GREENING THE ANIMATION INDUSTRY:
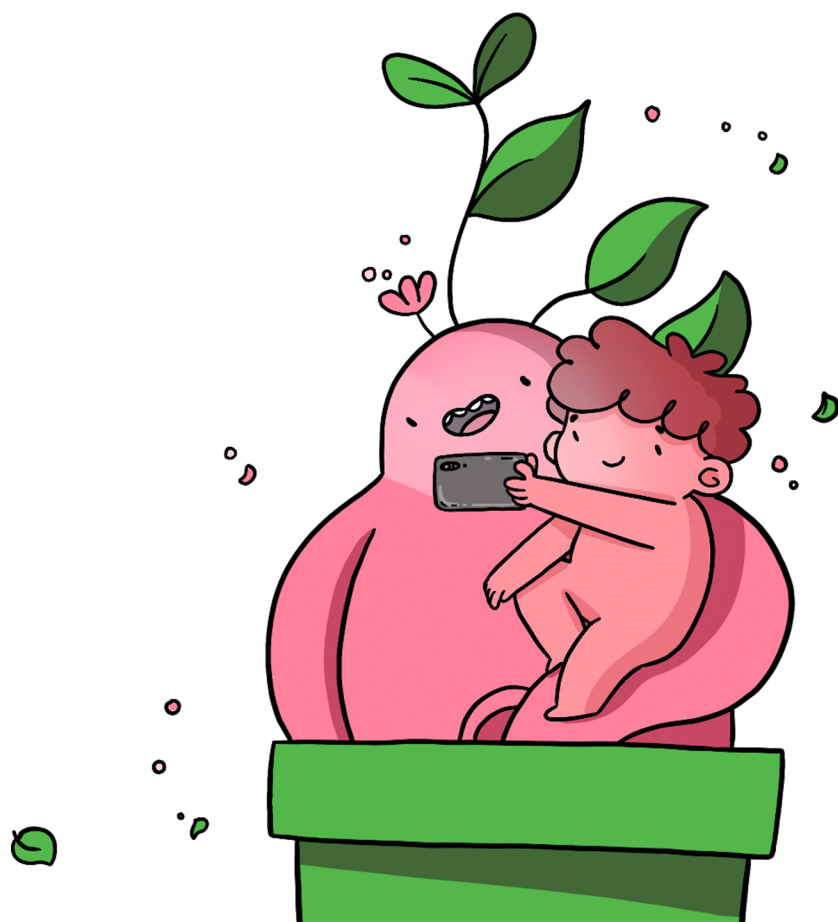
11 LESSONS FROM LOCKDOWN

CARDiFF ANiMATiON FESTIVAL.

GREENING THE ANIMATION INDUSTRY:
11 LESSONS FROM LOCKDOWN

INTRODUCTION

The 2020 Covid-19 pandemic forced animation companies to adapt and embrace remote working.

Has this had a positive impact on the animation industry's carbon footprint?

What learnings can we take forward post-pandemic?

We spoke to some Cardiff animation companies and freelancers to explore the lessons we can learn from animation in lockdown.

We spoke to:
- **Cloth Cat Animation**, a medium-sized 2D animation studio (45-85 employees);
- **Bomper Studio**, a small CG animation studio (11-12 employees);
- **Picl Animation**, a micro 2D animation studio (2-6 employees);
- **Laura Tofarides**, a Cardiff-based freelance stop-motion animator and modelmaker;
- We also drew learnings from a webinar by **ftrack** called Animation After a Pandemic, featuring **Cloth Cat**, **Bomper**, **Blue Zoo**, **Boulder** and **Fourth Wall**.

Bomper compared their carbon footprint across two months pre-lockdown compared to two months during lockdown.

Picl compared the carbon footprint of a TV production where series 1 took place pre-lockdown and series 2 took place during lockdown, and projected a footprint for series 3, based on how they expect to be operating post-pandemic.

Cloth Cat compared their annual carbon footprint pre-lockdown with their projected annual footprint post-pandemic, based on the 2020 practices they expect to maintain longer term.

This research is part of Cardiff Animation Festival's Clwstwr R&D project on Greening the Animation Industry. Thanks to **Clwstwr**, **PDR**, **Cloth Cat Animation**, **Bomper**, **Picl Animation**, **Laura Tofarides**, **ftrack**, **BAFTA Albert**, **Julie's Bicycle**, **Be Inspired Films** and **William Gold** for their help and contributions.

1. Much of the animation industry has been able to adapt to home working

Between March and August 2020, the Guardian, Forbes, Los Angeles Magazine, the Times of India, the Irish Examiner, The Times and many more reported on a boom in the animation industry during lockdown.

Bomper saw an influx of new work at the start of lockdown, which Bomper's Emlyn Davies says may or may not have been as a result of the pandemic.

Blue Zoo also saw an increase in work coming in. Blue Zoo's Francesca Pesce said "VFX had a lot of issues with not being able to shoot live action footage, but Blue Zoo works with full CG, so we actually had more projects coming in, and projects that were supposed to start a bit later started sooner. The effect was that we suddenly had to recruit a lot more people, so now we have up to 300 people working for the studio and we probably need to recruit even more."

In May, the Guardian spoke to Sarah Smith, co-founder of UK studio Locksmith Animation, about her experiences of making Disney feature film Ron's Gone Wrong during lockdown – she said "we've kept the movie on track. Given the situation now it is more likely [animation companies] will get projects green lit as they will be seen as the safest and most reliable option. We are a good bet in this time as we can guarantee to make things."

Also in May, Forbes spoke to Chris Prynoski, president and founder of Titmouse, which produces Big Mouth and The Midnight Gospel for Netflix and Star Wars: Galaxy of Adventures for Lucasfilm. He said "clients are doubling down on animation. They don't know when they'll be able to shoot [live action] again. With animation, even though it takes a long time, they know it's going to happen. Commercials are [also] on an uptick. We're getting more requests from people who have never even considered it. Like, five or six bonafide requests per day. It's as much as we can handle."

2. Remote working pipelines vary across 2D, CG and stop motion...

CG animation pipeline – Bomper:

Bomper has adopted a remote desktopping pipeline – meaning staff are using computers at home to run computers in the studio – so the only thing being transferred out is the pixels on the screens rather than any files themselves.

Team communication happens over written messages and impromptu voice/video meetings on Discord. Bomper were using Slack for communication before lockdown, but have switched to Discord because it allows video chat, voice chat, jumping into a meeting room etc.

On setting up for remote working and deciding on a pipeline, Emlyn Davies from Bomper says "The key is how you plan to work. Understanding how big your files sizes are allows you to plan the best approach. Ours are really hefty – you have a master file which can be updated by anyone and then that's linked into the scene, and the file you're animating in is referencing hundreds of files – so remote desktoping into the studio makes more sense than sending really large files back and forth. There are loads of apps for remote desktoping, we just tried them all and found what worked for us."

### 2D animation pipeline – Cloth Cat:

Cloth Cat are using a cloud-based pipeline rather than remote desktopping. They're using Google File Stream for unlimited cloud storage – this syncs to everyone's machine and each team member downloads only what they need.

A Synology storage solution automatically downloads everything to the in-house render farm running Deadline, so when somebody remotely submits something it automatically goes to the render farm. This also acts as a backup and disaster recovery.

Cloth Cat are using Ftrack for review, as they were before the pandemic. They happened to already have access to Google File Stream, so this hasn't increased costs.

