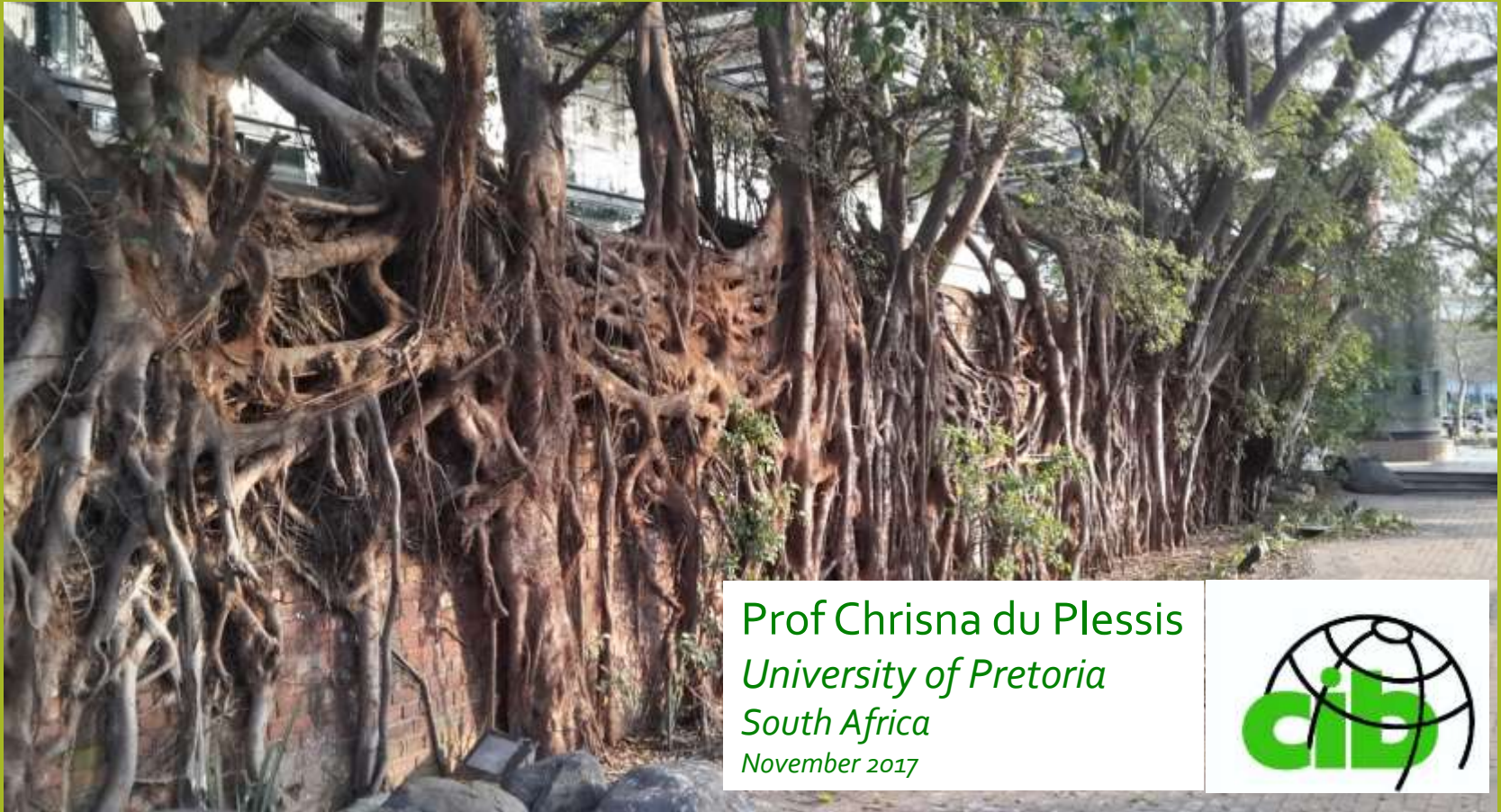


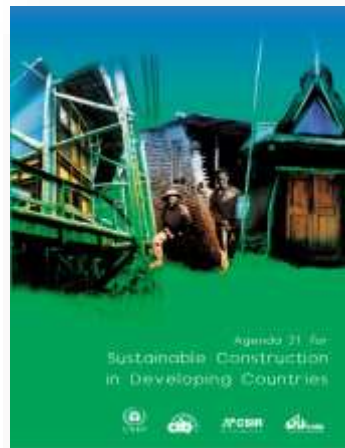
RESEARCH ROADMAP SUSTAINABLE CONSTRUCTION



Prof Chrisna du Plessis
University of Pretoria
South Africa
November 2017



A mature field?



- W116: Smart and Sustainable Built Environments
- W115: Construction Materials Stewardship
- W110: Informal Settlements and Affordable Housing
- W104: Open Building Implementation
- W101: Spatial Planning and Infrastructure Development
- W69: Residential Studies
- W120: Disasters and the Built Environment
- TG79: Building Regulations and Control in the Face of Climate Change
- TG86: Building Healthy Cities



Low hanging fruits are in the basket

Renewables are rapidly growing

Sustainable construction no longer a hot topic

WHAT HAS CHANGED?

