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100% RENEWABLE ENERGY (RE)
A BUSINESS RESPONSE TO COP21

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Member of Integral Group



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The United Nations Framework Convention on Climate Change 21st
Conference of the Parties (COP21)

Written by: Benjamin J. Galuza, Clara Bagenal George
Elementa Consulting
Date: 9th March 2016

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Edward Mazria FAIA / FF
Architecture 2030
www.architecture2030.org





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Statement of Intent: Increase Engagement

This is not a research paper on climate science. As a Group, we have completed literature reviews on climate science, and the anticipated resulting economic and policy shifts that will have a direct impact on our business.

Through this paper we are seeking to **increase engagement** and **encourage action** to **reverse climate change**. The window of time to mitigate and halt irreversible climate change is rapidly closing. It is our belief that all businesses in industrialized and fully developed economies must take decisive action now. We must collectively transition to a 100% renewable energy economy as soon as possible.

Through this position paper, it is our aim to distil key themes from COP21 into **actionable ideas** for **business owners** and **decision makers** with whom we frequently collaborate in the building industry.

Acknowledgments

We would like to thank our industry partners and collaborators who have dedicated their careers, lives and personal energy to create a better world. The contributions to the industry made by the following groups have shaped the authors' views and have made a paper such as this possible. The Green Building Councils, One planet Living and the Bioregional team, The International Living Futures Institute, The 2030 challenge.... The list goes on....

*(RE) Renewable Energy

RE is defined as energy produced by systems such as photo-voltaic solar panels, solar thermal energy, wind, tidal or wave, etc; modern definitions typically preclude combustion of any kind.



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EXECUTIVE SUMMARY

Abstract

As a company, Elementa designs built environments through systems engineering and sustainability consulting in the development and revitalization of buildings, communities and small scale energy infrastructure.

We have segregated our thinking on climate change into three key time frames, 1) the near term, present to 2020, 2) the medium term, 2020 to 2030, and 3) the long term, 2030 to 2050. This paper will focus on the near and medium term, we believe that actionable ideas that integrate sustainability can lead to increased value, beyond competitors' business as usual approach. In the long term, sustainability will simply be required, by consumer demand and through policy and enforcement.

Additionally, due to the great scale of the challenge we face, our collective actions in the first two terms will dictate whether the long term will be a doubling down on climate change mitigation or rather a shift towards adaptation and resilience against locked-in climate change. Universally, in the built environment, the goal is net zero carbon emissions in operations, for all new build and major renovation projects by

2030. Arriving at this destination will be a unique journey for every project. The entire economy will need to strive towards 100% renewable energy and carbon neutrality by 2050. Due to the global economic threat of climate change and increased consumer and constituent pressure, it is likely that by 2030, not only will all new build be zero carbon emissions, policy will also be introduced that requires existing buildings to begin reducing energy demand and consumption to aid in achieving these goals.

Elementa, a member of Integral Group, has had the unique opportunity of solely focusing on deep green, sustainable engineering. From this vantage point we have helped many clients at various scales either take their first step or their one hundredth step, on their journey towards a sustainable and regenerative future. Through these experiences, we have come to the conclusion that doing the right thing for a company's business, does not inherently preclude doing the right thing for future generations and creating a legacy in which we can all be proud.

To improve business resiliency and readiness for the one future that lies ahead, here are some key ideas that business leaders in the built environment can implement today.

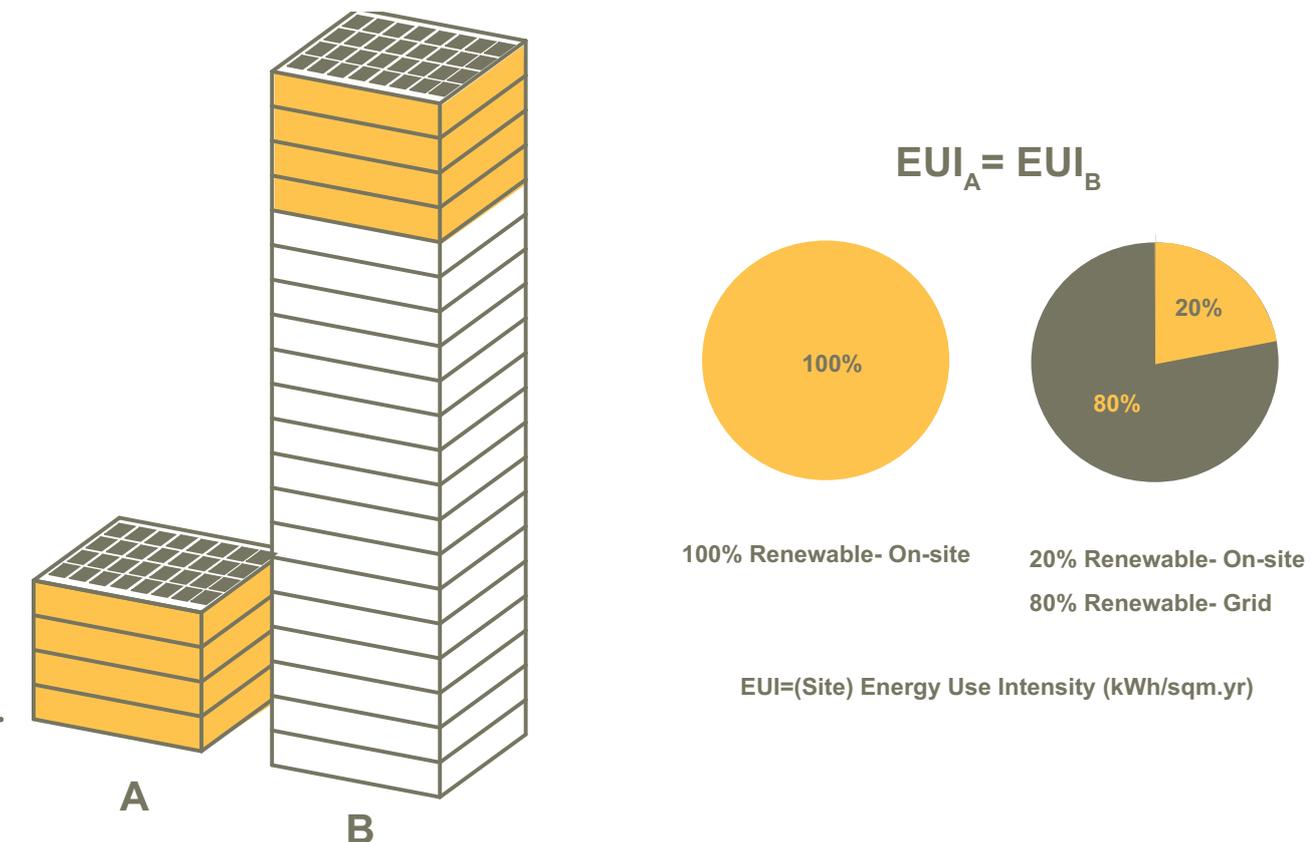


Figure 1: The energy supply for all inputs to the building industry must shift to 100% renewable energy as soon as possible and no later than 2040.



