



Growing the New Michigan – Global Center of Mobility



December, 2011

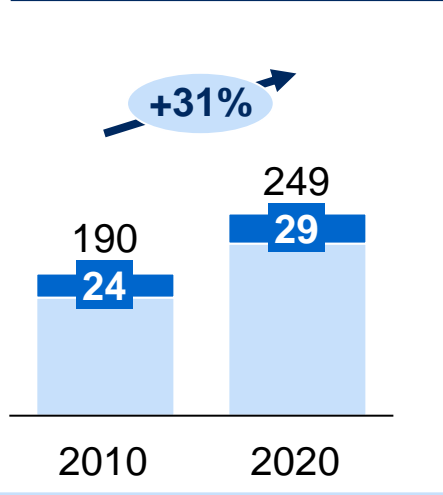
Developed by McKinsey & Company with support from Business Leaders for Michigan staff

Michigan can evolve from an automotive hub into a Global Center of Mobility

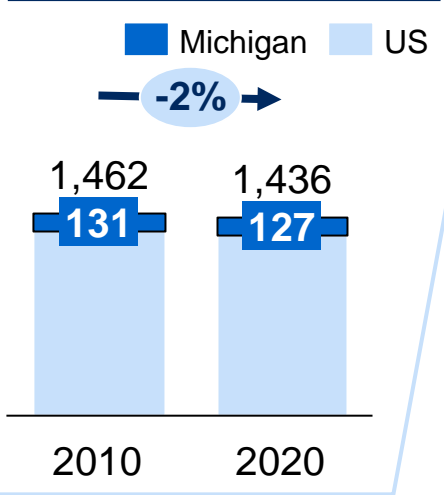
The asset

- Existing auto cluster has the potential to transform current supplier ecosystem into new clusters through innovative products and R&D excellence
- Existing infrastructure is currently underutilized and can be leveraged by new entrants to create adjacent clusters

GDP in mobility¹
\$ Billions



Total employment
Thousands



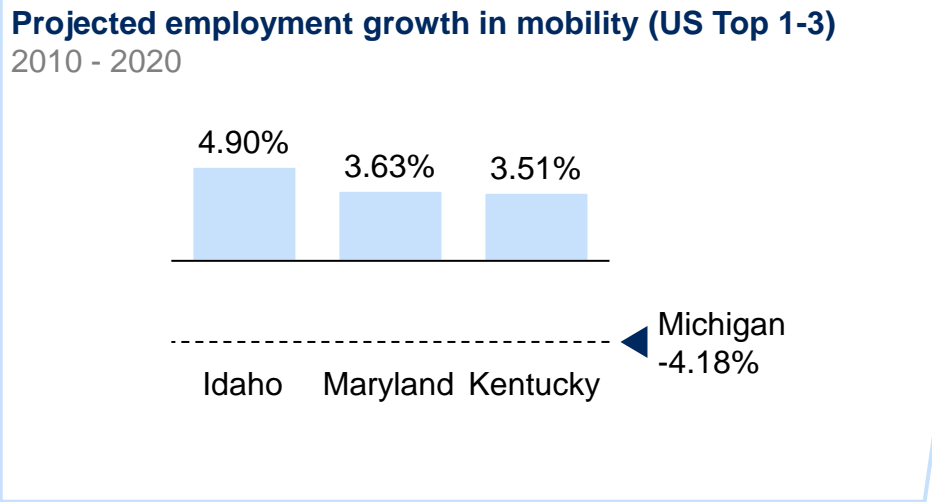
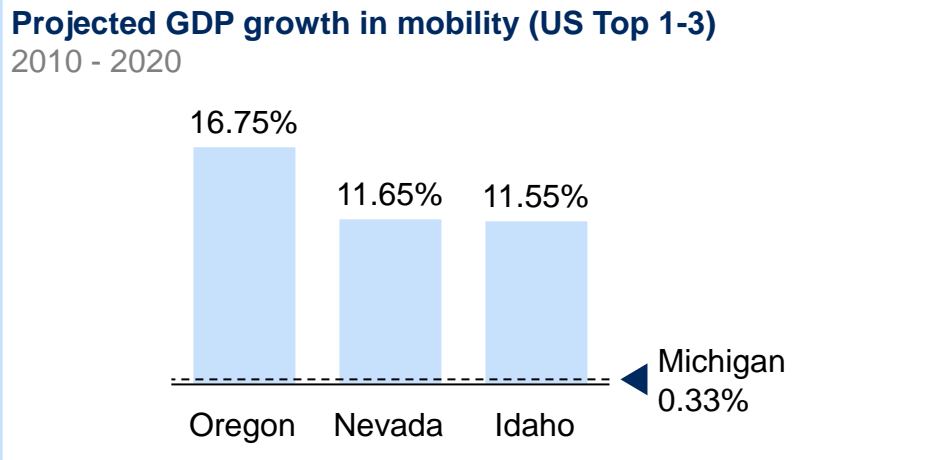
Potential ways to leverage the asset

