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# Decision Support Unit (DSU)

Renewable Energy Sector Study – ANNEXES  
August 2021

Donna Loveridge, Arlette Nyembo



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## Disclaimer

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## About the Decision Support Unit (DSU)

The DSU is a Foreign Commonwealth and Development (FCDO) -financed project implemented by Oxford Policy Management (OPM) in the Democratic Republic of Congo (DRC). It is designed as a support function to FCDO's overall management of its Private Sector Development (PSD) programme. The DSU provides evidence and analysis aimed ultimately at improving the programme's overall impact of increasing incomes for the poor in the DRC. In addition, the DSU provides an external learning role targeting improved implementation practices of the broader development community working in the field of economic development.

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## Table of Contents

<b>Acknowledgements.....</b>	<b>3</b>
<b>Table of Contents .....</b>	<b>4</b>
<b>List of Figures, Tables and Boxes .....</b>	<b>5</b>
<b>Annex 1: Evaluation question matrix.....</b>	<b>7</b>
<b>Annex 3: Programme documents reviewed and references.....</b>	<b>12</b>
<b>Annex 4: Conceptual framework for assessing MSCs, constraints and target beneficiary outcomes.....</b>	<b>15</b>
<i>Understanding of systemic change.....</i>	<i>15</i>
<i>Approach to assessing systemic change .....</i>	<i>17</i>
<i>MSC and systemic change evaluation rubrics.....</i>	<i>18</i>
<b>Annex 5: Élan's market system change objectives .....</b>	<b>19</b>
<b>Annex 6: Élan's theories of change .....</b>	<b>20</b>
<b>Annex 7: Élan's interventions and activities .....</b>	<b>25</b>
<b>Annex 9: Assumptions .....</b>	<b>34</b>
<b>Annex 10: Élan 1.0 PCR: future indications of MSC .....</b>	<b>42</b>
<b>Annex 11: Profile and needs of Élan's intended beneficiaries.....</b>	<b>44</b>
<b>Annex 12: Additional pico solar and SHS sales information .....</b>	<b>50</b>
<b>Annex 13: Number of Beneficiaries and their poverty profiles .....</b>	<b>54</b>

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## List of Figures, Tables and Boxes

Figure 1: Élan 1.0 ToC (2016/2017).....	20
Figure 2: ToC 2020 with key adaptations.....	21
Table 1: Élan's targeted market systems changes.....	19
Table 2: Élan 1.2 renewable energy strategy constraints and invention rationales (2019).....	22
Table 3: Number of interventions by phase.....	25
Table 4: Élan 1.0 and 1.2 RE budget (excluding core and overhead costs), excluding Covid-19 interventions .....	25
Table 5: Élan support to solar marketing and/or distribution (MSC 7.1 and 7.2 / RE 01) .....	26
Table 6: Élan's support to ICS manufacturing, and/or marketing and distribution (MSC 7.1 and 7.2 / RE 01) .....	29
Table 7: Élan's support for business and consumer credit (MSC 7.3 / RE 02) .....	31
Table 8: Élan's renewable energy business environment intervention (MSC 7.4 / RE 03).....	32
Table 9: Élan support for the coronavirus pandemic .....	33
Table 10: Assumptions underpinning Élan's theories of change .....	34
Table 11: Élan 1.0 Project Completion Report: Future indications of market systems changes.....	42
Table 12: DRC GDP per capita (2015 – 2020).....	44
Table 13: DRC population – International Poverty Line Poor and Non-poor.....	45
Table 14: No. and % of households in urban centres with access to electricity .....	46
Table 15: Product Categories - Off-Grid Solar Lighting Products .....	47
Table 16: Comparison of low quality and quality lantern prices .....	49
Table 17: Actual and estimated solar lighting sales volumes and revenue in DRC for GOGLA members.....	51
Table 18: Estimated average product price and non-GOGLA affiliated sales .....	52
Table 19: GOGLA reported sales of solar appliances (2019-2020).....	53
Table 20: Élan's reported number of people benefiting from increased income 2014-2020.....	54
Table 21: Income groups in Élan's studies.....	55

---

Table 22: Estimated number of solar customers by income brackets.....	56
Table 23: Estimated number of ICS customers by income bracket .....	57
Table 24: Estimated value of benefit for solar customers by income bracket .....	58
Table 25: Estimated value of benefit for solar customers by income bracket .....	59
Table 26: Élan 1.0 Solar customer poverty profile.....	60
Table 27: Élan 1.0 ICS customer poverty profile .....	61

# Annex 1: Evaluation question matrix

	EQ	Sub- Questions	Data Source	Data Collection method	Analysis
<b>A: Relevance</b>					
A.2	<b>To what extent was Élan and the interventions it supported appropriately designed to meet the needs of stakeholders and target beneficiaries?</b>				
		How important (market actors including target beneficiary) were the MSCs that Élan chose to address to stakeholders?	Sector strategy Market actors	Document review Interviews	Compare most important MSCs referenced by market actors to those that Élan focused on; interpret with consideration of context and the likelihood of Élan's ability to affect some MSCs
		How appropriate were the interventions to target the constraint?	Sector strategy Intervention designs and plans Market actors and Élan staff	Document reviews Interviews	Analyse market system actors' responses re appropriateness (consider extent to which the design appropriately addressed the constraint vs quality, quantity, timeliness of delivery)
A.3	<b>To what extent did the intervention logic and assumptions of the Élan project (and its interventions) hold during implementation?</b>				
		What assumptions did Élan make regarding change pathways and market actors' incentives and motivations (at the sector and intervention level)?	Élan sector strategy Intervention designs Élan staff	Document review Interviews	Collate, categorise and synthesise key assumptions made; Compare key assumptions made to implementation experience, and where there are differences collate information on the affect (e.g. on business models, MSC etc)
<b>B. Effectiveness</b>					
B.2	<b>To what extent has Élan led to improvements in market systems?</b>				
		How, and how much, have targeted constraints and MSCs changed during the period of Élan's support?	Élan reports Élan staff Other organisations supporting the sector Market actors Partners	Document review Interviews	Compare expectations to actual
		How, and how much, have Élan's	Élan reports Élan staff	Document review	Collate MSCs, Compare expectations to actual

		interventions changed: policies, practices, resource flows, relationships and connections, power dynamics and mental models); and benefits for market actors including poor and marginalised target groups?	Other organisations supporting the sector Market actors Partners	interviews	according to each category; compare across categories (i.e. have some categories of changes occurred more than others)
		To what extent have the key growth drivers and potential impact indicators identified in Élan's PCR materialised over time?	Élan staff Partners Other market actors beneficiaries	Document review Interviews	Compare expectations to actual according to each growth driver and potential impact indicators
B.3					
		What are the main factors influencing the changes in targeted constraints and market systems (policies, practices, resource flows, relationships and connections and power dynamics)?	Élan staff Partners Other market actors beneficiaries	Document review interviews	Collate responses to identify the most frequently mentioned factors / those with the largest effect (positive / negative)
		To what extent do these factors relate to Élan's interventions and activities?	Élan staff Partners Other market actors beneficiaries	Document review interviews	Analyse the proportion that track back (also consider the extent of the effect)
<b>D. Impact</b>					
D.1	<b>What improvements in income delivered to target beneficiaries, contribution to poverty reduction, and any additional or unplanned impact can be attributed to Élan?</b>				
		To what extent did Élan's work result in material increased income for target beneficiaries?	Élan documents Partners Market actors Beneficiaries	Document review Beneficiary interviews and FGDs	Compare to baseline incomes to net increased incomes; if available analyse data beyond average NAIC, data on changes in income for

					similar groups not targeted by Élan
		To what extent did Élan contribute to unplanned or additional impacts?	Élan documents Partners Market actors Beneficiaries	Document review Beneficiary interviews	Analyse strength of evidence (through the results chain) supporting (partial to fully)/ not supporting Élan's causal contribution
D.2	<b>What factors influenced the impact?</b>				
		What are the main factors influencing the achievement of impacts for targeted beneficiaries?	Élan documents Partners Market actors Beneficiaries	Document review Beneficiary interviews and FGDs	Collate responses to identify the most frequently mentioned factors / those with the largest effect (positive / negative)
		To what extent do these factors relate to Élan's interventions and activities?	Élan documents Partners Market actors Beneficiaries Élan staff	Document review interviews	Analyse the proportion that track back to Élan (also consider the extent of the effect)
<b>Sustainability</b>					
E.1	<b>To what extent have the results of Élan in terms of market systems change been sustained?</b>				
		Does there continue to be investment in project supported models and building internal operational capacity for the models? B. Do the actors have access to the necessary capacity to continue implementing the new business models?	Élan staff Partners Market actors Beneficiaries	Document review interviews	Analyse level of investment (financial and non-financial) and difference this has made; b) categorise types of capacity and type of actor; and whether they have or do not have (yes, partially, no)
		To what extent have changes in policies, practices, resource flows, relationships and connections and power dynamics to which Élan has contributed continued without	Élan staff Partners Market actors Beneficiaries	Document review interviews	Links to B2, determine which ones have 1) continued and 2) been resilient. Categorise by type of change, location etc

		Élan support, and been resilient to changes in market system?			
		What are the key factors helping or hindering their sustainability and resilience?			Collate factors to identify the most frequently mentioned factors / those with the largest effect (positive / negative); compare to factors affecting achievement of MSC and impact
<b>Future programming</b>					
	What are the implications for FCDO's future programming that may include the renewable energy sector in DRC?				
		What are the key constraints that currently hinder poor consumers from increasing their access to off-grid renewable energy products? To what extent are these the same or different from constraints that existed 5 – 10 years ago?	Élan documents Élan staff Partners Business associations Beneficiaries	Interviews	Triangulate data collected for effectiveness questions
		What market changes would have the greatest effect on increasing many poor consumers access to affordable energy in DRC in the short, medium and long term? To what extent, do these relate to policy, practices, resource allocation, relationships and mental models?	Élan staff Market actors (Élan partners and others) Business associations	Interviews	Categorise responses from interviews,
		Which constraints are most feasible for a donor-	Market actors (Élan partners and others)	Interviews	Categorise constraints and levels of feasibility

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		funded initiative to address in the short, medium and longer term? How would they best be addressed?	Business associations Development organisations		
		There are several organisations or initiatives that aim to improve energy access to the poor in DRC. To what extent are they addressing the constraints identified? What are the gaps?	Public documents Market actors (Élan partners and others) Development organisations	Document review Interviews	Collate data according to constraints they seek to target

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2019 June Rapport Campagne Marketing Indigo KINSHASA

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## Annex 4: Conceptual framework for assessing MSCs, constraints and target beneficiary outcomes

### Understanding of systemic change

The term ‘systemic change’ captures the notion that changes in the system need to be significant so that more marginalised people are benefiting more from market activities<sup>1</sup>. There are some challenges with the concepts of market change, market systems change and systemic change: when is a change in a market a change in the market system? When is a market system change systemic? In part, the challenge is because systems are complex, diverse and changing all the time.

