Durham University
Business School

Cannabis companies: opportunities and challenges for a sustainable future

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Preface

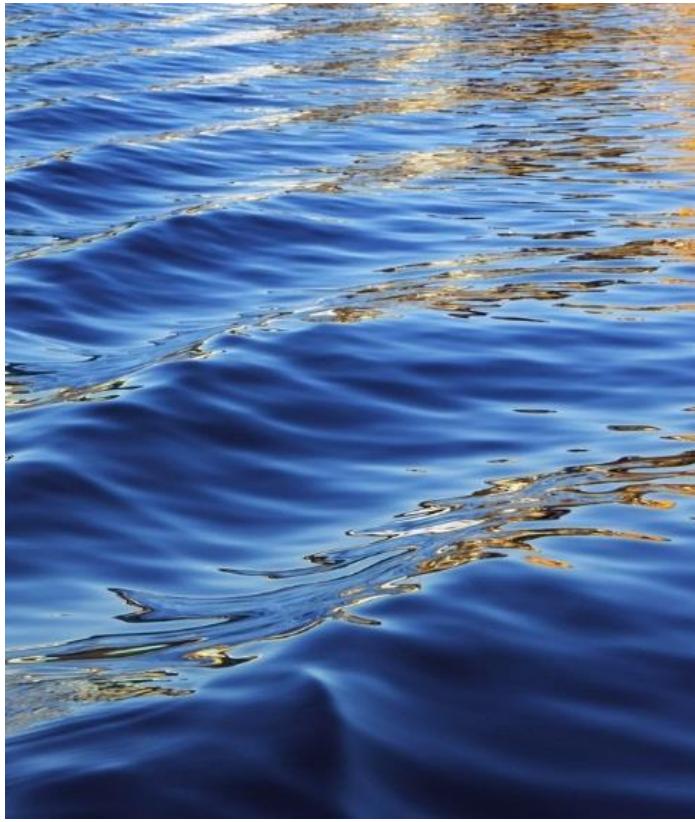
- The past two decades have witnessed a growing shift towards legalization and/or decriminalization of cannabis worldwide
  - Some countries have legalized it completely (Uruguay; Canada)
  - Some US states have legalized medicinal and/or recreational cannabis
  - Many countries in the world have legalized (primarily, medicinal) cannabis
- A new industry is emerging
  - Largely fragmented at the moment
    - Cannabis transfer across borders is not legal
  - Regulatory framework is evolving
    - Largely tracking social sentiment
  - Enhanced uncertainty
  - Cannabis companies mushrooming
- Cannabis companies pride themselves on being "green", "organic" etc.
  - Implies they contribute to sustainability
  - However, this issue is not always as cut & dry…

Preface

- In today's presentation, we shall:
  - introduce cannabis as a plant
  - present the key features of cannabis companies
  - discuss cannabis' positive/negative contributions to sustainability
  - discuss how cannabis companies (can) contribute to the biosphere of the Isle of Man

Cannabis: the plant

An introduction



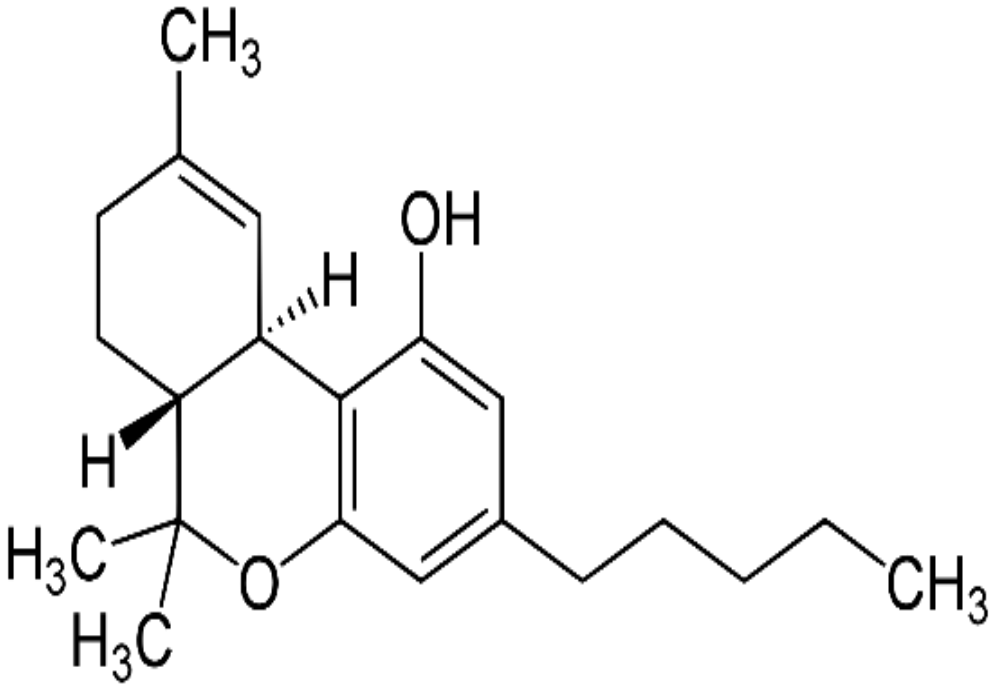
Cannabis: the plant

- The monospecific genus of a flowering plant from Asia
  - Belongs to the Cannabaceae family
  - Presumed roots: Central Asia (NE Tibet) 28m years ago
  - Human domestication: around 12,000 years ago
  - Written evidence dates as far back as 2737 BC (China)
- Contains large number of compounds
  - **Cannabinoids**: chemical compounds active in cannabis
    - These are the phytocannabinoids (ca. 120)
  - **Terpenes**: chemical compounds responsible for cannabis' aroma, flavors, and colour
- Of particular interest are two specific compounds: THC; CBD