Because they didn't need to use a remote desktopping pipeline, Cloth Cat staff were able to take their computers home with them. Cloth Cat gave chairs and desks to staff who needed them, and made sure they had enough hard drive space to cache everything.
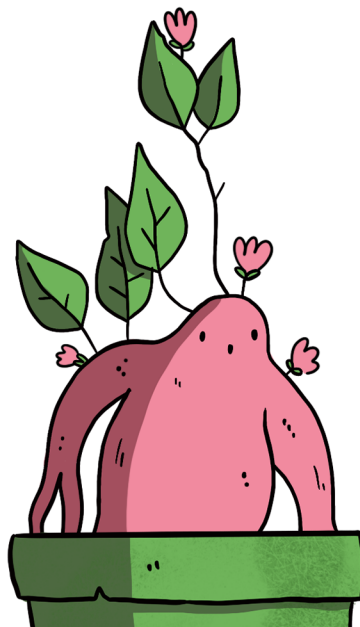
Picl is also using a cloud-based pipeline rather than remote desktopping, using Dropbox for cloud storage, which also syncs to everyone's machine and staff download only what they need.

Some Picl staff are using their own computers, and some took Picl computers home with them.

Picl were also already using Ftrack for review and have continued to use it during lockdown.

Stop motion animation – Laura Tofarides:

Laura has been modelmaking remotely (which she was doing before the pandemic).

Communication happens over Whatsapp and Slack, as well as daily phone calls and video calls, and sending directors pictures of the puppets (sometimes next to a ruler for scale), which directors can draw over in Photoshop to give feedback. This pipeline has remained the same since before lockdown.

Laura has also been able to do a small amount of stop motion animation remotely from a home studio she built to adapt to the pandemic. However, most of the stop motion work Laura was doing before the pandemic is not possible remotely, especially high end stop motion animation, so studios Laura has worked with are having to find ways to adapt studio work, such as bringing in masks and hand sanitiser, social distancing, staggered lunch times, one-way systems around studios, updating ventilation systems with filtration and having smaller crews than they would usually use working for longer. Stop motion studios are facing a range of challenges in adapting their spaces to incorporate new safety measures. While some larger studios have a large amount of shoot space that often wouldn't have all been used at once, so are quite well placed to incorporate distancing, this is more challenging for smaller studios.
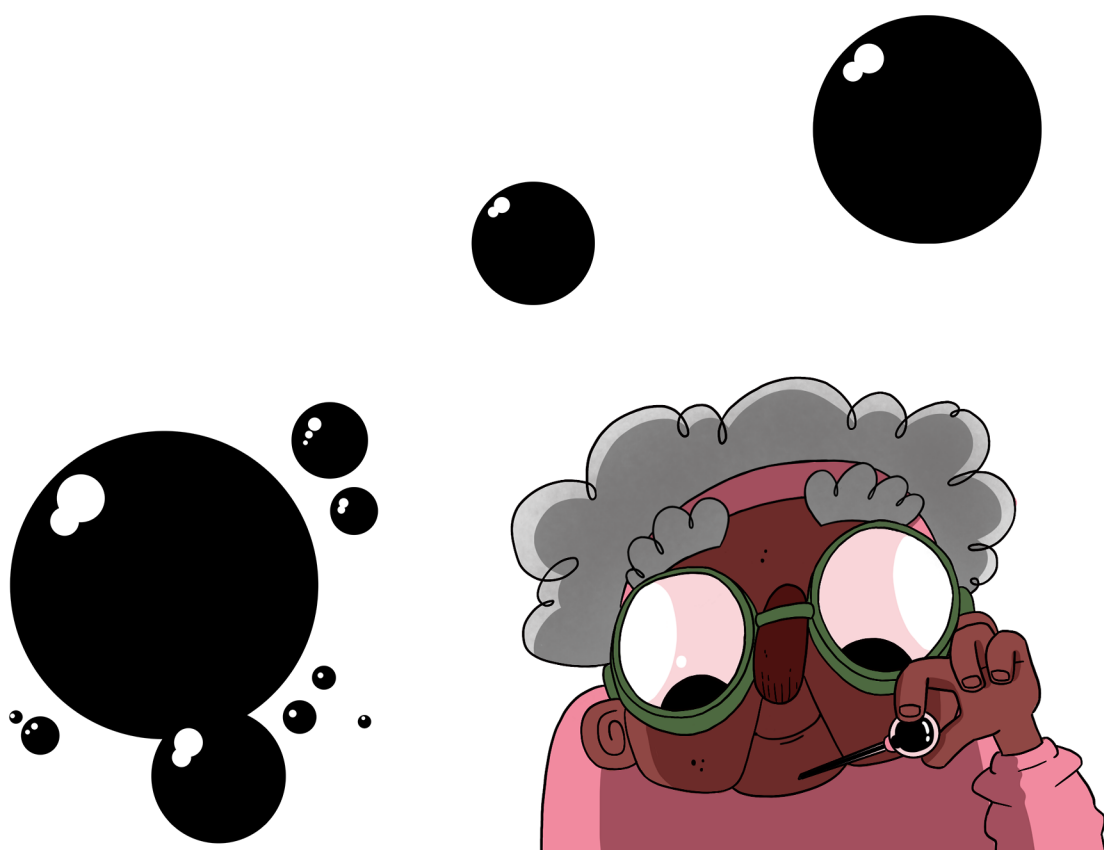
3. ...and each remote work pipeline comes with challenges

CG animation:

Internet speed is the biggest bottleneck for Bomper. This is key for remote working, allowing staff enough bandwidth to remote in as well as headroom to use the internet. Each machine needs 25-40MB bandwidth up and down to allow the remote desktopping pipeline to run smoothly.

To facilitate remote working, Bomper are now looking to increase their bandwidth from 100MB to 1GB, at roughly 4x the cost of their current plan (including a £5,000 fee to upgrade and then another £8,500 a year in fees).

Staff members' home internet and equipment also becomes a factor – when Bomper went into lockdown one of the first things they did was to send out a staff survey to check what each staff member had access to (PCs, laptops, monitors, internet speed, office space), so they could make sure staff had everything they needed to be able to carry on working.

2D animation:

Cloth Cat also found staff internet speeds to be a challenge, and have found that staff based rurally actually tend to have better internet speeds than their city-based counterparts, contrary to what they might have expected.

On the challenges of setting up for remote working, Cloth Cat's Jon Rennie says "it was a real learning curve. What would be really useful would be someone who could advise on setting up remote working – setting up networking, establishing cloud servers etc. If the suppliers of these services and softwares provided more support and advice they'd attract a lot more people to work in this way. There's an opportunity there to bridge the gap between Amazon, Microsoft and Google and some of the lower tier providers to advise creative industries on cloud storage, cloud servers and cloud workstations. There's a need right now to get people cloud working and sharing things properly so data isn't lost. Even most IT people don't know how to do this. Wales has a push now towards home working and there's a real opportunity to ensure people are supported in this way."

Stop motion animation:

Learning to animate stop motion from home has been a steep learning curve for Laura.

While she would usually work with a camera person, lighting person, someone setting up the pipeline for her etc, she's now having to learn all these other skills herself in order to do the one job she was doing before, which was animation. She's learnt these skills through YouTube tutorials and help from industry contacts, building on general knowledge she's picked up over the course of her career to date.

In setting up her home studio, Laura was lucky to have been gifted lots of the equipment she needed from a studio that was closing its premises, so she didn't need to buy a camera, a tripod, rigging, C stands, or magic arms – although she did still have to buy some lights and a Dragonframe license. If she had had to buy everything from scratch, she estimates it would have added up to at least £2-3000 of equipment.

