

Bringing Business and Societal Impact Together in an Evolving Energy Sector

Iliana Ilieva, Bernt Bremdal, and Sanket Puranik

Abstract—As the challenges associated with sustainability, urbanization, life quality and demography become more imminent, companies are adapting to the changing requirements by means of revised strategic approaches. Thus, enterprises are increasingly deviating from the traditionally absolute priority of maximizing total return for shareholders. While this priority is still important, businesses are also looking at the total societal impact (TSI), which represents a collection of measures and assessments that incorporate the economic, social and environmental impacts of their products and services [1]. This paper focuses on the compound influence that TSI may have within the energy domain. In particular, the business opportunities resulting from the Horizon 2020 funded project INVADE are being discussed but seen from the perspective of a socially responsible corporate strategy. Referring to discussions, analyses and undertaken initiatives this paper concludes that business models which incorporate environmentally friendly, local and social and fair energy are capable of accelerating business growth for the concerned companies.

Index Terms—Business growth, energy flexibility, platform ecosystems, total societal impact.

I. INTRODUCTION

Impact is often considered the core measure of a project's success. However, it may be observed that the influence of changing consumer preferences, together with ever more challenging environmental setting, results into a revised impact outlook that includes the compound total social impact (TSI) concept. A global proponent of this claim is the Boston Consulting Group (BCG) [2]. Through their omnipresent management consulting activity, the company is one of the most significant influencers in the business world. Their basic message is that social engagement and classic business can no longer be separated. Social responsibility carries value, caters for growth and pays off. Although HES (Health, Environment and Safety) constitutes a core aspect in social responsibility development what is pursued in the current work is more extravert. To fulfil the promise of a high TSI score HES and all aspects of ethics and governance must saturate every part of the value chain and transpire into a product/service and a marketing message that is consistent

Manuscript received February 30, 2019; revised April 28, 2019. This work was supported by the INVADE project (2017-2020) which has received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No.731148.

I. Ilieva and S. Puranik are with Smart Innovation Norway, Håkon Melbergs vei 16, 1783, Halden, Norway (e-mail: iliana.ilievar@smartinnovationnorway.com, sanket.puranik@smartinnovationnorway.com).

B. Bremdal is with Smart Innovation Norway, Håkon Melbergs vei 16, 1783, Halden and the University of Tromsø Postboks 6050 Langnes, 9037 Tromsø, Norway (e-mail: bernt.bremdal@smartinnovationnorway.com).

with the standards of the processes involved.

TSI embraces multiple strategic and operational aspects. Environmental sustainability and climate friendly operations and leadership lie at its core. There have already been a number of examples where companies were suffering the negative consequences associated with neglect for people, local communities and nature. Furthermore, TSI is also about gender and social equality. The last years' #MeToo campaign has unveiled issues that have been suppressed for too long. As a result, the consequences for leaders and company policies that from now violate basic conventions and respect for the female customer or workers can be devastating. The same can be stated about racial and religious directed misconduct. But social responsibility is also about respect for the regular citizen and his/her private life. Social platforms and big data can be threatening that. Twitter, Google and Facebook have all made their earnings on services that exploit ordinary people's use of their systems. Such social platforms have the exploitation of personal data at the heart of their business model. Violation on data privacy has already been experienced by some social platform users (e.g., the internationally known Cambridge Analytica scandal).

In the energy world people's privacy concern has surfaced in the wake of the smart meter and the introduction of AMS. Usability is also an issue that falls within the scope of the social responsibility and must be a part of the TSI measure, also with respect to energy domain related solutions. Products and services that yield benefits or preference to only a certain group of the population can also be negative. Elderly and disabled people may have problems with or be inhibited from using certain technologies. Initiatives or companies that bring them into the general social life may be seen as a brand booster – also by those not directly affected.

Lastly, specific reference should be made to millennials who show tendencies to be more sensitive to many of these aspects and tend to act differently in many ways than previous generations [3]. Thus, “green initiatives” look to be more lifestyle compatible than ever before. Indeed, from a life style perspective, millennials are more readily embracing ecological food, energy savings and collective travels than any other generation. It could be therefore expected that this type of users will be well responding to energy flexibility initiatives that promote local and sustainable energy production and consumption.

An important point to be made here is that all of the above discussed issues are connected under the TSI cap. Failure to embrace those within the business strategy may have a negative impact on the stock market position and shareholder returns, as well as on recruiting the best employees and being attractive to customers.

