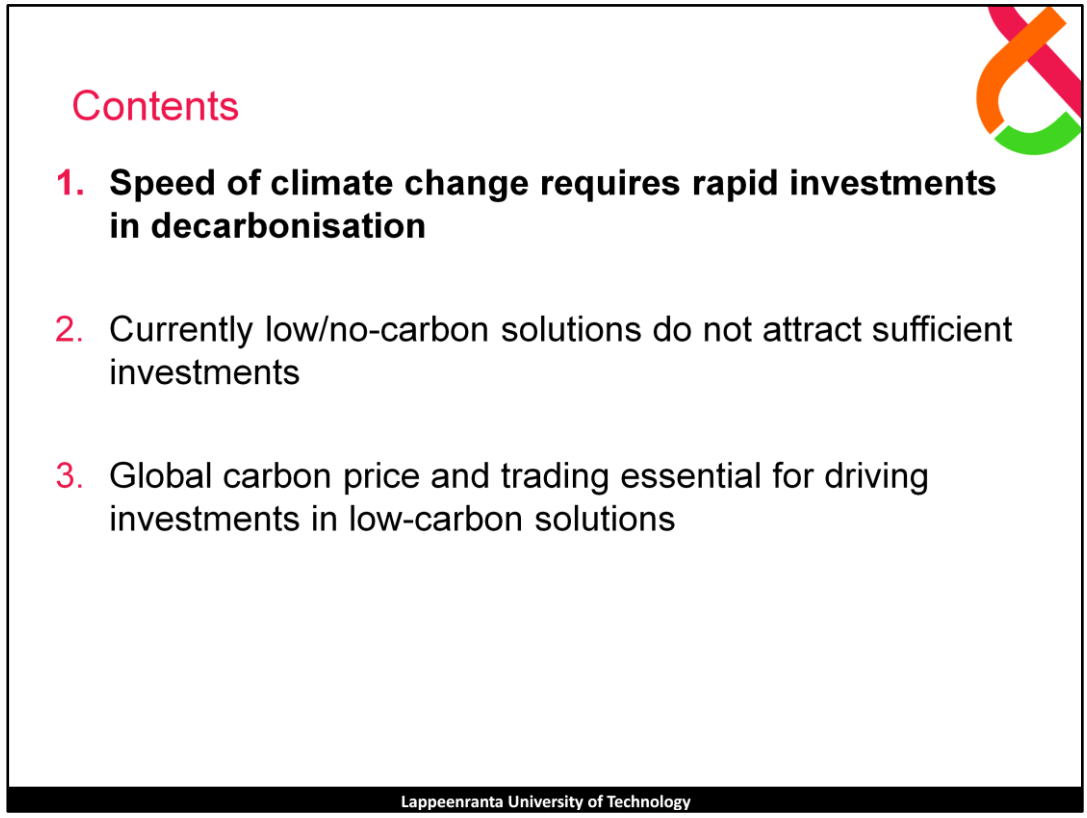
The author was invited as a key note speaker to the FITH SESSION OF THE UN GENERAL ASSEMBLY OPEN WORKING GROUP ON SUSTAINABLE DEVELOPMENT GOALS (25-27 November 2013). Due to an emergency the presenter was not able to participate in the session. This is an updated version of the presentation published by Lappeenranta University of Technology, in which is the author has an academic affiliation.

