et al.

Nature, **347**, 539 (1990), US patent 5,247,190

1992 - foundation of Cambridge Display Technology, CDT

Organic LED technology:

Engineering: chemical synthesis

[CDT partnership with/acquisition by Sumitomo Chemical Company]

‘semiconductor’ purity levels achieved,
detailed chemical modifications made to improve efficiency
and lifetime.

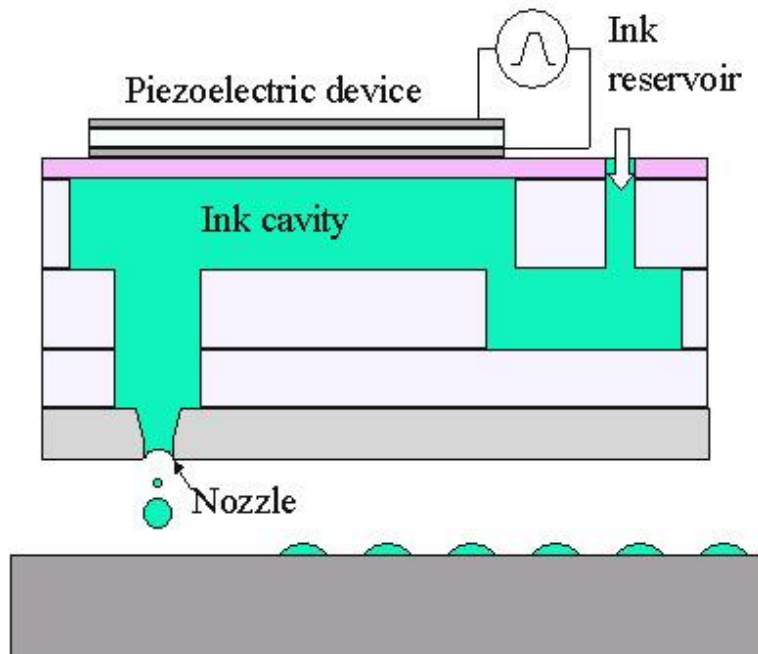
LED lifetimes: 1990 - few minutes
1996 - 1000 hours
2010 > 100,000 hours (projected)

OLED technology: printing

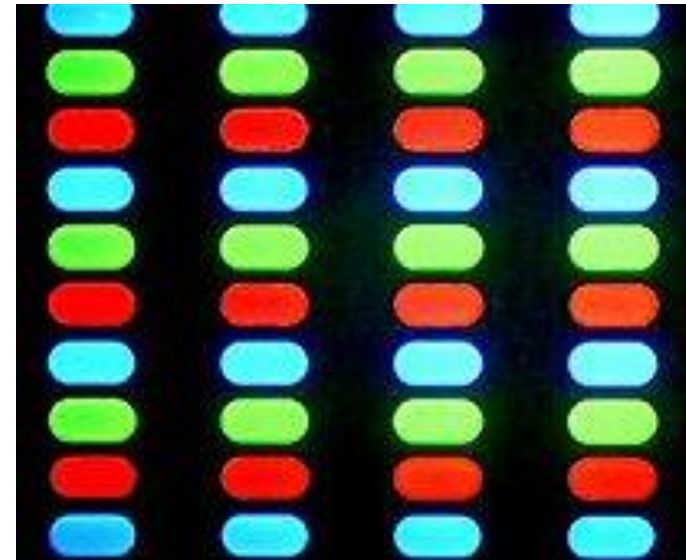
[CDT partnership in 1996 with Seiko-Epson Base Technology Research Center Tatsuya Shimoda, Takeo Kawase et al]

How to pattern the red, green and blue pixels? **direct printing**

Inkjet Deposition Process:



- Polymer deposition by ink-jet printing

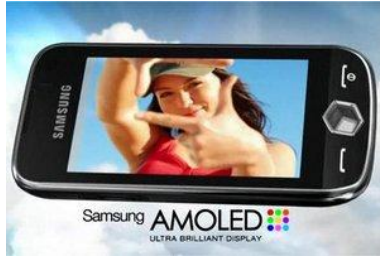


Printed Polymer in Bank Holes

Organic electronics – Status

Existing markets

Phones (45M units in 2010) MP3, camera



OLED

Emerging applications

Advanced prototypes



Source: Sumitomo-CDT

Next generation applications

Demonstrators, but technology challenges



Lighting,
wall-side TV

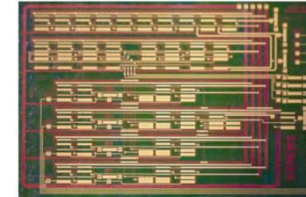
OTFT

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Paper-like
flexible
displays

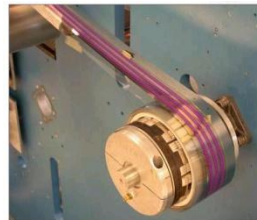
Source: Plastic Logic



All-polymer
& next gen.
displays;
RFID
circuits
sensors

Source: PolyIC

OPV Solar Cells



Mobile
Power;
building
Integrated PV

Organic Solar Cells?