A. The Grocery Industry Example

The ideas promoted by BCG in [2] have been illustrated with an example from the grocery industry, which according to the authors, is a stagnant business in the US. Wherever “responsible consumption” products are adopted and sold a significant growth can be detected. Sales of products that are labelled with organic, natural, ecological or fair trade have soared and captured a disproportionate share of growth. In the US alone, sales of such products grew at about 9% annually in recent years, thus accounting for about 70% of total US grocery-sales growth [3]. As a result, natural, environmentally friendly, organic, social and fair trade, locally grown products have accounted for 68% of the total sales [4].

B. An Energy Sector Example

Replicability of such social responsibility issues can be found within the energy domain. The discussion presented by [4] points towards three social responsibility inclined factors that characterize access to energy. The first relates to distributed renewable energy technology installations with attractive pay-back of investment period. The benefits associated with this factor are more intensively perceived in developing countries (e.g., in Africa) where impact can be associated with money savings, better safety and health and improved education. The second factor with respect to energy access considers changing customer expectations, while the third is associated with the use of mini-grids and micro-grids [5]. And it may well be suggested that it is attractive energy services, local renewable energy production and consumption, and energy independence to have provoked the importance of the presented factors.

C. Relevance for the INVADE Concept

The above reflected trends demand the attention of the INVADE project, INVADE partners and relevant stakeholders. The INVADE project envisions a cloud-based ICT platform that through integration with EVs and batteries enables storage services at various levels in the distribution grid (mobile, distributed and centralized). More specifically, the project aims to provide battery energy storage-based services to multiple stakeholders in the grid by means of a flexibility operator (FO) [6]. The overall idea is that the FO operates several energy storage sources from different owners spread across the network and connected to the Flexibility Cloud. The Flexibility Cloud represents an ICT platform that can efficiently send and receive messages from batteries using the communication platform, smart meters, remote terminal units, grid switches, renewable sources, prosumers and consumers, electric vehicles and charging stations [6].

Businesswise, the INVADE concept embraces the recent developments in business model innovation circulating around the establishments of platform ecosystems and also integrating the value of storage and energy flexibility from a local perspective. The opportunity to trade flexibility services through local community-based micro market structures gives new business opportunities, as previously advocated in [7]-[12].

With respect to the ecosystem development the work in

[13], [14] and [15] well represents the business model innovation trends as related to the digitalization-enabled characteristics of easy access, openness and multi-sidedness. Further, [16] and [17] discuss platform ecosystem aspects associated to value-creation for all members of the respective platform-based network and stress on the importance of effectively attracting users and setting the interaction governance principles to allow for easy and efficient communication and value exchange.

In the above set context of flexibility trading, local aspects and ecosystem development, the market appeal to users should be seen from a social impact viewpoint. Following the logic behind the postulated TSI concept, it can be expected that environmentally friendly, local and social and fair energy can incentivize user interest and unleash business growth. Thus, improved TSI with respect to an energy enterprise’s business will have positive impact on its corporate longevity by contributing to the company’s sustainability and keeping it operational over the long run. In other words, and as also discussed by [2], TSI can no longer be separated from business (Fig. 1).

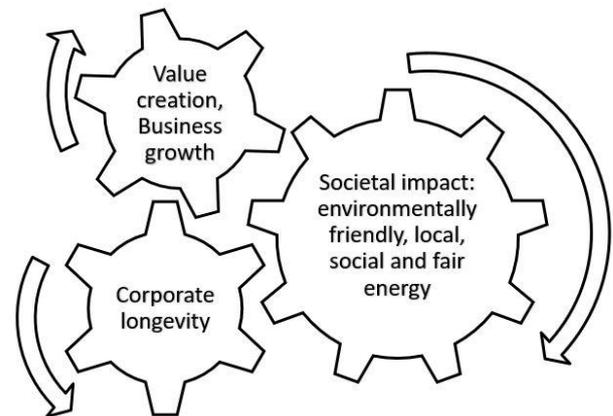


Fig. 1. Business and societal impact come together in an evolving power sector with focus on local, renewable and sustainably produced energy. The figure has been inspired by the discussion provided in [2].

Some of the INVADE partners have already adopted a clear strategy that includes a social responsibility platform. In the following chapter, examples of specific social responsibility strategies followed by energy domain acting businesses, part of the INVADE consortium, will be exposed. Having focus on those, this paper aims to verify approaches to incorporating TSI considerations across energy actors and to justify operations carried in a socially responsible manner. The overall research goal is to provide a trustworthy example of how innovative solutions in the energy field (as represented by INVADE) can incorporate a variety of social responsibility aspects and give suggestions for generic TSI-inclined business strategy.

