

WHOLEGRAINdigital

# Sustainable web design for everyone

State of the Browser 2021

Tom Greenwood, Wholegrain Digital

@eatwholegrain





# Internet emissions are huge



ICT



Germany



Global Aviation

# Energy in manufacture and operation



Data centres

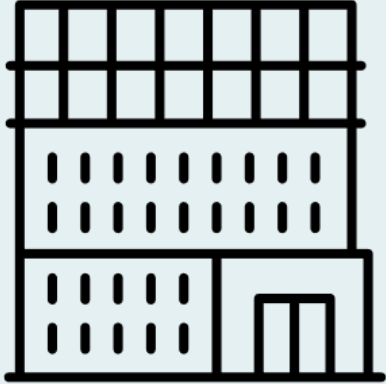


Transmission  
networks



End user devices

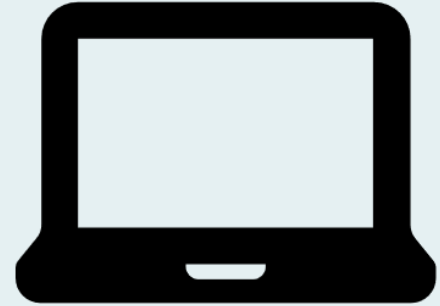
# This is where we can save energy



Reduce server  
load



Reduce data  
transfer



Reduce device energy

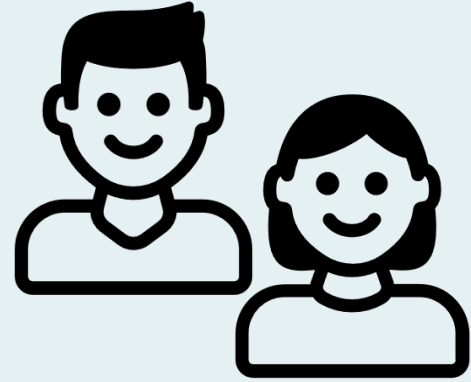
# The benefits



Reduced energy  
usage



Improved  
performance



Improved user  
experience


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So what can we do?



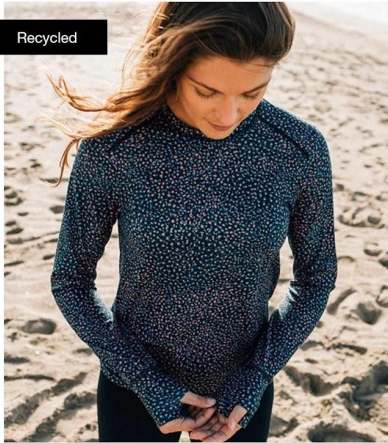
# Streamline user journeys

[Men](#) [Women](#) [About](#) [Blog](#) [Sustainability](#)



Recycled

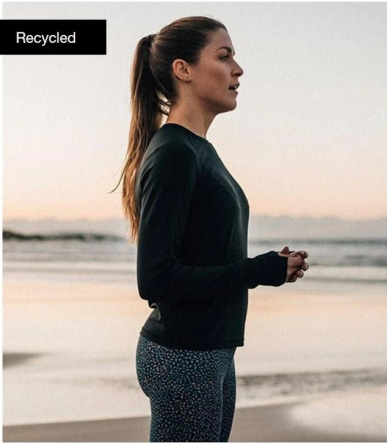


**Sale**  
**Makani Top**

Active top in performance recycled fabric.

★★★★★ (4)

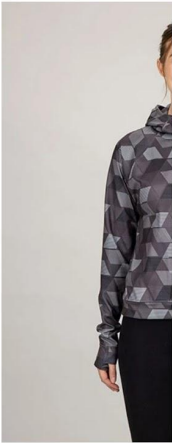
Recycled



**Sale**  
**Makani Top**

Active top in performance recycled fabric.

★★★★★ (4)




**Sale**  
**Makani Hoodie**

Active top in performance recycled fabric.