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Key Takeaways and Actions for All

- 1. Communicate values:** develop universally engaging language, and messaging tool kits for different groups of stake-holders that clearly articulate your business' desired outcomes. Though the messaging may change from one group to the next, the outcomes should be aligned to your broader business strategy.
- 2. Focus on people:** improve quality of life, opportunity and outcomes for all people. A sole focus on carbon will limit engagement and achievements, and will often lead to sub-optimization, detours and dead ends.
- 3. Data driven:** develop key environmental (people and planet) performance indicators (KEPI's) and collect data on your projects' and assets. The end game of the mass quantification known as "big data", is really about "big correlation". Patterns and key characteristics for success will emerge, these characteristics and thresholds will be distilled and readily available for decision makers of all kinds. Customers and clients are already developing KEPI's of their own, and will demand to see the same from their supply chain and all of those with whom they conduct business.
- 4. Demand more:** consumers, clients, developers and owners of property can demand more from internal teams, as well as external design and construction teams. Work with teams who have a desire to understand your vision and add value to your business. The biggest challenge is to get people to think differently. For the built environment, the greatest cost lies in 'doing it differently today' from how we 'did it yesterday', because the 'uncomprehended' is mischaracterized as the 'unknown' and as 'risk.' To avoid this we must focus on simple solutions.
- 5. Prioritize areas of investment:** Clearly articulate "product" or project attributes and amenities that can be marketed and sold on to customers by developing premium products. Clearly and frequently articulate, simple project goals that are not optional. These goals, aligned with the company vision and must run from top to bottom in terms of your business' leadership. Distinguish mandatory goals from any aspirations that are optional. Communicate how success will be measured once the project is built and operational. For the built environment success occurs 12 to 18 months into a project's operations.
- 6. Build and protect your brand:** The defining characteristics of a building owner's or developer's products will be attached, by the consumer, to all of those involved in the delivery. This can have a positive or negative impact on reputation and future prospects. Consumers, especially the under 30 group, are increasingly well informed with increasingly strong views on social and environmental issues. This also has impacts on your ability to attract and retain talent.
- 7. Do more of what works:** Don't reinvent the wheel or wait for new technology to solve the problem. Leverage existing technologies that have reached scale and have indelible characteristics. Utility infrastructure and building envelopes and structure have 50 to 100 year life cycles and should be the first priority for investment, to reduce resource demand and improve efficiency and resiliency. Inappropriate application and inadequate adaptability of these systems creates large scale asset risk for property holding enterprises.
- 8. Focus inside project boundary:** Focus where you have direct control; put your eggs in one basket and watch that basket. Design for the lowest site-based resource utilization efficiency that is financially feasible. Design your site based systems for the future upstream systems that you want, not what is upstream today, upstream systems won't be there tomorrow, but your site based system will be. Don't focus on modelled carbon emissions associated with the grid. Set measurable, performance based targets (based on KEPI's above), look at the meter, not the model.
- 9. Apply pressure upstream:** Design for 100% electrically driven systems, zero on site pollution and combustion. Where project density is high and energy consumption is higher than onsite renewable energy production potential, purchase renewable energy from the grid to reach zero carbon. No matter how tall your building, set an energy use intensity (EUI) goal equivalent to that of net zero or net positive energy buildings. See figure 1.
- 10. Offset embodied carbon:** fund (RE) renewable energy projects, through certified and audited institutions as a form of carbon offsets for all embodied and 'Scope 3' GHG related activities.



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BACKGROUND

In 2009, Copenhagen laid the foundation by obtaining global consensus that climate change is being caused by humans and that average global temperature rise must not exceed 2°C, in order to avoid wide-spread catastrophic and irreversible climate change. Five years later, at COP20 in Lima, Peru all participating countries agreed to bring commitments to COP21 in Paris. In addition to nation state commitments, this inspired other major public (cities, states, provinces, etc.) and private entities to follow suit and bring their own commitments to Paris. This combination of commitments from people everywhere, showed that we are ready to address climate change, often through interrelated quality of life and health based initiatives. Additionally this communicated with words and actions that constituents want to see their national governments match and exceed business and community-led ambitions.

COP21 Paris Outcomes

COP21 Paris commitments are non-binding emissions reductions and climate change mitigation funding targets. Paris set a new stretch target of 1.5°C, also known as 'well below 2°C,' helping to mitigate climate change impacts that are already negatively impacting health, safety and economies of people in low lying, small island states. This new goal requires immediate collective action to reach peak emissions as soon as possible, no later than 2020 to 2025. We must rapidly cut emissions through demand reduction, system efficiency and renewable energy (RE) offsets and sourcing. These actions are out of the necessity to balance greenhouse gas (GHG) emission sources and sinks to get back to pre-industrial emission levels and attempt to halt the rise of global average temperatures. To stay below 2°C it is estimated that all energy demand and consumption will need to be 100% RE by 2050 to 2060. Leaders agreed to revisit commitments at a minimum of every 5 years to ratchet up GHG emission reduction targets. The current commitments put us on a path that is well above 2°C and which will likely lead to irreversible climate change.



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Planetary Carbon Balance Explained Elementa's Water Basin Analogy

Global warming and climate change are a result of the rapid build-up of greenhouse gasses, predominantly carbon dioxide in the atmosphere due to human activity. Historically, greenhouse gas emissions were emitted, in small quantities and at low flow rates, into the atmosphere from sources such as animals and bio-digestion of organic material.

Carbon dioxide is sequestered, 'taken away', from the atmosphere through natural processes such as plant photosynthesis and by being absorbed into the Earth's oceans.

In pre-industrialised era, the amount of carbon dioxide that was emitted equalled the amount that was taken away, creating a balance with minimal fluctuations. This means that there was no appreciable build-up of CO2 in the atmosphere.

Using the analogy of a basin, the amount of water poured into the basin represents the amount of CO2 (equivalent) emitted into the atmosphere, the volume of water in the basin represents the level of carbon dioxide in the atmosphere. The amount of water pouring out of the plug hole represents the amount of carbon dioxide that is absorbed by the natural systems of the earth. Figure 2 represents carbon dioxide balance within the atmosphere in the pre-industrialised era.

Since the pre-industrial era, the amount of CO2 that is emitted into the atmosphere has been dramatically increased, through the burning of fossil and bio-based fuels - the flow of the tap has been increased. The capacity of the earth to absorb carbon has also been severely reduced, 80% of the earth's natural forests have been destroyed, (the plug has been blocked). This means that the amount of carbon dioxide in the atmosphere is increasing, i.e. our basin is filling up, this is because the flow of the tap is larger than the flow through the plug hole. See figure 3.