Although having a rather descriptive approach, the current work creates the basis for attaining energy-business specific recommendations through the following: setting the context of a socially responsible innovation in the light of the INVADE project; reference to different actors in the energy domain that have successfully incorporated TSI outlook in their strategy; specific examples of TSI-adapted products, services and business models that justify increasing business growth opportunities (Fig. 2).

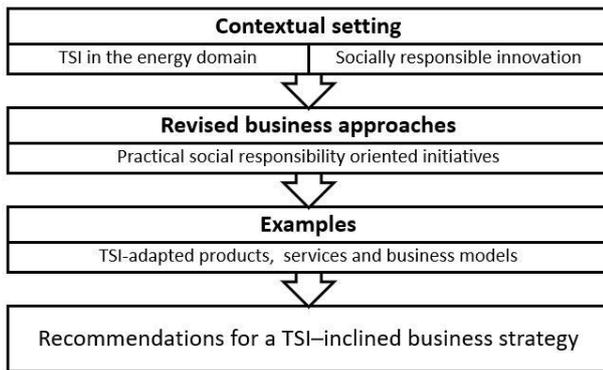


Fig. 2. Approach to creating the basis for the generation of energy-domain specific recommendations that reflect the incorporation of a TSI attitude within business strategy.

The presented in Fig. 2 approach corresponds to the structure of the remaining part of this paper. In particular, the contextual setting and reference to revised business approaches are provided in the second chapter, while the third chapter presents specific INVADE examples of how products, services and business models can be strongly related to the TSI aspect. The final two chapters provide discussion, concluding remarks and give generic recommendations for incorporating a TSI-inclined business strategy.

II. THE IMPORTANCE OF TSI FOR ENERGY RELATED BUSINESSES

The energy flexibility endeavors of INVADE fit right in the accelerating public focus on social impact. An important question to be answered is how to package, develop and promote socially responsible energy and flexibility services that can produce the growth of a scale similar to what the American grocery industry experiences. Labeling the INVADE platform facilitated services as “green” and “sustainable” can provoke increased customer interest and investments, and would undoubtedly have positive business impact on the various companies, members of the consortium. To promote local flexibility markets where renewable energy sources are instrumental in reducing polluting resources while keeping energy and infrastructure costs down for companies and the public alike is a valuable business approach. The discussion provided by [2] points in the direction of necessary strategic focus. Social responsibility is important but left alone it may not be able to suffice for growth and stock value increase. Thus, it is necessary to integrate the key elements of social responsibility into products, services, organizational activities and corporate strategies that seek to build value for customers, companies and investors. In this context, corporate longevity as referring to a company’s ability to survive and prosper over time is particularly relevant. Inherently this also relates to innovation-based business transformation that avoids destructive processes. Further, the work provided in [2] implies that TSI is the future measure for how to determine the value of a company and refers to a new way for leaders to look at their organizations’ role in society.

The mentioned social responsibility points are of high

relevance for the energy related businesses. Paying attention to those when designing new products and services can largely incentivize customers’ acceptance and response. Being in the energy domain, INVADE sees TSI as the cultivating instrument for harvesting from the project’s research and innovation achievements in the future. In fact, it creates a basis for a strategy that could achieve significant business and societal impact at the same time. The project members share the environmental concerns that aim to achieve a better world and a cleaner future. Thus, an exploitation strategy is suggested where localism (associated with patriotism and short travelled energy), renewables (associated with sustainability) and social (meaning user-friendly technologies and infrastructure that are non-intrusive, affordable, controllable and sustainably produced) are combined and demonstrated in terms of tangible spin-outs from the project. Publicity over the same elements is to be used to saturate dissemination and marketing. The practical social-responsibility oriented initiatives carried by some of the INVADE project partners are briefly discussed below.

A. Technology Company in the Energy Domain

The marketing activities carried by the international corporation Schneider Electric, partner in the INVADE project, saturated with focus on this. The company’s declared aim to use their products to develop sustainable energy resources, assure gender balance and a high degree of governance has been visible in all types of promotional channels. Their IoT (Internet of Things) developments make a clear stand against threats to privacy. Thus, the social responsibility philosophy has become an integrated part of their products. This is a superb example of what business leaders should pay attention to.

