BOSTON CONSULTING GROUP

Navigating through COVID-19 and oil supply-demand shock

Discussion with PVN CEO

14 APRIL 2020

PETROVIETNAM

Your BCG team today

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BCG has invested extensively over the years on our relationship with Petrovietnam

[2014] PSC Management Program

[2016] PVN Board Workshop

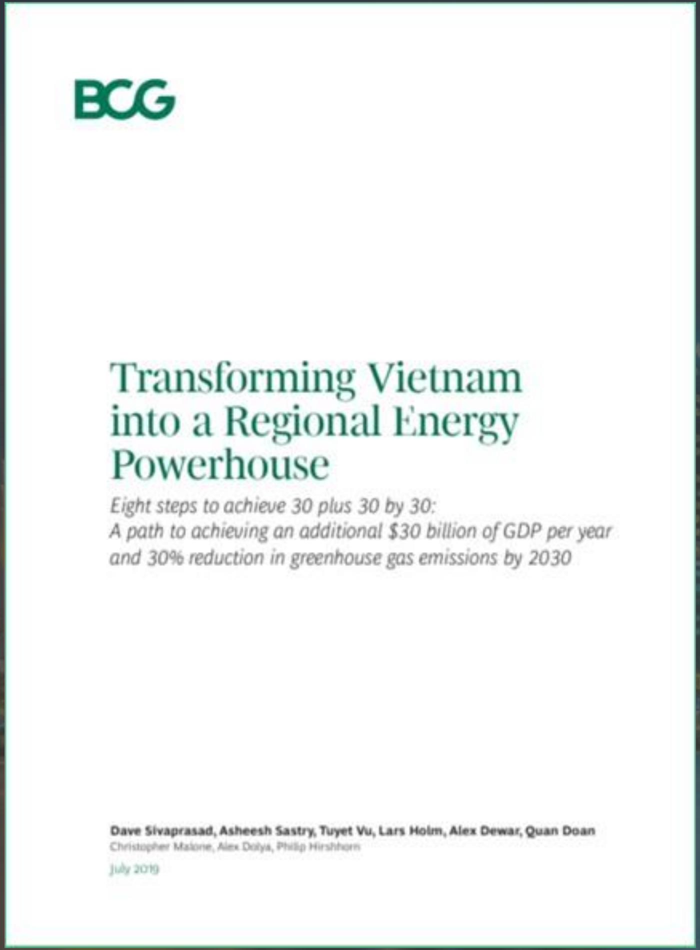
[2017] BSR 1 week on-site diagnostic – Multiple engagement and workshop

[2017-2019] BSR Profit improvement proposal

[2017-2019] Extensive public sector engagement on energy

[2016-2020] Extensive engagement with PVN Executive Team on multiple topics

- Upstream productivity
- Digital transformation
- Gas & LNG


BCG

Transforming Vietnam into a Regional Energy Powerhouse

Eight steps to achieve 30 plus 30 by 30:
A path to achieving an additional $30 billion of GDP per year and 30% reduction in greenhouse gas emissions by 2030

Dave Sivaprasad, Asheesh Sastry, Tuyet Vu, Lars Holm, Alex Dewar, Quan Doan
Christopher Malone, Alex Dolya, Philip Hirshhorn

July 2019

Market Perspective (15 min)

Perspectives from IOCs & suggested priorities for PVN (10 min)

Deep Dive: Strategic responses by industry players (15 min)

Deep dive on key transformation topics (45 min)

- Supply Chain Resilience
- Transform core processes to significantly reduce cost base
- Innovation in capital delivery

Deep dive: Enabling through Digital & Technology (10 min)

Discussion on way forward and priorities (15 min)