Part of curriculum

The screenshot shows a Google search interface. The search bar contains the text "sustainability education + Construction". Below the search bar, the "All" tab is selected. The search results show approximately 112,000,000 results found in 0.53 seconds. The top result is titled "Scholarly articles for sustainability education + Construction" and lists several articles with their authors and citation counts. The second result is titled "Sustainability in Construction Education: Journal of Professional ..." and provides a link to the article on ascelibrary.org, along with the author's name, year, and citation count.

https://www.google.com/?gfe_rd=cr&ei=J7ofVuq... Higher Educati... Novell Group... sustainabilit... x Bb B

it View Favorites Tools Help

onvert Select

Page Safety Tools ?

ogle sustainability education + Construction

All News Images Videos Maps More Search tools

About 112,000,000 results (0.53 seconds)

Scholarly articles for sustainability education + Construction

Sustainability in construction education - Wang - Cited by 32

... literacy: the future paradigm for construction education ... - Murray - Cited by 48

... recommendations for creating sustainability education ... - Moore - Cited by 160

Sustainability in Construction Education: Journal of Professional ...

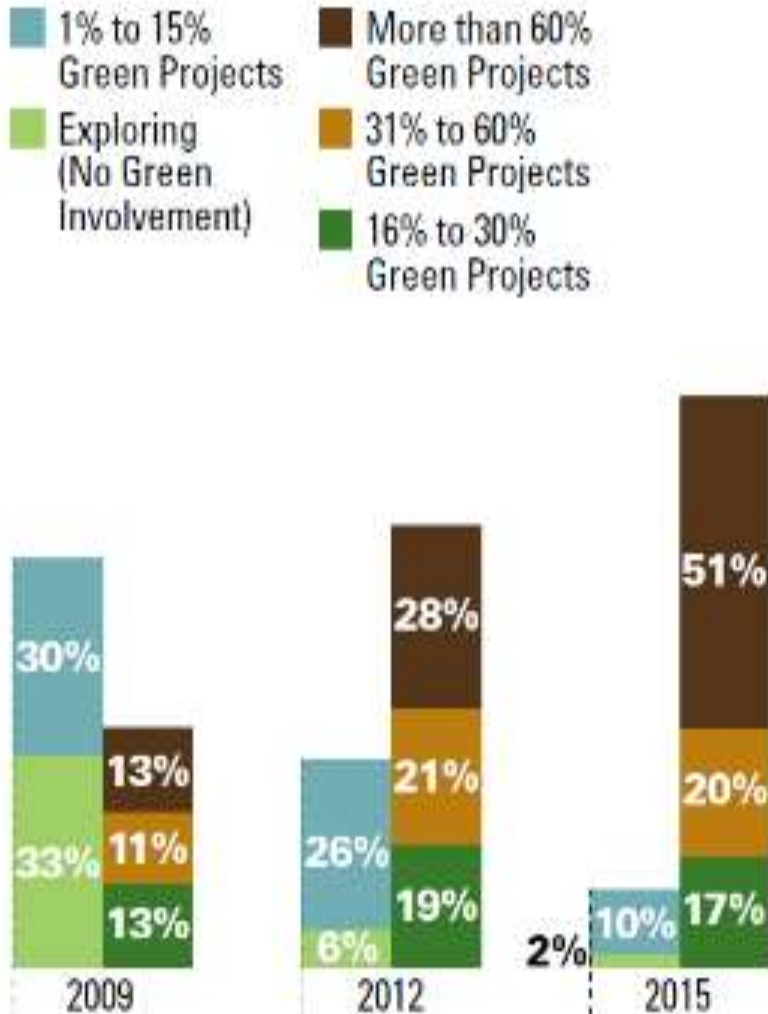
[ascelibrary.org/doi/abs/10.1061/\(ASCE\)1052-3928\(2009\)135%3A1\(21\)](https://doi.org/10.1061/(ASCE)1052-3928(2009)135%3A1(21))

by Y Wang - 2009 - Cited by 32 - Related articles

"Education for sustainability in construction management curricula. ... "Sustainable Construction Education Using Problem-Based Learning and Service ...

Green building is big business

Source: McGraw Hill Construction, 2013



100 Green Building Councils
1.2 billion square meters of green building area registered with WGBC

Main drivers

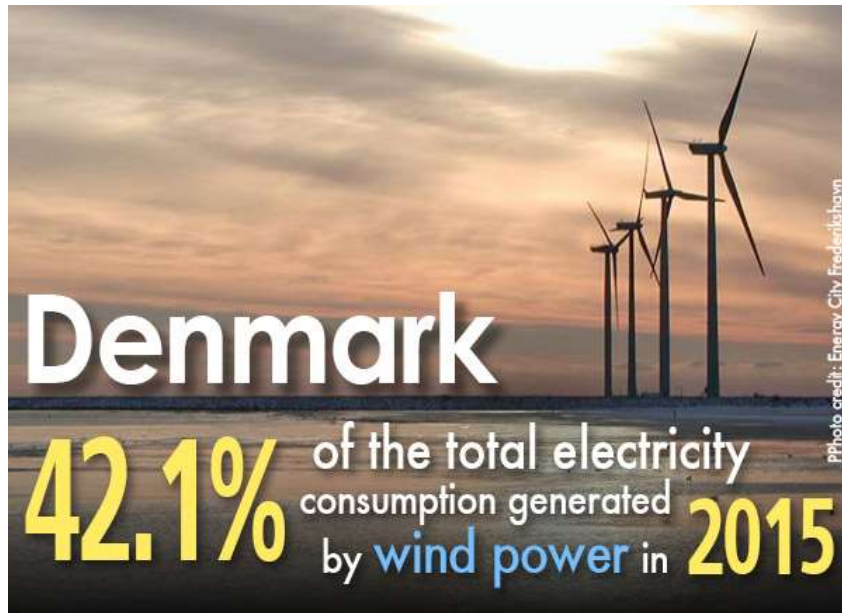
- client and market demand
- reduced operating costs
- reputation and branding
- Improved health and well-being linked to productivity