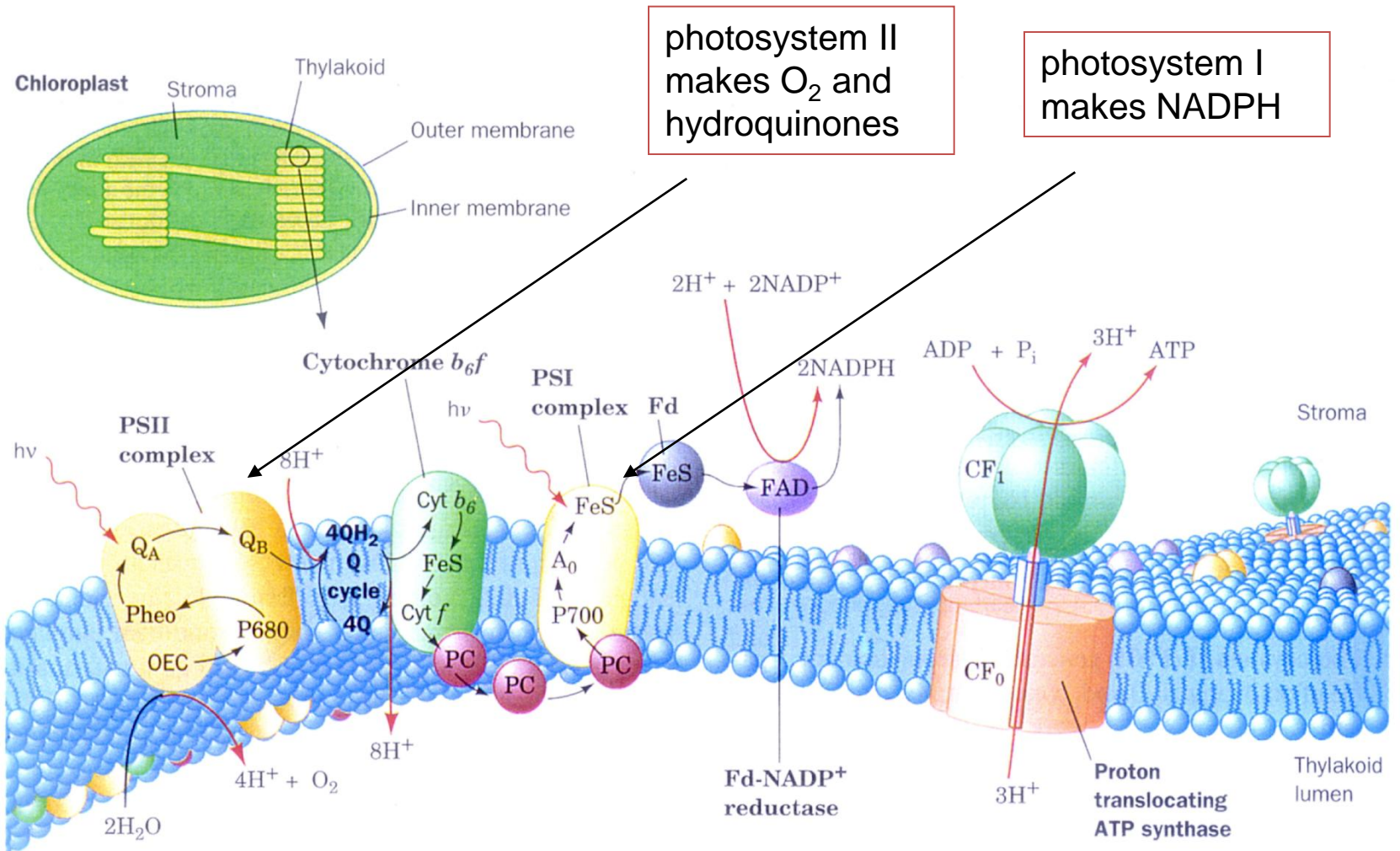
π -conjugated molecules used in nature for photosynthesis, but:

- green plants construct a very complex multiple 'heterojunction' structure to separate electron and hole

Current research and development:

- 'crude' single heterojunction devices work much better than they should.....

Green plant photosynthesis:

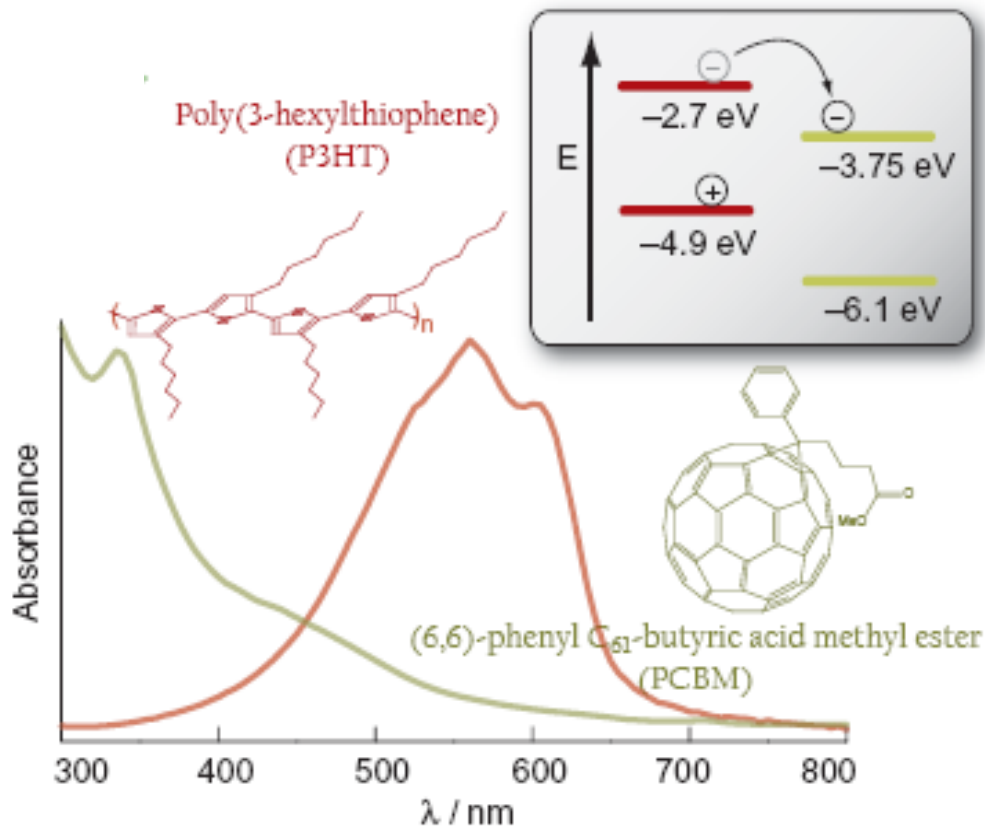


photosystem II makes O_2 and hydroquinones

photosystem I makes NADPH

Organic solar cells: simple recipe!

mix two semiconductors together so that there is a lot of interface between the “electron donor” and the “electron acceptor” materials

