IEA Committee on Energy Research and Technology

Innovation for Cool Earth Forum (ICEF) Fintech

Georg Erdmann, retired Professor for Energy Systems at Berlin University of Technology

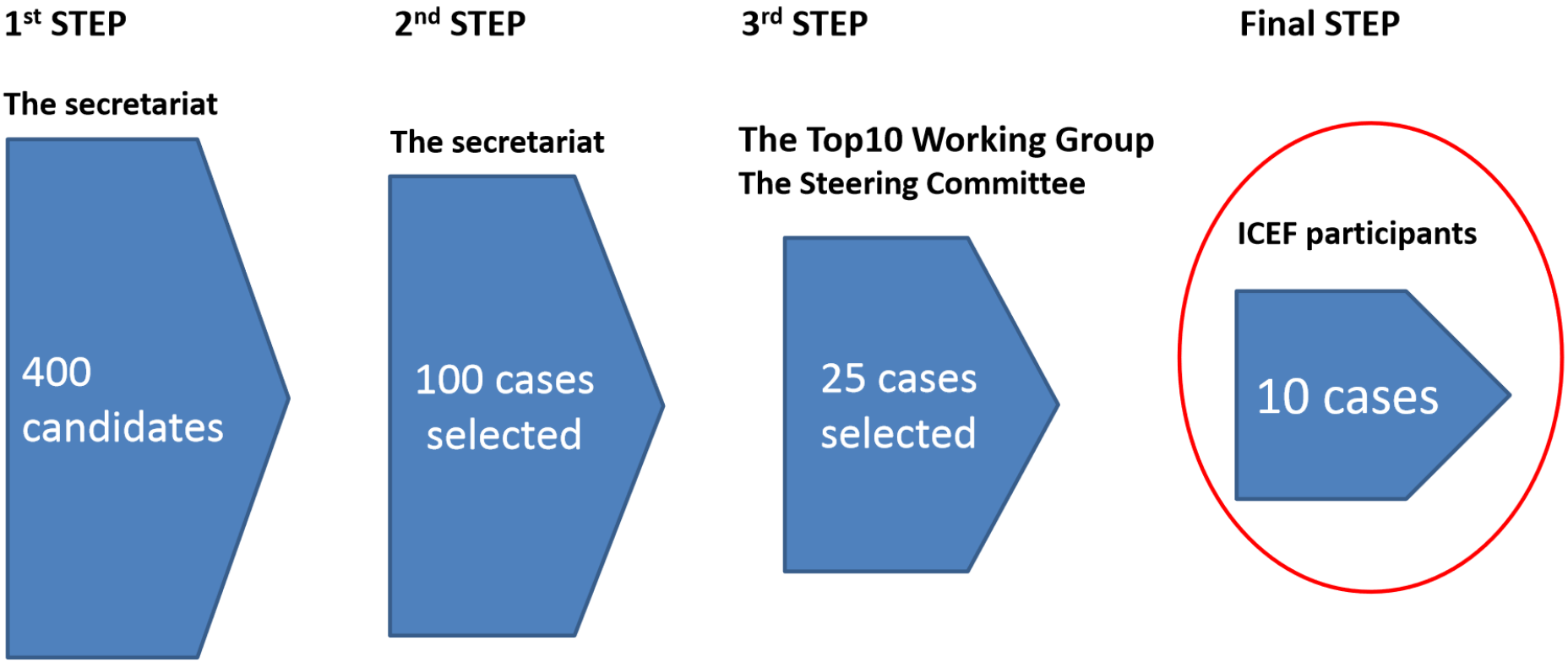
Major ICEF Products

1. Annual Meeting in Tokyo with ~1000 participants from ~80 countries aiming
   - to discuss technological and social innovations in order to achieve the ultimate goal of achieving “net zero CO_2 emissions”
   - to encourage the cooperation among participants

2. ICEF Top 10 Innovations: Election of the most notable among recent innovative developments in energy and climate mitigation in a 4 step selection process
   - Participants of the annual ICEF meeting select the Top 10 Innovations from a short list of ~25 proposals
   - The result is presented during the closing session