THC & CBD

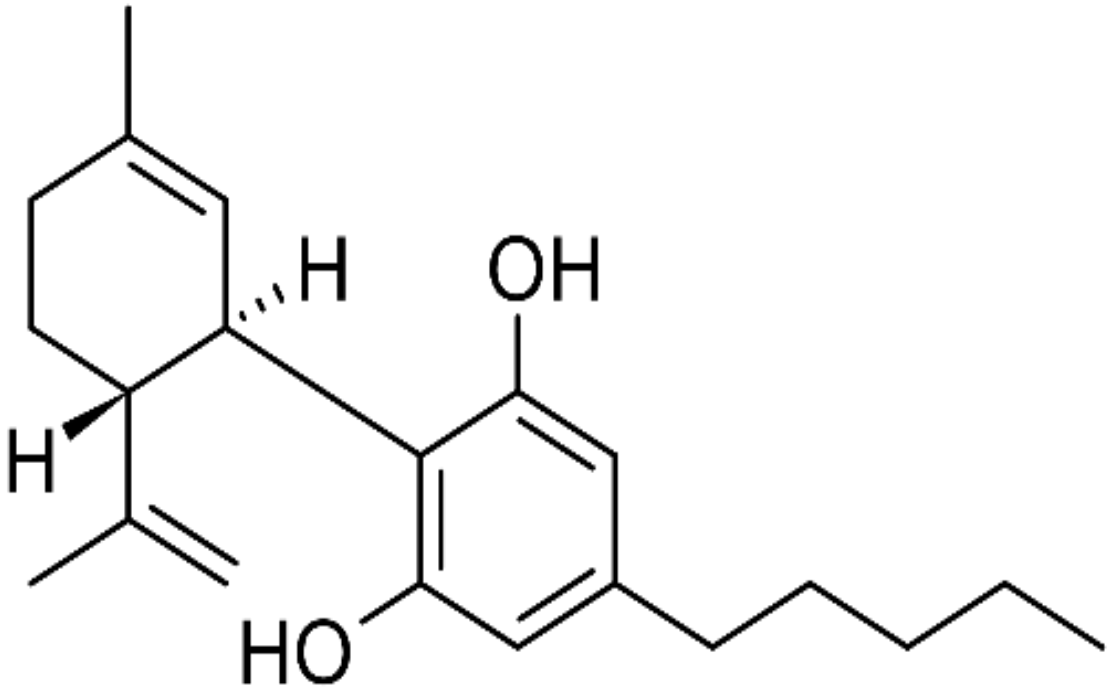
THC

- **Delta-9 Tetrahydrocannabinol (THC)**



CBD

- **Cannabidiol (CBD)**



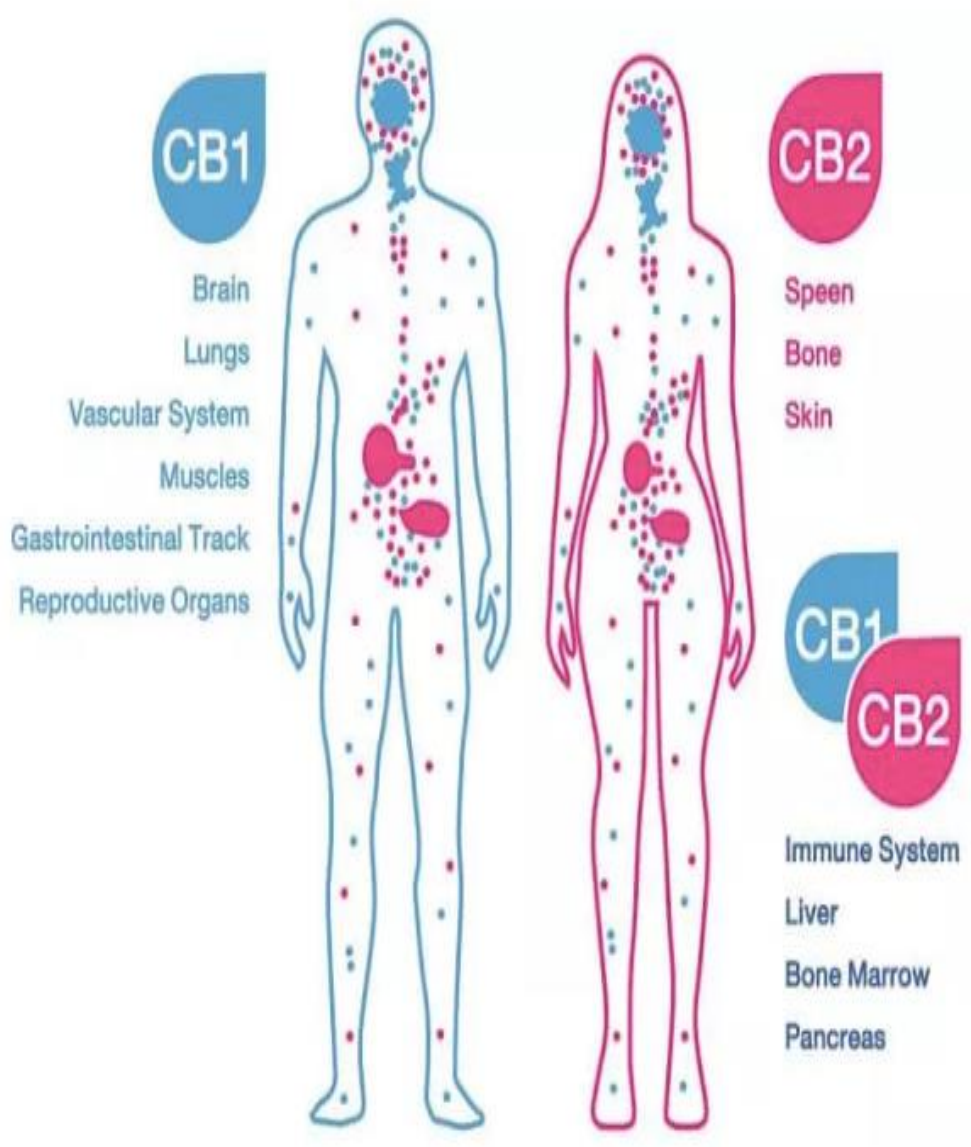
How THC and CBD impact humans

Human endocannabinoid system processes cannabinoids in the human body

Two groups of cannabinoid receptors: CB1 and CB2 (Milenkovic, 2019), distributed along the nervous and immune systems (Kochen, 2022)

- CB1 receptors: mostly located in the brain, spinal cord, and peripheral nervous system (Garcia-Cabrera, 2021; Rubio-Escalona, 2021) => **interact with THC**
- CB2 receptors are spread around human body organs => **interact with CBD**

See graph from https://biologydictionary.net/endocannabinoid-system/ (reproduced in Montuschi, 2023)



How THC and CBD impact humans

- Endocannabinoid system
  - A biological network distributed throughout the entire human body and central nervous system, including the brain
  - Body produces its own endocannabinoids to maintain homeostasis
    - **Homeostasis: involves detectors that monitor when a system departs from a "set-point," and mechanisms that restore equilibrium when such departures are detected**
    - **Bit like a thermostat**
- Cannabis supplements the body's endocannabinoid system (ECS)
  - Phytocannabinoids interact with the ECS
  - By mimicking our own endocannabinoids, it helps us achieve homeostasis
- In the brain, the system has an effect on
  - Memory; control of movement; modulation of pain; development of nerve growth and plasticity; adaptability of nervous system; sleep, appetite; anxiety; social behaviour
- Outside the brain, the system has an effect on the
  - Bladder; bowels; reproductive system; heart; hormonal & metabolic systems; control of cancer

Cannabis classification

Comprises mainly of three (sub)species

- **Cannabis Sativa** (European lineage)
  - Labeled in 1753 by Karl Linnaeus
- **Cannabis Indica** (Asian lineage)
- **Cannabis Ruderalis**

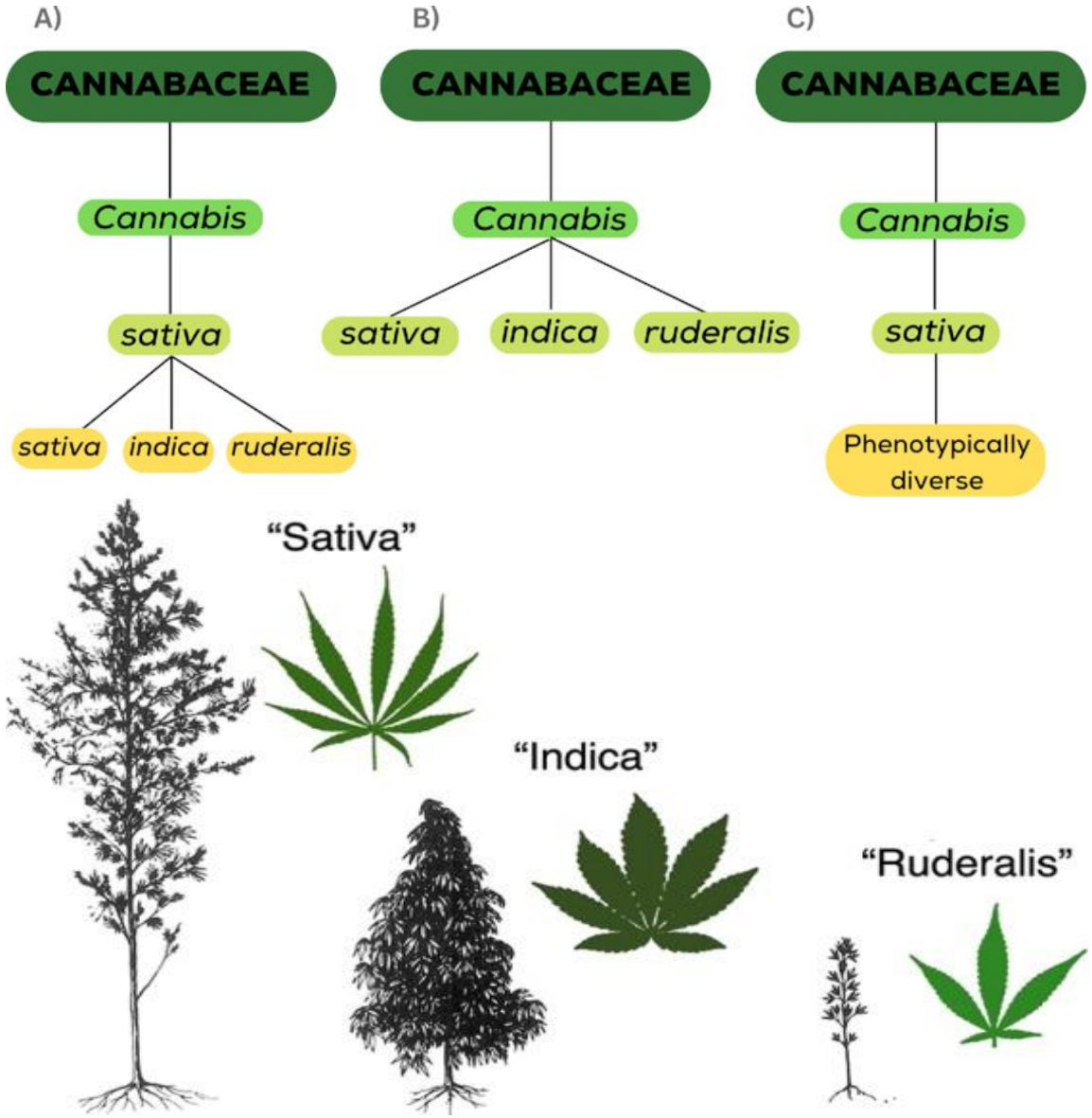
Indica bears a higher THC:CBD ratio than sativa