★★★★★ (5)

Shopping Basket


×



**Makani Top**  
Size: 8 / Sunset / Lapis  
£32.50 x 1 Remove




**Women's Nieuwland  
4mm Hooded Wetsuit**  
Size: 8 / Ink  
£243.75 x 1 Remove



**Keyne Jumper**  
Size: 8 / Sea Rust

Basket

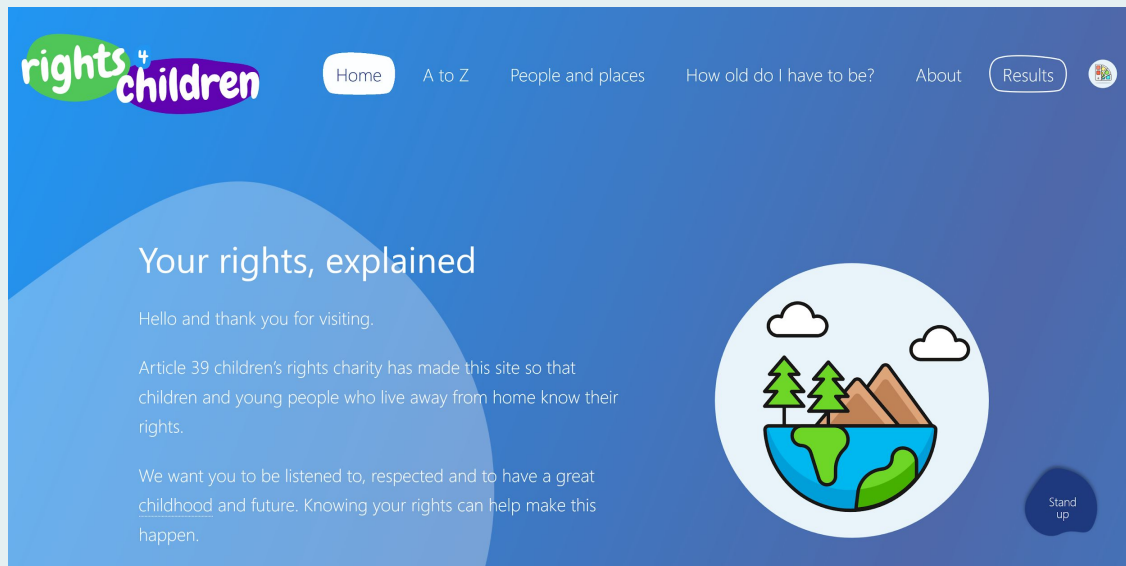
Checkout





# Efficient Images

- Use less images
- Use vectors and CSS instead of photos
- Design the smallest version of your photos





1.2MB JPEG  
1280 x 800





640 x 400px

**360kb JPEG**



640 x 400px with blurred edges

**192kb JPEG**



640 x 400px with blurred edges

**192kb JPEG**



640 x 400px B&W with blurred edges

**129kb JPEG**

A diagram on a dark purple background comparing three image formats: JPEG, WEBP, and AVIF. Each format is enclosed in a light blue, irregular blob. Yellow chevron symbols (>) are placed between the blobs. Below each blob, its size reduction and browser support are listed. JPEG is the largest, followed by WEBP, and then AVIF.