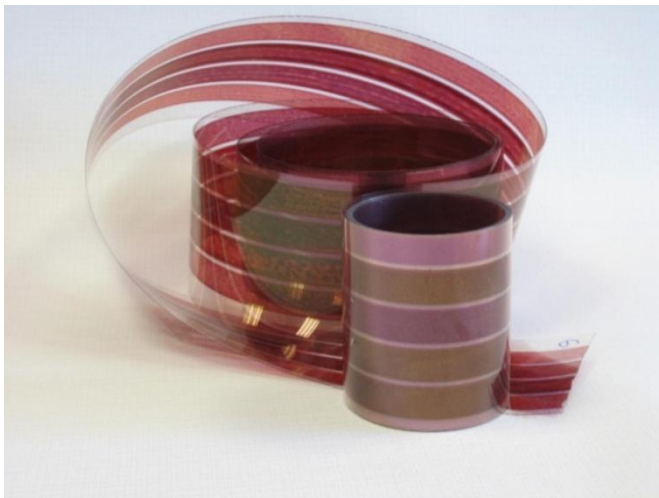
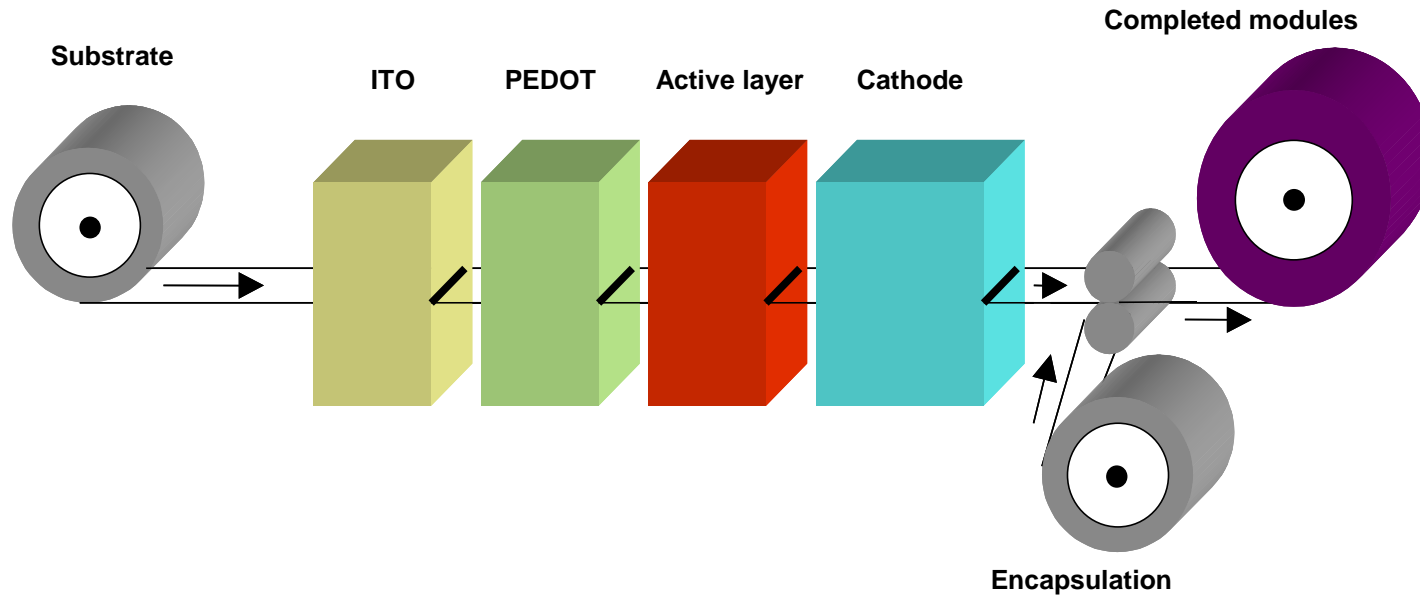


Poly(3-hexyl thiophene) – hole acceptor

Fullerene – electron acceptor

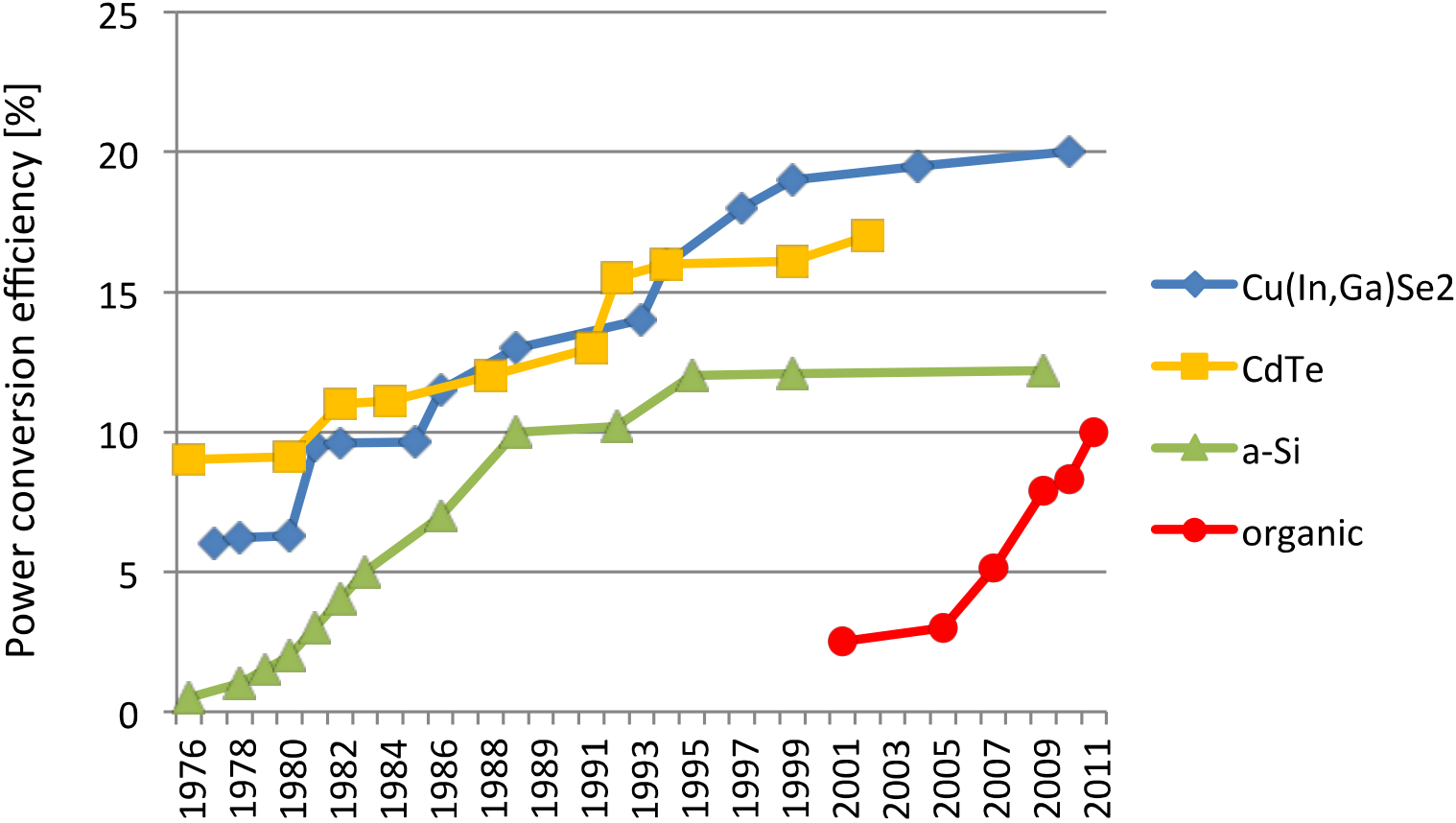
Solar energy conversion efficiencies now up to 10% with red-shifted polymers (2012)