1. **System boundaries:**<sup>2</sup> Market systems contain sub-systems (household systems, value chain systems, etc.) and are interlinked with other systems, such as health and political systems. For instance, if access to finance is a key constraint to a target population accessing better quality seeds, this then requires an analysis of the supply and demand for financial services and the rules and functions which surround these transactions to understand why target farmers cannot access finance on viable terms. System boundaries are generally determined at the market analysis stage and include the actors and institutions that need to be directly or indirectly engaged to achieve the desired change. As understanding of systems increases during implementation, the boundaries of the system may also change.<sup>3</sup> Too narrow a boundary may mean that programmes miss identifying key binding constraints which will impede change while too wide a boundary may make identifying market changes overwhelming.<sup>4</sup>
2. **Types of changes:** different types of individual changes, which are interrelated, occur within markets and it can be challenging to observe them and to make sense of their importance and overall level of market changes. For instance, it is easy to see increased sales of seeds to farmers but difficult to see changes in a farmers’ mindset about higher quality seeds.
3. **Scale:** implies that entire markets will behave differently, underpinned by deep social change, triggered by achievements of multiple interventions.<sup>5</sup> A single innovation being scaled may not be enough for systems change, which requires many innovations coming together over time, interacting with and building on each other, in order for the market to evolve<sup>6</sup>. Many programmes, however, often equate scale

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<sup>1</sup>Kessler (2014). Scale, Sustainability and Resilience have been identified by DCED as being key characteristics of systemic change.

<sup>2</sup> BEAM Exchange (unknown – a)

<sup>3</sup> USAID (2014)

<sup>4</sup> Fowler, et al (2016)

<sup>5</sup> BEAM Exchange (unknown - b).

<sup>6</sup> FSG (2016)

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of impact with the breadth of impact or give more emphasis to breadth than depth (i.e. number of poor people benefiting<sup>7</sup>). Breadth is not about reaching a specific number as breadth can differ depending on the market characteristics.<sup>8</sup> Scale also requires a depth to the changes, i.e. changes in norms may signal deeper changes, since they relate to people's mental models, while behaviour changes in some market actors may be temporary if norms also do not change; or changes in more interconnected systems (and their actors and functions) mean that changes are more widespread beyond the boundaries of the system of primary interest; some changes for poor people may be more material than others. Scale is also affected by timeframes. Changes may be incremental so that systemic changes only become more apparent over longer periods of time; which may not always align with the typical periods of donor funded programmes.

4. **Sustainability** refers to markets continuing to be more responsive to the needs of the poor and adapting to ensure a continuation of benefits to the poor beyond the life of a donor-supported intervention.<sup>9</sup> This definition is broader than those that emphasise a continuation or permanence of the immediate outputs (e.g. a policy or business model) and positive benefits that results from these outputs, and recognises that systems are not static. This continuation of market responsiveness to the poor also captures notions of resilience, in that markets must be resilient to shocks and changes and ultimately to be able to adapt to such events in ways that they remain or are increasingly inclusive, while also growing. The resilience of market systems<sup>10</sup> implies that individual market actors within systems are also resilient, can take advantage of opportunities and minimize negative impacts,<sup>11</sup> or sufficient market actors are sufficiently resilient to influence the overall market. Superficial changes have the risk to relapsing to earlier states.
5. **Constraints:** Interventions are designed to address specific underlying binding constraints in the operation of the market system, which the intervention seeks to change. Results chains are framed in terms of the outcome that is expected to occur if the constraint is addressed. M&E systems focus on measuring this future state and many programmes often do not explicitly review the extent to which the constraint has changed. Rather it is assumed that if the desired outcome occurs the constraint has been removed or decreased. Also understanding changes in the constraint can

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<sup>7</sup> This may also be influenced by management tools such as quantitative targets that emphasise breadth rather than depth, which can incentivise programmes to select interventions that will quickly and simply generate large numbers of beneficiaries without any discernible market systems change.

<sup>8</sup> For instance, interventions result in changes in functions that impact positively on 30,000 farmers. Whether this reflects scale may depend on whether the total number of potential beneficiaries is 50,000 or 500,000 farmers.

<sup>9</sup> BEAM Exchange (unknown).

<sup>10</sup> The term market system is used here and reflects social, ecological and economic elements. [MercyCorps](#) define these elements as: a) social systems: the relationships, behaviors, cultural rules and norms between people, households, communities, institutions and groups, as well as the social services (e.g., health, education) these groups provide; b) ecological systems: the natural resources and ecosystems services that support the major livelihood strategies and living conditions in the target area; c) economic systems: the systems governing the production and consumption of goods and services in the target geography.

<sup>11</sup> Ostrio-Cortes and Jenal (2012) note that there is too much emphasis on permanence of development programmes' outputs (e.g. piloted business models) rather than the ability of market actors to create their own solutions to withstand current and future shocks, and to adapt to changes that are difficult to foresee.

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help understand the depth of changes that may have occurred, sustainability and also the effectiveness of interventions.

## Approach to assessing systemic change

In response to these challenges and to fulfil the principal aim of the sector study (that is to assess the extent to which the performance of market systems in the sector has been improved as a result of Élan's interventions) the study sought to:

1. **Define the boundaries of the market system using the Élan sector strategies and interventions.** Systems are often interrelated and may be overlapping within a sector, sub-sector or supporting function. They may also have a geographic boundary depending on the partner organisation that Élan works with to affect change, the nature of that organisation and type of change (e.g. market function versus formal rule, the latter of which may have a broader initial geographical impact than a function change). Élan uses the adopt, adapt, expand and respond framework. For the sector study, we will consider that these are within the system boundary. If Élan defines a sector study according to geography, e.g. a province, then expand may also happen outside of this boundary. Respond refers to changes in supporting systems, and again may be limited to geography. Expand beyond the geographical boundary of a system or respond occurs in interconnected systems (beyond supporting) would signal greater scale and sustainability of market changes than if expand and respond occur only within a narrower boundary.
2. We will seek to **categorise evidence of the different types of market changes** that are sought to help understand the significance of changes. Policies, practices and resource flows are explicit structural changes and more easily observable. Changes in relationships and connections and power dynamics may be partially explicit and signal deeper changes, while mental models are implicit and often difficult to observe directly, or only through proxies, but considered transformational.<sup>12</sup>  
  
This will highlight what changes are happening but not necessarily how that change happens. However, this is addressed through the evaluation questions.
3. To provide insights into the **scale of the change**, we will seek evidence of the breadth and depth of the change compared to the total scale of change that might be reasonable given the context and timeframe. For instance, in relation to breadth of change - what proportion of traders, exporters and/or processors have established out-grower schemes and provide extension services to smallholder farmers, and what proportion of smallholder farmers are covered by such functions; and what does this mean for an inclusive and growing market system (using the boundaries noted above). On depth, to what extent do the changes reflect changes in power dynamics or norms (mental models)?
4. The depth and the breadth of market changes will provide some insights into the **likely sustainability** of the changes. Due to limitation in the timeframe and resources for the sector study we will not be able to examine market resilience, but we will seek

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<sup>12</sup> From [Shaping Inclusive Markets](#)

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evidence regarding selected market actors' (that is Élan's direct partners but may include others in the market) incentives and resilience capacity. Resilience capacity refers to the extent to which they adapt to ongoing changes in markets and withstand current and future shocks while still being responsive to the poor. This may include evidence that they have adapted the initial pilot innovation that Élan supported.

5. We will collect evidence to understand the extent to which the targeted underlying market **constraints (rules and functions) have been changed**, Élan's influence on these changes and what this has meant for changes to the system.

## MSC and systemic change evaluation rubrics

To assist with the analysis of market systems changes and systemic change data was collated and analysed according to the framework below<sup>13</sup>. This captures the types of market changes and their significance (a combination of the two axes – beginning to significant and structural to transformational). The framework does not explicitly cover sustainability, but sustainability is seen as a combination of changes that are at the strengthening-significant and semi-explicit – transformational implicit descriptions.

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<sup>13</sup> This builds on and expands frameworks for systems change presented in two FSG publications – Shaping Inclusive Markets (2017) and The Water of Systems Change (2016).

## Annex 5: Élan's market system change objectives

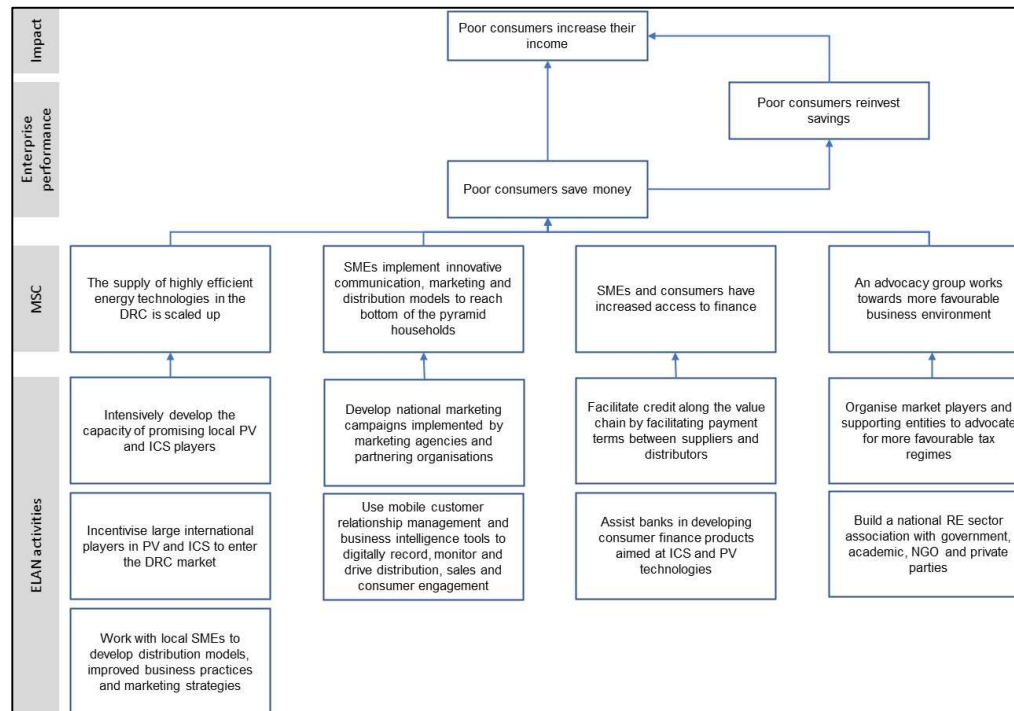
Élan identified key market system changes to achieve. These statements were updated in accordance to changes to Élan's theory of change following the testing of assumptions underlying previously articulated change pathways. For instance, MSC 7.3 focused on banks being the actors to change their practices, this was then broadened to financial institutions and other market actors (such as manufacturers) and then finally to financial institutions as Élan started to target international investors with an impact mission.