JPEG

WEBP

-30%

96%  
support

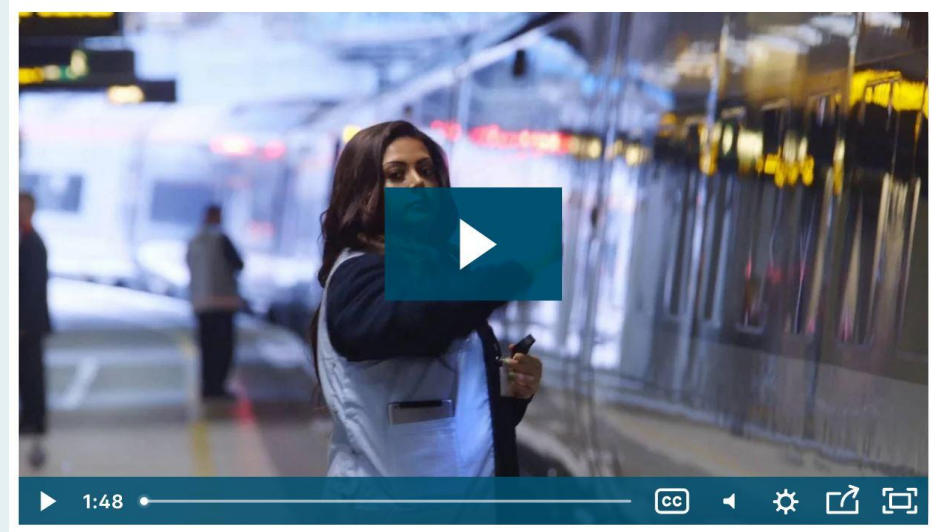
AVIF

-50%

67%  
support

# Use video efficiently

- Avoid auto-play
- Compress video files
- Stream at lower definition
- Reduce time

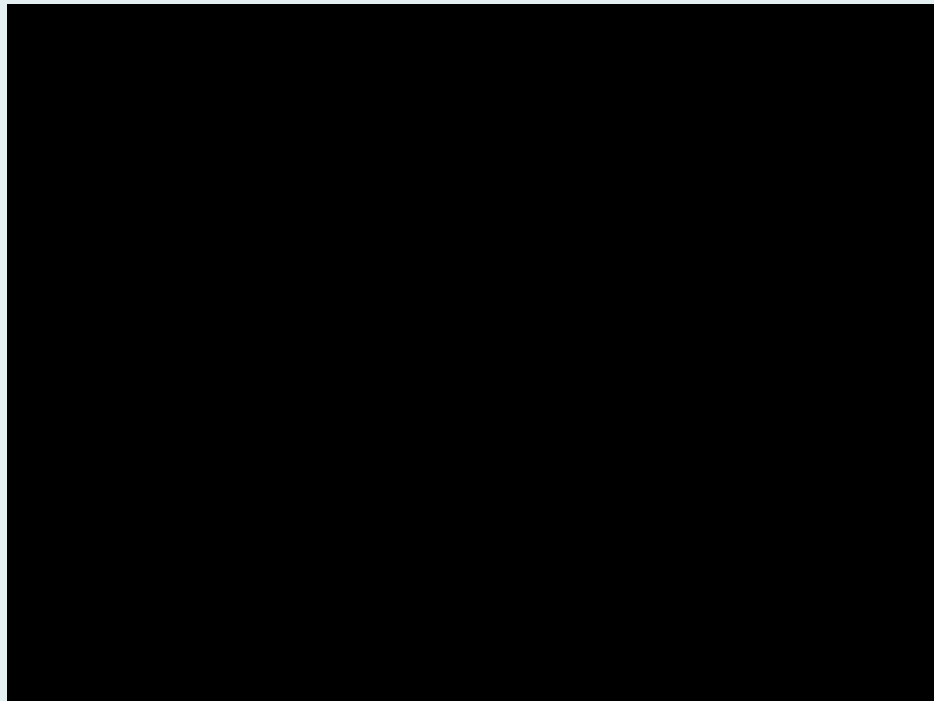


# Replace video with animation

## Interactive animation

- Less data
- SEO friendly
- Accessible
- Controllable timeline

After Effects > Lottie





# System Fonts

They are free!

The screenshot displays the Hotels.com website. At the top is a red navigation bar with the Hotels.com logo, a currency selector set to GBP, a help menu, and links for 'Your bookings', 'Join now', and 'Sign in'. Below this is a white navigation bar with links for 'Deals', 'Things to do', 'Packages & Flights', 'Groups & Meetings', 'Gift Cards', 'List your property', and 'Hotels.com® Rewards'.

The main content area features a search widget on the left and a large background image of the Tower Bridge in London. The search widget, titled 'Where to?', includes a text input field with 'e.g. London' and a search icon. Below the input field are sections for 'Check-in' (06/03/2020, Friday), 'Check-out' (07/03/2020, Saturday), and 'Rooms' (1 room). It also shows 'Adults' (2, Aged 18+) and 'Children' (0, 0-17). A blue 'Search' button is at the bottom right of the widget.

Below the search widget, three promotional banners are visible: 'Pay now or later on most rooms', 'Free cancellation on most rooms', and 'Save with Secret Prices! Unlock now'.