B. Hotel Chain Promoting Sustainable Tourism

Another partner with a significant social responsibility program is the Albena Group in Varna, Bulgaria. The management has already spotted what the authors of [2] have been pointing to. Despite their low-key image their focus on locally grown, ecological food served in all restaurants and hotels during the tourist season, their pursuit of renewable energy solutions and forest preservation creates a very solid base for sustainable tourism and the type of social responsibility driven business development that [2] advocates. The INVADE project has come up with the term “Green Inclusive” as a token of the kind of exploitation effort that could best serve the Albena Group. The case of Albena is an excellent example of how incorporating a flexibility platform and social value creation into the business strategy can promote a company’s popularity and bring economic prosperity.

C. A Multi-utility Company

Utility companies have a strong local element. Being closely related to the local authorities, they have even greater social responsibility and need to place societal mission in the heart of their operation. Being a multi-utility company, the INVADE partner Lyse has well matched the social responsibility issues. Energy-related services such as EV charging, PV and battery solutions, distributed energy and

management of such has become the core business, while still including all the elements of traditional "smart homes". The company's aim is to supply competitive, environmentally sound and social modern services – a strategic choice that well fits the total societal impact perspective.

The positive business impact associated with greater focus on improved TSI can be contrasted to other, not that environmentally friendly market opportunities. As an example, a company's involvement in other industries, like nuclear, oil, gas and coal can jeopardize the success of end-user involvement. Also, there have been cases where major pension funds divest from such industries, simply because they are considered a liability to the environment and the society and direct threat a sustainable future [18].

III. HOW INVADE GIVES OPPORTUNITY FOR BUSINESS GROWTH THROUGH BETTER TSI?

The INVADE project builds its cloud flexibility platform concept on a number of elements related to technology, business modelling and end-user acceptance. To reflect on the opportunities provided by INVADE, various points to reflect the total social impact related to the project's concept market implementation will be presented below.

- 1) Technology integration and communication that ensures accelerated deployment of flexibility. This can save the society significant amount of money and open-up for more non-fossil solutions.
- 2) Privacy protection with respect to data management and IoT functionalities, and catering for governance issues related to this.
- 3) Smart computational services and extensive data management services that utilize on aggregated flexibility from local providers in order to service distribution system operators (DSOs) and balancing responsible parties (BRPs).
- 4) Definition and promotion of the flexibility operator's role as an instrument for engaging local and environmentally friendly energy consumption and production. In this relation companies can capitalize in the emerging flexibility market through taking the role of flexibility operator and providing services to the regional BRPs, DSOs and other market actors.
- 5) Facilitation of renewable energy supply to the end-user market through product development.
- 6) Incentivizing product offers for increased use of renewable energy in transport.
- 7) Maintaining a high degree of supply reliability in the regional and distribution grids by utilizing new technological opportunities provided by INVADE and capitalizing on the available flexibility.
- 8) Utilizing on the DSOs' advantage at the intersection between infrastructure and technology to develop with help of INVADE the services of tomorrow within energy management, energy efficiency and welfare technology.
- 9) Supporting incumbent utilities to embrace small, local energy plants, along with their focus on large and central power generation, and to assume energy flexibility on an equal basis to classic infrastructure upgrades.
- 10) A platform business model that includes and honors the

consumers and prosumers thus enhancing their status as energy flexibility providers and making it attractive to become a local member of a flexibility program.

- 11) Business cases that offer a variety of "remuneration and services" combinations to different end-user groups, topped with a sensible contribution to a better environment.
- 12) New level of environmental awareness among customers of INVADE-exploiting companies.
- 13) Provision of tools for dynamic balancing and syndication of flexibility resources based on smart charging and vehicle-to-grid technology (V2G) to serve drivers, owners of charging stations, building owners, DSOs and aggregators/BRPs. The tools are based on the INVADE in-depth work on forecasting and optimization as part of the cloud flexibility platform development.
- 14) Platform functionalities that can accelerate the upswing of e-mobility and make a difference in the transport sector giving grounds to address private transport-related sustainability as a social responsibility issue.

Following on the above presented opportunities, it can be made clear that enterprises that choose to deploy what INVADE has to offer can be associated with a particular profile as "green", innovative and socially responsible. Utilizing on the INVADE concept, energy market actors such as distribution system operators, retailers, aggregators and flexibility operators (which may stem solely from the transport sector – e.g., charging point operators) could be capable of making a significant local impact, perhaps at a national level too. The declaration of their social responsibility through their mission as a utility/flexibility provider should appeal to leaders in the shareholding organizations. However, it is of particular importance to build the relationships with the end-users on terms of sustainability, local solutions and trust. The latter comes down to building stronger customer relationships in the future, securing affordable and high-quality power supply, privacy despite influx of technologies that can be perceived as intrusive. In short, the discussed types of actors should place end-users at the heart of all operations. The approach to end-users cannot be left on the municipalities alone as these could fail to build the needed citizen relationships. Thus, companies must create own dialogue and construct their own direct messages to achieve what they want and include the opportunities provided by INVADE. As a result, sustainability, proper data management, employment of innovative product and service offers that ensure end-user welfare can be the most significant differentiator for customers' stock market value and future tendering.