**Table 1: Élan's targeted market systems changes**

Élan 1.0 2016	Élan 1.0 2017	Élan 1.2	Élan 1.0 Intervention references	Élan 1.2 intervention references
MSC7.1: SMEs produce or import highly efficient energy technologies	no change	MSC RE1 - RE companies can serve lower income customers and new Élan areas	RE10, 14, 16, 21, 22, 23	NP110, RE101, RE 107
MSC7.2: SMEs implement innovative communication, marketing and distribution models to reach BoP households			RE02,03, 04, 05, 06, 07, 08, 09, 13, 14, 15, 19, 20, 24 (14 interventions)	
MSC7.3: Banks provide SMEs & consumers with adequate financial products	MSC7.3: Financial institutions and actors along the RE supply chain provide SMEs and consumers with adequate financial products	MSC RE2 - Financial institutions fund DRC RE companies and consumers	RE24	RE109
MSC7.4: SMEs advocate for more favourable tax regime	no change	MSC RE3 - RE companies advocate for a more favourable business environment		RE109

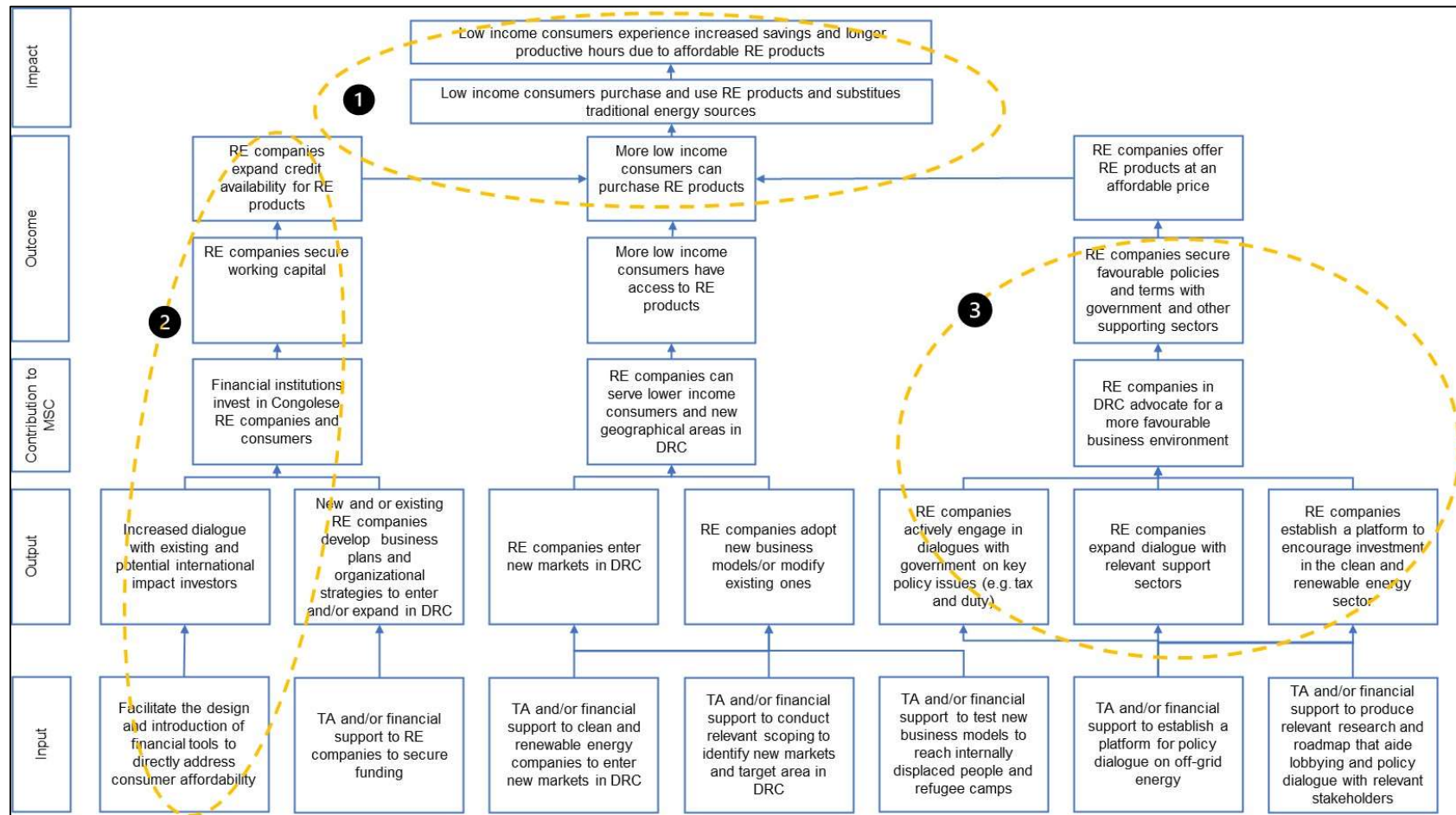
## Annex 6: Élan's theories of change

Figure 1: Élan 1.0 ToC (2016/2017)<sup>14</sup>



<sup>14</sup> Élan (2016). Annual Report and Business Plan. Cited in DSU (2018). Mid Term Evaluation Renewable Energy Sector Review

Figure 2: ToC 2020 with key adaptations



**Table 2: Élan 1.2 renewable energy strategy constraints and invention rationales (2019)**

Constraint	Effects of constraints	Systemic issue	Intervention rationale	Status 2021
<b>Logistics</b>				
Existing retailers and distributors focus on fast moving consumer goods (FMCG)	Distributors and retailers rarely invest in more expensive durable goods.	<ul style="list-style-type: none"> <li>Here, the retail “culture” is geared towards rapid turnover of goods.</li> <li>Focus on low-cost, low-quality good with high turnover.</li> </ul>	Energy products will need to be as accessible as the currently ubiquitous products (e.g. candles, kerosene, batteries, charcoal, generators, fuel)	Not yet ubiquitous
<b>Policy and regulation</b>				
Little or no quality standards on the importation of durable goods	Poor consumer experiences and reduced product adoption	<ul style="list-style-type: none"> <li>Inadequate quality infrastructure</li> </ul>	Work with government to secure adoption of existing international quality standards – if possible linked to fiscal incentives/reform	No action taken by Élan; No change
No national RE tariff exemptions, incentives or subsidies	Higher product prices for consumers and lower market penetration than neighbouring regions	<ul style="list-style-type: none"> <li>Government prioritizes on on-grid generation</li> <li>Unfair market competition from fossil fuel technologies</li> <li>No national off-grid or pro-poor energy strategy</li> <li>Fiscal terms and provision of exemptions on a company-by-company basis through ANAPI, the investment promotion agency</li> </ul>	<p>Tariffs/incentive reform</p> <p>According to The GOGLA guidance for governments on Energy Access (2017), notes duty exemptions and national programmes for the adoption of stand-alone technologies are critical frameworks for the stand-alone, off-grid solar systems industry</p>	No national RE tariff
<b>Financing</b>				
Lack of appropriate credit models that can scale	Limited credit to make units affordable to poorer consumers	<ul style="list-style-type: none"> <li>Lack of data on poorer customers</li> <li>Businesses skills and capital to increase business sophistication</li> </ul>	<ul style="list-style-type: none"> <li>Improve access to local talent and international investment</li> </ul>	Élan held investment conference in 2019, evidence

	keeping prices for end-users high and as a result increasing non-payment.		<ul style="list-style-type: none"> <li>Innovative techniques needed to tailor energy products to spending patterns</li> </ul>	<p>of outcomes from conference not available</p> <p>No action taken re data</p>
Limited capital	PAYGO growth is limited by the availability of finance	<ul style="list-style-type: none"> <li>Banks struggle to finance renewable companies as they do not have a way to value their collateral</li> <li>Most investment funds still consider DRC to be too risky.</li> <li>Local financial institutions in the DRC have not yet been directly engaged in the renewable energy market.</li> </ul>	<ul style="list-style-type: none"> <li>PAYGO is an effective mechanism for improving affordability</li> <li>Leverage banks and MNOs interest in entering the solar market to promote the use of their branchless or mobile banking offerings.</li> </ul>	PayGo improves affordability, but most PayGo customers are likely to be lower or upper middle class
International investors lack confidence in the DRC's enabling environment and energy frameworks	Hard to attract staff and build systems to expand offerings to new segment	<ul style="list-style-type: none"> <li>Unstable business and political environment</li> </ul>	Direct financial interventions if private actors are to offer affordable, high-quality products and services across the DRC.	Élan held investment conference in 2019. Outcomes of conference in terms of investment unknown.
<b>Consumers</b>				
Low mobile money penetration	Increases transaction costs for the business and the consumer	<ul style="list-style-type: none"> <li>Low level of trust in financial services</li> <li>Limited network availability</li> </ul>	Possible A2F intervention	No actions taken
Low familiarity / awareness of RE products	High marketing and communication costs	<ul style="list-style-type: none"> <li>High use of collected wood among poorer households</li> <li>Investing scarce resources in a new type of energy product or service is risky for poor households.</li> </ul>	Requires bespoke marketing and awareness raising activities to convey the message using the right channel and context	No actions taken
<b>Markets in Crisis</b>				

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Deemed unattractive by many companies who have better market opportunities in easier to serve locations.	In a 2018 Élan RDC-FSDA survey, 97% of refugees and IDPs surveyed reported no access to electricity	<ul style="list-style-type: none"><li>• Remoteness and instability</li></ul>	To access these markets, private sector players need to work with or through humanitarian organizations, NGOs, donors and foundations.	Élan supported Altech to pilot sales in Lusenda refugee camp.
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## Annex 7: Élan's interventions and activities

The information in this Annex has been gathered from Élan reports. Some information is incomplete.

**Table 3: Number of interventions by phase**

Élan 1.0		Élan 1.2		Both phases	
No. of interventions	% of all interventions	No. of interventions <sup>15</sup>	% of all interventions	No. of interventions	% of all interventions
18	21	7	36	25	29%

Élan 1.2 supported a further two Covid-19 interventions in the renewable energy sector. It supported nine Covid-19 interventions in total.

**Table 4: Élan 1.0 and 1.2 RE budget (excluding core and overhead costs), excluding Covid-19 interventions**

	All	RE7.1 /7.2 / RE1				MSC 7.3 /RE 3	MSC 7.4/RE 2
		Solar		ICS		<i>Budget information missing</i>	<i>Budget information for Phase 1 support to ACERD missing</i>
Élan budget	2,015,301	\$1,492,287	36%	\$392,085	42%	\$1,200	\$129,729
Partner budget	3,169,556	\$2,621,655	64%	\$545,601	58%	\$2,300	
<b>Total</b>	5,184,857	4,113,942		937,686		3,500	\$129,729

<sup>15</sup> Based on the intervention list provided by Élan April 2020 and updated September 2020.

**Table 5: Élan support to solar marketing and/or distribution (MSC 7.1 and 7.2 / RE 01)**

Code	Partner / Intervention objective	Location /Period	Budget – Total	Élan	Partner
RE02	<b>Altech:</b> Setting up a PICO PV distribution network	Equateur 4/12/2015 - 4/03/2016	\$3,550	\$2,050	\$1,500
RE03	<b>Eco Mwinda Energie:</b> Distribution of pico solar	Gemena 25/10/2016 - 14/10/2017	\$45,275	\$16,250	\$29,025
RE05	<b>Altech and La Difference:</b> Support a BDS-incubator service provider to extend its services by co-financing support for ALTECH's working capital and marketing and distribution capacity to increase sales in North and South Kivu. Includes pilot for new solar product and training staff on the use of smart phones and mobile applications to monitor and record sales This new product pilot and the initiative to use smartphone applications are geared to help improve ALTECH's operational efficiency.	Kivus 1/01/2016 - 20/12/2016	\$91,916	\$15,032	\$76,884
RE07	<b>Dev Solaire:</b> marketing and distribution of pico Pv (expanding its business beyond furniture, domestic appliances and school supplies in Kananga). It makes manufacture in China, imports and distributes solar lamps in Katanga, under its own brand.	Lubumbashi, Katanga 15/10/2015 - 15/03/2016	\$141,122	\$60,381	\$80,741
RE08	<b>Go Shop Renewables:</b> marketing support	Goma, Kivus 5/10/2015 - 5/10/2016	\$11,290	\$8,290	\$3,000
RE09	<b>Altech:</b> Pico marketing & distribution (challenge fund winner)	Kivus 1/07/2016 - 20/12/2016	\$1,138,059	\$198,284	\$939,775
RE10	<b>d.light:</b> Distribution of imported solar lamps.	Kinshasa 1/05/2016 - 30/06/2018	\$1,000,000	\$500,000	\$500,000

RE13	<b>Eco Mwinda Energie</b> Renewables: pico solar distribution	Kinshasa 3/12/2015 - 3/02/2016	\$130,185	\$50,190	\$79,995
RE19	<b>Kit for Africa:</b> Marketing and distribution of Pico Pv	Lubumbashi	\$0	\$0	\$0
?	<b>Dev Solaire:</b> with GLP to launch Solar Kit PayGo <sup>16</sup> : The pilot will test the market with 1,000 products on the Angaza PAYGO platform which will make use of TMB's PéPéLé mobile money platform for mobile payments	Lubumbashi	\$0	\$0	\$0
?	<b>MKOPA</b> partners with Élan to enter DRC and launch 1000 pcs pilot by end of 2017 towards full roll out in 2018 <sup>17</sup>		\$0	\$0	\$0
RE20	<b>Pygma</b> , a local communication company, for the develop and implement a national, multi-channel (radio and TV advertisements, billboards and product demonstrations during markets or specifically organized roadshows) and brand agnostic marketing campaign on the benefits, quality and purchasing options for RE products overall.	Lubumbashi	\$0	\$0	\$0
RE22	<b>Greenlight Planet</b> (GLP) entered the DRC market in 2018, with a focus on finding the right distribution partners and introducing their brand into the market. Élan supported GLP to assess the market, logistics, marketing and HR.	North Kivu 26/07/2017 - 31/12/2018	\$275,312	\$96,000	\$179,312
RE23	<b>BBOXX:</b> Development and distribution of BBOXX PAYG Solar Home Systems	North Kivu 12/12/2017 - 31/12/2018	\$246,943	\$246,943	\$0

<sup>16</sup> Élan (2017). Q2 Report. Dev Solaire is the first distributor in DRC to market Solar Home Systems through a Pay-as-you-go integrated consumer credit system. DevSolaire is the largest distributor of solar products in Katanga and sees the sales of solar home systems as an adjacent offering from it's direct sales of pico solar products.