# 4. Home working doesn't necessarily reduce energy use...

CG animation:

While Bomper's studio energy use has reduced by 17% (from 648 to 541kg CO_2e over a two month period), their total energy use has actually increased by 22% (from 648 to 791kg CO_2e over the same period) due to the rise in energy use by staff working from home (from 0 to 250kg CO_2e over the same period), with staff using additional PCs at home to remote into PCs at the studio.

2D animation:

While Picl's emissions from work from home energy use have risen from 0 to 246kg CO_2e per hour of TV produced during lockdown, this is only a third of the emissions created by their energy use working in the studio pre-lockdown, which stood at 791kg CO_2e per hour of TV produced and has now fallen to 0.

While Cloth Cat anticipate a six-fold increase in emissions from work from home energy use, they project their total emissions from energy use post-lockdown to fall to less than 31% of their pre-lockdown energy footprint (11.9 tonnes CO_2e compared to 39 tonnes CO_2e annually), because they expect their studio energy use to fall by over 81%, from 38 tonnes CO_2e annually pre-lockdown to 7.1 tonnes annually post-lockdown.[1]

Total emissions from energy use (as a percentage of each studios pre-lockdown total
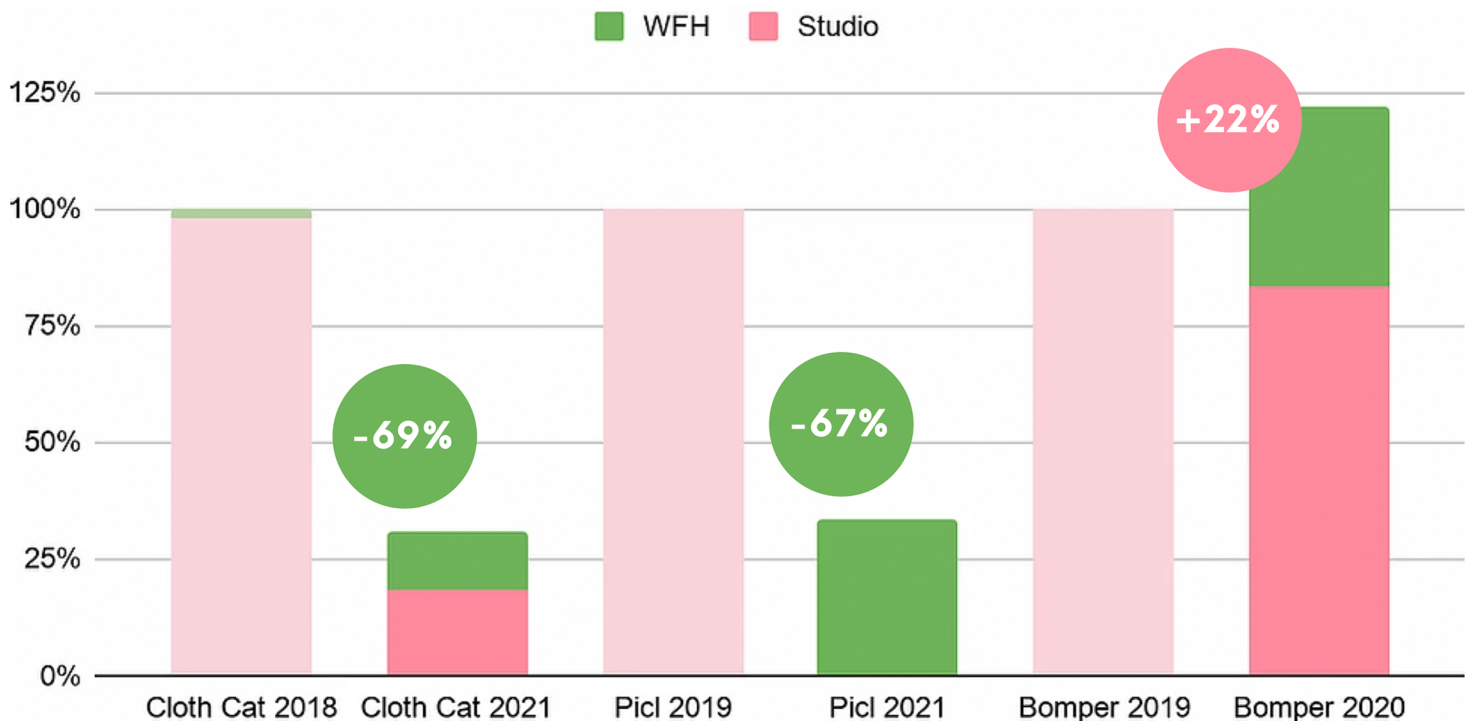
1 Data sources: Cloth Cat Animation; Picl Animation; Bomper Studio; BAFTA Albert advisor; Sustainable Energy – Without The Hot Air – David MacKay, 2016.

5. …but reducing commuting emissions can have a huge impact on a studio's carbon footprint
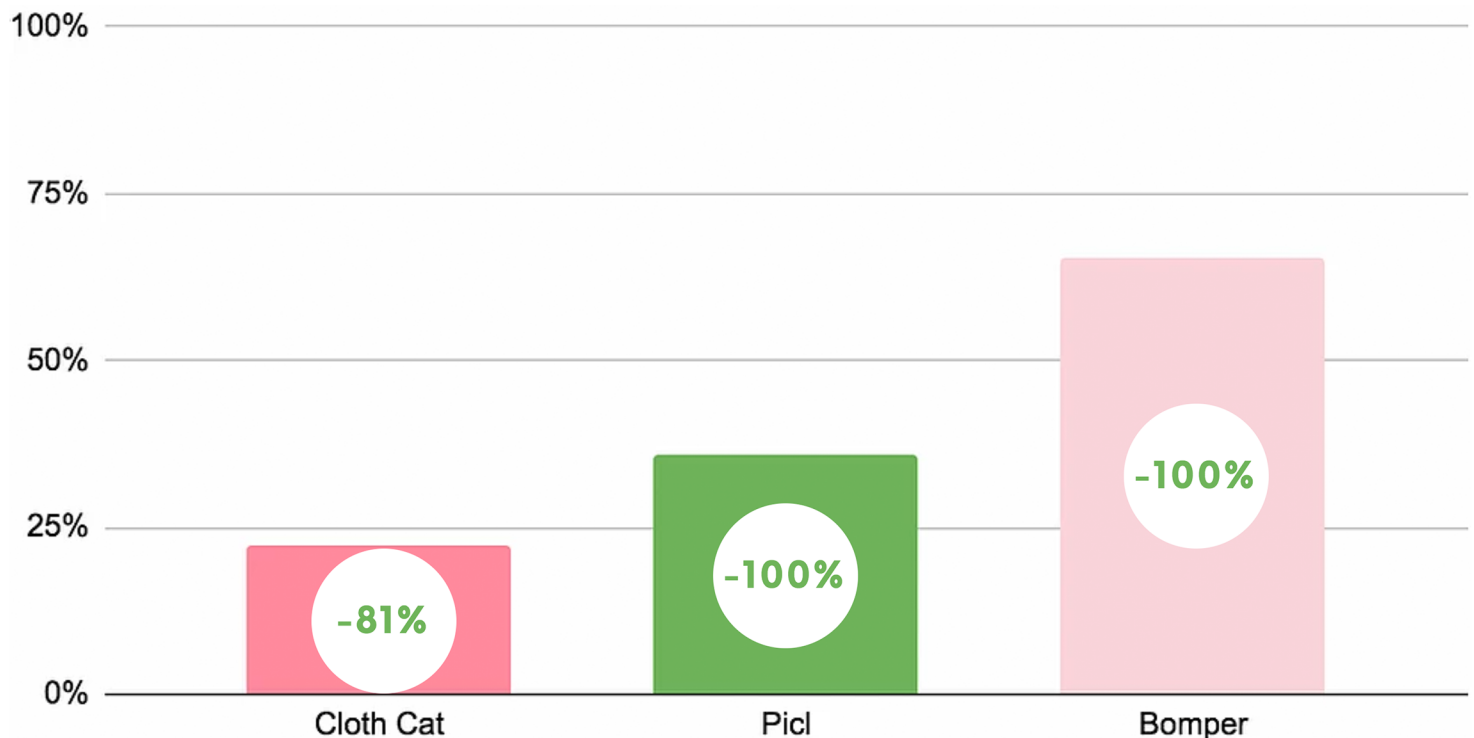
2D animation:

Cloth Cat's projected fall in emissions from commuting is significant, with projected post-lockdown commuting emissions totalling less than 19% of their pre-lockdown commuting emissions (falling from 15.8 tonnes CO2e to 3 tonnes CO2e annually).