- Build new clusters around innovation in sustainable mobility on clean technology / fuel efficiency
- Aspire to be the global leader in efforts that minimize environmental impact in an automobile's life cycle
- Leverage existing technologies, human capital and infrastructure to attract new industries and businesses into Michigan
- Encourage commercialization and risk-taking through business friendly regulations, private public partnership and private sector leaderships

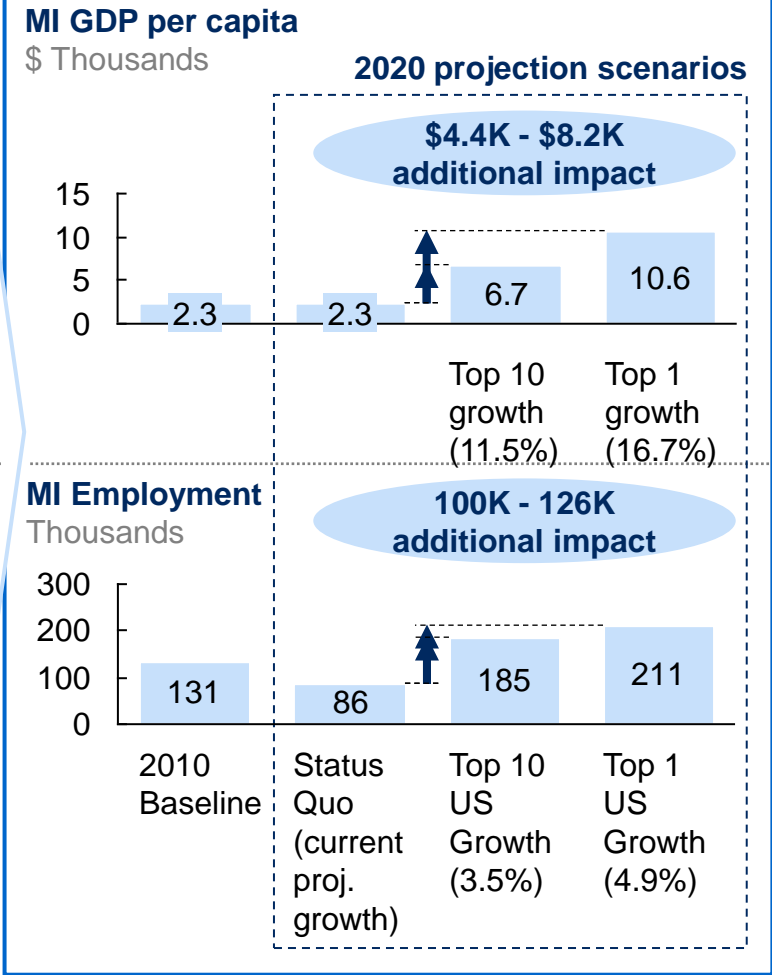
¹ Includes all mobility sectors such as auto, aerospace, rolling stock, ships and boats and other transportation

2020 Goal: Michigan should be a Top Three state in mobility

Today, top US states outperform Michigan in growing mobility



Michigan should aspire to reach top US state growth in mobility



Key considerations for becoming a Global Center of Mobility

A Opportunity & aspiration

- Global mobility is heading towards a new era of clean technology and fuel efficiency (e.g., improve fuel economy of cars / light trucks by 5% annually to comply with 54.5 mpg in 2025)
- Michigan should aspire to aggressively grow, attract and build infrastructure around existing automotive supplier ecosystem and future non-automotive clusters to be the center of future “sustainable mobility” in the world