3. ICEF Innovation Roadmap project: Use the ICEF platform to promote the development and deployment of clean energy technologies
   - Solar and Storage (2015)
   - Zero Energy Buildings (2016)
   - Carbon Dioxide Utilization CCU (2016-2017)
   - Carbon Dioxide Removal / Direct Air Capture DAC (2018)

Selection Process of ICEF Top 10 Innovations



ICEF Top 10 Innovations: 2018 Winners

Category A: Technologies foreseen by 2050	
Osaka University	New materials for photocatalysts to produce hydrogen
Giner Inc.	High efficiency ammonia synthesis from water and nitrogen
Advanced Reactor Concepts, LLC.	Advanced small modular reactor (aSMR)
C2CNT LLC	Capture and conversion of atmospheric CO_2 into carbon nanotubes
University of California (UCLA) and CO_2 Concrete, LLC	Turning carbon dioxide into concrete
Hitachi and Tohoku University	Development of a new, low combustible electrolyte for lithium ion batteries
NEDO, IHI Corporation	The world's first 100 kW class demonstration test of ocean current power generation
Category B: Business Model Transformation	
Climeon	Converting waste heat into electricity
Tesla, Inc.	Delivering 100 MW storage within 100 days
Alstom	The world’s first hydrogen-powered train

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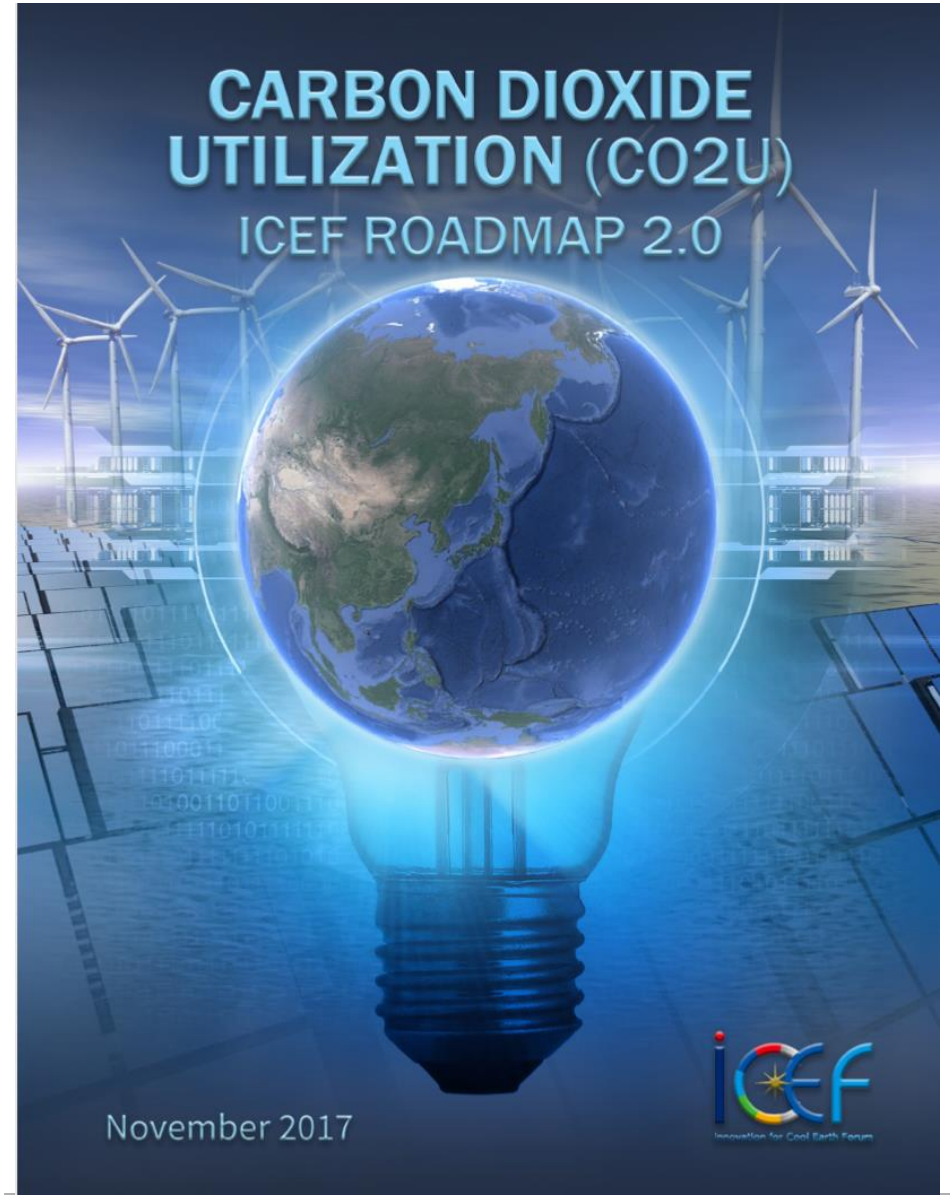
https://www.icef-forum.org/platform/report.php