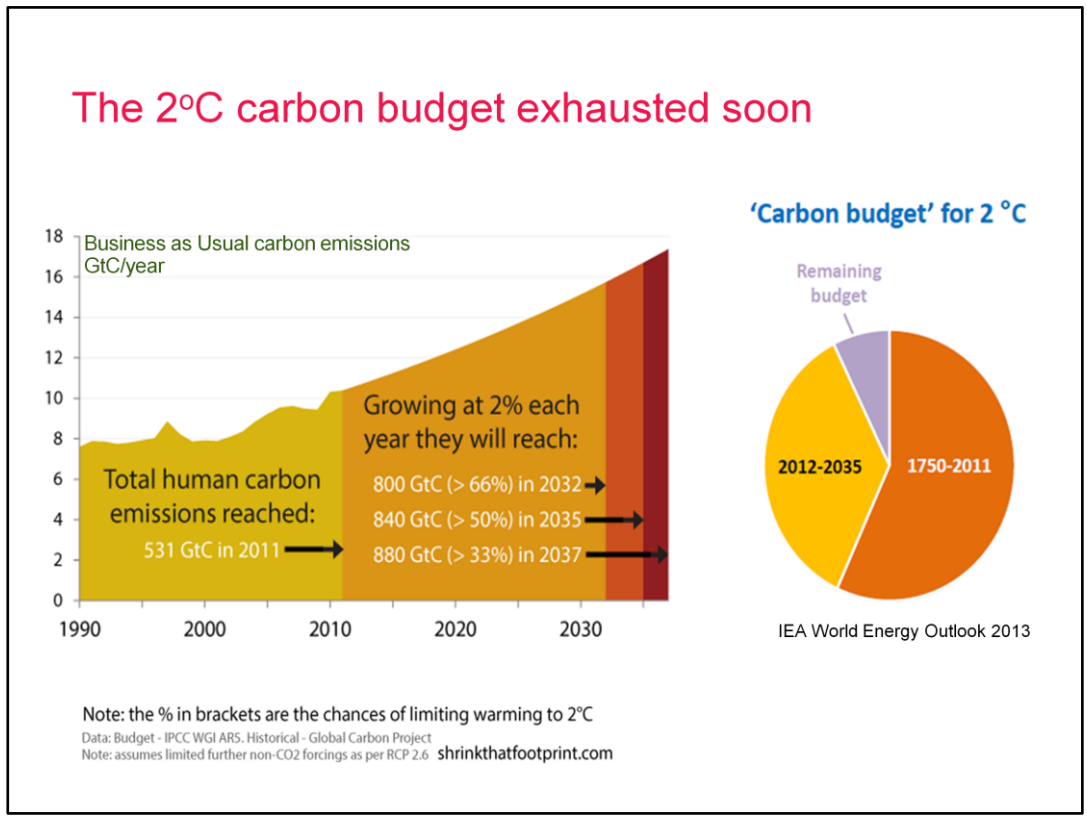
According IEA, as the source of two-thirds of global greenhouse-gas emissions, the energy sector will be essential in determining whether or not climate change goals are achieved.

My presentation addresses the issue from the investor point of view.



The presentation has 3 parts, I would like illustrate how the speed of climate change requires rapid investments in decarbonisation and currently low/no-carbon solutions do not attract sufficient investments and based on our experiences propose a global carbon price and trading as a best solution to attract enough low/no-carbon investments and drive down existing emissions.

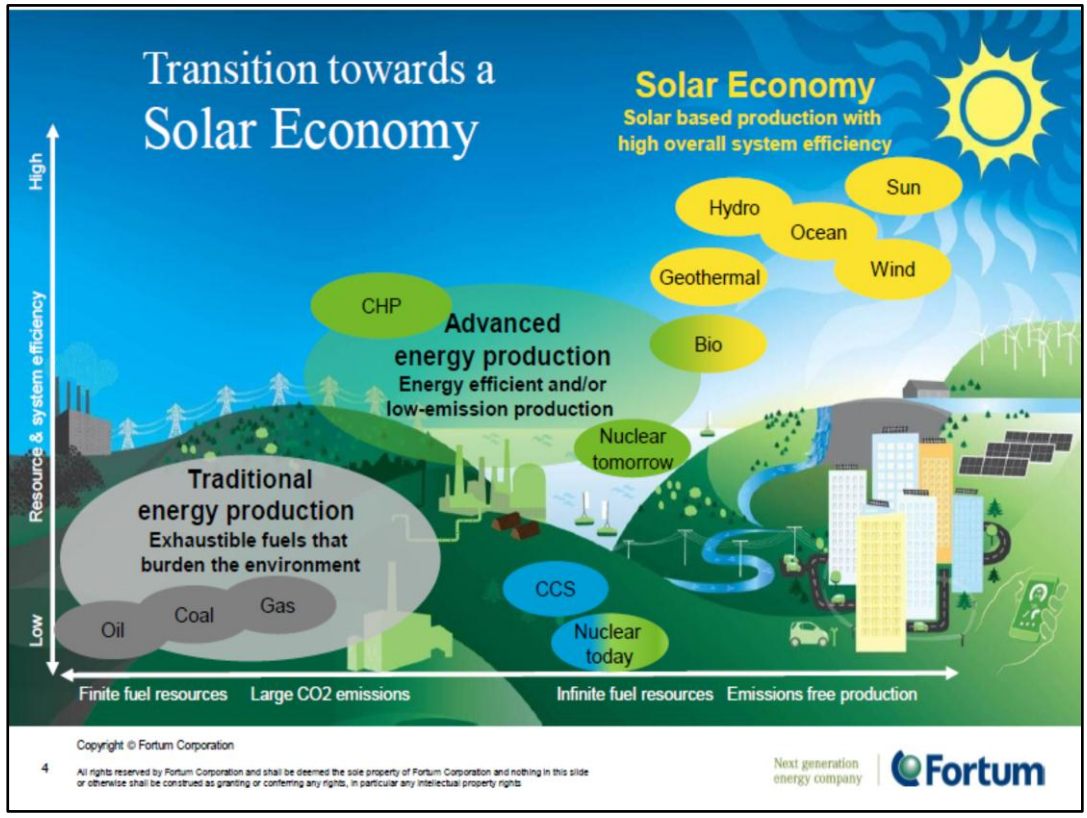
Lets start with a speed of change…



As illustrated in the IPCC WG1 report we are rapidly filling our 2 C carbon budget. With a business-as-usual scenario in 2032 we would have 66% chances to stay with 2C scenario and 2037, only five years later, only 33% chances. Taking into account the long time horizon of energy investments, this future is scary close.