Government on board

(sort of...)

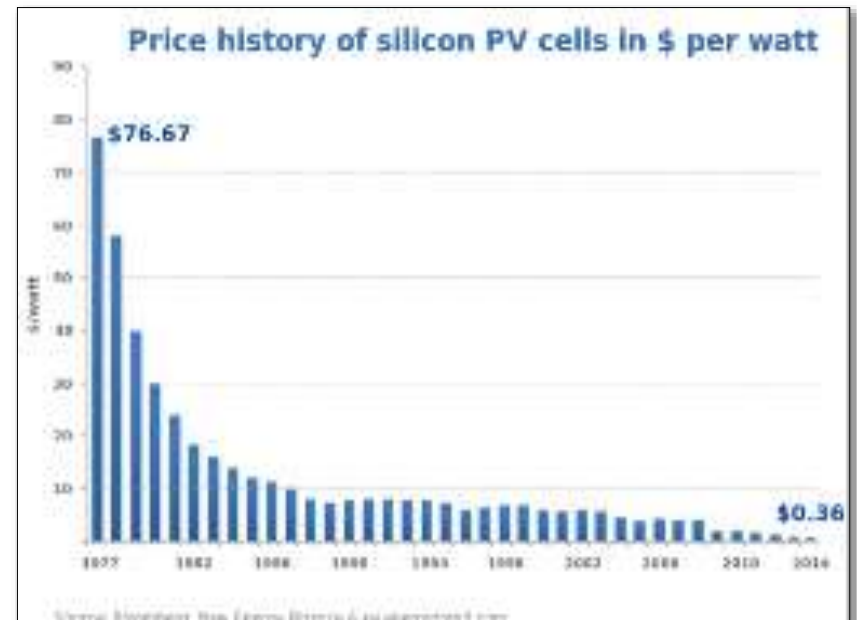


Renewable energy is viable



100% renewable energy is not a fantasy for someday, but a reality today.

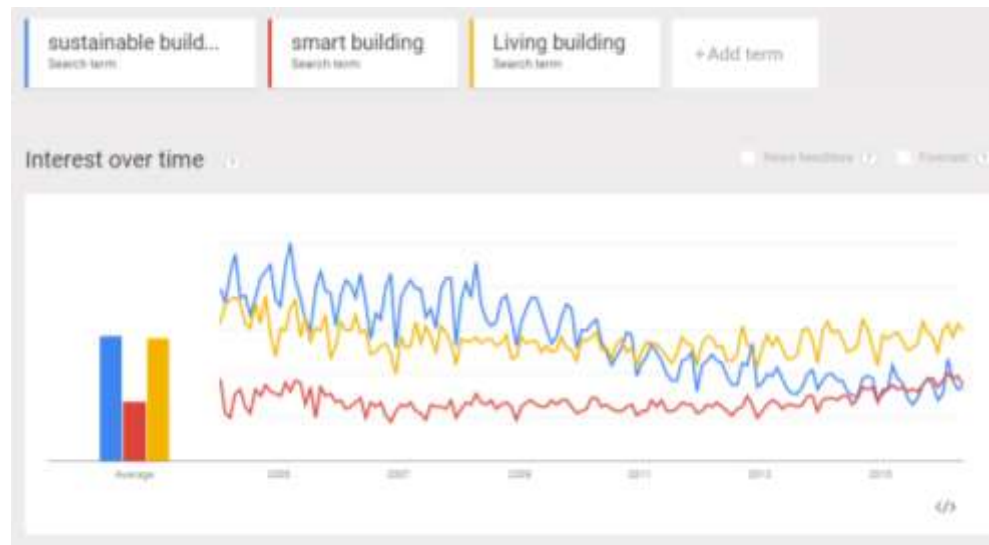
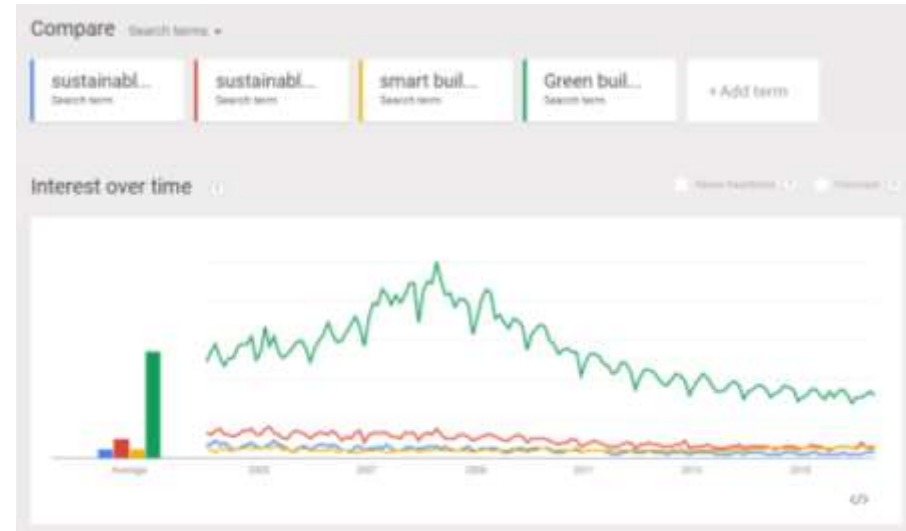
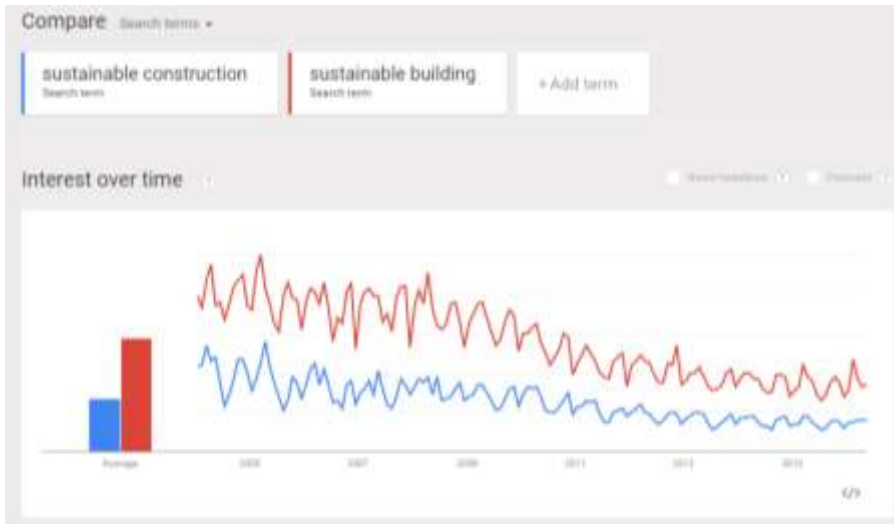
657 GW installed capacity by 2014