B Feasibility & case for action

- Michigan has a strong existing infrastructure, talent pool and R&D capabilities to address the opportunities above
- Existing cluster has sophisticated supplier ecosystem, which already has strong partnership with potential stakeholders for new cluster (e.g., sustainability technology predicted to generate GDP of \$173 billion by 2020)
- Development and retention of talent, private/public partnerships, private linkages to universities, and appropriate launch/support for business building will be required
- Michigan will need to be globally competitive on knowledge, infrastructure and ecosystem dimensions and needs strong ties to high value commercial opportunities

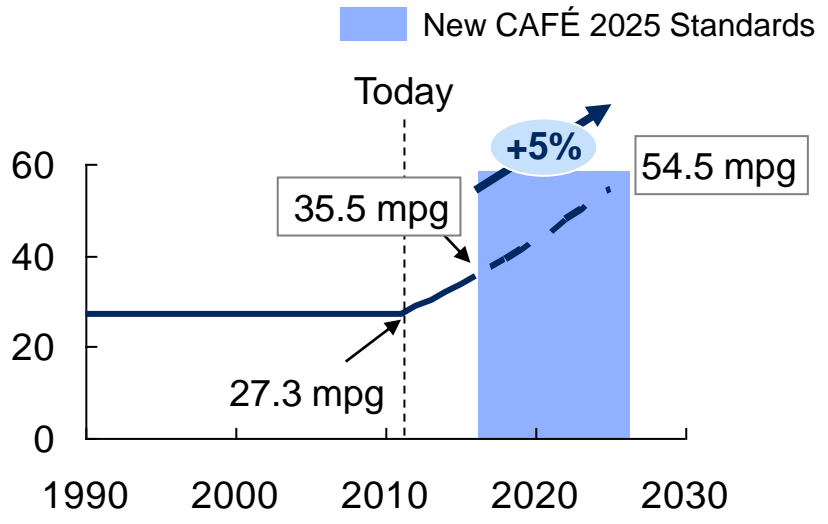
C Enablers & initiatives for stakeholders

- Collaboration with education and research institutions to develop cutting edge technologies and translate intellectual property into commercial opportunities
- Removing barriers: business incubation/building, potential regulation, capital access and availability

Increasing emphasis on clean technology in mobility is a key megatrend that Michigan is uniquely positioned for

Government mandates to restrict CO2 emissions are driving clean technology developments

- Emission is becoming an increasing concern because worldwide consumption exceeds 18 million barrels of oil per day and emit 2.7 billion tons of carbon dioxide each year
- Public transportation is becoming increasingly relevant to alleviate pressure on the road

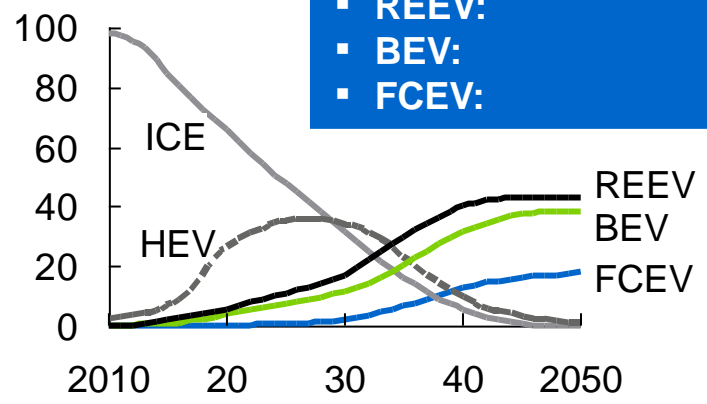


Mobility industry is heading towards fuel efficiency technologies

- Government regulations are driving stricter requirements in fuel efficiency
- Auto makers are under pressure to squeeze more mileage per unit of fuel