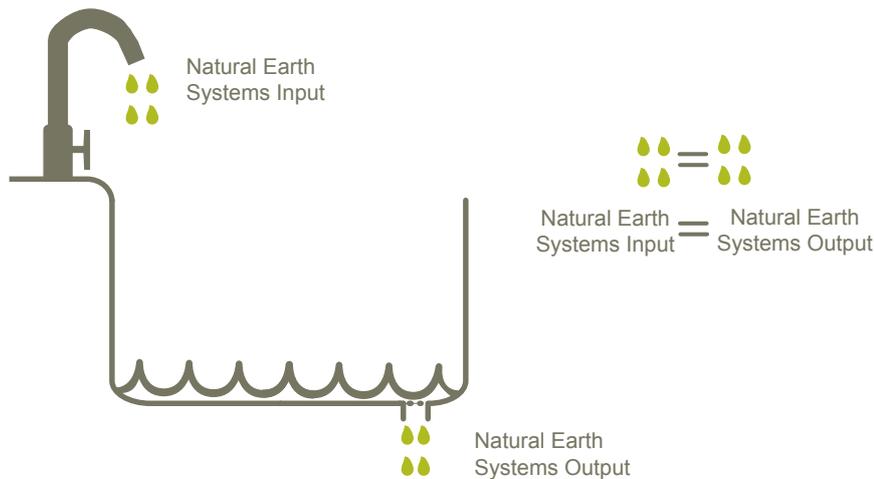


Figure 2

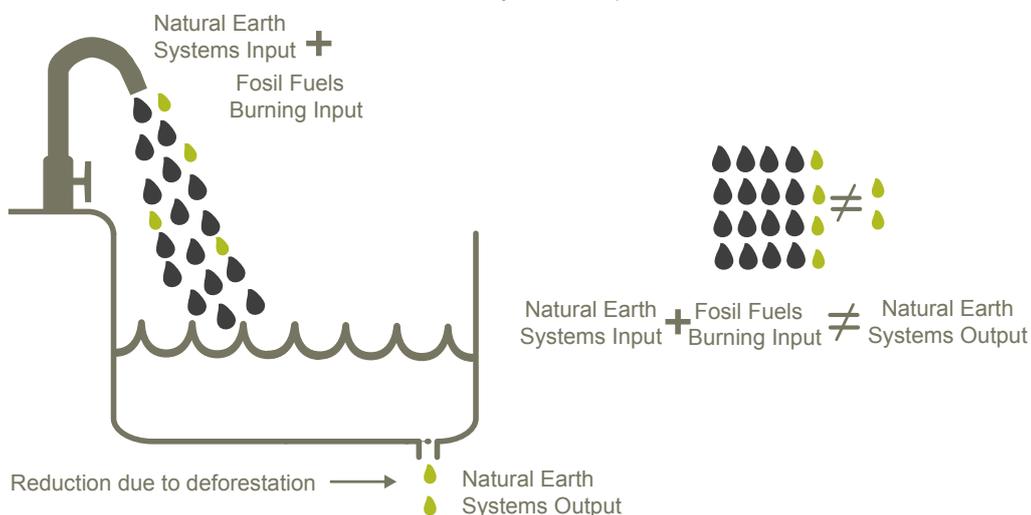


Figure 3

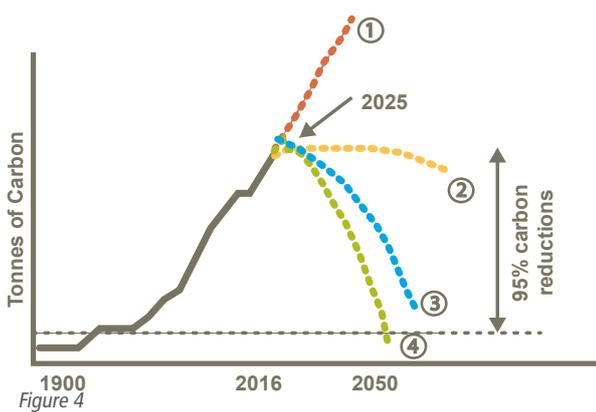


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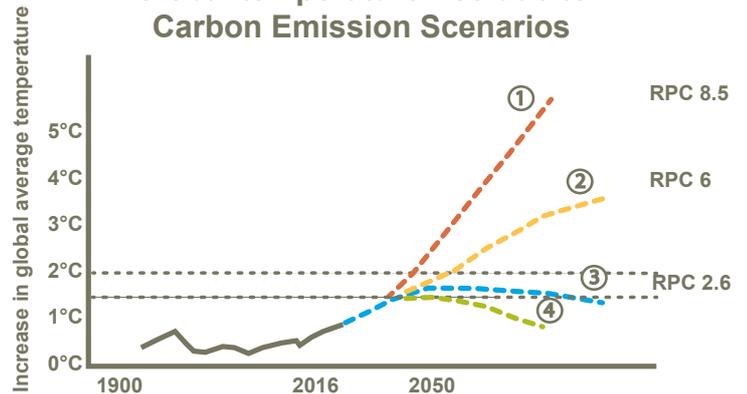
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Carbon Emission Scenarios



Global temperature rise due to Carbon Emission Scenarios



The increase of the levels of CO₂ in the atmosphere leads to global warming and climate change. As previously mentioned, if the average temperature rises beyond 1.5 -2°C this will cause irreversible damage. The graphs in Figures 4 and 5 show the increase in levels of CO₂ in the atmosphere and the increase in global temperature. We must ensure that the CO₂ level remains below an acceptable threshold to ensure that this temperature rise does not occur. This threshold level of CO₂ is represented by the volume of the basin in our analogy. If the basin overflows, this means that the average temperature has risen beyond 1.5 -2°C.

global temperature rise, it's just at a slower rate.

If we continue 'Business as usual' global carbon emissions will continue to increase each year, Case 1 in Figure 4. We are likely to reach the 2°C temperature rise by 2040, this is represented by Figure 5.1.

It is a huge undertaking, to lift people out of poverty, provide energy access and peak carbon emission rates (i.e. keep the flow rate of the tap constant), see Case 2 'steady carbon emission' in Figure 4. If we manage to peak, and reach a constant flow rate, the basin will still overflow

Carbon emissions must radically reduce, however reducing emissions i.e. reducing the flow rate of the tap, means we are still increasing the volume of carbon in our basin, thus increasing

① 'Business As Usual'

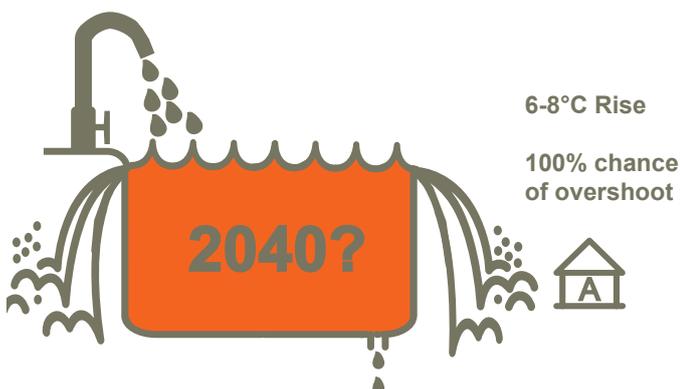


Figure 5.1

② 'Steady Carbon Emission'

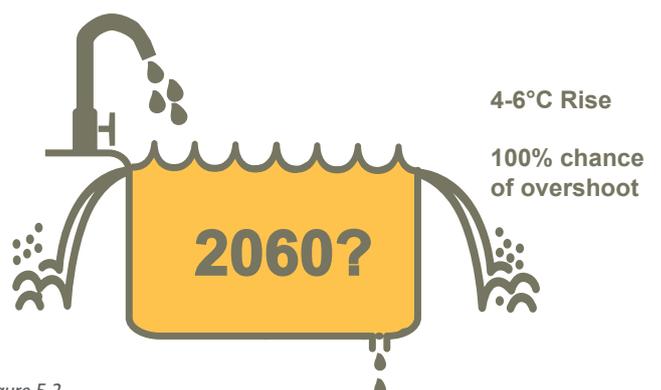


Figure 5.2



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If carbon reduction levels of 80 and 95% are achieved by 2050, shown by Case 3 and Case 4 respectively in Figure 4, we have a chance that our basin will not overflow. This is represented by Figure 5.3 and 5.4. However, even if we achieve 95% reductions by 2050 we still have a 14% chance that our basin will overflow.