Low potency for ruderalis

Differentiation between sativa-sativa and sativa-indica about 1m years ago

- 700 strains
- Hybrid strains also exist

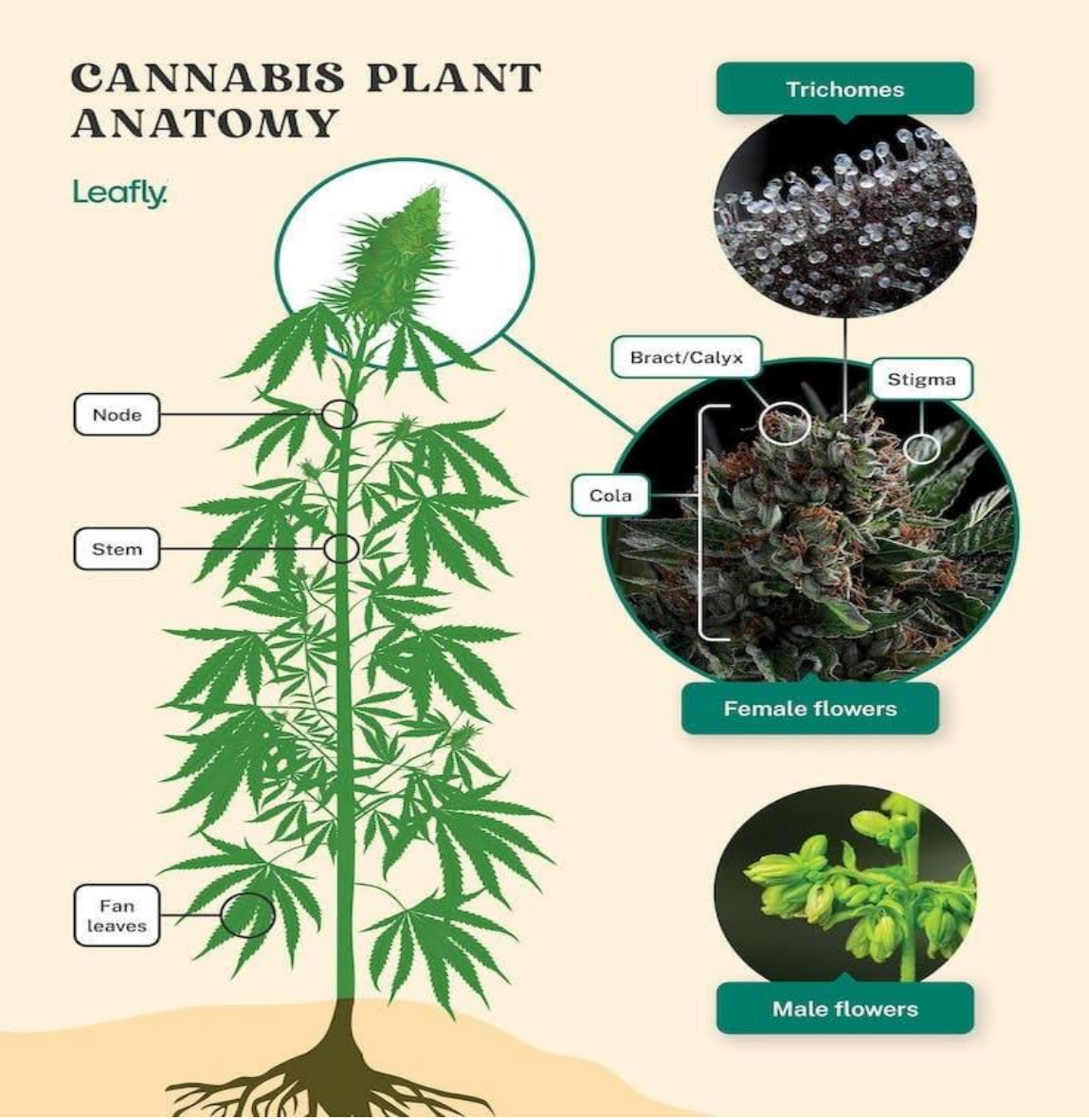
Cannabis growth thrives in mild, humid climates, with temperate, (sub)tropical conditions



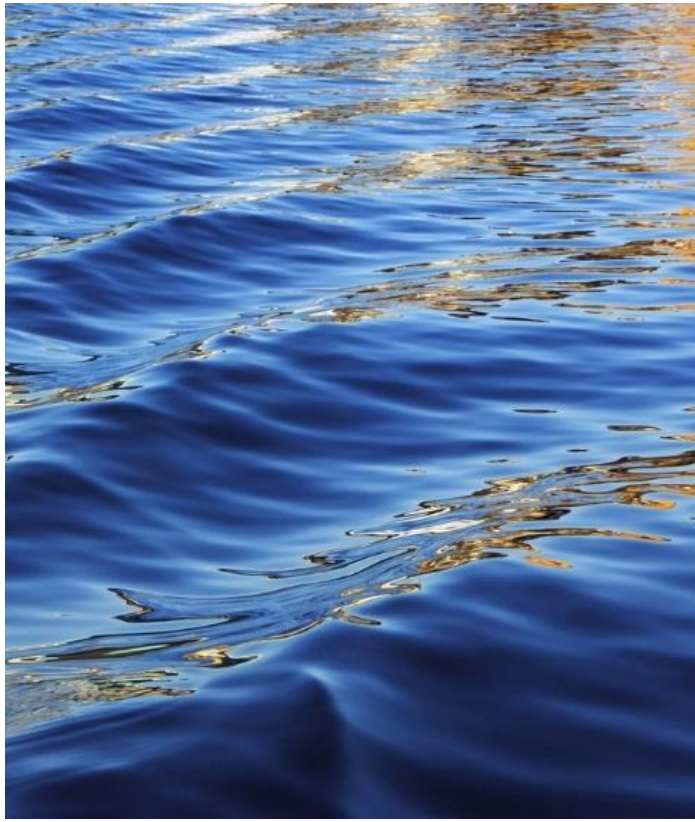
Hemp and marijuana

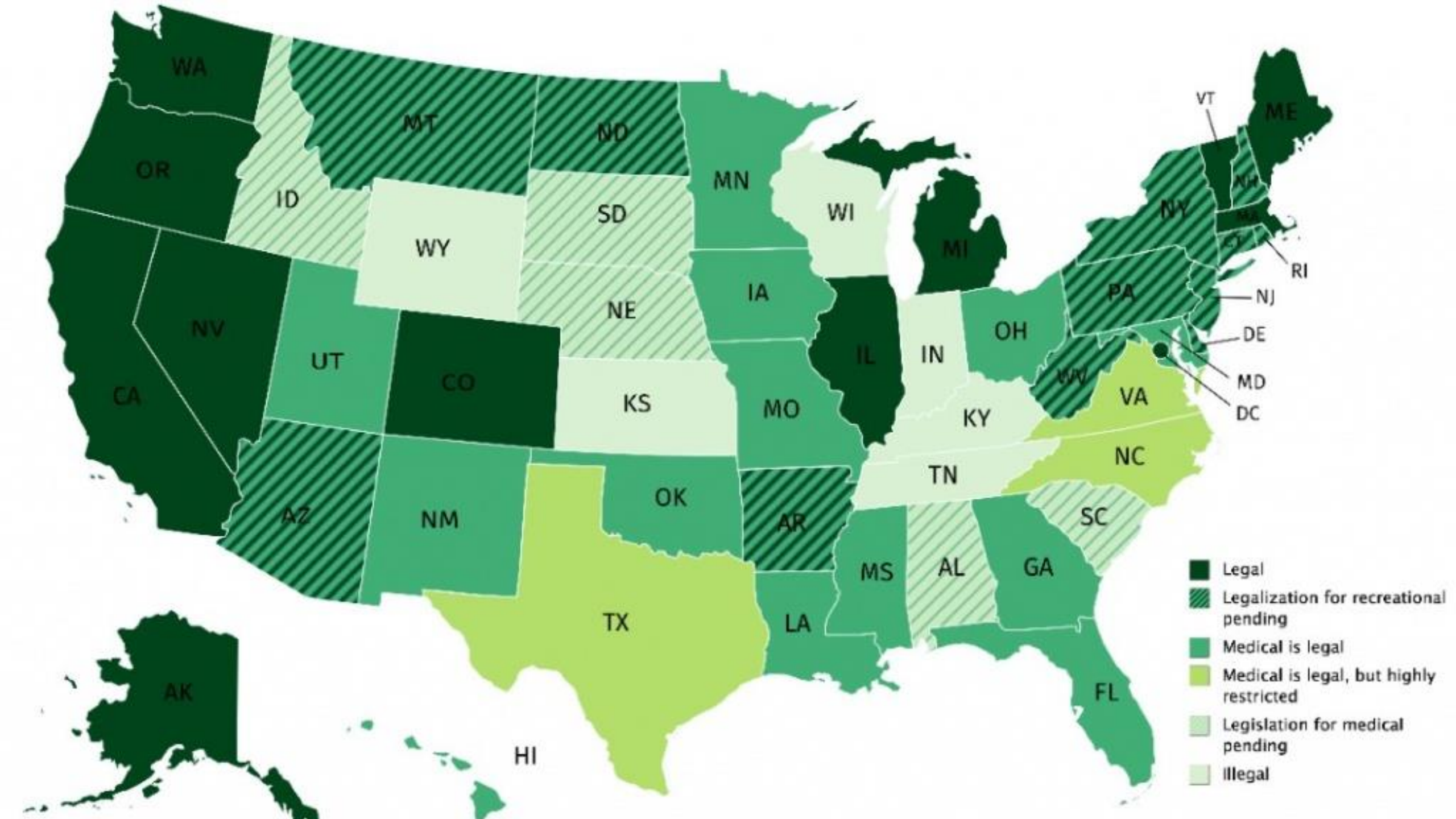
Two varieties of Cannabis sativa:

- agricultural variety (**hemp**; < 0.3% THC by dry weight)
  - 0.3%: US/Canada/East Asia standard => *Rosales*
  - EU: 0.2%; Mexico: 1%; Malaysia: 0.5%
  - Primarily stemming from **male** cannabis sativa plants
  - Proper (close) spacing, if cultivated for seed (fiber)
- pharmacological variety (**marijuana**; >0.3% THC by dry weight)
  - THC levels in marijuana reportedly average about 10%, with a high of 30%
  - Primarily stemming from the **female** Cannabis sativa plant (Toth et al., 2020).



On cannabis companies




WA
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WV
VA
NC
SC
GA
FL
PA
NY
VT
NH
ME
MA
CT
RI
NJ
DE
MD
DC
AK
HI
Legal
Legalization for recreational pending
Medical is legal
Medical is legal, but highly restricted
Legislation for medical pending
Illegal

CANNABIS INDUSTRY MARKET MAP

MEDICAL CANNABIS

PharmaCannis
Aphria
Minnesota Medical Solutions
leaflinelabs
Surterra
PharmaCielo
ALTMED
theraplant
Green Organic Dutchman

DELIVERY / E-COMMERCE

flow
kana
Grassp
eaze
tradiv
MEADOW

MANAGEMENT SERVICES

ARBOR PACIFIC
MedMen
ELECTRUM
strainz
Reynold Greenleaf & Associates
Adistry

CANNABIS PRODUCTION

RUBICON ORGANICS
MINDFUL
CANNDESCENT
COPPERSTATE FARMS
Solstice

DATA / ANALYTICS

HEADSET
POTBOTICS
New Frontier data
BDS Analytics
BAKER
CONFIDENT CANNABIS
Steep Hill

PAYMENTS / TRACKING / COMPLIANCE

MJ FREEWAY
würk
s2solutions
flowhub
BIOTRACKTHC
payQwick
KIND
OptiLeaf
Hypur

INVESTORS / HOLDING COMPANIES

canopy BOULDER
CASA VERDE CAPITAL
PRIVATEER HOLDINGS
POSEIDON ASSET MANAGEMENT
THE ARCVIEW GROUP
MJIC
CRONOS GROUP

CONSUMER PRODUCTS

DIXIE BRANDS
sqye medical
green gorilla
Auntie Dolores
Charlotte's Web by The Stanley Brothers
KUSH BOTTLES
nutiva NURTURE VITALITY
Jane West
THERABIS
HOUNDLABS
SUNCLIFF
LEAF

CBINSIGHTS

Dehulled (or shelled) **seed**:
feed & food

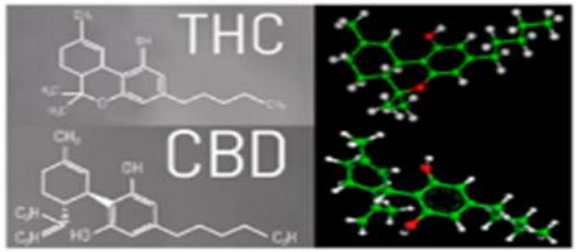
Dehulling

Whole hempseed:
food & feed

Flowers

Cosmetic:
Essential Oil

Pharmaceuticals:
THC & CBD



Hempseed oil:
food, feed,
cosmetics

Cold-Pressing

Hempseed meal:
food & feed,

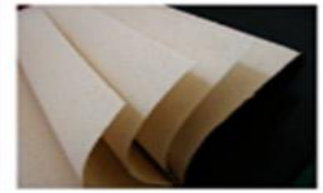
Shives

Animal bedding

Construction:
Insulation material
(hempcrete)