The 'Hotels.com Rewards' section is highlighted with a purple background. It features a graphic of a calendar grid with numbers 1 through 10, followed by an equals sign and a crescent moon icon. The text reads: 'Collect 10 nights get 1 reward\* night. No gimmicks, just rewards.' A 'Find out more' button is located at the bottom right of this section.

At the bottom of the page, there is a banner for 'JAMAICA HEARTBEAT' with the text 'FEEL THE RUSH' and a 'LET'S GO' button.

\*See terms and conditions



# Optimise custom fonts

- File format (WOFF2)
- Subset fonts
- Use fewer weights (or variable fonts)

<b>Inter UI (default)</b>	<b>Inter UI (optimised)</b>
TTF file	WOFF2 file
2192 characters	98 characters
300kb	7kb

# Low energy colours

*Only relevant on OLED screens*

**WHITE**

Highest energy

**BLACK**

No energy

**DARK**

Low energy

**BLUE**


High energy

*~25% more than  
green and red*


# Track less

Bloomberg the Company & Its

Menu Search



Energy & Science | F



## Your Choices Regarding Cookies

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Personalised ads and content, ad and content measurement, audience insights and product development	▼
Bloomberg required cookies	▼
Bloomberg functional cookies	▼
Bloomberg advertising cookies	▼

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Manage Cookies

Customer Support

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### Daily newsletter

climate news and insights on  
ence, environmental impacts,  
ech and green finance.

Sign Up

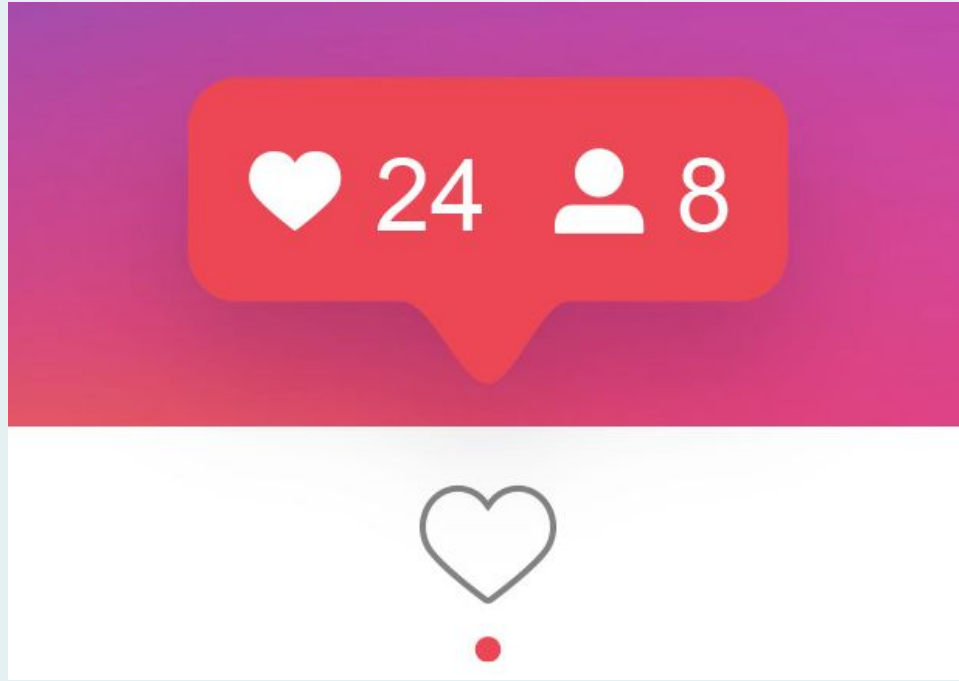
# Track less

Platform	Size	Cookies?
Google Analytics	17KB	Yes
GA with GTM	75KB	Yes
Matomo	40KB	Yes
Minimal GA	1.5KB	Yes
Fathom	1.2KB	No
Plausible	<1KB	No

# Efficient coding languages

- Most efficient: C, Rust, C++
- Least efficient: Perl, Python, Ruby
- JavaScript is:
  - 7 times more efficient than PHP
  - 16 times more efficient than Ruby

# Don't drug the user



# Design for the less privileged

## What Does My Site Cost?

Find out how much it costs for someone to use your site on mobile networks around the world.