<sup>17</sup> Élan (2017). Q2 Report.

RE24	<b>Total DRC</b> , a multinational supplier and distributor: Marketing and Distribution of Pico Pv of solar products from d light (S20 and S300), under its own brand "Awango by Total". It obtained supplies directly from China with no direct contact with d.light DRC.	Kinshasa 15/12/2017 - 31/12/2018	\$0	\$0	\$0
RE102	<b>Dev Solaire</b> : Sale of RE appliances in Kasaï. The partner was supported to export its activities into the region of Kasaï.	Kasai 24/02/2020 – June 21	\$212,385	\$55,962	\$156,423
RE103	<b>Altech</b> - Sale of improved cookstoves and SHS in targeted areas of Kivus and Kasaïs, including in some refugee camps.	Kivus and Kasai 4/03/2020 - 1/06/2021	\$770,000	\$195,000	\$575,000
RE107	<b>Baobab+</b> - Facilitate BAOBAB PLUS market entry into the DRC RE market: introduction to ACERD, market assessment study, etc.		\$47,905	\$47,905	\$0
	<b>TOTAL</b>		\$4,113,942	\$1,492,287	\$2,621,655
				36%	64%

**Table 6: Élan's support to ICS manufacturing, and/or marketing and distribution (MSC 7.1 and 7.2 / RE 01)**

Code	Partner / Intervention objective	Location /Period	Budget – Total	Élan	Partner
RE04	<b>FLOW</b> (Seventeen Engineering): The intervention aimed to improve consumers' access to quality ICS at affordable prices. Élan: subsidised Flow to set up a production workshop by 2019; TA to explore distribution models that facilitate sales of ICS in large quantities; and develop and implement a global marketing and distribution strategy; facilitate connections to institutions, potential sources of financing for SMEs, and consumer credit solutions. FLOW only manufactured for 3 weeks then stopped.	Lubumbashi 8/01/2016 - 30/12/2016	\$166,454	\$23,888	\$142,566
RE06	<b>Halt Bank:</b> produces ICS in Katanga using local materials and sells them by using a flexible payment scheme to help poor people's affordability. ÉLAN supported HB to develop a new marketing strategy to increase awareness of ICS and reach more customers in rural and urban areas; facilitate the improvement of production costs and Halt Bank's linkages with large enterprises to aid expansion.	Lubumbashi 1/09/2015 - 1/04/2016	\$178,934	\$90,069	\$88,865
RE14	<b>Biso Na Bino:</b> Production and Distribution of improved cookstoves in Kinshasa	Ngaliema , Masina, Ndjili, Kinshasa 27/09/2015 - 30/09/2016	\$182,610	\$80,290	\$102,320
RE16	<b>BASCONS</b> , created in 2007, produces and distributes ICS. In 2015 it received GIZ support. Élan supported to launch a semi-industrial production, and accelerate the development and implementation of its marketing and organizational strategy to sell 600+ ICS per month (an increase from 100 per month in 2015).	Kinshasa 1/09/2017 - 14/08/2018	\$61,090	\$27,410	\$33,680

RE21	<b>BURN Manufacturing</b> designs, manufactures and distributes the fuel efficient, and durable biomass cookstoves. Élan supported BURN's entry to DRC and its marketing and logistics. BURN established distribution in Kinshasa, Lubumbashi, Goma and Bukavu. Burn closed its operations in DRC, although still distributes ICS through Altech.	Kivus 6/07/2017 - 31/12/2018	\$341,459	\$163,289	\$178,170
RE26	<b>Goma Stove:</b> Elan supported the start-up to develop and implement of a marketing / distribution plan, improve management capacity so that it can negotiate and develop strategic and sustainable partnerships with companies' local, regional and international levels for access to finance, technology transfer and management.				
RE108	<b>Makala Bio: Details of intervention unclear - no documentation</b>	Kinshasa	\$7,139	\$7,139	
	TOTALS		\$937,686	\$392,085	\$545,601
				42%	58%

**Table 7: Élan's support for business and consumer credit (MSC 7.3 / RE 02)**

Code	Partner / Intervention objective	Location / Period	Budget Total	Budget Elan	Budget Partners
RE11	<b>Biso Na Bino, Sofibank and Vodacom:</b> Credit-based sales of improved cookstoves				
RE12	<b>Biso Na Bino and Pro Credit Bank (PCB)</b>	Kinshasa			
RE15	<b>Go Shop and Pro Credit Bank</b> (now Equity Bank): Credit for solar pico.	Goma, North Kivu 9/11/2016 - 31/12/2017	\$3,500	\$1,200	\$2,300
?	<b>Sofibanque:</b> Consumer credit for ICS sales <sup>18</sup>	Kinshasa			
	<b>TOTALS – not calculated due to missing information</b>				

Élan's 2017 sector strategy<sup>19</sup> identified Élan was working with Equity Bank, FINCA, Advans Banque, and others to develop solar loans (>\$100) and developing credit-scoring for mass-market mobile credit and savings products with FINCA and MPESA. These were access to finance initiatives. Information on the activities is not available. The August 2018 closure report noted that there was a pilot with Rawbank (Easy shop) and Equity Bank that explored software that can integrate three main mobile operators into a PayGo platform.

Other activities included: Élan provided guarantees to manufacturers for the importation of pico solar by local businesses; and Investment Forum June 2019: Élan \$16,700 and ACERD \$1,500.

<sup>18</sup> From Élan (2018). PCR.

<sup>19</sup> Élan (2017). Strategy Solar 2017 – Partners.

**Table 8: Élan's renewable energy business environment intervention (MSC 7.4 / RE 03)**

Élan supported the establishment of ACERD since 2018 but not intervention was set up for this activity.

Code	Partner / Intervention objective	Location / Period	Budget Total	Budget Elan	Budget Partners
RE101	<b>ACERD sustainability:</b> ensure the sustainability of ACERD by securing multi-year finance for the association to be able to hire staff, most notably a director, and establish an office to increase its credibility in the sector. One member of the Élan team was seconded part-time to ACERD and has been working one day per week as a member of the executive committee of ACERD. The activity has concentrated mainly on communication and the establishment of a public profile for ACERD so that it can position itself as a representative voice of the industry in dialogue with government and other stakeholders. <sup>20</sup>	Kinshasa 19/05/2020 – July 2021	\$129,729	?	?
RE106	<b>UCM</b> - Elan's support to UCM to carry out a first pilot of its kind for the DRC. Elan assisted UCM in identifying the private sector partner able to carry out this project, accompany this partner along the process of accessing the WB's credit line.				

Élan's 2017 sector strategy<sup>21</sup> noted Élan was starting cooperation with GOGLA and Total to reduce VAT and import taxes. No information is available on this activity.

<sup>20</sup> Élan (2019). Project Completion Report Addendum

<sup>21</sup> Élan (2017). Strategy Solar 2017 – Partners.

**Table 9: Élan support for the coronavirus pandemic**

Code	Partner / Intervention objective	Location /Period	Budget – Total	Élan	Partner
RE104	<b>FORAF ASBL:</b> Elan provided a \$48 subsidy to reduce the costs of SHS for consumers who are staying at home and providing energy access to households in Kinshasa. 1938 SHS were sold.	Kinshasa 1/07/2020 - 1/07/2021	\$111,369	\$111,369	
RE105	<b>Ima World Health:</b> Installation of solar PV power and battery back-up installed at five public health facilities across Kinshasa.	Kinshasa 1/07/2020 - 1/07/2021	\$92,288	\$92,288	

## Annex 9: Assumptions

**Table 10: Assumptions underpinning Élan's theories of change**

Phase	Assumptions	Evidence
1.0	Supporting local solar and ICS companies would be sufficient to reach scale. <sup>22</sup>	<b>This did not hold true.</b> By late 2016, Élan concluded larger businesses were necessary to reach scale and expanded its attention to encourage international manufacturers to establish operations in DRC. <sup>23</sup> See Section 4.1.2: Practices (attracting international businesses to DRC)
1.0	Poor consumers would switch to lighting products, replacing kerosene and battery torches and lights with solar, and traditional cook stoves with ICS.	<b>This only partially held true.</b> The key issue here is that consumers 'switch' to pico solar and ICS. It seems more likely that customers use pico solar and ICS to supplement other sources, and the degree to which they are used more than other energy sources depends on several factors, such as: <ul style="list-style-type: none"> <li>• Whether customers can afford to buy enough products that meet all their household uses. In some cases, products may only be able to be used by one household member at a time, e.g. children doing homework, in which case there may not be a 'switch' and a range of sources are still in use. This then impacts negatively on assumptions about savings materialising from using pico solar.</li> <li>• A 2021 study of Altech customers in Goma and Bakavu show that some customers buy pico solar as a complementary source of lighting and electricity to back-up other sources. It is not a replacement for other sources.</li> <li>• ICS customers frequently also use traditional stoves alongside ICS, keeping them for when it is necessary to cook for a lot of people.</li> </ul>
1.0	New distribution models would be adopted by local businesses <sup>24</sup> .	<b>This has partially held true.</b> Local solar distributors adopted new distribution models in line with Élan's agreements with them. Most businesses adapted model to their individual circumstances after the partnership with Élan ended. In part this may be because the businesses did not agree with all the aspects of the models proposed by Élan. In some cases, businesses did not continue with business models. See Section 4.1.4: Practices
1.0	Banks would be willing to develop relevant products and provide credit once they understood the financial	<b>This has not held true.</b> Banks and other financial institutions are not providing credit to RE businesses or consumers. Élan established a number of partnerships with bank for consumer credit for pico solar and ICS, but none have been successful. There is little information available on the reasons for this.

<sup>22</sup> Élan (2016). Annual Report.

<sup>23</sup> Élan (2016). Annual Report.