What does this mean for the building Industry

In the UK buildings represent 43% of all green house gas emissions. This includes emissions associated with the construction of the building (embodied carbon) and the emissions associated with using the building (in-use emissions).

If we continue, 'business as usual', see Example A of Figure 6, CO₂ is added to the basin when the building is built and every year, for the life time of the building. This will lead to the basin to overflow.

If we build Net Zero Carbon buildings, see Example B of Figure

6, CO₂ is added to the basin when the building is built, however no more CO₂ will be added to the basin through the lifetime of the building.

Constructing the building as in Example B, Figure 5.3 still increases the volume in the basin, (due to the embodied carbon). We have enough headroom in the basin for this type of construction at present, but if we continue constructing all buildings as Example B the basin will eventually overflow. Example C shows a building that mitigates this. This can be achieved by;

1. Use the building as a renewable power plant- It generates more renewable energy than it uses, this gives renewable energy to the grid for others to use. (Reducing the flow rate going into the basin). Also known as net positive energy.
2. Investment into carbon capture or reforestation. (Increasing the drain rate through the plug.)

③ '80% Carbon Emission Reductions'

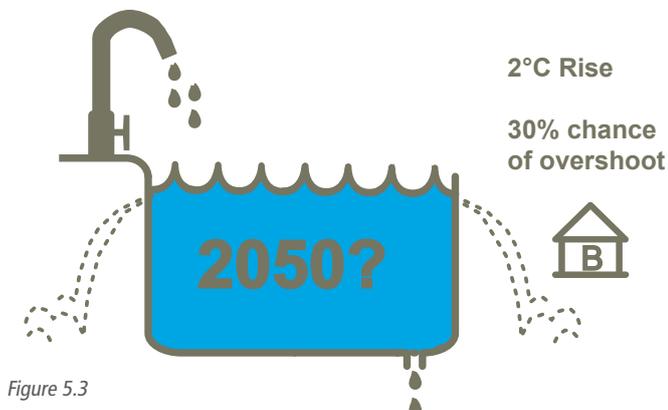


Figure 5.3

④ '95% Carbon Emission Reductions'

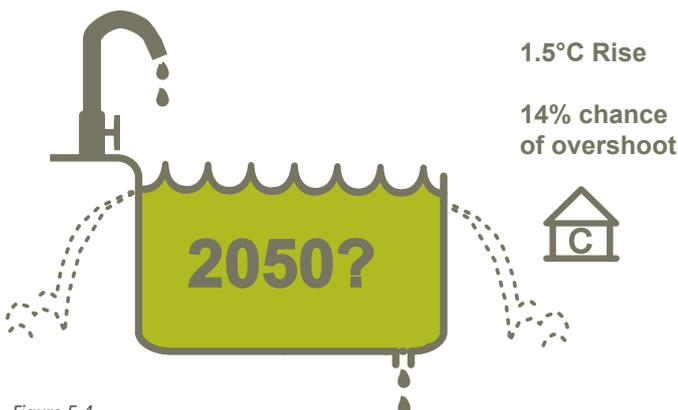


Figure 5.4



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The buildings in examples A-C have relatively large life-cycle carbon emissions. Even example C will take many years to pay back its carbon debt, before it becomes truly zero carbon. This method is only available to us while we have headroom in the basin, in the near future the industry will have to focus much more on reducing embodied carbon.

It is clear that buildings like example B and C are necessary for meeting the COP 21 emission targets. Whether you are an 'early adopter' or wait till this becomes regulation, buildings will have to be built in this way. We need to aim for buildings that are restorative and regenerative, example D in Figure 6 this would put us on the pathway that aligns with Figure 5.5.

Our vision should be building to create a better environment for future generations. They will be extremely low in embodied carbon, perhaps through the use of natural materials. They will generate more energy than they use, through renewables. They will clean the air rather than pollute it and they will provide healthy environments that nourish and promote healthy, happy people.

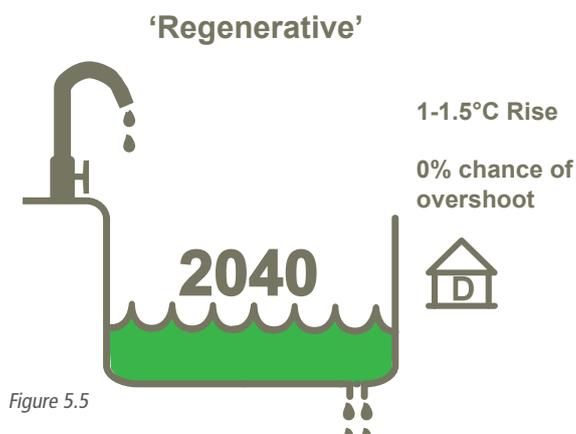


Figure 5.5

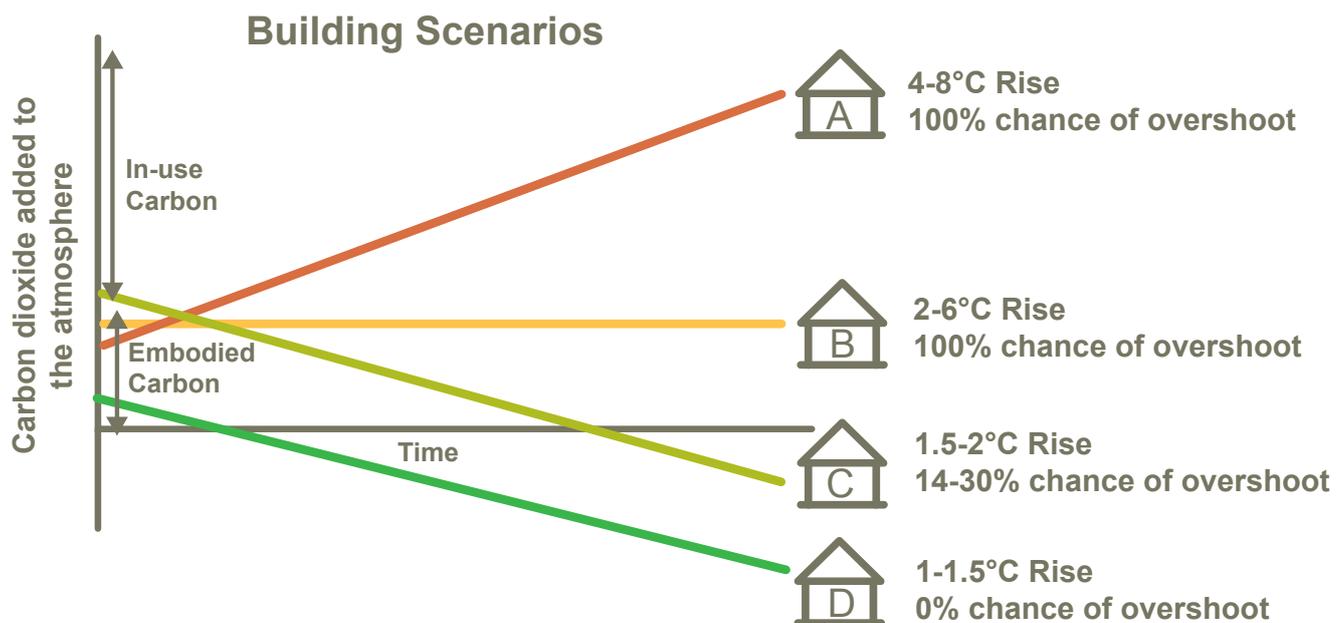


Figure 6 A) Business as usual B) Net Zero Energy C) Net Positive Energy D) Near Zero Carbon + Net Positive