Market Perspective

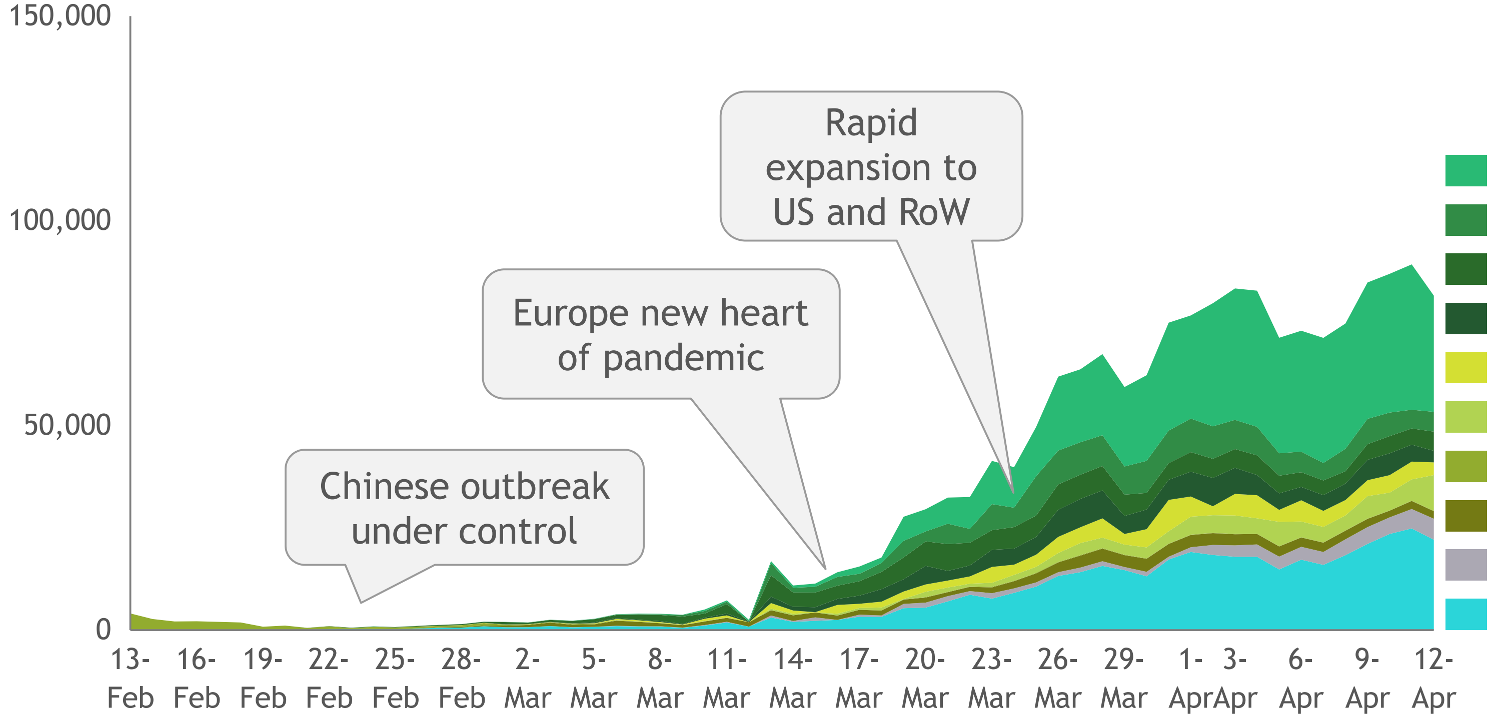
Macro-economic Perspective

Reported case count growing rapidly

US has seen world's highest # of new cases in last few days

Data as of 13 Apr

Daily number of new cases detected



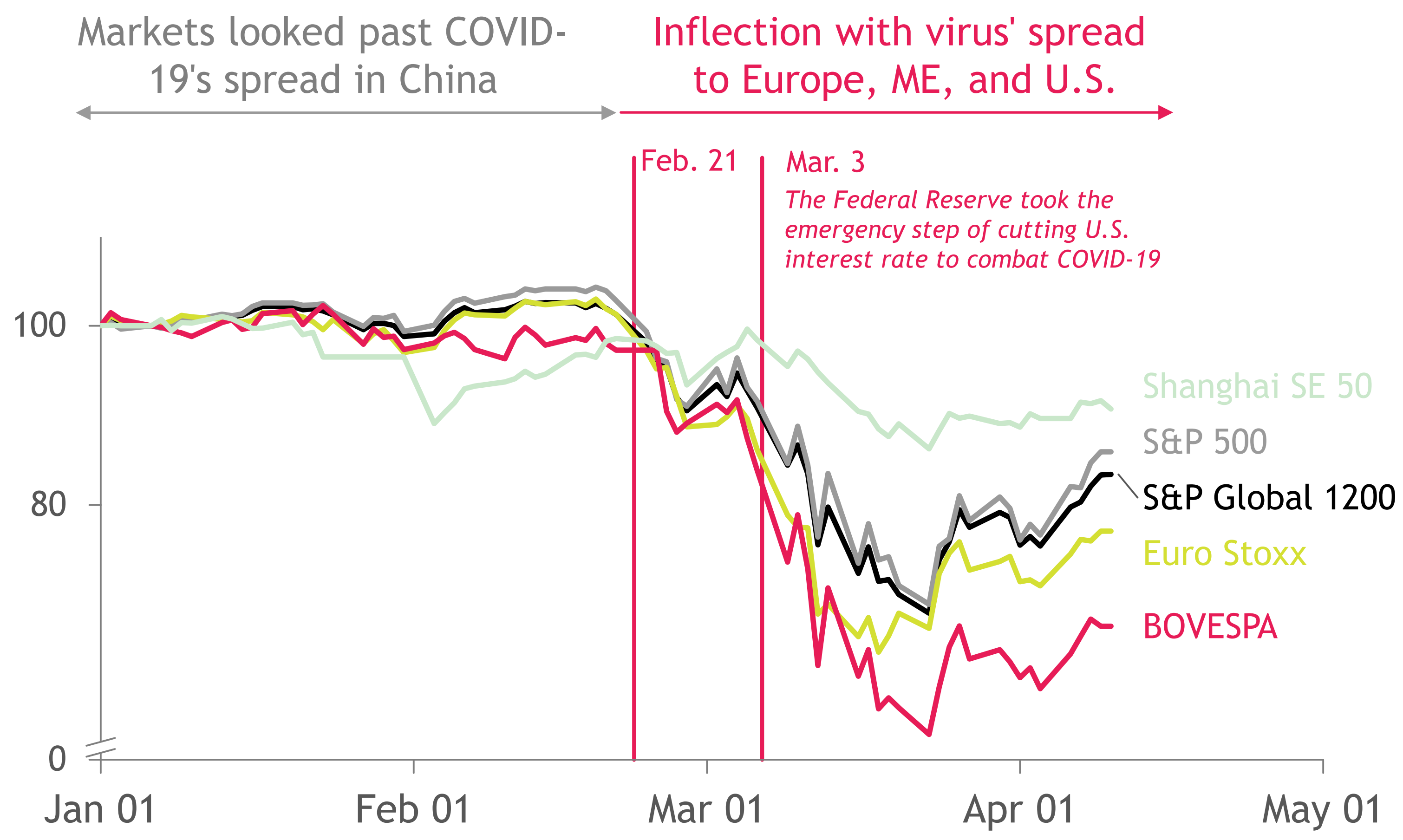
cases and deaths reported

	Total cases	Avg. daily growth[1]	Total deaths
US	558.9 k	24%	22.1 k
Spain	167.7 k	19%	17.2 k
Italy	155.9 k	16%	19.9 k
Germany	128.5 k	18%	3.0 k
France	122.2 k	18%	14.4 k
United Kingdom	83.5 k	19%	10.6 k
China	82.9 k	9%	3.3 k
Iran	72.3 k	15%	4.5 k
Turkey	57.4 k	18%	1.2 k
Rest of the world	404.6 k	12%	18.1 k

1. Calculated from first day when cumulative # of cases surpassed 100

Source: National Health Commission China (China-specific data through Tencent 腾讯), Johns Hopkins CSSE(Non-China Data through JH.CSSE Github), BCG Henderson Institute analysis

Global markets are reacting to COVID-19 with significant decline



US stock market plummets despite Federal Reserve's emergent interest rate cuts, which challenges traditional crisis mgmt. measures

Declines can be seen in gold, crude oil, dollars, stock and bond markets

Chinese market may become a safe haven for global investment

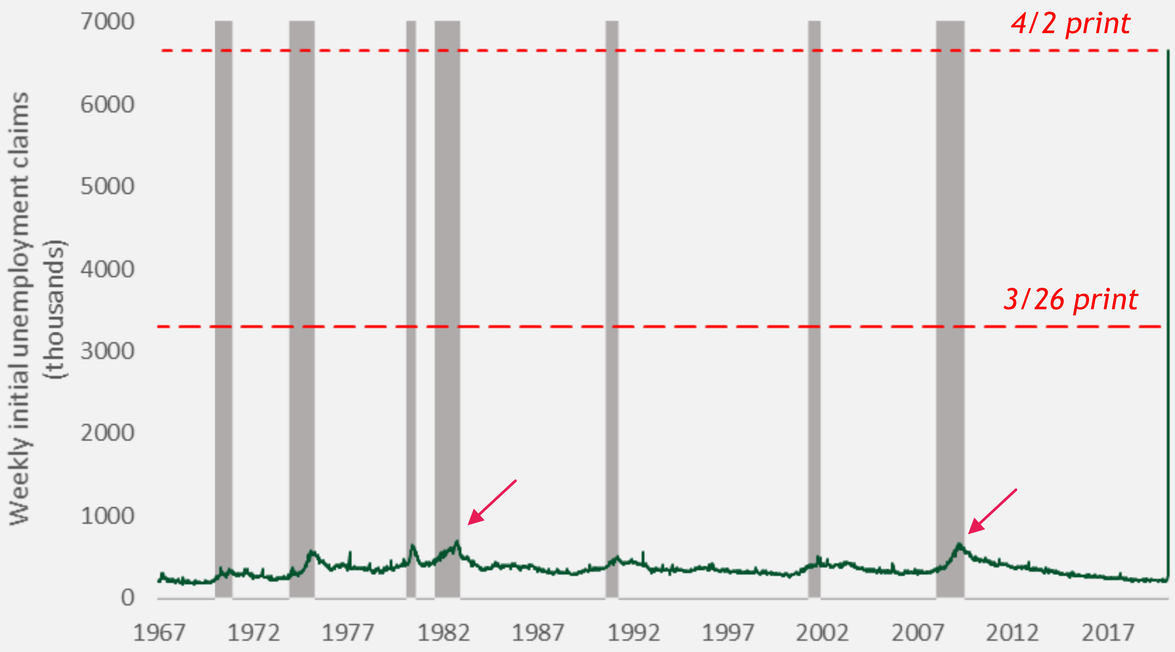
- A shares have rebounded from Feb. driven by liquidity and onshore sentiment, but has started to decline again later in mid March
- Morgan Stanley upgrades China, Singapore, and Australia as new safe haven of assets