Eight19 Ltd (2010): roll-to-roll solar cells:



Manufacture of organic PV modules made on a flexible substrate using roll-to-roll methods

Progress with organic solar cells:



Eight19: printed polymer solar cells

Technology Push:

- potential for lowest cost (materials and manufacture)
- potential to reduce full systems costs (low weight, robust, unbreakable)

Falls short of a 'market pull'



Indigo Case History

Enterprise Tuesday

November 2012

Solar panels



Organic solar is a bit different

- Robust, lightweight plastic films
- Based on abundant elements
- Fraction of the embedded energy
- Fraction of the CAPEX
- What's not to like?



Challenges

- Organic technology is still a research project
- It has a product lifetime of 5 years or less
- The existing solar market is commoditised and barely profitable
- Investors have been burned in recent years

- You need scale to compete
- ...But you can't get scale until you are competitive

- So what do you do?



Finding a viable market

New Product, Existing Market	New Product, New Market
Existing Product, Existing Market	Existing Product, New Market

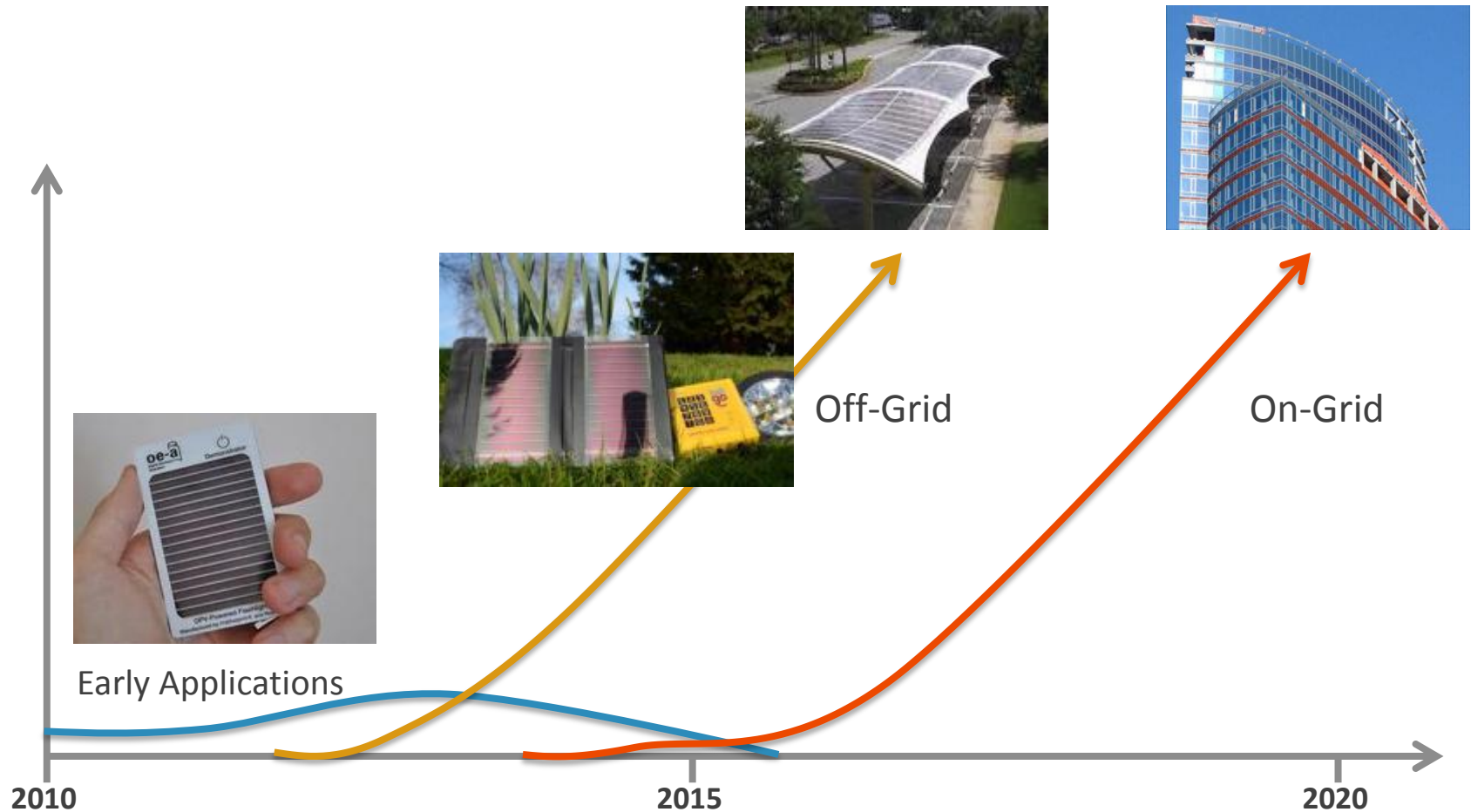
Building integrated solar

Consumer devices

Emerging markets



Small companies only survive if they move fast



Huge Off-Grid Solar Market Opportunity

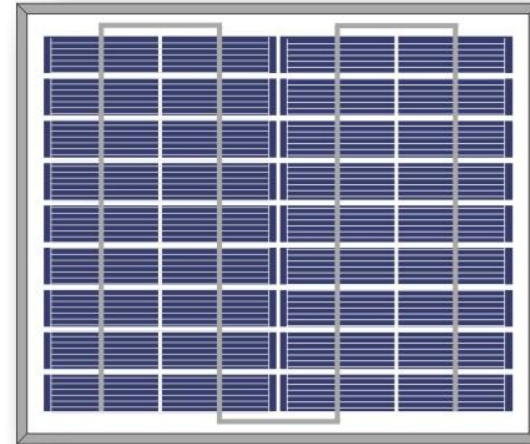


- 1.3Bn people without electricity
- 600M people spend \$15-35/yr to charge phones
- \$38Bn / year spent on kerosene lighting

TOTAL MARKET ~ \$50Bn/yr



Market Needs a New Business Model



Power is a pay-as-you-go Service....