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CHANGE: AGENTS AND ADOPTION

There are three primary agents of change: 1) technology and innovation, 2) customer demand and 3) policy. There are theories on change adoption that we can overlay with the agents of change. We can collate change adoption into three categories: 1) innovators and early majority – what we would call leaders and first followers, 2) the late majority, and 3) the laggards. Leaders imagine what is possible, that which does not yet exist, and create new ideas, products, services and business models to deliver this new idea to the market. They often create a market where one did not exist before, typically garnering a premium for this more valuable and differentiated offering. The early majority of competitors and customers see this new offering and seek out alternatives. As competitors enter the space, expand the market and provide similar offerings, tinkering ensues, manufacturing and supply chains streamline and prices fall. The greater the number of comparable substitutes entering the market place, the more prices fall. The new standard that was set by the leaders and innovators soon becomes the norm, this is akin to customer demand driving change. Finally, if customer demand is not enough, we have policy which can act to incentivize good behavior and tax or regulate behaviour which is not in the long term interest of the community. This applies to the late majority and laggards. Policy comes in a legislative and legal format or simply as guidelines, best practices, standards or institutional and corporate policies.

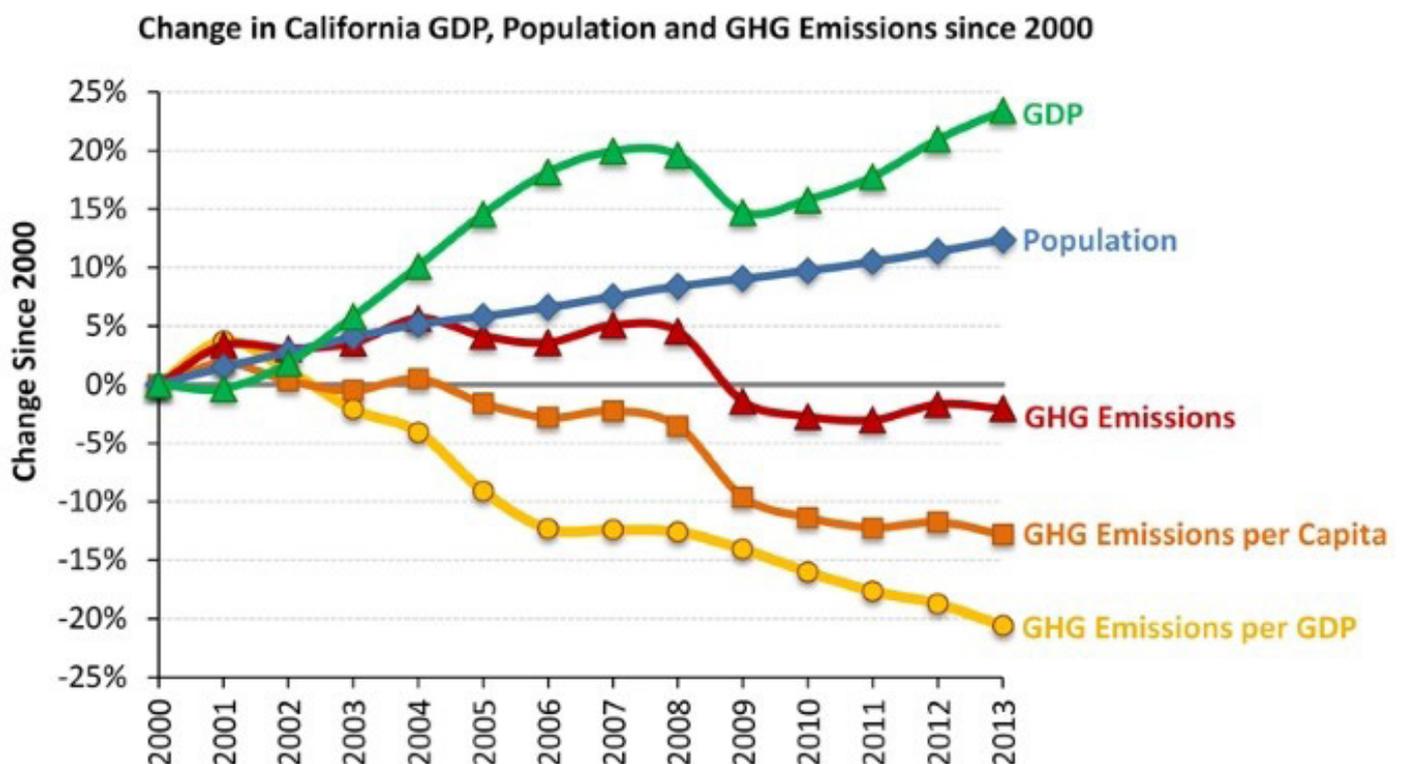
The discussion of change is relevant to this position paper because there is false perception that doing the right thing for future generations and the environment is divorced from doing the right thing for your business today. There are numerous case studies of varying scales that are referenced below to illustrate this point.

Case Study 1 – State Scale

The State of California, ranked by the International Monetary Fund (IMF) as the 8th largest economy in the world is home to over 38 million Americans. California passed a land mark bill, AB32, in 2006, two years before the largest recession since the great depression of 1929. This bill set the State's first ever emissions reduction targets in the landmark Assembly Bill referred to as the Global Warming Solutions Act. Emissions fell during the recession, which could be expected. What was not expected is what happened next, during the recovery. Total greenhouse gas emissions continued to fall. The bill was working. In addition, throughout the recession and the recovery the population continued to grow, that's more people consuming more goods and services, all of which were being delivered more efficiently.

The measures in AB32, did not stop businesses from flourishing, they improved quality of life and help ensure that environmental services and benefits will be available for generations to come.

Figure 1: Image: Change in California GDP, Population and GHG emissions since 2000 ¹