Picl's commuting footprint has reduced by 100%, from 509kg CO2e per hour of TV produced to zero. Picl intend to maintain this after lockdown.

CG animation:

Bomper's commuting footprint, which made up the majority of their pre-lockdown footprint (65%) has reduced by 100% from 1226kg CO2e over a two month period to zero, causing the significant reduction in their total footprint. [2]

Pre-lockdown emissions from commuting (as a percentage of each studio's pre-lockdown total carbon footprint)

[2] Data sources: Cloth Cat Animation; Picl Animation; Bomper Studio; BEIS/Defra Greenhouse Gas Conversion Factors 2019.

6. Cloud storage can make a big difference to carbon footprint

Both Cloth Cat and Picl are using cloud-based pipelines, with different cloud storage suppliers.

Picl are using Dropbox, which only uses 17% renewable energy. Cloud storage made up 8% of Picl's pre-lockdown carbon footprint. Now their lockdown carbon footprint is significently reduced, cloud storage makes up nearly a third (29%) of their footprint. By switching to a carbon-neutral supplier, Picl could reduce the carbon footprint of an hour of TV they produce by 109kg CO2e.

Although Cloth Cat's cloud storage usage is projected to increase significantly from 2018-2021, Cloth Cat use Google Filestream, which is a carbon neutral cloud storage system, so this doesn't result in an increase in their projected footprint. Were Cloth Cat using a cloud storage supplier using 0% renewable energy, rather than a carbon-neutral supplier, their pre-lockdown footprint would increase by 1% (0.7 tonnes more CO2e), and their projected post-lockdown footprint would increase by nearly a quarter (23%; 4.3 tonnes more CO2e).

Other cloud-based solutions include Apple iCloud and Microsoft OneDrive. Direct comparisons between cloud-based solutions aren't easy – in building their Click Clean Scorecard, Greenpeace reported a lack of transparency from cloud storage suppliers around their environmental impact. However, Apple reports that its operations are all carbon neutral and its data centres are powered by 100% renewable electricity. Microsoft also reports being carbon neutral, and has committed to becoming carbon negative by 2030 and removing all of its historic carbon by 2050. Dropbox are aiming to power their data centres with 100% renewables and reach carbon neutrality for some operations by 2030. Google have committed to fully decarbonising their electricity supply by 2030 and report having already offset all of their historic carbon. [3]
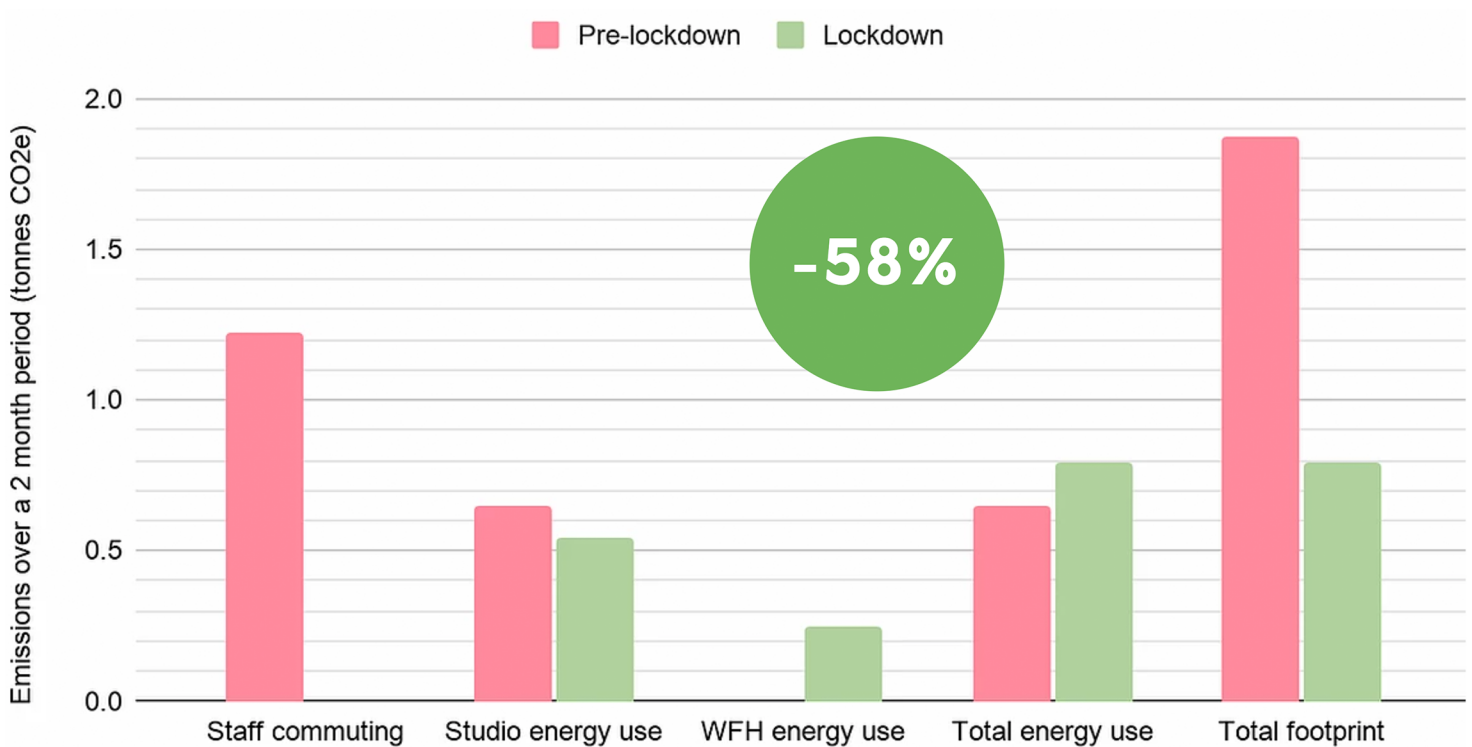

[3] Data sources: Cloth Cat Animation; Picl Animation; Bomper Studio; GreenPeace Click Clean Scorecard; American Council for an Energy-Efficient Economy; Apple, Microsoft, Dropbox, Google.