<sup>24</sup> Élan (2016). Annual Report.

	aspects of renewable energy technologies.	
1.0	Local companies would be willing to use their own capital to support sales on credit. <sup>25</sup>	<p><b>This has only partially held true.</b> Some businesses (solar and ICS) were already providing credit to consumers and retailers before partnering with Élan. This appears to be for short periods, e.g. up to three months. Some businesses appear to have stopped doing so due to the Covid 19 pandemic.</p> <p>Élan piloted PayGo models with four local businesses<sup>26</sup>, of which only one is currently operating this model. The working capital demands for the model are high. Credit is available for 90 days on lanterns but repayment periods for SHS are a lot longer (12 – 36 months) to make them more affordable to lower and upper middle-income Congolese. This puts a lot of pressure on local businesses cashflow. One business, Altech, has raised international investment and loans to support their working capital needs.</p> <p>One business interviewed said they were launching a PayGo offer before the end of 2021.</p>
1.0	Manufacturers are willing to allow distributors to buy on credit, which in turn would enable distributors to pass on credit to final consumers. <sup>27</sup>	<p><b>This has mostly not held true</b> Most interviewees commented that the terms with international manufacturers had not changed since Élan started. However, one business noted they had terms that allowed them to sell products to customers and start collecting payments before they had to pay manufacturers.</p> <p>Local manufacturers and distributors are providing some credit to other actors in their supply chain.</p>
1.0	Distributors collect customer information, use monitoring tools to facilitate payment terms and instil confidence in providing credit. <sup>28</sup>	<p><b>This has mostly held true</b> The PayGo model aids the electronic collection of information efficiently and some may be using this. Only a few businesses noted that they collect consumer information.</p> <p>Up to 2016, GlZ supported the government to develop a credit agency but one has not yet been established. Customer credit history information is not yet shared to benefit customers and increase access to credit.</p>
1.0	Customers would repay credit. <sup>29</sup>	<p><b>This appears to be partially true but those providing credit are still adjusting terms to find the optimum arrangements to increase repayment rates.</b></p> <p>Businesses do not always want to share information on their repayment rates.</p> <p>Élan reported repayment rates for the Altech pilot in 2016 were 95%.<sup>30</sup>,</p>

<sup>25</sup> Élan (2016). Annual Report.

<sup>26</sup> The degree to which these pilots were implemented is unclear.

<sup>27</sup> Élan (2016). Annual Report.

<sup>28</sup> Élan (2016). Annual Report.

<sup>29</sup> Élan (2016). Annual Report.

<sup>30</sup> Élan (2016). Annual Report..

		<p>Some businesses provide limited credit for short periods. Two PayGo operators provide credit, but only one for lanterns (over 90 days) as well as solar home systems (24 – 36 months). Operators have adjusted payment terms to find the optimum level to ensure customers can afford and make timely repayments.</p> <p>In the ICS sector, manufacturers found customers did not always repay credit with high default rates, but there was also challenges with sales agents handling credit sales.</p> <p>Other businesses do not provide credit, believing that customers will not repay and since they move frequently it is difficult to find them to follow up on payments.<sup>31</sup> Interviewee data was not clear but it seems that this situation could arise more often for some customer segments. Many businesses seek customers who are salaried employees on the assumption they are more likely to be able to afford products and they are attached to an institution that makes the location more stable.</p>
1.0	Renewable energy companies expand from key to other regions in DRC; and expand their product offering. <sup>32</sup>	<p><b>This has mostly held true</b> With Élan's support several businesses have expanded geographically and broadened the range of products they are selling. Some businesses that Élan introduced to locations have not continued to sell products due to low consumer purchasing power or unfavourable business environments.</p> <p>A few businesses have continued to expand locations without Élan support, Altech being the most notable, with other businesses expanding on a much smaller scale.</p> <p>Some businesses have expanded their product offering. Within the pico solar sector, two businesses import better than 'Chinese' quality lanterns, but at the Lighting Global certified level. Altech has expanded into ICS (with Élan support), charcoal and food products such as corn flour. Some of Altech's product expansion has been supported by other organisations.</p> <p>See Section 4.1.4: Practices</p>
1.0	After international manufacturers of solar lights and ICS had been attracted to the DRC, they would attract sufficient investment for production to occur in DRC. <sup>33</sup>	<p><b>This has not held true.</b> Élan incentivised d.light (solar) and Burn (ICS) to establish in the DRC. At the time the partnerships commenced, d.light was already selling to distributors while Burn was not. Élan believed both would establish production in DRC following sufficient growth in sales. Burn did not meet sales targets and closed its operations, although continues to sell to distributors. d.light also closed its operations in DRC and continues to sell to distributors.</p> <p>It appears that Élan did not expect partners that it worked with later in Phase 1 (such as GLP or BBOXX) to establish production.</p>
1.0	<p><b>Additionally, Élan made assumptions about specific distribution models it proposed.</b></p> <p>Assumption 1: Banks would buy stock from international manufacturers based on a</p>	
		<p><b>This did not hold true.</b> Local banks have not purchased inventory.</p>

<sup>31</sup> DSU key informant interview, June 2021. It is not known if this is location specific.

<sup>32</sup> Élan (2016). Annual Report.

<sup>33</sup> Élan (2016). Annual Report.

<p>40%-40%-20% payment tranches (and underpinned by an Élan guarantee of 40%), and use agents to reach consumers, providing them with credit to which customers pay agents in instalments who in turn pay the banks who pays the supplier.</p>	
<p>Assumption 2: Distributors would buy stock from suppliers based on a 40%-40%-20% payment tranches (and underpinned by an Élan guarantee of 40% to enable favourable payment terms),</p> <p>Assumption 3: Distributors send stock to key sales locations and uses sales staff to reach consumers, record consumer information in customer relationship management systems, and provide credit.</p> <p>Assumption 4: Consumers would pay sales staff, and the distributor would pay suppliers the first tranche on the initial sale and final tranche on complete payment.</p>	<p><b>This did not hold true.</b> Based on interviews, most manufacturers require distributors to pay a 50% instalment at the time of ordering products and then the remainder either prior to shipping or on receipt of products in DRC. Most businesses interviewed said terms had not changed since before Élan commenced. In some cases, it may be that connections that Élan help make between suppliers and importers/distributors have not lasted (e.g. Dev Solaire with d.light and then GLP) so there has not been the time required to build more trust between businesses. One business cited they now did have better terms than before, which included payment tranches after they had made sales.</p>
<p>Assumptions 5: Consumers who had bought solar lights would 'step up' to buy solar</p>	<p><b>This assumption only partially held true.</b> Some interviewees stated customers are 'stepping up', but this is anecdotal evidence.</p> <p>More companies are now selling solar home systems, but this is not always in conjunction with smaller less expensive products. Some businesses have stopped selling smaller products (e.g. Altech's PayGo pilot included selling a \$10 lantern but its lowest priced item is now \$50 – see below), while some of Élan's partners do not sell them at all. This suggests that</p>

	home systems. <sup>34</sup> Consumers would progress from solar lights, which retailed for between US\$10-15 with a maximum payback period of one month, to a solar light and charger, retailing for between \$30-45 and a three month payback period, and eventually to a solar home system that retailed at between \$150-200, would be bought on credit through PayGo technology or a bank loan with a minimum payback of one year. With this step-up in mind, companies were expected to introduce SHS after the first year. <sup>35</sup>	<p>it is not profitable for businesses to offer credit on the lowest priced items. It is not clear whether customers that can afford lanterns are then 'stepping up' to SHS. It may be more reasonable that customers either step between small products like lanterns or they buy a smaller item to test before investing more in a small home system.</p> <p>The payback period for solar home systems has been extended to three years. RE companies are providing credit for lanterns (sold at \$50 cash and \$59 credit but only one business, Altech) and solar home systems (which cost about \$300 or more on credit)<sup>36</sup> but banks are not. Businesses have been adjusting monthly payment amounts and the total period of payments to find the level that consumers can afford to repay. However, credit criteria means it is more likely that consumers accessing credit have salaried employment.</p> <p>Banks have not provided loans. There are currently three PayGo operators, of which one only sells solar home systems. Two were supported by Élan.</p>
1.2	Sufficient renewable energy companies would be willing to join an industry association.	<p><b>This has held true, but the sustainability of membership needs to be tested.</b></p> <p>ACERD has about 30 members.</p> <p>There are mixed views, however, on the value of membership, that is the benefit received against the cost of membership fees (\$3,000 per annum). Those businesses who feel they are yet to receive a benefit may not continue their membership. See Section 4.1.6: Relationships and connections</p>
1.2	Élan can incentivise renewable energy businesses to serve lower income consumers within its lifetime.	<p><b>This has partially held true, but needs to be further tested to see if businesses maintain their focus on lower income consumers post-Élan.</b></p> <p>Some businesses Élan partnered with have products aimed at lower income consumers (between \$4-20), but they may not be quality verified according to Lighting Global standards (but quality is checked prior to shipping<sup>37</sup>) or Élan has influenced them to cater to this segment for pilots. However, some of the businesses Élan worked with are no longer selling products</p>

<sup>34</sup> Élan (2016). Annual Report citing Lighting Africa research that showed consumers were five times more willing to pay for solar lighting products after hands-on use.

<sup>35</sup> Élan (2016). Annual Report.

<sup>36</sup> Accurate price information is not available, this is an estimate based on information provided by interviewees)

<sup>37</sup> DSU key informant interviews

		<p>affordable to the poor In some cases, businesses are selling but focusing on other segments such as SHS. We did not have information across all partners but estimate that possibly 25% of Élan's partners in the solar sector are no longer focused on products such as lanterns. Profitability is one factor influencing this since profit margins on solar home systems are more than lanterns.</p> <p>Businesses that Élan has not partnered with generally do not serve lower income consumers. This excludes importers and distributors of 'Chinese' products.</p> <p>We estimate that 70% of customers are below \$3.20 pppd while 46% of customers are below \$1.90 per day.</p> <p>Customers accessing credit e.g. via PayGo operators tend to have higher incomes, and may be more likely to be salaried employees. This is reasonable particularly where credit is provided, since businesses want confidence that customers will repay. However, inconsistent income bands used in Élan's studies between 2018 and 2021 make comparison difficult.</p> <p>According to ÉLAN's studies between 2015 and 2018, nearly 60% of improved cook stove customers are below the poverty line of \$1.90 per day.</p> <p>See Section 4.1.6 and 5.1.1 for more information.</p> <p>Some businesses believe subsidies are a necessary measure to better match to consumers purchasing power.</p>
1.2	Renewable energy companies remain interested in working with Élan, including moving to new locations, and implement all contractually agreed activities.	<p><b>This has held true.</b></p> <p>Élan supported a small number of businesses multiple times, with subsequent interventions often involving applying the same business model to new locations.</p> <p>Several of Élan's partners have said they would work with Élan again. Some businesses who have experienced substantial challenges have also still delivered on agreements.</p>
1.2	Élan's activities contribute to concrete improvements in the business environment.	<p><b>This has not held true.</b> Élan has supported the establishment of the association, which is positive move but it has not yet led to the key BER goal of reduced taxes on renewable energy products</p> <p>At least two businesses that Élan partnered with have secured individual temporary tax exemptions for products in specific locations, creating an unequal playing field.</p>
1.2	The affordability of renewable energy and clean energy products is the main standard for a profitable and sustainable sector in DRC.	<p>This assumption has held true and is still being tested as the market remains at an early stage of development.</p> <p>There is a large number of poor and low income urban populations in DRC and affordability of products remains a key issue of concern for businesses. Some businesses do not believe that poor consumers can afford renewable energy products.</p> <p>PayGo operators have adapted their credit terms (period, frequency and amount of repayments) to find what is affordable to all customer segments and able to ensure a high repayment rate. SHS and larger products, such as appliances, are more profitable for renewable energy businesses. These products are not affordable to poor consumers.</p>
1.2	Increasing the affordability and accessibility of renewable energy products in North and	<p><b>This has held true for a few, but the increase in income is limited.</b> The use of solar and ICS products has contributed to small increases in the disposable incomes of many poor beneficiaries, but not all. These increases have primarily been achieved through household savings on energy costs between \$2 – 7.50 for pico solar and up to \$12.50 per month for ICS.</p>