1. 6 emergent cuts over the past 20 years happened during the Internet bubble in 2001, after the 9/11 terrorist attack, and before and after the subprime crisis in 2007; 2. Institutions like DB, UBS and GS have greatly cut respective forecast on US economic growth in 2020 H1, and DB even expects a negative growth in Q2; 3. Many companies have reduced estimated demand for crude oil from 1.2Mn barrels/day at the beginning of the year to 0.3-0.6Mn barrels/day; according to the Brent price on Feb. 28th
Source: S&P Capital IQ; BCG ValueScience® Center

Subway No. 7 on March 17th at 1:30 PM
between Grand Central and Times Square

Unprecedented real economy freeze now in the data

Weekly initial claims

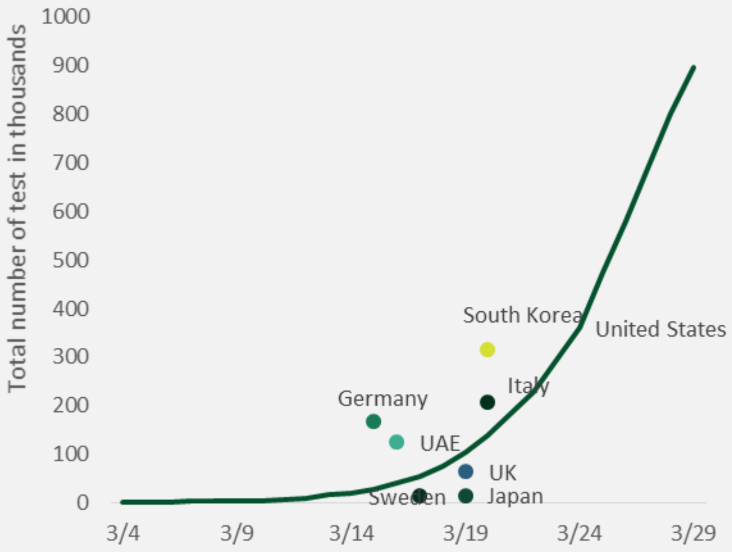


In level space, ~10x the prior peak or peak in Global Financial Crisis (arrows)

Source: NBER, Department of Labor, and BCG Center for Macroeconomics analysis
Photo credit: Author

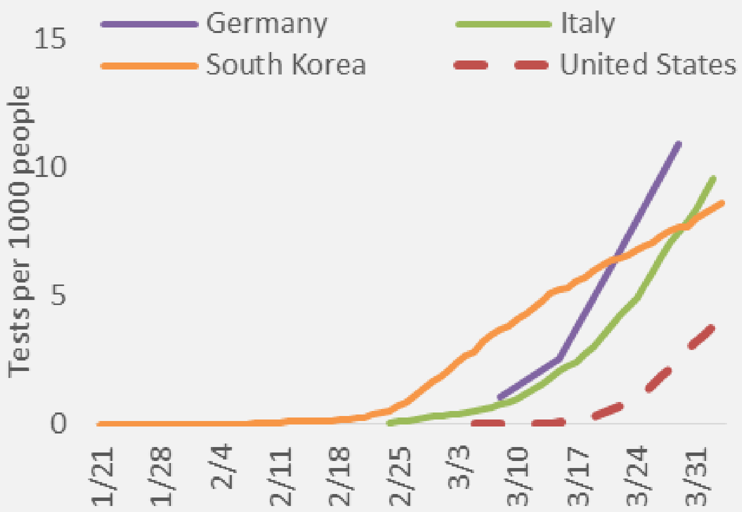
Testing: Virus testing focus now - will shift to antibodies

Testing (virus) - levels



Testing for Virus accelerating in multiple geographies (e.g. US)

Testing (virus) - scaled



South Korea an example of the power of extensive virus testing

Testing (antibodies)

?

Need serological (antibodies) testing to determine degree of asymptomatic infections and likelihood of "herd immunity"

Implications for duration of social distancing and thus extent of macroeconomic damage

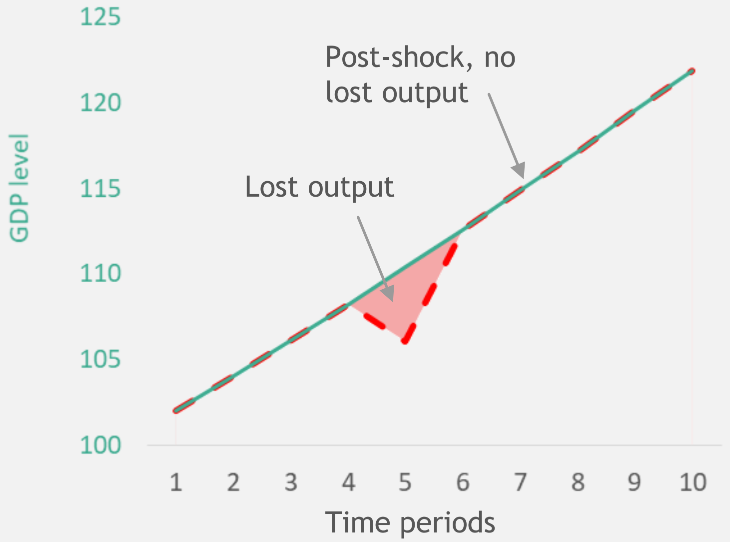
Source: Covidtracking.com, German Hospital Society (DKG), Korean Center for Disease Control, Ministry of Health and Community Protection - United Arab Emirates, BCG Center for Macroeconomics

What shape will the Covid-19 shock take?

Illustrative

V - at least this

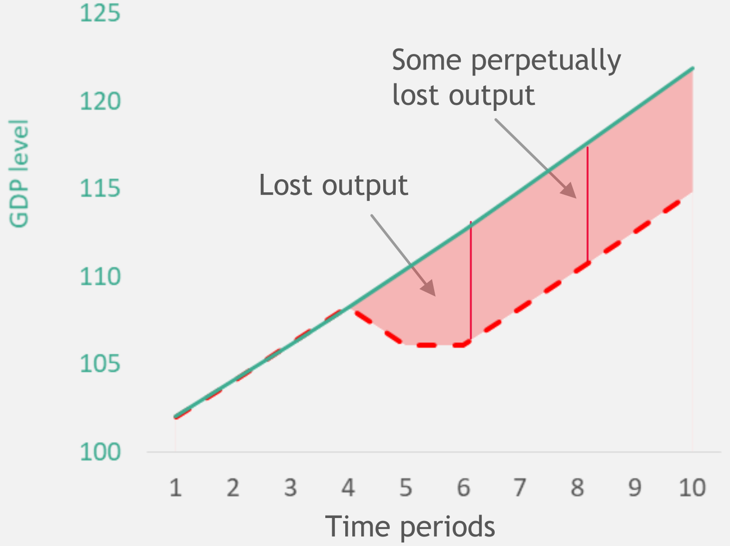
Severe shock, but can bounce back to prior growth path