Sophisticated renewable materials



SC is old hat

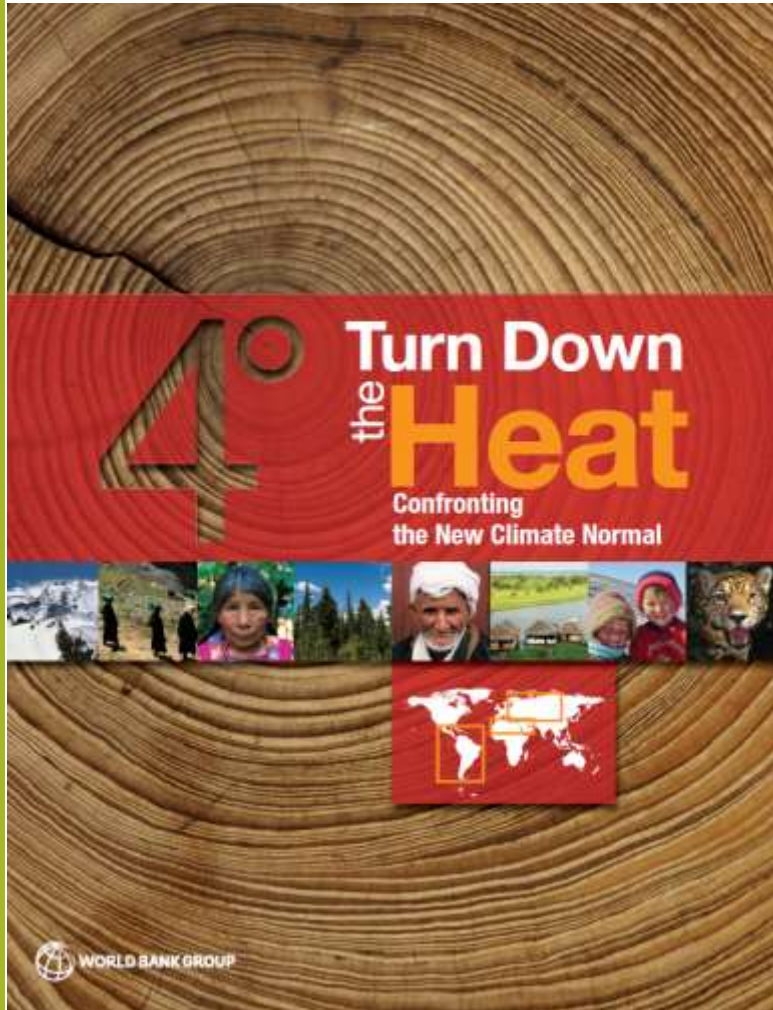




IT'S THE END OF THE
WORLD AS WE KNOW IT

A new climate normal

11



At 4 °C warming there is serious doubt whether development goals can be achieved

Rapidly closing window for action. The buildup of carbon intensive, fossil-fuel-based infrastructure is locking us into a future of CO₂ emissions. The International Energy Agency (IEA) has warned, and numerous energy system modelling exercises have confirmed, that unless urgent action is taken very soon, it will become extremely costly to reduce emissions fast enough to hold warming below 2°C.