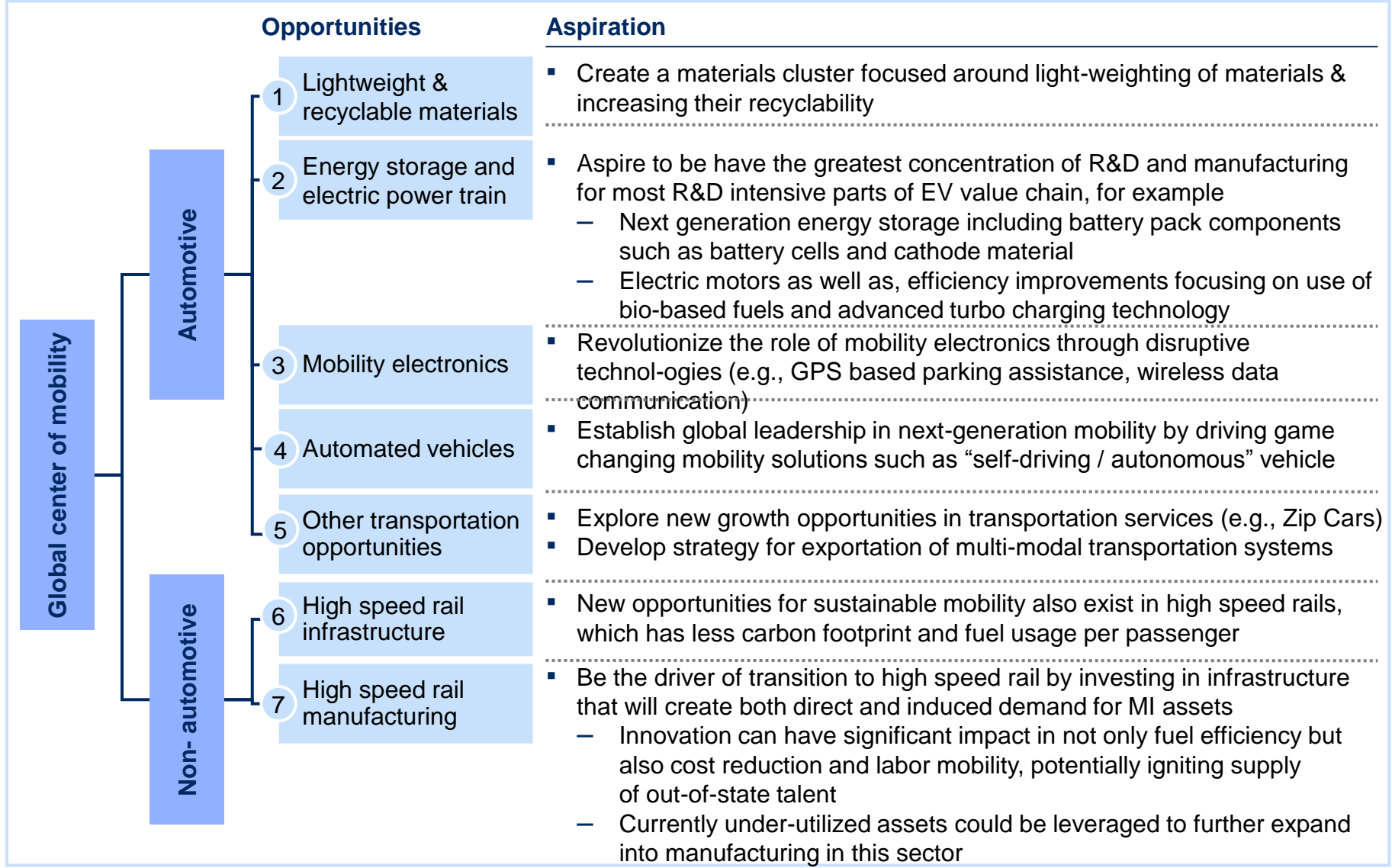
Market outlook¹, 2020
Million units produced p.a.