V shape leaves *de minimis* impact on the present value of future output

U - the main risk

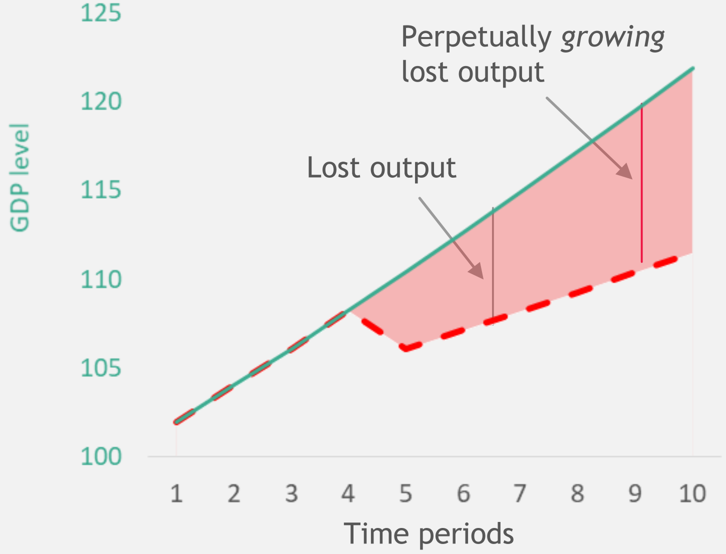
Significant and perpetually lost value



One-off damage to economy's supply side (labor, capital, productivity) leads to more and perpetual loss of present value of future output

L - still unlikely

Significant and perpetually *growing* lost value

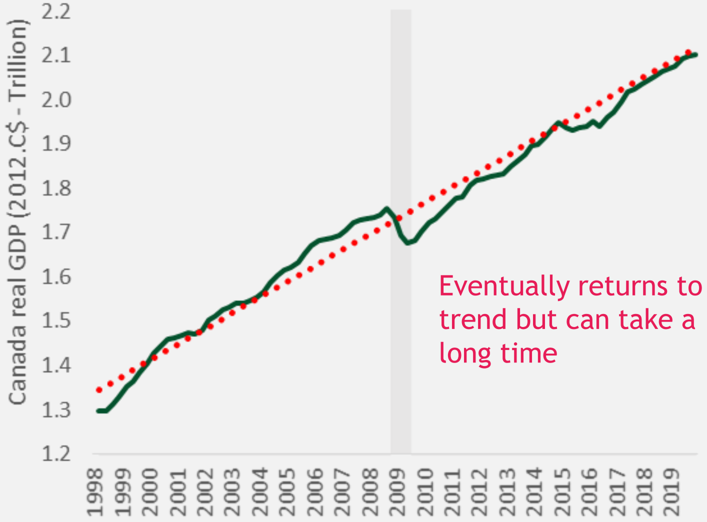


Recurring or irreparable damage to economy's supply side leads to perpetually growing loss of present value of future output

Source: BCG Center for Macroeconomics analysis

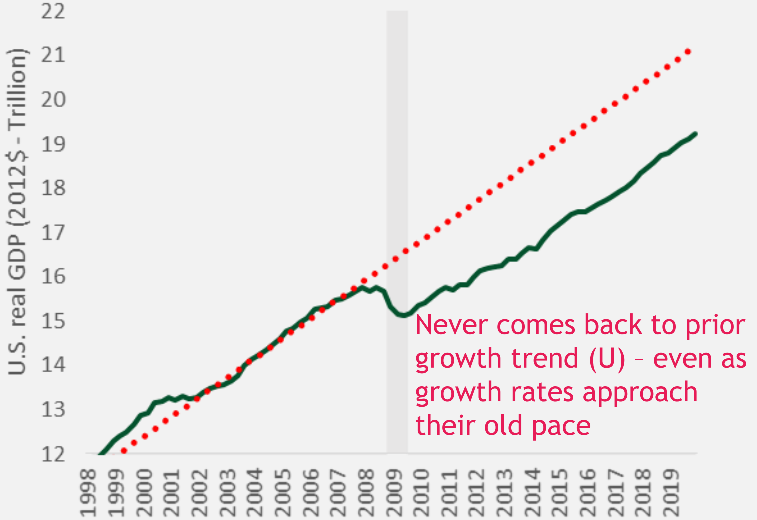
V-U-L empirics: same shock, three shapes

V-shape
2008 Canada



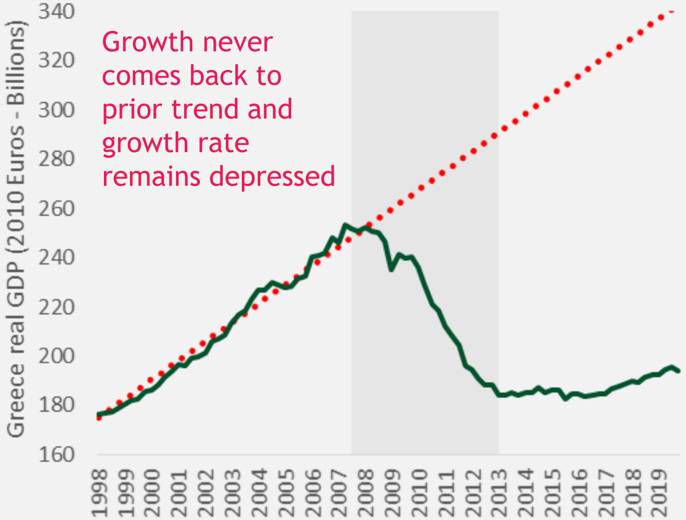
- Canada closest to V-shape (returns to prior trend)
- No systematic banking crisis – no damage to economy's supply side

U-shape
2008 United States



- U.S. clear U-shape (returning to growth *rate*, but at a lower *trend*)
- Driven by severe banking crisis – a one time hit to capital formation

L-shape
2008 Greece



- Greece experienced a sustained depression and L-shape
- Growth has struggled at a much slower pace, with recurring damage to supply side

Note: Canada trend (1985-2008); US trend (2003-2007); Greece trend (1995-2006)
Source: NBER, BEA, Statistics Canada, Hellenic Statistical Authority (ELSTAT), BCG Center for Macroeconomics analysis

Leaders forced to make two macro calls in COVID crisis

Strategic macro call

What will be the present value of future growth under COVID-19?

I.e. "geometry" of the shock: will it be a V, U, or L shape and what does it imply

Will be basis for strategic response (capex decisions, business model adjustments,…)

Tactical call

What will be the depth, speed, and duration of COVID-19 shock?