A new class of refugee

Since 2008, an average of 26.4 million people have been displaced by disasters every year



The new urbanization challenge

13



Moving 1 billion people in 30 years
...peacefully

An intelligent, connected world

14

 **Sophia (Robot)**
@SophiaRobot2 [Follow](#)

My message is use seat belt while u are in the car.



11:53 AM - 27 Oct 2017

3 Retweets 4 Likes

👤👤👤

📍 CIC Saudi Arabia, CNN Breaking News, Forbes and 7 others

🗨️ 1 📄 3 📧 4

United Nations Declares Internet Access a Basic Human Right

NICHOLAS JACKSON | JUN 3 2011, 4:17 PM ET

The report comes the same day that a monitoring firm found two-thirds of Syria's Internet access has been shut down without notice

1,107

 Tweet

1


 g+1

 in

 Share

More ▾






“The real problem of humanity is the following: we have paleolithic emotions, medieval institutions and god-like technology; and it is terrifically **DANGEROUS** and it is now approaching a point of crisis overall”

Edward Wilson

Learning *to*
Die
in the
Anthropocene



REFLECTIONS ON THE
END OF A CIVILIZATION

Roy Scranton

“Scranton draws on his experiences in Iraq to confront the grim realities of climate change. The result is a fierce and provocative book.”

—Elizabeth Kolbert, author
of *The Sixth Extinction*

“For humanity to survive in the Anthropocene, we need to learn to live with and through the end of our current civilization”

7 Stages of Grief

(Modified Kubler-Ross Model)

Shock*

- Initial paralysis at hearing the bad news.

Denial

- Trying to avoid the inevitable.

Anger

- Frustrated outpouring of bottled-up emotion.

Bargaining

- Seeking in vain for a way out.

Depression

- Final realization of the inevitable.

Testing*

- Seeking realistic solutions.

Acceptance

- Finally finding the way forward.

Dealing with the great grief

THE MASS EXTINCTION
OF OTHER SPECIES CAUSES
MORE GRIEF THAN I CAN
BEAR.