Fibre:
textile & paper

Paper

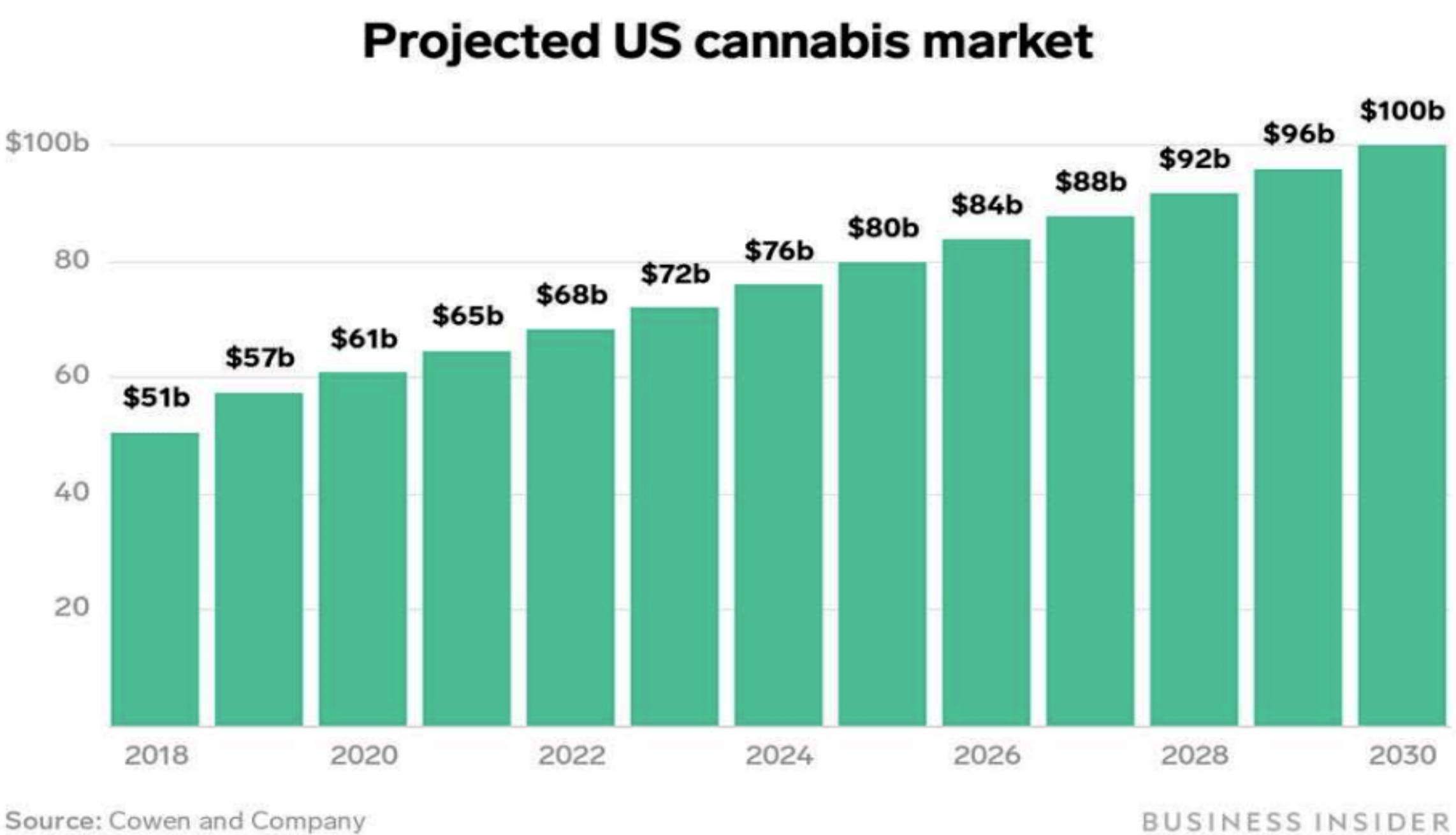


Textile

Roots:
Phytoremediation & soil
revitalization

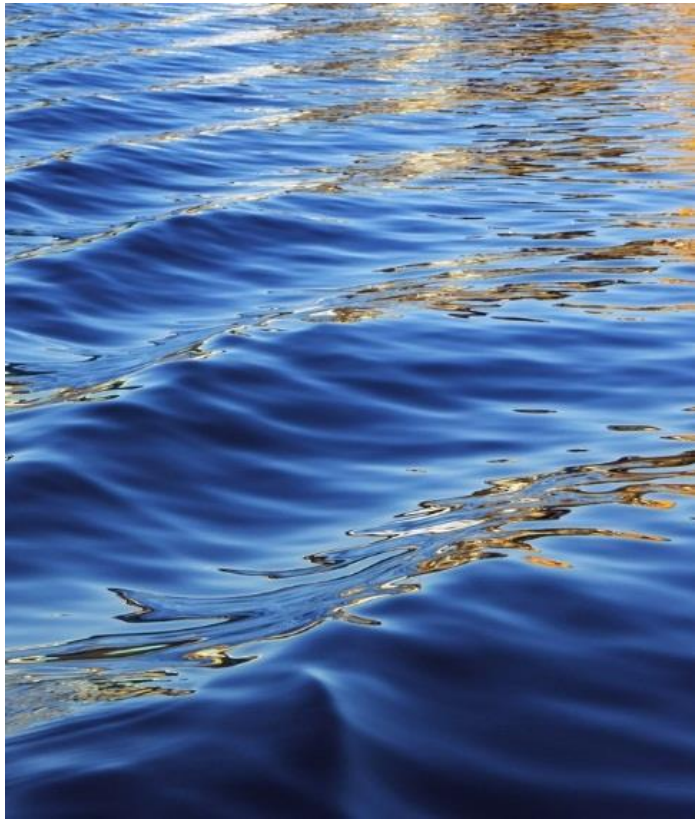
Classification of cannabis companies

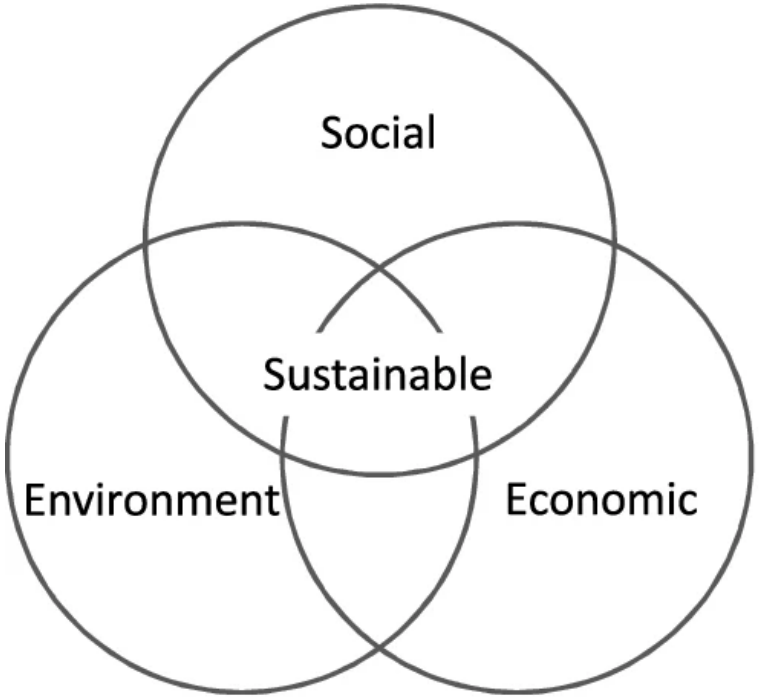
- Contingent on their actual contact with the plant
  - **Plant-touching:** involved directly in the cultivation and growth of the plant, hemp-products, marijuana-products as well as pharmaceutical research
  - **Non-plant-touching:** ancillary/support
    - involved e.g. in assisting "touch-the-plant" companies with investing/financial services, media services, agri-tech, realty…
- Contingent on the purpose of the products they offer
  - **Medicinal**
  - **Recreational**
- Classification of Proctor (2022)
  - **Manufacturers:** provide auxiliary support to the industry
    - engaged in cannabis extraction, product preparation, packaging, and labelling
  - **Retailers:** dispensaries in states where residents can buy cannabis/-related products
  - **Growers:** businesses that own marijuana farms and actively cultivate the plant
  - **Drug-makers:** pharma firms using biotech to create drugs derived from the plant

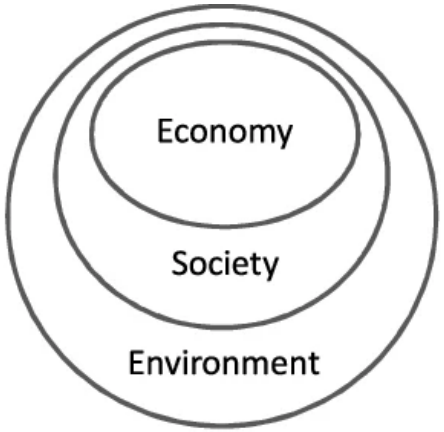

Projected US cannabis market
$100b
80
60
40
20
$51b
$57b
$61b
$65b
$68b
$72b
$76b
$80b
$84b
$88b
$92b
$96b
$100b
2018
2020
2022
2024
2026
2028
2030
Source: Cowen and Company
BUSINESS INSIDER

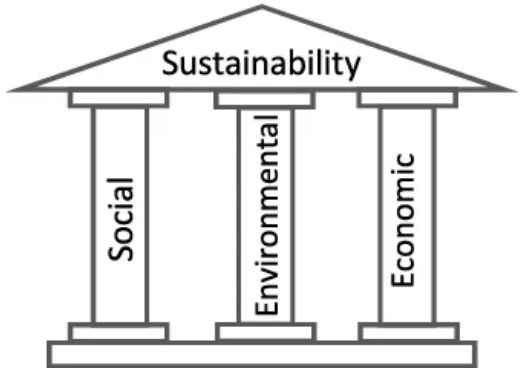
Cannabis & the sustainability debate

Opportunities and risks









Preface

UNESCO: "*Sustainability* is often thought of as a long-term goal (i.e. a more sustainable world), while *sustainable development* refers to the many processes and pathways to achieve it."

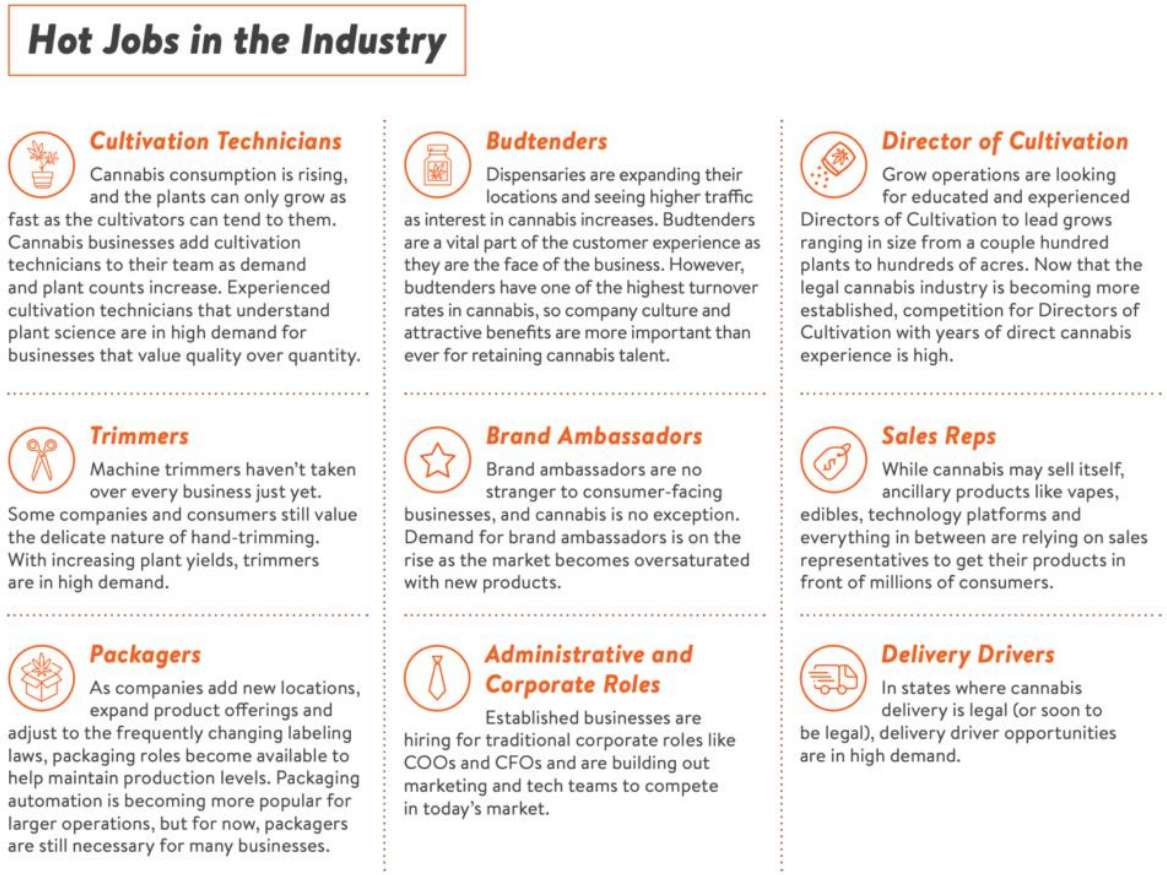
Cannabis is linked to several aspects of sustainability – not always positively, though

Economic sustainability

Employment

Industry-specific

- US cannabis industry > 440,000 jobs (Barcott & Whitney, 2024)
- Growing/packaging in cultivation facilities
  - Multiple roles
- Civil servants needed for licensing/inspections of those facilities
- Health promotion/education experts
- Distributors
- However: much of the above may be subject to automation (blockchain; AI)



Hot Jobs in the Industry

Cultivation Technicians
Cannabis consumption is rising, and the plants can only grow as fast as the cultivators can tend to them. Cannabis businesses add cultivation technicians to their team as demand and plant counts increase. Experienced cultivation technicians that understand plant science are in high demand for businesses that value quality over quantity.