But Solar is all UP FRONT + Maintenance/Repair



Disruptive Innovation: Combine Mobile and Solar

indi
go

smarter solar power
2.5W Solar Home System



Change the game

Currently (Kenya)

- 900 KSh/mth for Kerosene (\$10)
- 20 KSh/charge for mobile

Total: ~\$13/mth

Indigo

- 900 KSh install (\$10)
- 120 KSh/wk (\$1.40)

Total: ~\$6/mth

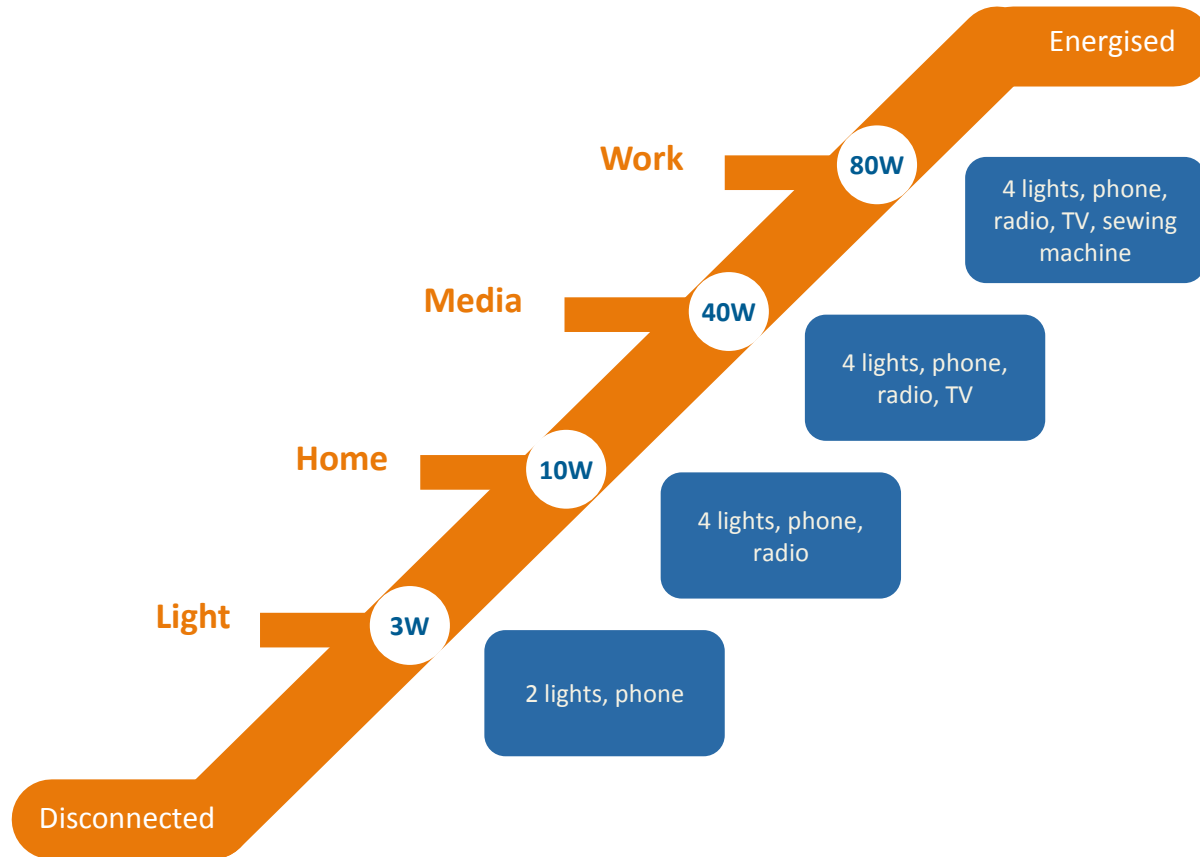
Customer cuts weekly energy spend by 50% or more

AND

has 8 hours of light for 2 rooms
+
mobile phone charging too

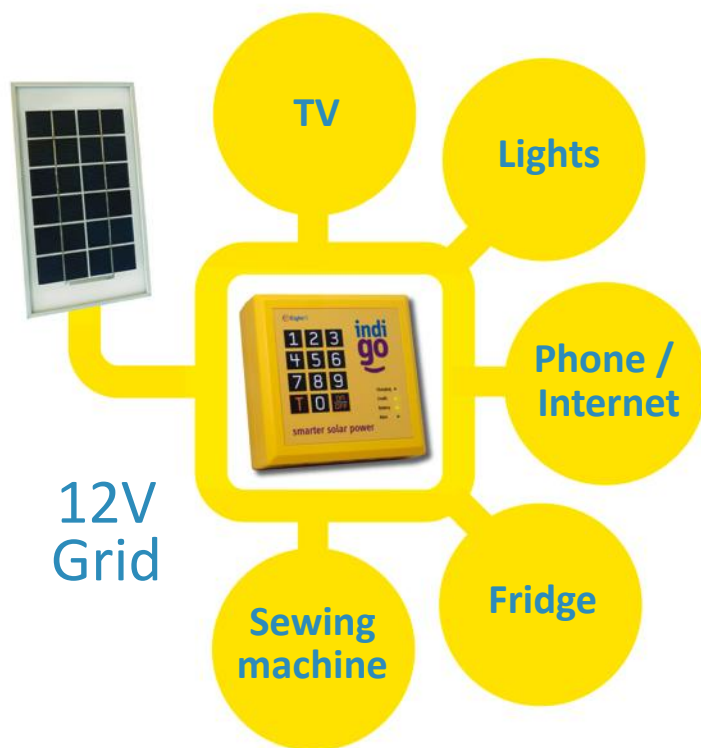


Go beyond the obvious



Build a vision (emergent strategy)

Energised home



- Grid connection ~\$400-800
- Bottom-up view of power
 - Solar and battery cost is almost linear i.e. little economy of scale
 - Losses in distribution
 - Centralised purchasing
- Un-Grid delivers power now
 - Appropriate solutions that build with users needs
 - New generation of low power, low voltage appliances
 - Vision of future power usage
 - Just as mobile replaced the landline