▪ ICE:	62
▪ HEV:	23
▪ REEV:	5
▪ BEV:	3
▪ FCEV:	< 1



¹ ICE: internal combustion engine, HEV: hybrid electric vehicle, REEV: range extended electric vehicle, BEV: battery electric vehicle, FCEV: fuel cell electric vehicle

A Michigan should aspire to be the global leader in sustainable mobility solutions



A B Sustainable mobility leadership in automotive

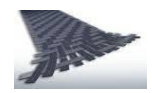
■ Michigan
■ US

Technologies

Opportunities

Feasibility

"Transformers"
... Directly profit from fuel efficiency trend



1 Lightweight/recyclable materials



2 Energy storage



Electric power train



3 Mobility electronics



5 "Other" Transportation Opportunities

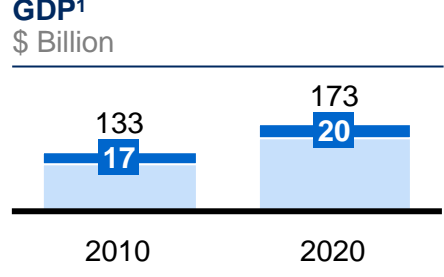


4 Automated vehicles

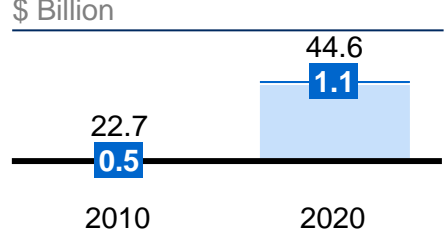
"Rising stars"
... greatest potential to take off in the long run

"Revolutionary game changers"
"If I had asked people what they wanted, they would have said faster horses."
— Henry Ford

Sustainability technology GDP¹



Mobility electronics GDP²



- North American car sharing market to reach \$3.3 billion by 2016

- Apple's iPod created a tribe of customers by creating a demand that did not exist
- Apple's investment, during a period of turmoil created an entire ecosystem reliant on Apple devices

Given thin margins on batteries and power trains, close proximity to OEMs will be a significant advantage to Tier 1 suppliers

Existing auto supplier ecosystem has strong partnerships with mobility electronic stakeholders such as Microsoft; transportation services & multi-modal systems export will provide additional growth opportunities

Better access to an experienced talent pool – lowers the cost of recruiting, and risk of relocation

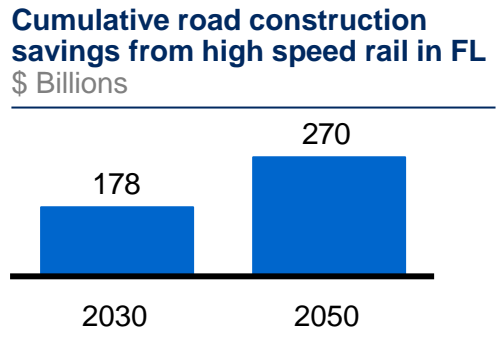
1 Includes revenue in auto components such as engine, climate control & engine cooling, fuel system, exhaust etc.
2 Includes electronics & electrical, audio and telematics

A B Sustainable mobility leadership in high-speed rail

Opportunities and aspirations

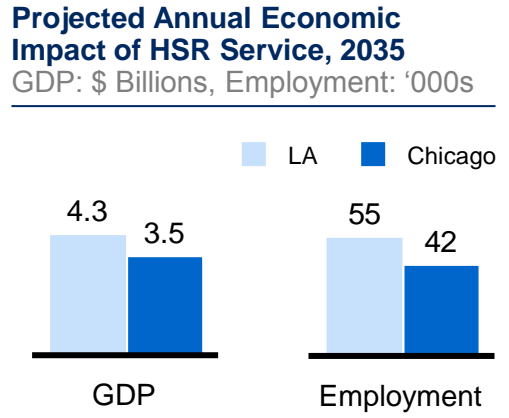
6 High speed rail infrastructure

Rail infrastructure construction is a potential driver of infrastructural spend savings (e.g., alleviates traffic pressure on road)



7 High speed rail manufacturing

High-speed rail is estimated to support 24,000 jobs for each billion dollars of investment including direct & induced jobs (4x of impact in typical manufacturing)