<https://www.bbc.co.uk/news> weighs 4.02MB. Here's what that costs around the globe.

Want to make things better? Check out the [full results and recommendations at WebPageTest.org](#).

Cost in USD

Cost in USD, PPP

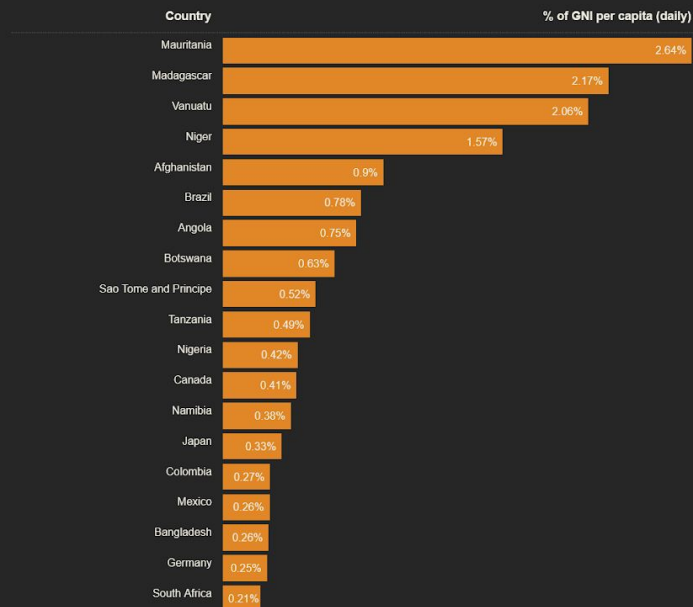
Cost as % of GNI, PPP

☐ Postpaid

☒ Prepaid

### Cost as a percentage of GNI (PPP method) (POSTPAID DATA)

This is the relative cost of the site based on data from the [ITU](#) and [World Bank](#). The cost of data is standardized based on the PPP factor. The cost then has affordability factored in by comparing to the GNI per capita (broken down to a daily number). Prices were collected from the operator with the largest marketshare in the country, using the least expensive plan with a (minimum) data allowance of 500 MB over a (minimum of) 30 days. Prices include taxes. Because these numbers are based on the least expensive plan, they are **best case scenarios**.



*“Things continue to get better  
and better for the wealthy,  
leaving the rest behind.*

...

*For "modern" pages, half a  
megabyte is a decent hard  
budget.”*

Alex Russell, Google





# Green hosting

- Direct renewable energy
- Local contracts
- REC's
- Carbon Offset / Carbon Neutral



# Green hosting

- Server caching
- CDN's
- Static technology
- Scaleable cloud services (e.g. Cloudflare Workers)



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# Resources



# WebsiteCarbon.com

Website Carbon Calculator

[Get the badge!](#) [How does it work?](#) [FAQ](#)

## How is your website impacting the planet?

Estimate your web page carbon footprint:

Your web page address

Web page URL

Calculate

By using this carbon calculator, you agree to the information that you submit being stored and published in our public database.



A BOOK APART

NO

34

Tom Greenwood

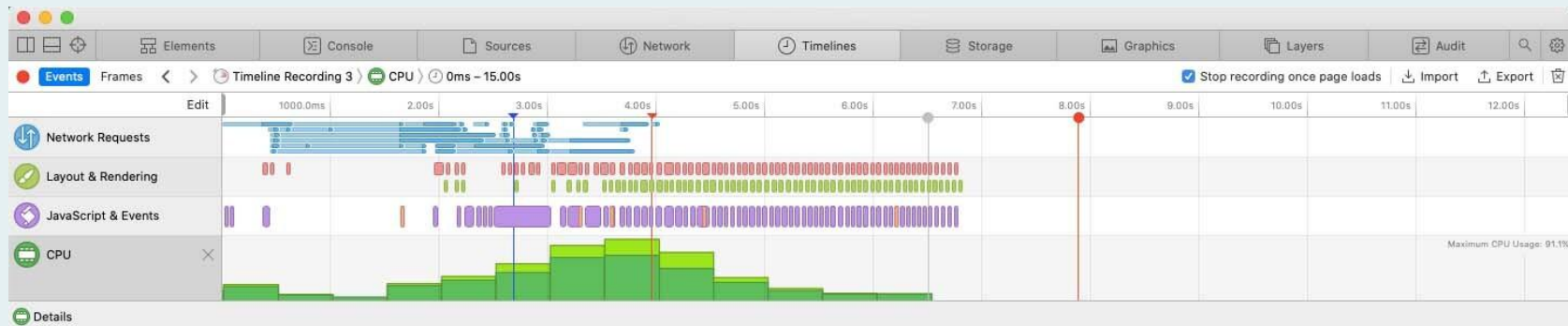
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# SUSTAINABLE WEB DESIGN