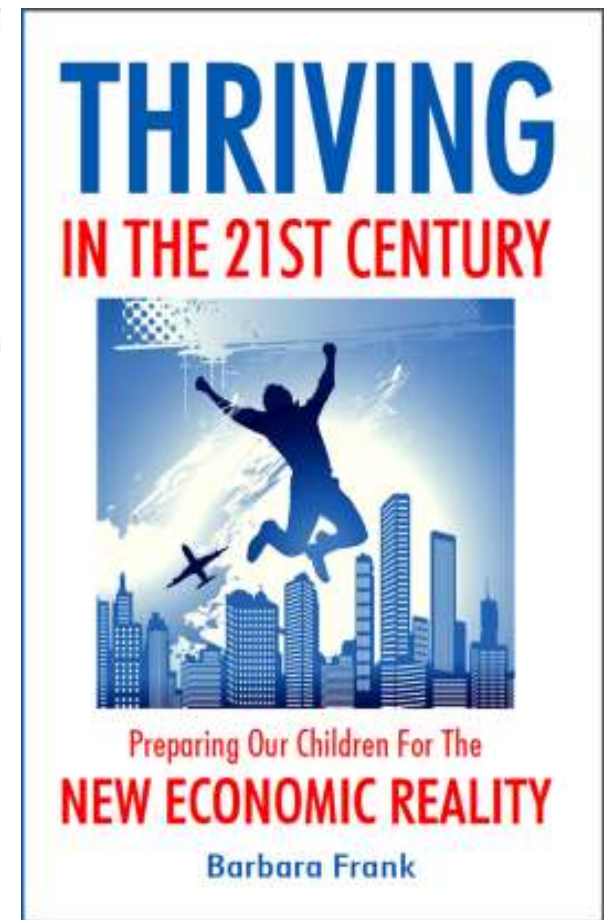
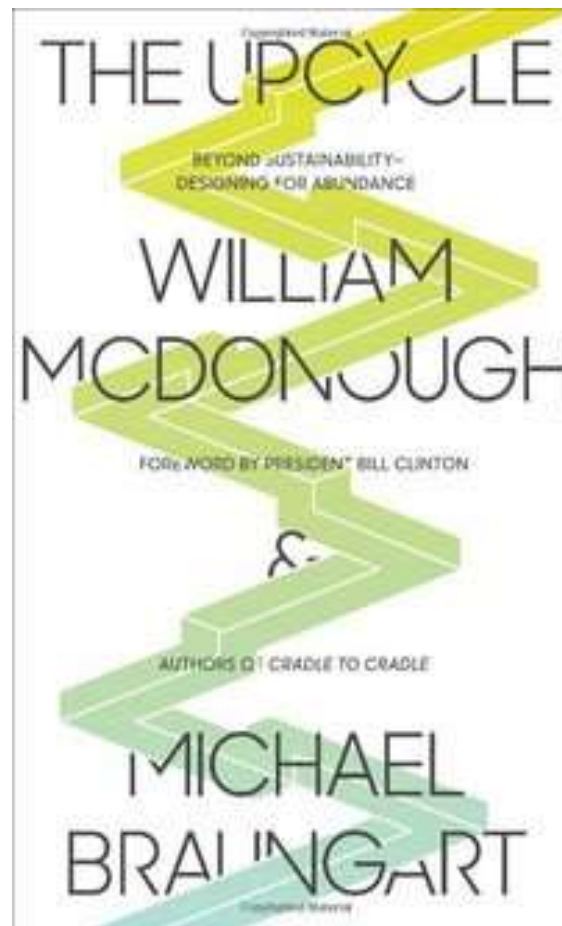
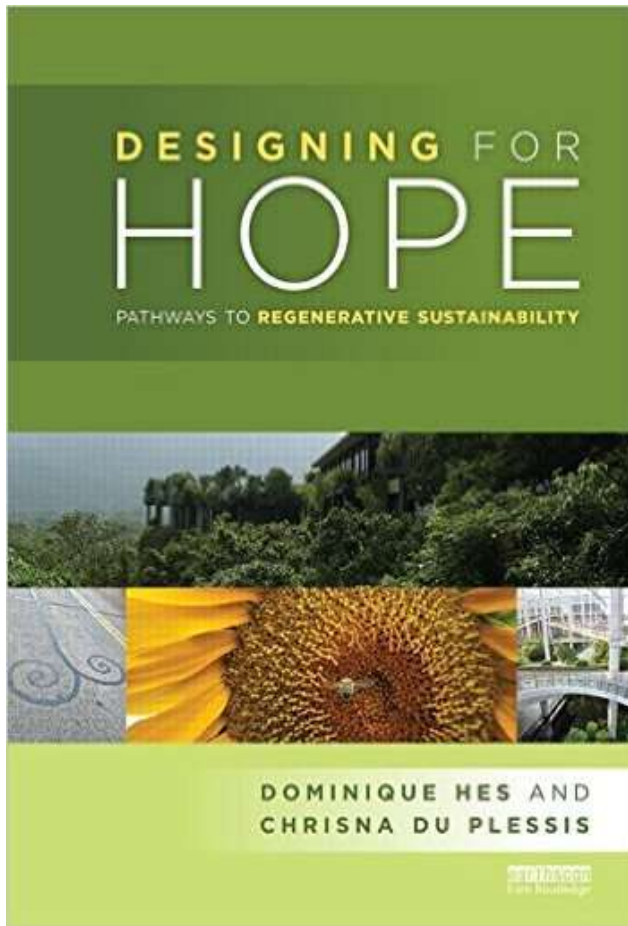
mimiandunice.com


SO,
DENY
IT!



http://www.ourbreathingplanet.com/wp-content/uploads/2011/03/ME_193_Denial1.png

Needing to find hope





- How do we create an abundant and thriving future in which all species can flourish for all time?

To do different things
we need to do things differently
(new process)

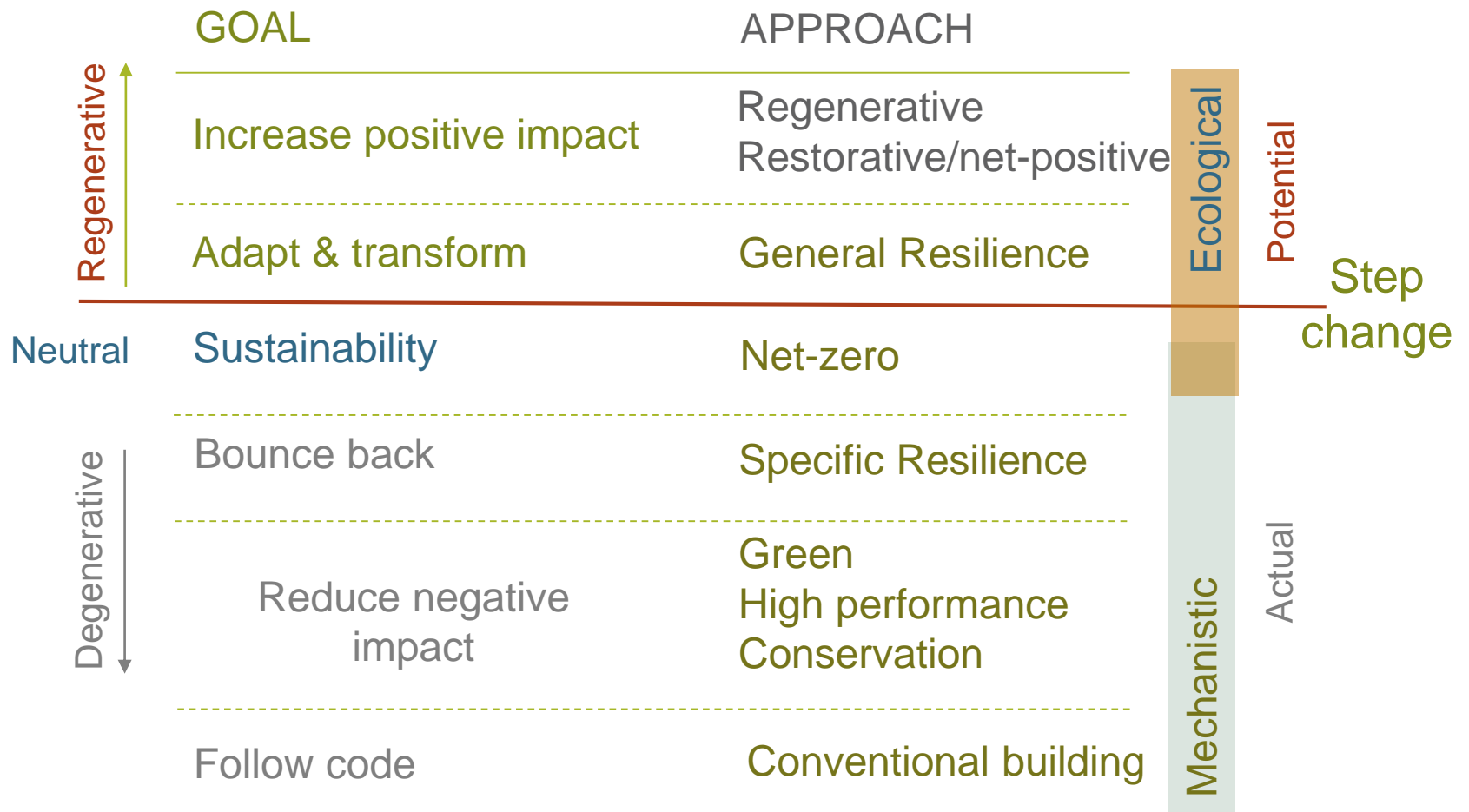
Before we can do things differently
we need to think about them differently
(new purpose)