Finally, an important point to make, with reference to the earlier discussed trends, developments and then opportunities offered by INVADE, is the strategic need for success-eager companies from the energy domain to build good basis for TSI and for how "power friendliness" (flexibility) and renewables fit in. This would require various actions at the different steps of the management processes (i.e., data harvest, market analysis, service development, sales, etc.). The authors of the current work envision a consequent

INVADE-grounded research effort where the actions and processes are in-depth discussed and that could be perceived as a guiding example for revision of the strategic business moves carried by actors in the energy sector. More specifically, the optimal goal of future work will be to create the basis for a framework that can help market actors generate the desired and necessary impact.

IV. DISCUSSION

TSI is currently part of an effort to build new business models in INVADE. The project's focus on the integration of renewable energy, climate issues, e-mobility, innovation and infrastructure comply with several of the UN sustainable development goals [19]. A number of the commercial stakeholders in the project and those following the project closely have already catered for aspects of TSI. However, there is a need to create new business models and strategies that are more coherent in terms of societal concerns.

Yet, investments in TSI activities may become qualified as poor ones if inconsistencies are experienced. A stakeholder that seeks to improve energy performance by means of monitoring and control for a group of consumers may fail if the effort causes a notion of privacy intrusion or data misuse. With the latest scandals around Facebook, the awareness of the latter is growing. The discussion around smart meters around the world has also exposed such concerns. If a company is promoting EVs while the top management is still driving large gasoline driven cars, the confidence in their long-term commitment to e-mobility might be questioned.

In INVADE such inconsistencies are receiving a lot of attention as new business models are developed. The approach is to exploit the adapted by Maurya [20] Lean Canvas in order to resolve inconsistency issues and develop coherent business models based on the findings in INVADE. As with most canvas models of this kind it is important to apply a customer-centric approach. This could well be supported by Porter's classic industrial analysis [21]. A customer-centric approach implies focus on people or companies that are willing to pay for the products or services. This distinguishes them from mere users. In the context of TSI one could also distinguish between experimental customers that are willing to pay for a trial experience and those customers that pay, stay loyal and even promote the solutions to others. In the world of home automation systems and demand-response this can be extremely important. Further, customer segments can be redefined into smaller ones. As an example, within the INVADE project there are defined 12 segments of e-mobility and EV-drivers, each with a different focus and different needs.

As with the traditional Lean Canvas, the top three major problems that transpire from the analysis of a customer segment are selected. Around these, a commercial player in the project can build a business case with value proposition that embraces a sellable solution.

A. How is TSI Perceived, Emphasized and Communicated within a Customer Segment?

First, it is important to note that TSI is not a single metric, but a collection of measures and valuations that capture the

economic, social, and environmental impact of a company's products, services, operations, core capabilities, and activities. In order to determine whether certain TSI-inclined solutions could fit, it is necessary to get insight of the geographic, sociographic and demographic understanding of the customer segment. In addition, an evaluation should be made on whether there are incompatible TSI elements. When constructing the Unique Value Proposition (UVP) this understanding is essential. History has seen several demand-response projects that have failed to observe this broader picture, thinking that monetary compensation alone is a sufficient incentive. But services that impose their solutions on people's life can quickly generate resistance. As an example, load reduction during certain periods can be perceived as negative by families with small kids. Thus, the UVP needs to be worked upon in iterative steps. It may, therefore, be helpful to identify negative aspects that should be eliminated early and create a language that is considered friendly, supportive and future oriented. Such an approach will make the product development and marketing efforts more easily compliant with social responsibility and win customer's consent.