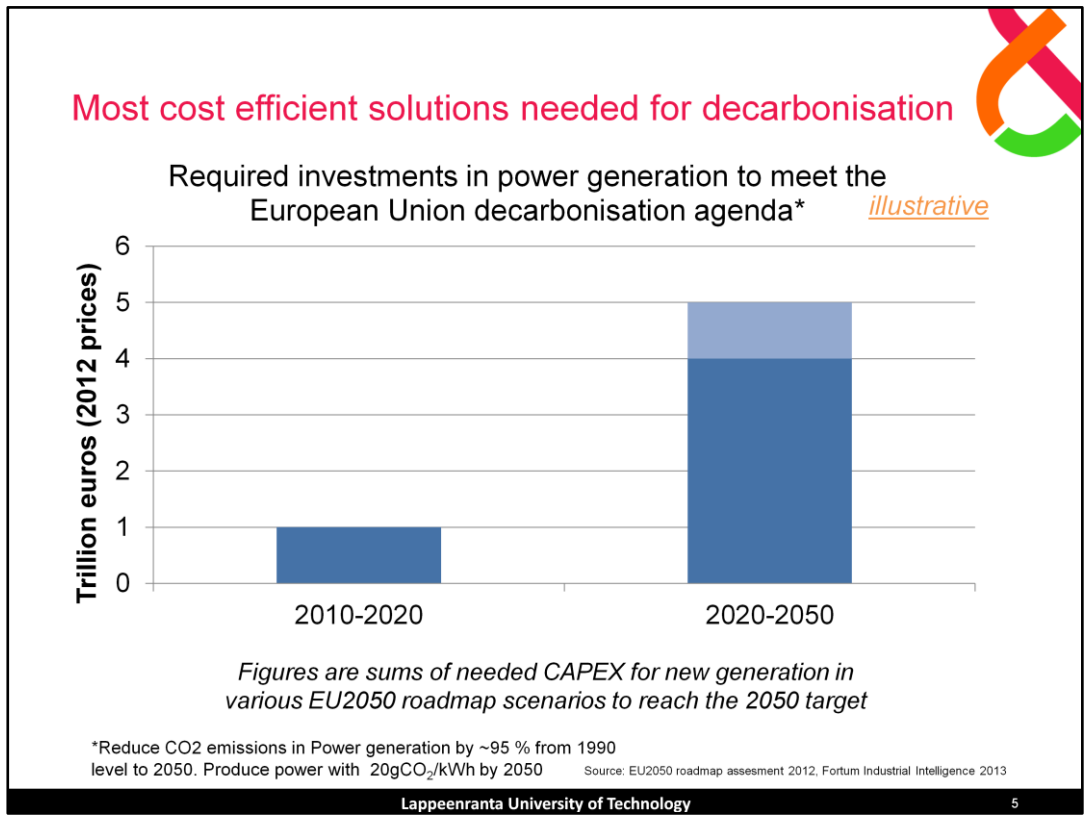
IEA informed already in 2011 that 80% of the total energy-related CO2 emissions permitted to 2035 in the 450 Scenario are already locked-in by existing capital stock, including power stations, buildings and factories. Without further action by 2017, the energy-related infrastructure then in place would generate all the CO2 emissions allowed in the 450 Scenario up to 2035.

"As each year passes without clear signals to drive investment in clean energy, the "lock-in" of high-carbon infrastructure is making it harder and more expensive to meet our energy security and climate goals," said Fatih Birol, IEA's Chief Economist.