	South Kivu, Kasai Central will increase the net income of vulnerable groups and poor men and women.	The depth of benefits differs across groups. The importance of the monthly savings is greater for poor people. The degree of savings experienced are dependent on numerous factors including: how and how often customers use the products, whether they replace existing energy sources; whether using pico solar and ICS reduces expenditure on other fuel sources; the cost of fossil energy; date of acquisition, acquisition prices; and currency exchange rates. Charcoal costs could be halved by those using ICS, although available information is more limited. See Section 5.1.2
1.2	Élan partners' sell products that are affordable to lower income people.	<b>This has partially held true.</b> Affordability remains a key issue. See Annex 9 for more information on the affordability of different products. In summary, different partners sell a range of products affordable to different income groups. Some only sell solar home systems which are unlikely to be affordable to the poor, even on credit. Solar home system customers appear less likely to be low income. Some partners have no longer selling lower priced items. See Annex 9 and Section 5.1.2: Practices and 5.1.5: Mental Models
1.2	Low-income consumers will buy RE products from Élan partners, they will use them appropriately and benefit economically and financially from this use.	<b>This has partially held true.</b> See above for information. Of the pico solar customers, it is estimated that only a small number products for income generating purposes. For instance, a study of Altech customers in Bakavu and Goma found that 12% of customers used solar products for income generating activities. In Goma, solar energy was used more for entertainment (35%) than in Bukavu (14%). The use of solar and ICS products has contributed to small increases in the disposable incomes of many poor beneficiaries, but not all. These increases have primarily been achieved through household savings on energy costs between \$2 – 7.50 for pico solar and up to \$12.50 per month for ICS. The depth of benefits differs across income groups, but is small for all. For a household of five persons, savings for a household living below \$1.90 then savings equates to between 1-2%. Energy costs increase when pico solar and SHS is used to supplement SNEL-provided electricity. Élan's 2021 study showed that between 20 – 50% of customers reported decreased energy expenditure, with lower income households more likely to report a benefit. Where customers have access to a range of energy sources, SNEL, independent power providers and solar, they likely use a mix to minimise costs while achieving regular energy access. For some customers, the benefits are not income related but do contribute to other issues that influence wellbeing such as: less disruption from power outages and increased flexibility for household activities. However, customers do not always use their benefits, such as warranties to fix or replace faulty products. A 2017 study by Élan found 17% of pico solar and 7% of ICS did not last 12 months, and 40% of pico solar customers and 10% of ICS customers tried to get them fixed. Section 6: Impact has more information
1.2	There is sufficient consumer demand for Élan supported innovations including a national platform and the expansion of distribution networks.	<b>This is yet to be fully tested:</b> Sales of pico solar have been incrementally increasing. The degree to which there is sufficient demand for quality pico solar and ICS is yet to be fully tested. Some businesses advocate the use of subsidies for pico solar, which suggests there is not yet sufficient demand. Likewise, some interviewees were sceptical of the demand for ICS. Based on Élan's studies of the poverty profile of consumers, it appears demand from Élan's target group (below \$1.90 for phase 1 and below \$3.20 for phase 2) is at least as great by consumers that are above \$3.20 per day.

		<p>Demand for pico solar and SHS is also impacted how quickly and cost-effectively SNEL is able to expand the grid and whether mini-grids are able to scale. Élan's 2021 impact study found that consumers in Goma either did not buy products and no longer used products due to the availability of independent power providers (SOCODE and VIRUNGA SARL) operating min-grids using pre-payment and SNEL who uses a post-payment system.</p> <p><b>This has held true:</b> At least 30 businesses have become members of ACERD.</p> <p><b>This has held partially true:</b> Businesses have expanded distribution networks and some have continued to do so without Élan support, albeit mostly at a slower pace.</p>
1.2	Partnering with Élan reduces the risk related to entering new remote markets to serve low-income customers that they would not have otherwise served.	<p><b>This has held true in most circumstances.</b></p> <p>Most of Élan's agree that Élan's work helped to decrease risks. There is one partnership (Dev Solaire to expand to the Kasais) where Élan's partnership did not reduce the risk and significant and costs materialised.</p> <p>However, the risk-reduction for pilots has not always resulted in partners continuing to operating in new locations. The sustainability of some expansions e.g. into refugee camps, still needs to be tested.</p>

## Annex 10: Élan 1.0 PCR: future indications of MSC

Table 11: Élan 1.0 Project Completion Report: Future indications of market systems changes

MSC	Key growth drivers	Key indicators of MSC	2021 Status
Households and small business will generate savings and increased profits through access to affordable and sustainable energy products and services which are brought to market by a growing number of profitable companies. To increase the availability of high quality products, ÉLAN RDC will facilitate increased local production, and importation where local production is not advantageous. In turn, new communication, marketing and distribution models will be employed to reach households previously unreached by traditional marketing methods. Banks and other investors will provide affordable capital to overcome financial constraints, while tax advocacy will contribute to driving down costs and providing the most affordable products possible to consumers.	Sales of solar lamps, home systems and improved cookstoves will increase. PayGo solutions will continue to grow as a way of bringing affordable consumer credit to market. Investors and financial institutions will invest / make capital available. The RE association will remain active, and undertake lobbying efforts that will improve the business climate for RE companies	Sales volumes: d.Light, BBOX, Altech, Dev Solaire, BURN	Information is not available for all businesses, but overall most businesses appear to have increased sales. Some estimated a drop in expected sales over 2020/21 by 15-20% due to the coronavirus pandemic and changes in consumer purchasing power and delays in international logistics.
		PayGo as % of overall sales of solar products	Partial data is available. GOGA reports show that a growing proportion of sales are now by companies using the PayGo model. However, it is likely GOGA reports do not capture all sales by Élan partners. Élan supported four businesses to pilot PayGo, of which only Altech continued this model.
		Volume of equity investment in RE	Limited data is available but there are reports of new equity and debt investments in renewable energy businesses operating in the DRC. Most investment appears to be secured by international companies rather than local and relate to solar home systems sales. Altech has secured investment in 2020 and 2021 despite the downturn in investment activity globally due to the pandemic.
		Volume of debt financing made available	

		RE Association holds regular meetings	Only anecdotal information is available from interviewees. This suggests that meetings are held, but not all members attend.
		Duty and tax rates on RE products	At least three businesses selling solar home systems have secured exemptions on some taxes however there is not yet a sector wide tax exemption. There is limited evidence to determine whether tax exemptions have resulted in reduced prices.
		Price of solar products (dropping prices would indicate both more competition and improved business climate)	There is some evidence that the price of some solar products have decreased through the introduction of another quality tier (below Lighting Global certified). Monthly payments for some products purchased from PayGo companies have decreased but this does not necessarily indicate products are less expensive and the total period of payment has been increased as another measure to increase affordability, which may increase the total price of the product as interest payments could also increase.

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## Annex 11: Profile and needs of Élan's intended beneficiaries

### Poverty levels in DRC

*This information supplements that provided in Section 3.1 of the main report.*

**Élan's target beneficiaries are DRC's urban poor who could benefit from access to affordable and safer electricity and ICS.** These beneficiaries represent a significant portion of the population. In 2012, 76.6% of DRC's population – nearly 53m people – were estimated to live below the poverty line of US\$1.90 per day.<sup>38</sup> While DRC's GDP per capita has grown over the last five years, by 2020 it remained low at \$556 (see table 1). Almost one-third of DRC's population lives in urban areas (see Table below)

**Table 12: DRC GDP per capita (2015 – 2020)**

	GDP per capita	GDP per capita (PPP <sup>39</sup> )	GDP per person employed
2015	497	905	
2016	471	964	
2017	467	1059	1979
2018	557	1111	
2019	580	1141	
2020	556	1131	

**Income disparities exist across different regional and rural/urban localities within DRC.** While levels of poverty are higher in rural areas, poverty has been decreasing at a slightly faster rate than urban areas.<sup>40</sup> The West, East and South has the lowest levels of poverty, while Central and Congo Basin have the highest. Poverty has widened and deepened in North and South Kasais, while all poverty indicators have improved in North and South Kivu and Orientale.<sup>41</sup>

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<sup>38</sup> 90% live below \$3.10 per day (World Bank, 2018). The UNDP's Multi-dimensional Poverty Index (MPI) differs from the international poverty line. It finds that 36.8% of the population is in severe multidimensional poverty and a further 17.4% vulnerable to multidimensional poverty. The disparity between income poverty and MPI indicates that individuals below the income poverty line may have access to non-income resources. UNDP (2020). *The Next Frontier: Human Development and the Anthropocene Briefing note for countries on the 2020 Human Development Report Democratic Republic of the Congo. Élan's (2015) report on 'Savings on charcoal consumption increasing real income of poor households in Belair and Kisanga' (in Lubumbashi)* noted that Élan considered those living below \$1.25 per day or \$50 per year poor. However, later documents in 2018 defined the poor at \$1.90 per day.

<sup>39</sup> Purchasing power parity

<sup>40</sup> In 2012, the national poverty incidence was estimated to be 64%: 64.9% in rural areas and 66.8% in urban areas, excluding Kinshasa.

<sup>41</sup> World Bank (2018). *Urbanization Review Productive and Inclusive Cities for an Emerging Democratic Republic of Congo*. World Bank Group, Washington DC; World Bank (2019).

**Table 13: DRC population – International Poverty Line Poor and Non-poor<sup>42</sup>**

	Non-poor (%)	Poor (%)	Estimated number of non-poor (mil)	Estimated number of poor (mil)
Urban population	43	57	10.6	20.1
Rural population	11	89	5.6	45
Males	24	76	-	-
Females	23	77	-	-
Primary education	20	80	-	-
Secondary education	34	66	-	-
Tertiary / post-secondary	75	25	-	-

Kinshasa and Bas-Congo have the highest levels of urbanisation at 80%, with most of the population living in Kinshasa. The Congo Basin (Equateur, Bandundu and Orientale) have the lowest levels of urbanisation, while the East has relatively low levels (17%).<sup>43</sup> Living standards in Kinshasa are higher than in the rest of the country, and the poverty rate is lower, although wealth decreases the further households are located from downtown Kinshasa. Unemployment is very high in Kinshasa: 77% of the population is either unemployed or underemployed and women and youth are more likely to be unemployed or underemployed. Across DRC nearly 60% of men and 28% of women receive a salary.

### Access to energy

Approximately 91% of DRC's 87 million population<sup>44</sup> do not have access to electricity. Access rates are lower in rural areas, 1%, compared to urban areas at 19%.

The National Electricity Company (Société Nationale d'Électricité [SNEL]) performs poorly. SNEL has only 500,000 registered connections and illegal connections are common; the average tariff is low, resulting in significant financial losses while the service is unreliable. Although there is strong potential in hydro, this is underdeveloped, and aging infrastructure and poor maintenance means the existing plants operate at less than 50% capacity.<sup>45</sup> However, other energy providers are starting to be established. For instance, in Tshikapa, Mutwanga, Matebe, and Mbuji-Mayi, electricity is supplied by independent power producers (IPPs). Some mining companies also connect nearby households as part of their social support initiatives, while non-governmental organisations have also set up IPPs. This is important as it impacts on demand for solar products, which was a finding of Élan's 2021 impact study of Altech customers in Goma.