7. Home working can be a much greener way of working – particularly in 2D animation
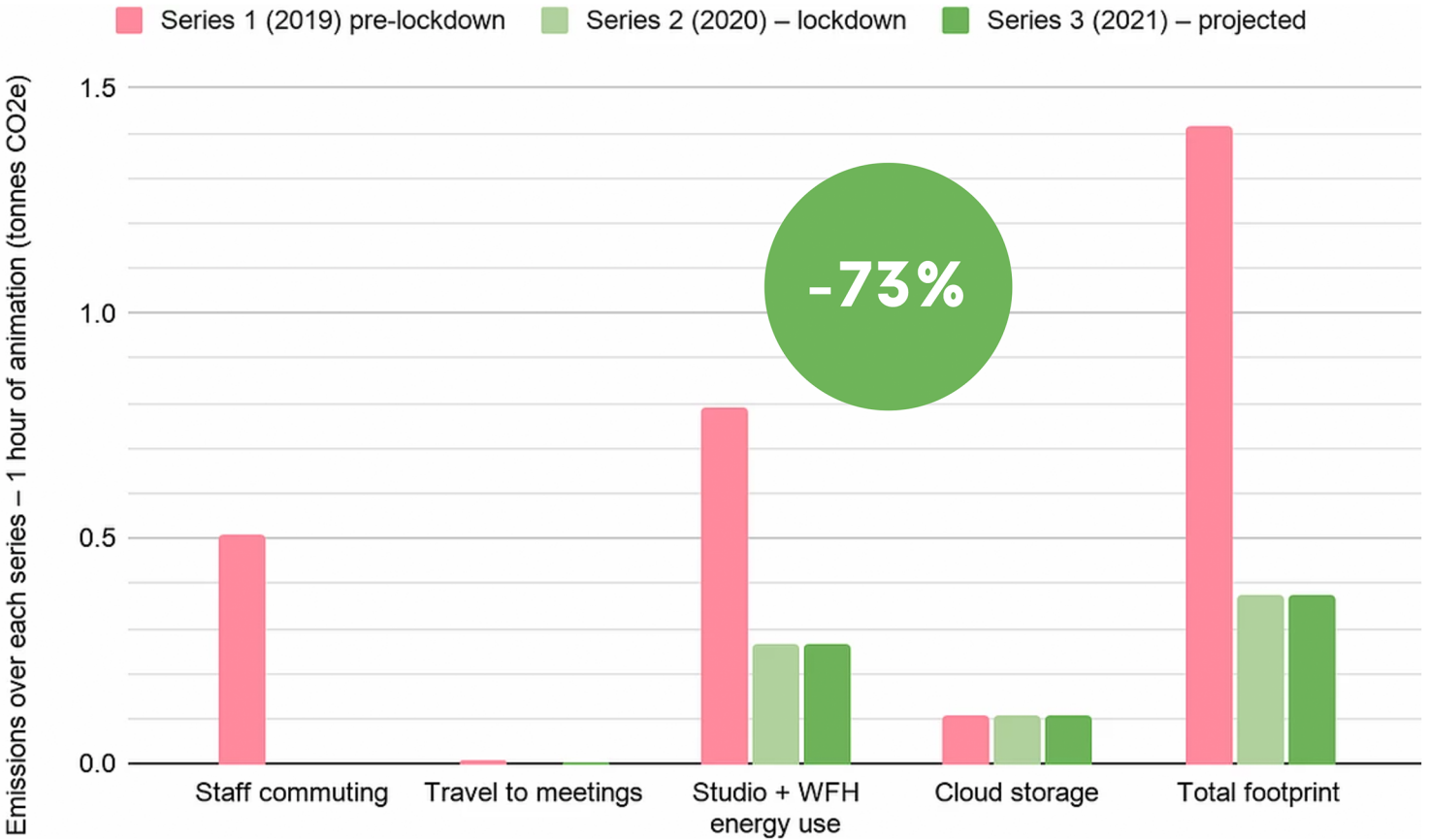
CG animation:

Bomper Studio carbon footprint comparison – pre-lockdown vs during lockdown

Bomper's lockdown carbon footprint stands at only 42% of its pre-lockdown footprint, at 791kg CO2e over a two month period during lockdown compared to 1874kg CO2e over a two month period pre-lockdown. Bomper have always worked via email and calls, so travel to and from a client even before lockdown was very limited. [4]

4 Data sources: Cloth Cat Animation; Picl Animation; Bomper Studio; BAFTA Albert advisor; Sustainable Energy–Without The Hot Air – David MacKay, 2016; BEIS/Defra Greenhouse Gas Conversion Factors 2019; GreenPeace Click Clean Scorecard; American Council for an Energy-Efficient Economy.

Picl Animation carbon footprint comparison – series 1-3 of an animation production (2019 vs 2020 vs 2021)

Picl's lockdown carbon footprint stands at only 26% of its pre-lockdown footprint, at 373kg CO2e for an hour of broadcast animation produced during lockdown compared to 1415kg CO2e for an hour of broadcast animation produced pre-lockdown. Other than re-introducing a small amount of travel for meetings, Picl expects to maintain most of its 2020 working practices post-lockdown, projecting a post-lockdown footprint of 376kg CO2e per hour of animation produced, less than 27% of its pre-lockdown footprint. [5]

[5] Data sources: Cloth Cat Animation; Picl Animation; Bomper Studio; BAFTA Albert advisor; Sustainable Energy–Without The Hot Air – David MacKay, 2016; BEIS/Defra Greenhouse Gas Conversion Factors 2019; GreenPeace Click Clean Scorecard; American Council for an Energy-Efficient Economy.
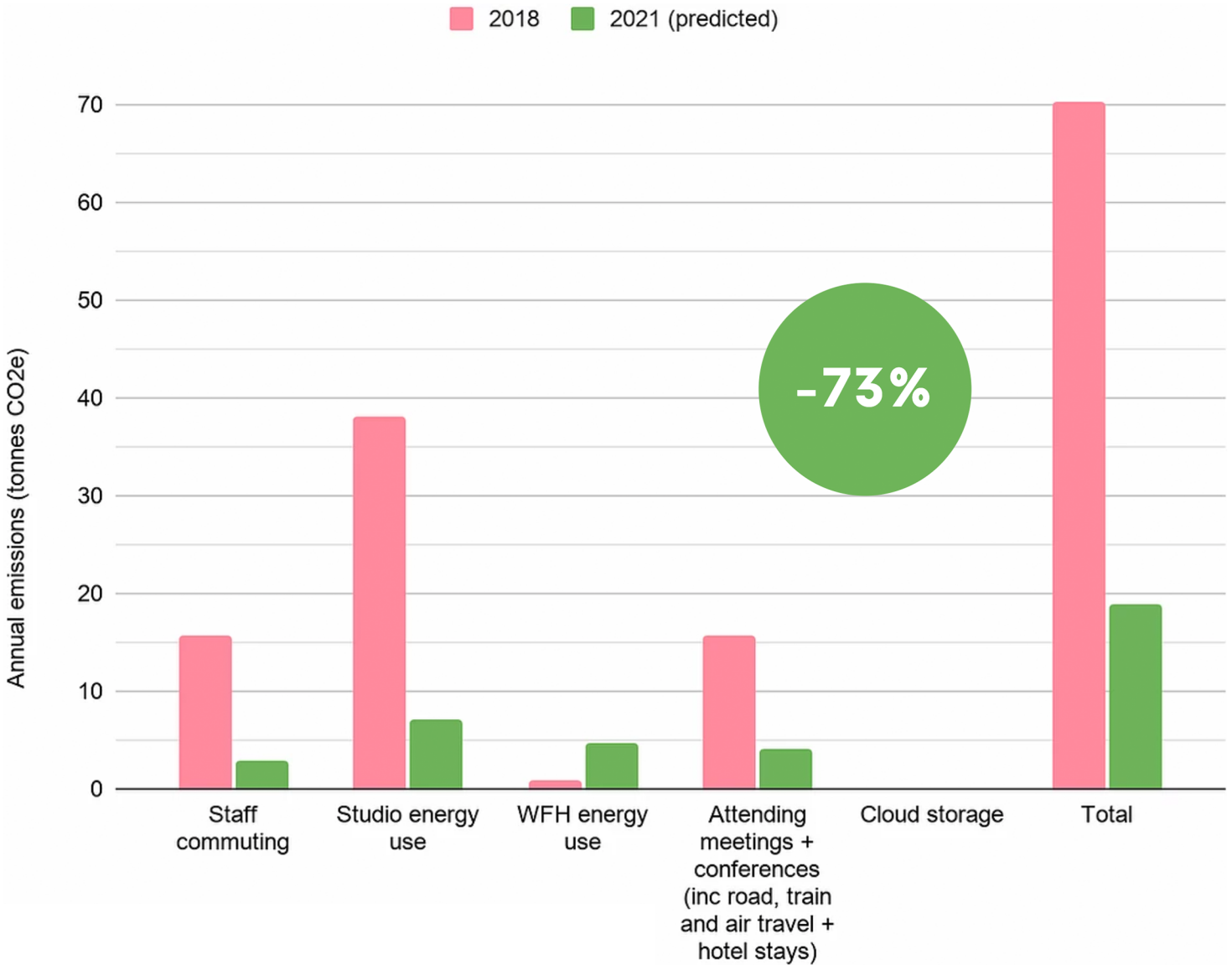
Cloth Cat Animation carbon footprint comparison – 2018 vs 2021