Indigo in Action



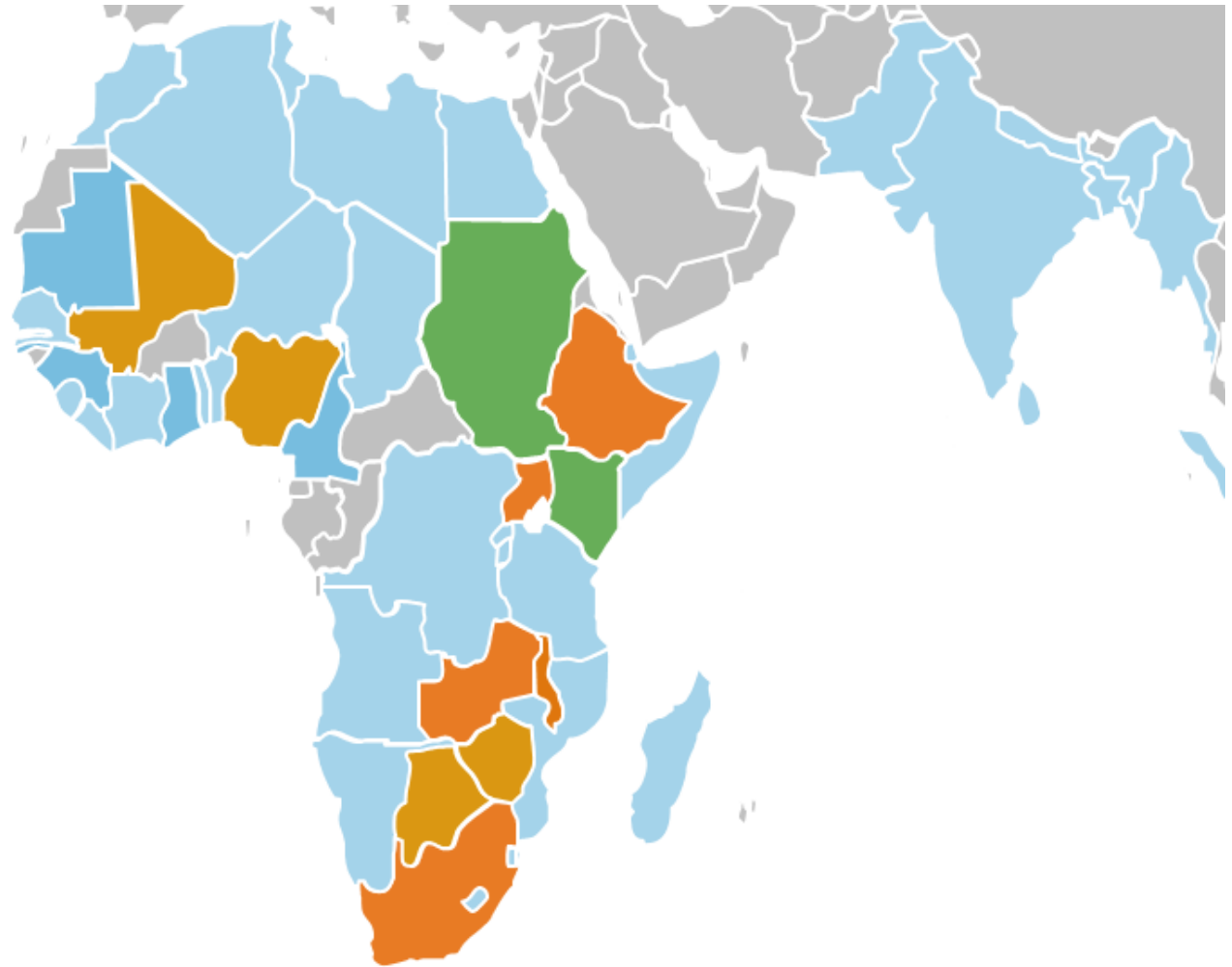
Studying with Kerosene lamp



Studying with Indigo solar



Geographical Deployment



Key: Indigo

-  Deployment
-  Early Deployment
-  Planned Deployment
-  Negotiations
-  Enquiry



Why we do it

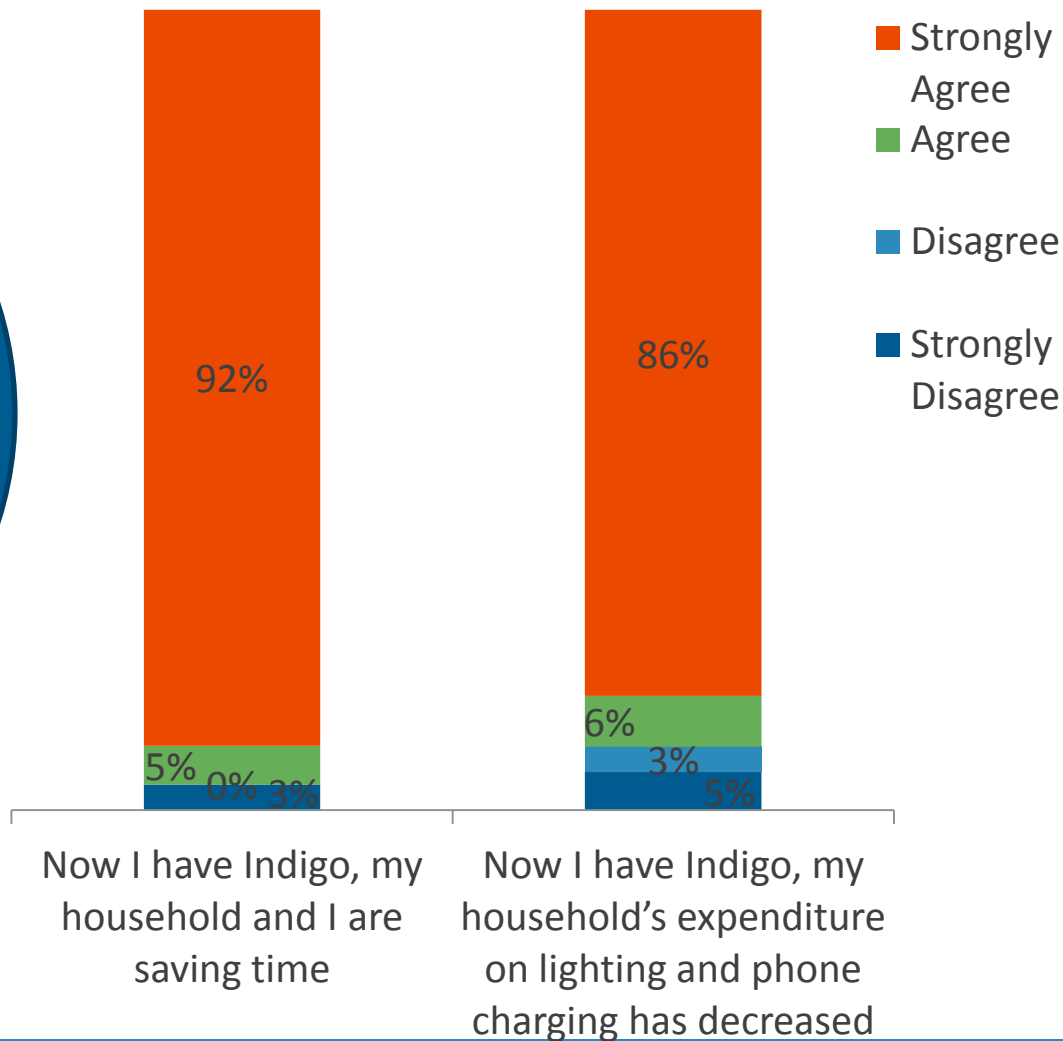
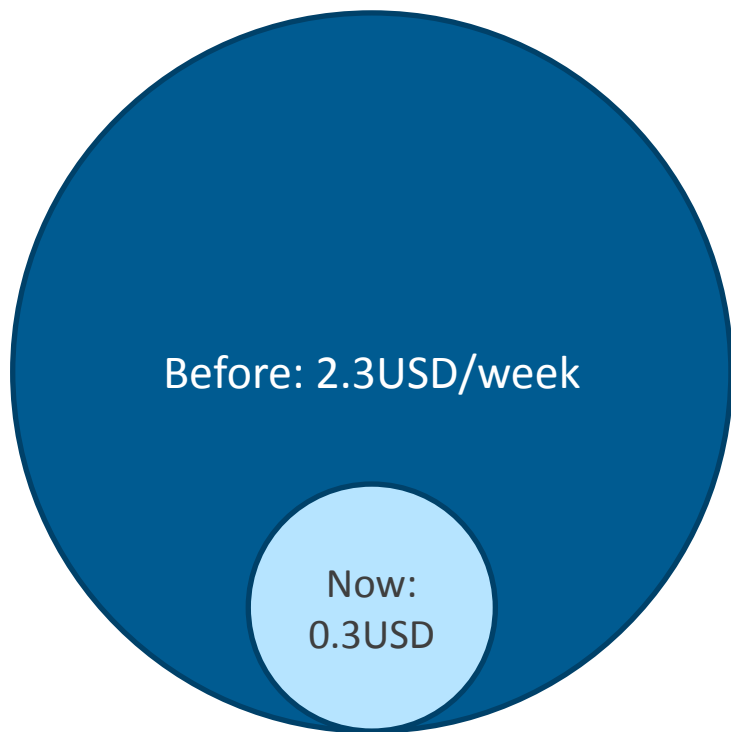