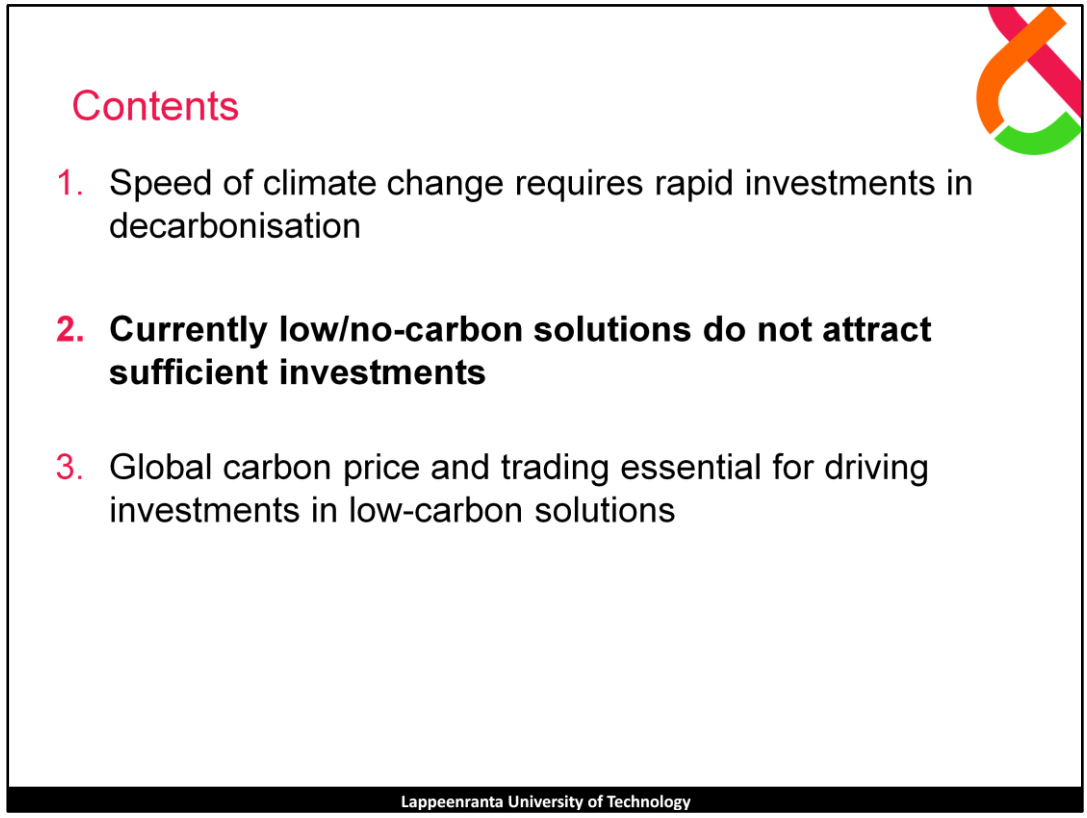
Fortum Corporation, a Finnish company that provides sustainable energy solutions, illustrates the change with this picture. We need to transitions ourselves from traditional energy production based of exhaustible fuels that burden the environment, into advanced energy production with higher energy efficiency and low-emissions and finally into solar based production with high overall system efficiency. Fortum call this Solar economy. It means to have energy directly as solar electricity or heat, and also indirectly as hydro, ocean, wind and bioenergy, and geothermal energy.

The main question is how we could do the transformation fast enough to stay under 2C carbon budget.