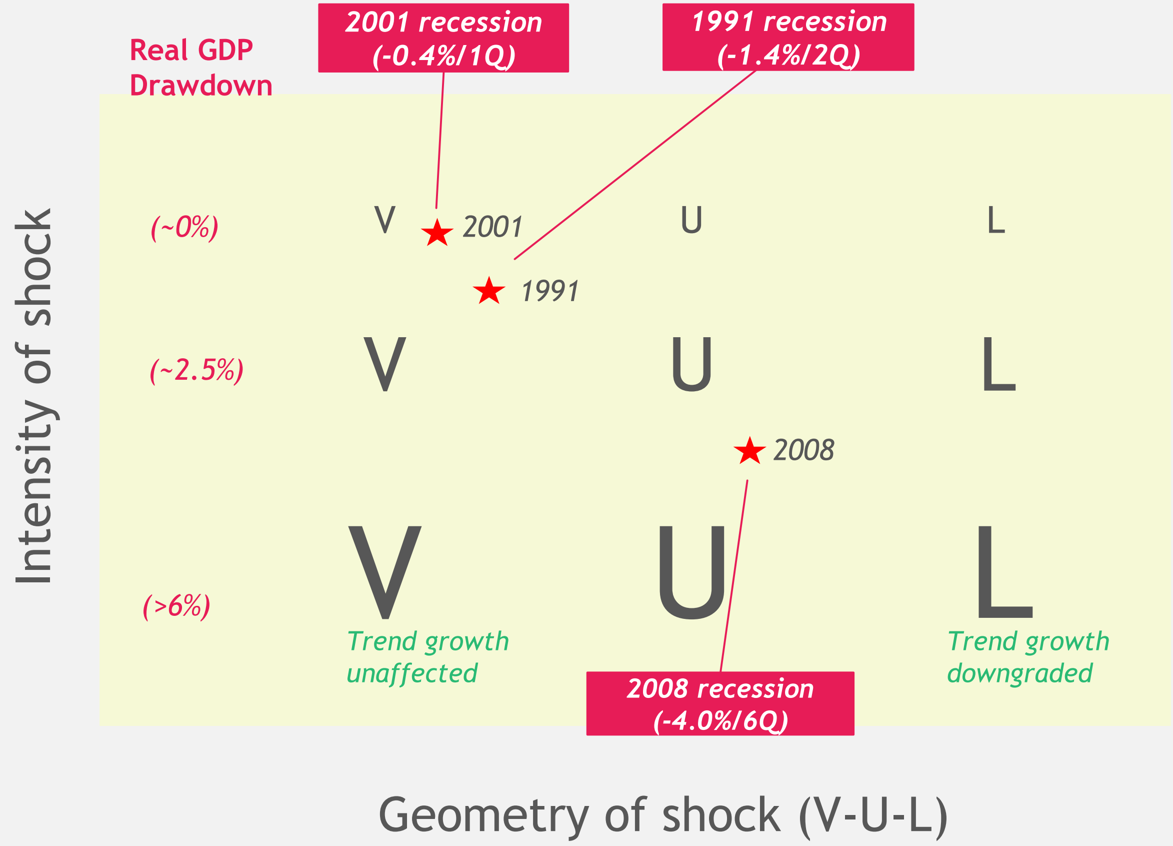
I.e. "intensity" of the shock, a different dimension from "geometry"

Will be basis for near-term response (activity, output, staffing, suppliers, etc)

Shock geometry vs. shock intensity

Illustrative

Last 3 US recession in terms of geometry vs. intensity



The last three U.S. recession can provide grounding for the dimension of the intensity and form.

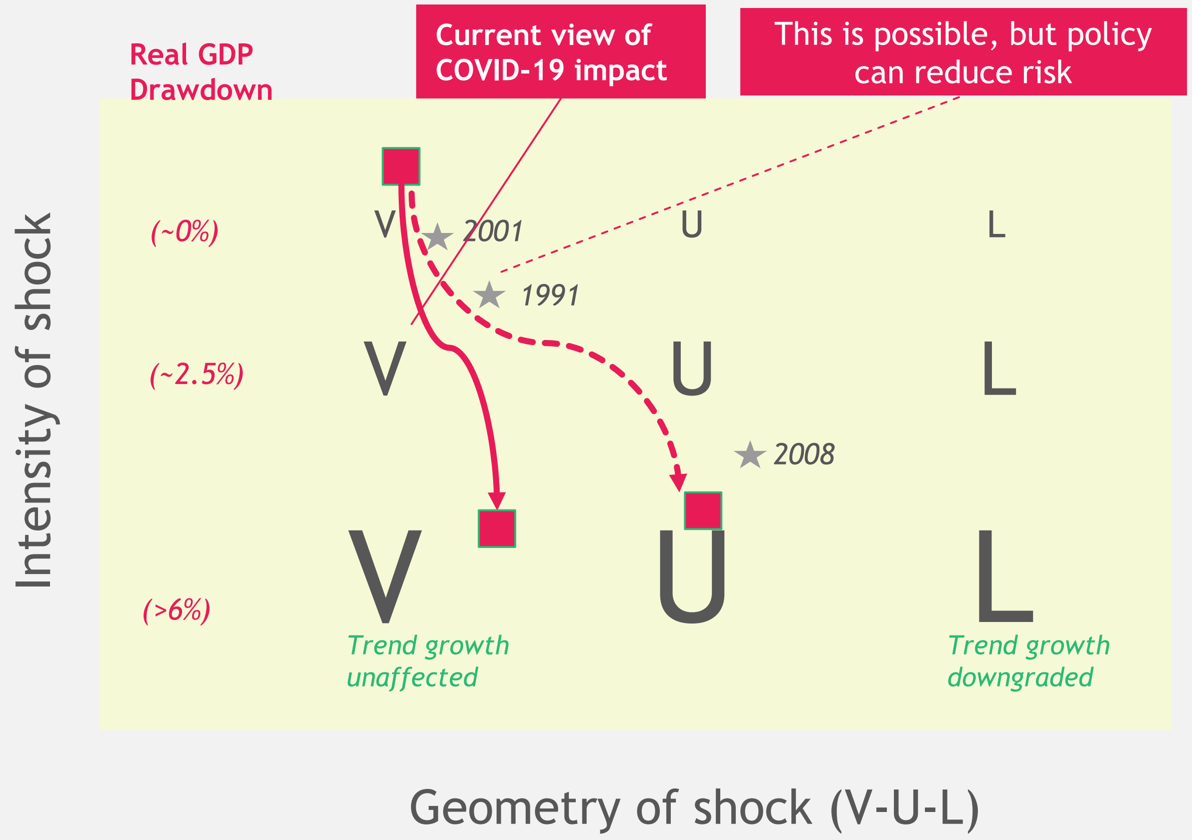
- **1991** was a V shape recession – 1.4% GDP drawdown over 2Q, with a hint of U as for a long time it look as if growth wouldn't return to trend
- **2001** was a classic mild V shape – with only a 0.4% GDP drawdown lasting 1Q
- **2008** was a severe U shaped recession as GDP drew down 4% over 6 quarters and never returned to the prior trend

Source: BCG Center for Macroeconomics analysis

At this point, Covid-19 a deep V-shape, skewed on U-shape

Illustrative

Scenario description



What can tip the scenario U-Shape

A "U-shape" downturn would require sustained damage to the *potential* of the economy – a permanently lower level of capital, labor, or productivity. This type of damage often accompanies financial crises.

Two paths to a U-shape

1. Financial system problems that cripple credit intermediation and thus damage capital formation
2. Extended real economy "freeze" which also damages capital formation

Coronavirus has unique risk profile in that both paths to structural damage are plausible/likely and also interdependent

Source: NBER, BEA, BCG Center for Macroeconomics analysis

Global Shock for Oil & Gas industry

5

Shocks of the oil market

Demand: Social distancing

Supply: OPEC+

Demand: Economic recession

Storage: Overhang, potential fill

Demand: long term shift?