No simple answer

- Joy of creating something new
- Exploring the unknown
- Potential for wealth
- Learning
- Recognition
- Impact
- Solving a puzzle



Success helps



- **100%** strongly agreed with the statement “Now I have Indigo, I am using less kerosene”



Particularly when it is demonstratively beneficial

On average each student is studying an extra **2.5** hours per day

"I do better at school now because I can complete my homework every night" Indigo User, Female, Class 8 Student



On average families are productive for an extra **3.2** hours per day

"I can open my shop for an extra 3.5hrs per day, instead of shutting at 6.30pm I stay open until 10pm" Indigo user, male



Summary



Lessons

- We started in one place and finished somewhere quite different
- Move fast and focus on the achievable
- Face reality: If it doesn't work / can't work – change!
- Be prepared to think outside the box
- Capture a vision
- Inspire others
- Keep innovating





“Today I live in the city”

- Mr Chabalala, Zambia



Thank You!

info@azuri-technologies.com



Dr Seená Rejal

Chairman, Cambridge Policy Associates

Former Business Development & Financing, Eight19

Overview

- What drives me
- How it all started (... in Cambridge)
- Before Eight19
- The ride with Eight19
- Next...

Personal Drivers



Cambridge Roots

- **Entrepreneurship & Sustainability**
– key themes!
- Institute for Manufacturing
- CU Entrepreneurs
- Spin Offs / Startups



Clinton Climate Initiative



- Leveraging markets to “Move the Needle”
- High-impact, near-term, scalable solutions
- Overcoming market failures
- Intersection of policy, business, finance & tech
- Entrepreneurial business-oriented team
- Significant resources
- Cross-tech (across CCS & Solar)