Budtenders
Dispensaries are expanding their locations and seeing higher traffic as interest in cannabis increases. Budtenders are a vital part of the customer experience as they are the face of the business. However, budtenders have one of the highest turnover rates in cannabis, so company culture and attractive benefits are more important than ever for retaining cannabis talent.

Director of Cultivation
Grow operations are looking for educated and experienced Directors of Cultivation to lead grows ranging in size from a couple hundred plants to hundreds of acres. Now that the legal cannabis industry is becoming more established, competition for Directors of Cultivation with years of direct cannabis experience is high.

Trimmers
Machine trimmers haven't taken over every business just yet. Some companies and consumers still value the delicate nature of hand-trimming. With increasing plant yields, trimmers are in high demand.

Brand Ambassadors
Brand ambassadors are no stranger to consumer-facing businesses, and cannabis is no exception. Demand for brand ambassadors is on the rise as the market becomes oversaturated with new products.

Sales Reps
While cannabis may sell itself, ancillary products like vapes, edibles, technology platforms and everything in between are relying on sales representatives to get their products in front of millions of consumers.

Packagers
As companies add new locations, expand product offerings and adjust to the frequently changing labeling laws, packaging roles become available to help maintain production levels. Packaging automation is becoming more popular for larger operations, but for now, packagers are still necessary for many businesses.

Administrative and Corporate Roles
Established businesses are hiring for traditional corporate roles like COOs and CFOs and are building out marketing and tech teams to compete in today's market.

Delivery Drivers
In states where cannabis delivery is legal (or soon to be legal), delivery driver opportunities are in high demand.

Economic sustainability

- Legalization of medical cannabis leads to
  - **Lower cost of equity (ca. 25-48bps; Guernsey et al., forthcoming)**
    - Legalization of medical cannabis boosts labor supply through increased labor force participation, employment, hours worked, and net migration
  - **Higher cost of state borrowing (7-9 bps for state bonds; Cheng et al., 2023)**
    - Increased cannabis consumption => more people seeking public housing, energy subsidies, food stamps => higher expenditure for police, corrections, public welfare
- **Real estate price-pressure**
  - Higher demand for industrial properties suitable for cannabis firms (Wade, 2022)
- **Tax revenues => expanded tax base**
  - From users; also, from attracting new residents/tourists in states where it is legal
  - It can also expand tax-avoidance!
    - In states where both recreational & medical marijuana are legal, medical cannabis is taxed at a lower rate => if you get a medical-use card, you pay less taxes

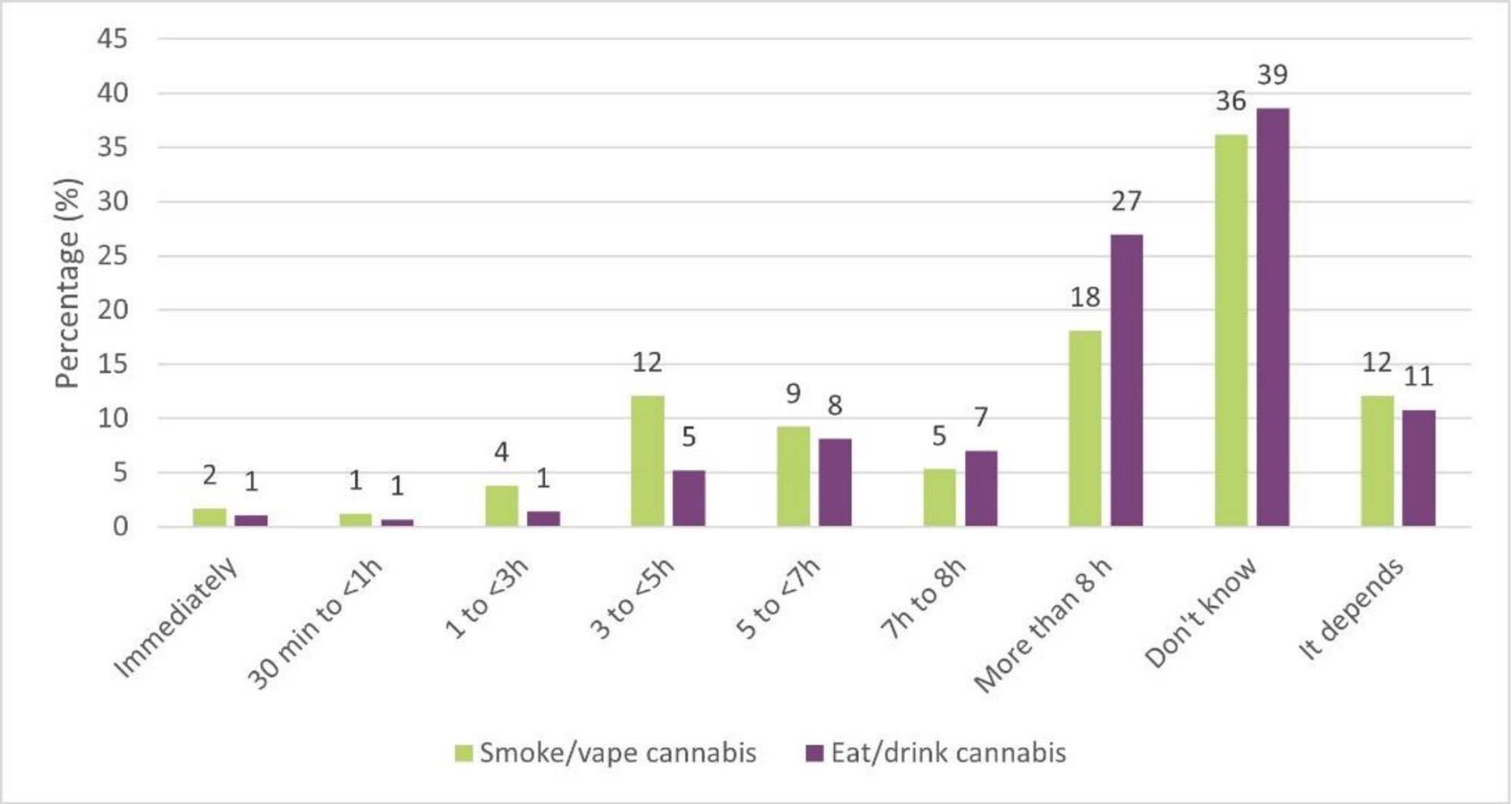
Economic sustainability

- **New product lines** based on hemp seeds/oil/fiber
  - Animal feed; biofuels; biopesticides; bioplastics; chemical industry; cosmetics; food/supplements; hempcrete; medicinal cannabis; paper/pulp; textiles etc.
- **Increased efficiency**
  - E.g., hemp cultivation yields x3 more metric tons of fiber per hectare, at ca. 80% lower cost with ¼ of the water, compared to cotton
- **Appellations**
  - California Department of Food and Agriculture programme to define appellations for cannabis for outdoors cultivations
  - "Regenerative cannabis" – or even, synthetic cannabis!
    - E.g., engineered yeast used to produce high-quality, low-cost THC and CBD

Social sustainability

- **Marijuana Tourism - valued @ $17bn in the US (Dupej and Choi, 2025)**
  - Travel/tour agencies, accommodation/catering providers, wellness retreats etc.
  - Issues to resolve: setting standards, creating safe consumption spaces, minding non-consumers, keeping the illicit market out, etc.
- **Rural development**
  - Optimal local hemp-varieties can create local clusters with value-added chains of hemp
- **Social equity**
  - Restorative justice measures for communities discriminated against during "War on Drugs"
- **Educational/research benefits**
  - University partnerships with cannabis growers (Schuster and Bird, 2021); cannabis research chair sponsorships by cannabis companies (Grundy et al., 2023); cannabis-related degrees offered (https://cbdoracle.com/news/cannabis-education-training-schools/)
- **Labor market benefits**
  - Medicinal cannabis can help mitigate the side effects of other prescription drugs, reduce the strain on the ambulance service and hospital beds, get people back into employment
- **Medical benefits**

Social sustainability



Environmental sustainability

- **Air quality**
  - Cannabis plant tissues => high concentration of biogenic volatile organic compounds (BVOCs)
- **Biofuels (e.g., biogas, bioethanol, biomethane, biodiesel)**
  - Cannabis' cellulose converted into sugars (**cellulolysis**); sugars fermented/distilled into ethanol
  - **Hemp biodiesel:** extracted from hemp seed for use in diesel engines; biodegradable
- **Cannabis biomass**
  - Can be used to produce biofuels; can also allow THC to seep into waterways/the environment
- **Bioplastics**
  - From the wooden part of hemp stalks; biodegradable
- **Biopesticides**
  - **Mulching**: maintains soil-moisture; minimizes soil-erosion; moderates soil-temperature; prevents weed-growth => less need for weedicides; prevents seed germination of unwanted plants; weather-insulation
- **Soil Cleansing**
  - Phytoremediation: cannabis/hemp absorbs pesticides, herbicides, fertilizers, rodenticides, heavy metals, chemicals, etc.