Eventually, all the above discussed approaches will determine what channels should be used to address the customer. The communication effort and the way the solution is delivered must in turn be compatible with the strategic TSI elements and the UVP. The former helps to stimulate awareness of the potential customers in the segment. The latter enables the end-user to verify the perception gained in the early marketing and sales phase. A supplier of solar panels that promotes climate friendly energy but applies an electrician that delivers the panels on a diesel truck, is likely to disappoint its new customer. Similar negative attitude can be provoked if the panels are installed by means of underpaid, foreign labor. Another example could be a hotel chain that promotes sustainable tourism but ignores the fact that many tourists include employees' welfare and gender equality as parts of this term. Ecological food and solar panels on the roof are thus likely to be insufficient in convincing tourists about the hotel chain's sustainability ambitions. Putting different social responsibility considerations together is part of the aspiration of the exploitation and business model group within the INVADE project, having the goal to establish a lasting impact.

B. Outlook

Since long companies have sought to boost their image by designing various forms of social responsibility programs. Donations to different causes such as welfare and foreign aid, donations to university programs, support of sustainability interest groups and contributions to work on other societal issues have been the rule. But all must be considered a side activity and very often the first part of the budget that is reduced or eliminated when the company faces economic challenges. According to [22] TSI is about integrating the societal aspect in the core business. This offers scale advantages that in return create positive societal impact and business benefits. On an overall level it might be hard to spot the difference between a genuine TSI approach and the classic HES (Health, Environment and Safety) processes

most companies have developed already. Indeed, there exist significant overlaps, but HES is more introvert, typically focused at the organization's internal welfare. HES processes are also more inclined to specify the "do not's" to avoid undesired situations and consequences of the company's operation. Social responsibility is concerned with "do good things" for people, typically beyond the company's organization, thus becoming a truly extravert activity.

Further, TSI needs to be included in the company's strategic thinking and therefore also in all the processes embraced by the company's value chain. A double standard practice could severely penalize the business. A company that simply "green washes" its image but continues its fossil-based operations as before can eventually be subject to negative attitude from customers or members of the public. In this relation, social media can strongly accelerate the process. As an example, a corporation may experience hard market times if it advocates for social responsibility but gets caught in using child labor. Also, if a company's market department promotes clean, ecological food and a discovery is made proving that the company is still adding conserving chemicals, its market positions can be significantly weakened. In this respect, the management teams would need to understand that nowadays customers, and particularly the younger generations, are less tolerant with regard to such social responsibility incompatibilities

Companies which ignore social responsibility aspect in their strategic moves can experience negative market consequences. Financial players may choose to divest from companies that are not responding to the demand of a more responsible conduct. As investors are willing to make both a change and a profit, sustainability funds are gaining popularity. A situation where pension funds at large start to divest from enterprises with a non-existent or poor TSI strategy, even if current revenues are still growing, could be perceived as a major threat for certain companies. In addition, if it becomes apparent that investment practices can significantly hurt the prospects of the coming generations, the demand for a very acute TSI-oriented investment policy could further increase.

C. Recommendations

Considering the discussion arguments presented earlier in this paper and referring to the advices provided by [23], there can be made some generic recommendations that the management of an energy-related company might find useful when taking steps towards a more TSI considerate strategy:

- 1) There should be good understanding of the company's current position and vision for further development
- 2) The arguments of why TSI is important to the company's business strategy should be clearly defined
- 3) Creation of a list of social responsibility initiatives that apply to the specific energy company's business
- 4) Partnership with companies/organizations that already have valuable sustainability profile
- 5) Definition of key goals and associated metrics to progressively measure impact
- 6) Engagement of customers and key stakeholders to give feedback on issues they are interested in
- 7) On-time communication of TSI-related initiatives towards both customers and investors

The above points imply that the management envisions

what the company's societal impact should be and has a good understanding of the company's desired future. In addition, this will help to better perceive the emotional and rational preferences of future customers. Further, as regulations are changing to encompass the renewable energy targets and to set the grounds for sustainable energy future, there could be a great difference between fast movers and laggards. If an energy company's TSI-supportive arguments are well communicated and in line with the current societal changes, an image of energy sustainability proactiveness and business agility can be created. This could give advantage as compared to other enterprises in the field. Finally, it may also be helpful to reinforce and rejuvenate the company's brand if such an action can contribute to the desired positive attitude.

However, it is imperative that the TSI effort is assessed in terms of economic and social benefits and embracing all the company's activities. And it may often be hard to integrate the TSI concepts into strategy supported operations and as basis for a revised business model. Thus, TSI should not be allocated to a special team or department. While such units can be facilitators, the top-management ownership is important, with the whole organization being engaged and contributing to social responsibility initiatives. A goal should be to create value for shareholders and become aligned with sustainability targets within a rapidly developing and transparent world where external stakeholders are in a position to define the societal agenda more than ever.