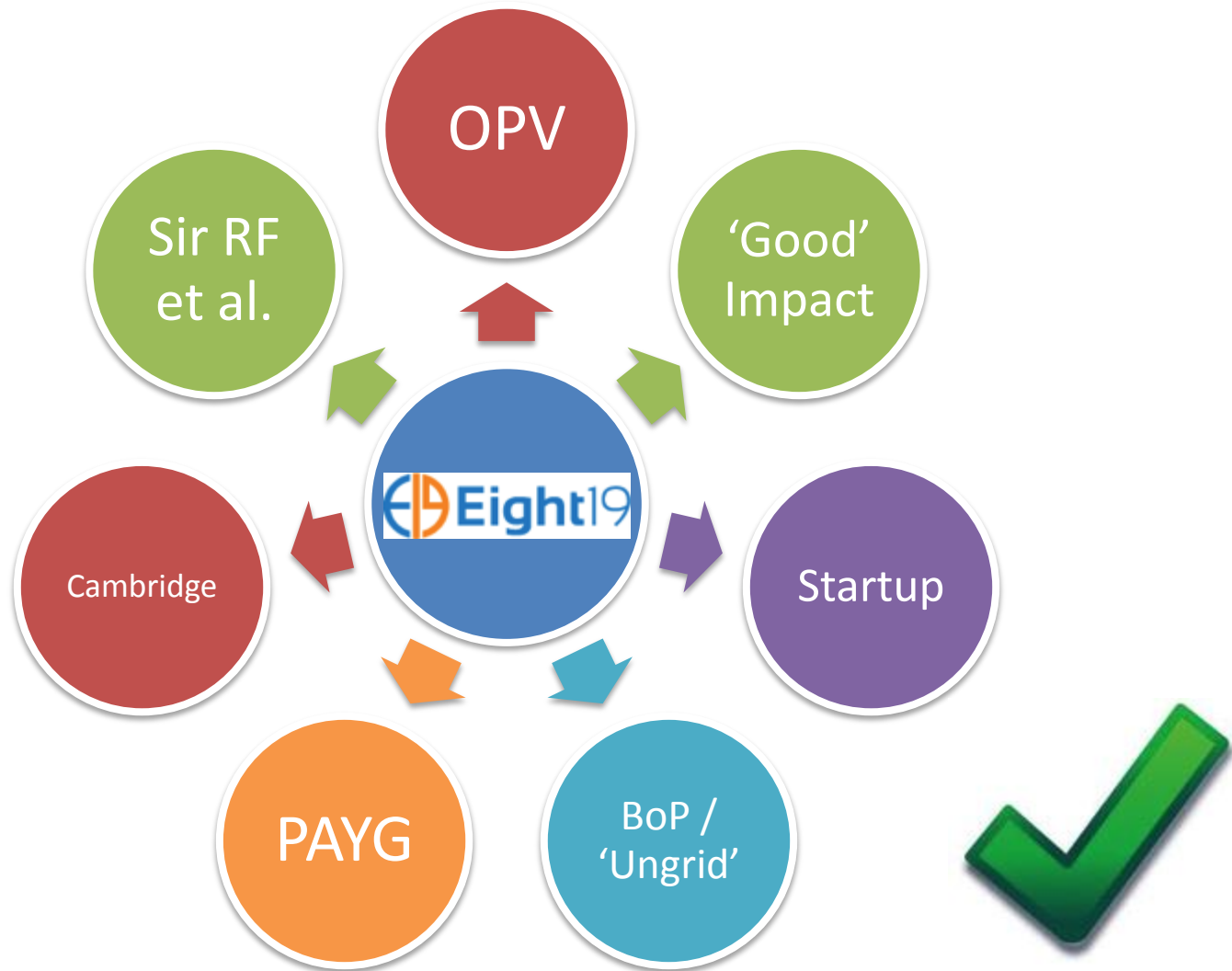
Disruptive Startups - GT



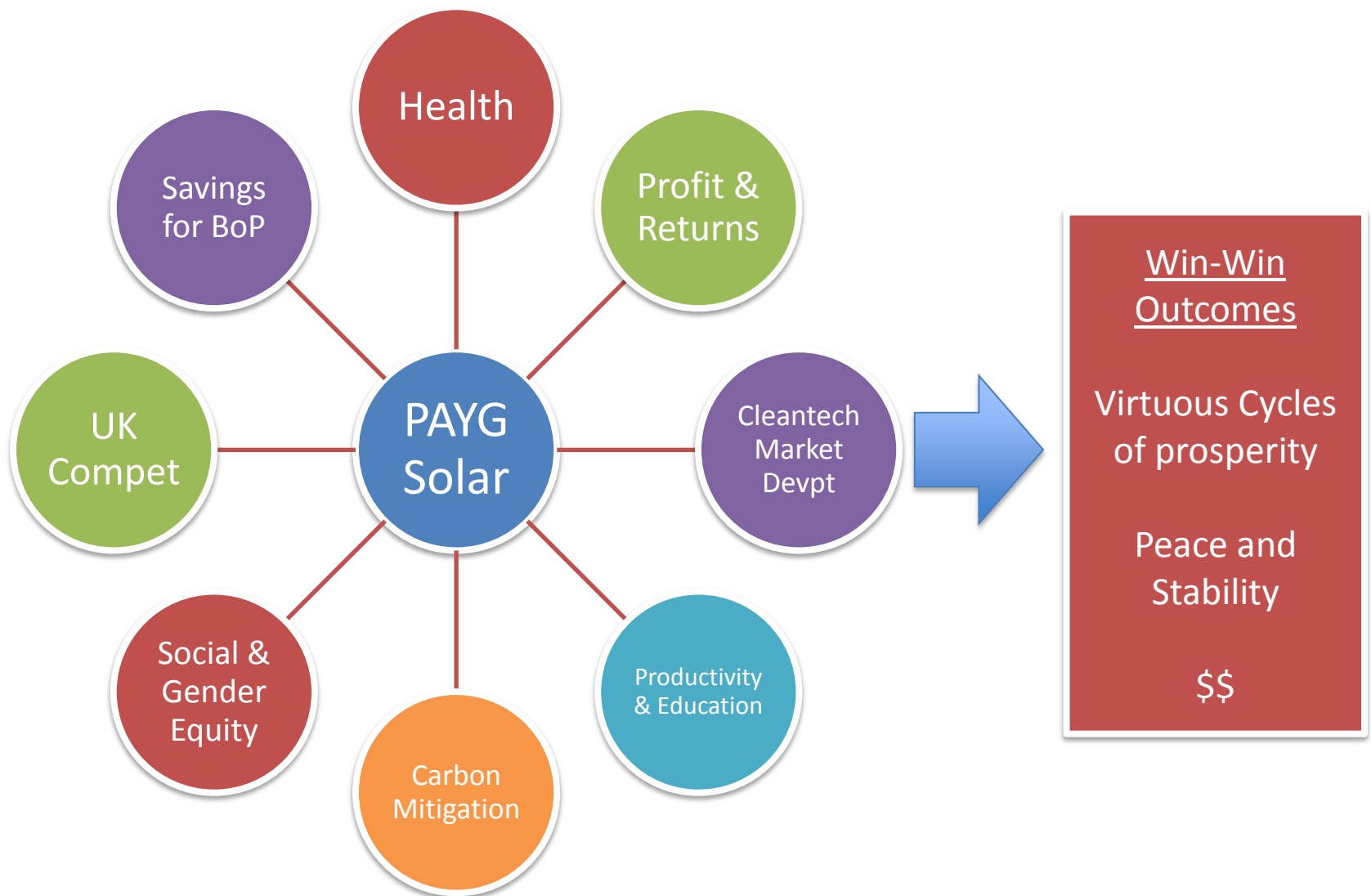
- Negative Emissions Tech / CO₂ Air Capture
- High calibre team
 - Kyoto Protocol authors
 - Princeton & Bell Labs physics
- Billionaire backers
- Using power of markets
- VEC Finalists
- Business Development & Strategy



Eight19 Passed the Test!



Impact of PAYG Solar



Brief & Fit

- Fledgling concept
 - Execution play
- ↓
- Build brand internationally
 - Educate market on PAYG solar
 - Find partners and customers
 - Raise finance needed to scale



Challenge was exciting; change it could affect, real.

Finance

- Project Finance vs. Equity
- Different investor types – tailoring needed!
 - Impact investors, philanthropists, other patient cap
 - VCs and other angels
- Innovative project finance mechanisms
 - Revolving funds (‘Kickstart’)
 - EIS Mechanisms in the UK
 - CSR funds
- Lobbying of WB / IFC – challenge of ‘bankability’

Network Effect & Tipping Points





ipcc
climate change



UNITED NATIONS
FOUNDATION



Next...

- Tackling the 'bankability' market failure
- Cross-industry team
- Mobilising the masses
- You can be involved directly
- Stay tuned...

Thank you

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