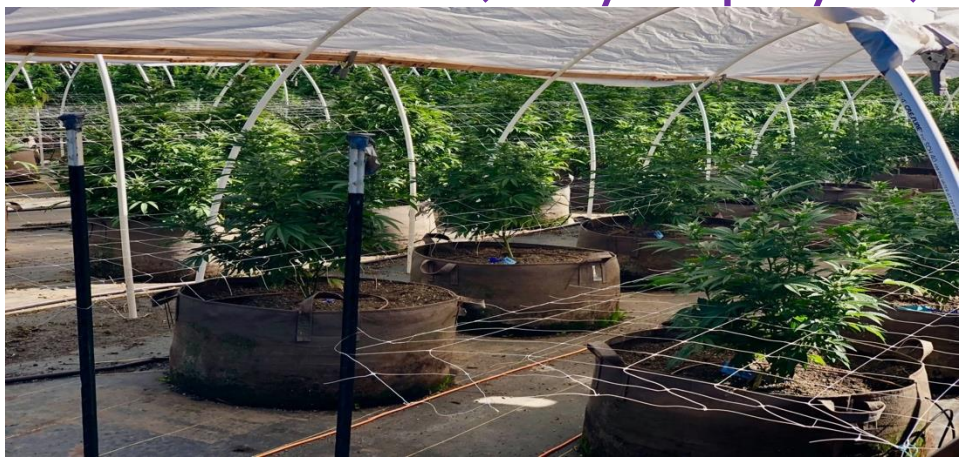
Environmental sustainability

- **Photosynthesis/biosequestration**
  - Cannabis/hemp sequesters up to 22 tons of CO_2 from the atmosphere => lower greenhouse gases
  - Extended life of hemp products => this carbon is unlikely to re-enter the environment soon
- **Cannabis pollen effects**
  - If marijuana and hemp are grown in the same region, hemp farms could pollinate nearby marijuana crops, lowering the cannabinoid content and potentially causing it to go to seed.
    - Solution #1: cull all male plants; only grow males indoors
    - Solution #2: distance between hemp and marijuana farms of > 4 miles
- **Water supply/quality**
  - Cannabis farming relies on artificial irrigation (esp. outdoor cultivation – Wilson et al., 2019)
  - Can cause agricultural runoff => increase concentration of pesticides, insecticides, heavy metals, excess nutrients, and wastewater pollutants in nearby soil, watersheds, surface water
  - Diversion/depletion of water from streams & springs => -ve impact on aquatic/terrestrial life
  - **However: hemp requires less water**

Environmental sustainability

- **Indoor cultivation (over 5 cycles per year)**

- **Outdoor cultivation (1-2 cycles per year)**



- **Greenhouse cultivation**

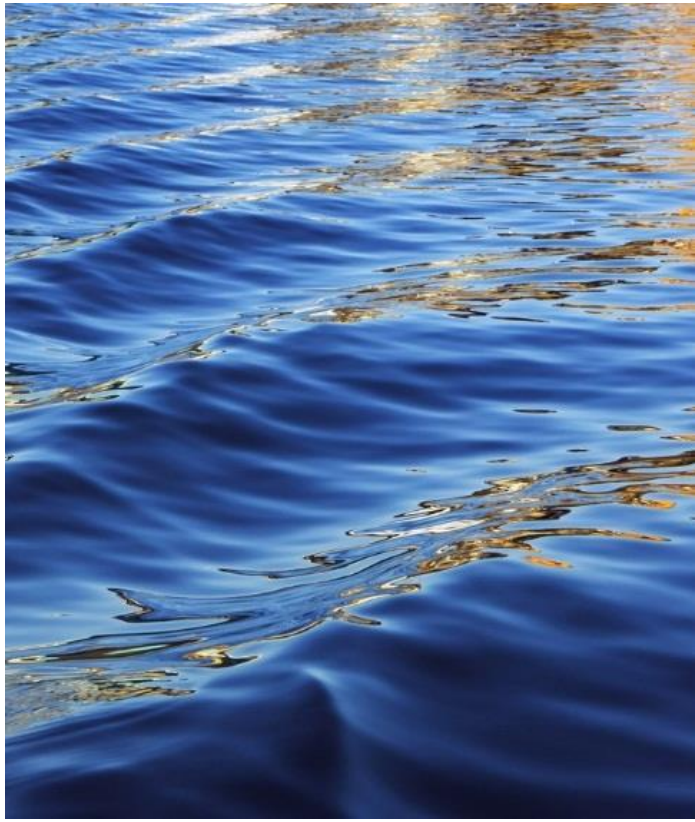
Environmental sustainability

- **Forestation**
  - Hemp dampens deforestation (fewer trees to be cut for paper production)
    - Better quality of paper
    - Faster growth of plant (matures in 4 months) => more paper produced
      - 1 hectare of hemp produces 3-4 times as much paper as 1 hectare of forest
  - More environmental-friendly processing
    - Conversion into paper sheets without the need for strong chemical whitening agents
    - Can be recycled up to 9 times versus max 3 of standard paper (Martinez-Oro, 2018)
  - High labor costs (extracting fibers from the hemp stalk is labor-intensive) and storage/supply chain management costs (hemp is harvested once per year)
- **Deforestation**
  - Land-use change & forest fragmentation (forests cleared for outdoor & greenhouse cultivation)
  - Pesticide-related poisoning of wildlife (Wartenberg et al., 2021)
- **How much land is actually needed to meet demand**
  - 4,400 acres can meet US demand (RAND Corp, 2010); 0.003% of US farmland (Mills, 2025a)

Environmental sustainability

- **Waste management**
  - Ca. 175k tons of solid waste generated annually from cannabis cultivation
    - E.g., biomass, plant media, packaging, defective/faulty/expired products, unused cannabis oils, extracts, single use vape cartridges, trimmings, capsules, containers, wrappers, crop waste
  - Burning => pollution (1 kg of cannabis waste => 3000 kg of carbon dioxide)
  - Hydroponically derived cannabis plants => 1:3 ratio of biomass-to-media waste
  - Landfilling requires 50-50 biomass-to-non-cannabis
  - Composting: microbial transformation of waste that reduces phytocannabinoids to non-detectable levels & produces nutrient rich products => benefits the soil
    - Problem: involves CO_2 emissions, heat emissions, requires large areas, odour pollution
- **Fertilizers**
  - Soil pollution; runoff; groundwater contamination; poisoning of adjacent water bodies
  - However: **hemp does not require significant amounts of herbicides or pesticides**
- **Transportation => increases carbon footprint**

Cannabis companies, sustainability, and the biosphere of the Isle of Man



UK Cannabis Ecosystem

A few trivia about the Isle of Man's regulatory status of cannabis

- Series of consultations (February/March 2019; October/November 2020)
  - Strong public support for cultivation/manufacture of medicinal products, subject to a suitable regulatory framework
- 2021: regulatory framework allowing commercial operators to grow, manufacture, distribute and export cannabis products under license from the Isle of Man
- Licensing => Gambling Supervision Commission (GSC)
  - Broad experience with regulating nascent sectors (e.g., e-gaming) on the island
  - Multiple license types (e.g., import, export, extraction, cultivation etc.); fees capped @ £62.5k p.a.
- The target is to attract cannabis-related businesses to the island primarily for:
  - Medicinal cannabis exports (i.e., for CBPMs)
  - R&D (e.g., for industrial and medical uses of hemp)
- First license: 2022 (Grow Lab Organics – indoor cultivation)
- First medicinal cannabis dispensing service: Karsons Pharmacy (Dec 1st, 2022)
  - Private prescriptions for CBPMs obtained from a CQC (Care Quality Commission) registered private clinic with medical practitioners on the specialist register are fulfilled on the Isle of Man
  - Isle of Man: only clinics that have been registered as an Independent Medical Agency can offer CBPM-prescriptions; off-island clinics must be CQC inspected.