1. Air Resource Board's Greenhouse Gas Inventory Data <http://www.arb.ca.gov/cc/inventory/data/graph/graph.htm>



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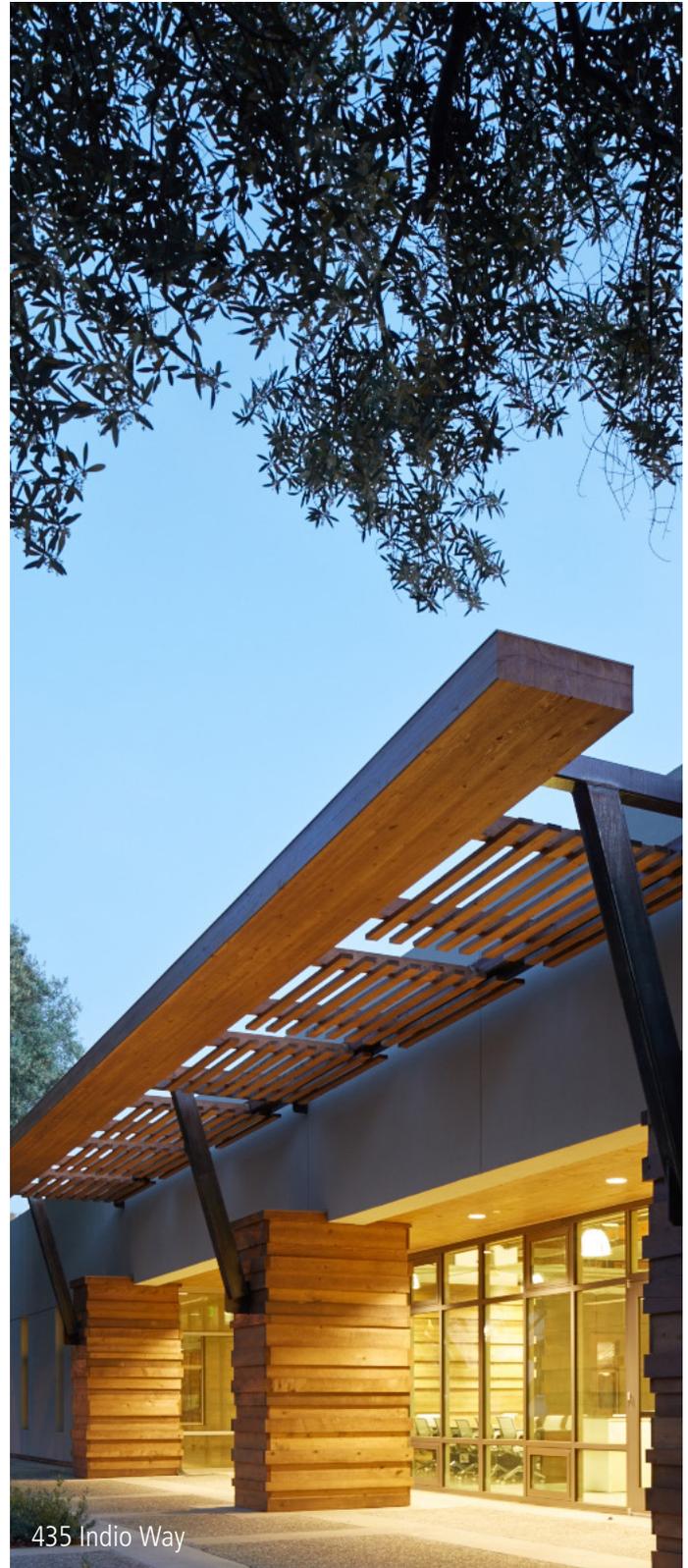
Case Study 2 - City Scale

"Mature Cities such as Stockholm, Copenhagen, Portland, Hong Kong, Hanover and Singapore have all shown, through efficient land use and sustained investments in public transport, that it is possible to grow prosperous economies while dramatically reducing externalities such as GHG emissions and air pollution. For example, Stockholm reduced emissions by 35% from 1993 to 2010, but grew its economy by 41%, one of the highest growth rates in Europe."^{2,3} For cities that have been tackling emissions reductions for the past decade, this story is not unique. C40, a network of the world's megacities have been sharing ideas, policies and plans, constantly ratcheting up actions and competing with one another to see who can reduce emissions faster and further.

Case Study 3 - Building Scale

435 Indio Way, a zero energy building with no onsite pollution or combustion was the first of its kind, where a real estate developer, renovated an existing office building from an unrentable, derelict space into a vibrant, tech tenant ready space. Developing for zero energy was simply a better investment. "The business model proves you are \$2 million better from doing it this way if you sold it," according to the developer, Kevin Bates, and "if you don't sell it, it pays for itself in the 3-4 months. It's a pretty strong economic case for a building of this size."⁴

These three, simple case studies, show that for leaders and early adopters, whether these leaders are governments or individual property owners, there is a unique opportunity to create differentiated products that improve quality of life while doing the right thing for the environment. If you are a city, this differentiation, attracts talent and capital and increases economic growth and revenue to continue to improve infrastructure. If you are a property owner or developer the differentiation creates additional amenities and attributes that can be sold on to "customers." The window of time to create differentiated products is from now until 2020 to 2025, because by 2030 it will be required by code. In the future, the ability to transfer existing property assets that do not meet the rigor of upcoming codes and standards will become challenging, these properties' emissions will become a liability. This is perhaps the single most important reason to understand your buildings KPIs and begin benchmarking against peers, because buildings with high resource utilisation will be worth less in the future (and they already are now).



435 Indio Way

2. *The New Climate Economy*, <http://2014.newclimateeconomy.report/cities/>

3. *Stockholm Green Economy Leader Report* "<https://files.lse.ac.uk/files/2013/06/LSE-2013-Stockholm-Final-Report-webhighres.pdf>

4. Molly Miller, "A Real Estate Developers Business Case for Net Zero". <http://www.integralgroup.com/blog/a-real-estate-developers-business-case-for-net-zero/>



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COP21 HIGHLIGHTS

Communication

When we seek to inspire groups of people to change we must seek to understand the values that these groups care about. Typically it's: people, communities and belonging, and reinforcing individual identities and uniqueness, job creation, money, we need to talk about the business case. Finally, once these values and fundamental considerations have been addressed, now we can talk about the planet. When we talk about the planet, we have to talk about people, about customers, about our team members and employees, about our families and friends. Talk about future generations, about legacy. Don't talk about polar bears or penguins. Most people are not 'environmentalists' and they don't want to be environmentalists. Embrace and celebrate who they are. They want to be more who they are, not more like me and not more like you. For example, stop talking about 3,553,647 tonnes of carbon saved - it's important but it's boring.

Happiness is the joy of being yourself and the joy of belonging. When this is fundamentally understood and appreciated only then will we inspire change in others⁵.

Highlights for the Built Environment

Cities will lead governmental policies and ambitions. We can expect more net zero energy roadmaps like the one completed for Cambridge, Massachusetts and the One Planet Living Roadmap completed for Brisbane, California. All cities will need to develop similar climate action plans. The World Resource Institutes GHG inventory tool and the 2030 Challenge's 2050 Roadmap to Zero Carbon Emissions will also be a part of the tool kit. As existing building efficiency and conservation in city cores are maxed out, cities will need to turn to district energy systems and reskinning buildings.

Signing the Paris Agreement

- Following the adoption of the Paris Agreement by the COP (Conference of the Parties), it will be deposited at the UN in New York and be opened for one year for signature on 22 April 2016--Mother Earth Day. The agreement will enter into force once 55 countries that account for at least 55% of global emissions have deposited their instruments of ratification.
- Petition your country's leader to sign this agreement as soon as possible.

What is Elementa doing?

- The COP21 commitment that we took to Paris is a commitment to show owners on every Elementa project how they can get to zero carbon emissions. We have rolled this out on every project since. See <http://www.elementaconsulting.com/cop21-elementa-consulting-joins-uk-gbc-in-making-our-climate-pledge/>.
- We will offer a sustainability goal setting workshop on all major projects where we are involved in the concept phase or sooner as part of our base services.
- We are committing to publish and maintain a 'Green List' of preferred manufacturers and new technologies that can combat climate change and improve quality of life through the built environment.
- Develop and publish tool kits for our project collaborators so that they can easily do their part to combat climate change and improve quality of life.
- After 12 to 18 months, collect post occupancy evaluations of all of our buildings' performance (indoor environmental quality, energy and water - and where available waste).

5. Attributed based on the research in George Marshall's "Dont even think about it: Why our brains are wired to ignore climate change."



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CONCLUSIONS

As discussed in the Change Agents and Adoption section of the paper, policies like the 'IPCC Binding agreements' are for the late majority, laggards etc. and represent the bare minimum that we must achieve. Waiting for legal international binding agreements from the UN will almost certainly be too late for many low lying and at risk countries and cities. However, it is still important to send a signal to the market that all polluting, combustion-based fuels will soon be illegal. This creates an immediate business opportunity for leaders and early adopters to differentiate their products and offerings while mitigating their own long term financial risks.