The OPEC+ & G20 deal: Up to 15 mmb/d off market in coming months

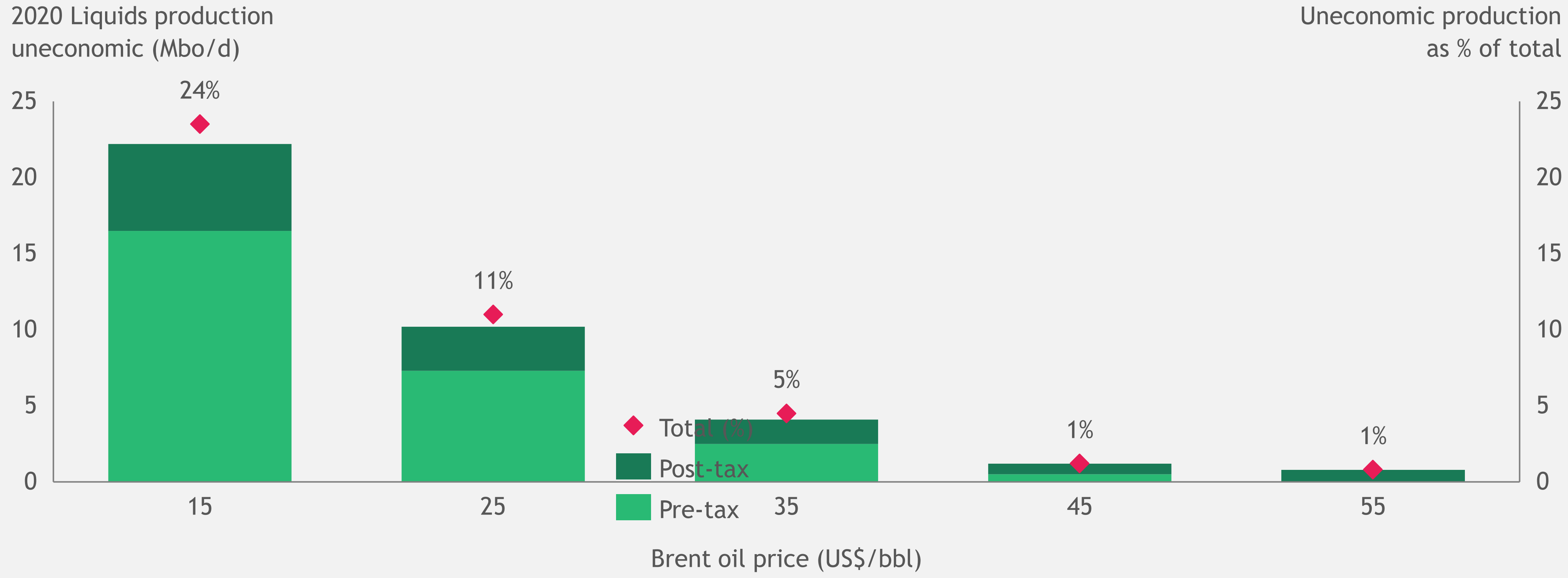
9.7
mmb/d from OPEC+

+2
mmb/d additional from Gulf potentially

TBD
mmb/d other cuts from US, others

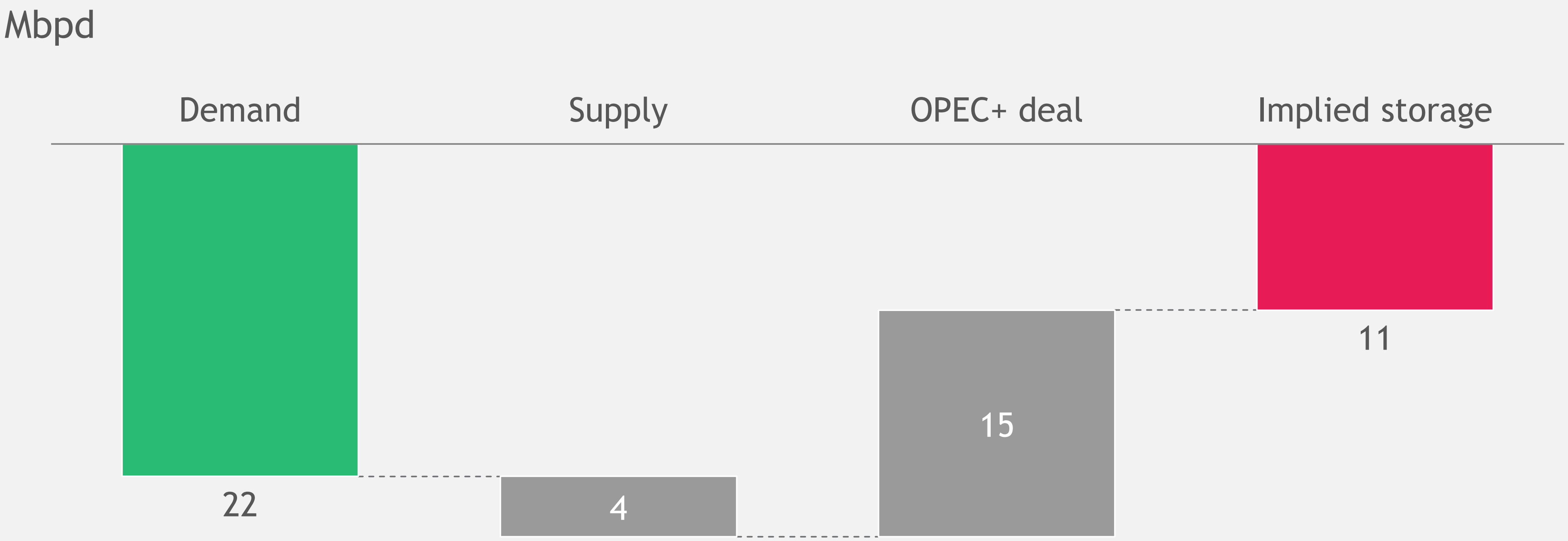
Other production declines may occur via economics

Global uneconomic[1] production at low oil prices



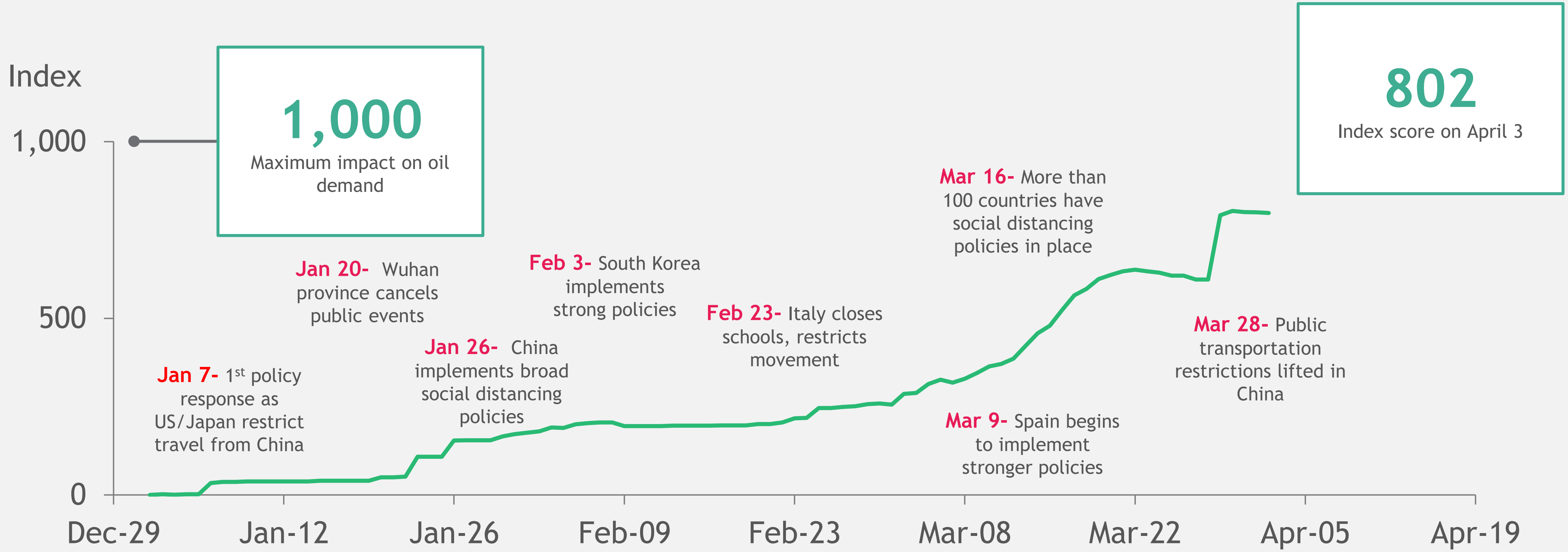
1. Not covering production costs and government share
Source: Wood Mackenzie