Fintech Innovations

1. Fintech includes innovations such as
   - Blockchain
   - Internet-of-Things (IoT)
   - Data Mining using “big data”
   - Artificial Intelligence (AI),
   - Mobile payment systems
   - Micro finance and crowd funding

2. Many startups (in Berlin alone more than 700)

3. The market entry of Fintech solutions will only be successful if they promise a significant benefit against conventional financial solutions. This is not always obvious

4. Regarding the present r&d efforts, some Fintech innovations will be rather successful and shall create disruptive changes affecting many business sectors and the society

General Fintech Observations

1. Many Fintech innovations have other primary goals than GHG reductions

2. According to the results of the recent ICEF meeting, Fintech innovations encourage bottom-up approaches

3. Therefore Fintech innovations can contribute to energy and environmental improvements towards a low-carbon economy as “unintended sideline effects”

4. Fintech innovations (micro credits) shall play a major role in developing countries where the conventional financial markets are not rather developed

5. Regarding the situation in Germany, it seems that there is presently no capital shortage

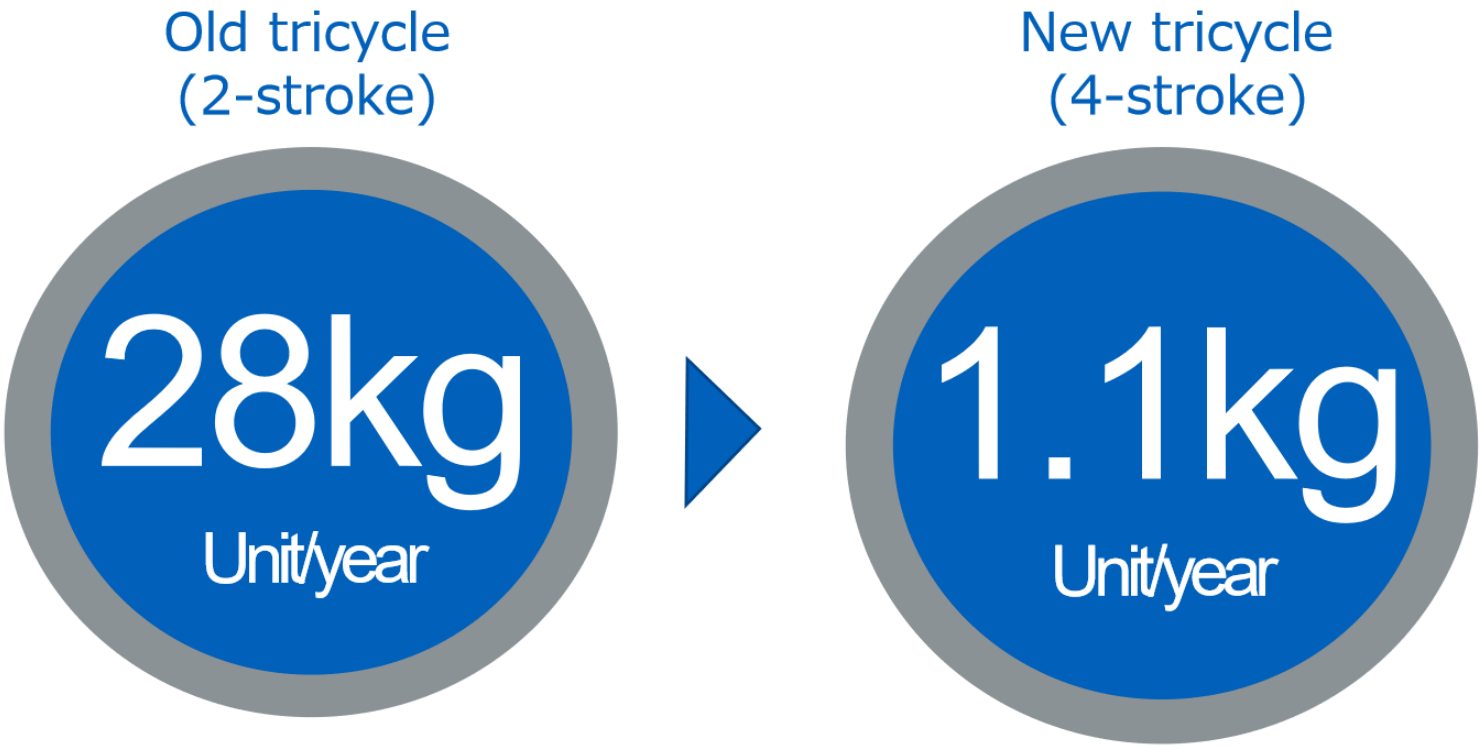
6. But the success of Fintech innovations is often limited through lack of management skills and the complexity of regulations