Isle of Man's Biosphere

How cannabis companies can contribute to the Isle of Man's **economy**

- Increase inward investment => new jobs => attract more skilled employees
  - Across the entire cannabis companies' ecosystem: involving both the industry directly and allied enterprises
- Can encourage more people to live/work on the island
  - Esp. those with relevant skills
- Know-how transfer => evolve into a cannabis knowledge hub?
  - Encourage cross-border collaborations with established corporations in the field
  - Established expertise => can prompt these corporations to outsource some of their activities to the Isle of Man
    - The case e.g., of cannabis research; we have lacked for decades scientific evidence on the harms from excessive cannabis use due to prohibition
  - Focus on legally acceptable cannabis applications (medical cannabis; industrial hemp)
    - Launch industrial parks based on them, inviting overseas corporations to set shop

How cannabis companies can contribute to the Isle of Man's **economy**

- Can encourage more people to visit the island
  - E.g., cannabis tourism as part of agro/eco/health tourism
  - Rise in revenue and employment on the island
  - However: content of this tourism needs to be carefully calibrated
  - Recreational cannabis is not legal, so this will not play out as in several US states where it already is
    - Possibility #1: combine with health tourism
    - Possibility #2: combine with tours in the aforementioned "industrial parks"
    - Possibility #3: combine with ad hoc medical cannabis/industrial hemp expos
  - Care should be taken to avoid allusions to the island being open for recreational cannabis tourism
    - Recreational cannabis not legally allowed (yet)
    - Cannabis tourism can produce negative externalities
    - In the event that social sentiment around cannabis shifts, Isle of Man has to be in a position to take the smallest possible hit

How cannabis companies can contribute to the Isle of Man's **economy**

- Spillovers to other industries, e.g.,
  - Construction (via hempcrete)
  - Accounting (via rendering the island a cannabis accounting expert center)
  - Food & drink industry (via introduction of new brands with cannabis)
  - Cannabis cultivation benefiting other sectors, e.g., Cleantech
- Appellations
  - Develop "Manx" cannabis products => enhance island's identity in the market
  - "Regenerative cannabis"
  - Synthetic cannabis
  - High-end products
  - Niche segments
  - Target high-end clienteles
  - Also, clienteles with green/vegan preferences
  - As mentioned before, focus should be on medical cannabis or CBD products
    - Products e.g., of high THC potency may reveal health risks and elicit class lawsuits

How cannabis companies can contribute to the Isle of Man's **economy**

- If the Isle of Man turns into a major knowledge hub for the cannabis industry, it can consider further financial innovations
  - Establish standardization of cannabis/hemp products
    - Quality benchmarks
  - Use those to launch a commodities' exchange for cannabis/hemp varieties
    - Spot market
    - Futures/options market
  - Attract funds investing in cannabis stocks to list their shares on TISE a miax company
  - Launch a stock exchange for private (i.e., non-publicly listed) cannabis companies
  - Draw on the expertise of the local banking sector to support the above
  - Again here, priority should be given to companies focusing on medical cannabis or industrial hemp apps
    - To avoid e.g., legal challenges from the US government or negative externalities to the banking sector (if Isle of Man domiciled banks offer banking services to those companies)

How cannabis companies can contribute to the Isle of Man's **education**

- Provide environmentally sustainable innovations to existing issues
  - Leverage the properties e.g., of hemp
    - Hempcrete for the construction sector
    - Contribute via biofuels to the island's energy mix
    - Contribute to farming (e.g., via mulching)
- Organize public lectures to educate the local community as per how their operations impact sustainability on the island

How cannabis companies can contribute to the Isle of Man's **education**

- They can contribute to the financing of vocational courses, or university degrees related to medical cannabis at the UCM University College Isle of Man
  - As mentioned earlier, such courses exist in North America
  - Maybe help engineer collaborations with N. American universities offering such courses already
    - E.g., launch joint programmes or offer their programmes online
  - This would guarantee first-mover advantage to the Isle of Man in this education niche in the UK/Europe
  - This would guarantee the influx of more researchers in the field and students to the island
  - Clearly beneficial, from an academic, social, and financial perspective

How cannabis companies can contribute to the Isle of Man's **enjoyment**

- They can help channel part of their revenues toward:
  - Social services
  - Culture/heritage management
- This can be done via
  - Charity
  - Private-public partnerships
- Bring the industry to the "grassroots"
  - Invite residents to roadshows of cannabis products
  - Organize tours of cannabis firms' facilities
  - Showcase the achievements of the industry and how they translate into actionable results for the society (e.g., health applications)
- Enhance cannabis tourism's content by offering the same activities for tourists
  - Make the island "stand out" for them by showcasing the industry's success-story on the island

How cannabis companies can contribute to the Isle of Man's **environment**

- By employing sustainable methods throughout the life cycle of the product
  - Reduce BVOCs (e.g., via carbon/mineral filtration, ozone generators, neutralizers etc.)
  - Foster the use of hemp in mulching for agricultural use
  - Take advantage of the island's location - cross-pollination less likely
    - Unlikely to have a large number of outdoor farms
    - Also, more so, if male cannabis plants (i.e., hemp) will be cultivated indoors
  - For indoor cultivation => use of more efficient lighting (e.g., LED) and HVAC systems
  - Use phytoremediation for soil cleansing
  - Reduce their impact over energy and water supply
  - Employing environmentally friendlier (though not always recyclable) packaging (e.g., bioplastic, PCRs, PLAs)
- Educate the community on how they actively take agency as environmental stakeholders

How cannabis companies can contribute to the Isle of Man's **engagement**

- Collaborate with companies on the island to promote products conducive to sustainability
  - E.g., popularize the use of hempcrete in construction
- Instill sustainable practices to the younger generation
  - E.g., offer free hemp paper products (such as notebooks) to schools
- Actively seek feedback on their products by the community
  - Monitor performance (own and that of their products)

In conclusion…

- The Isle of Man has added the cannabis industry to its economy's portfolio-mix
  - The industry's unique risks and returns make it an attractive addition
  - Sustainability potential - and sustainability risks (cannabis is not as "green" as advertised)
- An issue that often goes unnoticed: **sustainability is not irrelevant to sentiment**
  - E.g., Trump administration has prompted shifts in "green" commitments in various sectors
  - Sustainability exhibits a **fad-like evolution**
- As does regulation!
  - It is **pro-cyclical** => it tracks sentiment (Gerding, 2007)
  - It is **subject to biases** => it can be hijacked by sentiment (Hirshleifer, 2008)
  - **Cannabis regulation caters to sentiment – see the legalization wave internationally…**
- **So, the whole sustainability/regulation debate is not entirely "rational"!!**
- What this means for cannabis companies: **they are also sentiment-dependent!!!**
- This raises some concerns that need to be taken into account

In conclusion…

- Changes in cannabis consumption norms largely a **generational issue**
  - Millennials and Gen Z more socially liberal
    - Younger generations less likely to smoke
      - More likely to use cannabis…
    - But what about the future?
    - **Will social sentiment always remain as positive?**
    - Think about **tobacco firms in the 1980s**
    - What if health side-effects of cannabis grow in public attention?
    - **The potential for addiction due to THC will not go away because the law makes cannabis legal**

In conclusion…

- Sustainability, as part of SRI/ESG, may not always view cannabis positively
  - Medical v recreational cannabis companies
  - Medical cannabis abuse
  - Environmental concerns
  - Implications for institutional investments => implications for equity financing
- Sentiment shifts likely to impact recreational cannabis (companies) more
  - Suggests focus on medical cannabis and industrial hemp
  - Less likely to be impacted by sentiment shifts

In conclusion…

- The case of the tobacco industry is instructive:
  - *"Businesses always need to understand which way society is going on the key issues that affect their products. If you are perceived as part of the solution to current social concerns, then you're well positioned. But if you're part of the problem, you may want to exit the business. At the very least, you'll need a more conservative financial structure. As recently as 1986, the most valuable brand name in the world was Marlboro. Yet its value was about to begin a long and steady decline that can be attributed almost entirely to changes in our society and its view of smoking as a social rite. These changes did not come without plenty of warning. As early as 1939, the Surgeon General of the United States suggested that smoking could be bad for your health; and a later Surgeon General's report in the 1960s concluded that there was a direct link between smoking and cancer. Congressional hearings in the 1990s raked tobacco-company executives over the political coals and encouraged massive lawsuits against the industry."* – Michael Milken

    https://www.mikemilken.com/articles.taf?page=1

- **Moral lesson: the debate on regulation and sustainability for an industry as risky as the cannabis one needs to monitor sentiment, in order to both forecast it and hedge against it!**