To address climate change and increase the likelihood of success we must take every single opportunity to purchase renewable energy (RE) today, whether by putting solar on our roofs or purchasing it from the grid or energy wholesalers. This increase in consumer demand will continue to drive down renewable energy prices for all. It will put pressure on utility companies to upgrade their infrastructure with appropriate demand management strategies such as grid scale energy storage that is now available, increasing the efficacy of already existing renewable energy sources.

The mass migration of people everywhere in the world to urban environments will lead to increased strain on natural resources and even more carbon emissions. Gensler Architects has calculated that this migration and increased urban infrastructure will be the equivalent of building one London per month for the next 400 months. The recent "Total Carbon Study", published in the fall of 2015 for the US Greenbuild Expo, noted that one third of a building's total carbon emissions are emitted before the building goes into operation. In addition to operating emissions, we must also address embodied carbon emissions now and begin scaling these solutions. We must at minimum, which has no added cost, ensure that every building built today has the potential to be zero carbon in the future.

If businesses in wealthy, developed countries continue to ramp up consumption of renewable energy, for building operations, material extraction, manufacturing, and transport, it will pay the way for an entire renewable energy manufacturing infrastructure for the entire global supply chain. And as wealthy nations' appetite diminishes in 10 years' time, and their grids are fully transformed, renewable energy systems manufacturing supply can pivot to provide these same services to developing countries as they continue to grow, lift people out of poverty and provide energy access to more and more individuals.

As a simple rule of thumb for how best to set goals and where to invest first, always remember to cut the demand in half, double the system efficiency and then offset with renewable energy.

It is clear that we collectively have the processes, finances and technologies today required to solve all of our problems. If we align our priorities to a sustainable and regenerative future we have the potential to right this vessel that we call Earth and put all people on a path to prosperity.

This is a future we can all believe in and one we can all be proud to raise our children in and leave behind.

1. Gensler Architects: http://www.gensler.com/design-thinking/in-focus/designing-vibrant-communities?utm_content=buffer9e4ab&utm_medium=social&utm_source=facebook.com&utm_campaign=buffer

2. "Total Carbon Study," Ecological Building Network. <http://www.ecobuildnetwork.org/projects/total-carbon-study>



APPENDIX:

NOTES AND STORIES ON COP21

FROM BENJAMIN J. GALUZA

A BRIEF HISTORY OF COP

The COP has been meeting each year for the past 21 years. The last major negotiations, with an attempt to reach a universal agreement and legally binding contract on limiting greenhouse gas emissions, took place in 2009, in Copenhagen. Global leaders came together and universally agreed that the climate science was accurate – and undeniable – and that we were going to be the first sentient species to self-exterminate based on our current trajectory (not to mention taking most of the rest of the planet's species with us).

They agreed that climate change is real, it is being caused by humans and we have the means to reverse it. In 2009, it was agreed that the best possible way to avoid catastrophe is to stay safely below an average global temperature rise of 2 °C. If we go above 2 °C it may trigger irreversible climate change, reinforcing negative feedback loops that exacerbate the problem. It must be understood that the climate is extremely sensitive to temperature changes. We are already near a 1 °C rise in global average temperature above preindustrial levels, this rate of increase over the past 100 years happened ten times faster than the planet has ever seen. A beyond 2 °C rise will increase the intensity and severity of once rare events: storms, droughts, floods, and heatwaves.

This rapid change in micro-environments will be at such a pace, that no species plant or animal (including us) will be able to adapt and therefore survive – the other option for species survival, is to migrate but with the planet at capacity, there is nowhere else to go.

The projected 2 to 3 meter global sea level rise will render many of the world's major global population and economic centers inert or in distress; New York, London, Shanghai to name a few. Keeping in mind that cities most of which are at sea level, are on track to increase in population to house near 70% of the world's population by 2050. Our very economic engines will start to have portions below the flood plain or sea level by 2060 if we do not act now.

The actions taken in Copenhagen to reach consensus on this science was no small feat and prepared the groundwork for Paris.

Between Copenhagen and Paris, the climate models and science evolved. Heading into Paris 2 °C was no longer the target. If we target emissions reductions to stay below 2 °C, we will have more than a 30% chance of overshooting. If we target a 1.5 °C rise, we have a 14% chance of staying below 2 °C. Though both statistics are not necessarily comforting, the target has been set to target 1.5 °C, and to get there as quickly as possible.

What does stopping climate change look like?

The greatest chance for success curtails total greenhouse gas emissions, "peaking" by 2020 with drastic reductions in GHG emissions to get to preindustrial levels before 2050. A goal of getting all world-wide energy systems to 100% renewable energy by 2050 will limit risk of overshoot to 14%.

These ambitions and requirements were delivered at COP21. They were whispered under breath. They were quietly, calmly and directly delivered by delegates. Delivered with a sense of urgency. They were screamed and shouted by protesters. The business case for making these transitions was squarely presented. It took all forms and all languages. There was no room for misinterpretation of the change that is needed.

STORY – HERE COMES A BUS

Every great endeavor deserves a metaphor. Nothing like using a big bus to get the point across. This concept was shared with me by a new friend, Bob, who attended COP21 and spent the day with me and the UK based Bioregional's (One Planet Living) team. Here's how the story goes.

Scene 1 - Copenhagen

All of the world's climate negotiators are on a bus to Copenhagen to solve the world's climate crisis. Suddenly the bus gets stuck in the mud. One of the negotiators comes up with a solution to their problem, "let's get a tow truck." After some debate, everyone agrees that this is a reasonable solution and that it should be pursued. They elect a delegate to call the towing company and order a truck to their location. The delegate reports back, "We're going to have to pay for this tow truck." Everyone looks around the bus, some avoiding eye contact. Some of the developed countries finally break the silence, "we're willing to chip in and pay for our share. How about everyone else?" A small island state chimes in, "Chip in! How generous! But couldn't you just apportion the cost for the truck amongst all the developing countries, you drove the bus into the mud in the first place." A debate ensues on: who should pay for how much, and when. Meanwhile the tow truck is never dispatched and the most precious resource of all, time, passes. Without the negotiators taking much notice, a few people from a nearby town, decide that they're going to try to give this bus a push and get it out of the mud and back on the road – helping some strangers in need. The bus, moves forward a bit, but slides back into its ruts. It's too heavy with all of the people on the bus. Unable to get the negotiators' attention, they send someone back to town to bring more help.



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Scene 2 - Paris

Back inside the bus and after no progress being made on the matter of who should pay for the tow truck and how much, a few people break off and come up with a new idea, "what if we just got off of the bus and started pushing?" A few fully developed countries ditch the tow truck idea, "we're willing to make commitments, go outside and push the bus, as long as we all agree to get out and push." Meanwhile more help from town has just arrived and they're already outside pushing, and its working, they're slowly moving the bus forward. But not hard or fast enough, at the very least the townspeople know they'll need everyone to get off the bus to lighten the load. They'll likely need some of the negotiators to help push, but not necessarily all of them, there's a steep transition at the end of the pit and they need momentum to get out.

The Resolution

The solution is not a technological one. The story also uncovers that we need to know what's going on outside the bus to make an informed decision. Collectively, we need those with the will, the power and the ability to work together. We need to show up and push or get out of the bus and push, either way roll up your sleeves and be prepared to get dirty if you are: 1) ready, 2) willing and 3) able. We must recognize that some countries cannot tick all three boxes, but the rest of us who can, have a responsibility to make up the difference, push harder and smarter. This was the sentiment going into COP21. And overall the solution was much simpler, and more satisfying (working together) than it first appeared.