Cloth Cat's projected post-lockdown carbon footprint stands at only 27% of its pre-lockdown footprint, at 18.8 tonnes of CO_2e annual emissions post-lockdown compared to 70.2 tonnes CO_2e annual emissions pre-lockdown. Their projected reduction in emissions from travel to meetings and conferences is almost as significant as their reduction in commuting emissions, falling from 15.7 tonnes CO_2e annually pre-lockdown to a projected 4 tonnes CO_2e annually post-lockdown – 26% of their pre-lockdown figure. [6]

[6] Data sources: Cloth Cat Animation; Picl Animation; Bomper Studio; BAFTA Albert advisor; Sustainable Energy–Without The Hot Air – David MacKay, 2016; BEIS/Defra Greenhouse Gas Conversion Factors 2019; GreenPeace Click Clean Scorecard; American Council for an Energy-Efficient Economy.

8. There are pros and cons to home working beyond the environmental impacts

No commute means money and time savings for staff – Bomper's Emlyn Davies feels not having to travel into work each day benefits their staff. Blue Zoo's Francesca Pesce agrees "a lot of people do prefer to work from home because we were all commuting to London – the transport is expensive, it might take you two hours to commute to and from the studio, and that time and money is saved." Cloth Cat also think their team have a better work life balance due to home working, and more freedom and flexibility – Jon Rennie says "people can go and work at their parents' for a week or whatever they want."

Staff don't have to move house to work on a production (and studios can access a larger pool of talent) – Jardine Sage of Fourth Wall says "we're in the North West – we have an art director in Ireland, one of the lead background artists is in France; all of these people had made the commitment before Covid to move to Liverpool, and now we've turned round and said 'you can stay where you are if you want to.' It's allowed us to open up the door a little bit more, which is useful for us too because London has a lot of talent, there's a lot of talent in Manchester, Bristol, Cardiff." The expectation on animators is often that they'll move house for each new production. Jardine says "that's not a productive way to work, and one of the positives we need to look at is that people can have a bit more of a family life and actually just stay where we are and it doesn't necessarily affect production." Cloth Cat's Jon Rennie agrees "if you make everyone move at the end of each production, animation becomes a young person's game because people want to put down roots and stay somewhere, so we were sometimes losing people that way." Chris Prynoski of Titmouse says "it used to be that if you wanted [a top animation job], you really had to be in LA, New York, or somewhere near a studio. If you weren't, you had to be a lot better than anyone in town. Now, not so much. It's a great opportunity for creative professionals living outside the big cities to get a foothold in the business."

Effects on production (and/or staff putting in extra time to keep productions on track) – Bomper have found remote working has impacted on production, although they have still managed to deliver one of their biggest productions during lockdown. Emlyn says "CG design and animation is a team sport, and having peers sitting next to each other problem-solving is a key day to day activity to get projects over the line, especially for the much smaller projects that have days to turn around. Coming up with ideas is hard remotely." Boulder's Chris Lynch found after an initial drop-off in productivity in the first few IT-heavy weeks of lockdown, "everyone got the time back they would have spent commuting, so we all pulled together to avoid an overall drop-off." Sarah Smith of Locksmith says "everyone is putting in 20% more hours to achieve the same amount of work logistically working from home." The boundaries between work and home are blurring for many remote workers – Francesca Pesce says "we got used to replying to late messages in the evening, even though nobody asked us to, because we were at the computer anyway and it naturally happened, but also because we were all trying to make it work somehow."
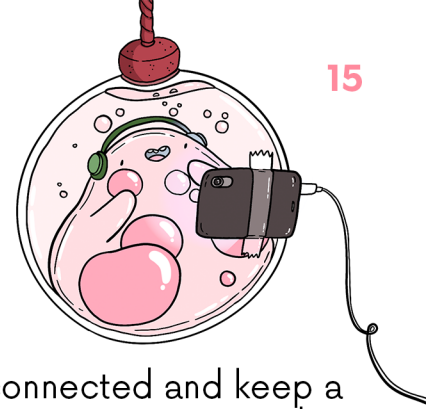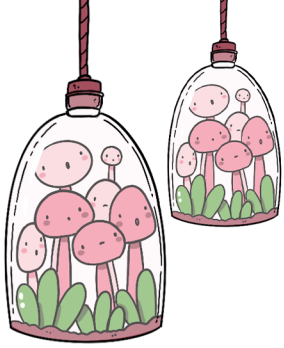
Staff mental health – Although studios are attempting to keep staff connected and keep a feeling of community, there are concerns for staff mental health. Jardine Sage says Fourth Wall had to work out how to structure a day in terms of communication, introducing Slack chats and morning Zoom meetings to get briefs going and make sure everyone's feeling on the same page and people aren't feeling on their own. Blue Zoo's Francesca Pesce says "my major worry became people's mental wellbeing. We have dailies every day, we have coffee breaks and meetings on Zoom, we have Friday showings to keep that community… But there's always someone who's been having loads of tech issues all day. Having zoom calls and being able to vent about that really helps them. In a studio you can always turn around and rant to someone; the fact you can't do that [at home] affects people mentally." Emlyn Davies feels "there will inevitably be knock-on mental health issues with some staff potentially feeling isolated." Cloth Cat's Jon Rennie agrees, but feels working from home is beneficial for some. "The biggest problem is not really the technology, but actually it's communication and it's community, keeping people talking, making sure people don't feel as if they're on their own. There's always a balance when you're in the studio – some people actually don't like being in an office environment. And some people with certain mental health issues prefer to be isolated or away from loud noises. So being in an office environment isn't ideal. So I think partly it's about giving people choice, and now there's an opportunity to do that." Laura Tofarides points out that the combination of working from home and being a freelancer can also be tricky, as you have to learn to manage your own time, and nobody's ever going to tell you to stop at a certain time, so it can be tempting to work into the night and not take evenings and weekends off.