V. CONCLUSION

The presented paper has focused on the connection between business and societal impact as related to the INVADE project which most significant outcomes can be broadly classified as concepts, software, standards, and business instruments. With respect to the INVADE project focus has been placed on the business model and the technical platform supporting it. Provided that an agile and vital market and sales operation are mobilized, business model and technical platform in combination can offer a significant business growth potential. TSI-related outcomes from the project can both directly and indirectly benefit project partners and the broader stakeholders. However, it is believed that this would require the adoption of distinct TSI strategies. Thus, the outcomes are to be closely associated with the world's demand for social responsibility in all aspects of people's lives. Direct benefits could come from potential new revenue streams generated in the existing businesses or from spin-offs, or through the adoption of new business models. Indirect benefits are likely to transpire through standardization and policy recommendations which make it easier to do business with EV and storages.

While network effects, associated with the INVADE flexibility platform operation need to be created in every local region, there is room for a global Flexibility cloud operation that delivers sustainable, ethical and user-centric flexibility services on a local level. Yet, a TSI philosophy will be essential. If successful, the societal impact that the project targets will be achieved through the development of products and services with a "social conscience" and aligning this effort with common people's craving for a better life and livable planet - in all respects, for the people themselves and for future generations.

REFERENCES

[1] D. Beal, R. Eccles, G. Hansell, R. Lesser, S. Unnikrishnan, W. Woods, and D. Young, "Total societal impact. A new lens for strategy," *The Boston Consulting Group*, 2017.

[2] D. Beal, "Moving towards total societal impact," *The Boston Consulting Group, Centre for Public Impact*, 2017.

[3] GALLUP, *How Millennials Want to Work and Live*, Washington D.C., 2016.

[4] The Boston Consulting Group. (2019). When social responsibility leads to growth. [Online]. Available: <https://www.bcg.com/en-be/capabilities/sustainability/when-social-responsibility-leads-growth.aspx>

[5] SNBC. Sustainable energy. (March 2017). Access to energy: When business issues meet social impact. [Online]. Available: <https://www.cnbc.com/advertorial/2017/03/13/access-to-energy-when-business-issues-meet-social-impacts.html>

[6] I. Ilieva and J. Rajasekharan, "Energy storage as a trigger for business model innovation in the energy sector," in *Proc. 2018 IEEE International Energy Conference (ENERGYCON)*, 2018.

[7] A. Ramos, C. D. Jonghe, V. Gómez, and R. Belmans, "Reaching the smart grid's potential: Defining local markets for flexibility," in *Proc. IAEE Conference*, 2014.

[8] P. Olivella-Rosell, P. Lloret-Gallego, Í Munné-Collado, R. Villafafila-Robles, A. Sumper, S. Ø. Ottessen, and B. A. Bremdal, "Local flexibility market design for aggregators providing multiple flexibility services at distribution network level," *Energies*, vol. 11, no. 4, p. 822, April 2018.

[9] K. Porter. (October 2017). Local flexibility markets mark the emergence of the new DSOs. *Watt-Logic: Energy and Innovation* [Online]. Available: <http://watt-logic.com/2017/10/10/dso/>

[10] REGEN transforming energy. (April 2018). Local flexibility markets in five steps part one: local flexibility trials. [Online]. Available: <https://www.regenw.co.uk/news/the-development-of-local-flexibility-markets-in-five-steps-part-one-19-april-2018>

[11] REGEN transforming energy. (April 2018). Local flexibility markets in five steps, part three: The role of a local flexibility market. [Online]. Available: <https://www.regenw.co.uk/news/local-flexibility-markets-in-five-steps-part-three-the-role-of-a-local-flexibility-market>

[12] REGEN transforming energy. (May 2018). Local flexibility in five steps part four: How a local flexibility platform could work. [Online]. Available: <https://www.regen.co.uk/local-flexibility-in-five-steps-part-four-how-a-local-flexibility-platform-could-work/>

[13] I. Ilieva, B. Bremdal, and D. Wåge, "Digital ecosystems as disruptive force of flexibility services in the energy sector," in *Proc. IAEE Conference*, 2018.

[14] D. Wåge and G. E. Crawford, *Creating Disruptive Ecosystems*, Stavanger: Disrupt AS, 2016.

[15] D. Wåge, B. A. Bremdal, and G. E. Crawford, "Platform based business models in the future energy markets," in *CIREC Workshop*, Ljubljana, pp. 7-8, June 2018.