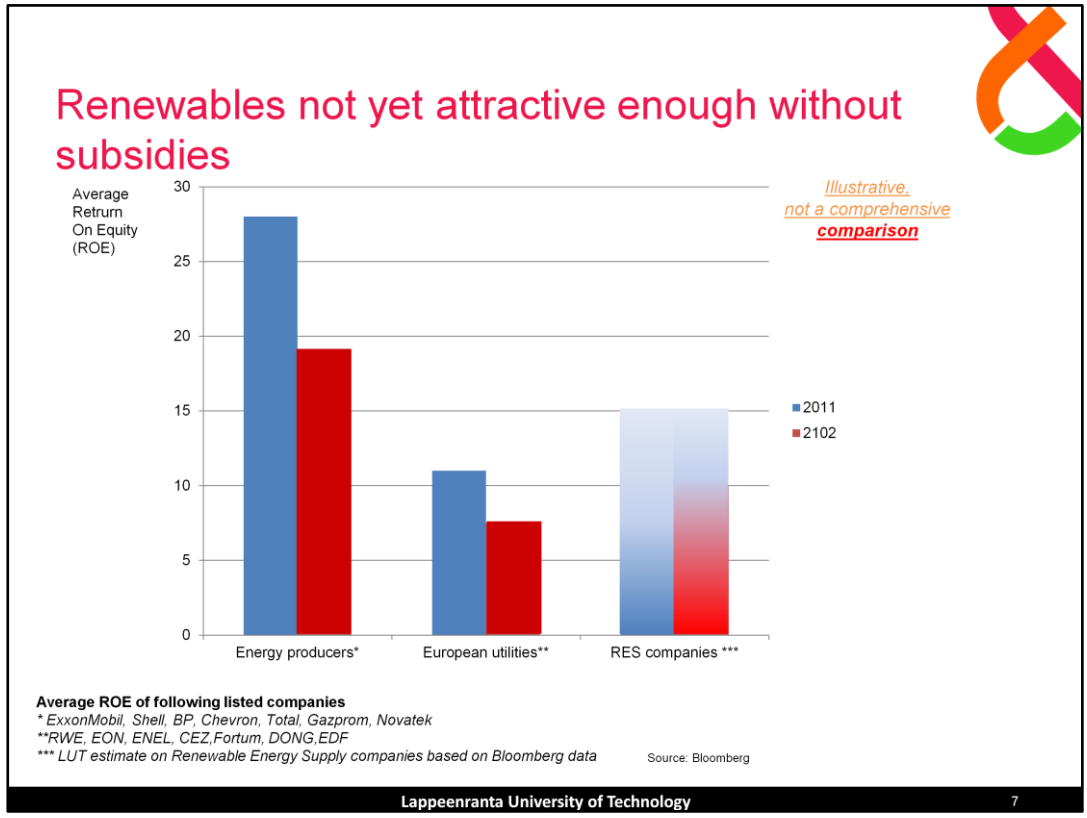


In order ro understand the magnitude of change, we studied investments needs for decarbonisation. In EU alone the required investment level between 2010-2020 is around 1 trillion euros and between 2020-2050 4-5 trillions more are needed. The investment volumes are so big that without capital markets they would not be possible. We should also adjust our policies from a long time global horizon keeping closely in mind the huge monetary volume needed for this massive change.

Lets see how investments behave today…



Currently low/no-carbon solutions do not attract sufficient investments

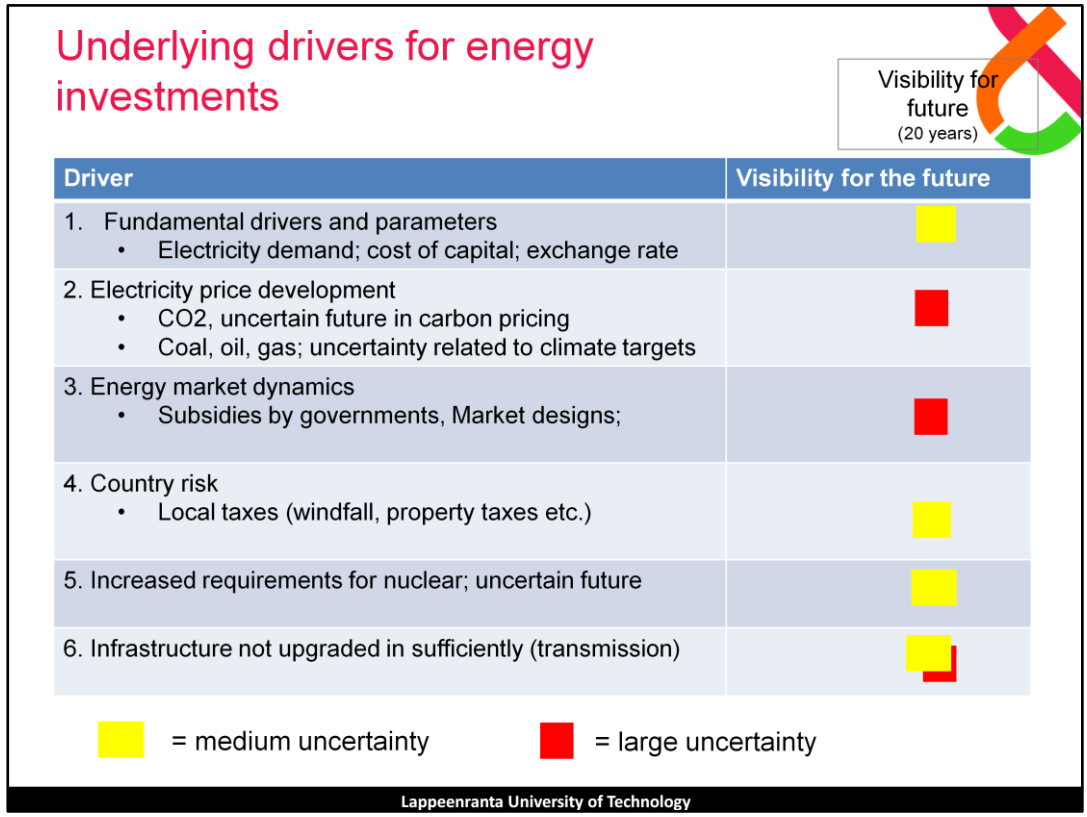


Investments into energy production like in oil & gas typically create 20-30% returns while investments into current utilities and renewable equipment manufacturing much less. Due to the absence of specialized RES generation firms data, their data is not shown here, but generally RES returns are between 5-15% with subsidies.

Globally, still majority of the energy money goes to the fossil side. The Grantham Research Institute on Climate Change and the Environment from the London School of Economics reported that last year top 200 oil, gas and mining companies have allocated $674bn/y for finding and developing new fossil reserves. According to the World Resources Institute over 1000 new coal-fired plants, with a total installed capacity of 1,4 billion megawatts (MW), are being proposed globally. If they will be build the investment need would be over 1 trillion. According IEA, fossil fuels currently meet 80% of global energy demand. Even if current policy commitments and pledges made by countries to tackle climate change and other energy-related challenges were to be put in place, global energy demand in 2035 is projected to rise by 40% – with fossil fuels still contributing 75%. In parallel, according Bloomberg (14 January 2013) the investments into clean energy were 2012 around $270 billion/y and they decreased $30 billion from year 2011.