- High speed rail is the most promising in energy efficient mobility: 106 passenger miles/kWh, far head of 13 (for airplanes) and 24 (for cars)
- 0.2 lb CO2 emission per passenger mile compared to avg. 0.6 (for airplanes) and 0.4 (for cars)

Feasibility for Michigan

US Manufacturing locations for passenger and transit rail vehicle components

- Railcar or locomotive OEM manufacturing/ assembly
- ▲ Tier 2 manufacturing



- Michigan already has tier 2 manufacturing
- In addition, new entrants can leverage lower fixed cost base due to existing under-utilized infrastructure, that can be re-tooled for new opportunities

© Potential enablers – What needs to happen to successfully pursue the opportunity?

	Roles	Requirements	Key enablers	Case examples
Customers	<ul style="list-style-type: none"> Commercial opportunities 	<ul style="list-style-type: none"> High quality products/ services that fit demand Favorable costs 	<ul style="list-style-type: none"> Competitive business climate Business friendly regulations and policies 	Italian leather cluster
Existing businesses	<ul style="list-style-type: none"> Backbone of the current cluster and foundation of future clusters 	<ul style="list-style-type: none"> Resources Commercial opportunity 	<ul style="list-style-type: none"> Modernized infrastructure Business friendly regulations and policies 	Hollywood, CA
New businesses/ entrepreneurs	<ul style="list-style-type: none"> Key driver of new clusters and new opportunities 	<ul style="list-style-type: none"> Availability of resources Availability of talent Business friendly environment 	<ul style="list-style-type: none"> Capital availability Frictionless job market – magnet for talent Development of entrepreneurs 	
Infrastructure providers	<ul style="list-style-type: none"> Infrastructure for clusters 	<ul style="list-style-type: none"> Commercial opportunities Business environment 	<ul style="list-style-type: none"> Business friendly regulations and policies Vibrant cities and metros 	California wine cluster

C Potential enablers – What needs to happen to successfully pursue the opportunity?

Potential enabler	Potential actions	Case examples
1 Overarching vision (to be the “Silicon Valley” of mobility)	<p>Create infrastructure that supports / incentivizes rapid development of mobility technologies (e.g., be the first state to support recharging stations on interstate systems, pilot areas for assisted traffic guidance)</p> <p>Be the leader in setting global standards/regulations to support future mobility solutions (e.g., legal/safety standards)</p>	<p>California wine cluster</p> <p>Hollywood, CA</p>
2 Building a inter-connected urban cores	Partner with other states to improve connectivity infrastructure and create a joint marketing effort	
3 Development of a public-private partnership	Create a distinctive university-business partnership focused on developing home grown entrepreneurial talent in all future mobility related sectors	Massachusetts
4 Immigration reform	Attract high skilled labor and STEM talent to Michigan through targeted immigration reform and incentives	
5 Innovations in transportation services (e.g. Zip Car) and infotainment	<p>Develop and implement creative solutions for transportation services by leveraging successful incubator experiences from states such as CA and MA to encourage entrepreneurship</p> <p>Build new partnerships with mobility electronic stakeholders and create incentives for them to move to Michigan</p>	
6 Improved funding accessibility	<p>Encourage investments that create the greatest long-term economic impact by prioritizing incentive programs</p> <p>Level the playing field between established corporations and startups through incentives and targeted grants</p>	<p>Italian leather cluster</p> <p>Norway</p>

Case examples

Case examples parallel to Michigan NOT EXHAUSTIVE

California wine cluster
 Consists of 680 wineries, about 1000 wine growers, suppliers of grape stock, farming equipment providers, advertizing firms

Norway
 Oil & gas industry has successfully developed an exploration and production (E&P) and oil field supply equipment (OFSE) sector by leveraging industrial clusters, and existing infrastructure capabilities

Italian leather cluster –
 Consists of famous shoe companies; suppliers of footwear components, machinery, moulds, design services, tanned leather

South Korea

- Took nearly 10-15 years to internalize its learning and develop domestic talent in the shipbuilding industry
- No.1 in shipbuilding with a revenue of \$43 billion today



Hollywood, CA
 Hub of motion picture production, theatres, television and music recording studios, editing, lighting, and post-production companies