Recruitment challenges – Bomper brought in a new production coordinator right at the start of lockdown, who has never physically met anyone on the team. Fourth Wall were in pre-production on a new series when lockdown hit, so they've had to build a remote crew of 40 animators, designers, riggers etc who have never physically met, and they've had to build a new studio remotely. Blue Zoo have found recruitment difficult remotely, and they aren't taking chances on staff like they might have previously. Francesca Pesce says "while last year I could afford to hire someone more junior or who had more to learn, now if I'm hiring someone who's just graduated their showreel has to be perfect, and I have to get the impression from the interview that they could cope perfectly and independently with their job. Of course they can still talk to us but they need to be able to do their job independently for most of the day. For people just coming out of uni that's something they need to work on now."

Training and induction challenges – While studios have developed a range of strategies for managing training and induction remotely – Fourth Wall are remoting into each other's desktops to help people, and Cloth Cat staff are sharing screens with people and having them there on video chat – Boulder's Chris Lynch still feels that with remote working "there's something lacking in training and induction, because it's much easier for someone to be sitting and working away and their peer right beside them might see their monitor and immediately lean over and give them a hand, and I think that's quite fast and free-flowing and people get quite friendly with each other. And I think going forward we're all going to adapt to doing this across the internet, but for me I definitely see that as lacking at the moment, that human touch really."

Production staff need to use different communication skills – Bomper's Emlyn Davies has found he's doing a lot more reading and writing and less chatting, which can be challenging if that's not the sort of work you're suited to. Jon Rennie agrees, saying his role has now become much more about messaging people and making sure they're ok.

Security and backup considerations – Jon Rennie has found that with studio storage now acting as archive / disaster recovery backup, Cloth Cat now have more security and more backup than they had even before. He still feels security is a concern – "we're not working necessarily for clients who contractually require a very robust security system – if we were working for Netflix of Apple they'd need a lot more security, their security requires multiple levels of access limitation etc." Jon says security is based on trusting staff not to leak anything. "Look at it this way – how many Marvel spoilers have you seen coming out of VFX companies? And they employ thousands of people around the world all the time working on multiple films. Everybody knows their job relies on looking after the projects they're working on – that's the industry we work in, everything relies on trust. In future we could probably work on a completely virtual system using Google or Amazon cloud-based systems which would be even more secure, but why do we need it to be that secure? You don't want your staff to feel like they're not trusted." Bomper set up VPNs to try and make their pipeline as secure as possible, but Emlyn agrees it's down to trust; "in terms of security we looked at loads of things... there was one where the sales team were saying this is fully encrypted, nobody can get to it, it's two factor, all this stuff, and I said 'ok, well could I just take a photo of the screen and post it?' And they said 'yeah. Yeah you could.' So it's all about trust essentially." Blue Zoo set up two-factor authentication to prevent any unauthorised access – while they were not so concerned about staff leaks, one of their major concerns was whether data could be hacked.

Benefits for companies outside London – Cloth Cat's Jon Rennie says "before, because I'm in Cardiff, we felt quite isolated from what was going on in London. There are all these big London-centric meetings where everyone would come together, you could hear everyone drinking tea and eating cake and I'd be down the end of a scratchy phone line wondering what was going on. Whereas now, everyone's in the same size square on a computer, everyone's the same, you're all able to check in together; to be honest I find this more democratic and open than it was before. I don't want to go back to being forced to go to London every month or so to have meetings because frankly it took a whole day out of my life, it's very expensive... so I'm actually preferring this way of working because ironically in some ways it brings us closer together."

9. Some of the changes made this year will last beyond lockdown

Cloth Cat have moved out of their studio space, and don't intend to return to the studio until summer 2021 at the earliest. Cloth Cat already had a handful of staff working remotely using remote desktopping, but weren't happy with the speed of this pipeline, so they were already looking for remote working solutions when the pandemic hit. Jon Rennie says "we were working towards remote working anyway, but it wasn't going to happen particularly fast and there were a lot of tech hurdles to overcome. The pandemic forced us to look at those hurdles and work out solutions."

A lot of Cloth Cat's equipment was coming towards end of life (e.g. their server) and was going to need to be replaced. Now, instead, they have removed all old equipment and streamlined their servers to only the storage and render farm. In the future, Cloth Cat now don't intend to rebuild the old infrastructure, as their new infrastructure developed in 2020 is flexible for home and office working. This will allow Cloth Cat to be more flexible going forward, without a server room sitting in a particular place that everyone has to be networked to. Jon now wants to focus his efforts on making sure remote working works better, and then have all work happen using a remote work pipeline – even if some of that work is happening in the studio. "We're now saying let's not bother having a fixed server in the studio let's have a virtual server, let's have cloud storage, let's have those things we thought we'd never need or that would be too expensive. If we're not paying for such a big studio anymore – e.g. maybe half the staff are working from home – then we can afford to spend on cloud storage which makes everyone's life easier.

"This is going to be the new normal. We aren't going to go back to being in the studio in the same way. People are going to want to have that flexibility to work at home, or to work in the studio for a couple of days, or go on holiday for a month with their kids and work from there. If we can provide that opportunity, why not? Animation's fortunate, we're not live action, we've been able to carry on working, and I think we have to show how we can make that really interesting and a good 21st Century way of doing things, not assuming we have to come back into a studio in the same place at the same time. Home working will stay, but some people want to be in the studio and be with people. So we will inevitably have a space, [but] we don't actually know yet what that will look like."

In contrast, Laura feels the stop motion animation industry is more likely to return to previous ways of working. On whether she can see herself continuing to animate from home post-lockdown she says "having set up the home studio now means I could potentially take on small commissions, so that's an opportunity… but I can't wait to get back into the studio, I really miss being part of a team."
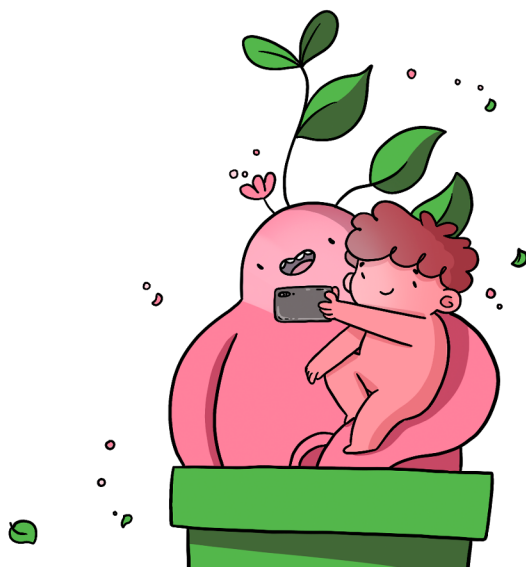
On whether Bomper will keep any of 2020's changes going forward, Emlyn says "honestly, I'm not sure. We're looking at splits for remote working (e.g. a 3/2 split), but waiting to see how the next few months pan out. As I type, Caerphillly, where the studio is based, is in a local lockdown, so the studio is off limits and all staff are working remotely." Emlyn says people are not going to want to go back to commuting five days a week to an office – "we did some surveys and I genuinely was expecting everybody to say 'I don't want to come back into the office ever again, I want to work from a beach in the Bahamas' or something, but I was surprised that lots of them did want to come back into the studio, but more flexibly, so maybe one or two days a week. Currently we're just waiting to see what happens, so everybody's going to stay remote for a while. We've tried lots of social stuff, zoom quizzes etc, and we're trying to make sure everyone gets a chance to speak in meetings. But I genuinely do miss having people in the studio and being able to go to the pub with people on a Friday and having those chats about random stuff that might not be work-related."