To my view, the investment volumes into clean energy are a way too low and the downward direction is alarming. IPCC WG3 estimated in that in order to achieve low-stabilization levels (430-530 ppm CO2eq) the share of low-carbon electricity supply (renewables, nuclear and CCS) should increase from current approximately 30% level to more than 80% level by 2050. The challenge will grow when fossil fuel prices are falling due to a large price flexibility.

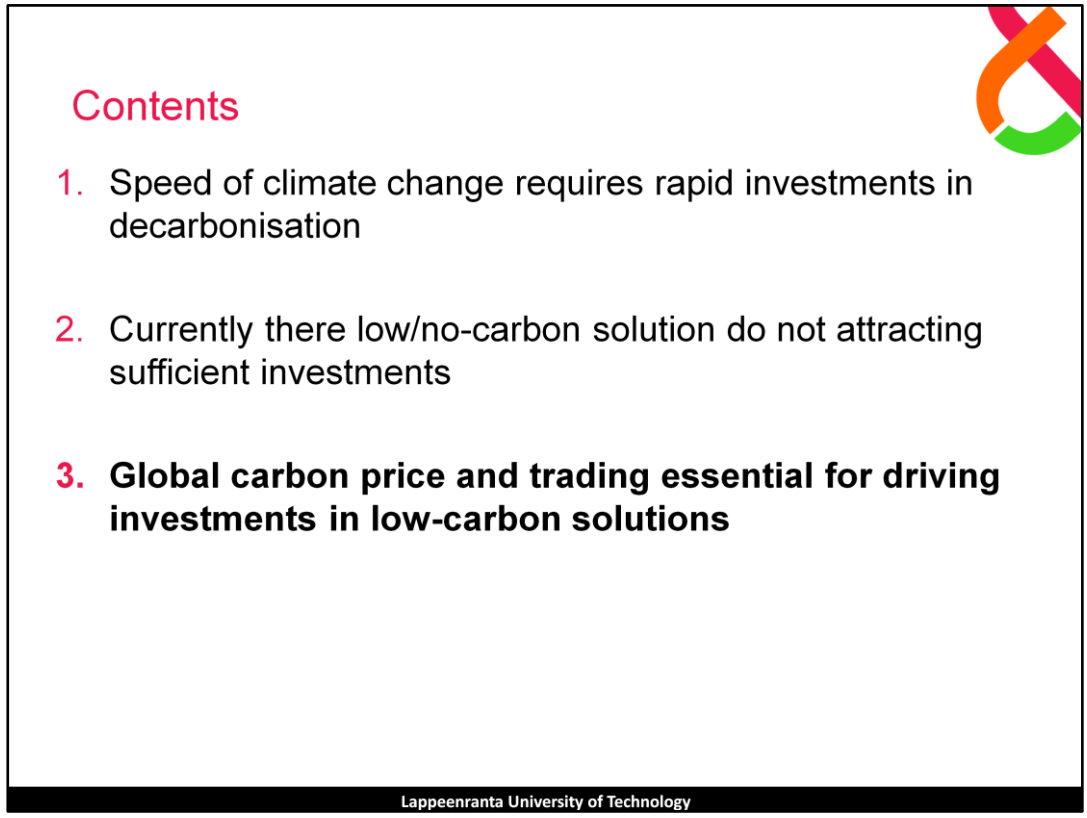
Sourve: J Leggett, M Campanale, Grantham Research Institute on Climate Change and the Environment, London School of Economics / Unburnable Carbon 2013: Wasted capital and stranded assets