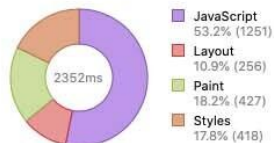
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FOREWORD BY Rachel He

**Buy it at:**  
[abookapart.com](http://abookapart.com)



### Main Thread



### Energy Impact



**High**  
Average CPU: 35.1%  
Duration: 7s

### CPU Usage

Total  
Average: 35.1%  
Highest: 91.1%

Main Thread  
Worker Threads  
Other Threads



### Threads

#### Statistics

Network Requests: 124  
Script Entries: 1073  
Timers: 443  
Events: 8  
5

requestAnimationFrame  
setTimeout  
load  
readystatechange

#### Sources

Timers: 1543  
215  
198  
65  
16  
...

ai-2.0.min.js:1:13401  
rbtools.min.js:21:11545 - t  
rs6.min.js:37:11663 - s  
ai-2.0.min.js:1:14278  
jquery.min.js:2:30560

sustainablewebmanifesto.com

# Sustainable Web Manifesto

*"If the Internet was a country, it  
would be the 7th largest polluter" <sup>1</sup>*

[Sign the Manifesto](#)





Sign up in footer of [wholegraindigital.com](http://wholegraindigital.com)



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### Is digital sustainability becoming mainstream?

Alongside the launch of my book, [Sustainable Web Design](#), there has been an explosion of activity around digital sustainability recently and it feels like there is too much to go in this month's issue. This is a positive sign that sustainability is becoming more mainstream in the digital sector. In fact, I will be facilitating a session with Gauthier Roussille at [MozFest](#) on 10th March called [Making Sustainability Mainstream](#). It's free



sustainablewebdesign.org

Sustainable  
Web Design

[View strategies](#) [Contact](#)

# What is sustainable web design?

Web technology has the potential to bring huge benefits to society and the environment, but only if we use it wisely...

# thegreenwebfoundation.org

Together towards a green web

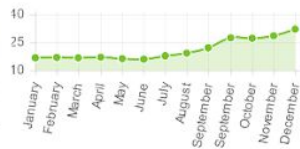
## Is your website hosted **green**?

One day the Internet will run entirely on renewable energy. The Green Web Foundation believes that day should be within reach, and develops tools to speed up the transition towards a green Internet.

CHECK >

**36,440,968** checks performed to date,  
**31.3%** is powered by renewable energy

Percentage green domains



interact-poll-public-api.herokuapp.com is grey

| Checked 3 months ago



serviceapothek.nl is green hosted by Uniserver Internet B.V.

| Checked 3 months ago



ipv6-c007-nyc005-ix.1.ocniflixvideo.net is grey

| Checked 3 months ago



omn.nl is green hosted by KPN

| Checked 3 months ago



www.instagram.com is green hosted by Facebook

| Checked 3 months ago



twitter.com is grey

| Checked 3 months ago



www.facebook.com is green hosted by Facebook

| Checked 3 months ago

Trends Greenweb checks

CHANGING THE WORLD? START WITH  
AN APP!

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# Contact me

[tom@wholegraindigital.com](mailto:tom@wholegraindigital.com)

[@eatwholegrain](#)

[www.wholegraindigital.com](http://www.wholegraindigital.com)