Table 4 illustrates some geographical differences in access to electricity.

<sup>42</sup> World Bank (2019a) with the number of poor and non-poor based on World Bank data from different sources: population 87m and urban population of 42% of total population.

<sup>43</sup> World Bank (2018).

<sup>44</sup> World Bank; USAID (2019). This equates to 12-13 million households.

<sup>45</sup> USAID (2019)

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**Table 14: No. and % of households in urban centres with access to electricity<sup>46</sup>**

Town	Households with access	Electricity access
Lubumbashi	214,000	< 70%
Matadi	67,000	< 70%
Likasi	54,000	< 70%
Kinshasa	1,400,000	< 80%
Kikwit	7,000	4%
Mbuyi-Mayi	24,000	12%

Alternative electricity sources have been developed, including: shared generators set-up by local entrepreneurs; battery-powered flashlights, and; low-quality component-based solar panels bought in the open market.

Given the significant gap in access to electricity and the timeframes and resources needed to develop grid solutions, Elan argued that **off-grid solutions such as pico solar, provide a credible avenue to improving urban and rural households' access to electricity over the next 10-15 years<sup>47</sup>**. Given the high number of people below the international poverty line, affordable access to electricity is a key requirement.

#### **Affordable access to pico solar and improved cook stoves**

The solar market in DRC has three categories<sup>48</sup>:

1. **Low priced and low quality pico solar products**, typically referred to as 'Chinese' lanterns<sup>49</sup>. These were available in some urban centres in DRC prior to Élan commencing<sup>50</sup> and, today, have 'flooded the market in the east of the DRC' and are widely available in other, but not all, locations<sup>51</sup>. This category cost between \$1 – 15<sup>52</sup>.
2. **Certified lanterns and other small products**: These products are similar in function to the Chinese products and smaller – single lights and torches, and some that include mobile phone charging functions, but better quality. Some of this category were available in DRC when Élan commenced, but not widely available. They cost between \$10 – 50 and most are sold as cash sales rather than on credit. The certification process involves a certifying organisation conducting a series of quality checks, an action that increases the cost and therefore price of the product.<sup>53</sup>
3. **Certified home systems**: Home systems differ in size, functions and capabilities. They may include batteries with multiple lights and appliances such as TVs, radios,

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<sup>46</sup> USAID (2019)

<sup>47</sup> DSU (2018), Mid-Term Evaluation; USAID (2019)

<sup>48</sup> According to key informant interviewee

<sup>49</sup> While these products are referred to as 'Chinese' products, most quality, or certified, products are also manufactured in China. Therefore, it is misleading to refer to product by the country of manufacture. Key informant interviews; other countries of manufacture or supply cited by interviewees included: United Arab Emirates; Turkey; Germany and the Eurozone.

<sup>50</sup> No detailed information is available on the range of products, and the numbers available by location.

<sup>51</sup> Key informant interview

<sup>52</sup> Based on key informant interviews.

<sup>53</sup> Key informant interviews. One interviewee noted some lower prices for non-Chinese lanterns, as low as \$4 but most interviews cited higher prices.

and fans<sup>54</sup>. They are more expensive and the model of sale on credit has often been introduced alongside these products. Smaller systems cost around \$500 – 1000.

GOGLA, the global industry association for off-grid solar energy, further categorises the second and third group according to their capacity and service (Table 6).

**Table 15: Product Categories - Off-Grid Solar Lighting Products<sup>55</sup>**

Overall category	Solar module capacity, Watt Peak (Wp)	Categorization by services provided by product	Corresponding level of Multi-Tier Framework energy access enabled by use of product
Portable Lanterns	0 – 1.499 Wp (indicative)	Single Light only	Enables partial Tier 1 Electricity; Access to an individual person
	1.5 – 2.999 Wp (indicative)	Single Light & Mobile Charging	Enables full Tier 1 Electricity Access to at least one person and contributes to a full household
Multi-light Systems	3 – 10.999 Wp (indicative)	Multiple Light & Mobile Charging	Enables full Tier 1 Electricity Access to at least one person up to a full household
Solar Home Systems	11 – 20.999 Wp	SHS, Entry Level (3-4 lights, phone charging, powering radio, fan etc.)	Enables full Tier 1 Electricity Access to a household
	21 – 49.999 Wp	SHS, Basic capacity (as above plus power for TV, additional lights, appliances & extended capacity)	Enables full Tier 2 Electricity Access to a household when coupled with high-efficiency appliances
	50 – 99.999 Wp	SHS, Medium capacity (as above but with extended capacities)	Enables full Tier 2 Electricity, Access to a household even using conventional appliances
	100 Wp +	SHS, Higher capacity (as above but with extended capacities)	

Products in category 2 are most affordable for poor consumers. Enea Consulting<sup>56</sup> study found customers in Kinshasa were willing to pay \$30 for a lantern, although Élan's market study<sup>57</sup> found households generally wanted energy systems that offer greater comfort, that is have greater capacity. While 40% of households wanted larger solar systems and 31% wanted systems that powered their entire house, **94% of respondents could only afford products under \$20**. The demand<sup>58</sup> for solar products over \$20 decreased

<sup>54</sup> Appliances might be part of a solar home system package or separately.

<sup>55</sup> GOGLA (2020). Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, January - June 2020, Public Report.

<sup>56</sup> Élan (2015). Summary Research by Enea Consulting for Lighting Africa (presentation 16 October 2015).

<sup>57</sup> Élan (2017). Market study

<sup>58</sup> In accordance with ability to pay which differs from wanting or aspiring to have systems that are not currently affordable to them.

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rapidly; only 4% of households demanded products priced from \$41 to \$60, and almost zero wanted systems over \$81. Some interviewees believe solar home systems are affordable to low-income persons if they pay on credit.

While certified category 2 products are more expensive than the 'Chinese' products, the total cost over a two or three-year period may be lower as the certified products last longer and warranties are provided to customers.<sup>59</sup> However, several interviewees described most Congolese as having 'low purchasing power' and being 'price sensitive' who would prefer to buy cheaper low quality, and less durable products and replace them. Using data collected from interviewees on the price of low- and high-quality lanterns and potential durability<sup>60</sup>, this may be a logical practice for the lowest price products particularly if they last for six months. As the price of cheaper products increases and durability worsens, then like-certified products will probably end up costing less over a two – three-year period.

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<sup>59</sup> GOGLA's methodology for assessing impact of solar products calculates product lifetime as 1.5x the warranty period.

<sup>60</sup> Data was not collected on product functionality, e.g. light plus phone charging capability..

**Table 16: Comparison of low quality and quality lantern prices**

Product and assumptions	Prices mentioned by interviewees	Estimated cost over 2 years	Estimated cost over 3 years
"Chinese" lamp - Replacement needed 3 monthly	1	8	12
	3	24	36
	7	56	84
	15	120	180
<b>Average</b>	<b>6.5</b>	<b>52</b>	<b>78</b>
"Chinese" lamp - Replacement needed 6 monthly	1	4	6
	3	12	18
	7	28	42
	15	60	90
<b>Average</b>	<b>6.5</b>	<b>26</b>	<b>39</b>
Quality lamp - 2 year warranty; replacement post warranty period	8	8	16
	10	10	20
	15	15	30
	20	20	40
	50	50	100
<b>Average</b>	<b>20.6</b>	<b>20.6</b>	<b>41.2</b>

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## Annex 12: Additional pico solar and SHS sales information

This information is supplementary to Section 4.1.4.

**Altech:** Altech was already selling solar lanterns prior to Élan. After Élan commenced and following its agreement with d.light, Altech's average annual sales volumes increased over 100% between 2014 to 2016. In 2017, Altech began to sell Omnivoltaic products under its own brand, which were three times higher than the d.light products (which made up for a drop in sales of 66% between 2016-17).<sup>61</sup> In mid-2017, Altech piloted PayGo and began to sell solar home systems that are sold for between \$200 – 1300 in addition to solar lanterns. In 2020, 87% of Altech's sales volume were from solar lanterns. While solar home systems contributed only a small proportion to volume, they made up a notable proportion of revenue.

**Dev Solaire:** Dev Solaire was not selling lanterns prior to its partnership with Élan and from this zero-base average annual sale volumes increased by more than 800%. Since the partnership with Élan ended, further growth in volume has occurred but at a much lower level.

**BBOXX** increased its sales between 2018 and 2020 by over 250%.

Data in Table 19 and 21 are from GOGLA reports from 2016 – 2020. GOGLA does not report where unless a minimum set of criteria have been met. This is to maintain the confidentiality of its members data. However, GOGLA provided additional data when requested for cash and PayGo sales for H2, 2019; H1, 2020 and H2, 2020.

Value has been estimated where this is missing by dividing the value from the most recently previous reporting period by the total number of sales in that year and then multiplying it by the total reported sales. There are limitations to this estimate given the total sales volume is comprised of products that range from single light lanterns to solar home systems, the latter of which are more expensive. Globally, in 2020 lanterns are 63% of sales. The proportion of lanterns to total solar lighting sales has been slowly decreasing trajectory since 2018 so that SHS make up a greater proportion of sales. If this trend also occurring in DRC, even though it is a less mature than other countries covered in the report, this would not be reflected in the estimates. The average price of all products in DRC has changed between

The following companies are listed as contributors to data for the DRC: ALTECH GROUP SARL; Azuri; BBOXX; Bright Life by Finca; d.light; DGridEnergy; Greenlight Planet; Innovation Africa; OmniVoltaic Energy Solutions; Shenzhen Solar Run.

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<sup>61</sup> Analysis of information reported in Élan (2018). Altech Market Player Survey

**Table 17: Actual and estimated solar lighting sales volumes and revenue in DRC for GOGLA members**

Year	Sales Volume Cash	Sales Volume PayGo	Sales Volume Total	% PayGo sales	Value Cash <sup>62</sup>	Value Paygo <sup>63</sup>	Value Total	Annual increase in sales	Annual increase in value
							<b>Estimates in blue</b>		
H1 2016			73,191				\$903,549		
H2 2016			729				\$9,000		
H1 2017			46,090				\$419,008		
H2 2017			242,271				\$7,427,996	290%	760%
H1 2018			11,197				\$419,008		
H2 2018			54,316				\$2,032,584	-77%	-69%
H1 2019	23,158	14,989	38,147	39%	207,281	7,502,179	\$7,709,460		
H2 2019	24,215	23,812	48,027	50%	498,000	1,687,000	\$2,185,000	32%	304%
H1 2020			54,747		N/A	3,605,000	\$3,605,000		
H2 2020	23,595	27,590	51,185	54%	358,000	8,568,000	\$8,926,000	23%	27%
			619,900				\$33,636,605		

<sup>62</sup> Market value for cash = estimated retail price\*nb of sales

<sup>63</sup> Market value for PAYGo=Total cost of ownership\*nb of sales. Where total cost of ownership=sum of all payments made by the customer until ownership of the product (down payment + repayments)

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**Table 18: Estimated average product price and non-GOGLA affiliated sales**

Year	Estimated average product price	Estimated sales volume for non-affiliated businesses
2016	\$12.35	189,538
2017	\$27.21	739,387
2018	\$37.42	167,982
2019	\$114.82	220,959
2020	\$118.29	271,621
		1,589,487

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In 2019, GOGLA started reporting appliance sales in DRC. These have nearly all been televisions, with a small number of refrigerated units. Fans, solar water pumps and other appliances have not been reported, although some interviewees noted they sold these products. There has only been a 1% increase from 2019 to 2020.