Demand crisis drives oversupply – OPEC+ deal not the solution



Source: IEA monthly oil data service, BCG CEI analysis

Government response oil demand index begins to fall as China opens up- will remain elevated



Note: Index maximum is 1000, country response is weighted by oil demand
Source: Oxford COVID-19 Government Response Tracker, BP stats, BCG CEI analysis

Global demand may be down 25 mmb/d or more, driven by 3 sectors- economic losses are also now showing

Shipping

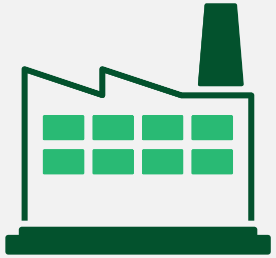
- Global slowdown is reducing overall demand
- One exception is oil tankers
  - Increased activity from expanded production, storage arbitrage

Transportation

- Many countries under locked down
- Global road fuel demand to drop by 5% y/y
- Traffic congestion indexes down 90%+ in most major cities

Aviation

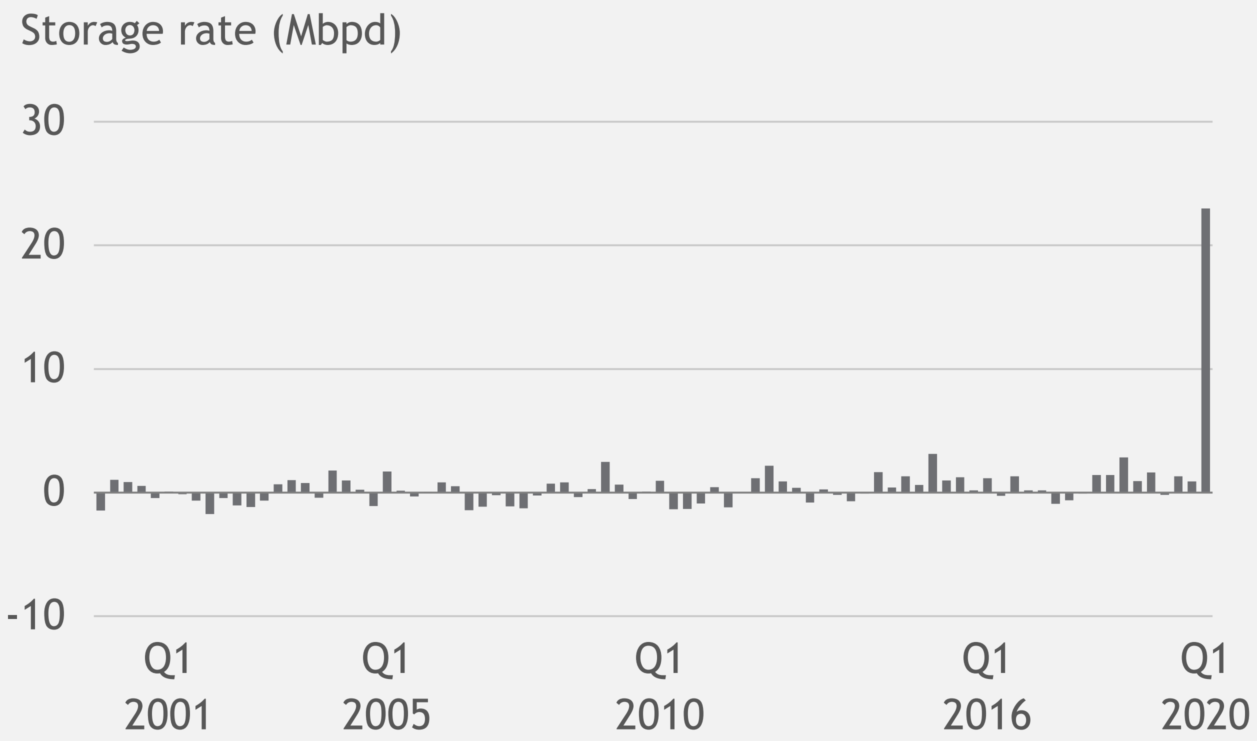
- Multiple borders closed
- Daily flights down 100k
- Airlines will begin to reach bankruptcy by May



Broader economy

- US with more than 3 million new unemployment claims
- PMI in nearly all countries down sharply as purchases slow

The Corona crisis has led to fastest storage build up ever



Source: IEA monthly oil data service, BCG CEI analysis

Storage may fill up

US storage capacity will be filled up – on a time scale of months or weeks

Locally, storage maximum can be reached earlier

Logistic bottleneck will decouple entire regions from global markets

Local spot prices will be driven down

What will be COVID-19's oil demand growth impact? Consider V, U, and L-scenarios in levels & growth space

Illustrative

V Now unlikely

U

L

V: Classic shock – real recession, minor policy error

An intertemporal displacement of demand, resume orig. output path

U: Large shock – financial recession or major policy error

Output path shifted lower, but same growth path (slope)

L: Shock + something breaks on supply side (structural impact)

Output path shift lower with a lower growth rate (new slope)

Source: BCG Henderson Institute; BCG Center for Macroeconomics analysis, BCG Center for Energy Impact

Perspectives from other IOCs & priorities for PVN

Oil Majors

"Majors focus their initiatives primarily around business health"

Response (How to fight the crisis?)	HSSE and continuity of operations	Supply chain resilience	Cash preservation and cost cutting
Rebound (How to transform the company post crisis?)	Strategic positioning, M&A, optimal portfolio mix in $30/bbl world	Pace of investment in Climate / Energy transition	Optimal size and governance
	New investor and employee story – The 'Purpose' of the company	New capital structure and capital allocation	New ways of working & new operating model

Source: BCG experience, BCG analysis

3 key risks triggered by COVID-19 on ongoing operations

Restrictions on international crew

Potential disruptions in operations due to restrictions on foreigners movements in the country

- Maximize local employees - hiring temporary local staff
- Engage authorities to secure “essential services” classification for key roles
- Minimize or fully eliminate optional activities

Unplanned production shutdowns

Due to restricted crew rotations, unplanned delay in maintenance

- Team A & B split working offshore
- Skeleton crews – remain essential personnel & services only
- Use boats to maintain safe distancing between personnel
- Extend offshore rotation periods
- Isolation quarters offshore and immediate heli-evac for infected staff
- Extend operating inventories to reduce frequency of interactions
- Mandatory quarantine before crew change

Operational disruptions with suppliers

Logistics disruption or financial distress

- Develop joint supplier plans to arrange critical items
- Engage with other operators to enable co-ordination
- Enforce visibility on critical equipment & long-lead-time items
- Establish connection & engage with new suppliers available in Vietnam

Many oil & gas players have revised their business plan, committing significant CAPEX reduction

	Capex cut ($B)	Capex cut (%)	Notes
Chevron	~4	~20	• Continue CAPEX for large oil development program, e.g. Tengiz field • Stop spending on small capital projects across upstream & refining • Abolish T/A program across CVX refineries • Reduce spend on drilling within Permian basin
Total	~3	~20	• Reduce spending on exploration & production, gas, renewables & power, refining & chemicals, and marketing & services
Shell	~5	~20	• Continue investment in midstream and supertankers for storage • Exits US LNG Lake Charles
BP	~3	~20	• Reduce CAPEX in US based assets • Halt drilling program in North Sea • Consider organization transformation program in 12 weeks time
Exxon Mobil	~10	~30	• The bulk of the CAPEX reduction will take place in the Permian • Reduce the pace of drilling and well completions
Saudi Aramco	3 - 8	9-24	• Conduct direct contractor negotiation • Ensure volume must meet mandated increases
Petronas	1 - 2	9-17	• Pursue cost transformation wave 2, targeting savings of $1-2 Bn • Significant focus on ensuring National vendor survival during crisis