Example 1: Presentation of Marei Oshima

Create economical and environmental empowerment by FinTech

Global Mobility Service Inc.

The impact of tricycle replacement (PM)



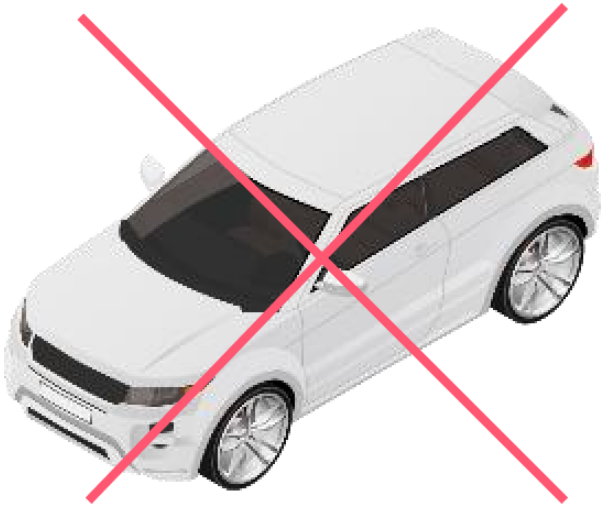
Solution by GMS IoT Device

MCCS

Mobility-Cloud Connecting System

Patent : PCT submitted

Mobility with MCCS Device



MCCS can deactivate the engine once the customer don't fulfill the financial obligation

Example 2: Presentation of Matthew McShane (TRINE)