**Table 19: GOGLA reported sales of solar appliances (2019-2020)**

	All Appliances	TVs	Refrigeration Units	Annual
H1 2019	14,039			
H2 2019	23,909			37,948
H1 2020	22,150	21,984	35	
H2 2020	16,335			38,485

## Annex 13: Number of Beneficiaries and their poverty profiles

This information is supplementary to Section 5.

**Table 20: Élan's reported number of people benefiting from increased income 2014-2020**

	Total	Below \$3.20 <sup>64</sup>	Women	% of solar customers
Élan 1.0 to 2018 <sup>65</sup>	129,800		54,516	84%
Élan 1.0 interventions reported during Élan 1.2 <sup>66</sup>	6320	4740	6504	100%
Élan 1.2	8946	6710	2791	100%
	145,066		63,811	

### Box 1: Élan 1.0 renewable energy outreach

At the end of Élan 1.0, Élan<sup>67</sup> reported that its renewable energy sector activities over five years (2014-2018) resulted in increased income to the total value of £9.2m for 129,800 people, of which 42% (54,516) were women. This equates to an average of £71, but this varies considerably across interventions.<sup>68</sup> It includes an increase in disposable income as a result of savings as well as any income generated from activities enabled by owning the renewable energy products.

Up to 2018, only 16% of persons increasing income did so via the ICS interventions. Of the nearly 109,000 persons benefitting from solar interventions by the end of Élan 1.0, nearly 35% related to one partnership with Dev Solaire while partnerships with Altech, d.light and Eco Mwinda Energie also contributed between 12-16%. Each of these partnerships were expected to double the number of people benefiting from increased income beyond 2018. Partnerships with Total RDC, Kit4Africa and Goma Stove contributed little while interventions that started late in the phase (such as BBOXX and Greenlight Planet) had not yet contributed.

**The profile of Élan's beneficiaries has changed slightly throughout implementation, with a move away from a focus on the poorest.** Élan's 2018 and 2021 poverty profiling

<sup>64</sup> Élan 1.2 used the findings from the 2018 Poverty Profiling Study, which found that 75% of respondents were below the \$3.20 international poverty line.

<sup>65</sup> Élan (2018). Project Completion Report.

<sup>66</sup> Based on data from two interventions with Halt Bank and BBOXX only, other partners did not respond to requests for data.

<sup>67</sup> Élan (2018). Project Completion Report. The report noted that it would not present adjusted NAIC in future reports, only that it would be noted that NAIC is likely overestimated.

<sup>68</sup> Élan (2018). PWIG data from 0 - £120. For those interventions that Élan 1.0 collected data to calculate NAIC the average was £42 and the mode £31-42.

studies used different definitions for poor and low-income earner (see Table below). The 2020 study's category for a low-income earner is close to that of the average income for a salaried employee (of \$1,979, 2017) and the World Bank's poverty level of a high income country category (\$2,007 per annum or \$167 per month; 2011 PPP).

**Table 21: Income groups in Élan's studies<sup>69</sup>**

Élan Studies	Poor			Low-income		
	Daily	Monthly	Annually	Daily	Monthly	Annually
2018	\$1.90	\$57	\$684	\$3.20	\$96	\$1,152
2020				\$5	\$150	\$1,800

Overall, it is estimated that 46% of beneficiaries in the renewable energy sector were extremely poor (\$1.90 per day). See Table 23.

<sup>69</sup> World Bank (2019a). f

**Table 22: Estimated number of solar customers by income brackets**

Phase	No. of beneficiaries reported by Élan	% solar customers	No of solar customers	% <1.90 per day	No. <1.90 per day	% <\$3.20 pppd	No. <\$3.20	% <\$5.50	No. <\$5.50	% other	Other	Notes
1	129,800	84%	109,032	54%	58,877	78%	85,045			22%	23,987	Élan counted all beneficiaries, not only poor. This number also includes ICS
1.2a	6,320		6,320	54%	3,413		6,320					Relates to Phase 1 interventions. Élan only counted beneficiaries earning below \$3.20. Élan did not support ICS in this phase.
1.2b	8,946		8,946	54%	4,831		8,946					Relates to Phase 2 interventions. Élan only counted beneficiaries earning below \$3.20. Élan did not support ICS in this phase.
	136,120		124,298		62,290		91,365					

**Table 23: Estimated number of ICS customers by income bracket**

Phase	No. of beneficiaries reported by Élan	No of ICS customers	% extremely poor (<1.90 per day)	No. extremely poor	% below <\$3.20 pppd	No. below \$3.20	Other	
1	129,800	20,768	43%	8,930	72%	14,953	5,815	Élan counted all beneficiaries, not only poor. This number also includes ICS
1.2a	6,320							Relates to Phase 1 interventions. Élan only counted beneficiaries earning below \$3.20. Élan did not support ICS in this phase.
1.2b	8,946							Relates to Phase 2 interventions. Élan only counted beneficiaries earning below \$3.20. Élan did not support ICS in this phase.
	136,120	20,768		8,930		14,953	5,815	

**Table 24: Estimated value of benefit for solar customers by income bracket**

Phase	Value of benefit (savings) reported by Élan	% of solar customers	Value of benefit for solar customers	Solar customers								Notes
				% poor (<1.90 per day)	No. poor	% below <\$3.20 pppd	No. below \$3.20	% below \$5.50	No. below \$5.50	%	Other	
1	9,200,000	84%	7,728,000	54%	4,173,120	78%	6,027,840			22%	1,700,160	Élan counted all beneficiaries, not only poor. This number also includes ICS. Differences in savings for solar and ICS customers are not included in these calculations
1.2	315,674		315,674	54%	170,464	100%	315,674					Élan counted beneficiaries earning below \$3.20. Élan did not support ICS in this phase. Differences in savings for solar and ICS customers are not included in these calculations
	9,515,674				4,343,584		6,343,514					

**Table 25: Estimated value of benefit for solar customers by income bracket**

Phase	Value of benefit (savings) reported by Élan	Value of benefit for ICS customers	ICS customers					Notes
			% poor (<1.90 per day)	No. poor	% below <\$3.20 pppd	No. below \$3.20 pppd	Other	
1	9,200,000	1,472,000	43%	632,960	72%	1,059,840	412,160	Élan counted all beneficiaries, not only poor. This number also includes ICS. Differences in savings for solar and ICS customers are not included in these calculations
1.2	315,674							Élan counted beneficiaries earning below \$3.20. Élan did not support ICS in this phase. Differences in savings for solar and ICS customers are not included in these calculations
	9,515,674			632,960		1,059,840		

**Élan's first poverty profiling study (2018) found that solar customers were both extremely poor and poor<sup>70</sup>** (see Table 23). The study found that:

- 54% of solar product customers earned less than the poverty line (the line used by the FCDO of \$1.90 per day (PPP) or \$60 per month);
- 78% earned low incomes of less than \$3.20 per day (equivalent to nearly \$100 per month).

**Customers' incomes could still vary significantly between different locations within DRC (see Table 23).** For example, the incomes of customers in Equateur were lower than those in Kinshasa:

- In Equateur, 97% of customers earned less than \$3.20 per day and 83% earned less than \$1.90 per day;
- In Kinshasa, 61% customers earned less \$3.20 per day and 31% earned less than \$1.90 per day.

**Table 26: Élan 1.0 Solar customer poverty profile<sup>71</sup>**

	Poverty profile					
	Average daily revenue (USD PPP)	Estimated daily income (USD PPP)		Highest education level <sup>72</sup>		
Summary		< \$1.90	< \$3.20	Primary	Second.	Tertiary
Overall RE sector	\$2.35	46%	75%	9%	37%	53%
Solar average	\$2.24	54%	78%			
Kinshasa solar average	\$3.02	32%	61%			
Equateur solar average	\$1.13	83%	97%			

**Élan's two studies on Altech (in 2020 and 2021) found that poor customers were a more important market than the poorest. One reason for this is that the poor are less credit worthy so less attractive customers.** The key findings of the two studies were:

- The Altech pilot in Lusenda refugee camp study (2020)<sup>73</sup>: found that Altech's customers earned on average \$3.47 per day (or \$105 per month), higher than the incomes of non-customers (\$2.73 per day).
- The Altech solar and ICS customers impact study in Bakavu and Goma (2021)<sup>74</sup>: found that 55% (57% in Bakavu and 52% in Goma) Altech's customers who bought

<sup>70</sup> The covered all sectors Élan worked in and estimated the poverty levels of customers for eight renewable energy interventions (six solar and two ICS) that commenced during 2015 and 2016. Most solar interventions related to the expansion of distribution networks for pico solar to new locations, while one related to d.light's establishment in DRC and another concerned the piloting of the PayGo model by Altech.

<sup>71</sup> A comparable poverty profiling study was not completed in Élan 1.2.

<sup>72</sup> By comparison, WB data (used in Table 3) notes that 80% of poor have only a primary education, 66% have secondary and 25% tertiary.

<sup>73</sup> Galinie, A and Bommart, D (2020)..

<sup>74</sup> Élans 2021 Altech study defined the category of low- income earners as those earning less than \$150 per month or \$1,800 per annum. This is more than three times the average GDP in DRC; and more than twice the

lanterns earned less than \$5 per day or \$150 per month; whereas nearly half (44% in Bakavu and 47% in Goma) of the customers who bought solar home systems earned between \$150-500 per month and only a third earned less than this.

According to Élan's studies between 2015 and 2018, nearly 60% of improved cook stove customers are likely below the poverty line of \$1.90 per day. Customers in Katanga were much more likely to be poor than those in Kinshasa.

**Table 27: Élan 1.0 ICS customer poverty profile**

	Poverty profile					
	Average daily revenue (USD PPP)	Estimated daily income (USD PPP)		Highest education level		
Summary		< \$1.90	< \$3.20	Primary	Second.	Tertiary
Overall RE sector	\$2.35	46%	75%	9%	37%	53%
ICS average	\$2.69	43%	72%			
Katanga	\$1.62	70%	93%	15%	45%	33%
Kinshasa	\$3.75	16%	51%			

Not all beneficiaries have seen an increase in their disposable incomes from the use of solar and ICS products. The 2021 Élan study of Altech customers found that in Bukavu:

- 70% of all respondents reported no change in their energy expenditure, with lower income households were more likely to report this than those earning greater than \$500 per month;
- 20% reported a decrease;
- 11% reported an increase in expenditure, with households in the two lowest income brackets more likely to report an increase.

In Goma, the study found:

- 50% of respondents reported decreased expenditure, with lower income households more likely to do so.
- 9% of respondents reported increased expenditure, with households in the two lower income brackets more likely to report an increase. Élan found that higher income households in Goma are more likely to adopt renewable energy as a back-up to electricity provided by SNEL, increasing a household's overall energy costs. Élan<sup>75</sup> identified a similar trend in their 2020 study of the Lusenda refugee camp.<sup>76</sup>

Élan's data on savings from cookstoves is limited compared with that for solar products, reflecting that Élan's support for cookstoves has been much less than that for solar products.

lowest income bracket of \$1.90 used in the 2018 study which is the rate FCDO (previously DFID) uses for its poverty analysis.

<sup>75</sup> Galinie and Bommart (2020)

<sup>76</sup> The study found that '*energy-related expenses, excluding solar energy expenses, are typically higher for people who use solar energy with a median of \$6.00*' suggesting that solar energy does not substitute for other types of energy but complements it.

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Élan began supporting ICS's partly to empower women beneficiaries (in alignment with FCDO's priority focus on women). However, Élan found that their ICS interventions were not reaching significant numbers of women beneficiaries as expected and stopped them.<sup>77</sup> There is some evidence on Halt Bank customers showing that charcoal costs from the use of cookstoves, halved for some customers.

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<sup>77</sup> DSU key informant interviews