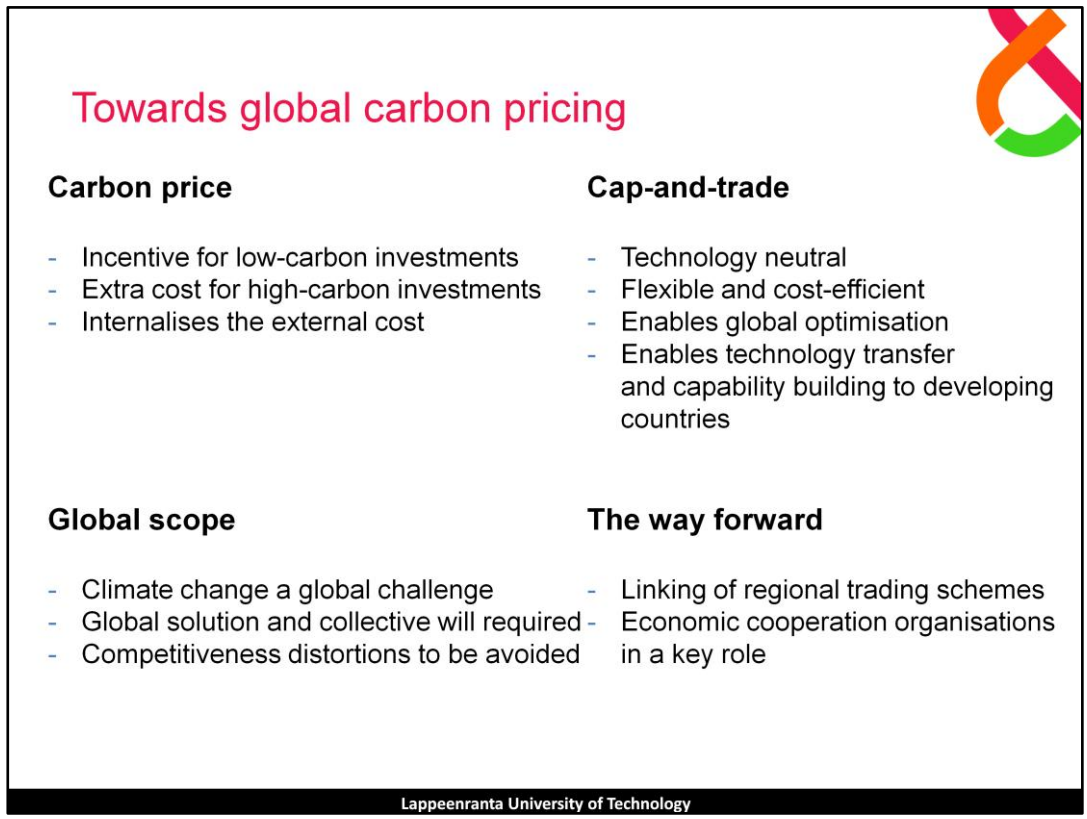
When an institutional investor considers energy investments, he or she analyses these parameters. Since big majority of energy investments have long time horizon, it would be essential that investors could see the future as far as possible. Some of parameters are not specific to energy area, like 1, 4 and 5. But some are specific to our industry, especially 2,3 and 6. Today when the future of carbon price and energy market designs are unclear many investors hesitate investing into the sector. This has been often ”fixed” by subsidies, but by subsidies we cannot ”fix” the big problem. Subsidies typically start to support the market entrance of certain technologies. If they have became permanent for one technology, typically then also other new solutions must be subsidized. And when all new solutions are subsidized it has in some instances led to a situation that also new projects with old technologies need to be subsidized and also existing operating fleets. This leads to local and often expensive solutions and cannot alone create such big change we need to have.

Another challenge in driver 6 is related to energy as a system. If we add a lot new intermittent renewable generation without upgrading the grid and having solutions for demand response or storage, we will end having major stability problems that will limit the growth of renewable energy.

What to do then?



Typically there are no silver bullet solutions for complex problems but this time I think there is one. Our view is that global carbon price and trading would be best solution to attract enough low/no-carbon investments and drive down existing emissions.

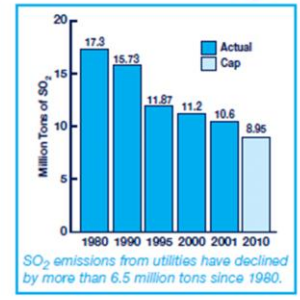


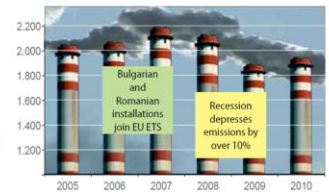
If we had a reasonable price for carbon and it would develop dynamically, it would incentivise low-carbon investments, be extra cost for high-carbon investments and production and it would internalise the external cost. By using Cap-and-trade mechanisms it would be technology neutral enabling global optimisation and technology transfer and capability building to developing countries. We think that it would offer most cost-efficient solution.

Since the climate change problem is global also solutions must be. We wish that by linking regional trading schemes, a global solution can be created.

Success stories in emissions trading

- North America SO2 trading; Full success
  - Sulphur dioxide emissions down faster than predicted and at one-fourth of the projected cost
  - The Economist: "the greatest green success story of the past decade."
- EU Emission Trading System (ETS); Potential success
  - Largest operational system with 11,000 installations
  - Technically working as planned and delivering the emission reduction target
  - Current oversupply of allowances is a consequence from overlapping policies and economic downturn
  - Could be improved for full success for example via dynamic allowance supply adjustment mechanism.