Silicon Valley, CA
 Collection of various established computer technology-related companies, start-ups related to technology, and venture capitalists

Taiwan
 Entered the semi-conductor industry with new business model of foundry-only semiconductor players, developed by local entrepreneurs

France: Building up an ecosystem of clusters to maximize benefits

Idea

- An integrated mobility cluster is key to success of the high speed rail project

Key Lessons

- **Integration with wider mobility:** enabling infrastructure initiatives which will offer scope for integration and the flow of wider benefits
- **Integrated Policy and Intervention:** Key to a sustainable long term future is successful integration between economic development, land-use, regeneration and transport planning
- **Enabling the Flow of Benefits:** Encourage private sector participation in the entire ecosystem

Case facts

- Development of the TGV (Train à Grande Vitesse) has led to the evolution of Lyon into a major hub linking Paris with South France, Switzerland, and soon, Turin
- Lyon has prospered with the arrival of TGV, evolving into a key commercial center; between the opening of TGV in 1982 and 1990, office space in Part-Dieu increased by 43%
- TGV has had a significant impact on tourism in the Burgundy region

Similarities to Michigan

- Connectivity
- Existing industrial base
- Under-utilized infrastructure

Economic impact

- The European Commission estimated that the High Speed Rail would directly add 0.25% to EU GDP and 0.11% to employment over 25 years
- Improving transport supply can change the way businesses work, influence their location decisions and how they grow and provide jobs
- This makes businesses more productive and competitive, an effect which persists over time

Norway: Leveraging existing capabilities to build new oil and gas industry

Similarities to Michigan

- Experiencing a downturn due to the oil shock (especially shipping)
- Preexisting industrial culture catalyzed the development of new industries
- Limited direct capabilities in new cluster (oil and gas) but had a strong non-HC economy in adjacent industries

Case facts

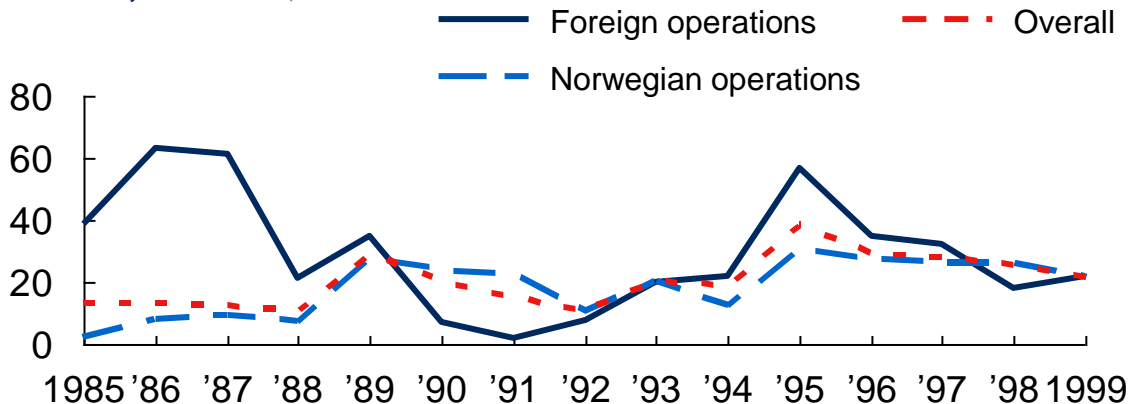
- Legislation to grant preference to Norwegian suppliers
- Three local E&P companies (Statoil, Hydro, and Saga) were set up and granted preference license allocation, securing substantial support from IOCs (international oil companies)
- Government provided research support by setting up and providing grants to universities and institutions

Key lessons

- Provide an overarching vision and achieve public and private sector consensus
- Use industrial clusters to initiate the new industry
- Divert capabilities from adjacent industries
- Develop partnerships with current global leaders to accelerate acquisition of capabilities
- Use captive local demand to seed the industry

Economic impact

Extent of foreign content in foreign and Norwegian operations in NCS, 1985-99, %



- One of top 10 producers of petroleum
- Norwegian OFSE manufacturing is world leading and highly specialized