COP21 PARIS OUTCOMES

Significant, Unparalleled Progress

In Paris, international governmental parties, pulled out all the stops. Called in all favors, dispensed all of their own social, political and personal capital, built up over decades of measured, trusted interactions with partners and counterparts. They left it all on the field, and took the world as far as it could go, and further than some thought was possible. Like Copenhagen it was no small feat. They worked into the night, night after night, for two weeks, with stamina and urgency. We all owe the parties a huge thanks for their service, dedication and commitment to a challenging and exhausting process. This is the beginning of serious action by governments in a globally coordinated effort, it doesn't need to be perfect it just needs to start moving.

National Commitments – Intended Nationally Determined Contributions (INDCs)

From COP20 in Lima, Peru it was established that countries would bring to Paris their voluntary greenhouse gas emissions reduction plans with relative time scales for implementation.

Here is a list of some of the commitments:

- EU: 40% below 1990 levels by 2030
- US: 26% below 2005 levels by 2025
- Other Developed*: 3.5% decrease below 2005 by 2030
- China: Peak CO2 by 2030
- Other Developing*: 10% below business as usual by 2030

*Aggregated commitments of individual "Intended Nationally Determined Contributions"

Other sectors, though not required to do so, got in on the fun and made commitments of their own, here's what the building industry collectively committed to: <http://web.unep.org/climatechange/buildingsday/take-action>

What are the agreed terms from COP21 Paris?

The measures in the agreement include:

- Peak greenhouse gas emissions as soon as possible and achieve a balance between sources and sinks of greenhouse gases in the second half of this century
- Keep global temperature increase "well below" 2 °C (3.6 °F) and to pursue efforts to limit it to 1.5 °C
- Review progress every five years (next review scheduled for 2020)
- \$100 billion a year in climate finance for developing countries by 2020, with a commitment to further finance in the future

President Obama, admitting that the deal was not "perfect", said it was "the best chance to save the one planet we have". - <http://www.bbc.co.uk/news/science-environment-35084374>



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Other Useful Summaries of Climate Talks

<http://www.vox.com/2015/12/12/9981020/paris-climate-deal>

<http://www.ipsnews.net/2015/12/cities-emerge-as-urgent-climate-solution-at-cop21/>

Are these commitments legally binding?

No. These commitments remain voluntary as a result of the Paris talks. These will go into affect once signatures are received- see above.

Will these commitments get us below 2°C threshold?

No. They will need to be “ratcheted up” as soon as possible, which the Parties recognized at the time of signing. Current commitments will lead to a rise of 2.5 °C rise to upwards of 3 °C.

President Hollande of France has already committed to review their policies ahead of 2020 in order to ratchet up now. -<https://www.climateinteractive.org/wp-content/uploads/2015/11/Ratchet-Success.pdf> . This further clarifies that some countries have the will and means to get the job done now, it also shows the power of the Paris agreement to meet the climate challenge.

Work with what we've got

Just as Copenhagen laid the groundwork, Paris laid the foundation. There is still much work to be done. Most of the commitments will not become active until 2020. We need to be peaking emissions by 2020 to maximize the likelihood of success.

Key signals from Paris:

- We got a signal from the entire world that the acceptability of burning coal is over for developed countries, oil will follow and gas soon behind it. There will need to be renewed investment in efficiency and renewable energy.
- We have commitments from our leaders to review plans and update them as needed to meet the 1.5 °C goal. Communities can follow suit and develop their own local plans.
- Cities, Universities, and Industry (and in the US, some States) have already led or followed suit and made commitments and policies of their own, all while their economies continue to grow.

COP21 Highlights for the Built Environment

Buildings Day

2030 Challenge has a measurable 2050 Roadmap, 2030 Palette, 2030 Districts, the China Accord and other mechanisms that are working.

Full Post on Buildings Day here:

<https://www.linkedin.com/pulse/cop21-buildings-day-2030-challenge-working-benjamin-j-galuza?trk=hp-feed-article-title-publish>

C40 Cities Forum

C40 Cities will keep foot on the accelerator.

- “Unlike some politicians, who wake up and think, ‘what am I going to say today?’” a mayoral panelist quipped, “Mayors wake up and think what am I going to DO TODAY?!”
- When Cr. Clover Moore, the mayor of Sydney, Australia, “shared” her city’s cycling infrastructure plan with Boris Johnson, the Mayor of London, a quick sleight of hand into his briefcase, a plane ride and a few months later it would reemerge as London’s now famed “Boris Bikes”! Boris received full credit, as the name implies, for implementing an intensely utilized, convenient service the constituents love. Mayors Johnson and Moore had some fun with this story while on stage together on Friday. Mayor Johnson’s credit is rightly deserved. He was not required to do any of it. But he woke up one morning and put it on the top of his “what am I going to do today?” list.
- The Mayor of Paris Anne Hidalgo announced to the world on Twitter (translated from French), “The mayors of the world are ready for 100% renewable energy between now and 2050.” Mayor Karin Wanngard of Stockholm, Sweden has her city on track for zero fossil fuel use by 2040. Mayor Moore of Sydney, Australia has developed a plan to get to 100% RE by 2030, and as she concisely put it, “showing negotiators here in Paris that they can and must commit to 100% clean energy and an end to fossil fuels as soon as possible.” That’s 3 global leading women who are tackling (climate change) like no one else.
- The mayors of more than 1,000 of the World’s largest cities committed on Friday, 4th of December, 2015 to become zero carbon emissions by 2050. The largest coordinated commitment to keeping us under 2 °C ever made.



APPENDIX: NOTES AND STORIES ON COP21 FROM BENJAMIN J. GALUZA

- Understanding that the poor and underserved will disproportionately be affected by climate change, The Children's Investment Fund Foundation (CIFF) has worked with C40 to put forward \$5.3 million dollars to help 30 cities in the global south to measure and report city wide greenhouse gas emissions and develop action plans. http://www.c40.org/blog_posts/ciff-commits-5-3-million-to-help-30-cities-measure-and-report-greenhouse-gas-emissions
- C40 Cities Finance Facility, has also garnered the interest and commitments from €3.5 million (US\$3.7m) funding from the German Federal Ministry for Economic Cooperation and Development (BMZ) and \$2 million from the International Aid and Development Bank. The focus of these initial funds will be used towards assisting C40 cities in developing and outlining sustainable infrastructure plans to then go out to the investment community to have the projects funded. http://www.c40.org/blog_posts/c40-germany-iadb-achieve-major-breakthrough-for-developing-cities

Full post on C40 Forum here:

<https://www.linkedin.com/pulse/c40-cities-network-full-effect-benjamin-j-galuza?trk=hp-feed-article-title-publish>

The individual stories behind C40 cities and 2030 communities clearly illustrated the business case for creating prosperous, sustaining built environments. First and foremost the plans that these communities have implemented make economic sense but they also make sense in terms of improving quality of life and reducing environmental impact.

Ben encourages and welcomes further discussion. Please contact events@elementaconsulting.com for feedback or info on future thought leadership events from Elementa.

Or tweet us [@elementa_uk](https://twitter.com/elementa_uk) or [@DeepGreenBen](https://twitter.com/DeepGreenBen)