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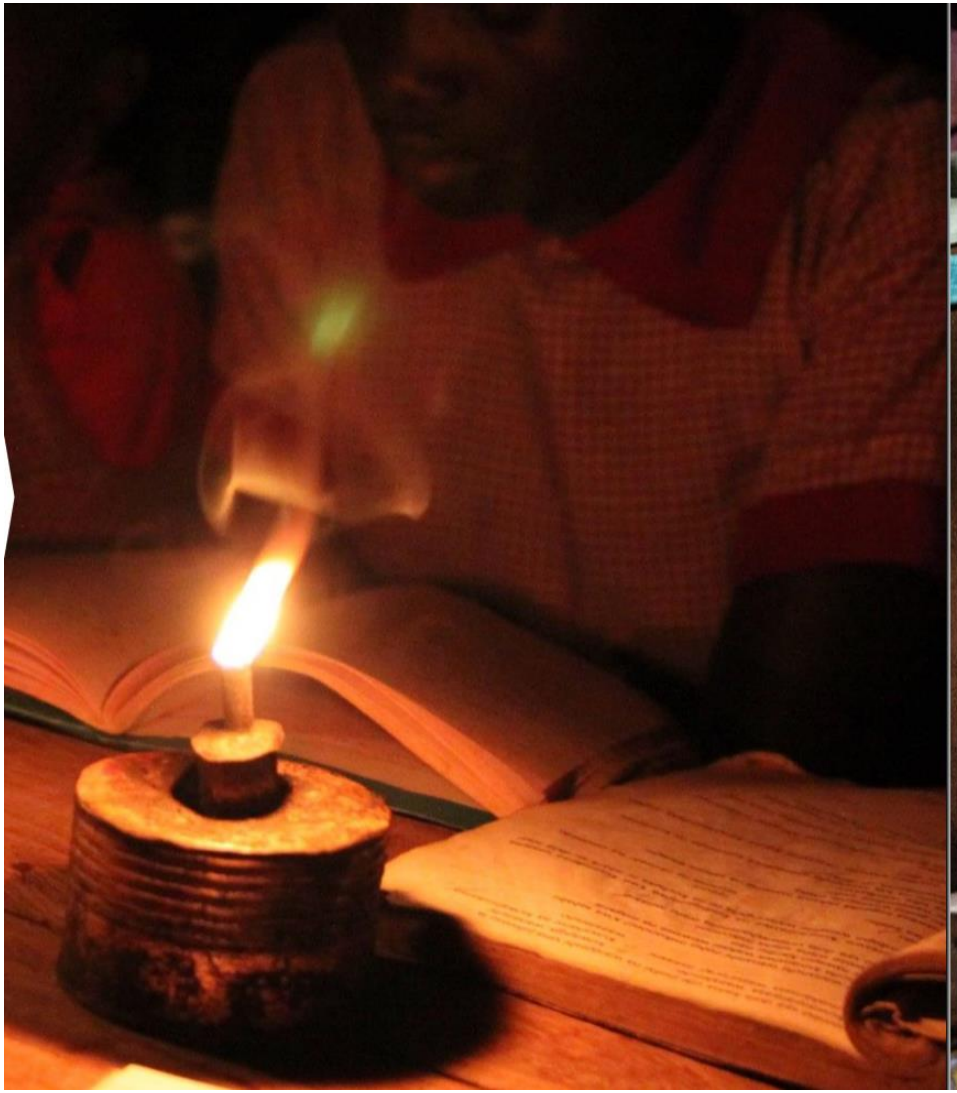