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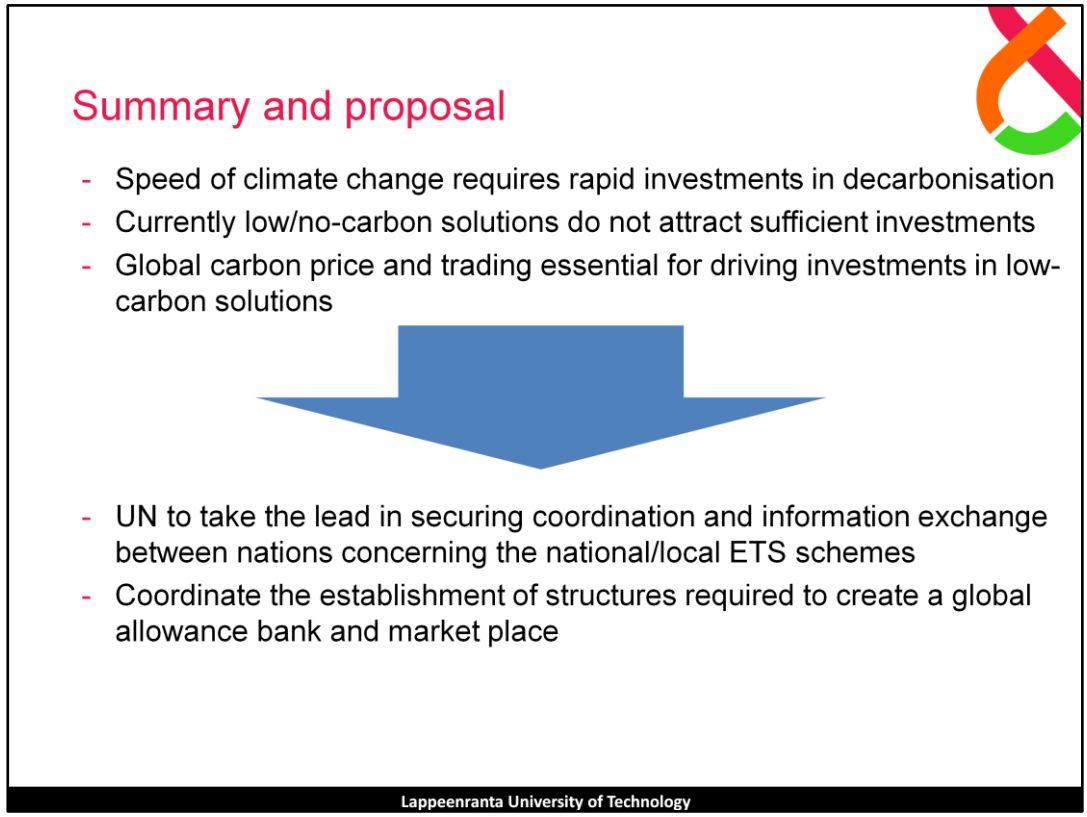
Cap-and-trade market mechanism worked well in SO2 emissions in North America, bringing them down as planned and financially in a very efficient way. The Economist called it "the greatest green success story of the past decade“ and illustrated how this invisible green hand delivered the objectives.

EU Emission trading system was established following many same principles than the SO2-trading. Technically system is working as planned and delivering the emission reduction target. However, due to a current oversupply of allowances CO2 prices are so low that they do not attract clean investments. The use of coal has increased and use of natural gas decreased. The oversupply is partially a consequence from economic downturn and several policies and measures that do not drive the market to a right direction as a whole.

Learning from these earlier emission trading systems, the global solution should be based on following principles:

- the amount of allowances should be based on physical limits of how much CO2 we could emit into the atmosphere
- there should be a dynamic allowance supply adjustment mechanism that adjusts the supply of allowances in cases of significant deviations in the economic development and
- we should have one overarching goal for emission reductions and the supporting mechanisms should be synchronised to take us to the same direction.



The key points of my presentation were: 1) Speed of climate change requires rapid investments in decarbonisation, 2) Currently low/no-carbon solutions do not attract sufficient investments and 3) Global carbon price and trading system would be the best solution.

There are wide variety of programs and projects resolving climate change issues; addressing resources, technologies, regional perspectives, project financing, etc., but I think that the work for finding applicable market mechanisms would very important, indeed crucial, now. Functioning market mechanisms will have a pivotal role in getting the transition into full speed. Therefore I propose the UN to take a leading role in securing coordination and information exchange between nations concerning the national/local ETS schemes. It would be very important to have an influential unit coordinating the establishment of structures required to create a global allowance bank and a market place.

According to the information I have available this kind trading system - which we are seeing as absolutely essential in solving the global emission dilemma and threatening climate catastrophe with a potential for runaway global warming - is unfortunately not under serious enough discussions in climate change talks. Therefore, other parts of the UN system, scientific community, private sector and NGOs should press the climate change talks to take it urgently into their agenda. Without exaggeration this might be a live and death question for future generations.

Finally, we cannot resolve this without activating masses of people along. In Finland for example some leading musicians have started an association called Stormwarning, that activates people for individual acts on energy and resource efficiency and our main church opened its annual assembly of synod with climate change theme. I am very pleased to see a lot of growing interest in this topic. Maybe the UN's Caring for Climate project under Global Compact could also attract NGOs and cultural parties to join the fight against catastrophic climate change. The transformation we have ahead impacts everybody. Sooner or later every organisation must create roadmaps for decarbonization.