Francesca Pesce says Blue Zoo have also surveyed staff and looked at what they want going forward. "We did a lot of surveys to check on people and check if they were doing ok, and in one survey only 5% of the studio said they were happy to return to London five days a week. The majority are really happy to work remotely, to work from other places, some people would rather return to their families in Italy and Spain and work from there. People have realised they could work in a different way."

Titmouse's Chris Prynoski says "I miss the creative collaboration, the shmoozing, the drinks and dinners. Keeping up those connections and the studio vibe over distance is the hard part. On the other hand, it's been a real pleasure to spend some quality time with my family."

10. Animation was already a very green method of TV production – and home working can make it even greener

The average emissions associated with making a TV programme or series is 62.3 tonnes CO2e. One hour of TV averages about 8.2 tonnes CO2e.

Cloth Cat Animation produced around 16.5 hours of TV in 2018, at an estimated carbon cost of 70.2 tonnes of CO2e, making their average emissions per hour of broadcast animation produced 4.25 tonnes – less than 52% of the average carbon cost of producing an hour of TV.

Their projected output in 2021 is expected to be even greener. They expect to produce a total of around 10.5 hours of broadcast animation in 2021, with a projected carbon footprint of 18.8 tonnes of CO2e, taking their average emissions per hour of broadcast animation produced down to 1.8 tonnes – less than 22% of the average carbon cost of producing an hour of TV.

The total emissions for an hour of broadcast animation Picl Animation made in 2019 was 1,415kg CO2e, 17% of the average carbon cost of producing an hour of TV. Series two of the same production in 2020 is expected to produce a total of 373kg CO2e, and Picl Animation are planning to maintain most changes made during 2020 after the pandemic – series three of the same production in 2021 is projected to produce very slightly higher total emissions of 376kg CO2e, less than 5% of the average carbon cost of an hour of TV. [7]

Carbon cost of producing an hour of TV
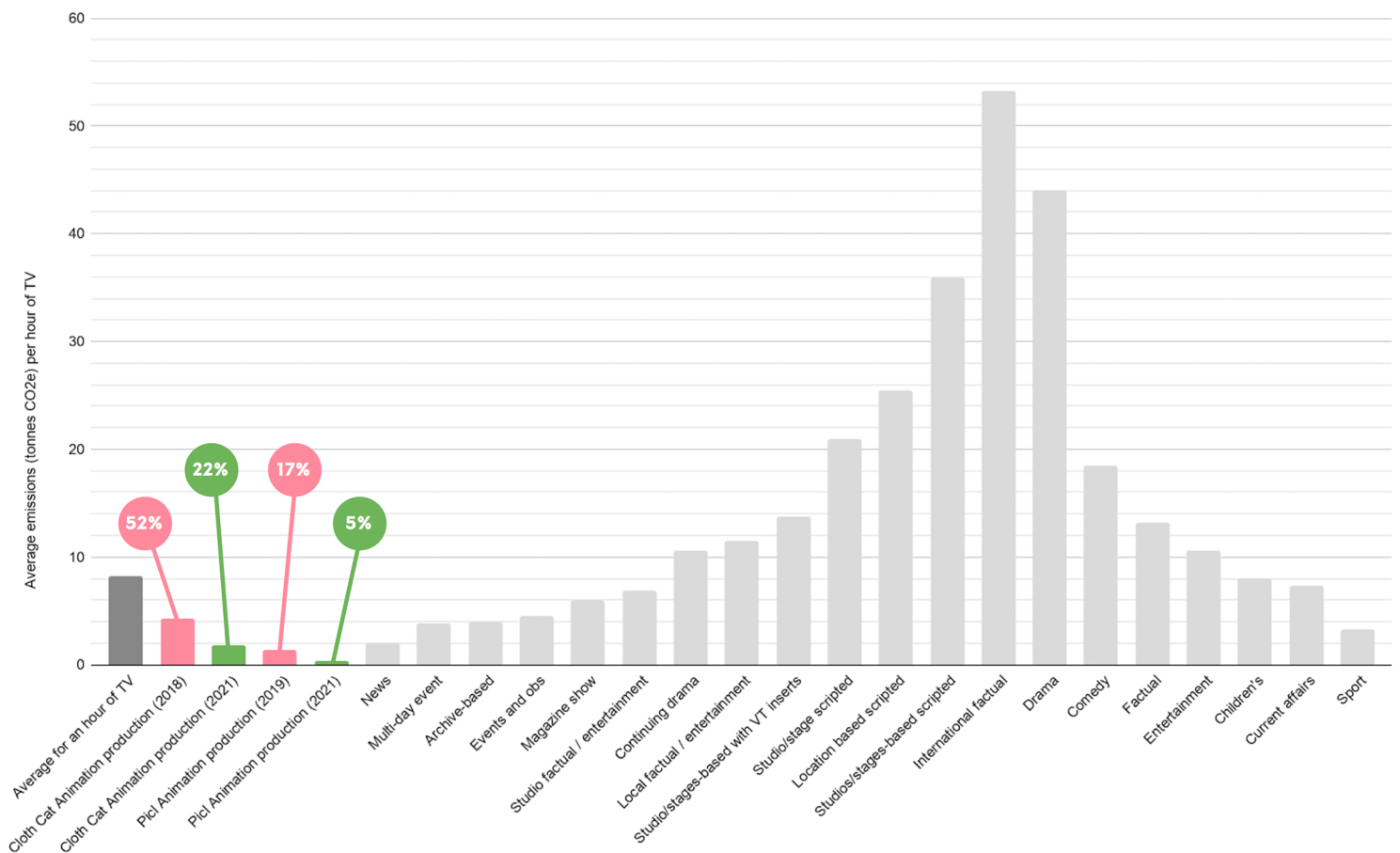
[7] Data sources: Cloth Cat Animation; Picl Animation; BAFTA Albert advisor; Sustainable Energy–Without The Hot Air – David MacKay, 2016; BEIS/Defra Greenhouse Gas Conversion Factors 2019; GreenPeace Click Clean Scorecard; American Council for an Energy-Efficient Economy; BAFTA Albert presentation at Cardiff Animation Festival's Online Climate Assembly, 3rd April 2020.

11. There are other ways we can make animation greener

Even when some studios return to a more familiar way of working, there are other ways we can make the animation production process greener.

Bomper's Emlyn Davies says "electricity is one of our biggest expenditures, with the volume and power of the machines we have in the studio. I have looked at getting solar panels, but the initial investment and payback are too long to risk on a building we don't own. This would be something we'd undertake if we owned the building.

"If everyone had amazing internet then cloud storage would be the future. 5G might be the key – it could transform the way we work."

Cloth Cat's Jon Rennie says "when we return to a new studio eventually, we would look to have one that doesn't require as much infrastructure or air conditioning."

He also feels there are ways the industry more widely can reduce its footprint, for example "for a lot of the courses you had to go to London once a week to learn CelAction or something – a lot of these courses have been forced to go online and actually embrace the technology, so I think there's more access to learning now than there probably ever was. Why don't we keep it that way?"

In April 2020, **Cardiff Animation Festival** came together with animation industry professionals, academics, heads of studios and climate change experts and explored how we can all work greener. Speakers from **BAFTA Albert**, **Julie's Bicycle** and **Be Inspired Films** joined us for short, focused online talks to cut through the noise and tell us easy ways to make our animation practice more environmentally sustainable. Then we opened up the conversation digitally to learn from each other and talk about how we can work together to make a difference, in virtual breakout discussions led by innovative facilitators **PDR**.

You can watch the talks and find out more at **cardiffanimation.com**.