[16] G. Parker, M. W. V. Alstyne, and S. P. Choudary, *Platform Revolution: How Networked Markets Are Transforming the Economy and How to Make Them Work for You*, New York, NY: W. W. Norton & Company, 2016.

[17] H. M. E. Korhonen, K. Still, M. Seppänen, M. Kumpulainen, A. Suominen, and K. Valkokari, "Start-ups innovating digital platforms: Towards successful interaction," in *Proc. ISPIIM Innovation Conference – Composing the Innovation Symphony*, Austria, Vienna, 18-21 June 2017.

[18] B. McKibben. (December 2018). At last, divestment is hitting the fossil fuel industry where it hurts. *The Guardian*. [Online]. Available: <https://www.theguardian.com/commentisfree/2018/dec/16/divestment-fossil-fuel-industry-trillions-dollars-investments-carbon>

[19] The United Nations. Sustainable Development Goals. [Online]. Available: <https://www.un.org/sustainabledevelopment/>

[20] A. Maurya, *Running Lean. Iterate from Plan A to a Plan that Works*, O'REILLY, 2012.

[21] M. Porter, *Competitive Advantage*, New York: Free Press, 1985.

[22] S. George. (January 2018). From Corporate Social Responsibility to Total Societal Impact. *A Medium Corporation*. [Online]. Available:

<https://medium.com/@sonali.george1309/from-corporate-social-responsibility-to-total-societal-impact-93ed38320f8f>

[23] M. Golomb. (May 2018). The Greater Good: Total Societal Impact. *A Medium Corporation*. [Online]. Available: <https://medium.com/@michaelgolomb/the-greater-good-total-societal-impact-488564406891>



Iliana Ilieva was born in Bulgaria and in 2008 completed the bachelor's degree in economics at the Sofia University, Sofia, Bulgaria. Ilieva continued her education within the economics field and in 2011 took a master's degree in economics from the Norwegian University of Life Sciences: School of Economics and Business, Ås, Norway. In 2015 Ilieva graduated from the PhD in renewable energy with focus on energy system analysis. The PhD was completed at the Norwegian University of Life Sciences, Department of Ecology and Natural Resource Management, Ås, Norway.

Since 2015 she has been working at Smart Innovation Norway, located in Halden Norway. Her position as a senior researcher and scientific coordinator has main focus on the fields of energy markets, market design, local energy trade, smart grid, demand flexibility, renewable energy. As part of her research work she has been authoring and co-authoring various journal and conference papers. Her recent scientific publications have been targeting the IEEE International Energy Conference (EnergyCon), the International Conference on Electricity Distribution (CIRED), the Journal of Energy Markets and others. Further, her current research interest relates to demand response, business modelling, innovative contract regimes, fair trade and total societal impact within the energy sector.

Dr. Ilieva is actively participating in various Norwegian and European initiatives within the energy field and is leading Smart Innovation Norway's contribution to various national and international (H2020) research projects.



Bernt Bremdal is born in Norway and holds a master's degree in mechanical engineering from the Norwegian University of Science and Technology, Trondheim, Norway (completed in 1982) and a PhD in applied artificial intelligence from the same university.

He has more than 25 years of experience in decision support, product development, performance optimization and knowledge and information management. He also has more than 10 years of academic research experience. Currently he is working as senior advisor for energy solutions with Smart Innovation Norway. In his current position he is actively involved with various Norwegian and international (H2020) research and innovation projects. He parallelly holds academic position as a professor at the University of Tromsø, Norway. He has an extensive publication list, with his recent scientific publications targeting CIRED, the EnergyCon and various IEEE conference proceedings. His research interests are linked to innovative business models and intelligent systems. He keeps a special research focus on smart grids, monitoring and control, AI supported business, user-centric developments, e-mobility and smart buildings, and works to bridge the gap between research and business development.



Sanket Puranik was born in India where he received his bachelor's degree in mechanical engineering from National Institute of Technology, Hamirpur, India in 2009. After working 2 years in the industry Puranik went on to pursue his master's in sustainable energy systems in 2011 from Chalmers University of Technology, Sweden. Thereafter, in 2017, Puranik received his professional doctorate in engineering (PDEng.) in smart energy buildings and cities from Eindhoven University of Technology, the Netherlands.

As of 2017 he is working with smart innovation norway, in Halden Norway. He currently works as senior researcher focusing on zero energy buildings and communities design, new business models in energy sector, demand flexibility, energy markets, and innovation management. In his research work he has been authoring and co-authoring various conference papers. His recent scientific publications have been targeting CIRED and the IEEE PES PowerTech conference (PowerTech).