Source: Bloomberg, WSJ, CNBC, Market Watch

Command center: Draft structure for the rapid response team

Management Team

Replication needed across all subsidiaries

Rapid Response Leadership

- Has authority for entire response effort and critical decisions
- Oversees overall progress and provides daily guidance
- Reports to Management Team

Advisory expert group

- Consists of HR/Legal/Health care/Crisis Management experts
- Advises on legal, regulatory and health related matters

People Health

- Assess potential impact of virus spread on company workforce
- Develop hygiene program and staff rotation and protection programs
- Design a communications for decisive information exchange

Team setup:
- Health experts
- Human resources
- Marketing communications

Commercial, Operation & project Health

- Zero Based Budgeting
- Monitor real-time developments
- Comprehensive OPEX and CAPEX reduction plans
- New organization set-ups
- Prepare to win in post COVID world

Team setup:
- Health experts
- Financial data analysts
- Human resources
- Operations
- Projects

Cash & Financial Health

- Prioritize scenarios and evaluate potential impact on financials and operations & stakeholders
- Create tailored response plans to mitigate scenarios
- Cash management office

Team setup:
- Strategy & Finance
- Commercial leaders
- Supply chain leaders
- Economists, data analysts

Supply Chain Health

- Categorize ops by business criticality
- Monitor and maintain operational data to inform scenario assessment
- Define clear contingency plans for critical ops

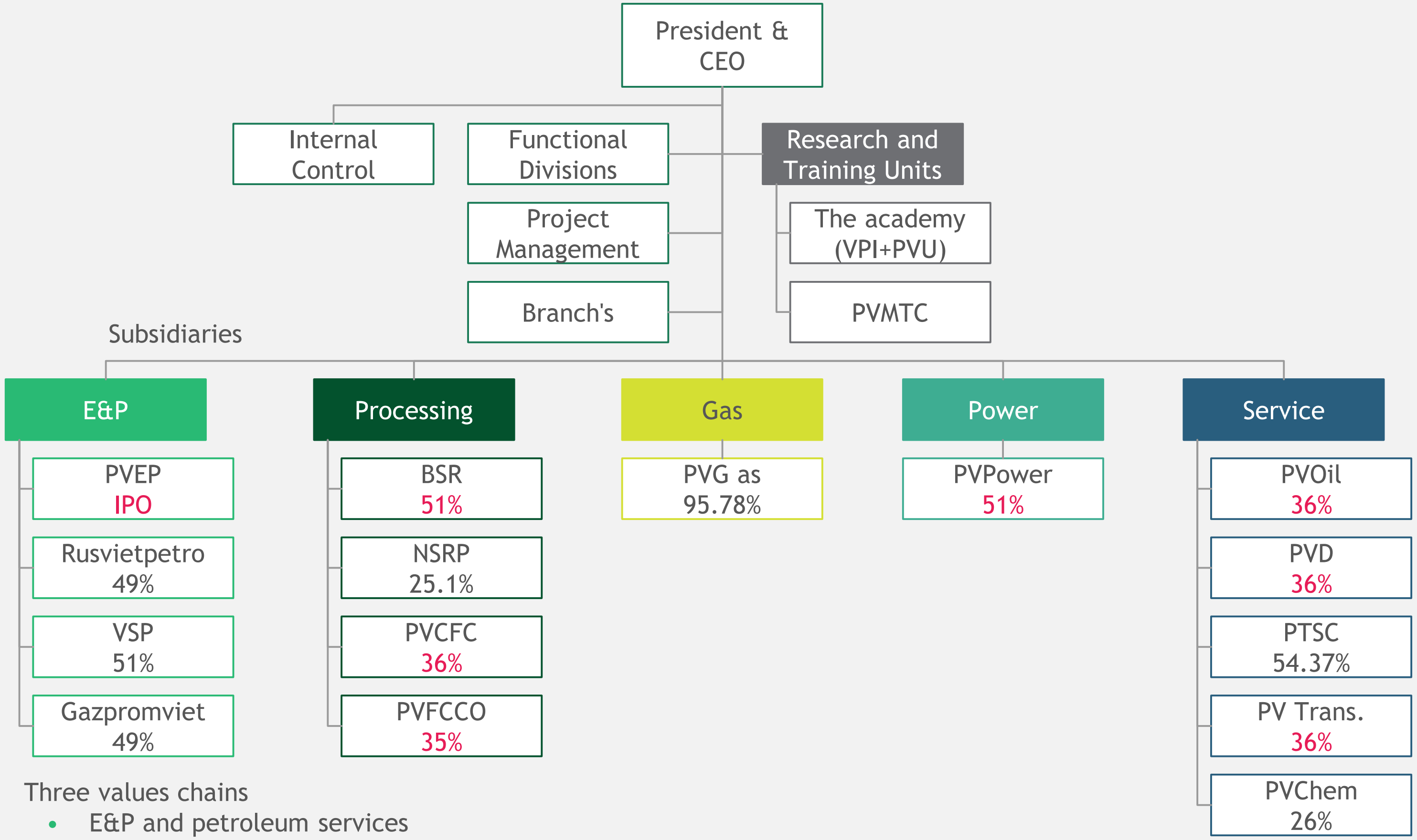
Team setup:
- End-2-end supply chain leaders & analysts across regions (incl. procurement, logistics, manufacturing)

Digital & Tech Health

- Assess current IT structure and develop plan support new way of working
- Identify new ops of using technology to support people and financial health

Team setup:
- IT
- Digital team
- Strategy & Finance

PVN organizational structure (to 2025) and key considerations



Three values chains

- E&P and petroleum services
- Gas. Power and natural gas fertilizer
- Refining and Petrochemicals—Distribution

Key considerations

- Gas and Power are managed as one subsidiary in most of IOCs
- E&P majors in recent restructuring focused on themes - play type, technology
- Centralized technical functions to drive functional excellence
- Customer focused organizational segments (e.g. BP)
- Growth and new venture development

BP's undertakes reorganization to realize its ambitions of net zero emission by 2050

New structure of BP

Business Groups

- Production & Operations
- Customers & Products
- Gas & Low Carbon Energy
- Innovation & Engineering

Integration function

- Strategy & Sustainability
- Regions, Cities & Solutions
- Trading & Shipping

Enablers

- Finance
- Legal
- People & Culture
- Communication & Advocacy

Putting sustainability & net zero emission by 2050 as their first priority

Aggressive expansion & business development in non oil & gas sector; focus on creating low carbon solutions for all BP operations

Foster development and pursue new value chain of decarbonization technology (e.g., Hydrogen, CCUS)

Embeds sustainability at the top of BP & apply group wide approach to capital allocation

Aim to develop integrated energy & carbon solutions at a larger scale beyond BP (e.g., other large corporations, cities etc.)

Support recommendations of TCFD (Taskforce on Climate-related Financial Disclosures) to promote transparency of reporting and act as a role model

Embed relevant cultures, rules & regulations to achieve set target of net zero by 2050

Source: BP website