Before we think differently
we need to be different
(being and becoming – express deeper values)

NEW CONCEPTUAL FRAMEWORK

Sustainability is evolving
Narratives are changing

An evolving understanding



Shifting narratives

FROM	TO
Doing less bad	Doing more good
Negative	Positive
Return on investment	Value added
Use	Exchange
Protect system health	Pursue wellbeing

21

species and still counting ...

Dragonflies Sighted in Khoo Teck Puat Hospital



FUTURE RESEARCH

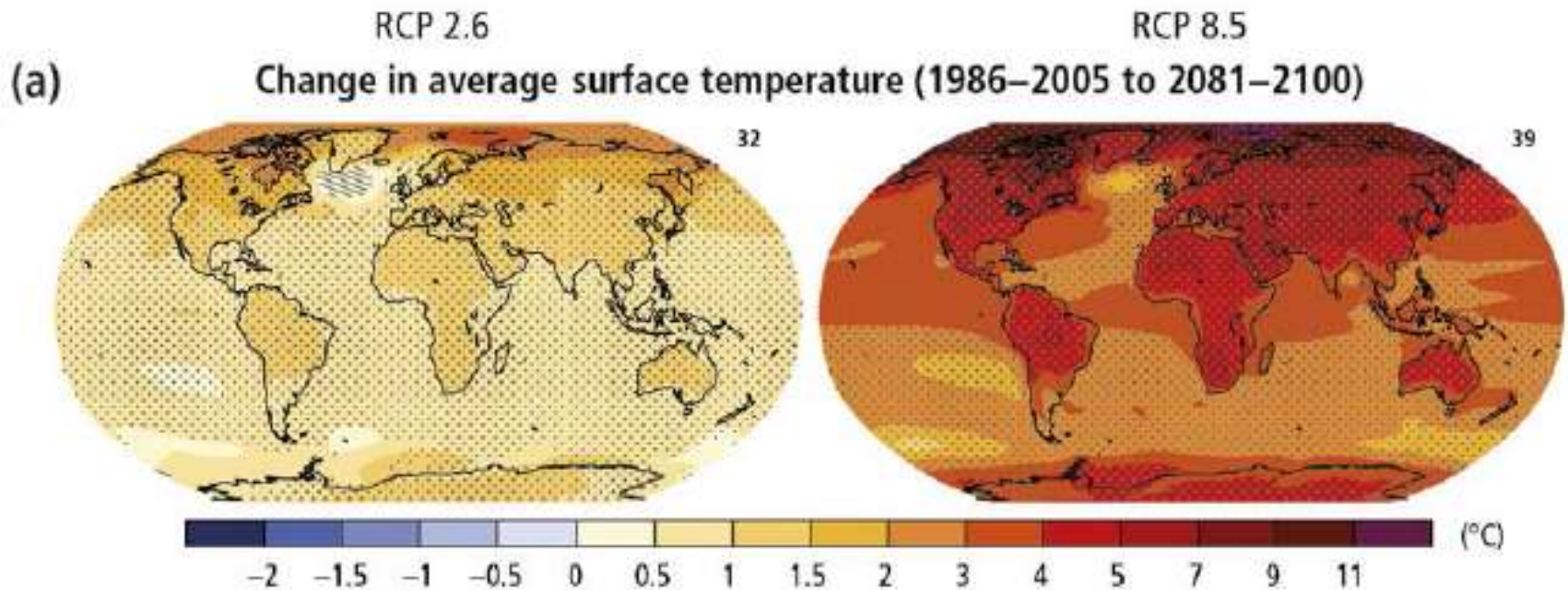
Building on existing knowledge

- Making sense of the data
 - Mining BIM and BMS data (ethically)
- Integration made easy
 - GIS and LCA info included in BIM models
 - BMS and the Internet of Things
- LCA for building materials
 - Keeping things honest
- Offsite construction