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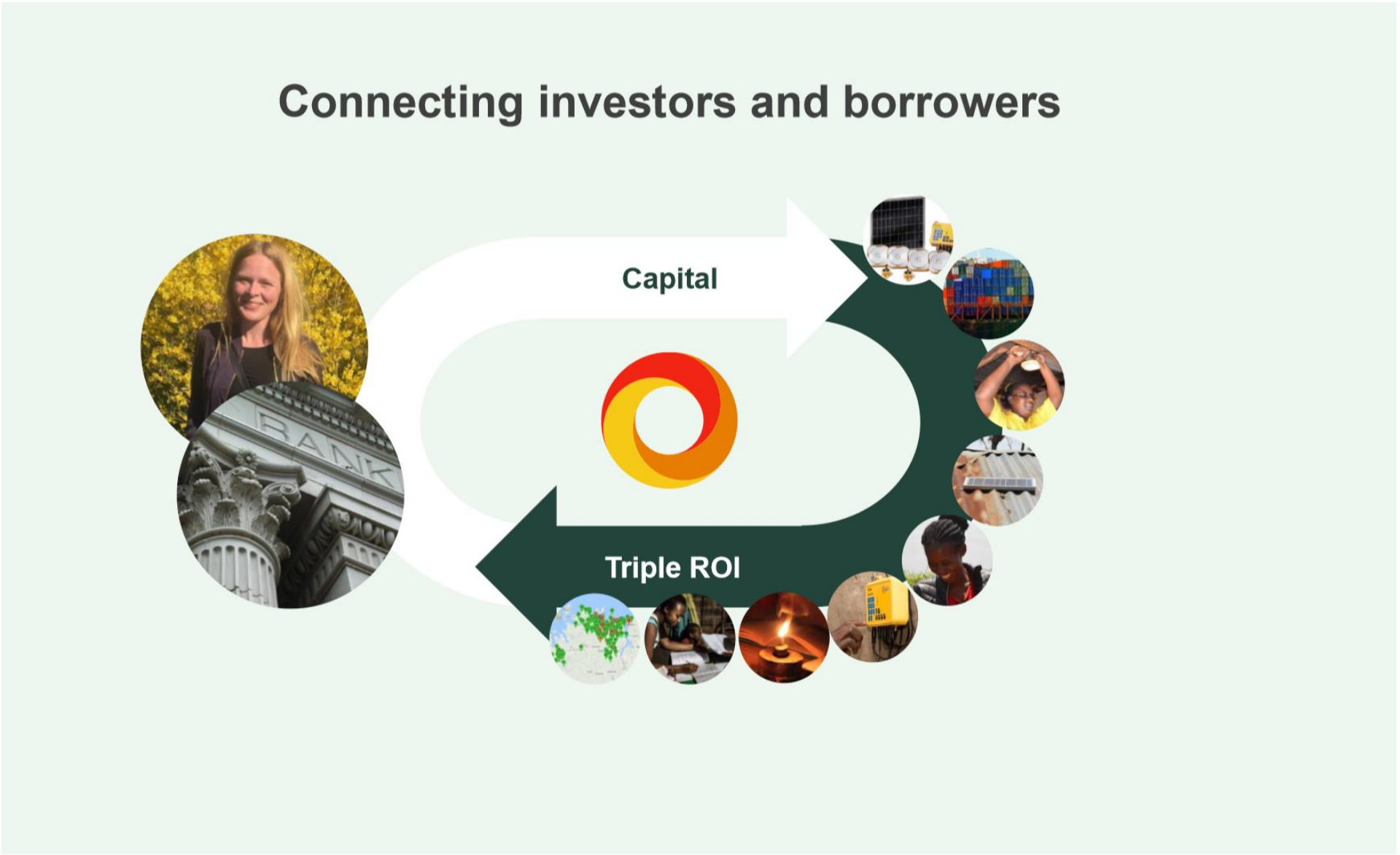

General Observations on Fintech Innovations

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General Fintech Caveats

1. Fintech innovations – like all other innovations – are faced with the well known environmental externalities. Without a strong climate policy commitment a low-carbon economy will not be reached. But there are other negative Fintech externalities:
   - What would be appropriate strategies to tackle with cyber security issues (particularly relevant if Fintech is applied in infrastructure industries)?
   - "Big data": Who should be the legal owner or personalized data?
   - What the legal owner of the data is allowed to do with them?
   - How to define the "misuse of personalized data"?

2. Fintech business may live from the value of data collected. Control of the own identity versus cheap consumption – is this an ethical acceptable and sustainable business model?

3. Is credit scoring via artificial intelligence a first step towards the control of human decisions through machine learning algorithms?

4. Potential market power of Fintech platforms (Amazon, Facebook, Google, …)

My Conclusions on the ICEF Fintech Session

1. Probably no other ICEF session ever had such a young podium (with the exception of the chair). But they had sound and convincing ideas on how their Fintech business concepts will economically. And they presented their ideas with lot of emotions and engagement

2. The speakers focused not on greenhouse gas abatement but on how to improve the people's quality of life. The environmental benefit will then be an indirect and long tern consequence of today's Fintech innovations

3. International organizations should monitor Fintech in developing countries because eventual negative developments should be identified and prohibited. If this monitoring is successfully integrated in the general UNFCC monitoring, then an opportunity to improve both the climate and the welfare might emerge