Challenges to inform new research ²⁷

- The climate map is changing
 - what happens to performance of green buildings?
 - How do we transfer learning between shifting climate zones?
- How do we 'measure' regenerative/contributive projects?
- Integrating across scales and cross-scale decision-making
- Accommodating the expanded built environment team
- The soft issues: behaviour changes & values

The climate map is changing



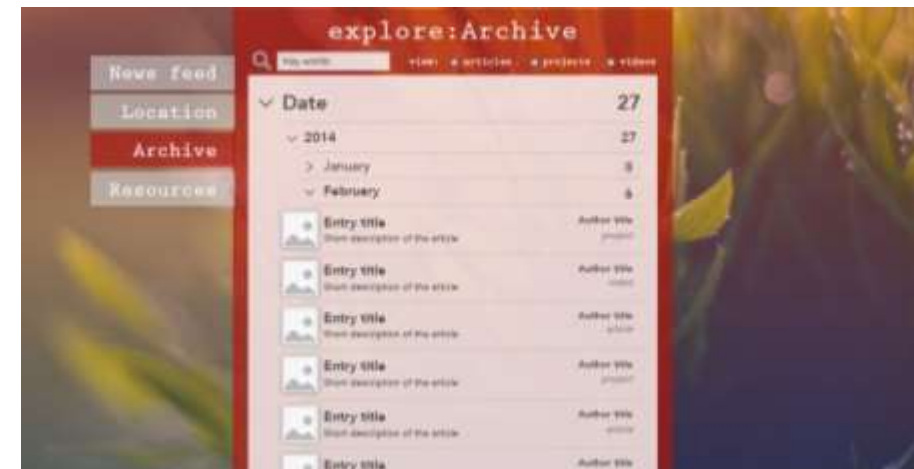
http://assets.climatecentral.org/images/made/9_27_13_andrew_futuretemp_change_500_201_s_c1_c_c.png

- What happens to performance of green buildings?
- How do we transfer learning between shifting climate zones?

A knowledge platform



- Collaborative
 - Theory development
 - Case study capture
 - Tool development

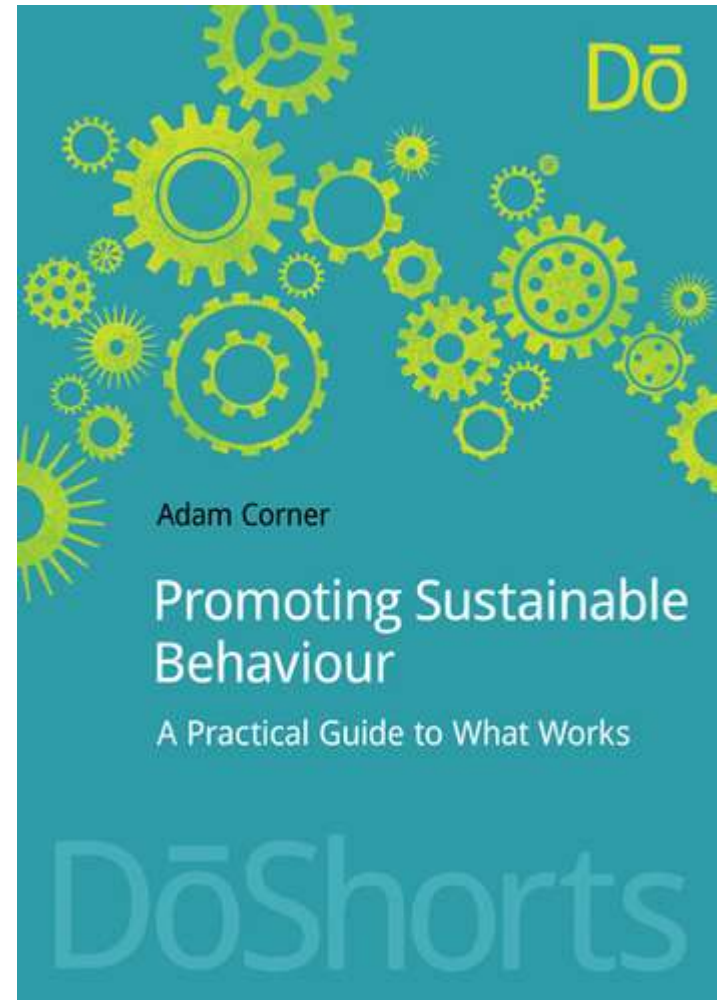


Design for sustainable behaviour

30



<http://newyork.thecityatlas.org/files/2012/06/take-the-stairs.jpg>



Next generation bio-based material ³¹





REGENERATIVE D & D

Reconnect that which is disconnected
Heal fractured systems

Devise new ways of being and doing
Create conditions for evolution & emergence
Contribute to greater system wellbeing

SUGGESTIONS?
